Fishery management strategies for Red Snapper

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Complaints about snapper & grouper fishing

Many species overfished/overfishing including six of the top ten landed species

High levels of discarding and “why can’t we just keep these fish”

Very short seasons for some species like red snapper

Small bag limits

Management death spiral of lowering ACLs which causes more discards which then leads to further lowering of ACLs

Red Snapper Season Announced For South Atlantic & It's Abysmal

Measly recreational red snapper season announced for the South Atlantic, and that's using the term "season" liberally.

May 26, 2023

Project goal

How can we model the economic and biological effects of a limited number of significantly different regulatory regimes that would minimize those discards while potentially increasing retained catch?

Model should be:

1) sufficiently realistic with fishery dynamics

2) flexible enough to model a multispecies fishery (start with red snapper)

Funded internally by NOAA

History

Crosson, Shertzer, Erik Williams (SEFSC), Rick DeVictor (SERO), Jie Cao (SSC), Genny Nesslage (SSC), Chris Dumas (SSC)

Ideas workshop at the Beaufort lab spring 2022 included many members of the Atlantic assessment team and SSC

Initial model reviewed by the SSC in October 2022

Now published in *North American Journal of Fisheries Management* (through two rounds of review including some technical changes to the model) by Shertzer et al 2024 https://doi.org/10.1002/nafm.10966

Management tools used in the South Atlantic for Snapper-Grouper Species

- Bag limits
- Vessel limits
- Trip limits
- Minimum size limits
- Limited access
- Area closures
- Time closures
- Gear requirements

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Management tools not used (or very infrequently) in the South Atlantic for Snapper-Grouper Species

- Catch shares
- Closed/limited access
- Larger, more area closures
- Aggregate SG bag limit
- Time closures across all species
- Lotteries
- Maximum/slot size limits
- Tag program/stamp
- Limits on the number of rec trips
- Mandatory retention

Scenario Modeling

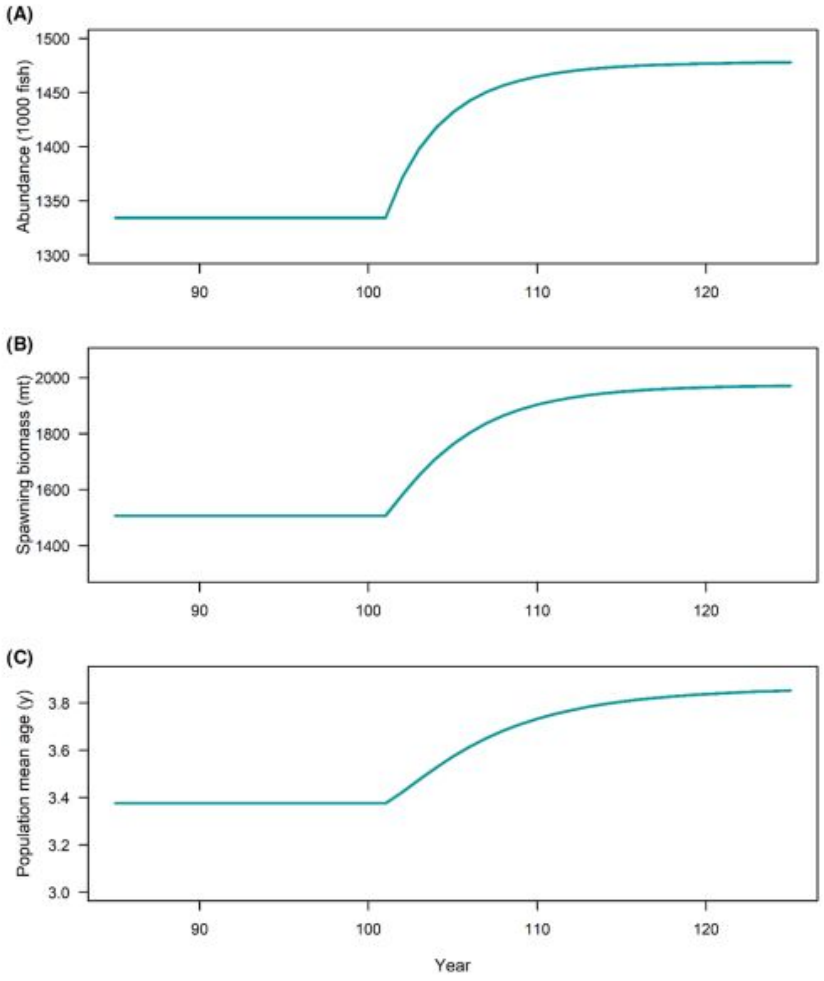
Spatial population model of Red Snapper and the multispecies fishery that captures them in the southeast U.S. Atlantic.

We simulated and compared 25 different management measures that fall broadly into the categories of

- gear modifications including discard mortality mitigation
- size limits
- spatial approaches
- general effort reduction (temporal or otherwise)

Modeling

For each scenario, we simulated current conditions then implemented the management scenario. 100 years to reach a long term equilibrium, change the management, then another 100 to a new long term equilibrium.



Criteria

Criteria for comparison address the management goals

- decrease dead discards
- rebuild the age structure
- increase landings
- increase spawning biomass

Gear modifications and discard mitigation

Fishing power has increased substantially, with improved boating equipment, electronics, and information-sharing technology. Can gear (unspecified) modifications reduce this efficiency?

- we test this scenario's effect on the recreational fleet by reducing its catchability (q) by 10% or 30%.

Discard mitigation scenarios via descender devices, assuming 100% compliance:

- Vecchio et al 2020: 21% inshore, 23% offshore
- Runde et al 2021: 12% (adjusted)

Size limits and effort reductions

Minimum size limit scenario: increase to 24 inches

Effort reduction scenarios:

- 25% or 75% of current effort, which can be distributed via seasons/tags/other.

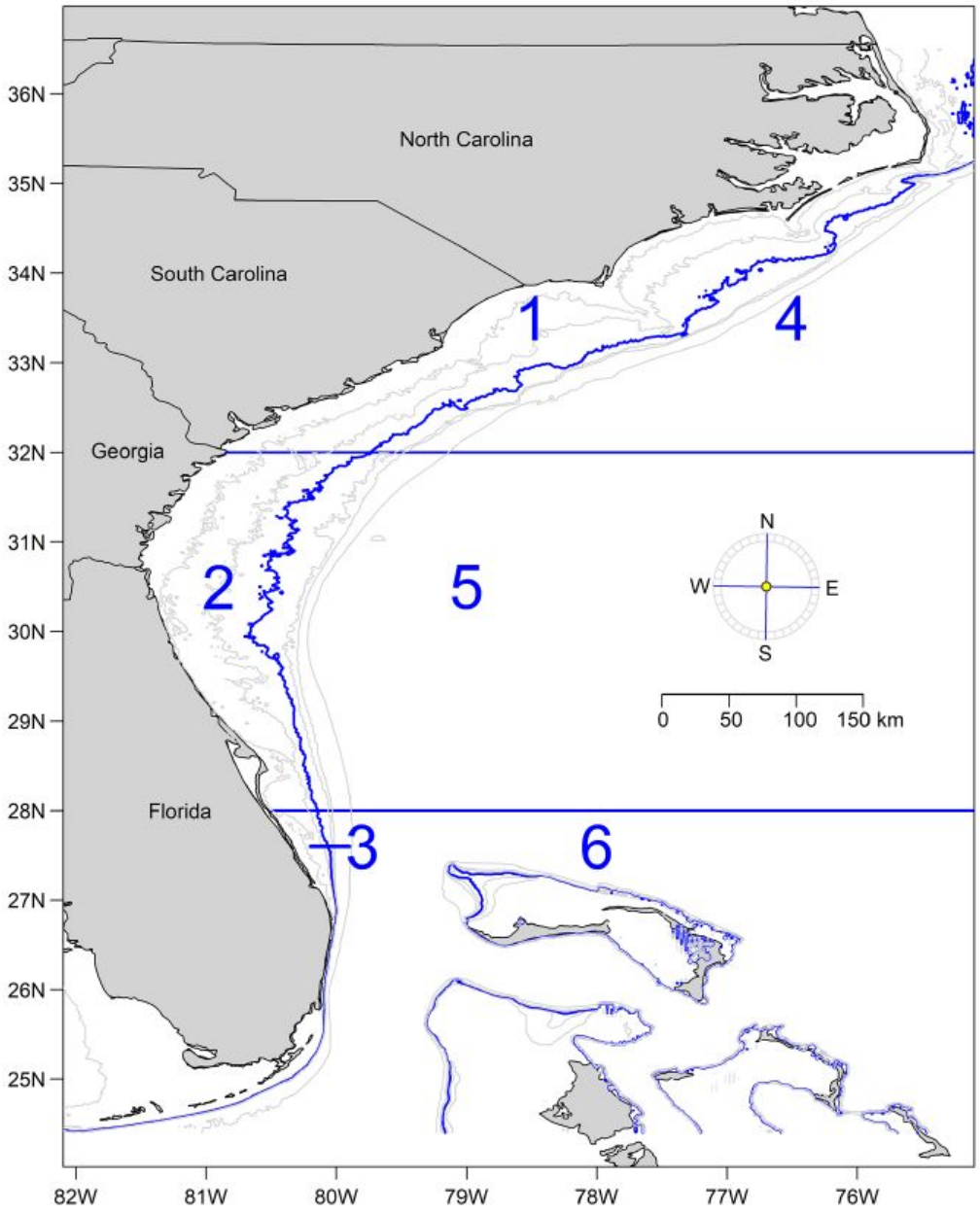
- 25% or 75% of current effort but with full retention (no discarding allowed)

Area experiments

Blue lines at 28°N and 32°N

Blue curve at the 35-m isobath. Light-gray isobaths are 15, 25, 45, 55, & 200 m.

four hypothetical scenarios explore effects of prohibiting red snapper retention, four prohibiting all bottom fishing in the area, four prohibiting only rec effort.



Comparative performance metrics

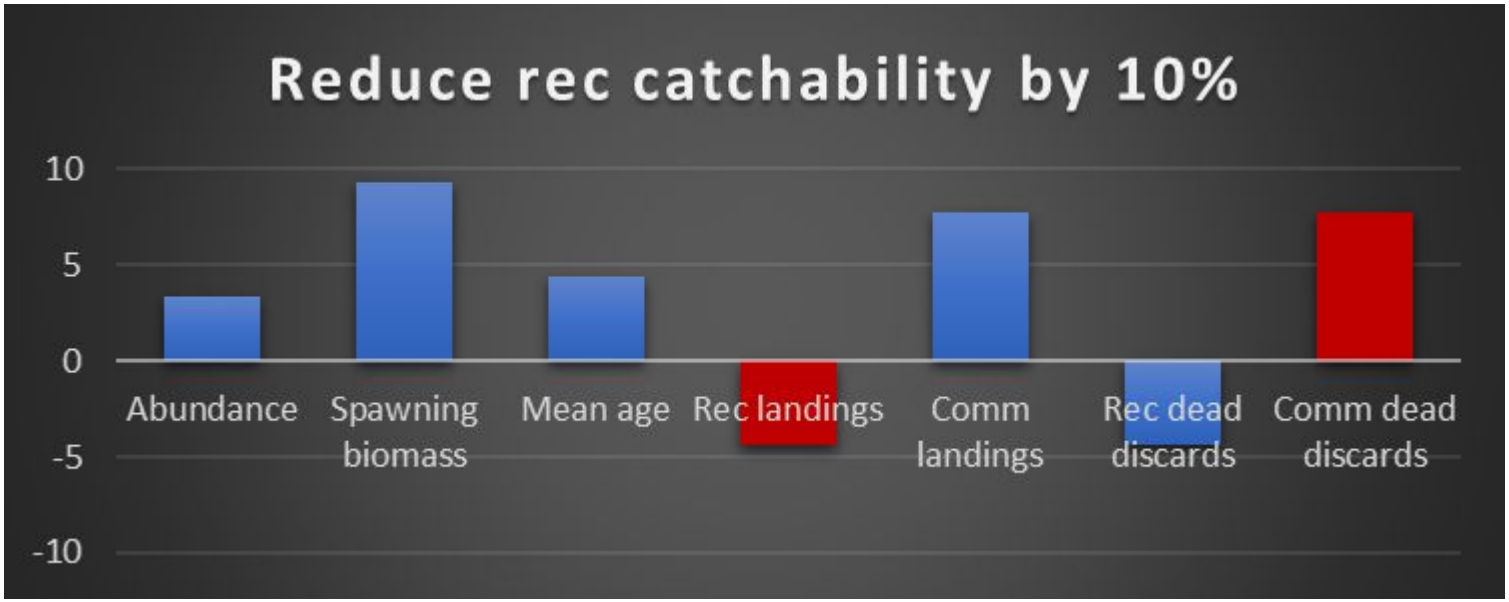
- equilibrium values of abundance
- spawning biomass
- mean age of the population
- landings (in numbers) of each fleet
- dead discards (in numbers) of each fleet
- mean weight (kg) of the landings of each fleet
- area-specific catch rates (landed fish in numbers per unit effort) of the recreational fleet.

Results of 25 scenarios

- all but two increased red snapper abundance, SB, and mean age
- Gear modifications are very inefficient at achieving goals
- Descender devices have modest effects, depending on assumptions
- Size limits are not a good management tool
- Reduction in efforts were the most promising scenario
- Spatial measures that still allow effort do little (unsurprisingly)
- In following slides, the number in parentheses in purple (2) is the scenario in Table 3 of the paper and in the graphs.
- Blue is desirable change, red is undesirable change

Gear modifications

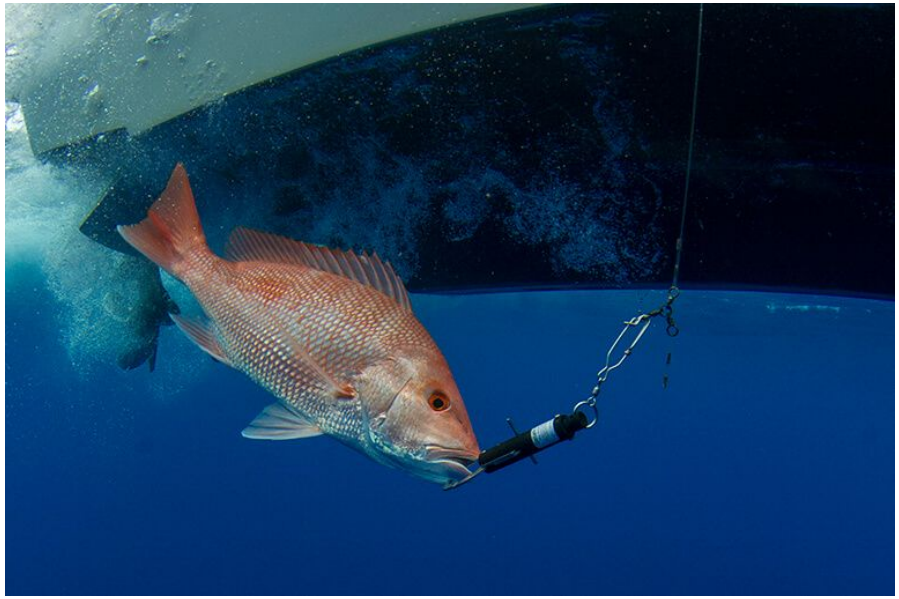
Unspecified gear modifications to reduce fishing power are unknown (!) and inefficient (ie 10% reduction in catchability only reduced landings and discards < 5%) (1), and a 30% reduction in catchability only reduced landings and discards < 15% (2)



Descender devices

Descender devices:

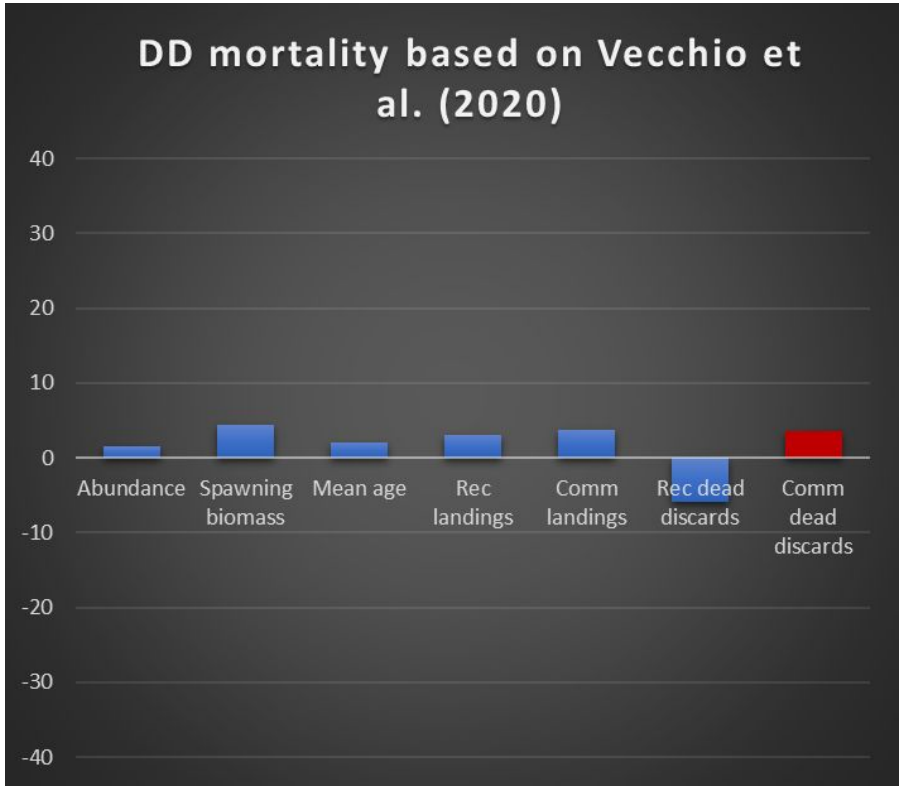
~8.5% decrease in discard mortality rate) reduced rec dead discards by 5.9%, with a 3% increase in landings and catch rates (3)



48% decrease in discard mortality rate) reduced rec dead discards by 37.8%, with a 19.2% increase in landings and catch rates. (4)

Descender devices

(3)



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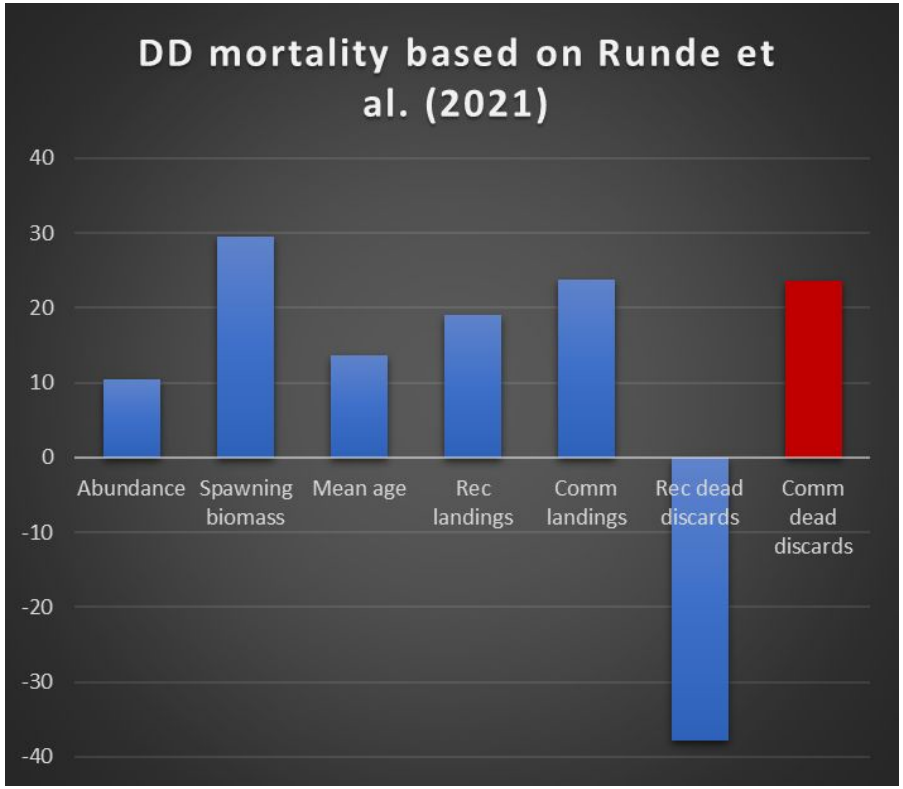
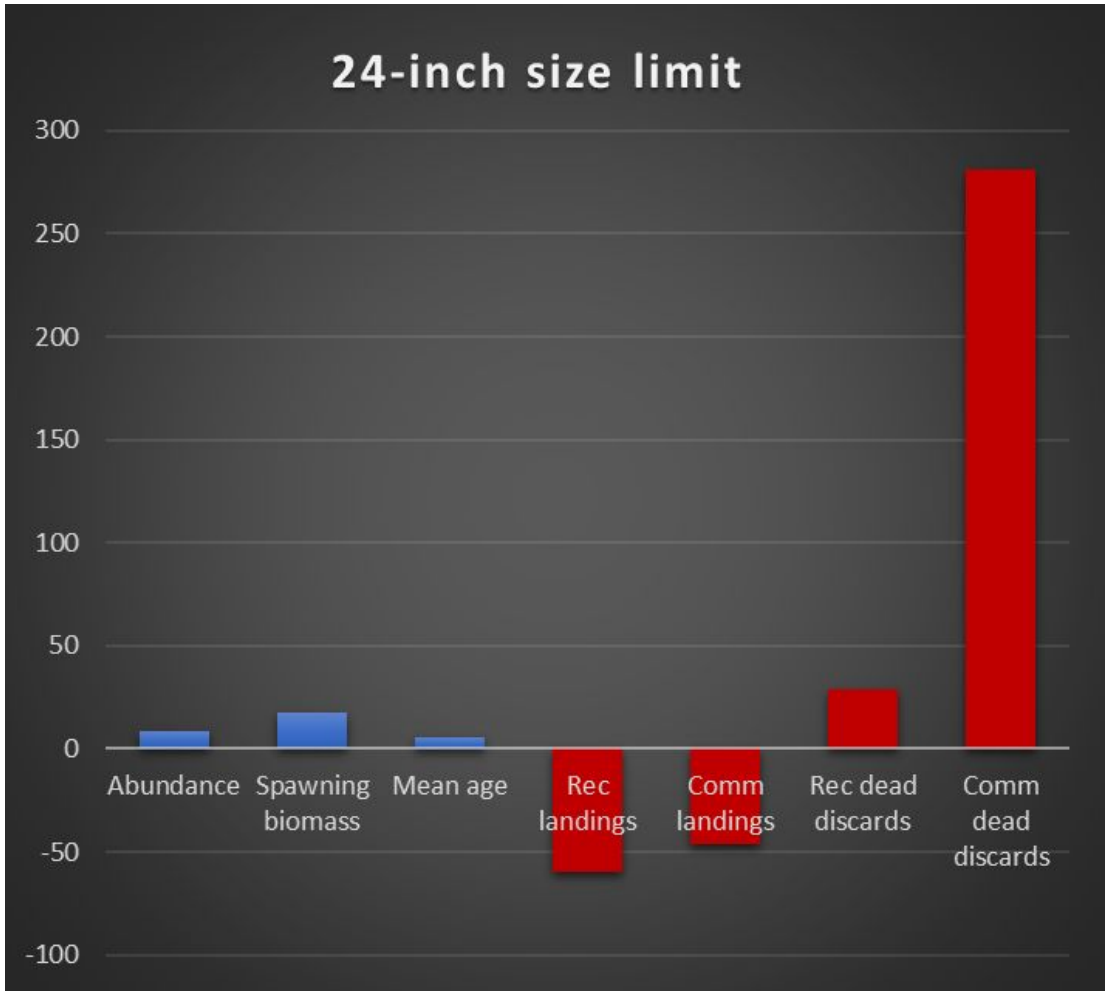


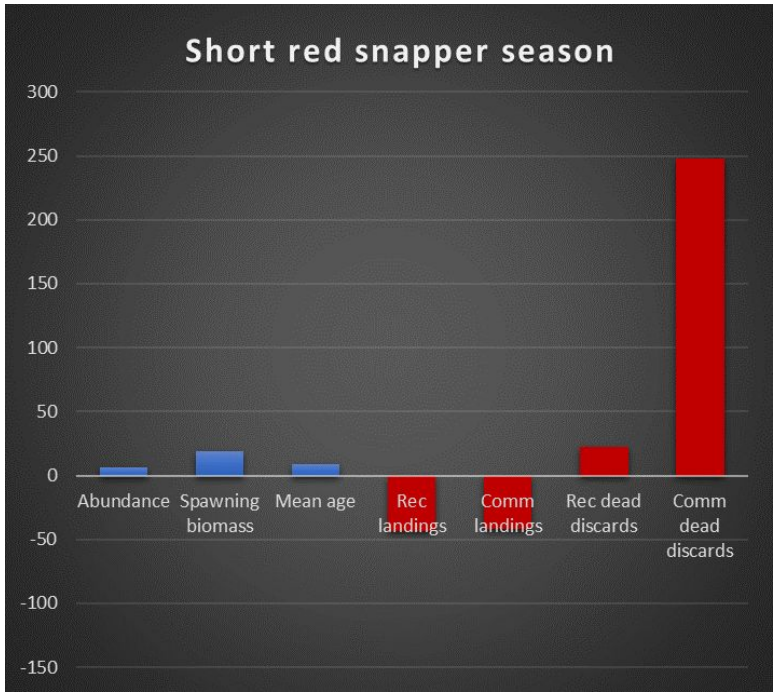
Size limits

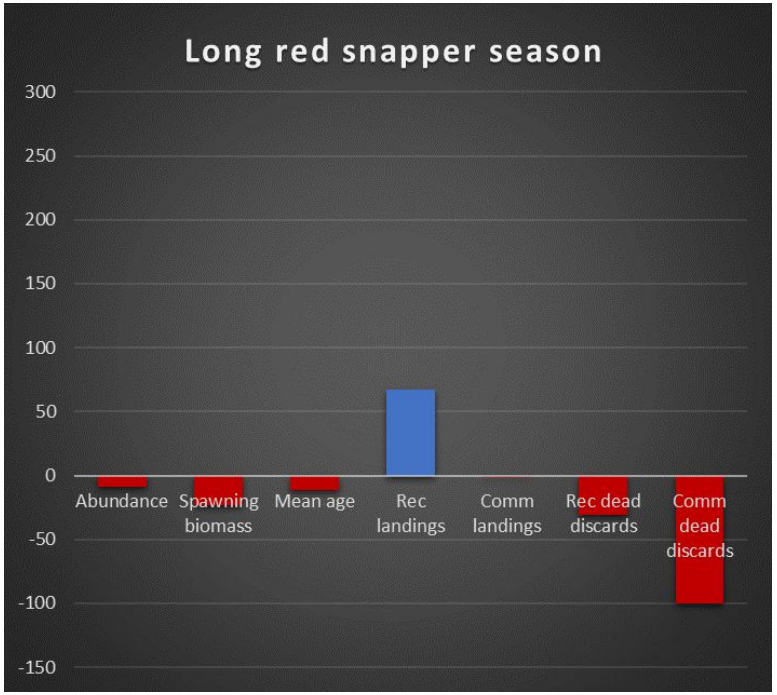
24 inch size limit (5) increased stock size BUT resulted in fewer landings and more dead discards for rec and commercial fleets and a ~50% reduction in recreational catch rates.



Red snapper seasons

A short red snapper season (6) enhances rebuilding but increases discards and reduces catch (as we can see currently in real life). A longer red snapper season (7) initially increases catch but leads to a drop in abundance.





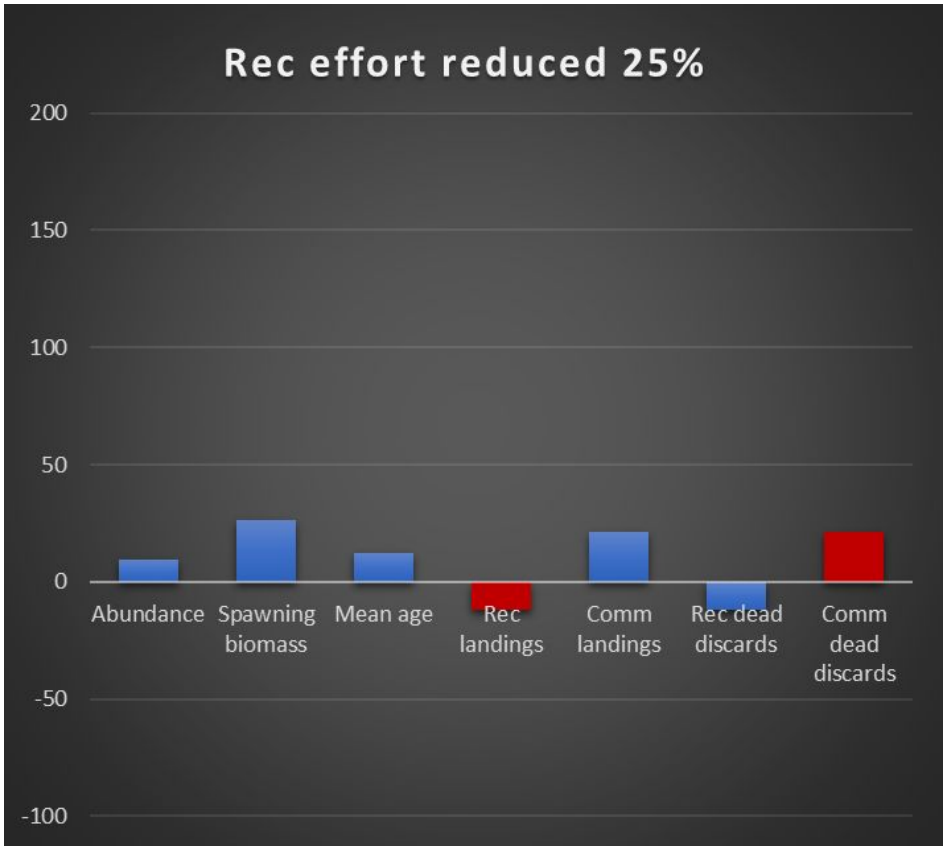
Effort reductions

Reducing fishing effort on the snapper–grouper complex (8-13) was among the most effective management strategies for rebuilding Red Snapper, increasing the average weight of landings and increasing recreational catch rates.

Paper does not differentiate between snapper grouper season closures or something more individualized like tags or a set number of allowed trips

Effort reductions

(8)



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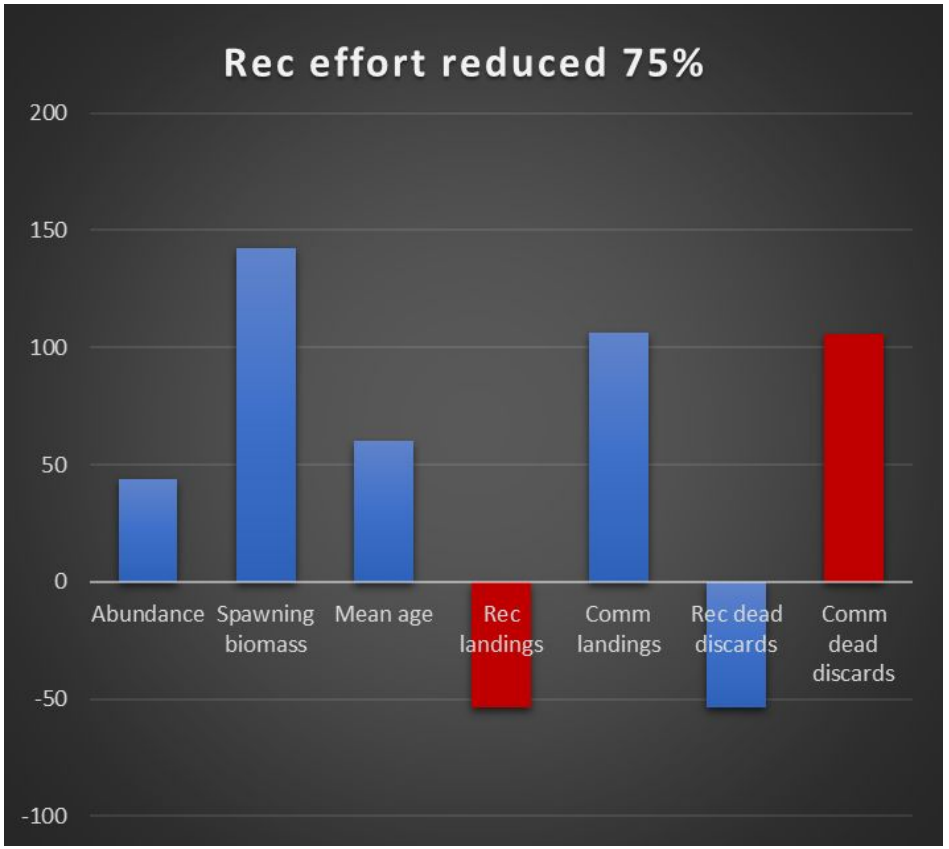

Effort reductions with full retention

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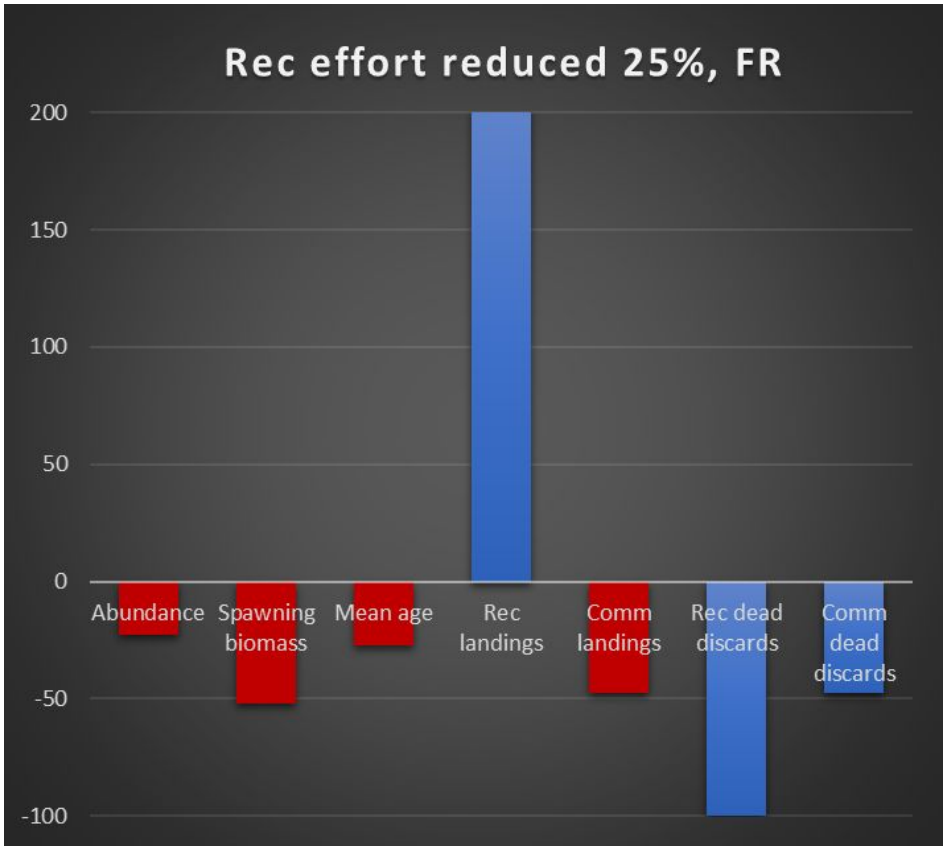

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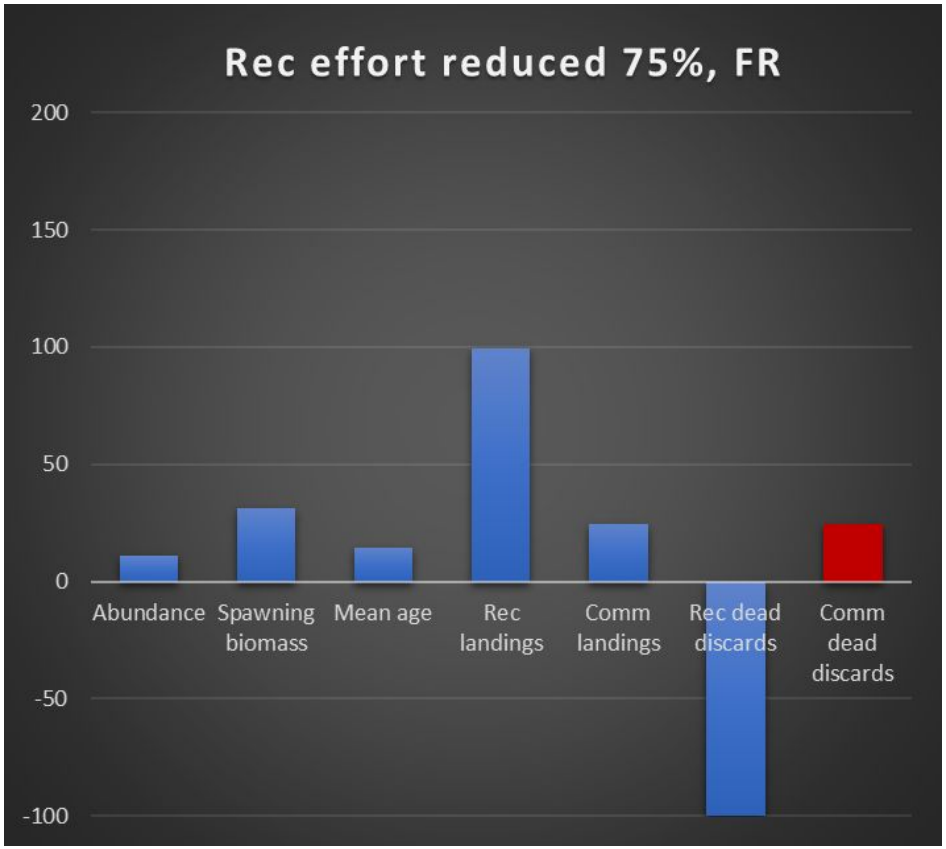


Area closures experiment

Generally reduced red snapper catch, stock size generally increased overall BUT reduced in open areas

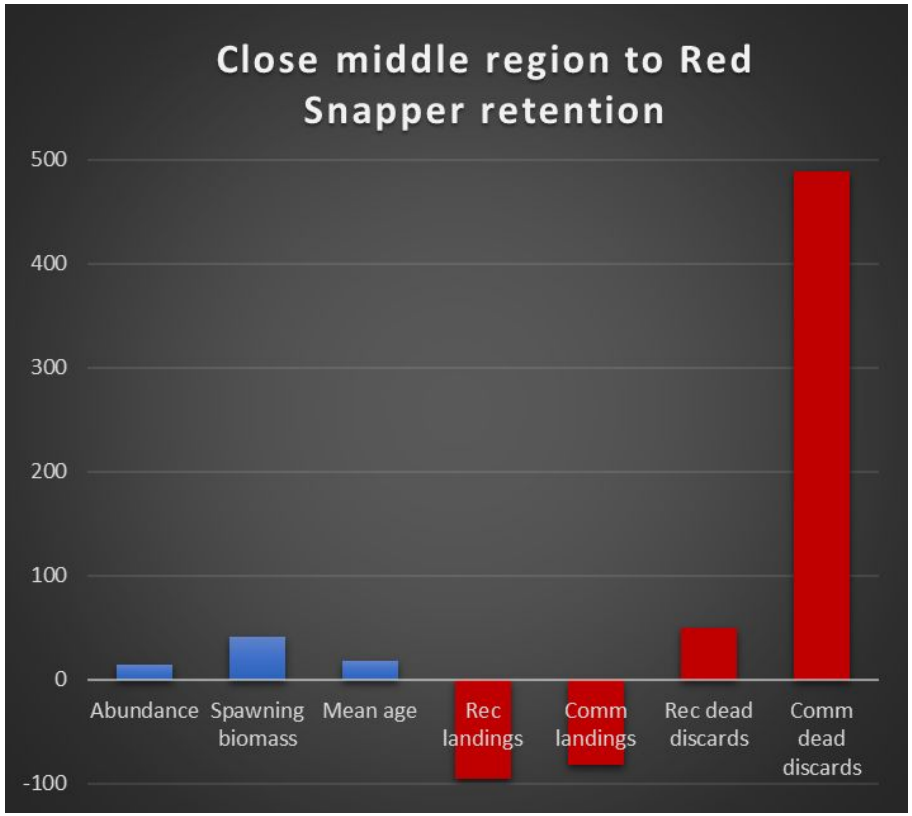
Almost all benefits come from closing to rec sector

Closing areas just to red snapper landings (14-17) increased dead discards with little return

Closing areas to all effort (18-21) increased biomass but decreased landings, especially in middle areas (16, 20, 24)

Area closures experiment

(16)



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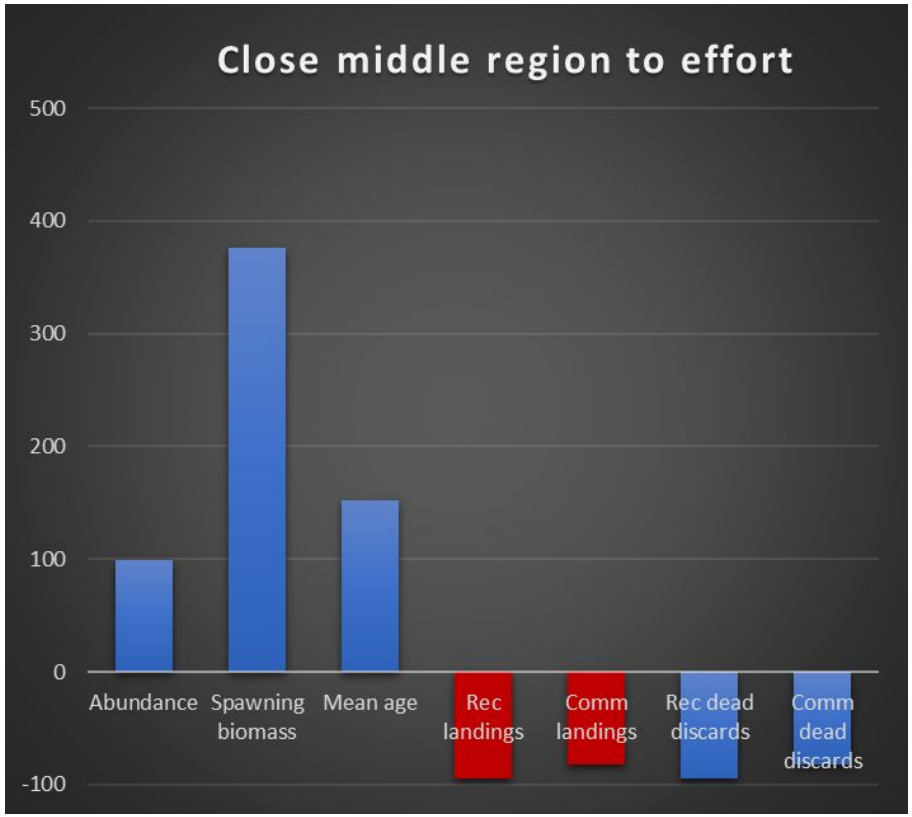
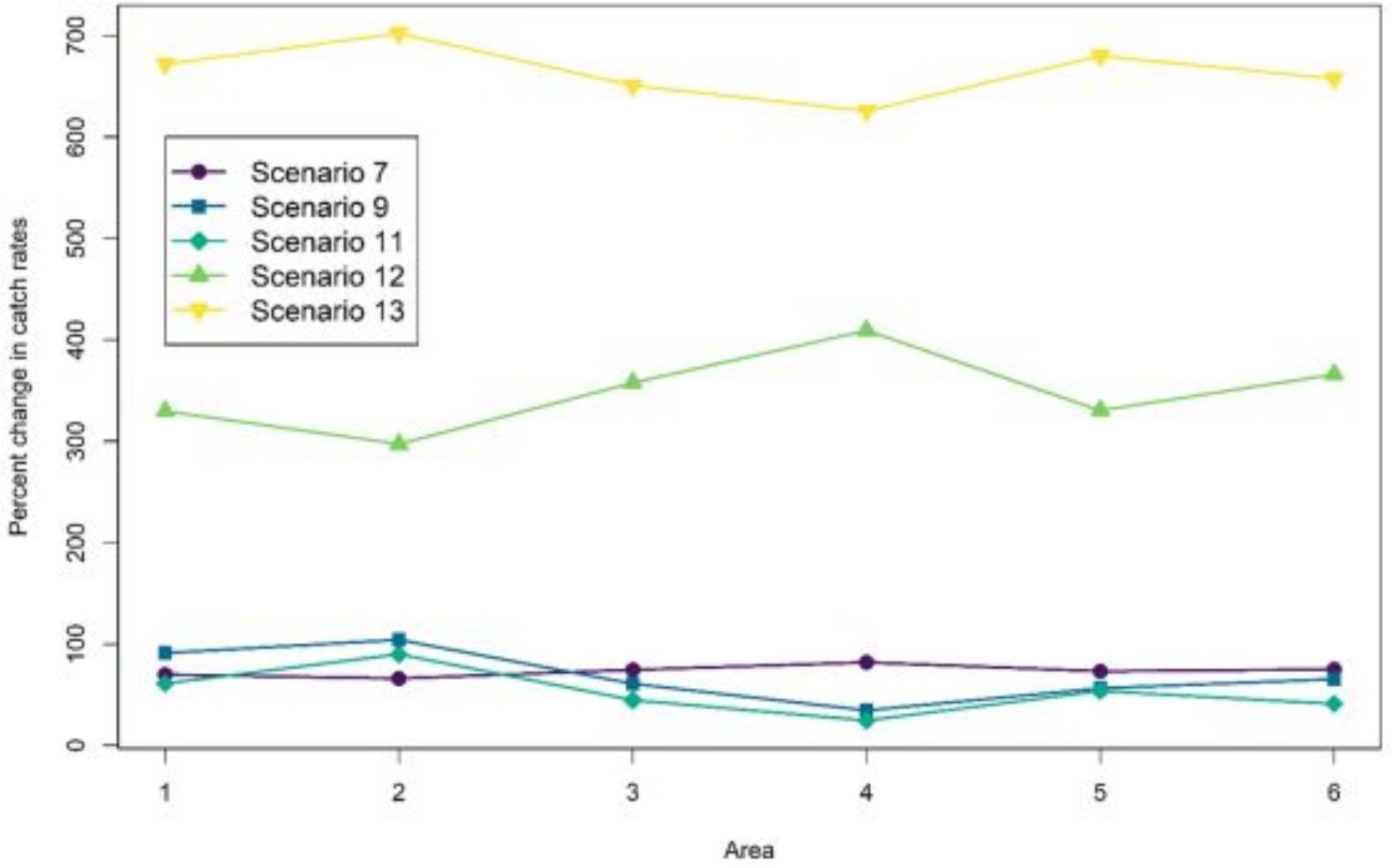


Model runs with rec CPUE increases >50%



Conclusions

The measures most effective at rebuilding the stock are those that limit fishing effort, either throughout the year or in locations where Red Snapper are most abundant. They increase stock size, landings, catch rates, and also positively affect other overfished stocks. Full retention could replace discarding.

Area closures also reduce catch though in comparison to effort reduction

Input controls (regs on effort) can reduce dead discards; output controls (regs on catch) generally do not. The exception is the output control of discard mortality mitigation.

Next steps

For our model:

Incorporate additional species that are caught with red snapper including gag, black sea bass, red porgy, vermillion snapper, red grouper. Add economic valuations.

For the SSC:

Discuss what strategies could meet goals for reducing discards and rebuilding the red snapper stock. What potential strategies should be explored for the Snapper-Grouper MSE?

NOAA FISHERIES

Additional Slides

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Overview for discussion

Paper evaluates four major strategies:

- gear modifications (decrease efficiency or address discard mortality)
- size limits
- spatial closures
- effort reduction via temporal closures or restrict the number of trips

and four Council goals:

- decrease dead discards
- rebuild the age structure
- increase landings
- increase spawning biomass

Suggestions for the discussion

Discuss what strategies could meet goals for reducing discards and rebuilding the red snapper stock.

Which strategies could achieve Council goals and may be viable in the short- and long-term? Which afford greater access and fishing experiences than a 1-4 day recreational season? Conversely, which strategies would be less likely to meet goals?

What potential strategies should be explored for the Snapper-Grouper MSE?

Prioritize a list of strategies.