

RECREATIONAL ANGLER ATTITUDES AND PREFERENCES IN THE SOUTH ATLANTIC SNAPPER- GROUPER FISHERY



Photo: NOAA Fisheries

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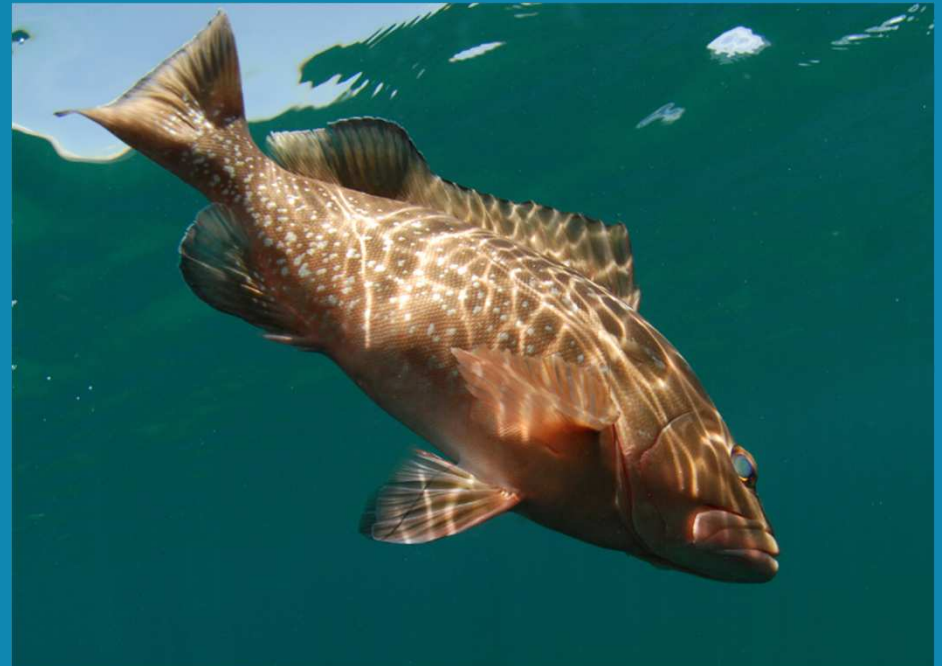
Project Overview



Methods



**Angler attitudes and preferences
for snapper grouper fishery**



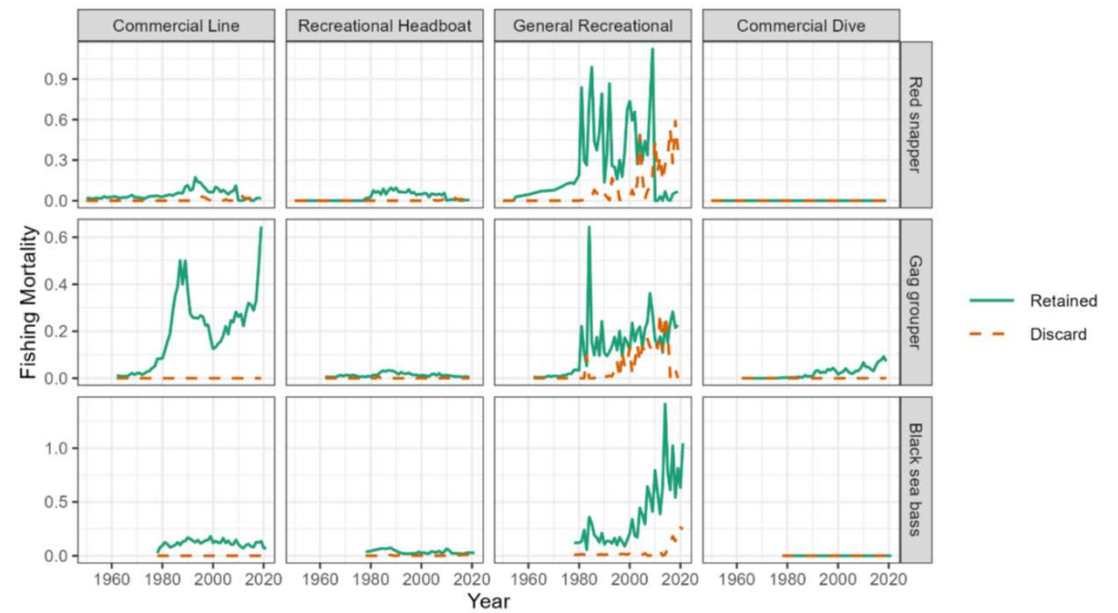
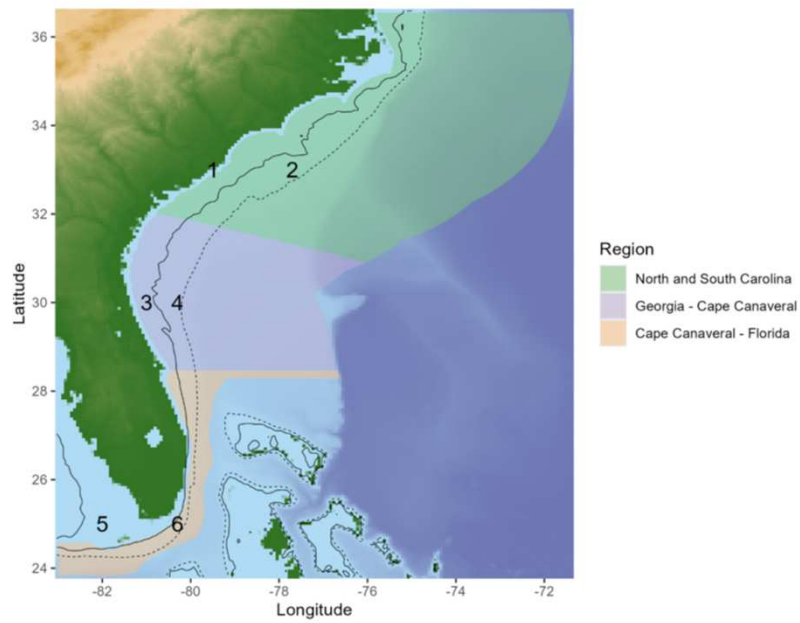
SAFMC Snapper-Grouper MSE

- Council Initiative (2022-), contracted with Blue Matter Science (MSE Modeling) and University of Florida (Situation assessment, Rec. Angler Attitudes & Preferences)
- Focus on strategies to reduce the number of released fish to improve yield throughout the fishery snapper grouper fishery
- Considering the need for fishery access and resource use while preventing overfishing and rebuilding overfished stocks.
- Opportunity to evaluate different management strategies and their associated biological, social, and economic tradeoffs.



SAFMC Snapper-Grouper MSE

MSE Model



SAFMC Snapper-Grouper MSE

Project: Recreational Angler Attitudes and Preferences in the South Atlantic Snapper Grouper Fishery

- Stakeholder working group
- Literature review
- Survey of recreational anglers to better understand attitudes and behaviors

Recreational Angler Attitudes and Preferences Project

Stakeholder working group

- Discuss management options in greater (qualitative) detail
- Provide input to survey design and help pre-test survey
- Available to provide feedback on survey results and MSE in future



Chip Collier (for Mike Schmidtke), Daniel Leschorn, Chris Kimrey, Catherine Bruger, David Moss, Martha Guyas, Mark Feagle, Marcel Reichert, Haley Stephens, Jeff Marinko, Jack Cox.

Recreational Angler Attitudes and Preferences Project

Literature review: Some insights

- Systematic review to synthesize literature on recreational fisher preferences for and response to management.
- Angler heterogeneity in preferences and responses was observed both across and within the studies
- Generally, anglers prefer regulations that affect aspects of harvest (such as size limits) over those that more fundamentally restrict fishing activity and affect their fishing experience.
- Anglers respond to regulation based on how it will affect them and how they like it. Anglers' support for or opposition to management regulations is at least in part related to how they feel or think about the regulations themselves.

Project Overview: Broad context

Recreational Reef fish federally managed

- MSA-based mandates for preventing, ending overfishing
- Rec. fishing generally open access
- Output-controlled fishery via regs that limit mortality
- Mortality is removals (harvest) plus discards (non-trivial)

Recreational fishers believed to care most about

- Access to fish (able to target reef fish)
- Access to harvest (season open to harvest)
- Trip quality (quantity and size of catch)
- Perceived fairness and predictability of regulations

Short-term trade-off

- Anglers want access, harvest of reef fish
- Harvest, access is leading to high reef fish mortality
- Constraining rec. fish. related harvest can lead to dissatisfaction

Project Overview: Rec. Fish. Mgmt. challenges

Trade-offs traditionally addressed with restrictive regulations

- Harvest season, size limit, bag limit, some gear restriction

Challenges

- Short harvest seasons very unpopular
 - Loss of option value, perceived unfairness or unnecessary
- Discard mortality and harvest season negative feedbacks
 - Shorter harvest seasons to decrease mortality, but can lead to more discards, which may trigger shorter harvest seasons for species in rebuilding plans, resulting in unpopular short season (e.g., 2 days)
- Regs vary by species, time, some space
 - Some species (e.g., red snapper) may be harder for anglers to avoid
 - Target switching may have ecosystem levels effects

Project Overview: research question and approach

Research question:

What are most preferred mgmt. options that have a chance of meeting sustainability requirements?

- Consider current and novel mgmt. actions and/or levels
- Consider behavioral responses to potentially yet unimplemented actions

Approach:

Survey-based discrete choice experiment instrument, augmented with additional stated preference questions

Informed by facilitated stakeholder WG and Oversight Team feedback

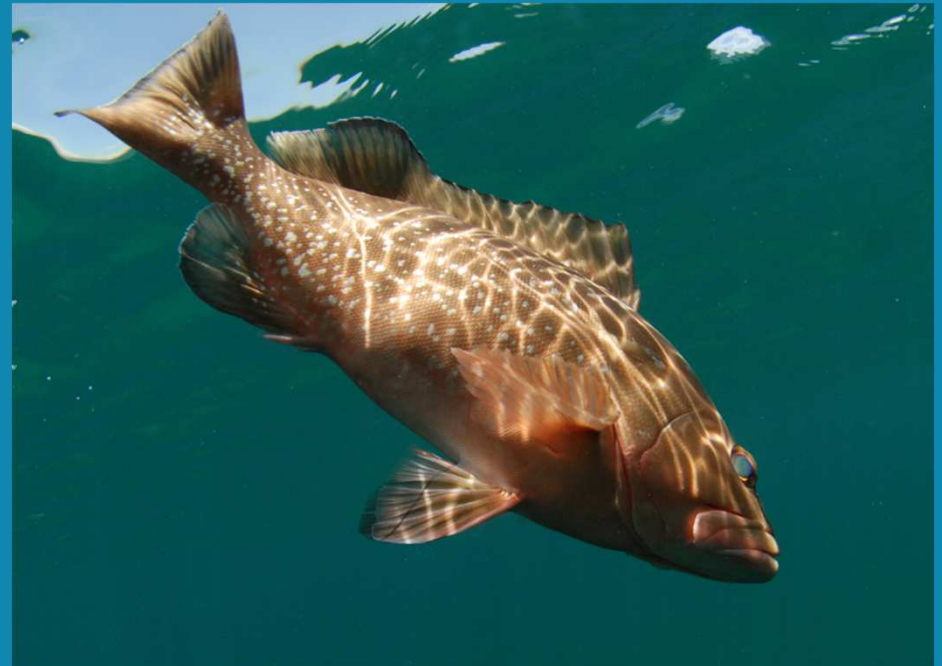
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**Angler attitudes and preferences
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Methods: Survey Instrument

Frame:

- Population: Marine recreational reef fishers
- Spatial: South Atlantic states (FL, GA, SC, NC)
- Temporal: reef fished in last two years

Implementation:

- Primary: Incentivized panel via Dynata with Qualtrics interface
 - Panel addresses response rate concerns and no publicly available contact information for marine rec. fishers in NC, SC, & GA.
 - Panel has some challenges, attempted to address with qualifying questions
- Secondary: Email-based version implemented via Qualtrics to only FL rec. reef fishers
 - Challenge is low response rate, even with some geographical targeting
- Initial results focus mostly on panel since this matches desired frame

Methods: Survey Instrument Components

Informed consent + background info

- Qualification question to select for “actual” reef fishers

Fishing behavior and experience

- Identification, avidity, target species

Opinions about management strategies and trade-offs

- Overall perceptions of regs and under which conditions they're acceptable

Discrete choice experiment

- Asked about specific levels or current or “more feasible” mgmt. actions
- Species-specific (gag or red snapper) for logistics, based on focus groups

Novel options

- General opinions (no DCE) about other “more novel” mgmt. actions

Demographics

Methods: Survey Introduction

To qualify...

- 18+ years old

▼  Skip to

End of Block if Recreational reef fishing (... Is Not Selected

This survey asks about outdoor activities in the South Atlantic, which include the marine waters of the east coasts of Florida, Georgia, South Carolina, and North Carolina.

Which of the following outdoor activities have you participated in within the **last 2 years** in the **South Atlantic waters**? Please select all that apply.

- ☐ Recreational kayaking (coastal and ocean waters)
- ☐ Recreational ice fishing (fishing on ice in the ocean)
- ☐ Paddleboarding (coastal and ocean waters)
- ☐ Recreational reef fishing (for snapper, grouper, black seabass, amberjack, etc.)
- ☐ ☒ None of the above

Methods: General regulations

Statements (Likert-scale agree-disagree)

Regulations are necessary to prevent overfishing reef fish populations

Stricter reef fish regulations would lead to increased reef fish populations

I would rather have less restrictive regulations now, even if they led to it being harder to catch keeper sized reef fish in the next 10 years

I would rather have more restrictive regulations in the next 2 years if it led to better reef fishing in the next 10 years

Methods: General regulation trade-off questions

Stricter regulations would be acceptable if they led to me...

Catching more reef fish per trip

Catching larger reef fish

Needing to travel shorter distances on the water

I don't believe stricter regulations would lead to any of these

*Check all that apply question

Methods: Survey DCE

Separate DCEs developed for:

- Red snapper
- Gag grouper

Necessary because...:

- Status quo harvest seasons differ dramatically
 - Red snapper: ~2 days
 - Gag grouper: ~57 days
- Reasonable attribute levels differ by species
- Respondents first identified: “Which species do you care most about?”
- Survey logic routed respondents to the appropriate DCE

Did not include a Status Quo as a “third option

Did include an explicit Opt Out “I would not fish for species X under either option”

Methods: DCE attributes and levels (Red snapper)

Harvest Season

- Short (current): 2 days
- Medium: 15 days
- Longer: 60 days

Reef Fish Targeting Closure

- None (current)
- 3 month
- 6 month

Reef Fish Agg Bag

- Unlimited (current*)
- Medium: (5-7 RF)
- High: (10-15 RF)

Mandatory Stopping Rule

- Yes
- No (current)

South Atlantic Reef Fish Permit

- \$0 (current), \$50, \$100, \$150

Methods: Survey DCE example

Question: Which management option would (Option 1 or Option 2) would you **most** prefer?

	Option 1	Option 2
Red Snapper Harvest Season	60 days	15 days
Reef Fish Targeting Closure	6 months	None
Reef Fish Aggregate Bag	7 reef fish (1 RS)	15 reef fish (1 RS)
Mandatory Stopping Rule	Yes	No
South Atl. Reef Fish Permit	\$50	\$0

- ☐ Option 1
- ☐ Option 2
- ☐ I would choose to not fish for Red Snapper under either option

Methods: Novel options

Harvest tags

- Individual tags needed to harvest fish, but not season, bag, size limits
- Number available dependent on allowable harvest, and anglers might not one
- Allocation would be random and tags wouldn't cost money
- Tags would not cost additional money

Spatial Closures

- 50% water closed for 9mo, open for 3mo
- 50% water open year-round
- Closed/open areas would rotate yearly

Education requirement

- Passing intensive course required for SA Reef Fish Permit
- Course would teach best C&R and ethical fishing practices
- Cost would be \$25, going to cover instructor & class costs

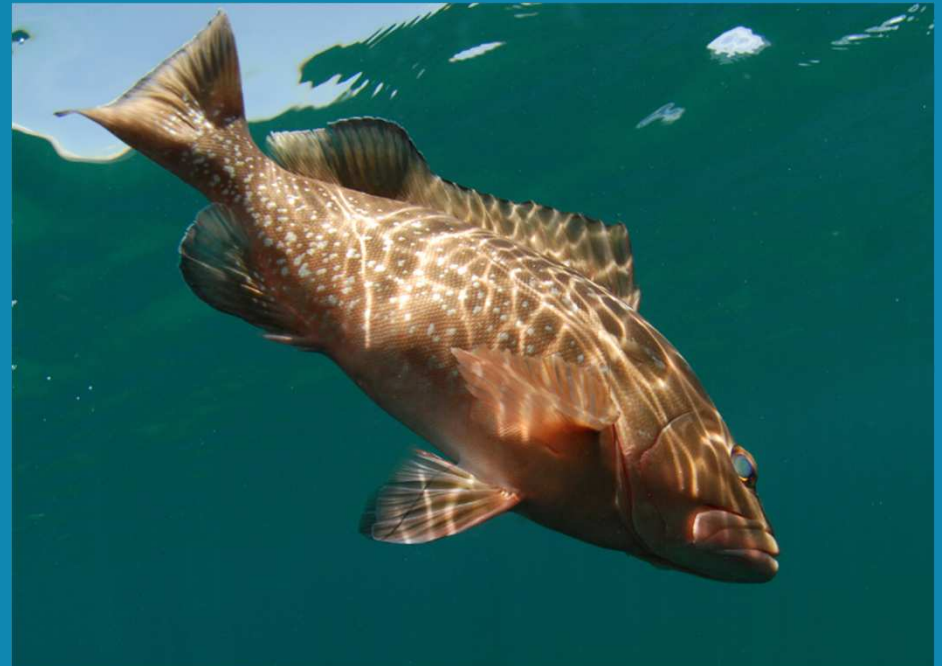
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Demographic Information (N = 1,936)

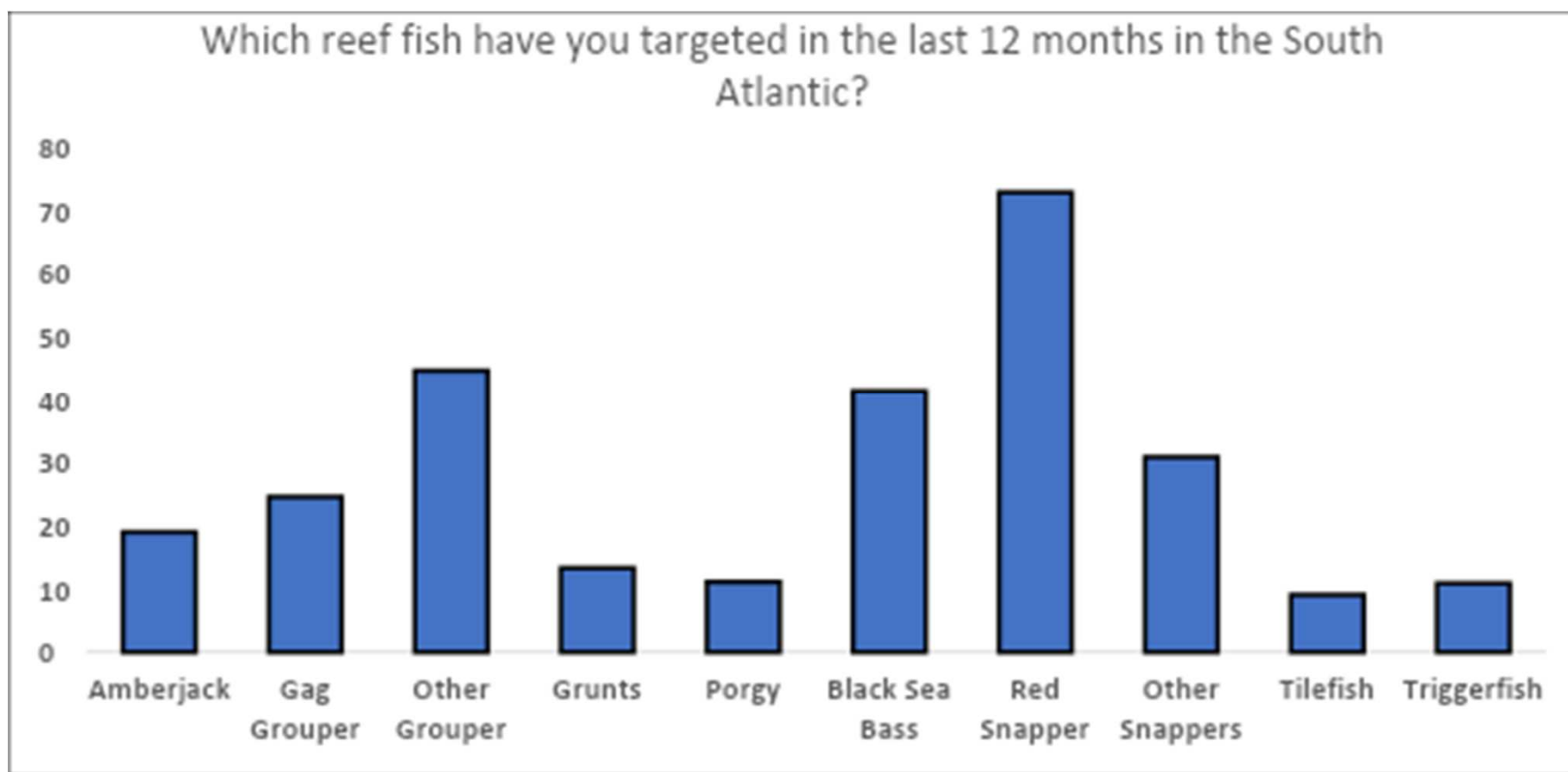
Male: 60%
Female: 40%

\$50,000-\$99,999: 39%
\$25,000-\$49,999: 26%
\$100,000-\$199,000: 21%

18-34 years: 27%
35-64 years: 62%
Over 65 years: 9%

Florida: 41%
Georgia: 21%
South Carolina: 16%
North Carolina: 22%

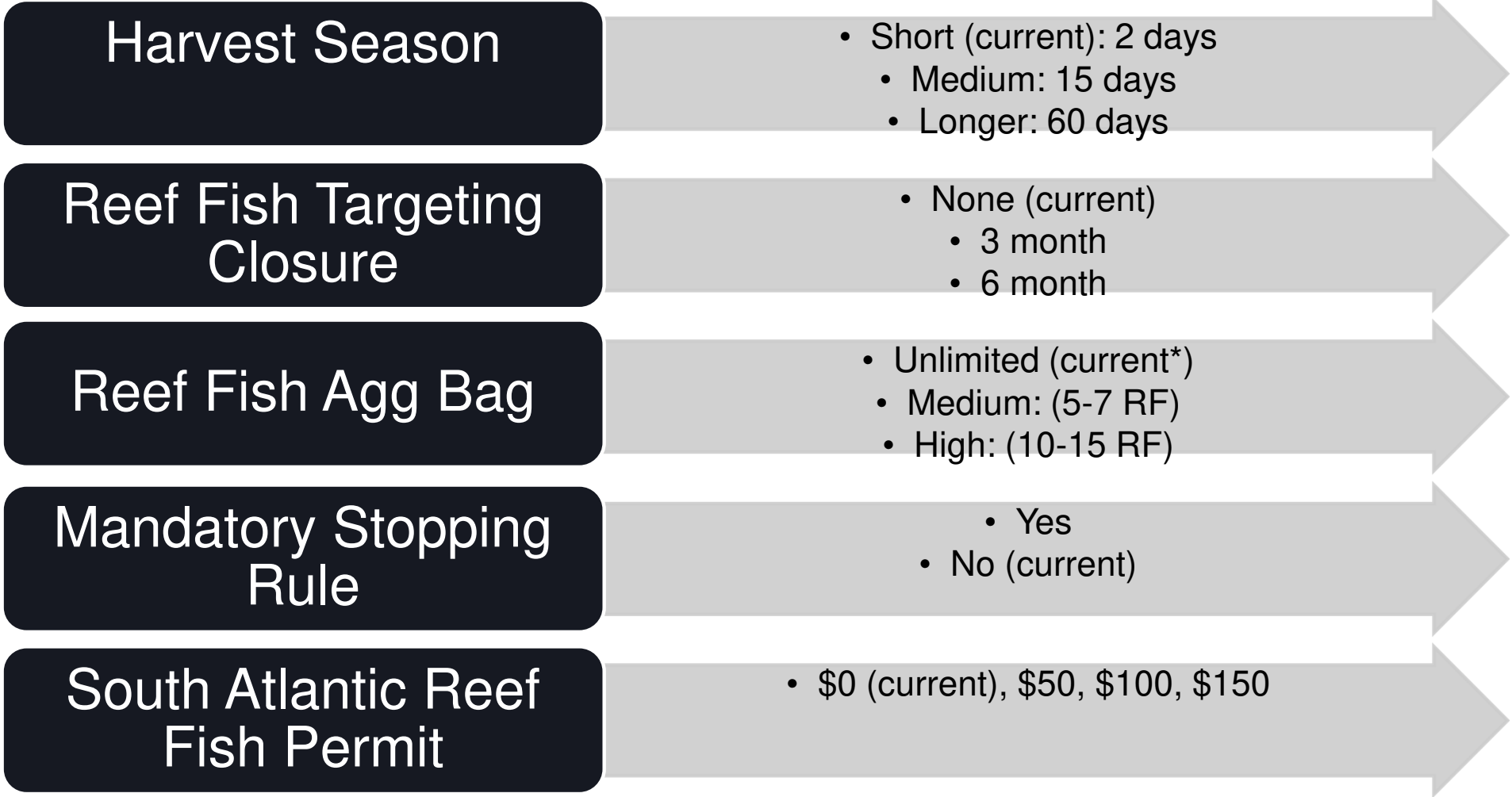
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Red Snapper



DCE Attributes and Levels: Red Snapper



DCE Attributes and Levels: Red Snapper

Question: Which management option would (Option 1 or Option 2) would you **most** prefer?

	Option 1	Option 2
Red Snapper Harvest Season	60 days	15 days
Reef Fish Targeting Closure	6 months	None
Reef Fish Aggregate Bag	7 reef fish (1 RS)	15 reef fish (1 RS)
Mandatory Stopping Rule	Yes	No
South Atl. Reef Fish Permit	\$50	\$0

- ☐ Option 1
- ☐ Option 2
- ☐ I would choose to not fish for Red Snapper under either option

Discrete Choice Experiment Results: Red Snapper

Choice	Coefficient	Mean WTP (\$)	Std. Error	95% Confidence Interval	
Permit	-0.005***	--	0.007	-0.006	-0.003
Harvest Season – 15 day	0.407***	\$89.11	0.064	0.280	0.533
Harvest Season – 30 day	0.596***	\$130.59	0.080	0.434	0.752
Target Closure – 3 month	0.473***	\$103.65	0.083	0.310	0.636
Target Closure – 6 month	0.373***	\$81.65	0.080	0.216	0.529
Agg Bag – 5 to 7	0.008	\$1.76	0.083	-0.155	0.171
Agg Bag – 10 to 15	0.119	\$26.20	0.081	-0.038	0.277
Mandatory Stopping – Yes	0.079	\$17.37	0.065	-0.048	0.207
Optout	-1.508***	\$330.45	0.112	-1.727	-1.288

Log likelihood = -4,552.92

N =

LR Chi2(8) = 199.02

Prob > chi2 = 0.0000

LCA Red Snapper: Latent Class Specific Utilities

Class 1 “Harvest-Oriented”

- Prioritizes access and opportunity
 - Value longer seasons and resist effort-restricting rules like closure and mandatory stopping
- Mixed view on agg bag

Class 2 “Conservation-Oriented”

- Favor closures and mandatory stopping rules
- Dislike both aggregate bag options
- Negative utility for longer harvest seasons

Class 3 “Flexible Pragmatists”

- Balanced preferences
- Mix of access and conservation tools
 - Open to moderate controls, like smaller agg bags and closures

LCA Red Snapper: Latent Class Specific Utilities

Variable	Class 1	Class 2	Class 3
Permit fee	-0.012	-0.011	0.000
Harvest season: 15 days	3.081	-1.642	0.686
Harvest season: 30 days	4.441	-2.313	0.117
Targeting closure: 3 month	-0.384	0.447	1.057
Targeting closure: 6 month	-2.849	1.881	1.892
Agg Bag: 5-7 RF	-0.451	-1.626	1.309
Agg Bag 10-15 RF	1.377	-2.069	-0.165
Mandatory Stopping Rule: Yes	-1.059	0.964	0.232
ASC_Optout	-2.471	-38.060	1.890
CLASS SHARE	42.2%	33.2%	24.5%

LCA Red Snapper: Demographics of red snapper classes

Variable		Class 1 (%)	Class 2 (%)	Class 3 (%)	χ^2 (df)
Gender					60.4*** (4)
	Female	39	41	49	
	Male	60	59	51	
	Non-Binary	0.5	0.05	0.4	
Income					142.2*** (10)
	Less than \$25,000	42	42	16	
	\$25,001-\$49,999	45	43	11	
	\$50,000-\$99,999	46	45	9	
	\$100,000-199,999	49	42	9	
	\$200,000 or more	54	39	8	

LCA Red Snapper: Demographics of red snapper classes

Variable	Class 1 (%)	Class 2 (%)	Class 3 (%)	χ^2 (df)
Age				35.1*** (6)
18-34 years	46	45	10	
35-64 years	46	44	10	
65 years +	50	38	12	
State Resident				31.9*** (8)
Florida	47	44	10	
Georgia	45	46	10	
South Carolina	48	41	11	
North Carolina	45	43	12	

LCA Red Snapper: General fishing regulations & tradeoffs

Variable	All Sample	Class 1 (Std.Dev)	Class 2 (Std.Dev)	Class 3 (Std.Dev)
Regulations are necessary to prevent overfishing reef fish populations	4.12 (1.02)	4.14 (1.02)	4.17 (0.99)	3.88 (1.07)
Stricter reef fish regulations would lead to increased reef fish populations	3.82 (1.00)	3.82 (1.01)	3.88 (0.97)	3.55 (1.04)
I would rather have less restrictive regulations now, even if they led to it being harder to catch keeper sized reef fish in the next 10 years	2.74 (1.21)	2.74 (1.21)	2.73 (1.24)	2.80 (1.11)
I would rather have more restrictive regulations in the next 2 years if it led to better reef fishing in the next 10 years	3.81 (1.01)	3.85 (1.01)	3.84 (1.00)	3.58 (1.02)

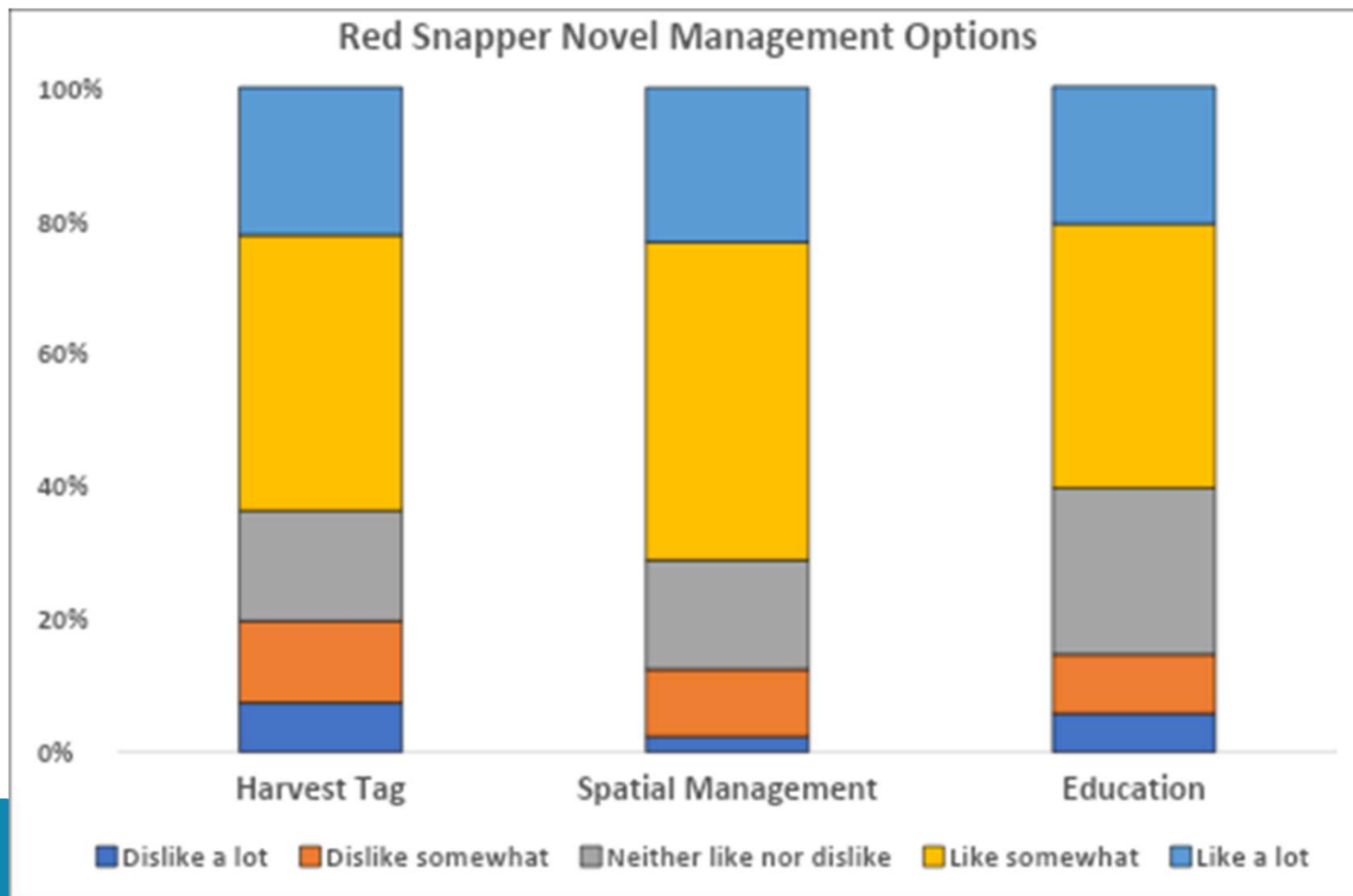
LCA Red Snapper:

Stricter regulations acceptable if they lead me to.....

Variable	All Sample (%)	Class 1 (%)	Class 2 (%)	Class 3 (%)
Catching more reef fish per trip	56	58	57	43
Catching larger reef fish	58	60	59	46
Needing to travel shorter distances on the water	46	47	46	43
I don't believe stricter regulations would lead to any of these	9	8	8	18

*Check all that apply question

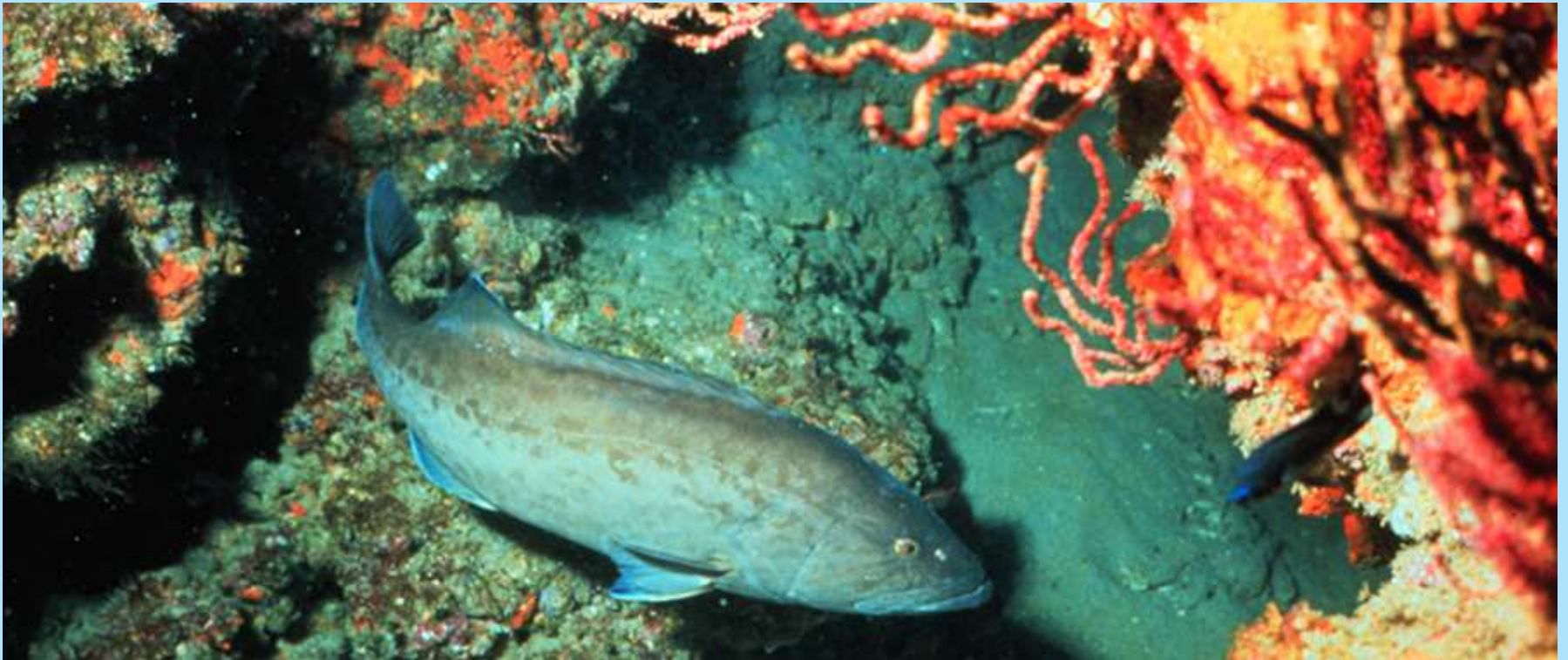
Like/Dislike for Novel Management Options (N = 1,679)



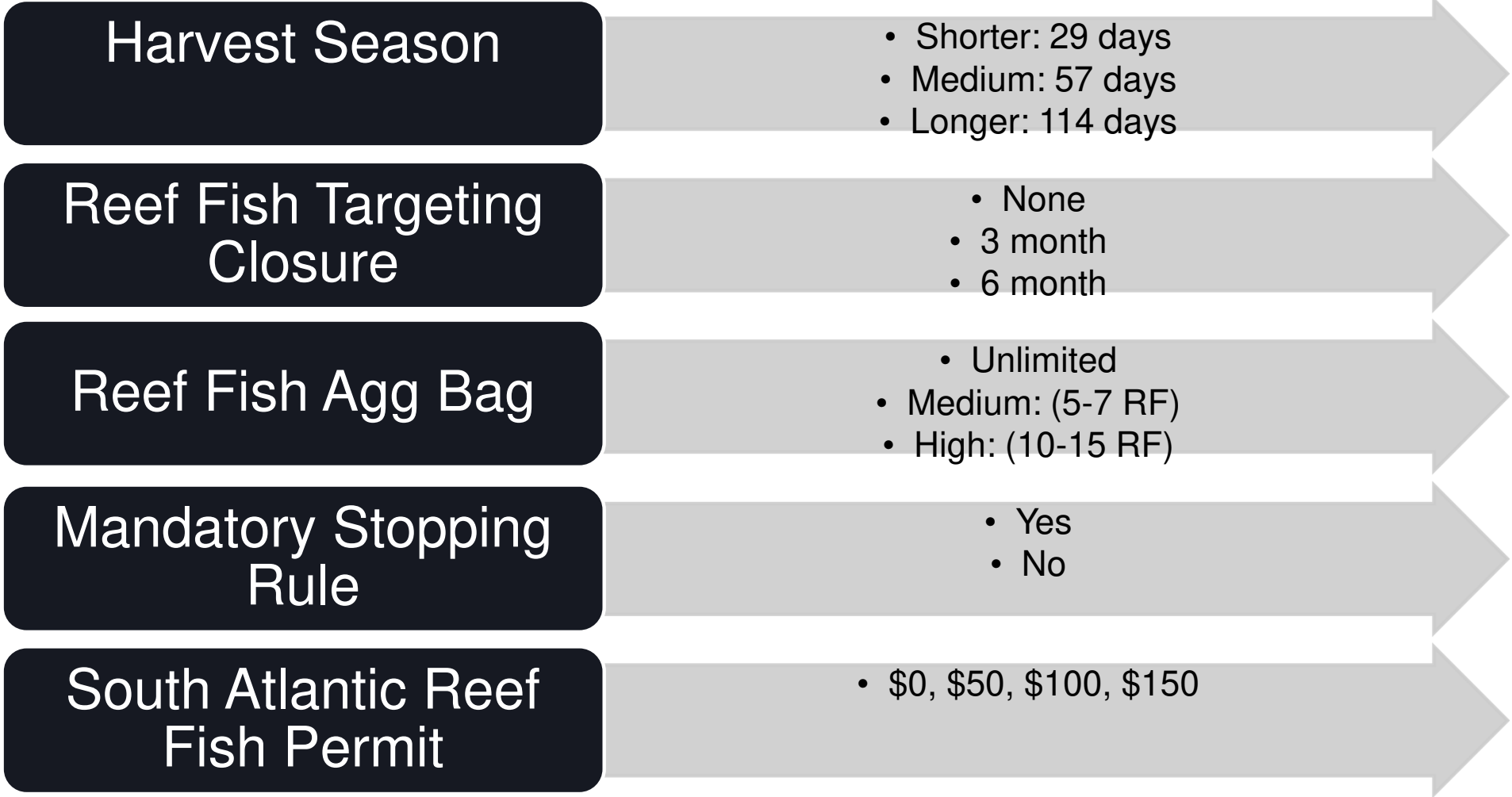
Changes in # of trips targeting red snapper or gag grouper in response to preferred DCE option

	Red Snapper	Gag Grouper
Stop or decrease a lot	11%	12%
Decrease a little	6%	11%
Stay the same	38%	40%
Increase a little	32%	25%
Increase a lot	13%	12%

Gag Grouper



DCE Attributes and Levels: Red Snapper



Discrete Choice Experiment Results: Gag Grouper

Choice	Coefficient	Mean WTP (\$)	Std. Error	95% Confidence Interval	
Permit	-0.004*	—	0.002	-0.007	-0.000
Harvest Season – 57 day	0.136	38.20	0.148	-0.155	0.427
Harvest Season – 114 day	0.044	12.20	0.181	-0.312	0.399
Target Closure – 3 month	0.176	49.50	0.172	-0.160	0.513
Target Closure – 6 month	-0.091	-25.6	0.164	-0.412	0.230
Agg Bag – 5 to 7	0.172	48.40	0.215	-0.249	0.593
Agg Bag – 10 to 15	0.269	75.60	0.203	-0.129	0.667
Mandatory Stopping – Yes	0.197	55.50	0.157	-0.110	0.505
Optout	-1.78***		0.260	-2.29	-1.27

Log likelihood = -794.13

N = 287

LR Chi2(8) = 63.28

Prob > chi2 = 0.0000

LCA Gag Grouper: Latent Class Specific Utilities

Variable	Class 1	Class 2	Class 3
Permit fee	-0.096	-0.005	0.002
Harvest season: 57 days	-0.588	-0.030	0.268
Harvest season: 114 days	-1.363	0.887	0.080
Targeting closure: 3 month	-1.772	0.548	0.064
Targeting closure: 6 month	1.387	0.197	0.001
Agg Bag: 5-7 RF	2.572	-1.017	0.057
Agg Bag 10-15 RF	0.439	-0.053	0.330
Mandatory Stopping Rule: Yes	3.657	1.177	-0.150
ASC_Optout	-10.587	1.415	-2.214
CLASS SHARE	18.7%	13.6%	67.7%

LCA Gag Grouper: Latent Class Specific Utilities

Class 1 “Control Supportive”

- Favor strong management
 - Strongly dislike longer harvest seasons
 - Strong like for mandatory stopping rules
 - Extremely negative opt-out

Class 2 “Moderate Conservationists”

- Optout if regulations are overly burdensome or restrict daily catch
- Willing to accept closures and stopping rules

Class 3 “Access- Oriented Pragmatists”

- Flexibility and continued access
- Unlikely to leave the fishery
- Neutral toward targeting closure
- Prefer large agg bags

LCA Red Snapper: Demographics of gag grouper classes

Variable		Class 1 (%)	Class 2 (%)	Class 3 (%)	χ^2 (df)
Gender					5.11(4)
	Female	22	19	60	
	Male	22	10	68	
	Non-Binary	0	0	0.1	
Income					13.3(10)
	Less than \$25,000	35	18	47	
	\$25,001-\$49,999	24	15	61	
	\$50,000-\$99,999	19	11	70	
	\$100,000-199,999	16	9	75	
	\$200,000 or more	38	13	50	

LCA Gag: Demographics of classes

Variable	Class 1 (%)	Class 2 (%)	Class 3 (%)	χ^2 (df)
Age				12.9*(6)
18-34 years	22	15	64	
35-64 years	22	10	69	
65 years +	26	17	57	
State Resident				4.7(8)
Florida	22	11	68	
Georgia	28	10	63	
South Carolina	20	13	67	
North Carolina	20	20	60	

LCA Gag Grouper: General fishing regulations & tradeoffs

Variable	All Sample	Class 1 (Std.Dev)	Class 2 (Std.Dev)	Class 3 (Std.Dev)
Regulations are necessary to prevent overfishing reef fish populations	4.11 (1.01)	4.14 (1.01)	3.67 (1.20)	4.18 (0.95)
Stricter reef fish regulations would lead to increased reef fish populations	3.68 (1.04)	3.83 (0.96)	2.97 (1.18)	3.76 (1.00)
I would rather have less restrictive regulations now, even if they led to it being harder to catch keeper sized ref fish in the next 10 years	2.58 (1.16)	2.40 (1.07)	2.56 (1.11)	2.65 (1.20)
I would rather have more restrictive regulations in the next 2 years if it led to better reef fishing in the next 10 years	3.82 (1.02)	3.98 (0.91)	3.31 (1.13)	3.86 (1.01)

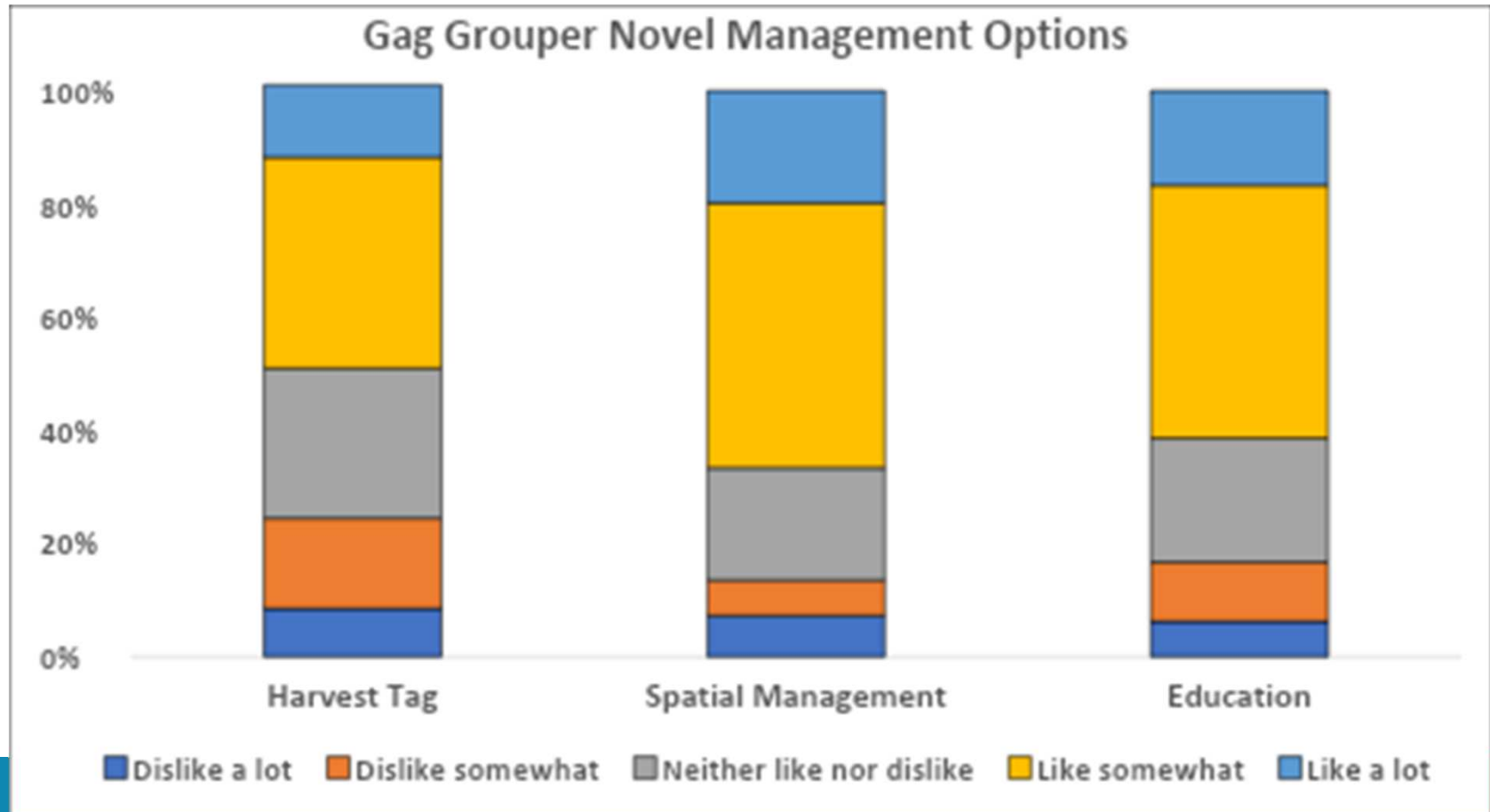
LCA Gag Grouper:

Stricter regulations acceptable if they lead me to.....

Variable	All Sample (%)	Class 1 (%)	Class 2 (%)	Class 3 (%)
Catching more reef fish per trip	61.1	61.9	36.1	65.6
Catching larger reef fish	57.6	58.7	38.9	60.9
Needing to travel shorter distances on the water	44.4	44.4	38.9	45.5
I don't believe stricter regulations would lead to any of these	9.4	9.5	13.9	8.5

*Check all that apply question

Like/Dislike for Novel Management Options (N = 96)



Results summary (Panel survey)

- Most respondents thought regulations were necessary and would prefer regulations that would improve their catch
- Most respondents cared much more about red snapper than gag
- Red snapper respondents in two main classes
 - Slightly larger class (42%) wanted longer harvest seasons and few restrictions
 - Smaller class (33%) wanted more restrictions, including targeting closure
 - Classes did not differ much at all by demographic, or general regulations preference
 - Overall classes, DCE showed positive WTP for restrictions, esp. targeting closures
- Most (>50%) red snapper respondents liked novel options, especially spatial closures, and few (<20%) disliked novel options
- Gag responses suffered from small sample size, and had a much larger “no change” class

Management inferences

- There is broad support for restrictive regulations in general
- Split opinions of red snapper-focused anglers regarding restrictive harvest and targeting regs—overall a preference for more restrictive, but large but perhaps numerical minority group would strongly dislike these.
- Most fishers seem open and interested in novel reef fish management options, especially spatial closures.
- From these results along: restrictive reef fishing regulations may well increase overall satisfaction IF they improve fishing, but they will also likely be opposed by a sub-group.

Key uncertainties

Should we “trust” panel data?

Panel studies are expected to be most representative of general angler population and *not* favor the most avid or regulation-opposed anglers (who may be more visible in public meetings and/or oversampled in email-based surveys).

Species specific uncertainty

The results we are most confident in are for red snapper. There is some indication gag respondents were less interested or open to change. It is possible such differences are related to the especially strict regulations for red snapper, but further evaluation is required before inferences could be applied to reef fish in general.

DCE surveys have some hypothetical bias

Implications for Snapper-Grouper MSE

- Key information on recreational angler management preferences and responses
- Will help inform scenario development and modeling of angler responses
- Stakeholder WG was formed and remains available for MSE feedback etc.

Thank You!

- Stakeholder Working Group
- All participants in the survey
- SAFMC for funding

