

MSEAS 2024 - YOKOHAMA, JAPAN

Community informed social indicators for the California  
Dungeness Crab Fishery  
under whale entanglement mitigation regulations

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Understanding whale entanglements  
off the U.S. west coast

2020

Changes in ocean  
conditions

Change in distribution of  
anchovy and krill

Whales follow prey  
inshore

Crab fishery  
opens late

400% increase in  
entanglements

While many entanglements in  
recent years have been reported in  
central CA, we know at least some  
of these entanglements occurred  
elsewhere along the west coast.

fishery in 2016  
concentrations were high

# Feds sued over danger to humpback whales from pot-fishing gear

*"Migrating whales shouldn't have to dodge deadly commercial fishing gear especially in national marine sanctuaries," a Center for Biological Diversity attorney said.*

# Two objectives



Understand how and why actions taken to mitigate whale entanglements are impactful to the fishery (to develop a set of considerations that could guide decision making)

Develop a set of community-informed social indicators (variables that can be monitored to tell us how well the fishing community is doing beyond state level landings and revenues)



# Why social indicators?

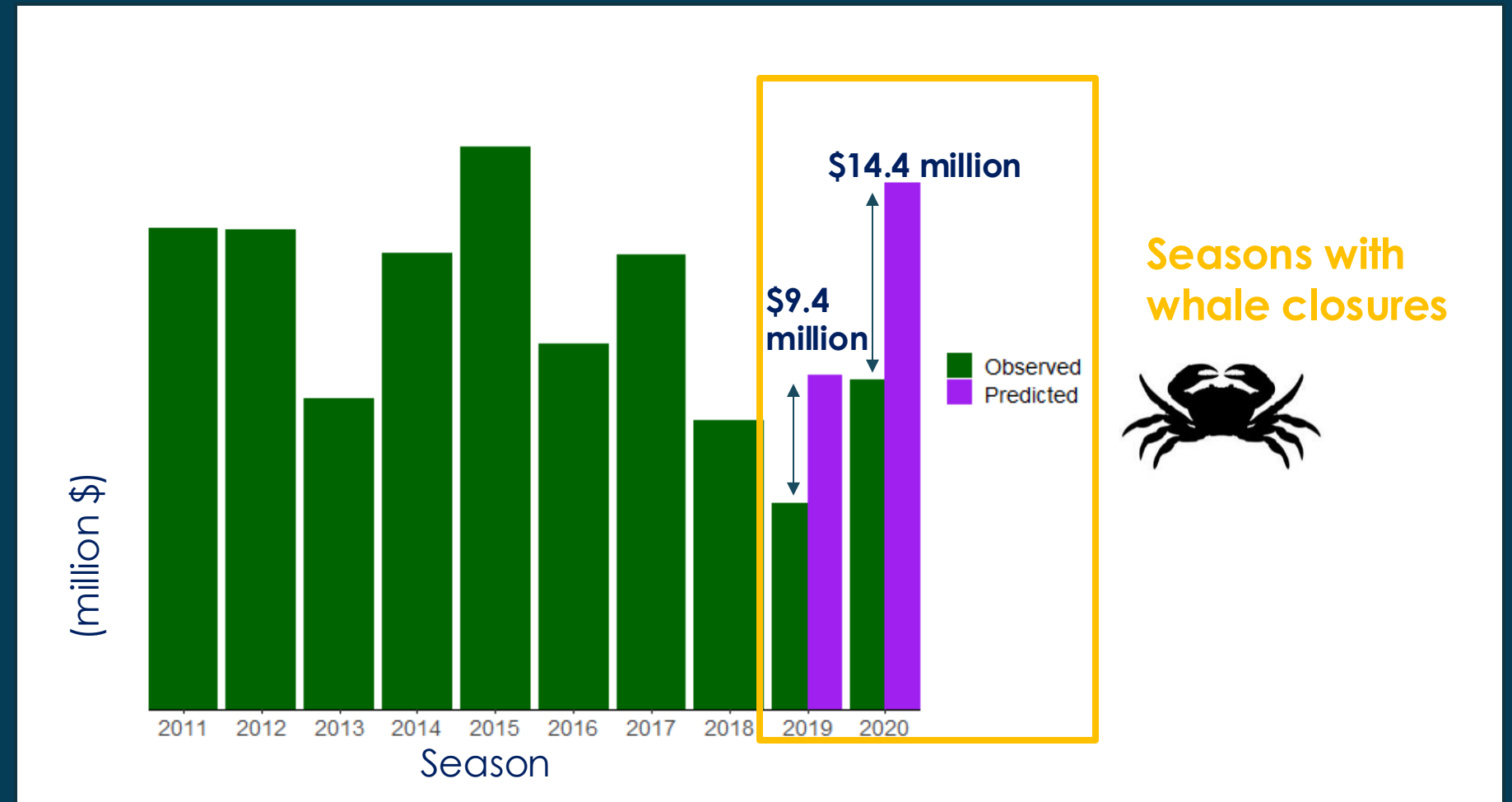
1. Sometimes large revenue losses are associated with delays/closures



*Dungeness crab revenues in Central California*

2. Even when the majority of crab available gets caught (more complex than just reducing fishing opportunity)

3. Highly variable between management areas and vessels (it doesn't affect everyone equally)



*Figure: Estimated revenues lost during seasons with closure periods (green = observed revenue, purple = predicted revenue)*

# Why social indicators?

- California level landings and revenues are not the full picture
- Social indicators specific to this fishery to monitor the situation in the context of the (continuing) regulation change

**Social indicators are a key variable that indicates the overall impact on both ecological and social objectives**

**ecological objective = minimizing whale entanglement**

**social objective = a productive and equitable fishery**



Photo: NOAA Fisheries



Photo: CDFW

# Community-informed approach

Interview Participants (N=42)

Likert scale questions to test a-priori indicators & open ended questions

3 sections:



Impact and adaptive actions

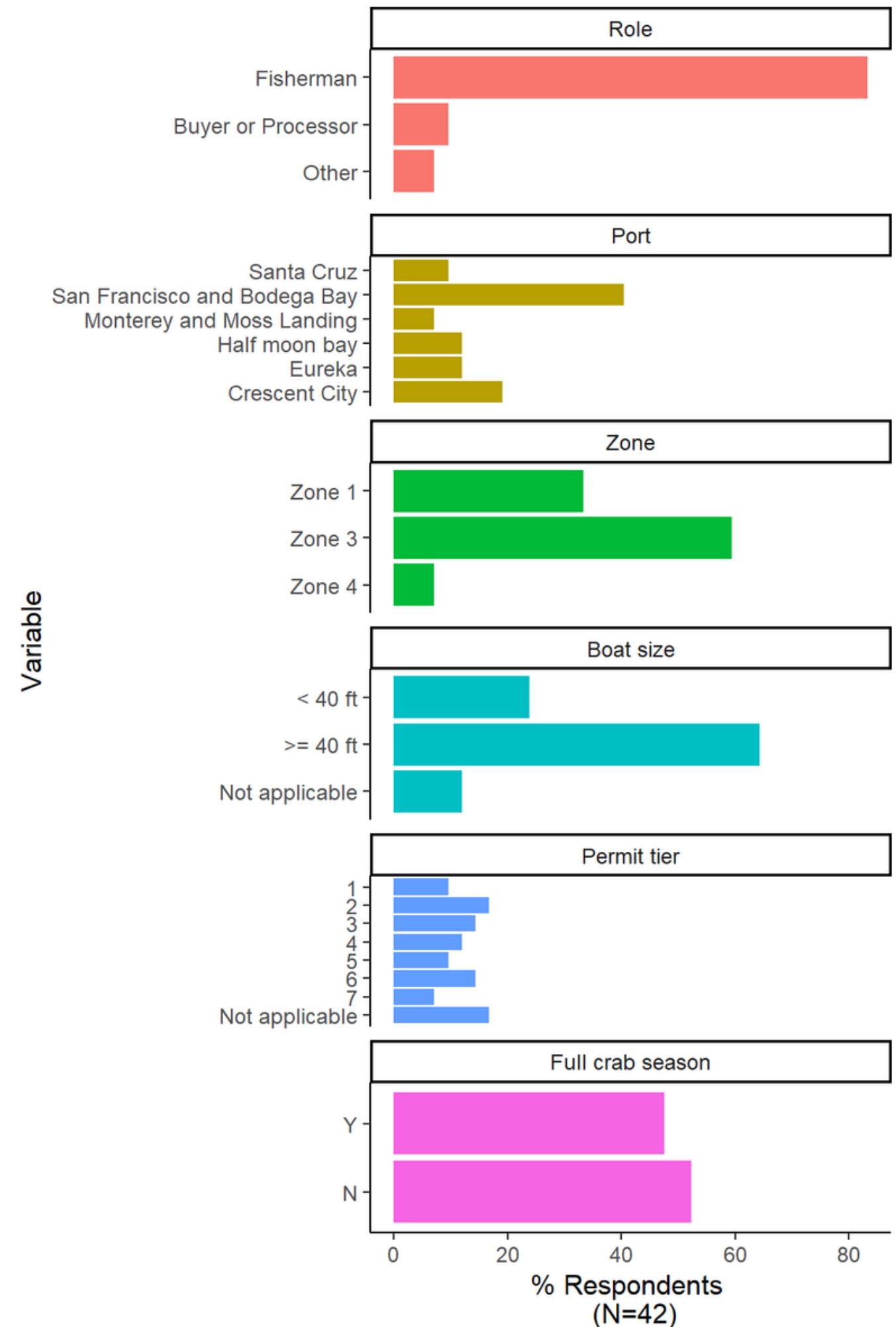


Indicators



Management recommendations

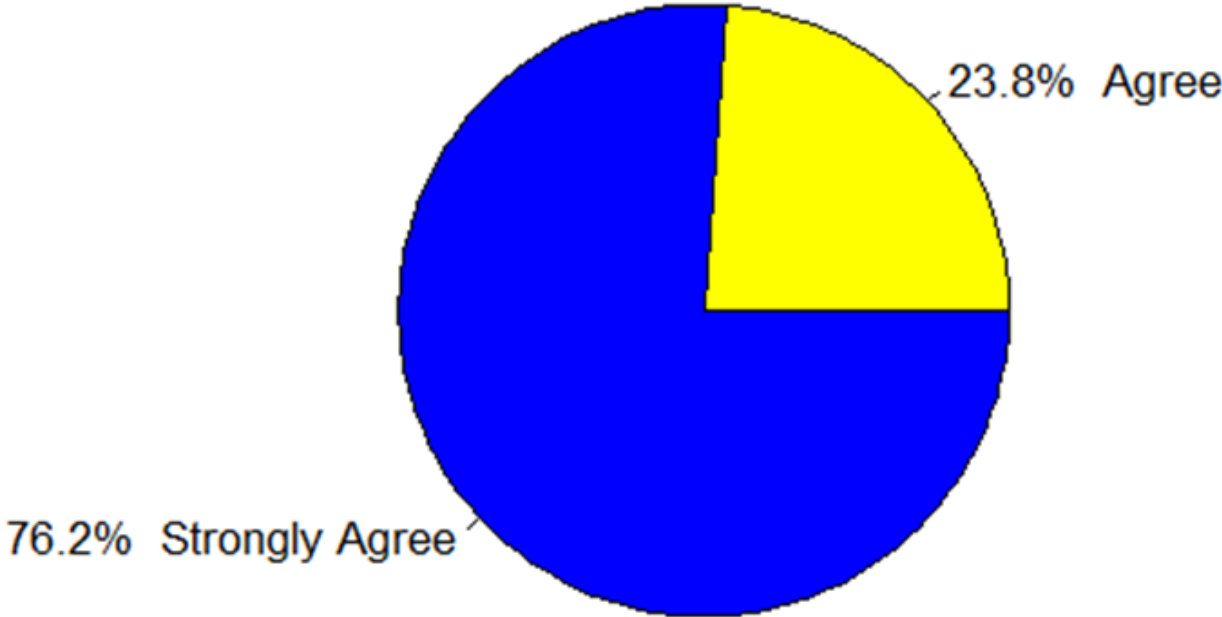
## Participant Demographics



# RESULTS

## Ranking of impacts

**Statement: Delays or closures because of whales affect me**



- All participants affected in some way

- But impact of interventions ranked differently by some groups

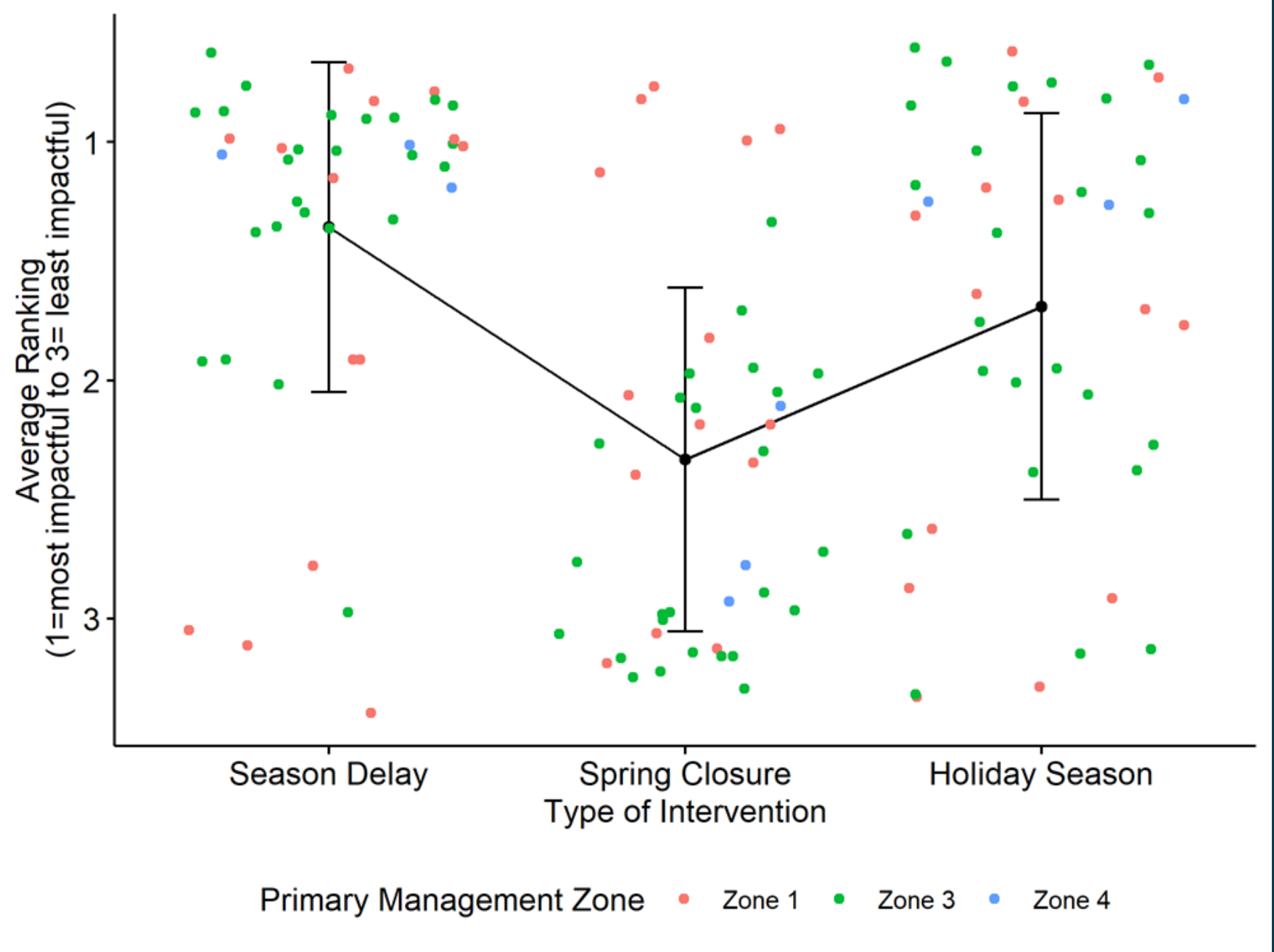
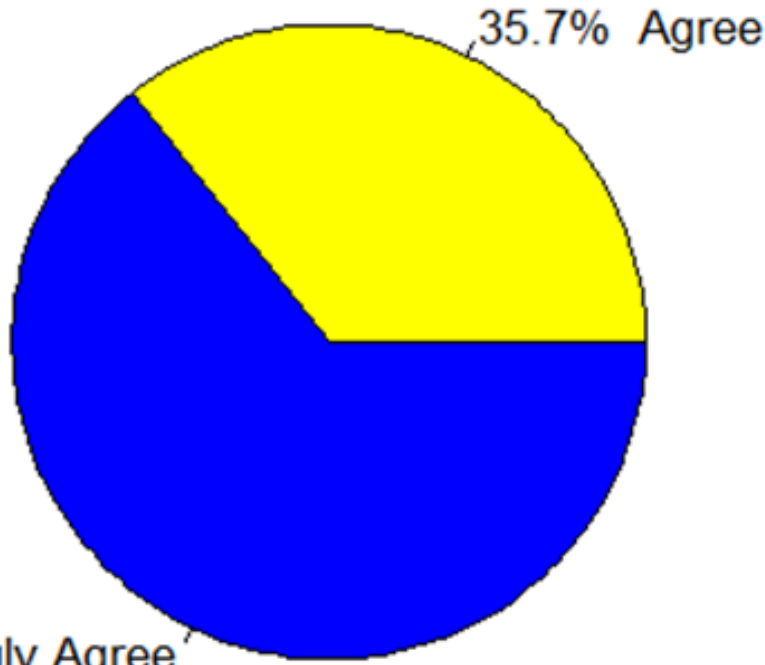


Figure: Ranking of impacts from worst (1) to least (3) by participants, by fishing zone.

# RESULTS

## Adaptive actions

**Statement: I have changed my routine or behavior**



- Everyone takes action to adapt



- But different adaptive actions between different types of management interventions

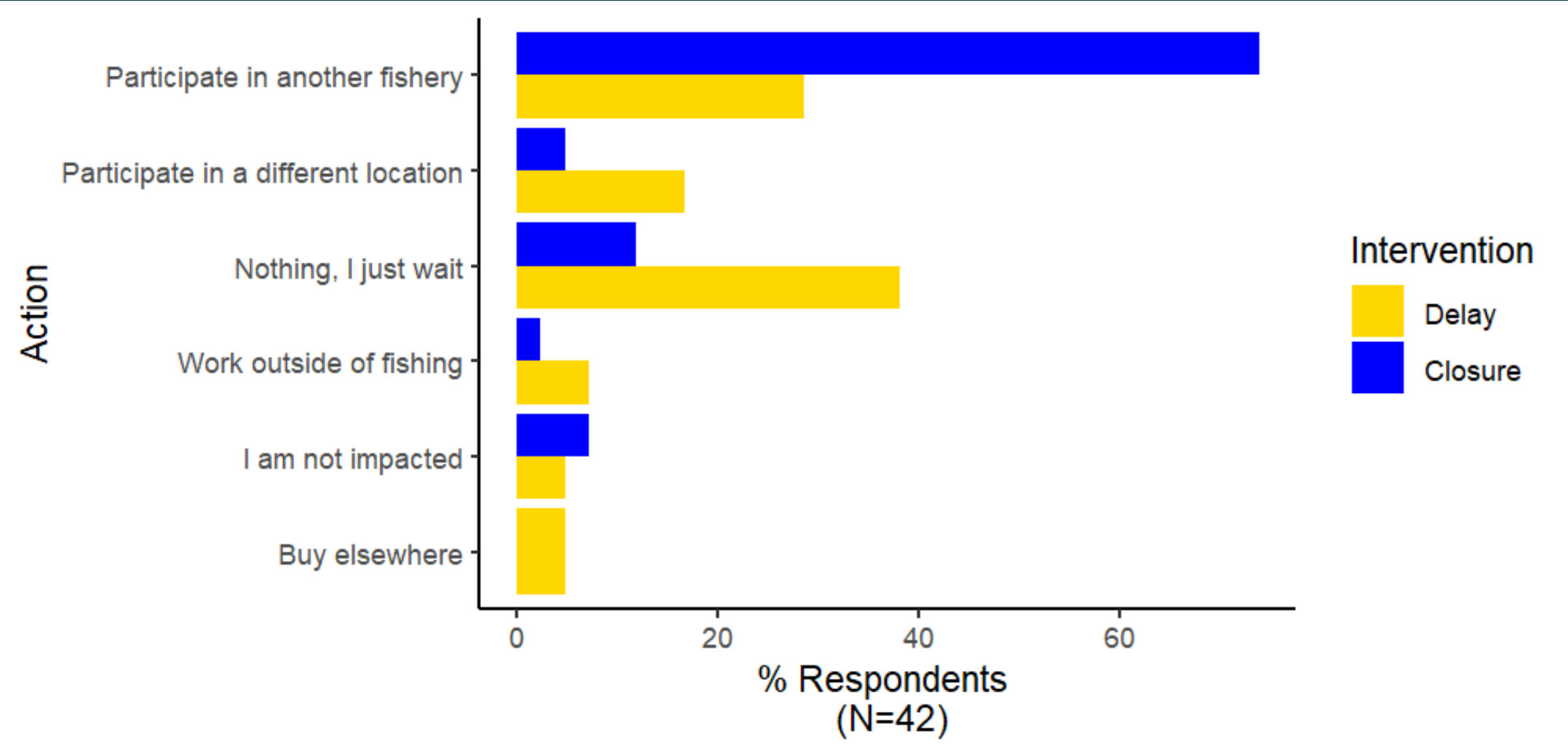


Figure: Actions taken by participants in the event of a delay or a closure to the fishery.



# RESULTS



## A-priori indicators tested

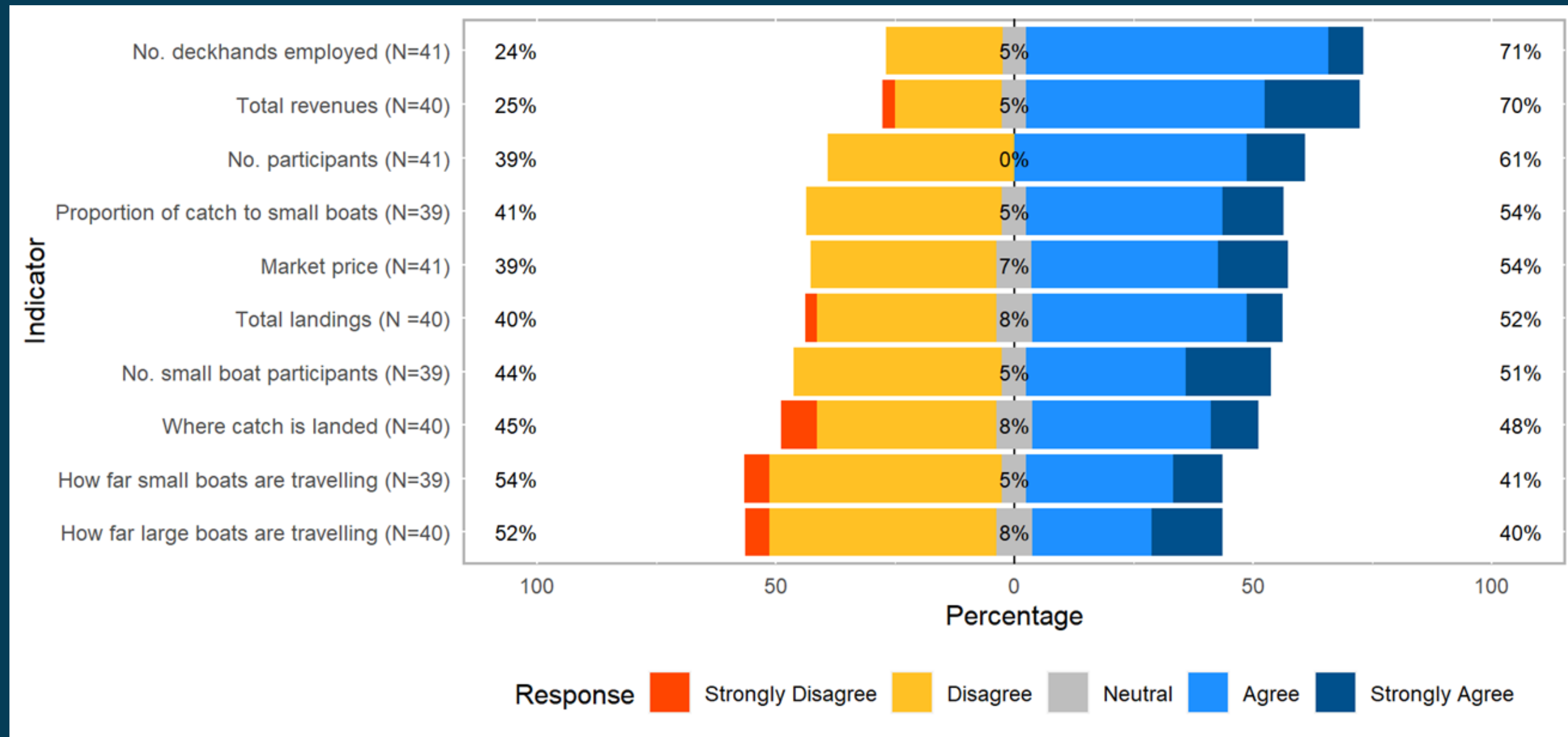


Figure: % of agreement across participants for each indicator tested

# RESULTS - New indicators



## Next steps

- Refine list of measurable indicators
- Refine further to those with existing data and test them
- Deliver a set of social indicators that can be monitored via a publicly available platform



Figure: Community informed potential indicators by theme

# TAKEAWAY MESSAGES

- **Social Indicators**

Indicators approach is robust to other climate and extreme event disturbances (not just whales)

- **Community informed**

Community informed social indicators can provide useful insight to the management of complex socio-ecological challenges

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