

The price tag of regulated open access for for-hire recreational fisheries

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Regulated open access: Homans and Wilen 1997 & 2005



- Input-based management in the absence of exclusion
 - e.g., season-length restrictions, vessel & gear restrictions
- Result: rent dissipation
- Mechanisms:
 - Cost-side: input stuffing on intensive and extensive margins
 - Product market-side: displacement of landings to low-value markets
- Biological sustainability is difficult to maintain.
- Still prevalent in many fisheries, but increasingly less so.

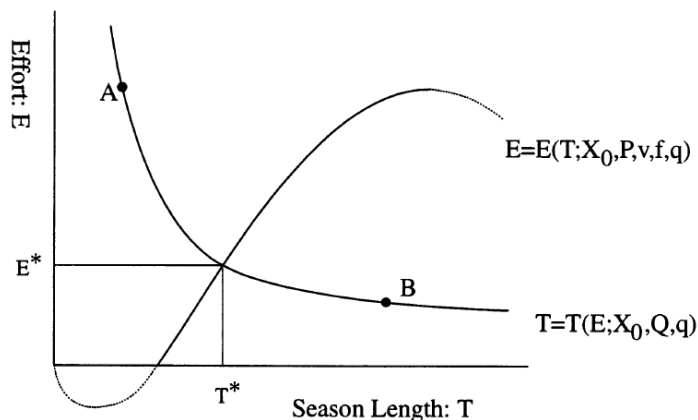


FIG. 3. Regulator season length choice and joint regulated equilibrium.

Recreational fisheries

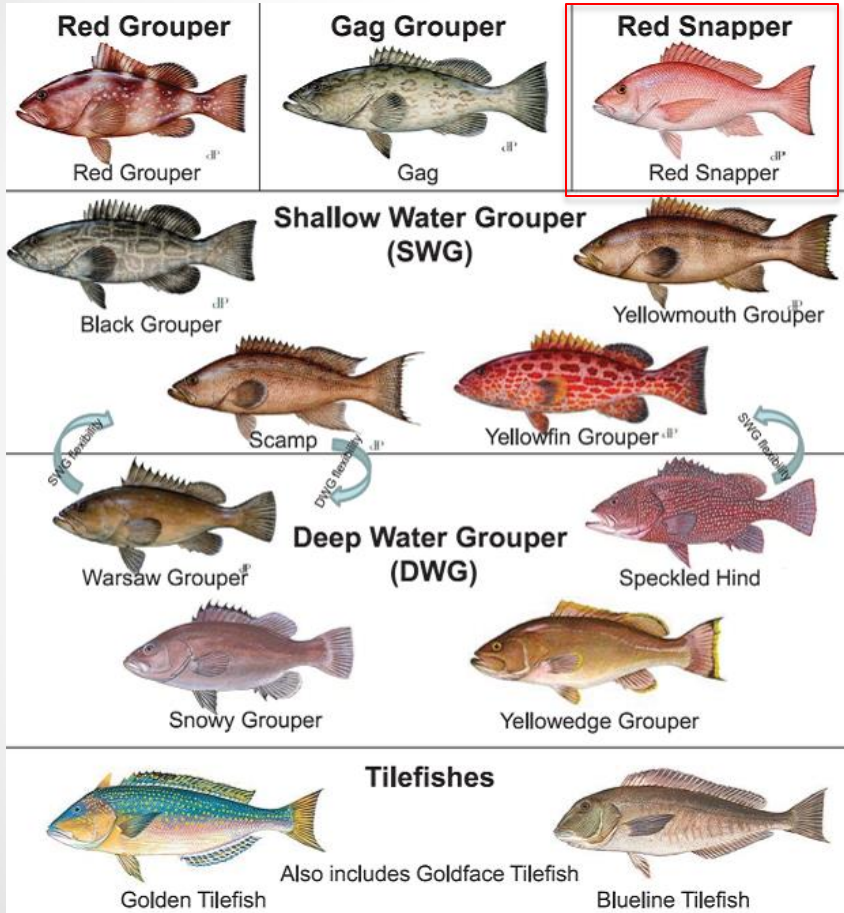
- Saltwater marine angling can be economically and ecologically significant.
 - USA: 9.6 million anglers & 63 million trips
- Recreational fisheries are almost all managed under regulated open access (ROA).
 - season limits, bag limits, size limits, etc.
- Theory suggests that welfare losses could arise from:
 - Excessive participation, congestion, allocative inefficiency of harvest and quality trips
 - Losses could be significant even if stocks are sustainably managed

But where's the empirical evidence?

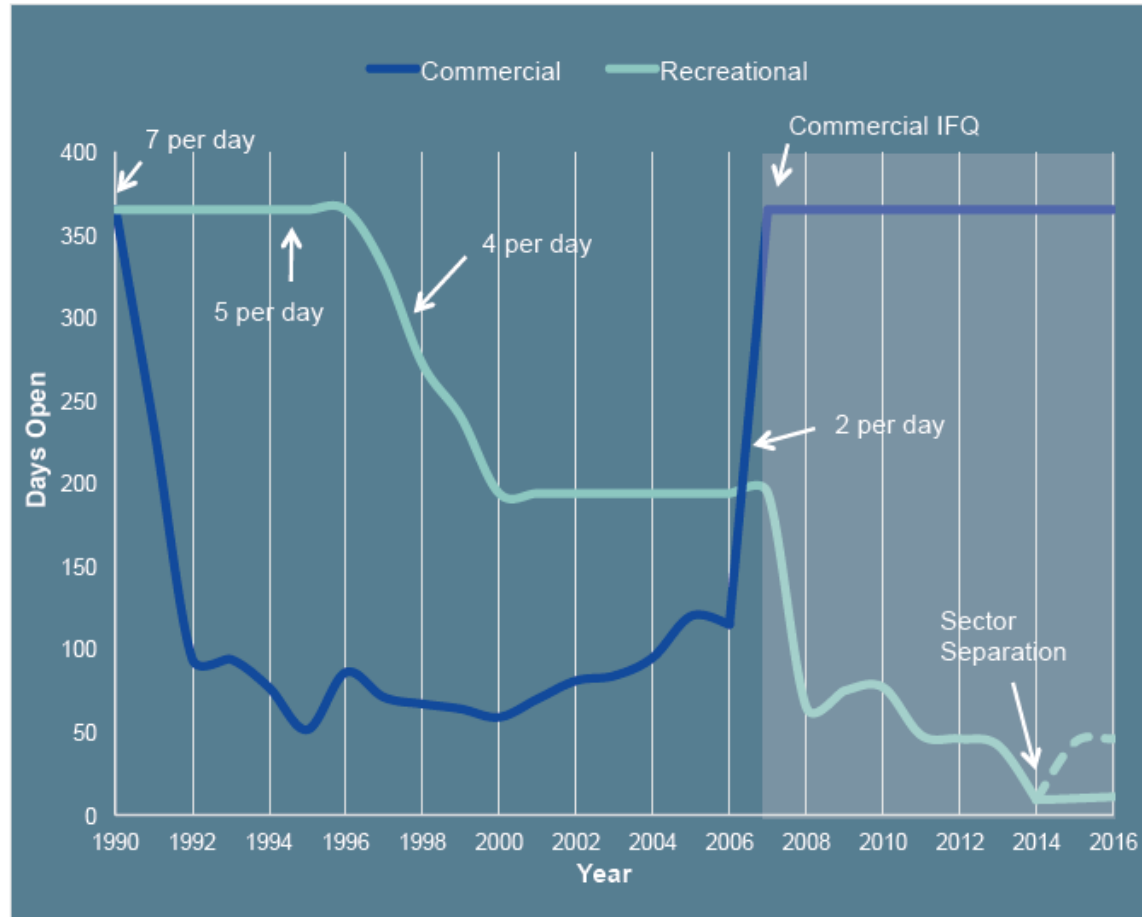
In a nutshell...

- We estimate the extent of welfare losses from ROA management for anglers pursuing red snapper on headboat vessels in the US Gulf of Mexico.
- We do this using a combined intercept/online survey of anglers' fishing preferences and behaviors.
- We find that a plausible coop/IFQ policy for headboats could raise the average angler's welfare by \$139/year.
 - \$12.3 million/year for just this one fishery

Gulf of Mexico reef fish



Red snapper management: a tale of two fisheries



The Gulf Headboat Collaborative (2014-2015)



- Individual vessel allocations of red snapper and gag grouper
- Complete seasonal flexibility
- Still subject to bag limits (2 per angler)
- Stringent reporting requirements & enforcement

Survey data

Design: one year process with 2 focus groups and a pilot survey

Data:

1. Brief intercept survey of 2014-2015 GHC passengers
 - Sampled year-round
 - Demographics, fishing experience, income and **email address**
2. Follow-up Internet survey of 2 page respondents
 - 2 waves; N=813
 - Revealed preference
 - Recall data on previous season
 - Stated preference
 - **Contingent behavior and preference data for alternative management policies**
 - Choice experiments on individual recreational trips
 - Value of time (VOT) questions

In recent years recreational anglers could only retain red snapper during a 1 to 1.5 month season starting June 1st. The season length and bag limit of a typical red snapper season in the recent past are presented in Policy A below.

Policy A

Season when red snapper can be retained	June
Red snapper bag limit	2
Price of one partial day (4-8 hrs) headboat trip	\$80
Price of one full day (8-15 hrs) headboat trip	\$130

If the Gulf of Mexico red snapper fishing policies were as described in Policy A, how many headboat trips would you have taken in 2015 in the different seasons? In considering your responses, please assume that any features about the fishing trips that are not mentioned such as sea conditions, the quality and size of the boat, the number of passengers, and bag limits and regulations for other species are the same as your 2015 experience.

2015 Gulf of Mexico Headboat Trips under Policy A

	January to end of May Holidays: New Year's, Spring break, Easter, Memorial day	June	July to end of August Holidays: Independence Day	September to end of December Holidays: Labor Day, Columbus Day, Thanksgiving, Christmas
Number of partial day (4-8 hrs) headboat trips in 2015 under Policy A	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Number of full day (8-15 hrs) headboat trips in 2015 under Policy A	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Please assume that any features about the fishing trips that are not mentioned such as sea conditions, the quality and size of the boat, the number of passengers, and bag limits and regulations for other species are the same as your 2015 experience.

Policy B

Season when red snapper can be retained	Any time of year
Red snapper bag limit	2
Price of one partial day (4-8 hrs) headboat trip	\$120
Price of one full day (8-15 hrs) headboat trip	\$200

Fixed attribute

Varying attributes

If the Gulf of Mexico red snapper fishing policies were as described in Policy B, how many headboat trips would you have taken in 2015 in the different seasons?

2015 Gulf of Mexico Headboat Trips under Policy B

January to end of May

June

July to end of August

September to end of December

Holidays: New Year's, Spring break, Easter, Memorial day

Holidays: Independence Day

Holidays: Labor Day, Columbus Day, Thanksgiving, Christmas

Number of **partial day (4-8 hrs)** headboat trips in 2015 under Policy B

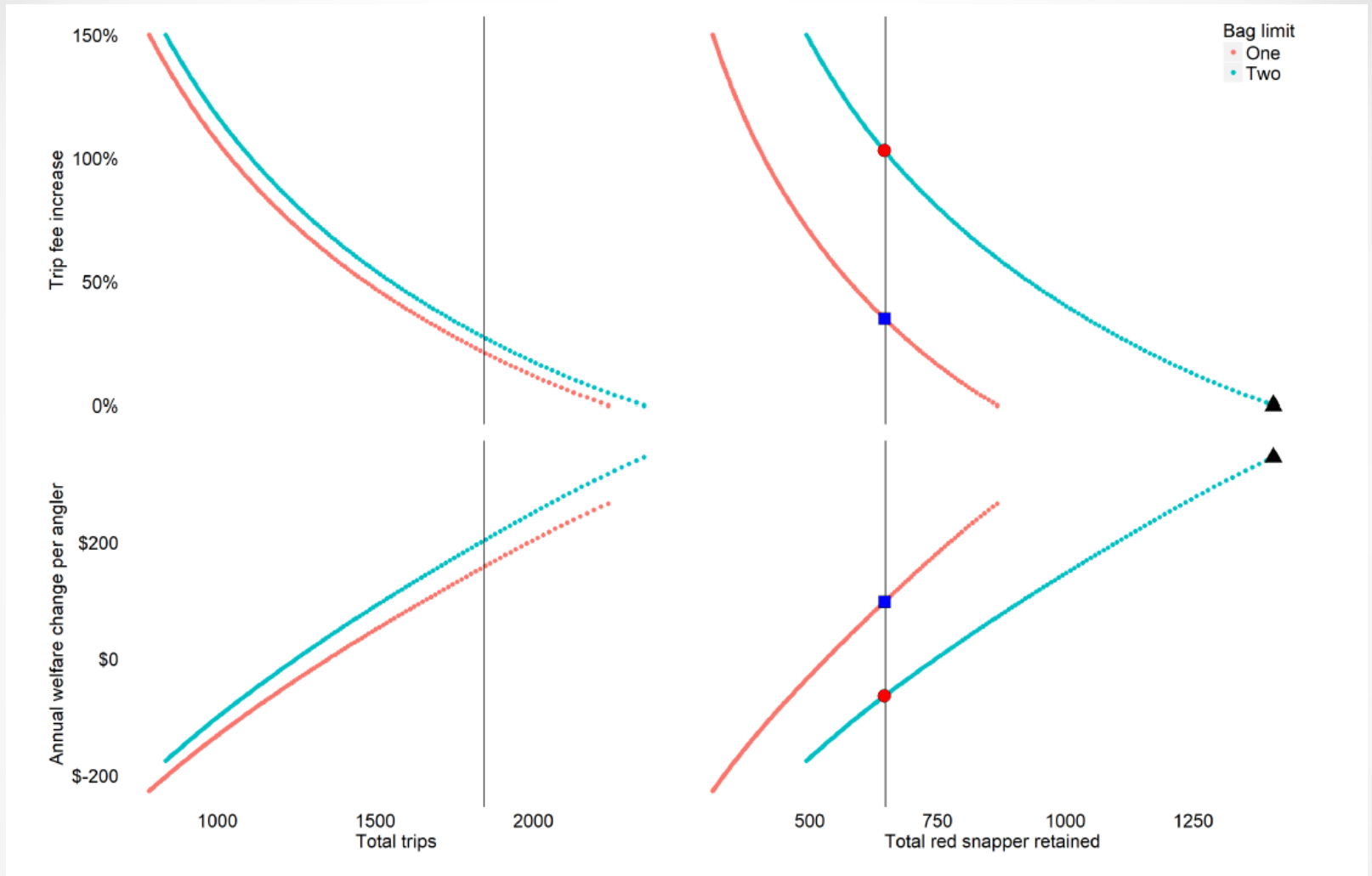
Number of **full day (8-15 hrs)** headboat trips in 2015 under Policy B

The econometric model

- We model the number, timing, and duration of GOM headboat trips at the seasonal scale.
 - Choices modeled over 4 seasons: Jan-May, June, July-Aug, Sep-Dec
- We estimate a Kuhn-Tucker discrete-continuous demand model
 - Explicit utility maximization at a seasonal (annual) scale
 - Translated generalized CES utility
 - See Lloyd-Smith, Abbott, Adamowicz and Willard (JAERE, forthcoming) for details
- The model is estimated using the baseline (Policy A) and counterfactual (Policy B) data
 - Welfare measures are based on differences in stated behavior between the scenarios.
- Welfare measures (compensating surplus) are calculated by simulation
 - Non-response and post-stratification weights used for estimation and simulation.

Valuing management reform

- IFQs make year-round retention of red snapper possible.
- But this improves trip quality outside of the June derby season, causing excessive trip demand and red snapper harvest
 - RESULT: predicted harvest > quota supply!
- Trip prices and/or bag limits must be altered by headboat operators to ration their quota allocation
 - Price vs. non-price based allocation
- To simulate the rights-based allocation, we assume a combination of lowered individual retention limits and higher trip prices
 - Consistent with the outcomes under the GHC policy experiment.



Black triangle: year-round red snapper, no rationing

Red circle: price only allocation (2 fish & 100% trip fee increase)

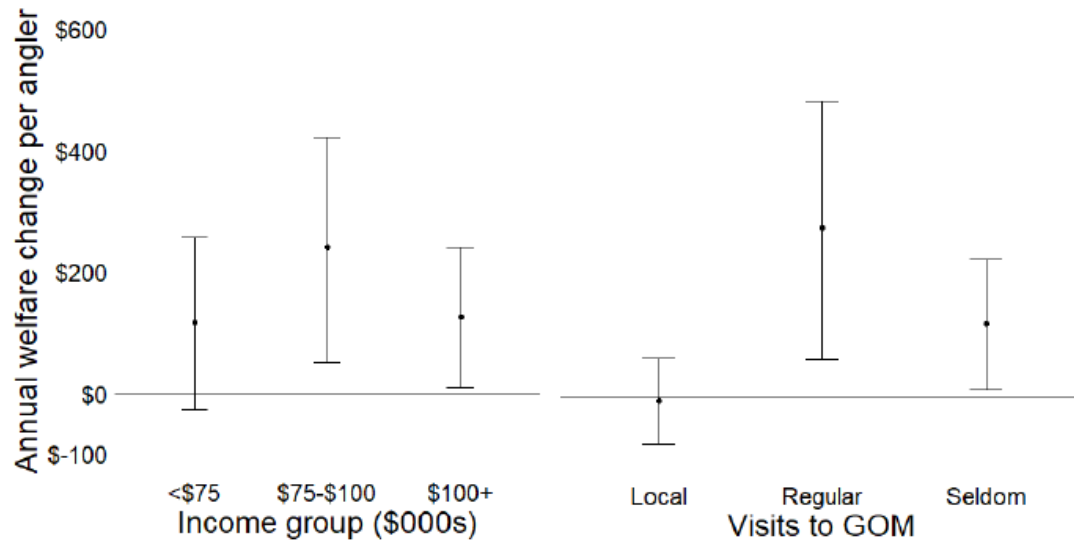
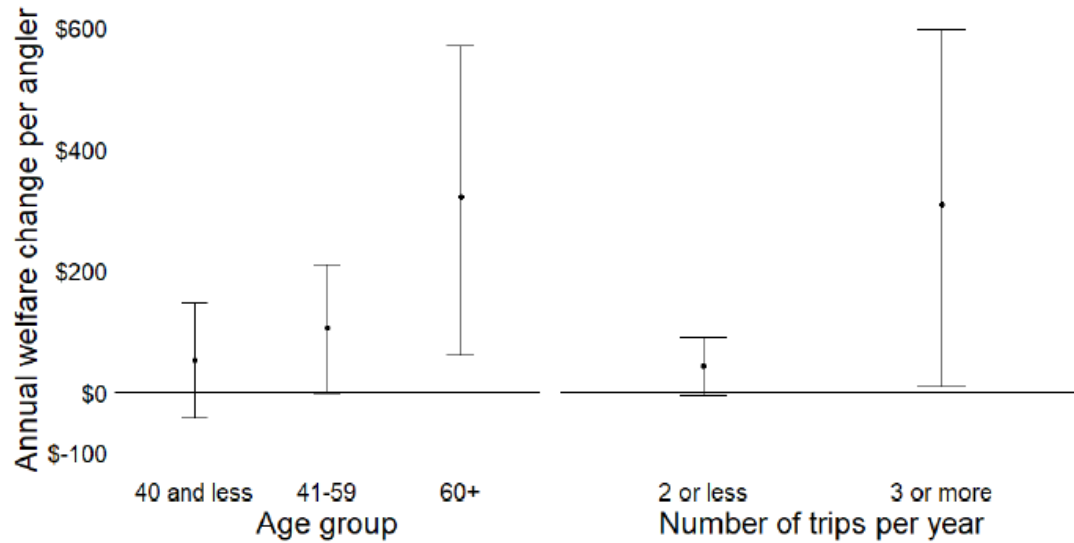
Blue square: price and bag limit allocation (1 fish & 40% trip fee increase)

Table 1. Expected trips, landings and welfare

	Overall trips		Overall red snapper landings			Mean welfare
June	Non-June	Total	June	Non-June	Total	
<i>Baseline (June-only retention)</i>						
489	1,356	1,845	649	0	649	-
<i>2-fish bag limit with 0% trip fee increase (Year-round fishing)</i>						
488	1,844	2,332	315	1,082	1,396	\$336
(0.4)	(182.8)	(182.7)	(0.3)	(108.3)	(108.2)	(\$131)
<i>1-fish bag limit with 40% trip fee increase (Year-round fishing)</i>						
345	1,312	1,656	142	508	650	\$139
(2.7)	(138.3)	(138.5)	(1.1)	(53.5)	(53.5)	(\$116)
<i>2-fish bag limit with 100% trip fee increase (Year-round fishing)</i>						
219	879	1,098	139	514	653	-\$62
(3.8)	(106.2)	(106.7)	(2.6)	(63.7)	(64.1)	(\$97)

Cluster bootstrap standard errors in parentheses using 500 conditional error draws. The overall trips and red snapper landings numbers are for all 537 red snapper anglers in the sample. Mean welfare changes are per angler/year.

Distribution



Conclusions

- Moving to rights-based allocation would yield welfare gains of ~\$12.3 million/year to existing GOM headboat anglers.
 - Would enhance headboat net revenues as well
- Likely an underestimate of welfare gains from a permanent program
 - Secure quota allocations → incentives for creative product differentiation
- Under the GHC pilot program
 - Red snapper became available year-round
 - Trips retaining red snapper increased by 161%
 - Catch rates of red snapper per angler declined, but with substitution to other species
 - Discard rates declined by over 40%

Recreational rent dissipation: the big picture

- Warning! Extrapolation ahead!
- Extrapolating \$139/angler to sub-populations:
 - Global (220 million anglers): \$30 billion
 - OECD: \$13 billion
 - USA: \$1.2 billion
- Suggests efficiency losses from ROA are substantial and highly policy-relevant.
- Much more research on feasible management reforms for recreational fisheries is needed.

Thank you



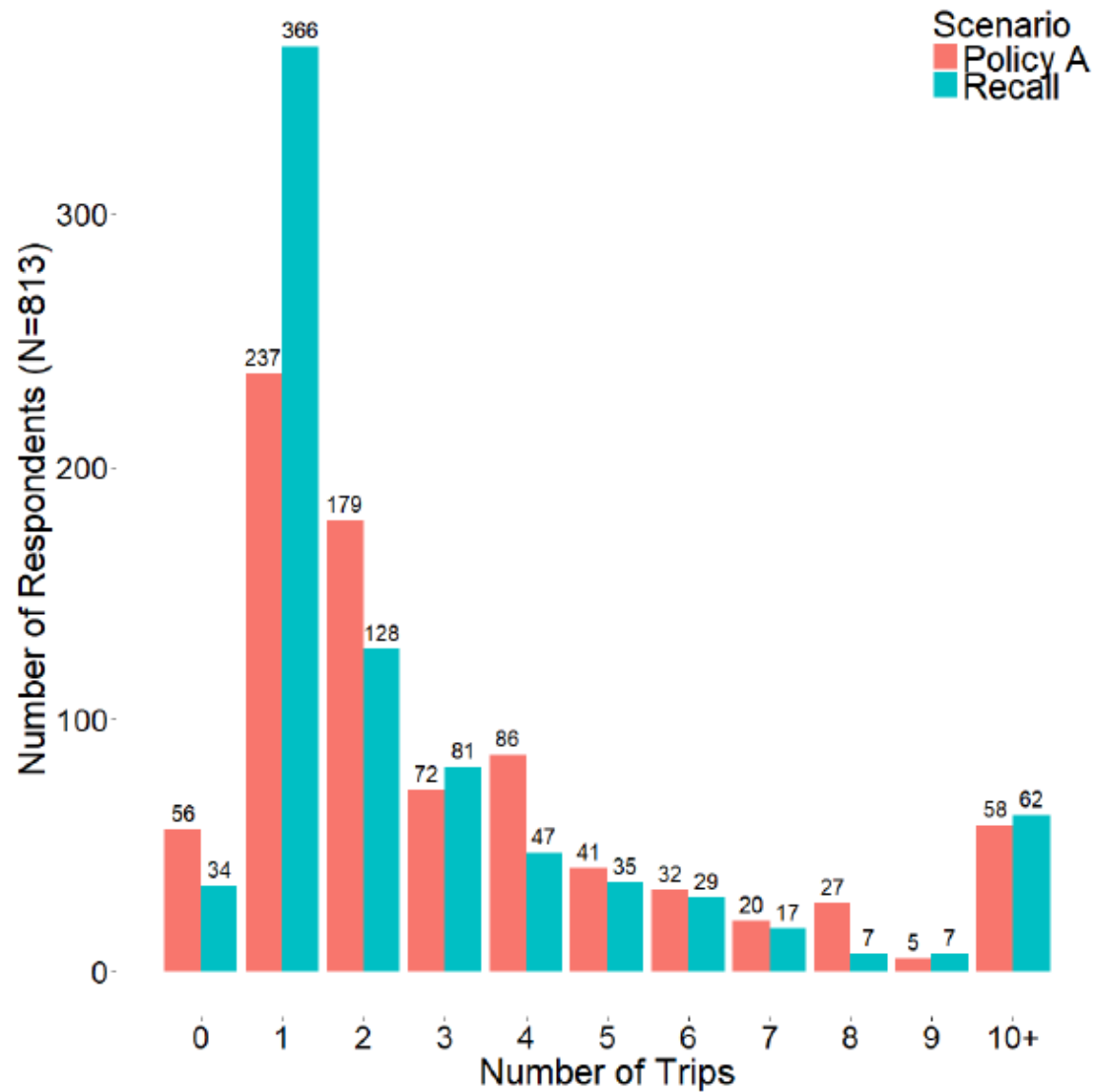


Fig. S1. Distribution of respondents by number of trips taken in a year for the recall and Policy A contingent behavior questions.

Translation

parameters: affect corner solutions and substitution

Satiation/substitution on parameters

- Constrained for identification

$$U(trips_t, z) = \sum_{t=1}^T \frac{\gamma_t}{\alpha_t} \psi_t \left[\left(\frac{trips_t}{\gamma_t} + 1 \right)^{\alpha_t} - 1 \right] + \frac{1}{\alpha_z} \psi_z z^{\alpha_z}$$

8 alternatives:

- Full vs. part-day trip
- Jan-May, June, July-Aug, Sep-Dec

MU at trips=0

- Parameterize as function of ASCs, demographics, bag limits, retention dummy for red snapper, etc.
- Includes EV(1) errors

Numeraire

expenditure:

- Income minus rec fishing expenditures
- Price of trip includes the estimated value of time