

# Estimating the benefits of rights-based management for recreational fisheries: Evidence from the U.S. Gulf of Mexico

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# Gulf of Mexico reef fish

**Red Grouper**



Red Grouper

**Gag Grouper**



Gag

**Red Snapper**

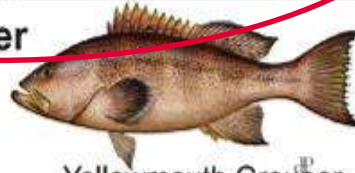


Red Snapper

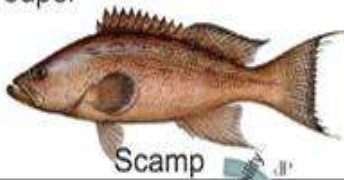
**Shallow Water Grouper (SWG)**



Black Grouper



Yellowmouth Grouper



Scamp



Yellowfin Grouper



Warsaw Grouper

**Deep Water Grouper (DWG)**



Speckled Hind



Snowy Grouper



Yellowedge Grouper

**Tilefishes**



Golden Tilefish

Also includes Goldface Tilefish



Blueline Tilefish

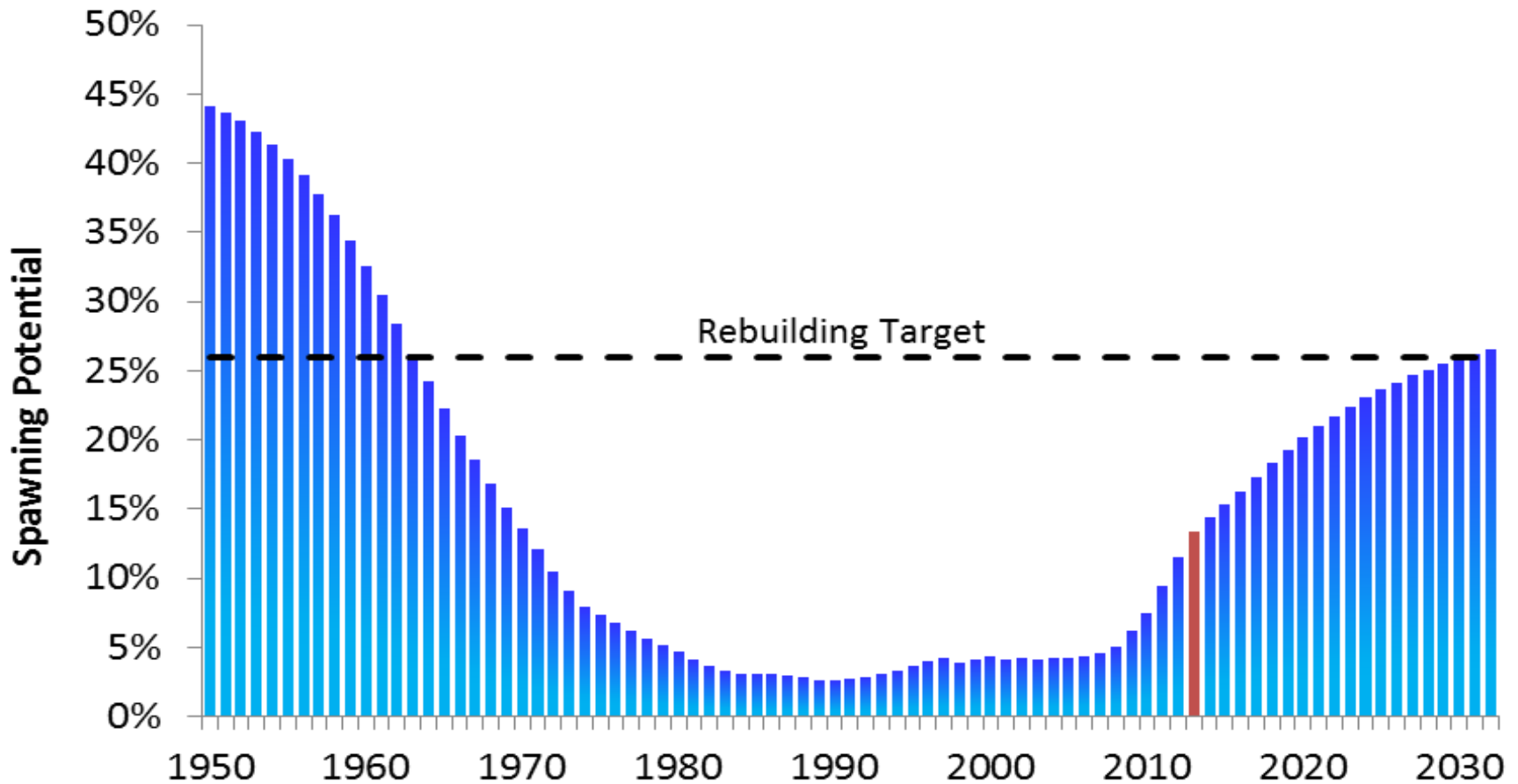


John Rae



NMFS SERO

# Red snapper rebuilding plan



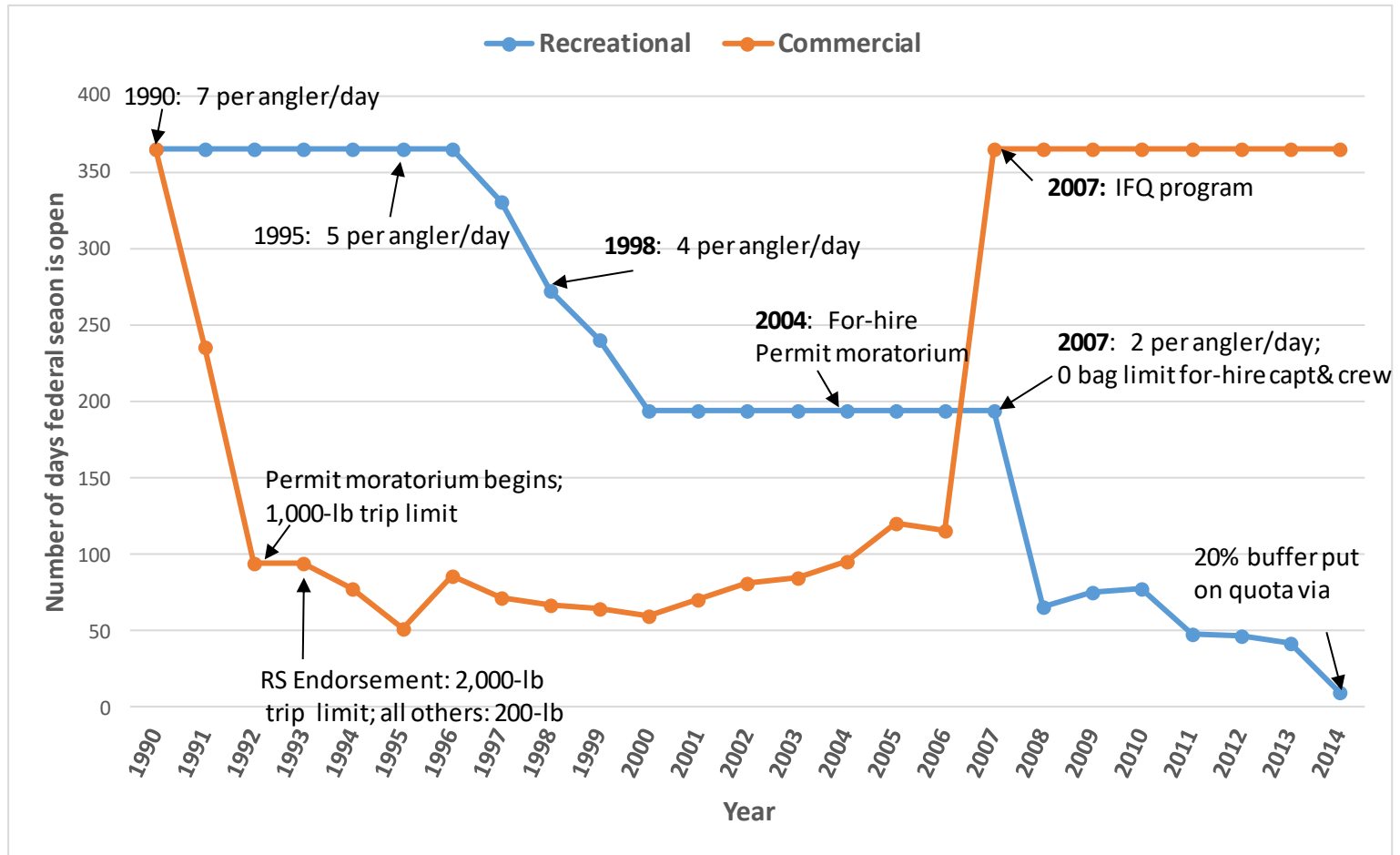
Source: NMFS SERO

# Regulatory environment

- Regulated open access – season limits, bag limits, size limits
- Conflict among user groups
  - Commercial/recreational (reallocation, litigation)
  - Private/for-hire recreational (sub-sector allocation, litigation)
  - Shrimp trawl
- Several attempted interventions by U.S. Congress
- State waters “non-compliant” regulations
  - Longer seasons (up to 365 days), higher bag limits, lower size limits, asserted (unrecognized) expanded jurisdiction
  - Available only for private anglers
- Persistent recreational overharvests; seasons and bag limits lower over time; disproportionate constraints on for-hire fishing

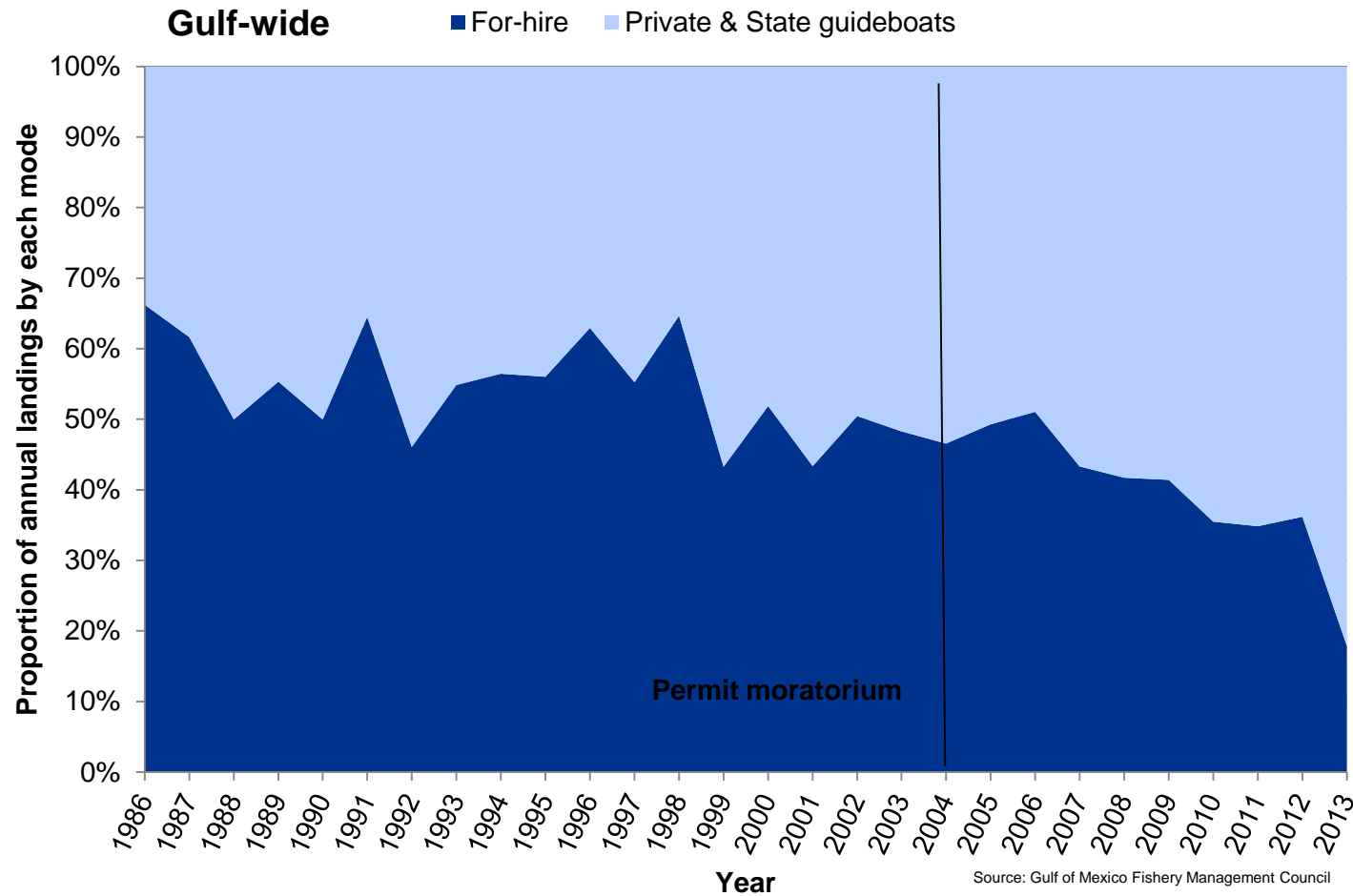


# Red snapper management history



Source: Gulf of Mexico FMC

# Recreational red snapper landings by mode



# Gulf Headboat Collaborative






# Recreational for-hire rationalization

- Recreational sector modes:
  - Private (vessel or shore)
  - For-hire (charter and headboat)
- Headboats are for-hire fishing vessels that carry 15+ passengers and charge primarily by the “head.”
- For-hire represents ~30-40% of reef fish recreational landings, headboats represent ~5-15%.
- Unique across most U.S. recreational fisheries for having trip-level logbook history
- For-hire fishing businesses have similar incentives with commercial fishing. Literature suggests potential for recreational for-hire RBM but this had been untested.

# Recreational for-hire rationalization

- Brown, G.M. and J.E. Wilen (2000). “Implications of various transfer and cap policies the halibut charter fishery.” Report for NOAA AFSC.
  - Proposed halibut charter IFQ program in Southeast Alaska, Gulf of Alaska c. 2005.
  - Abbott, J.K. and J.E. Wilen (2009). “Rent dissipation and efficient rationalization in for-hire recreational fishing.” JEEM 58(3).
  - Abbott, J.K. Maharaj, V. and J.E. Wilen (2009). “Designing ITQ programs for commercial recreational fishing.” Marine Policy 33(5).
  - Leal, D. and V. Maharaj (2009). Evolving Approaches to Managing Marine Recreational Fisheries. Lanham, MD: Lexington Books.
- 

# Exempted fishing permit (EFP):

- Issued to individuals for the purpose of conducting research or other fishing activities using private vessels. Permits direct/incidental harvest of species that would otherwise be prohibited.
- Exempted: recreational season closures for red snapper and gag grouper
  - Recent season closures are 11 to nearly 12 months (red snapper) and 6 months (gag)
  - Not exempted: Size and bag limits, seasonal spatial grouper closure, red snapper harvest prohibition after aggregate quota attained
- This EFP permits potential year-round fishing subject to quota availability and enhanced monitoring requirements.

# Gulf Headboat Collaborative (GHC) pilot program, 2014-2015



# GHC operations 2014-2015

- Voluntary 2-year pilot program
- Structure: fishing cooperative – collective quota allocations proportional to members' landings histories; sub-allocated among members by contract
- Self-governance:
  - Board of directors, operations agreement, membership dues
  - 5% quota reserve in 2014, 10% in 2015, held in common pool
  - Reserve release s.t. in-season landings weights vs. pre-season estimates by port
  - Retain any fish that appears mortally wounded, \$500/fish overage penalty (never used)
- Quota transferability (some barter, some \$20/fish)
  - 31 vessel to vessel transfers in 2014, 21 transfers in 2015
  - Additional transfers with common pool for rebalancing landings weights, reserve release

# GHC operations 2014-2015

	2014	2015
Vessels	17 (25%)*	19 (28%)*
RS alloc. (lbs.)	286,457	280,497
Gag alloc. (lbs.)	43,053	41,728
Quota reserve	5%	10%
Transfers	31	21
Fish transferred	3288 rs, 49 gag	2840 rs, 106 gag
Utilization	99% rs, 50% gag	90% rs, 38% gag

\* % relative to total Gulf of Mexico headboats



Thorium > SE Catch - Headboat Cooperative EFP Pre-Landing

\*This report is required by, and only authorized for, vessels currently operating under the Headboat Cooperative Exempted Fishing Permit. This report is required to be sent at least one hour prior to landing. Total landings by fish for Red Snapper and Gag Grouper must be reported.

OK

Select the State of the landing location:  
FL

Select the City of the landing location:  
Clearwater Beach

Select the Name of the landing location:  
Double Eagle Fleet Slip 51

Select the estimated landing time:  
13:50

Select the timezone:  
CST

Select the arrival date:  
Today

What are the total number of Red Snapper catch onboard?  
100

What are the total number of Gag Grouper catch onboard?  
200

Request confirmation code through email at additional cost?  
No

AT&T 4G 11:57 AM

Cancel Trip Report Save Cancel Trip Report Save

<b>Departed</b>	Tue, Sep 17, 2013 11:45 AM
<b>Returned</b>	Tue, Sep 17, 2013 04:00 PM
<b>Captain</b>	Capt Rob
<b>Lat/Long Degrees</b>	29-83
<b>Longitude Minutes</b>	D - (20 - 29)
<b>Latitude Minutes</b>	3 - (30 - 39)
<b>Anglers</b>	20
<b>Min Depth Fished</b>	30
<b>Max Depth Fished</b>	70

**Catch**

<b>Species</b>	GAG
<b>Number Kept</b>	3
<b>Number Released</b>	2
<b>Species</b>	RED SNAPPER
<b>Number Kept</b>	12
<b>Number Released</b>	8
<b>Add Species</b>	

**Save Trip Report** **Delete Trip Report**

Source: NMFS SERO

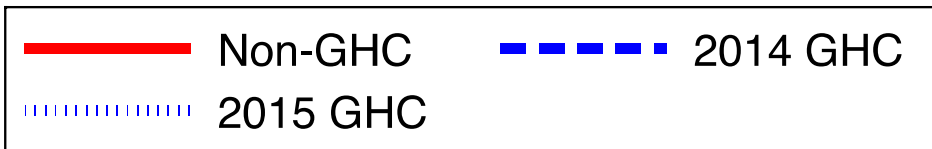
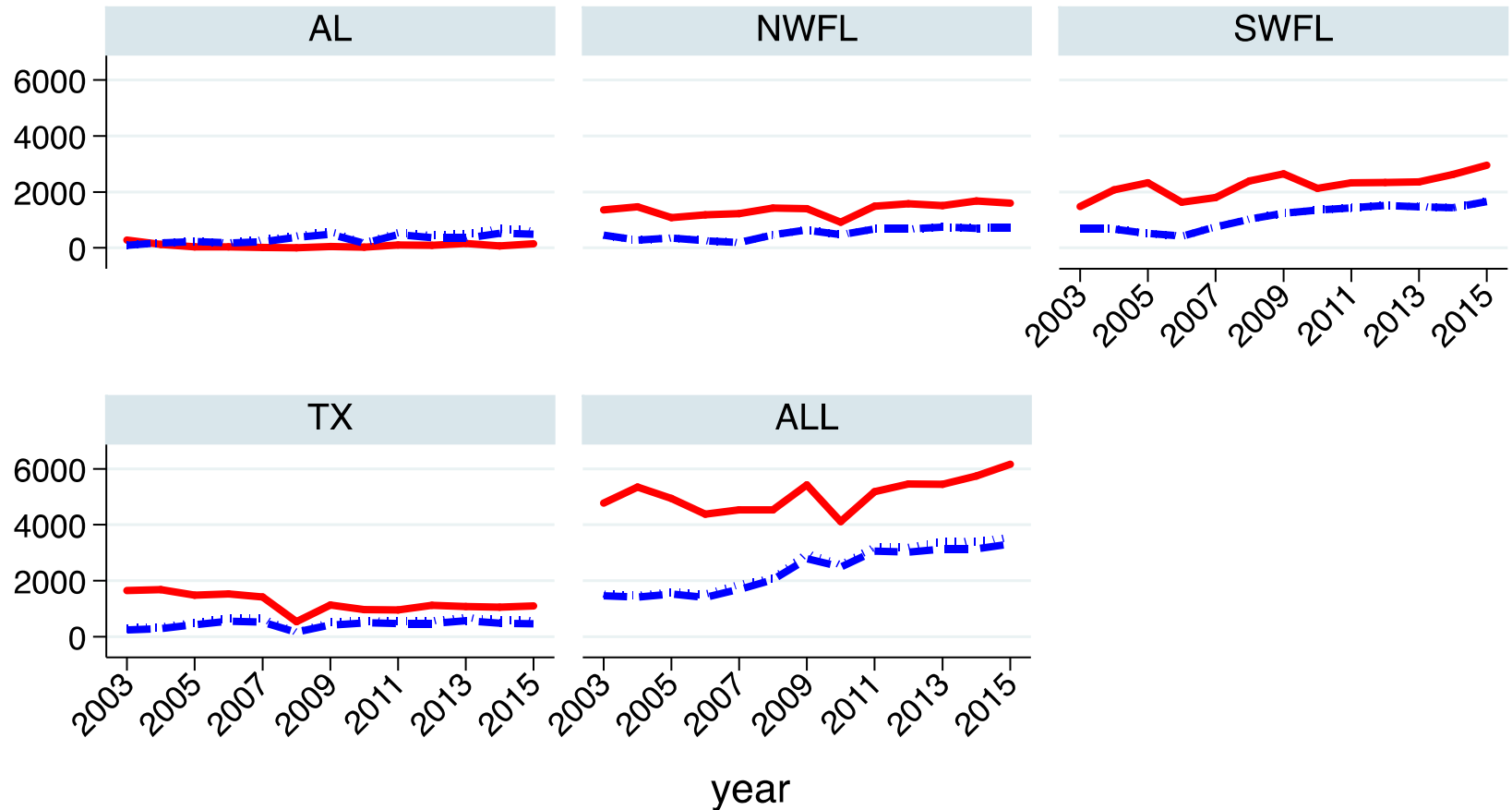
- Enhanced monitoring
  - Catch reported with electronic logbook same day as each trip
  - Quota deducted from online vessel accounts
  - Vessel monitoring systems (VMS)
  - Tags

# Program Evaluation

# Program Evaluation

1. 2003-2015 trip-level logbook data for vessels owned by GHC members
  - Landings, discards, anglers, locations, trip duration
2. Aggregated and censored 2003-2014 logbook data
  - Non-GHC logbooks unavailable due to government confidentiality
  - Aggregated by region/year and region/week
3. Economic surveys of GHC vessel owners
  - Years: 2013 (baseline), 2014, 2015
  - Trip characteristics, pricing, input costs, attitudes
4. Economic valuation survey of GHC passengers
  - 2 page survey on-board (10,718 returned)
  - Anglers recruited to online RP/SP survey (813 completed)

# Number of Total Trips



Graphs by HP\_State

# Summary: GHC vs non-GHC

- 2013-2015: 5.5% increase in total trips for GHC vs. a 13% increase for non-GHC
  - Similar trends in angler-days across the 2 groups
- 2013-2014: Large increases in red snapper or gag trips (114%) and landings (80%) for GHC vs. reductions for non-GHC
- In 2015 GHC red snapper trips stayed constant despite a decrease in allocation
  - Non-GHC red snapper trips and angler-days increased relative to 2014 (new sector separation policy increased common pool season 4x) but by less than their effective increase in allocation
- Similar, more muted, patterns for gag

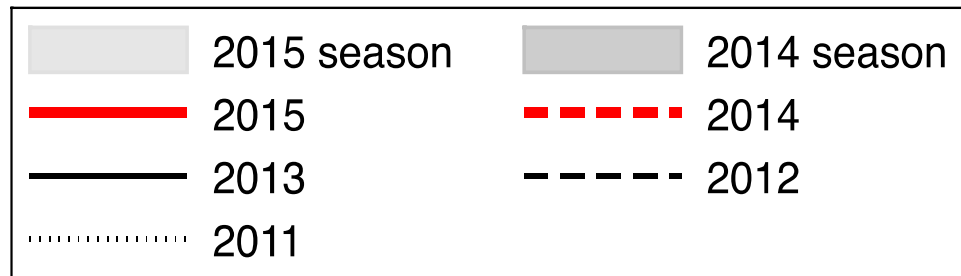
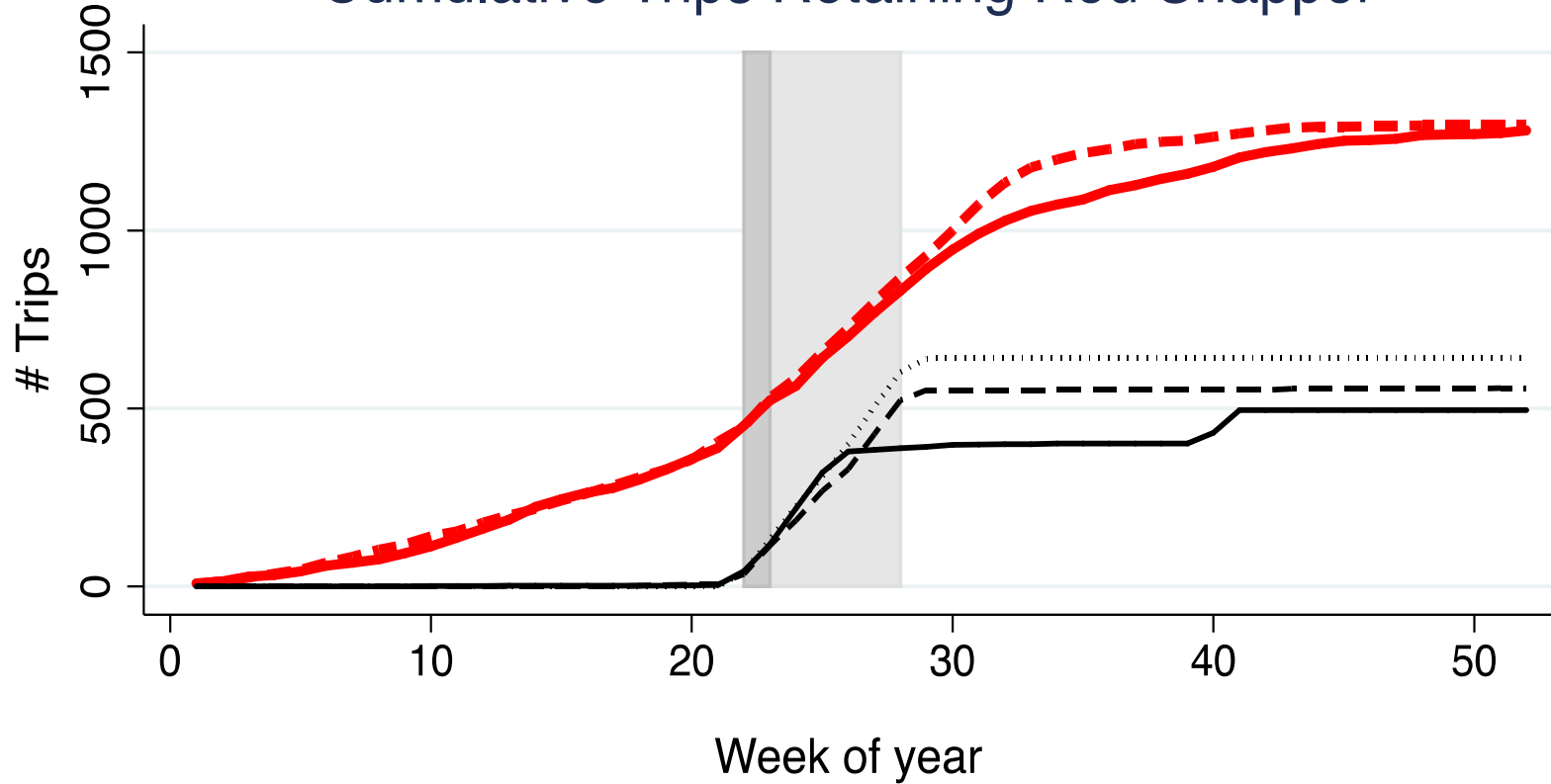
# GHC performance 2014-2015

	2014	2015
Landings rs (fish)	54,907	47,092
Landings gag (fish)	3025	1768
Total trips	3138 (+0%)*	3542 (+5%)
RS/gag trips	1877 (+114%)	1799 (+88%)
Customers	103,850 (+6%)	119,371 (+5%)
RS/gag customers	62,487 (+117%)	60,240 (+77%)
Discards per catch rs	-28%	-34%
Discards per catch gag	-21%	-18%
Port validation**	23%	26%

% Δ relative to 2013

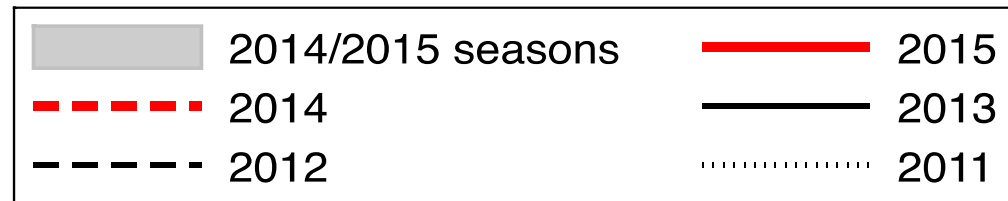
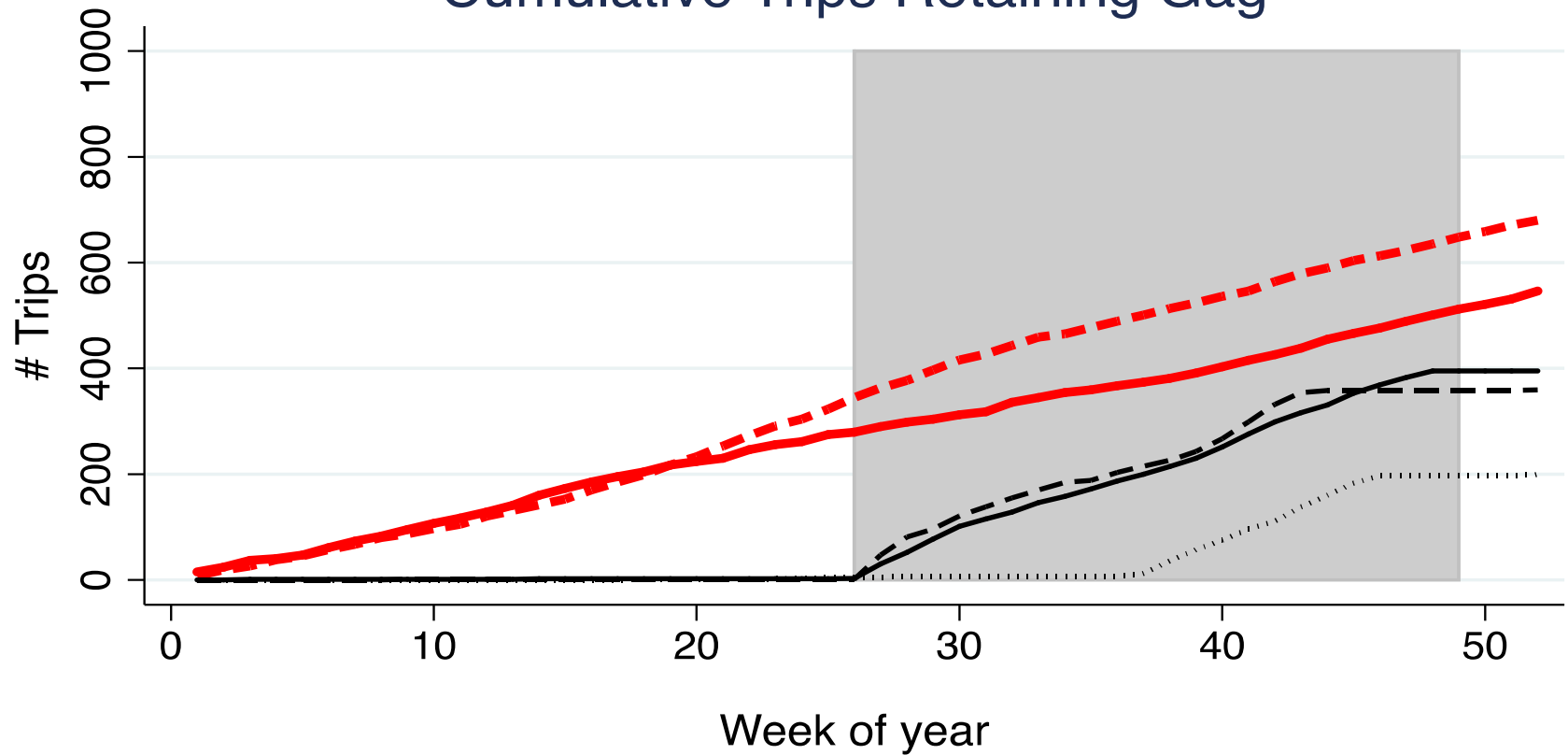
\*\* Compared to 10% status quo

## Cumulative Trips Retaining Red Snapper





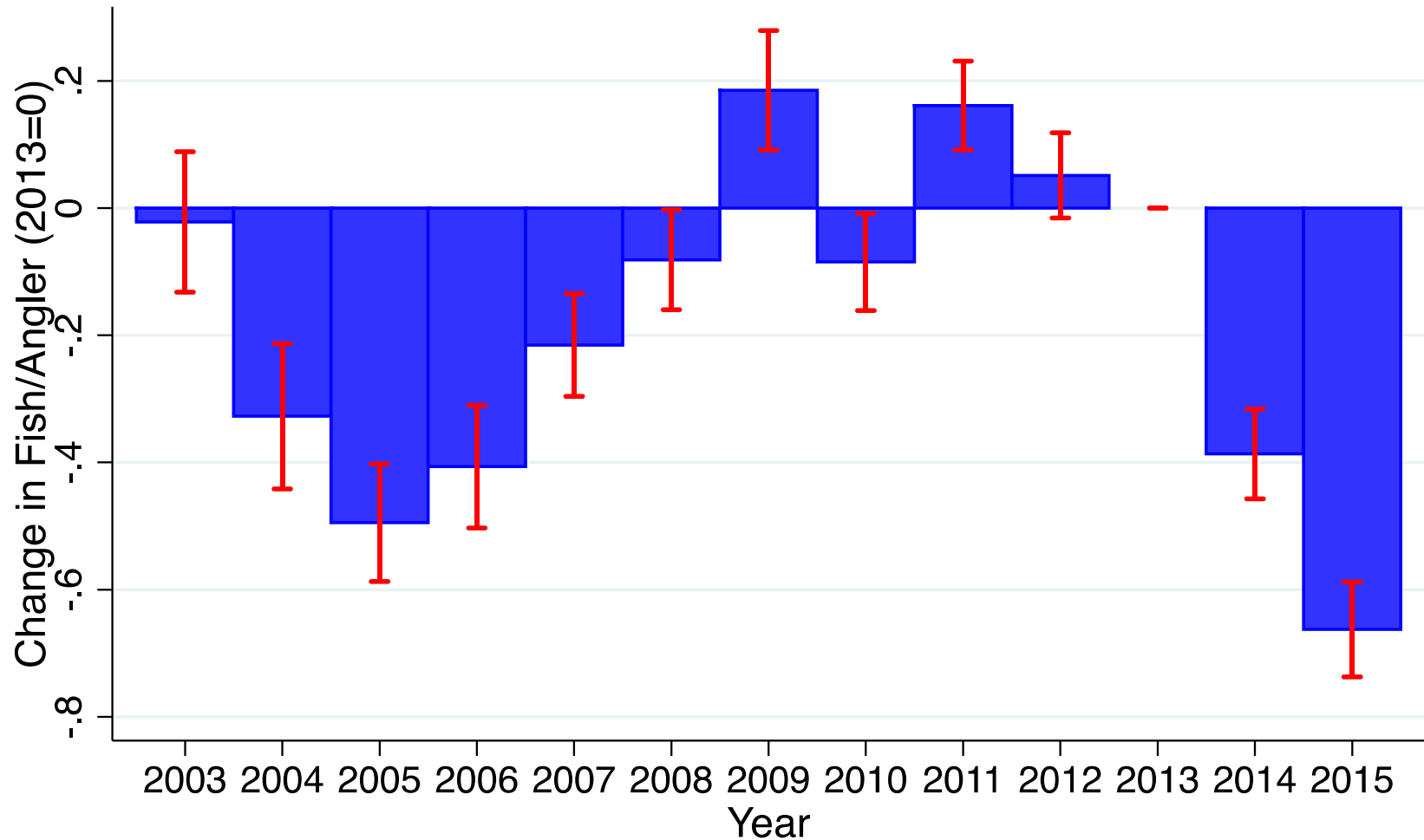
## Cumulative Trips Retaining Gag



# GHC red snapper per angler

Red Snapper per Angler (base=2013)

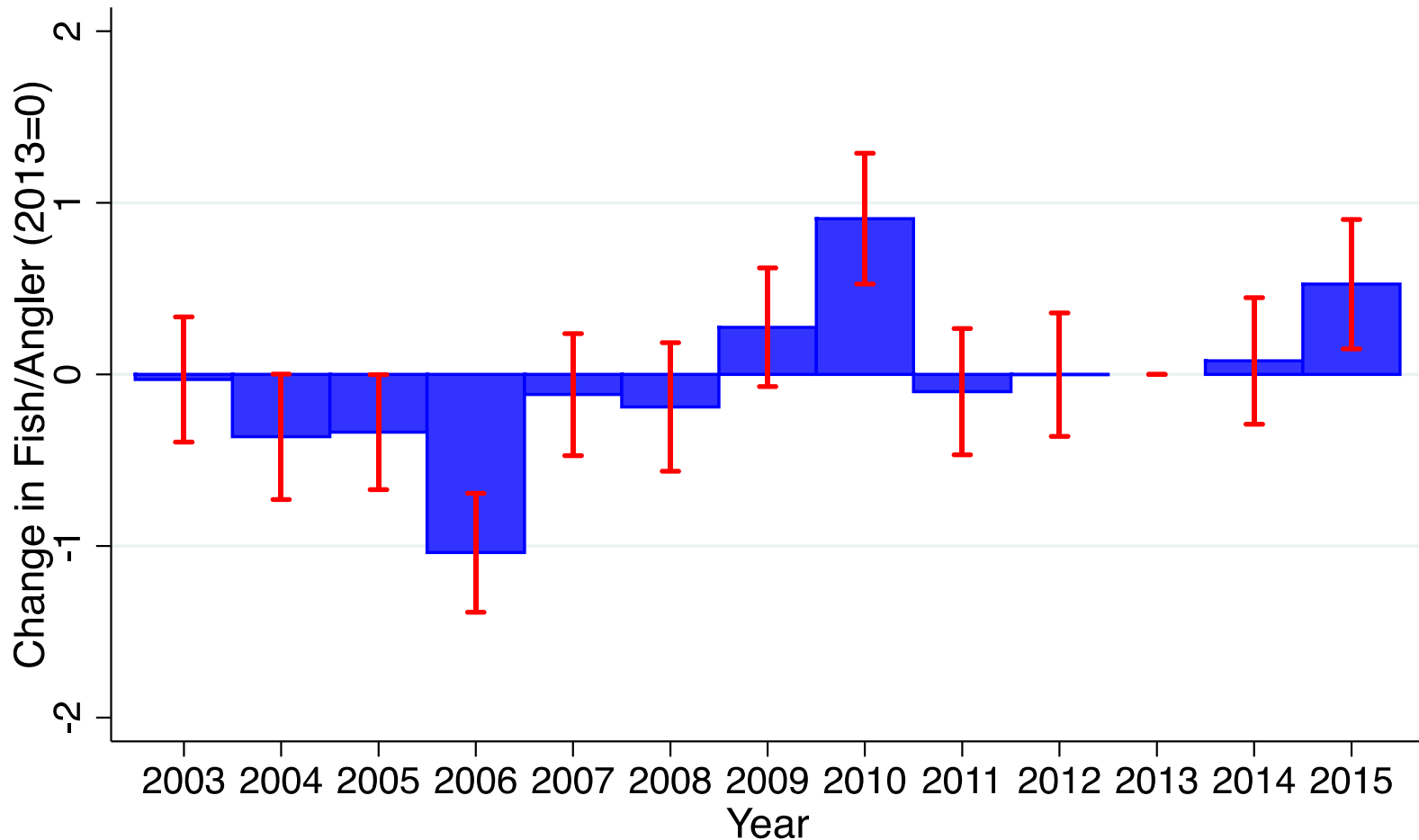
All Red Snapper Trips



Estimates from regression model with vessel and month fixed effects. Weighted by anglers per trip

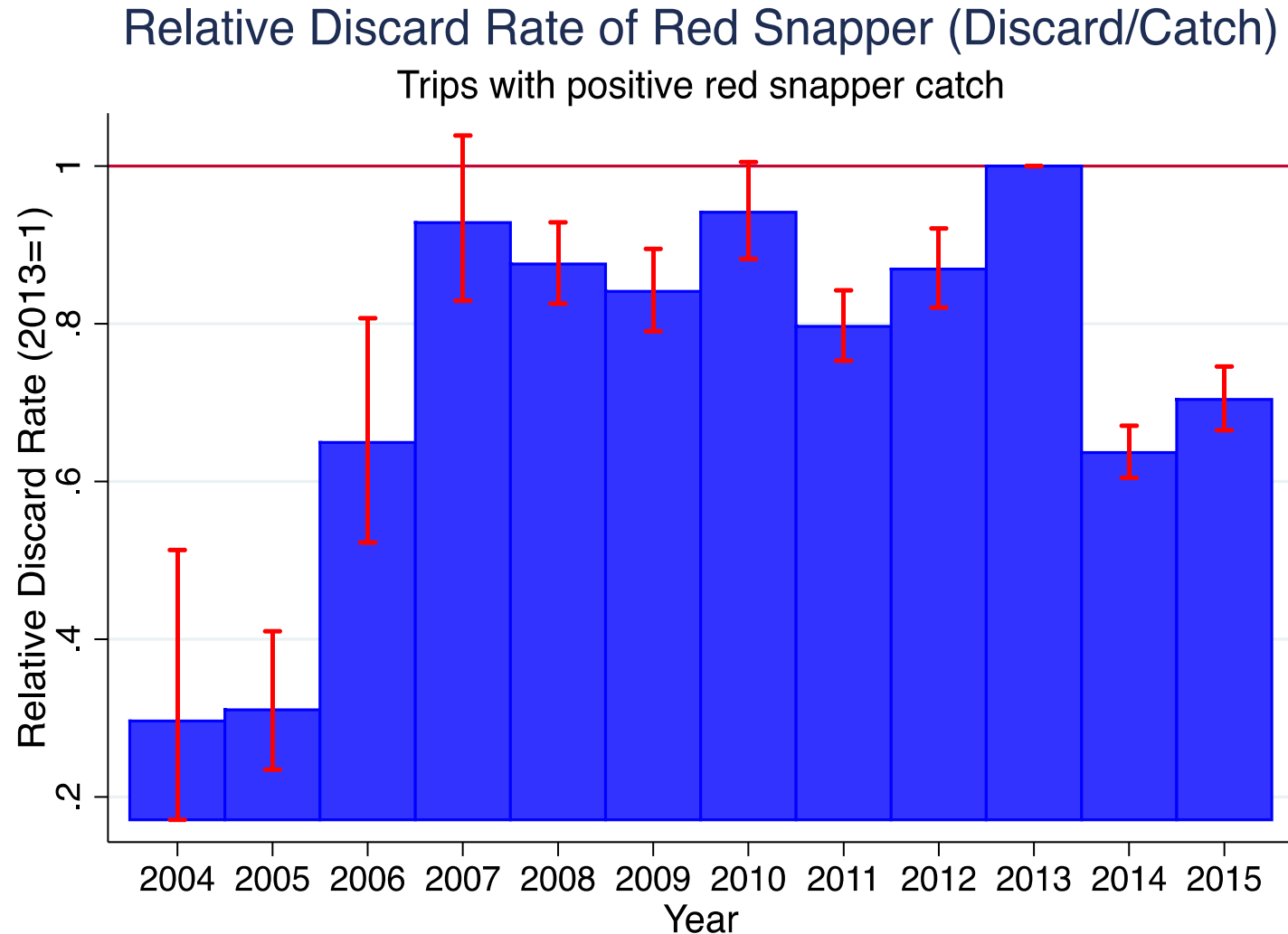
# GHC, total landings per angler

All Landings per Angler (base=2013)  
All EFP Species Trips



Estimates from regression model with vessel and month fixed effects. Weighted by anglers per trip

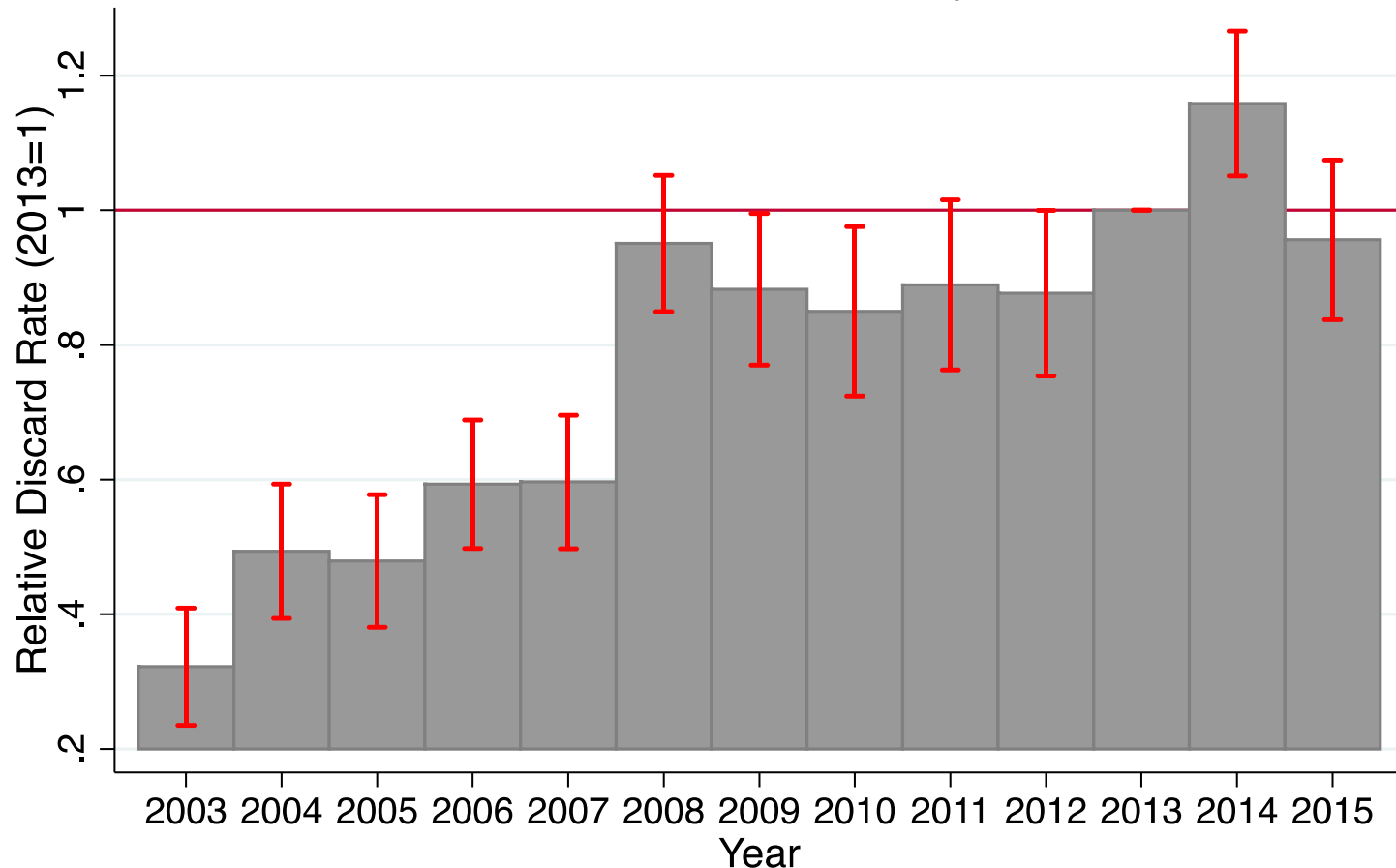
# GHC discard rates, red snapper



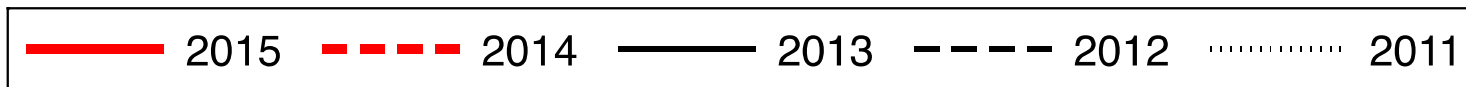
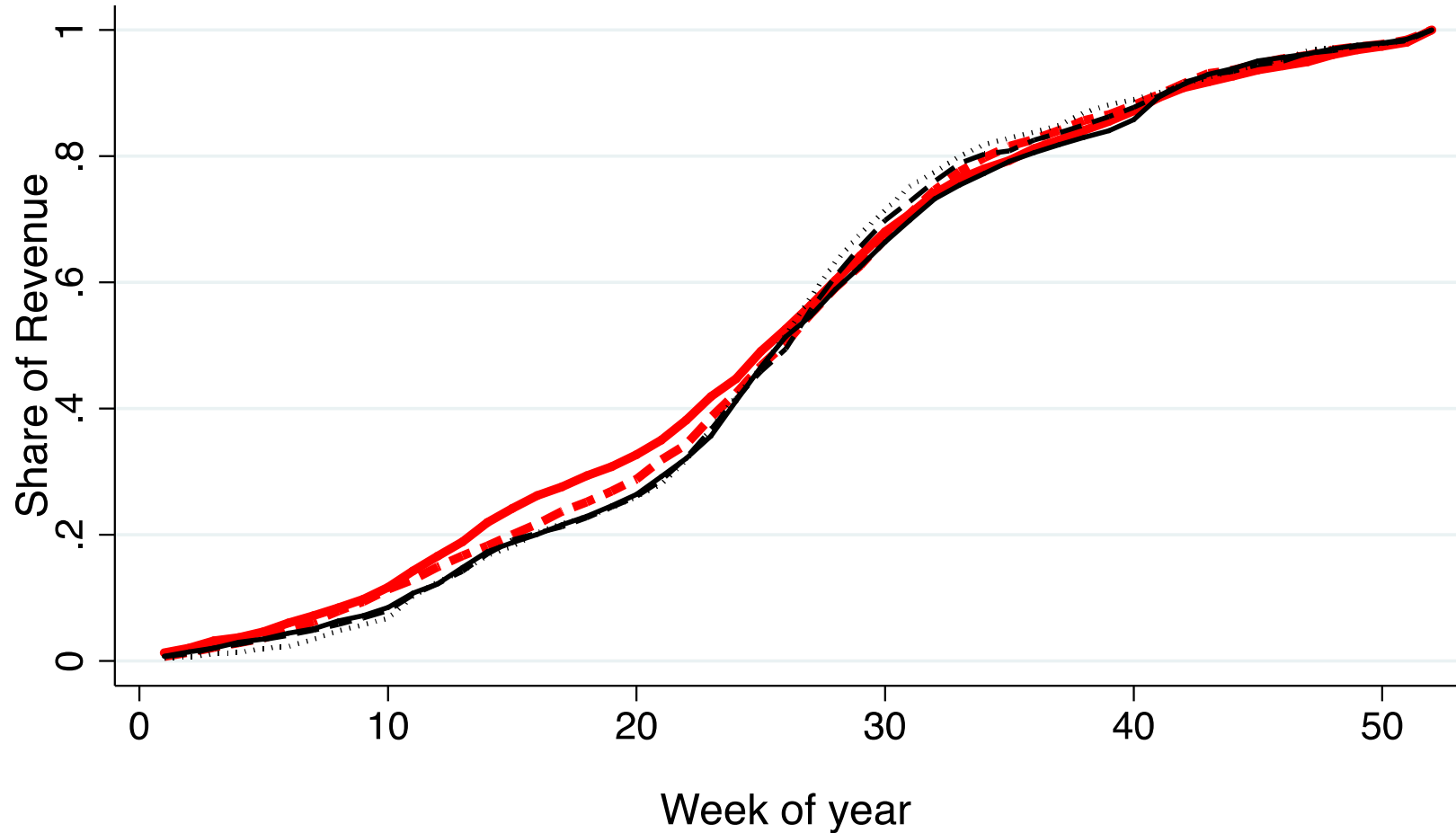
# Non-GHC discard rates, red snapper

Relative Discard Rate of Red Snapper (Discard/Catch)

Non-GHC Vessels Only



# Share of Seasonal Revenue

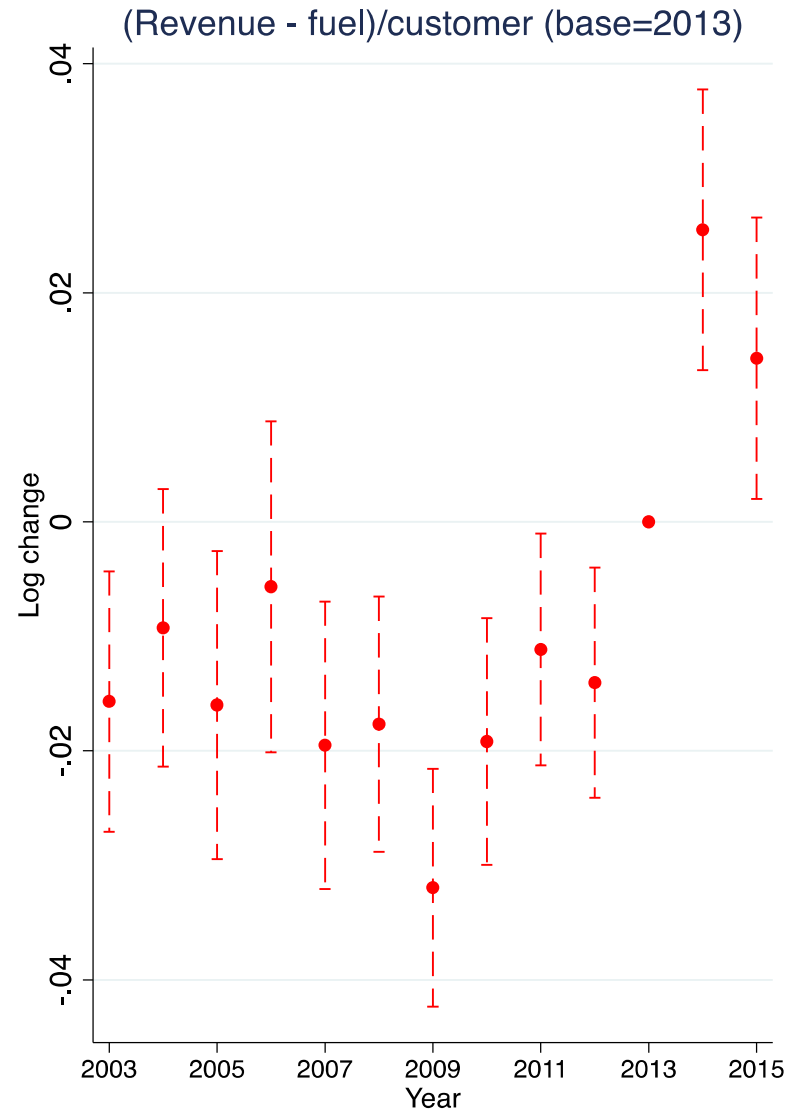
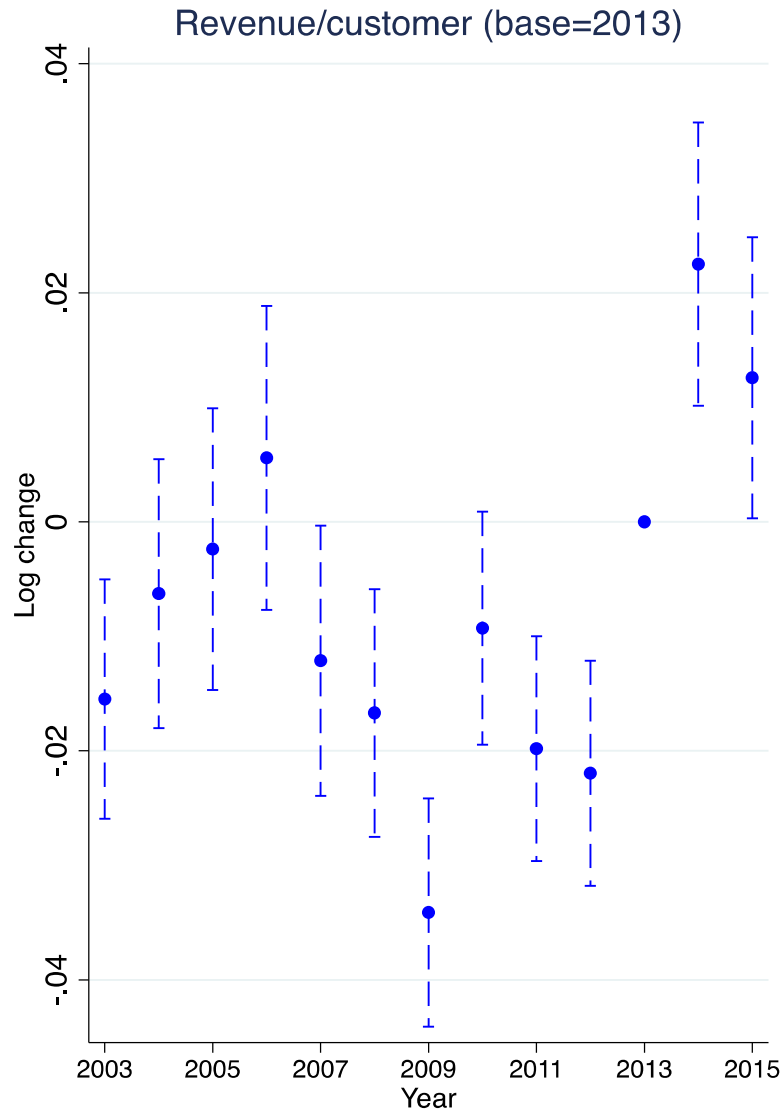


# GHC, net revenues


- Overall net revenues increased 8.9% (7.9%) in 2014 (2015).
  - Net revenue = revenue – fuel costs
  - Constant 2014 prices
- Most of this is from a quantity effect
  - Increases in anglers per trip in 2014 and trips in 2015
- There are also net revenue increases from price premia (+1%) and reallocation of anglers to longer, higher price trips (product mix).
- Probability of a trip being a full-day trip, conditional on red snapper retention, increased 0.12 (0.11) in 2014 (2015).



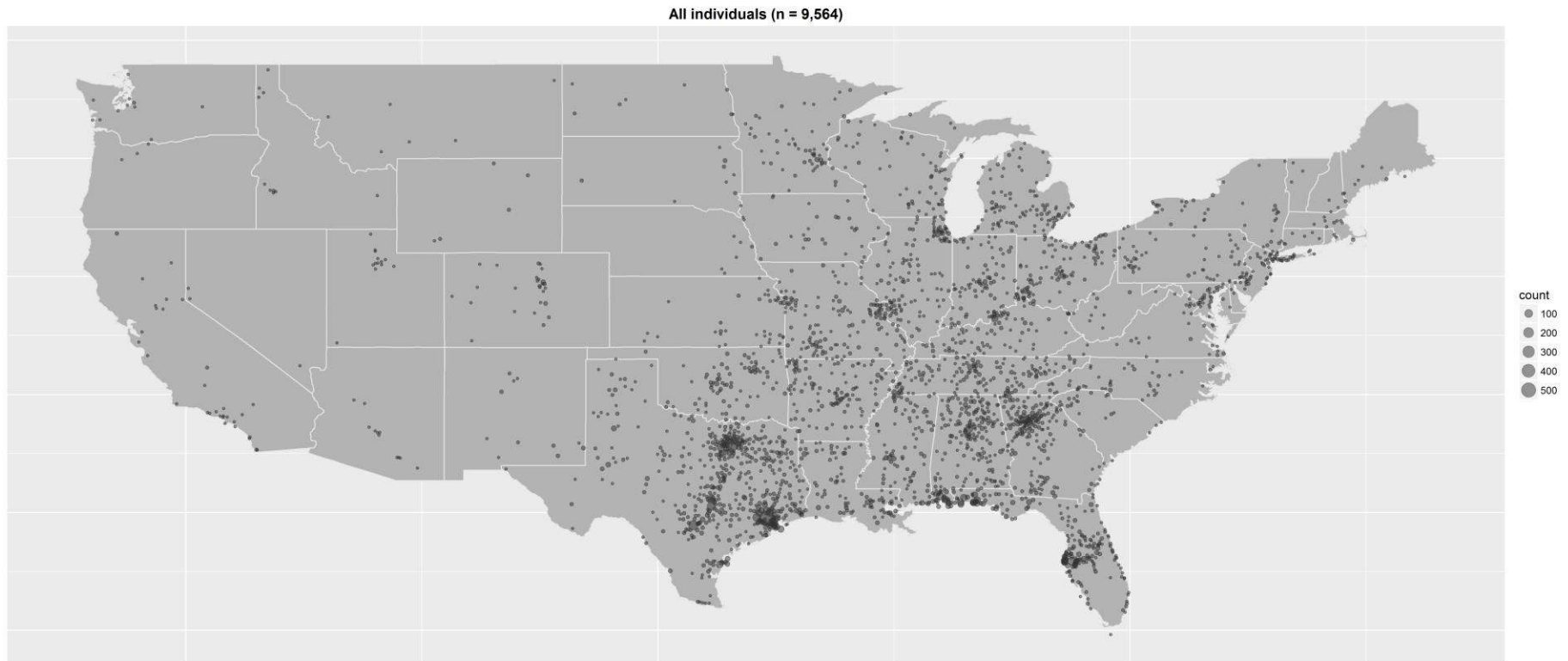
# GHC, product mix



# GHC angler survey

- 2-page survey administered at the end of trip by GHC crew
  - 10,718 total surveys returned, >66% with emails
  - Mean age: 34
  - Mean fishing experience: 15 years
  - % male: 77.5%
  - % new customers: 51%
  - Boat ownership: 14%
  - Median GOM fishing: 1-2 times a year; 26% 3+ times/year in GOM
  - Mean trip duration: 8.7 hours
- 

# GHC angler survey




# Angler valuation survey

- Valuing WTP for rationalization scenarios
  - Status quo fishing is rationed through seasons, but VOT may vary across a year. This can significantly affect welfare change from policy with intertemporal impacts (season closures).
  - We adapted the Kuhn-Tucker consumer demand model for intertemporal choices, including individual season-specific leisure constraints.
  - We estimate MU of angler and trip characteristics and simulate welfare change from policies with variations in prices and bag limits vs. year-round fishing.
- Survey design
  - Revealed preference (recalling previous fishing trips)
  - Stated preference
    - Attitudes, fishing experience, vacation preferences
    - Choice experiments on individual recreational trips
    - VOT WTA questions, seasonal VOT tradeoffs

# Angler valuation survey

- Preliminary evidence suggests significant angler value for rationalization.
  - WTP is positive and substantial (but more muted when year-round fishing is rationed by bag limits rather than prices).
  - Using SP and time-varying VOT increases WTP relative to 1/3 wage proxy.
- Latent class models of policy choice scenarios reveal preference parameters for two distinct classes:
  - Class 1 (58%) is sensitive to changes in trip prices and bag limits but not year-round retention.
  - Class 2 (42%) prefers year-round retention. These anglers are more likely to have higher incomes and have second homes in the region. Preferences increase with the seasonal spread of rationalized trips.

# Summary

1. Angler access to trips landing EFP species dramatically increased, especially in the Spring and late Summer (seasons otherwise closed).
  2. To stretch quota use, vessels reduced red snapper/gag landings per customer while maintaining overall landings and dramatically reducing discards of EFP species.
  3. Net revenues grew from recent years, driven by additional customer demand, shifts of customers to higher-margin trips, and modest price premia for EFP trips.
  4. Preliminary evidence of significant angler value for intertemporal flexibility in fishing opportunities.
  5. Two fishery plan amendments based on the GHC model are moving through the Gulf of Mexico Fishery Mgmt. Council process: Am 42 (~70 headboats) and Am 41 (~1200 charter boats).
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# More information

- NMFS SERO (2015). “Headboat Collaborative Pilot Program 2014 Annual Report.” March 2015.
- Abbott, J.K. and D. Willard. 2017. “Rights-based Management for For-Hire Fisheries: Evidence from a Policy Trial.” In review
- Lloyd-Smith, Patrick, J.K. Abbott, W. Adamowicz, and D. Willard. 2017. “Intertemporal Substitution and the Value of Leisure Time.” In review.
- Abbott, J.K., P. Lloyd-Smith, W. Adamowicz, and D. Willard. 2017. “Estimating the Hidden Costs of Derby Management for Recreational Resources.” Work in progress.
- GHC pilot program design and administration:
  - <http://gulfheadboat.com/>
  - [http://sero.nmfs.noaa.gov/sustainable\\_fisheries/gulf\\_fisheries/reef\\_fish/2013/headboat\\_efp/](http://sero.nmfs.noaa.gov/sustainable_fisheries/gulf_fisheries/reef_fish/2013/headboat_efp/)



RED SNAPPER  
IS OPEN



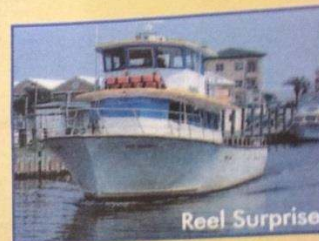
YEAR ROUND

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Reel Surprise

251.981.FISH



Zeke's Lady

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