Commercial Fishing Accidents and IFQ Programs in the Gulf of Mexico

Red Snapper and Grouper/Tilefish Fisheries

NOAA FISHERIES
SEFSC
Social Science Research Group

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Objective:

- To investigate the safety effects of shift from open-access to IFQ for red snapper and grouper/tilefish

Major Findings:

- Fishermen choose more favorable weather condition to fish after the introduction of the IFQ programs
- Weather has played a less important role as a cause of fatal injuries
- Fatality rate per 100,000 dropped from 19.08 pre-IFQ to 14.83 post-IFQ programs

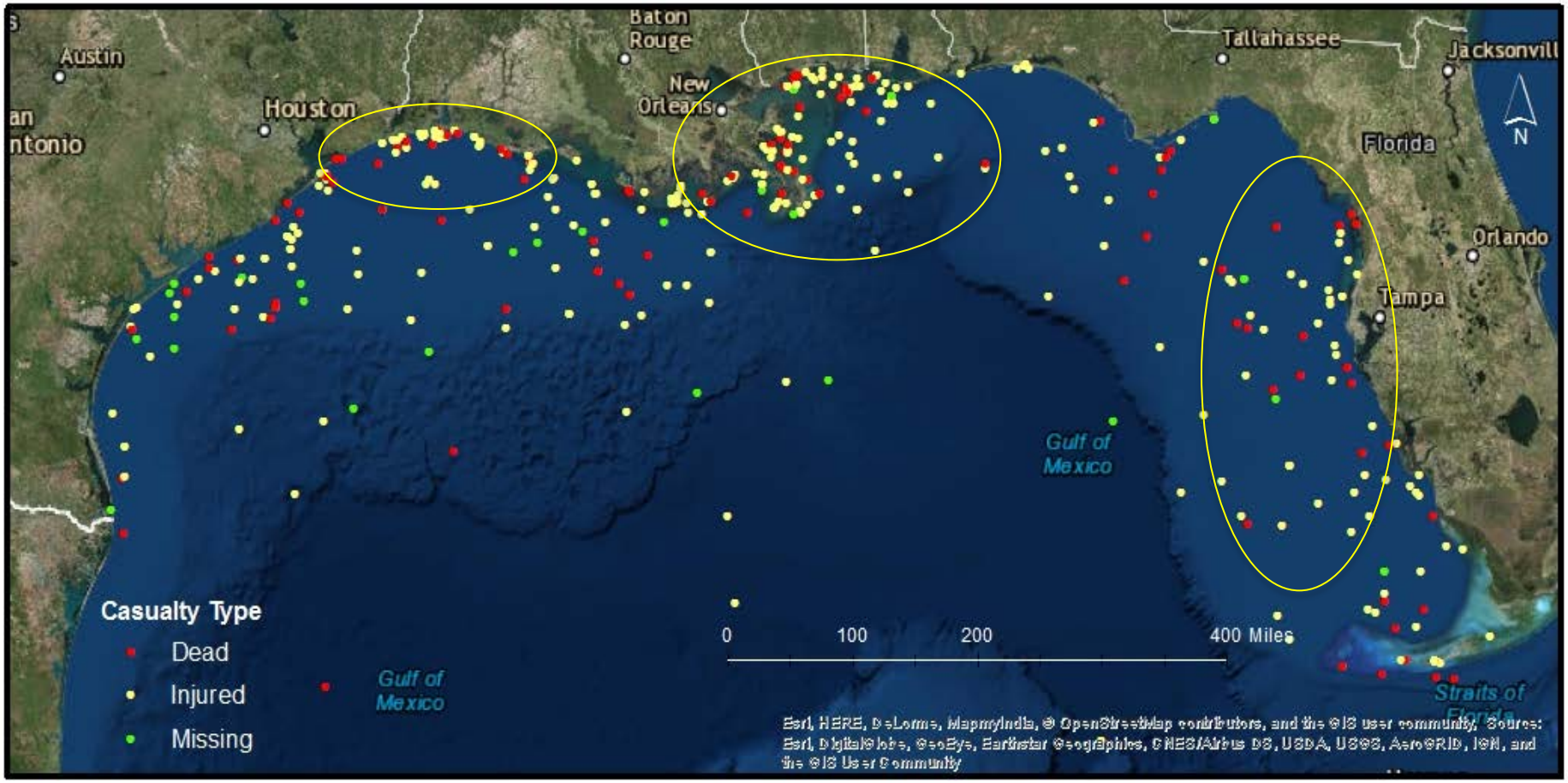
Dangerous Business of Fishing

- Harsh weather, long hours, and laborious work
- Highest occupational injury rate for the fishing industry nation-wide: 80.8 death rate per 100,000 FTE in commercial fishing relative to 3.3 for all industries nationwide in 2014
- Fishing derbies
- Government regulations
  - Promotion of safety in Magnuson-Stevens Fishery Conservation and Management Act (1976, 2007)
  - NOAA fishing seasons, quota, IFQ programs, observer program
  - USCG safety regulations, Commercial Fishing Vessel Safety Examination Certificate

Fishery Accident Studies Literature

- Safety regulations effects on investment and operating decisions of fishermen
- Weather condition, location, and vessel characteristics
- Are fishermen risk-averse?
- Interviews with captains and fishermen, downgrade the level of risk and don’t comply with safety regulations
- vessels non-compliant with vessel safety regulations and lack of safety training common, captain interviews revealed risk loving attitude
- High level of self-employed in U.S. commercial fishery
- Value of statistical life estimates in fishery

Commercial Fishing Accidents in the Gulf of Mexico (1993-2012)



Data

- Daily vessel profile constructed for 3,257 commercial fishing vessels with reef fish permits in the GOM for 2000-2012 (N=10 million, completed N= 3.5 million)
- Data sources:
  - Center for Disease Control (CDC)
  - Southeast Coastal Logbook (NMFS)
  - Permit Information Management System (PIMS)
  - National Buoy Data Center (NBDC)
  - Regional Fishery Management Council
  - NMFS Reef Fish Observer Program
  - Bureau of Labor Statistics (BLS)
- Constructing full-time equivalent (FTE)
- Establishing wages (compensation), revenue sharing

Variables	Pre IFQ	Post 2007 IFQ
Fatality Rate Per 100,000 FTE	19.08	14.83
Moving Average of Daily Crew Net Revenue Share	190	250
Days at Sea Per Trip	3.69	4.86

Considerations to Build the Model

- The probability of an accident is contingent upon the decision to take a fishing trip, which is not random
- Unobserved factors are likely to affect both the trip decision and the probability of a fatal accident
- To avoid bias in a potentially non-random selection among vessels taking a trip each day, an “incidental truncation,” we follow Heckman’s (1979) two-step procedure
- The residuals of the trip decision equation used as a selection bias control factor (lambda)
- Pelzman’s risk-compensating behavior

The Model

1. Selection Equation (Probit, Max. Like. method)

   Probability of Fishing=f(Weather Condition, Revenues, Vessel Characteristics, Labor Market Conditions, Stock Size, Remaining Quota, IFQ Programs)

2. Main Equation (Least Squares method)

   Fatality Rate=f(Weather Condition, Revenues, Vessel Characteristics, Days at Sea, Remaining Quota, IFQ Programs, Unobserved Effects)

Heckman Model Parameter Estimates for Selected Variables	Selection Eq. **(Partial Effects at Ave.)**	Main Eq.
Wind Speed	-0.07	0.27
Red Snapper IFQ	-0.06	-1.61
Grouper Tile IFQ	-0.15	-7.15
Unemployment Rate	0.06	-
Remaining Quota	0.08	0.78
Crew Net Revenue Share- moving ave.	1.07	8.80
Days at Sea	-	0.27
Crew/Length	-	0.23
Hook Gear	-	-0.35
Unobserved Variables (lambda)	-	8.84
All estimated coefficients are statistically significant at the 99% confidence level.		

Main Results

- Lower chances of fatality after the introduction of the IFQ-RS and IFQ-GT programs
- High wind speed reduces the odds of taking a trip (more so after the IFQ-RS program- results form divided sample)
- The role of wind speed in causing fatal accidents is reduced after the IFQ-RS program

Conclusions

- The IFQ programs in the GOM have indeed met the objective of improving commercial fishing safety!