



What you get for what you pay

A cost efficiency analysis for catch monitoring in the New England groundfish fishery

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Outline

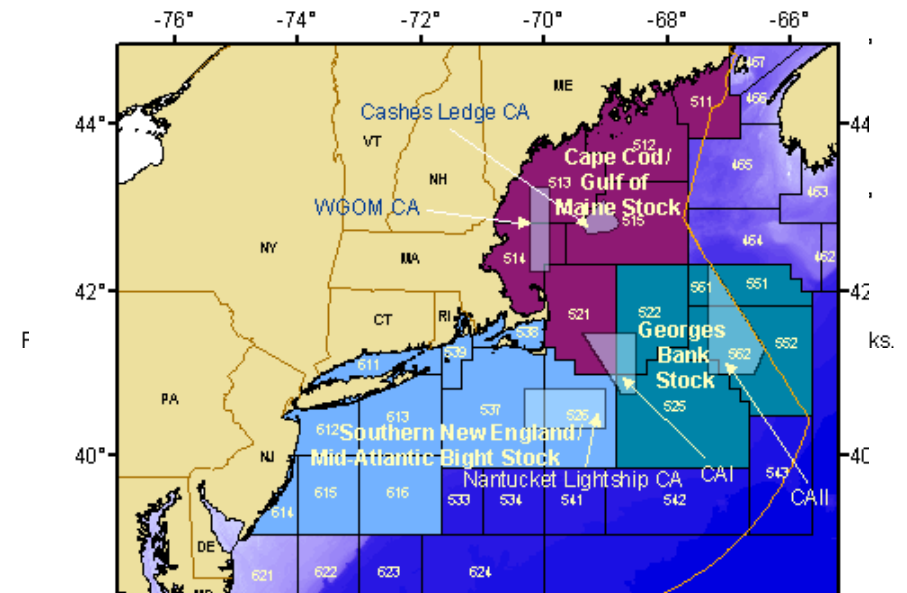
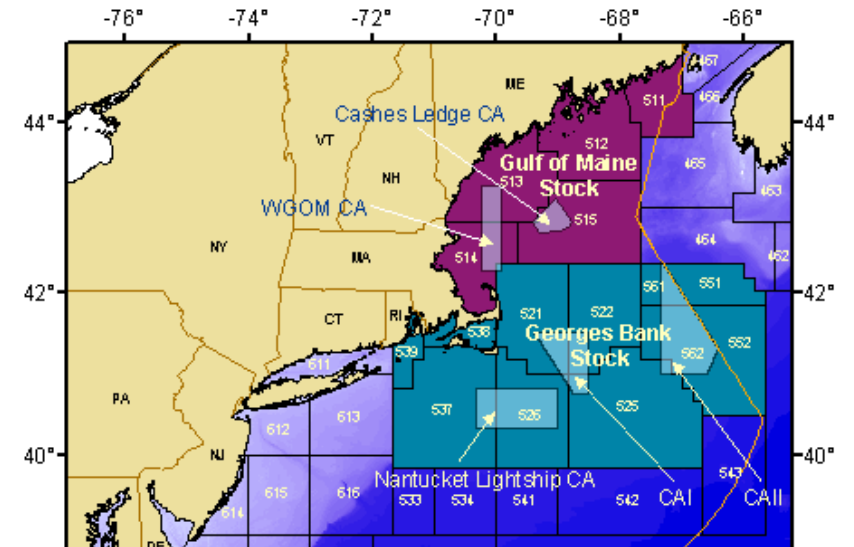
- Background NE groundfish- management/monitoring
- At Sea Monitors, Electronic Monitoring, Dockside Monitors
 - What you pay
 - Costs, program
 - What you get
 - Data Quality

Preliminary Estimates – FEEDBACK PLEASE!

Northeast Multispecies/New England Groundfish

Northeast Multispecies Species List

 American Plaice	 Atlantic Cod	 Atlantic Halibut	 Atlantic Pollock	 Atlantic Wolffish PROHIBITED
 Haddock	 Ocean Pout PROHIBITED	 Redfish	 White Hake	 Windowpane Flounder PROHIBITED
 Winter Flounder	 Witch Flounder	 Yellowtail Flounder		



Input control to output control

Days At Sea

Mandatory discards

Trip limits

Sublegal fish

2010

Amendment 16

Catch Shares

Sectors

Quota landings/discards

Leasing

Mandatory discards

Sublegal fish

prohibited species

Common pool

Days at sea

Monitoring matters!

- Ending overfishing
- Accountability measures
- Stock assessment
- Quota lease market



Monitoring matters!

'Codfather' Carlos Rafael pleads guilty

By Samuel Hill | March 30, 2017

Carlos "the Codfather" Rafael pleaded guilty Thursday to evading fishing quotas and smuggling the profits to Portugal.



Carlos Rafael owns Carlos Seafood in New Bedford, Mass. Steve Kennedy photo.

"Today, I pled guilty to the charges facing me," Rafael in a statement released just before he was scheduled to appear in U.S. District Court in Boston. "I am not proud of the things I did that brought me here, but admitting them is the right thing to do, and I am prepared to accept the consequences of my actions."

Rafael's sentencing hearing is scheduled for June 27. The U.S. attorney recommended 46 months of prison time.

"Mr. Rafael's scheme not only compromised delicate fish populations, but also profited on the backs of his hard-working crews," Acting United States Attorney William D. Weinreb said in a statement. "Mr. Rafael knew he was breaking the law by falsifying records, evading taxes and smuggling ill-gotten profits to Portugal. Without Mr. Rafael and his scheme, New England fishermen who work hard for honest pay can now

-National Fisherman

Monitoring in New England

- Human observers
 - At Sea Monitors (ASM)
 - Sector quota utilization
 - Area fished, species, landings and discards, gear type
 - Northeast Fisheries Observer Program (NEFOP)
 - ASM + biological sampling
- 2016 ASM transition to industry funded



Current monitoring target 14%

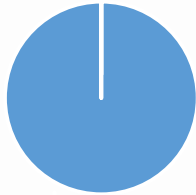
Fishing Year	NEFOP target coverage level	ASM target coverage level	Total target coverage level	Realized coverage level
2010	8%	30%	38%	32%
2011	8%	30%	38%	27%
2012	8%	17%	25%	22%
2013	8%	14%	22%	20%
2014	8%	18%	26%	25.7%
2015	4%	20%	24%	19.8%
2016	4%	10%	14%	n/a*

ASM coverage is low

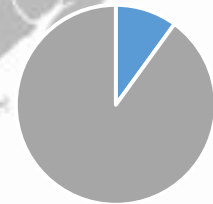
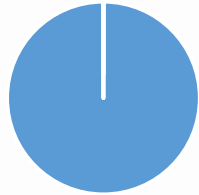
Alaska



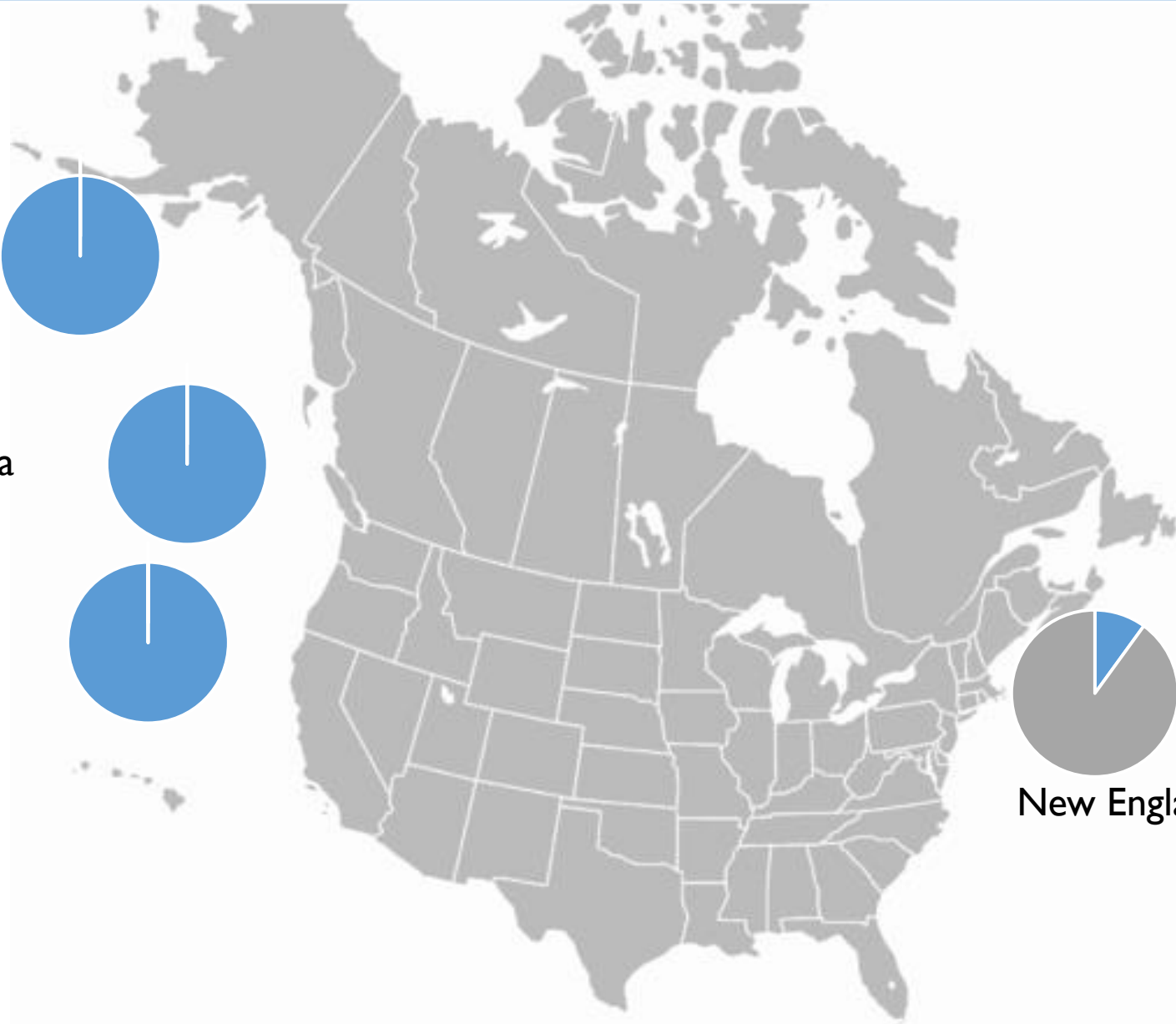
British Columbia



West Coast

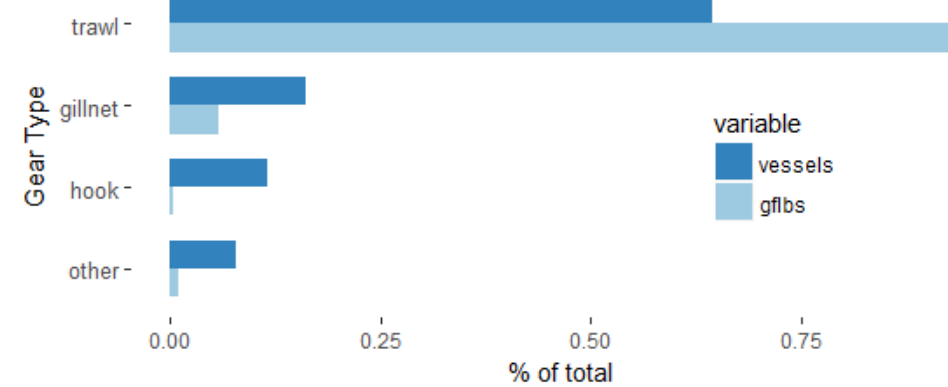
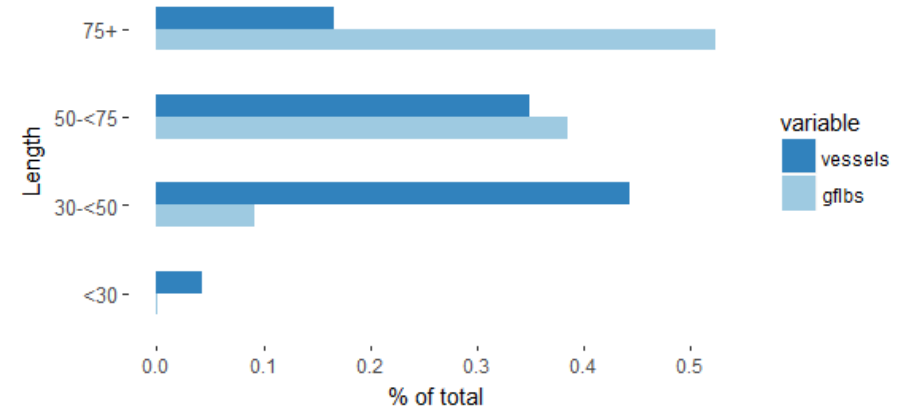
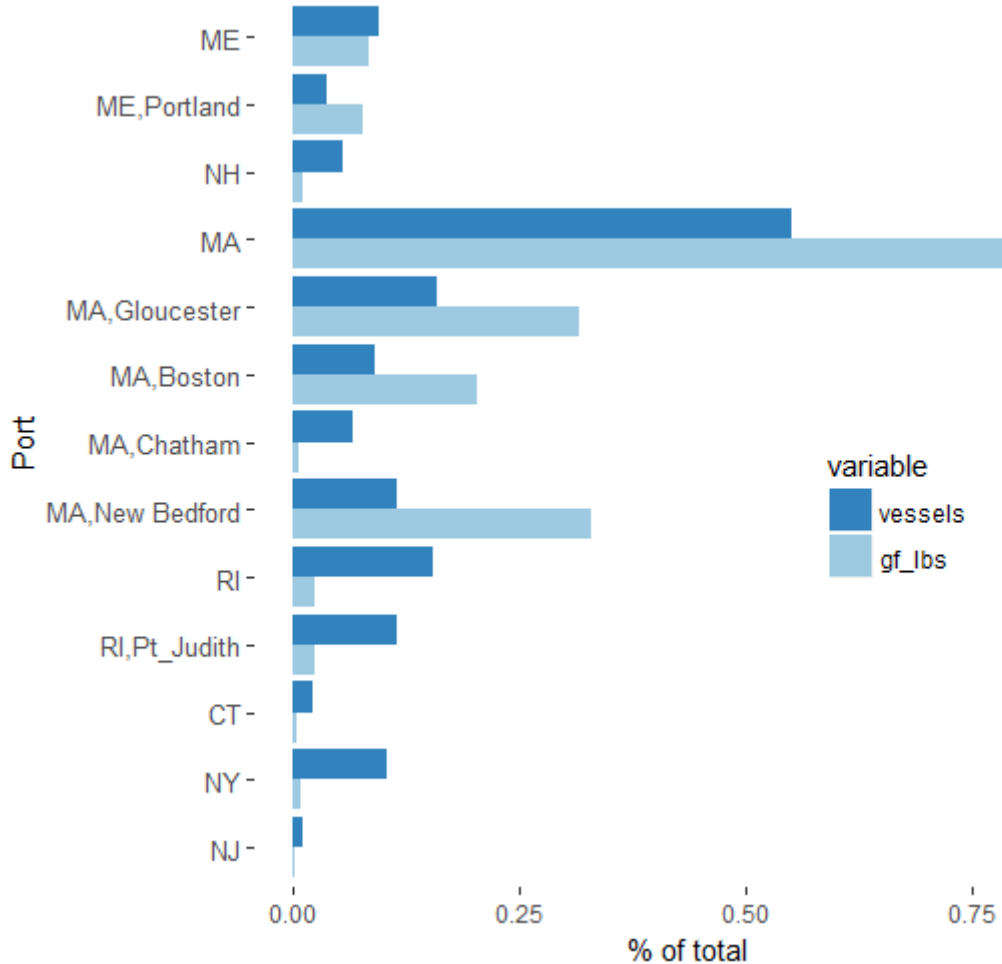


New England



Fleet Characteristics

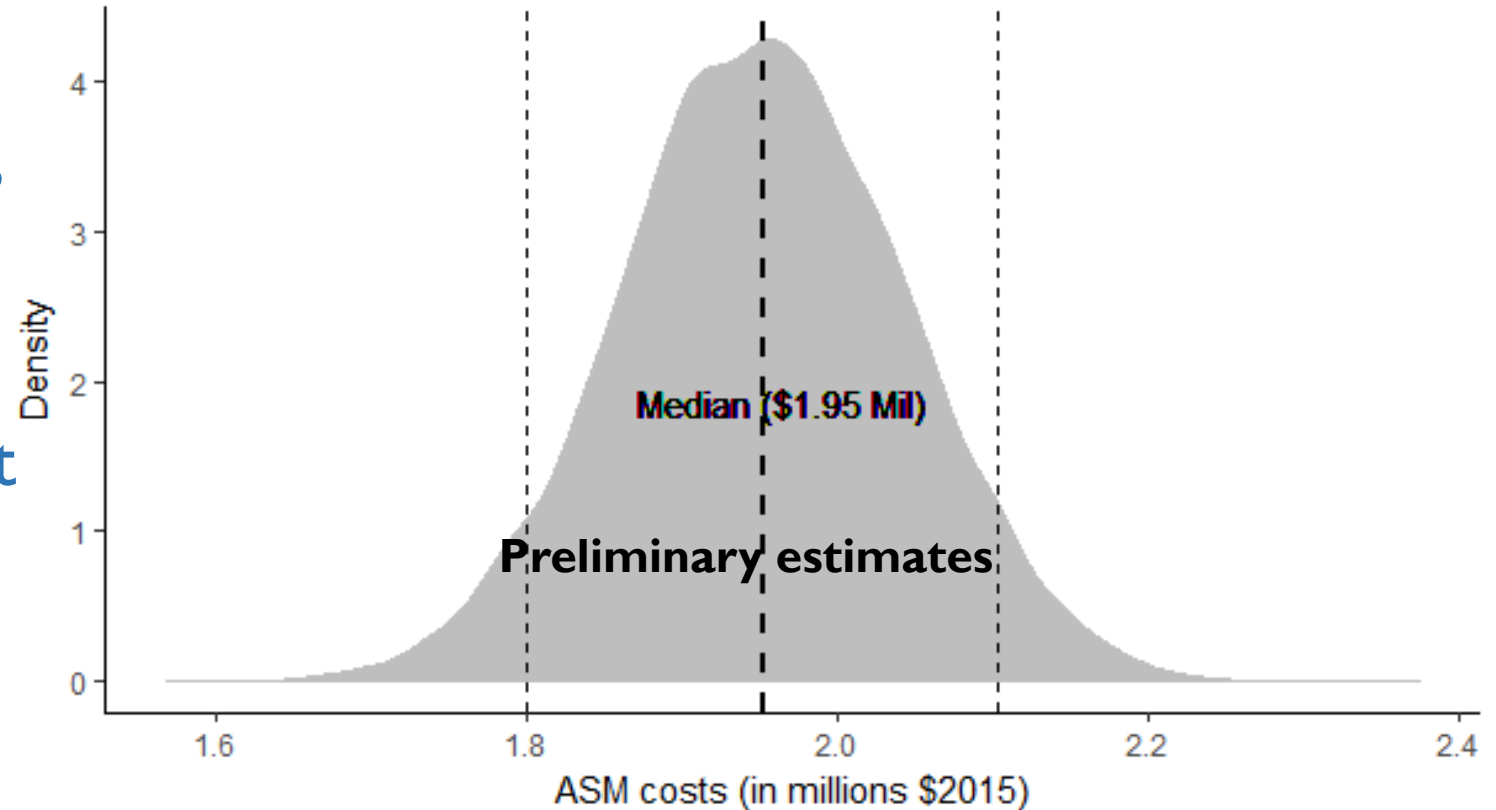
Reference Fishing Year 2015 (May-April)



And costly

Fishing Year 2015

- ASM target coverage 20%
- 976 covered trips (11.3% total trips), 169 boats
- Not including government costs
- At sea costs= 52%



Varying levels of data quality

Actual

**Tally, Basket/Tote
count**

**Volume to volume,
Cumulative sum**

Visual Estimate

Captain's Estimate

**Unknown,
combination, other**

Varying levels of data quality

Actual

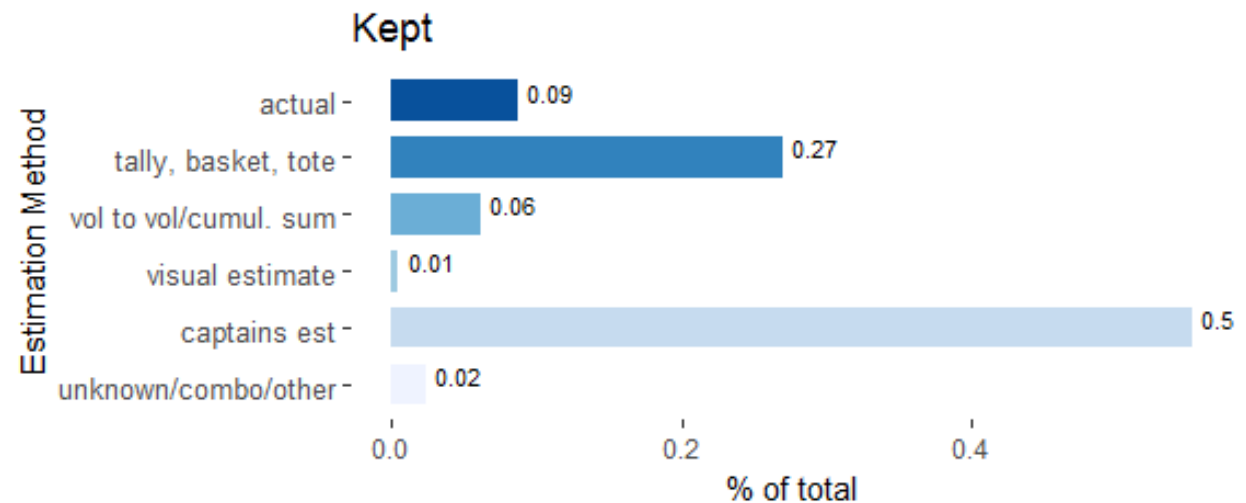
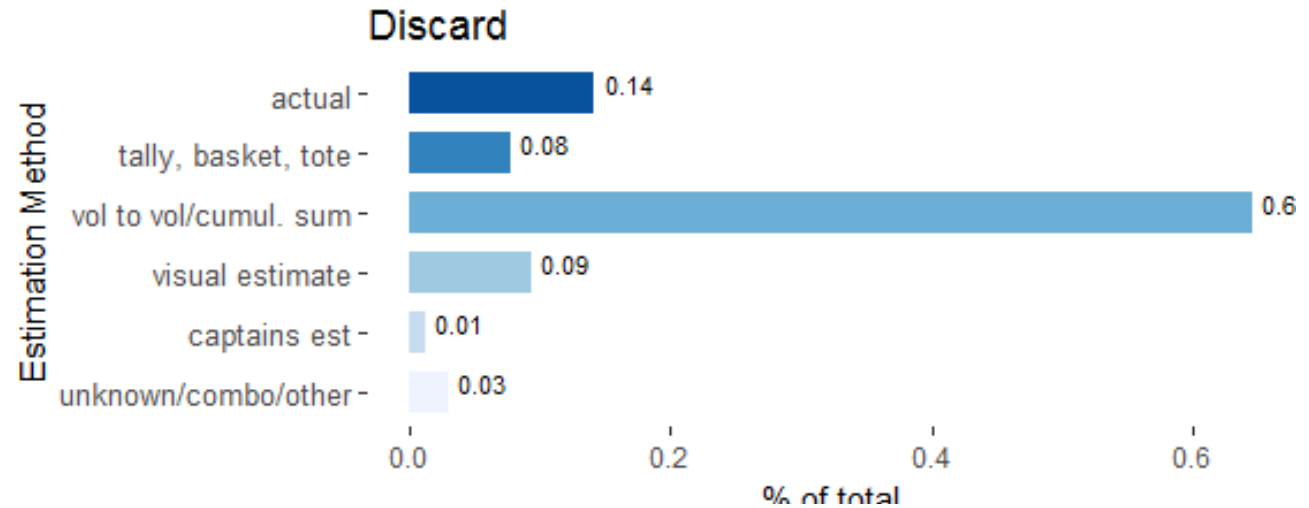
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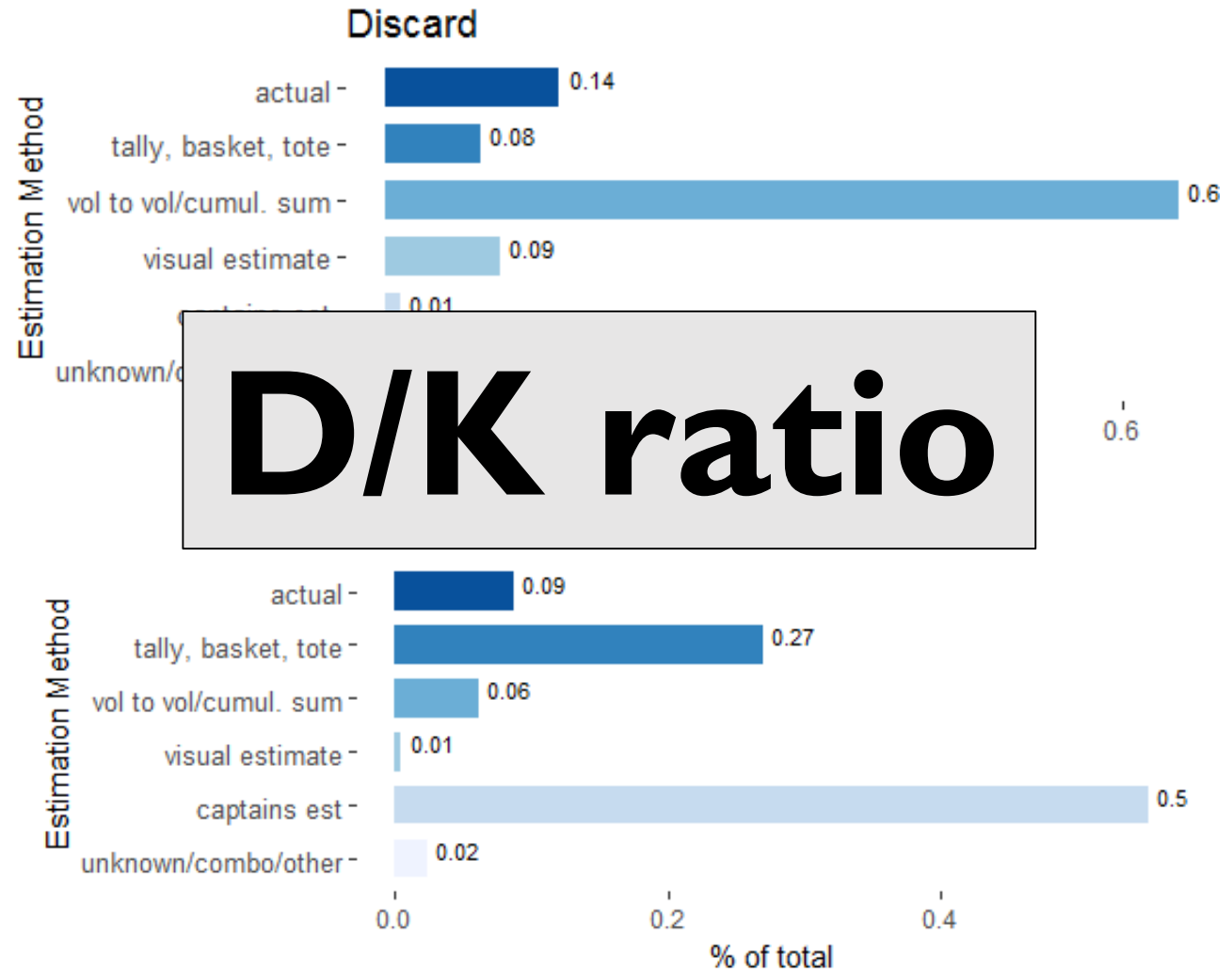
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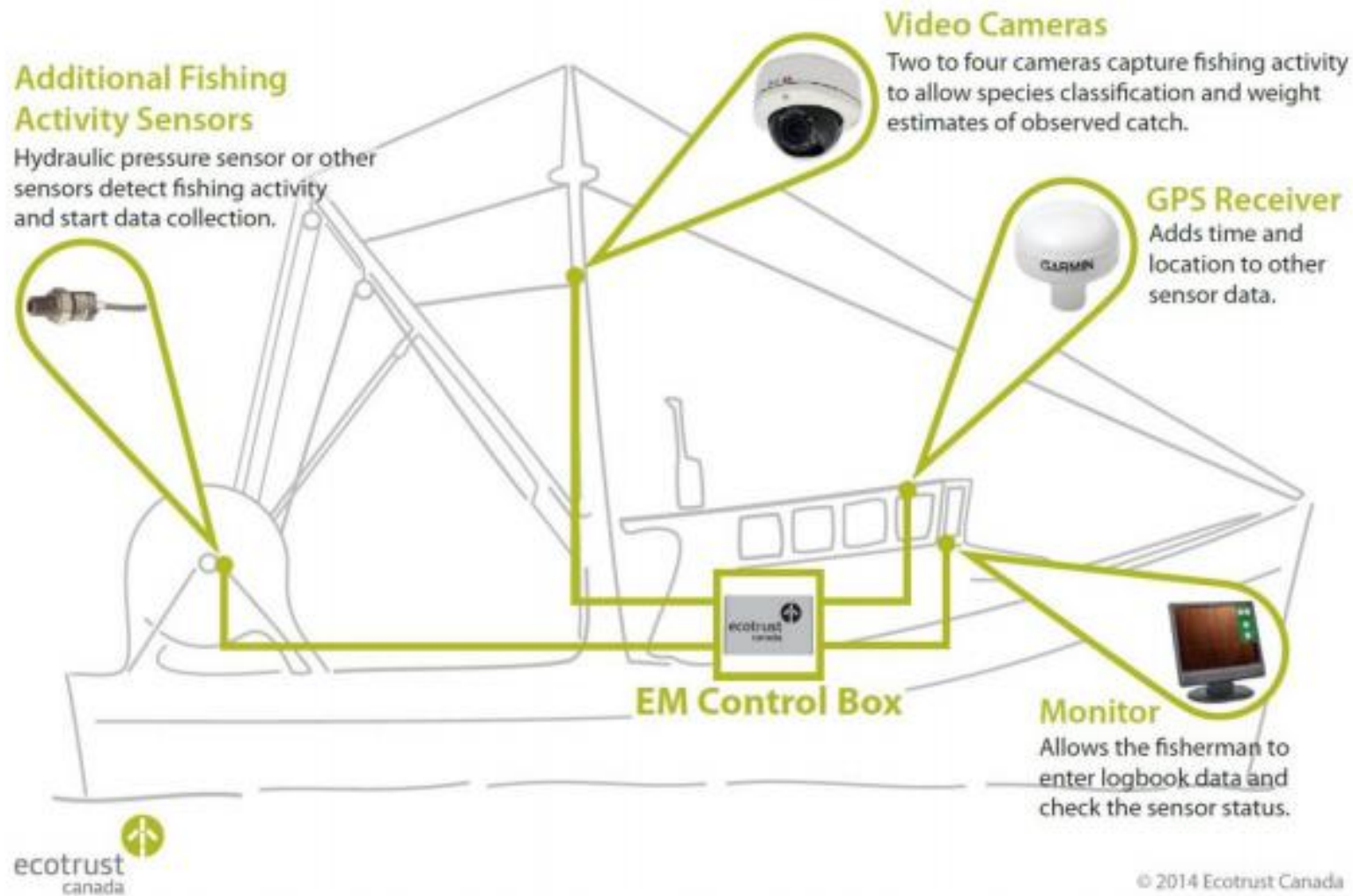
At sea monitoring

- Cost \approx \$1.95 mil
- 11.3% trips covered
- Varying data quality



http://www.huffingtonpost.com/2013/05/17/ocean-climate-change-fishing-industry_n_3275505.html

Electronic monitoring (EM)



Electronic monitoring (EM)

Discards of regulated groundfish

- **Census model**-EM video is used to directly identify and quantify discards of groundfish species.
- **Audit model**- Discards are estimated from electronic vessel trip reports (eVTRs) or other approved logbook systems submitted by vessel operators. Data from EM video is used to verify and validate the reporting accuracy of discards.
- **Compliance/maximum retention model**- EM video is used to document compliance and facilitate enforcement of prohibitions on discarding of specific species.

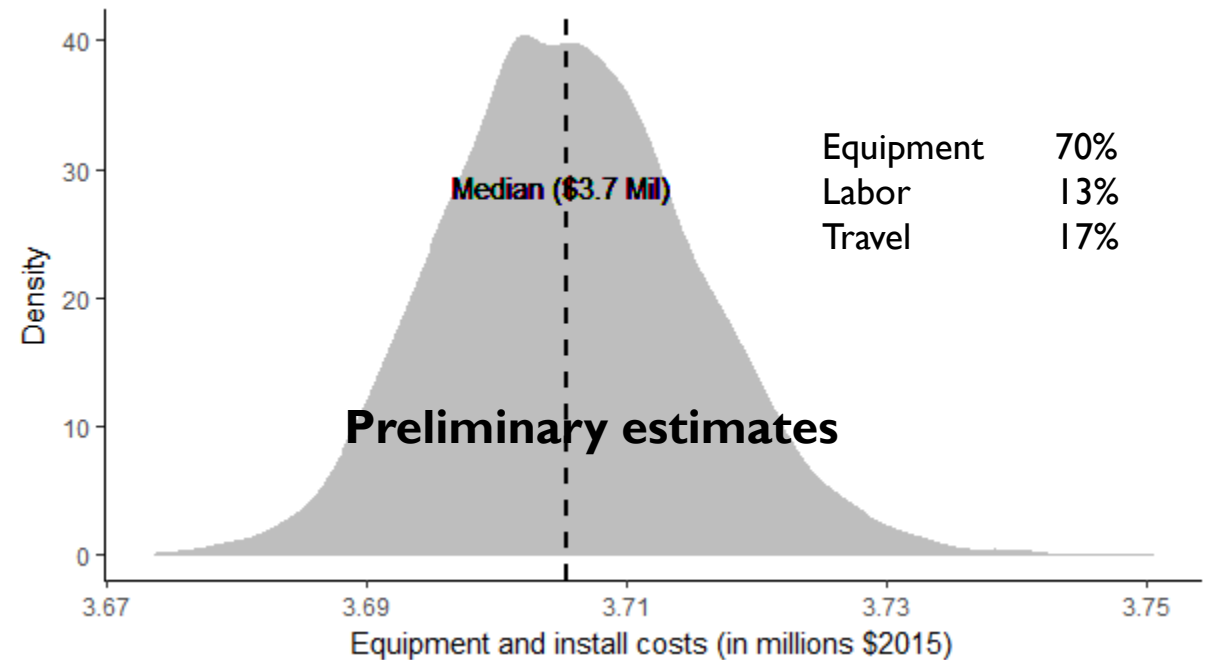
EM cost components

- Equipment/Installation (one-time cost)
 - Data transfer, storage, maintenance (annual)
 - Review (annual)
 - Program management
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- Based on cost survey, pilot programs
 - Randomizing inputs maintains confidentiality, but washes out variance

EM equipment/installation

Assumptions

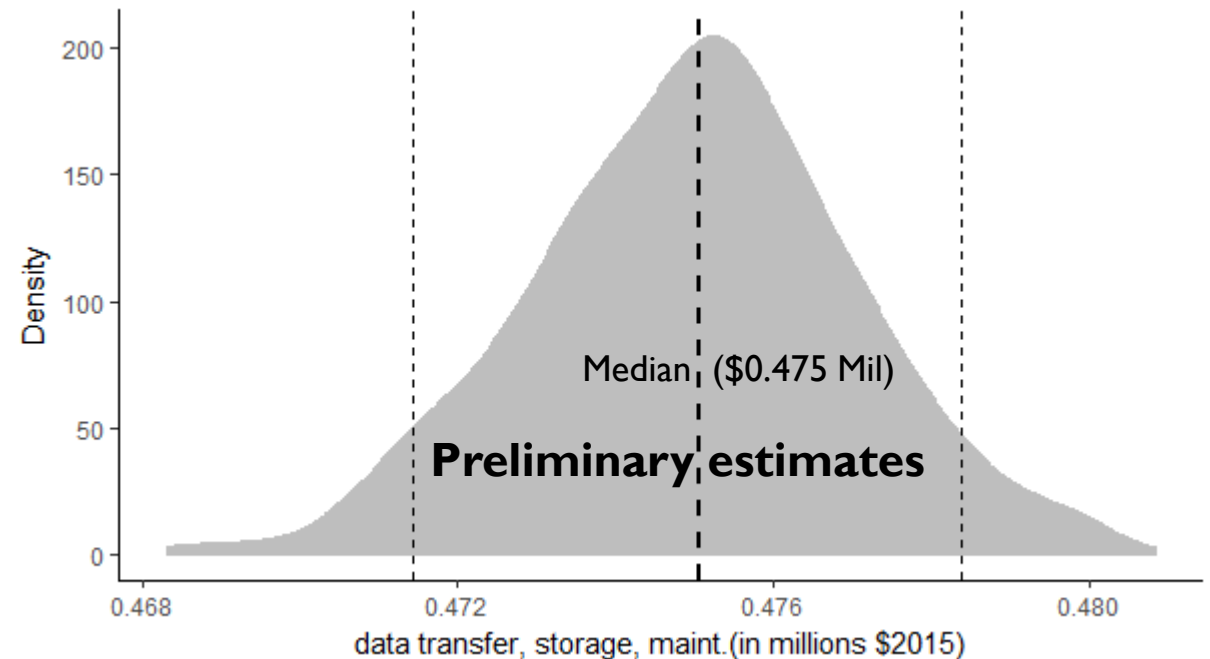
- System on all vessels (278)
- 3 cameras if hook boat or < 40', otherwise 4 cameras
- Technicians travel to vessels from 6 main ports and install back to back



EM data storage/transfer, maintenance costs

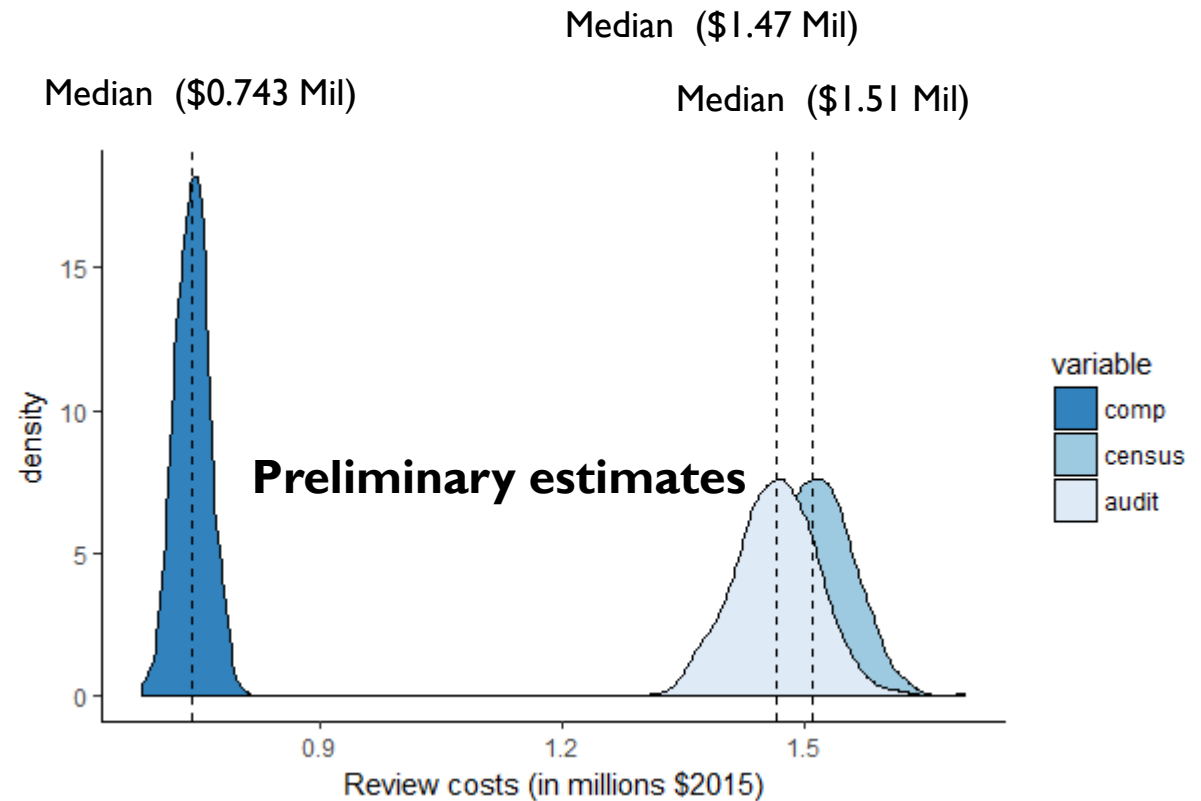
Assumptions

- Data mailed after every trip (all vessels, all trips)
- 100% stored in cloud
- Fishing footage=1-2.1 GB/hr
- Non-fishing=0.6-2.1 GB/hr



EM review costs

- Review 10% of total fishing time, non fishing time by trip
(not equivalent to ASM)



Electronic monitoring data quality

- Regardless of program type/review rate
 - Truly random review
 - Consistent focus on discards
- Different program=different data/error
 - Operator- catch handling
 - Logbook
 - L/W tables



http://www.gmri.org/sites/default/files/resource/maine_em_final_report_year_2_final.pdf

Additional work

- Groundtruth costs
- Fine tune estimates (uncertainty using real data)
- Other costs (sorting, etc costs on crew, program management?)
- Cost incidence
 - Industry (components of fleet/ distribution)
 - Government
 - Providers
- Cost comparisons/projections
- DSM costs

Preliminary Estimates – FEEDBACK PLEASE!

Challenges

- Good cost data, small sample size
- Assumptions on program design/scaling
- Variability (picture quality, catch handling, catch composition, etc.)
- Confidentiality
- Comparing ASM/EM
- Future costs-changing technology

Closing thoughts



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Data produced	biased sample	random sample
	varying estimation methods	consistent method
	discards and kept catch	discards
Cost drivers	simple (coverage rate)	complex (prog design, review rate, catch handling, video quality.....)

Acknowledgements

- Everyone who gave me data!