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NORTHEST FISHERIES SCIENCE CENTER

New Council Member Training

Economic and Social Analysis in Fisheries Management

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October 29, 2024

The Importance of Fishery Resources

U.S. Fish

- Highly migratory species
- Species on the continental shelf
- Anadromous species that spawn in rivers/estuaries

Fish are Valuable, Renewable Resources

- *Contribute to food supply, economy, health*
- *Provide recreational opportunities*

MSA, Sec 2(a)

National Standards

Standard 1

Conservation and management to:

- Prevent overfishing
- Achieve optimum yield
- Support U.S. fishing industry

Standard 4

Fishing privileges allocation to:

- Be fair and equitable
- Be planned to promote conservation
- Avoid excessive share of privileges to a single entity

Standard 5

Conservation and management to:

- Consider efficient use of fishery resources
- Not have economic allocation as only purpose

National Standards

continued

Standard 7

Conservation and management to:

- Minimize costs
- Avoid unnecessary duplication

Standard 8

Conservation and management to:

- Use economic and social data to account for fishery resource importance to fishing communities
  - Provide for sustained community participation
  - Reduce unwanted economic impacts on communities

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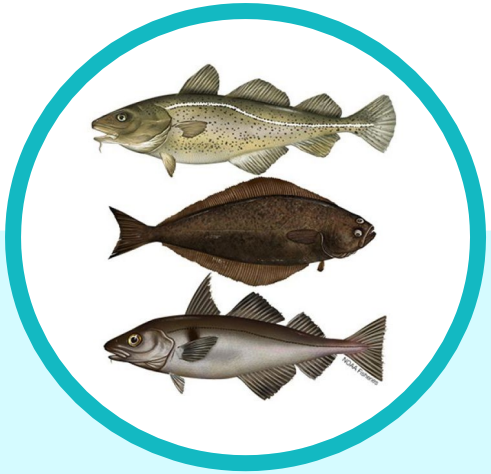
Fishery Management Plan Requirements



Requirements

- Incude Fishery Impact Statement
- Assess, specify, and analyze how conservation, management, and mitigation might effect economic, and social impacts to participants

MSA, Sec 303 (a) (9)

Impacted Groups

FISHERIES + FISHING COMMUNITIES

- Affected participants in fisheries and fishing communities

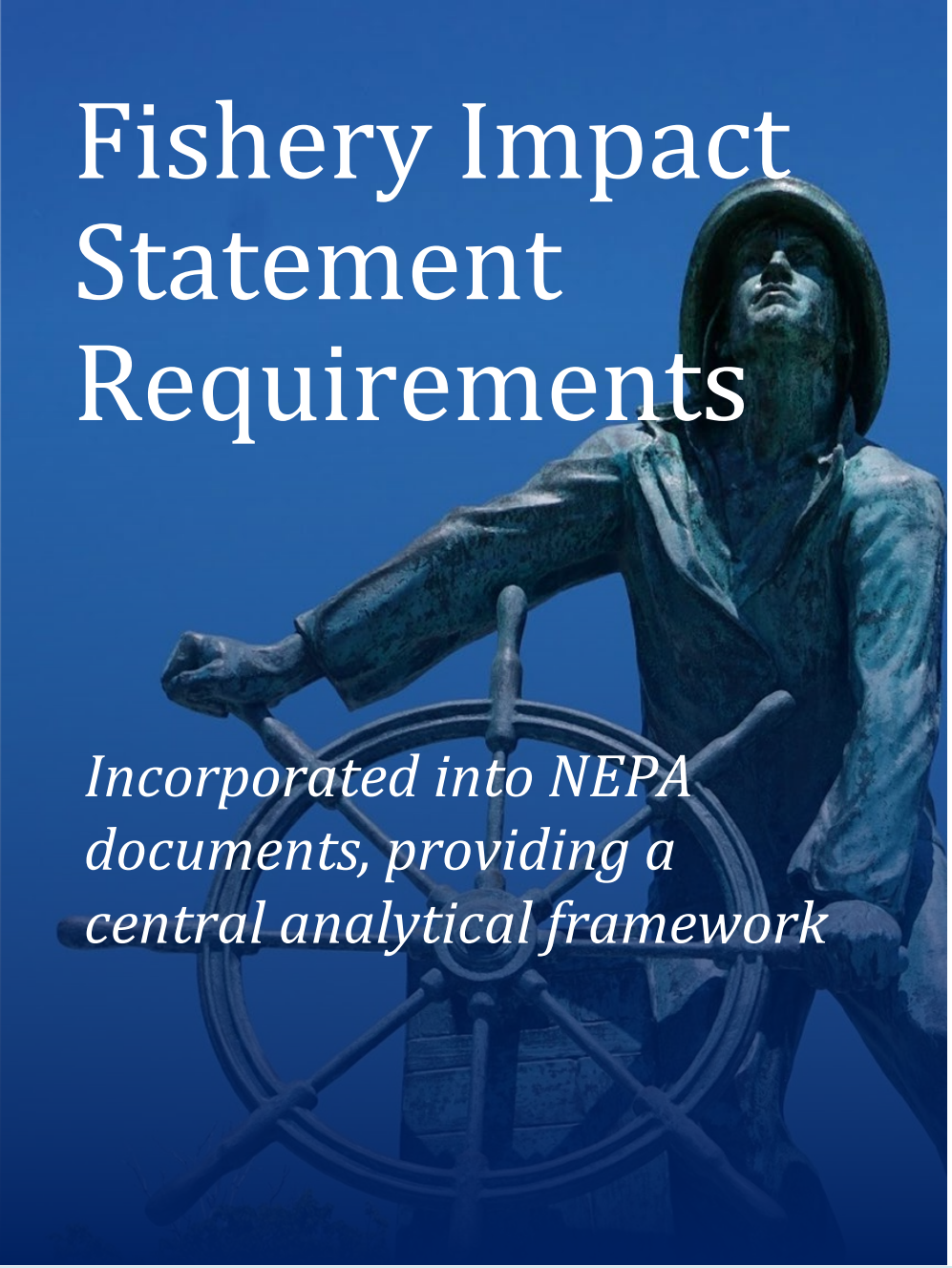
ADJACENT FISHERIES

- Participants in adjacent fisheries under authority of another Council (after consultation)

HUMAN LIFE AT SEA

- Safety at sea, including impacts to fishery participants

Fishery Impact Statement Requirements



Incorporated into NEPA documents, providing a central analytical framework

Historical Trends Included in Affected Environment

- Participation and count data, net or gross revenues, catch, etc.
- Disaggregated by state and/or port, gear type, vessel size, etc.

Predicted Outcomes in Environmental Consequences and Impacts

- Use same/similar categories as Affected Environment to provide sufficient context

Must Address

- Overall impacts of alternatives/options
- Differential impacts on sub-populations

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The Economics of Regulation

Market-Based Options

- Catch rights auctions
- Tradeable Quotas (Catch Shares)
  - ITQ's
  - Effort allocations
- Tradeable fish/trap tags

Command-and-Control Options

PERFORMANCE STANDARDS

- TACs, ACLs, etc.
- Bycatch limits/allocations
- Estimate precision standards (ex: CV30)

TECHNOLOGY STANDARDS

- Mesh size restrictions
- Min fish sizes, slot limits, etc.
- Bag limits
- Horsepower/Vessel size restrictions
- Fishing gear restrictions/requirements

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Framework for Analyses

Types of Analyses

- Benefit/cost (B/CA)
- Cost Efficiency
- Impacts
- Input/Output
- Qualitative

Units of Analysis

- Producers
- Consumers

Regulatory Drivers

- MSA
- EO 12866
- RFA
- EO 12898 (Environmental Justice)

Example 1

Impacts Analysis

ACL reductions in a multispecies fishery (NE groundfish)

Aggregate stability
masks potential for serious distributional impacts

Aggregated Impacts

RESULTS: *4 stocks likely to be constraining: GOM cod, GB cod (west), SNE/MA yellowtail flounder, witch flounder*

PREDICTIONS

- **Gross revenues** to lower 7% (FY16 from FY15)
- **Variable costs** to lower $5M (FY15/16 from FY13/14; fuel prices down)
- **Gains from lower variable costs offset** by losses to ASM costs (~$3M)
- **Redfish landings increases** – major uncertainty, likely to over-estimate revenues by $1-2M

Disaggregated Impacts

GAINS PREDICTED

- **Boston** (+33% to $17.2M)
- **Gloucester** (+35% to $11.1 M)
- **New Hampshire** (+23% to $1.6M)

LOSSES PREDICTED

- **New Bedford** (-46% to $9.2M)
- **Point Judith** (-58% to $0.8M)
- **NY + NJ** (-84% to $0.3M)

Reference table on next slide

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Example 1

Reference Table

Disaggregated Impacts Predicted Gains and Losses for FY## from FY ##

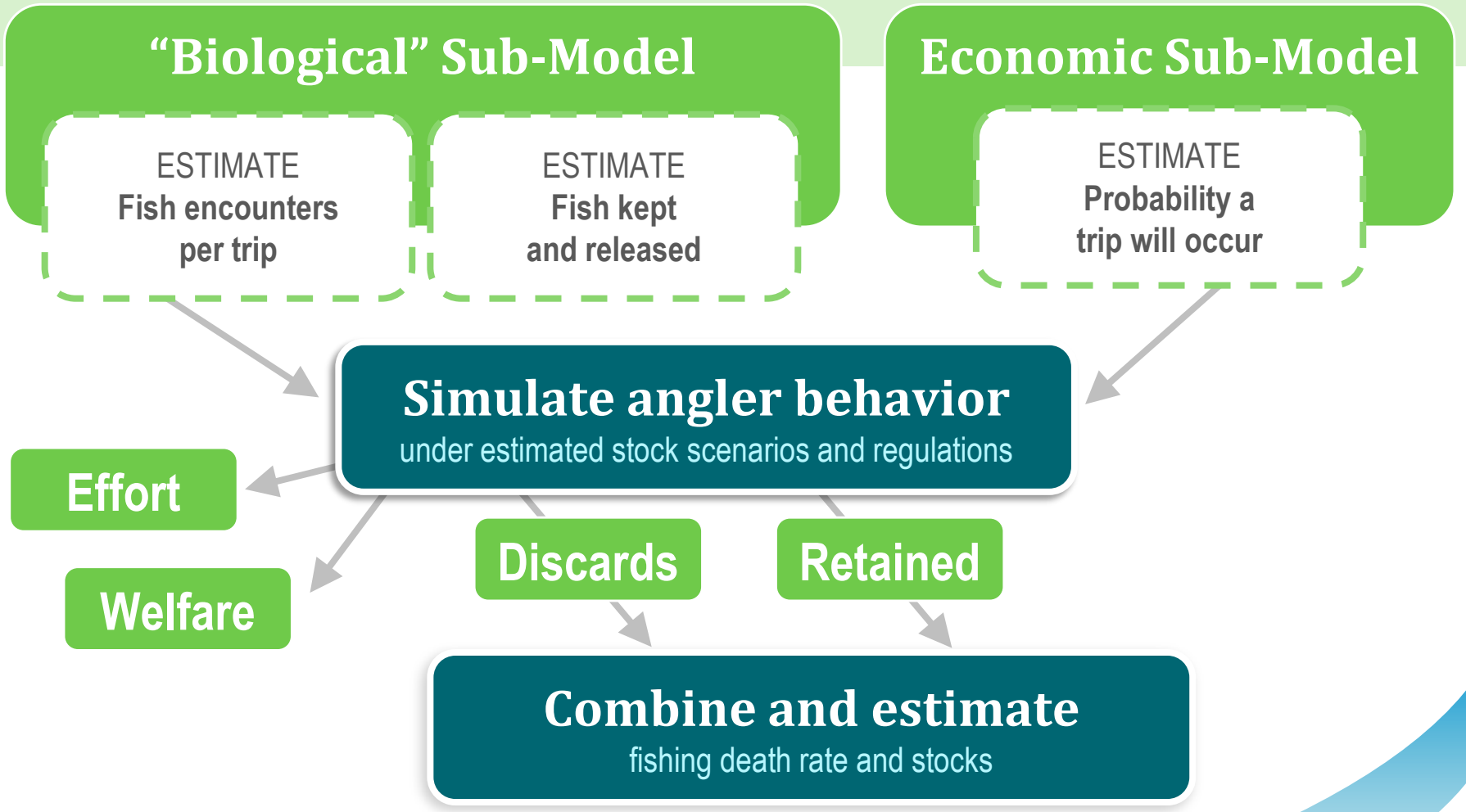
Location	No Action (%)	With ASM (%)	No ASM (%)
Connecticut	—	—	—
Massachusetts	-92	-3	-3
Boston	-90	33	33
Gloucester	-91	35	32
New Bedford	-94	-46	-45
Maine	-94	-9	-11
Portland	-94	-8	-10
New Hampshire	-85	23	15
New Jersey	-100	-100	-100
New York	-100	-70	-80
Rhode Island	-96	-65	-62
Point Judith	-95	-58	-58
Other Northeast	—	—	—

Example 2

Prospective Analysis to Support Alternative Development

Setting recreational size and bag limits

Model Overview



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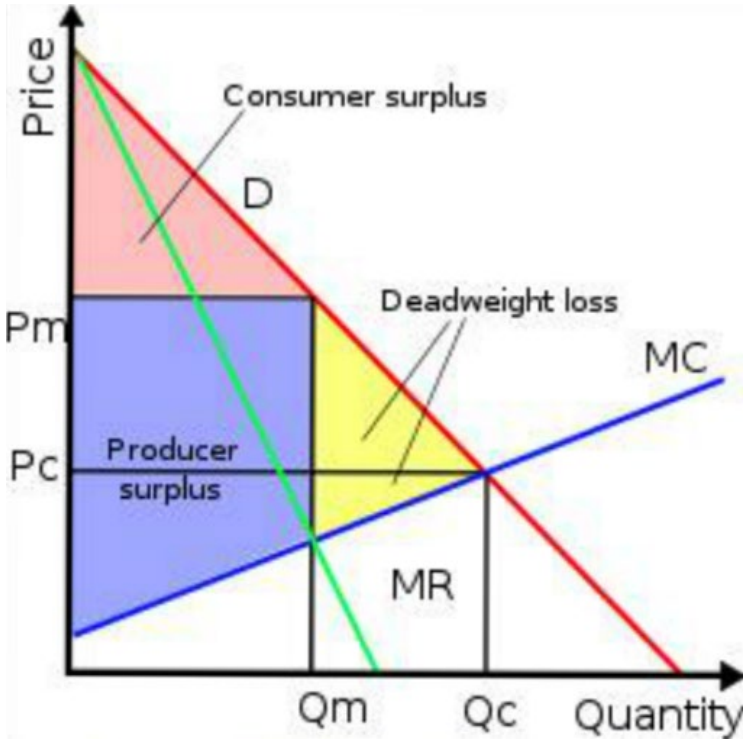
Example 3

Prospective Analysis to Support Alternative Development

Establishing excessive share limits



Surpluses and **deadweight loss** created by monopoly price setting

The Economics of Market Power

- Monopolist limits supply to increase producer benefits
  - Can decrease welfare / market benefits
- Only want to do this when benefits > costs
  - When 1% decrease in supply leads to >1% increase in price, maybe an incentive to withhold
- Math helps us figure this out

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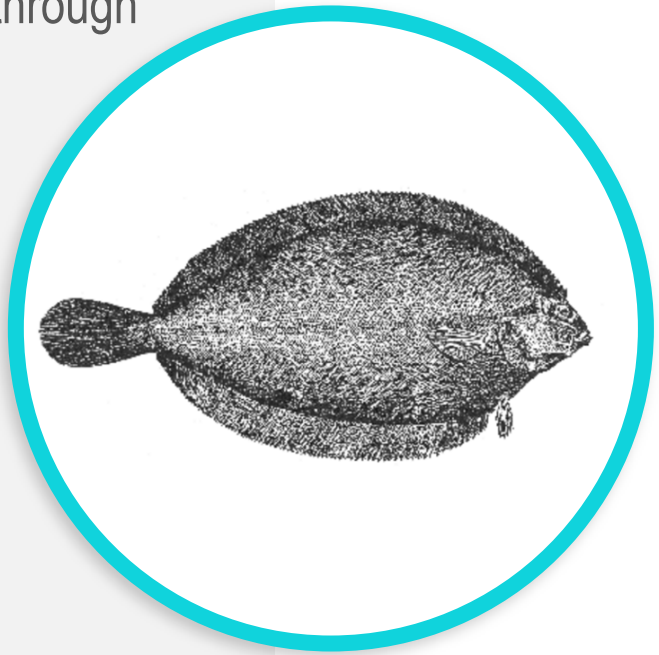
Example 4

Impacts Analysis

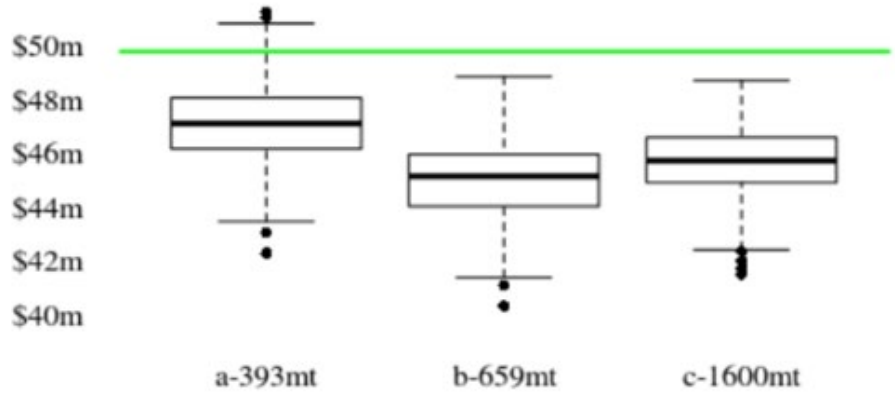
Informing Allowable Biological Catch through "risk policy"



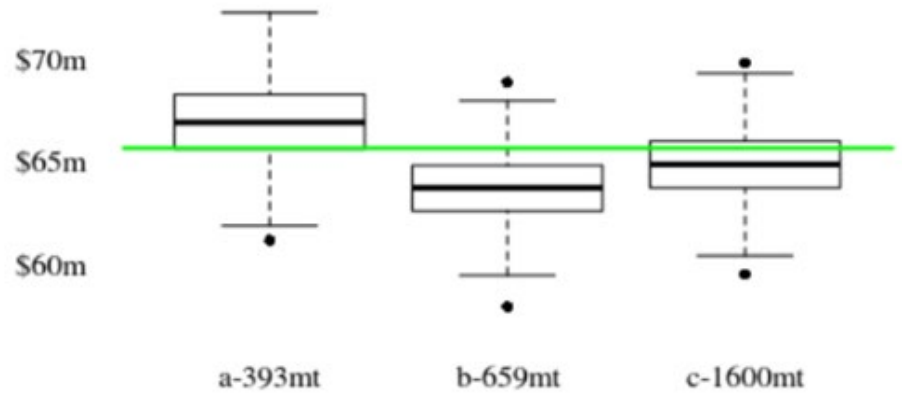
Three Potential ABCs Modeled

- 393mt
- 659mt
- 1600mt

Gross Revenues from Groundfish



Gross Revenues on Groundfish Trips



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Example 5

Policy Analysis

Shifting from subsidized observer coverage to industry-based funding

Subsidy removal:
Using cost survey data to estimate owner-level profitability

Table 8 – Estimated returns to owner and ASM costs[1,2,3]

	2010	2011	2012	2013	2014*	2015**
Total revenues	114,759	124,942	96,942	80,813	79,348	72,081
Variable costs	30,840	39,868	35,761	30,718	24,108	23,700
Crew share	34,362	37,528	29,332	24,542	23,969	22,091
RMUI	8,736	8,245	8,069	7,290	7,112	6,178
Business/Haul-out	15,083	14,128	13,596	12,089	11,528	10,061
Sector fees	1,772	1,842	1,396	1,263	1,152	1,311
Return-to-owner	23,966	23,332	8,787	4,911	11,479	8,740
ASM	5,190	39,868	3,081	1,990	2,729	2,637
ASM as pct RTO	*22%*	*26%*	*35%*	*41%*	*24%*	*30%*
Number active vessels	440	384	379	319	298	221

Table 9 – Estimated counts of vessels with positive and zero or negative returns to owner (ASM costs not included) by year[2,3]

	2010	2011	2012	2013	2014	2015
# vessels RTO <=0	133	114	157	156	111	86
# vessels RTO >0	307	270	222	163	187	135
proportion fleet <=0	*30%*	*30%*	*41%*	*49%*	*37%*	*39%*
Total number of vessels	440	384	379	319	298	221

Table 10 – Estimated counts of vessels with positive and zero or negative returns to owner by year, including hypothetical ASM costs[2,3]

	2010	2011	2012	2013	2014	2015
# vessels RTO <=0	159	136	173	164	120	130
# vessels RTO >0	281	248	206	155	178	91
proportion fleet <=0	*36%*	*35%*	*46%*	*51%*	*40%*	*59%*
Total number of vessels	440	384	379	319	298	221

[1] Values in reports in constant 2014 $1,000
[2] 2014 data are preliminary
[3] 2015 data are predictions

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Example 6

Pacific Islands Management

SEEM: An innovative framework to support setting Annual Catch Limits

SEEM | Social, Economic, Ecological, and Management Uncertainty

Working Group (est. 2019)

Develops methods to include uncertainty in management

Benefits

- Decision support
- Get better expert and community input
- Engages community
- Informs research
- Considers ecosystem and social science in stock assessment

Example Scoring Matrix

(Hospital et al, 2019)

Concerns about effects	Importance: Low	Low	Med	Med	High	High
Low		0	0	0	0	0	0
		1	1	2	2	3	3
Med		2	2	3	4	4	5
		3	4	4	5	6	7
High		4	5	6	7	8	9
		5	6	7	8	9	10

Figure A 1. Scoring matrix for social, economic, and ecological dimensions.

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Social Impact Assessment

"...a scientific method of gauging the social and cultural consequences of alternative fishery management actions or policies"

Part of NEPA analysis, identical in structure to economic impacts analysis (often combined)

NATIONWIDE EFFORTS

Defining NS8 fishing communities

Standardizing social indicators

- Social Vulnerability
- Commercial and Recreational Fisheries Engagement and Reliance
- Gentrification Pressure Vulnerability

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Non-NEPA Regulatory Requirements

Regulatory Impact Review (EO 12866/14094)

- Benefit/Cost analysis
- All affected sectors and fishing businesses
- Longer time horizon
  - Real dollars, discount rate
- Economically significant rule
  - >$100M annual effect
  - **OR** significant econ impact on region/sector

Regulatory Flexibility Act (RFA)

- Short-term financial status change
- "Directly regulated entities"
  - owners, businesses, vessels
- Will rule have significant econ impact on substantial number of small entities?
  - Size standard (2016 = $11M for all commercial fishing businesses)

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Best Practices

Baseline data at same scale as impacts/predictions

- NEPA: AE=EC

Data, theory, model and results clearly explained

- Assumptions clearly specified

Time-series data expressed in real dollars (say, > 3 yrs)

- nominal vs real dollars
- inflation distorts nominal dollars

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Best Practices

continued

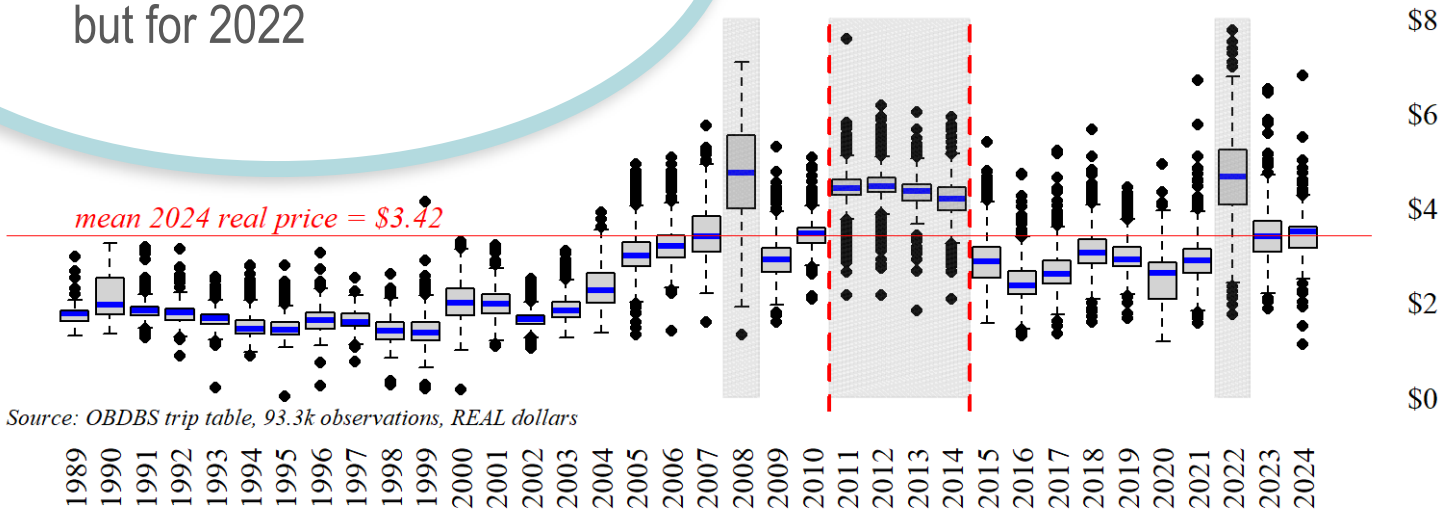
Include costs whenever possible

- Revenue changes can mask cost increases and decreases
- Options may have different costs
  - Effort location shifts
  - Added admin. or regulatory compliance costs

Fuel Prices

2011-2014: historic highs

2015-today: consistent, but for 2022



A 500 VHP trawler spends nearly $200/day less in fuel today than they did two years ago

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Common Questions

Recreational vs. commercial valuation

Valuing goods that don't trade in markets

- Willingness-to-pay v. Willingness-to-accept
- Stated preference v. Revealed preference

Peer review and the role of the SSC

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Lying with Numbers, Part 1

Costs and benefits with non-uniform time trends - THE DISCOUNT RATE

- The rate at which society may be willing to trade off between consumption today and consumption tomorrow
- Used whenever costs and benefits are estimated across time (e.g. Net Present Value calculations)
- "The higher the discount rate, the lower is the present value of future cash flows"
- NOAA has historically recommended two rates:
- (1) NOAA-defined "social rate of time preference" = 3%
- (2) OMB-defined "base-case discount rate" = 7%

In cases where an industry is trading off consumption in a transactional sense, ***discount rates in accordance with alternative investments (e.g. higher)*** *are appropriate*

In cases where the trade-off is considered on behalf of society in a non-transactional sense ***discount rates in accordance with the social rate of time preference (e.g. lower)*** *are appropriate*

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Lying with Numbers, Part 2

"Multipliers" and Input-Output Analysis

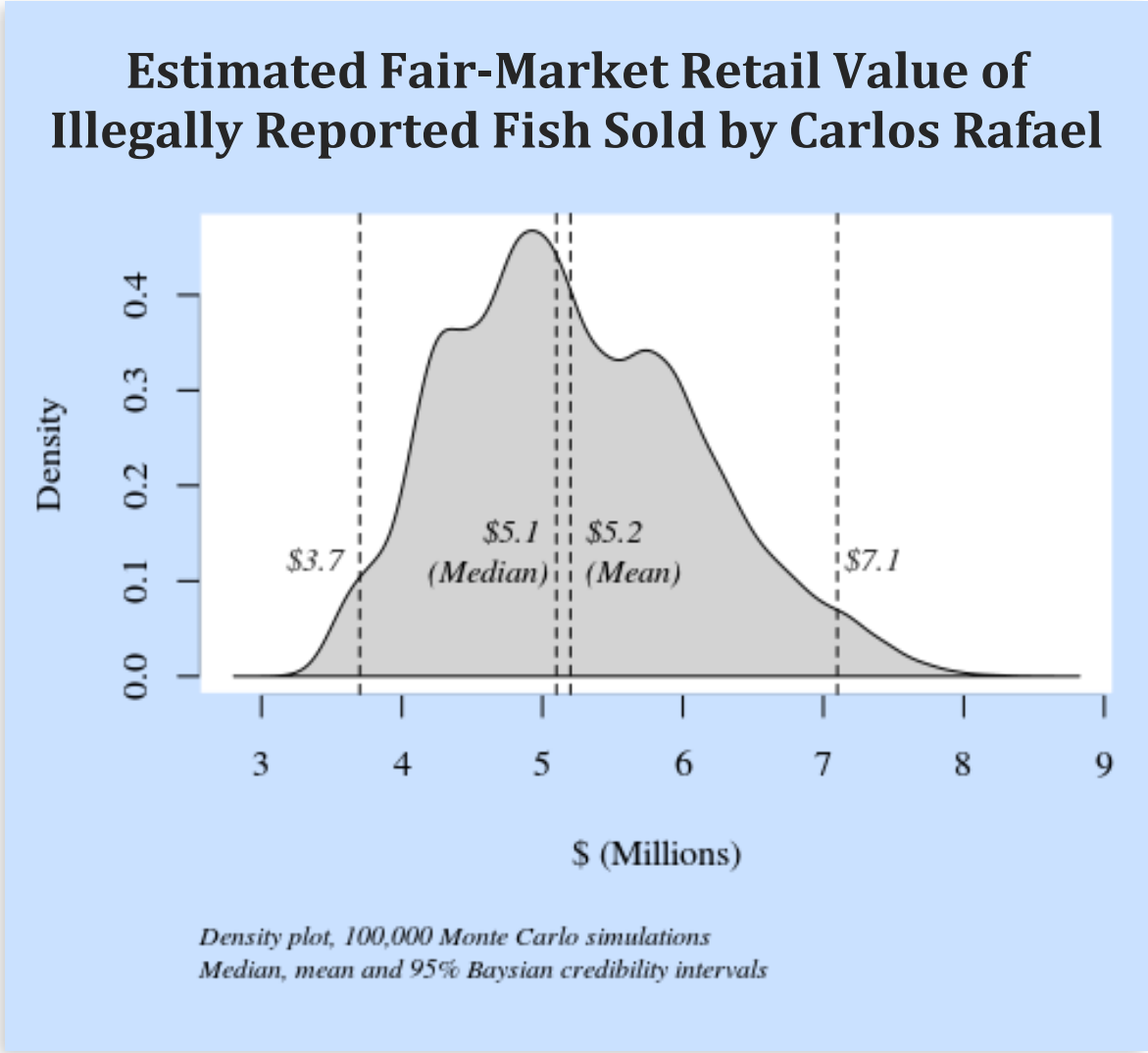
- These analyses apply mark-ups and second-order effects (jobs supported, etc) as products travel from initial to final point of sale
- "Generally, analyses should treat resources as if they were likely to be fully employed. Employment or output multipliers that purport to measure the secondary effects of government expenditures on employment and output **should not be included** in measured social benefits or costs"
- **Unusual case:** Carlos Rafael and the Lacey Act

Unusual Case

Carlos Rafael and the Lacey Act

Carlos Rafael mis-reported 783K pounds of fish that he sold for $1.6M

- Federal sentencing guidelines under the Lacey Act tie the sentence to the "fair-market retail value" of the product
- Traced the fish across secondary and tertiary dealers and through to restaurants in NYC



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Questions?

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