

**NOAA  
FISHERIES**

# NOAA Fisheries Recreational Fisheries Economics & Human Dimensions Program

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The Fisheries Forum  
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Beaufort, NC

# Overview

- Key Questions / Mandates
- Value vs. Economic Impacts
- Models & Data
- Future Directions



# KEY QUESTIONS

- What are the economic effects / changes in **benefits** of each management alternative?
- What are the **distributional** effects / **equity** considerations (i.e., who wins / who loses)?
- What is the most **efficient** outcome?
- What are **social / community** effects?
- What are the **broader economic impacts** (the affected human environment)?



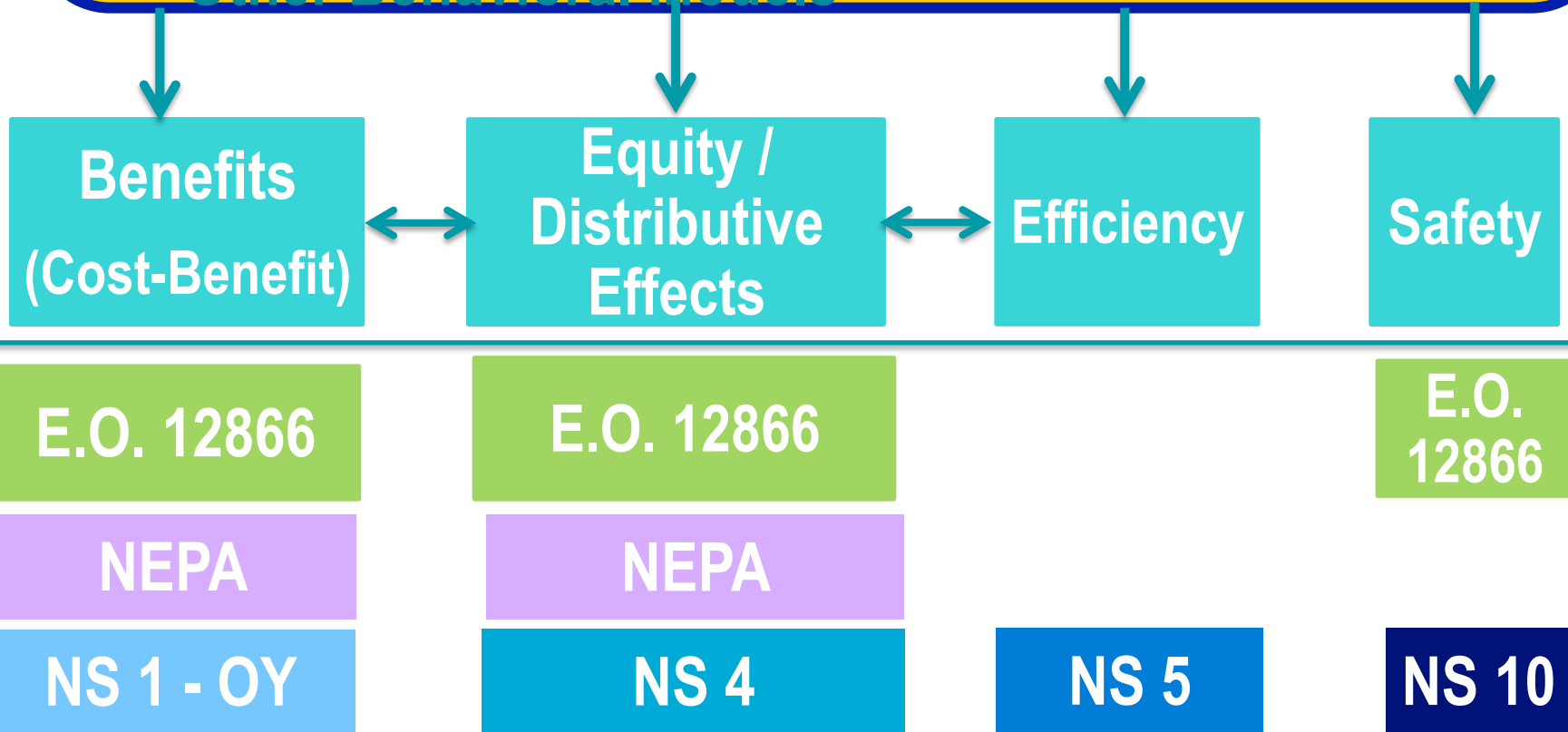
# KEY MANDATES

| Benefits<br>(Cost-Benefit)                  | Equity /<br>Distributive<br>Effects | Efficiency | Safety        | Social /<br>Community<br>Impacts |
|---|-------------------------------------|------------|---------------|----------------------------------|
| E.O. 12866                                  | E.O. 12866                          |            | E.O.<br>12866 | E.O. 12866                       |
| NEPA  | NEPA                                |            |               | NEPA                             |
| Reg Flex Act<br>(firms; acct'g<br>analysis) | Reg Flex Act<br>(for-hire firms)    |            |               | E.O 12898                        |
| NS 1 - OY                                   | NS 4                                | NS 5       | NS 10         | NS 8                             |



# Behavioral / Valuation Models:

- Travel cost model
- Hedonic model
- BLAST
- Other Behavioral Models



# Social & Community Impacts

E.O. 12866

**Economic Impact Model** – all costs-benefits

Economic impact model (affected human environment)

NEPA

Social Impact Assessment:

Social indicators

Community profiles

Other social analyses tools

NS 8

Social impact assessment  
Economic impact model\*

Minimize economic, social impacts; sustained participation of fishing communities

E.O 12898

Environmental Justice – subsistence fishing



# Economic Impact Models

## Management:

- Regulations' affect on other sectors
- Impacts on the “affected human environment

Provide an estimate of how angler expenditures contribute to a region's economy

- For example, the number of jobs supported

Used to evaluate economic development opportunities

- For example, how will local sales be affected by building a new fishing pier?





# Economic Valuation Models

Benefit-cost analysis of management options (e.g., bag limits, season lengths, protected areas)

- Predicting reactions to management and stock changes
- Change in distribution of benefits

Benefit-cost analysis of proposed projects affecting fisheries (e.g., benefits of dam removal)

Natural resource damage assessments (e.g., oil spills, hurricanes)



# Angler Expenditure Data

| Survey Region                    | Region     | Before Summit | Post - Summit |
|----------------------------------|------------|---------------|---------------|
|                                  |            | 2006          | 2011          |
| Angler Expenditure Survey        | Nationwide | X             | X             |
| ----Economic Valuation Questions | Nationwide | X             | X             |

## Uses: Economic Impact Analysis

- Industry statistics
- Management (**but not Cost-Benefit Analysis**)

381,000  
JOBS

## Challenges

Delays in completing analysis

Costly to implement



## Solution

Conduct durable goods survey in 2014  
Conduct trip expenditure survey in 2016

# For Hire Cost-Earnings: Before & After 2010 Summit

NMFS Data Plan

Every 5 years

## Uses

- Economic impacts
- Regulatory Flexibility Act
- Cost-benefit

| Survey Region | Pre-Summit | Post-Summit |
|---------------|------------|-------------|
|               | 2005-09    | 2010-14     |
| Northeast     |            | X           |
| Southeast     |            | X           |
| West Coast    | X          | X           |
| Pac. Islands  |            | X           |
| Alaska        |            | X           |
| Caribbean     |            |             |
| Atlantic HMS  |            | X           |

## Feedback at Workshop

*“This information is invaluable to the charter industry.”*

*“Information collected on taxes paid and generated extremely valuable.”*

# Stated Preference / Conjoint Surveys: Before & After 2010 Summit

## Data Collection Plan

- Refresh rate can depend more on changes in management than “age” of data

## Primary Uses

- Benefit-cost analysis (e.g., estimated value of trips, catch)
- Species trade-offs
- Reactions to management, stock changes
- **BLAST**- NE decision support tool

| Survey Region                                      | 2005-09 | 2010-14 |
|--|---------|---------|
| <b>Northeast</b>                                   |         |         |
| Groundfish   | ✓       | ✓       |
| Summer flounder, black sea bass, weakfish, scup    |         | ✓       |
| Striped bass, mackerel, red drum, bluefish, tautog |         |         |
| <b>South Atlantic</b>                              |         |         |
| Snapper-Grouper                                    | ✓       |         |
| Coastal Migratory Pelagics                         | ✓       |         |
| Dolphin-Wahoo                                      | ✓       |         |
| <b>Gulf of Mexico</b>                              |         |         |
| Reef fish  |         | ✓       |
| Coastal Migratory Pelagics                         |         | ✓       |
| <b>Oregon &amp; Washington</b>                     |         |         |
| Groundfish   | ✓       | ✓       |
| Salmon   | ✓       | ✓       |
| <b>California</b>                                  |         |         |
| Groundfish   | ✓       |         |
| Salmon   | ✓       |         |
| <b>Alaska</b>                                      |         |         |
| Pacific Halibut                                    | ✓       |         |
| Salmon   | ✓       | ✓       |

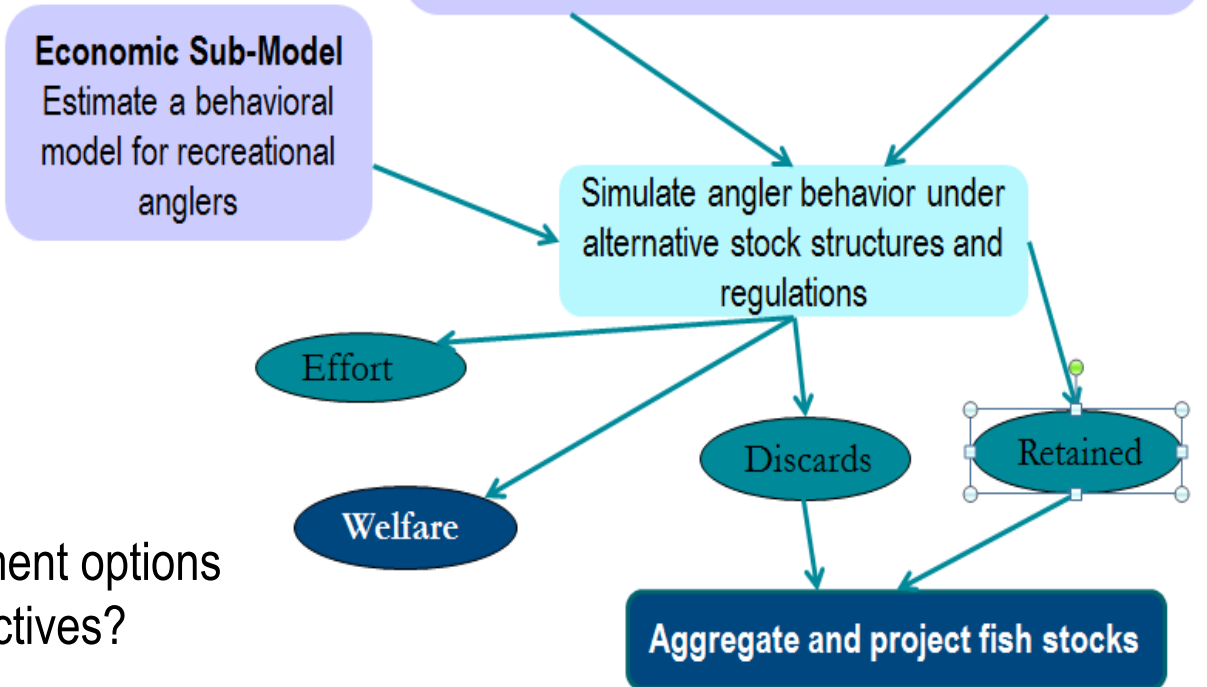
# BLAST Model

## MANAGEMENT USES:

How will changes in management strategies affect

- Fishing effort?
- Angler welfare?
- Fishing mortality?
- Stocks?

What combination of management options can achieve conservation objectives?



*“Two major advances of BLAST are 1) Council doesn’t have to figure out how to use economic information; 2) it uses a coupled biological–behavioral model”*

*“I hope the BLAST model can be worked on to address shortcomings; it would be a step backward not to use this cutting edge tool.”*

*“Thinking broadly about the portfolio of projects presented, BLAST is what the program must do.”*



# Social Indicators Web-based Mapping Toolbox

## Social Vulnerability

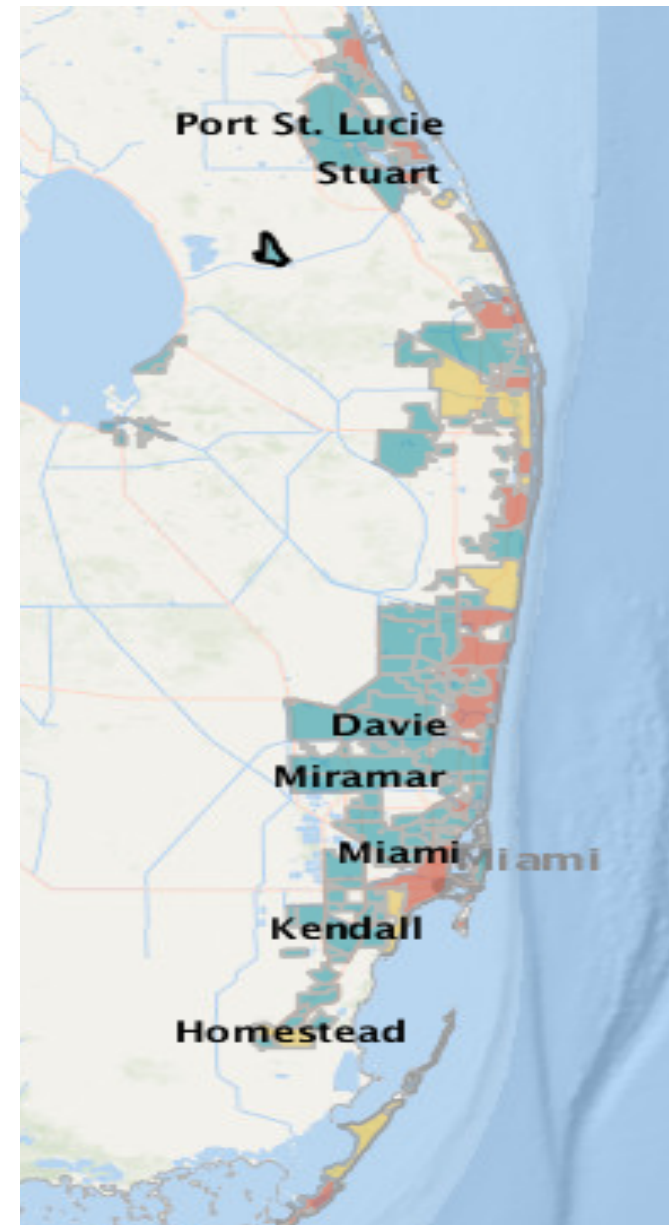
- Poverty
- Personal Disruption
- Population Composition Vulnerability

## Gentrification

- Retiree migration
- Urban sprawl
- Natural amenities

## Fishing Engagement & Reliance

- Recreational Fishing Engagement
- Recreational Fishing Reliance
- Commercial Fishing Engagement
- Commercial Fishing Reliance



# Social Indicators Web-based Mapping Toolbox

## Social Vulnerability

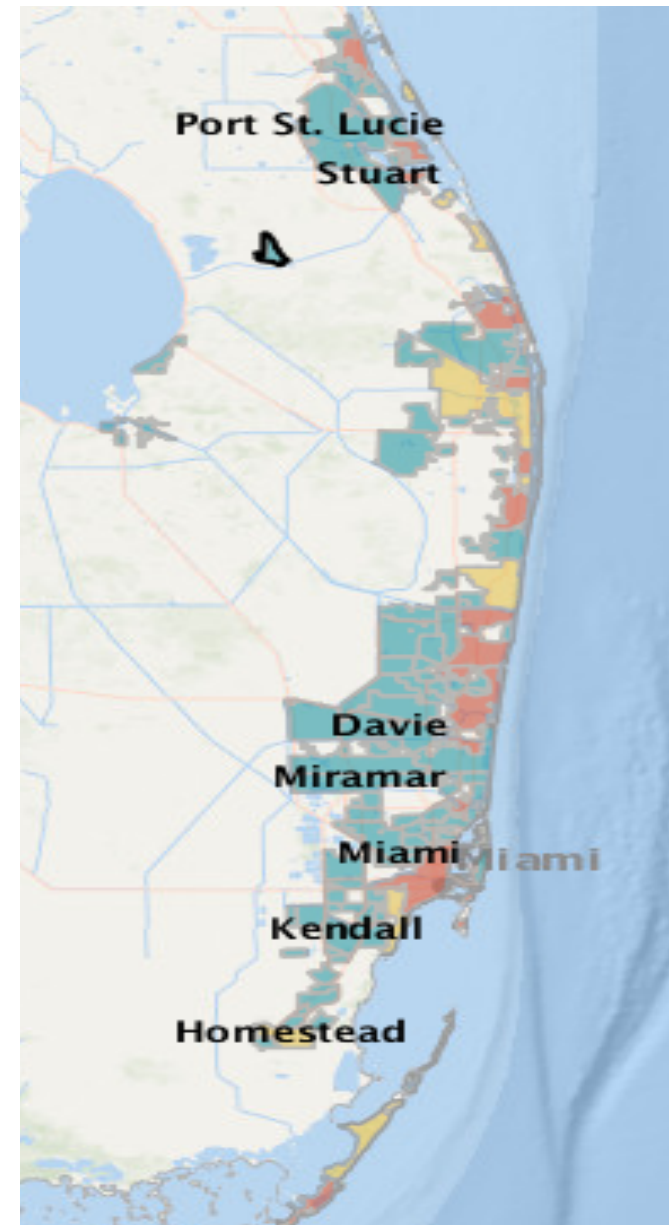
- Poverty
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## Gentrification

- Retiree migration
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## Recreational Fishing Engagement

- Commercial Fishing Engagement
- Commercial Fishing Reliance



# Workshop Recommendations

1. Increased communication of research goals and priorities for NOAA Fisheries' recreational fishing economics program.

2. Improve incorporation of socioeconomic information into the fishery management process.

3. Improved communication, cooperation and collaboration.

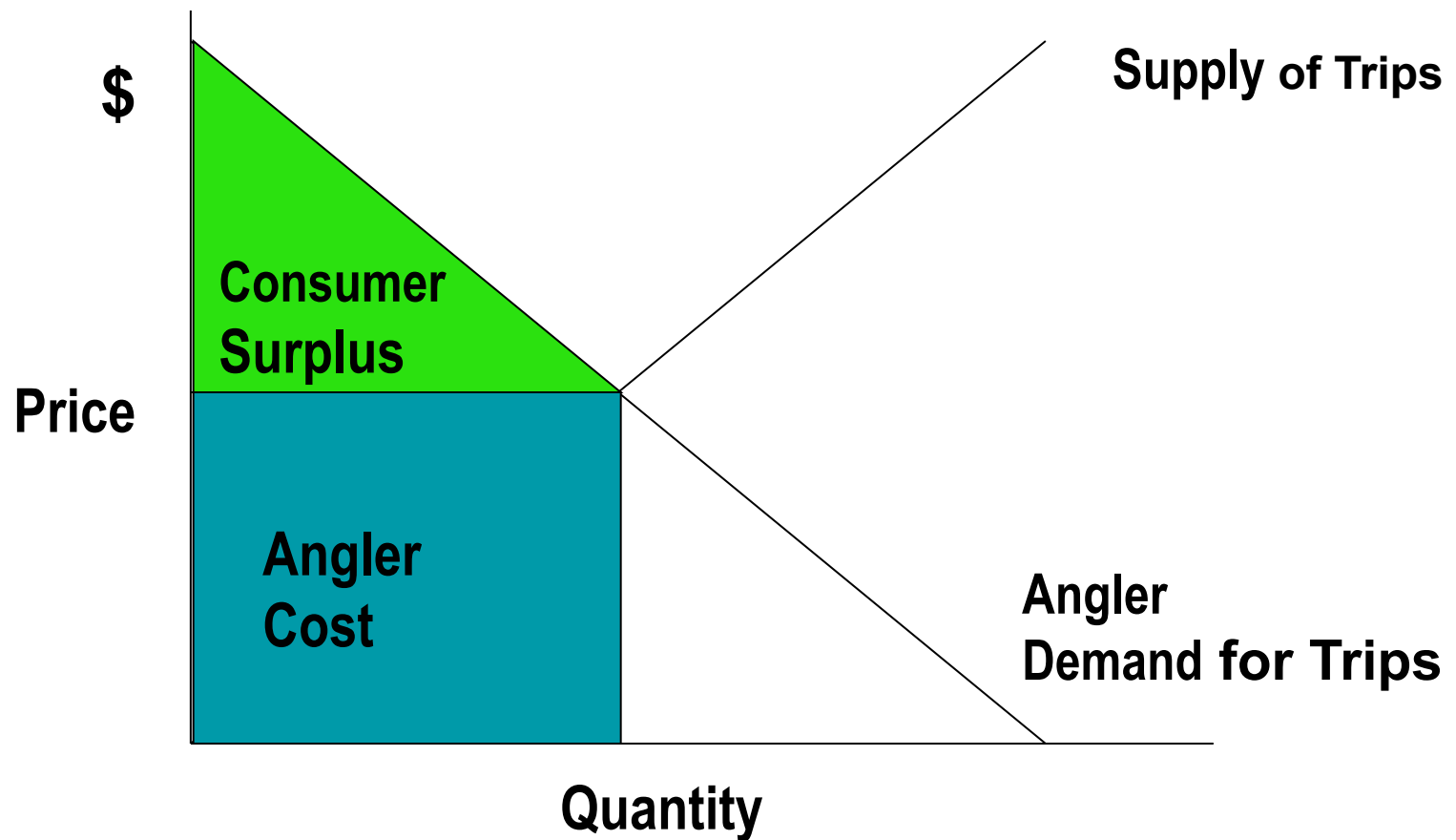
4. Improved socio-economic information.

*“Socioeconomics is rarely discussed during Council public meetings. It is always off on the side. How do we bring this more center and build trust in socio-economic information?”*

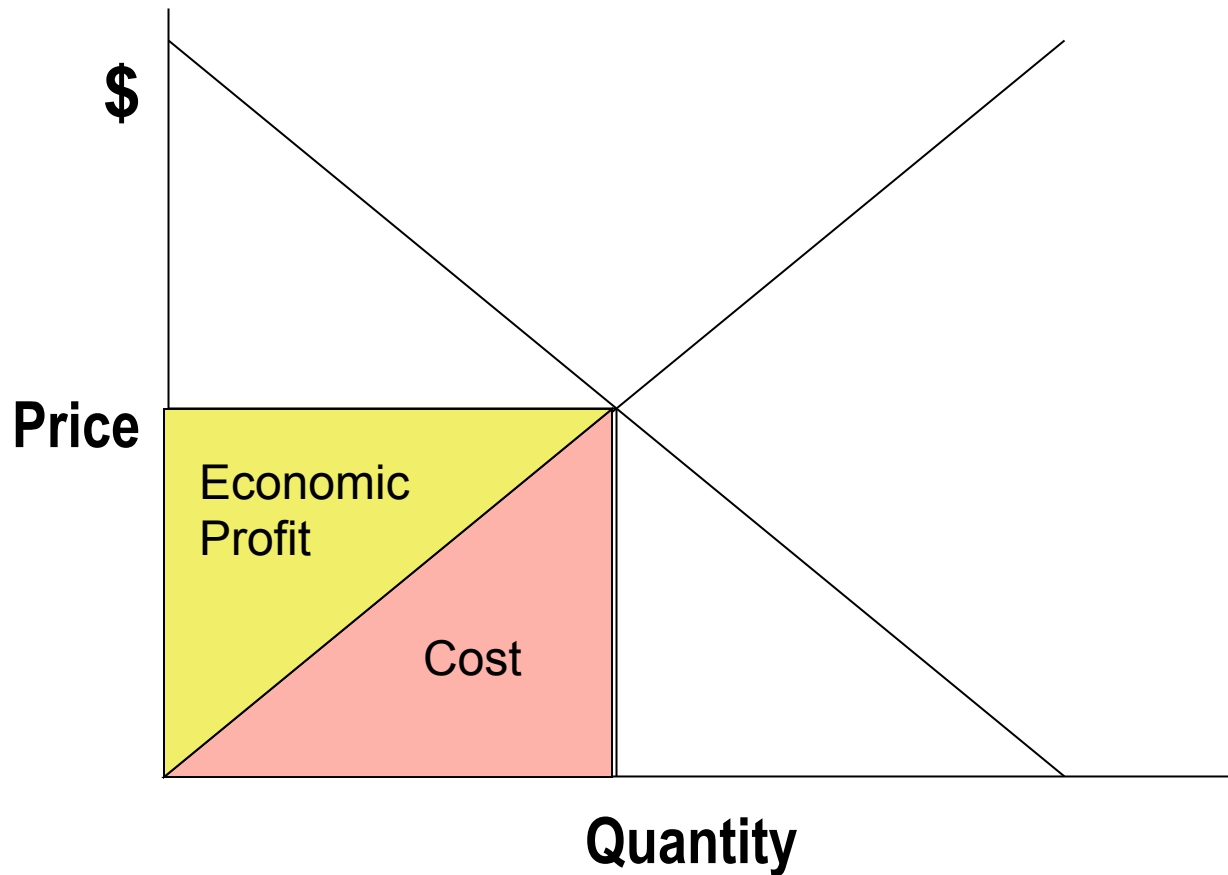
# Any questions?



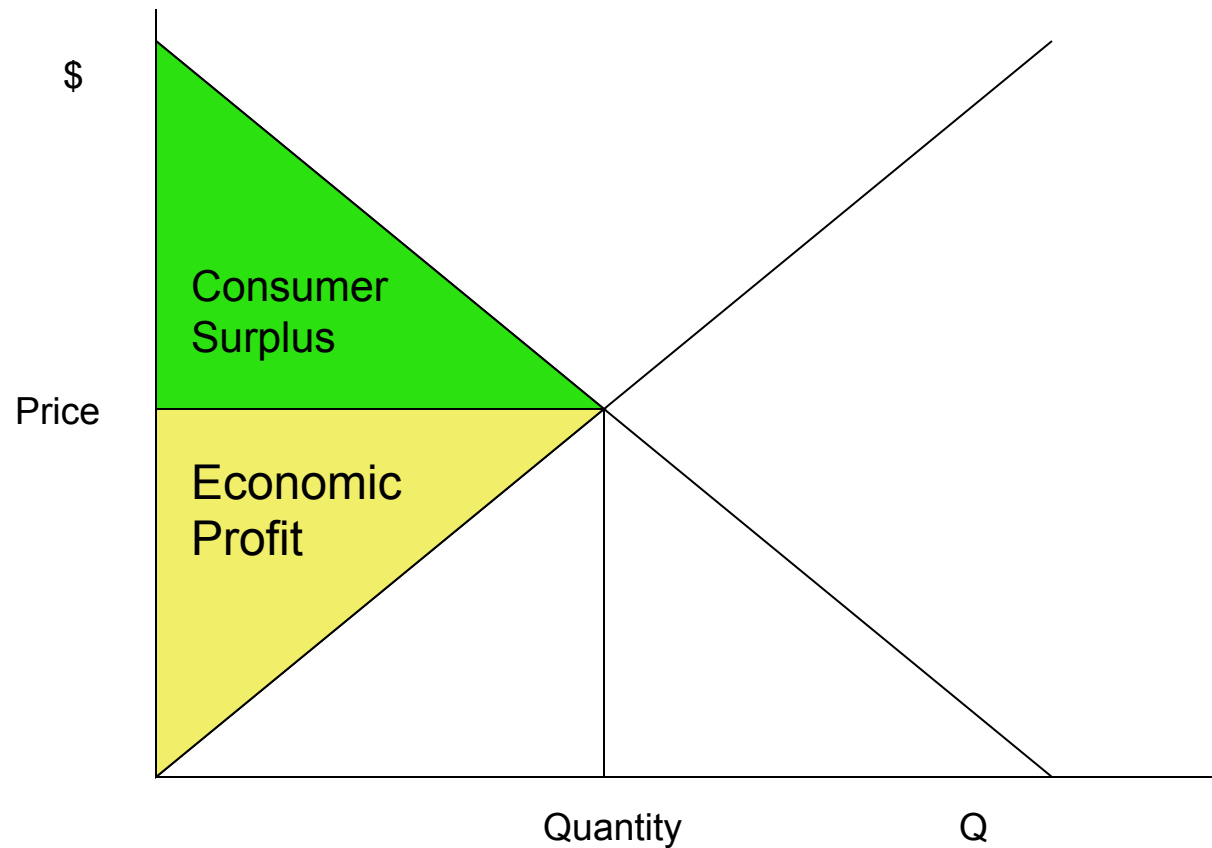
# Consumer Surplus: Basis for Angler Behavioral Cost-Benefit Analysis



# Producer Surplus: Basis for For-Hire Behavioral (Valuation) Analyses



# Economic Value / Net Economic Benefits



# Uses of Economic Impact Models (aka Input/Output Models) in Fishery Management

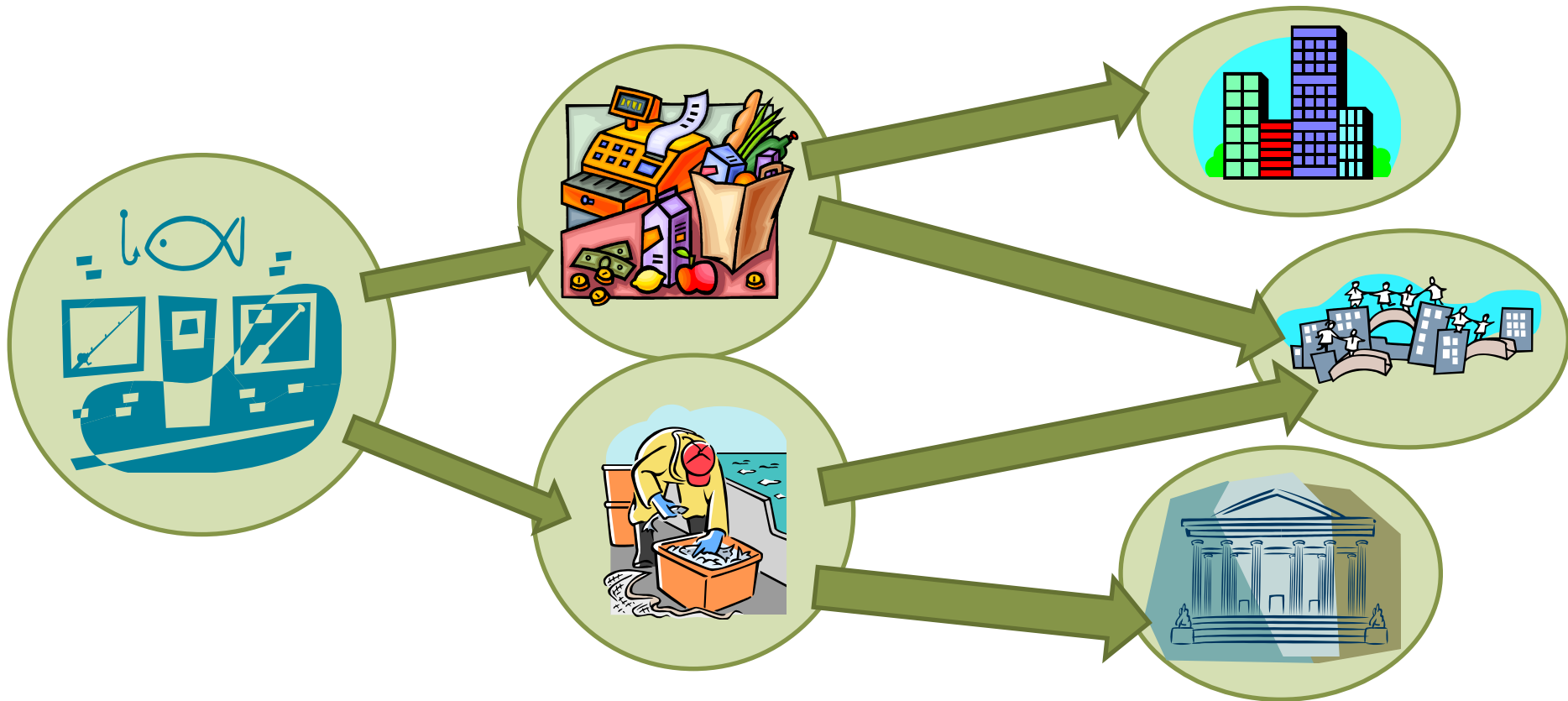
- Estimate impacts on sales, income, and jobs of different alternatives
- Inform managers of how these impacts are distributed
  - Across different regions, states, and (possibly) communities
  - Sectors of the regional economy
- I/O models capture inter-industry transactions between businesses and between businesses and final consumers in an economy





# Economic Impact Analysis

Economic impact models trace the flow of expenditures through a community and show the distribution of impacts between consumers, industries, households, and governments.



# Recreational Anglers

- Private boat sector
  - Spends \$25 million on trips
  - Willing to pay \$50 million for those trips
  - CS is \$25 million
- Shoreside sector
  - Spends \$5 million on trips
  - Willing to pay \$25 million for those trips
  - CS is \$20 million

In the example above, the Private boat Sector generates the greatest economic value (net economic benefit) as well as the greatest economic impacts.

# In sum,

## Economic Value / Behavioral Models

- To minimize effect of regulation options on anglers, for-hire operations, use behavioral / valuation model
- If economic efficiency is a policy goal (e.g., NS5), policy should seek to minimize the cost of providing goods and services to consumers and select options that generate the greatest economic value.

## Economic Impacts

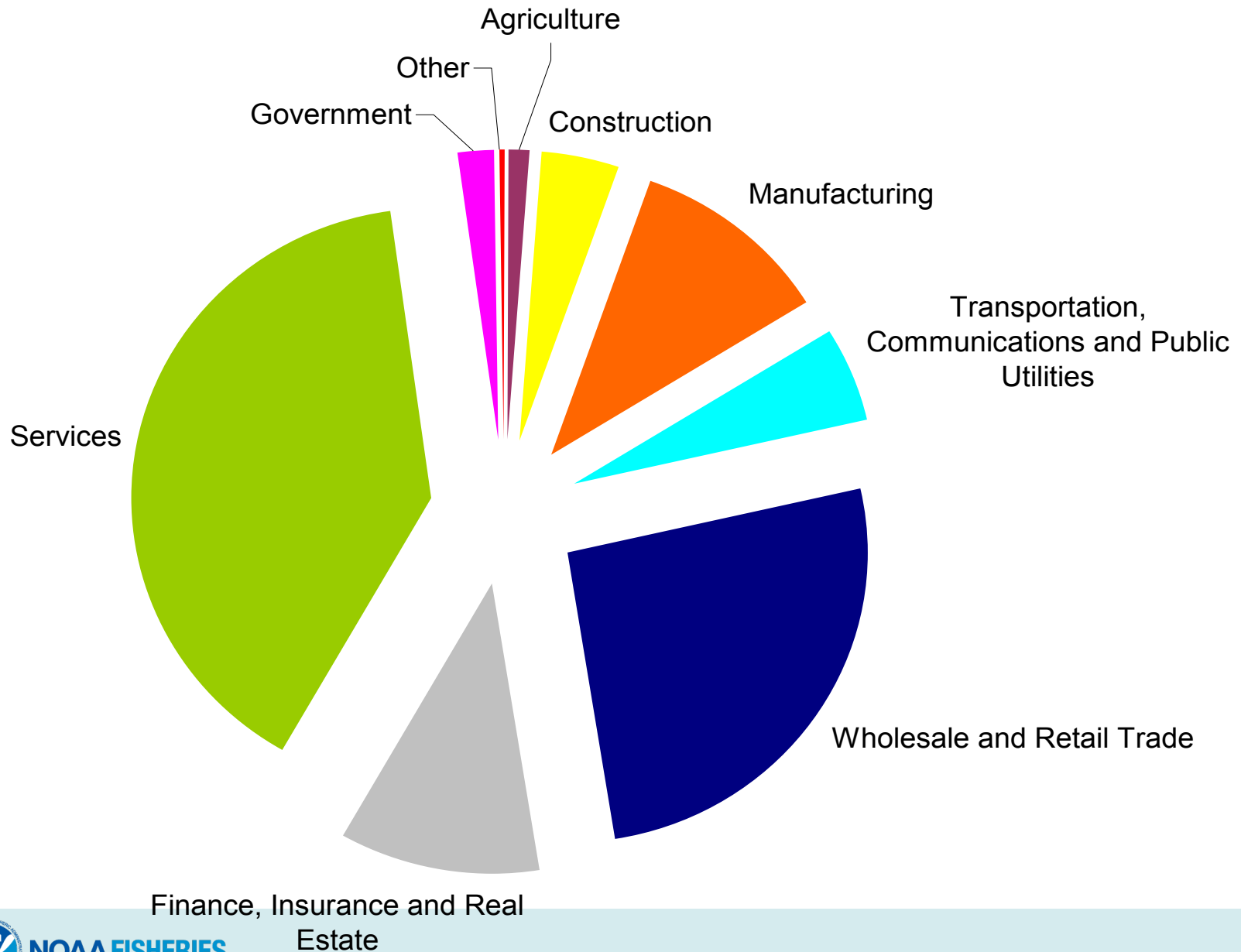
- Use to identify distributive effects (other firms, state, community)
- Use impact estimates with caution as they do not take behavioral adjustments to policy change into account (e.g., if you close fishing grounds, behavior will change (fewer trips? fish elsewhere?) and thus so will estimates of economic impacts).

# Example of Distribution of Income Impacts from a Reduction in Commercial Fishing Revenue

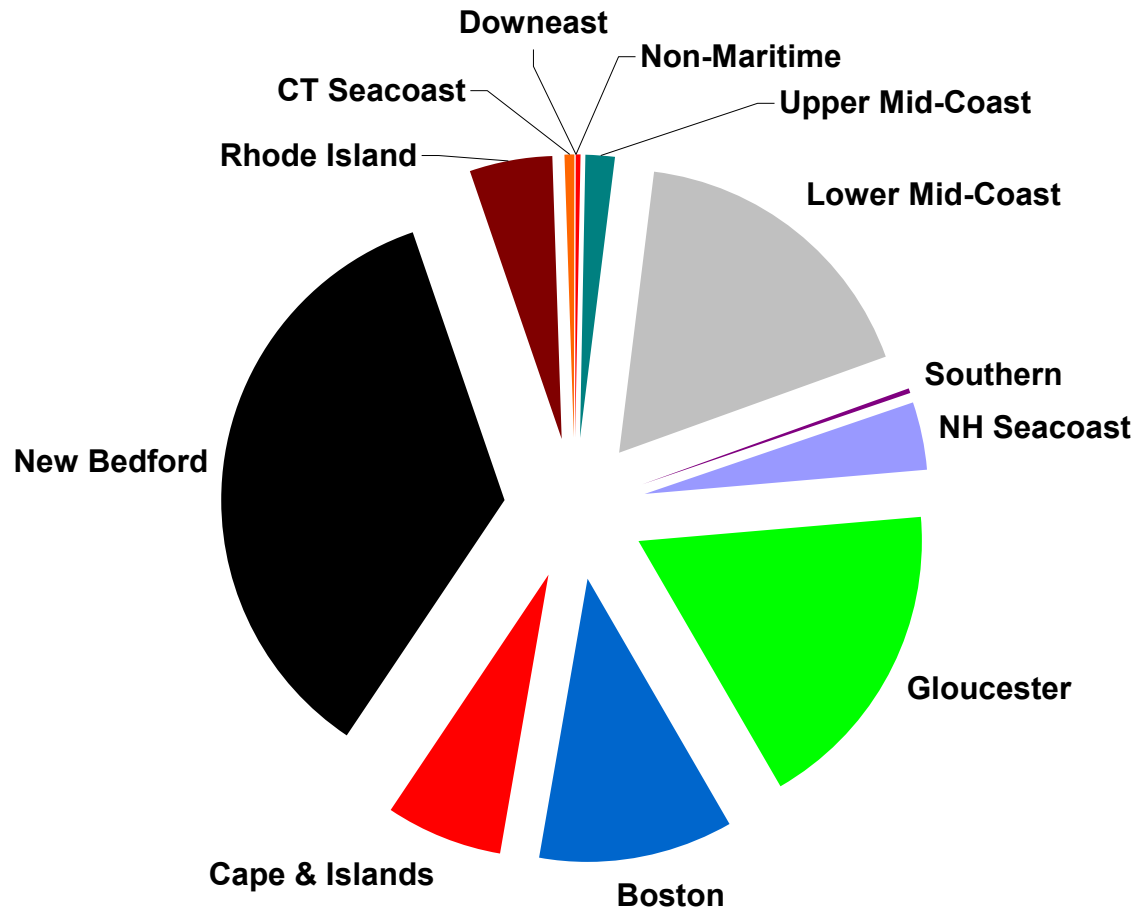
|                    | Alternative 1  | Alternative 3  | Preferred      |
|--------------------|----------------|----------------|----------------|
| Commercial Fishing | -22,582        | -29,537        | -20,067        |
| Processing         | -5,267         | -6,989         | -4,673         |
| Dealers            | -9,097         | -12,053        | -8,056         |
| Agriculture        | -246           | -326           | -218           |
| Construction       | -1,019         | -1,347         | -901           |
| Manufacturing      | -1,677         | -2,214         | -1,481         |
| Transportation     | -3,598         | -4,735         | -3,161         |
| Trade              | -6,304         | -8,340         | -5,574         |
| Finance            | -2,614         | -3,443         | -2,319         |
| Services           | -9,542         | -12,613        | -8,439         |
| Government         | -463           | -610           | -409           |
| Other              | -75            | -99            | -66            |
| <b>Total</b>       | <b>-62,488</b> | <b>-82,307</b> | <b>-55,367</b> |



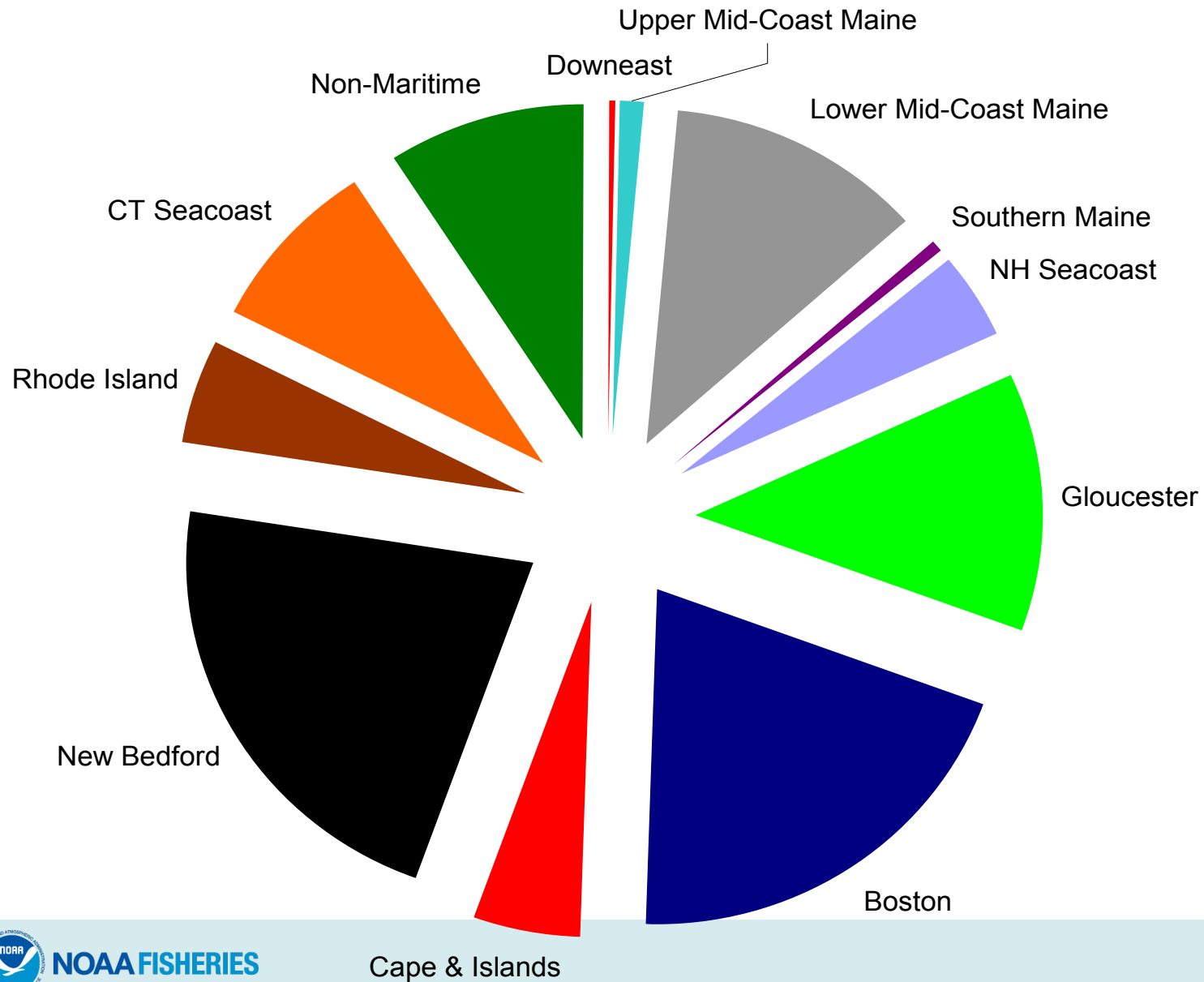
# Economic Impact Model: Income impacts by Industry



# Regional Distribution of Direct Income Impacts



# Economic Impact Model: All Income Impacts by Location



# Net Economic Benefits and Reallocation of Quota/ACL

- Net economic benefits are calculated as the change in consumer and producer surpluses due to new allocation of quota/ACL.
- If economic efficiency is the sole decision criterion for how to allocate (i.e., who gains/loses is irrelevant), then change allocation as long as gains in surpluses for one sector exceed reductions in surpluses for the other sector.
- In general, reallocate to sector with greater marginal willingness to pay (MWTP) until MWTP is equal across sectors and economic value (net economic benefits) is maximized.



# Economically Efficient Allocation

