

# **Fishery Management Council Member Training: Economic Analysis**

Rita Curtis  
Office of Science & Technology  
Silver Spring, MD  
Rita.Curtis@NOAA.gov

# Overview

- Central Questions:
  - What is the economic effect of each management option?
  - Who wins / who loses?
- Mandates
  - Focus on mandates that “shape” analyses
- Two Types of Model
  - Economic Benefits vs. Economic Impacts
- Some Management Issues
  - Rebuilding Plans, Allocation

# Primary Purpose of Economic Analyses

- What is the economic effect of proposed management options on fishermen and other affected entities (related firms, communities)?
- Who is affected and by how much?
- Provides opportunity to systematically and objectively assess the economic consequences of management options
- **SOLE OPPORTUNITY FISHERMEN HAVE TO MAKE THE REGULATORY PROCESS FOCUS ON THEM**

# KEY MANDATES

- MSA Section 303 (a)(9): Fishery Impact Statement
- E.O. 12866: Regulatory Impact Review (RIR): net benefits
- E.O. 13272: Proper Consideration of Small Entities in Agency Rulemaking.
- Regulatory Flexibility Act (RFA): (small businesses / substantial impact)
- Small Business Regulatory Enforcement Fairness Act
- NEPA (cumulative effects, indirect effect)

# E.O. 12866

- Regulate only when market failure requires it;
- Consider all benefits and costs broadly defined;
- Choose alternative that maximizes net benefit
  - Economic, Environmental, Health and Safety
  - Distributive impacts
  - Equity

# Regulatory Flexibility Act

- Purpose is to establish the principle that agencies shall endeavor to fit regulatory requirements to the scale of businesses **subject to regulation**.
- Small entity involvement
  - Will action have **significant** economic effect on a **substantial** number of regulated small entities?
  - If yes, seek alternatives to minimize burden
  - No requirement to choose any particular alternative

# NEPA

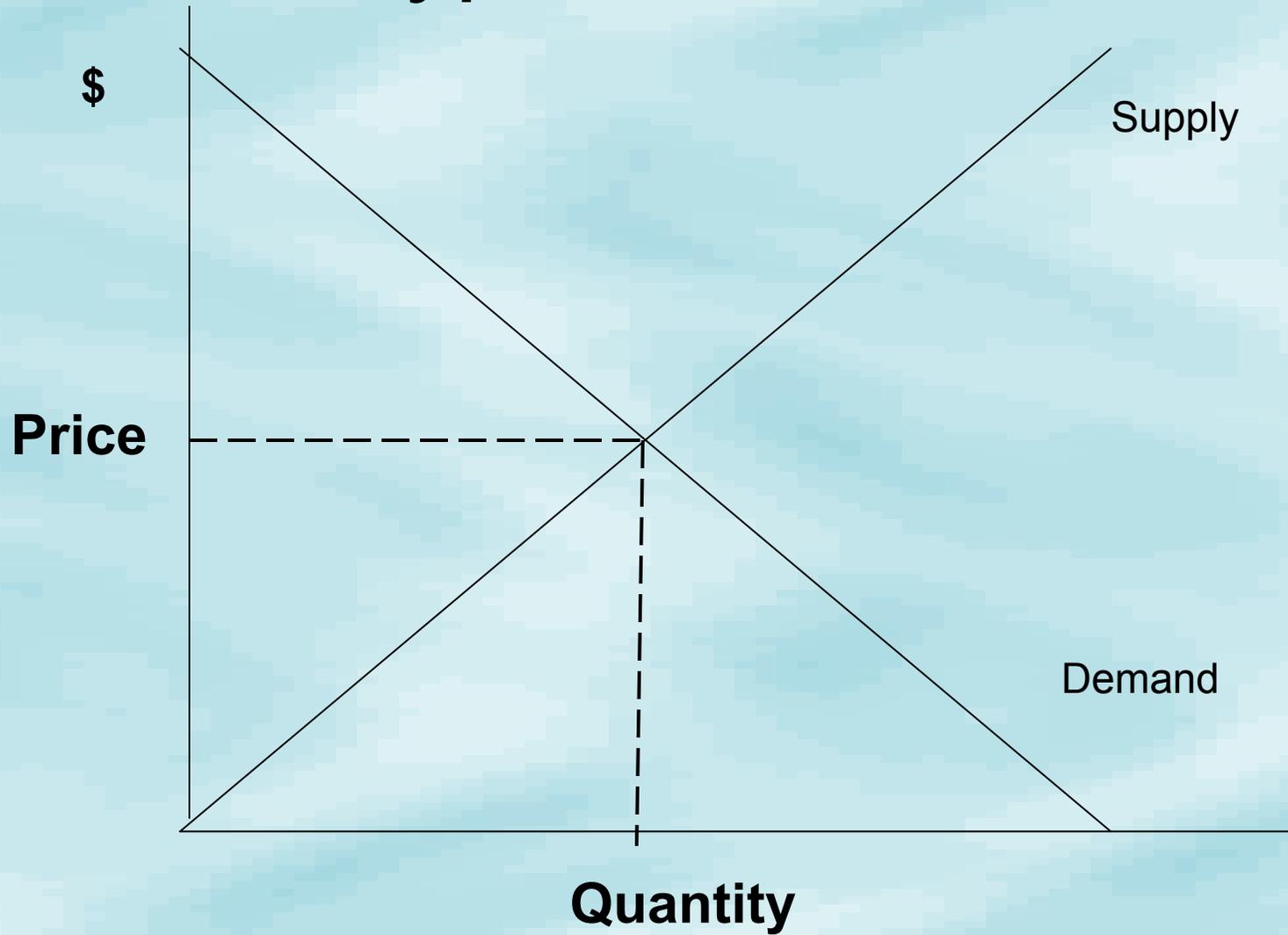
Broad requirements for economic analyses;  
Here, focus on two distinguishing requirements:

- Cumulative Effects
- Affected Human Environment, i.e., “Indirect Effects”

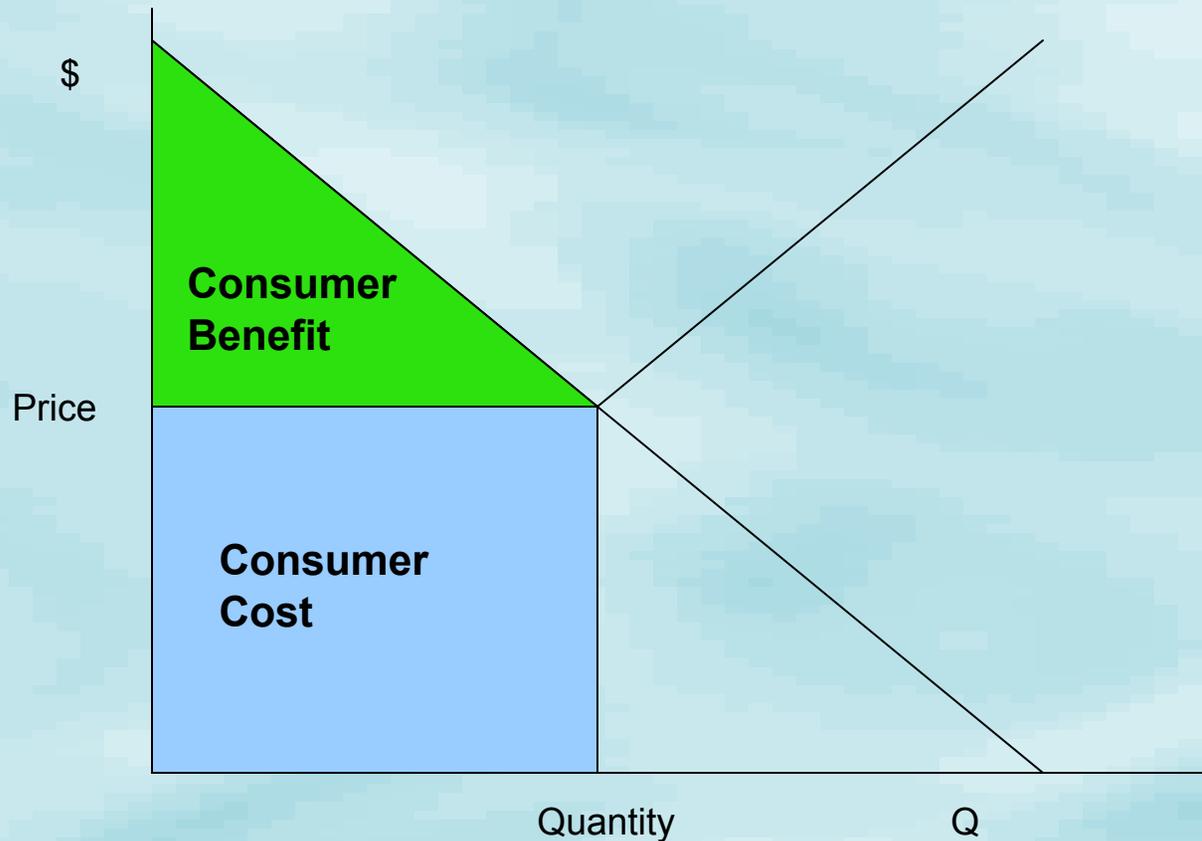
# Economic Value

- Two components:
  - Consumers - economic value is the difference between the price actually paid for a good or service and what the consumer would have been willing and able to pay.
  - Producers – economic value is the difference between the cost of producing a good or service and the price actually charged.

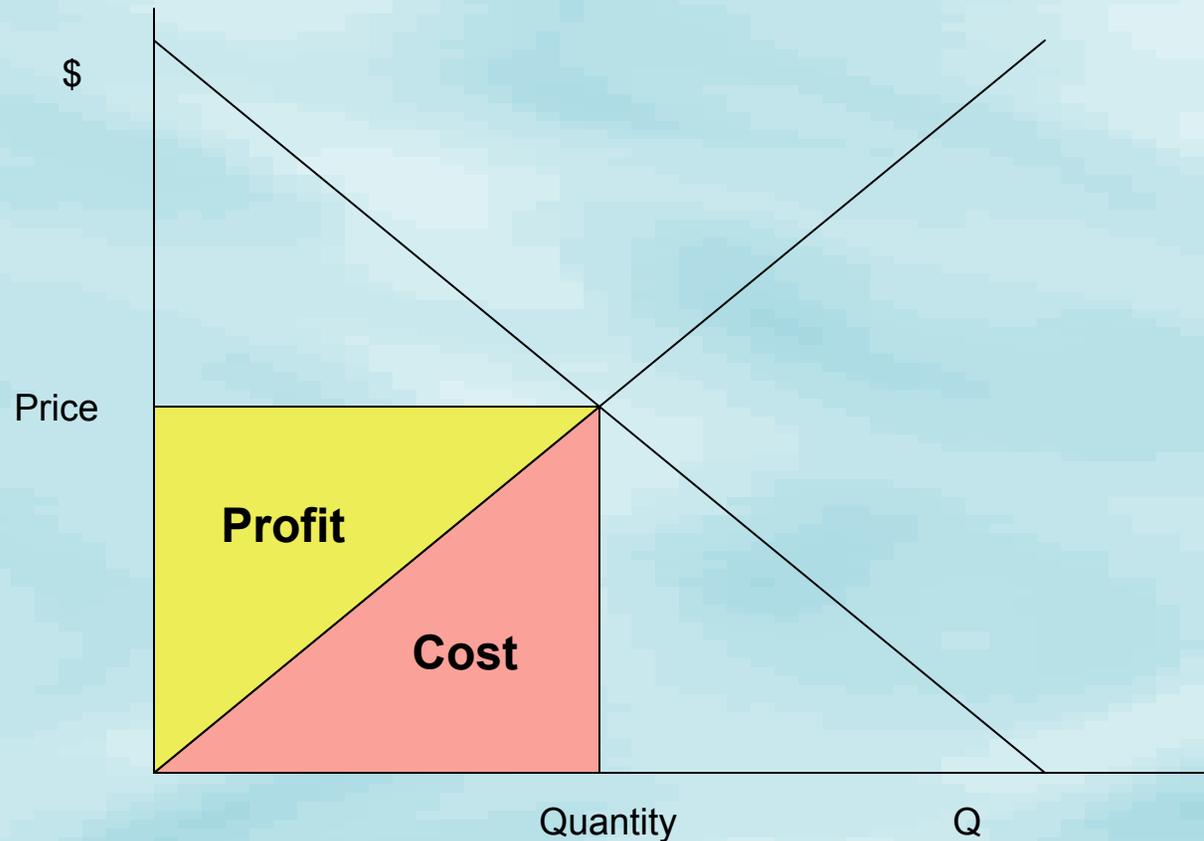
# A Hypothetical Market



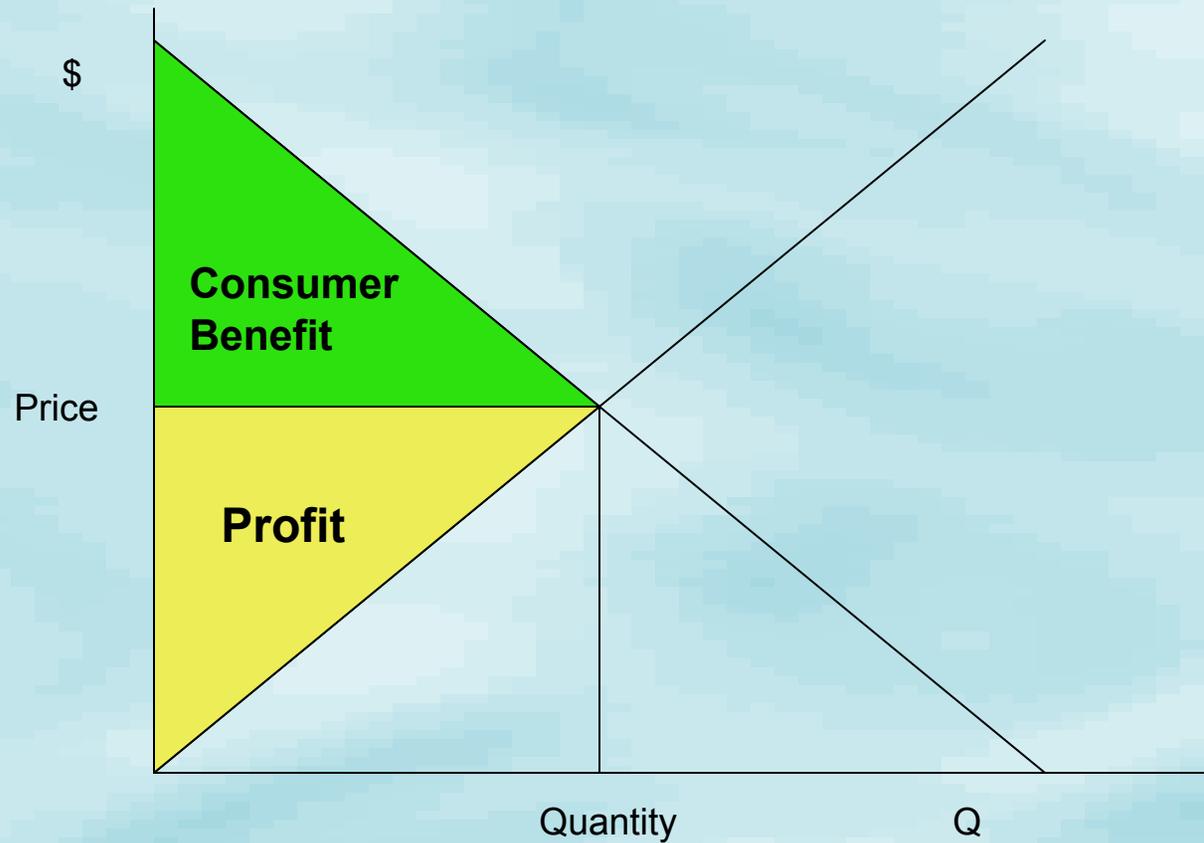
# Consumer Value: Basis for Angler Analyses



# Producer Value: Basis for Harvester Analyses



# Economic Value / Benefits



# Example: Economic Allocation of Red Grouper in the Gulf of Mexico

- Red grouper an important species for commercial and recreational fishermen
- Historical catches unrestricted, resulting in equilibrium distribution between sectors
- Stock depletion results in lower TAC
- Reallocation redistributes the burden of stock recovery
- Preliminary estimates of gains and losses for small redistribution of TAC for red grouper

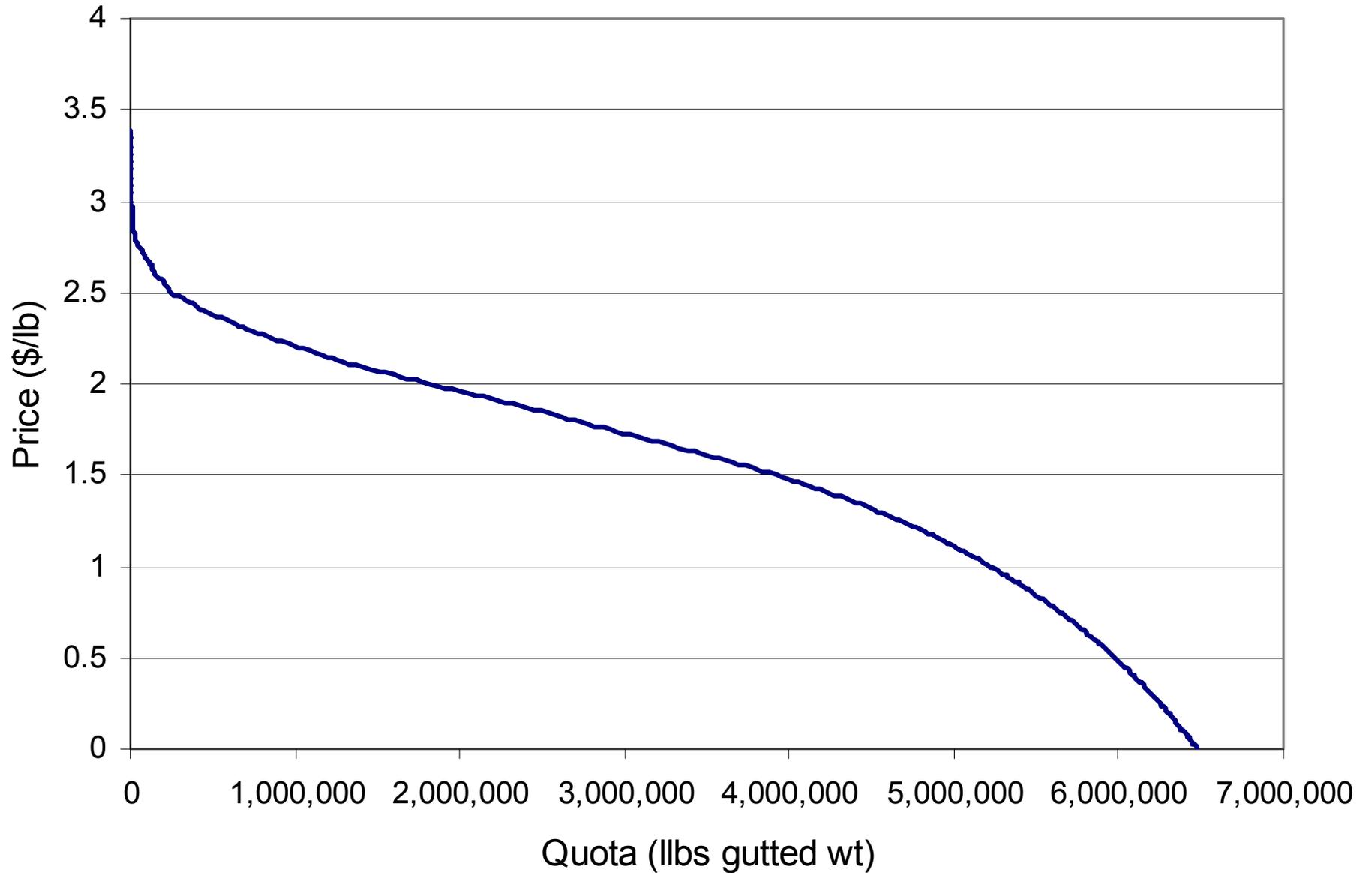
# Net Benefits and Reallocation

- Net benefits are calculated as the change in consumer and producer surpluses due to new allocation
- Change allocation as long as gains in surpluses for one sector exceed reductions in surpluses for the other sector

# Analysis of Commercial Sector

- Marginal willingness-to-pay (MWTP) equivalent to predictions of the lease price for quota under an IFQ system
- Estimate demand for quota by calculating MWTP for a wide range of commercial quotas

## Marginal Benefit Schedule for the Commercial Sector

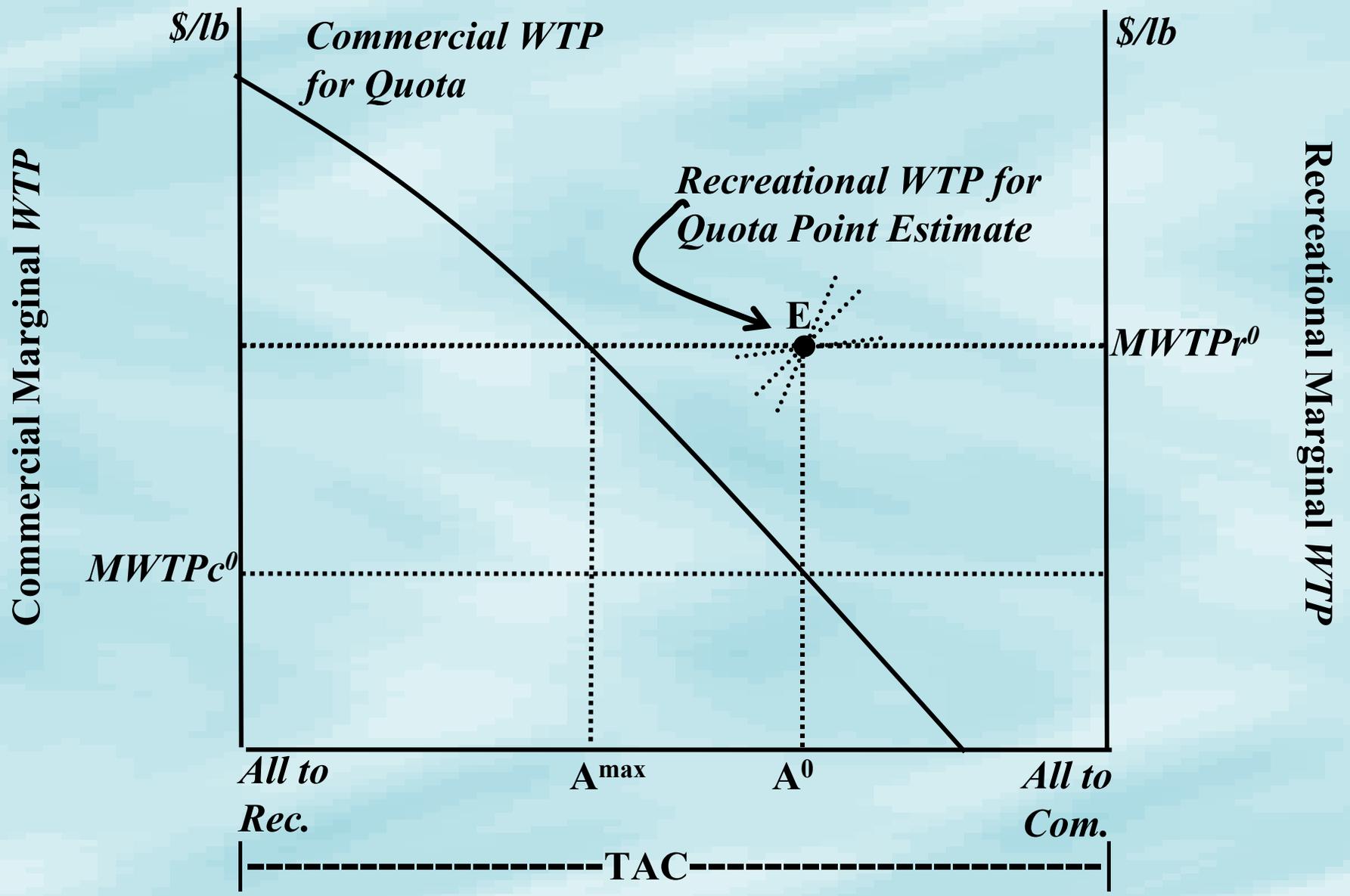


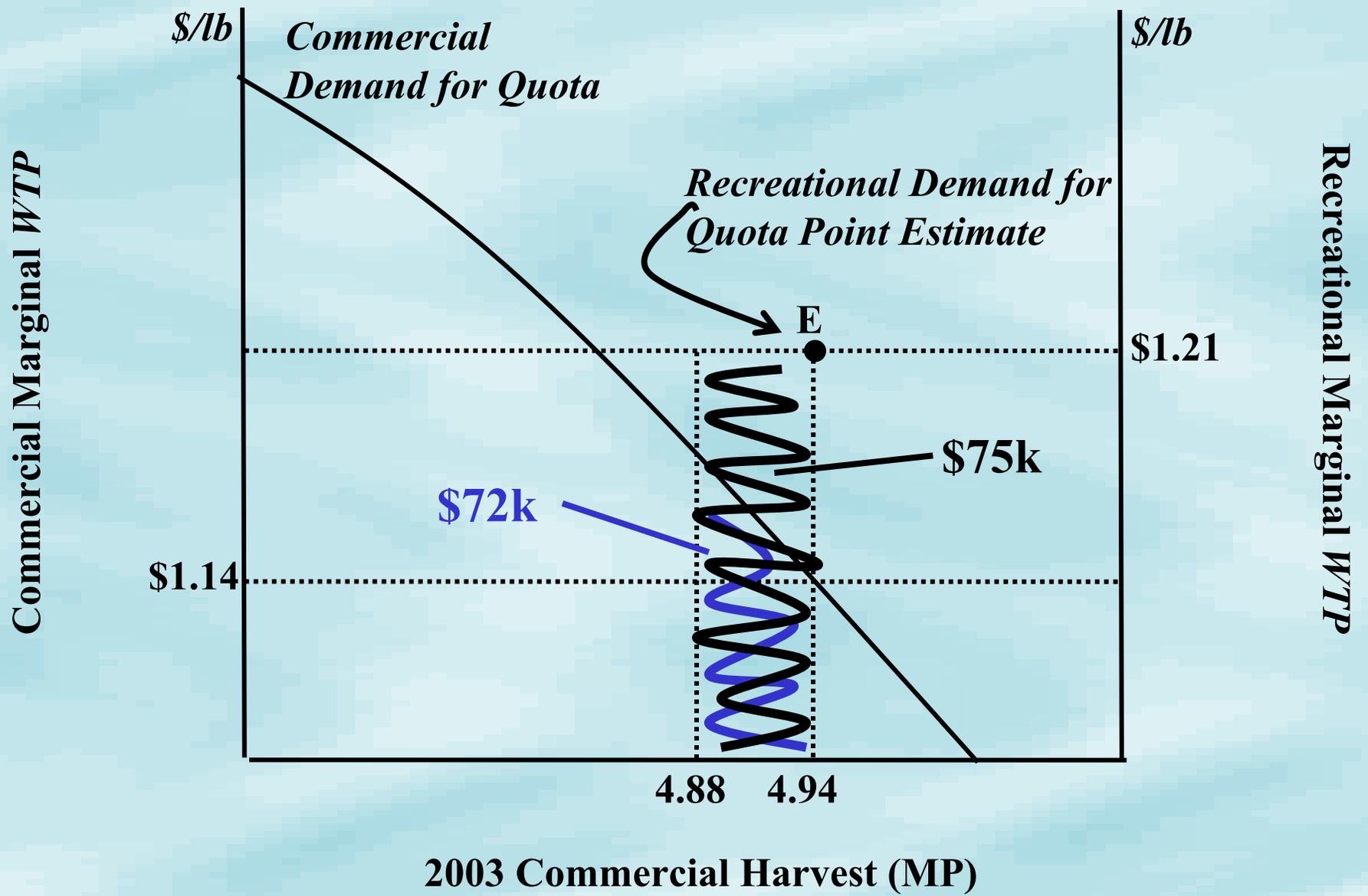
# Analysis of Recreational Sector

- Hedonic price function--charter trip prices a function of trip characteristics:
- Trip length
- Number of passengers
- County-level harvest characteristics averaged over all species
  - Keep per angler hour fished
  - Discards per angler hour fished
  - Weight per fish kept

# Recreation Model Results

- Mean *MWTP*/trip in 2003
  - \$/keep = 5.86 ( $\pm$  4.41)
  - \$/discard = -2.90 ( $\pm$  7.55)
  - \$/lb = 1.11 ( $\pm$  0.83)
  - \$/lb of gutted red grouper  
= \$1.21 ( $\pm$  0.91)

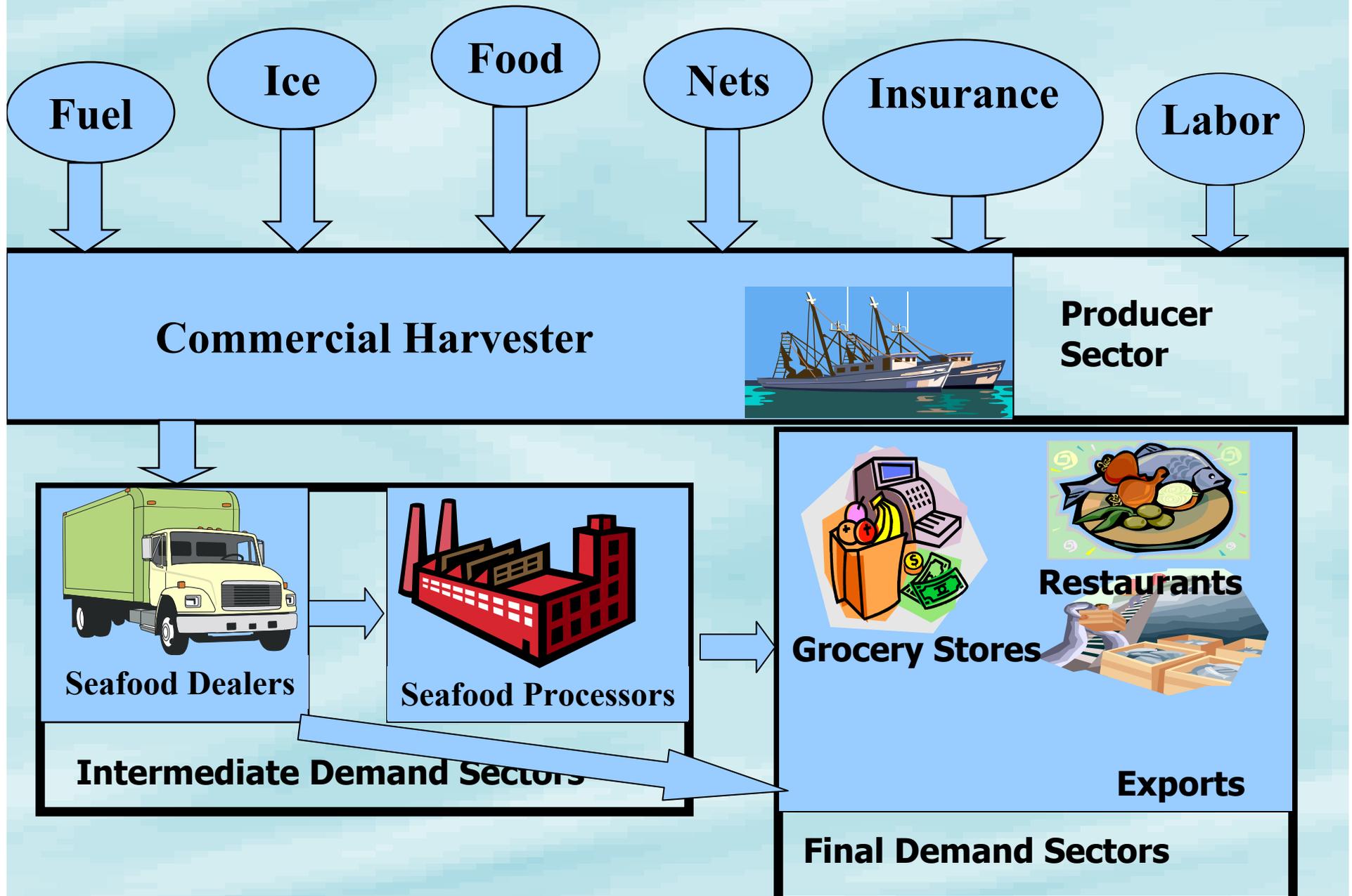




# Uses of Economic Impact Models (aka Input/out Models) in Fishery Management

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

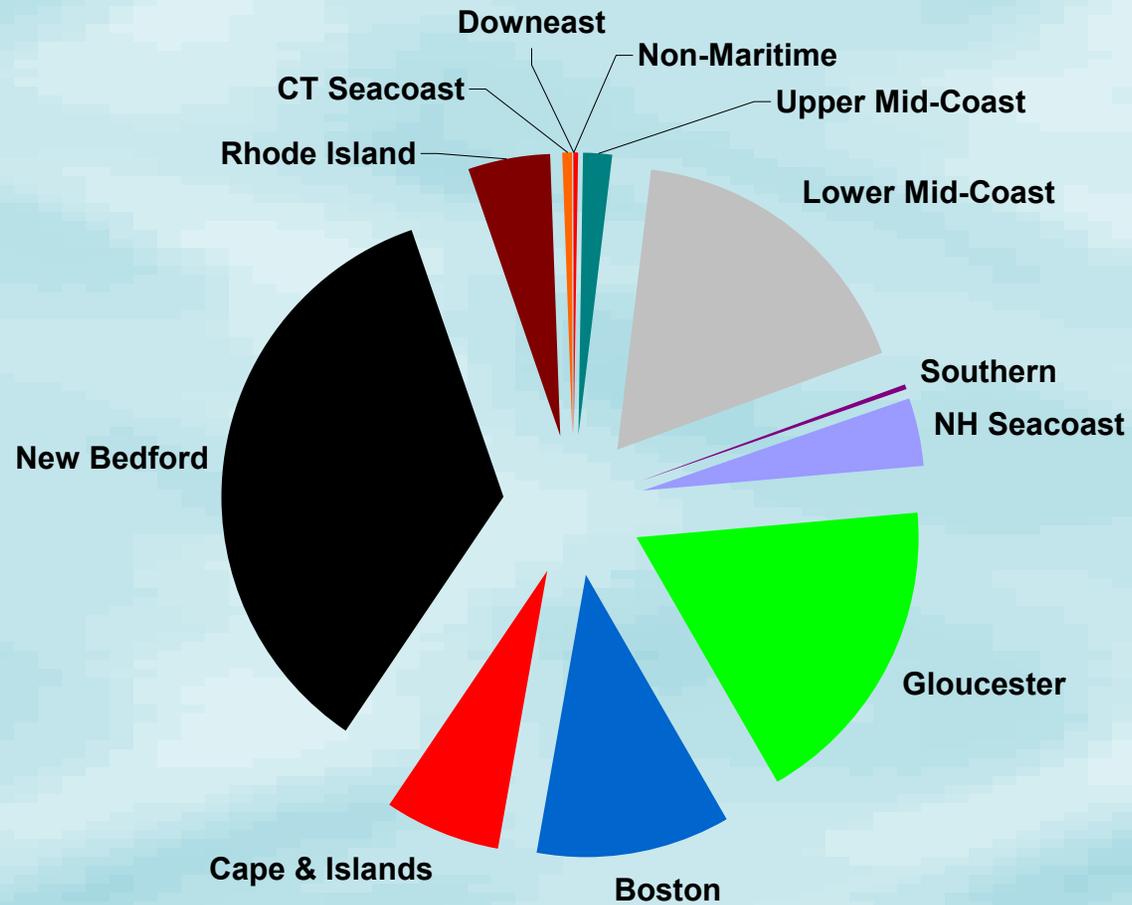
# Basic Input-Output Logic



## Ranking Alternatives: Income Impacts from a Change in Commercial Fishing

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

# Regional Distribution of Direct Income Impacts



# Economic Impact and Economic Value: An Example

- Firm A
  - \$200 million in sales
  - \$210 million in operating cost
  - \$10 million loss
- Firm B
  - \$125 million in sales
  - \$100 million in operating cost
  - \$25 million in profit
- Firm A has higher economic impact
- But, Firm B generates more economic value

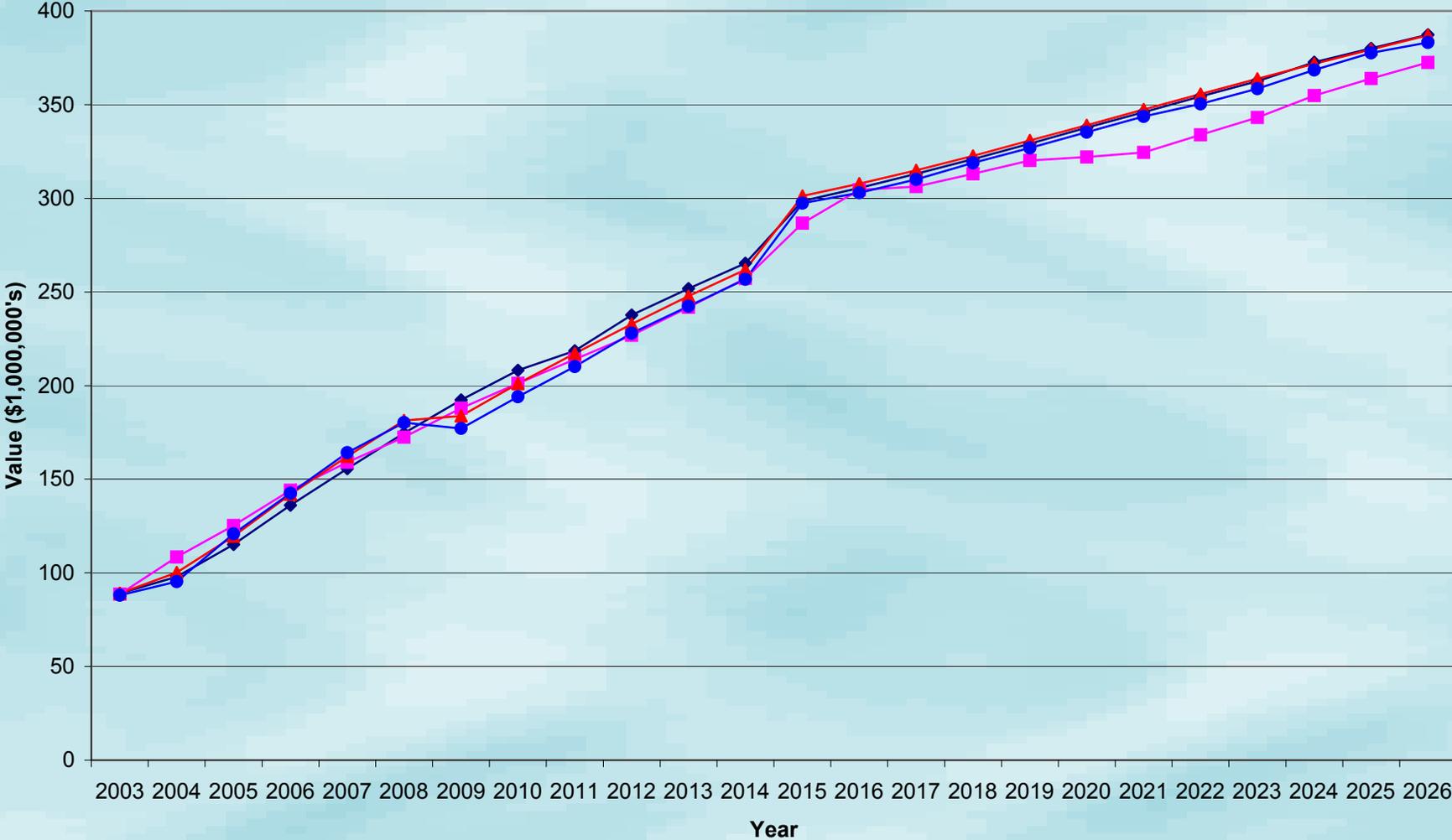
# Another Example: Recreational Anglers

- Angler A
  - Takes a private boat trip
  - Spends \$45
  - Willing to pay \$50
- Has higher economic impact
- Generates \$10 in economic value
- Angler B
  - Fishes from a pier
  - Spends \$5
  - Willing to pay \$25
- Lower economic impact
- Generates \$20 in economic value

# Consequence

- Allocation based on economic impact rewards the highest spender or highest cost producer:  
**the bigger the expenditure, the bigger the impact**
- Sound economic policy would seek to minimize the cost of providing goods and services to consumers (fish, for example)
- Primary use of I/O to identify distributive effects;
- Should **NOT** be used to make allocation decisions
- Take the estimate with a grain of salt

### Net Benefit by Alternative Rebuilding Strategy

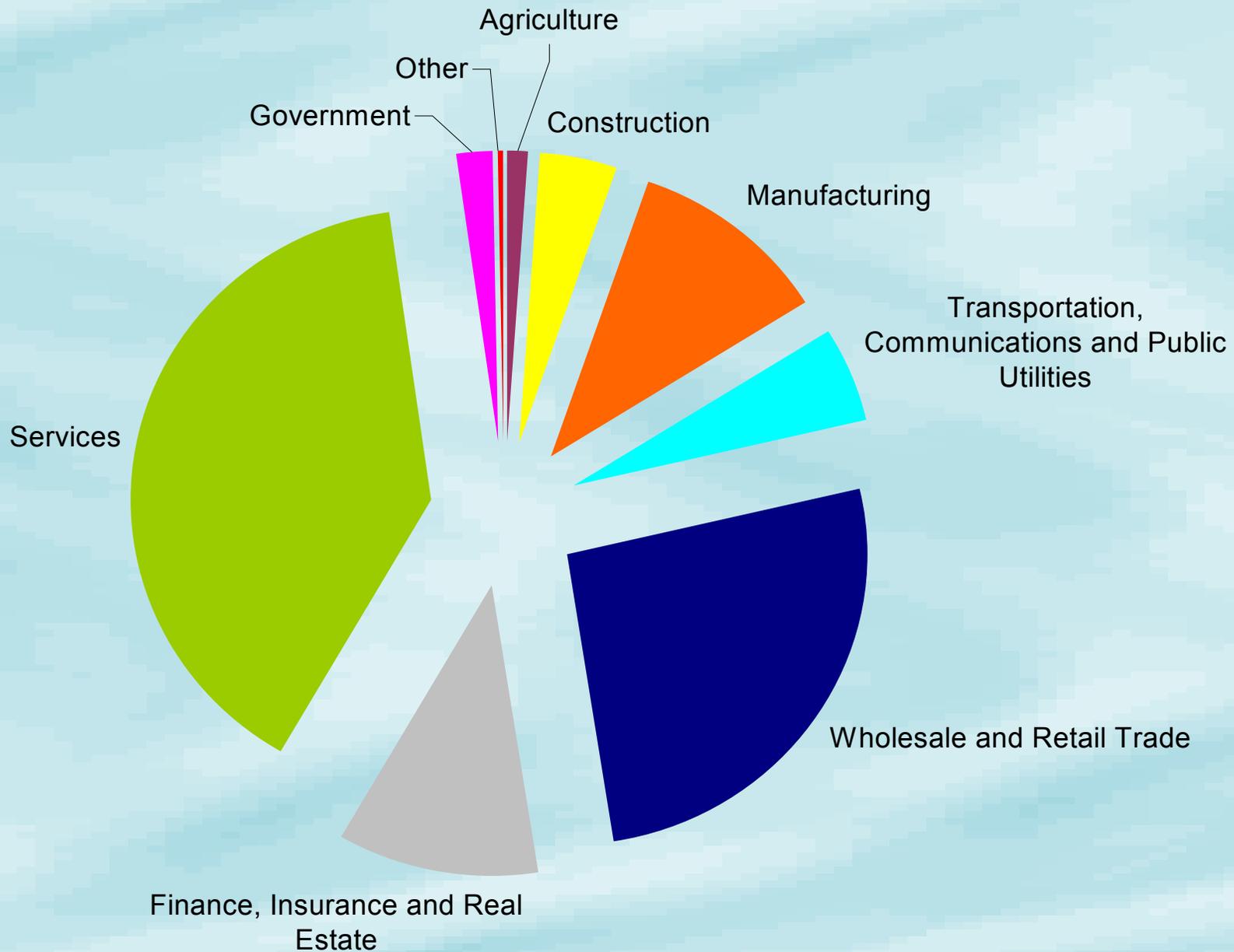


◆ F-Rebuild    ■ Phased F    ▲ Adaptive    ● Amendment 13

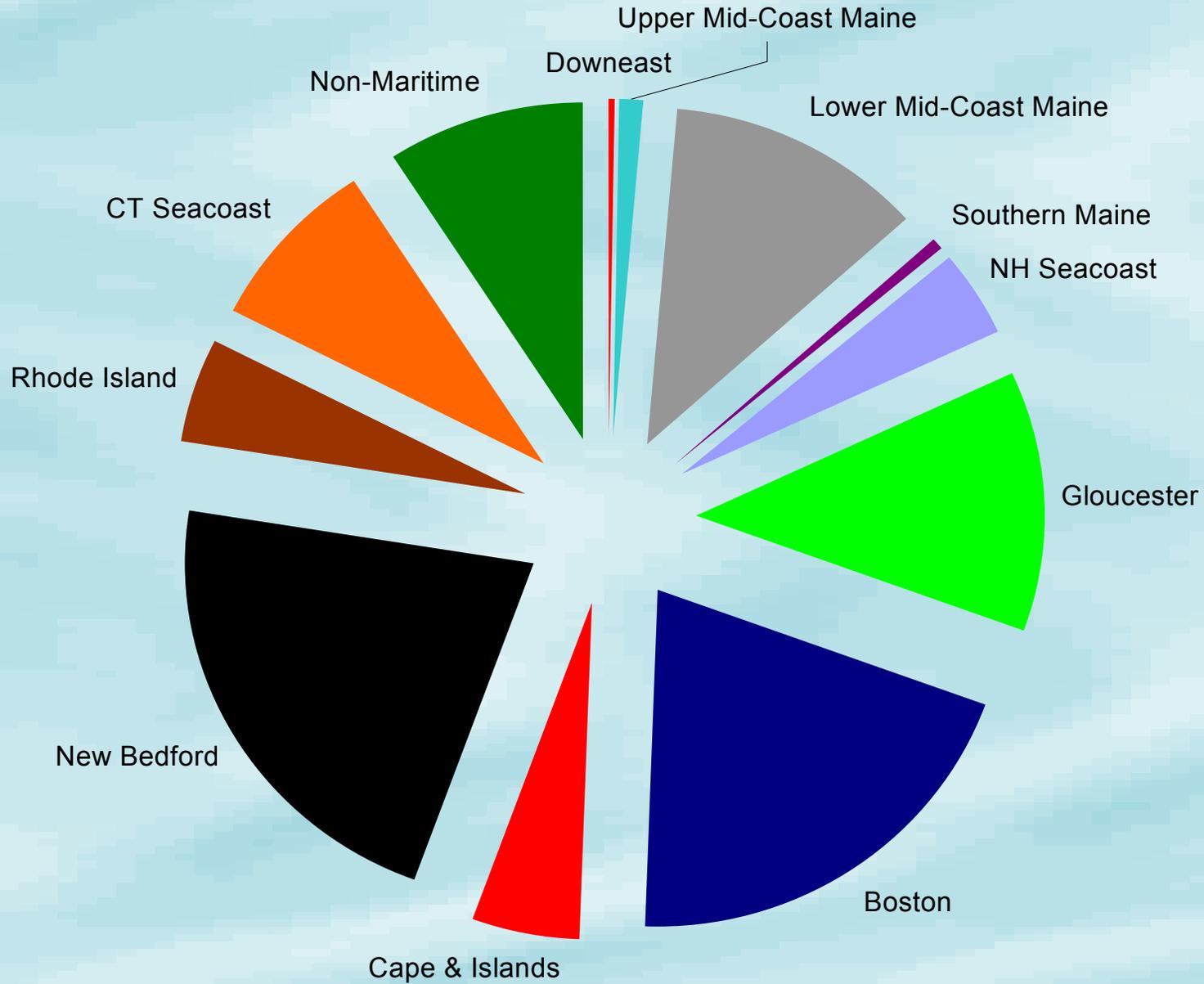
Annual Difference in Discounted Net Benefit (Rebuild in 2014 minus Rebuild in 2009)



# Economic Impact Model: Income impacts by Industry



# Economic Impact Model: Income Impacts by Location



# Social Sciences & Fishery Management

- We manage people not fish
- Management decisions are about allocation and security
- Statutory framework not about economic impact assessment (I/O) but assessing benefits/value
- Biological requirements are constraints not objectives
- Optimum yield is defined in social science terms (economic, social, cultural)
- Strengthened rights a necessary component of economical fishery management