Fishery Management Council Member Training:

Economic Analysis

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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
  - Allocation, Rebuilding Plans

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 <u>benefits</u> and costs broadly defined;
- Choose alternative that maximizes net <u>benefit</u>
  - 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 effct 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;

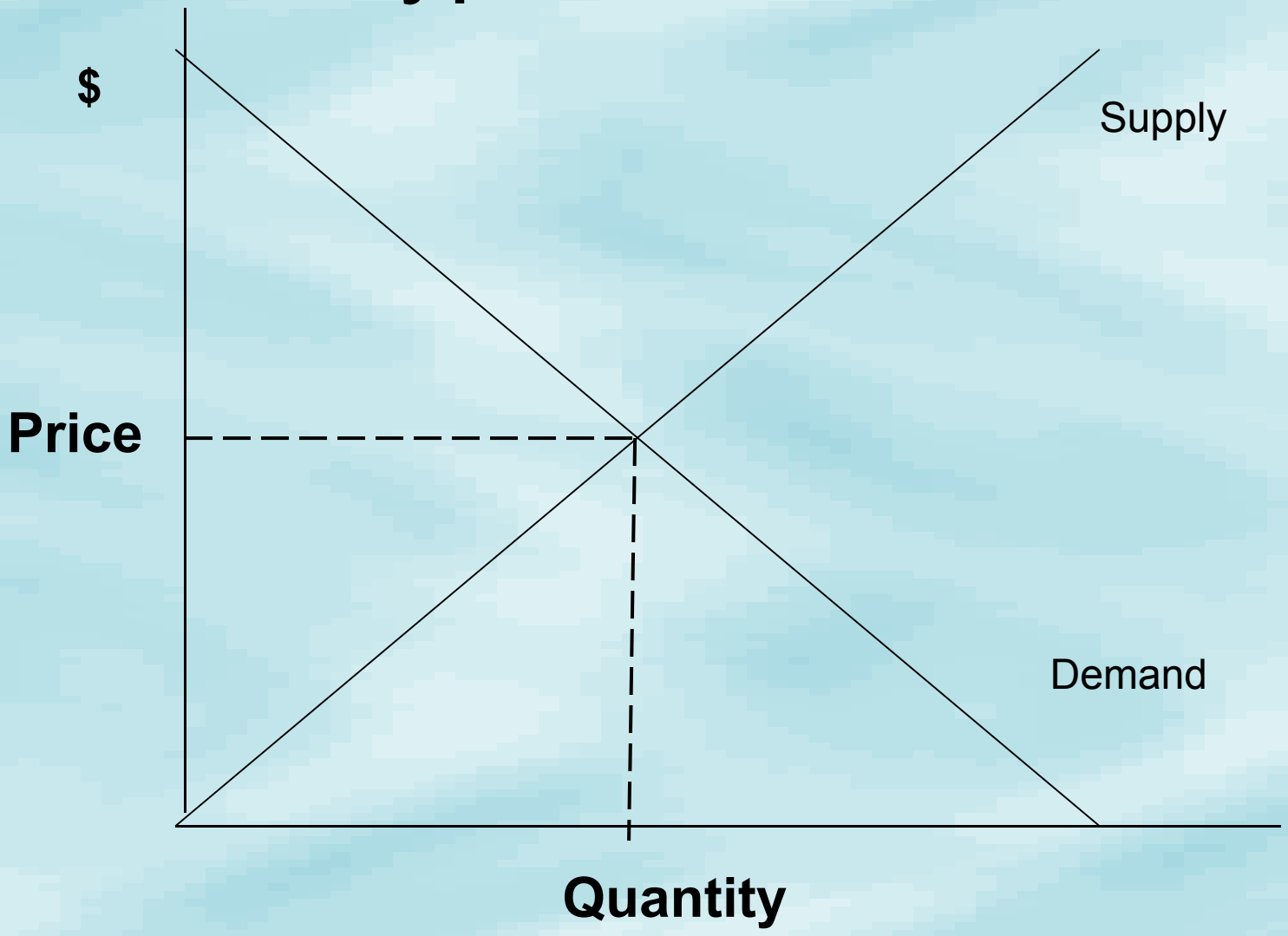
Here, focus on two distinguishing requirements:

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

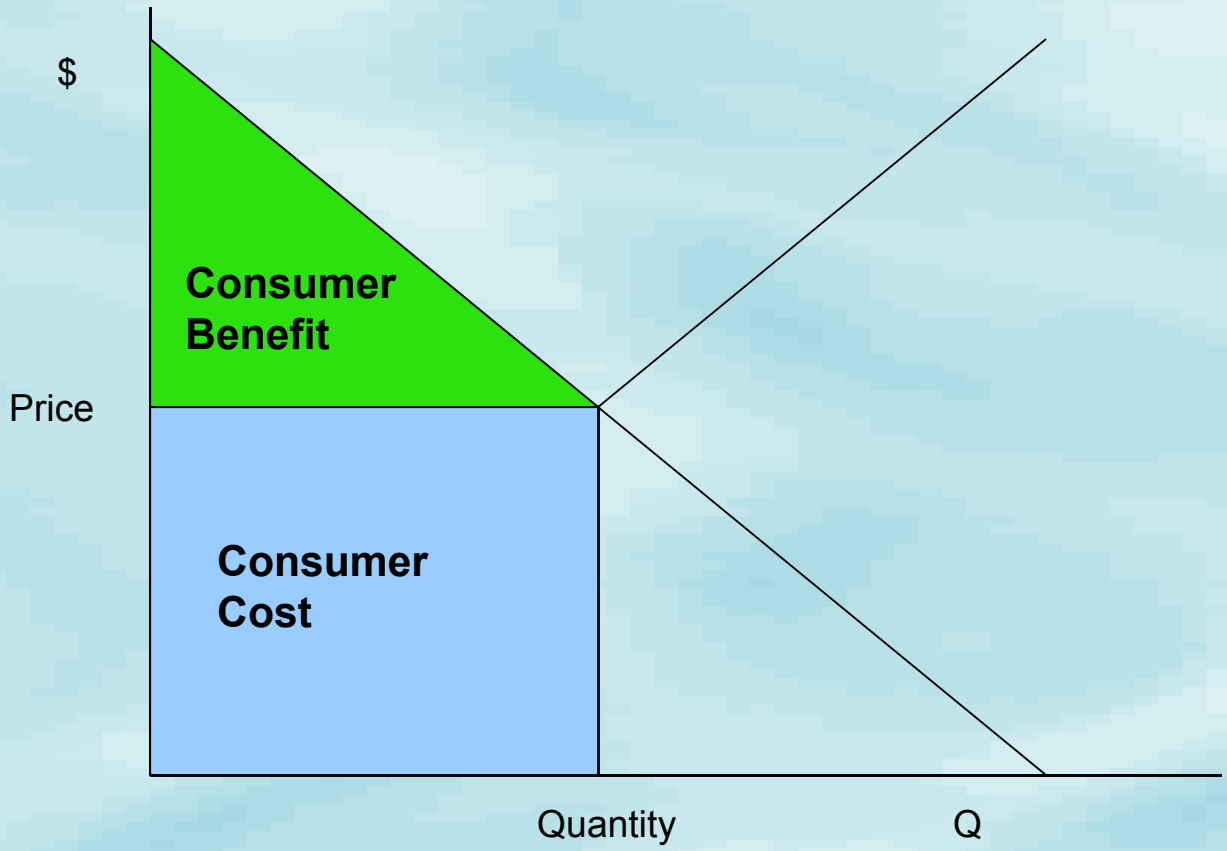
Economic Value

- 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.

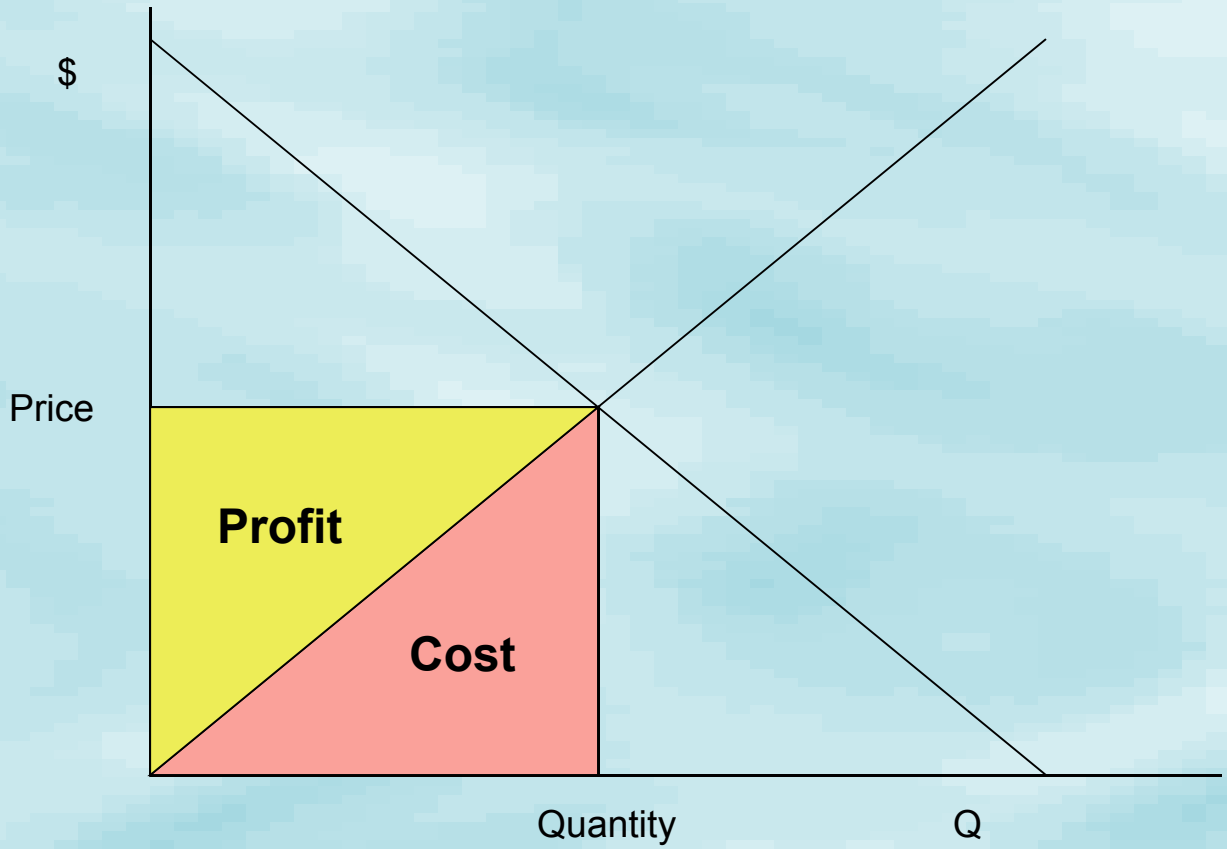
A Hypothetical Market



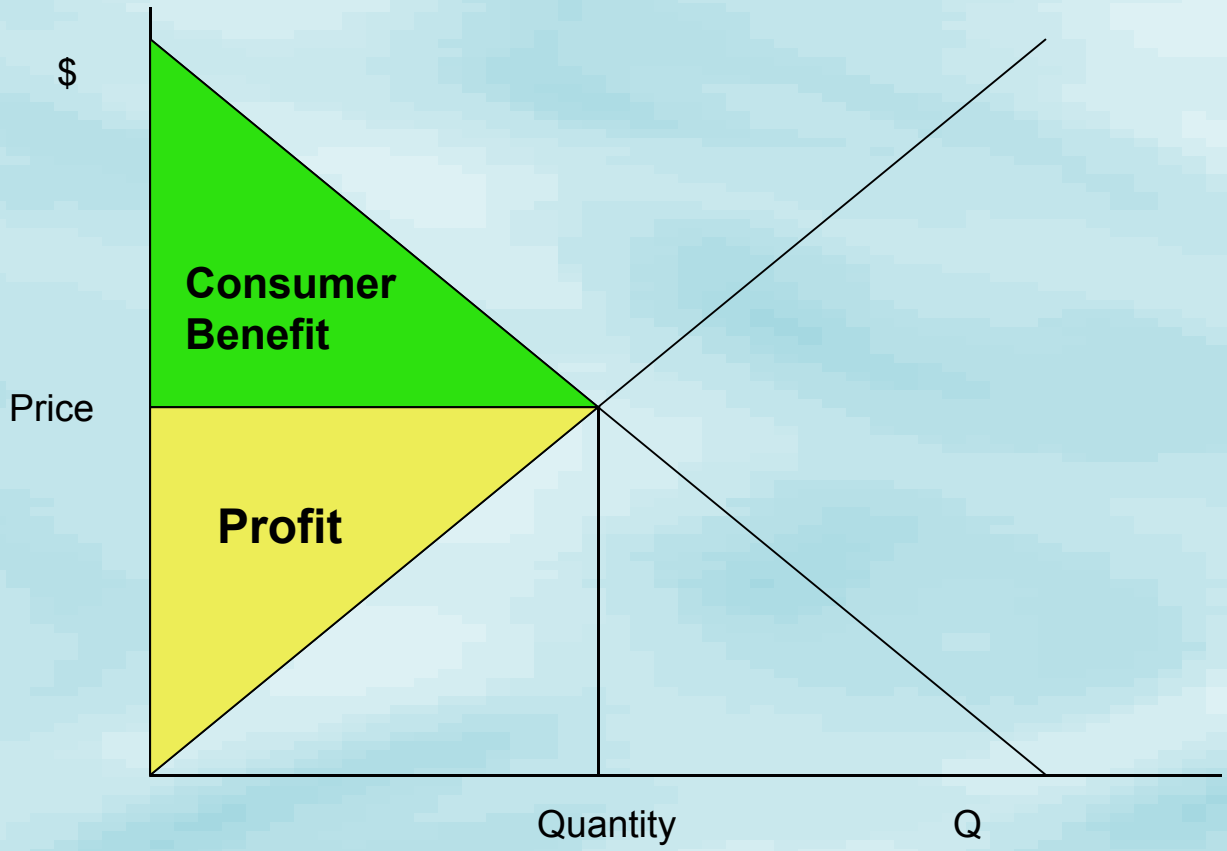
Consumer Value: Basis for Angler Analyses



Producer Value: Basis for Harvester Analyses



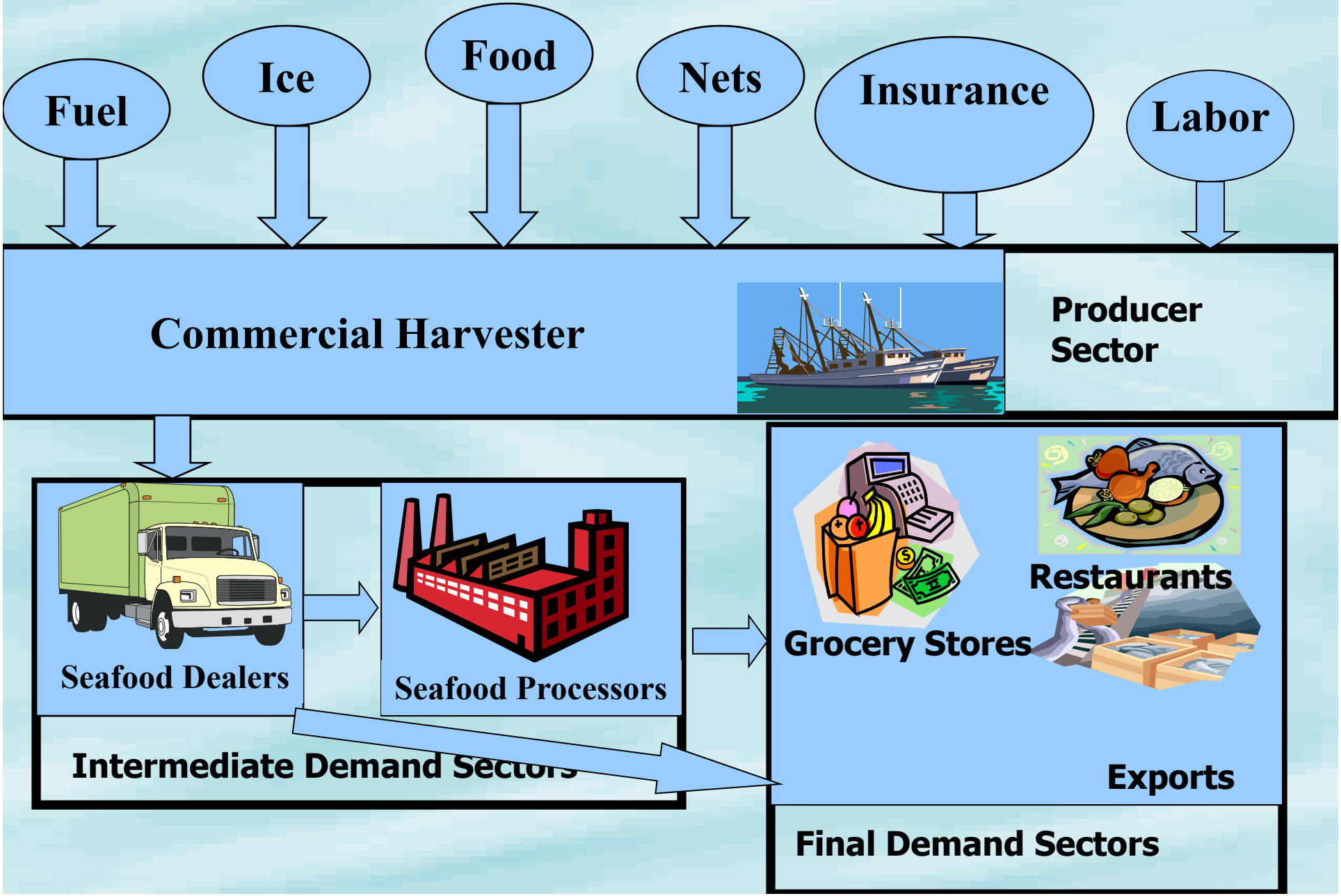
Economic Value / Benefits



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



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
- Angler B
  - Fishes from a pier
  - Spends $5
  - Willing to pay $25

- Has higher economic impact
- Generates $5 in economic value

- Lower economic impact
- Generates $20 in economic value

Consequence

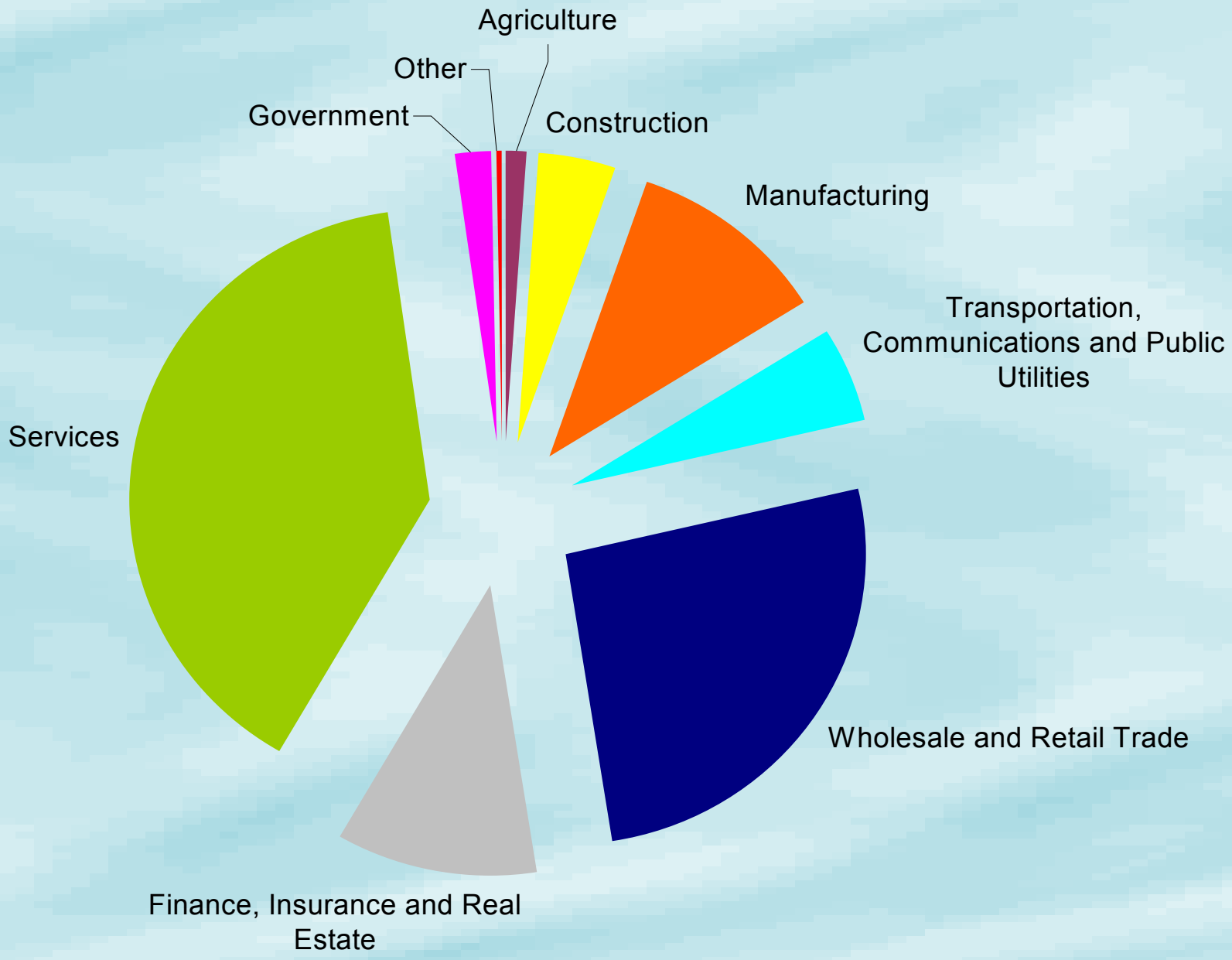
- Allocation based on economic impact rewards the highest spender or highest cost producer:

  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 – i.e. does not take adjustments to policy change into account

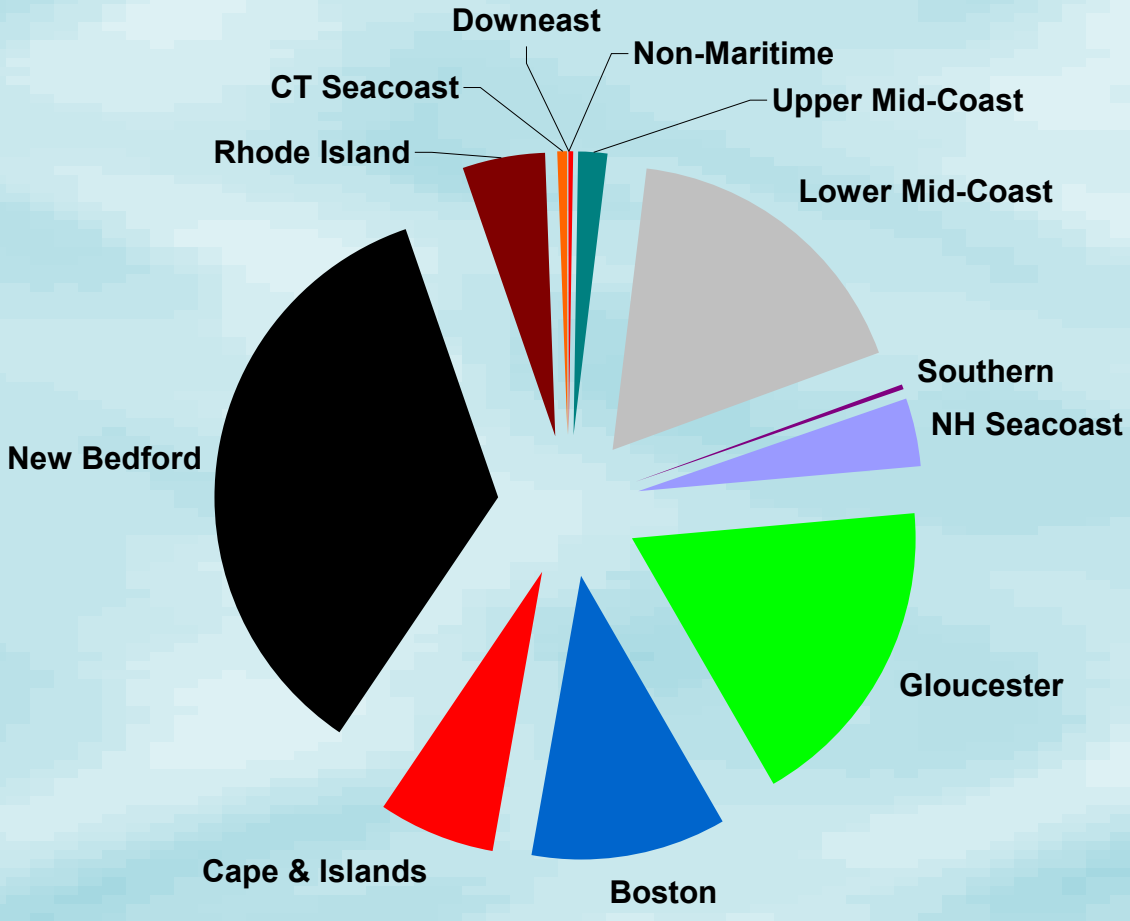
Ranking Alternatives: Income Impacts from a Change in Commercial Fishing

	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
Total	-62,488	-82,307	-55,367

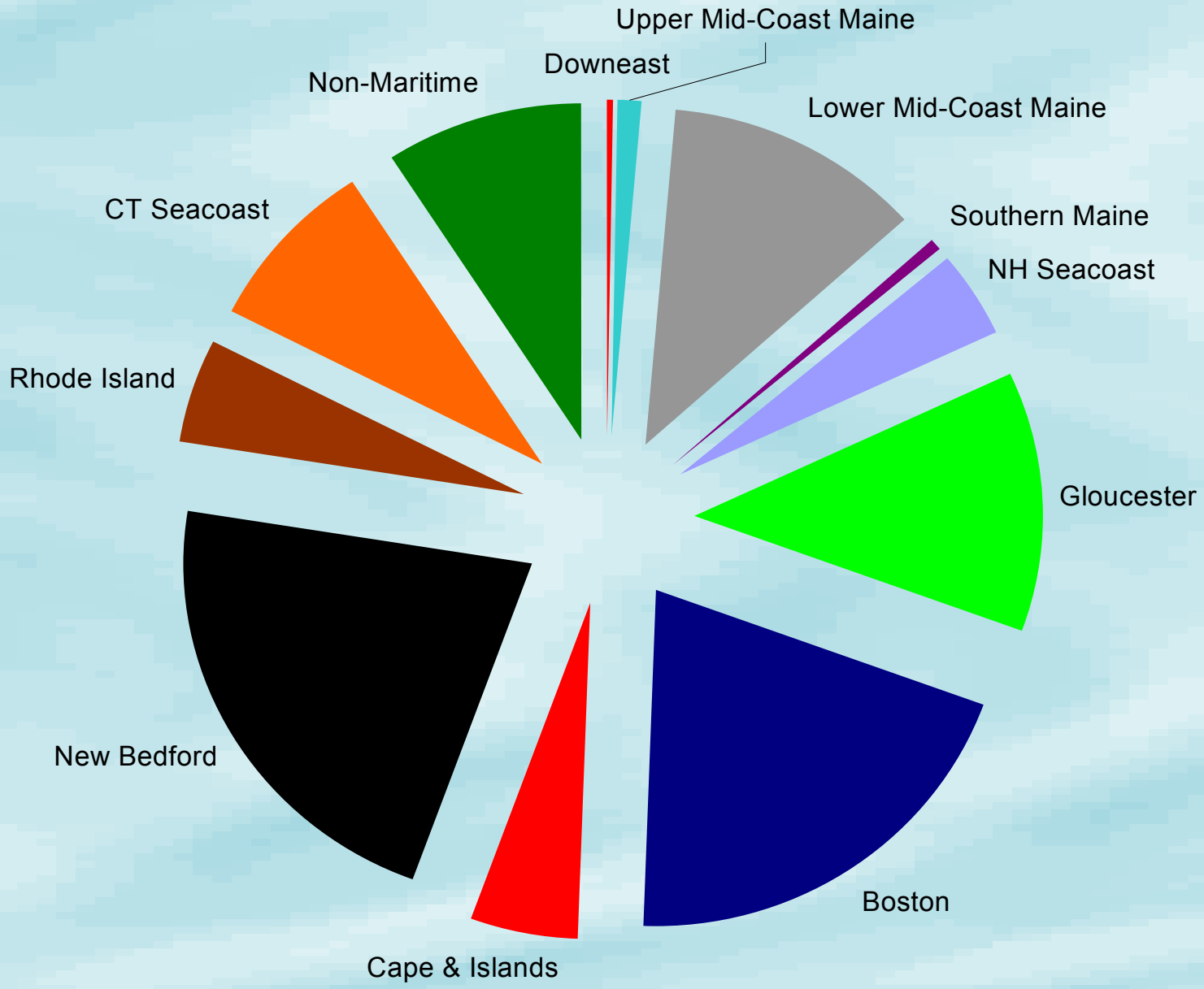
Economic Impact Model: Income impacts by Industry



Regional Distribution of Direct Income Impacts



Economic Impact Model: Income Impacts by Location



Net Benefits and Reallocation

- Net benefits are calculated as the change in consumer and producer surpluses due to new allocation

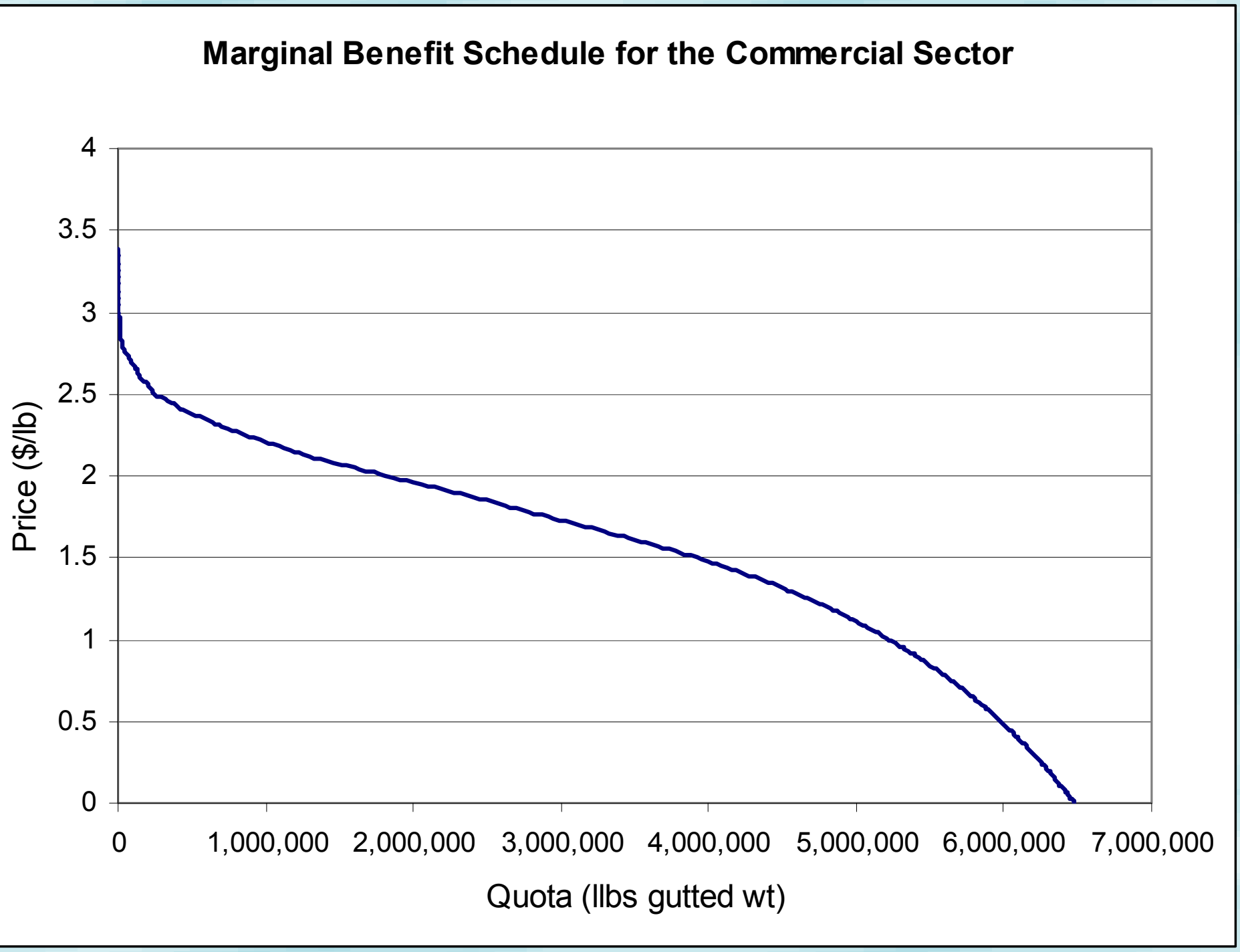
- Change allocation as long as gains in surpluses for one sector exceed reductions in surpluses for the other sector

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

Analysis of Commercial Sector

- Marginal willingess-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

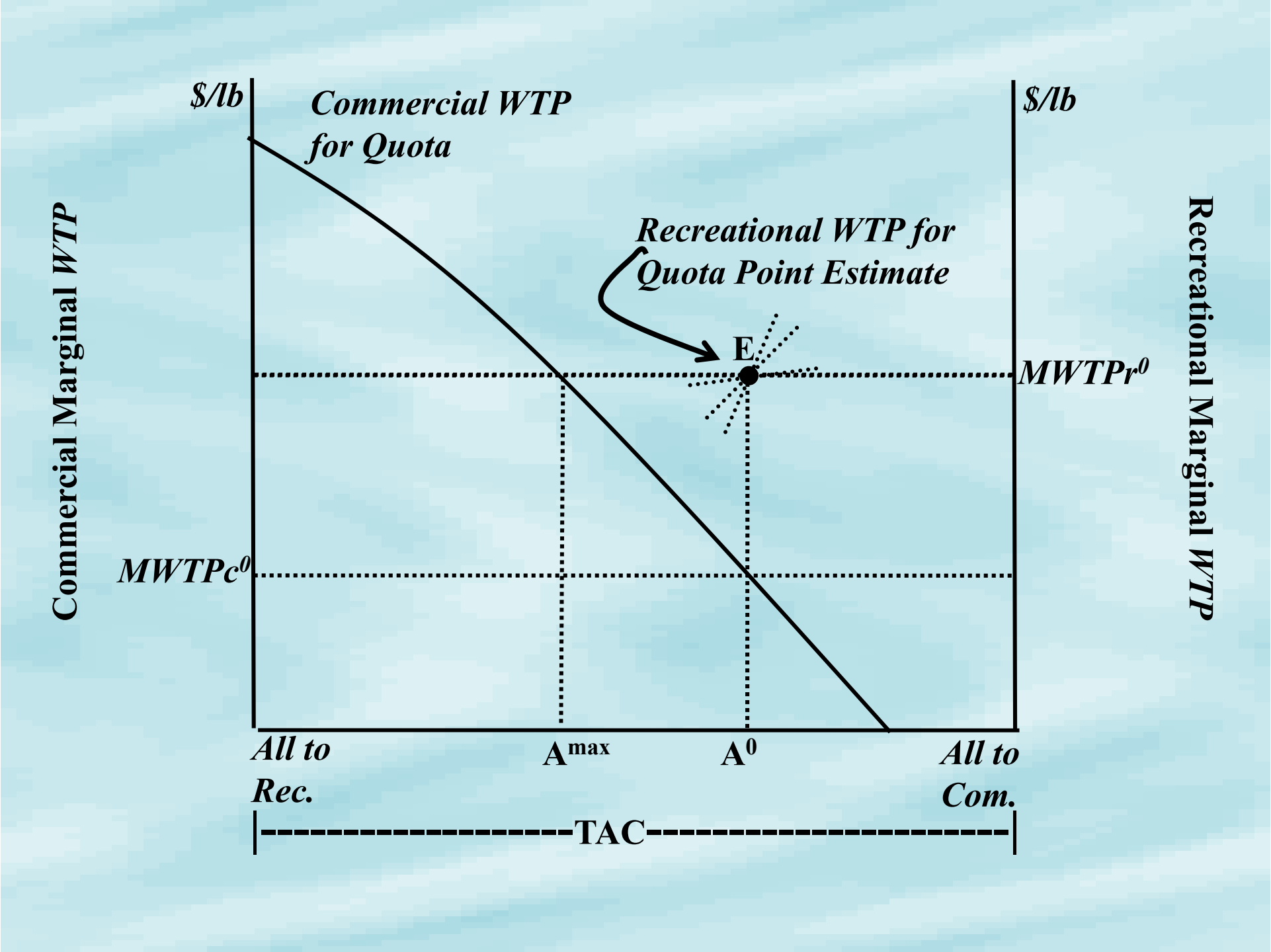

Marginal Benefit Schedule for the Commercial Sector
Price ($/lb)
4
3.5
3
2.5
2
1.5
1
0.5
0
0
1,000,000
2,000,000
3,000,000
4,000,000
5,000,000
6,000,000
7,000,000
Quota (llbs gutted wt)

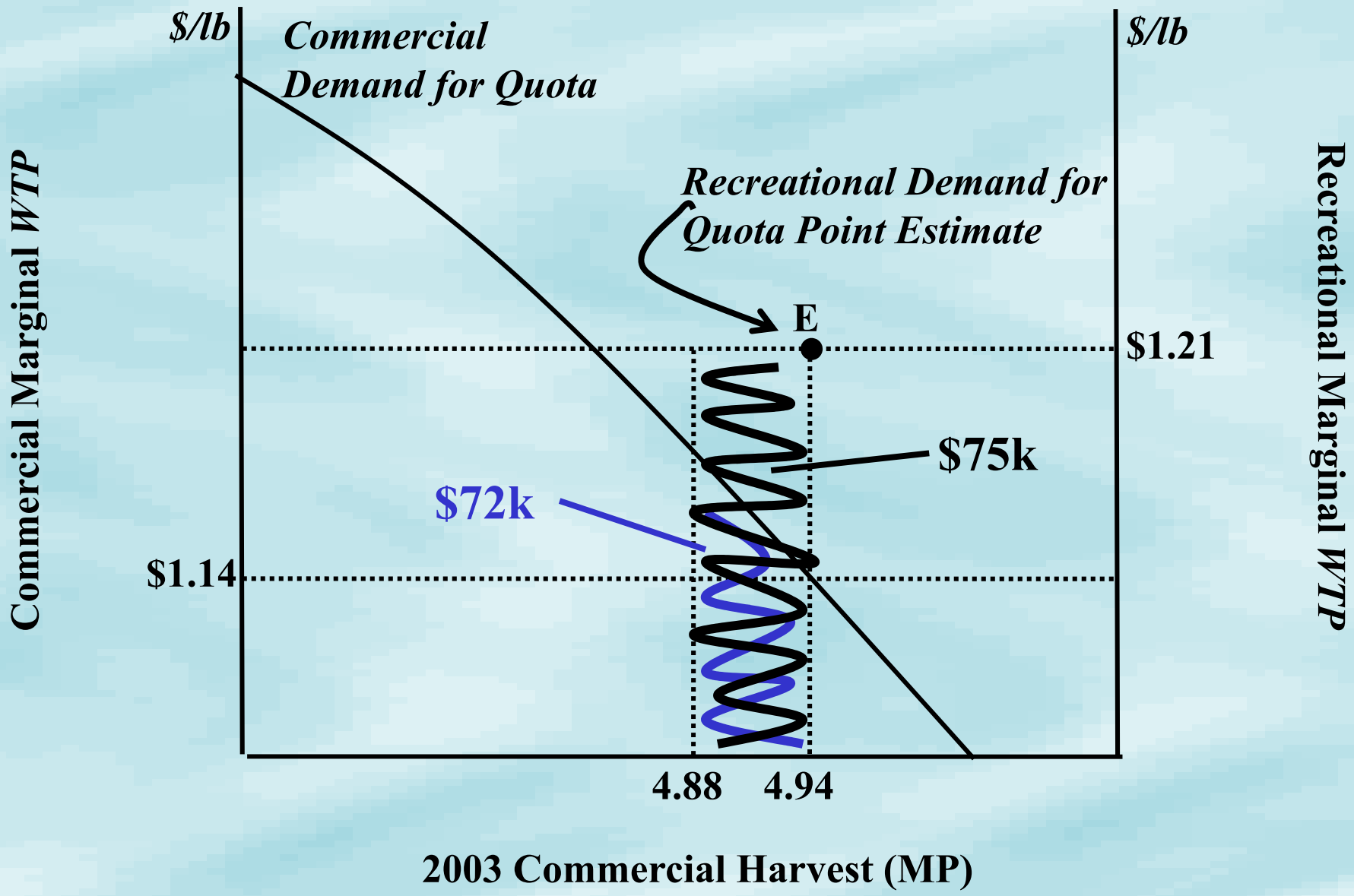
Analysis of Recreational Sector

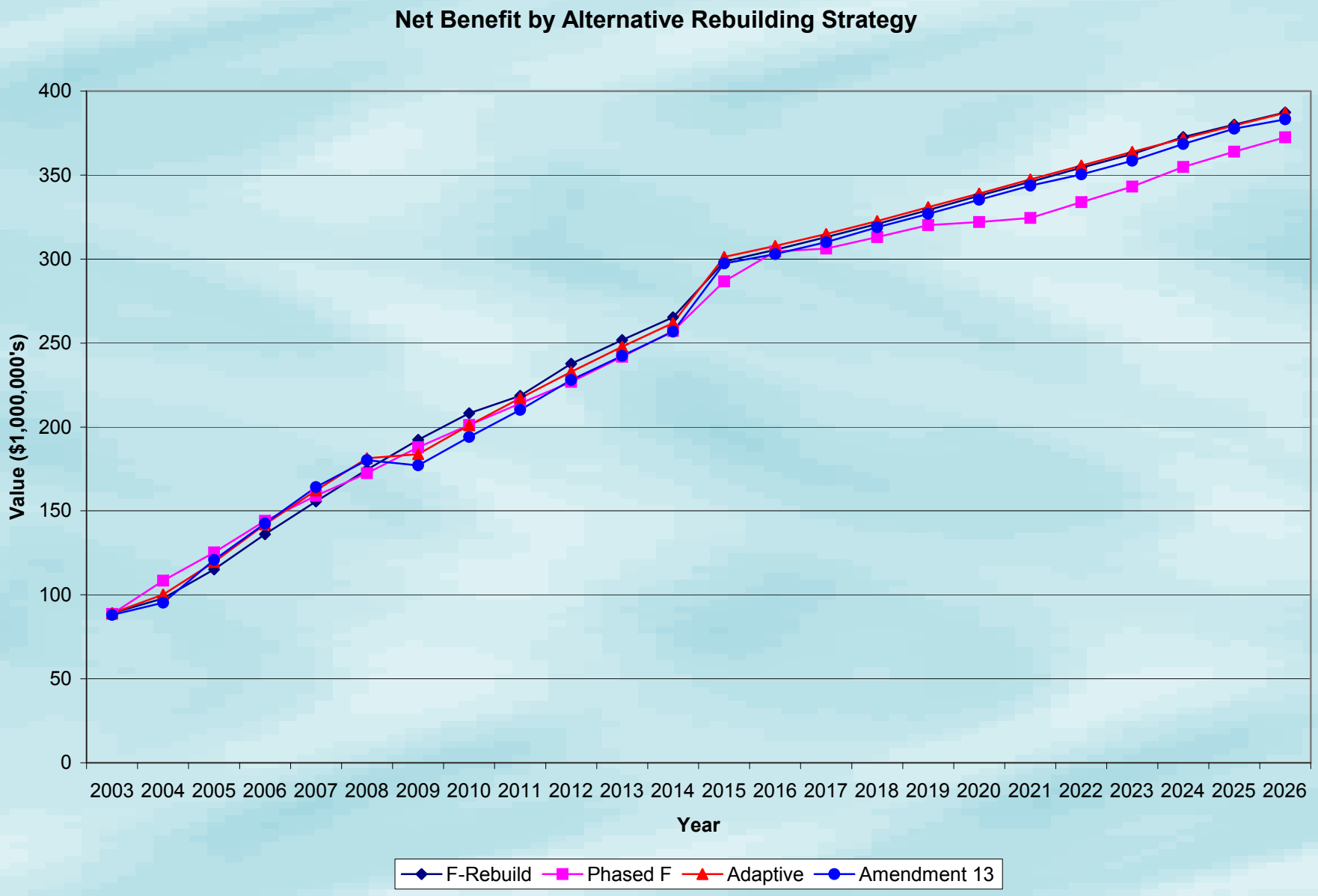
- Hedonic price function--charter trip prices a function of trip characteristics:
- Trip length
- Number of passengers
- County-level harvest characteristics averaged over <u>all species</u>
  - Keep per angler hour fished
  - Discards per angler hour fished
  - Weight per fish kept

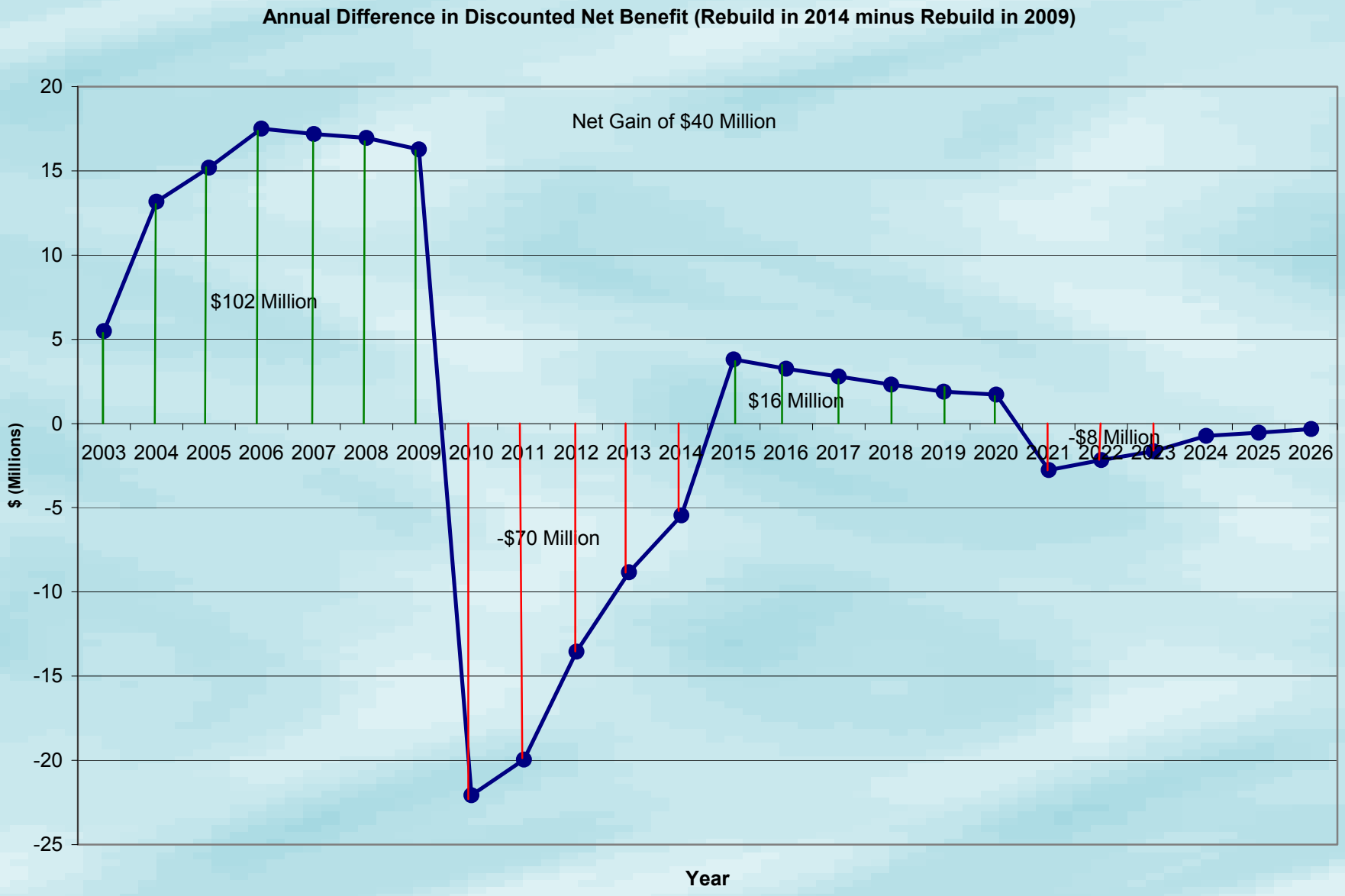
Recreation Model Results

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


$/lb
Commercial WTP for Quota
$/lb
Recreational WTP for Quota Point Estimate
E
MWTPr0
MWTPc0
Commercial Marginal WTP
Recreational Marginal WTP
All to Rec.
Amax
A0
All to Com.
TAC


$/lb
Commercial
Demand for Quota
$/lb
Recreational Demand for
Quota Point Estimate
E
$1.21
$75k
$72k
$1.14
4.88
4.94
2003 Commercial Harvest (MP)
Commercial Marginal WTP
Recreational Marginal WTP


Net Benefit by Alternative Rebuilding Strategy
Value ($1,000,000's)
400
350
300
250
200
150
100
50
0
2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026
Year
F-Rebuild
Phased F
Adaptive
Amendment 13


Annual Difference in Discounted Net Benefit (Rebuild in 2014 minus Rebuild in 2009)
Net Gain of $40 Million
$102 Million
-$70 Million
$16 Million
-$8 Million
20
15
10
5
0
-5
-10
-15
-20
-25
$ (Millions)
2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026
Year

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 fishing rights a necessary component of economical fishery management