Preliminary Analysis of the Effects of West Coast Trawl Rationalization

April – 2008

Rationalization's Cause and Effect

Drivers

- Defensibility of Harvest Privileges
- Profit motivation
- Total catch accountability
- Ability to consolidate
- Market conditions
- Resource accessibility
  - gear switching

Factors that Change under Rationalization

- Fishing Behavior
- Overall Fishing Effort
- Spatial Fishing Effort
- Length of Fishing Season
- Fleet Size
- Processing Capital
- Catch Disposition
- Catch Quantity

Resulting State

- Number of Vessels
- Location of Vessels
- Amount and Location of Processing Capital
- Fish Population

Resulting Impacts

- Net Economic Impact
  - Impact to harvesters
  - Impact to processors
- Community Impact
  - Economic
  - Social
- Fish Abundance

Trawl Harvesters

Driver

- Defensibility of Harvest Privileges
- Profit Motivation
- Ability to Consolidate Vessels
- Market Conditions
- Total Catch Accountability
  - Risks from Catch Uncertainty, Accountability for low allocation species
- Resource Accessibility
  - Gear switching

Effect

- Reduction in bycatch rates, with subsequent increase in harvest of under-utilized species
- Reduction in number of vessels, with subsequent reduction in costs and increased $ per boat
- Adjustments to overall & spatial distribution of harvest effort and delivery location
- Longer harvest period for SS Pacific whiting

The Likelihood and Implications of Bycatch Reduction in West Coast Bottom Trawl Fishery

Theory suggests bycatch should be reduced because:

- Constraining bycatch species will continue to limit access to target species
  - Avoiding those stocks will mean greater access to under-utilized target species
- Constraining species quota is likely to be costly
  - Acts as a deterrent for those that don't hold that quota
  - Acts as a benefit to those that hold quota, but can avoid such species and sell quota

Empirical evidence is available to illustrate potential bycatch reduction in the west coast bottom trawl fishery

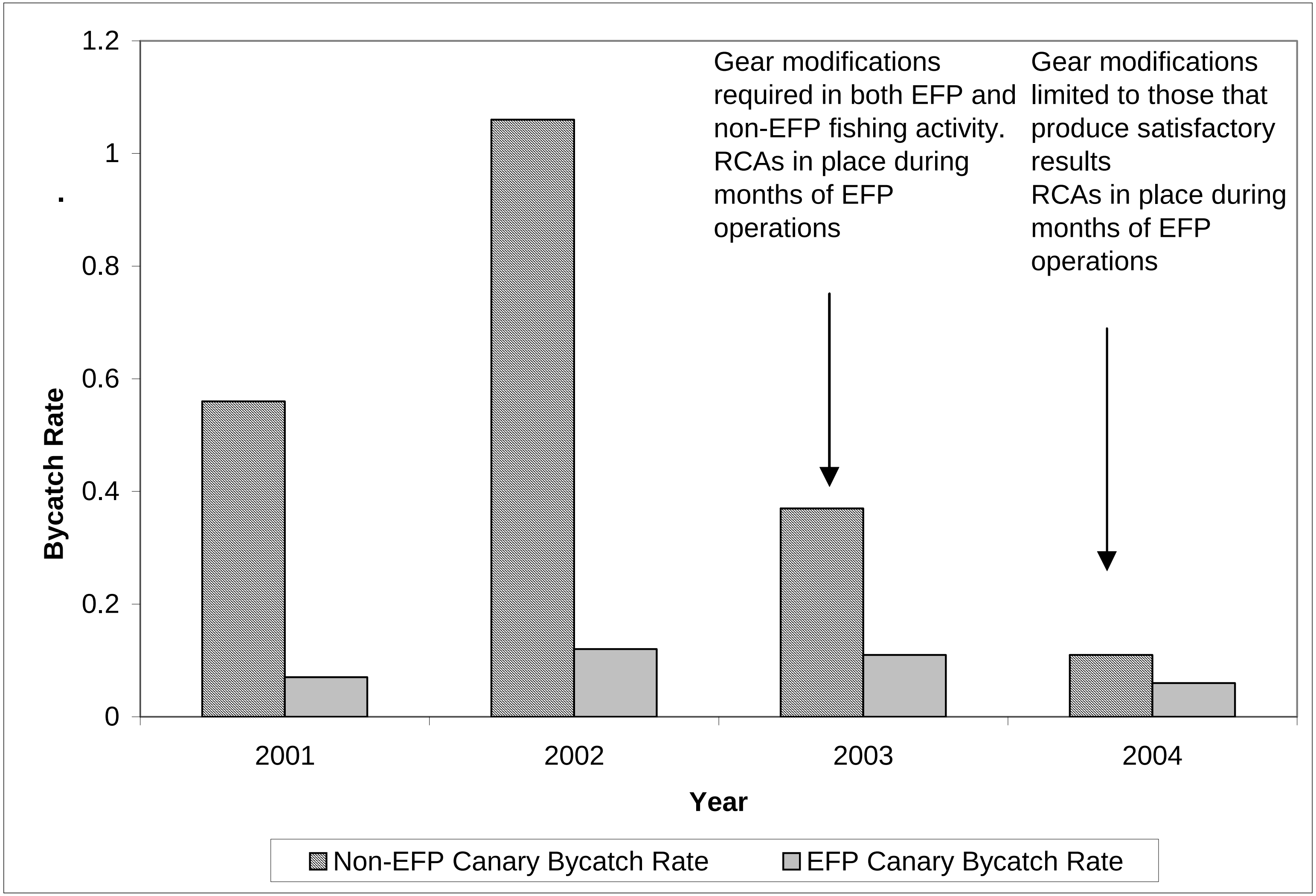
- The Washington Arrowtooth Flounder EFP

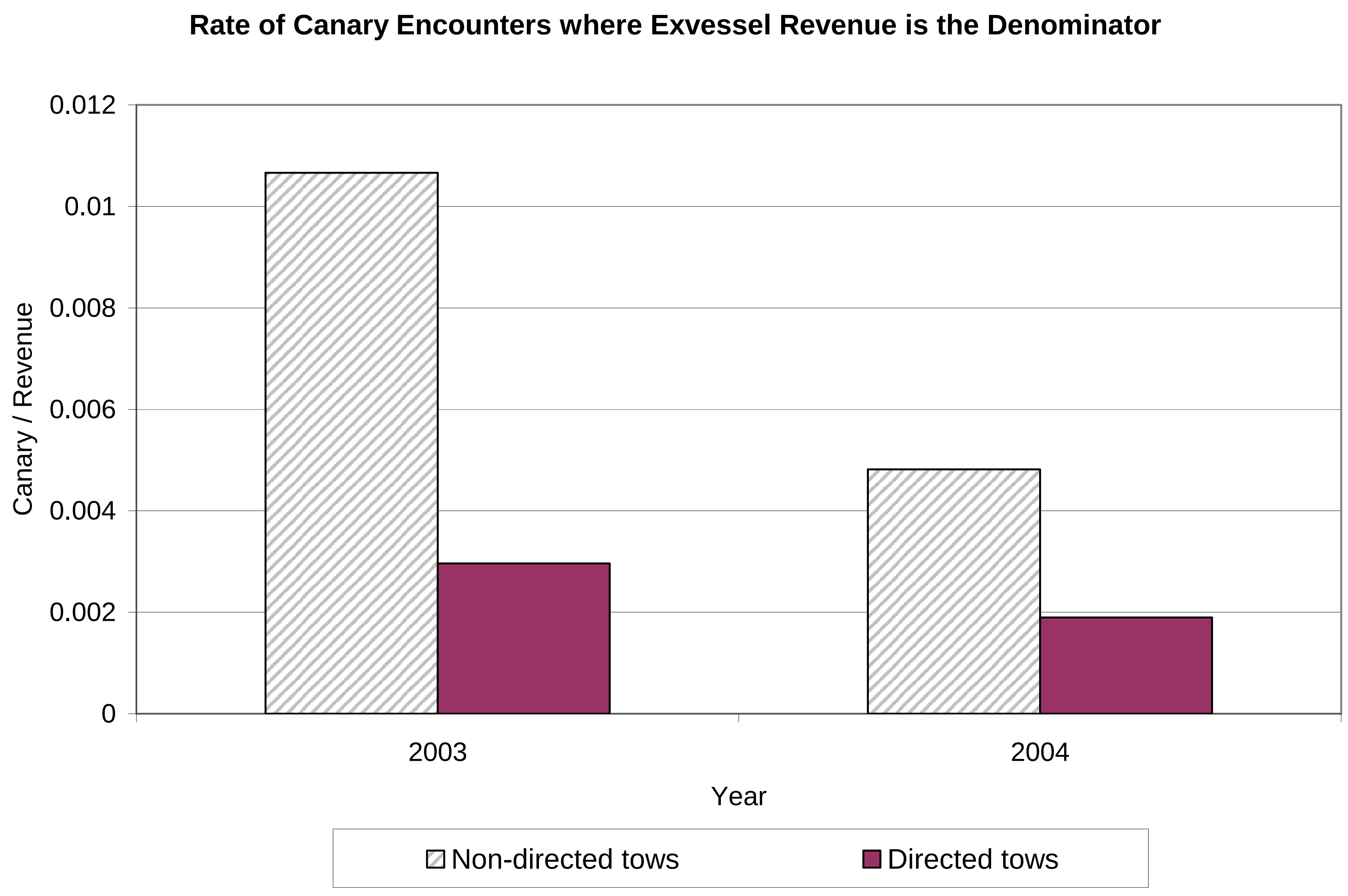
Description of EFP Project

In many ways, this project resembled a small rationalization program

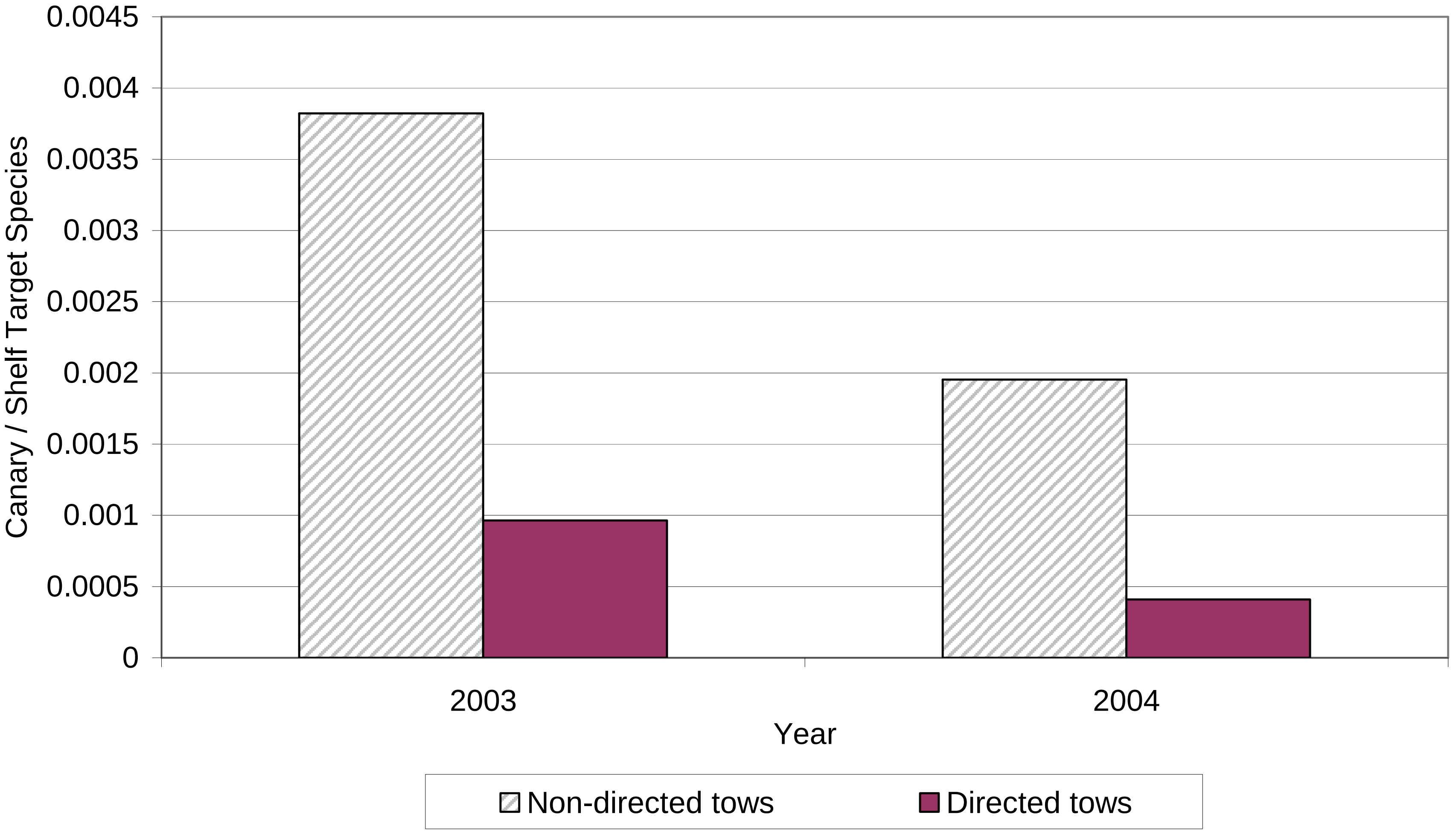
- Vessels required to carry observers
- Vessels held to individual limits on overfished species
  - When reached, those vessels required to fish under normal regulations while still carrying an observer
- Vessels held to both an individual, and an overall limit on overfished species catch
- Successful avoidance of overfished species allowed vessels to access greater amounts of target species

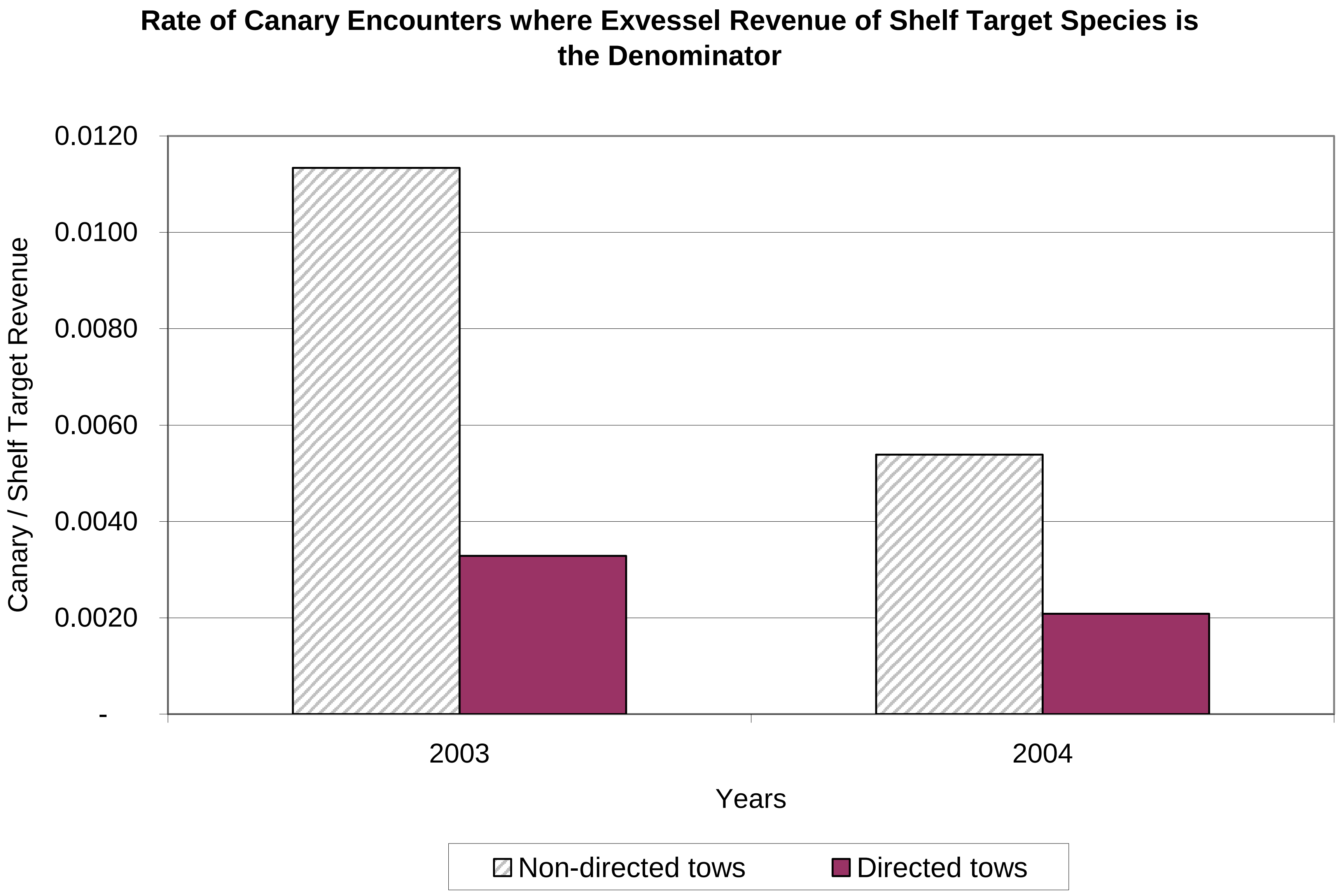
Annual Bycatch Rate of Canary Rockfish in Washington Arrowtooth EFP




Rate of Canary Encounters where Exvessel Revenue is the Denominator
0.012
0.01
0.008
0.006
0.004
0.002
0
Canary / Revenue
2003
2004
Year
Non-directed tows
Directed tows

Rate of Canary Encounters where Retained Pounds of Shelf Target Species is the Denominator




Rate of Canary Encounters where Exvessel Revenue of Shelf Target Species is the Denominator
0.0120
0.0100
0.0080
0.0060
0.0040
0.0020
-
Canary / Shelf Target Revenue
2003
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Years
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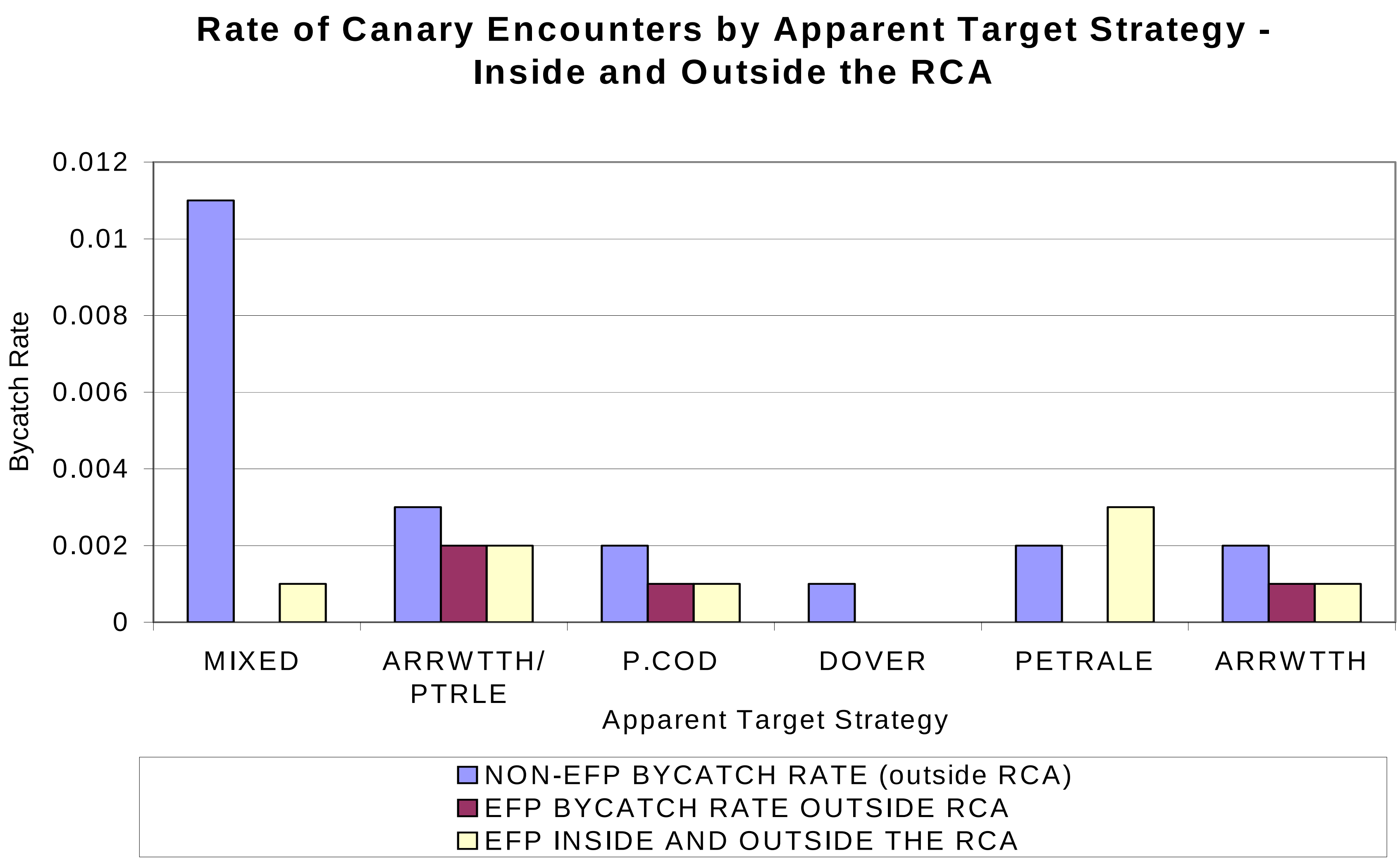


Shows that for all strategies, except for petrale sole, the incentives created by the EFP alone did better than regulation. RCAs in addition to the EFP incentives resulted in superior bycatch reduction in all cases

Bycatch Reduction on a Coastwide Basis

Arrowtooth EFP provides substantial evidence that bycatch should be reduced, but it is difficult to apply this study on a coastwide basis

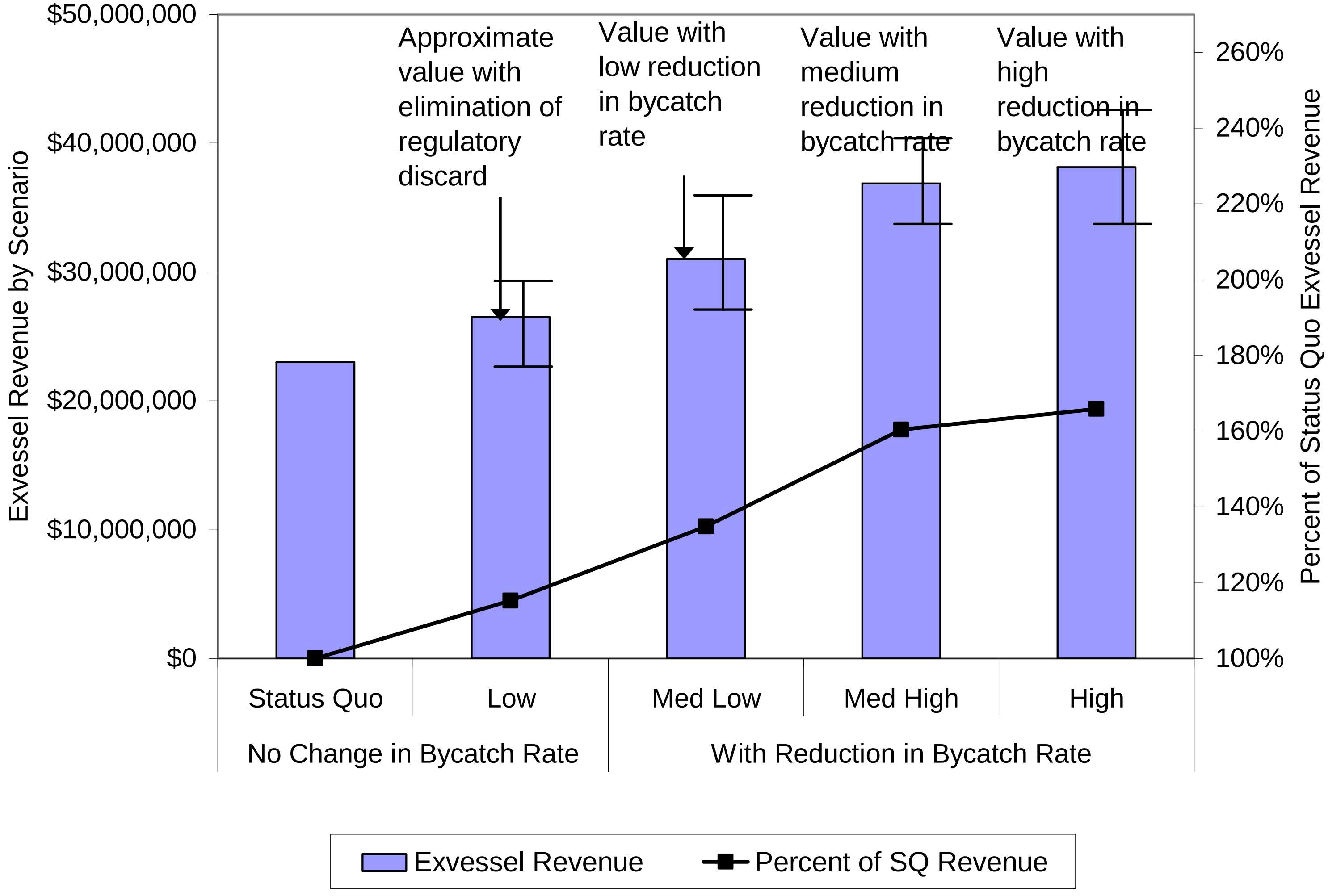
- Canary rockfish was the driving constraint off Washington. This may not be the case elsewhere
- The relative abundance of stocks differs as one moves along the coast
- Harvesters in other areas of the coast may respond differently to these incentives

- The best we can do is provide a range of possible harvest outcomes given a range of possible reductions in bycatch of constraining species

Possible Target Species Catch in the Non-Whiting Fishery

Species	Approximate 2006 Landings	Low Catch	Med Catch	High Catch
Sablefish	2,300	**2,651**	**2,651**	**2,651**
Longspine	750	**2,071**	**2,071**	**2,071**
Shortspine	515	**1,536**	**1,536**	**1,536**
Dover	6,000	**11,985**	**11,985**	**15,000**
Arrowtooth	1,900	**4,943**	**4,943**	**4,943**
Petrale	2,300	2,300	2,300	2,300
Other Flatfish	1,400	**2,547**	**2,547**	**4,800**
Yellowtail	40	51	51	**1,000**
Chilipepper	20	20	**2,000**	**2,000**
Pacific cod	365	**723**	**1,200**	**1,200**
Lingcod	140	**220**	**670**	**855**
Slope Rockfish	125	**680**	**1,120**	**1,120**

Possible Exvessel Revenue in the Non-Whiting Trawl Fishery (assuming status quo exvessel prices)



Consolidation Analysis

Risks faced by Harvesters from Rationalization

- Individual accountability and responsibility as a result of rationalization places risks on harvesters
- Risks are partially responsible for intended outcome
  - Some large implications become apparent in existing west coast rationalization alternatives

Source of Note-worthy Risks

Several species and allocation levels are the source of relatively high levels of risk:

- Overfished species
- Nearshore species (minor nearshore rockfish, black rockfish, kelp greenling, cabezon, etc)
- Flatfish species in Pacific whiting fishery
- Some others

Overfished Species in an IFQ Program (a summary of previously discussed issues)

Assuming trawl allocations are similar to status quo harvest levels:

- Overfished stocks are likely to constrain access to healthy stocks, leading to a high price for OFS quota
- Those harvesters encountering OFS without quota may need to incur a large expense to cover that deficit
- OFS quota may be difficult to find and acquire on the market if necessary
- Small quantities of OFS quota make it possible for strategic negotiation to occur
  - Such conditions aren’t conducive to efficient market operation

Nearshore Species and Flatfish
(flatfish issues specific to Pacific whiting fishery)

Assuming allocations are similar to SQ harvest levels, same conditions may exist for these species as OFS

- Places a large burden on harvesters.
- Potentially constrains access to target species

- Yet, the same conservation concern does not exist for these species as OFS

Some Methods for Dealing with High Risk Species

- Let the industry work it out
  - Impose relatively small allocations & issue IFQ
- Don't manage them directly
  - Option in whiting fishery to directly manage whiting and bycatch species, allowing incidental catch of other species to vary year to year
- Establish allocations that are larger than status quo harvest levels for each species
  - Establish sufficient quantity of quota that the quota market works effectively
  - May mean a reduction in opportunities for other sectors in some cases
- Maintain use of existing management tools
  - Cumulative limits for these species. Could be total catch based to maintain individual accountability

Factors Affecting the Ability for the Industry to Manage Risk

Voluntary “risk pools” are one way of managing the catch of such high-risk species in an IFQ program:

- Voluntary agreements depend heavily on several points:
  - That participants in those agreements be relatively balanced in their negotiation power
  - That participants in those agreements be few enough in number that they can agree

Decision Points Affecting the Ability to form and Maintain Voluntary “Risk Pools”

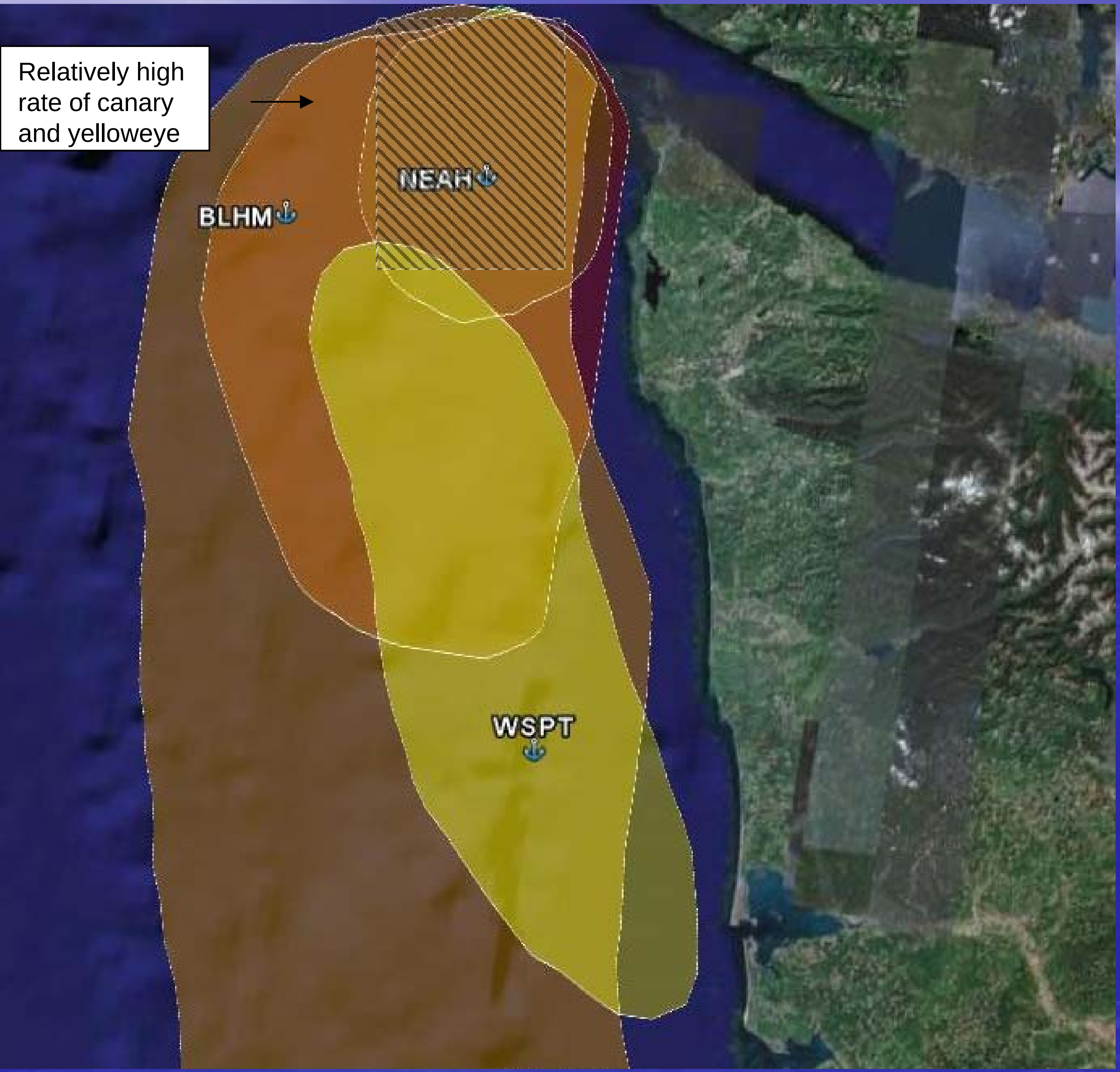
1. Fleet consolidation may assist the formation of risk pools
   - Fewer participants will increase the likelihood of agreements forming
2. Initial allocation of constraining, risk species may influence the formation of risk pools
   - Greater balance across harvesters helps foster the development and maintenance of risk pools
3. Accumulation limits for constraining, risk species
   - Restricts the amount of species any one entity can control
4. Presence of a grandfather clause for constraining, risk species
   - Also impacts the amount of species any one entity can control

- The second through fourth factors affect the balance of negotiation power between harvesters trying to form risk pools

Geographic Shifts in Fishing and Delivery Activity

Fishing effort is likely to shift away from regions with:

- High bycatch areas
  - Because of individual accountability, vessels will tend to move
- With inefficient fleets
  - Fleet consolidation will hit harder in areas with inefficient vessels
- With poor infrastructure and few (or no) processors
  - Clustering of infrastructure creates economic efficiency. Quota will flow to those areas because of greater economic returns



Neah Bay:

- Little infrastructure
- Cost inefficient fleet

Bellingham

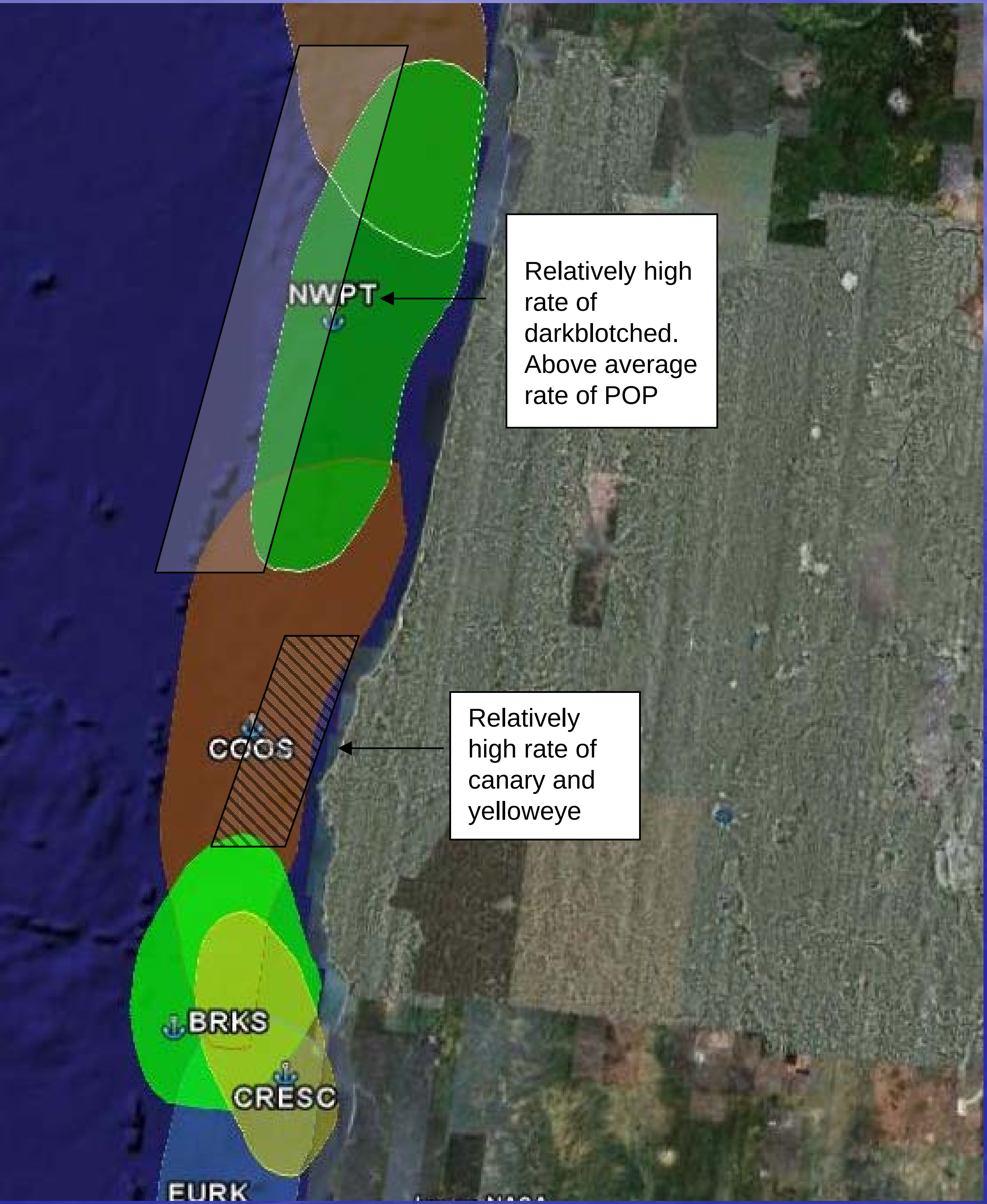
- Large amt of infrastructure
- Cost efficient fleet, but long travel distance

Westport

- Moderate infrastructure
- Cost inefficient fleet

Astoria

- Large amount of infrastructure
- Cost efficient fleet



Newport

- Large amount of infrastructure
- Cost efficient fleet

Coos Bay

- Large amount of infrastructure
- Cost efficient fleet

Brookings

- Little amount of infrastructure
- Cost efficient fleet

Crescent City

- Moderate amount of infrastructure
- Cost inefficient fleet

Eureka

- Large amount infrastructure
- Cost efficient fleet

Fort Bragg
- Moderate amount of infrastructure
- Cost inefficient fleet

San Francisco
- Large amount of infrastructure
- Cost inefficient fleet

Half Moon Bay
- Little infrastructure
- Cost inefficient fleet

Moss Landing
- Moderate amount of infrastructure
- Cost inefficient fleet

Morro Bay
- Little infrastructure
- ?Fleet?

Processors

Communities

To Co-op or to IFQ?

Why might the Council establish an IFQ system or a system of cooperatives?

- Several factors play into the consideration including:
  - Relative degree of administration for implementing co-ops or IFQs
  - Establish co-ops in regulation, or allow voluntary formation without a regulation?
  - Impose a high degree of individual accountability for OFS (IFQ), or spread the risk across multiple harvesters (co-ops)
  - The risk associated with the presence of a non-cooperative sector
- The appropriateness of IFQs or Co-ops may depend heavily on the characteristics of fishery participants and the structure of the management system.

Characteristics of fishery participants and their importance

<u>Self-motivated harvesters</u>

- Tend to harvest more of a collective resource
  - May find it difficult to agree to catch sharing arrangements in a coop system
  - May exacerbate derby conditions in the non-coop portion of a co-op fishery

<u>Socially-motivated harvesters</u>

- Operate in a manner that achieves a more collective outcome
  - Find it relatively easy to agree on catch sharing arrangements
  - More likely to continue operating in a collective manner if engaged in the non-co-op fishery

Characteristics of fishery participants and their importance (cont)

Objectives and Similarities of Harvesters:

- Harvesters with similar capacities and objectives may find it easier to reach collective agreements
- Harvesters with dissimilar capacities and objectives may not be able to reach agreement

Characteristics of fishery participants and their importance (cont)

Power and status among harvesters:

- Groups with power and status imbalances face difficulty reaching sharing agreements
- Imbalances can be solved by making sharing agreements for them (issuing IFQs or issuing “catch histories” in a coop program)

Characteristics of fishery participants and their importance (cont)

Group size:

- It is more likely that small groups will form collective relations
- Smaller group size makes it easier for participants to monitor and self-enforce one another
- Smaller group size enhances communication

Regulatory Co-ops vs Voluntary Arrangements

<u>Regulatory Co-ops</u>

- Guarantees groups will form, leading to relations that can manage risky, complex situations
- Requires there be a high degree of certainty that harvesters can coordinate effectively and find mutually beneficial objectives

<u>Voluntary Co-ops</u>

- Small, similar fleets may not need regulation to form co-ops, though they may be appropriate
- Large, diverse fleets may not operate effectively if co-ops are forced on them
  - May form arrangements among small sub-groups voluntarily

Characteristics of Sectors

<u>C-P</u>

- Relatively few entities
- Similar capacity
- Similar objectives

<u>Mothership</u>

- More entities than CP
- Somewhat similar capacities
- Different catch histories
- Similar objectives

<u>Shoreside whiting</u>

- More entities than CP or MS
- Varying capacities
- Different catch histories
- Both varying and similar objectives

<u>Non-whiting</u>

- Largest number of entities
- Wide array of capacities
- Highly different catch histories
- Varying objectives and targets

Economic impacts of IFQ management in the pacific coast groundfish fishery

Carl Lian, Rajesh Singh and Quinn Weninger

NMFS and ISU Economics

April 6, 2008

Question

- How will a switch to IFQ management change harvesting practices, fleet size, and profitability in the pacific coast groundfish fishery?

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- - limited entry trawl component of the pacific coast groundfish fleet
  - will not talk about *whiting* boats

Conceptual approach

1. Data: NMFS cost survey (2003-04); PACFIN; Groundfish fishermen

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4. Dynamic model of fleet structure under IFQs $\longrightarrow$ fleet size, catch/boat, costs and *resource rents*

Sources of cost *inefficiency* in 2003-04 data

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Analysis of 2003-04 cost data

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- Implications for IFQ fishery:
  - catch per-boat $\uparrow$ and cost per pound landed $\downarrow$

Catch and cost/pound under IFQs

- Predicted catch and cost per pound landed

Length (ft.)	Catch/Year	Cost/Pound
40	500,000*	$0.332
50	850,000*	0.255
60	1,352,100	0.260
70	1,354,100	0.316
80	1,358,900	0.397
90	1,371,300	0.468

* - physical capacity constraint

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- Actual catch and cost per pound (in 2004 data)
  -59.08 million pounds landed by 117 boats
  -Ave. landings per boat 434,000 lbs., cost/pound at $0.66
  -If 40-60 boats harvested same catch, cost falls to $0.26-$0.32/Lb.
  $\Longrightarrow$ Potential cost saving of $20 million

Total Quotas at 2004 Landings

- $\overline{Q}_{DTS} = 25.25$ m. Lbs $\quad \overline{Q}_{NDTS} = 21.25$ m. Lbs.

Fleet		Vessel Activity		% Harvested		Quota Lease Prices	
Boats	Len.	Catch/Boat	$/Boat*	DTS	NDTS	DTS	NDTS
32.11	60	1.221m	$0.489m	100%	94.3%	$0.433	$0.264
5.37	70	1.314m	$0.459m				

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- *Dockside revenue less fuel, labor, fixed costs, and return to vessel – *capitalized into the value of quota shares*
- Total annual groundfish rent: $14.369 million

Increased Total Quotas

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- Total annual groundfish rent: $22.543 million

IFQ Program design

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- Per day observer coverage fee – IFQ fleet will include larger share of big boats
- Landings taxes – implications for species harvested

Conclusion

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- Transition to the IFQ equilibrium may take time
- Additional cost reducing/value increasing adjustments can be expected

Preliminary Effects of Rationalization on Processors

April – 2008

Trawl Rationalization and General Effects on Processors

- <u>Processors</u>: receive whiting or non-whiting groundfish directly from harvesters, and conduct processing activities on the fish for resale.
  - Does not include second receivers, restaurants, or other non-processors
- Shore-based, CP, and MS; whiting and non-whiting
- Effects measured as changes in processor net revenue
  - *directly* from elements of the program (e.g., initial allocation of QS); or
  - *indirectly* from effects on harvesters (e.g., geographic shifts in harvests)

Processors: General Characteristics

- Shoreside Non-Whiting:
- Shoreside Whiting:
- Motherships:
- Catcher-Processors:

- Large number of firms
  - Five largest received 70% of landings
- Seventeen firms operated during 1998-2003
  - Five largest received 83% of landings
  - New entrants since 2003
- Three to five MS active since 1998
- Nine CP active in 1998-2003

Major Changes from Rationalization Affecting Processors

- Change in quantity and species mix of non-whiting harvest
- Regional shifts in landings in non-whiting fishery
- Change in season length and peak harvest volume in SS whiting fishery
- Exvessel price negotiations among harvesters and processors

Change in Quantity and Mix of Non-Whiting Harvests

Shoreside Non-Whiting: Bycatch avoidance by harvesters will lead to higher harvest volumes and a change in the mix of species landed

- Processors may need to expand processing capacity and marketing efforts in this fishery
- Development of niche markets may be possible, altering the competitive landscape for shoreside processors

Regional Shifts in Landings

Increases or decreases in landings at West Coast ports will affect shore-based processor operations:

- Processing plants with an *increase* may have to invest in capacity or adjust their scale or timing of operations.
- Ports with a *decline* could leave processors with excess capacity requiring its liquidation or disposal.

- Processors with an initial allocation of QS can influence location of fishing and delivery activity

Change in the Season Length of Shoreside Whiting

Shoreside Whiting: Existing facilities are designed to process and store large pulses of catch, with accompanying temporary labor force.

- Under rationalization, some retooling possible
  - Consolidation may occur. This may lead to closure of some plants, which could adversely or positively affect processors.
  - Reduction in labor costs may occur through uniform and more seasonally spread-out operations.
- If processors are allocated or obtain QS, may influence timing of fishing activity by harvesters.

Sector Restructuring and Barriers to Entry

- Some consolidation, joint ventures, and vertical and horizontal integration are possible
  - Initial allocation of QS to processors could stimulate integration
- Entry could be easier *if* potential new entrants are able to acquire QS
  - However, initial allocation to existing processors would add to current entry barriers, because they would not be required to purchase QS

Bargaining Power and Exvessel Price Negotiation

Mechanisms to the benefit of *harvesters*:

- Consolidation and initial allocation improves bargaining position
- Quota trading fluidity makes it easier for harvest to be directed to high-paying processors
- Harvesters with QS can “hold out” longer against processors while negotiating exvessel prices
- Elimination of “derby” in the whiting fishery makes the formation of bargaining groups among whiting harvesters more likely

Bargaining Power and Exvessel Price Negotiation

Mechanisms to the benefit of *processors*:

- Shoreside Whiting Processors: elimination of "derby" fishery and possible consolidation could reduce average costs, offsetting shift in bargaining power.
- Shoreside Non-Whiting Processors: harvesters may leverage higher prices, but larger harvest volume may lower processor average cost.
  - Smaller processors may be negatively affected, but for many of them, groundfish is a part of their overall portfolio.

- Net effect on bargaining power between harvesters and processors is not clear.
- *Initial allocation of quota to processors will have a direct, positive effect on their bargaining power.*

In Summary…

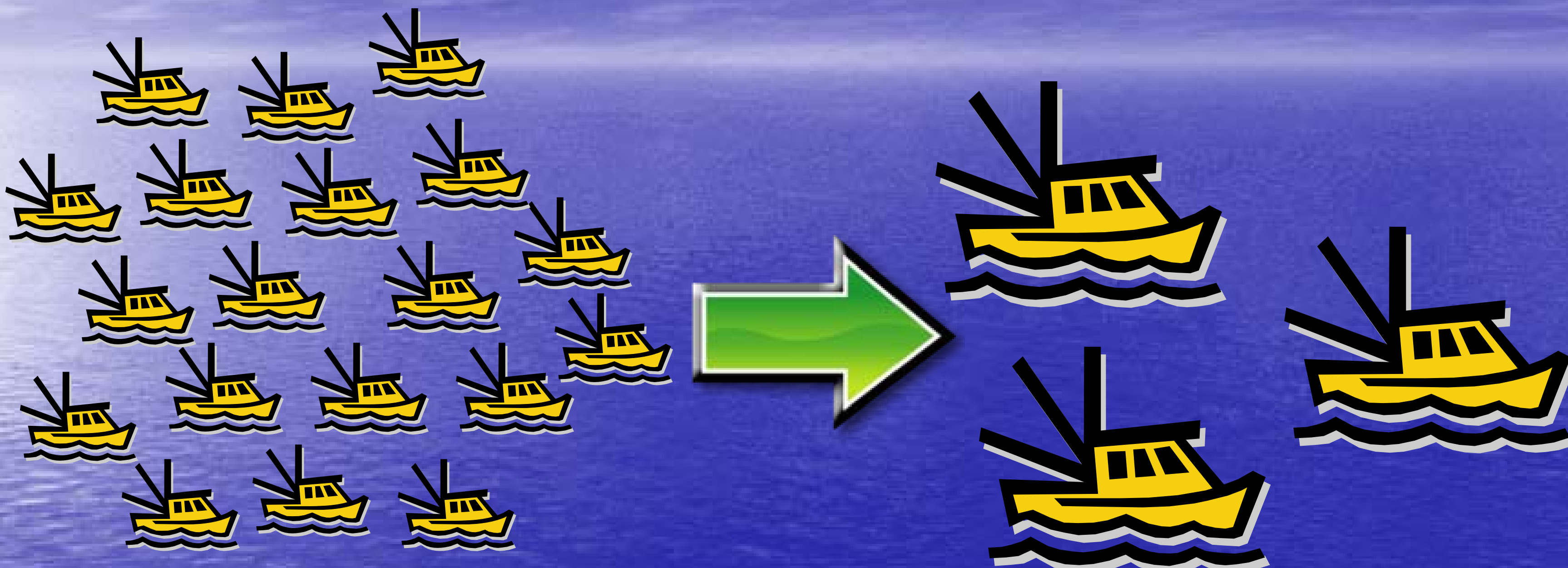
- Processors may experience some consolidation, lower labor costs, and (for non-whiting) opportunities for new markets.
- Regional shifts in landings could lead to a need for increased capacity in some locations, closure in others.
- Harvesters will improve their exvessel price bargaining position – but some processors may partially offset the shift through lower average costs.
- Initial allocation of QS will positively affect processors in a variety of ways.

Trawl Rationalization Community Effects

Indirect Effects

Fishing Communities will be affected by changes to harvesters and processors due to rationalization

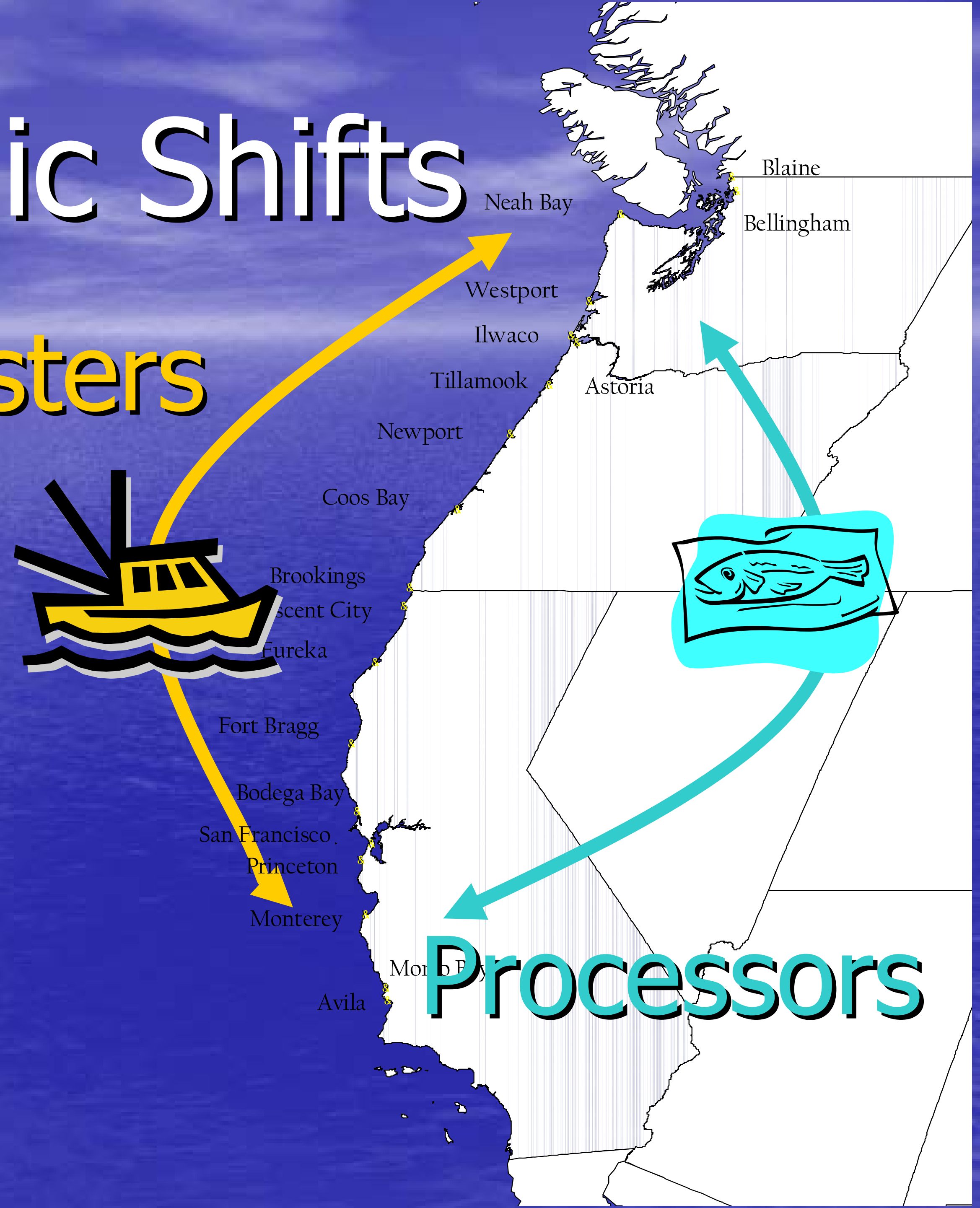
Community Impact Mechanisms



Fleet Consolidation

Geographic Shifts

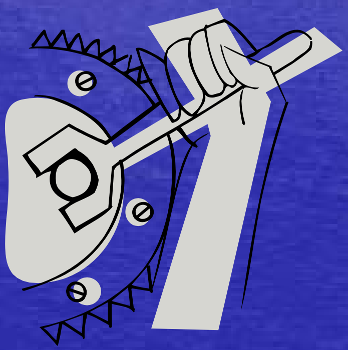
Harvesters



Processors

Types of Effects

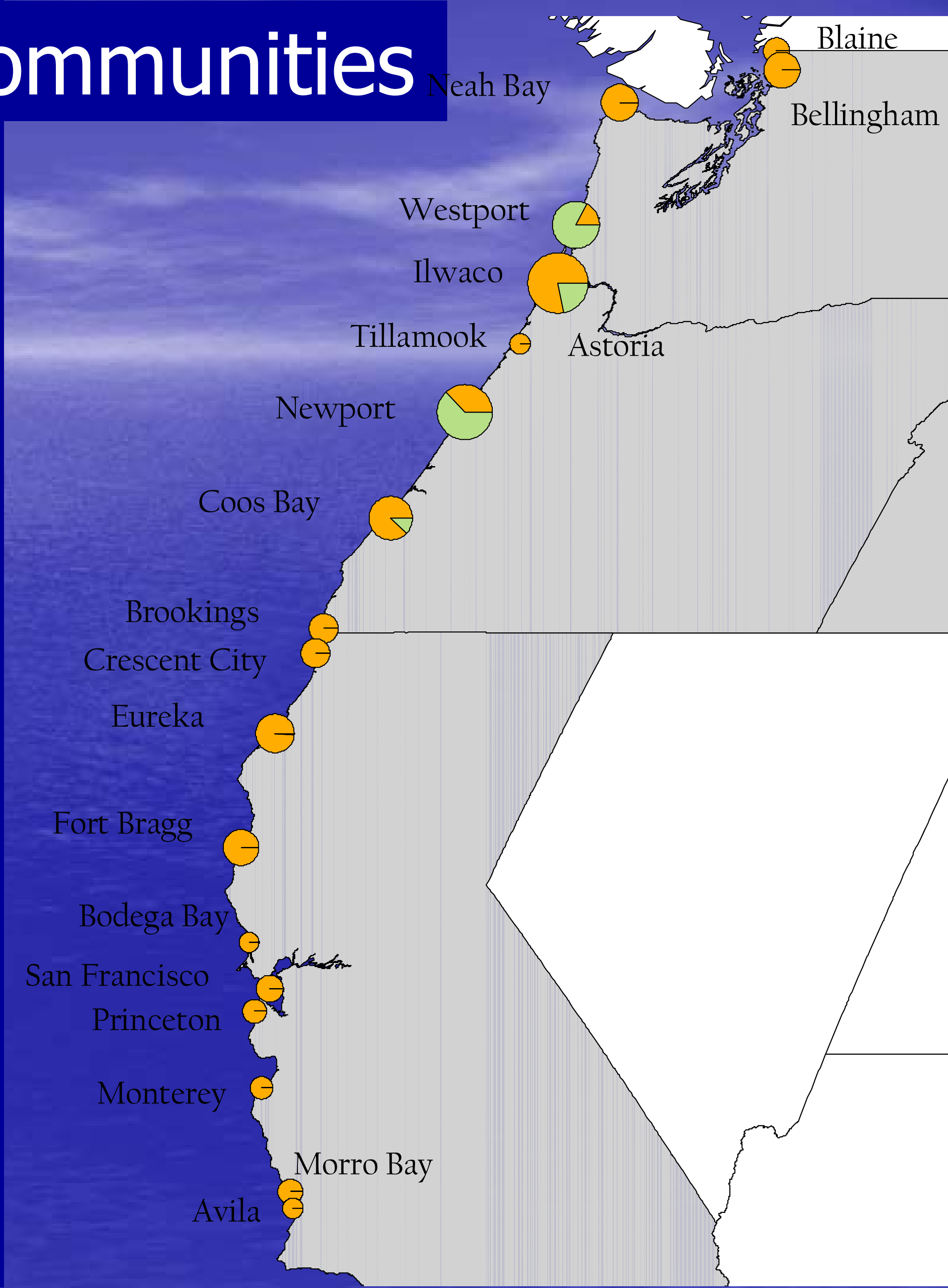
- Economic
  - Income
  - Employment



- Socioeconomic
  - Employment
  - Culture
  - Port Facilities

Trawl Dependent Communities

Blaine
Bellingham
Neah Bay
Westport
Ilwaco
Astoria
Newport
Charleston (Coos Bay)
Brookings
Crescent City
Eureka
Fort Bragg
San Francisco
Princeton/Half Moon Bay
Moss Landing
Morro Bay



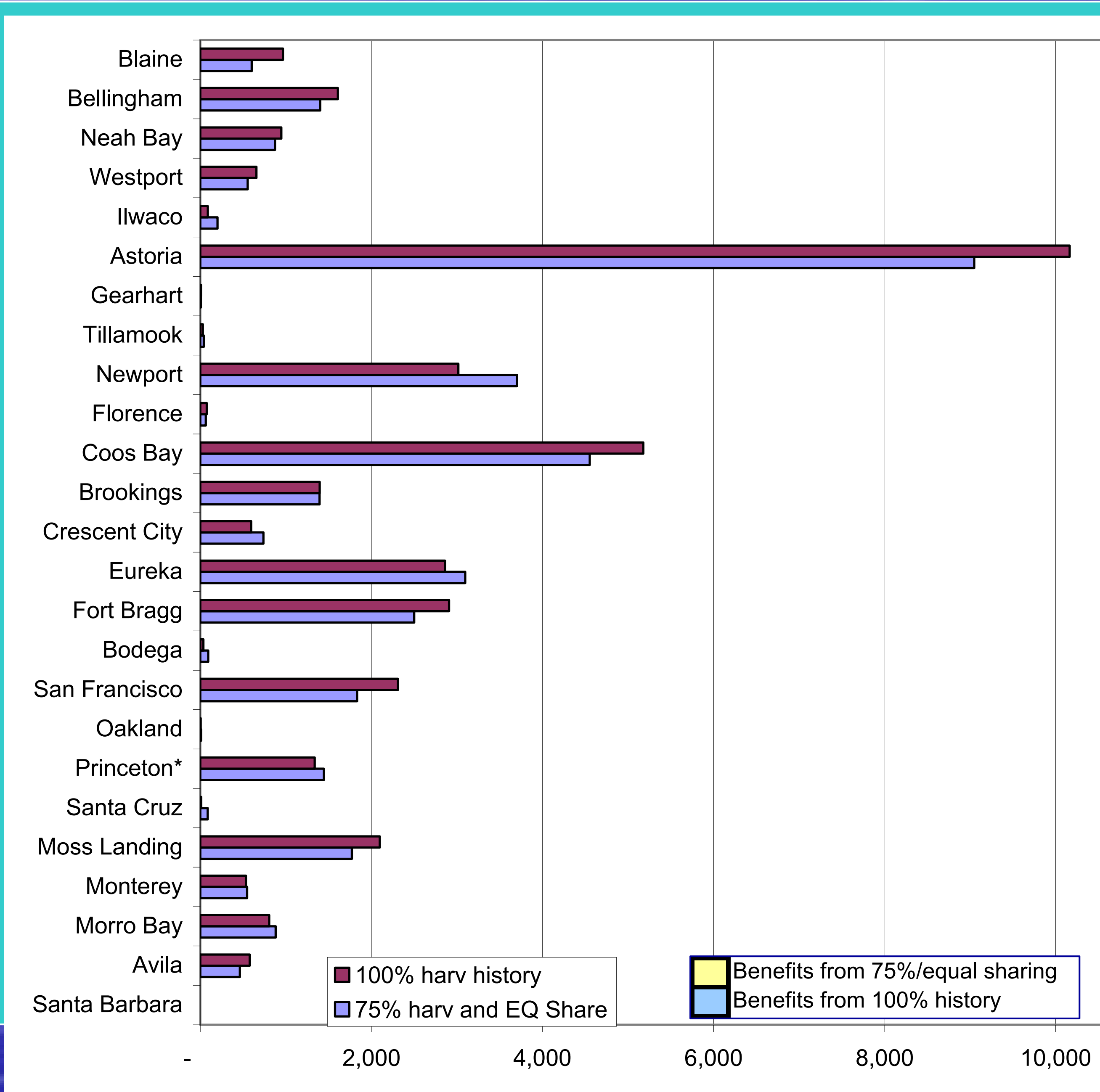
Port Characteristics

Port	Vessels	Processors	Vulnerability
Blaine	-	1	-
Bellingham	5	2	2
Neah Bay	5	0	1
Westport	2	1	2
Ilwaco	-	1	3
Astoria	30	4	2
Newport	21	3	2
Charleston (Coos Bay)	18	5	2
Brookings	6	0	3
Crescent City	3	0	2
Eureka	17	1	2
Fort Bragg	8	1	2
San Francisco	8	6	3
Princeton/Half Moon Bay	7	3	3
Moss Landing	7	1*	1
Morro Bay	4	0	2

Anticipated Effects: Non-whiting Ports

Port	Fleet Efficiency Score	Bycatch Dependent Area Score	Shorebased Infrastructure	Initial Allocation of Grndfish	Score
Bellingham	?	– –	+ +	+	
Neah Bay	–	– –	– –	–	–
Westport	–	+	+	–	
Astoria	+	+	+ +	+ +	+
Newport	+	–	+ +	+	
Charleston (Coos Bay)	+	+	+ +	+	+
Brookings	+	+	–	+	
Crescent City	–	+	+	–	
Eureka	+	+	+	+	+
Fort Bragg	–	+	+	+	
San Francisco	–	–	+ +	+	
Moss Landing	–	– –	+	+	
Princeton/Half Moon Bay	–	– –	+	+	
Morro Bay	?	+	–	–	

Initial Allocation — Non-whiting



Ratio	Rank
0.622601	14
0.871698	9
0.921269	12
0.845151	15
2.309633	18
0.890226	1
0.750238	24
1.309783	22
1.227364	3
0.84654	21
0.87934	2
0.998974	10
1.238814	13
1.082833	4
0.859626	5
2.460097	19
0.793731	6
2.213512	23
1.080325	8
7.768052	20
0.843944	7
1.02647	16
1.093233	11
0.801773	17
0.900665	25

Initial Allocation — Whiting

50% to Harvesters	Status Quo	100% to Harvesters
Newport	Westport	Newport
Astoria	Newport	Westport
Westport	Astoria	Astoria
Charleston (Coos Bay)	Ilwaco	Ilwaco
Ilwaco	Charleston (Coos Bay)	Eureka
Eureka	Eureka	Charleston (Coos Bay)
Crescent City	Crescent City	Crescent City
Moss Landing	Moss Landing	Moss Landing

Decision Points Affecting Communities

- Initial Allocation
- Accumulation Limits/Grandfather Clause
- Area Management
- Adaptive Management