FISHERIES MANAGEMENT

Lecture 10 – Nov 9th, 2015

Intro to Marine Science

Instructor: Lauren Bell

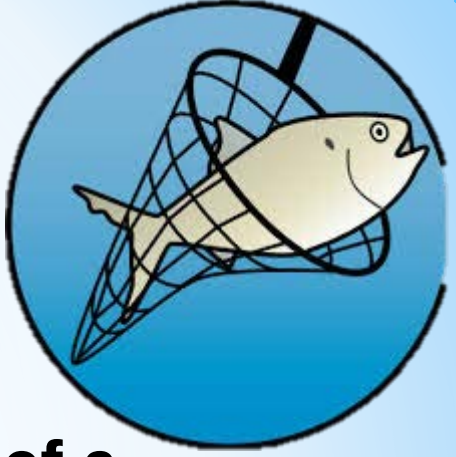
*Learning objectives

After this lesson, you will be able to:

- List the types of information needed to develop an accurate population model for a particular stock
- Identify the chief governing agencies responsible for management of Alaska state, U.S. national, and international fisheries
- Describe the general process of management - how is research translated into policy and harvest limits?
- List some of the advantages and difficulties inherent in ecosystem-based or cross-border management
- Recognize some of the unique forms of management that have been successful in Alaska

*How to “manage” what we don’t completely see?

*What does FM mean?



"Fisheries Management"

= a broad idea of the ideal attributes of a fishery and its resources

More accurately…a reflection of society's preferences for the fishery

Objectives: typically a bunch of contradictions!

yield vs biomass

jobs vs profits

"Conservation and management measures shall prevent overfishing while achieving… the optimum yield…"

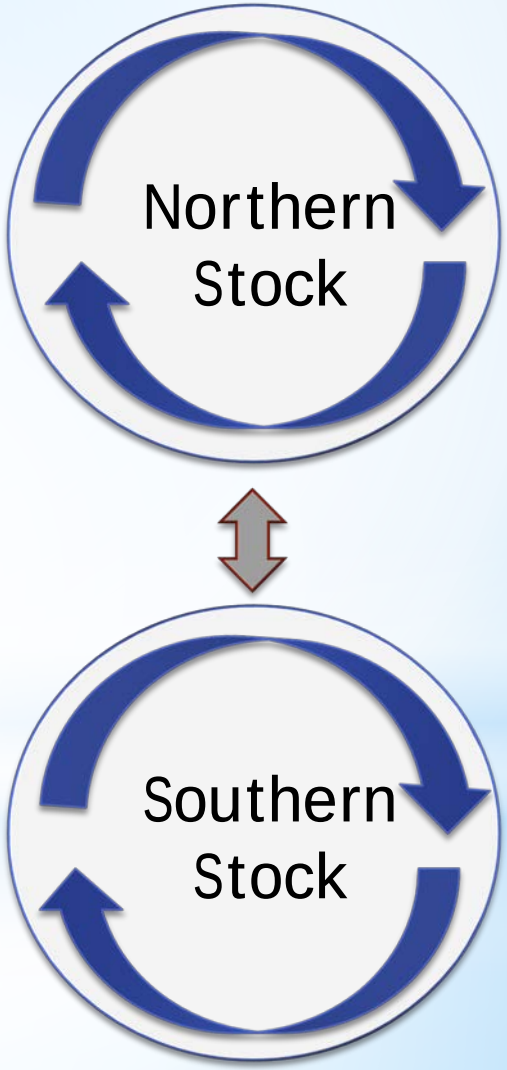
-NOAA

+ measureable criteria

*Step 1: Estimate stocks

What's a "STOCK" anyways?

- Group of individuals of the same species
- Group inhabits the same region
- Group interbreeds when mature
- Low-level interbreeding between stocks



*Estimating stocks

At its simplest:

Biomass

=

Birth + Growth

-

Catch - Death

*Estimating stocks

How to do this?

1) Catch data
2) Abundance data
3) Biology data

MODELS

*Catch data

- The amount of fish removed from a stock by fishing

- **Dockside monitoring**
- **Logbooks**
- **Observers**
  - At-sea
  - Electronic

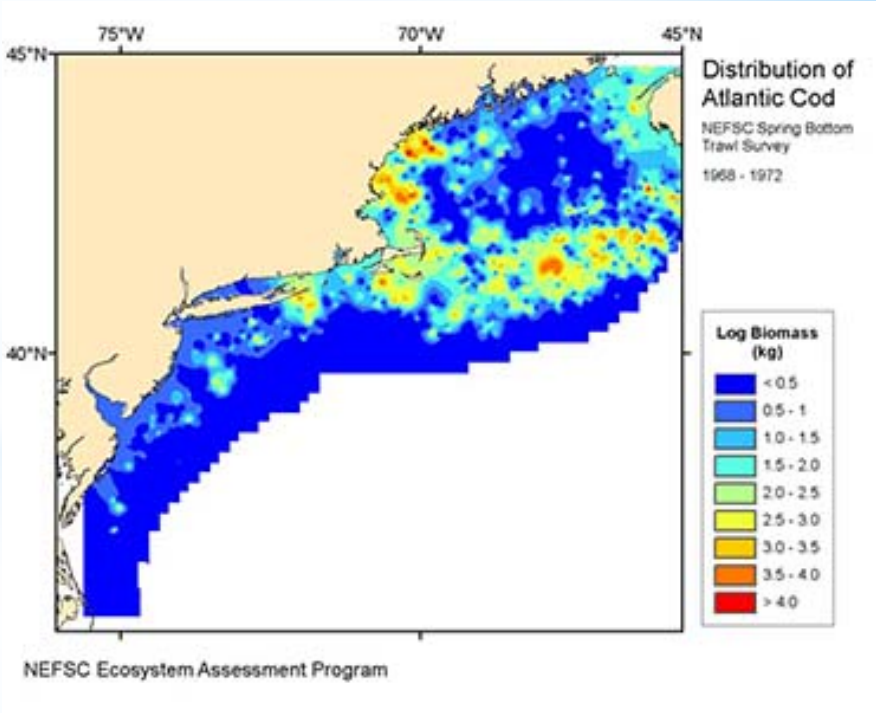
Age
Sex
Length
Fishing location
Gear
Discards

- **Recreational sampling**
  - Telephone interviews
  - Mail-in interviews

*Abundance data

- A measure, or relative index, of the number or weight of fish in the stock

- **Fisheries-independent surveys**
  - ➢ Statistically-designed
  - ➢ Research/contracted vessels
  - ➢ Large geographic range
    - ✓ Abundance over time
    - ✓ CPUE (catch per unit effort)



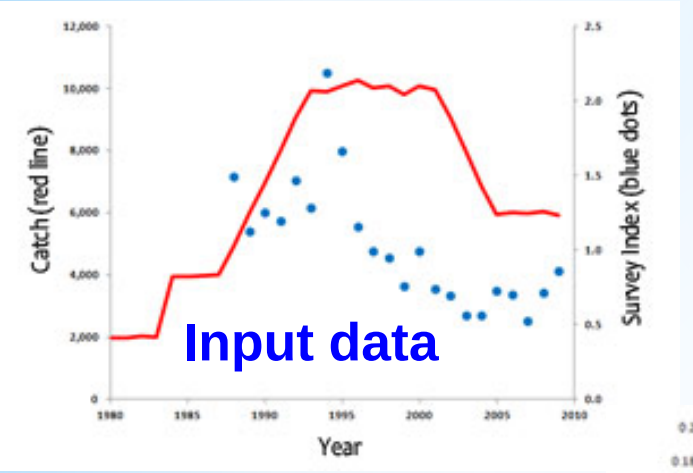
*Biology data

- Provides information on fish growth rates and natural mortality

- **Biological samples**
  - Collected during surveys, from at-sea observers, academic programs/cooperative research

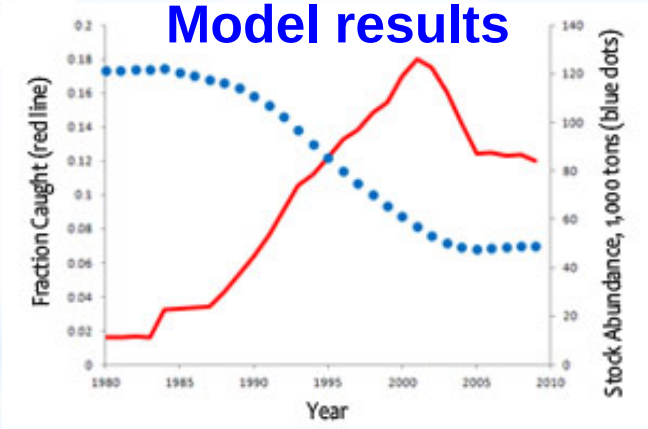
Size
Age
Reproductive rates
Movement

*Building models



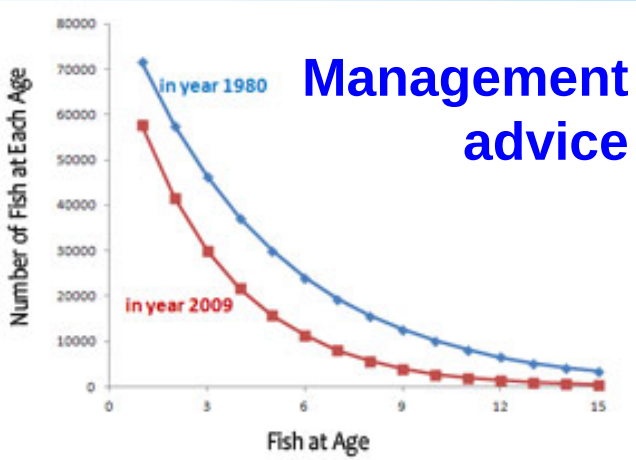
Building a computer simulation of fish pop.

- Input population info (abundance, growth, mortality, reproduction)
- Predict (use pop info to make model predictions of stock)
- Compare predictions to observations, tweak as needed (model needs to FIT!)



Accounting for ecosystem factors!

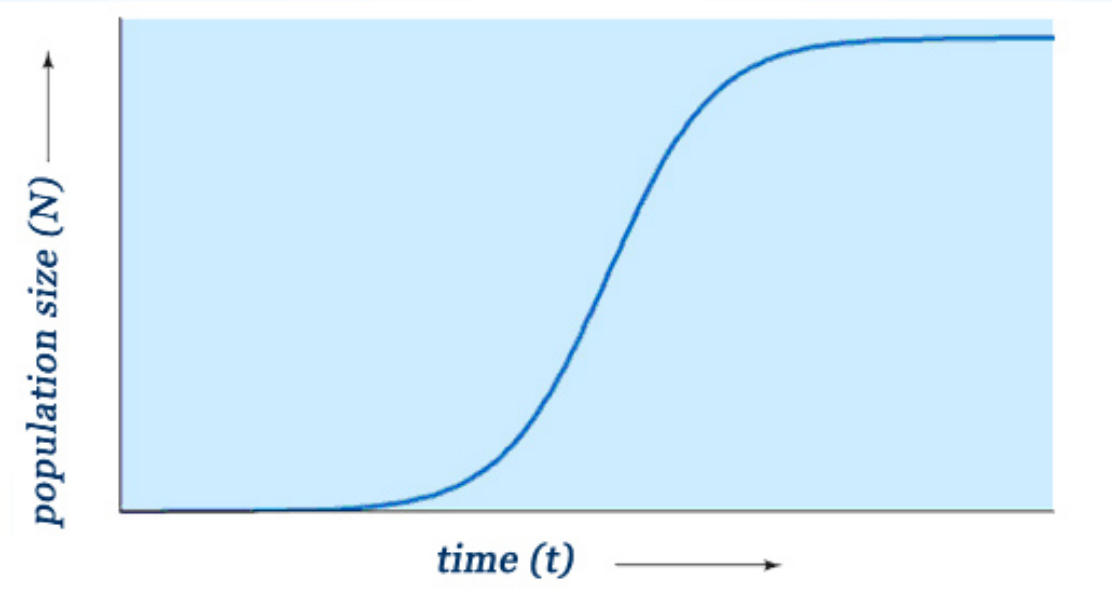
- **Food web interactions**
- **Competition/Symbiotic relationships**
- **Habitat health**
- **Physical/climatic environment**



*Renewable resources

ASSUMPTIONS:

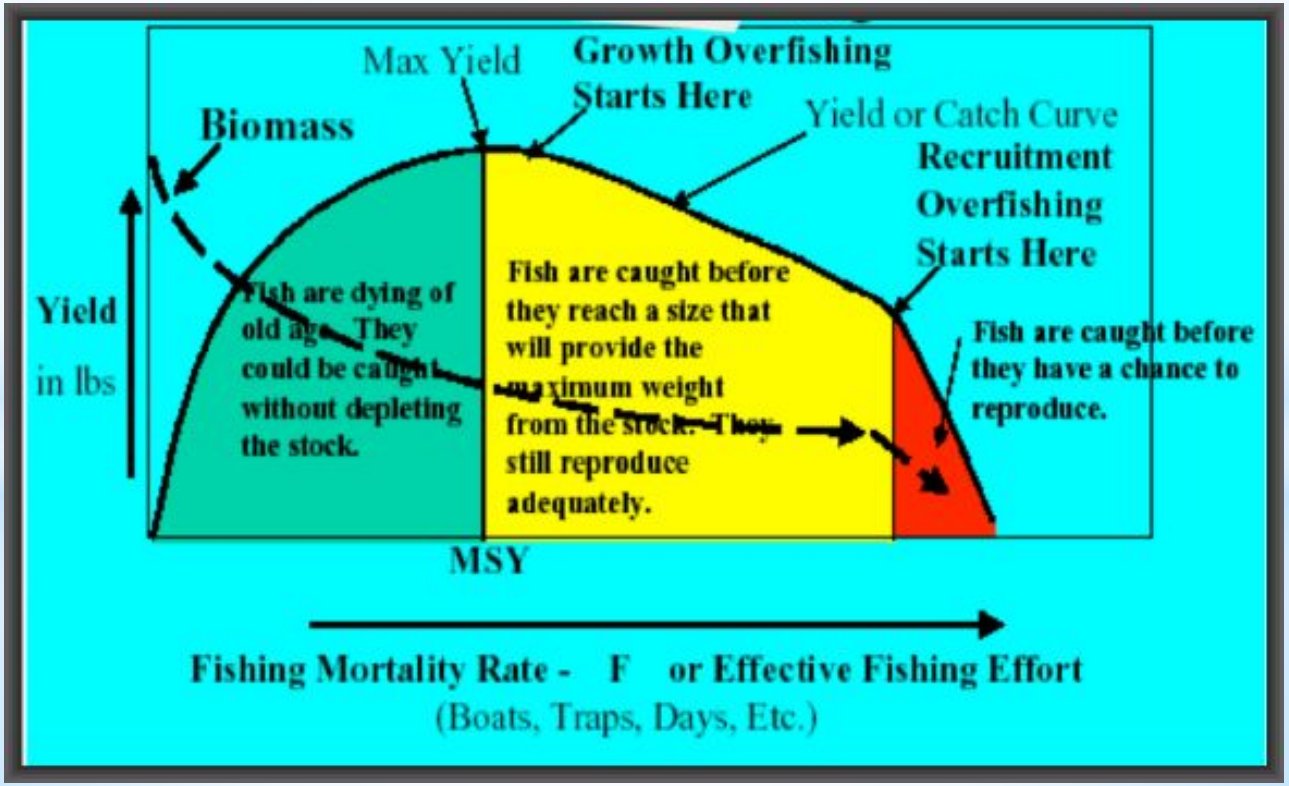
- Populations grow and replace themselves
- Without human harvest, populations reach a carrying capacity; cannot grow exponentially
- Reduction of population density increases growth rates, survival rates, and reproductive rates of the population
- Thus, there must be some level of harvest that produces an EXCESS of biomass above that which would naturally occur



*Step 2: decide harvest

Goal: **Maximum Sustainable Yield (MSY)**

= largest catch that can be taken from a stock indefinitely



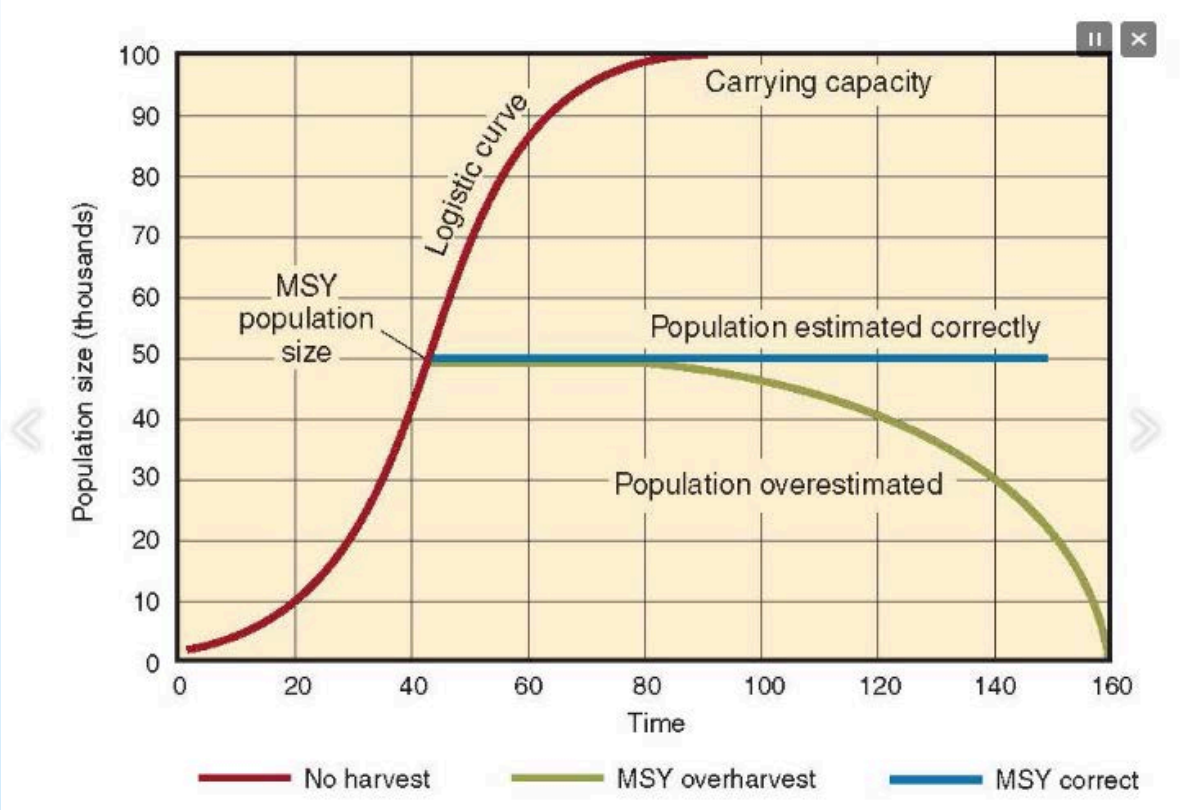
Should we be aiming for MSY, or <MSY?

*MSY – unfeasible?

A small, moving target – what happens if we miss?

- *Harvest too high – pop. goes extinct*
- *Harvest too low – stable equilibrium*

LIKELY BETTER TO BE CONSERVATIVE….



*Step 3: allocate to user grps

Dip netting

Hook and line

SPORT

Seiners

Gillnetters

Trollers

COMMERCIAL

Setnetters

"Traditional" use

Modern use

SUBSISTENCE

We will return to this….

*Step 4: policy & regulation

Majority fall into category of "regulated inefficiency"

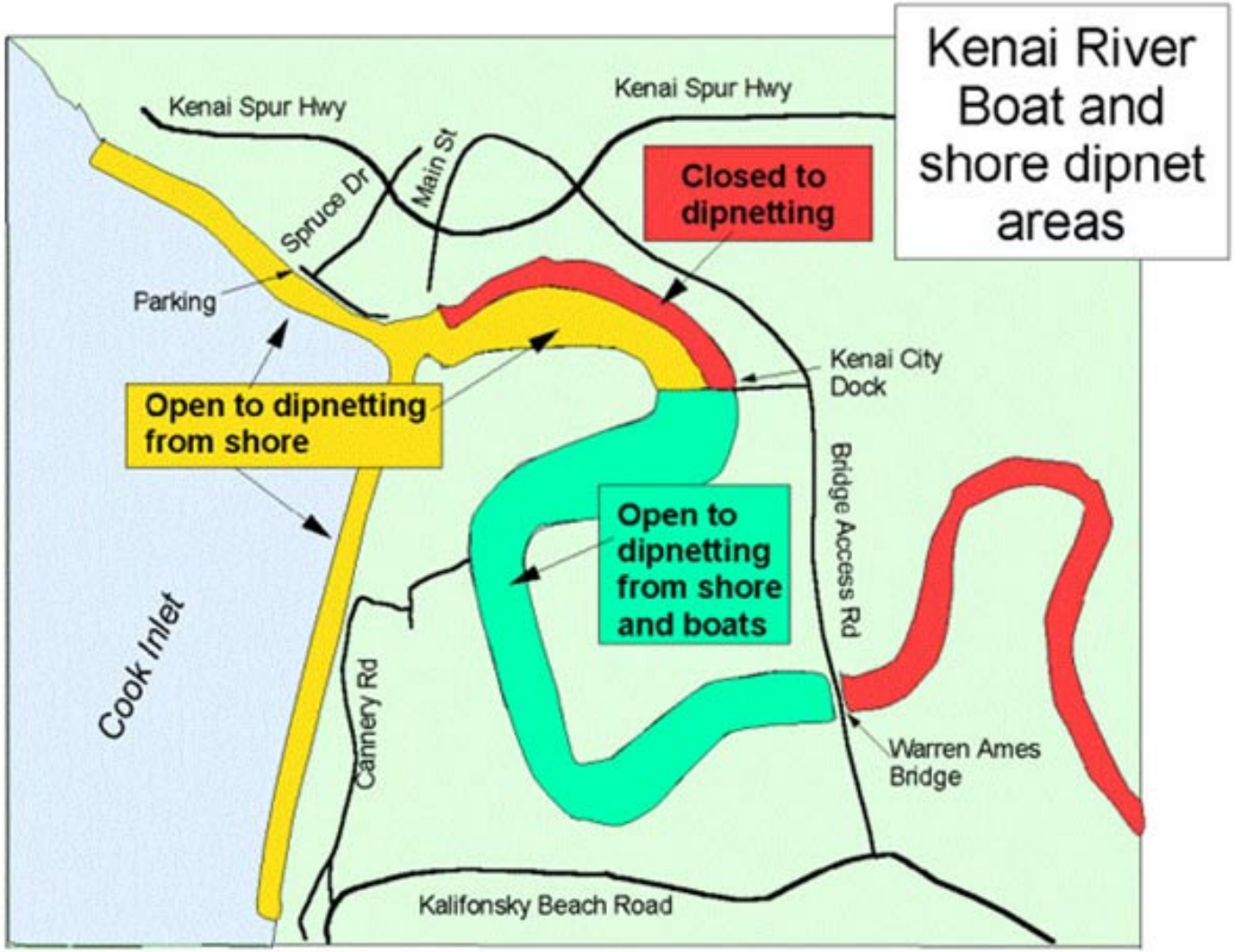
Over time:

- # of harvesters increase
- Boats become bigger, faster, more powerful
- Electronics become more sensitive and accurate
- Fishing gear becomes stronger and more efficient
- CPUE goes up

How to compensate?



*Time & area closures



Time:

- Can be start-to-finish dates
- Can be certain periods within a season

Area

- Where fishing takes place

May be gear specific

*Size of boat reg's

- **Some fisheries have expressed limits on size of boats** (e.g. Bristol Bay salmon fisheries – 32ft max)
- **Some fisheries managed by size groups of participating vessels**

FISHERY / BENEFITS	LARGE SCALE	SMALL SCALE
Subsidies	$$$$$ 25-27 billion	$ 5-7 billion
Number of fishers employed	about 1/2 million	over 12 million
Annual catch for human consumption	about 30 million t	same: about 30 million t
Annual catch reduced to fishmeal and oils	35 million t	Almost none
Annual fuel oil consumption	about 37 million t	about 5 million t
Catch per tonne of fuel consumed	= 1-2 t	= 4–8 t
Fish and other sealife discarded at sea	8–20 million tonnes	Very little

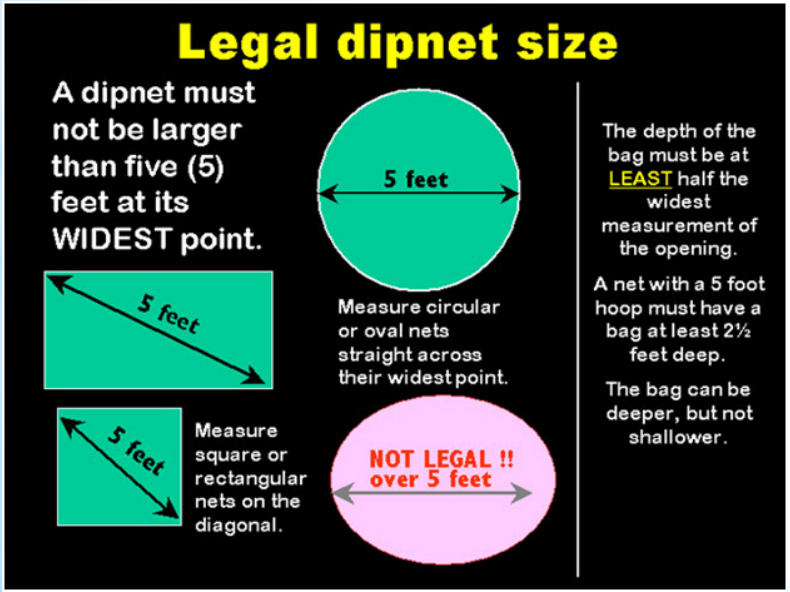
*Fishing gear restrictions

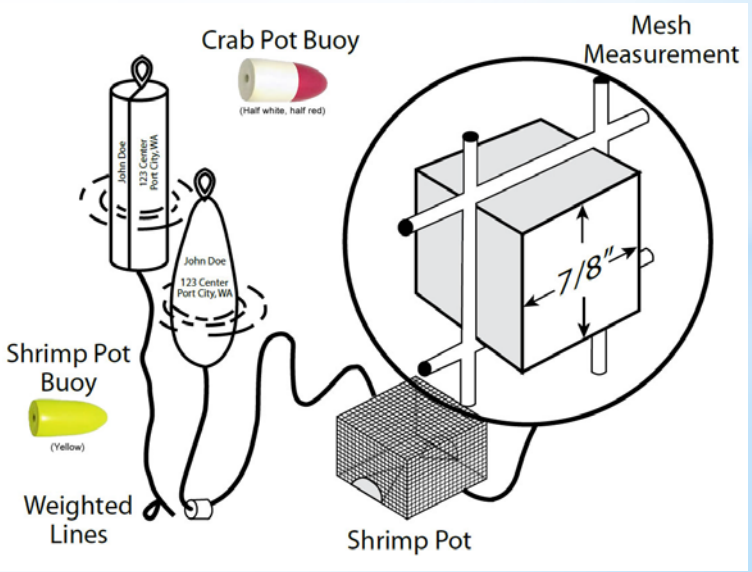
True in virtually every fishery

SE Alaska Personal Use Salmon Fishery:

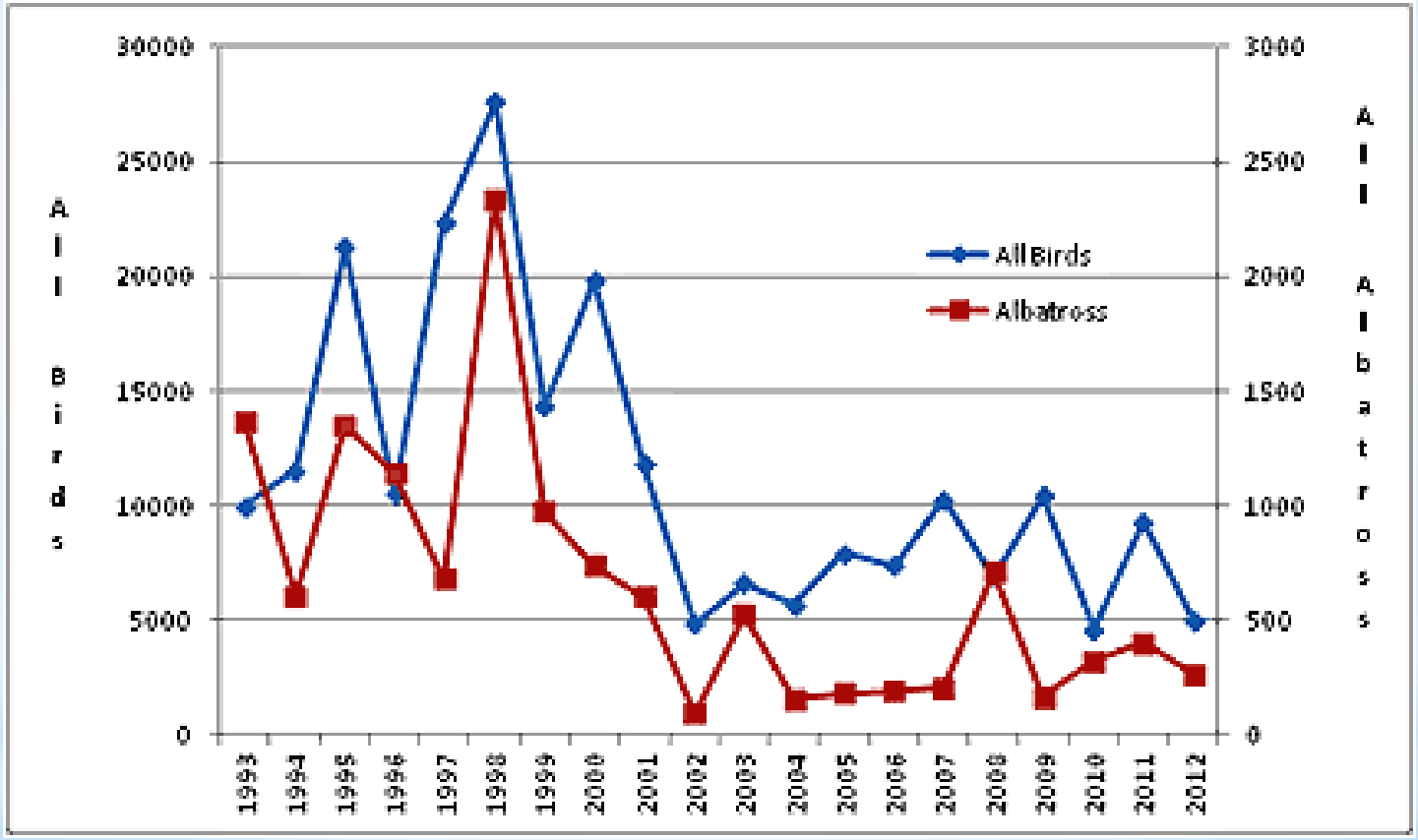
“Gillnet web in a gillnet used for fishing for salmon must meet one of the following requirements:

- ✧ the web must contain at least 30 filaments and all filaments must be of equal diameter;
- ✧ or the web must contain at least six filaments, each of which must be at least 0.20 millimeter in diameter”





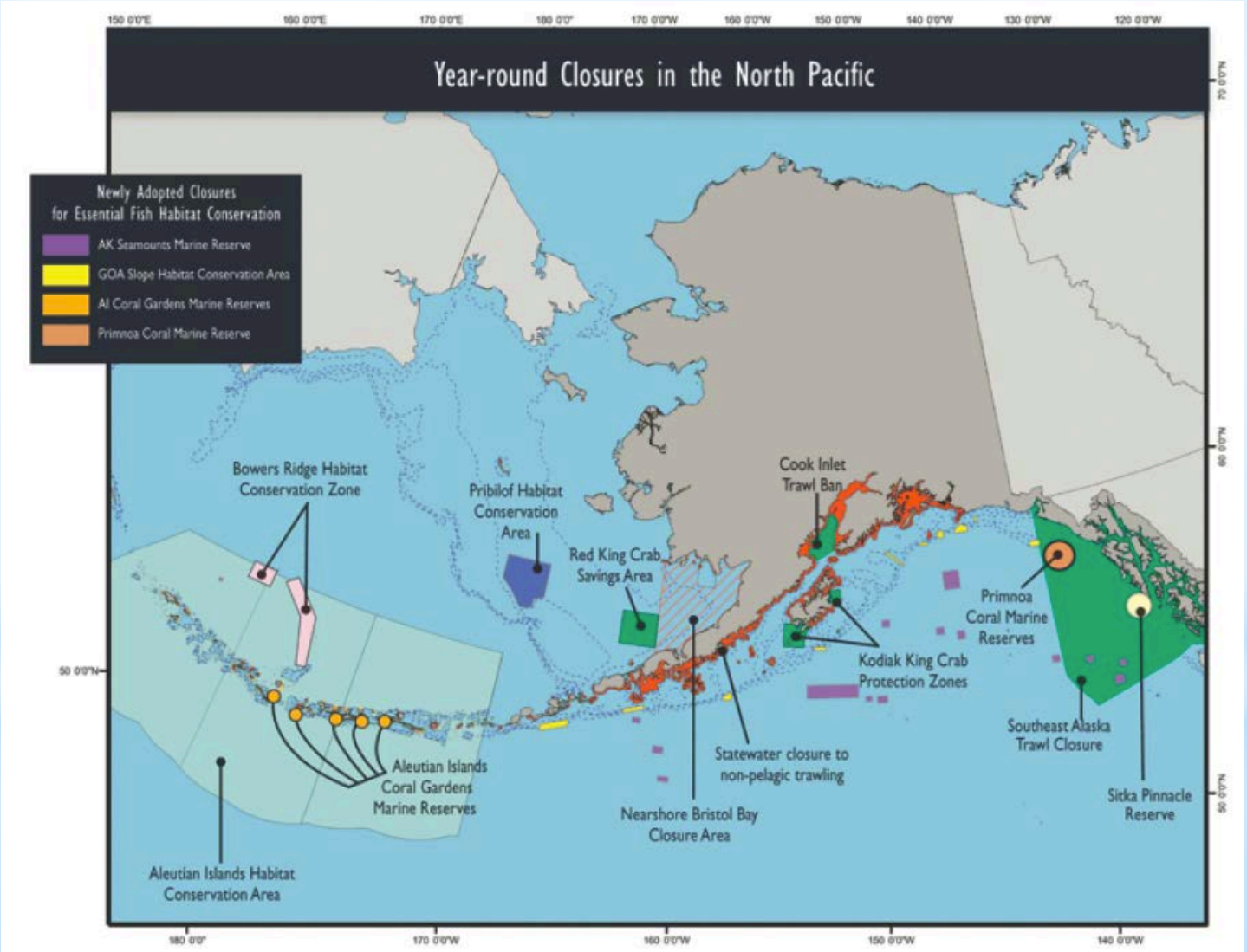
*Bycatch reduction



Alaskan longline fisheries: **BIRD BYCATCH**

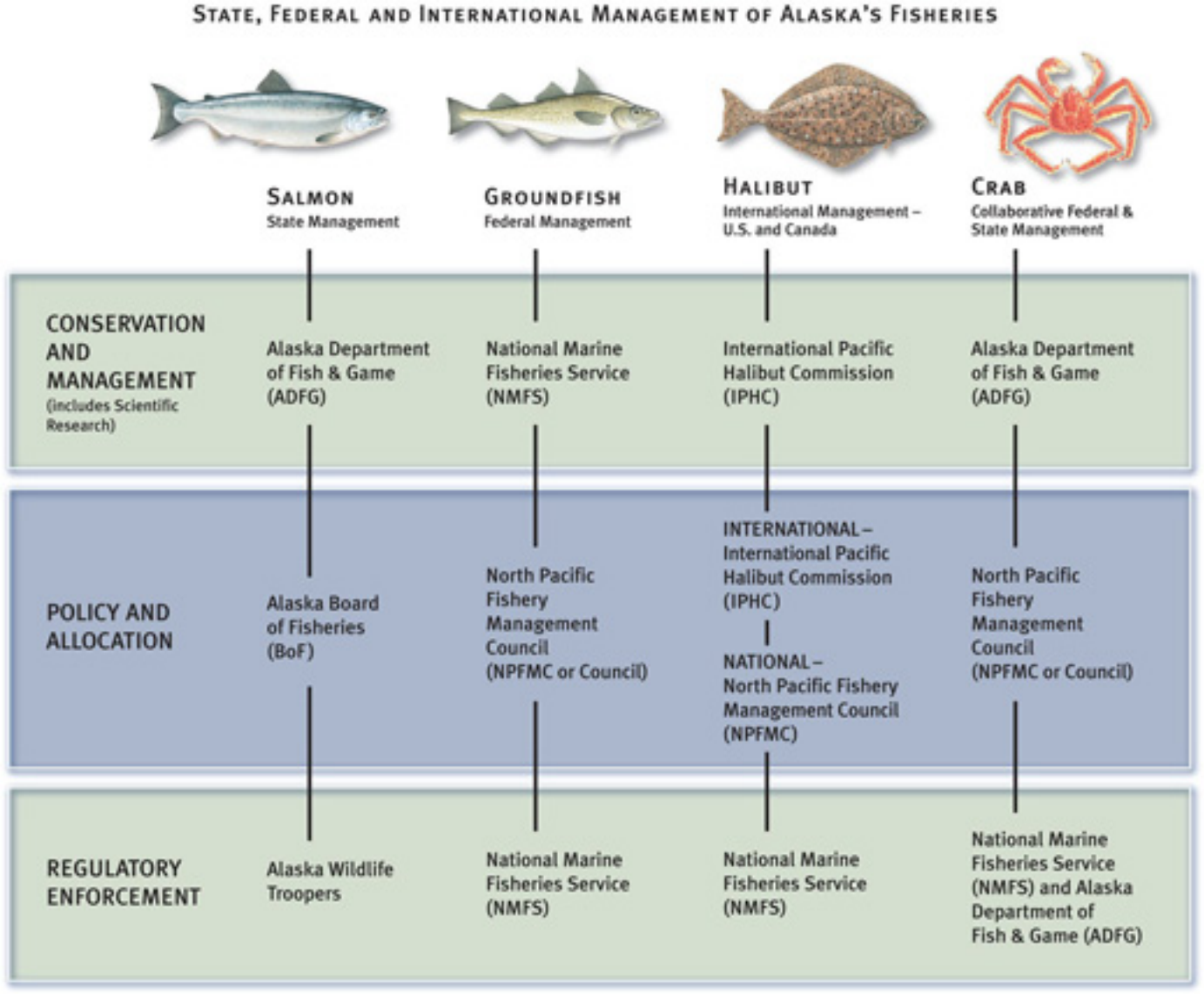
- Seabird avoidance gear
- Offal discharge methods
- Seabird Avoidance Plan
- Collecting all seabirds that are incidentally taken

*Habitat protection



Source: North Pacific Fishery Management Council

*Alaskan agencies



*How are decisions made?

Identified Problem
Stock status/allocation/rebuilding targets

↓

Scientific Review/Input
Technical Committee

↓

Proposed Action
Potential management measures

↓

Public and Advisory Input
Public comment process

↓

Commission Decides
Final management measures

↓

States Act
Regulations implemented and enforced

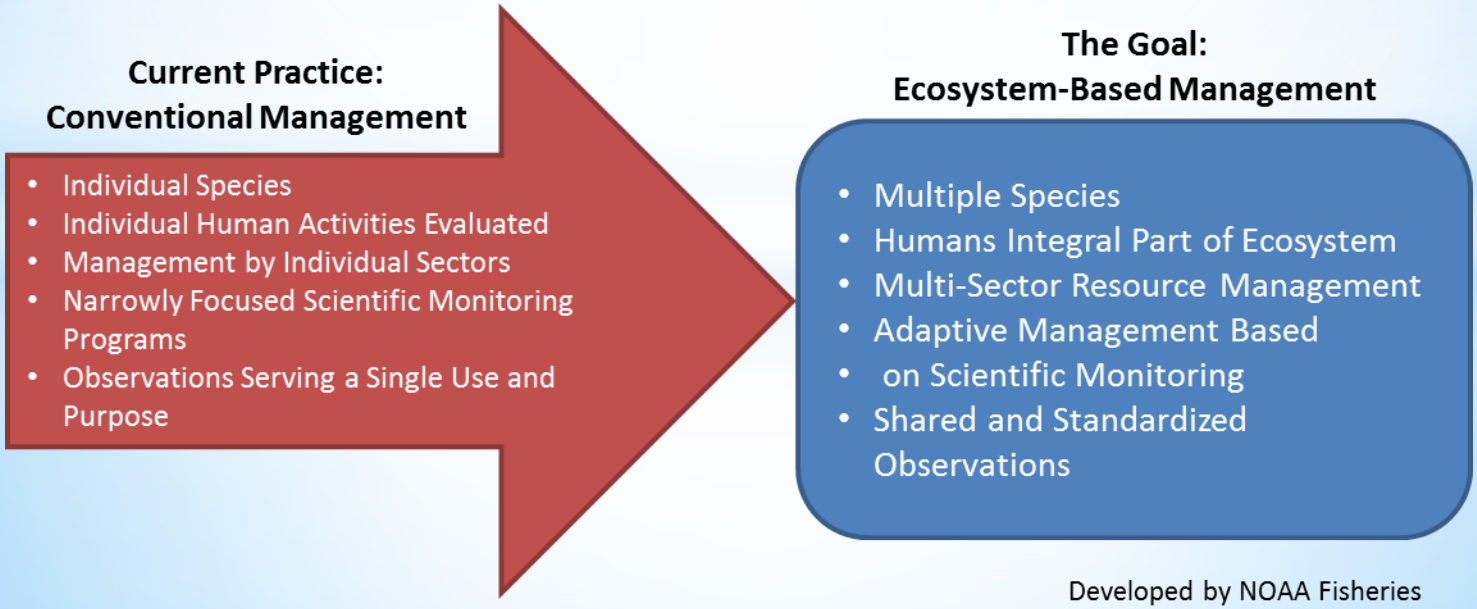
*Major types of management

~~Single-Species Management~~

Ecosystem Management

Rights-Based Management

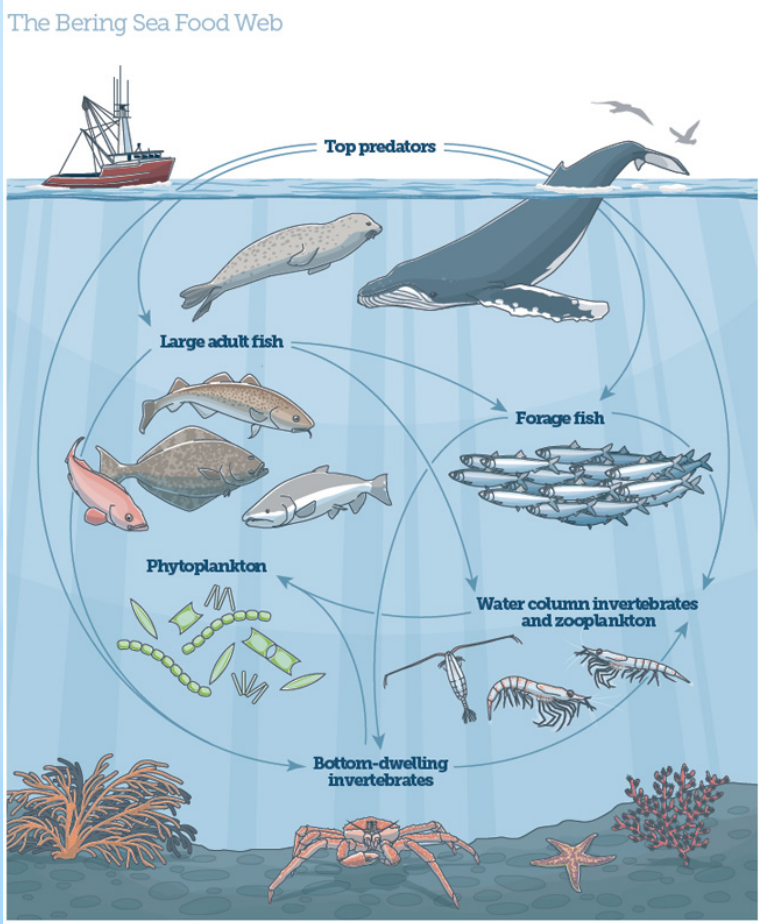
Co-management

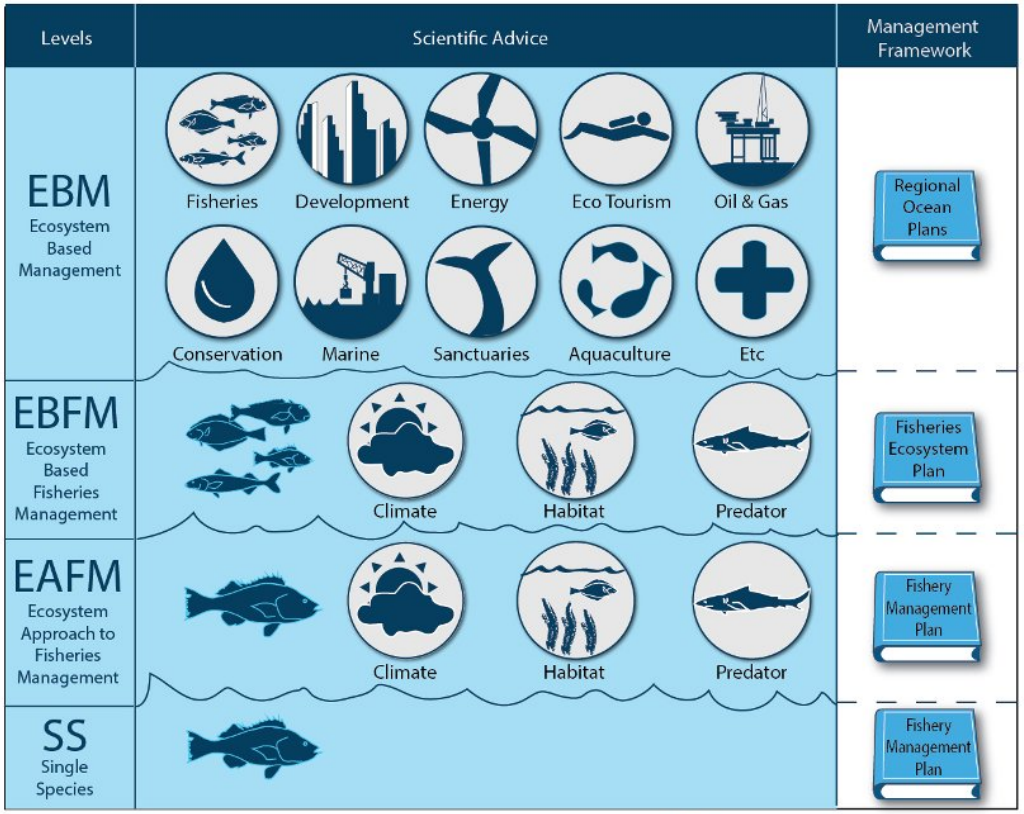


Developed by NOAA Fisheries

*Ecosystem-based mngmt

What about all the other species not directly harvested but important to biodiversity?





NOAA FISHERIES

*Economic "rationalization"

- **Open access + total catch limits = race for fish**
- **Competition → "overcapitalization" → inefficient**

Solution = "Rationalize" economic fishing behavior

- Limit access and assign individual catch limits
- Eliminate "race for fish" that drives overcapitalization
- Create a "market" for fishing rights

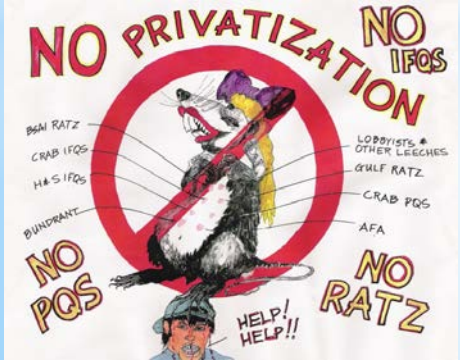
GOAL – maximizing **aggregate** profit

(outcomes of distribution not viewed as central)

*Rights-based FM

MANAGEMENT INSTRUMENTS: INCENTIVE BLOCKING AND INCENTIVE ADJUSTING MEASURES	
Incentive blocking instruments	**Incentive adjusting instruments**
Limited entry Buyback programmes Gear and vessel restrictions Aggregate quotas Non-transferable vessel catch limits Individual effort quotas (IEQs)	Group/community fishing rights (CDQs, etc.) Territorial use rights (TURFs) Individual transferable quotas (ITQs) Taxes and royalties

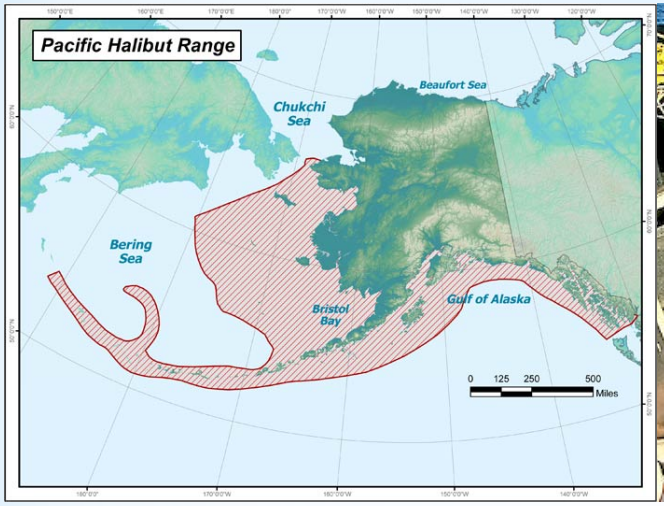
Theory: by internalizing market failures, causes fishermen to re-think production decisions, work to reduce/prevent overcapacity



But….who gets the quotas?

- The wealthy?
- Those who've fished in the past?
- Those who've fished most recently?

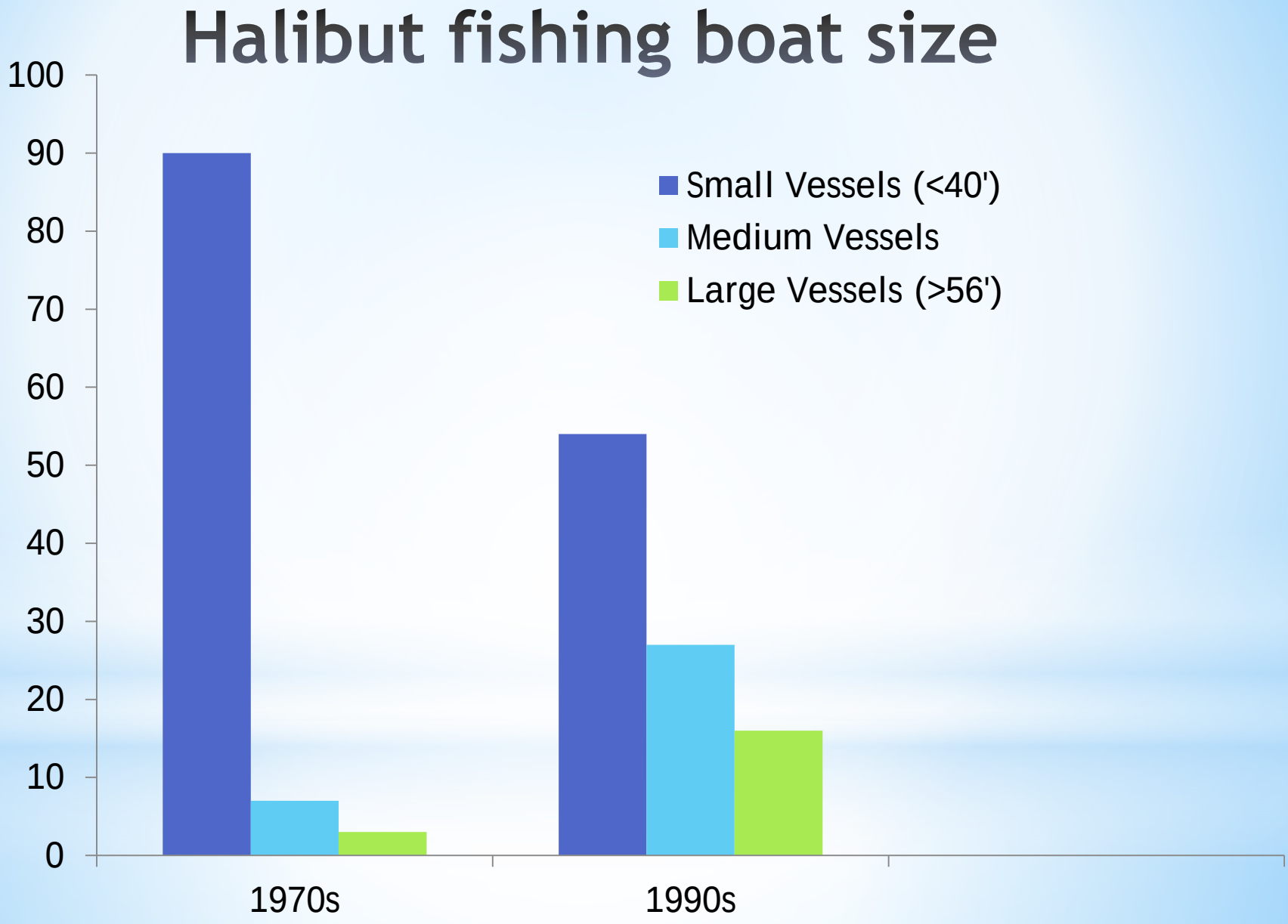
*Case Study: AK Halibut Fishery



International Pacific Halibut Commission set total allowable catch (TAC) for 80+ years

- Unrestricted access beyond seasonal closures
- Halibut fleet grows x3 between 1975 and 1983
- Large vessels take over
- Season shrinks from 150 day season to 16 days to 24-hr “derbies”
- Dangerous, poor product quality

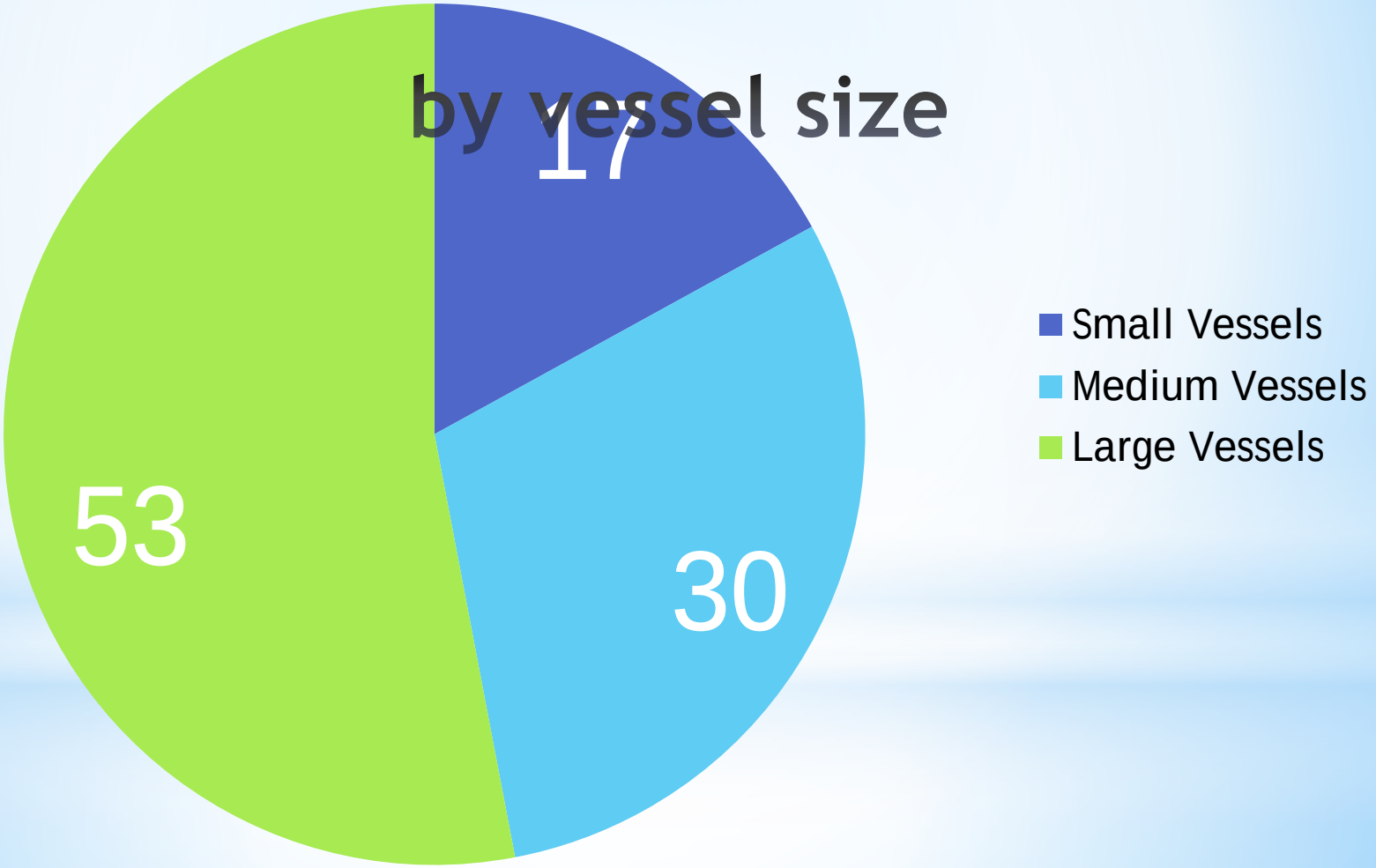
CASE STUDY: AK HALIBUT FISHERY



* Courtesy: Courtney Carothers

CASE STUDY: AK HALIBUT FISHERY

% of total catch caught in 1993, by vessel size

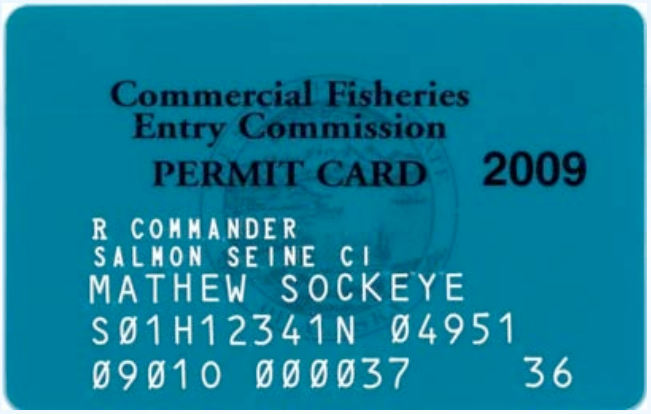


* Courtesy: Courtney Carothers

Fishery "Rationalized"

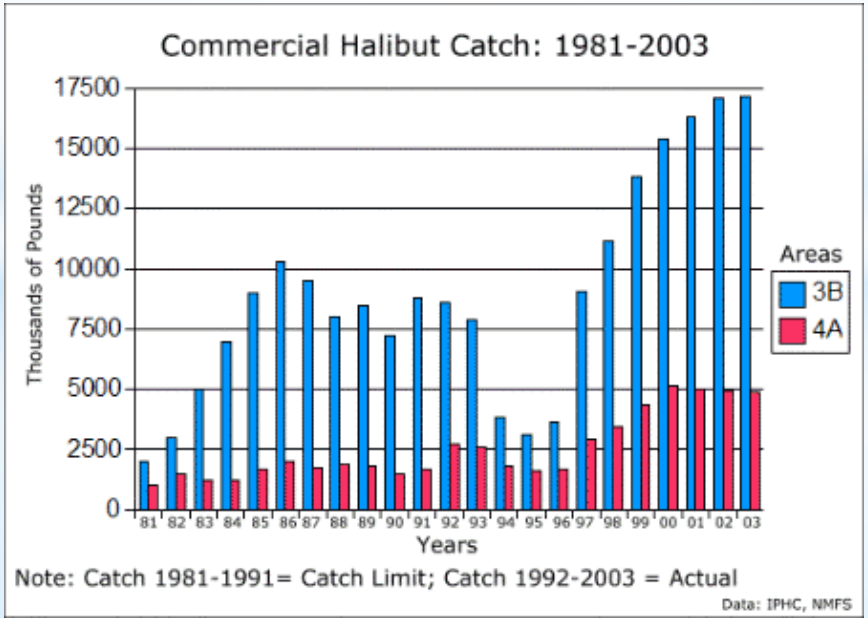
1995 – Individual Fishing Quotas implemented

- **Limit Access:** Boat owners who fished halibut in 1988-1990
- **Assign % of Catch (Quotas):** Owners received average % of catch caught in 5 yr period
- **Make the Quotas Tradable:** Halibut IFQ market established; Vessel size classes; rules on trading based on size class, "owner on board"



Outcome of Halibut IFQs

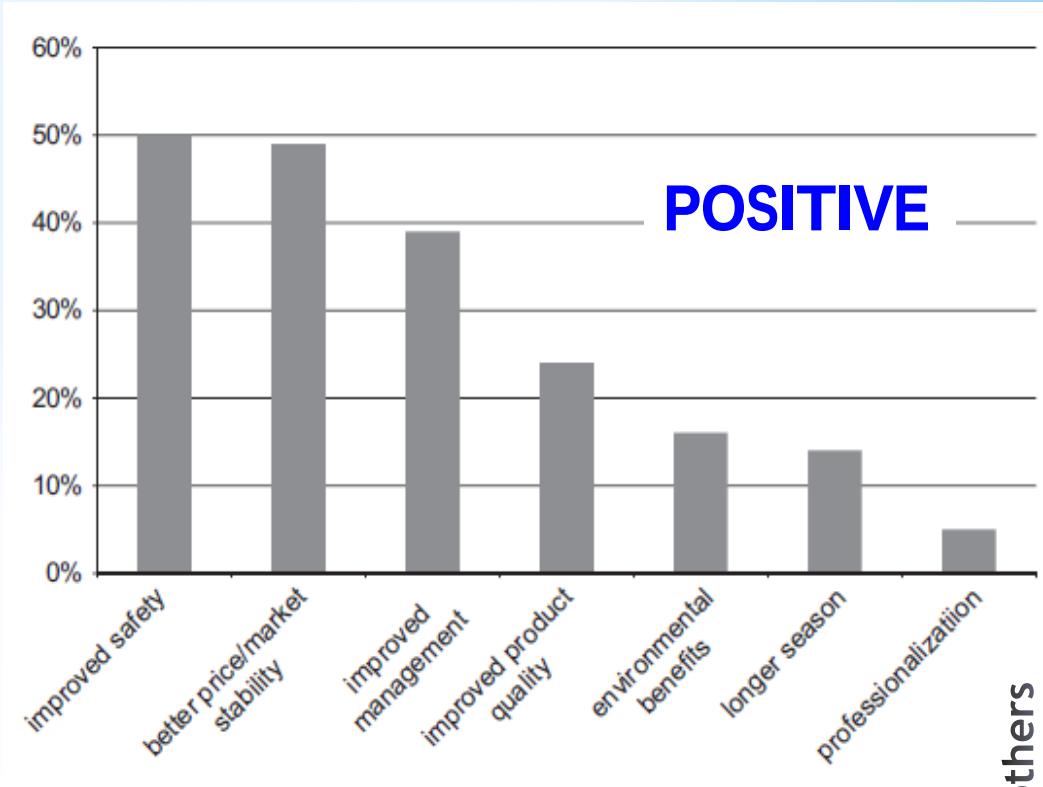
- # vessels declined by > 50%
- Individuals that own quota decreased by 34%
- Season increased > 8 months
- Value of halibut increased by 11%
- Alaska Halibut IFQ Program: “Gold standard of international fisheries management”

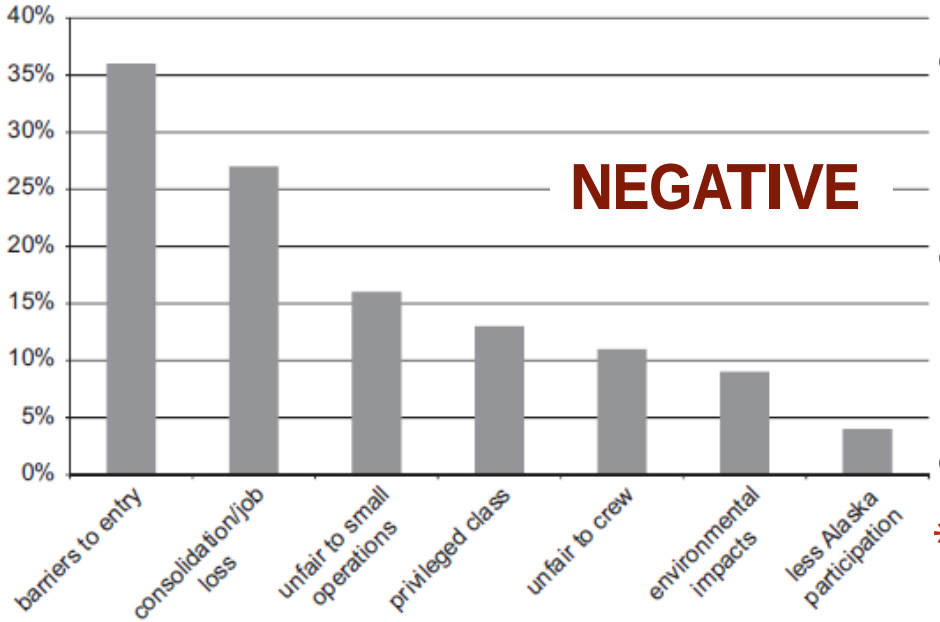


Perceived effects of IFQ system

- Dramatic decrease in fisheries participation from one generation to next
- Small towns disproportionately experienced permit loss
- Loss of "fishing culture"

Factor in social/community effects into success of fisheries management?





Courtesy: Courtney Carothers

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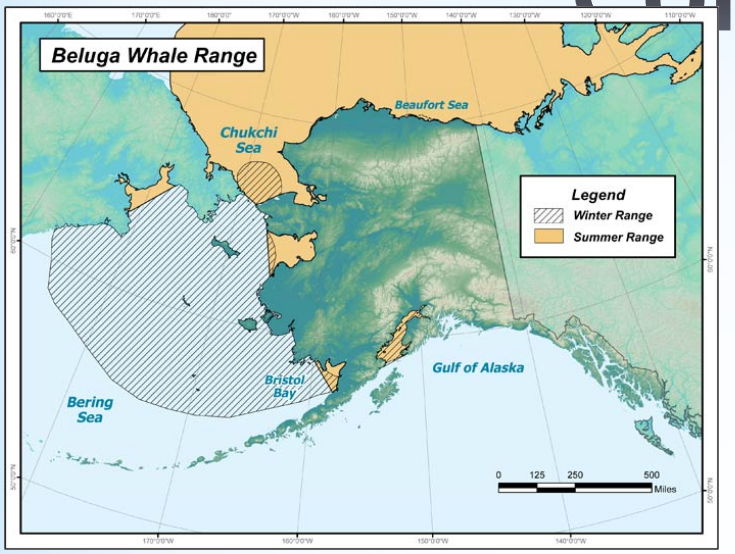
*Case Study: AK Beluga Whale Committee



- **ABWC created in wake of 1977 bowhead whaling moratorium crisis**
- **Comprised of Alaska Native hunters, scientists, agency managers**

GOALs:

- maintain healthy beluga populations
- provide adequate subsistence harvest of beluga whales
- protect hunting practices of Alaskan subsistence hunters
- demonstrate local management capacity to avoid regulation by outside parties (i.e., International Whaling Commission)

Co-management

shared management authority between resource users and government agencies

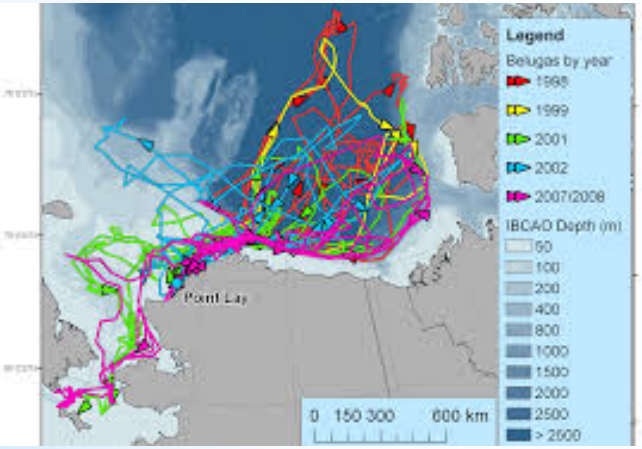
- Users are relied upon for their local ecological knowledge (LEK) or traditional ecological knowledge (TEK) to help inform understandings of populations and inform management

"Co-management promotes *full and equal participation* by Alaska Natives in decisions affecting the subsistence management of marine mammals (to the maximum extent allowed by law) as a tool for conserving marine mammal populations in Alaska."

-NOAA NMFS Alaska regional office

Successes and Difficulties

- Doubts of quality/validity of LEK & TEK
  - ➢ Need to be "validated"
- State just "placating" local communities
  - ➢ Cooperative agreements less likely to be ignored
- Degree of inclusion of Native Alaskans may be mis-represented
- Decontextualized TEK may not make sense
- Unrecognized cross-cultural miscommunication



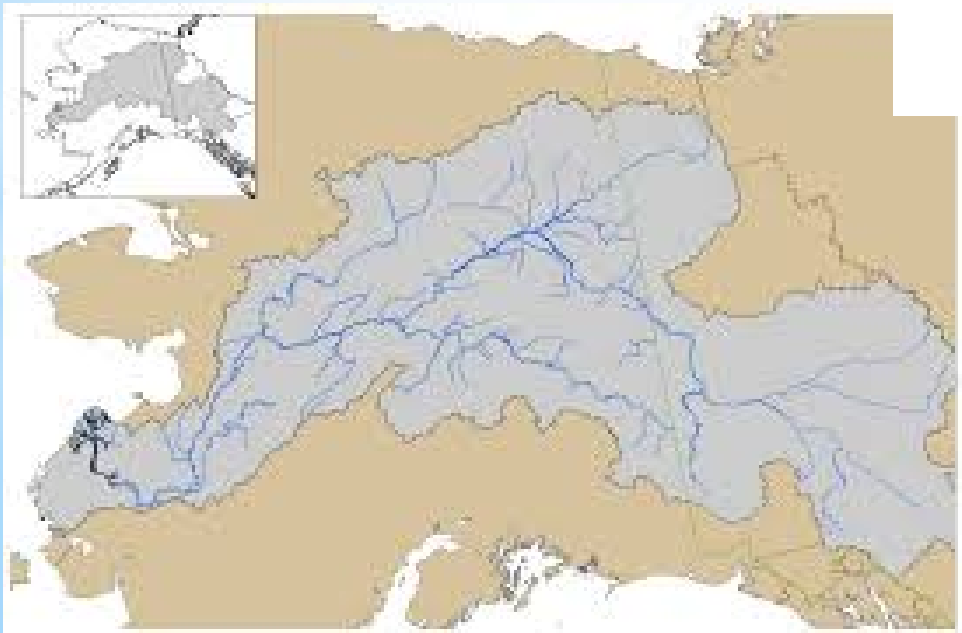
TO WORK: Power must *really* be shared – requires openness to TEK language and cultural ideology

*Case Study: Yukon River Salmon

Cross-border management

Yukon River Salmon Agreement:

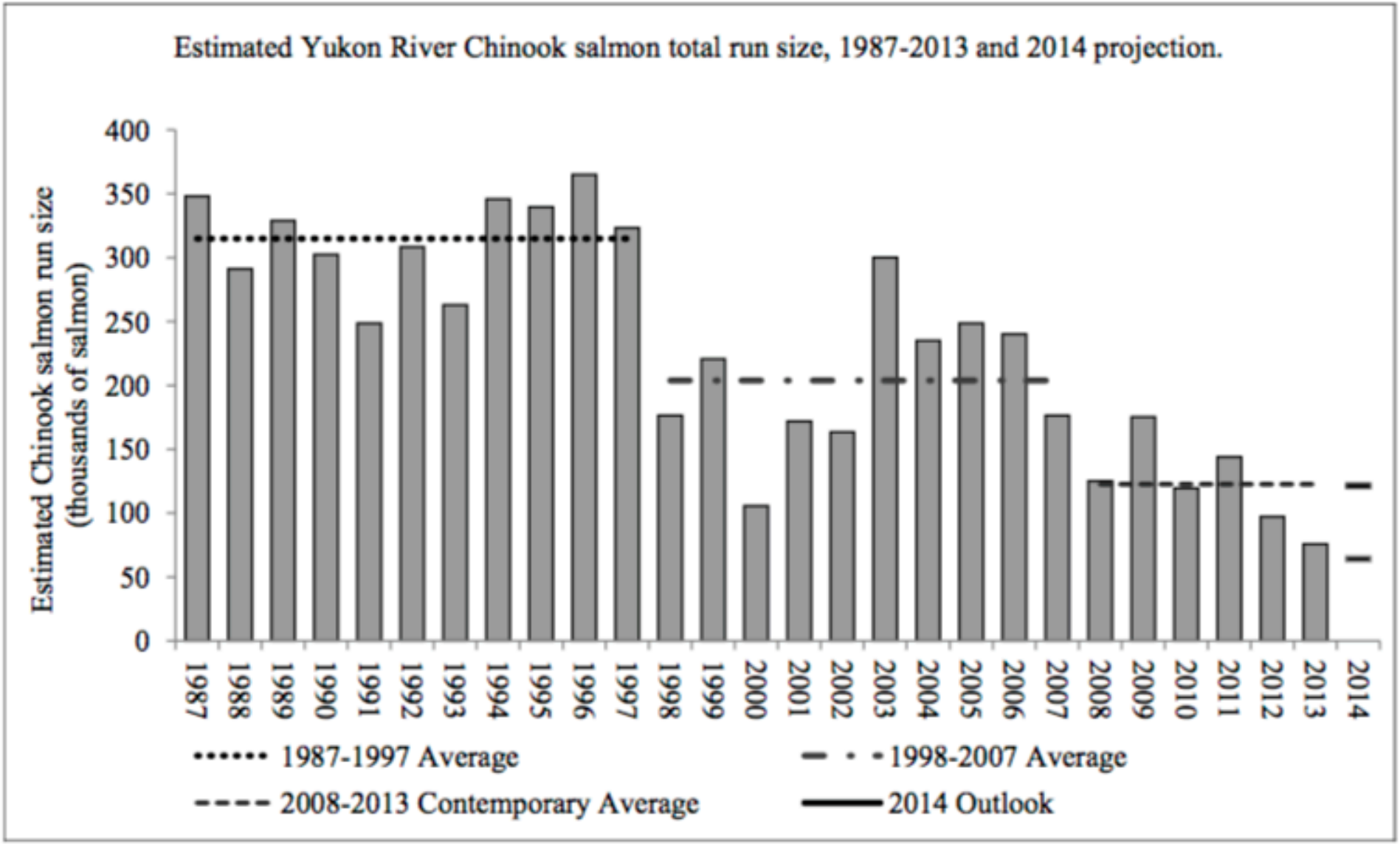
- Treaty ensuring adequate #'s of salmon return to Canada to meet spawning escapement objectives + Canadian harvest



Yukon Salmon Sub-Committee

- Non-government, public advisory body that makes recommendations to federal, territorial, and Yukon First Nation governments
- Recommendations may relate to legislation, research, policies, programs or management plans.
- Initiate seeking out public input on salmon management plans and responsible for consultation with First Nations on allocations

Declines = enhanced difficulties



* FISHERIES MANAGEMENT

Quickly approaching critical issue presentation and debate – get cracking!

See you next week, in person! Nov. 16th

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