An Ecosystem-based Fishery Management Approach Toward Sustainable Groundfish Resource Utilization in the Eastern Bering Sea

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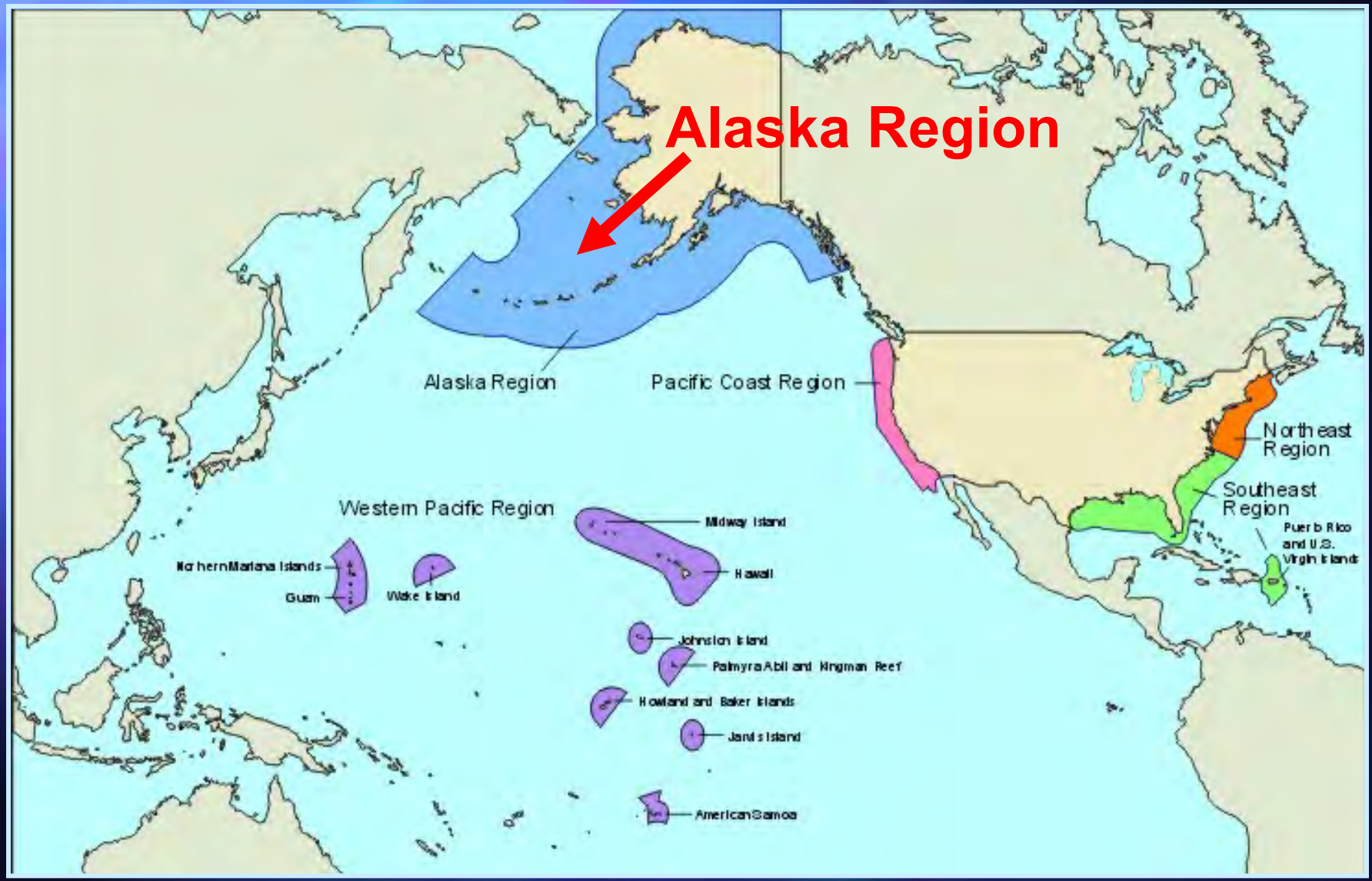
Federal Fishery Management Regions



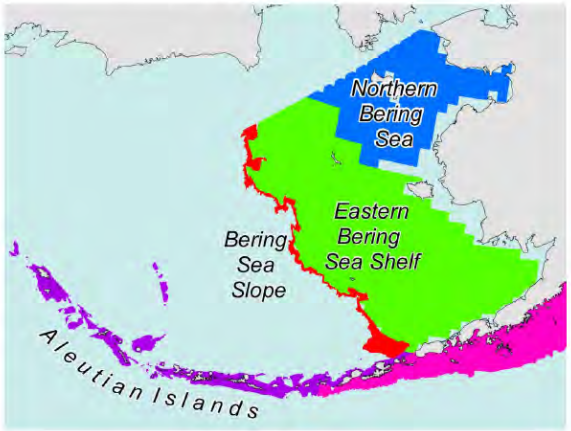
Source: National Marine Fisheries Service

GOA, BSAI, and Arctic Ocean

FISHERY MANAGEMENT PLAN

for

Groundfish of the Bering Sea and Aleutian Islands Management Area



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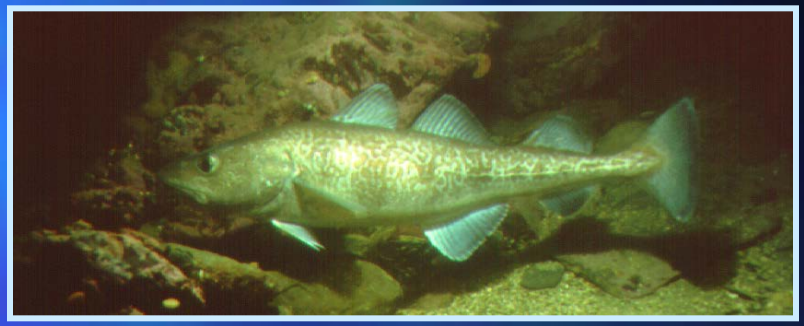
Commercially Important Groundfish

Walleye pollock *(Gadus chalcogrammus)*

Pacific cod *(Gadus macrocephalus)*



Yellowfin sole *(Limanda aspera)*

Pacific ocean perch *(Sebastes alutus)*

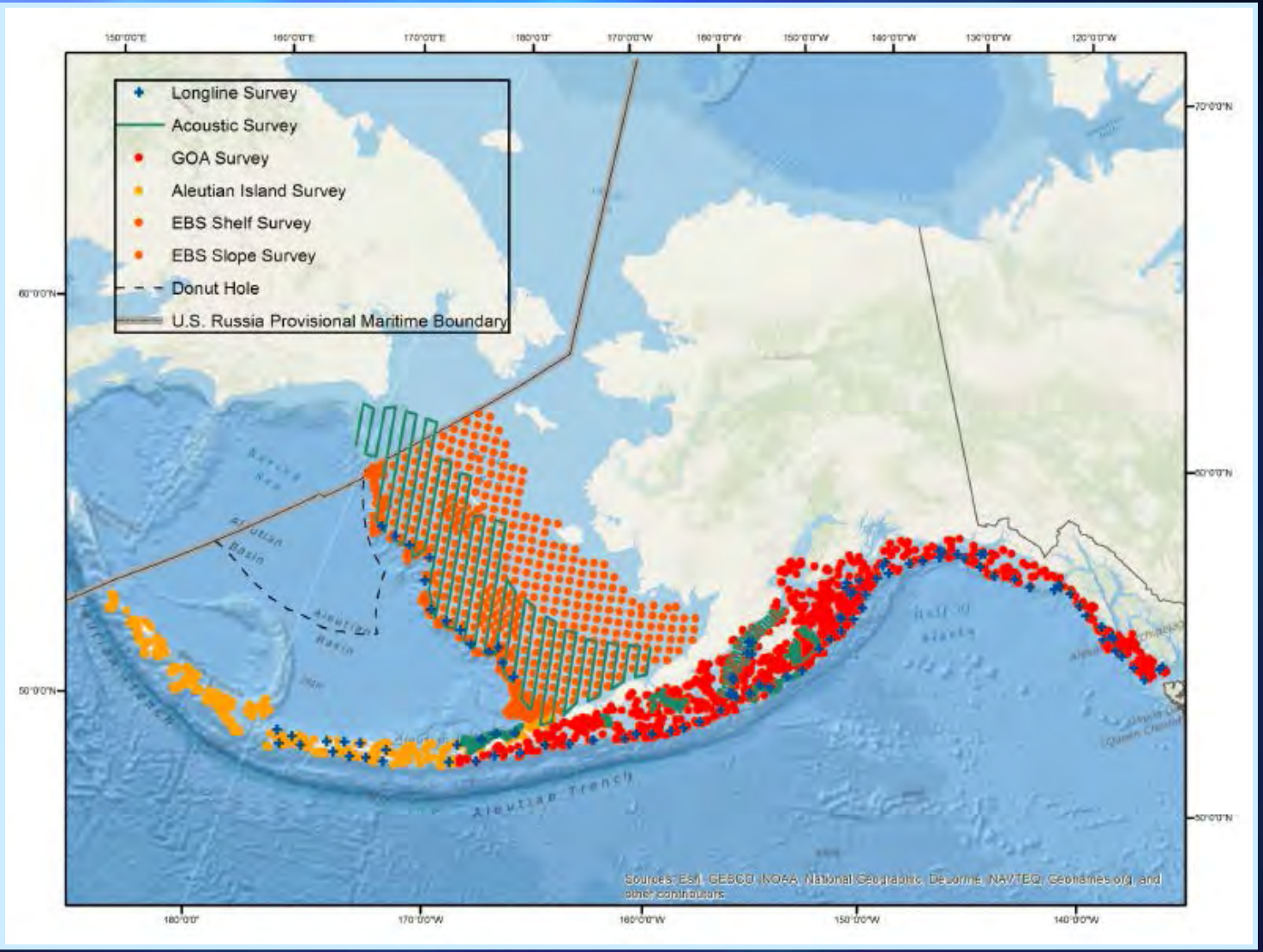
Photos: National Marine Fisheries Service

Bering Sea Groundfish Vessels

Groundfish Fishery Management Objectives

1. Prevent overfishing
2. Promote sustainable fisheries and communities
3. Preserve food web
4. Manage incidental catch and reduce bycatch and waste
5. Avoid impacts to seabirds and marine mammals
6. Promote equitable and efficient use of fishery resources
7. Increase Alaska Native consultation
8. Improve data quality, monitoring, and enforcement

NMFS Stock Assessment Surveys



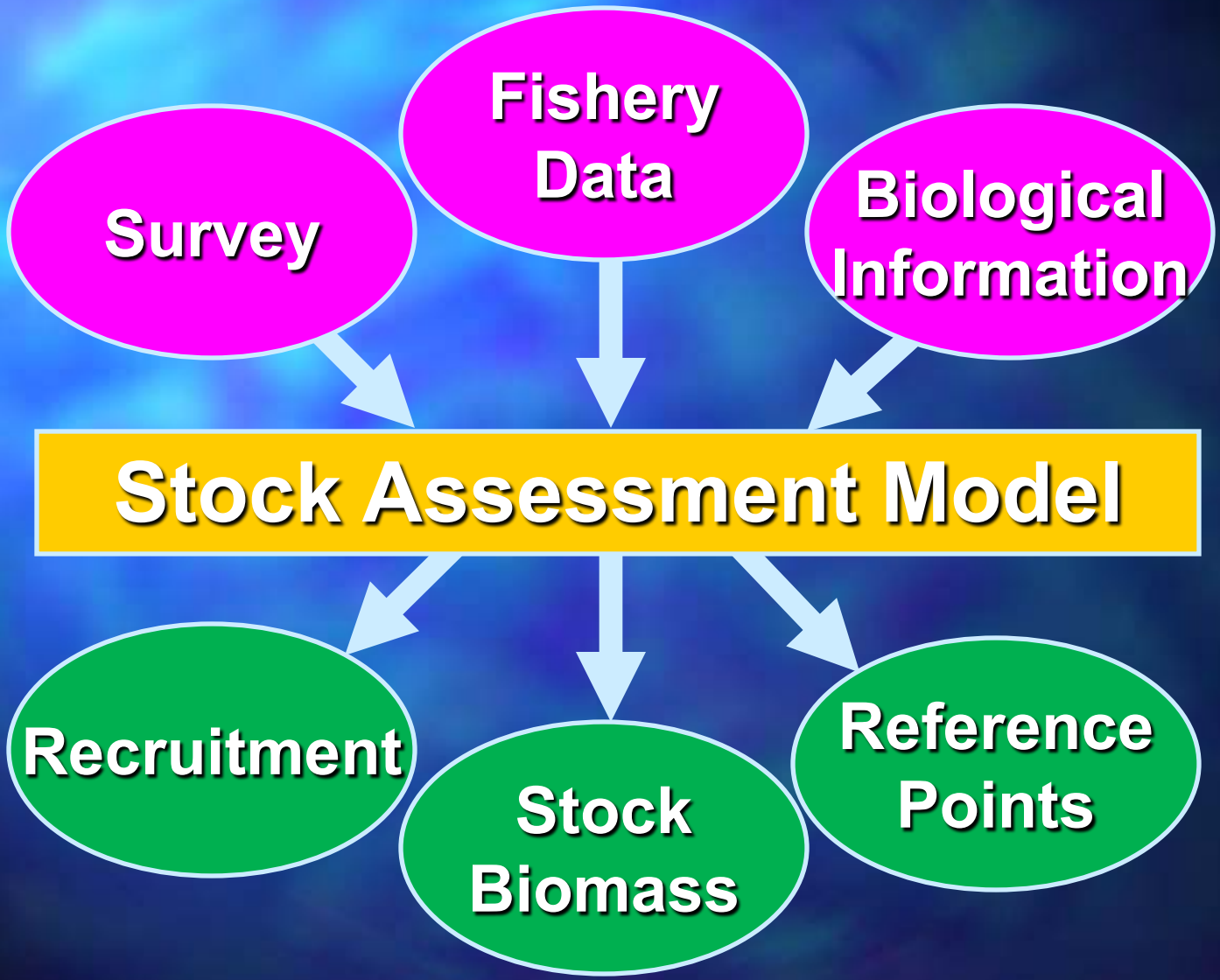
Source: National Marine Fisheries Service

Fisheries Data

- Landings data for shoreside deliveries
- Daily electronic reporting requirements for catcher processor and mothership vessels
- Comprehensive onboard observer program measures catch, bycatch, discards
- Unified database system: eLandings, at-sea observer program, Catch-in-Areas estimation
- Vessel Monitoring Systems (VMS) provide location

→ Goal to estimate total fishing mortality

Annual Stock Assessments

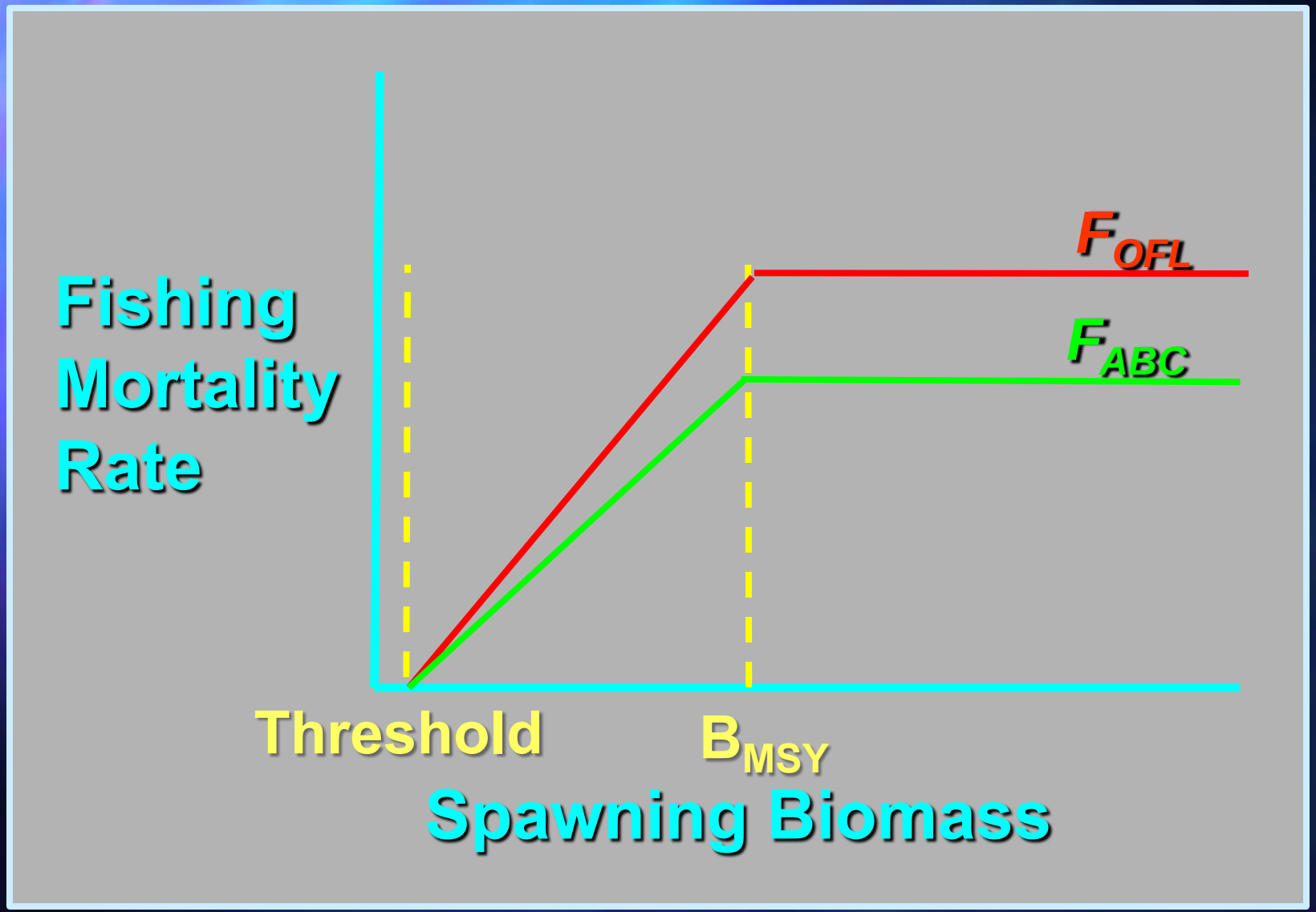


NPFMC Tier System

Used to specify overfishing level (OFL) and acceptable biological catch (ABC) from highest (Tier 1) to lowest (Tier 6) levels of information:

1 – Biomass, B_{MSY}, probability density function of F_{MSY}
2 – Biomass, B_{MSY}, F_{MSY}, $F_{35\%}$, and $F_{40\%}$
3 – Biomass, $B_{40\%}$, $F_{35\%}$, and $F_{40\%}$
4 – Biomass, $F_{35\%}$, and $F_{40\%}$
5 – Biomass and M
6 – Catch history

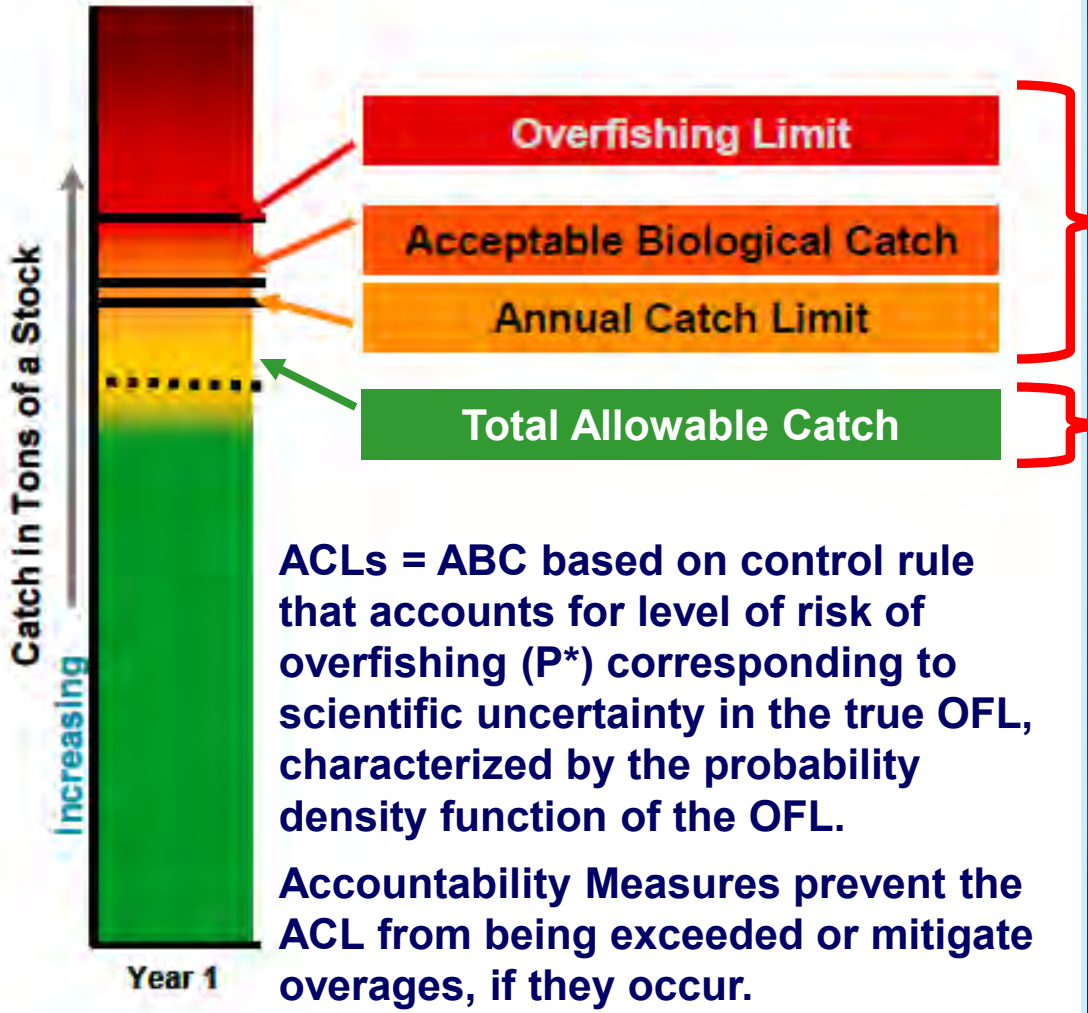
Harvest Strategy for Highest Tiers



Precautionary Approach

- F_{MSY} defines rate overfishing
- Buffer between overfishing and acceptable biological catch
- Tiers intended to be more precautionary with less information. Example:
  - Tier 6 – Catch history over 1978-1995
    - OFL = average catch
    - ABC = 0.75 x OFL
- ABCs and OFLs set by Scientific and Statistical Committee

Annual Stock Assessments



SSC sets OFLs and ABCs

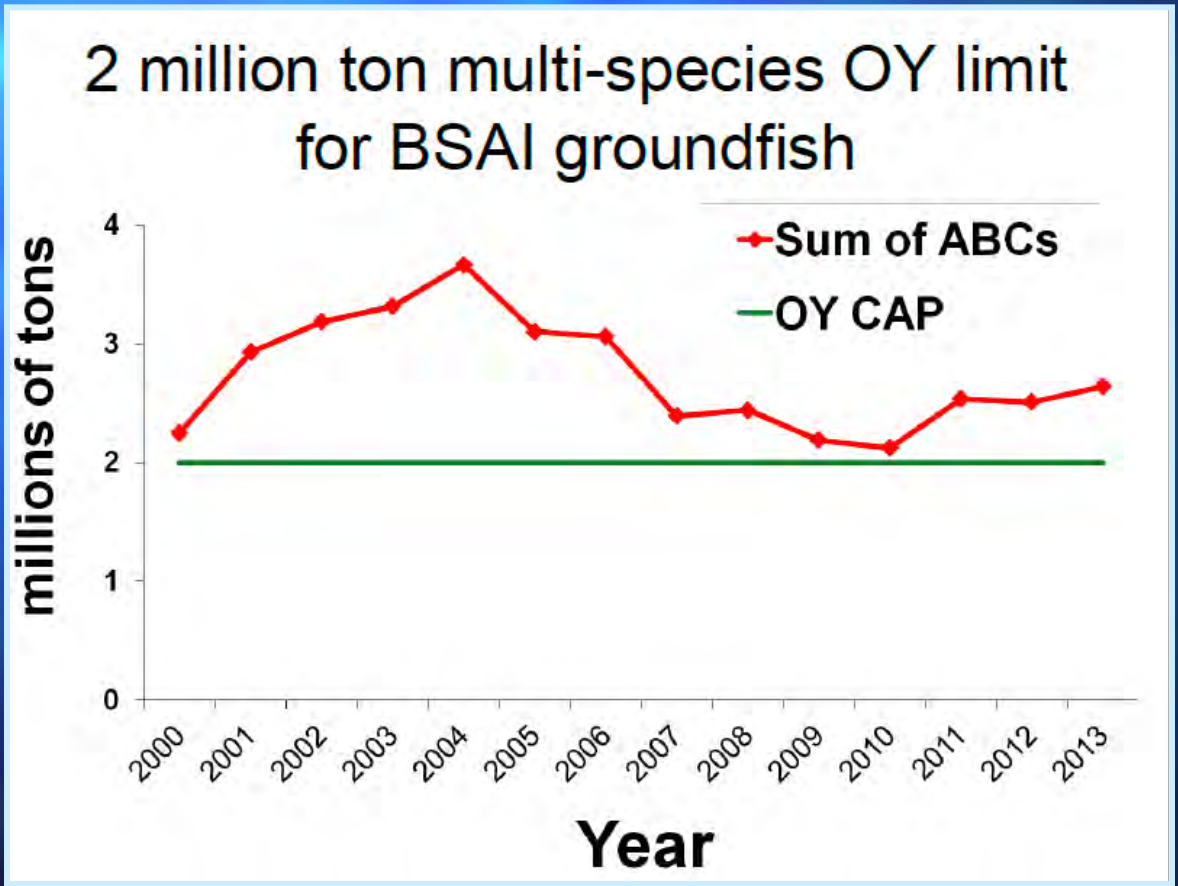
Council sets TACs ≤ ABCs

ACLs = ABC based on control rule that accounts for level of risk of overfishing (P*) corresponding to scientific uncertainty in the true OFL, characterized by the probability density function of the OFL.

Accountability Measures prevent the ACL from being exceeded or mitigate overages, if they occur.

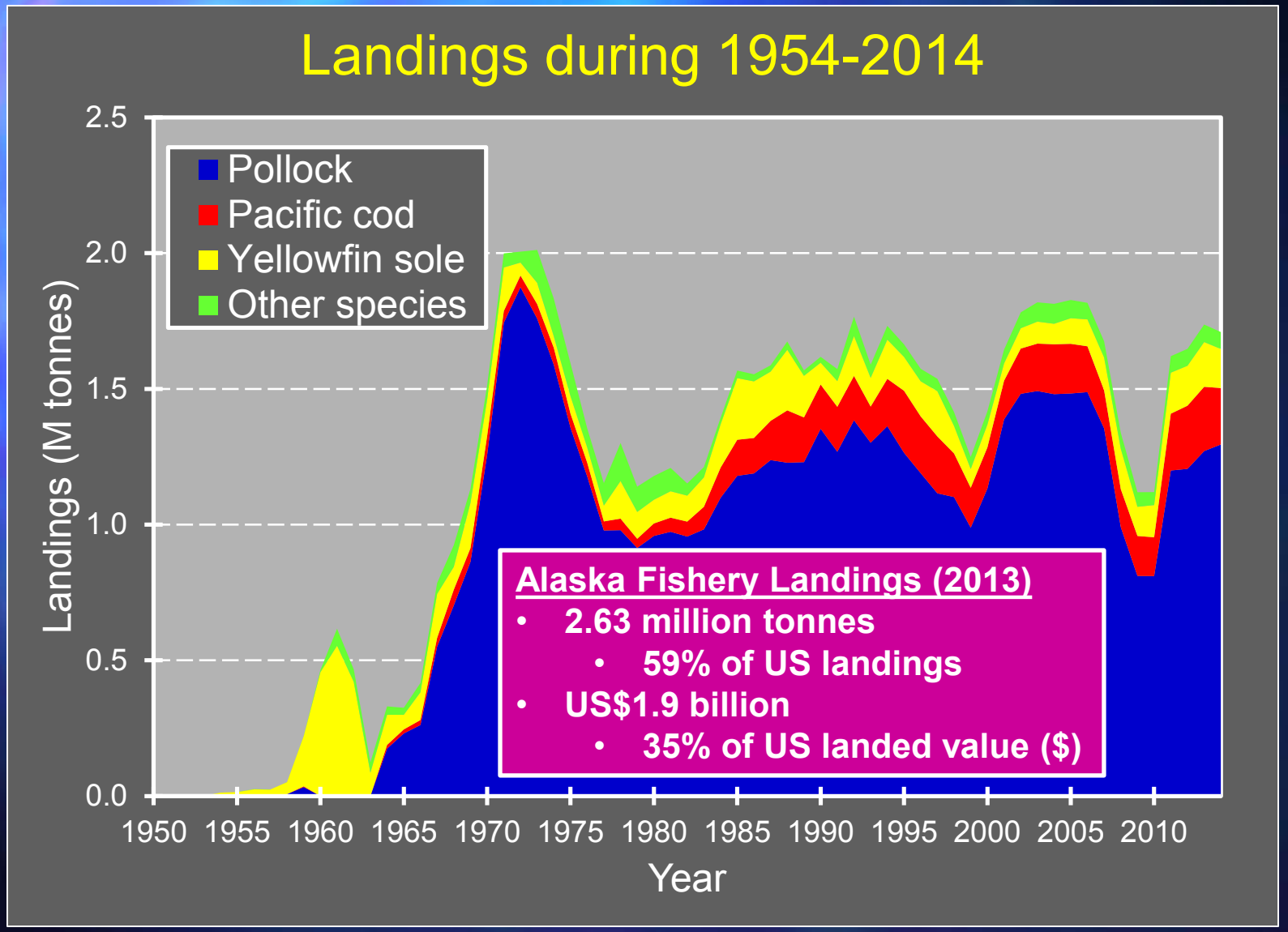
Additional Precaution in TACs

- Ecosystem-level Optimum Yield:
  - ∑TACs ≤ 2.0 million t



Source: Dana Hanselman, NMFS

Groundfish Fisheries in the Bering Sea



Groundfish Fisheries in the Bering Sea

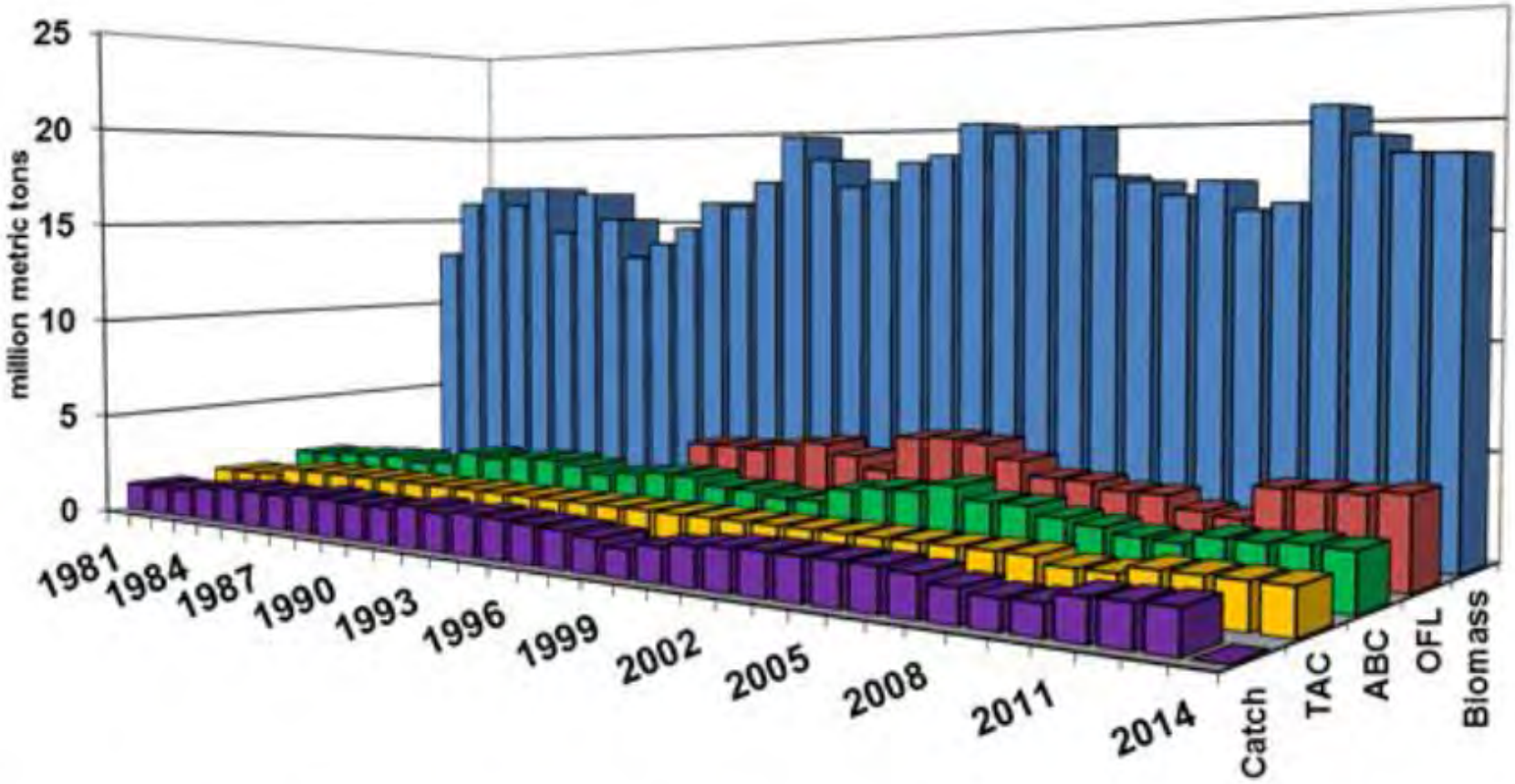
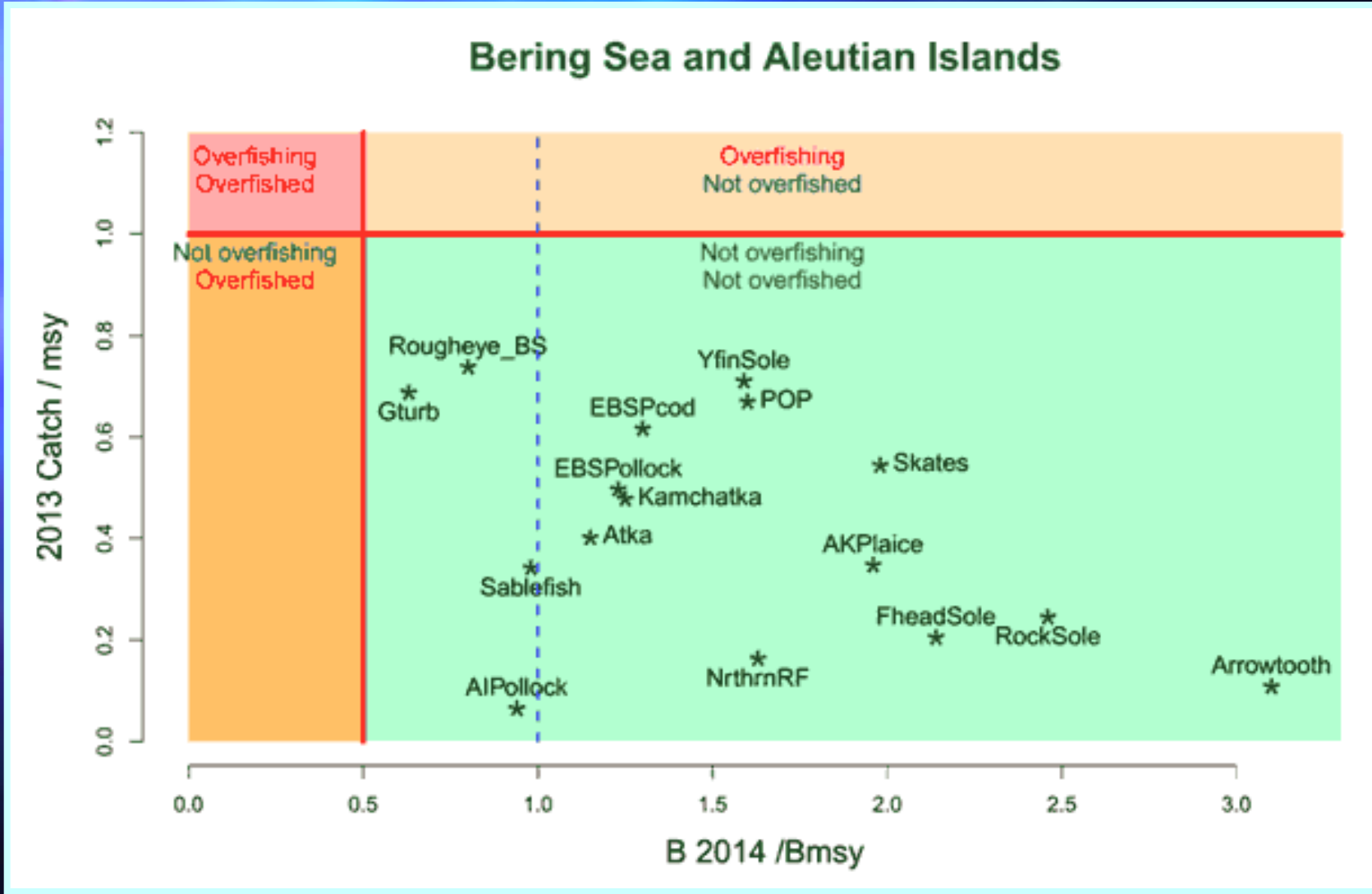


Figure 2. Biomass, Overfishing Level, Acceptable Biological Catch, and Total Allowable Catch for 1981-2014* and Catch, 1981-2013.

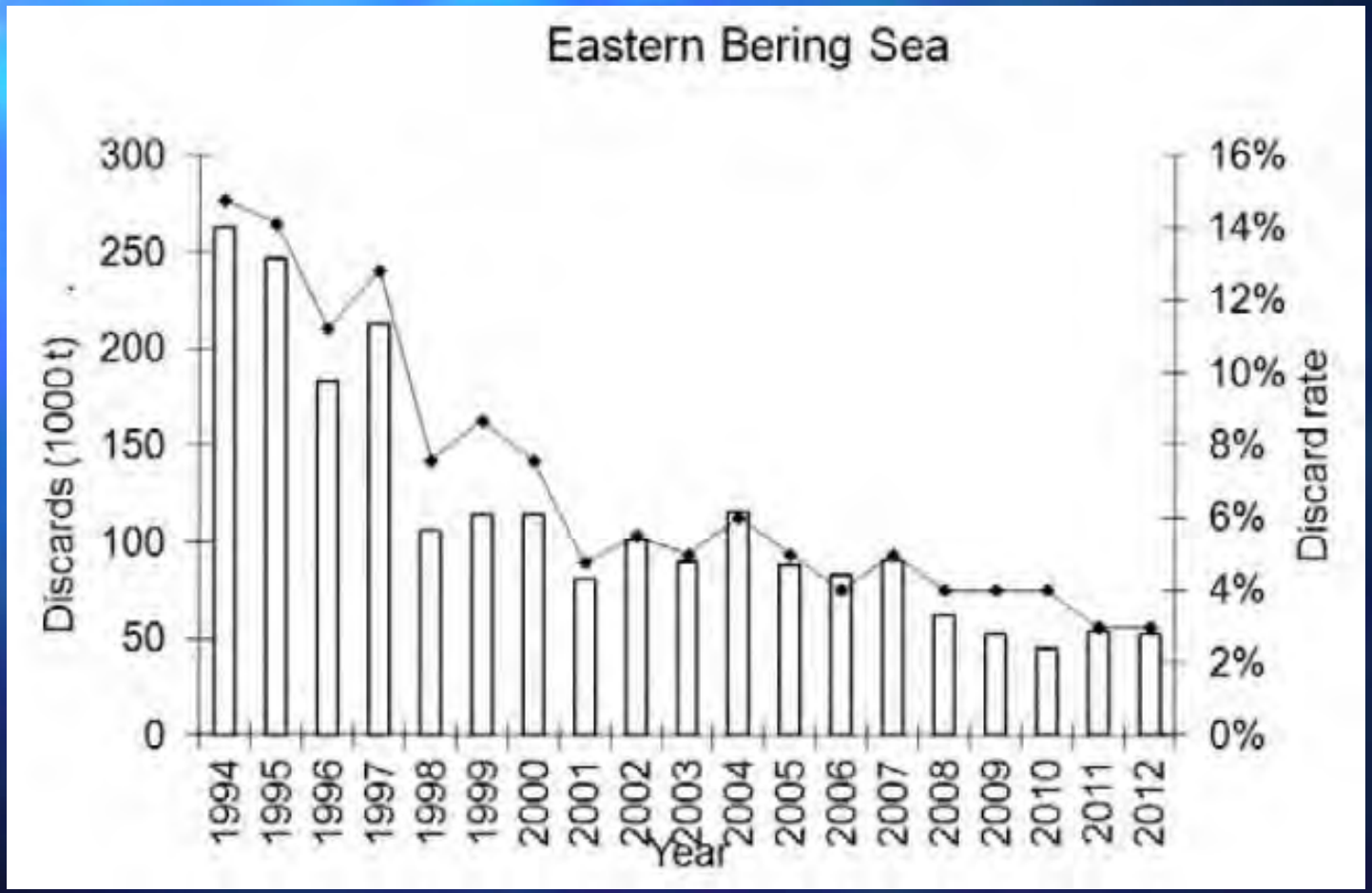
Source: NPFMC (2014)

Groundfish Fisheries in the Bering Sea



Retention & Utilization Requirements

- Groundfish fisheries are required to retain and utilize all pollock and cod



Source: NPFMC (2014)

Species Categories: Ecosystem Species

Ecosystem component species – non-target, not subject to overfishing or overfished, and generally not retained for sale or personal use

Forage Fish – directed fishing for forage fish is banned

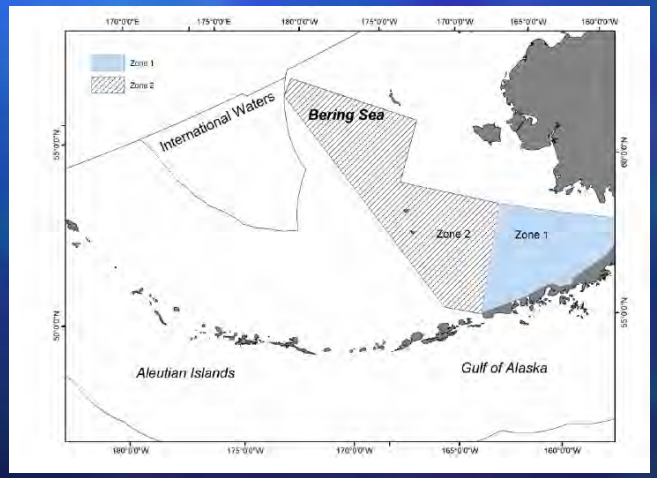
- Euphausiacea (krill)
- Osmeridae (smelt-like fish)
- Ammodytidae (sand lance)
- Myctophidae (lanternfishes)
- Others…

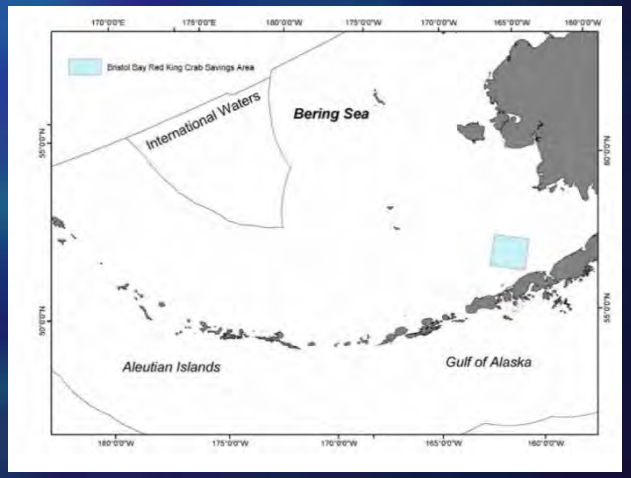
Species Categories: Ecosystem Species

Prohibited Species – must be returned to the sea

- Pacific halibut
- Pacific herring
- Pacific salmon
- Steelhead trout
- King crab
- Tanner/snow crab

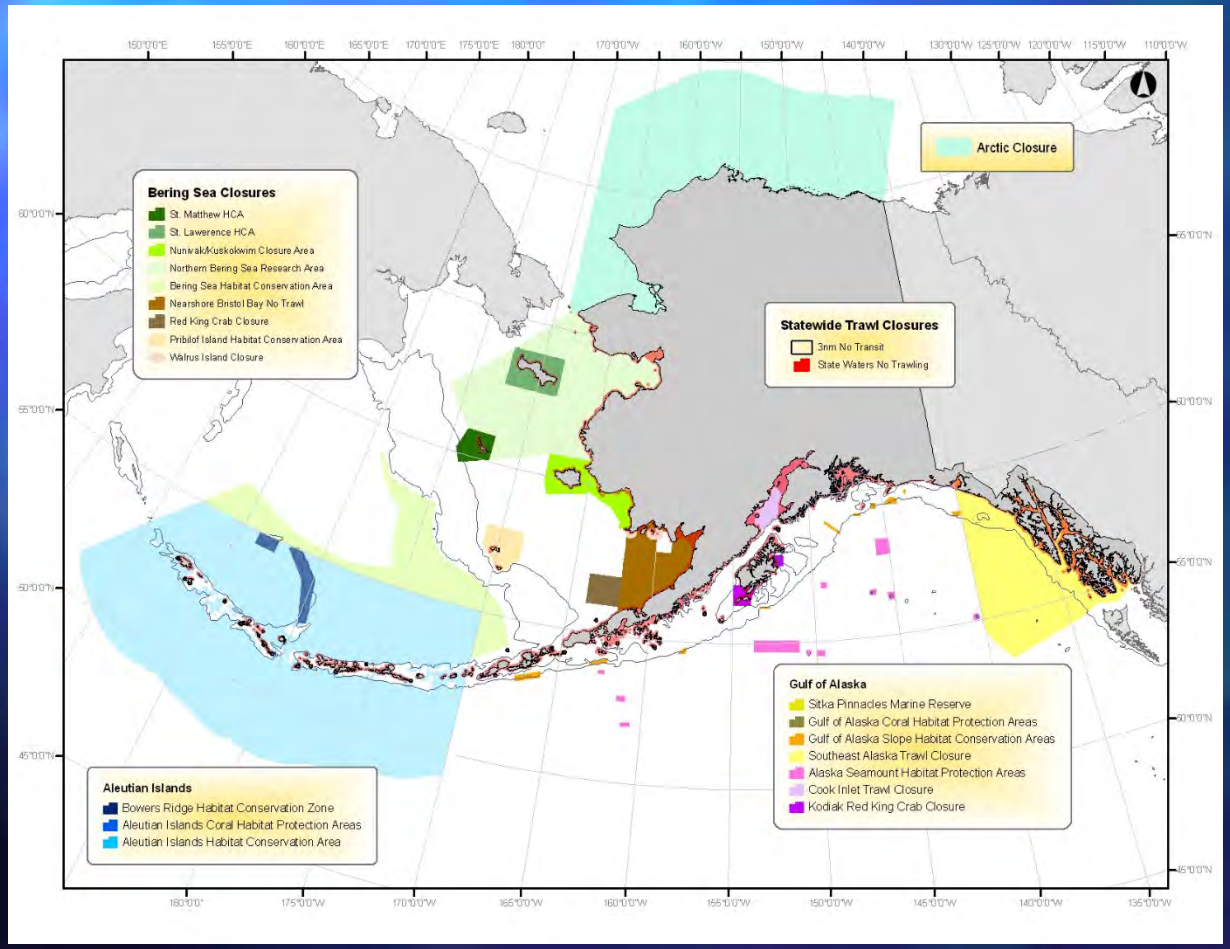
- Halibut, herring, salmon and crab managed with prohibited species catch (PSC) limits
- PSC limits may trigger area closures
- Other areas permanently closed to protect PSC species





Habitat Protection Measures

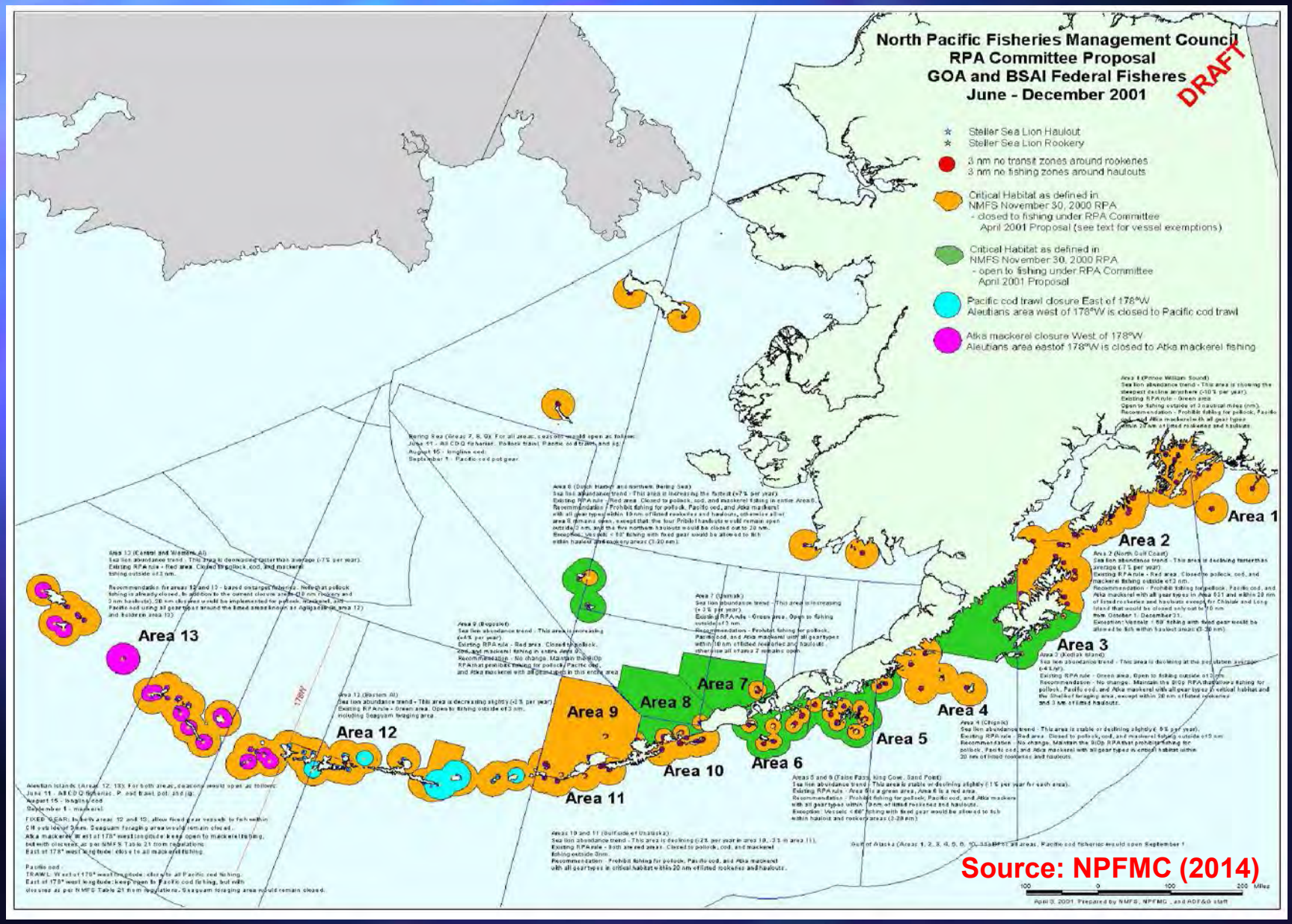
- Pollock fishery restricted to pelagic trawls
- Use of modified flatfish trawl gear
- Areas closured to protect bottom habitats



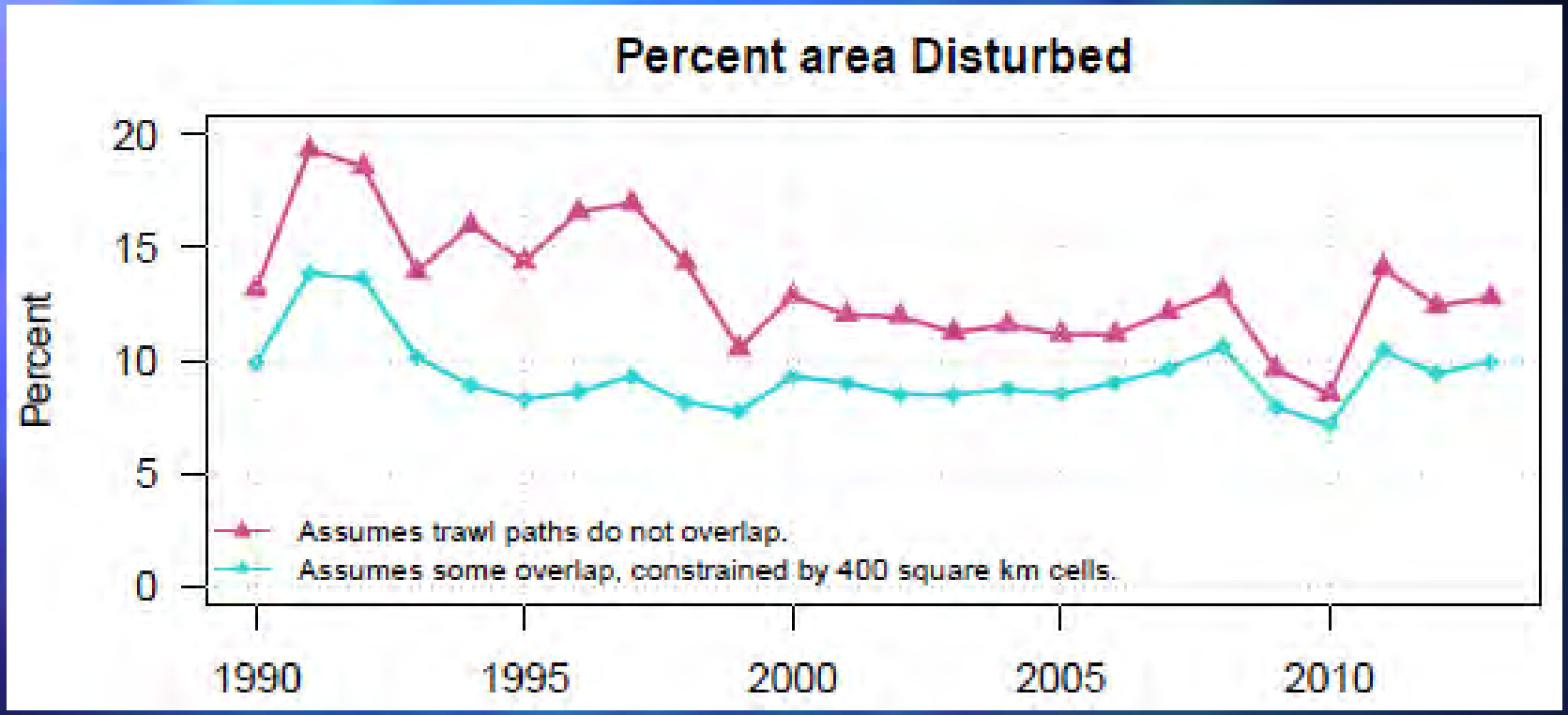
Map does not include areas closed to protect sea lions or PSC species

Source: NPFMC

Closure Areas to Protect Steller Sea Lions

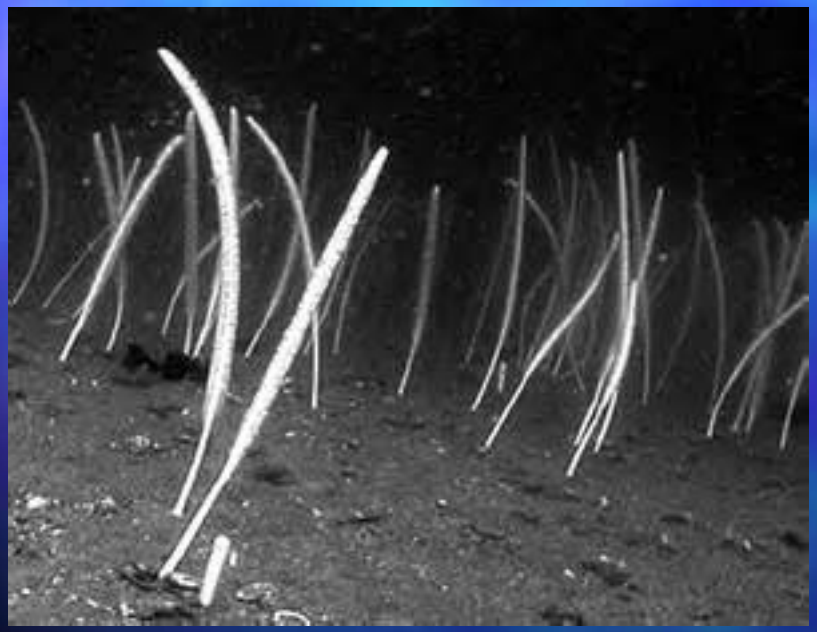


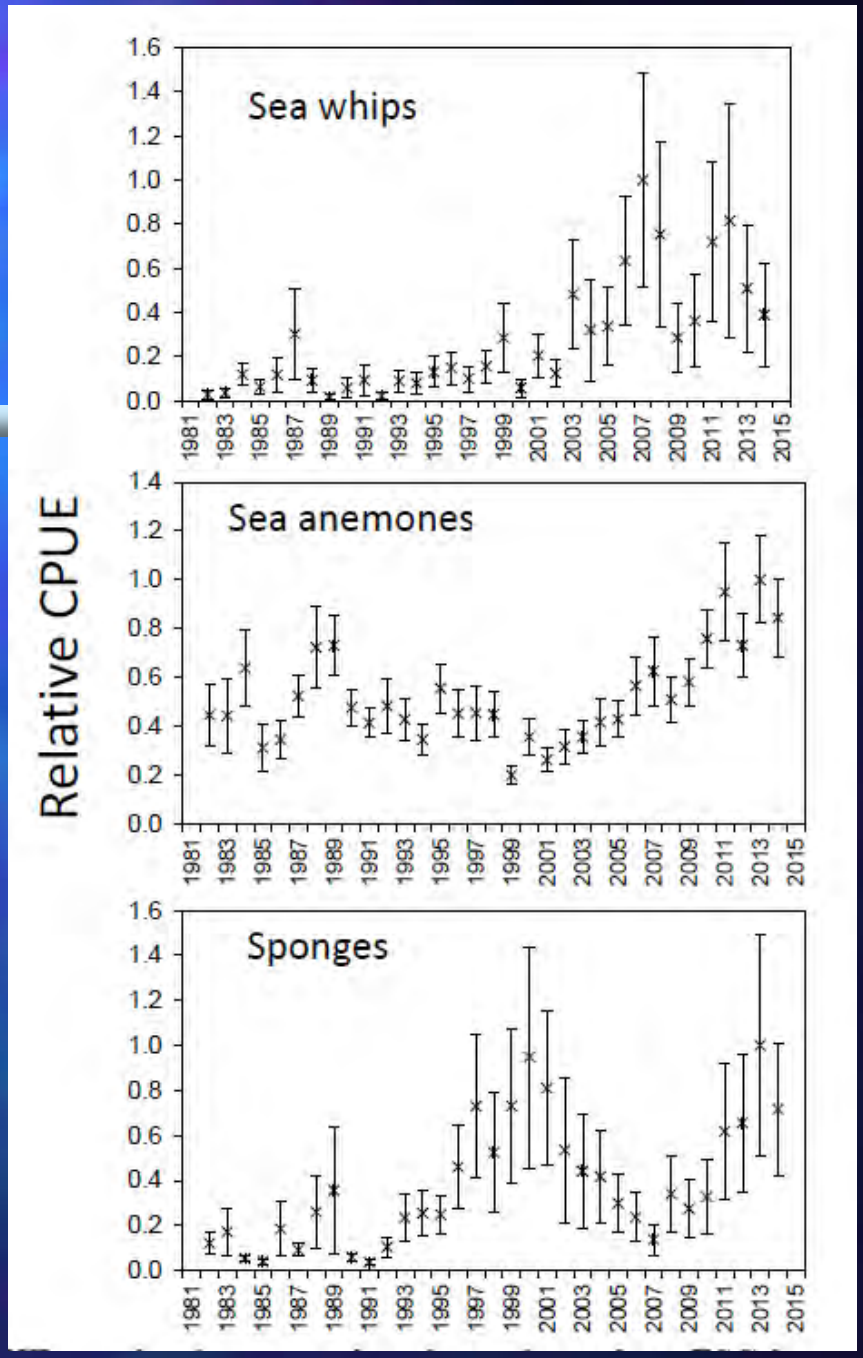
Estimates of Habitat Disturbance



Source: NPFMC (2014)

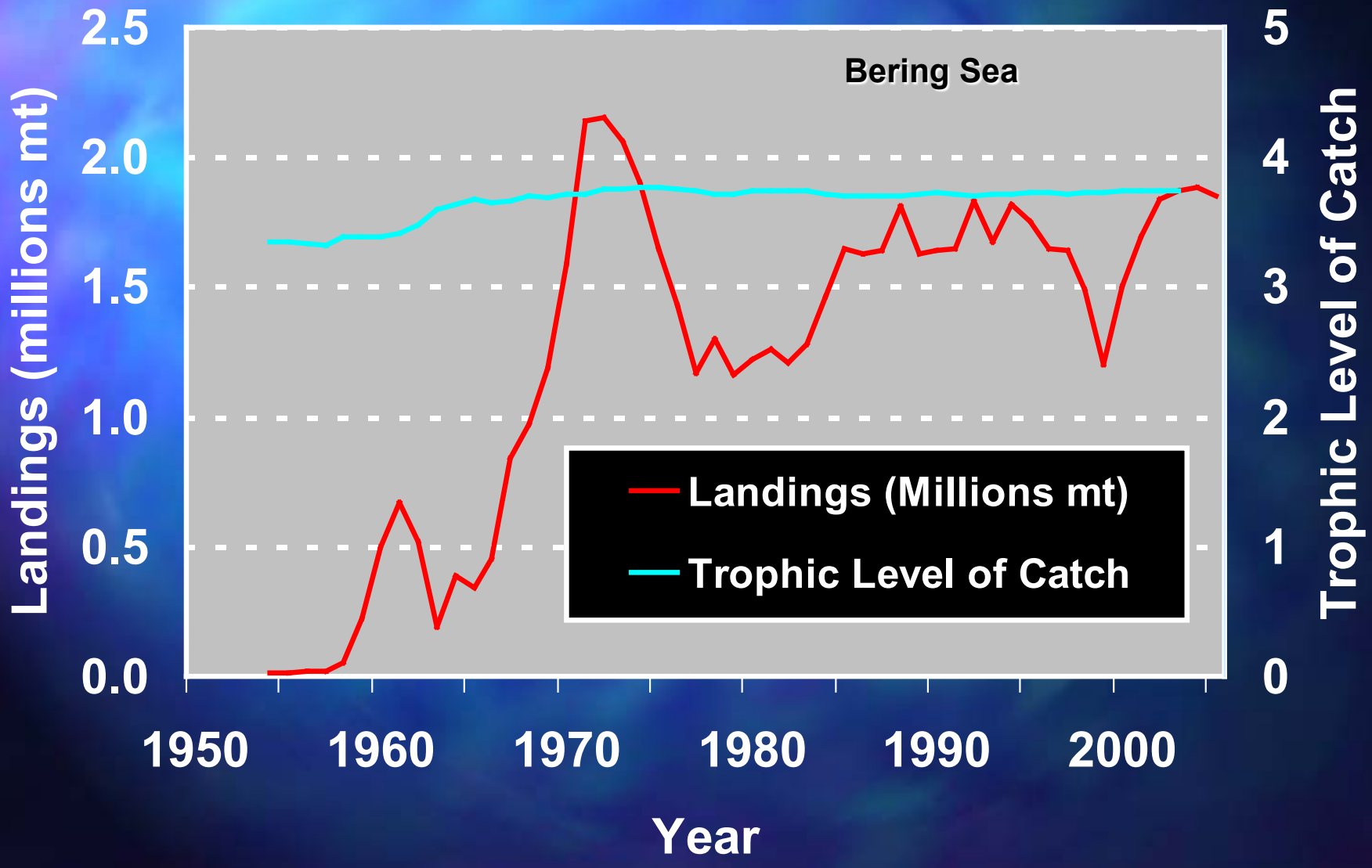
Trends in Structure-forming Invertebrates



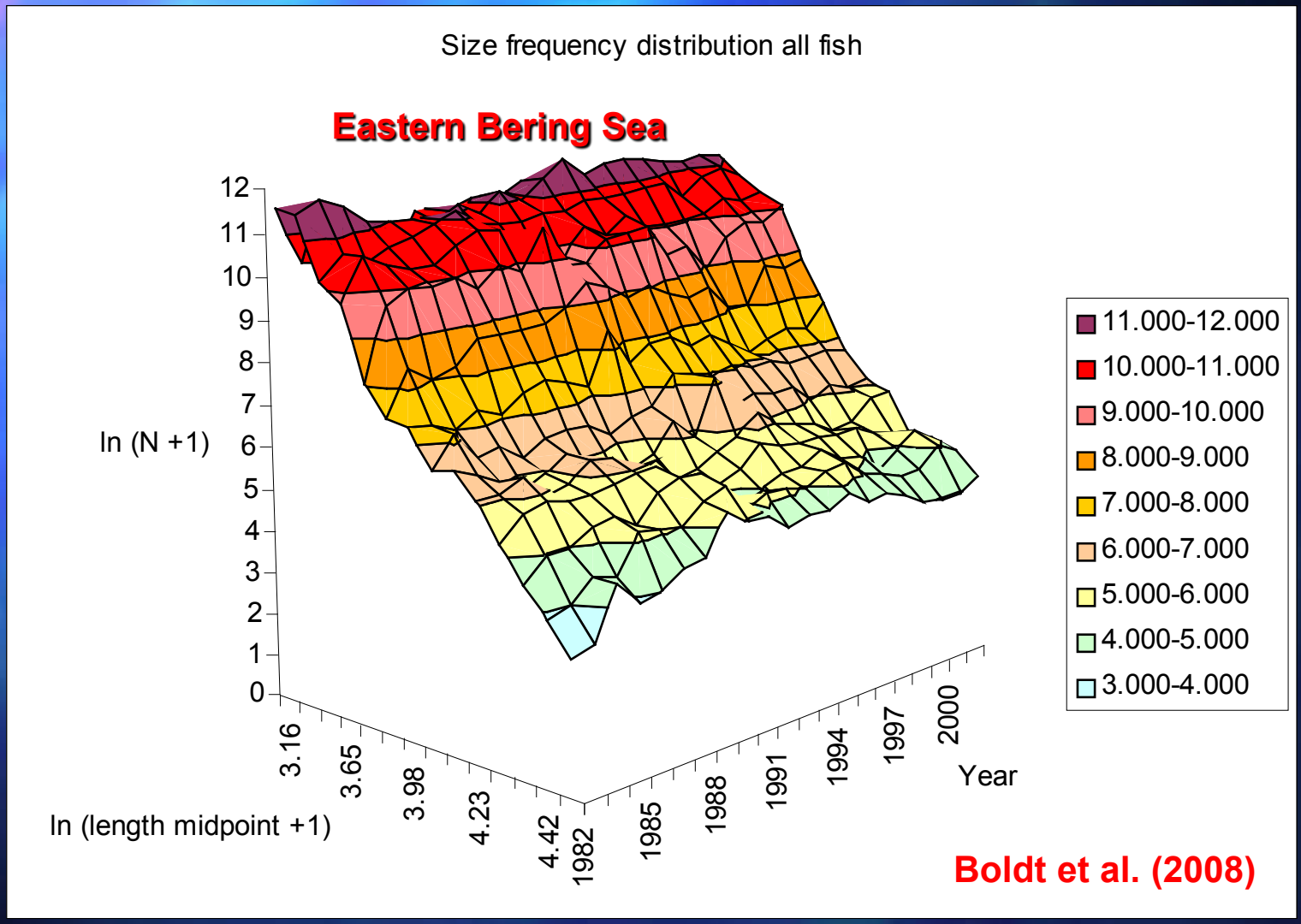


Source: NPFMC (2014)

Landings and Trophic Level of Catch



Other Indicators: Community Size Spectrum



Demersal fish community size spectrum (20-90 cm) from 1979-2002

Summary and Conclusions

- Despite species- and size-selective harvests, the following features are consistent with sustainable harvest policy:
  - Catches ≤ TAC ≤ ABC ≤ OFL
  - No overfishing nor overfished stocks
  - Protections to ecosystem components
  - Declines in fishery discards
  - Reductions in area disturbed by fishing
  - Increases in structure-forming benthic invertebrates
  - Stable trophic level of catch and community size structure

Summary and Conclusions

- Potential adverse effects of selective fishing on ecosystem structure and function may be mitigated by:
  - Conservative harvest rates
  - PSC limits promote behavior to fish in areas where fish community approximates desired mix of target species
  - No-take areas promote communities approaching unfished status
- Other considerations:
  - License limitations, IFQ programs, and fishery cooperatives eliminate race to fish and promote reduced bycatch


Questions?