Abundance-based Bycatch Management

Based on work by Steve Martell, Catarina Wor, and Ian Stewart

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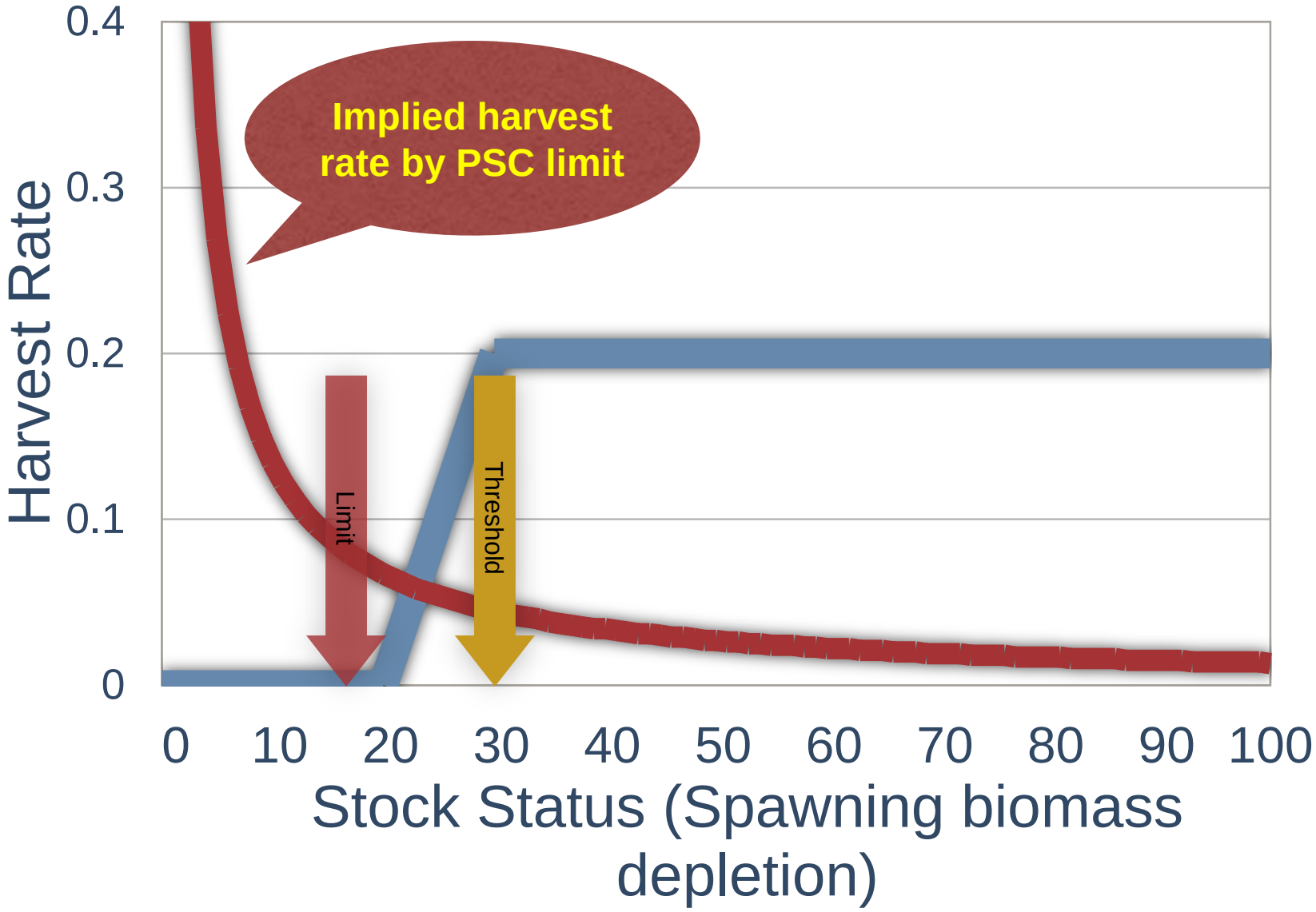
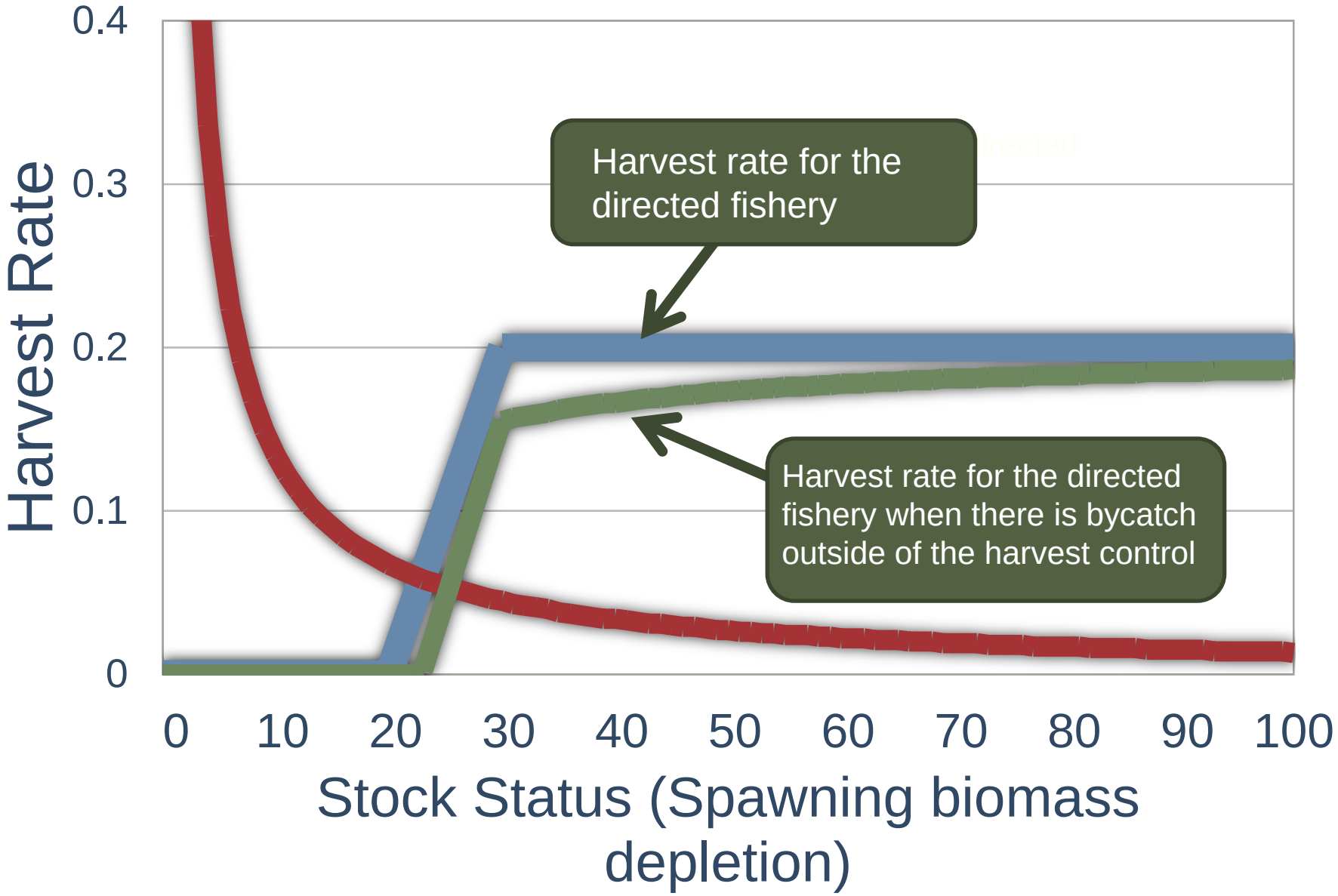
Halibut Bycatch Management

- Outline of current harvest controls for halibut removals
- Options for different harvest control rules
- Abundance-based management of bycatch
- Some basic requirements
- Measuring the impact of removals on the stock – the fishery footprint
- Managing by fishery intensity

Current Control of Halibut Removals

- Directed halibut fisheries are managed by harvest control rules that take account of halibut stock status
- These control rules act to limit removals at low stock status
- Halibut is a Prohibited Species in Alaskan trawl fisheries
- Halibut bycatch in these fisheries is controlled via a fixed cap on the Prohibited Species Catch (PSC) that does not respond to halibut stock status
- Current IPHC harvest policy must account for bycatch mortality


Implied harvest rate by PSC limit
Harvest Rate
0.4
0.3
0.2
0.1
0
Limit
Threshold
0
10
20
30
40
50
60
70
80
90
100
Stock Status (Spawning biomass depletion)

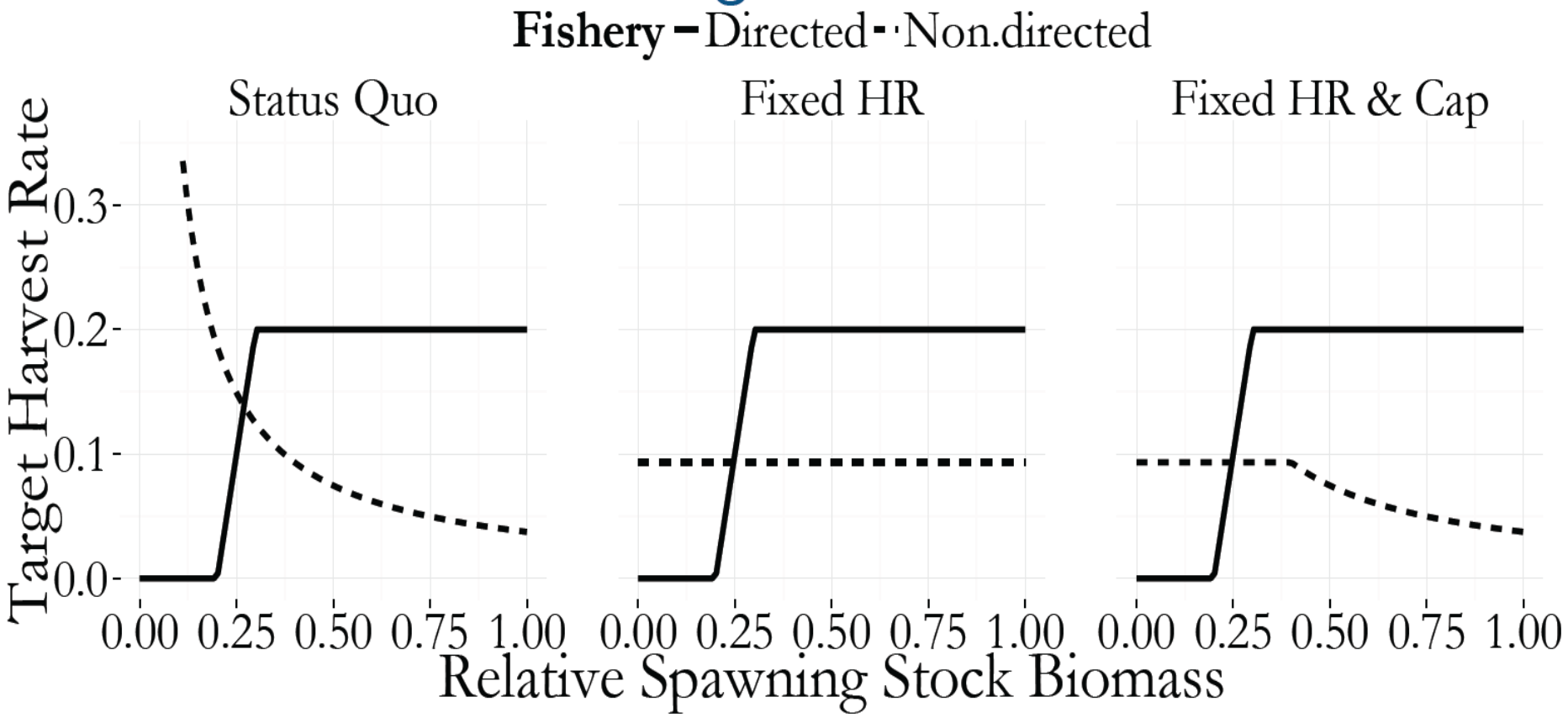

Harvest Rate
0.4
0.3
0.2
0.1
0
Harvest rate for the directed fishery
Harvest rate for the directed fishery when there is bycatch outside of the harvest control
0
10
20
30
40
50
60
70
80
90
100
Stock Status (Spawning biomass depletion)

Potential Harvest Control Rules for Bycatch and Directed Fisheries

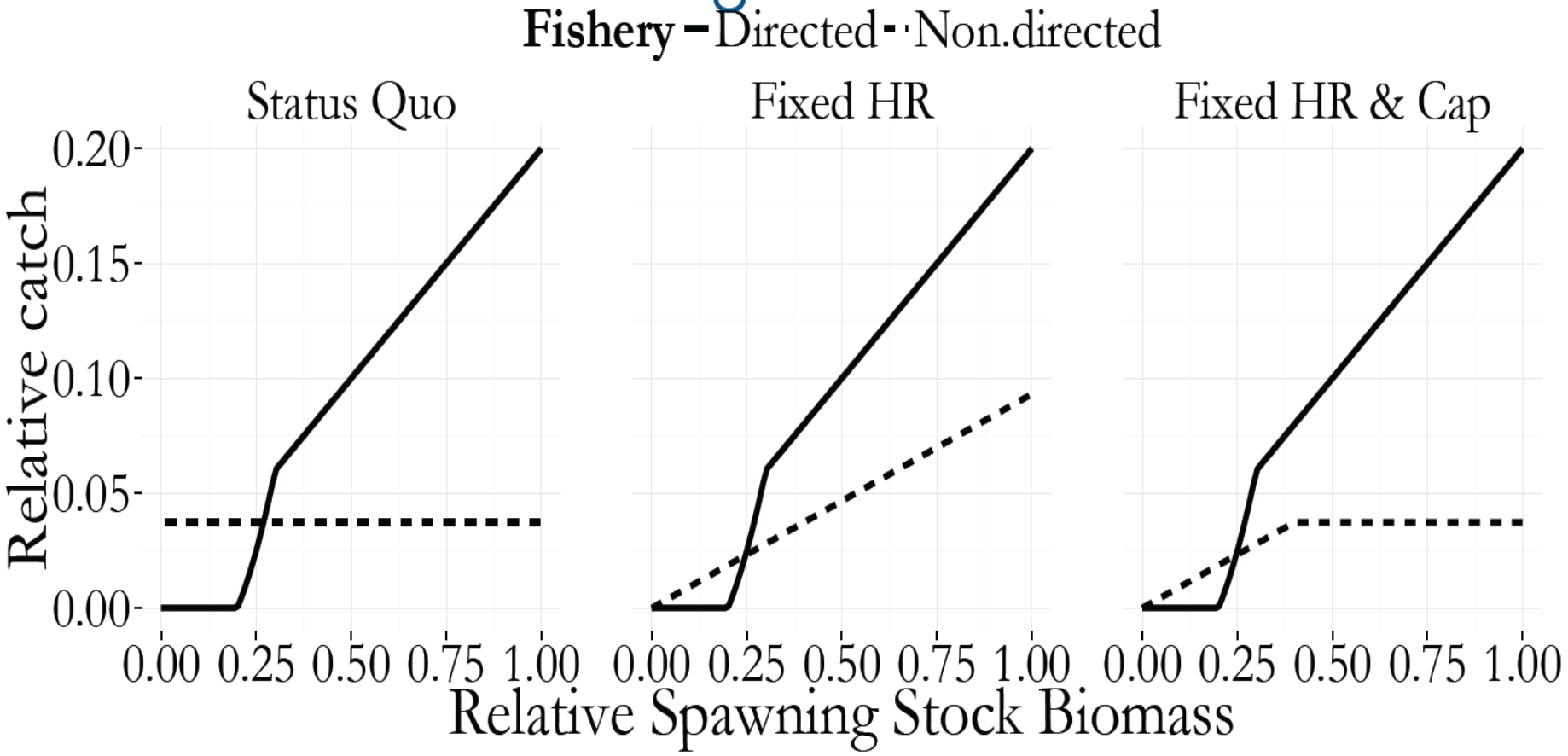
- NPFMC and IPHC independently adopt their own Harvest Control Rule

- NPFMC and IPHC coordinate conservation efforts & tradeoffs.

HCRs for setting annual PSC limits



HCRs for setting annual PSC limits



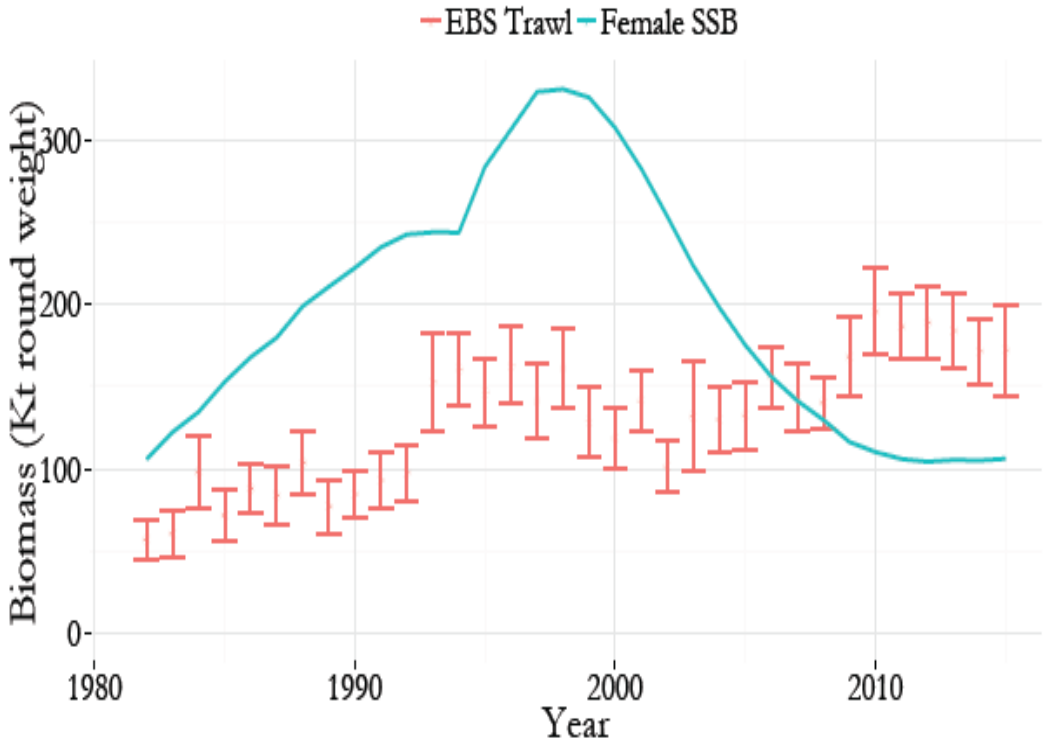
Prerequisites for abundance-based bycatch management not currently in place

- **The use of a harvest policy metric that includes all sources of mortality (e.g., SPR) [IPHC]**
- **A regulatory environment that allows bycatch levels to shift with abundance [Councils/DFO]**
- **An index of halibut abundance for bycatch removals that is linked to halibut stock status [IPHC]**
- **A metric of impact for bycatch removals (e.g., reproductive value of removals) – the footprint of the fishery [IPHC]**
- **Adequate sampling to characterize the footprint of each fishery [NPFMC/PFMC/DFO/IPHC]**
- **An agreement on the starting point for the footprint of each fishery [Canada/U.S.]**
- **An agreement on the sharing of total mortality among fisheries [Canada/U.S.]**

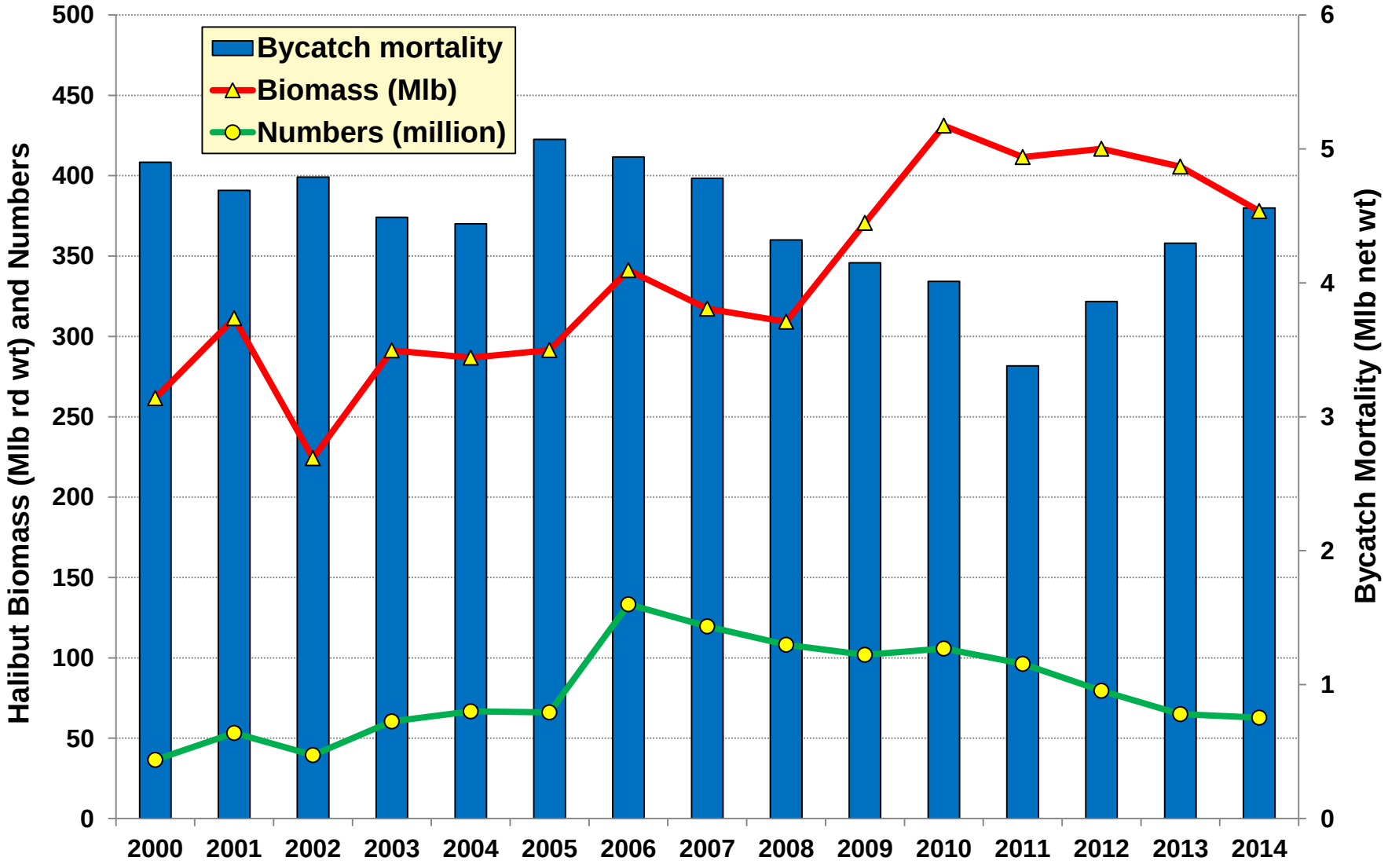
What can we use as an abundance index for setting bycatch limits?

- Direct observations from fishery-independent surveys?
- Model-based estimates of abundance?
- Model-based estimates of abundance with auxiliary fishery-dependent information?
- Combinations?
- Are they linked to halibut stock status?

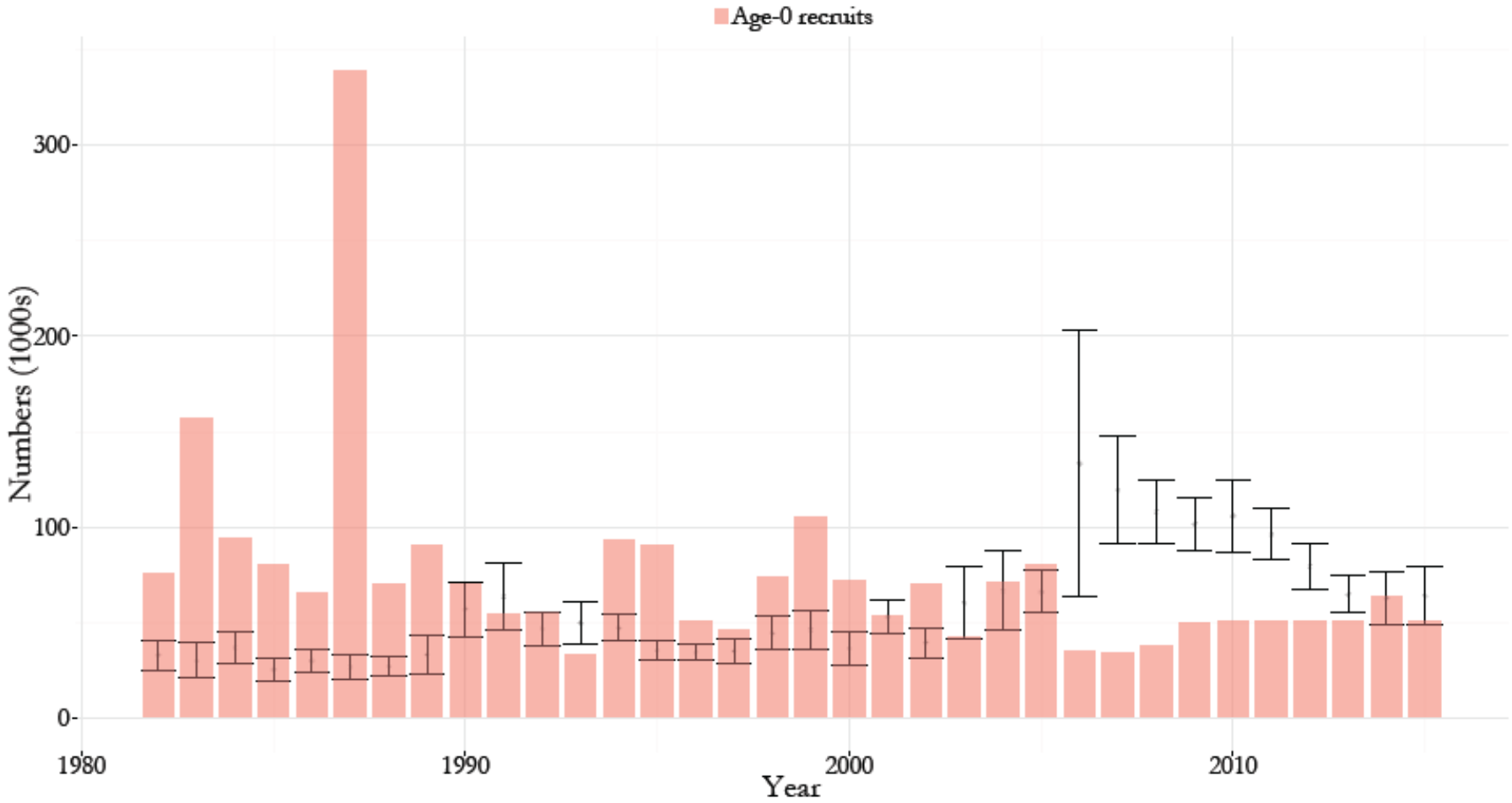
EBS-trawl Area Swept Estimates



NMFS Survey Halibut Abundance and Bycatch Mortality (Area 4CDE)



NMFS Eastern Bering Sea Survey vs. Estimated Age 0 Recruits from IPHC assessment



Fisheries Footprint

A measure of: fisheries impact on the reproductive value of a stock.

Fisheries footprint

- Proportion of the total fishing intensity (as measured by *SPR*) contributed by each fishery
- Now we can compare among *any* fisheries in terms of their impact on the reproductive value of the stock.
  - Works for bycatch of small/young fish.
  - Works for the directed fishery.
  - Works for comparing the directed fishery among regulatory areas.

Allocations based on yield vs. fishing intensity (reproductive value or spawning capital)

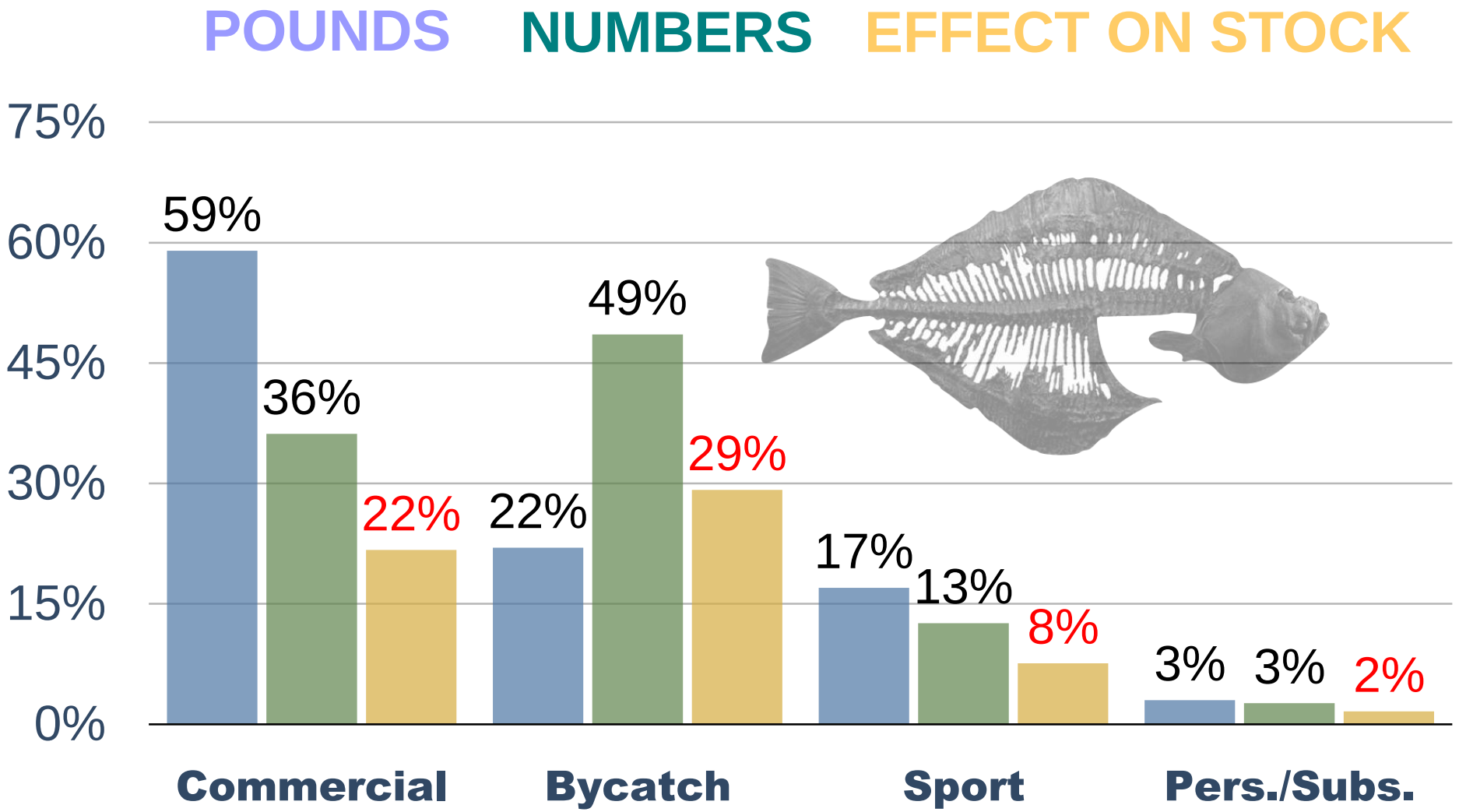
- Yield-based allocations: share a fixed proportion of the total catch

- Fishing intensity-based allocation: share a fixed proportion of the Spawning Potential Ratio

Size of fish matters to the footprint

Sector	# of Halibut per mt
Commercial	125
Bycatch	465
Sport	158
Personal	205

2014 Fisheries



Footprint responds to:

Things we can't control

Growth
Maturity
Natural mortality
Migration/movement
Size-at-age
…

Things we can control

Selectivity
Sex-ratio in the catch
Discard Mortality Rates
Sector contributions
The target SPR
(overall fishing intensity)
…

Some of The Actions Ahead

- Development of SPR targets for stock management
- Detailed illustration of fishery footprints for each sector's removals
- Understand and accommodate the impacts of migration
- Actions by each sector to minimize its footprint
- Discussion by parties to achieve sharing agreement on fishery impacts by each sector
- Control rules for each sector to achieve sharing agreement
- …and more!