Update on groundfish stock trends for the Gulf of Alaska

Gulf of Alaska Groundfish Plan Team

GOA Plan Team Members

James Ianelli (co-chair)	AFSC
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Bill Bechtol	ADFG
Tory O'Connell	ADFG
Mike Ruccio	ADFG
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Bill Clark	IPHC
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Jeff Fujioka	AFSC
Sarah Gaichas	AFSC
Jon Heifetz	AFSC
Tom Pearson	AKR
Beth Sinclair	NMML

Main events in the GOA

- **16 assessments of species groups**

- **NMFS 2003 Summer bottom trawl survey**
  - Gulf-wide this year (2001 excluded the EGOA
  - Depths to 700m
  - Results show most estimates higher than 2001
- **Skate fishery development**
  - Assessment included

ABC Summary

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Pollock	49,304	54,350	71,260	up 16,910	(31%)
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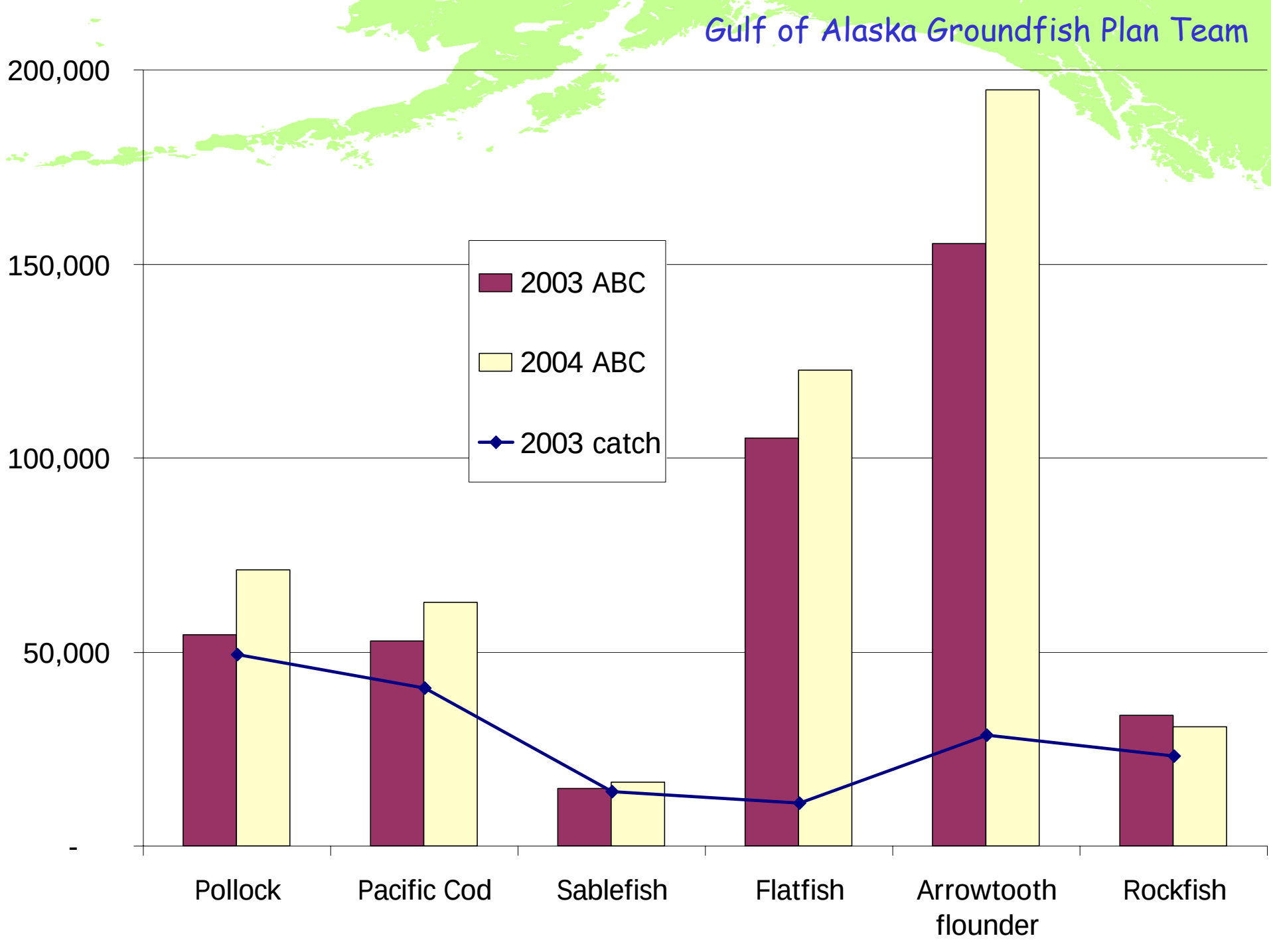
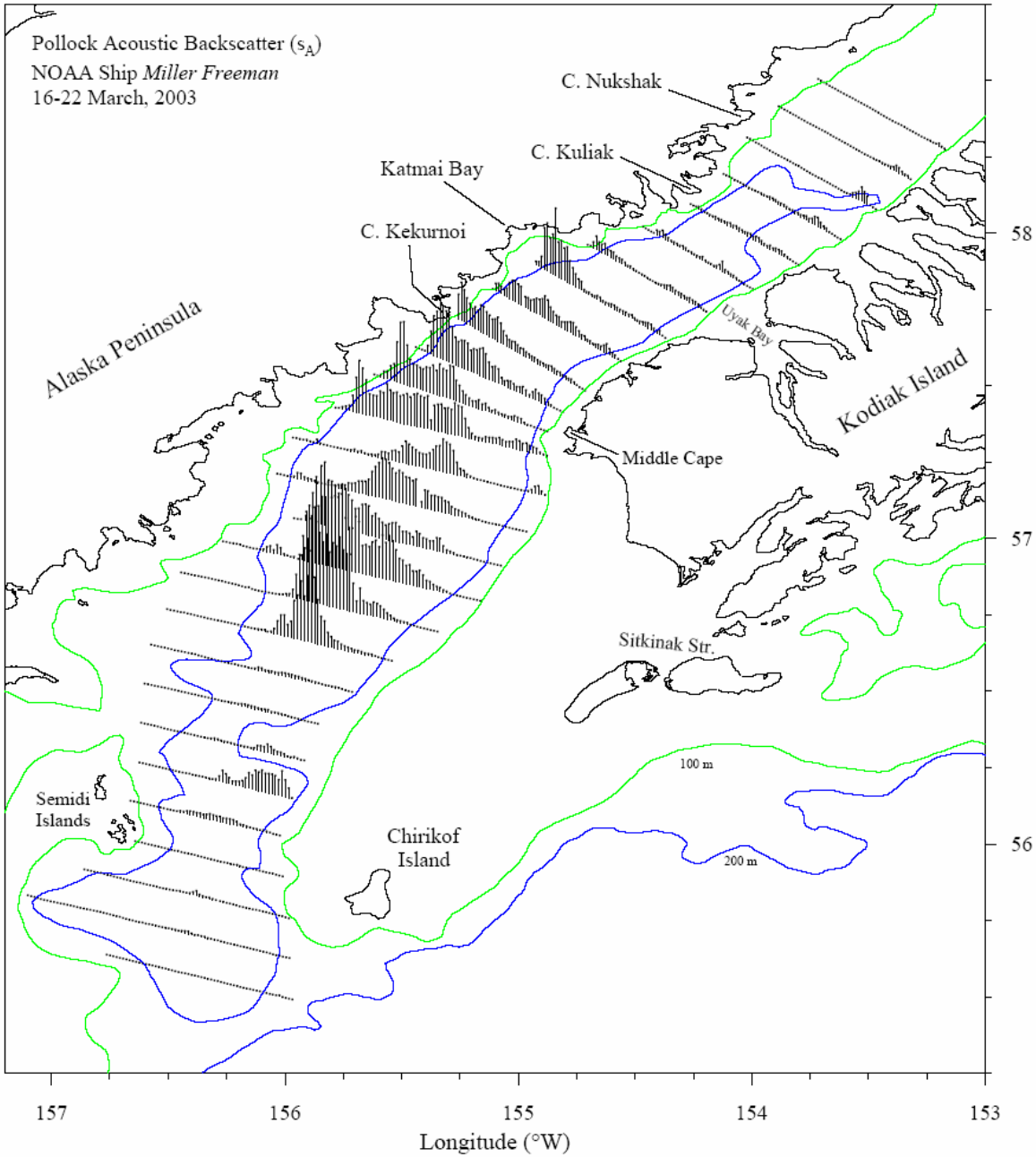
Rockfish	23,129	33,740	30,730	down 3,010	(9%)
Total	166,816	416,000	498,790	up 82,790	(20%)


Gulf of Alaska Groundfish Plan Team
200,000
150,000
100,000
50,000
-
2003 ABC
2004 ABC
2003 catch
Pollock
Pacific Cod
Sablefish
Flatfish
Arrowtooth flounder
Rockfish

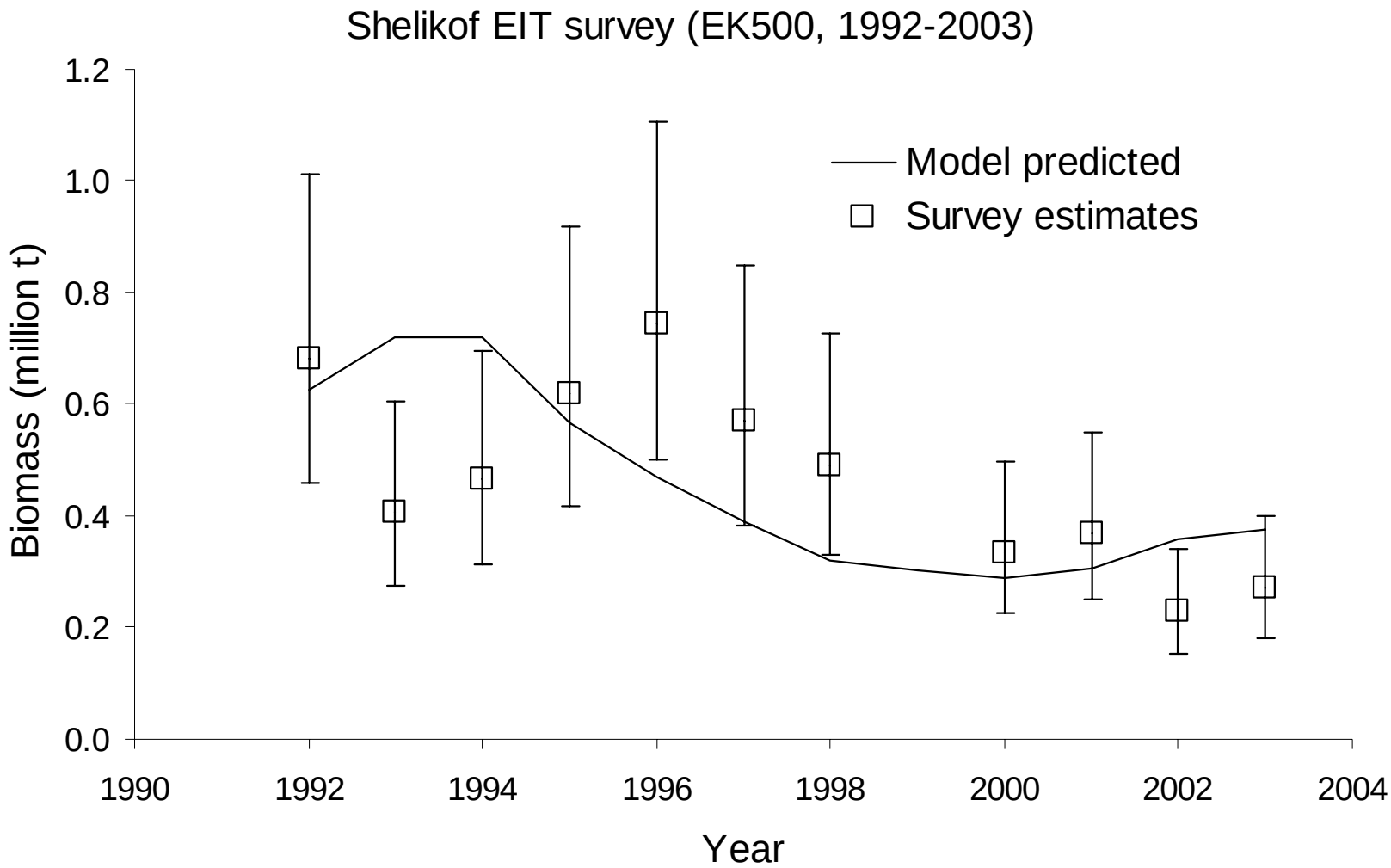
GOA Pollock studies

- **CIE Review**
- **Model averaging analysis**
  - Conclusion that the CHS ($F_{35\%} \sim F_{msy}$) reasonable
  - Environmental conditions important
- **Juvenile mortality analysis**
  - Attempts to account for predation on younger pollock
- **Acoustic surveys in 2003:**
  - Winter (Appendix D)
  - **New!** Summer acoustic
    - Not used in assessment (feasibility)

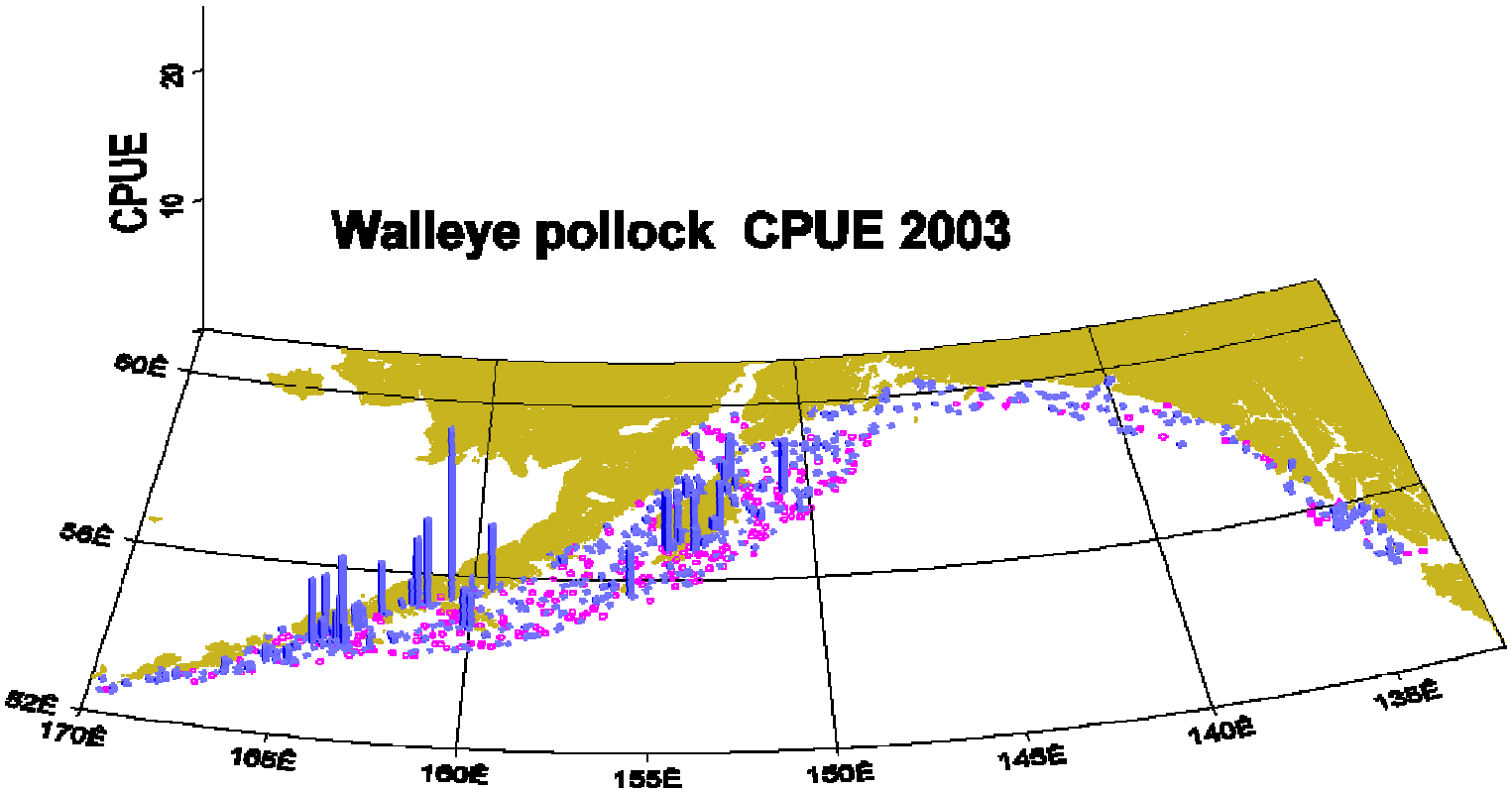
Winter acoustics



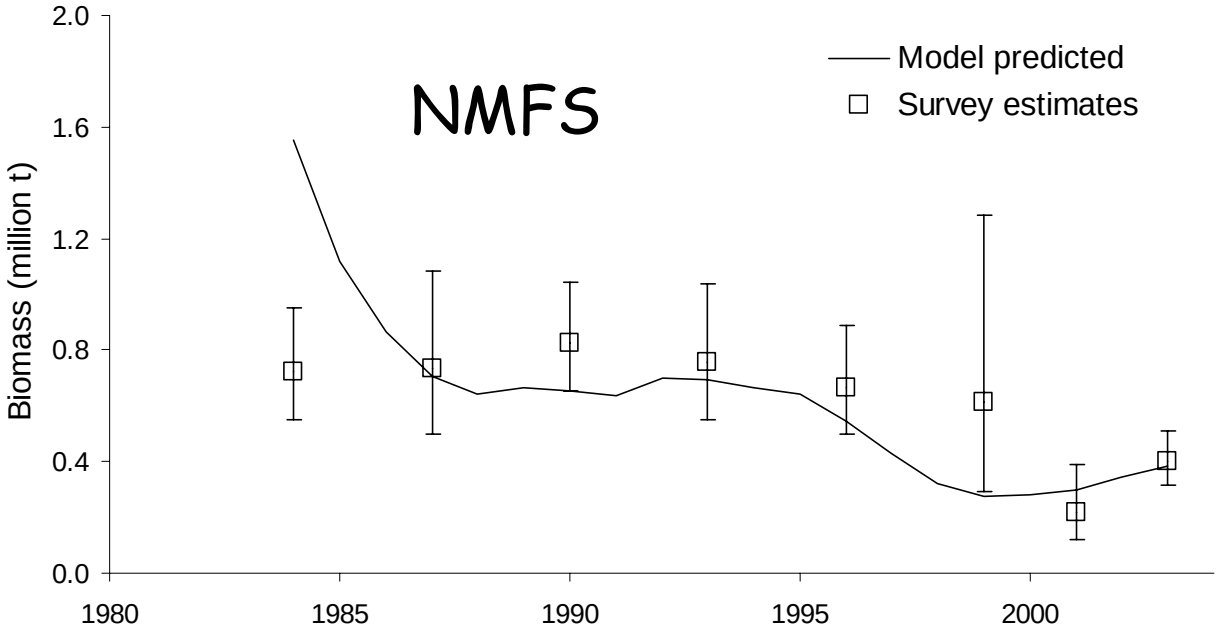
Fit to recent winter acoustic surveys

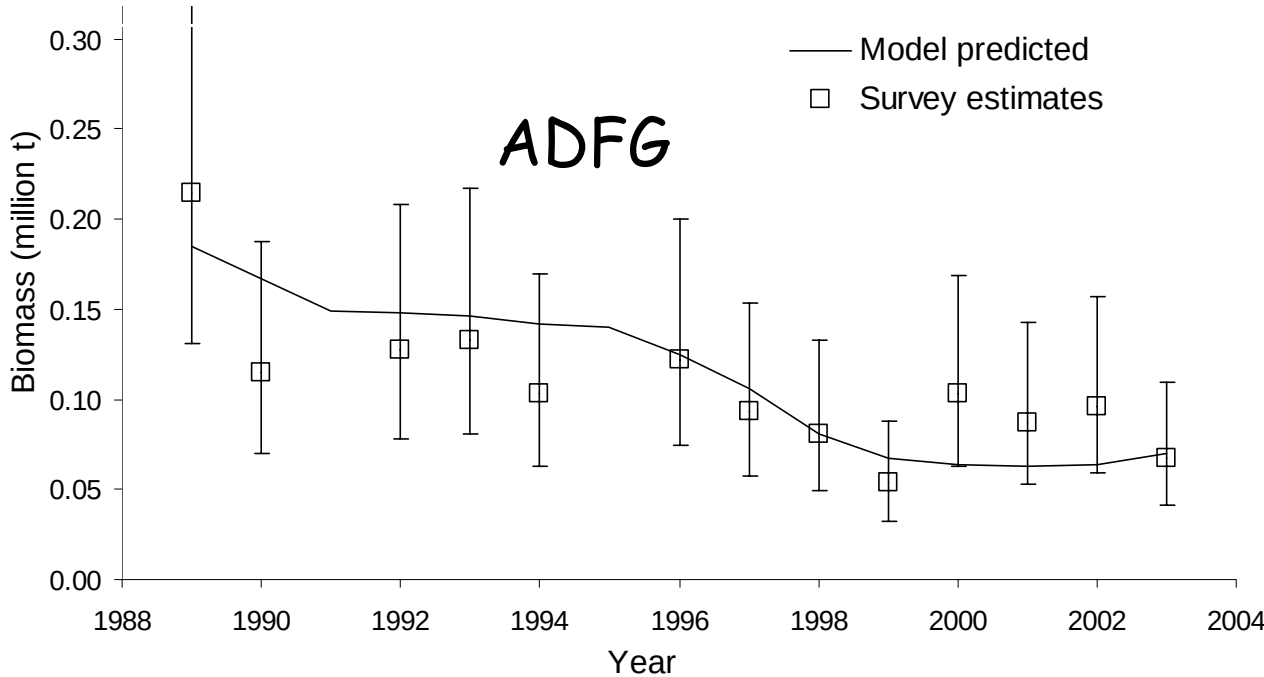


NMFS bottom trawl survey

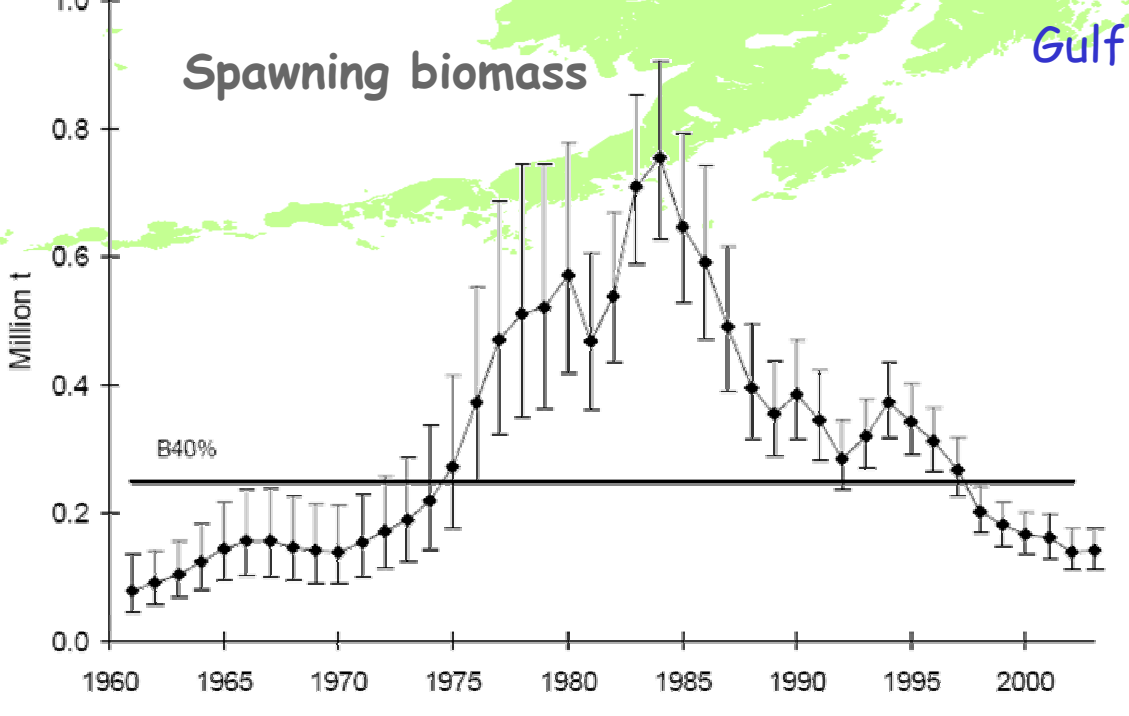


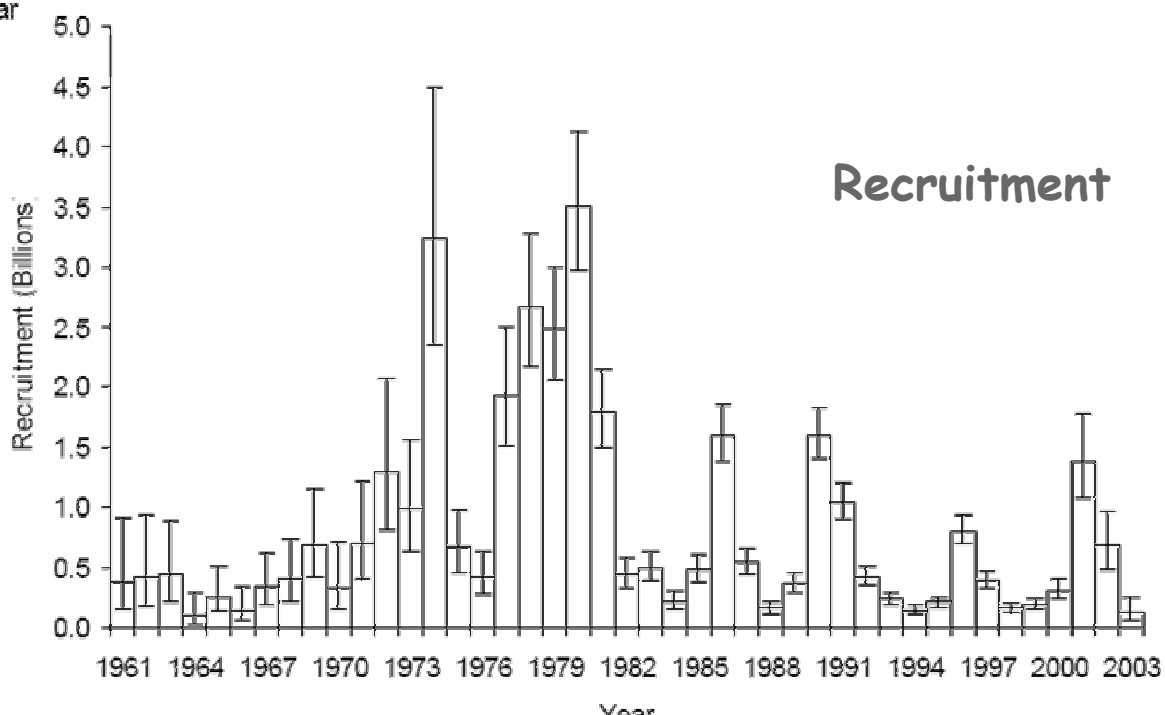
Trawl survey fits





Pollock model results





Added pollock conservation measures

- **Model selected**
  - Survey catchability assumption fixed at 1.0
- **Updated maturity-at-age used**
- **Assuming average 1999 yearclass**
- **Constant-buffer scheme used**

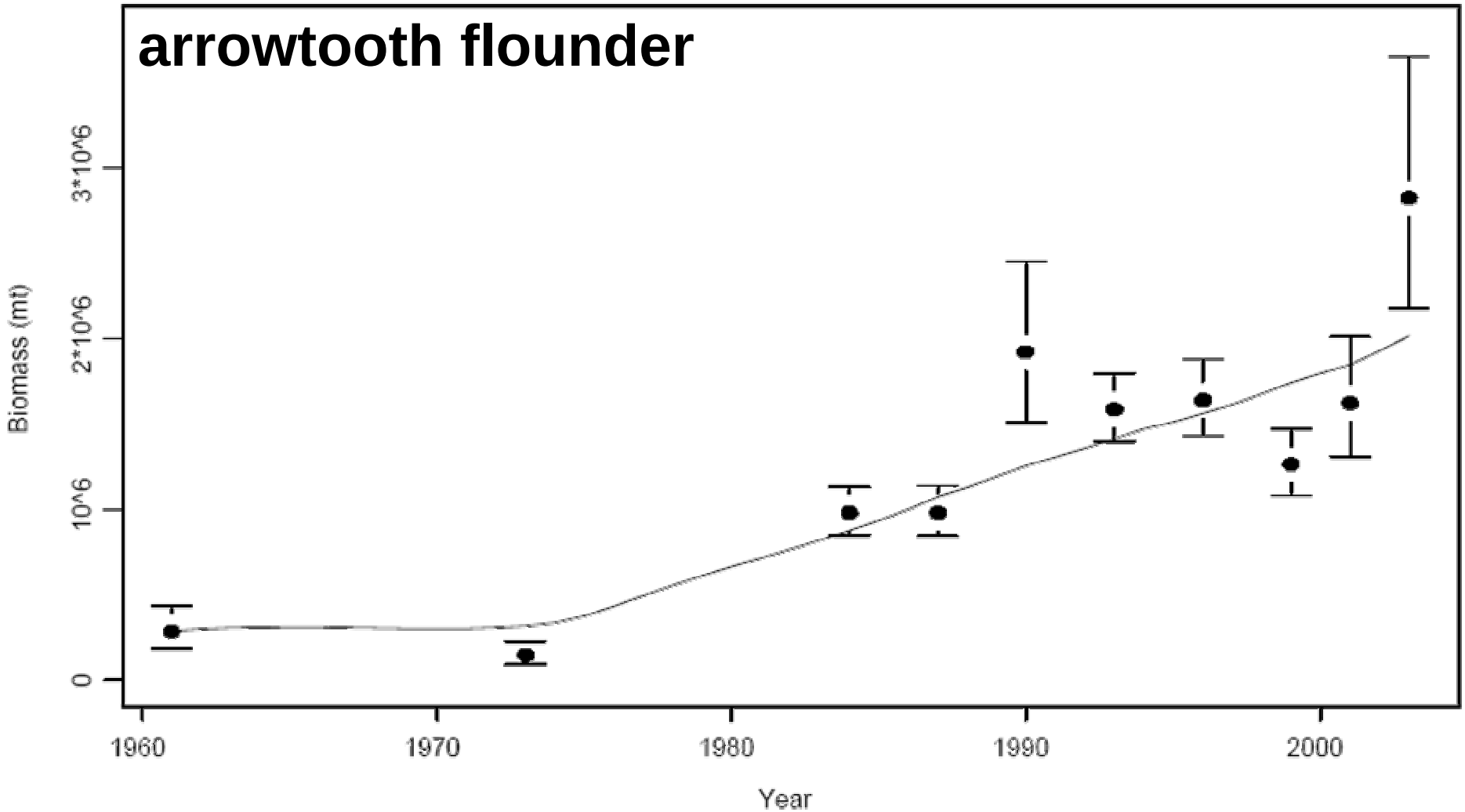
Pollock 2004 ABC

	Average 1999 year class	1999 year class as estimated
Author's adjustment	65,700	99,400
Maximum permissible	78,000	118,000

Pollock Spawning biomass

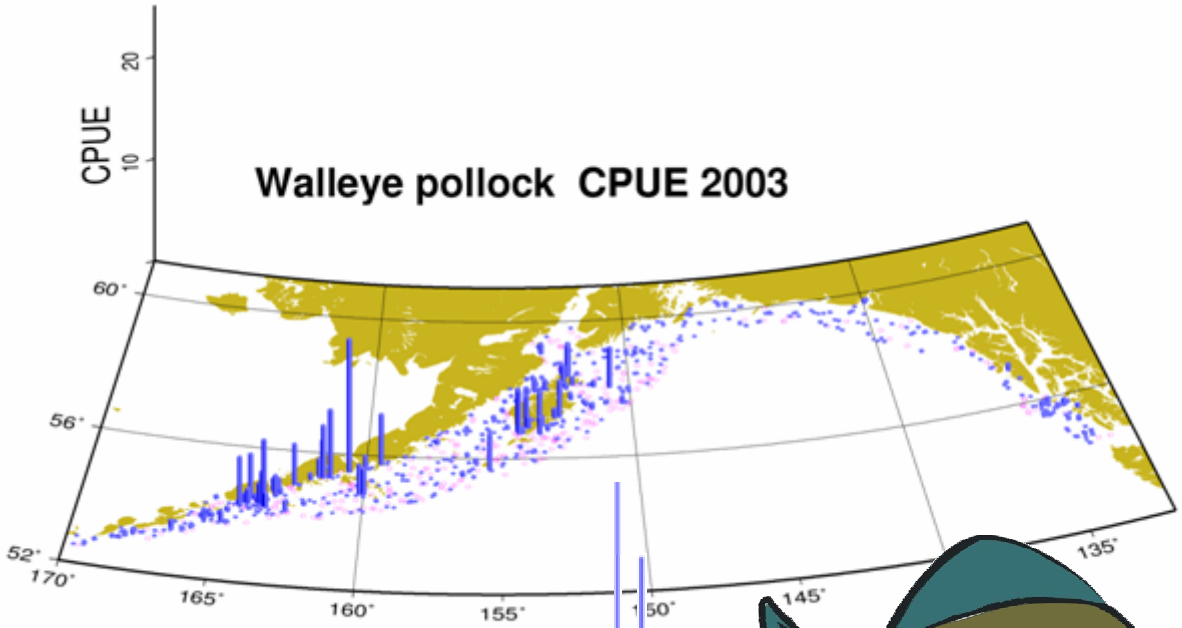
- **Spawning biomass (1,000's tons)**
  - ✶2004 = 195 (166 assuming avg 1999YC)
  - ✶$B_{40\%}$ = 248
  - ✶$B_{20\%}$ = 124

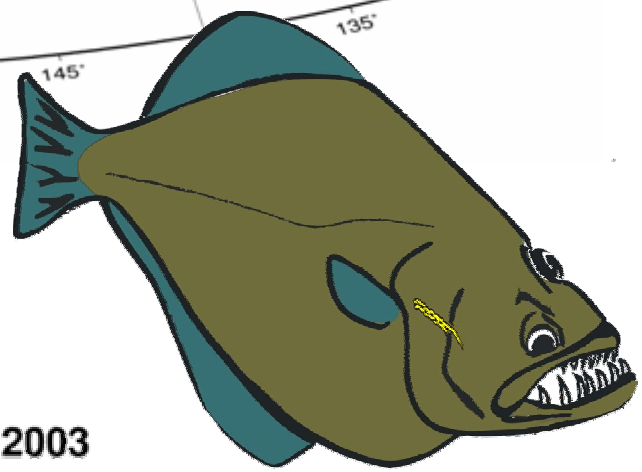
Environmental effects on GOA Pollock

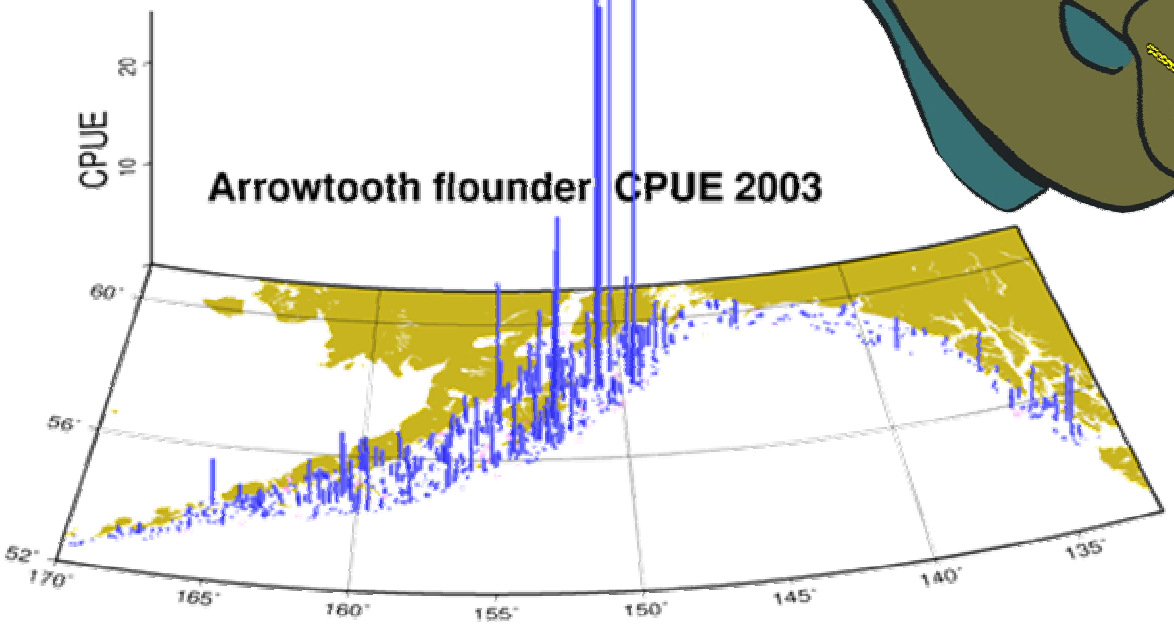


Gulf of Alaska predatio

Arrowtooth flounder







GOA pollock

&

arrowtooth flounder

ABC Summary

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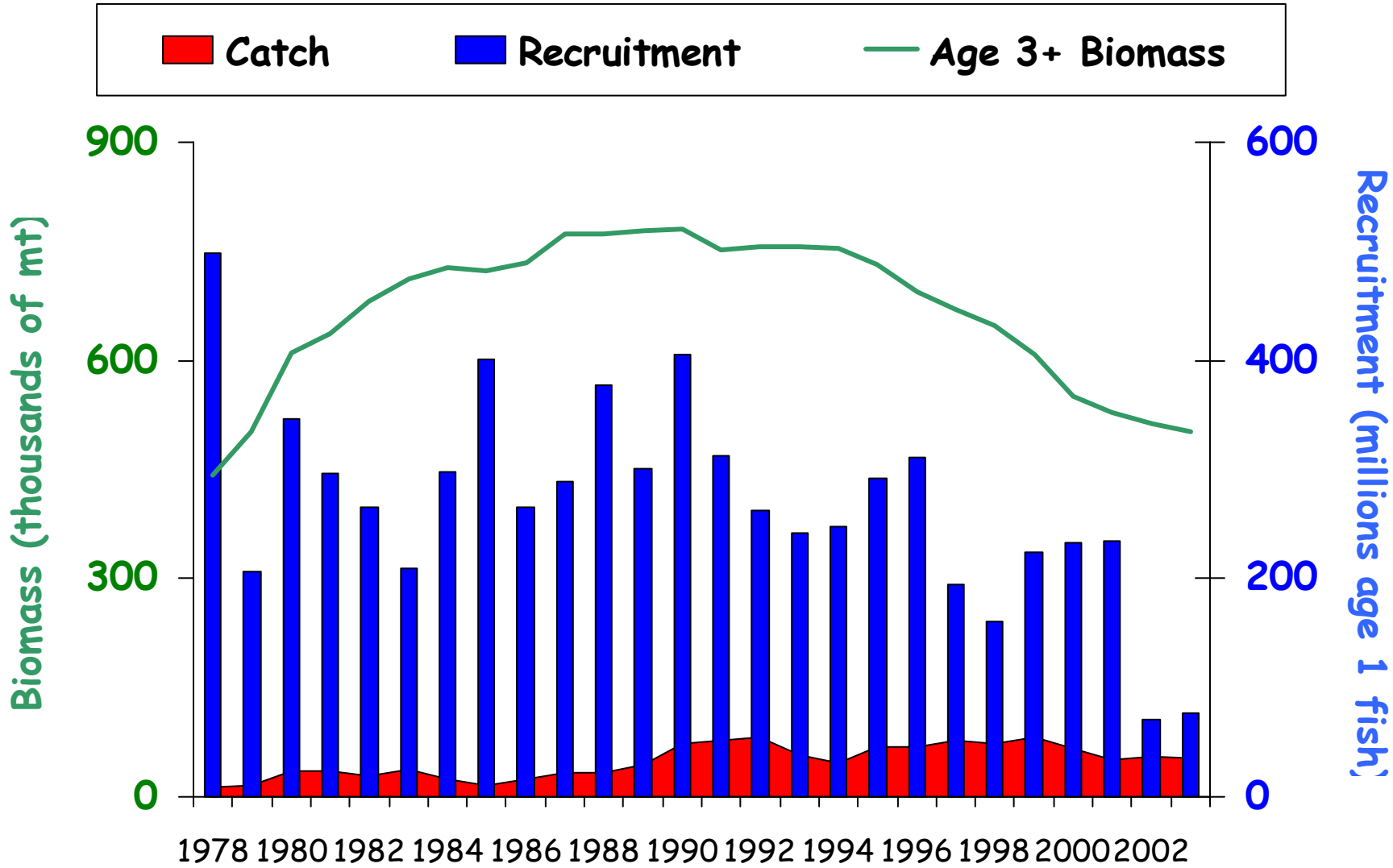
Total	166,816	416,000	498,790	up 82,790	(20%)

Pacific cod

- **Notes:**
  - ✶ Selectivity estimated over three stanzas:

    1978-86, 1987-99, & 2000 to the present
  - ✶ Risk-averse ratio applied to $F_{40\%}$
  - ✶ Steller sea lion prey species
  - ✶ Survey and catch series updated (some significant changes)
  - ✶ Spatial analysis of catch trends included

Pacific cod


Catch
Recruitment
Age 3+ Biomass
900
600
300
0
Biomass (thousands of mt)
600
400
200
0
Recruitment (millions age 1 fish)
1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002

Pacific cod

- **Female spawning biomass (tons)**
  - ✶2004 = 103,000
  - ✶$B_{35\%}$ = 77,800
  - ✶$B_{40\%}$ = 88,900

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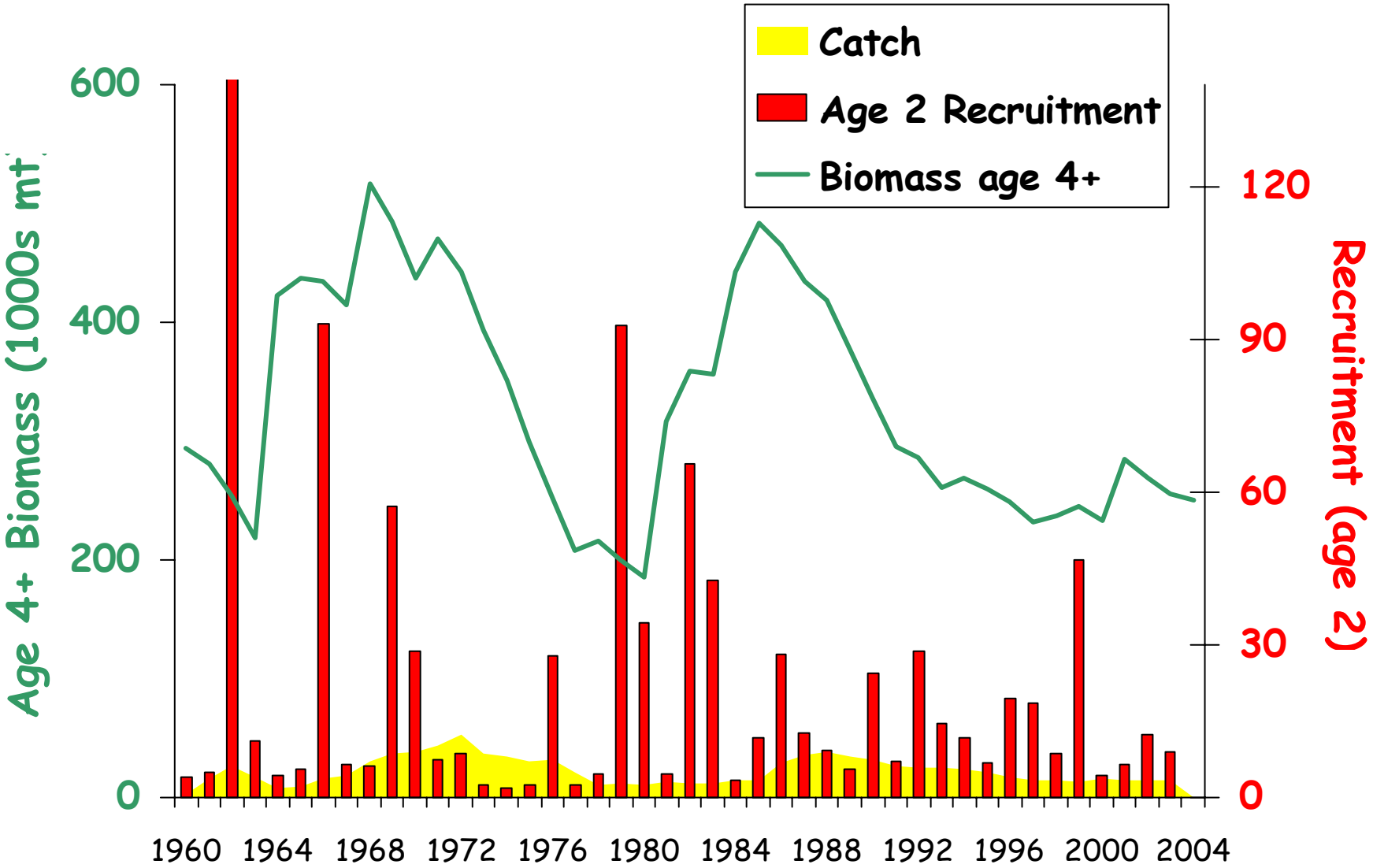
Sablefish

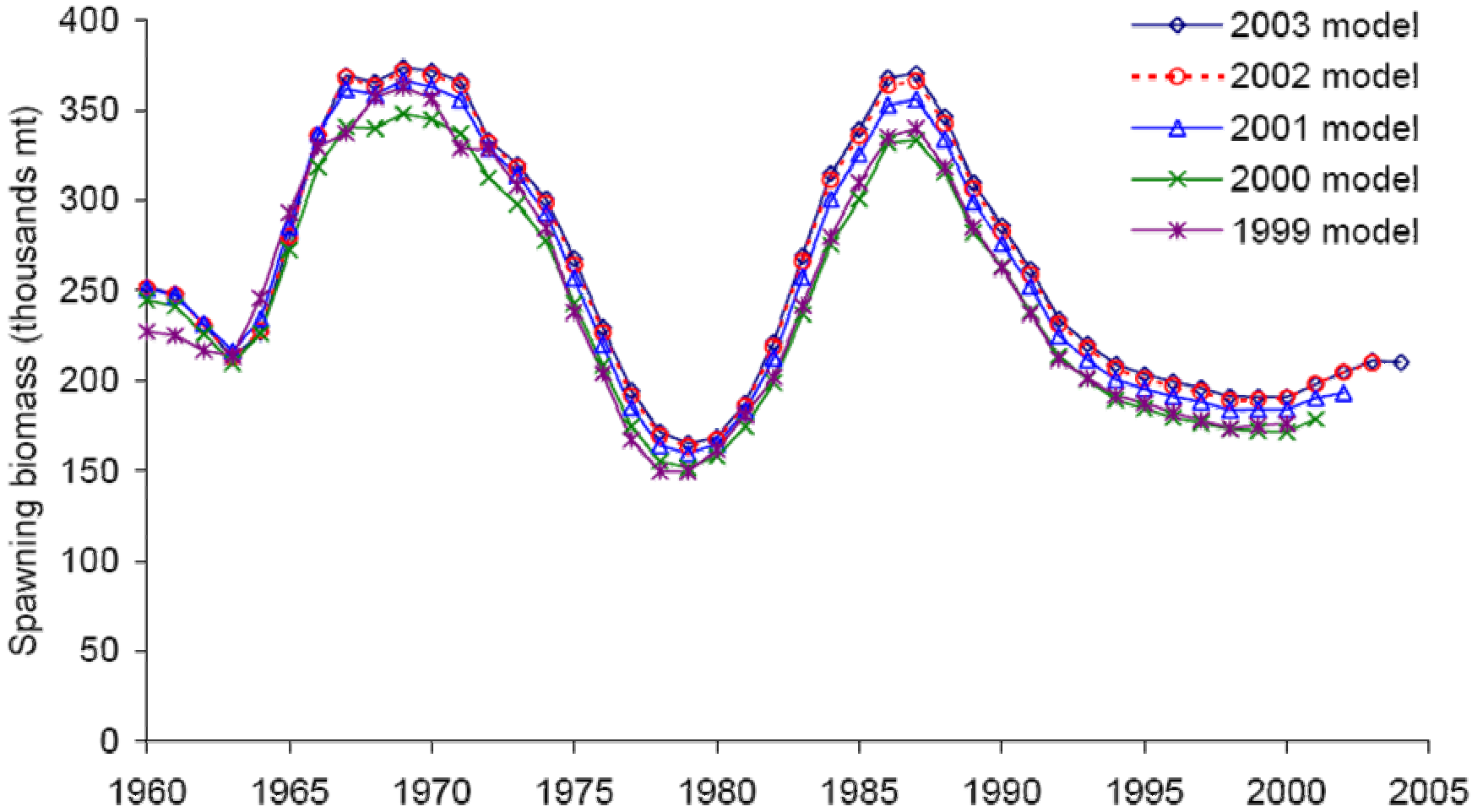
Notes

- Survey abundance decreased ~7% from 2002 estimate
- Status "moderate" and increased from recent low levels
  - About at $B_{40\%}$ level
- Authors proposed ABC recommendation based on estimates of probability of future stock sizes
- Used the SSC requested approach of harvest rates in projections
- Plan Team agreed with ABC (in general)
  - Two recommendations were 0.8 and 0.9 of Max ABC

Sablefish


Catch
Age 2 Recruitment
Biomass age 4+
Age 4+ Biomass (1000s mt)
600
400
200
0
Recruitment (age 2)
120
90
60
30
0
1960
1964
1968
1972
1976
1980
1984
1988
1992
1996
2000
2004

Sablefish retrospective pattern



Sablefish spawning biomass

- **Spawning biomass (1,000's tons)**
  - ✶2004 = 210
  - ✶$B_{40\%}$ = 211
  - ✶$B_{35\%}$ = 185

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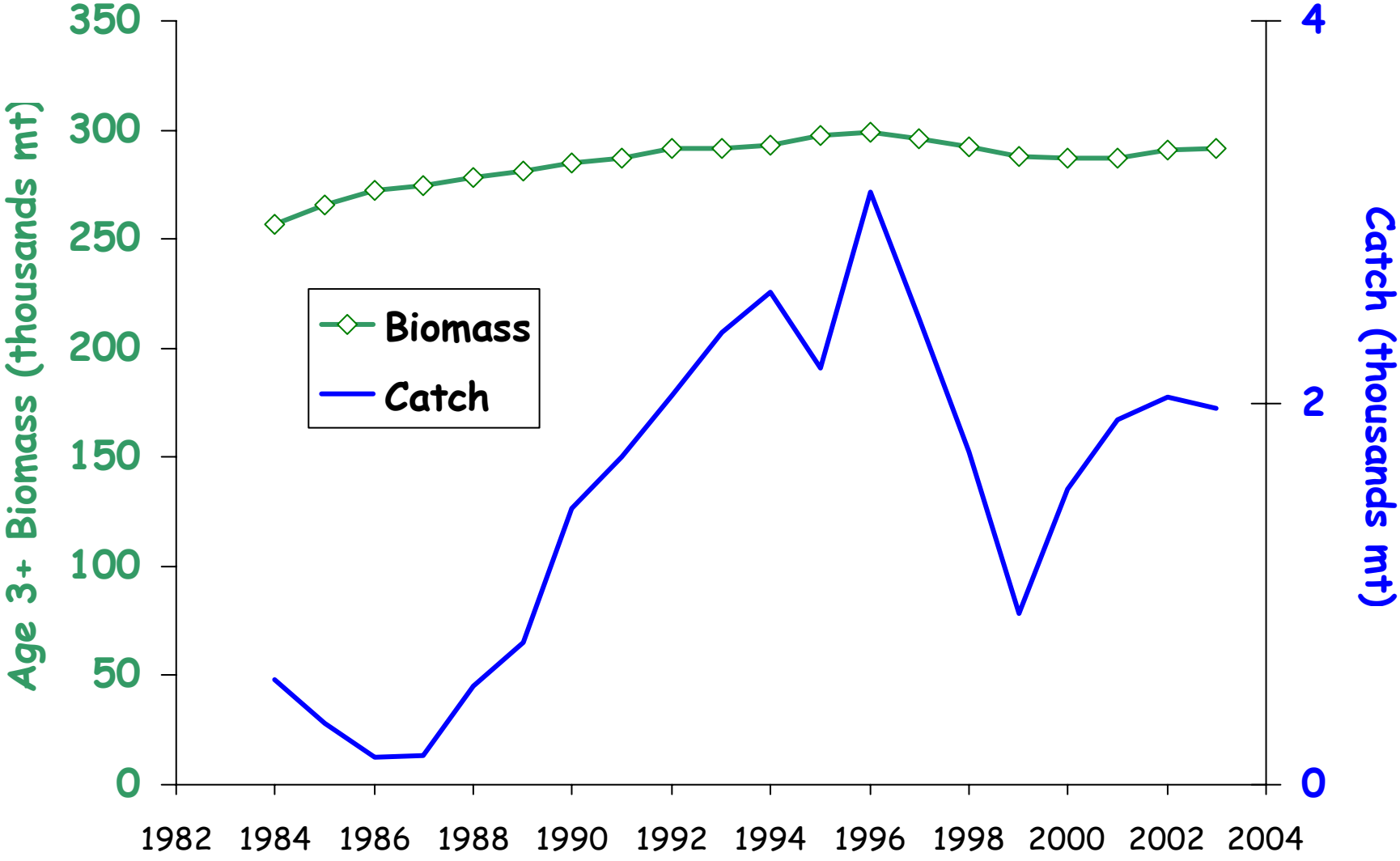
Flatfish ABC's

Species	2003 ABC	2004 ABC	Change	
Deep water flatfish	4,880	6,070	up 1,190	(24%)
Rex sole	9,470	12,650	up 3,180	(34%)
Shallow water flatfish	49,340	52,070	up 2,730	(6%)
Flathead sole	41,390	51,720	up 10,330	(25%)
Arrowtooth flounder	155,140	194,930	up 39,790	(26%)

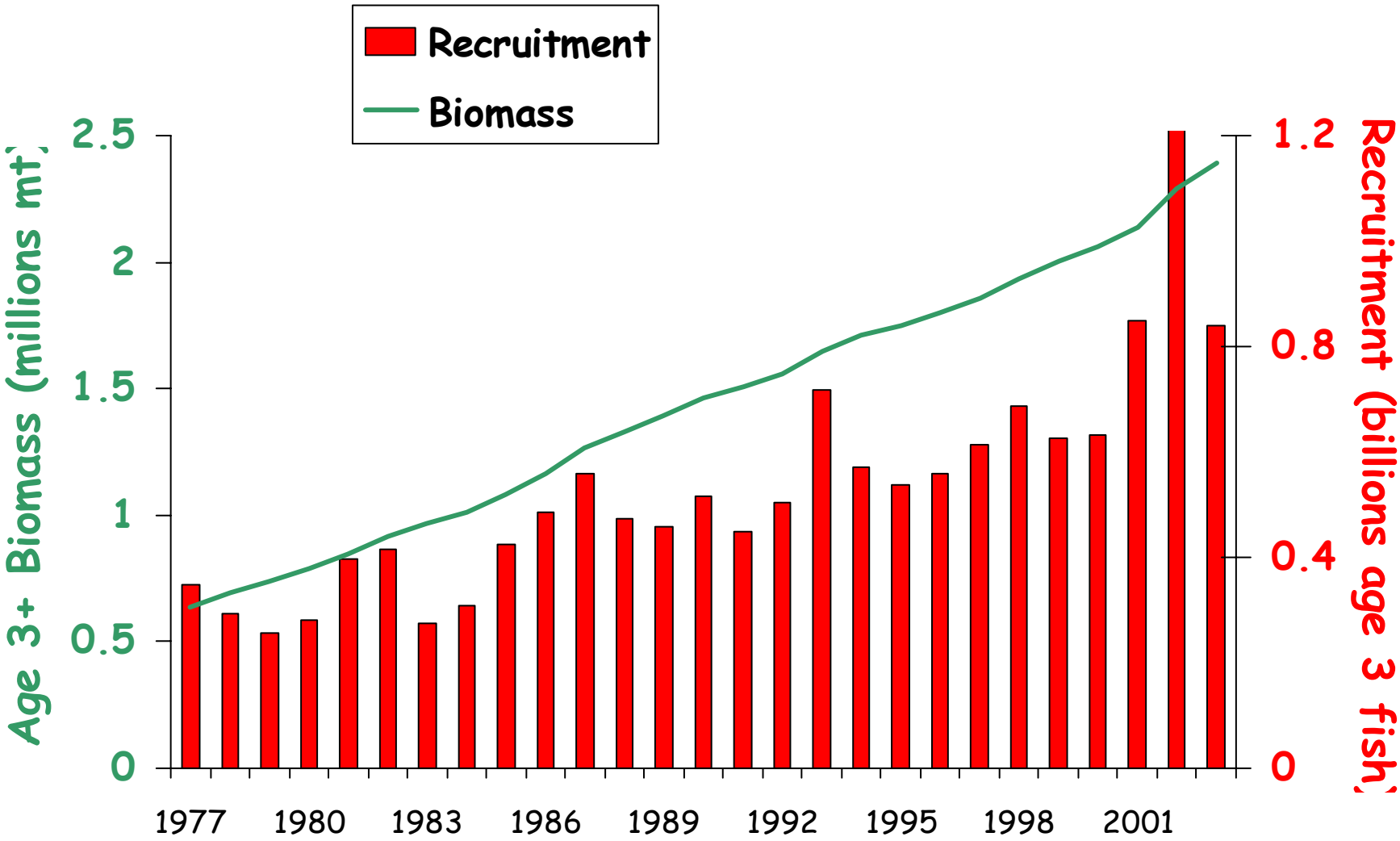
Flathead sole



Flathead sole

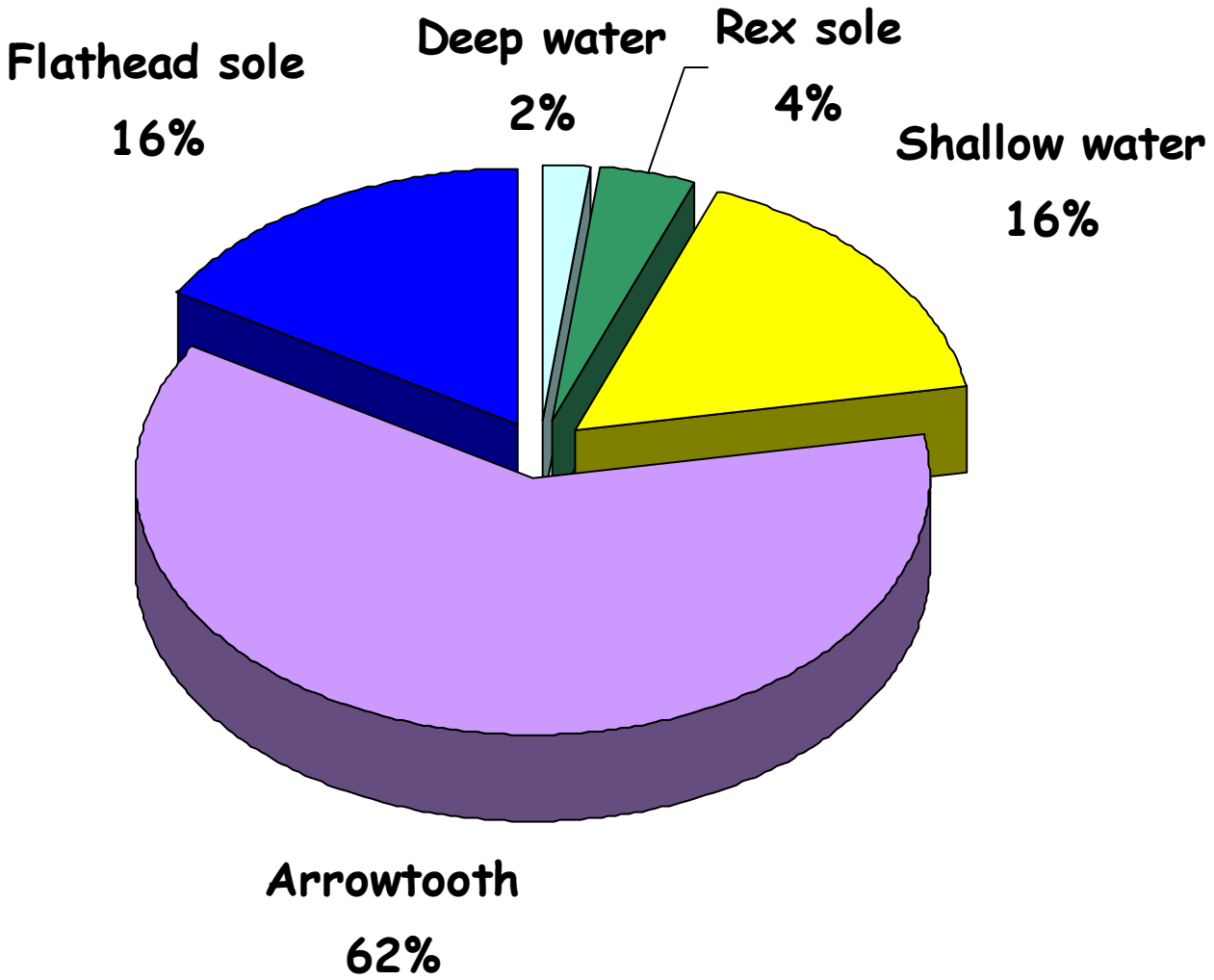
- **Female spawning biomass (tons)**
  - ✶2004 = 110,000
  - ✶$B_{35\%}$ = 42,000

Arrowtooth flounder



Flatfish 2004 ABC's

265,720 tons total



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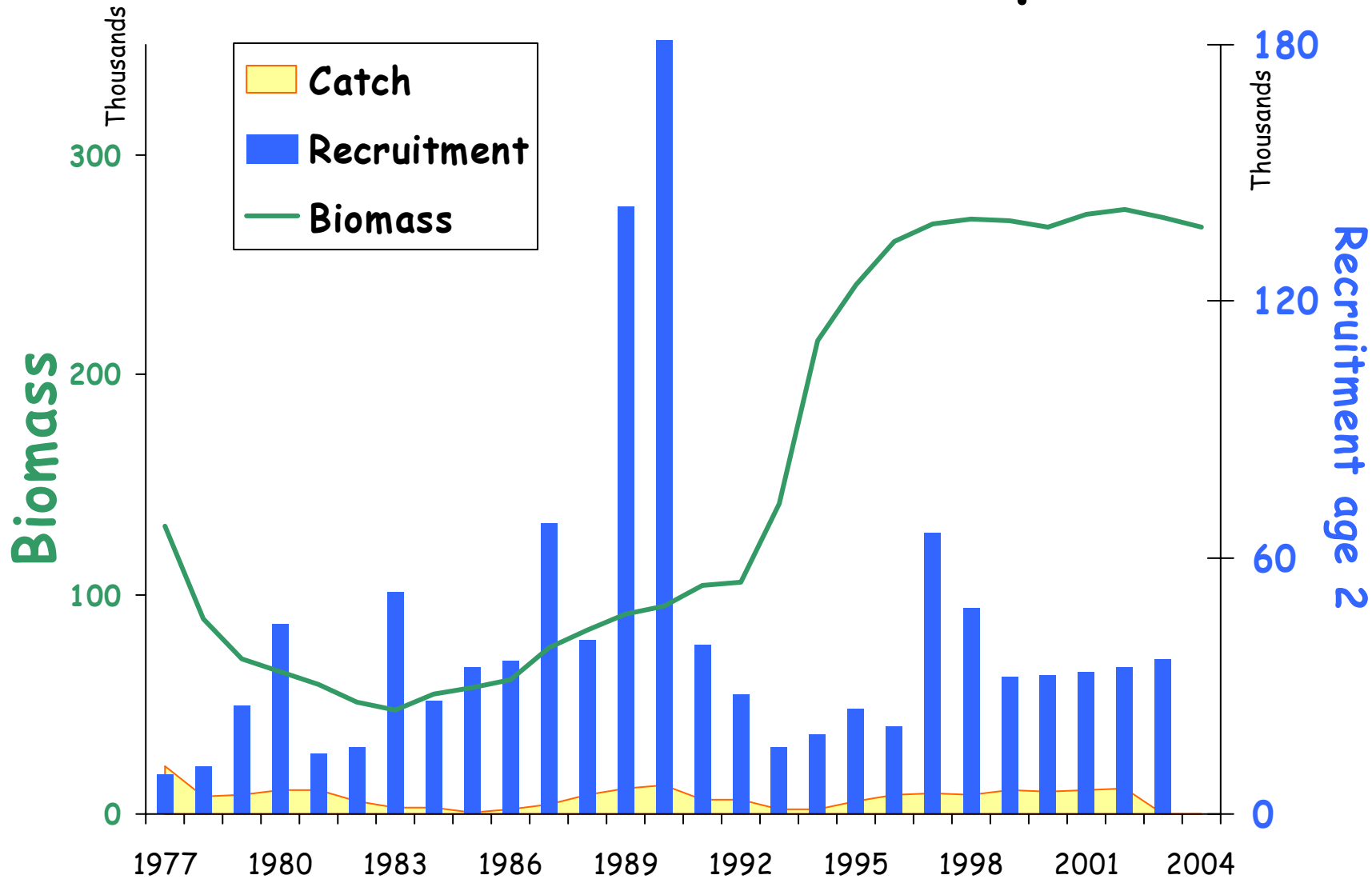
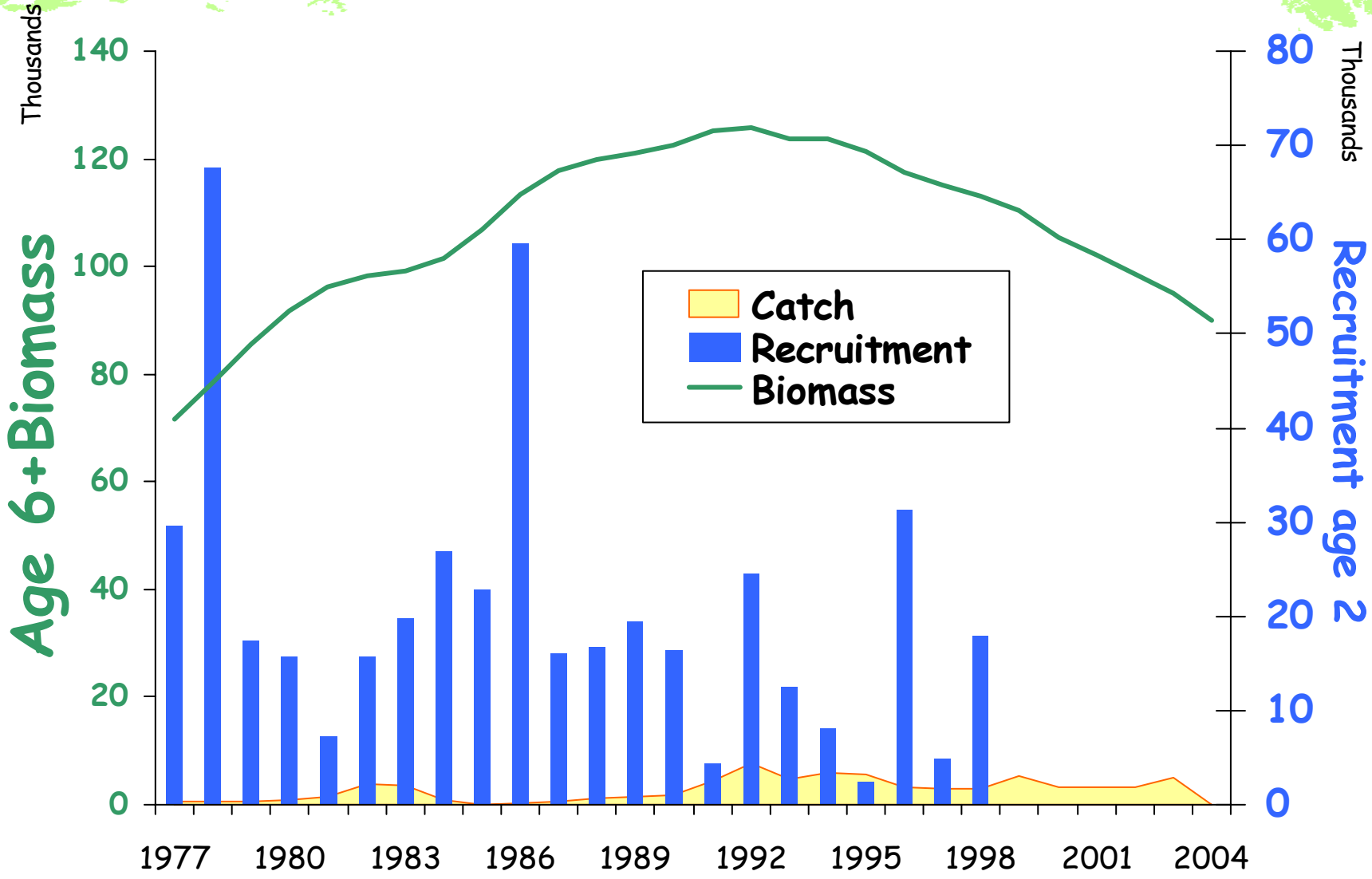
Rockfish ABC's

Species	2003 ABC	2004 ABC	Change	
Other Slope rockfish	5,050	3,900	down 1,150	(23%)
Northern rockfish	5,530	4,870	down 660	(12%)
Pacific ocean perch	13,660	13,340	down 320	(2%)
Shortraker/ rougheye	1,620	1,760	up 140	(9%)
Pelagic shelf rockfish	5,490	4,470	down 1,020	(19%)
Demersal Shelf Rockfish	390	450	up 60	(15%)
Thornyhead rockfish	2,000	1,940	down 60	(3%)

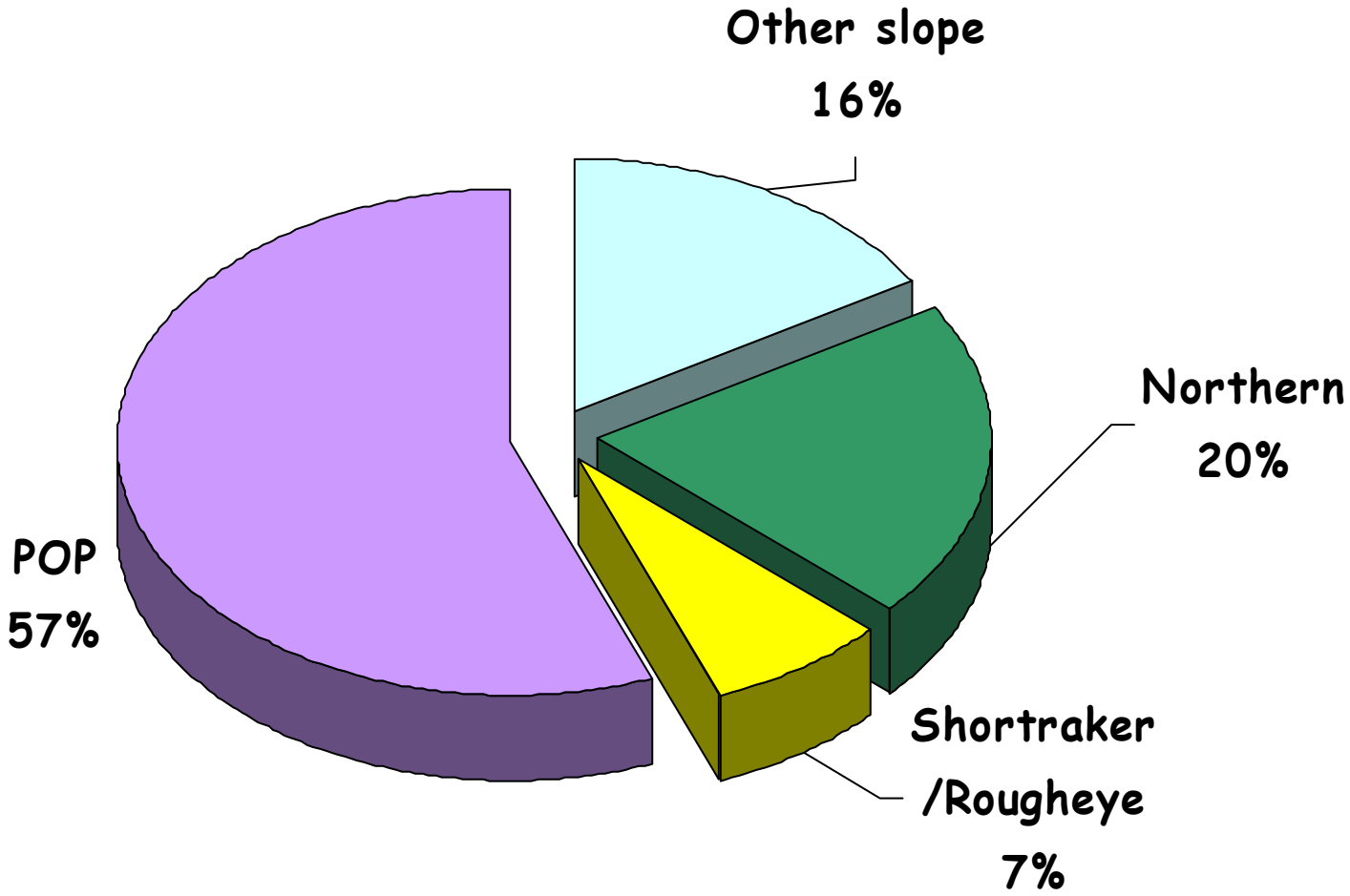
Pacific ocean perch



Northern rockfish



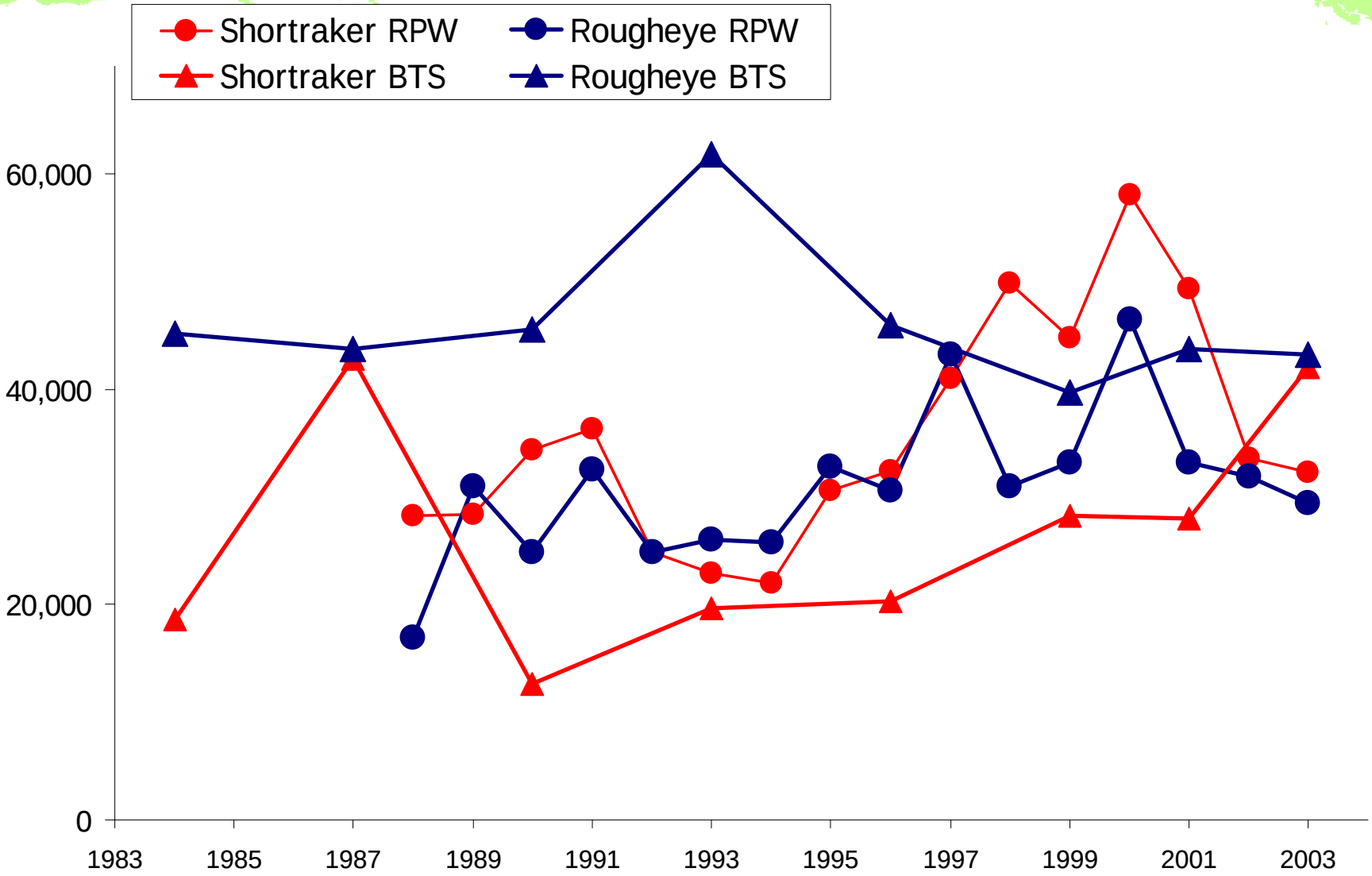
Slope Rockfish 2004 ABC's 23,870 tons total



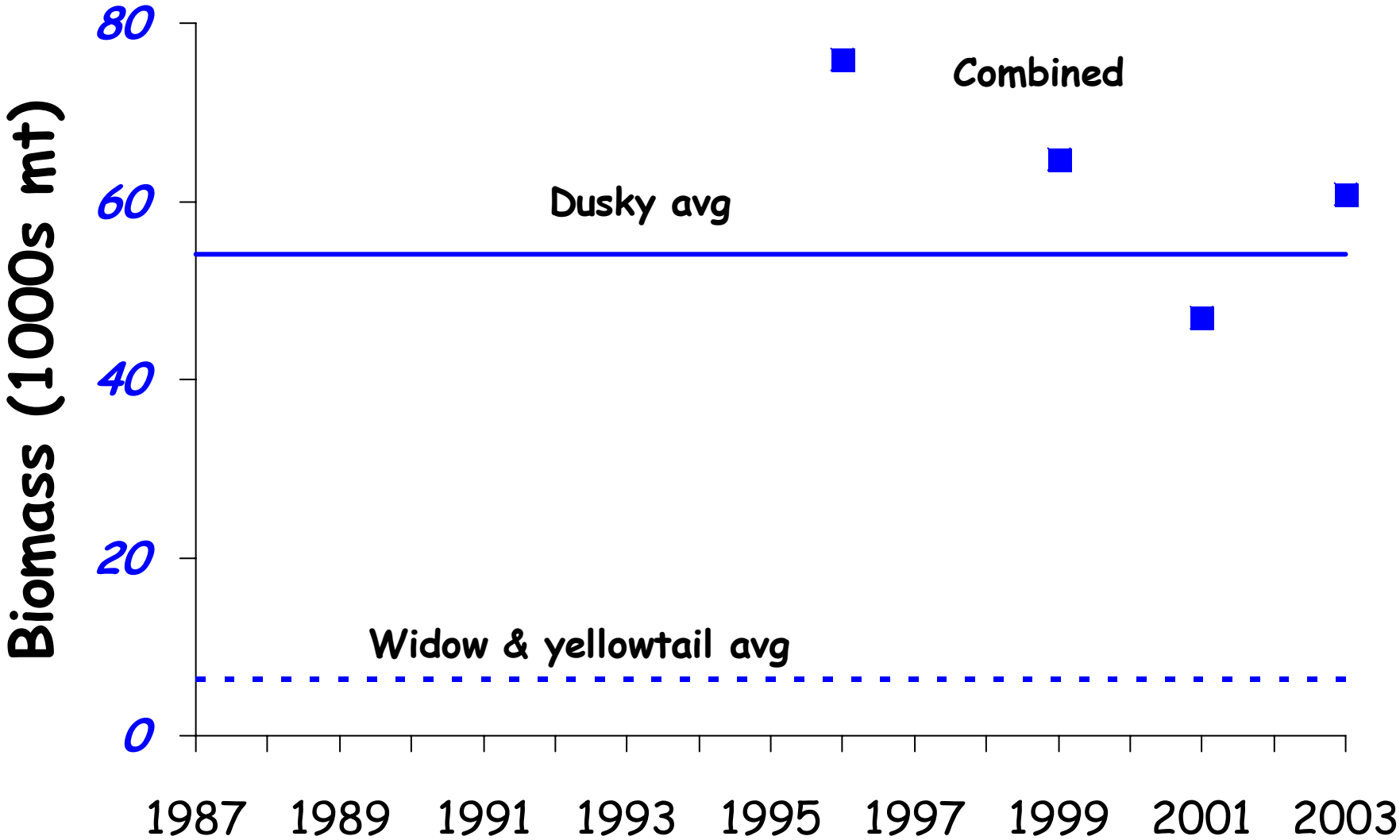
Rockfish spawning biomass

- **Spawning biomass (1,000's tons)**
  - ✶ POP:
    - 2004 = 95.8
    - $B_{40\%}$ = 89.7
  - ✶ Northern:
    - 2004 = 36.5
    - $B_{40\%}$ = 23.9

Shortraker rougheye survey trends



Pelagic shelf rockfish: biomass

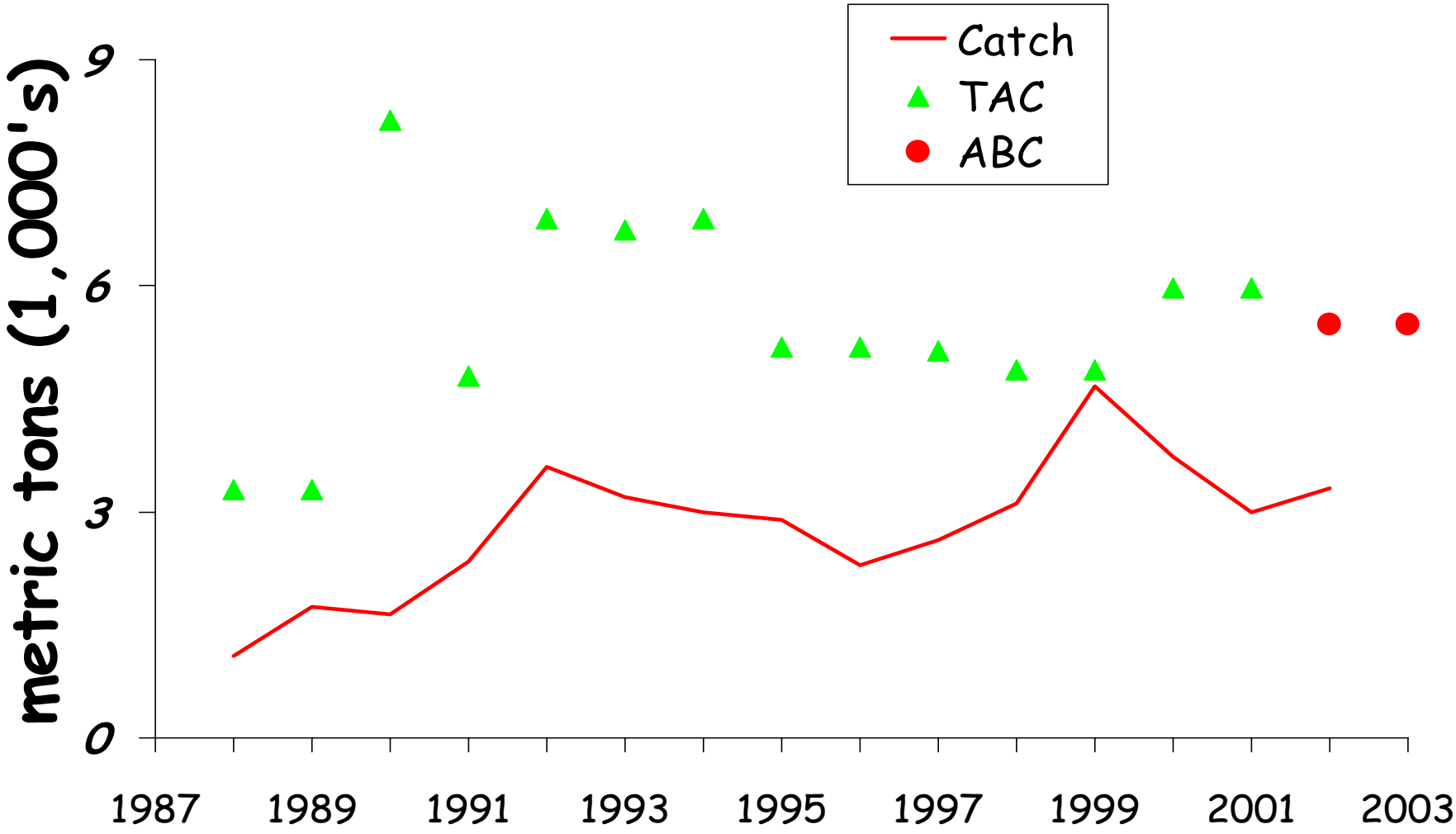


Dusky, widow, & yellowtail

Pelagic shelf rockfish

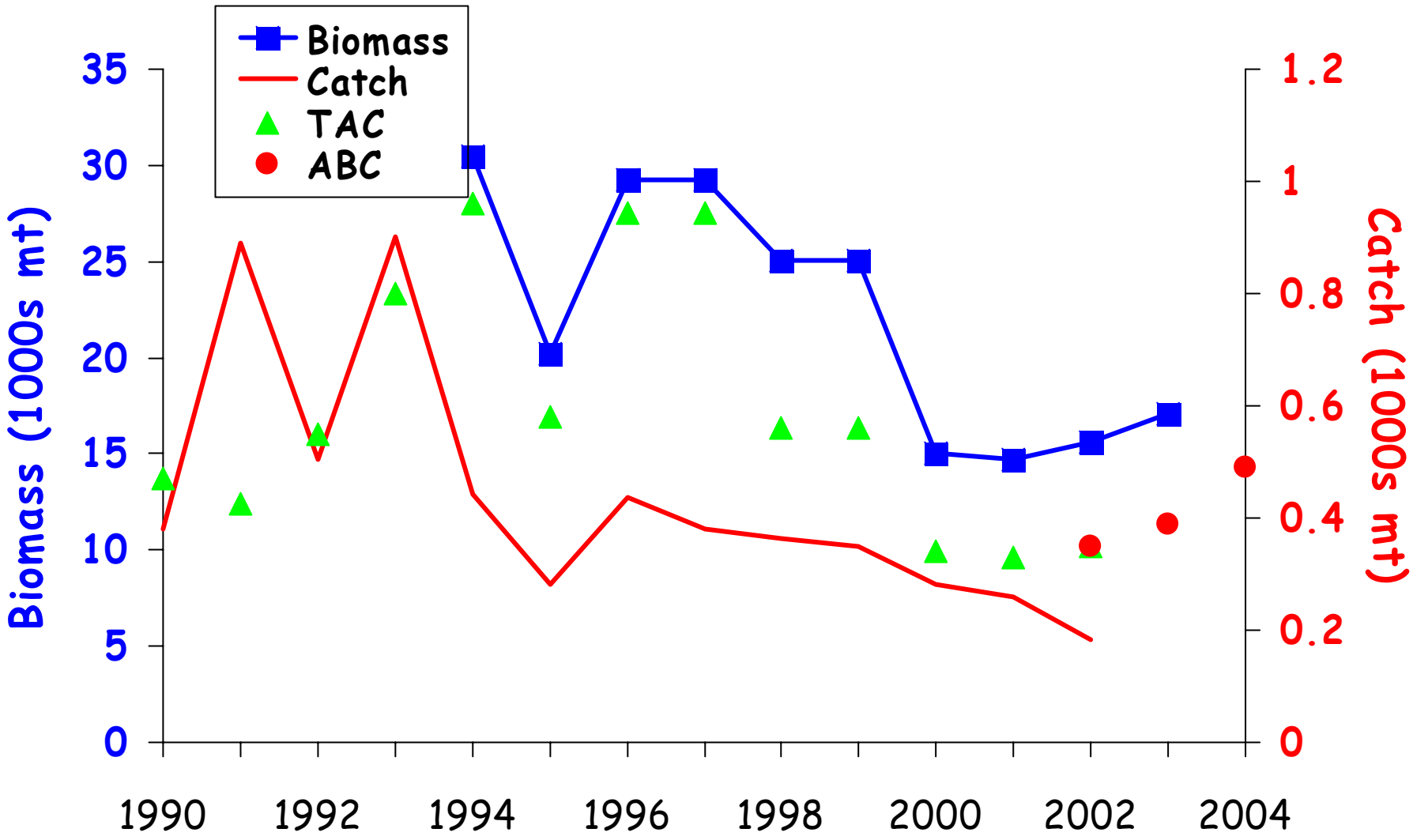
- **Age-structured assessment of light-dusky rockfish provided**
- **Accepted as preferred by the Plan Team**
  - (more conservative option)

Pelagic shelf rockfish: catch

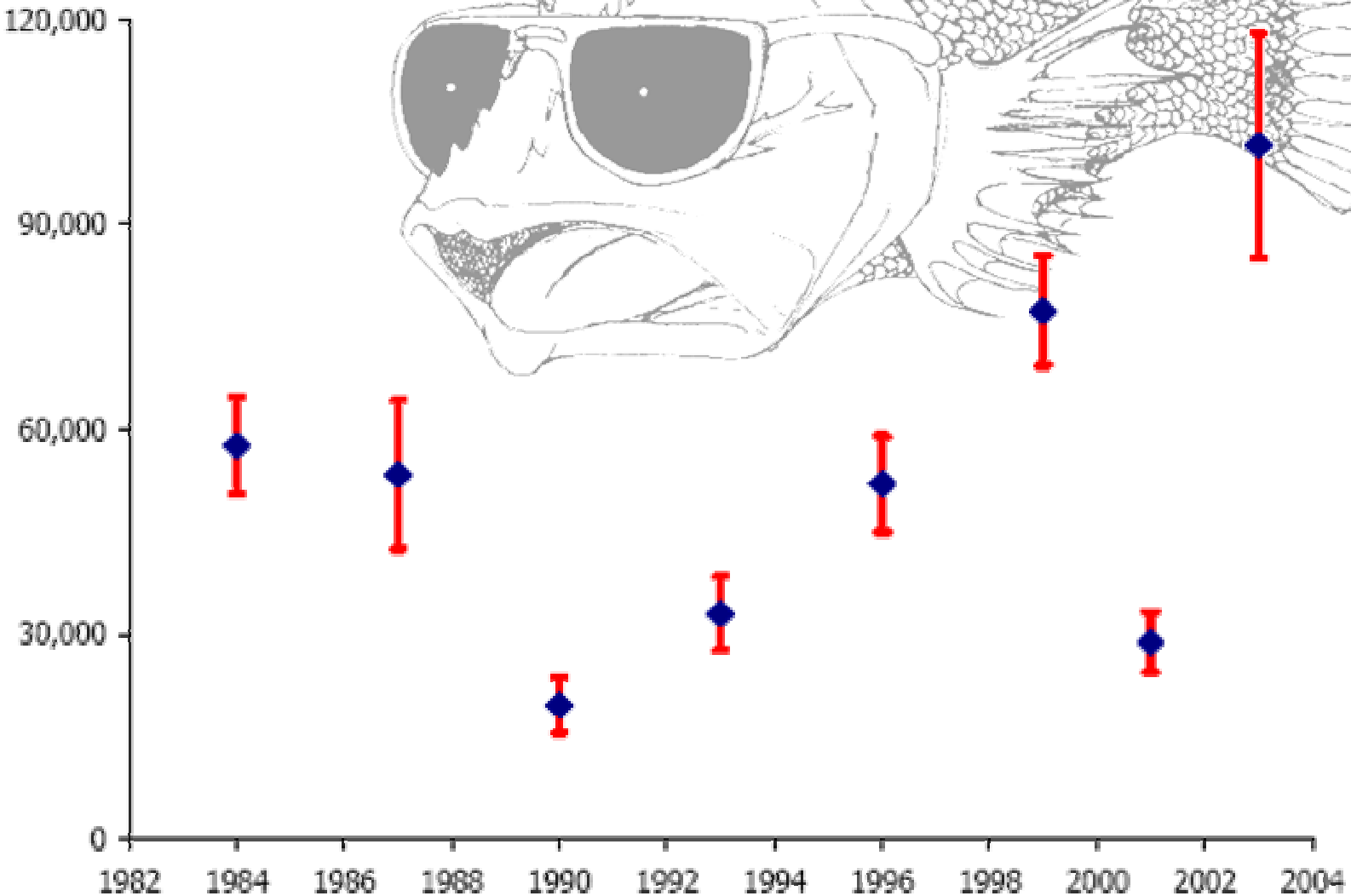


Dusky, widow, & yellowtail

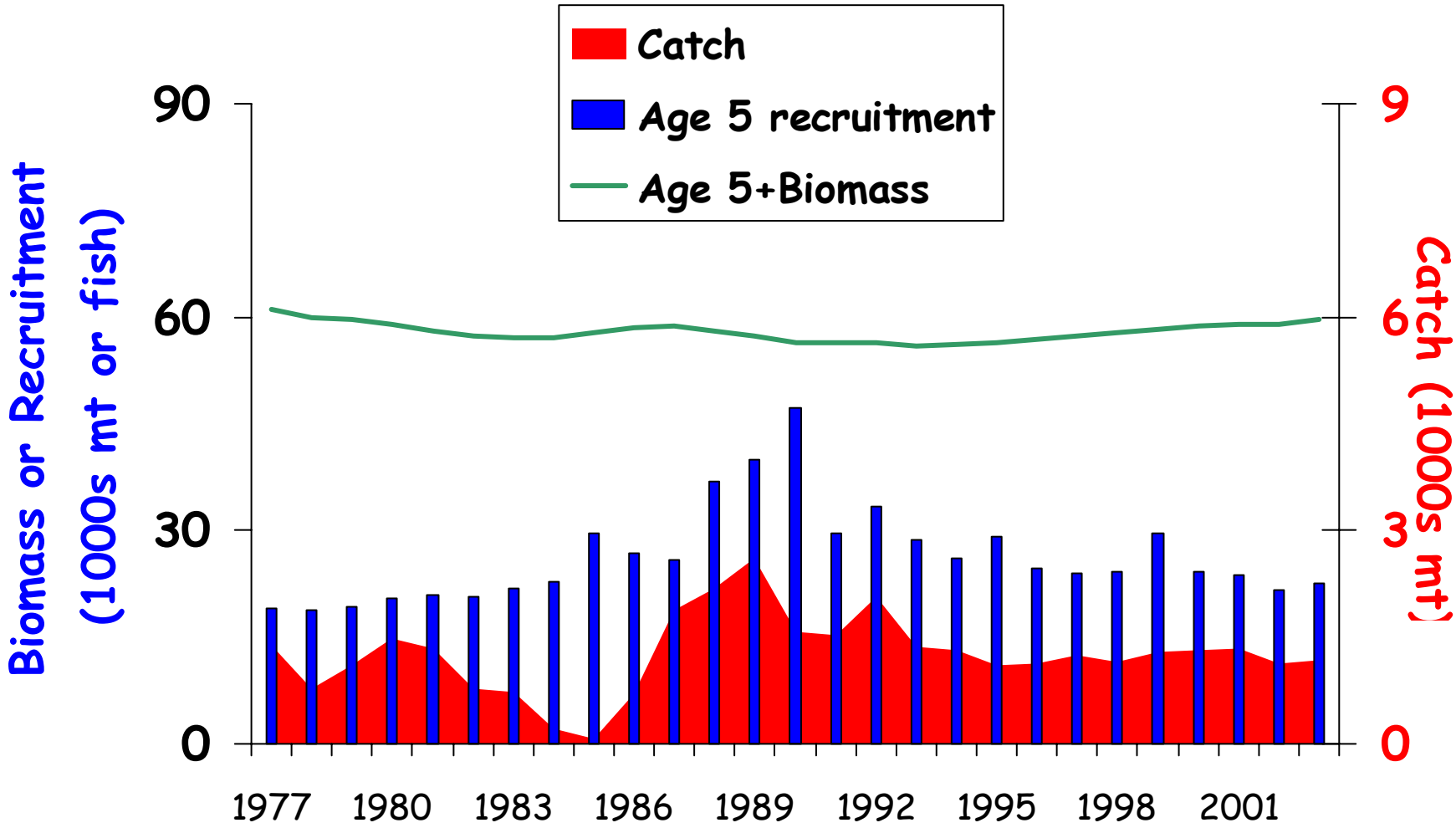
Demersal shelf rockfish



Thornyhead survey estimates



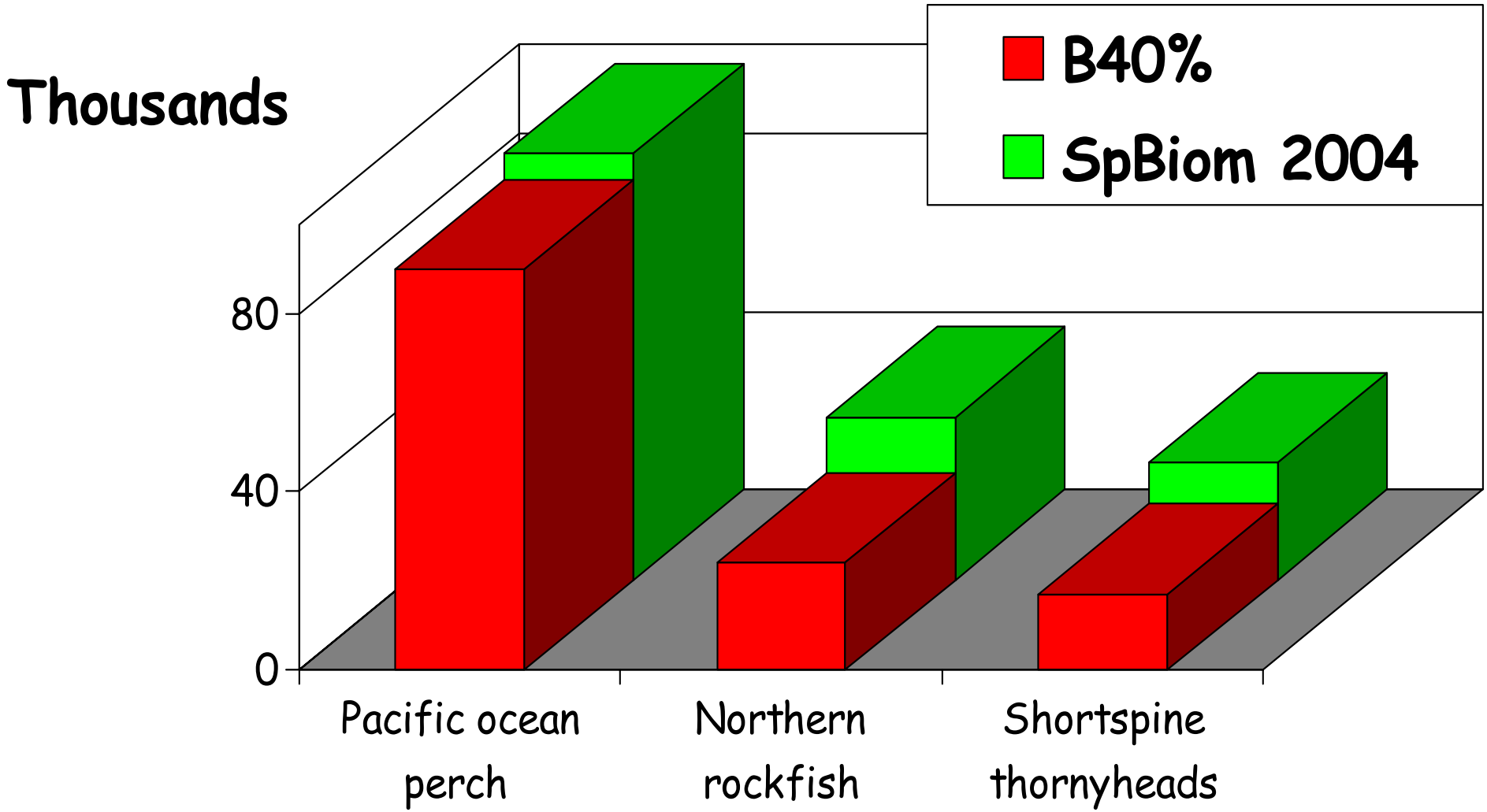
Thornyheads



Thornyhead spawning biomass

- **Spawning biomass (1,000's tons)**
  - ✶ 2004 = 26.2
  - ✶ $B_{40\%}$ = 16.9

Rockfish Stock Status

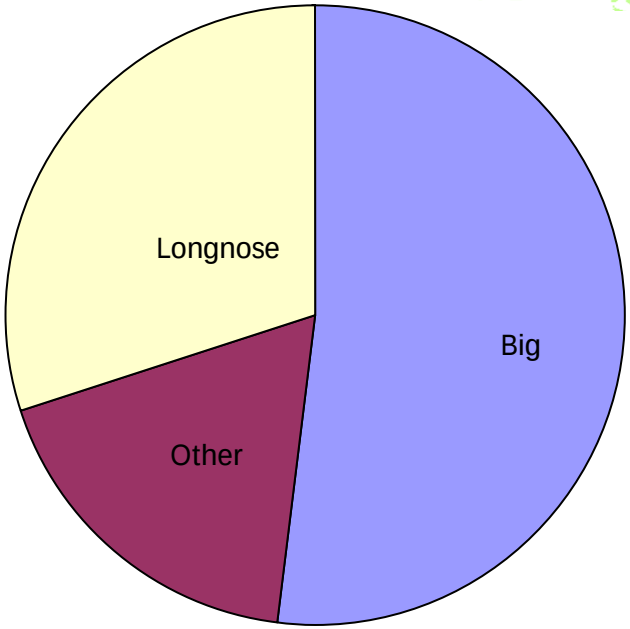


Atka mackerel

- **Easterly appearance**
  - Summer bottom trawl survey and fishery data suggest influx of 1998 or 1999 year class from the Aleutians
  - ABC recommended at 600 tons, sufficient to allow for bycatch levels

Skates

- **In GOA, 2 main target species**
  - ✶ Big skate (*Raja binoculata*)
  - ✶ Longnose skate (*Raja rhina*)
- **3rd group composed of many species**
  - ✶ *Bathyraja spp.*
  - ✶ not targeted to date



Rough relative biomass estimates (in GOA)

Big skate ~50%,

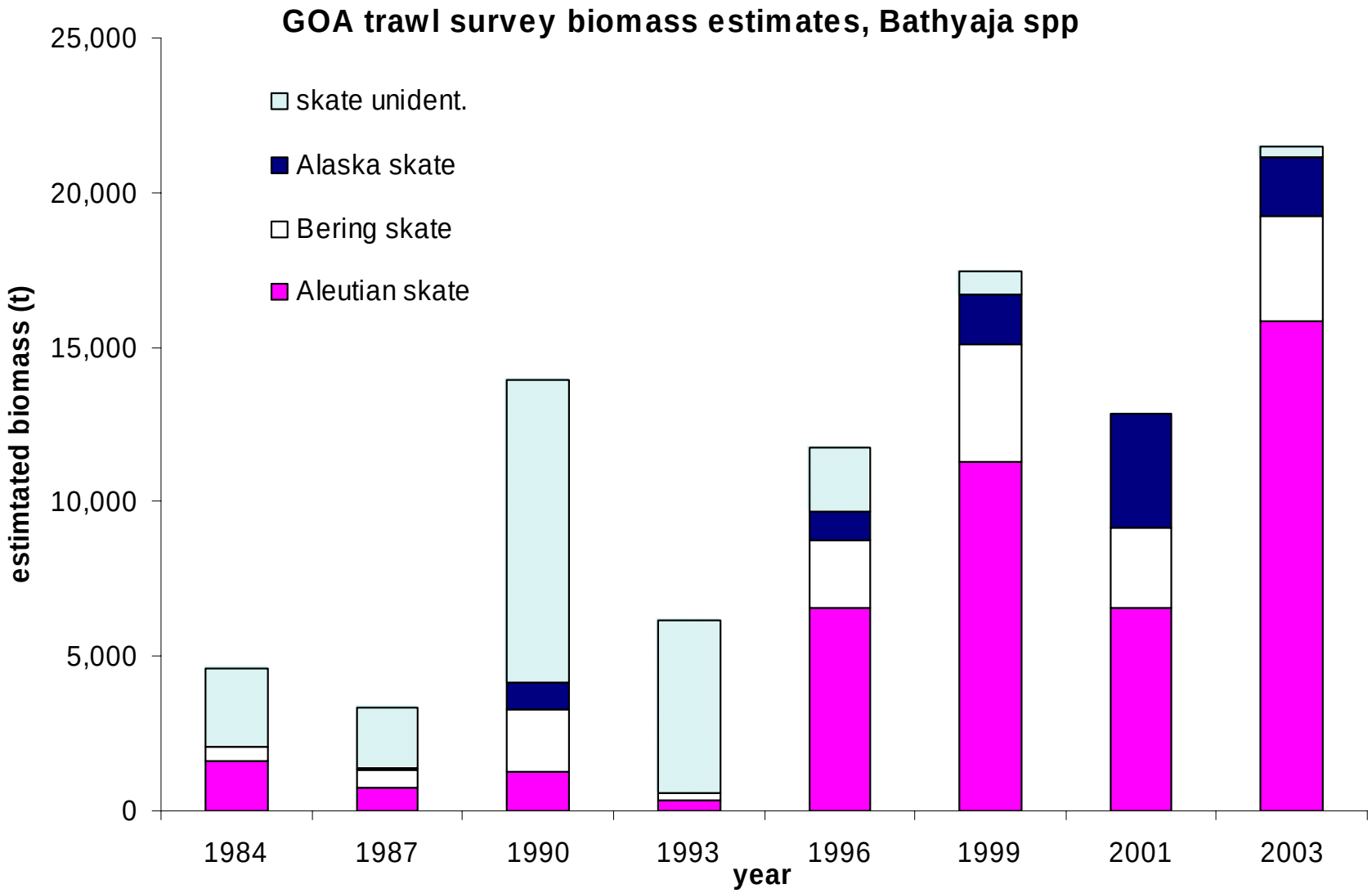
longnose about 32%,

~18% to *Bathyraja spp.*

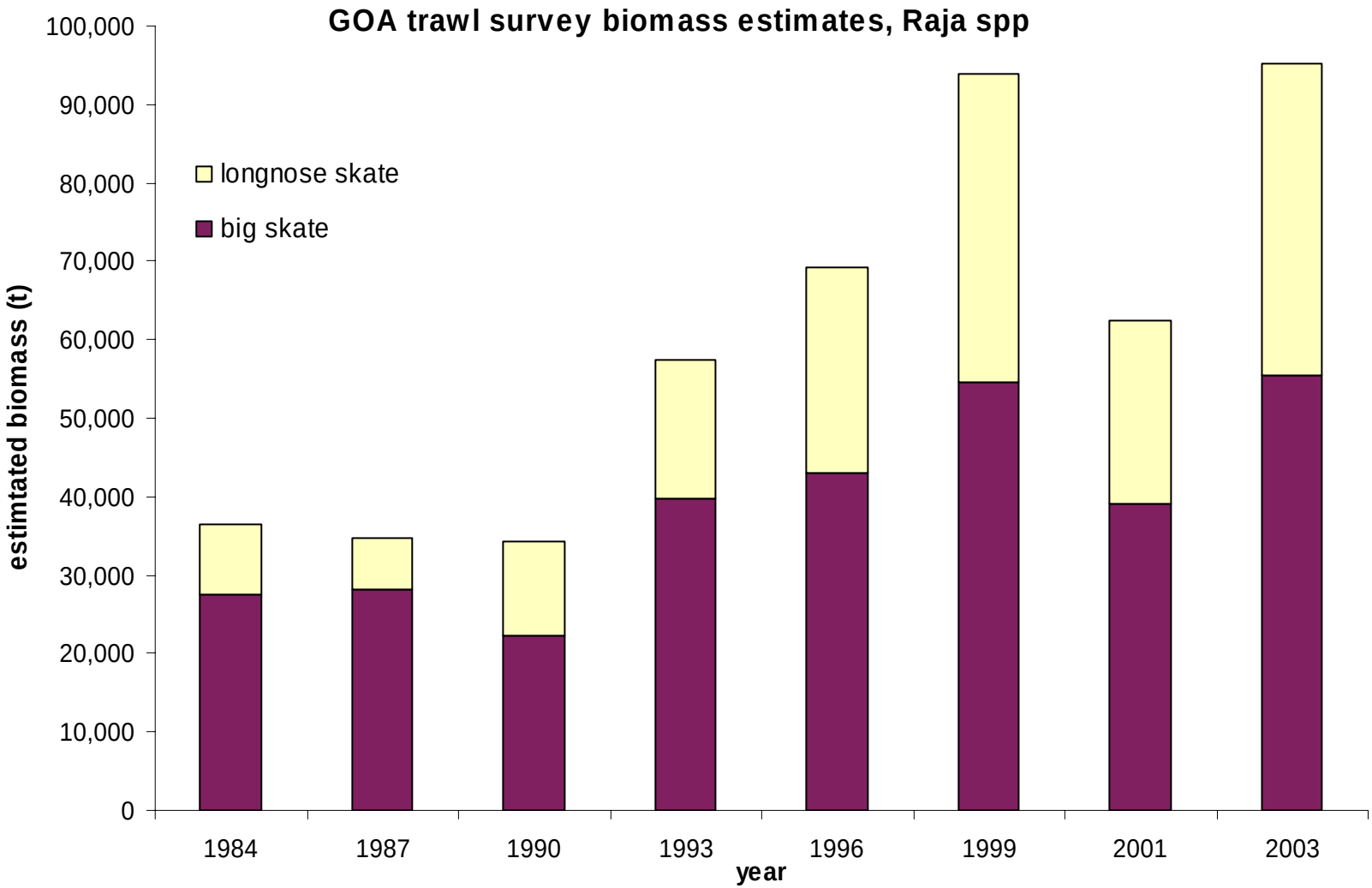
Skate catch estimation

- **Difficult, requires expansion to linked target**
- **Halibut fishery appears to be a large contributor**
- **AFSC has developed ID keys**
  - Observers trained for ID starting 2003
  - Some additional shoreside sampling provided by ADFG

Other skates



Big and longnose



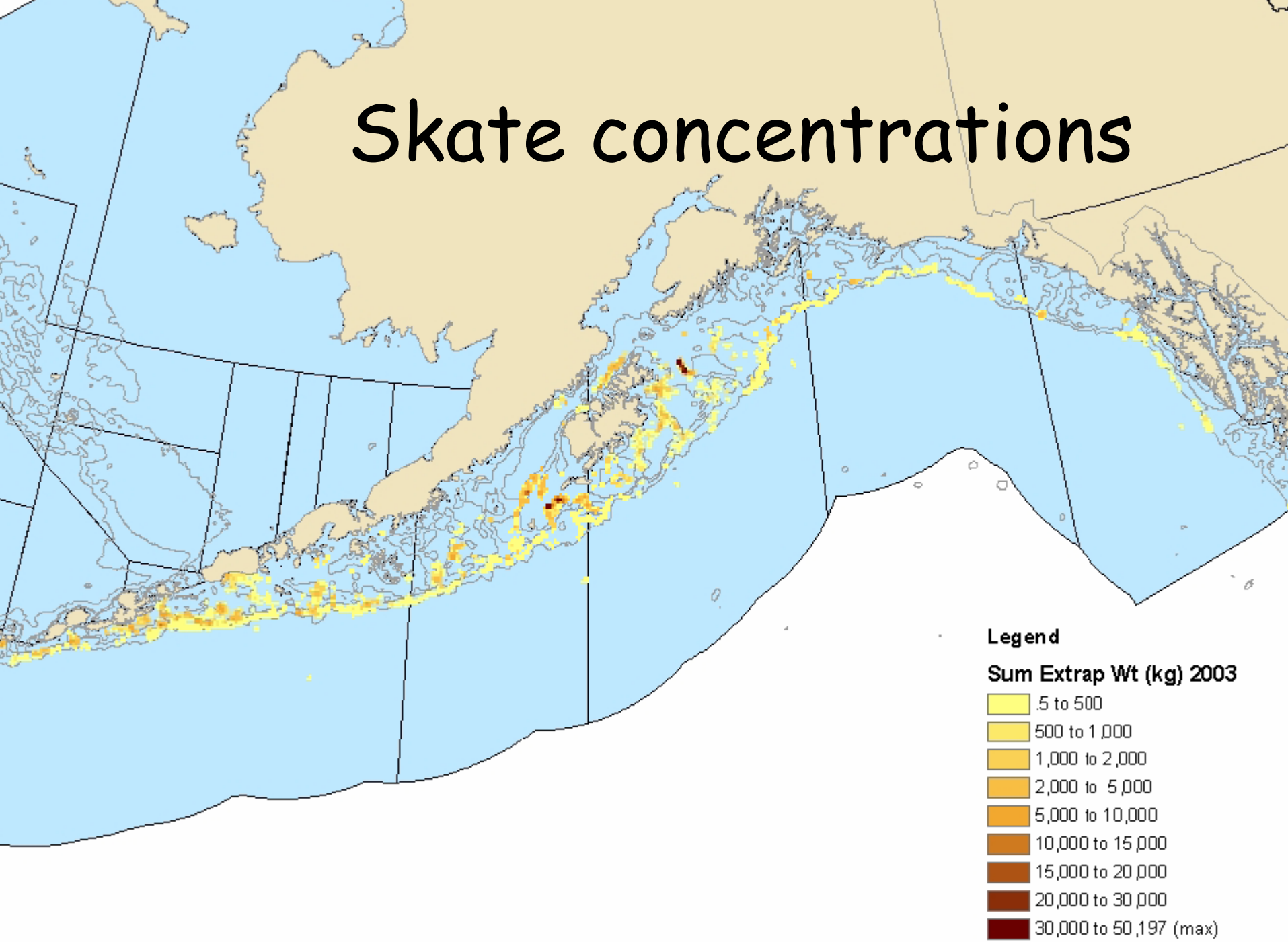
What are the conservation concerns?

- **Localized areas of directed fishery**
- **Uncertain ability to monitor catches**
- **Landings predominantly large females**
- **Large skates vulnerable in other parts of the world**
  - ✶E.g., Atlantic Barndoor skate is a related species
- **Uncertain harvest rate**
  - ✶Little known on the biology

Plan Team recommendations for GOA skates

- **Ease into more strict area and species specific ABCs**
  - Minimize inadvertent harvests due to poor sampling
  - Set ABC's for main target groups to area and a conservative TAC for Central GOA
  - Develop needed data collection systems

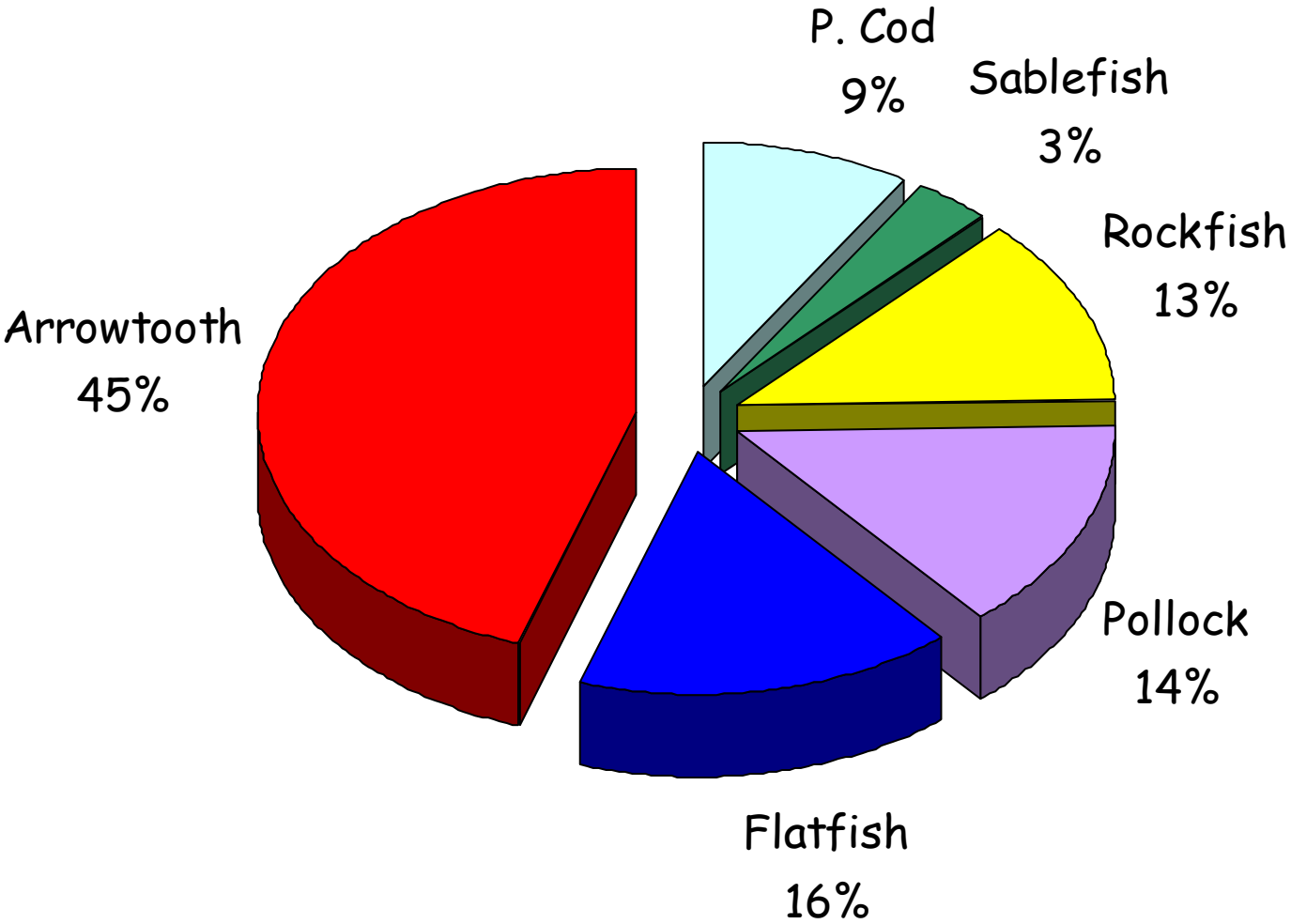
Skate concentrations



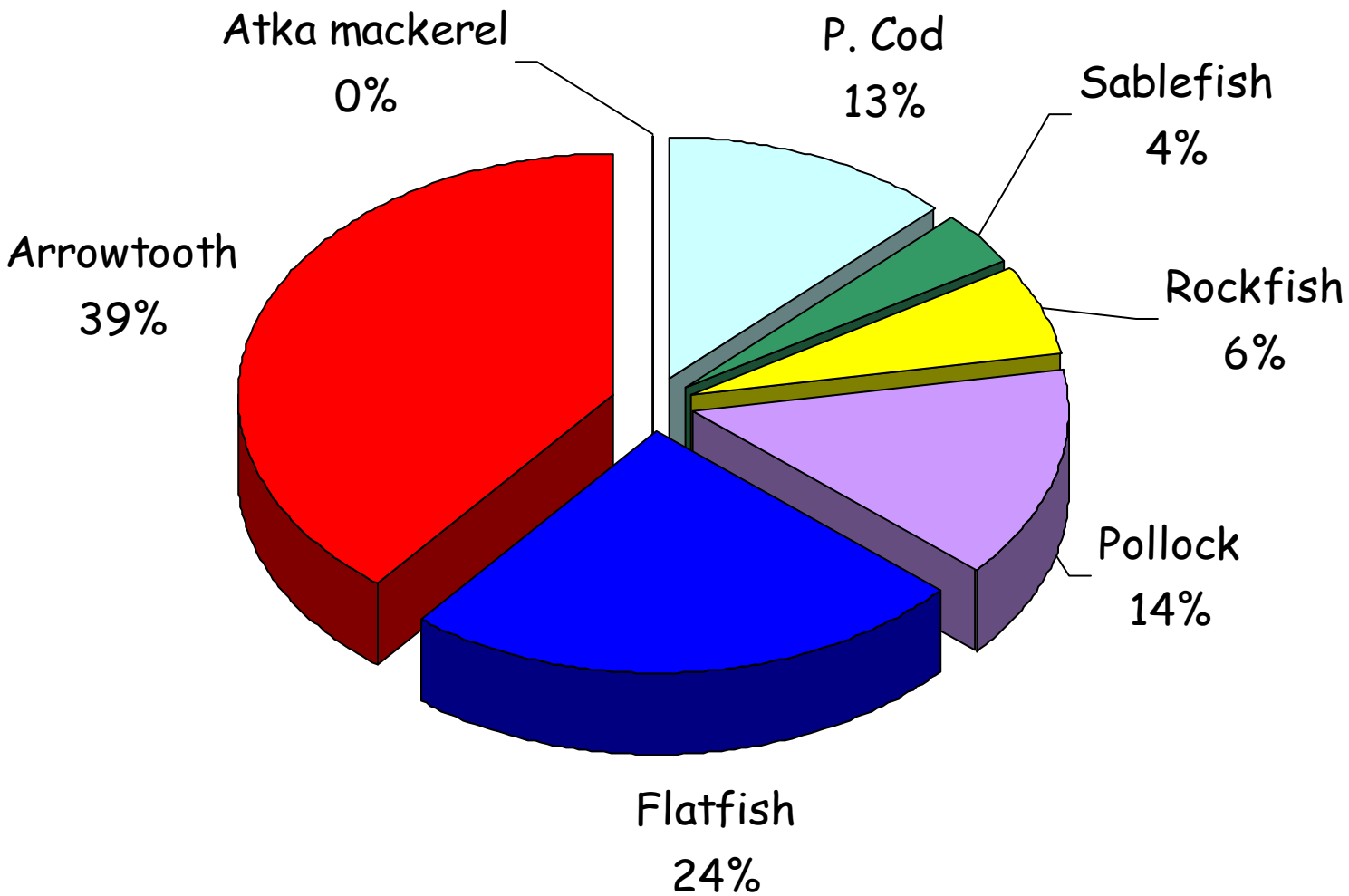
Summary by biomass

Projected biomass by species

~5.5 million tons total



Summary by ABC's

Projected ABC's by species

508,010 tons total (Plan Team)