Update on groundfish stock trends for the Gulf of Alaska

Report of the
Gulf of Alaska Groundfish
Plan Team meeting
Nov 17–21st, 2008

702 pages, 18 chapters,
2 GOA SAFE appendices
23 species or species groups

GOA Plan Team Members

James Ianelli (co-chair)	AFSC
Diana Stram (co-chair)	NPFMC
Jeff Fujioka	AFSC
Sandra Lowe	AFSC
Jon Heifetz	AFSC
Tom Pearson	AKR
Nick Sagalkin	ADFG
Cleo Brylinsky	ADFG
Leslie Slater	USFWS (joint)
Paul Spencer	AFSC
Nancy Friday	NMML
Mike Dalton	AFSC
Henry Cheng	WDF (joint)
Bob Foy	AFSC
Steven Hare	IPHC (joint)
Ken Goldman	ADFG
Sarah Gaichas	AFSC

Overview

Biennial cycle—"off" year for GOA

9 stocks in Tier 3

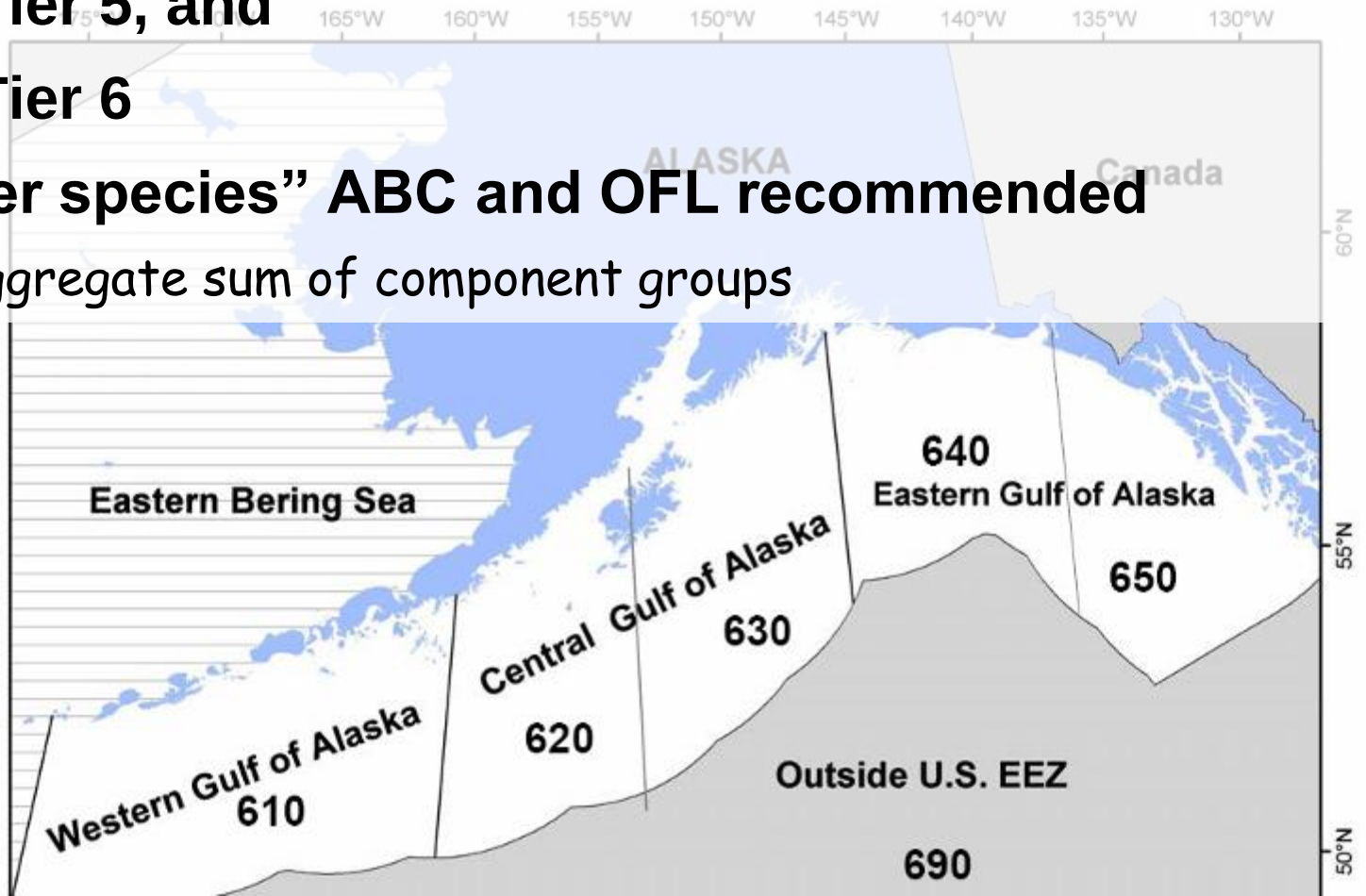
(mostly above $B_{40\%}$)

8 in Tier 5, and

2 in Tier 6

"Other species" ABC and OFL recommended

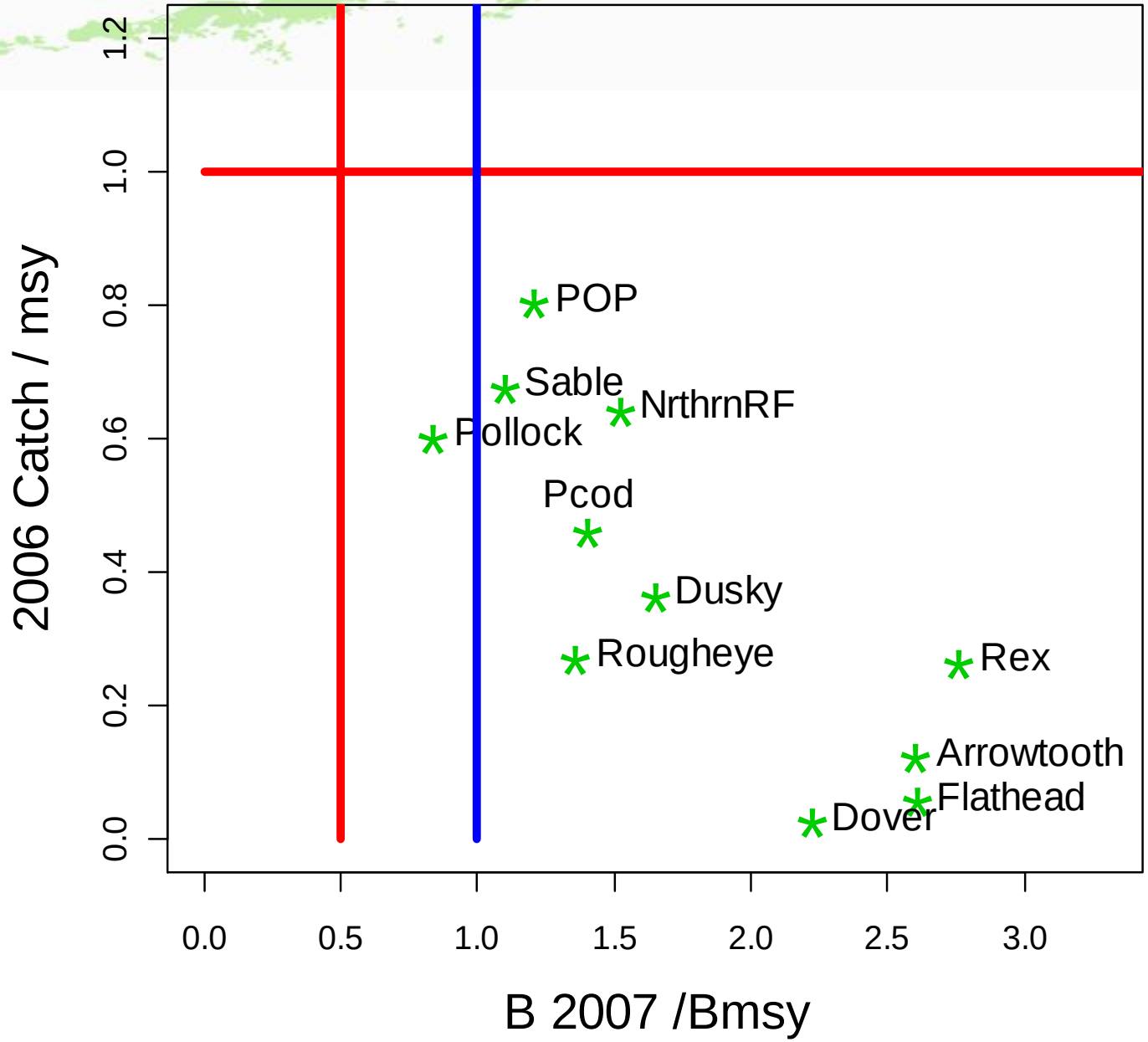
Aggregate sum of component groups



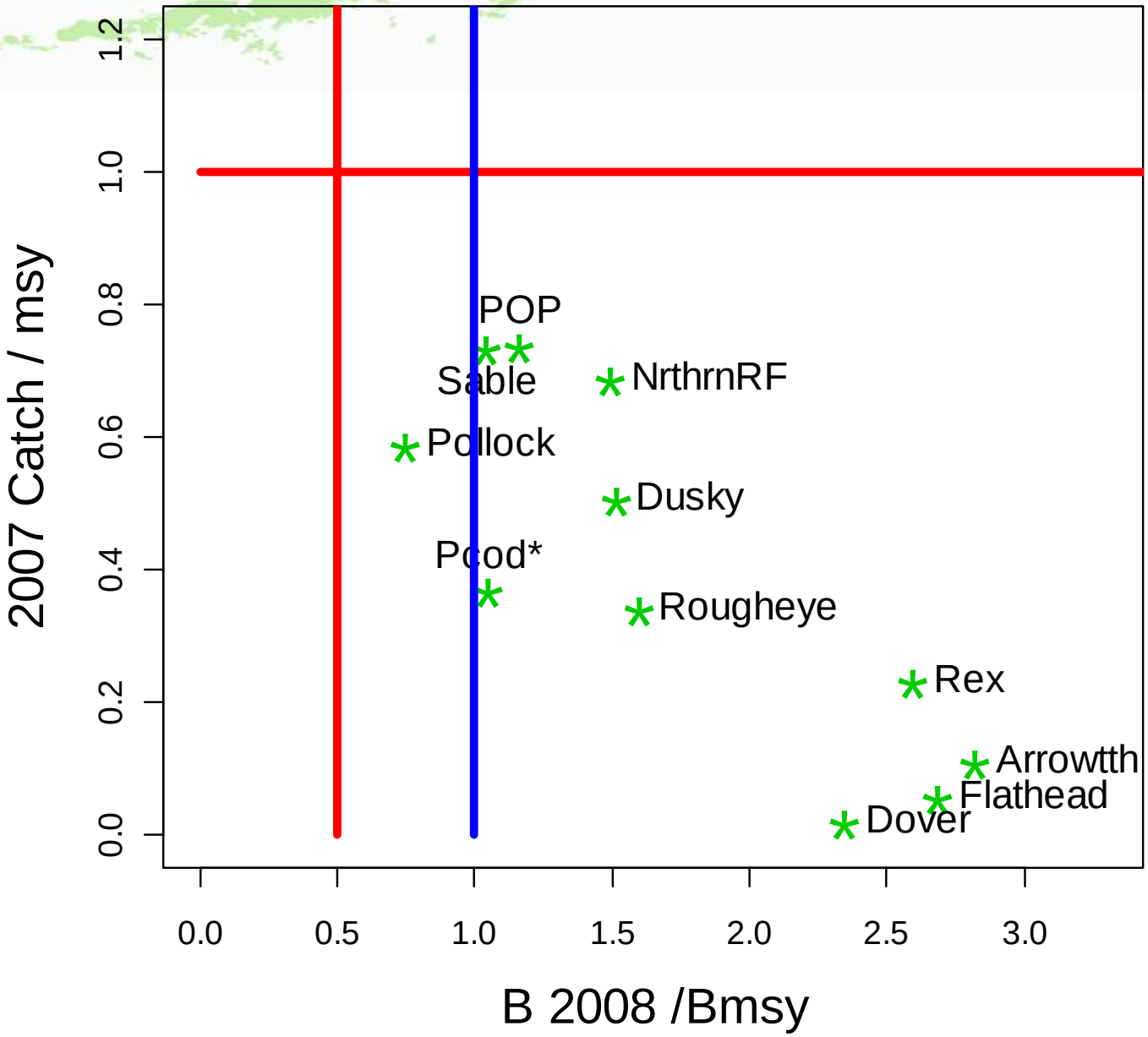
Survey outlook for 2009

- **Plan Team noted that throughout, the loss of the 2009 GOA bottom-trawl survey could adversely affect the ability to provide timely management advice**
  - Application of the revisions to National Standard Guidelines to implement annual catch limits (ACLs) may be directly impacted by lack of survey data (greater uncertainty mean lower ABC levels)

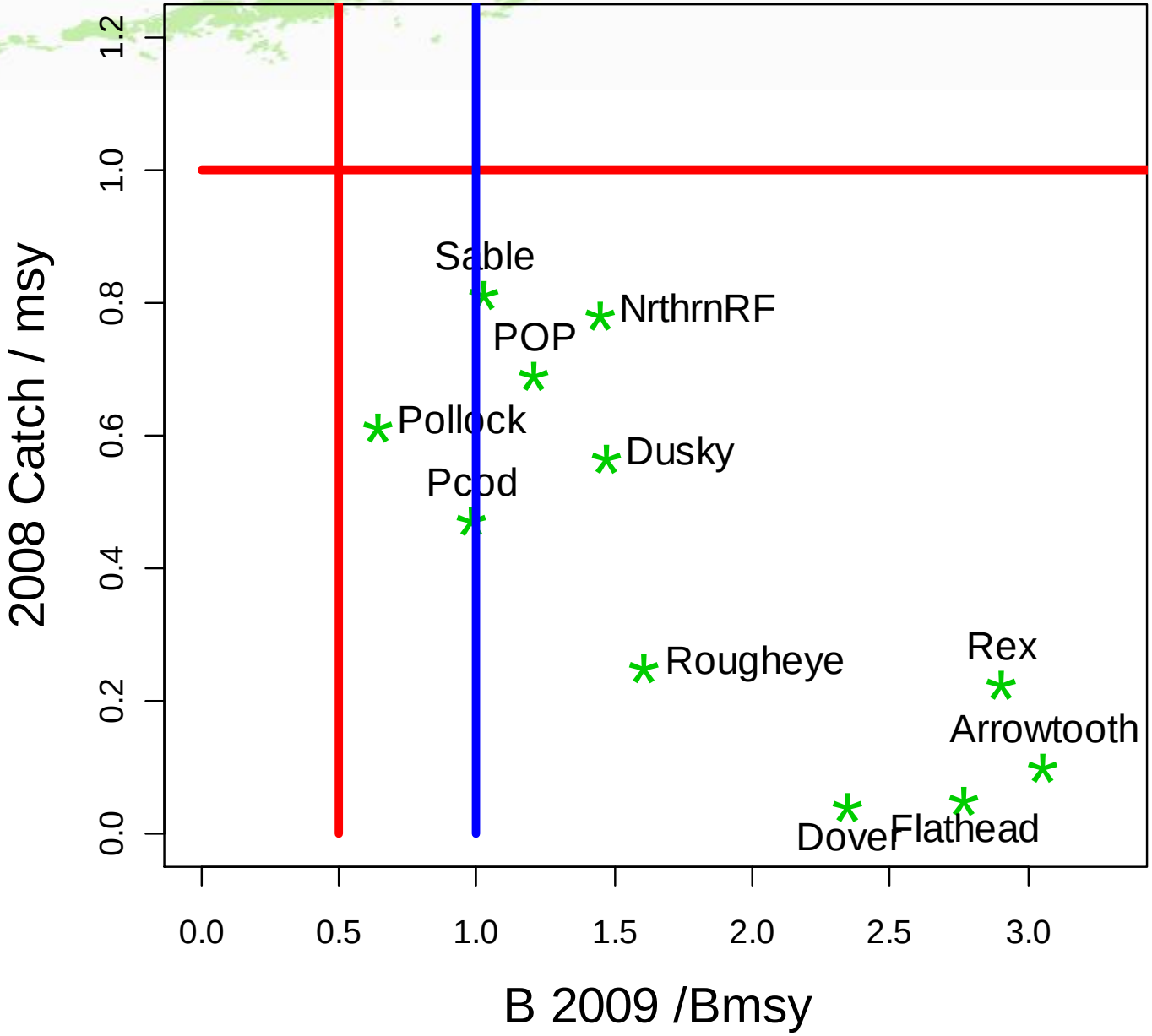
2006 results Gulf of Alaska



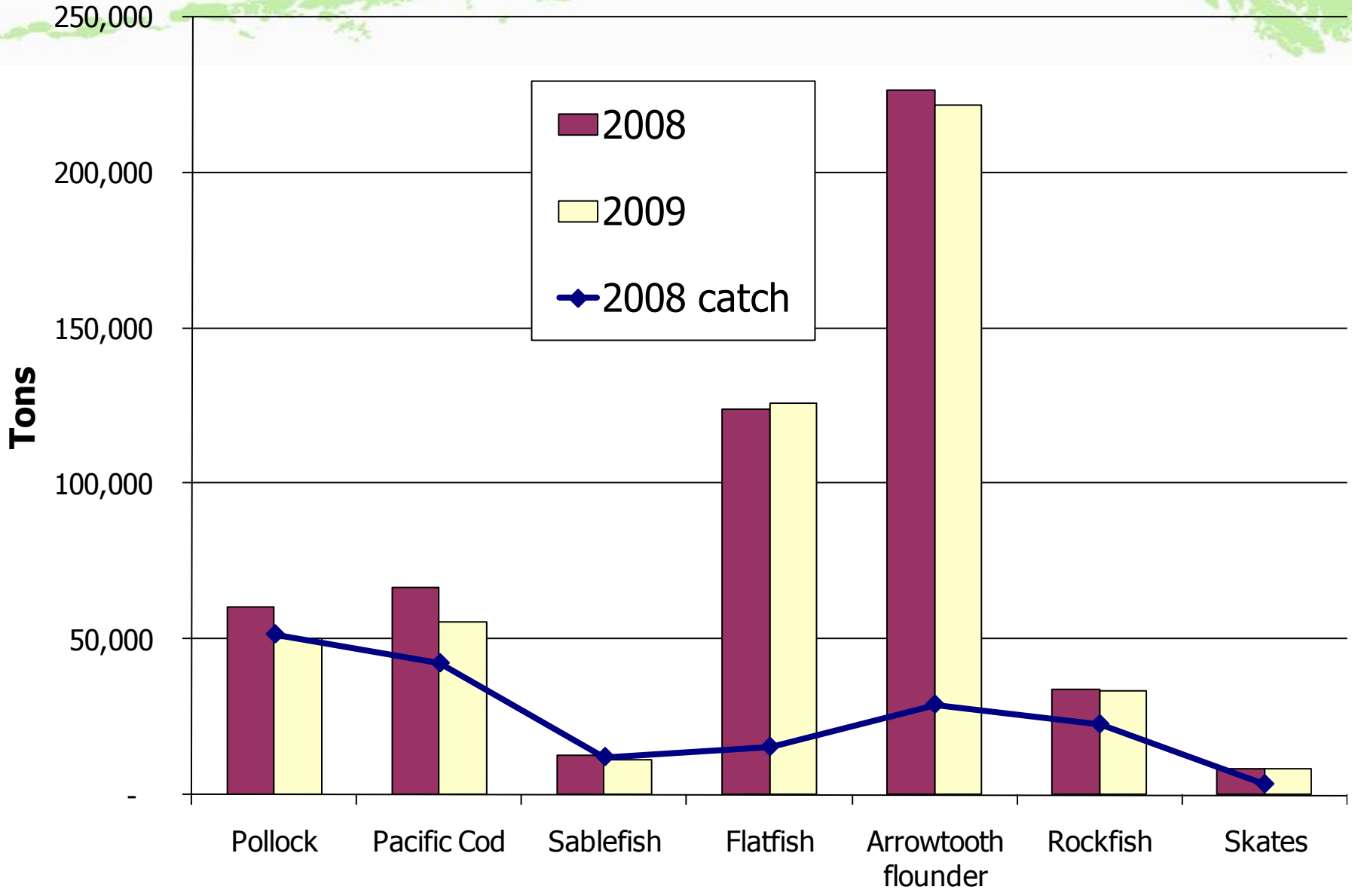
2007 results Gulf of Alaska



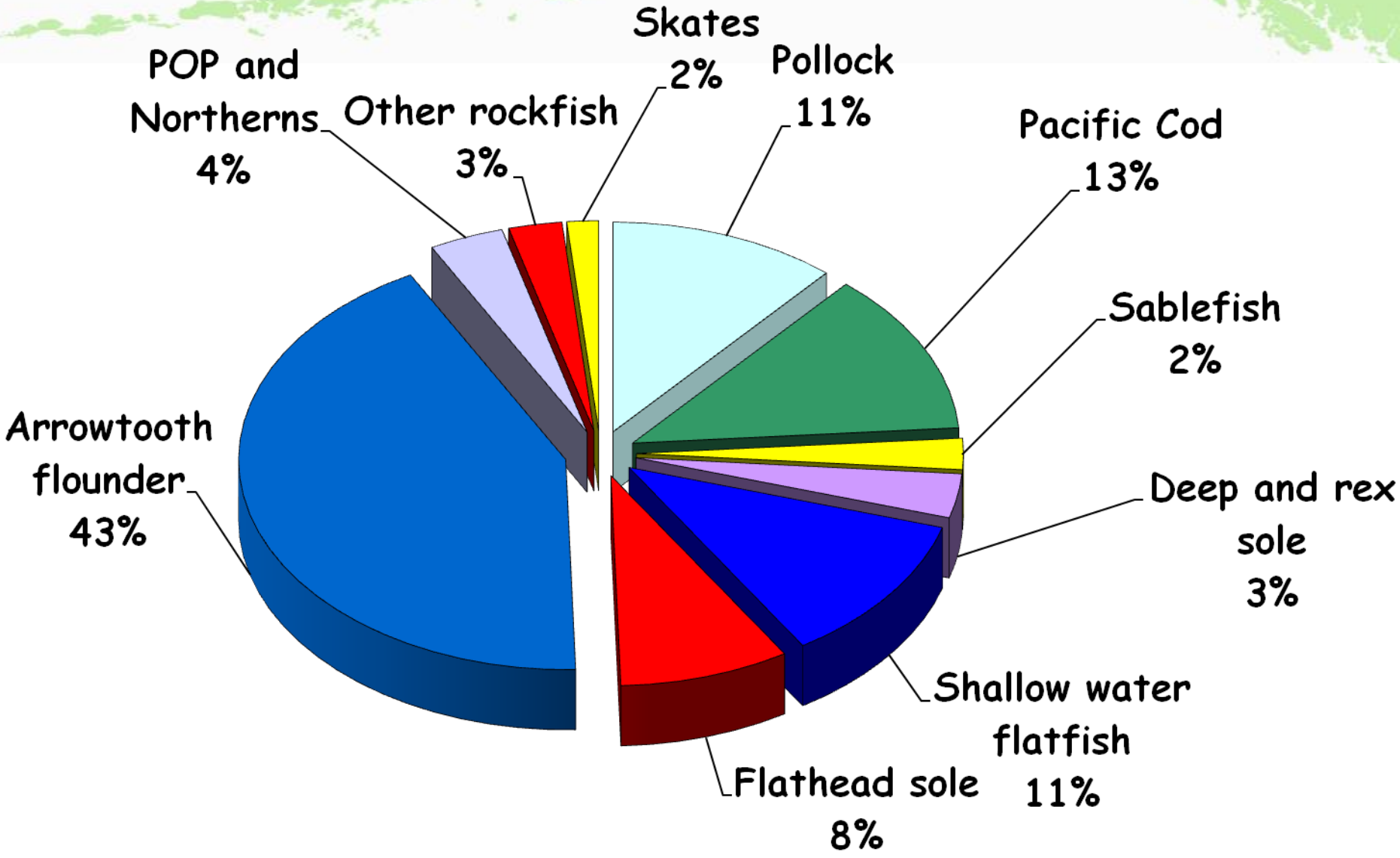
2008 results Gulf of Alaska



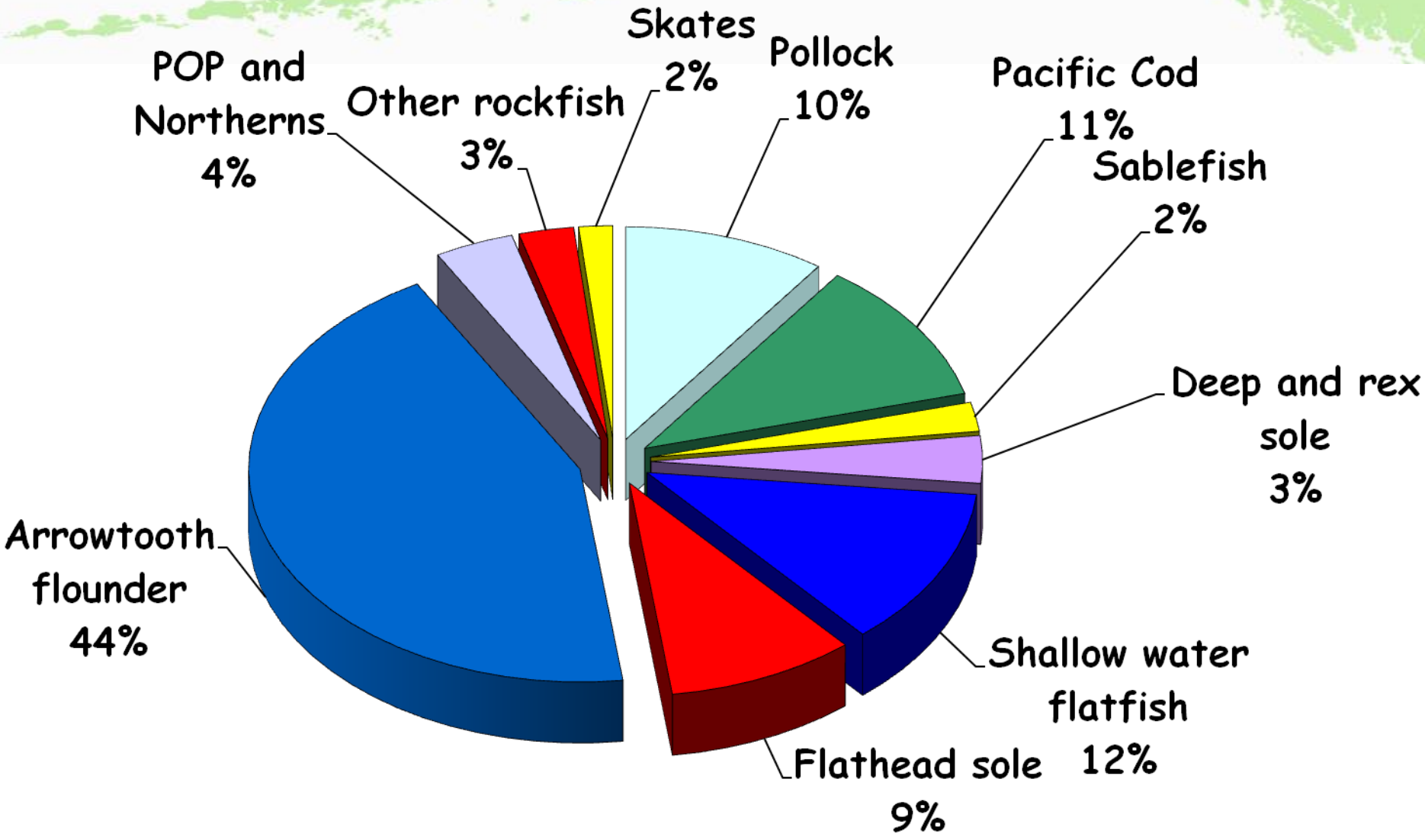
GOA Catch and ABC levels



GOA 2008 ABC's: 536,201 t



GOA 2009 ABC's: 509,515 t



Species overviews

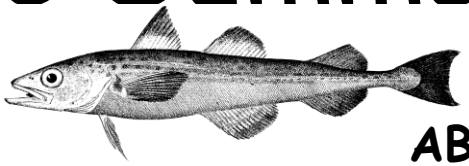
1. **2009 ABC/Catch and recommended changes**
2. **Highlights**
   - New data
   - Analytic approach (changes)
3. **Stock status and trend**
4. **ABC/OFL**
   - Tier history and candidacy
   - 2009, 2010 max*ABC*; recommended *ABC* (if < max)

Most detail on pollock, Pacific cod, and sablefish

Plan Team recommendations where ABC < maximum permissible:

	Percent of Max permissible
Pollock	86%
Demersal shelf rockfish	77%

ABC Summary



ABC

Species	2008 catch	2008	2009	Change	
Pollock	51,721	60,180	49,900	down 10,280	(17%)
Pacific Cod	42,424	66,493	55,300	down 11,193	(17%)
Sablefish	12,284	12,730	11,160	down 1,570	(12%)
Flatfish	15,544	123,759	125,617	up 1,858	(2%)
Arrowtooth flounder	29,163	226,470	221,512	down 4,958	(2%)
Rockfish	22,816	33,548	33,005	down 543	(2%)
Atka mackerel	2,071	4,700	4,700	same	(0%)
Skates	3,548	8,321	8,321	same	(0%)
Total	179,571	536,201	509,515	down 26,686	(5%)

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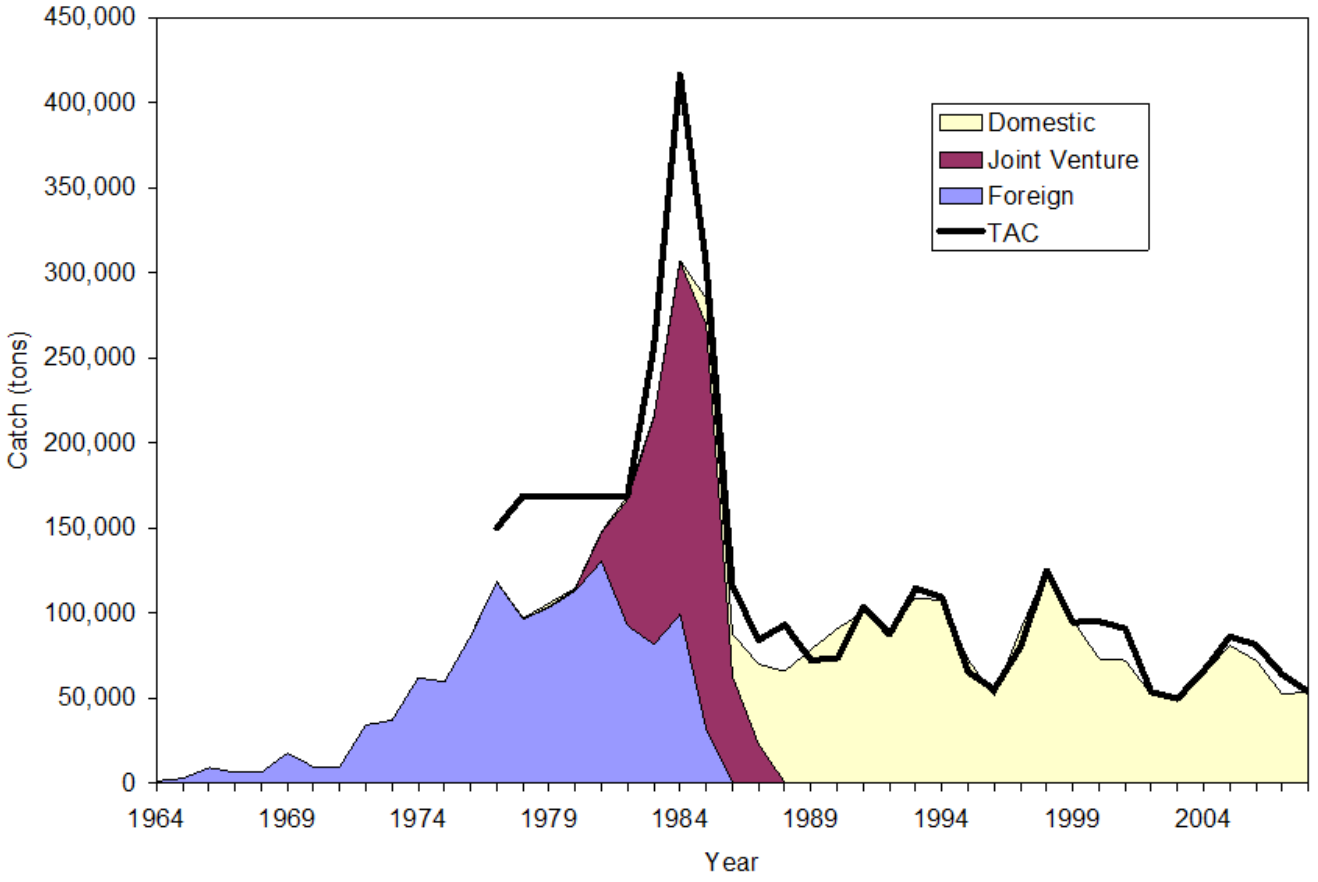
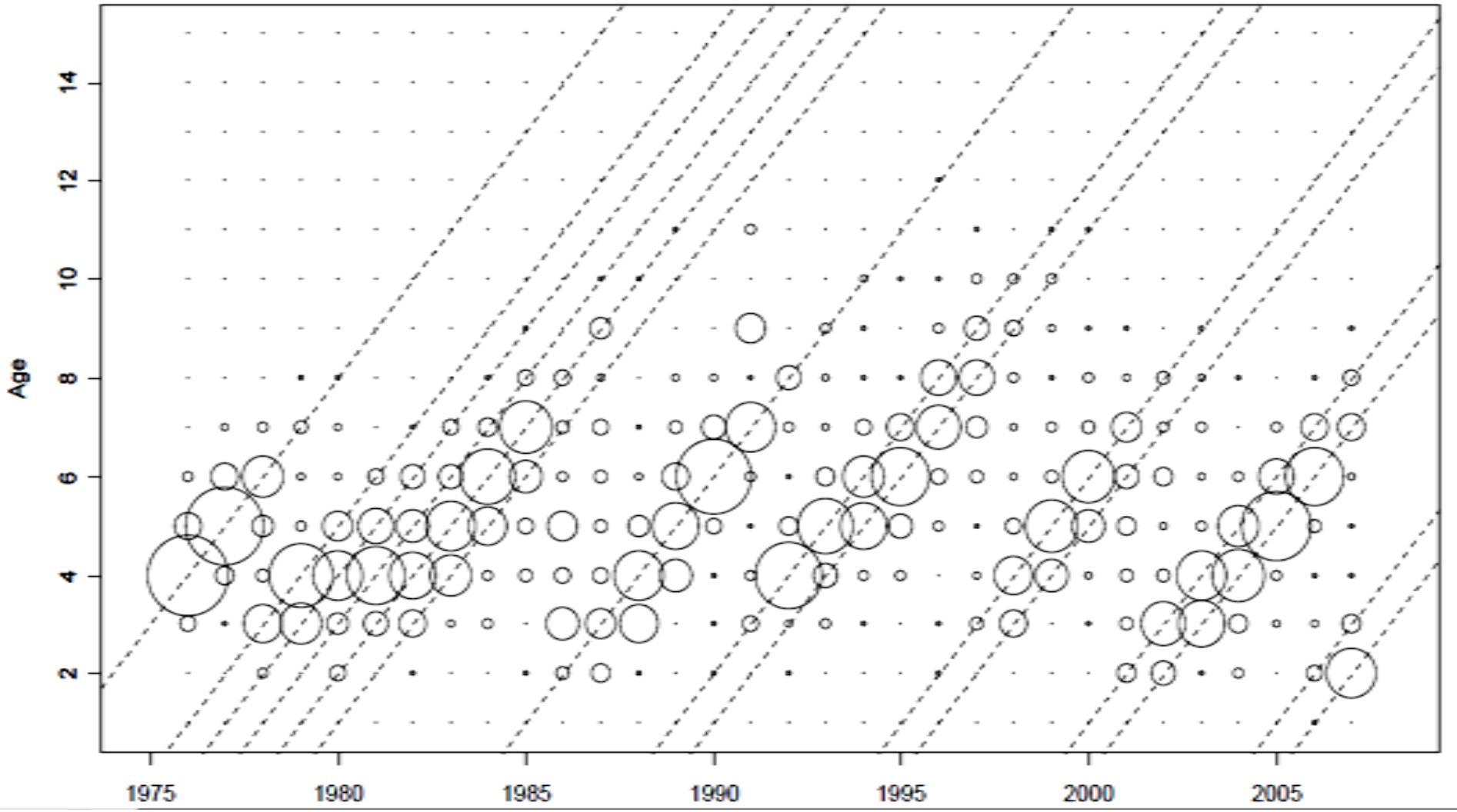
New Data

- Fishery: 2007 total catch and catch at age
- Shelikof Strait EIT survey: 2008 biomass and age composition
- ADF&G crab/groundfish trawl survey: 2008 biomass and length composition, 2007 age composition
- Vessel calibration study
  - Presented at October mtg

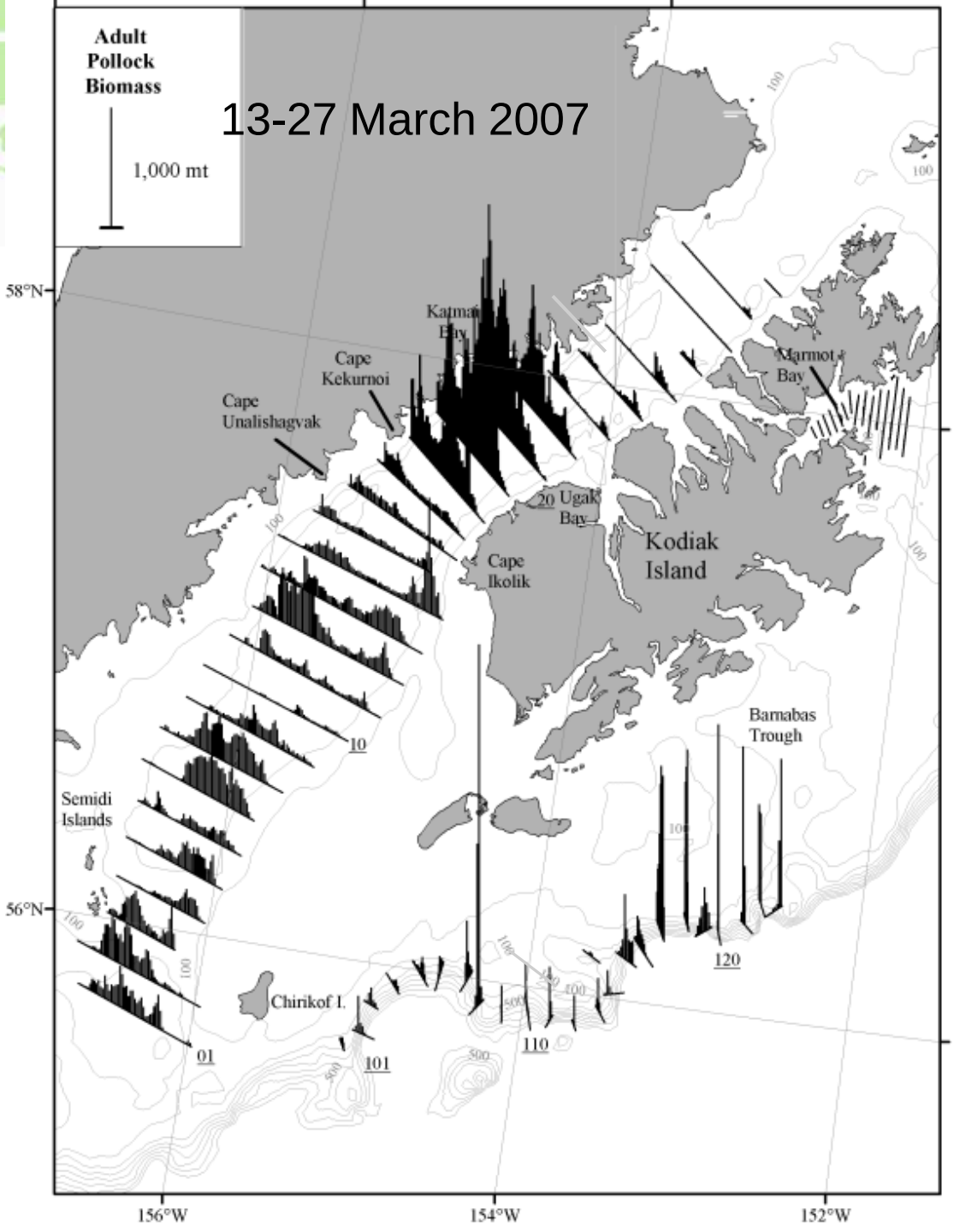


GOA pollock fishery age compositions

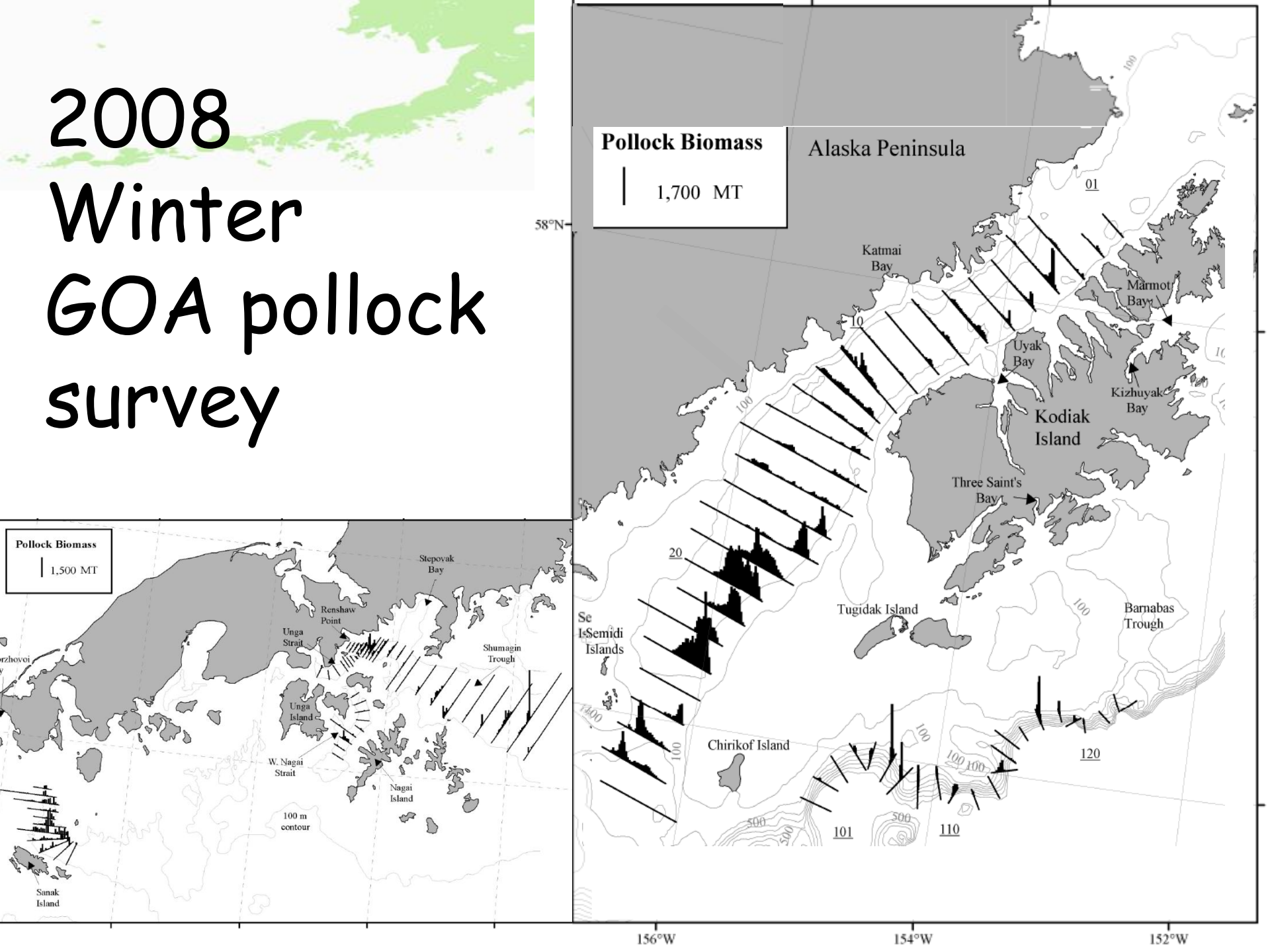


Catch at age, 1976-2007

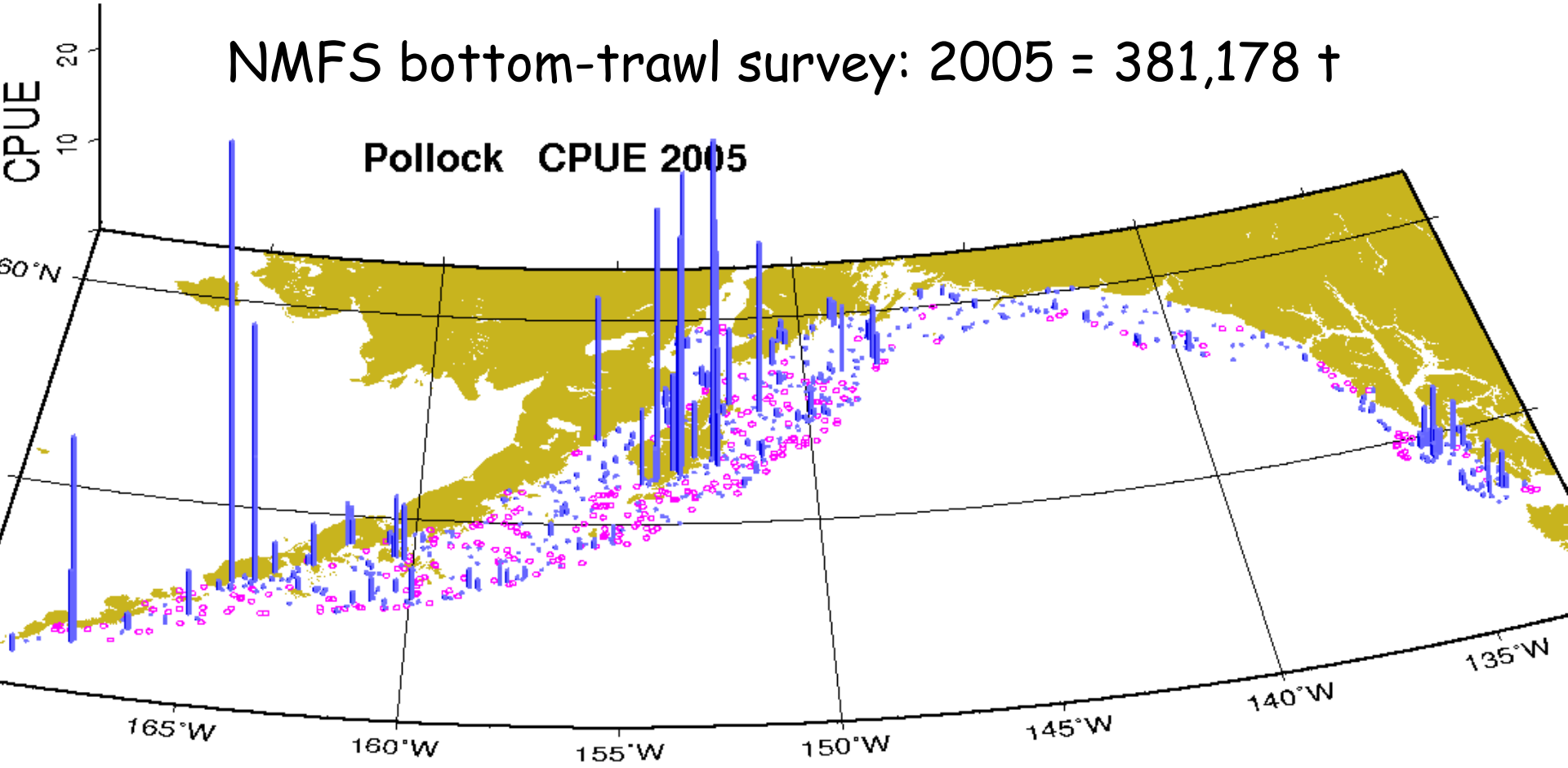
2007 Winter GOA pollock survey



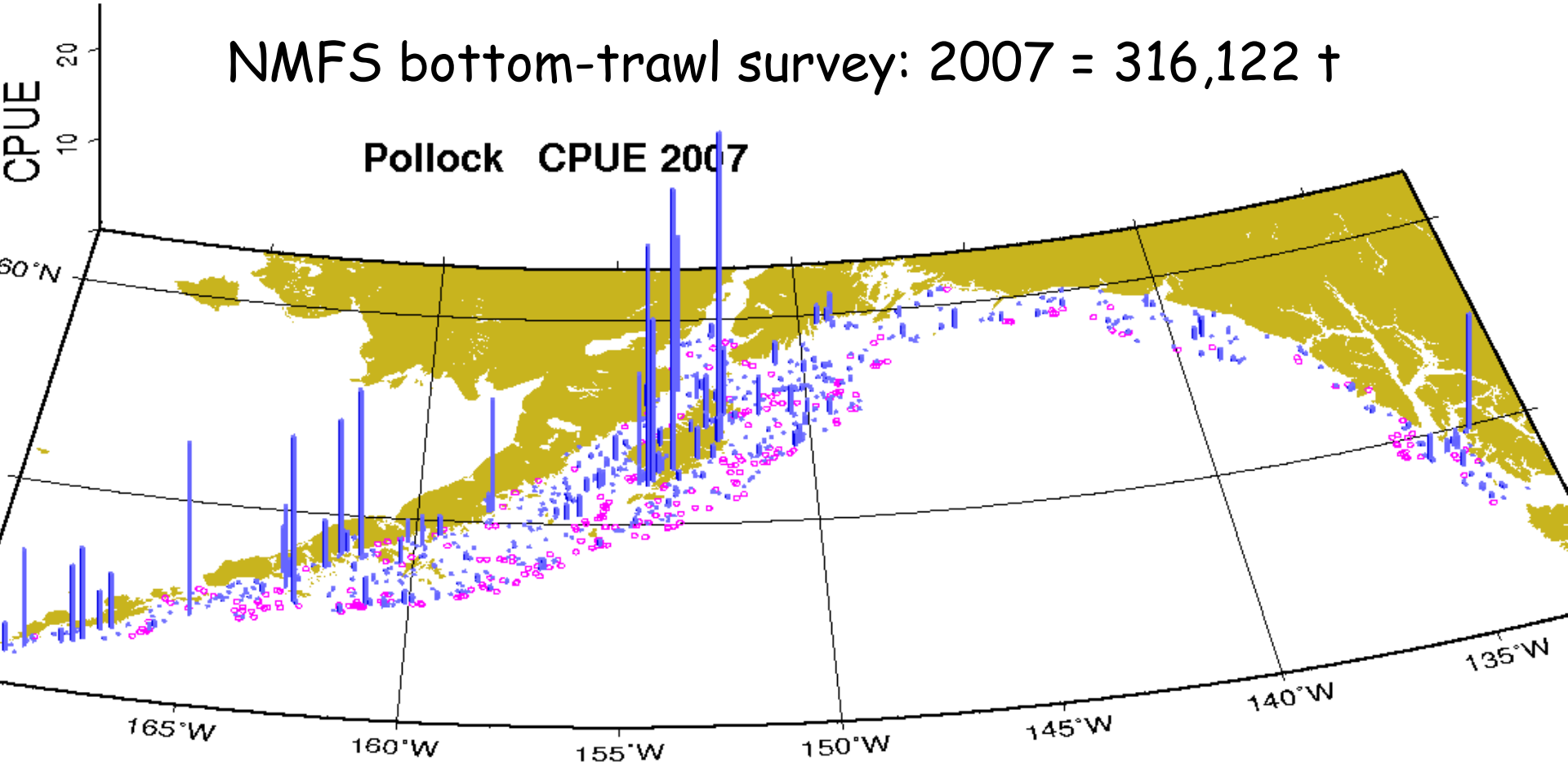
2008 Winter GOA pollock survey



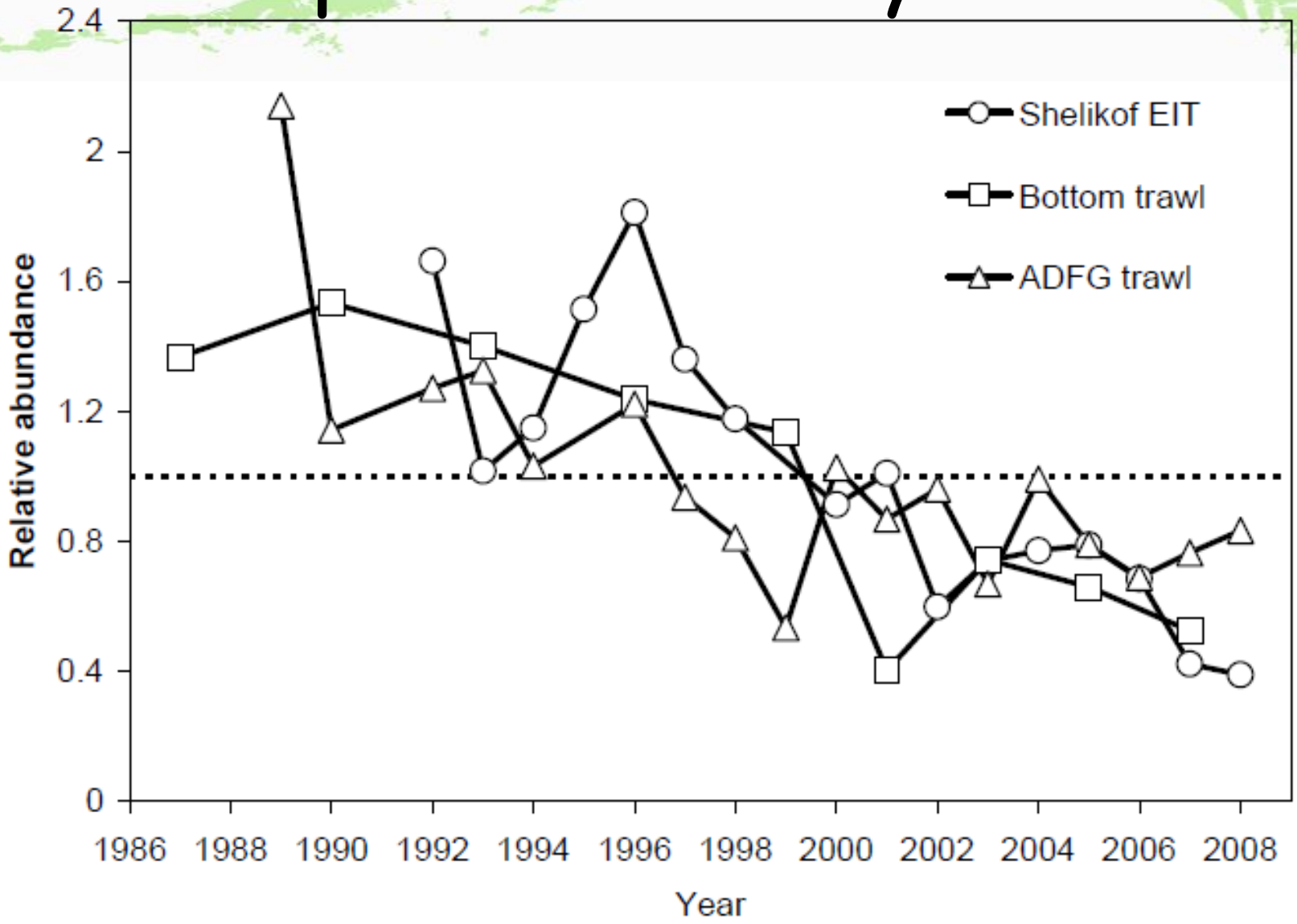
NMFS bottom-trawl survey: 2005 = 381,178 t



NMFS bottom-trawl survey: 2007 = 316,122 t



GOA pollock survey trends



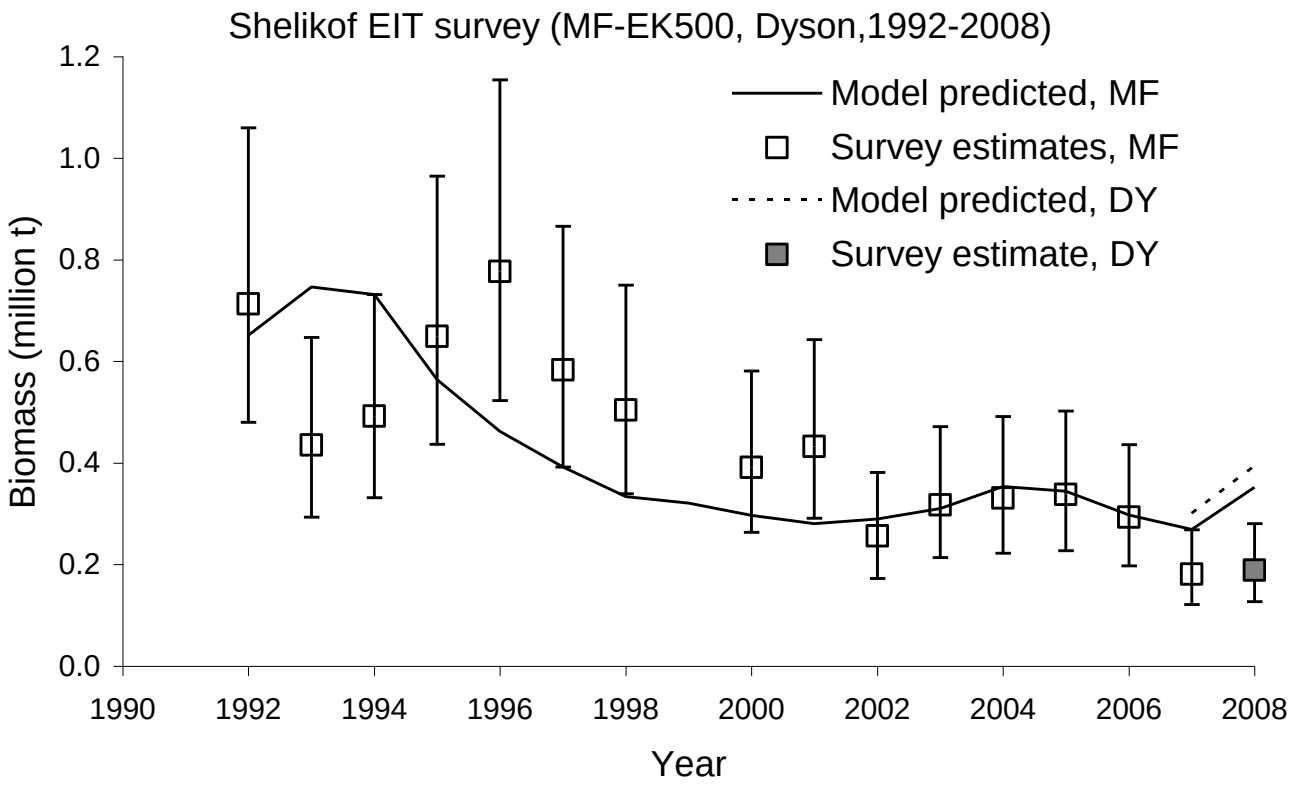
Relative trends in abundance indices, 1986-2008

Shelikof Strait survey

- **Team supported vessel calibration approach between Oscar and Miller**

$$\log L = -\frac{1}{2\left(\sigma_P^2 + \sigma_S^2\right)}\left[\log(q_{OD}) - \log(q_{MF}) - \delta_{OD:MF}\right]^2$$

Results from a vessel comparison between the OD and MF, indicate a ratio of 1.132 for Shelikof Strait (2007). The ratio is 1.31 in the Shumagin area (2008)

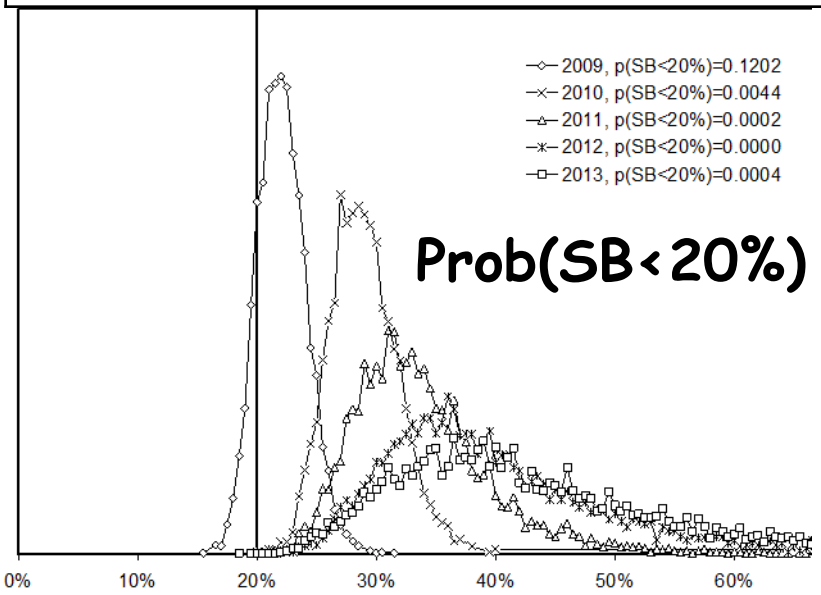


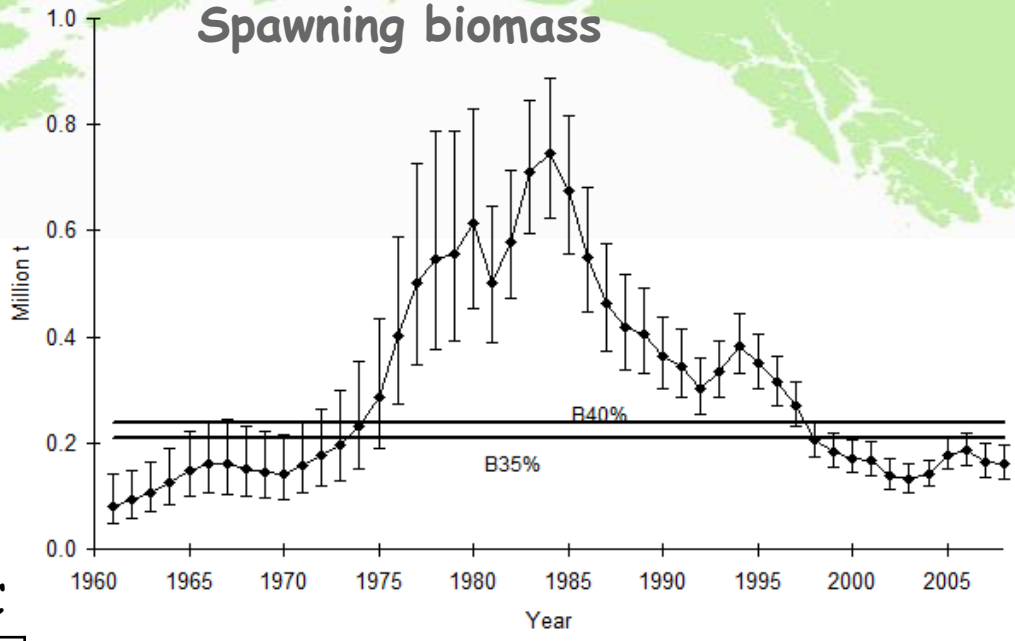
GOA pollock model results

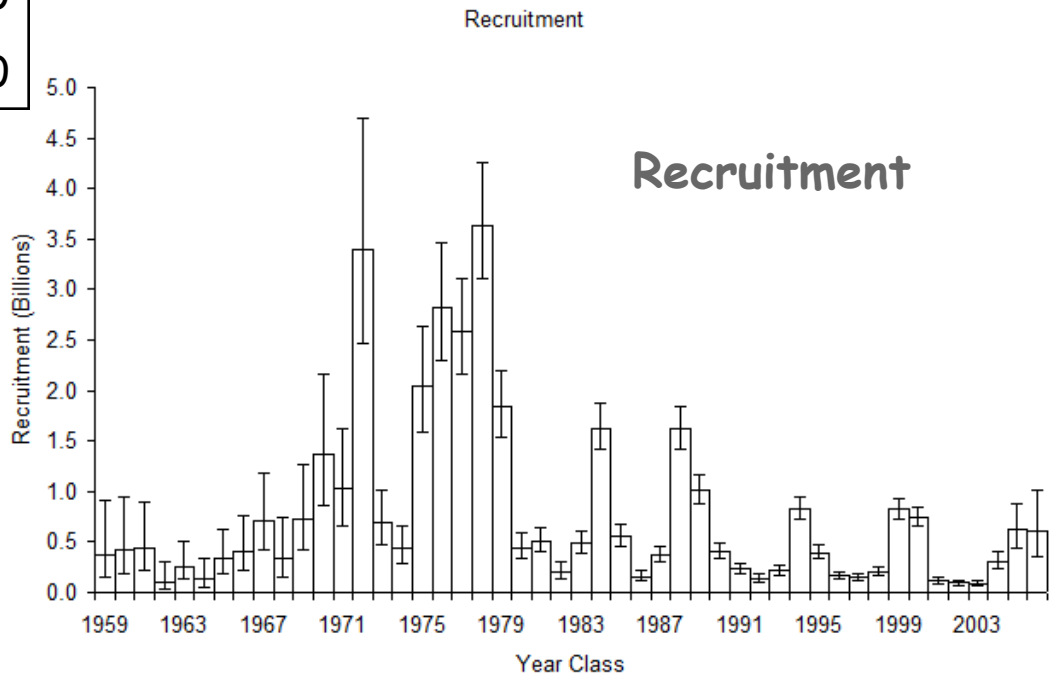
Conservative ABC:

- 15% of max-permissible
- 2009 SSB 22% of $B_{100\%}$

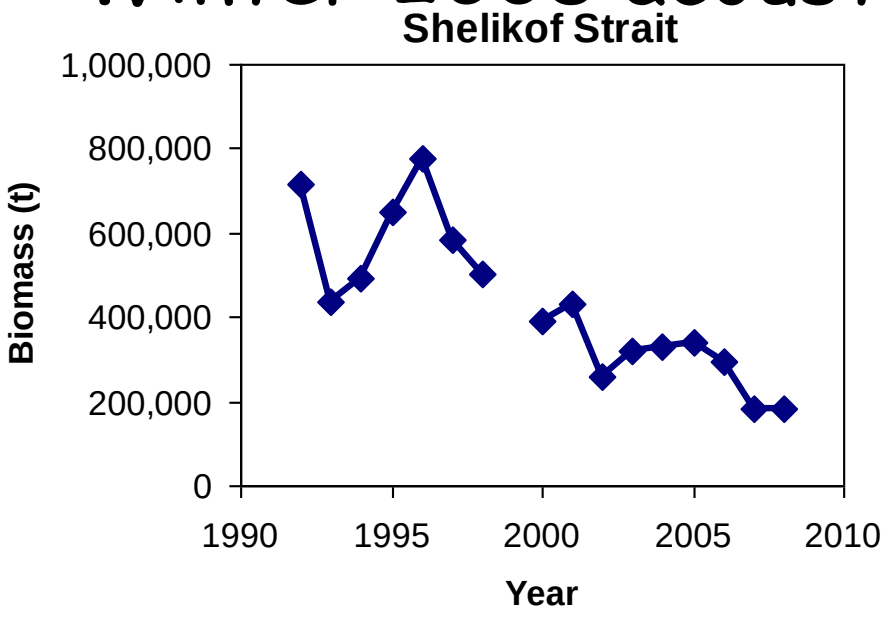
Pollock	Biomass	OFL	ABC
2009	675,749	69,630	49,900
2010		101,960	74,330

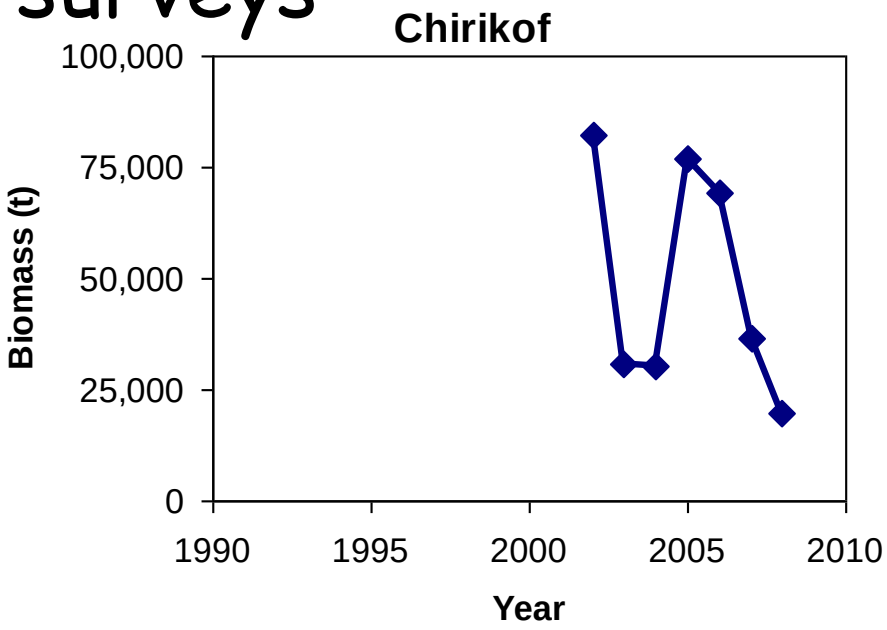


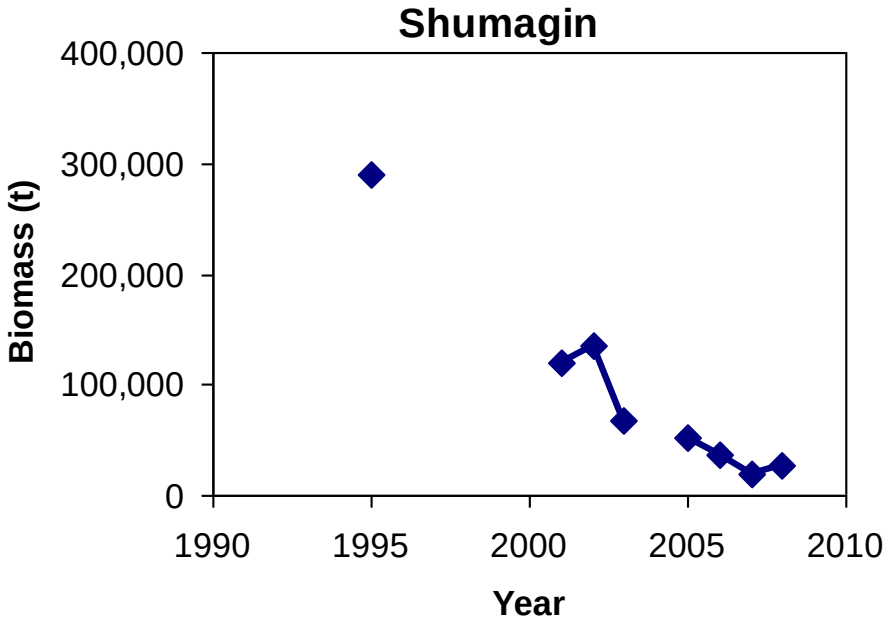


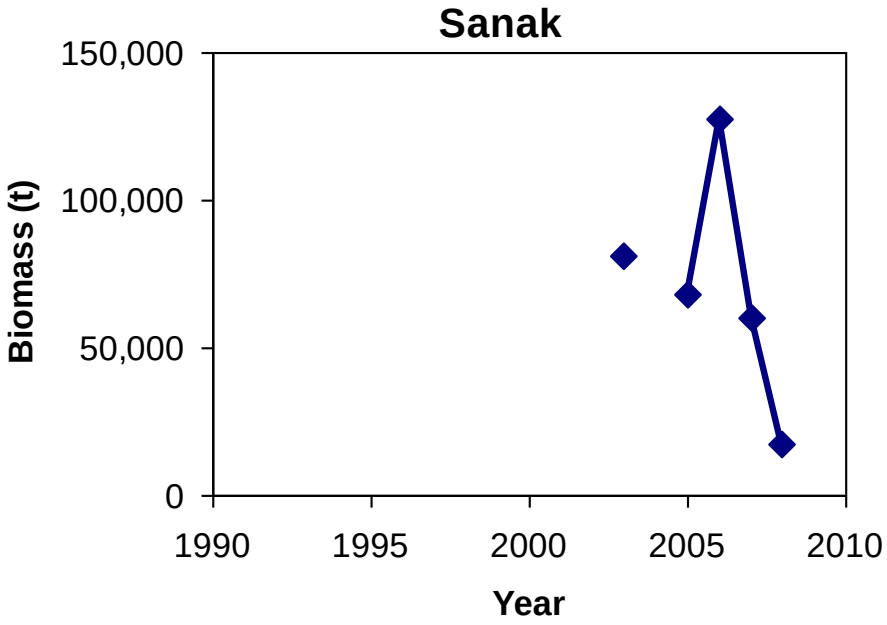


Winter 2008 acoustic surveys



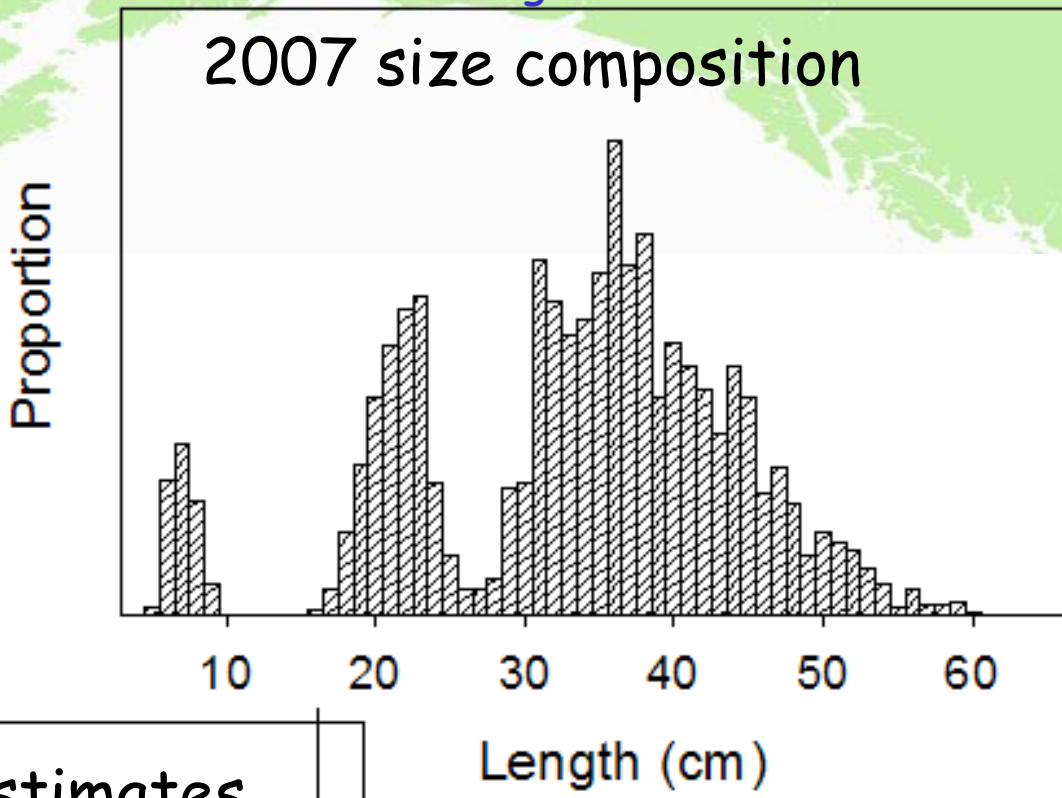


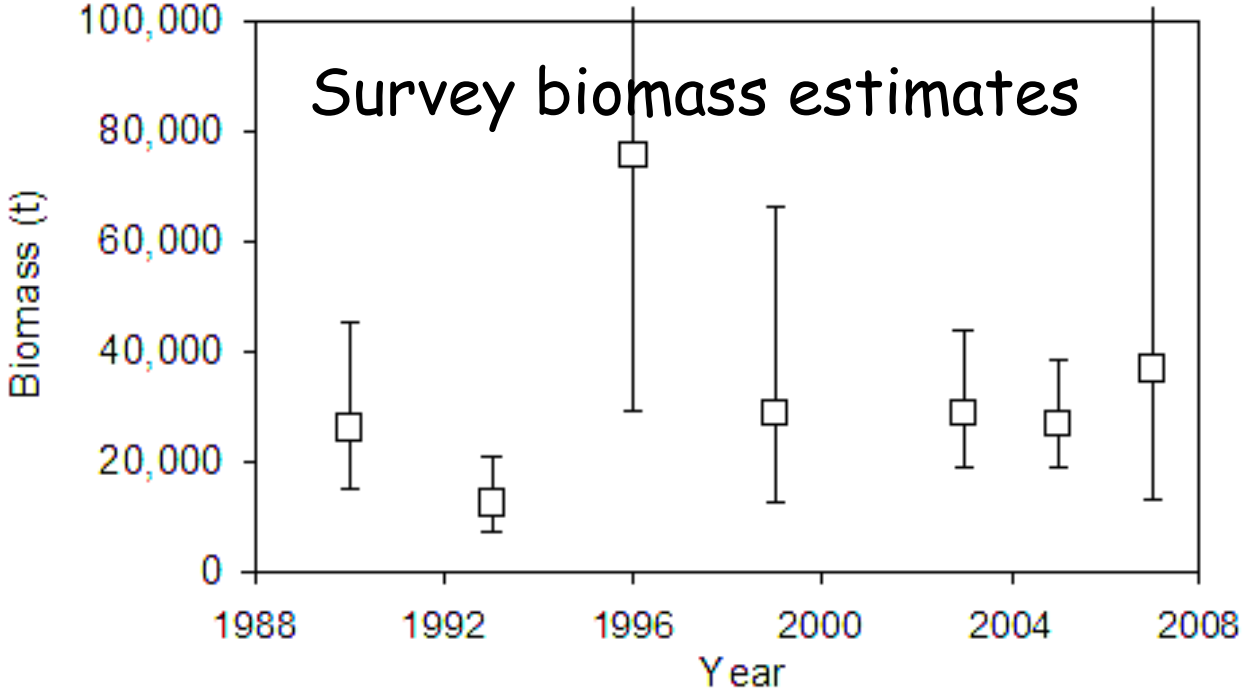




EGOA pollock (Tier 5)

EGOA Pollock	Biomass	OFL	ABC
2009	36,799	11,040	8,280
2010		11,040	8,280





No change from 2007

ABC Summary
Pacific cod

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Total	179,571	536,201	509,515	down 26,686	(5%)

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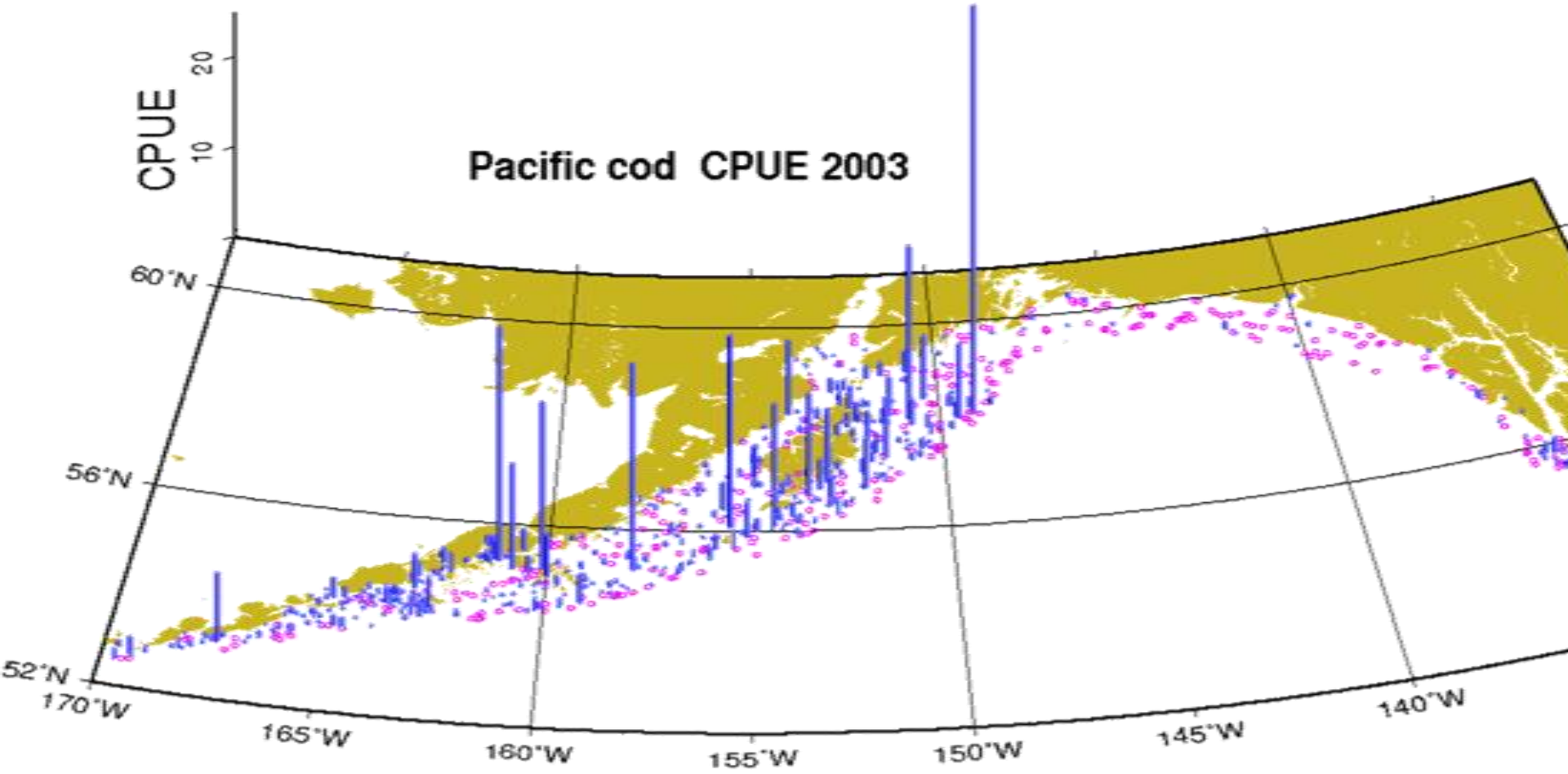
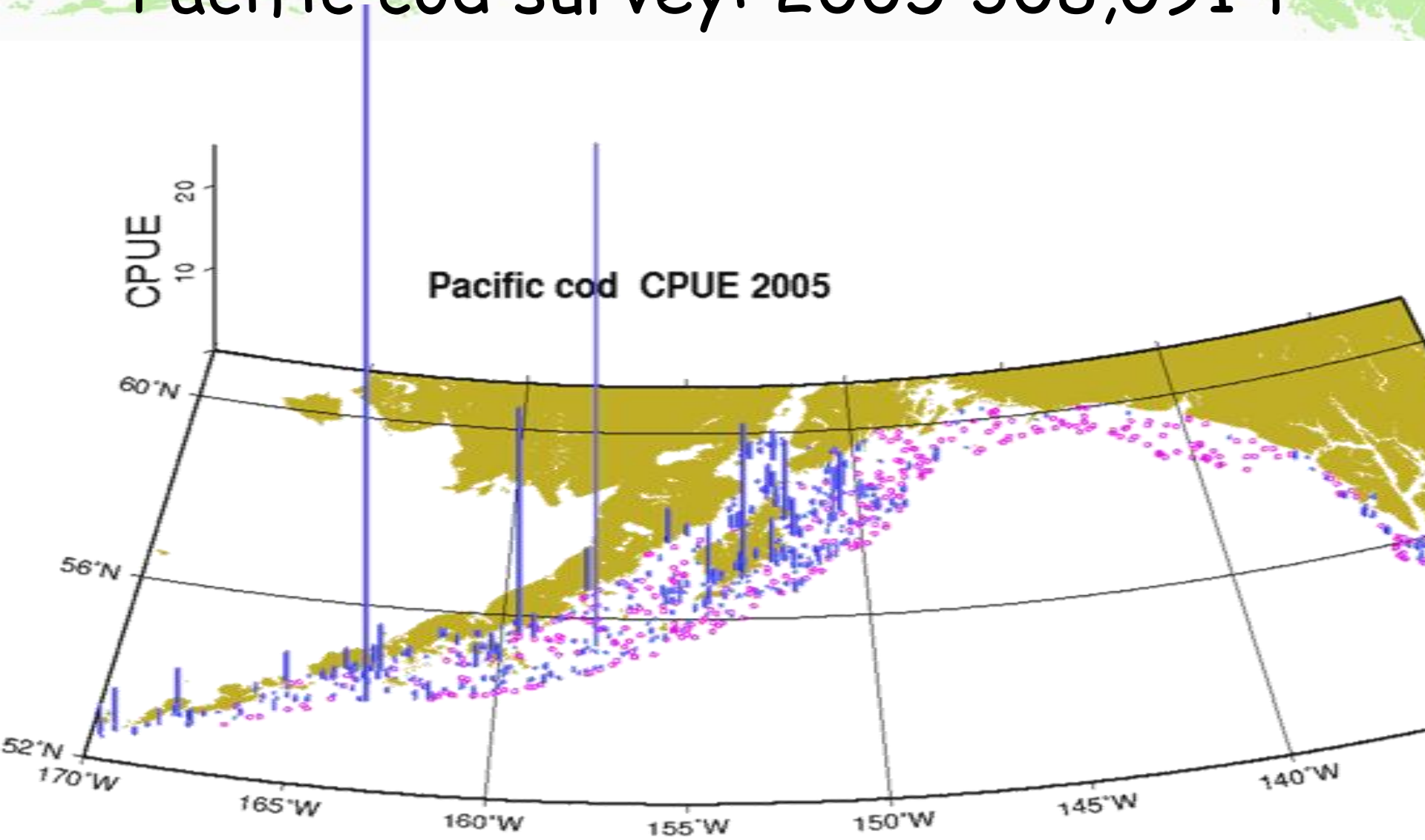
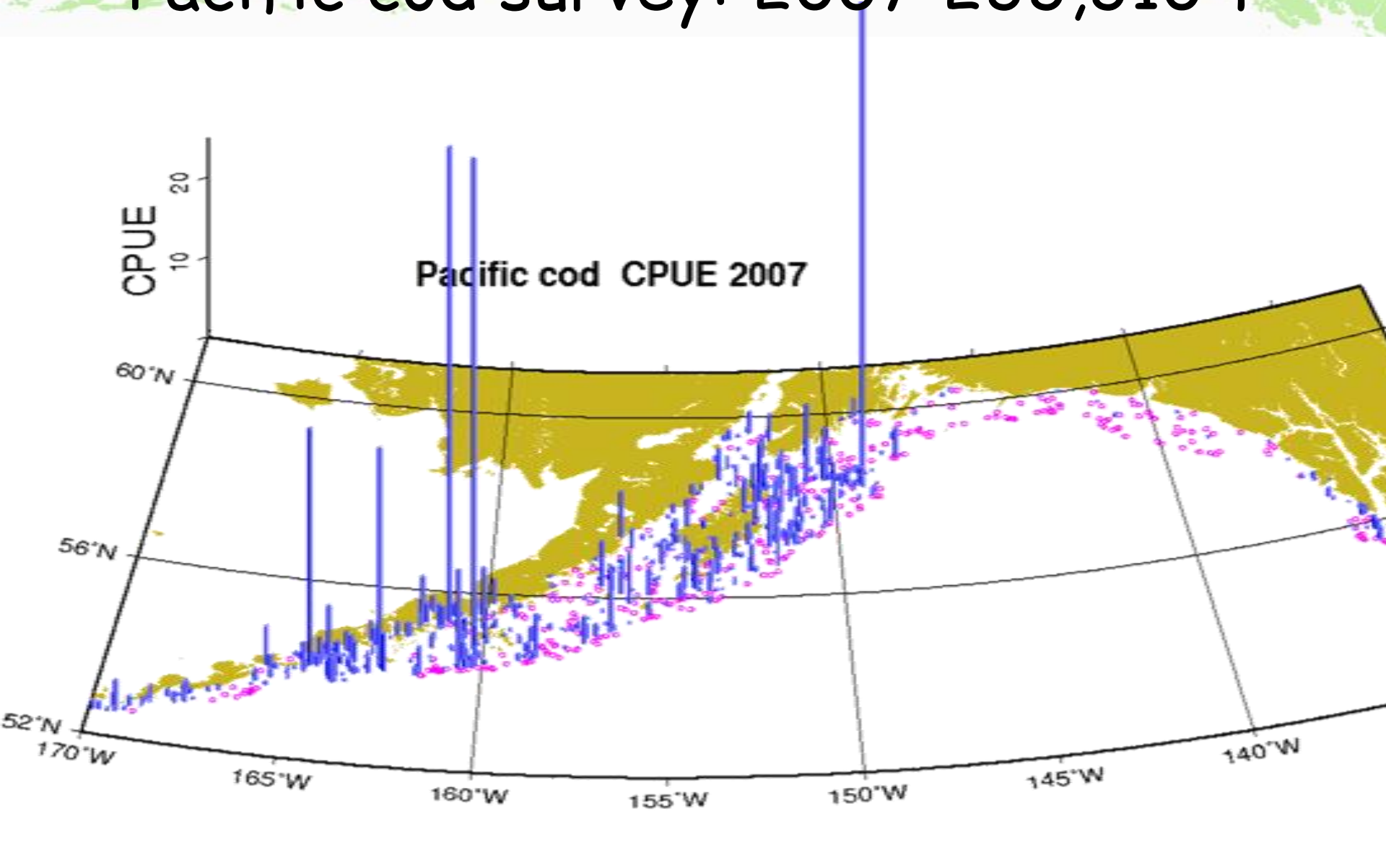
Pacific cod survey: 2003 297,402 t



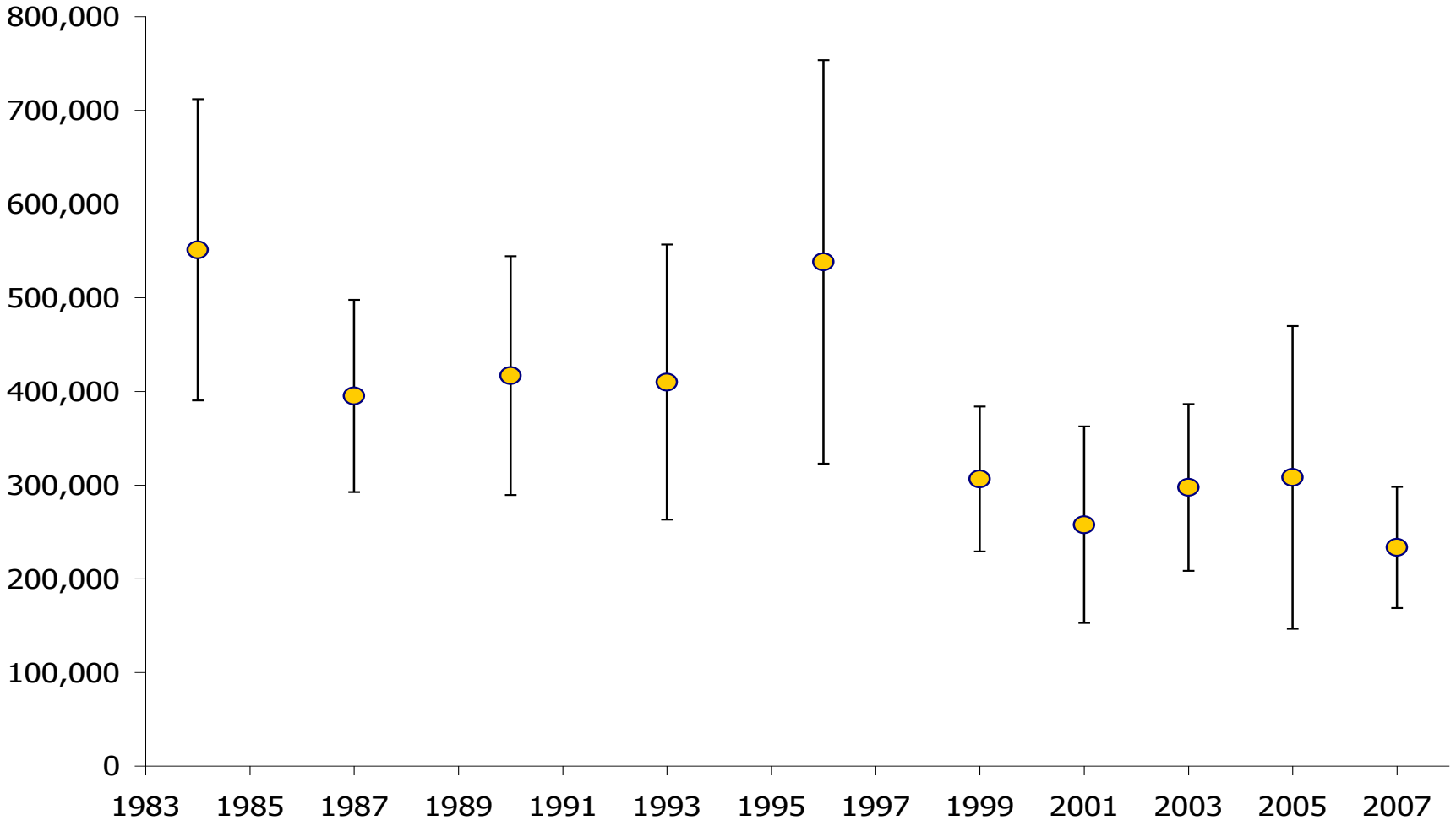
Pacific cod survey: 2005 308,091 t



Pacific cod survey: 2007 233,310 t

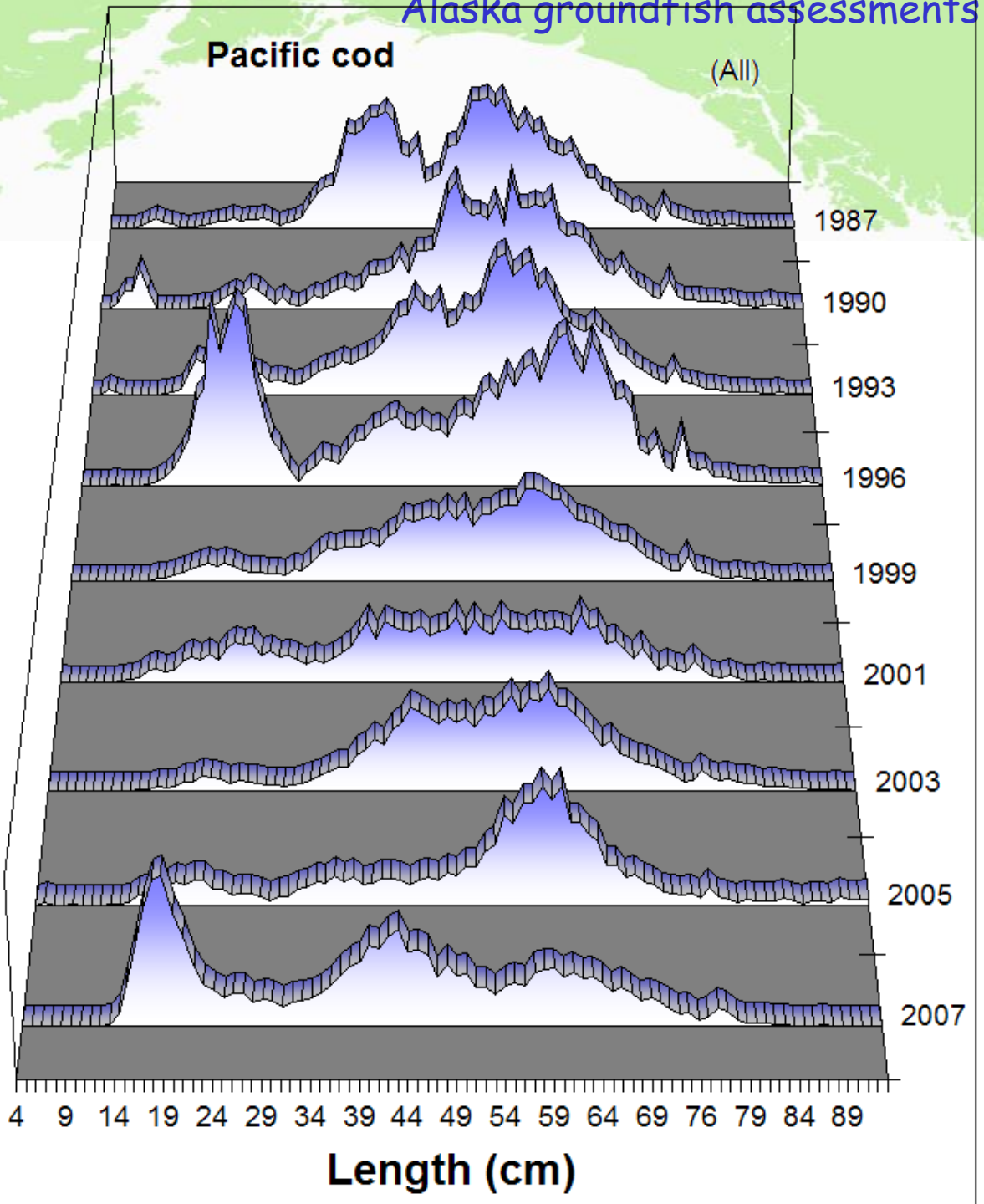


Pacific cod survey biomass estimates



Pacific cod

Survey abundance at-length

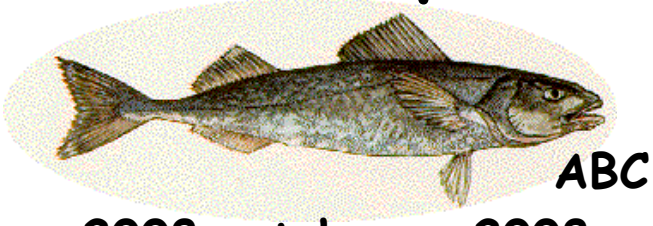


GOA Pacific cod

- **GOA assessment completed**
  - A full assessment was submitted, with September version as an appendix
- **Team accepted the model**
  - Recognizing refinements are needed, e.g.,
    - Issues on estimating survey catchability
    - Weighting of age-compositions
- **ABC recommendation consistent with survey trend**

Pacific cod	Biomass	OFL	ABC
2009	520,000	66,600	55,300
2010		126,000	79,500

ABC Summary
Sablefish



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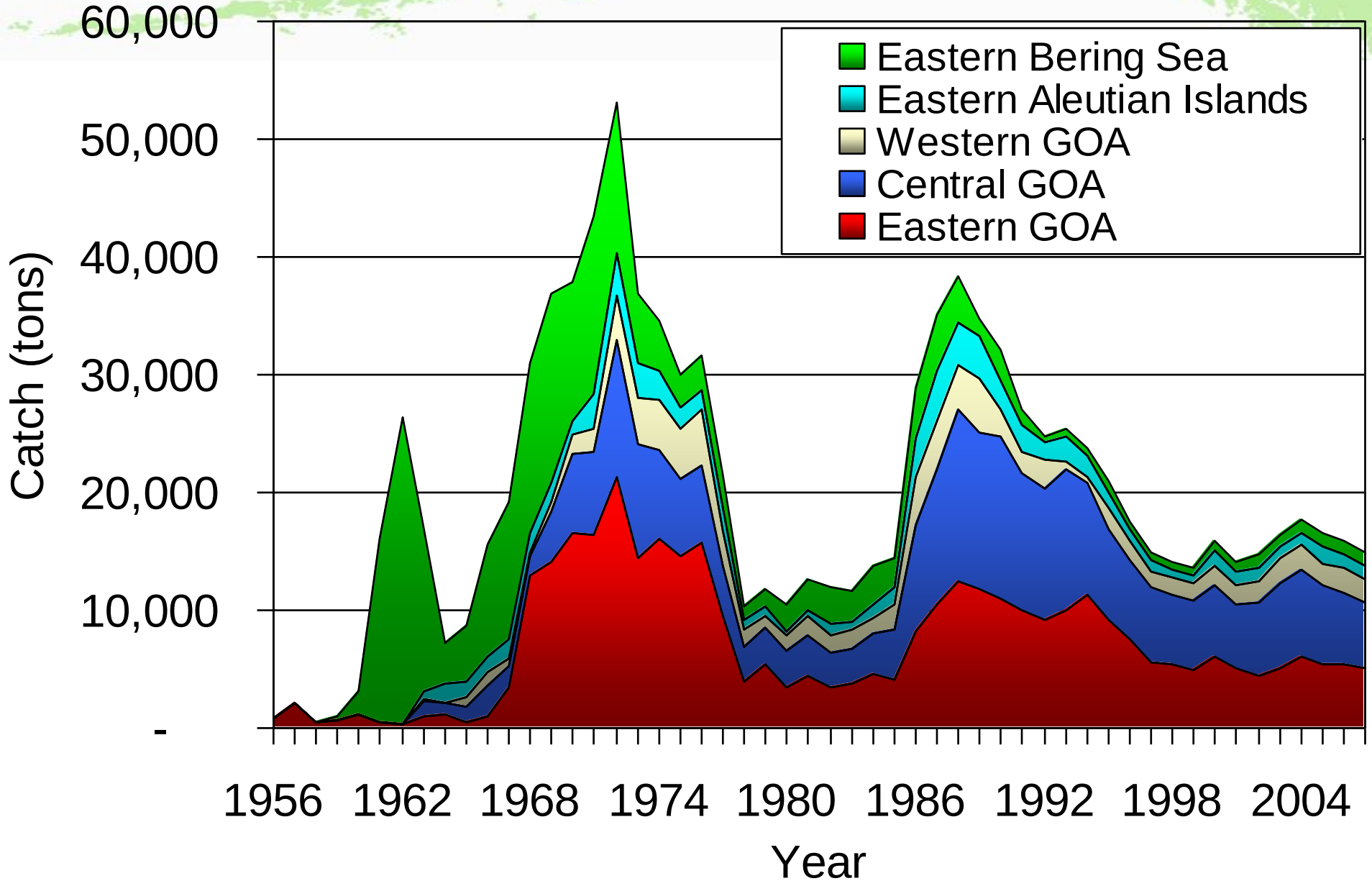
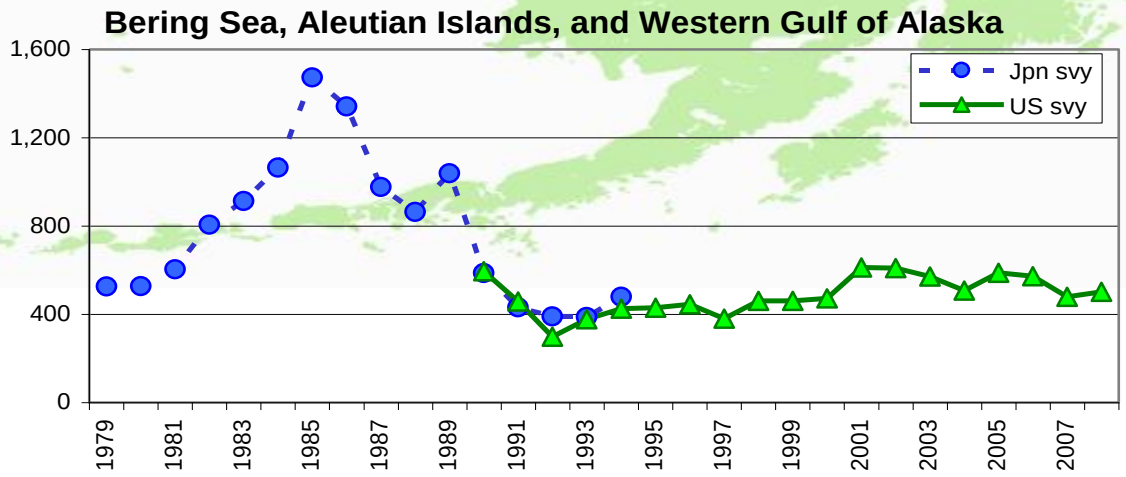
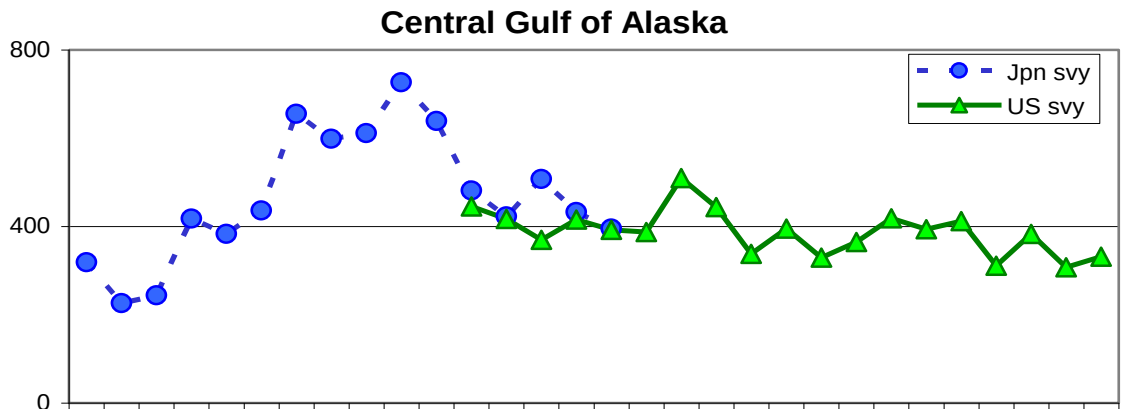
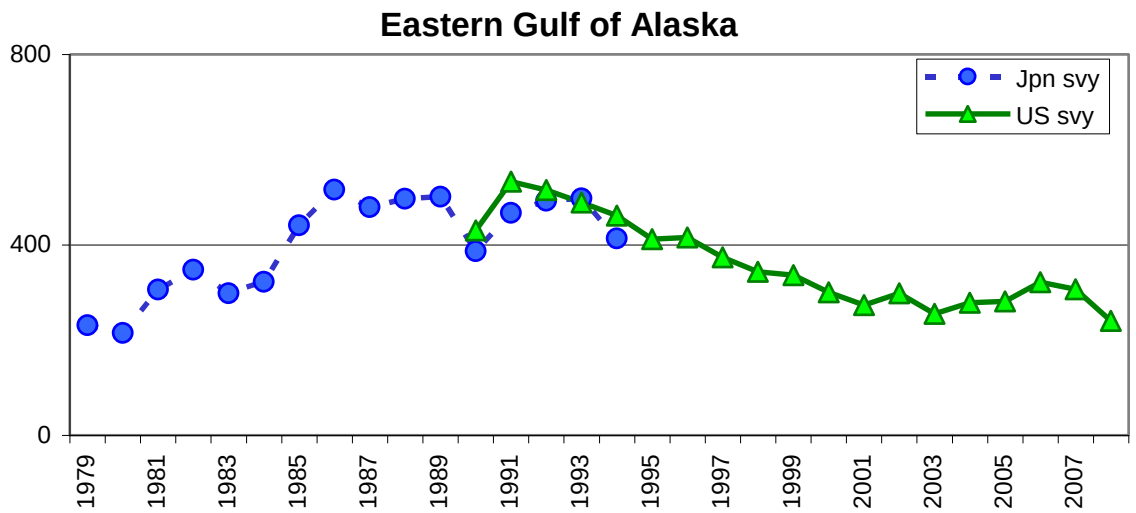
Sablefish Catch by Area



Sablefish regional survey trends



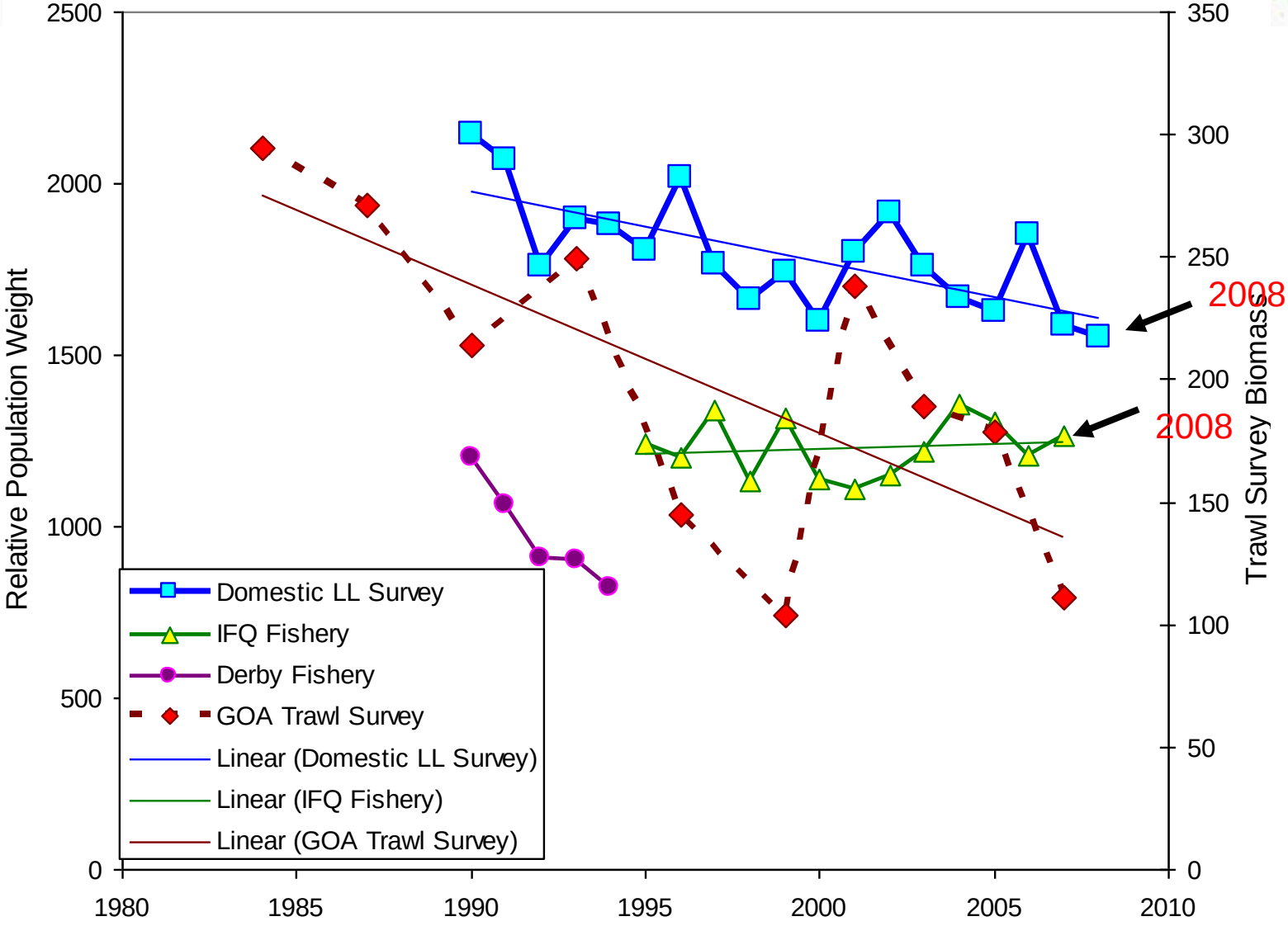




Slight increases in Central and western regions

Decreases in Eastern GOA

Sablefish indices

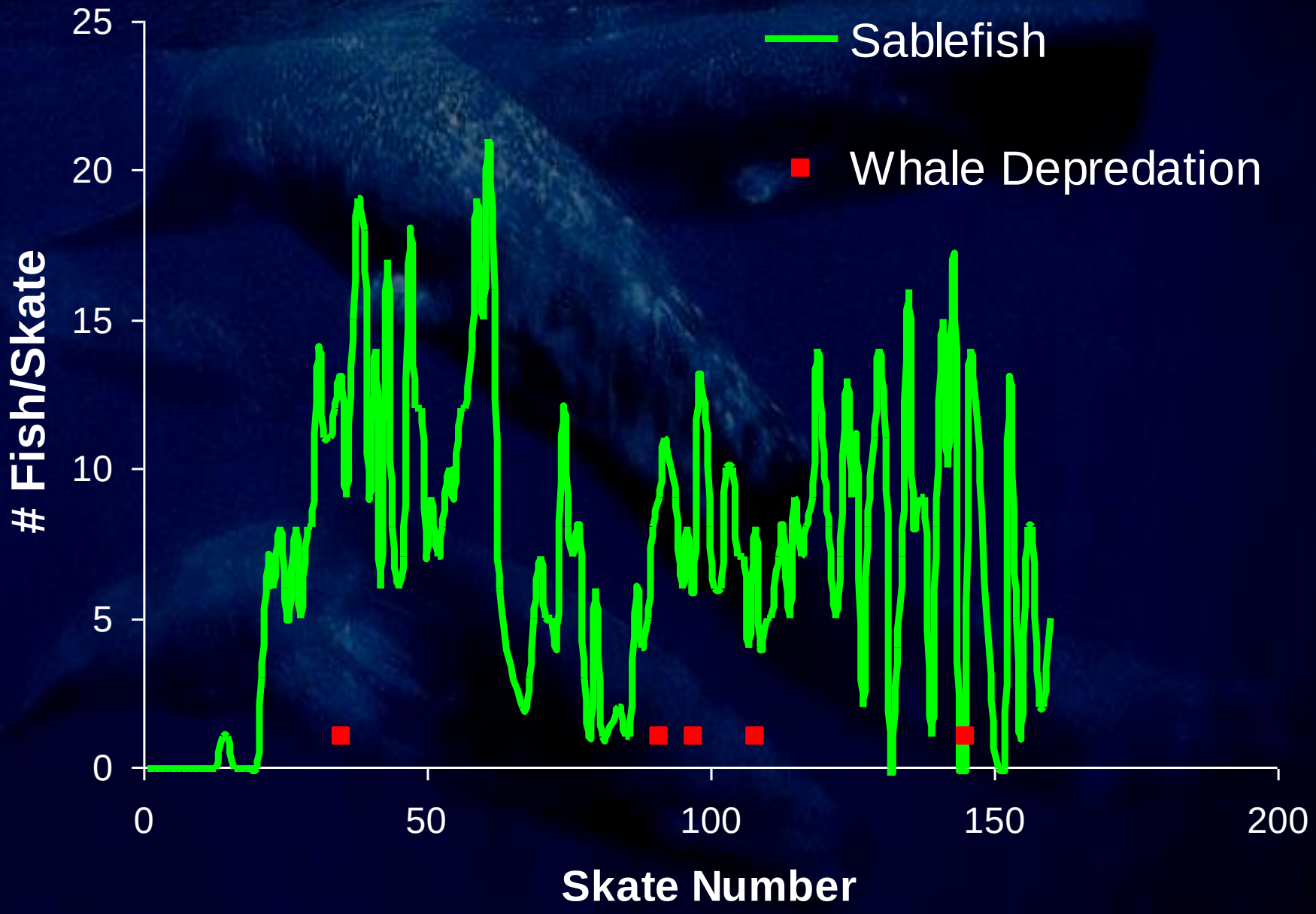


Sperm Whales

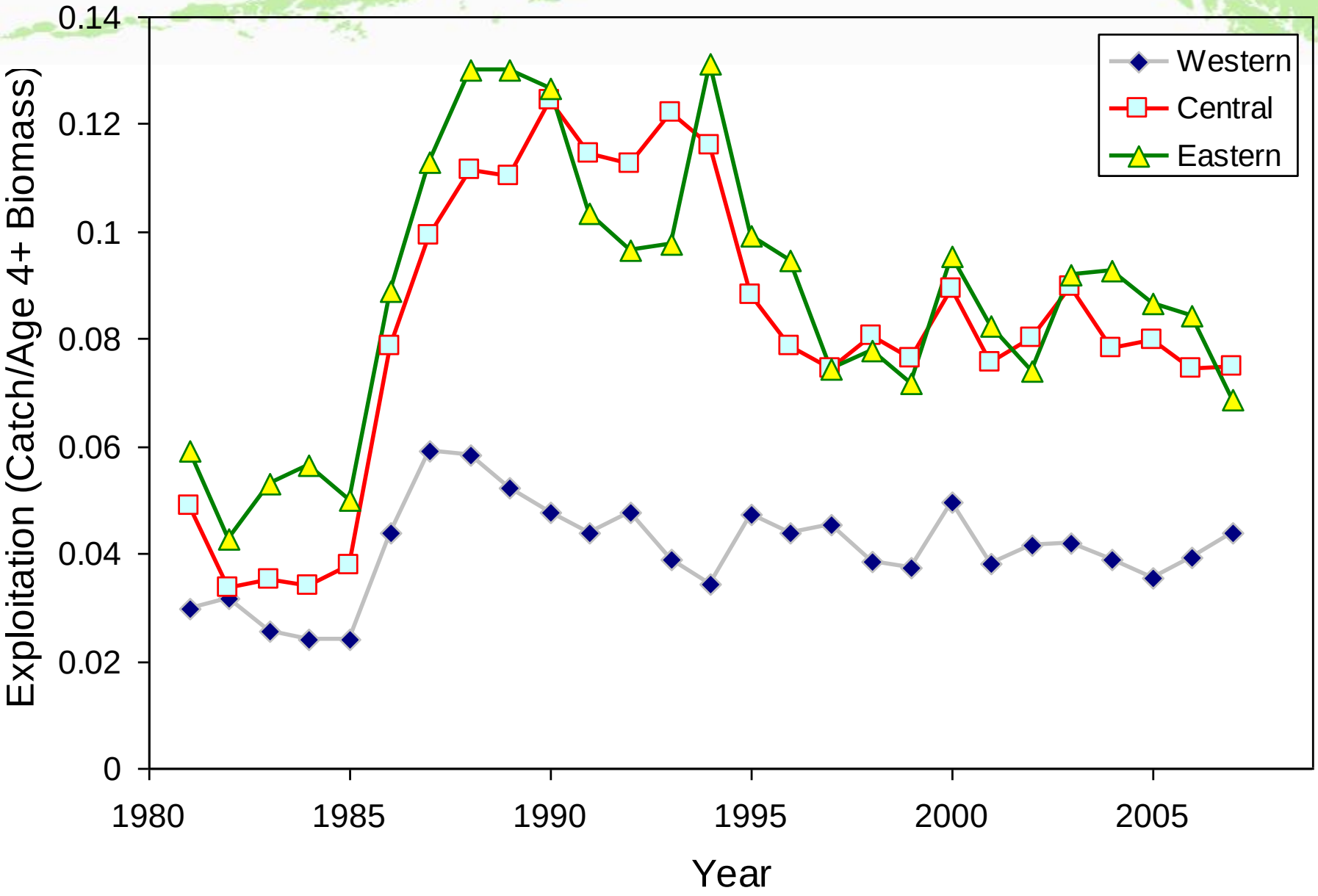
Recorded in surveys since 1998

- Most common in Eastern and Central Gulf of Alaska
- Survey catch rates unadjusted for sperm whale depredation

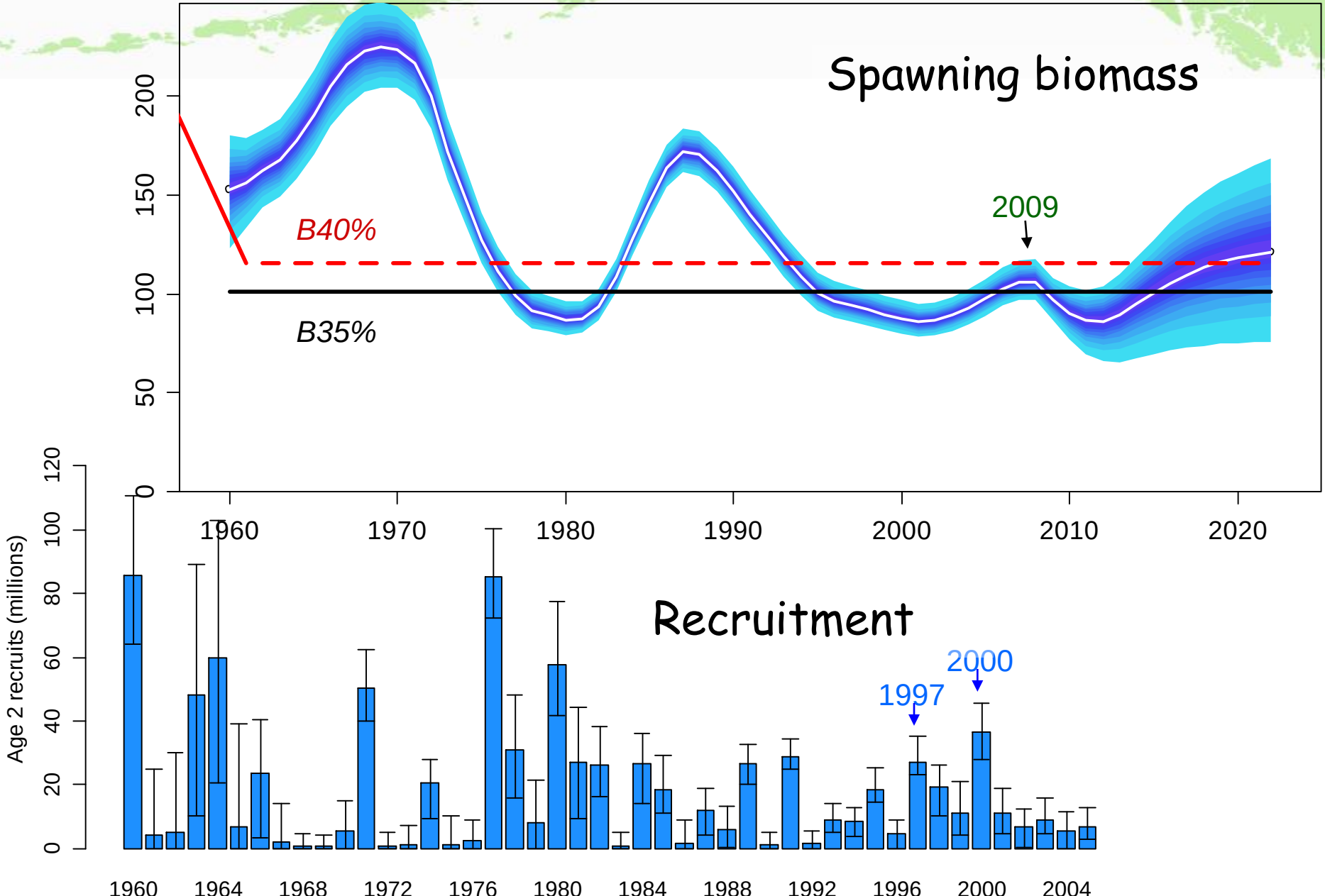
Sperm Whale Affected Sets



Sablefish exploitation by area



Sablefish recruitment & projection



Sablefish ABC/OFL

2009 spawning biomass 36% of $B_{100\%}$

Tier 3b ABC:

2008: 18,030 t

2009: 16,080 t

- 11 % decrease

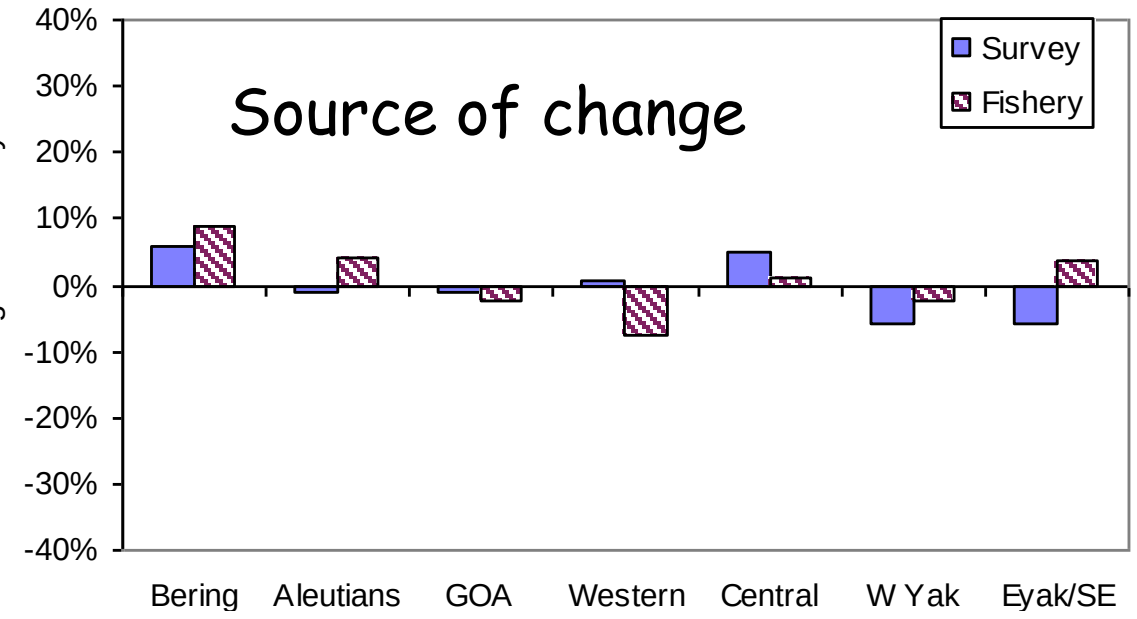
15,000 projected for 2010

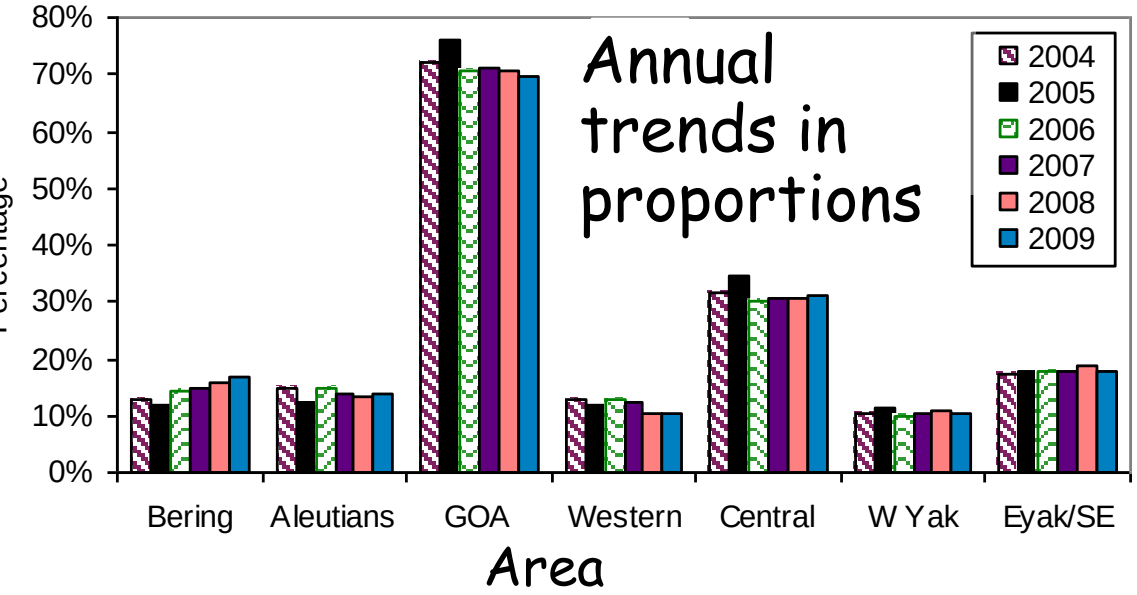
CIE review scheduled for 2009

GOA specific

Sablefish	Biomass	OFL	ABC
2009	149,000	13,190	11,160
2010		12,231	10,337

Sablefish apportionment





Eastern Gulf down most

- down 15-16%

Bering Sea continues to rise (relative)

- down 5%

Flatfish ABC Summary

ABC

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Pollock	51,721	60,180	49,900	down 10,280	(17%)
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Total	179,571	536,201	509,515	down 26,686	(5%)

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Flatfish ABC's

Species	2008 ABC	2009 ABC	Change
Deep water flatfish	8,903	9,168	up 265(3%)
Rex sole	9,132	8,996	down 136 (1%)
Shallow water flatfish	60,989	60,989	same(0%)
Flathead sole	44,735	46,464	up 1,729(4%)
Arrowtooth flounder	226,470	221,512	down 4,958(2%)

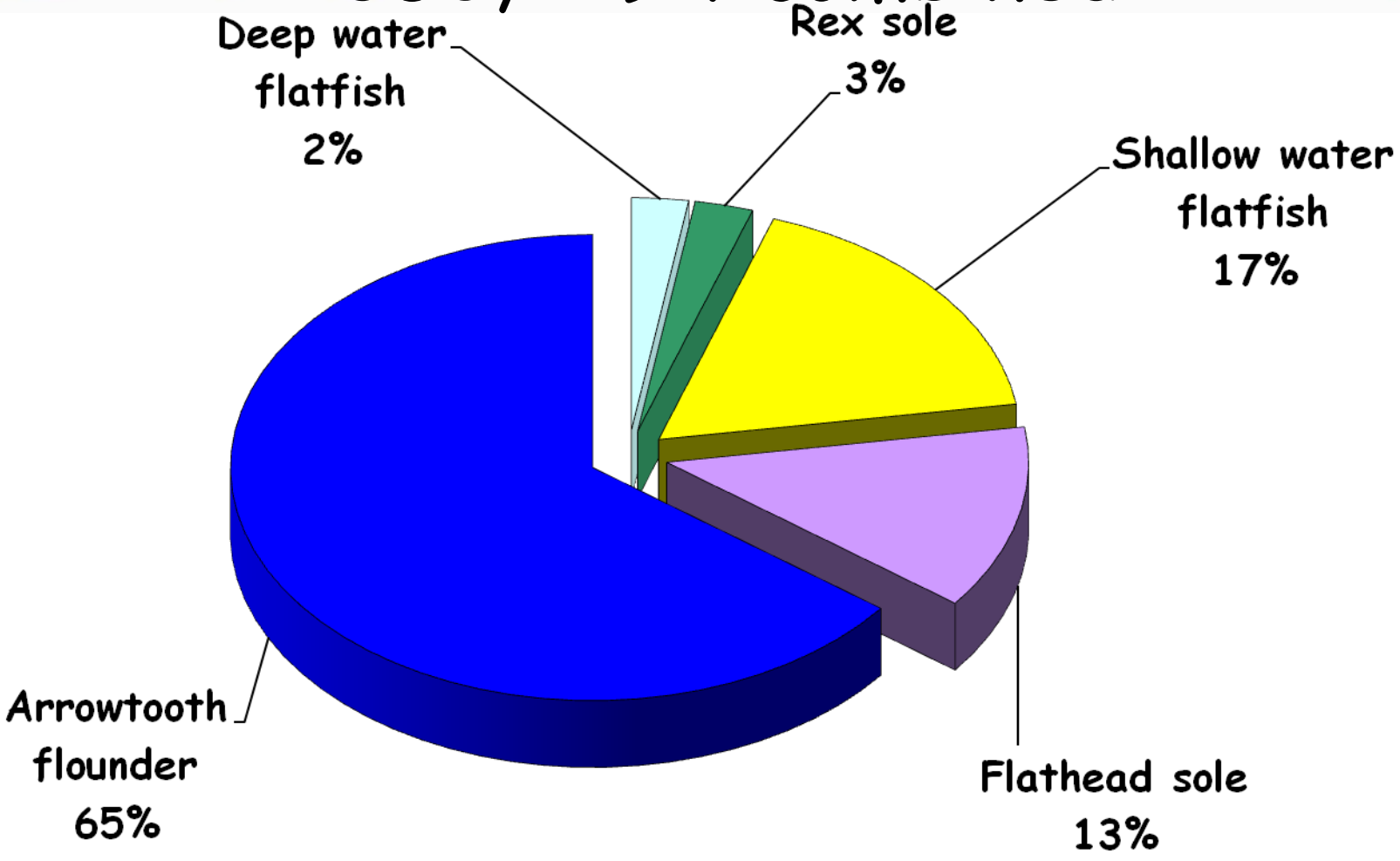
Deep-water ABC derived from Dover assessment (Tier 3) + others (Tier 6)

Shallow water flats: N and S rock sole Tier 4, others Tier 5

Up for MSC Certification

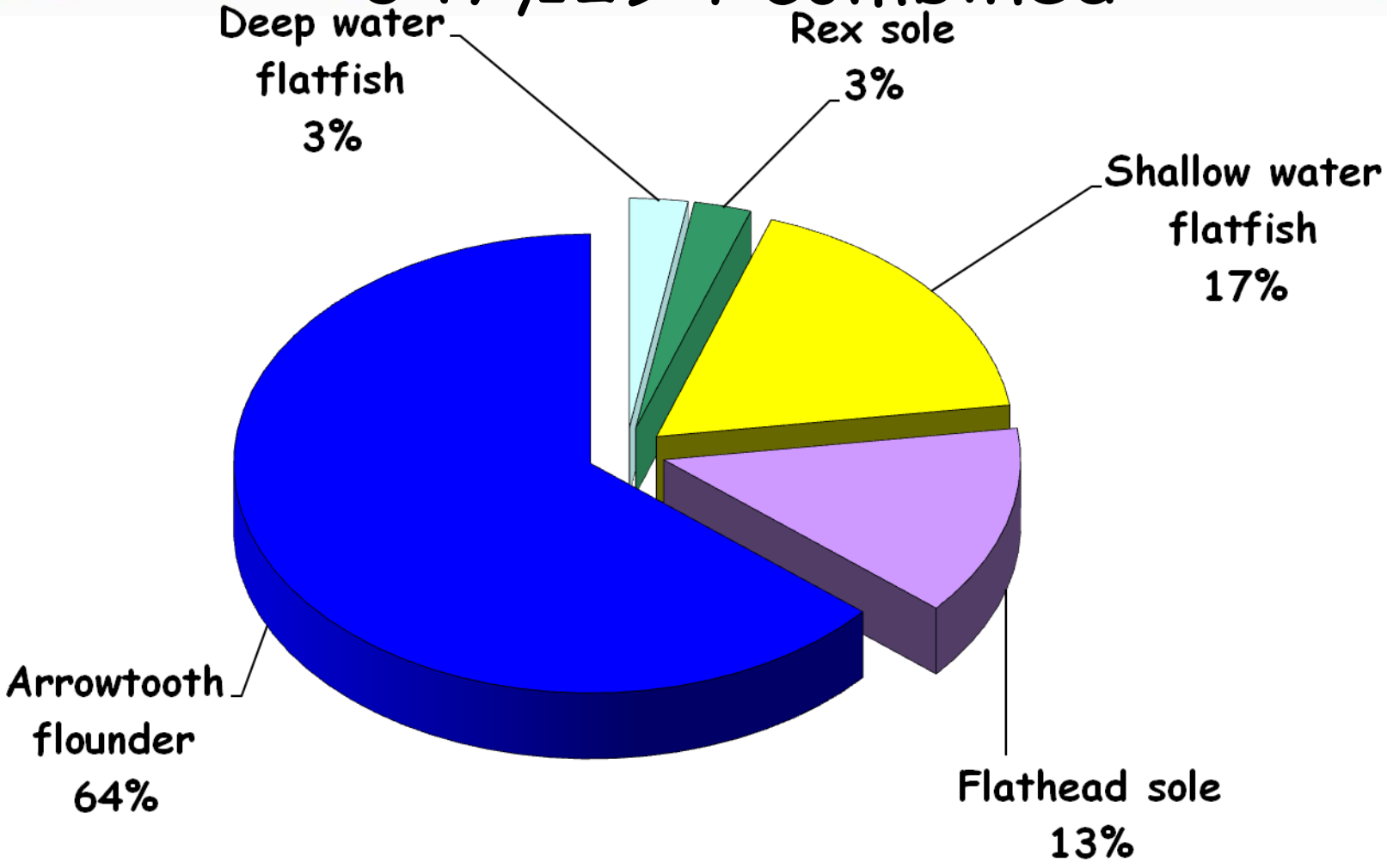
Flatfish 2008 ABC's

350,229 t combined



Flatfish 2009 ABC's

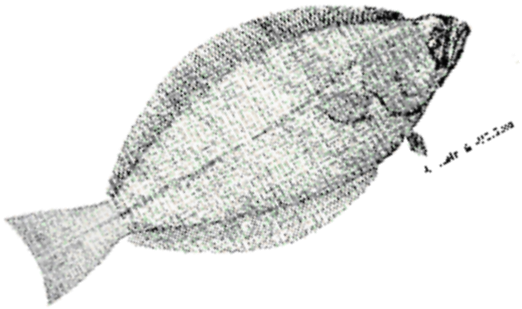
347,129 t combined

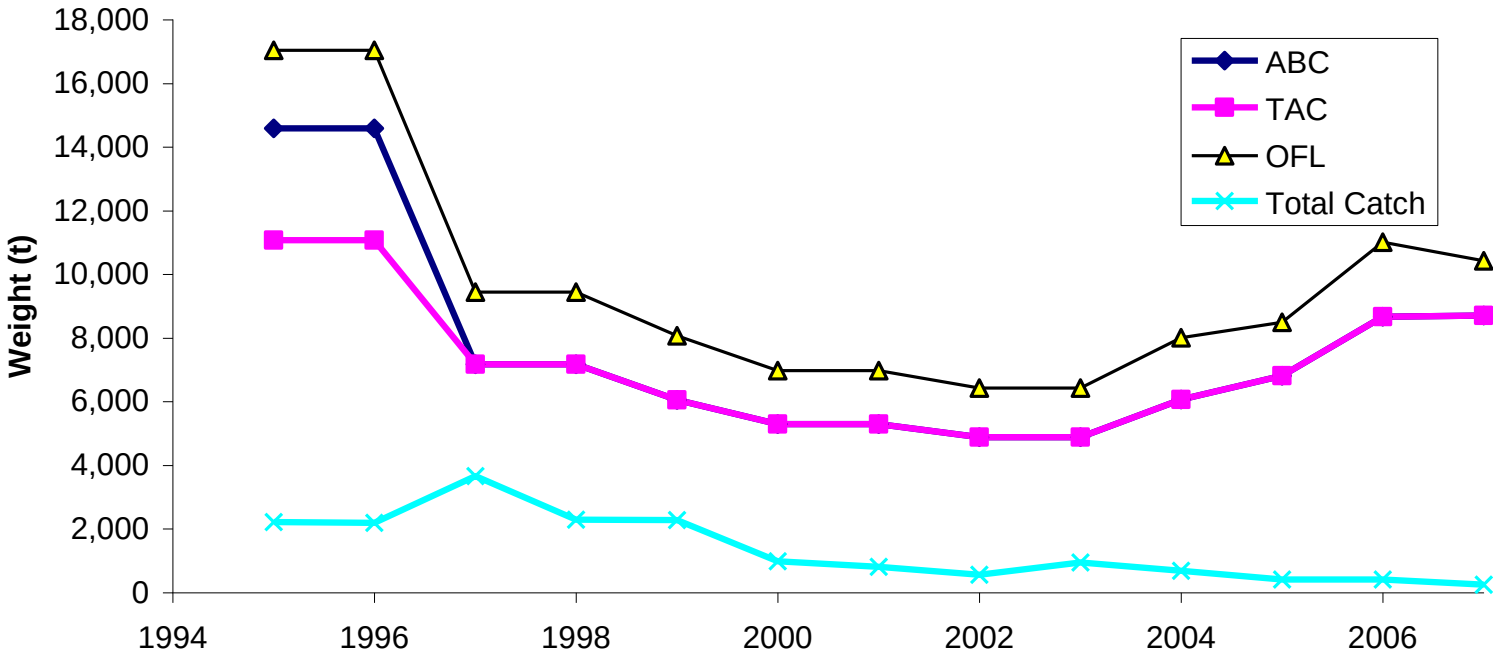


Deepwater flatfish

Dover sole
Deepsea sole
Greenland turbot

Deepwater flatfish	Biomass	OFL	ABC
2009	133,025	11,578	9,168
2010		12,367	9,793





Shallow water flatfish

Rely on survey

Most species increased in 2007 (relative to 2005)

Except yellowfin sole and English sole

Shallow water flatfish	Biomass	OFL	ABC
2009	436,590	74,364	60,989
2010		74,364	60,989

No change from 2007

	ABC	OFL
Northern Rock sole	17,169	20,230
Southern Rock sole	21,967	25,671
Rock sole subtotal	39,135	45,901
Yellowfin sole	5,293	6,894
Butter sole	3,819	4,974
Starry flounder	9,244	12,040
English sole	1,555	2,025
Sand sole	401	522
Alaska plaice	1,541	2,008
Total	**60,989**	**74,364**

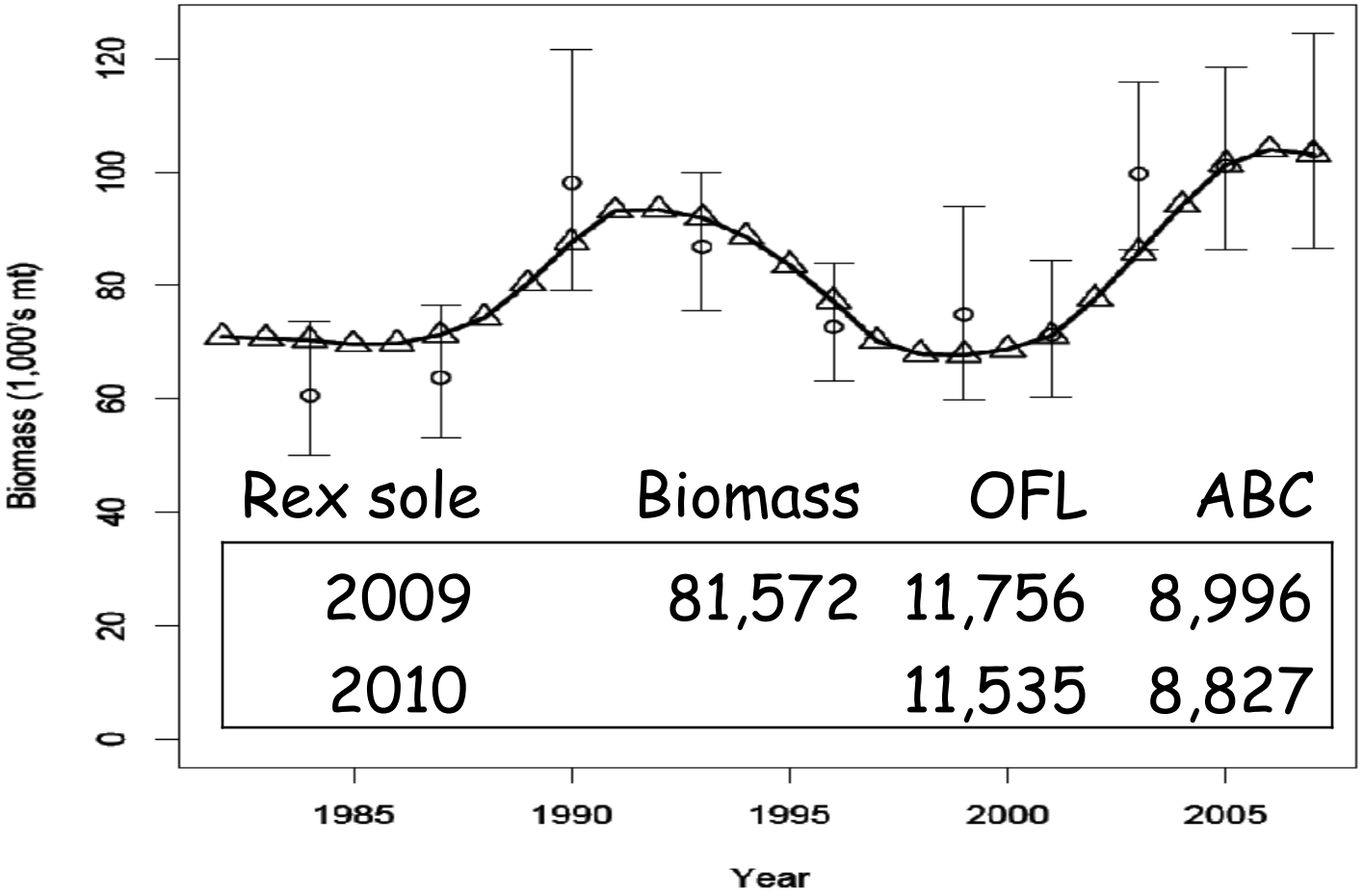
GOA Rex Sole

Age-structured model (since 2004), *M=0.17*

In 2005 adopted Tier 5 w/ model biomass

Due to young age at maturity and old selectivity estimates

2007 survey biomass highest observed

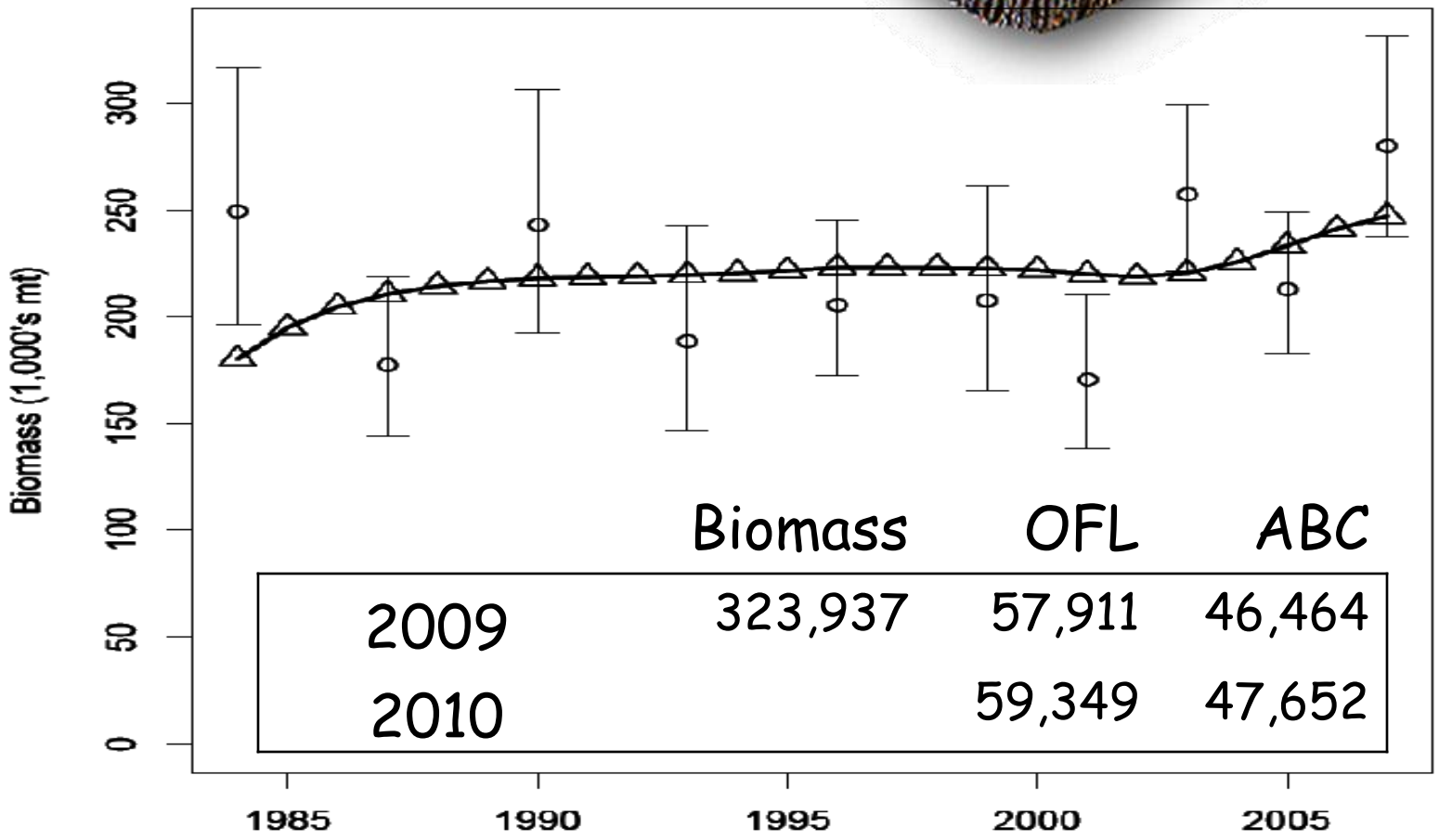


Rex sole	Biomass	OFL	ABC
2009	81,572	11,756	8,996
2010		11,535	8,827

GOA Flathead Sole

Age-structured model

2007 survey biomass highest observed

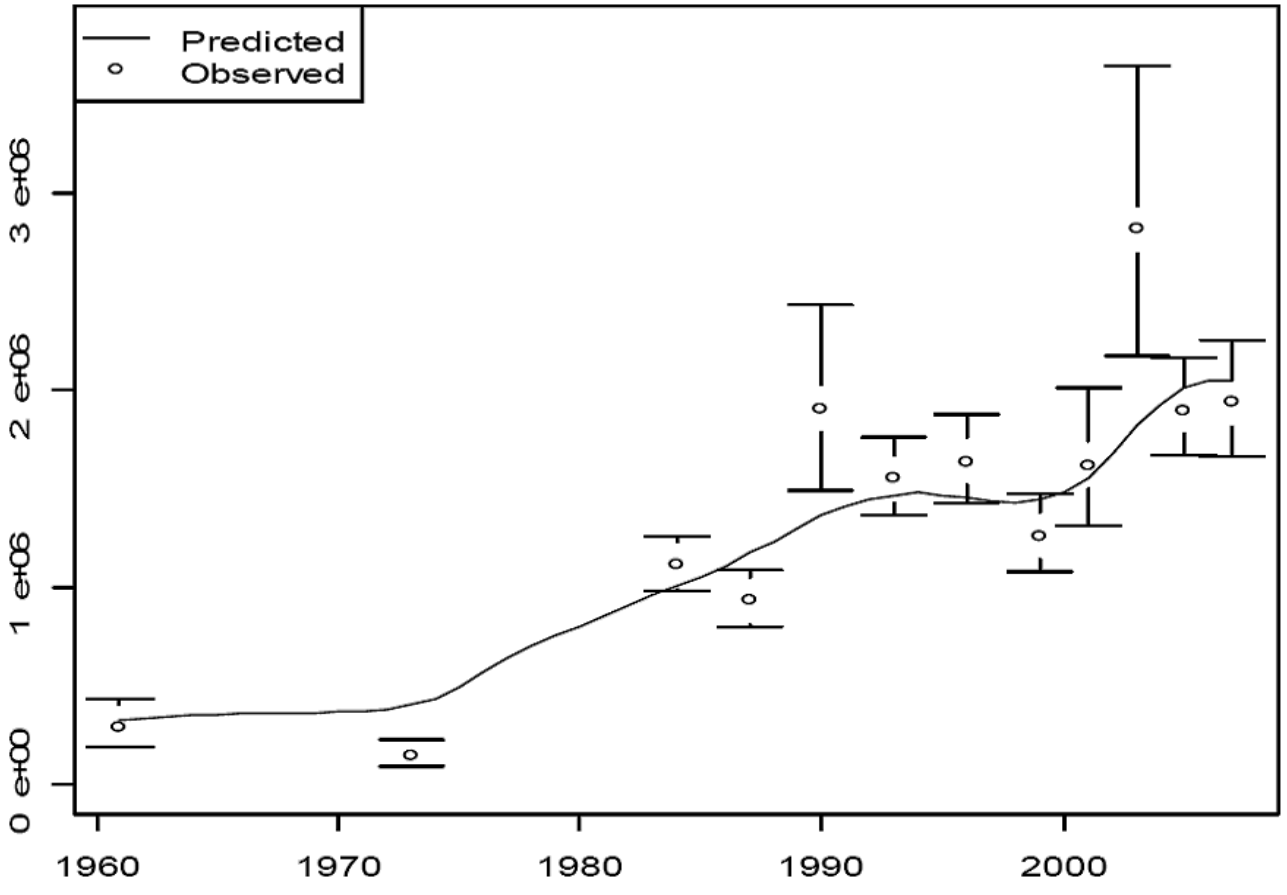


	Biomass	OFL	ABC
2009	323,937	57,911	46,464
2010		59,349	47,652

GOA Arrowtooth flounder

Rex sole	Biomass	OFL	ABC
2009	81,572	11,756	8,996
2010		11,535	8,827

Based on age/sex structured model

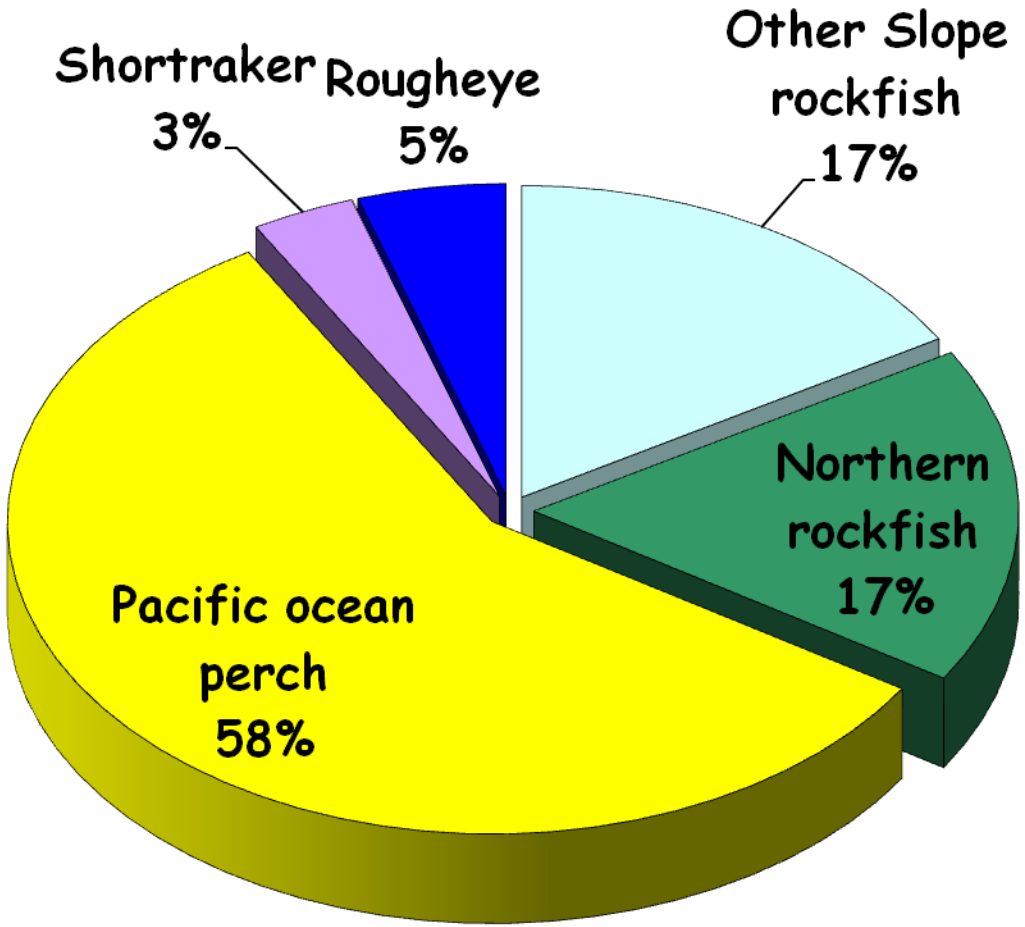


Rockfish overview

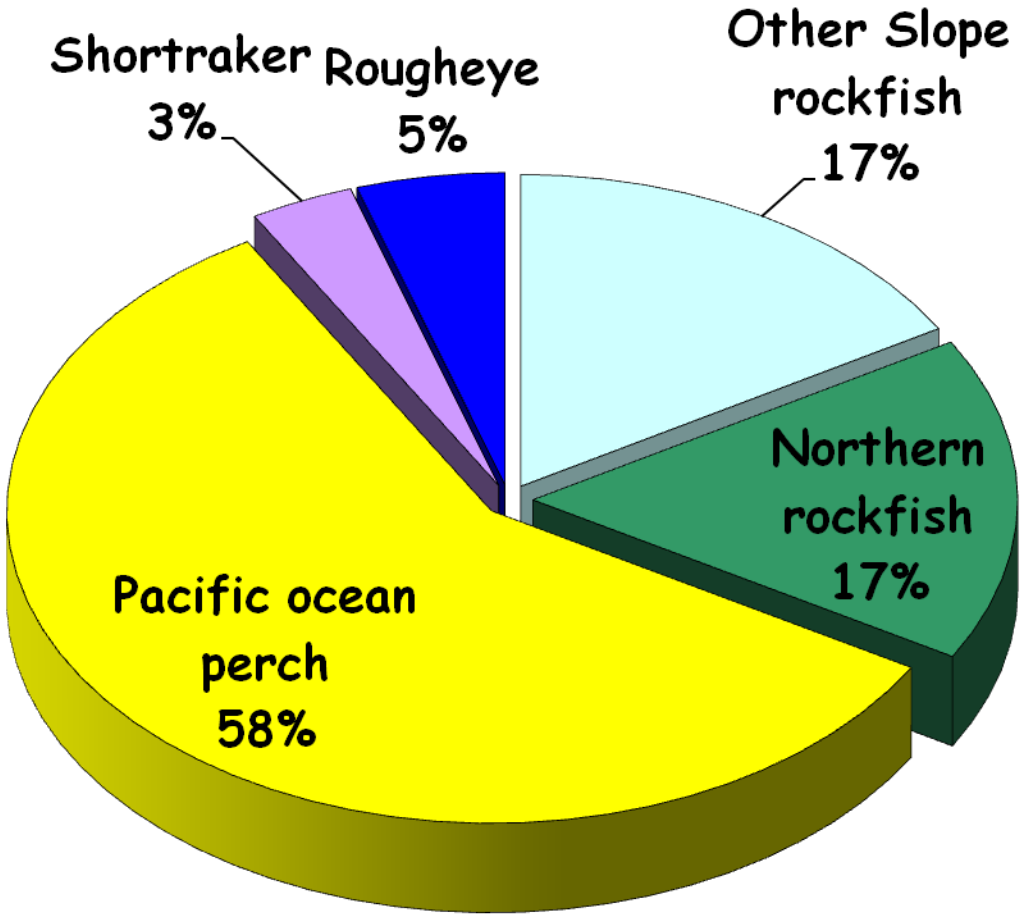
Species	2008 ABC	2009 ABC	Change
Other Slope rockfish	4,297	4,297	same (0%)
Northern rockfish	4,549	4,362	down 187 (4%)
Pacific ocean perch	14,999	15,111	up 112 (1%)
Shortraker/ rougheye	2,184	2,182	down 2 (<1%)
Shortraker	898	898	same (0%)
Rougheye	1,286	1,284	down 2 (<1%)
Pelagic shelf rockfish	5,227	4,781	down 446 (9%)
Demersal Shelf Rockfish	382	362	down 20 (5%)
Thornyhead rockfish	1,910	1,910	same (0%)
Total	33,548	33,005	down 543 (2%)

Summary: Page 23
Chapter: Page 433

Slope Rockfish 2008 ABC's 26,029 tons total



Slope Rockfish 2009 ABC's 25,952 tons total



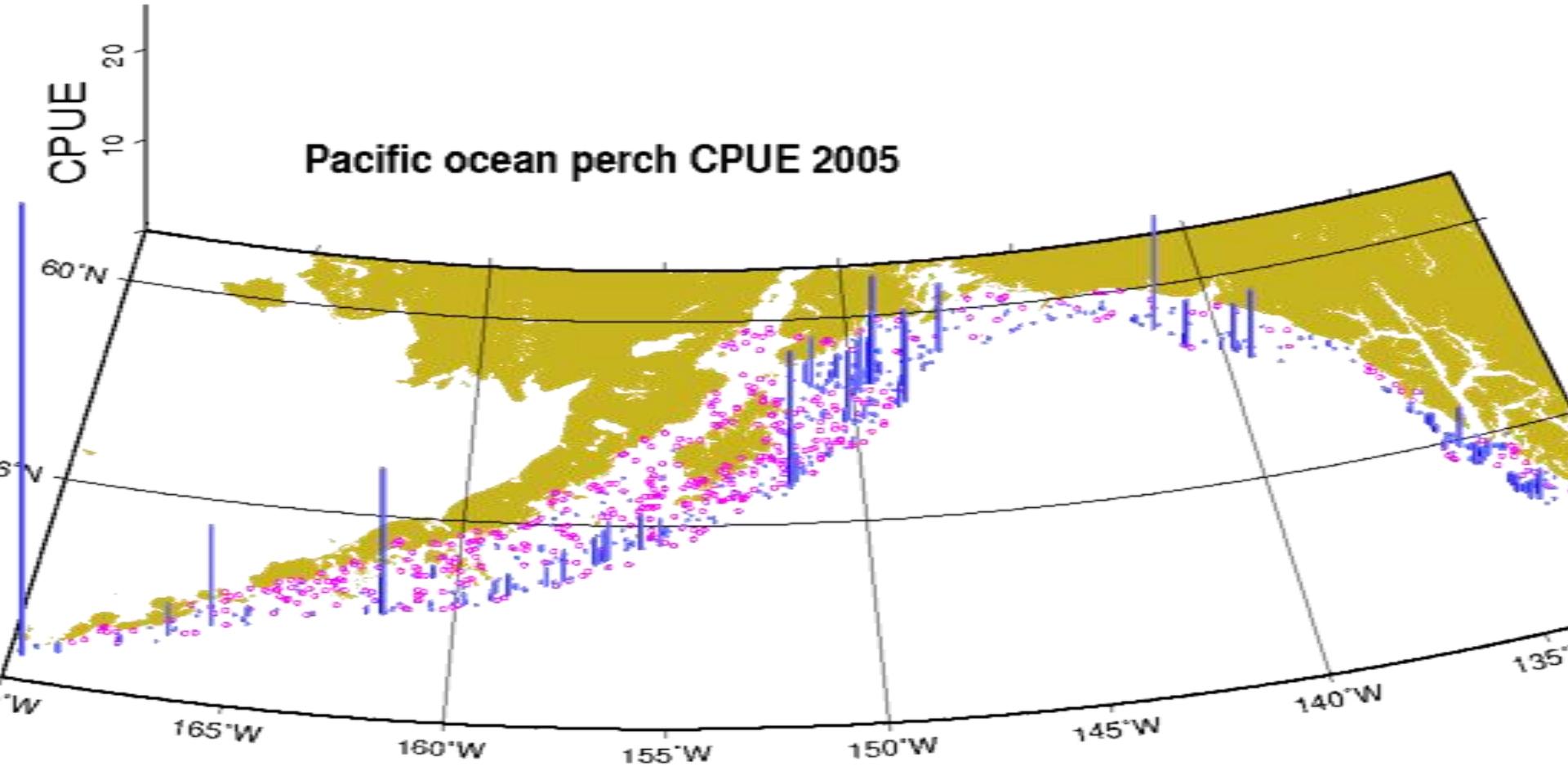
Pacific ocean perch

SSC Comments

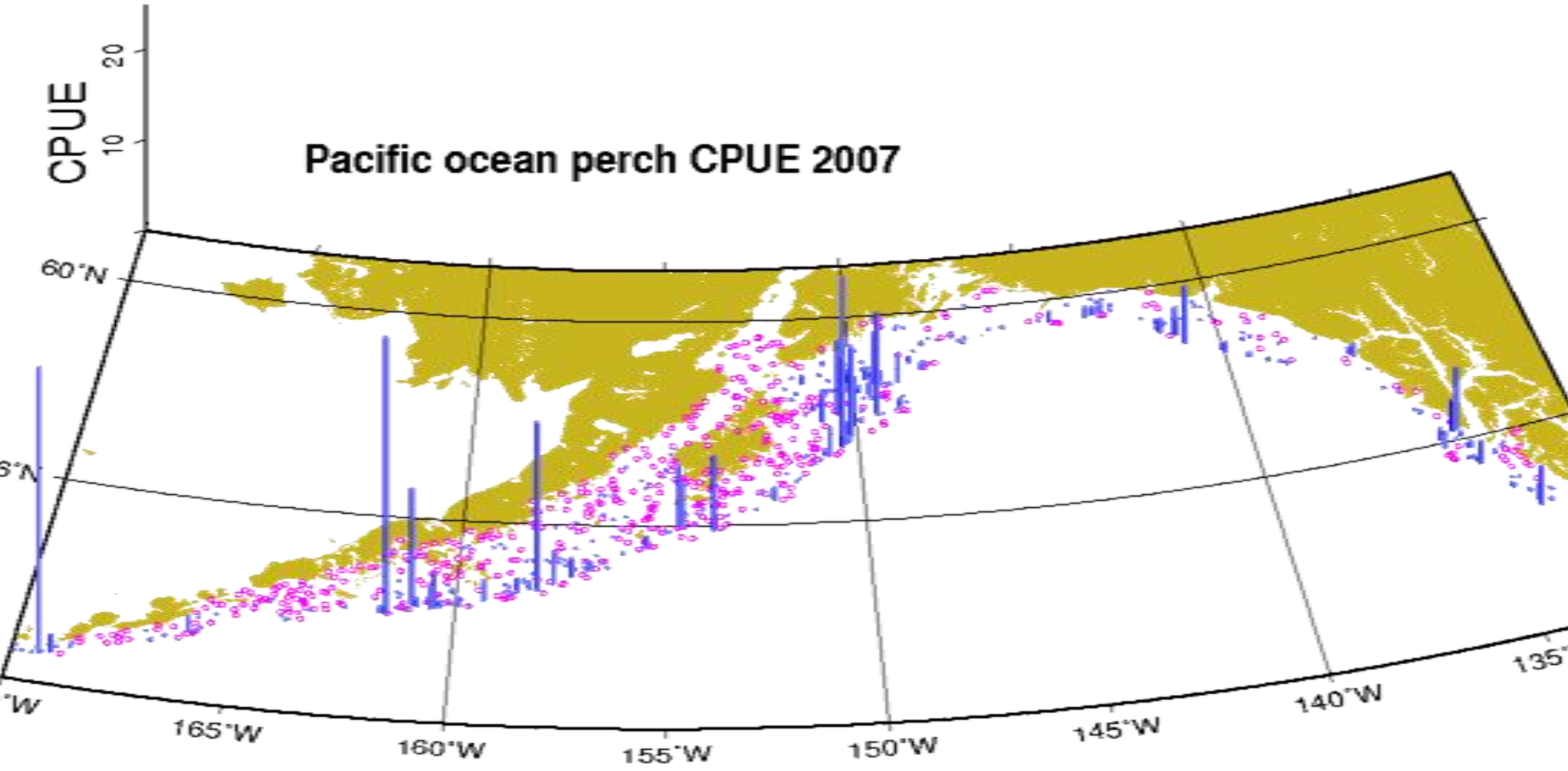
all rockfish

- **Pacific ocean perch**
  - Plot spatial distribution of commercial catch by year
  - Table of catch should include estimates of discard
- **Rougheye rockfish complex**
  - Develop rationale for decisions regarding mixed species assessment
  - Attention to potential for overfishing weaker stock
- **Rockfish**
  - Do apportionment weights by survey proportions or biomass matter?
  - Explore different scenarios of biomass distribution

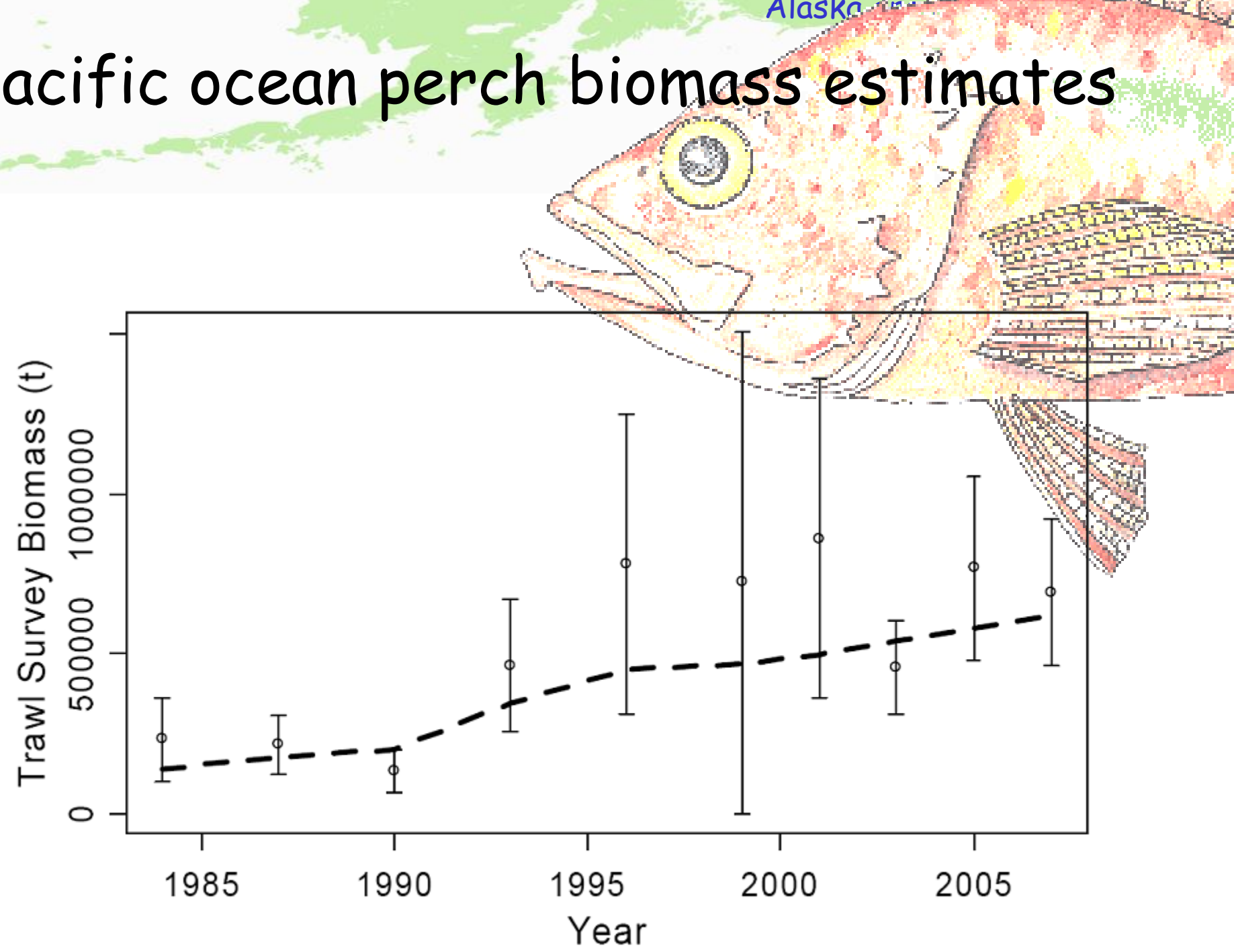
2005 estimate: 766,418 t



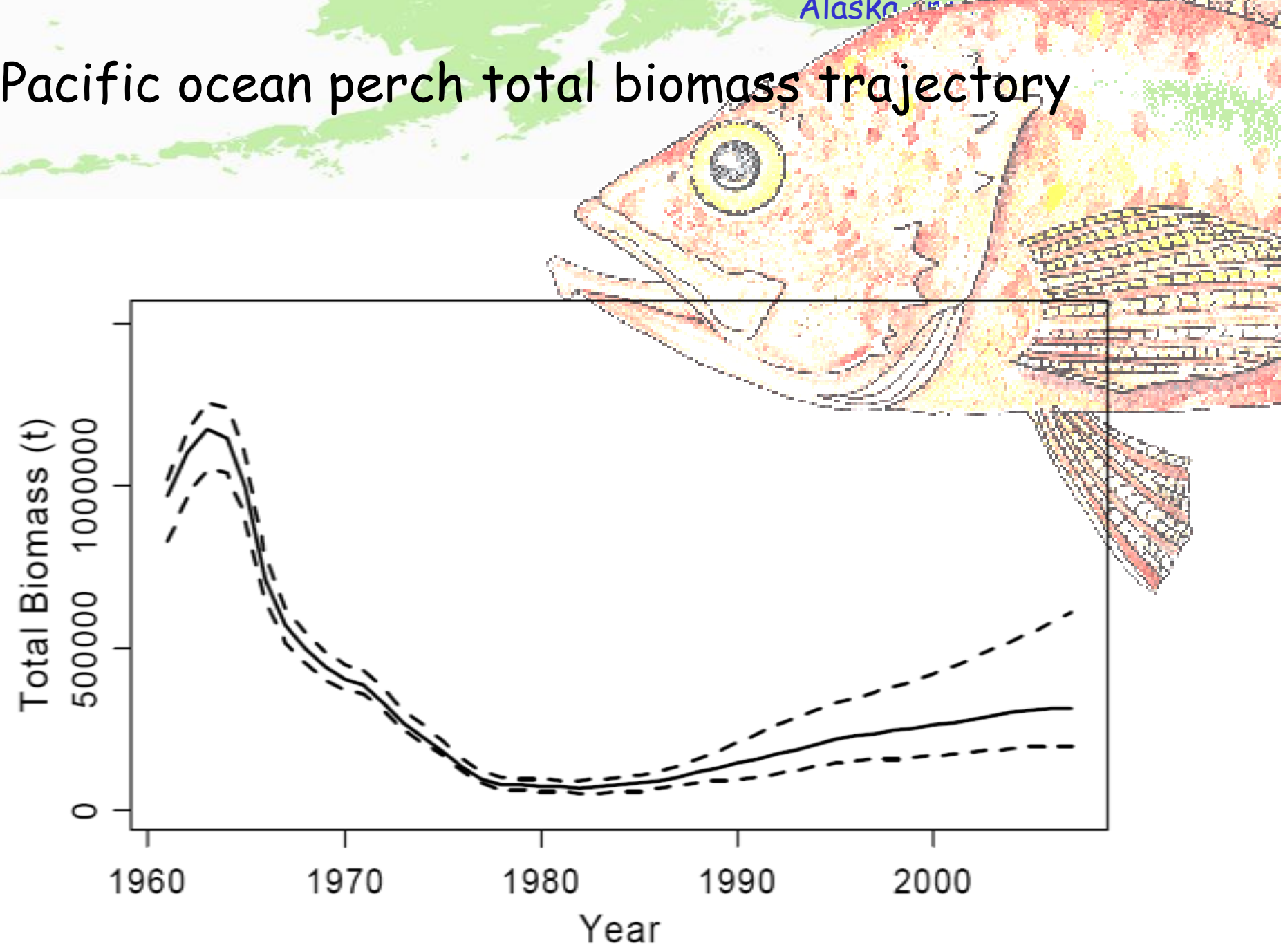
2007 estimate: 688,180 t



Pacific ocean perch biomass estimates

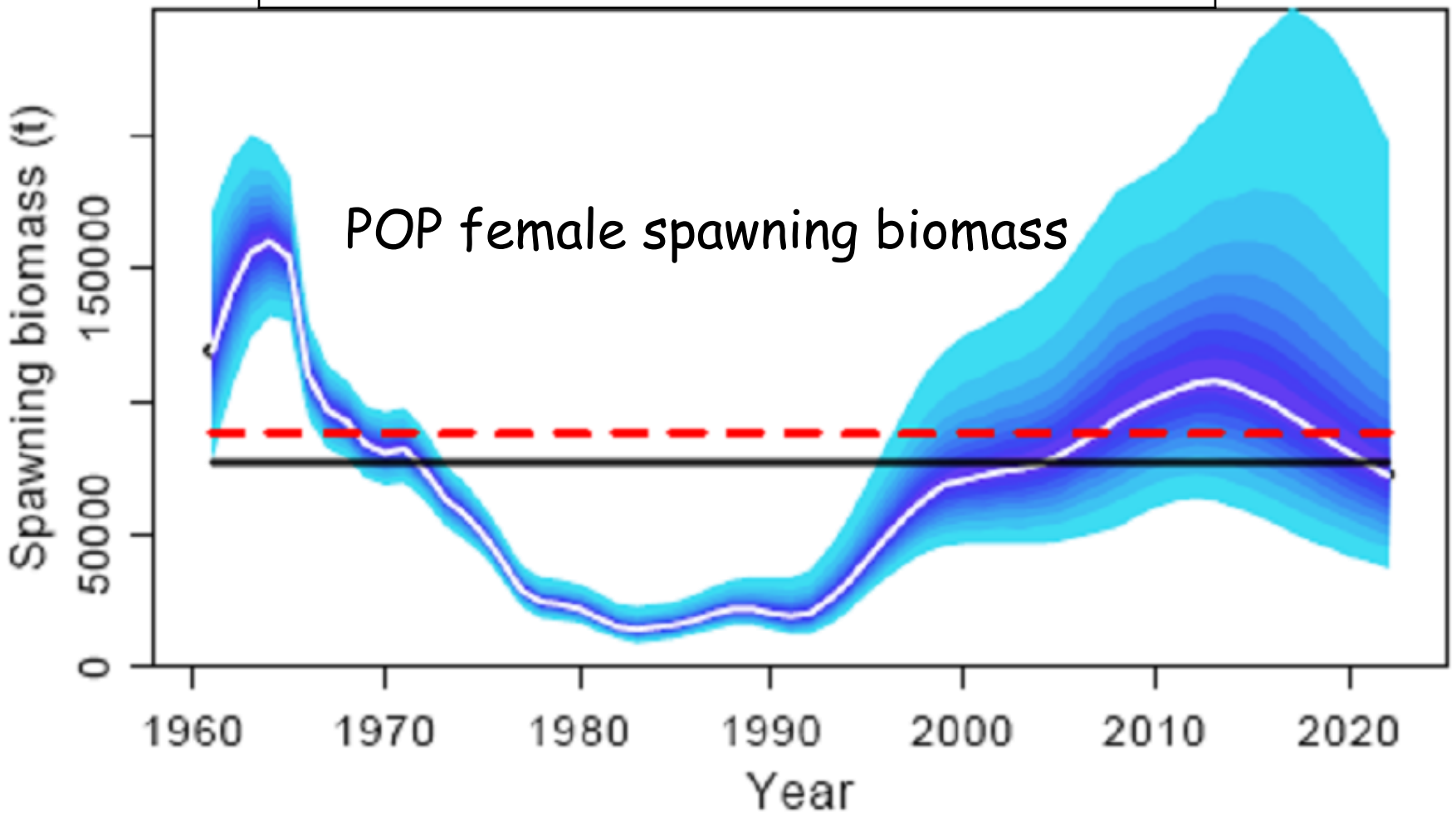


Pacific ocean perch total biomass trajectory



Pacific ocean perch

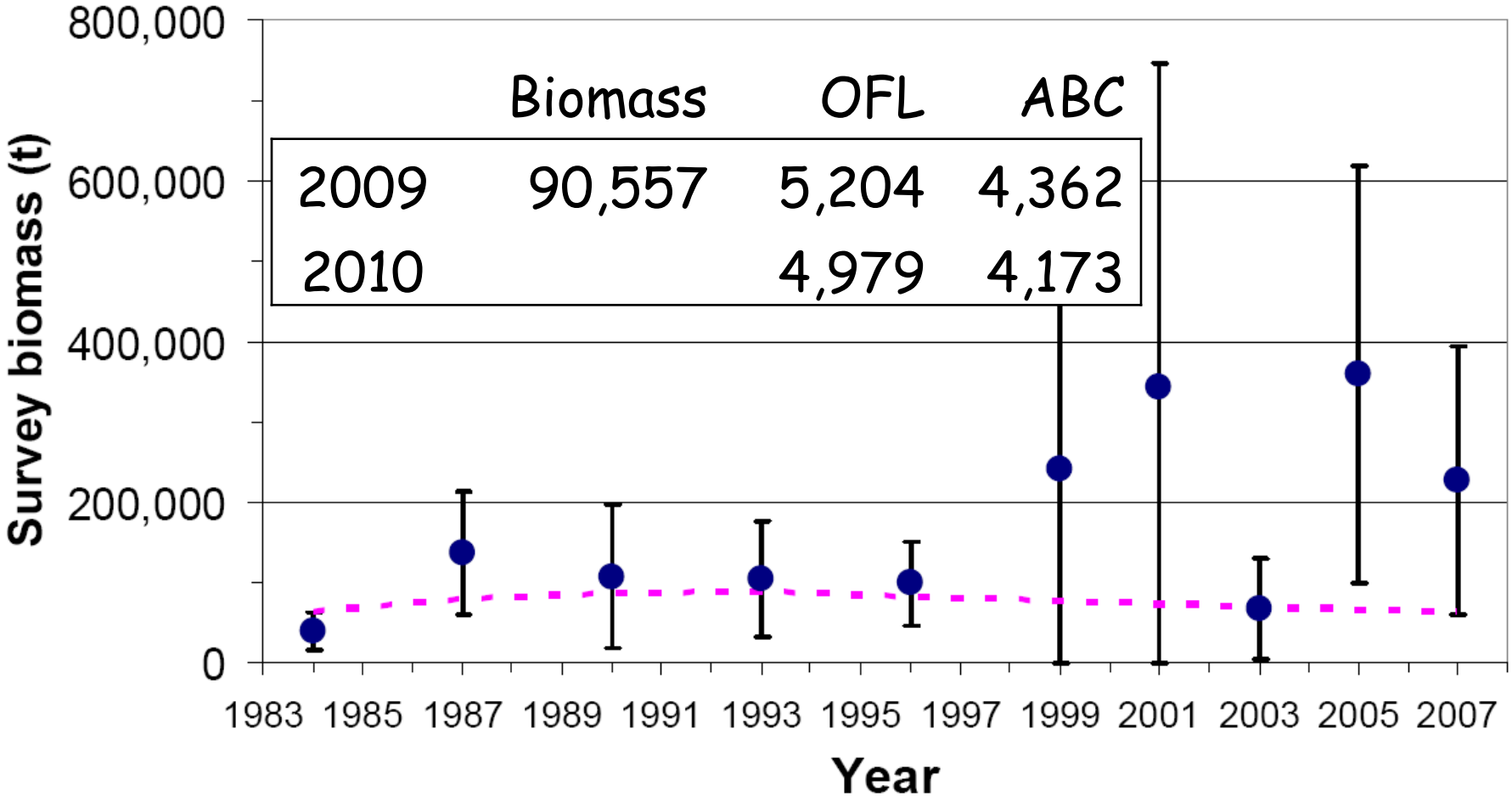
	Biomass	OFL	ABC
2009	318,336	17,940	15,111
2010		17,925	15,098



Northern rockfish

- Model revised based on workshop and CIE
- Female spawning biomass declining slightly at 29,000 t, above B40% (22,300 t)

	Biomass	OFL	ABC
2009	90,557	5,204	4,362
2010		4,979	4,173



Rougheye vs Blackspotted

2007

Accurate and verified species identification necessary

Rougheye

130

Weight (kg)

Blackspotted

130

Weight (kg)

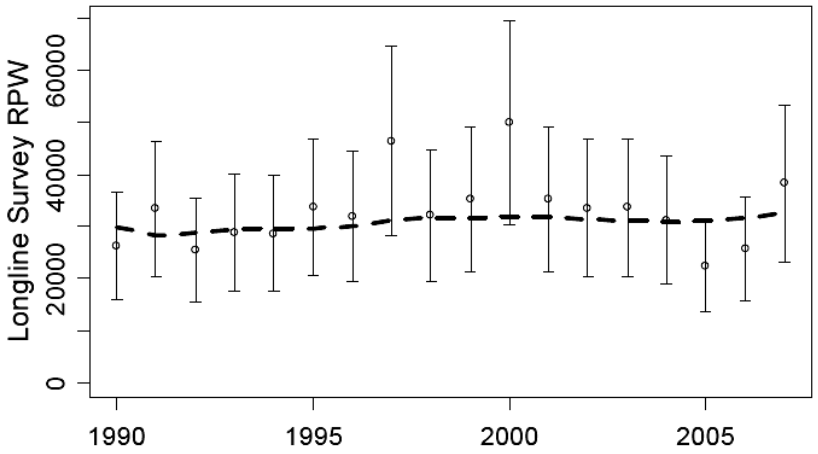
0 200 400 800

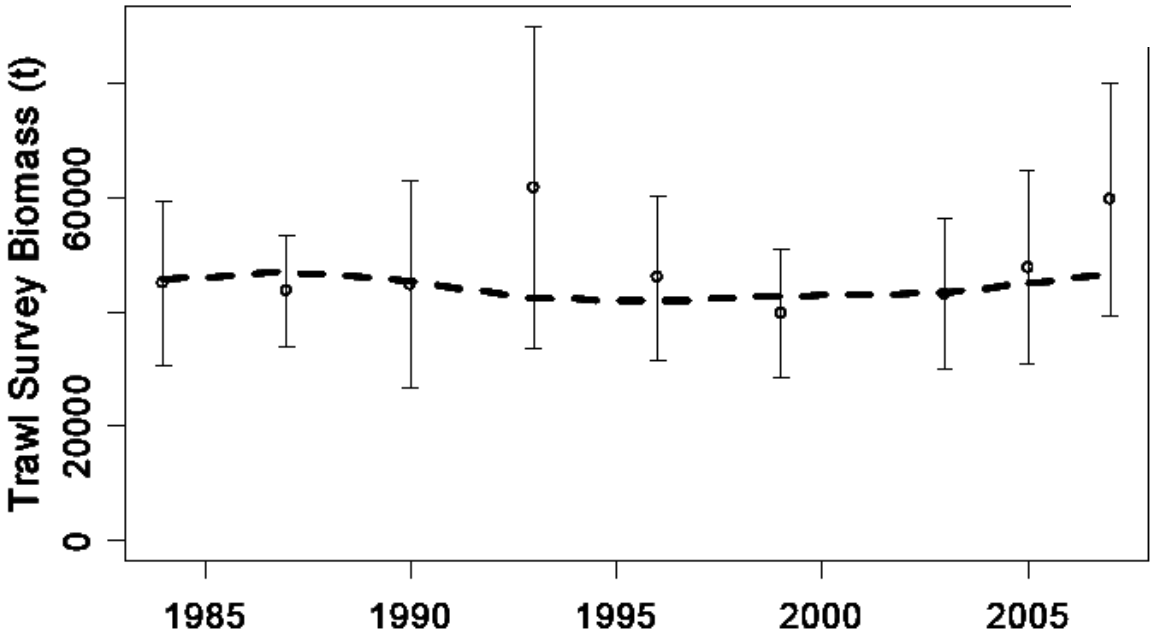
km

Rougheye rockfish

Tier 3a

Rougheye	Biomass	OFL	ABC
2009	46,385	1,545	1,284
2010		1,562	1,297





Other slope, shortraker rockfish

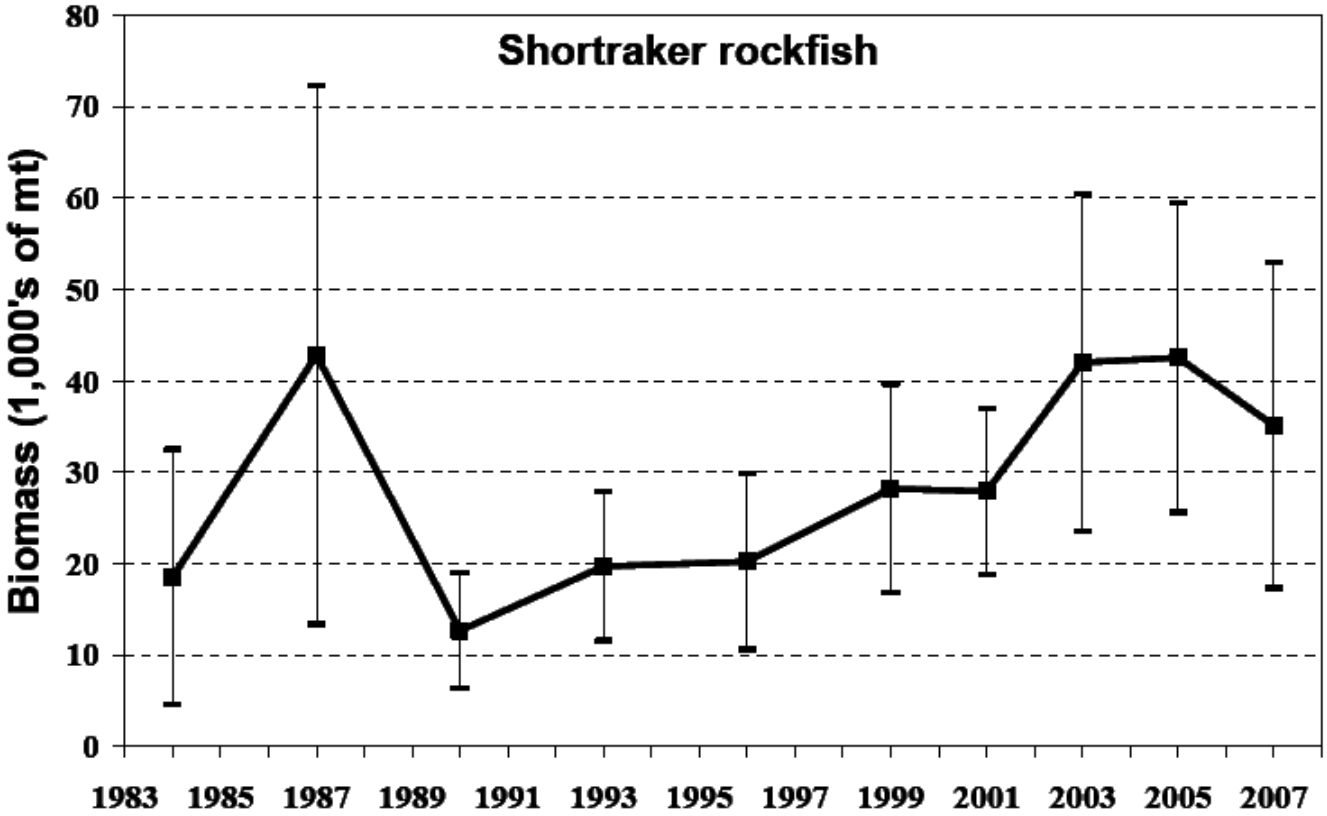
No change from 2007

Shortraker	Biomass	OFL	ABC
2009	39,905	1,197	898
2010		1,197	898

Other slope:

Sharpchin rockfish
Redstripe rockfish
Harlequin rockfish
Silvergray rockfish
Redbanded rockfish
Darkblotched rockfish
Splitnose rockfish
Greenstriped rockfish
Vermilion rockfish
Bocaccio
Pygmy rockfish
Yellowmouth rockfish

Other slope rockfish	Biomass	OFL	ABC
2009	90,283	5,624	4,297
2010		5,624	4,297

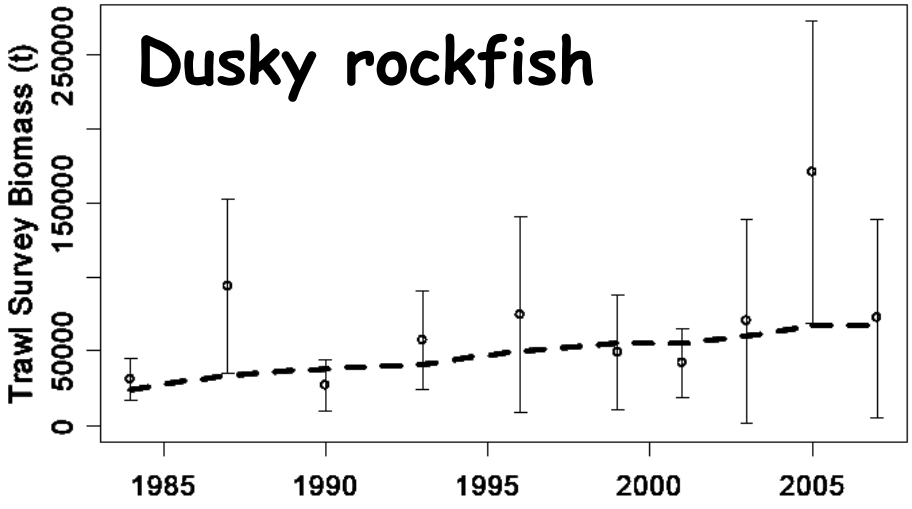


Pelagic Shelf rockfish

Management tiers

- Dusky: Tier 3a, based on age-structured model
- Widow, yellowtail: Tier 5
- Dark rockfish removed (state management)
- Species ID problems need addressing

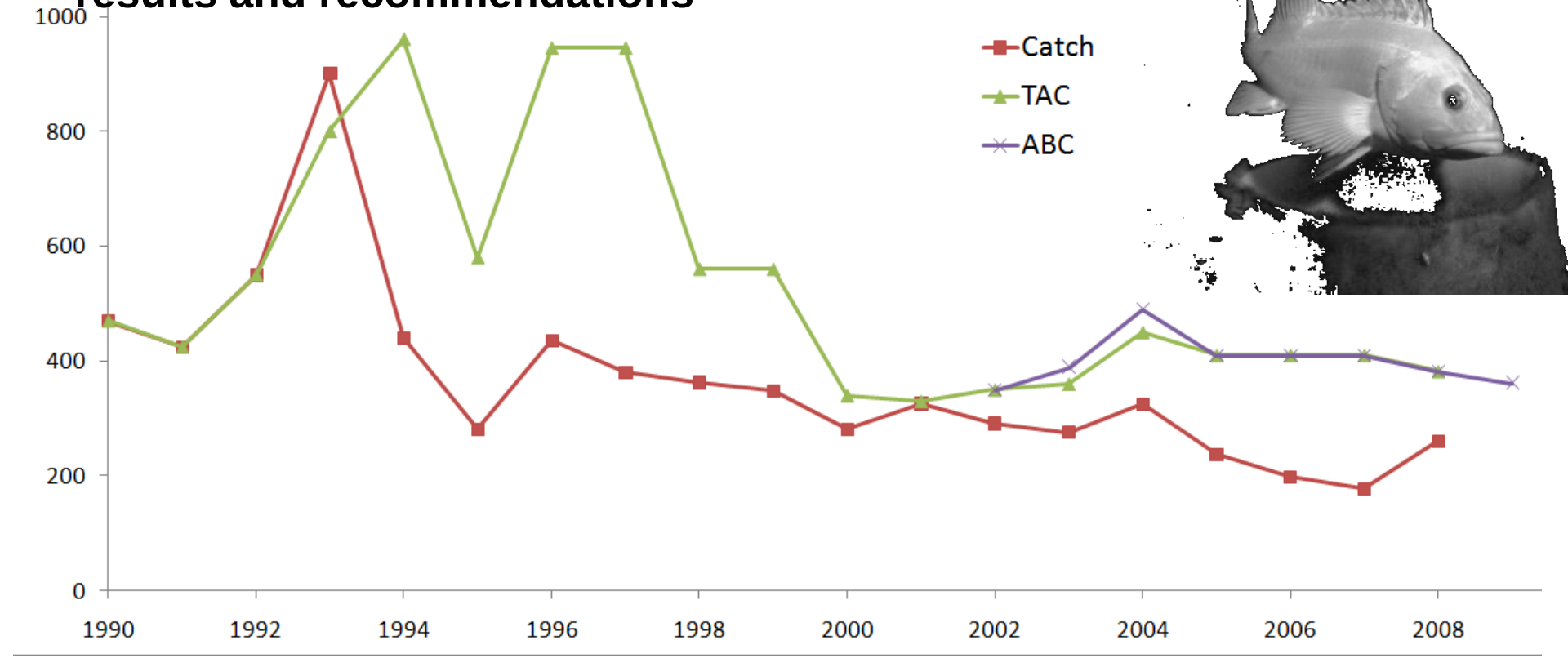
Pelagic shelf rockfish	Biomass	OFL	ABC
2009	67,841	5,803	4,781
2010		5,420	4,465



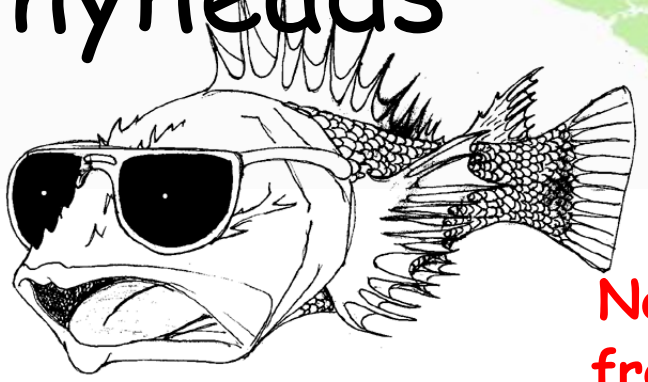
Demersal shelf rockfish

- **Mainly yelloweye rockfish**
- **Unaccounted bycatch mortality adds uncertainty**
- **Last survey conducted in 2007**
- **Updated average weights affect results and recommendations**

	Biomass	OFL	ABC
2009	17,390	580	362
2010		580	362



Shortspine thornyheads

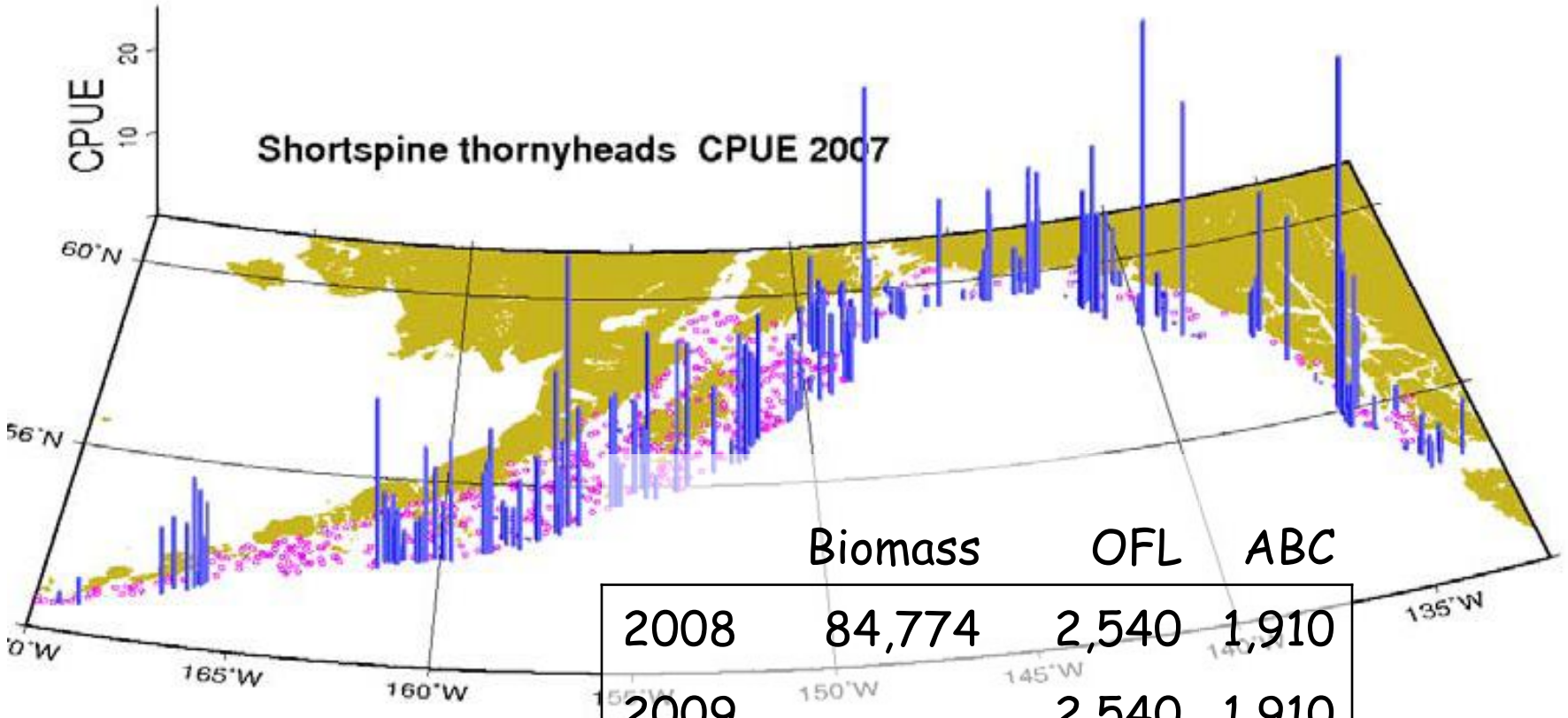


Survey estimate down from 2005

No directed fishery (but important)

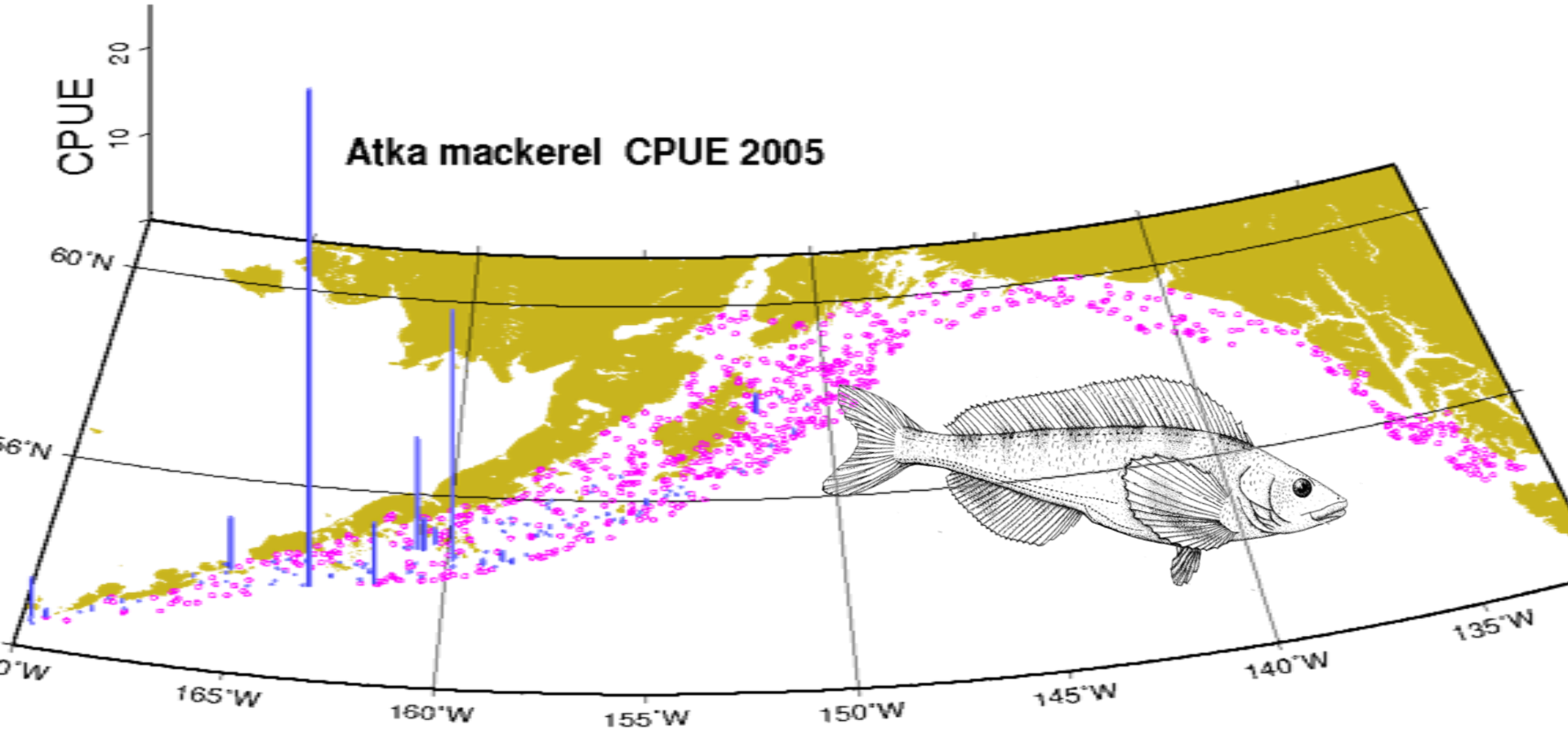
Tier 5

No change from 2007



	Biomass	OFL	ABC
2008	84,774	2,540	1,910
2009		2,540	1,910

Atka mackerel 2005 survey

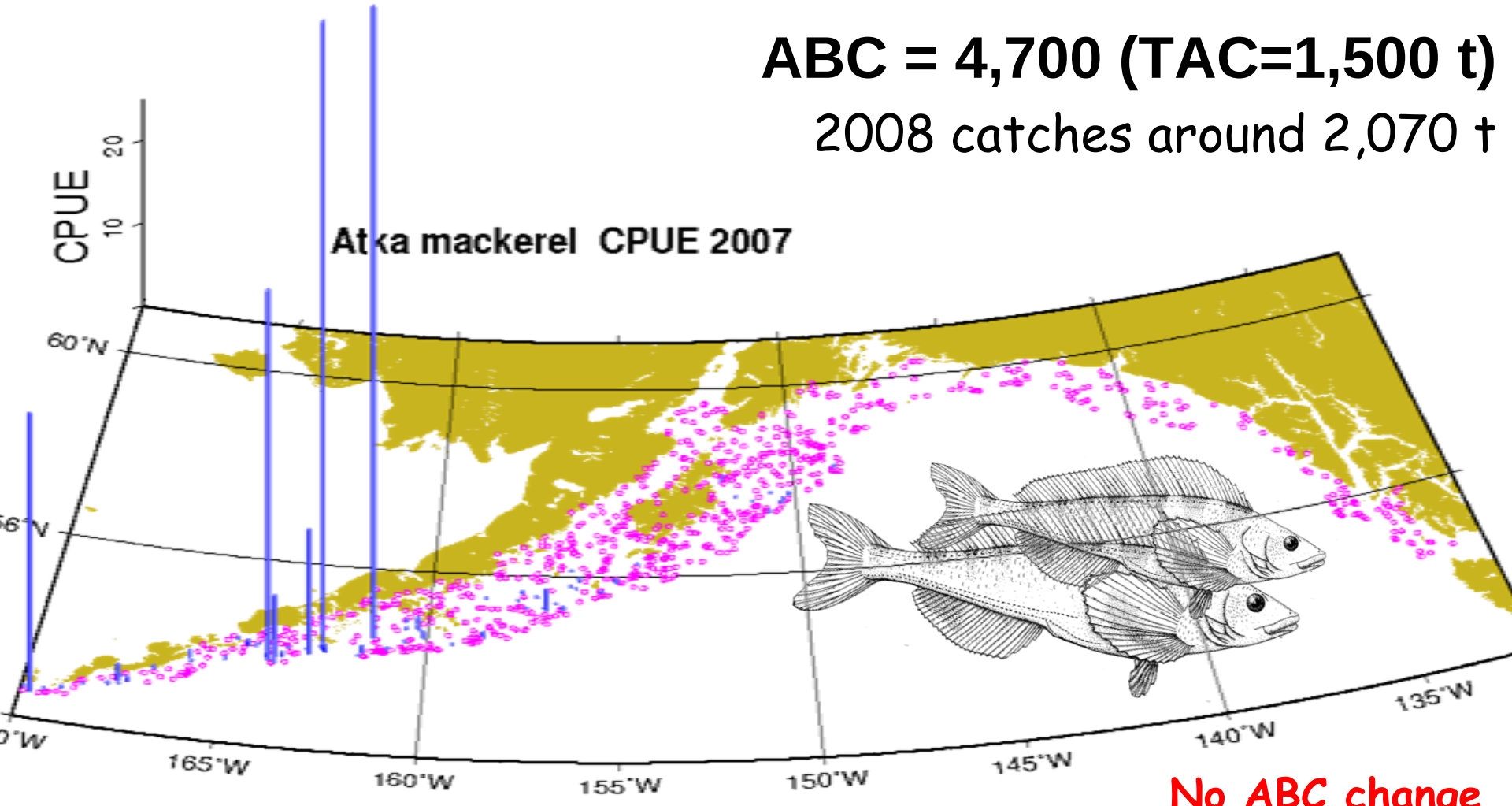


Atka mackerel 2007 survey

Tier 6 species, no directed fishing since 1996

ABC = 4,700 (TAC=1,500 t)

2008 catches around 2,070 t



No ABC change from 2007

ABC Summary

Species	2008 catch	ABC 2008	ABC 2009	Change	
Pollock	51,721	60,180	49,900	down 10,280	(17%)
Pacific Cod	42,424	66,493	55,300	down 11,193	(17%)
Sablefish	12,284	12,730	11,160	down 1,570	(12%)
Flatfish	15,544	123,759	125,617	up 1,858	(2%)
Arrowtooth flounder	29,163	226,470	221,512	down 4,958	(2%)
Rockfish	22,816	33,548	33,005	down 543	(2%)
Atka mackerel	2,071	4,700	4,700	same	(0%)
Skates	3,548	8,321	8,321	same	(0%)
Total	179,571	536,201	509,515	down 26,686	(5%)

Summary: Page 36
Chapter: Page 957

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.*

GOA skate issues

- IFQ halibut fishery bycatch still a problem
- State opening a skate fishery in PWS
  - ~136 tons
    - Big skates
      - 23 t
    - Longnose
      - 113 t
- Currently outside of federal TAC

Skates ABC/OFL

Tier 5

Age-structured model may be available for Big and/or longnose skates next year

No change from 2007

Big skates	Biomass	OFL	ABC
2009	44,400	4,439	3,330
2010		4,439	3,330

Longnose skates	Biomass	OFL	ABC
2009	38,490	3,849	2,887
2010		3,849	2,887

Other Skates	Biomass	OFL	ABC
2009	28,057	2,806	2,104
2010		2,806	2,104

Other species

- **GOA "Other species" ABC and OFL specified for the first time**
- **Methods aggregate: Squid, sharks, sculpins, octopus**
  - Separate chapters for each of these groups
  - OFL and ABC recommendations sum
- **Additional Team recommendations:**
  - Move squid to the forage fish category
  - Evaluate alternative management approaches for cephalopod species
    - Groundfish Tier system may be inadequate

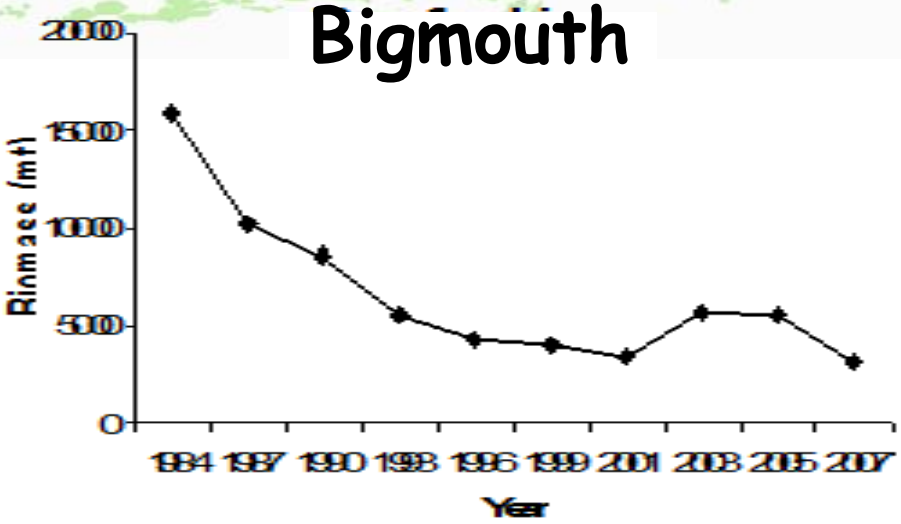
Chapter 18a. GOA Sculpins

	Retained	Discarded	Total	Percent Retained
2003	54	697	751	7%
2004	58	600	658	9%
2005	89	455	544	16%
2006	94	481	576	16%
2007	162	695	856	19%

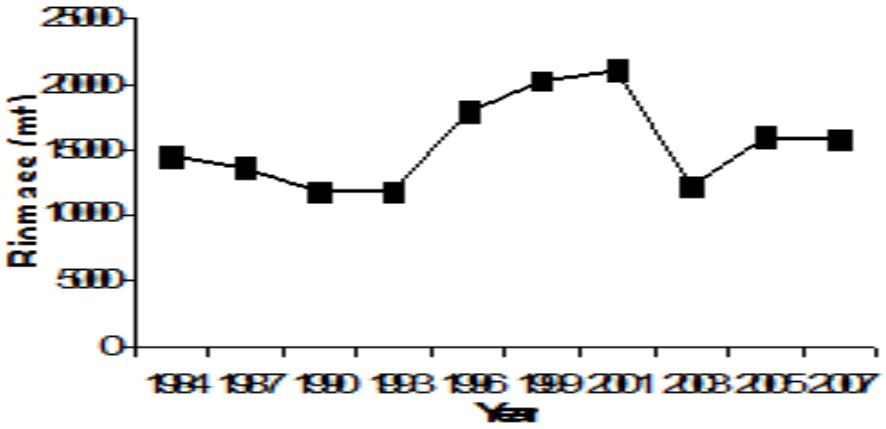
Sculpins	Biomass	OFL	ABC
2009	30,836	5,859	4,394
2010		5,859	4,394

GOA Sculpin biomass estimates

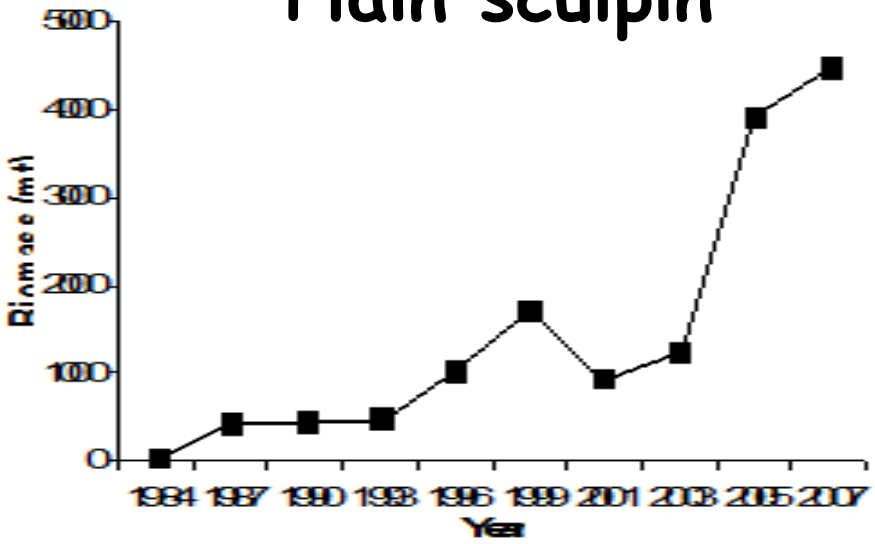
Bigmouth



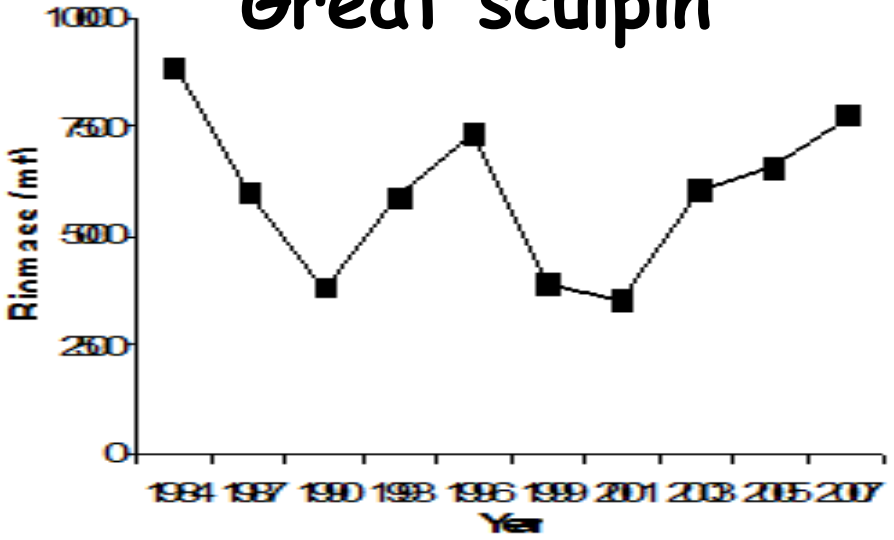
Yellow Irish lord



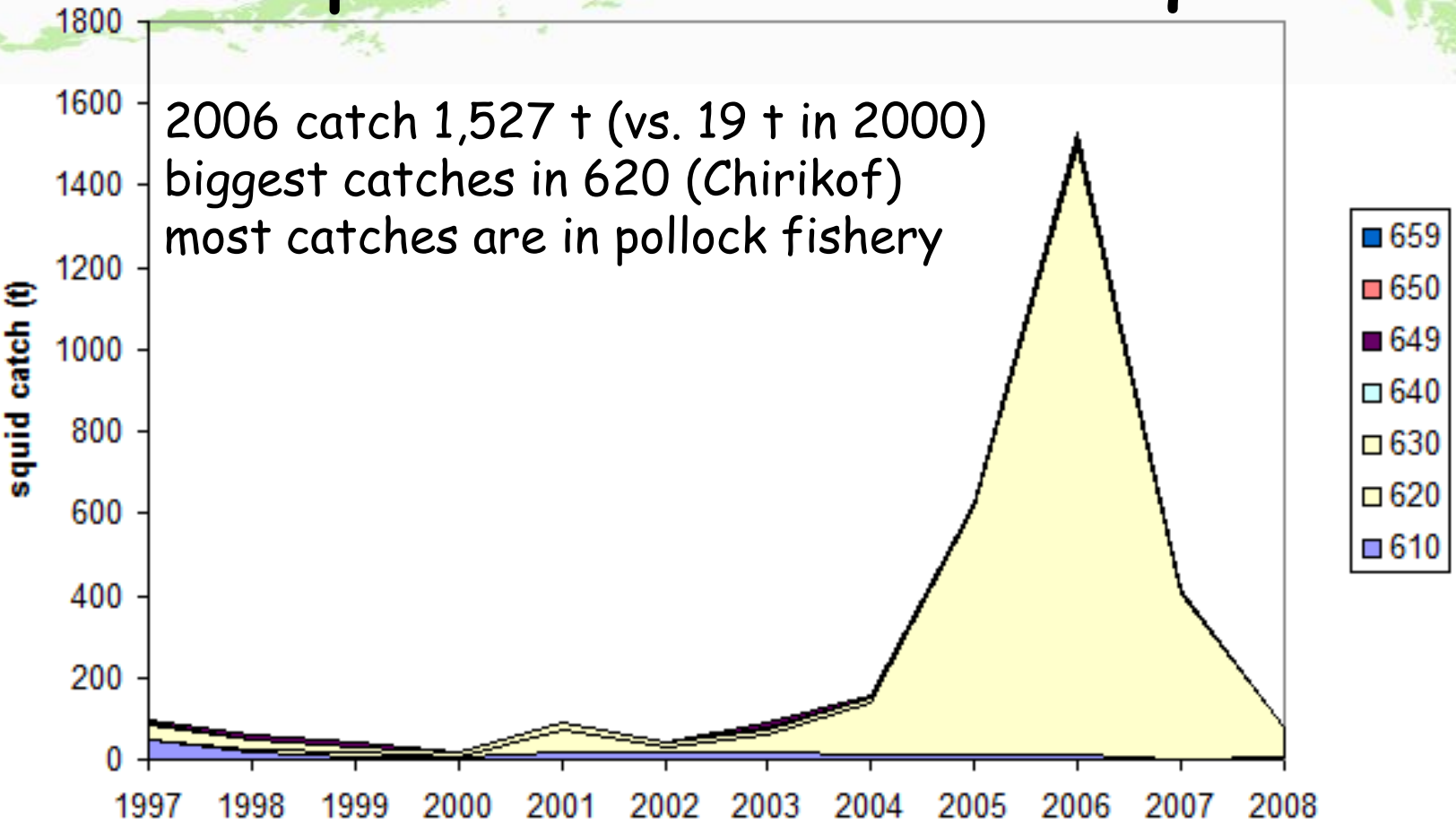
Plain sculpin



Great sculpin

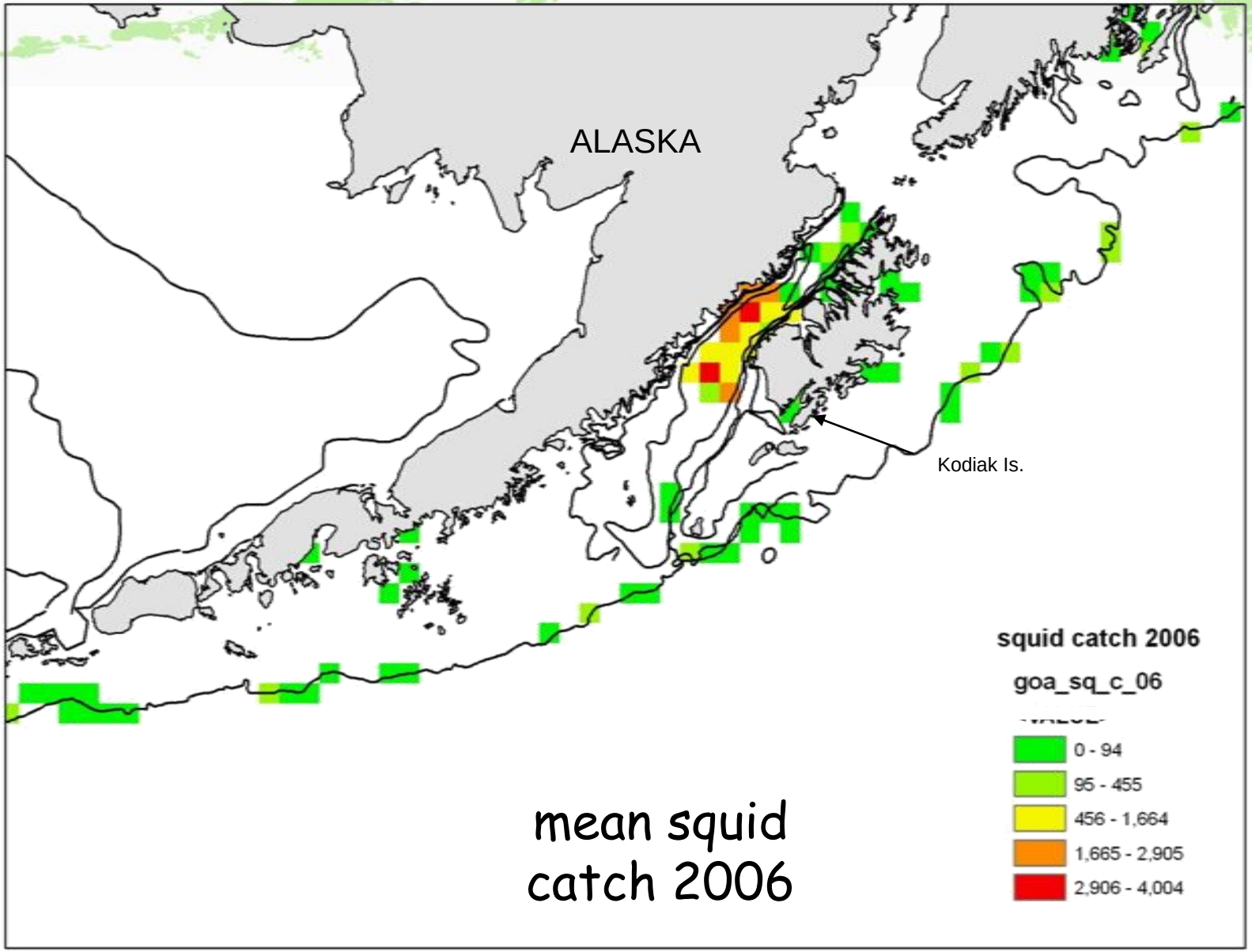


Chapter 18b. GOA Squid



Squid	Biomass	OFL	ABC
2009	Unknown	1,527	1,145
2010		1,527	1,145

Squid catch: distribution (2006)



mean squid catch 2006

18c. Octopus

- **Discard mortality study**
  - Assessment authors suggested discard mortality factor be used as part of management
  - Modified Tier 6 method accepted

Octopus	Biomass	OFL	ABC
2009	Unknown	298	224
2010		298	224

18d. GOA Sharks

- **Four species/groups**
  - Spiny dogfish, Salmon shark, sleeper shark, Updated catch data for 2008
  - Biomass estimates for 2007
  - Recent life history and demographic study results
- **Results**
  - Recommend Tier 6 with average catch
    - Most appropriate with life-history results

GOA Shark	Biomass	OFL	ABC
2009	Unknown	1,036	777
2010		1,036	777

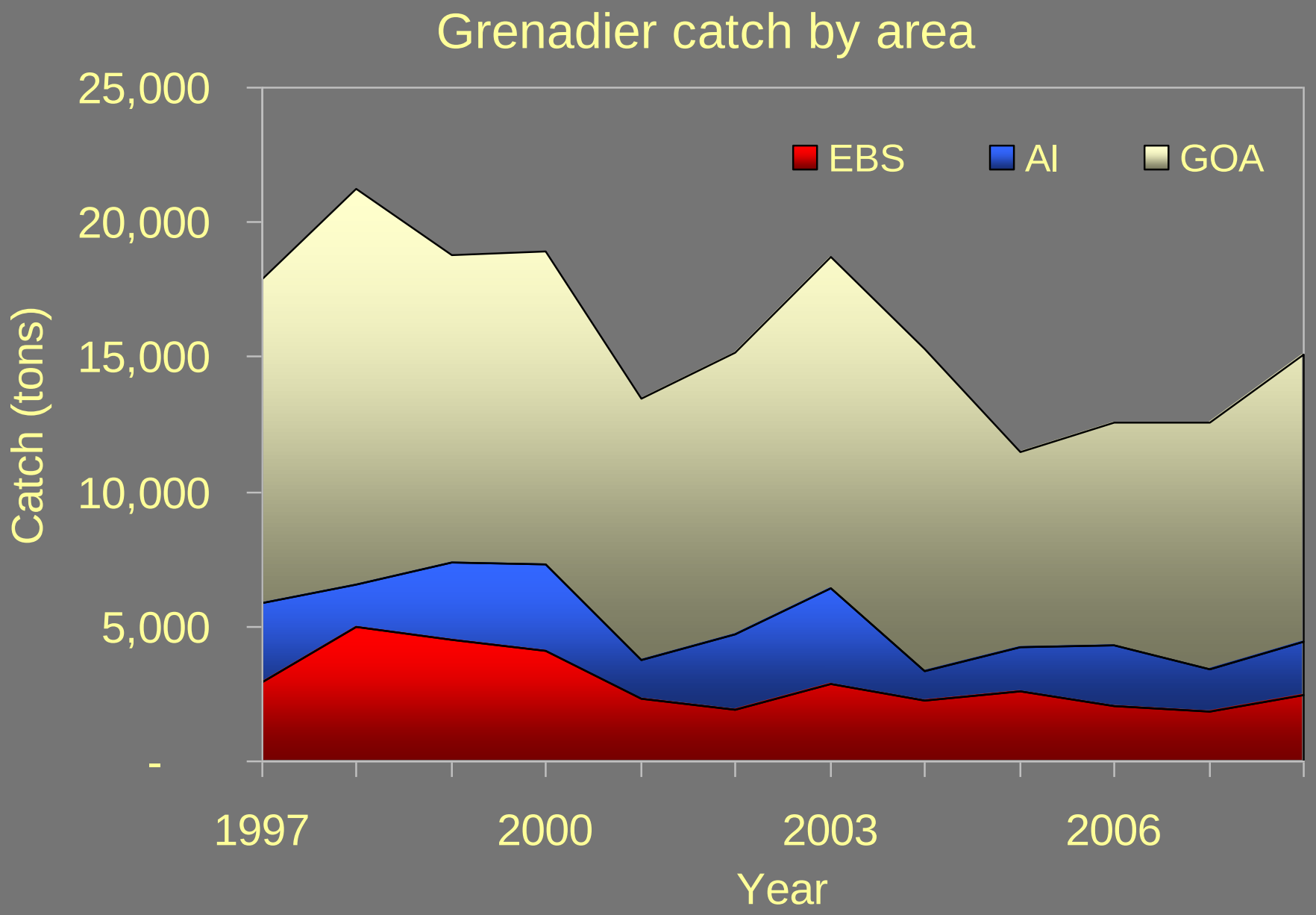
Appendix: GOA forage fish

- **Includes many species**
  - Eulachon and capelin main focus
- **Plan Team recommendations**
  - Squid should be moved into forage fish
  - MRA (including squid) be explicitly reevaluated in management amendment analysis for forage fish.
  - Cook Inlet eulachon stocks require further evaluation given the listing of the Cook Inlet belugas

Appendix: Grenadiers

- "Nonspecified" by NPFMC, (not part of FMPs)
- Assessment not officially required
- First done in 2006 for "other species" considerations

Appendix: Grenadiers



Appendix: GOA grenadiers Recommendations

Assessment related

- Tier 5 seems reasonable given reliable biomass estimates from the trawl surveys
- Region-specific ABCs and catches by region for grenadiers should be included

Moving grenadiers into the FMP should be a priority for the Council

- For the GOA if not in both regions