

# Update on groundfish stock trends for the Gulf of Alaska

Report of the  
Gulf of Alaska Groundfish  
Plan Team meeting  
Nov 15–19<sup>th</sup>, 2010

## GOA Plan Team Members

James Ianelli (co-chair)	AFSC
Diana Stram (co-chair)	NPFMC
<b>Kristen Green</b>	ADFG
Henry Cheng	WDF (joint)
Mike Dalton	AFSC
<b>Bob Foy</b>	<b>AFSC</b>
Nancy Friday	NMML
<b>Chris Lunsford</b>	AFSC
Sarah Gaichas	AFSC
<b>Ken Goldman</b>	<b>ADFG</b>
<b>Steven Hare</b>	<b>IPHC (joint)</b>
Jon Heifetz	AFSC
Sandra Lowe	AFSC
Tom Pearson	AKR
Nick Sagalkin	ADFG
Leslie Slater	USFWS (joint)
Paul Spencer	AFSC



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# Overview

Biennial cycle— off-survey year for GOA

10 stocks in Tier 3

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

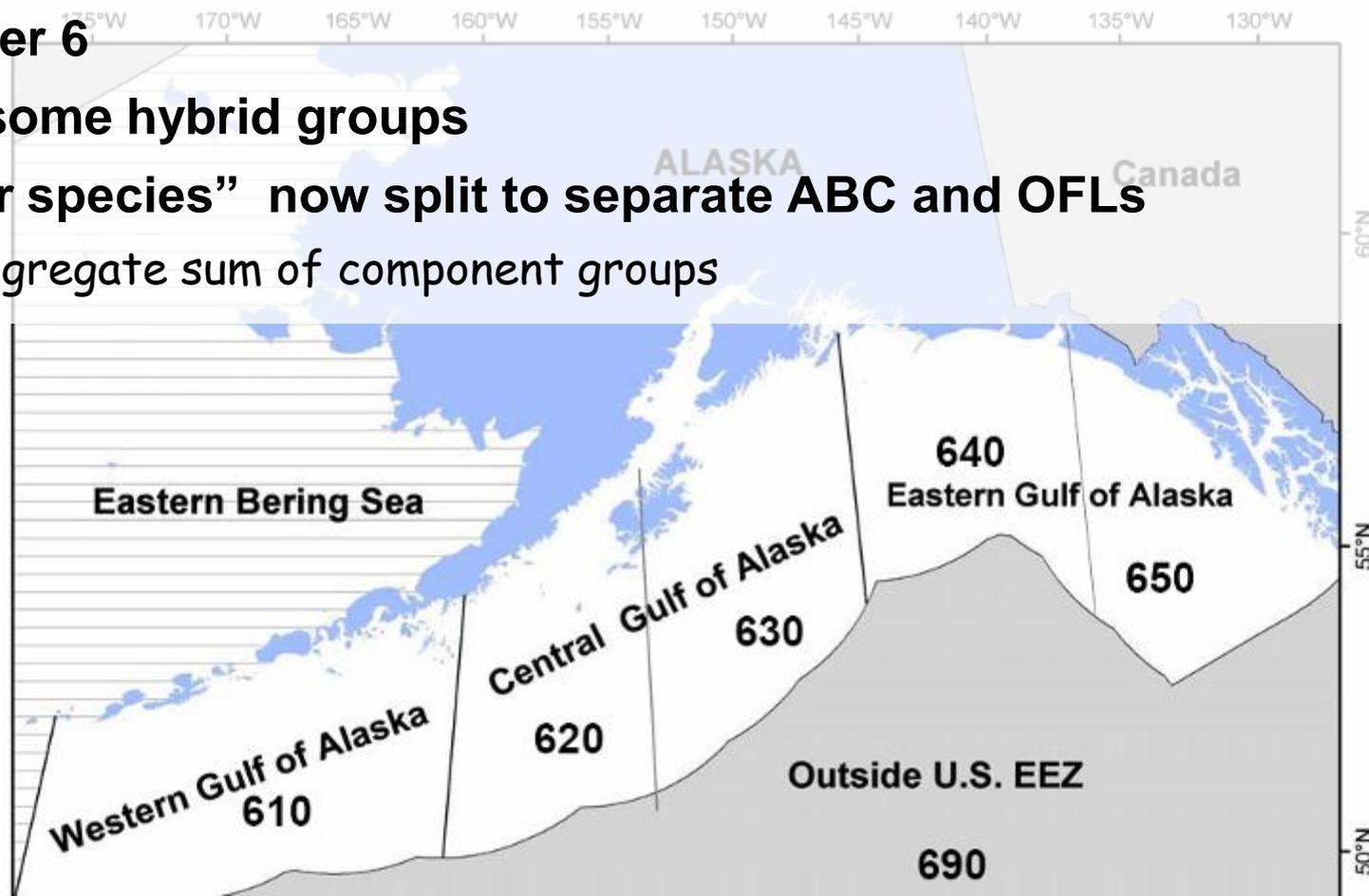
8 in Tier 5, and

5 in Tier 6

Note some hybrid groups

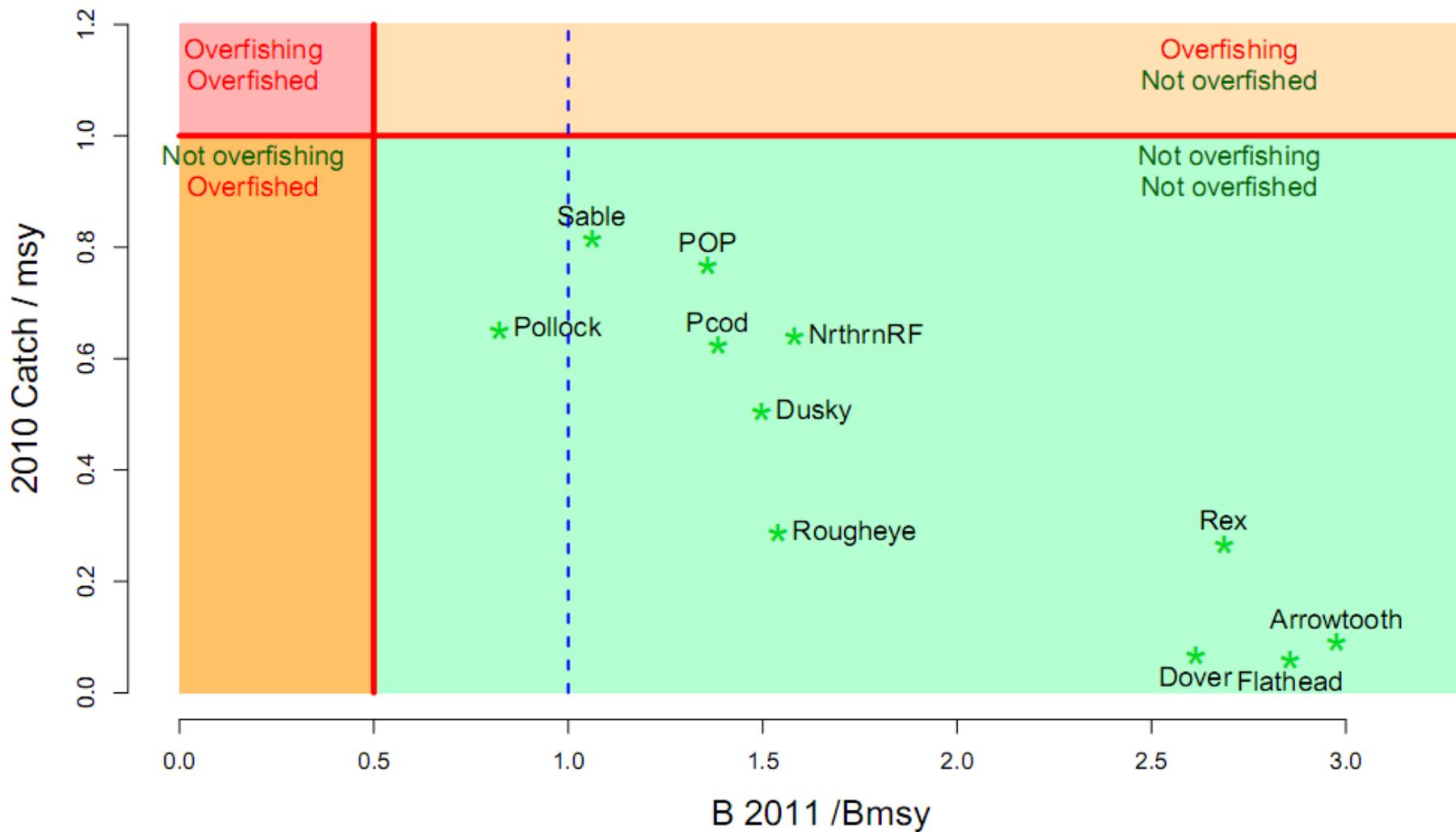
“Other species” now split to separate ABC and OFLs

Aggregate sum of component groups

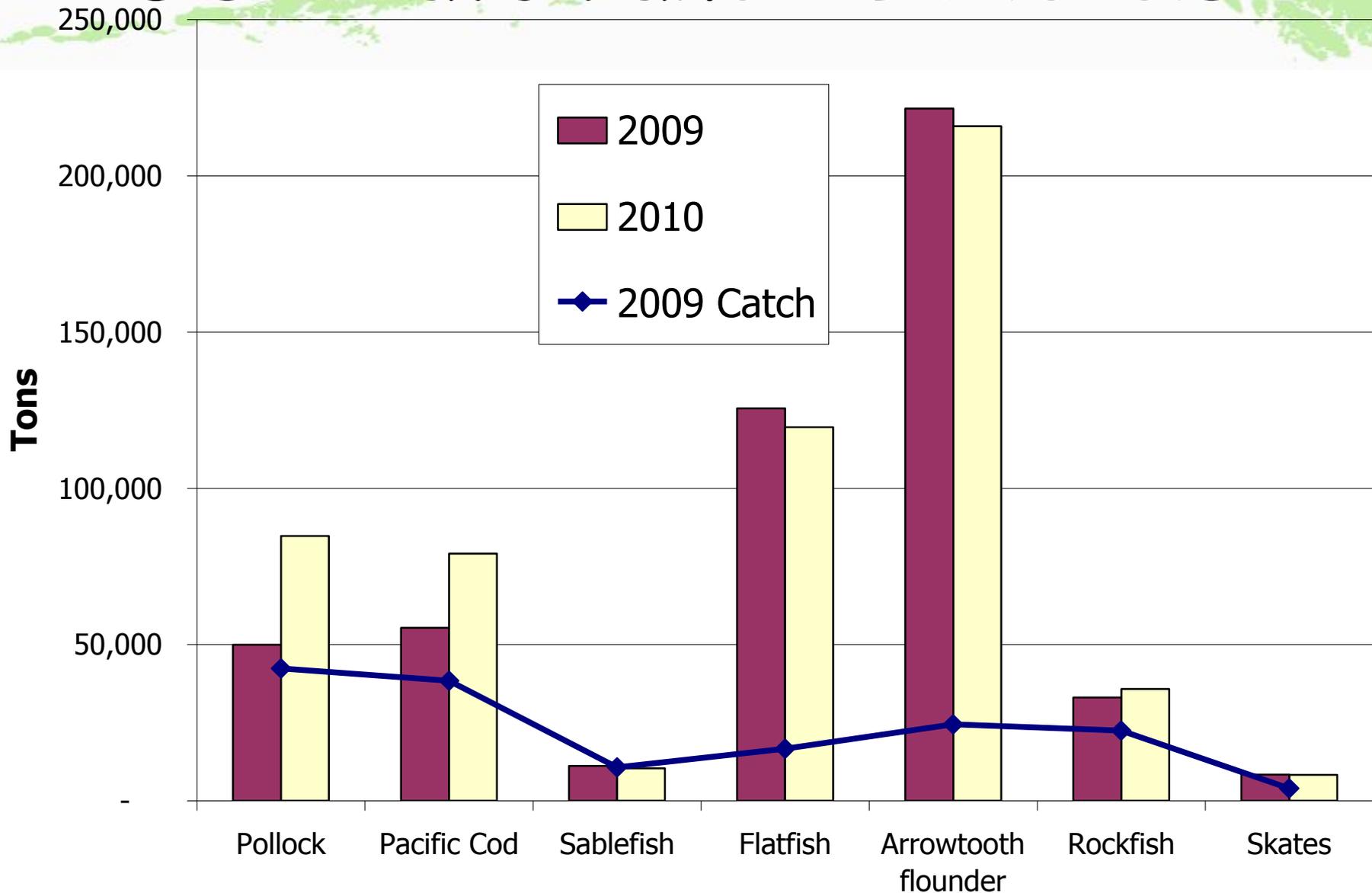


# 2010

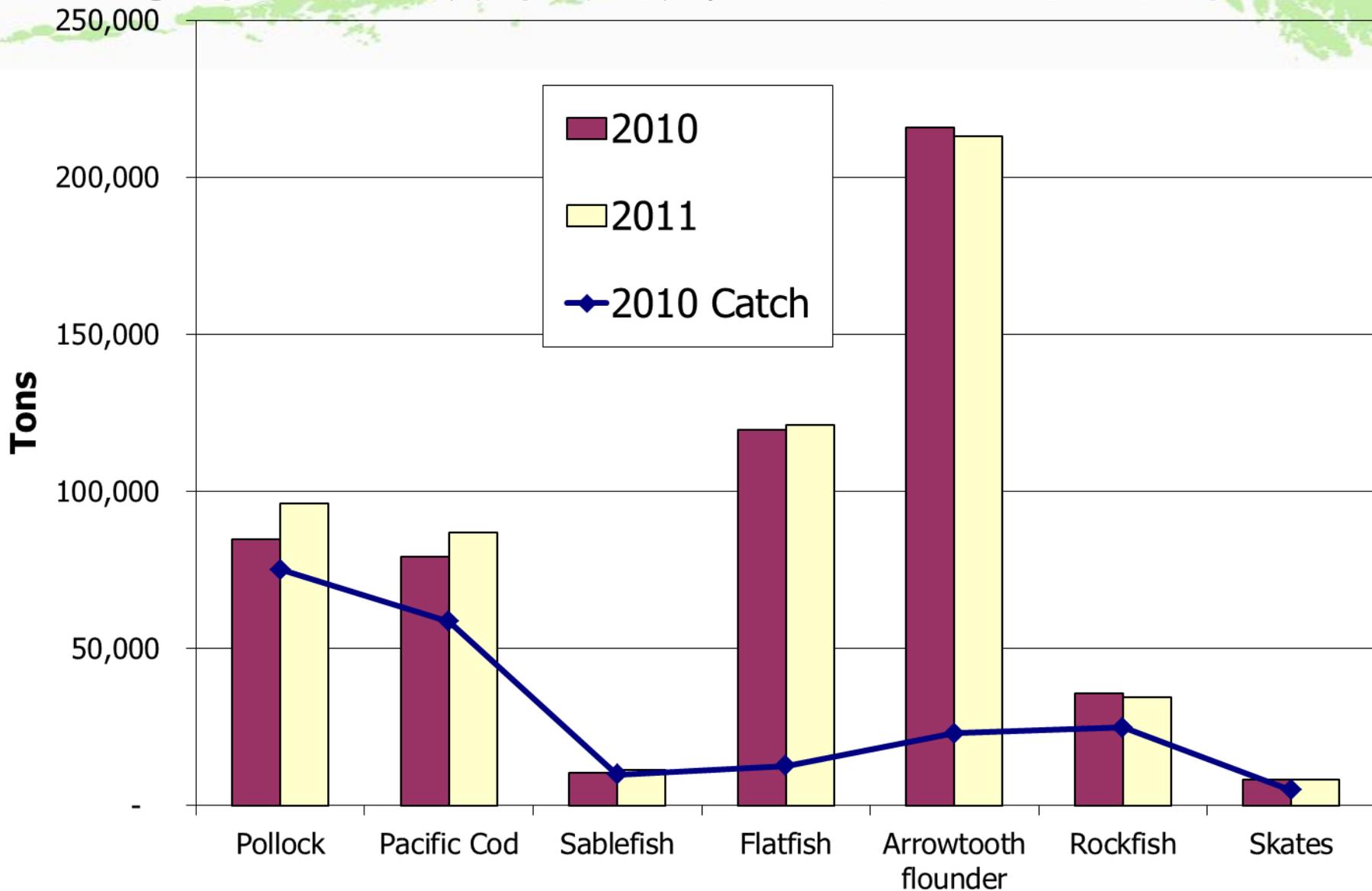
## Gulf of Alaska



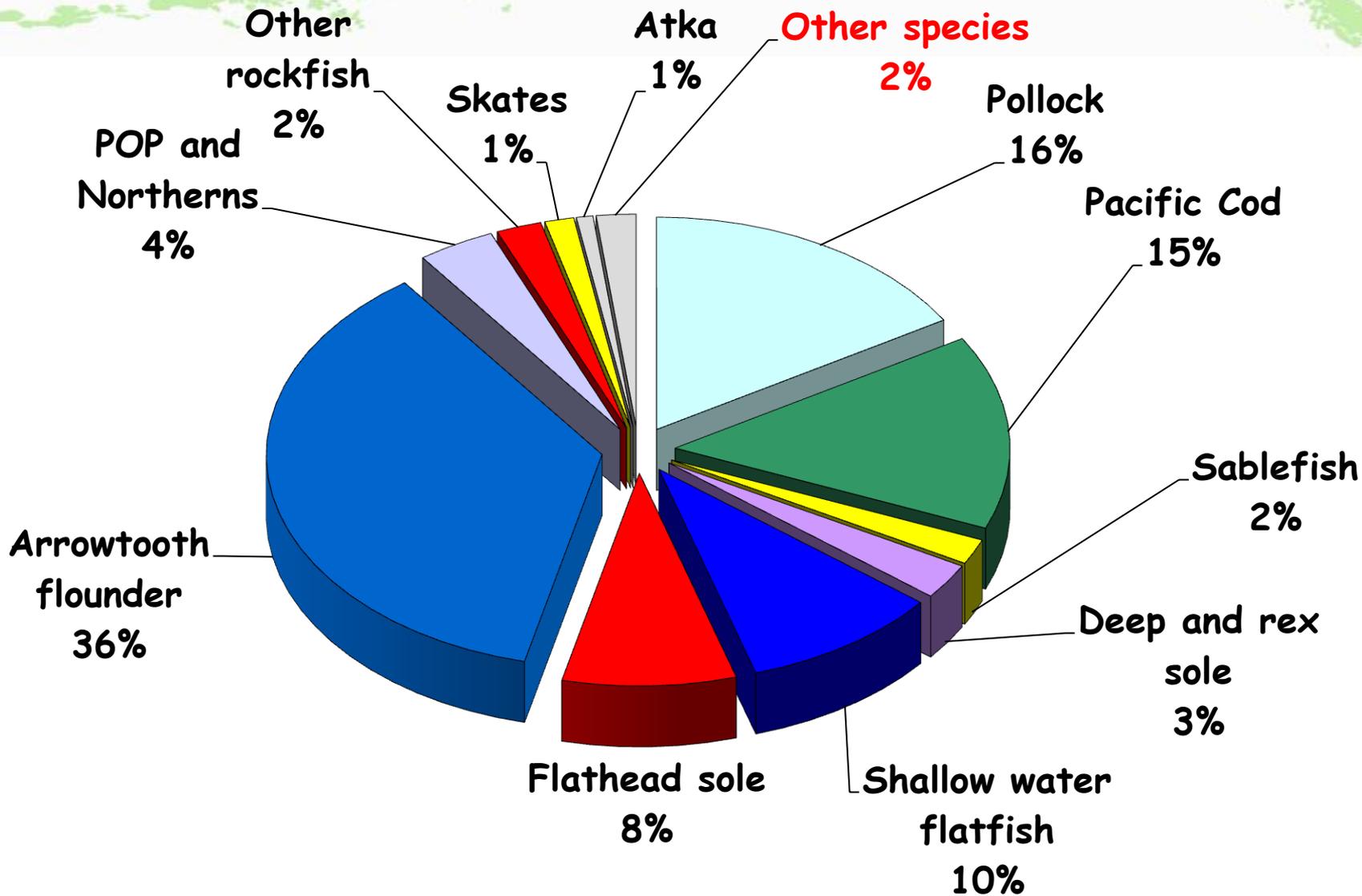
# GOA Catch and ABC levels



# GOA Catch and ABC levels



# GOA 2011 ABC's: 587,525 t



# ABC / TAC

- **Plan Team recommendations where ABC < maximum permissible:**

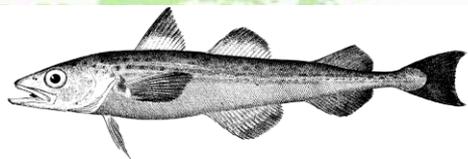
<b>Percent of Max permissible</b>	
<b>Pollock</b>	<b>84%</b>
<b>Demersal shelf rockfish</b>	<b>77%</b>
<b>GOA Sharks</b>	<b>58%</b>

# Species overviews

1. **2010 ABC/Catch and recommended changes**
2. **Highlights**
  - ♦ New data
  - ♦ Analytic approach (changes)
3. **Stock status and trend**
4. **ABC/OFL**
  - ♦ Tier history and candidacy
  - ♦ 2011, 2012 maxABC; recommended ABC (if  $<$  max)

**Most detail on pollock, Pacific cod, and sablefish**

## ABC



Species	2010	ABC		
	Catch	2010	2011	Change
Pollock	75,189	84,745	96,215	up 11,470 (14%)
Pacific Cod	58,660	79,100	86,800	up 7,700 (10%)
Sablefish	9,998	10,370	11,290	up 920 (9%)
Flatfish	12,757	119,583	121,245	up 1,662 (1%)
Arrowtooth flounder	23,015	215,882	213,150	down 2,732 (1%)
Rockfish	24,870	35,771	34,653	down 1,118 (3%)
Atka mackerel	2,409	4,700	4,700	same (0%)
Skates	4,944	8,273	8,273	same (0%)
Other Species	1,793	7,075	11,199	up 4,124 (58%)
Total	213,635	565,499	587,525	up 22,026 (4%)

Summary:

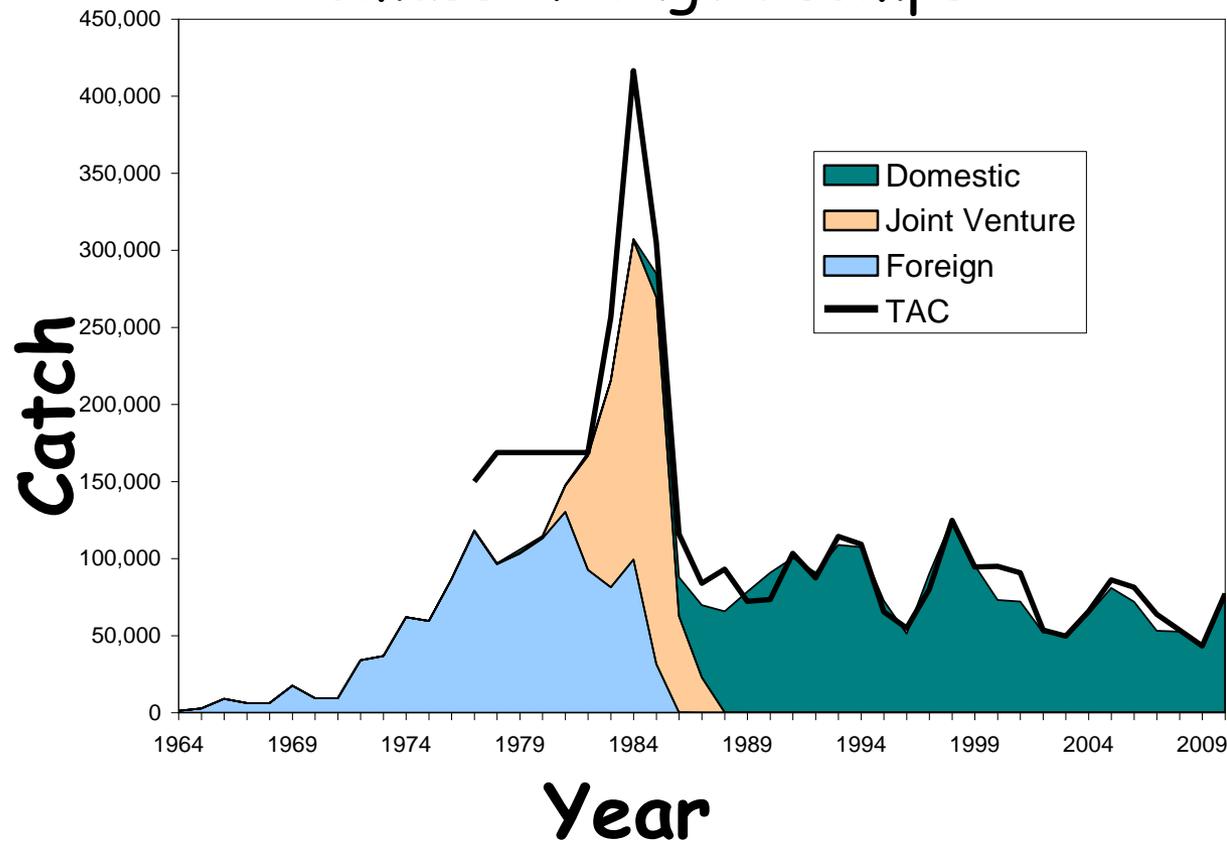
Page 13

Chapter:

Page 53

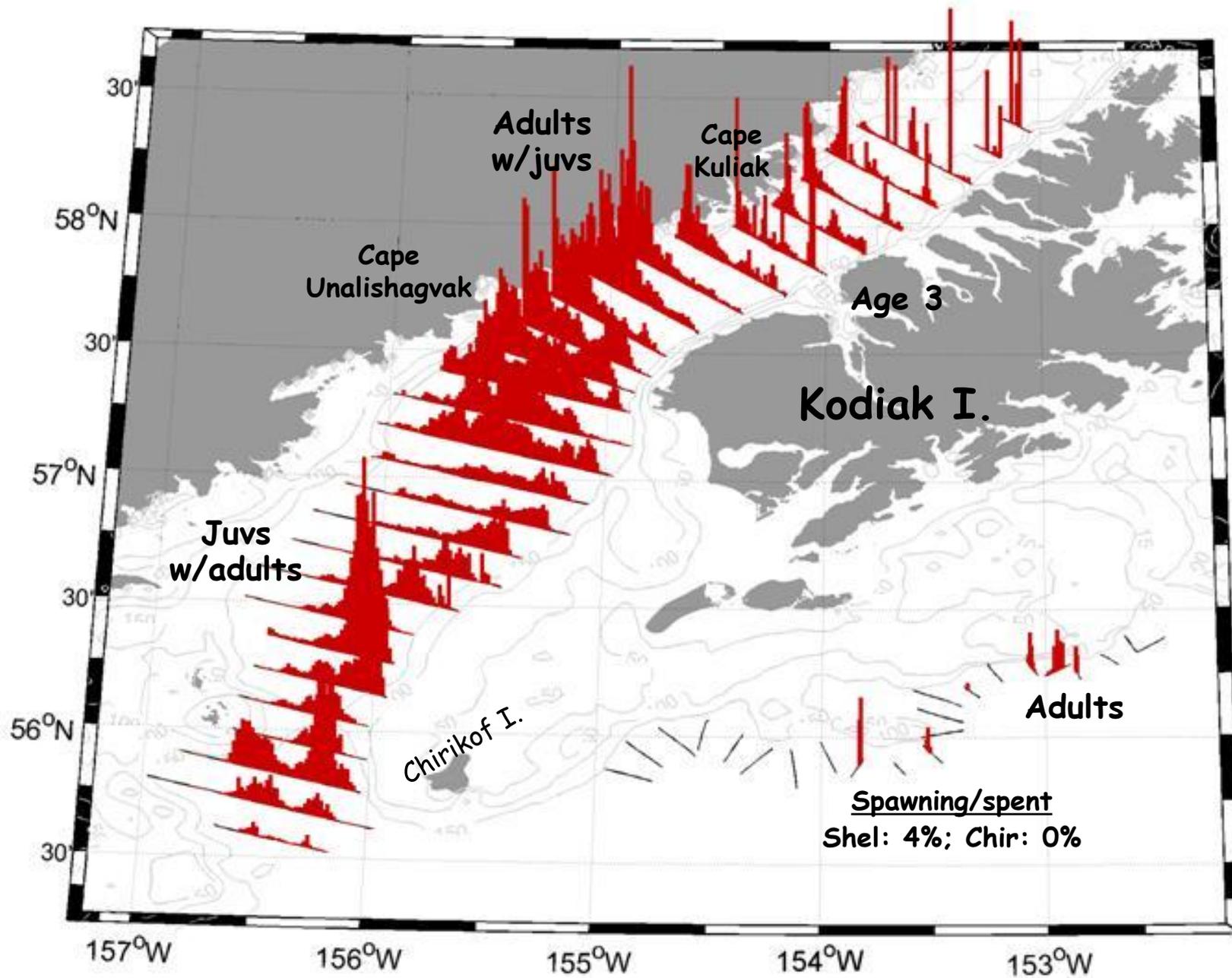
# New Data-GOA pollock

**Fishery:** 2009 total catch and catch at age  
**Shelikof EIT survey:** 2010 biomass and age composition  
**NMFS summer survey:** 2009 age composition  
**ADFG trawl survey:** 2010 biomass & length comps



2009  
Winter  
GOA  
pollock  
survey



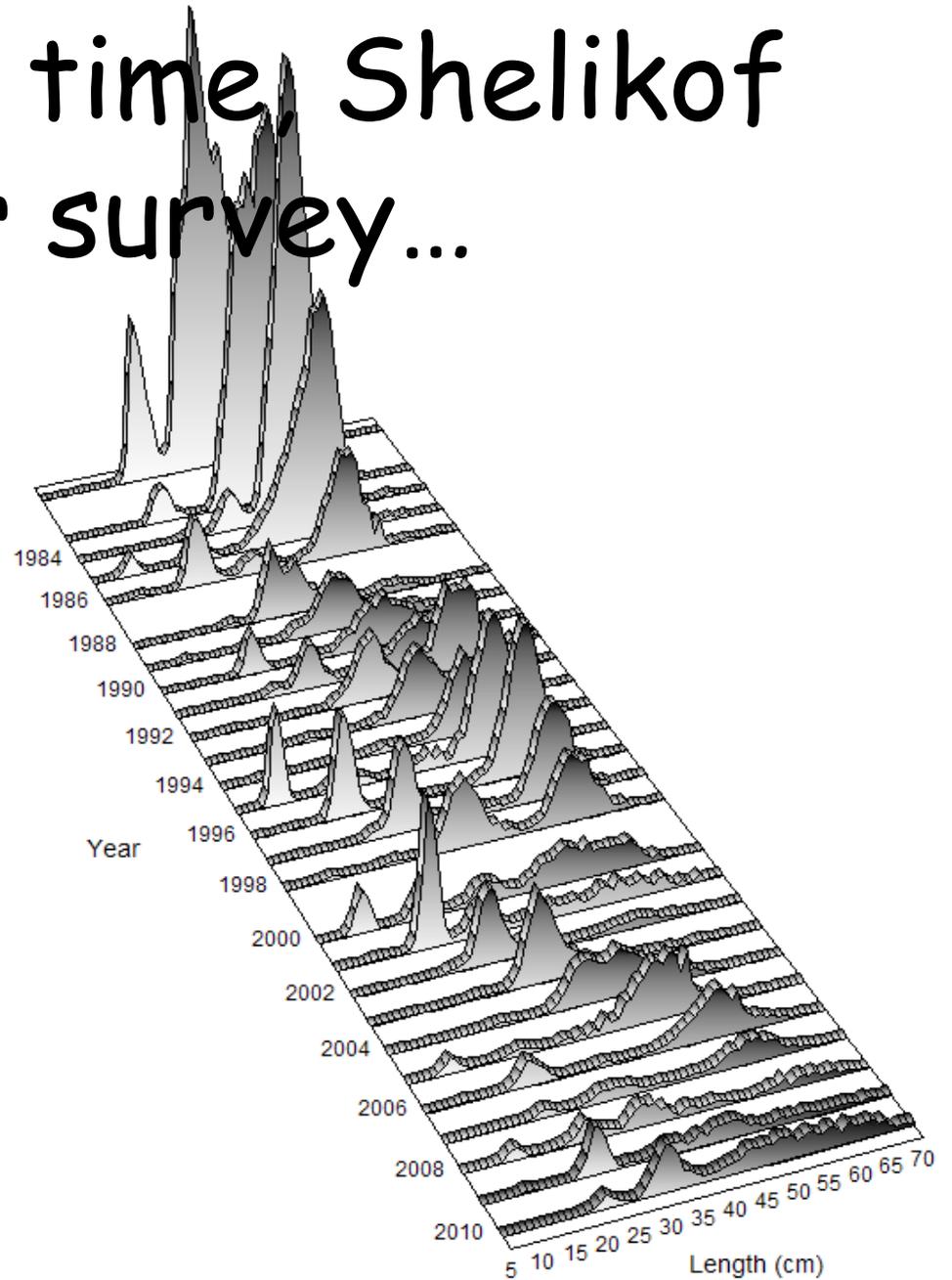


**Shelikof: 22-28 Mar**

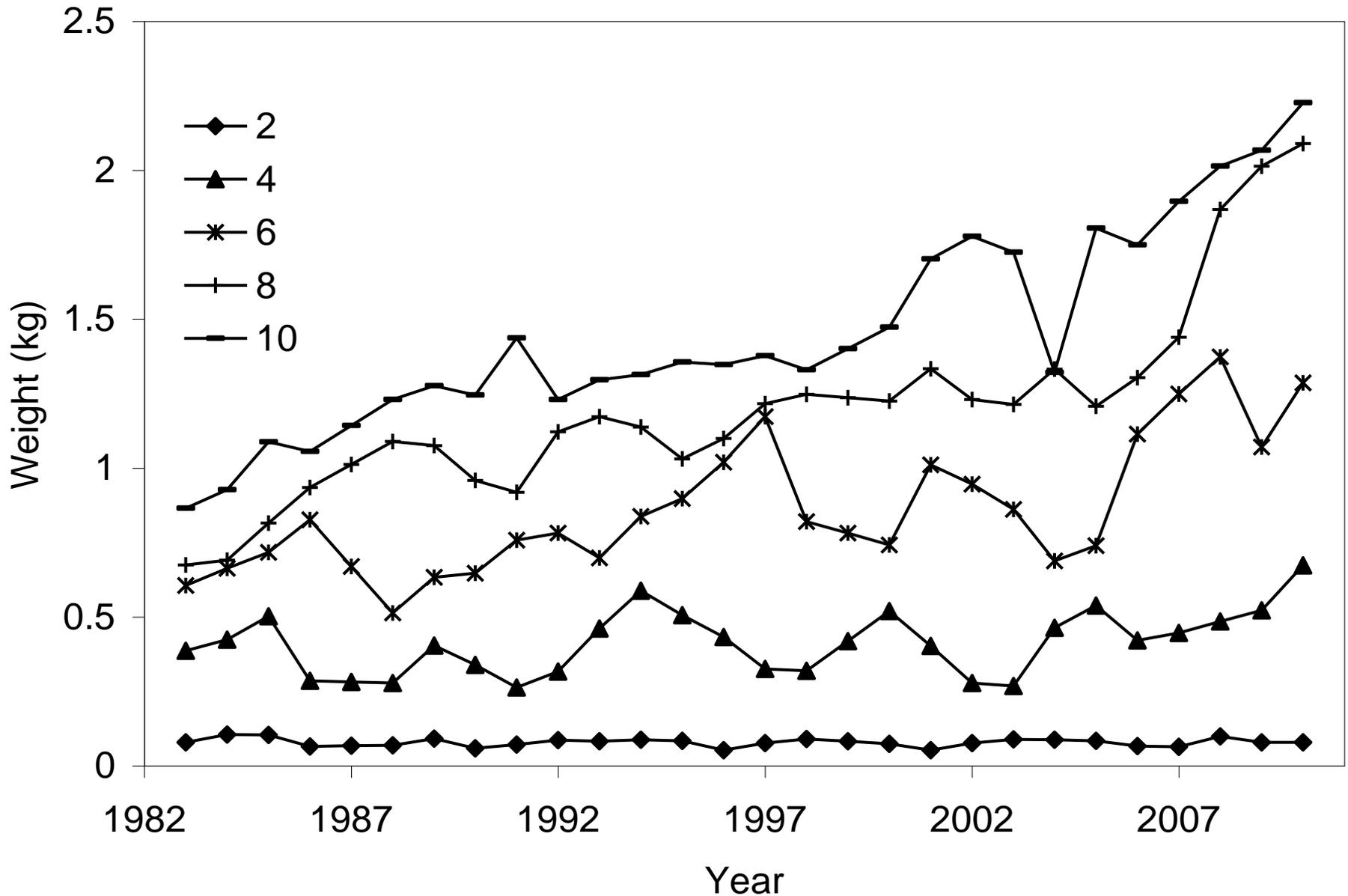
**Chirikof: 18-19 Mar**

# Length over time, Shelikof winter survey...

- By biomass



# Shelikof survey weight at age



# Pollock Distribution along the Kenai Peninsula and in Prince William Sound

Kenai: 2-5 Mar

PWS: 5-7 Mar

Previous surveys

Kenai

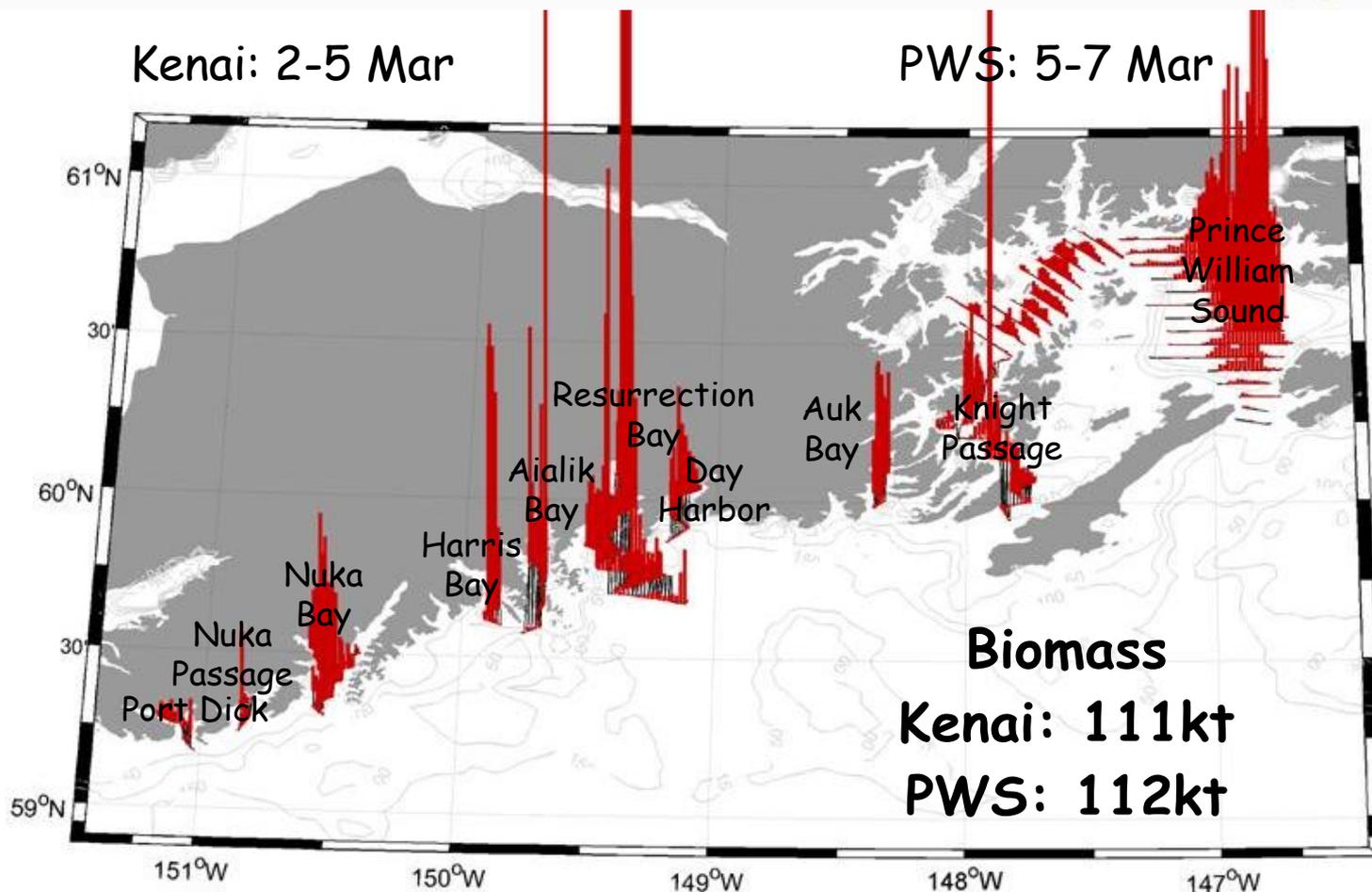
Summer 2003

PWS

Winter 1984

Winter 1990

Summer 2003

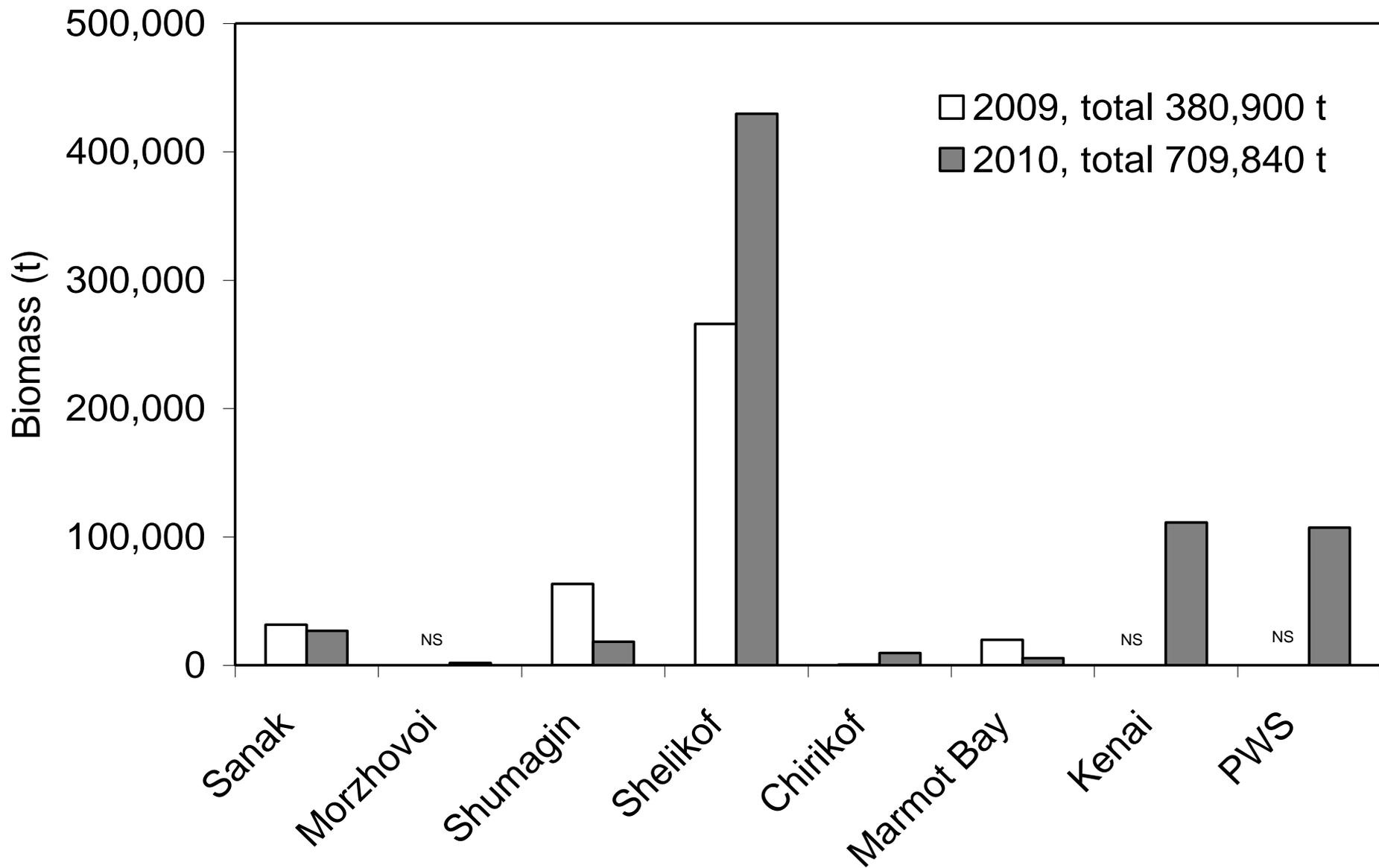


Biomass

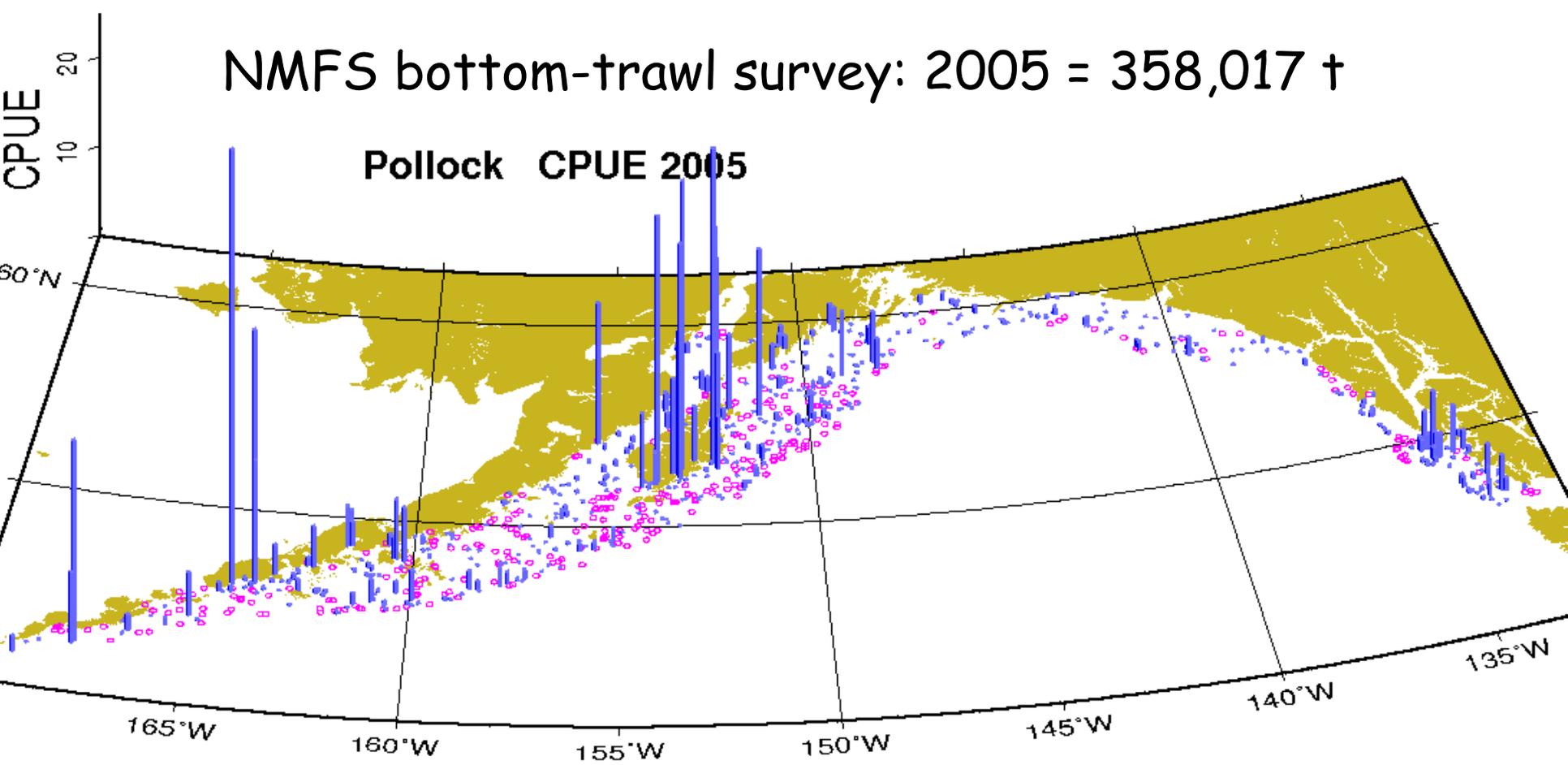
Kenai: 111kt

PWS: 112kt

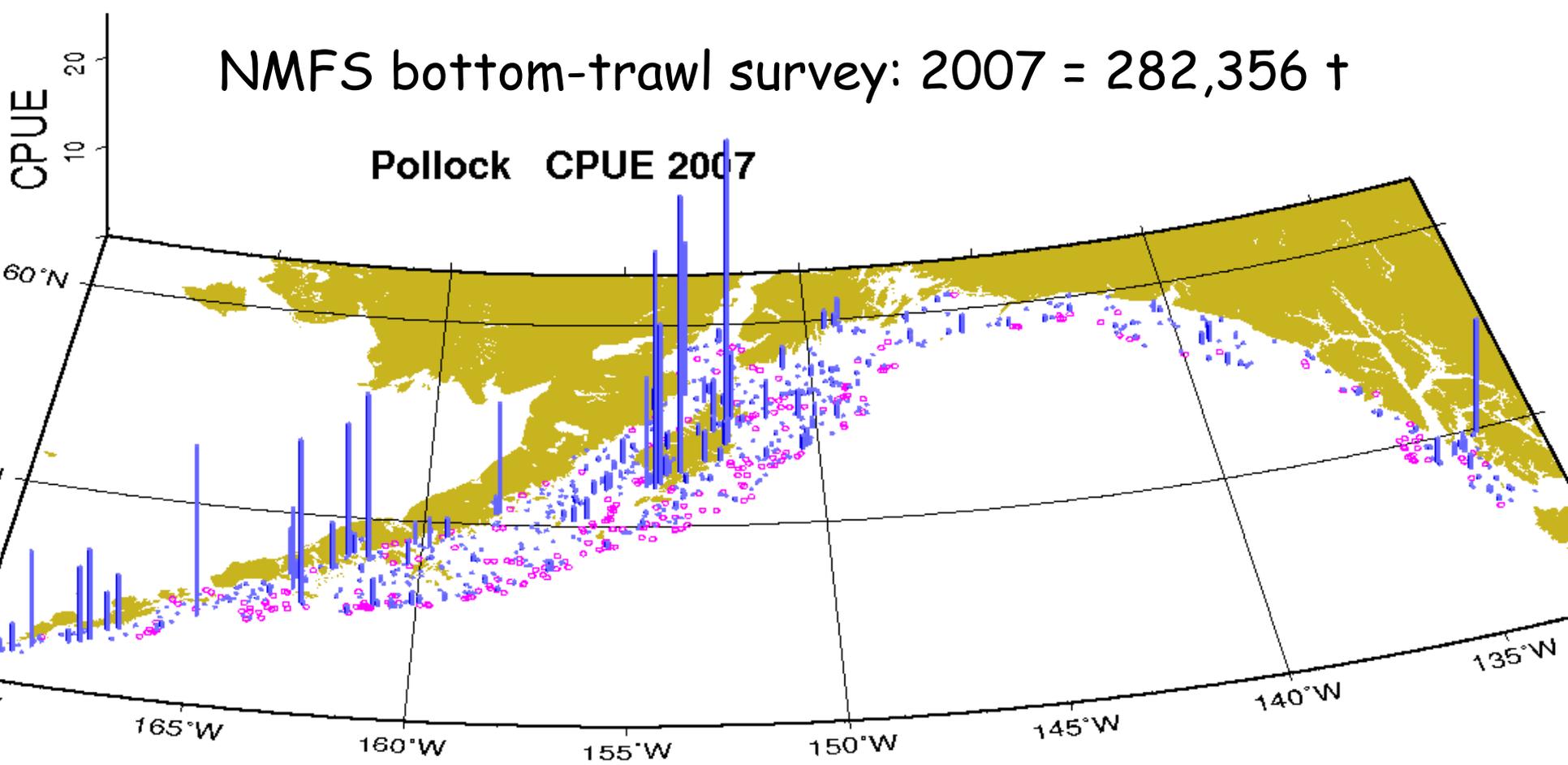
# 2010 winter acoustic surveys



NMFS bottom-trawl survey: 2005 = 358,017 †



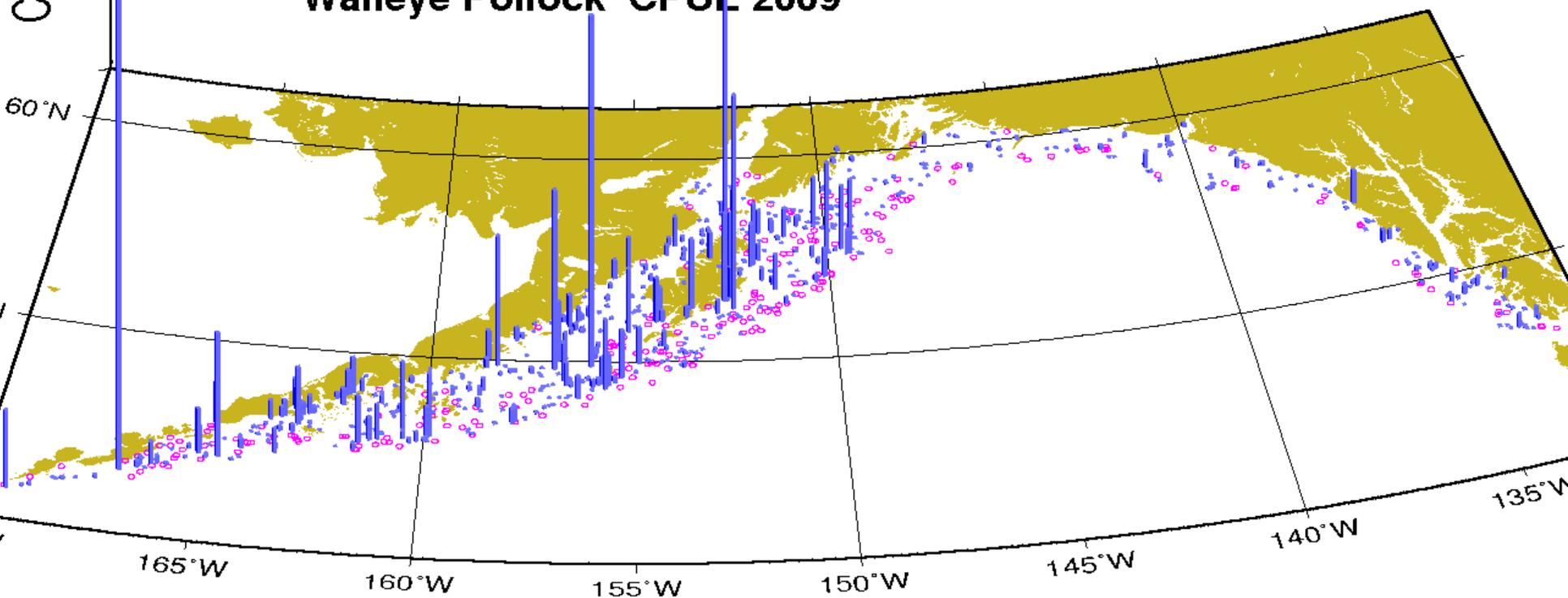
NMFS bottom-trawl survey: 2007 = 282,356 †



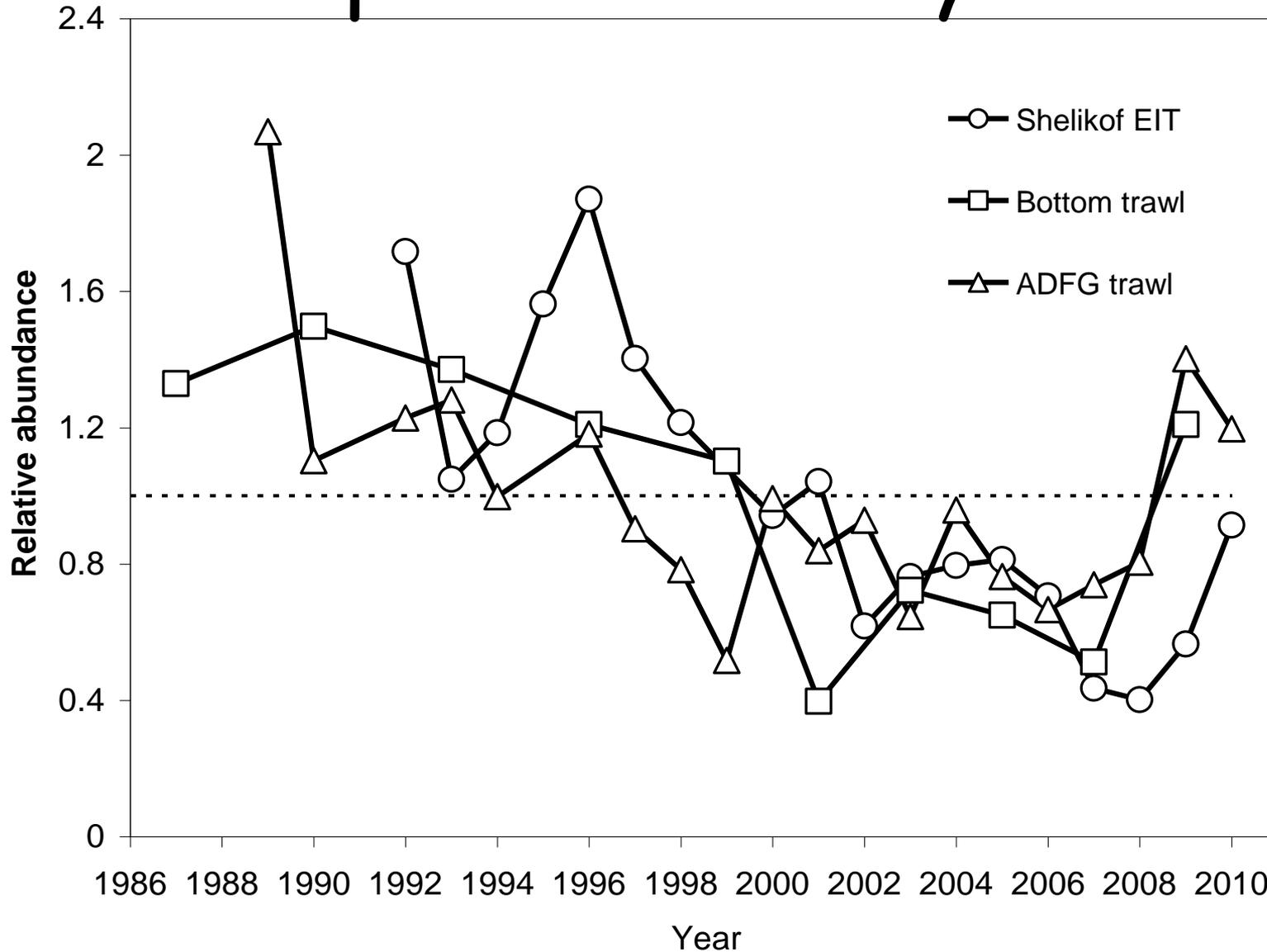
NMFS bottom-trawl survey: 2009 = 669,505 †

CPUE

Walleye Pollock CPUE 2009

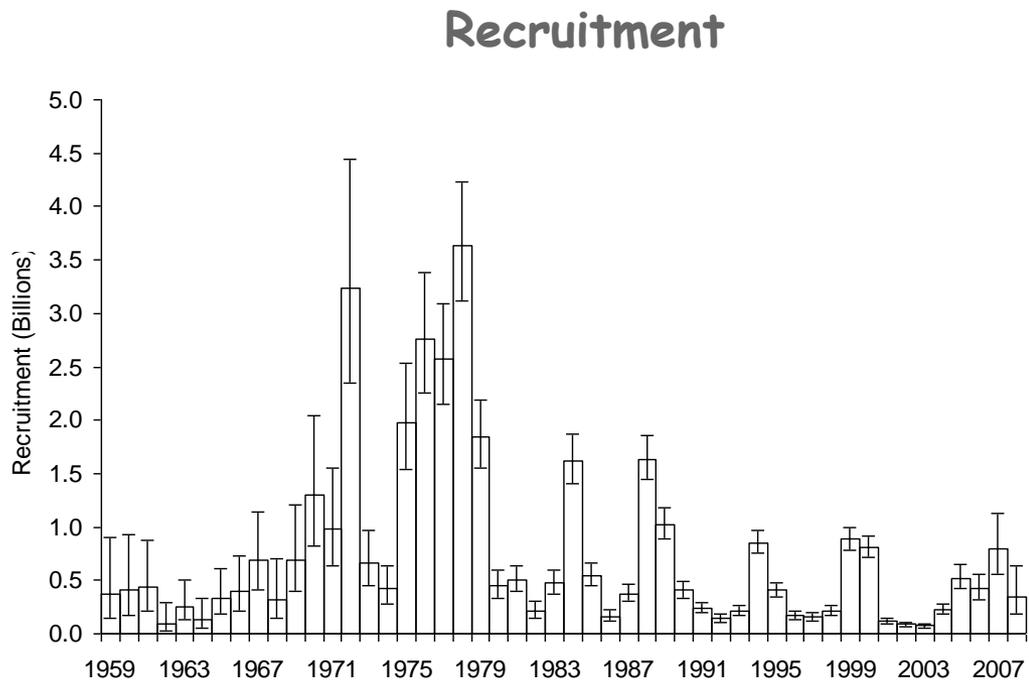
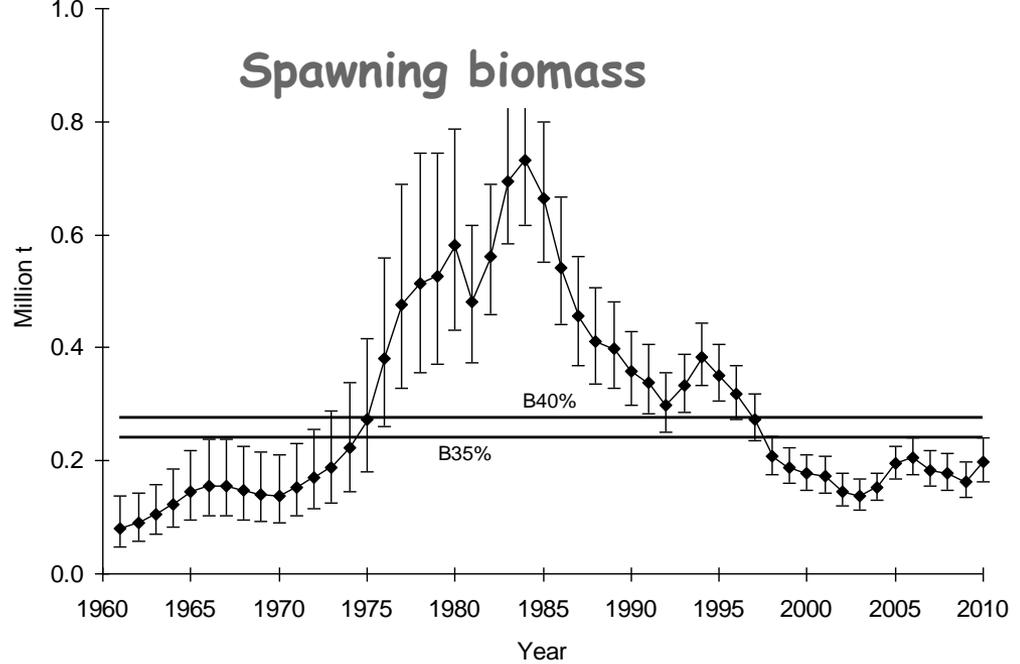


# GOA pollock survey trends



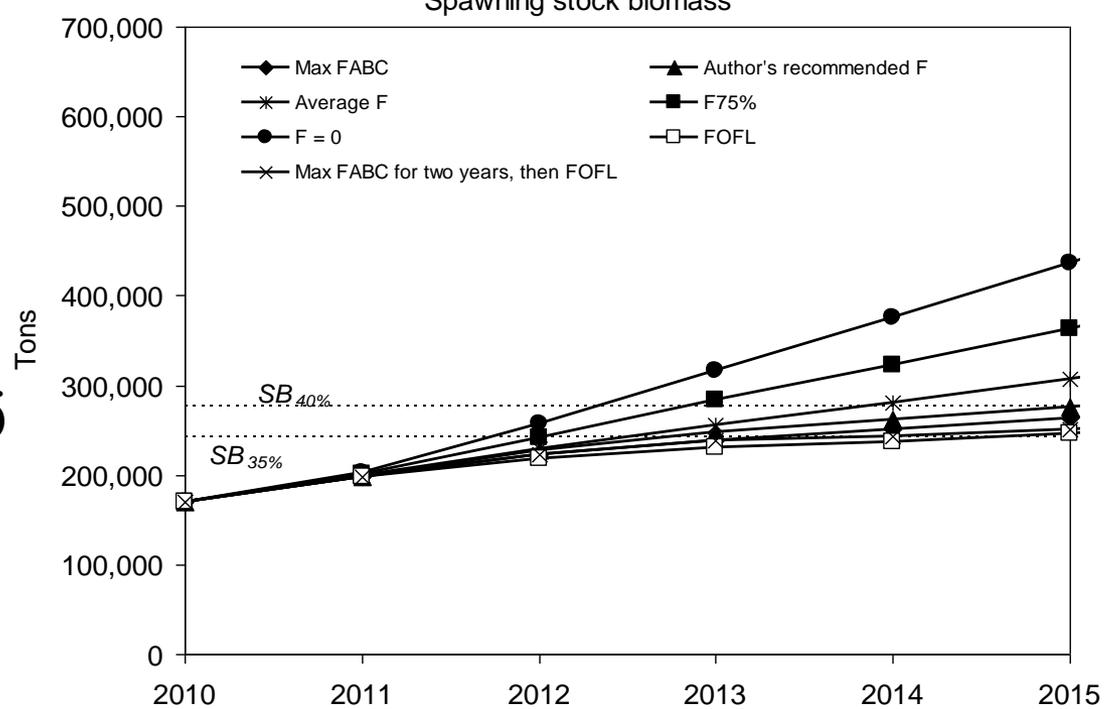
Relative trends in abundance indices, 1986-2010

# GOA pollock model results

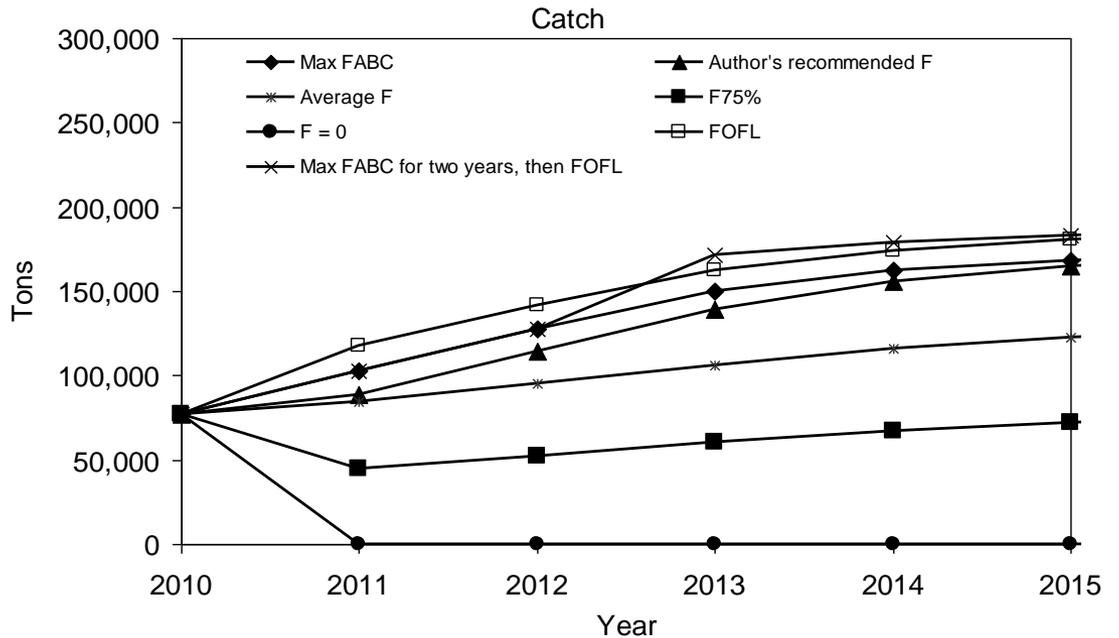


# GOA Pollock projections

2010-2015  
Spawning  
biomass



Yield



# GOA pollock ABC considerations

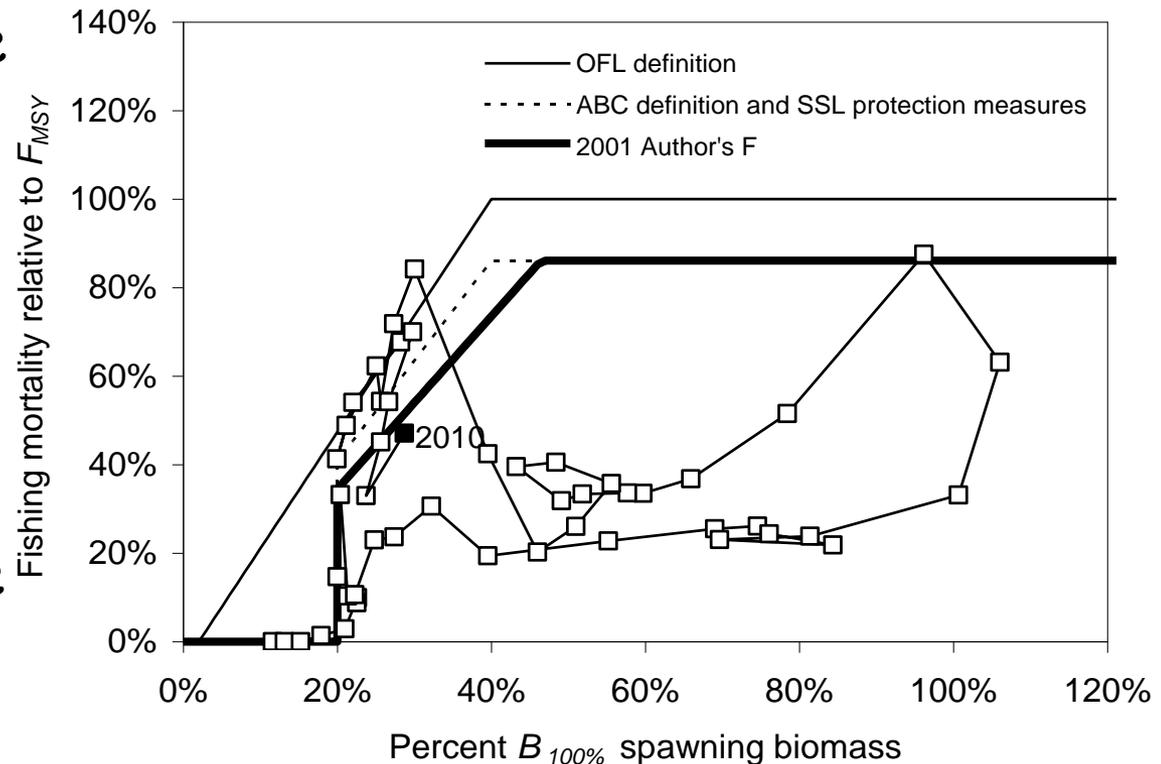
## Recommendation conservative

- ♦ ABC much higher if  $q$  estimated
- ♦ Harvest rate below maximum permissible FABC

## Tier 3b

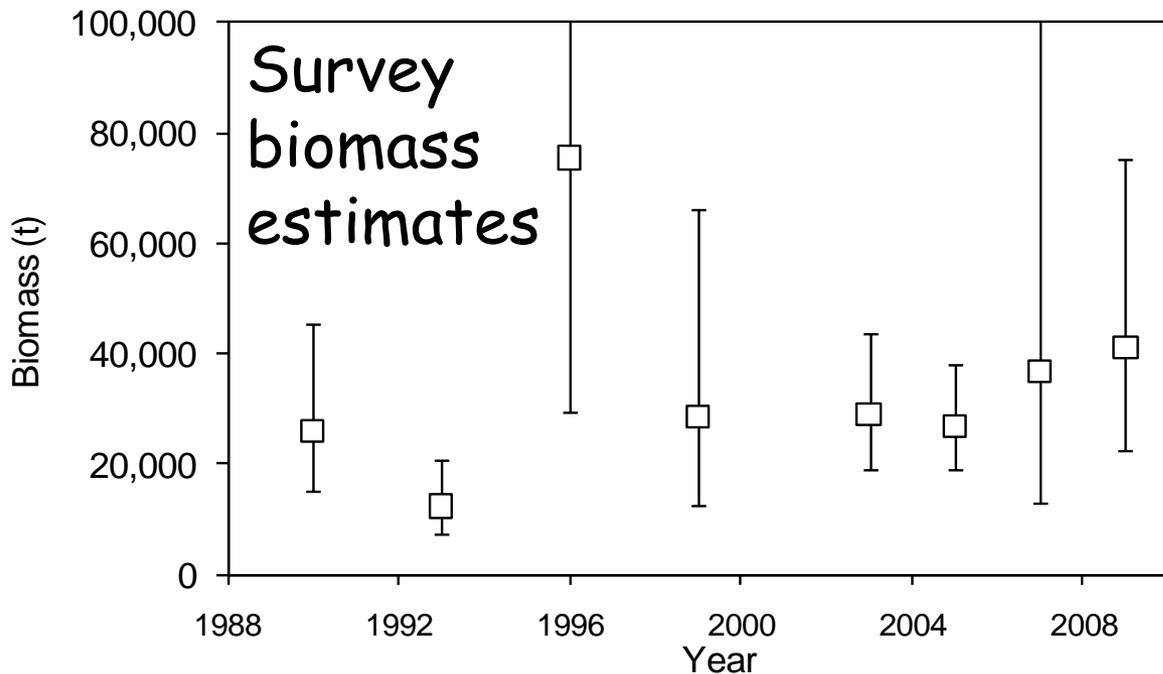
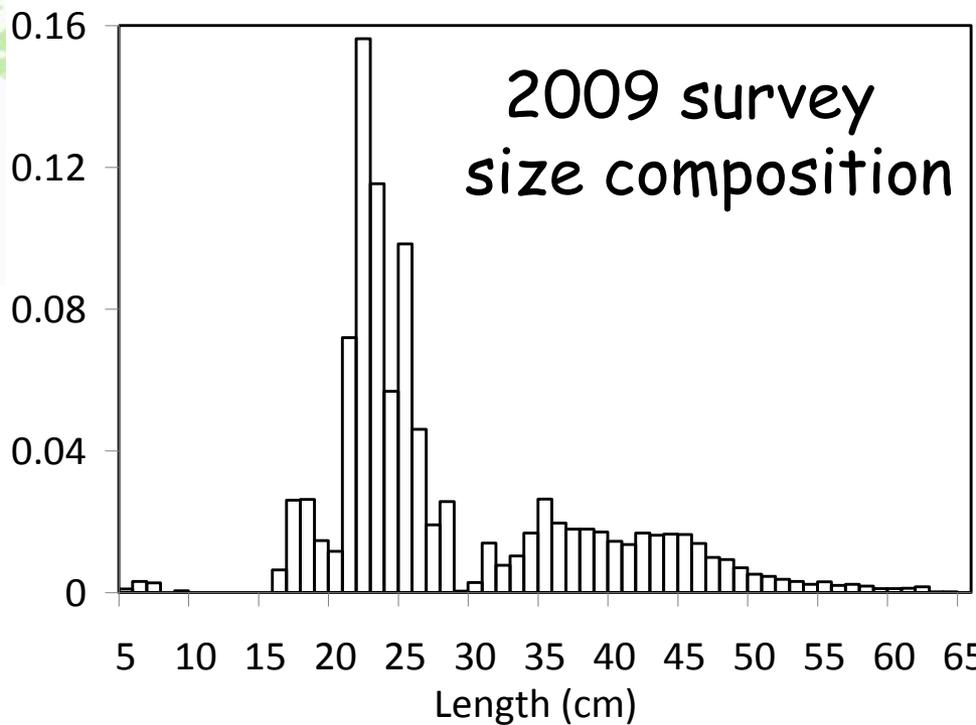
2011 SSB 29% of  $B_{100\%}$   
 2011 ABC is 88,620 t,  
 15% increase from the  
 2010 ABC

Pollock	Biomass	OFL	ABC
2011	934,788	130,356	96,215
2012		163,356	121,649



# EGOA pollock (Tier 5)

EGOA Pollock	Biomass	OFL	ABC
2011	41,088	12,326	9,245
2012		12,326	9,245



Same as 2009  
recommendation

# Salmon bycatch in GOA

- **Chinook 2010 values well above historical levels**
  - ♦ Catch > Incidental Take Statement (ITS) for GOA fisheries
- **Brief report from Regional Office presented to Plan Team**
  - ♦ Discussion paper for Council at this meeting
- **Plan Team provided recommendations for analysis (page 3 of GOA minutes)**

# ABC Summary

## Pacific cod



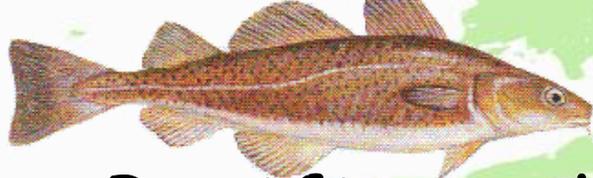
Species	2010 Catch	ABC		Change
		2010	2011	
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Summary:

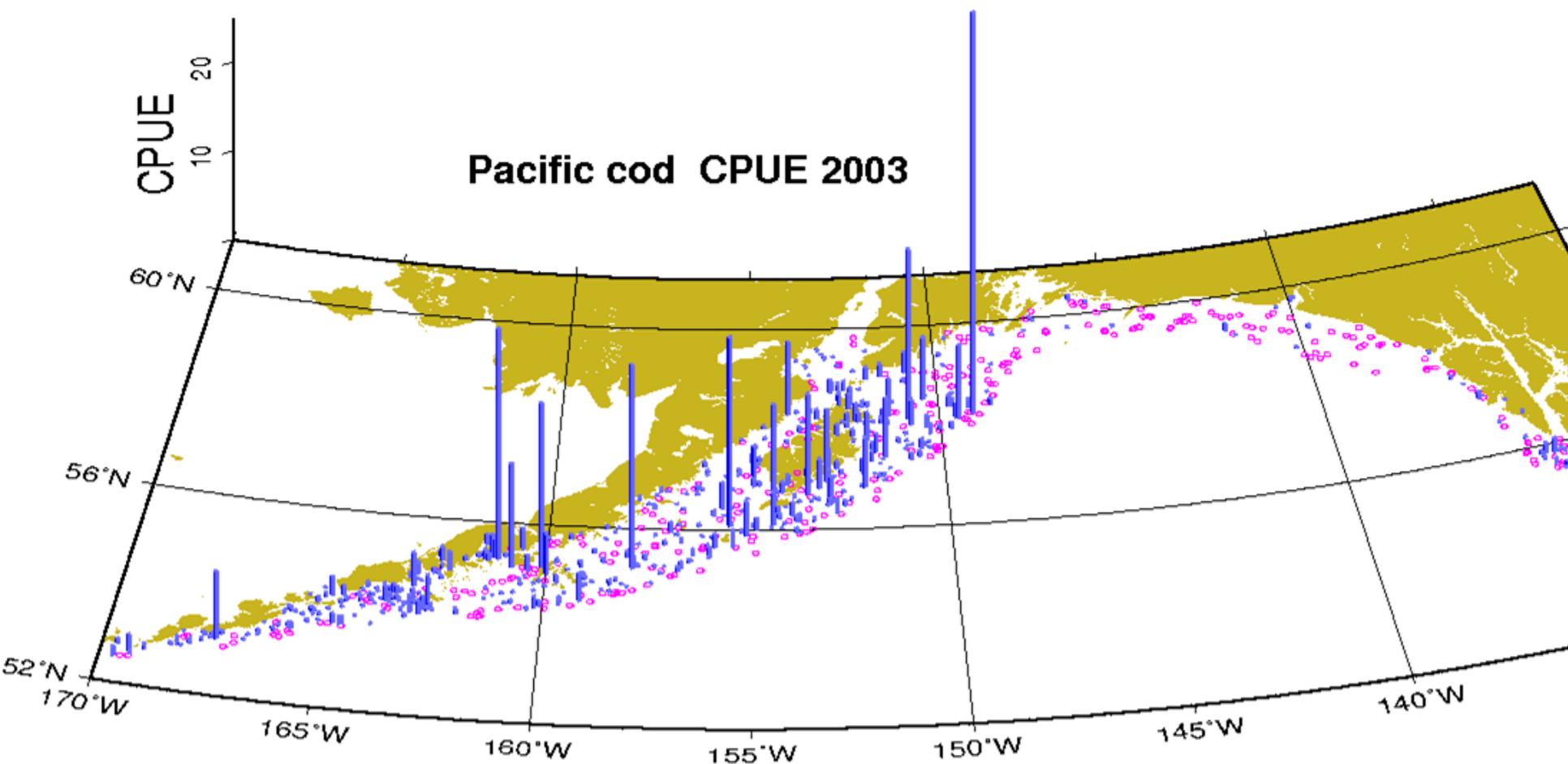
Page 15

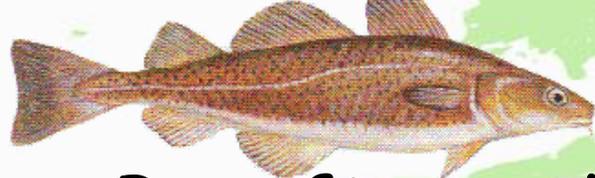
Chapter:

Page 157

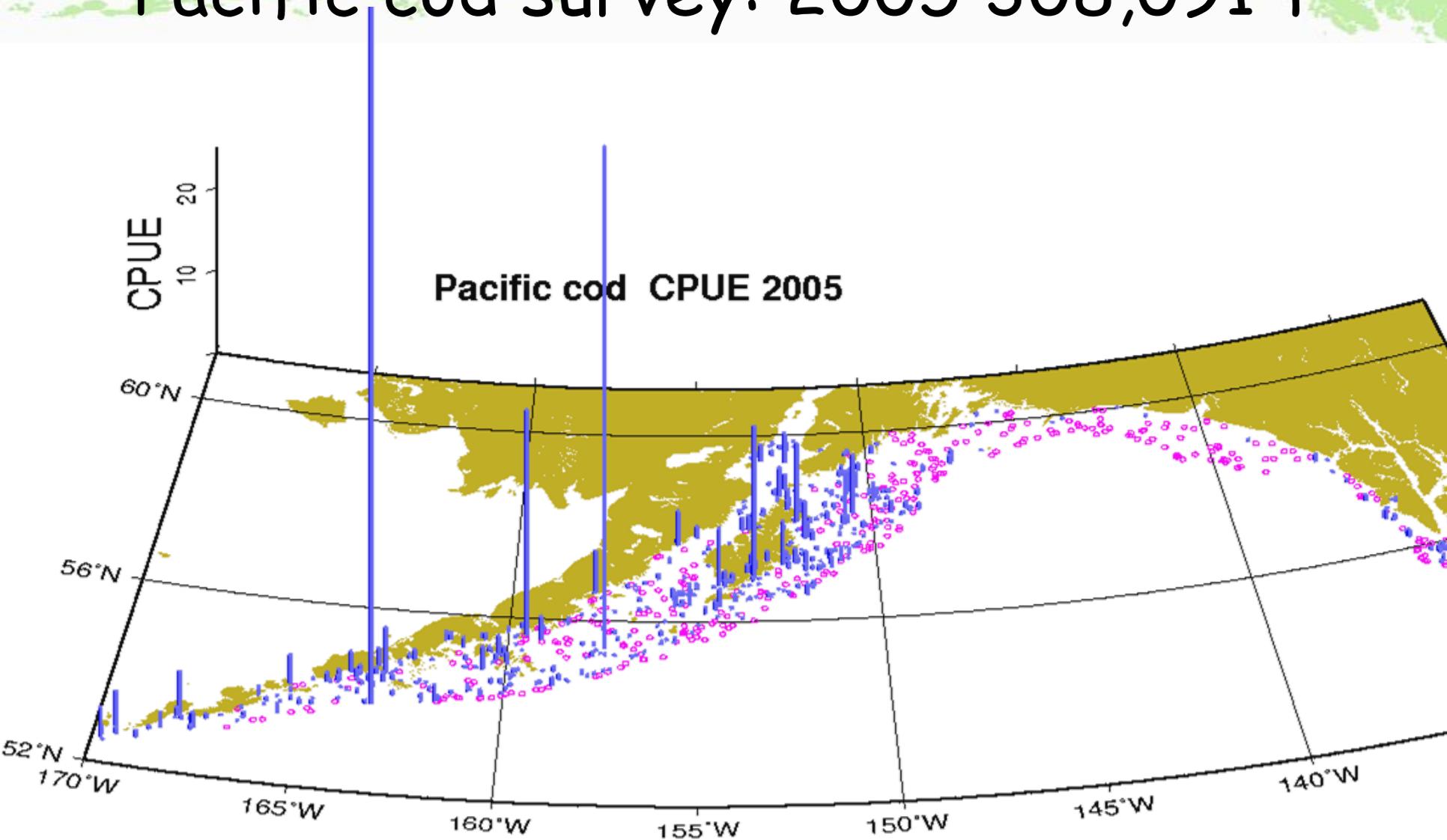


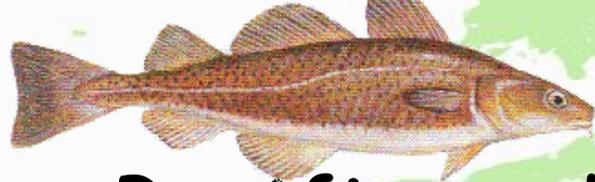
# Pacific cod survey: 2003 297,402 †



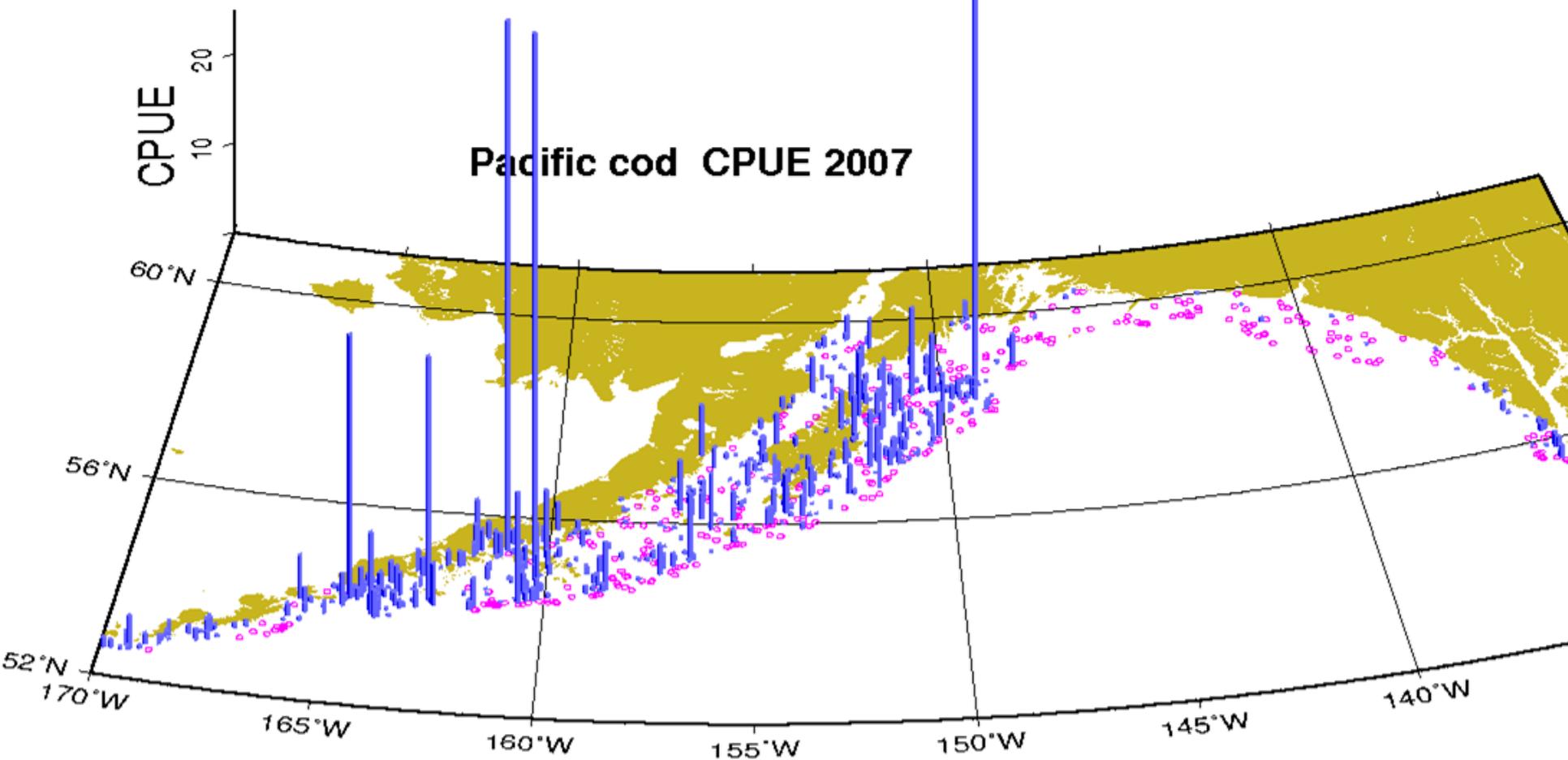


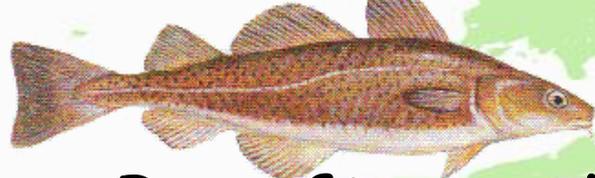
# Pacific cod survey: 2005 308,091 †



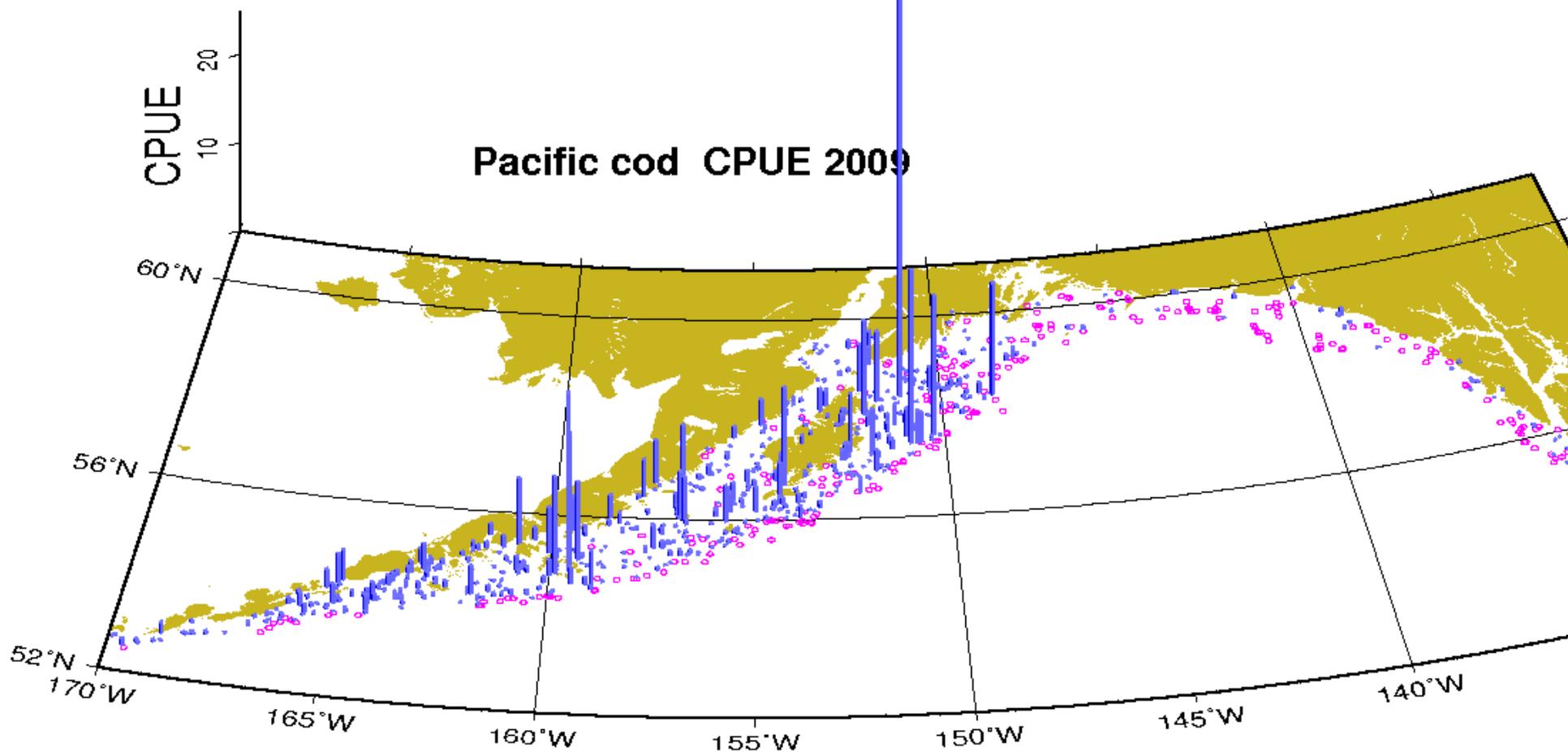


# Pacific cod survey: 2007 233,310 †



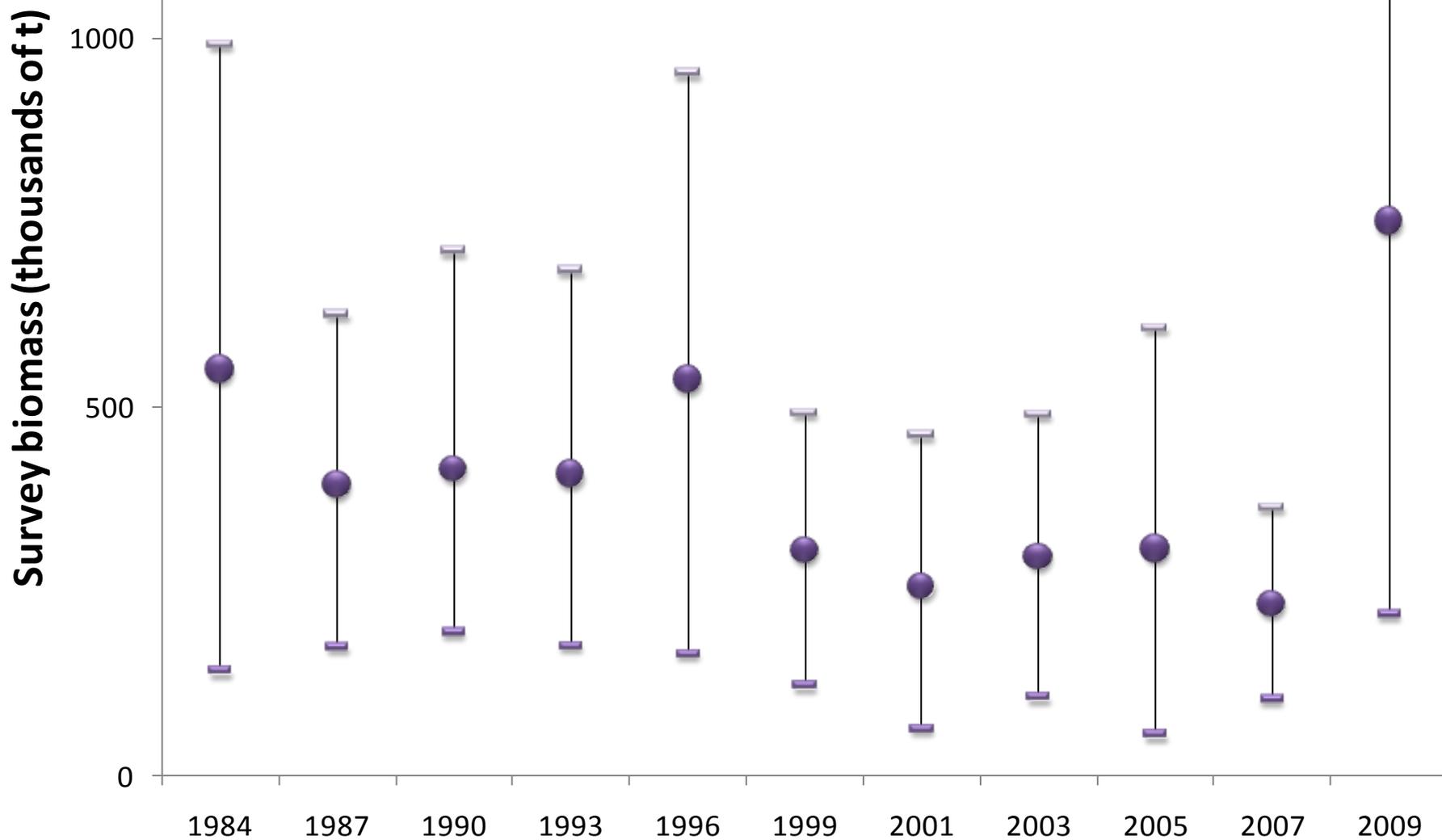


# Pacific cod survey: 2009 752,651 †





# Pacific cod survey biomass estimates

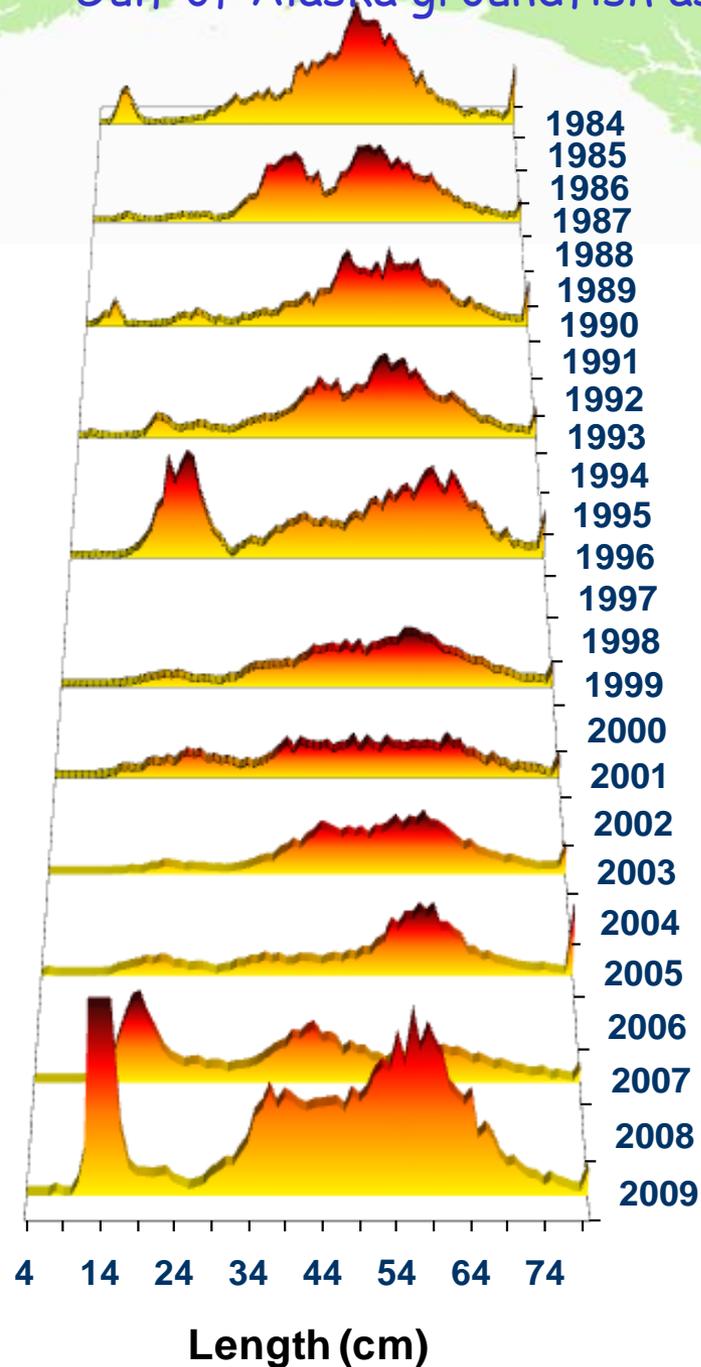




# Pacific cod

Survey  
abundance  
at-length

Gulf of Alaska groundfish assessments





# GOA Pacific cod models

- **Model A, which is the same as last year's model**
- **Model B, which is the same as Model A, except:**
  - ♦ Fishery age composition and size-at-age data removed
    - Only one record each (2008 Jan-May longline fishery)
  - ♦ New 1-cm length bins, replacing old 3-or-5-cm bins
  - ♦ 5 new seasons, replacing 3 old seasons
  - ♦ Constant growth, replacing cohort-specific growth rates
- **Model C, which is the same as Model B, except:**
  - ♦ Survey age composition and size-at-age data removed
  - ♦ All size composition records turned "on"



# GOA Pacific cod notes

## Accepted Model B

- ♦ Using criterion proposed by authors

## GOA Team discussion

- ♦ Concern over differences in age estimates between assessments

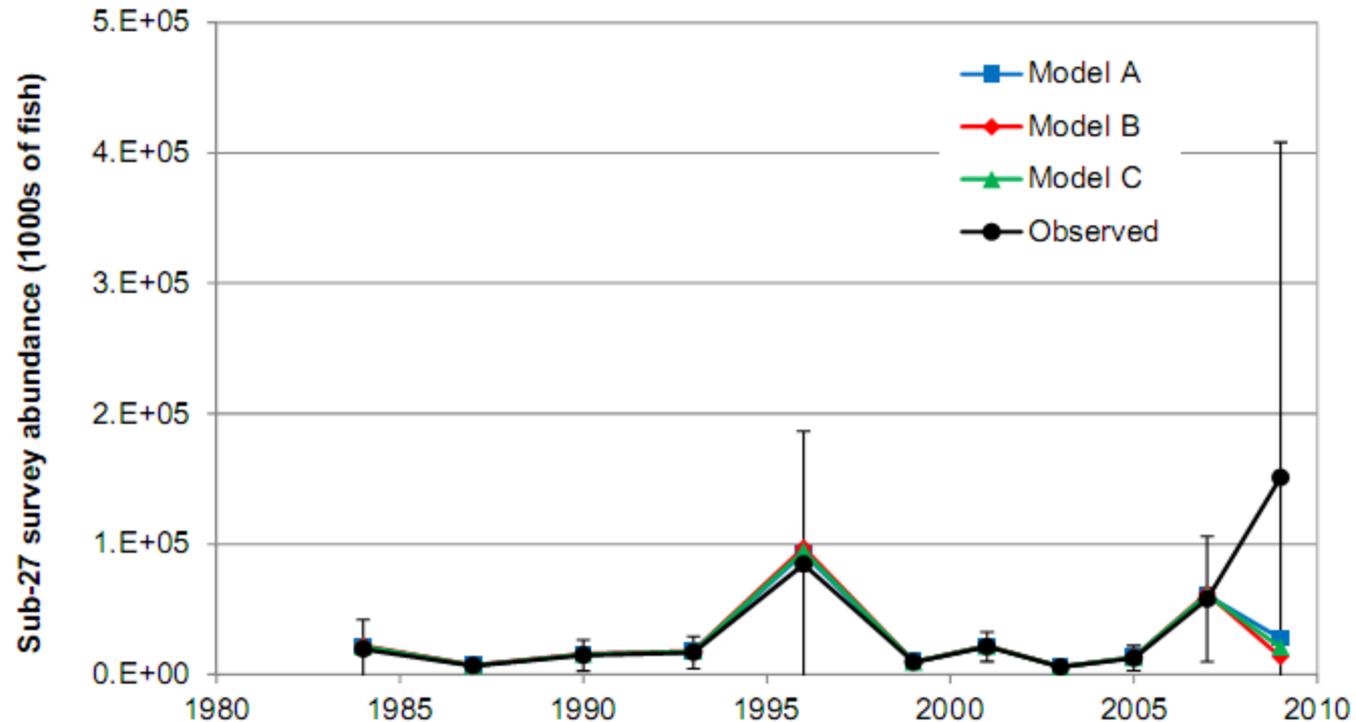


Figure 2.2b—Fits of the three models to the sub-27 trawl survey abundance time series.



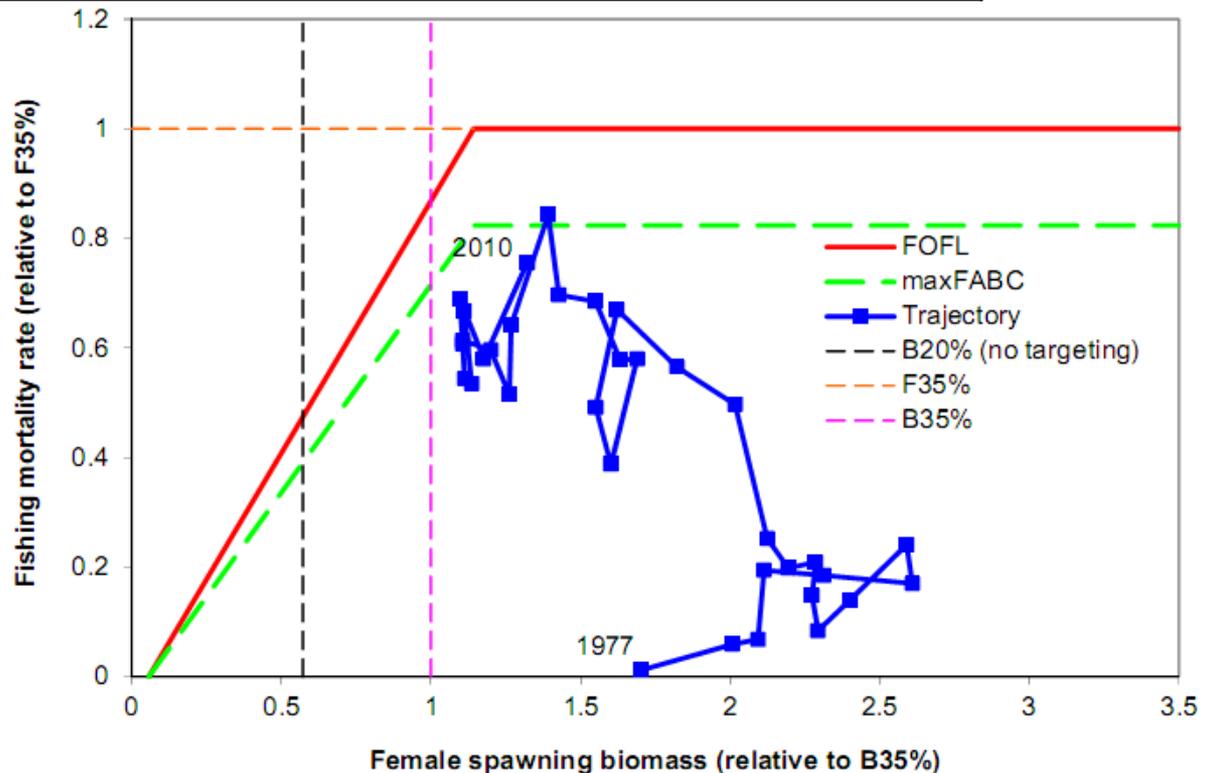
# Pacific cod ABC/TAC

## Tier 3a

- SSB above  $B_{40\%}$  for 2011 (48% of  $B_{100\%}$ )

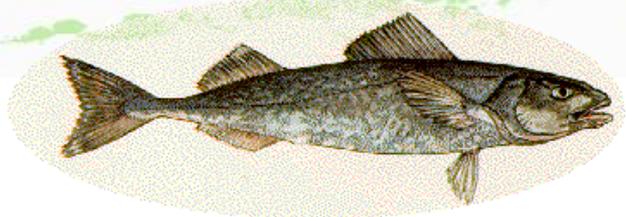
Pacific cod	Biomass	OFL	ABC
2011	428,000	102,600	86,800
2012		92,300	78,200

Survey biomass



# ABC Summary

## Sablefish



Species	2010 Catch	ABC		
		2010	2011	Change
Pollock	75,189	84,745	96,215	up 11,470 (14%)
Pacific Cod	58,660	79,100	86,800	up 7,700 (10%)
Sablefish	9,998	10,370	11,290	up 920 (9%)
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<b>Total</b>	<b>213,635</b>	<b>565,499</b>	<b>587,525</b>	<b>up 22,026 (4%)</b>

Summary:

Page 17

Chapter:

Page 329

# 2010 sablefish assessment overview



## Model

Changes for 2010 based on February modeling/data workshop:

- ♦ Removal of RPW index
- ♦ Required rebalancing of data weights

## Data updates

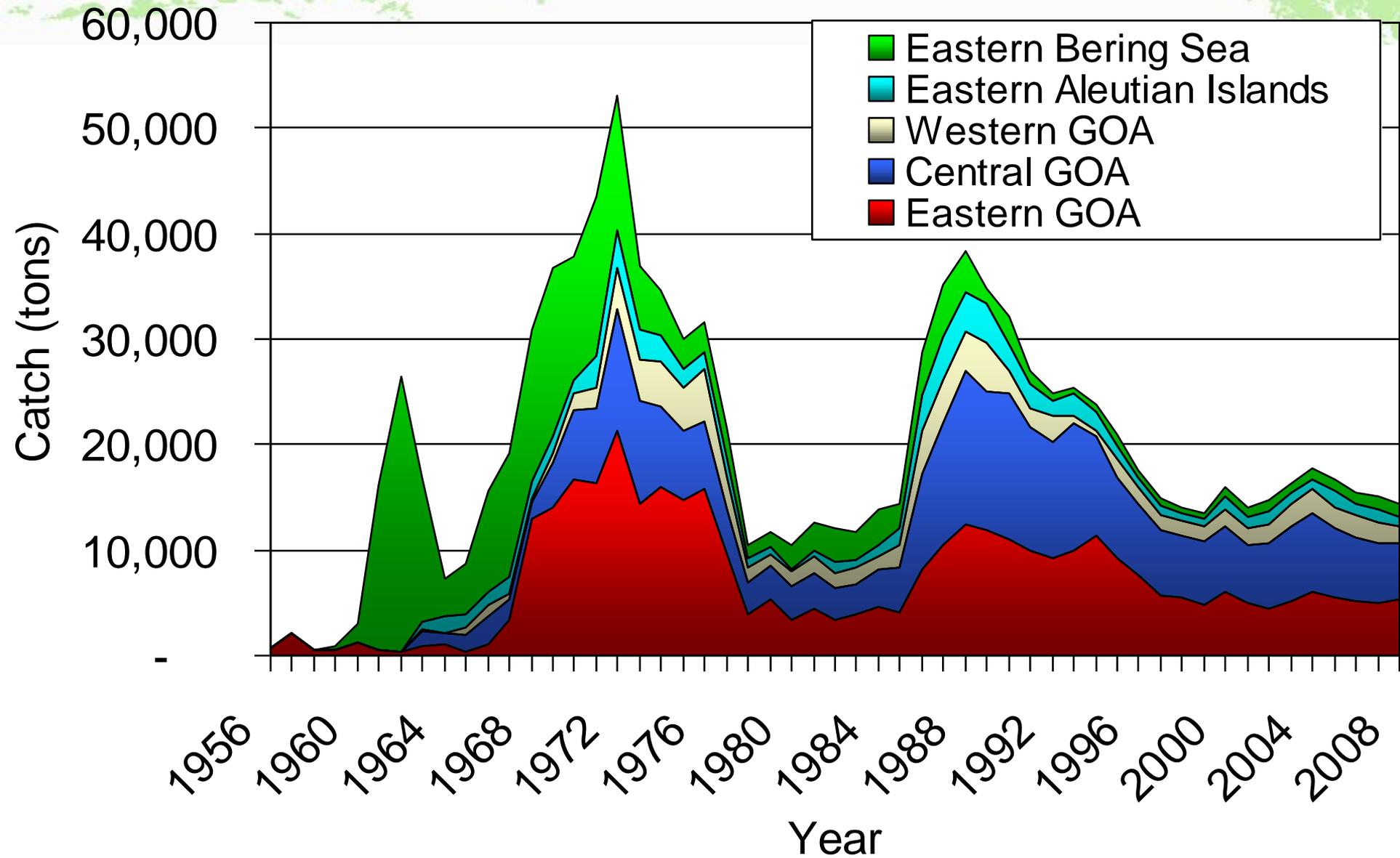
Catch: updated 2009, and new catch for 2010

Abundance: 2010 Longline survey  
2009 Longline fishery

Ages: 2009 Longline survey  
2009 Longline fishery

Lengths: 2010 Longline survey  
2009 Longline fishery  
2009 Trawl fishery

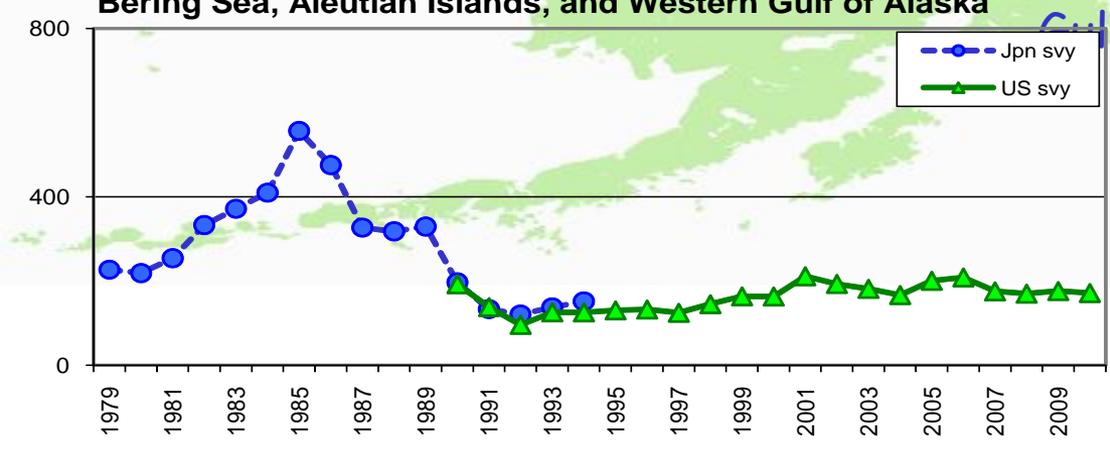
# Sablefish Catch by Area



# Bering Sea, Aleutian Islands, and western Gulf of Alaska

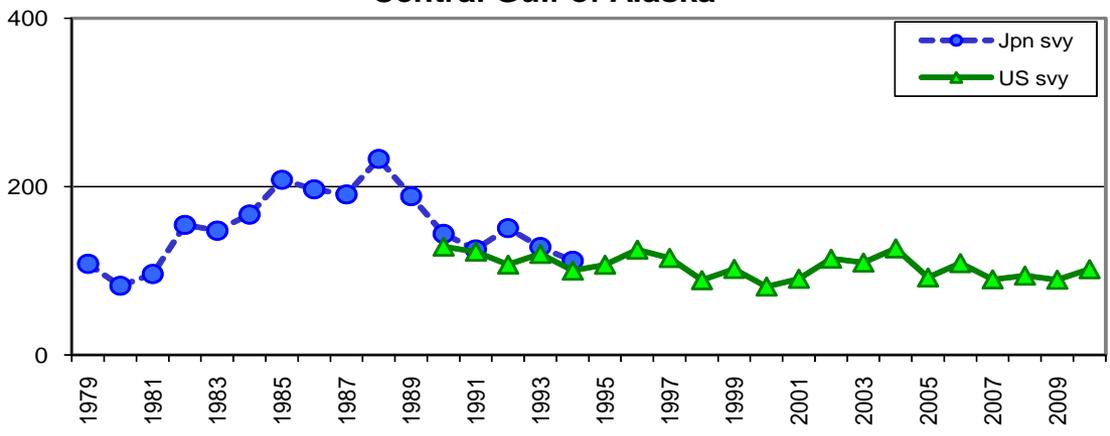
# Gulf of Alaska groundfish assessments

## Longline survey by area...



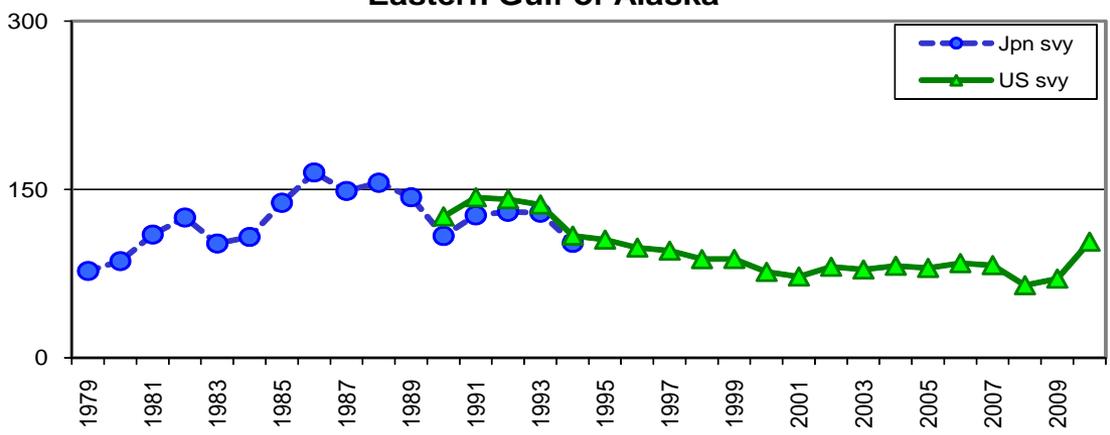
BSAI

### Central Gulf of Alaska



Central GOA

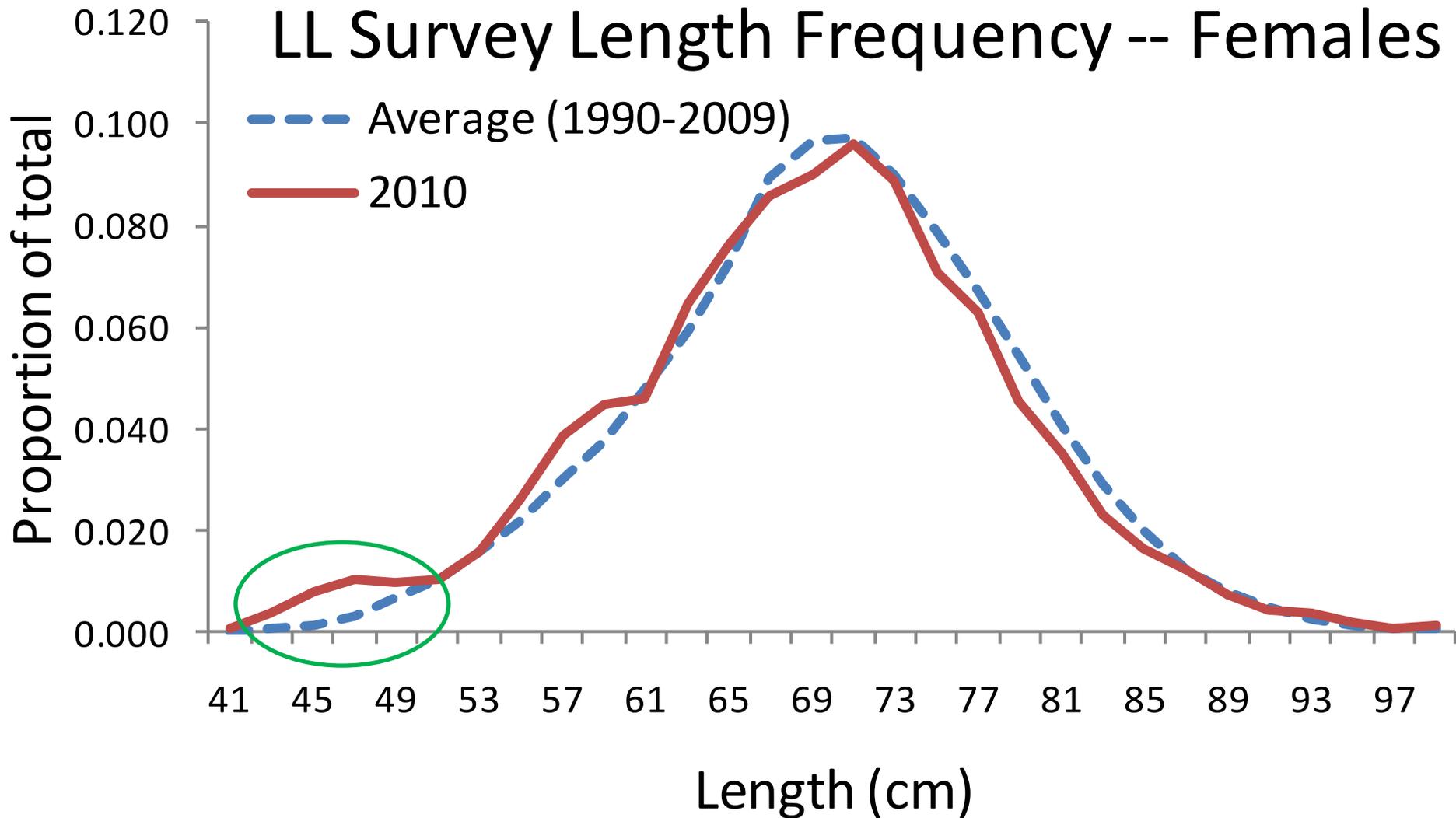
### Eastern Gulf of Alaska



Eastern GOA

# Recruitment sign?

## LL Survey Length Frequency -- Females

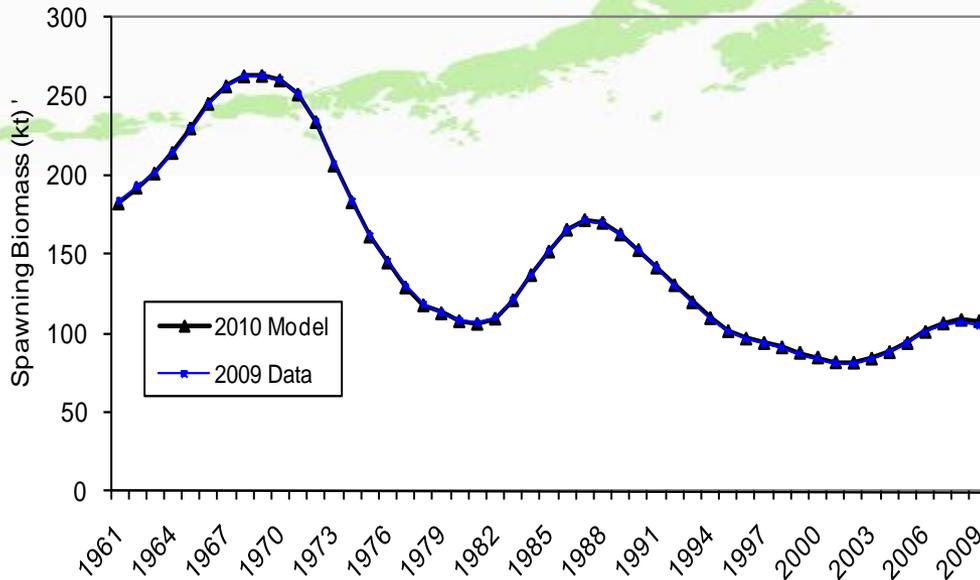


# Model evaluations

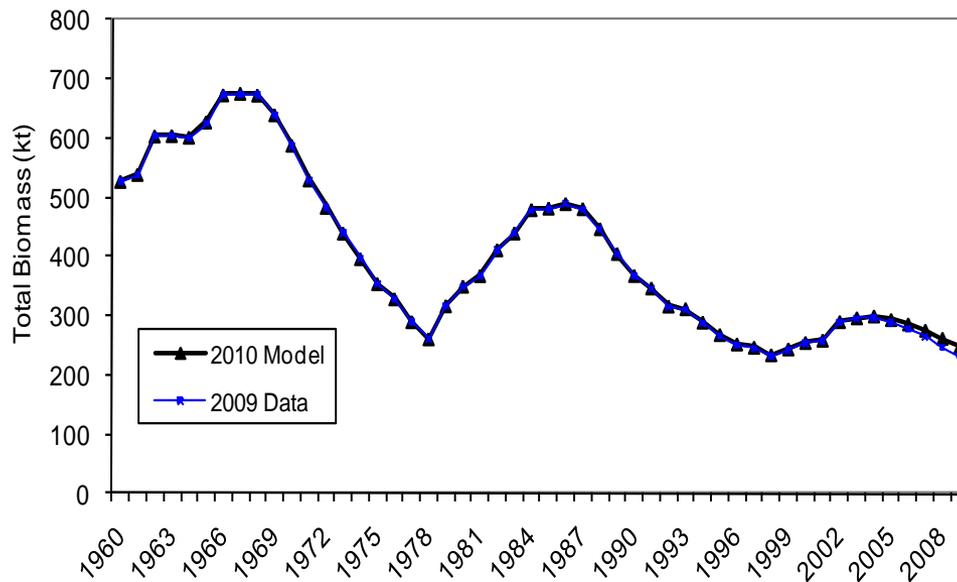
## Results between models similar

- **Model 1 (2009 base model)**
  - ♦ Removal of RPW recommended by several reviews
- **Model 2 (2009 base model with RPWs removed)**
  - ♦ Different weight on other data sources
- **Model 3 (Model 2 but reweight comp. data)**
  - ♦ Variance assumptions more realistic for compositions
  - ♦ Retrospective patterns improve

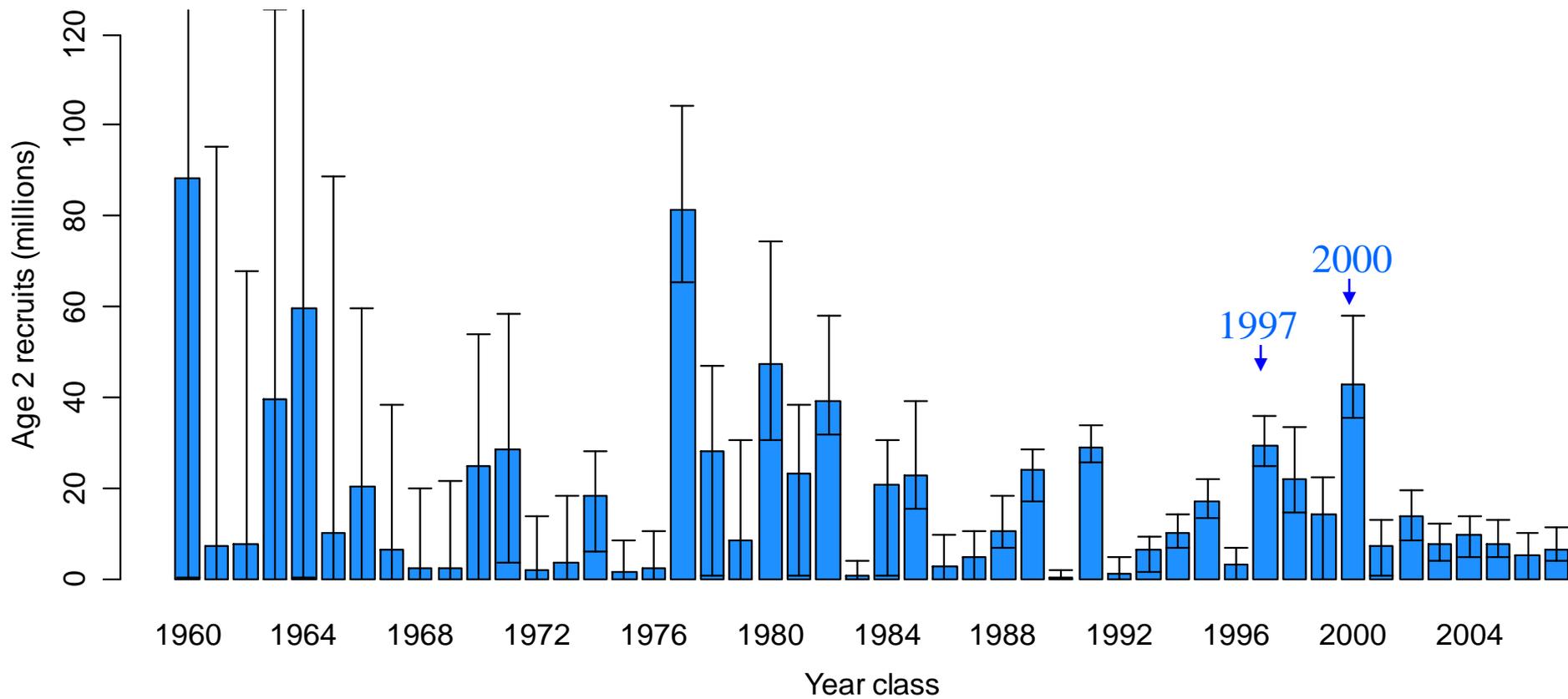
# Trends



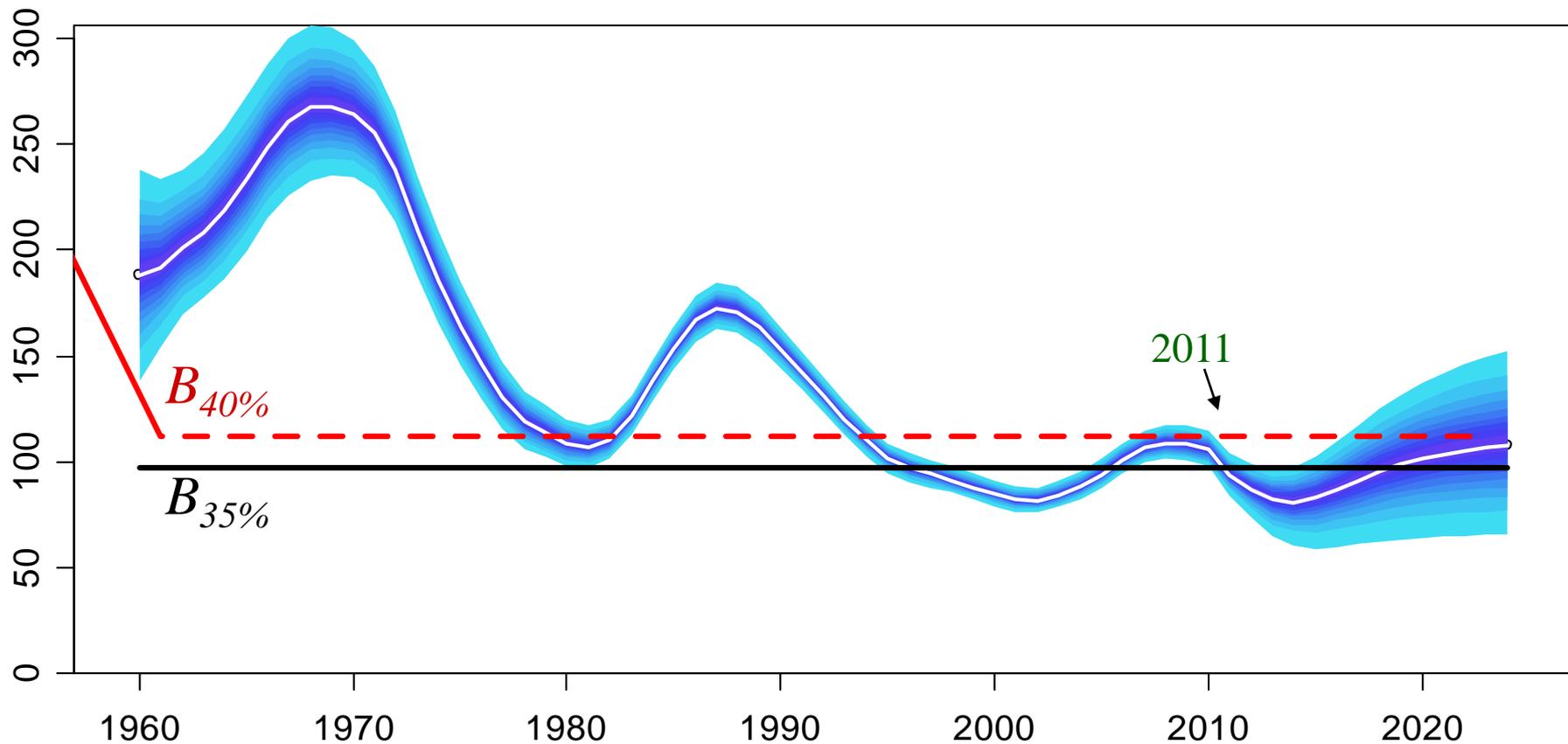
- **Spawning biomass leveling off**
- **Total biomass has increased slightly from last year's estimates**



# Sablefish: Recruitment



# Sablefish: Projection



# Sablefish ABC/OFL

**2011 spawning biomass 37% of  $B_{100\%}$**

## Tier 3b ABC:

ABC 2010: 15,230 †

ABC 2011: 16,040 † (vs. 13,660 projected)

♦ 5 % increase

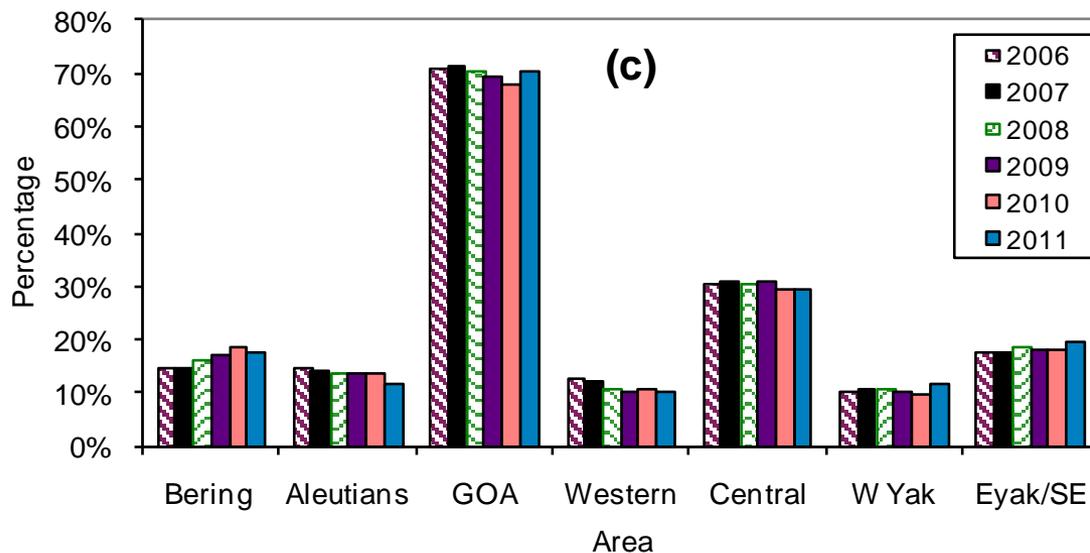
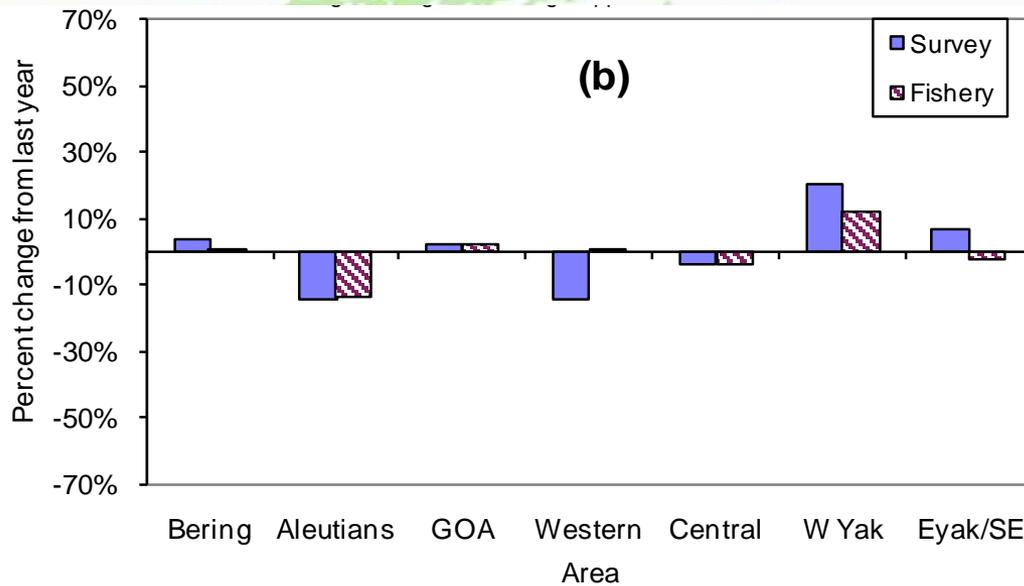
Decline to 14,700 projected for 2012

Two surveys planned for 2011

## GOA specific

Sablefish	Biomass	OFL	ABC
2011	149,000	13,340	11,290
2012		12,232	10,345

# Sablefish: Apportionment

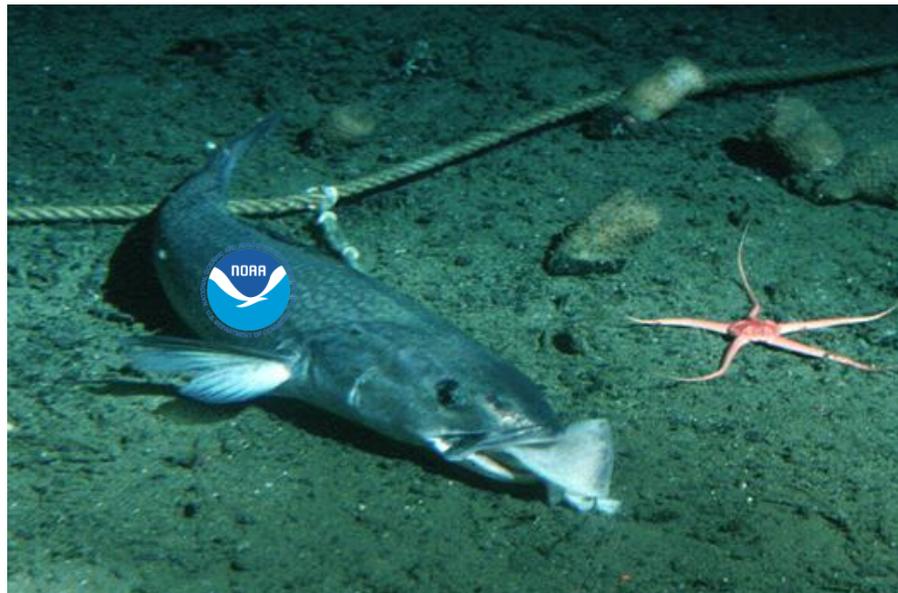


- **Eastern Gulf increase**
    - ♦ Wyak up 24%
  - **All western areas decrease share**
    - ♦ WG and AI ABC decrease
- Central GOA ABC increase in line with overall increase**

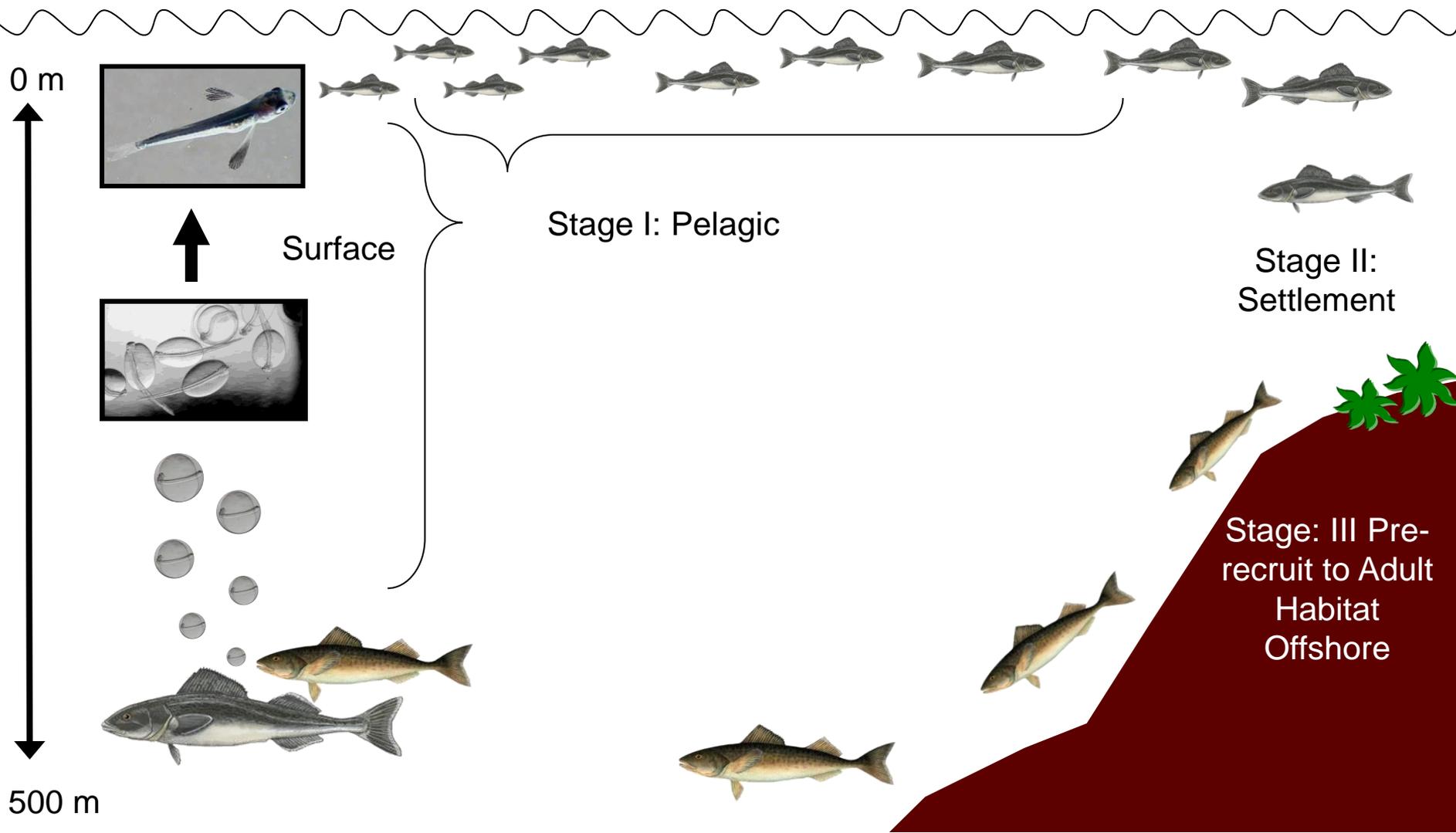
# Factors affecting sablefish recruitment in Alaska

**Marine Ecology and Stock Assessment  
Staff**

**ABL 2010**



# Sablefish Early Life History



# Flatfish ABC Summary



Species	2010 Catch	ABC		
		2010	2011	Change
Pollock	75,189	84,745	96,215	up 11,470 (14%)
Pacific Cod	58,660	79,100	86,800	up 7,700 (10%)
Sablefish	9,998	10,370	11,290	up 920 (9%)
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<b>Total</b>	<b>213,635</b>	<b>565,499</b>	<b>587,525</b>	<b>up 22,026 (4%)</b>

# Flatfish ABC's

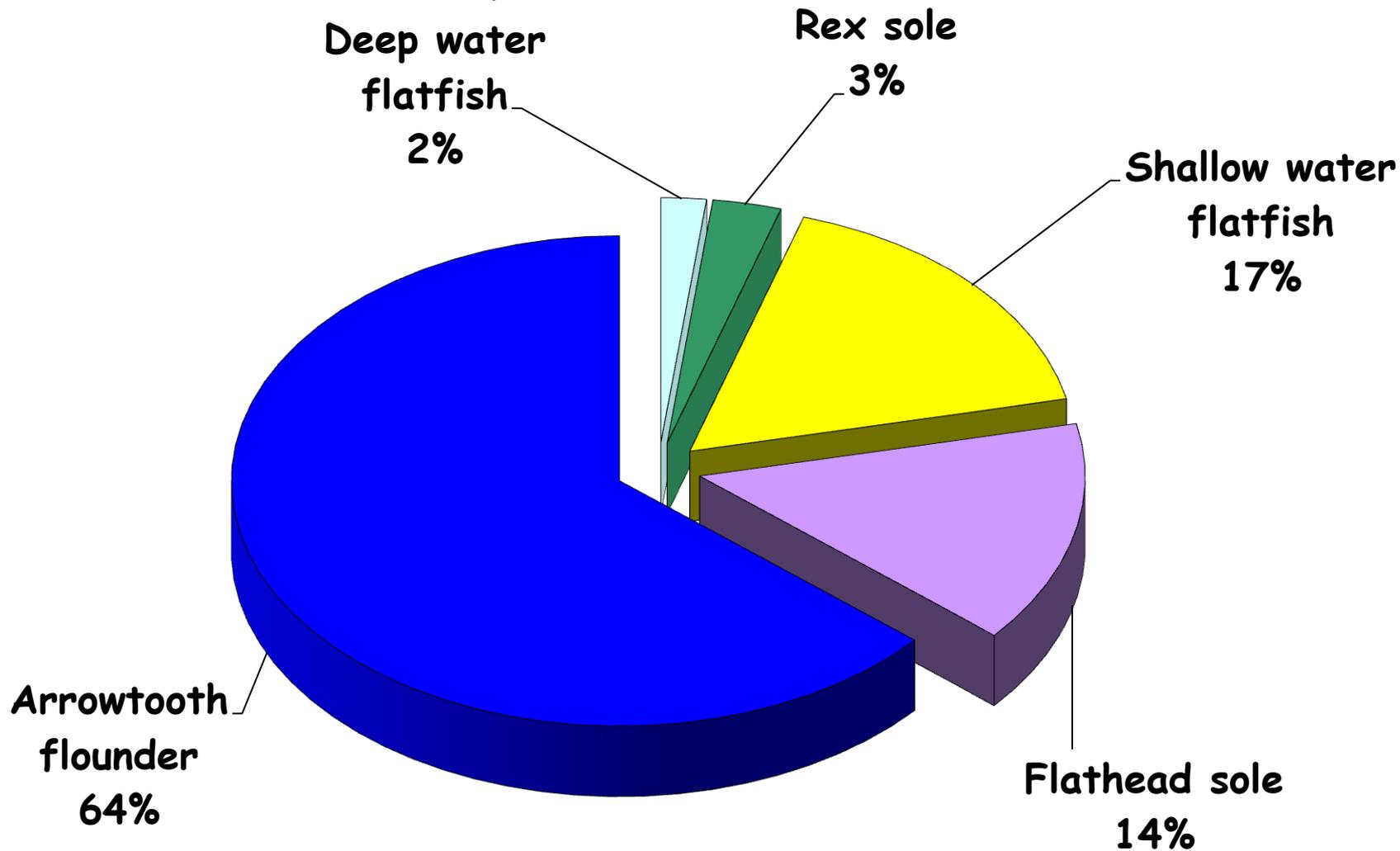
Species	2010 ABC	2011 ABC	Change
Deep water flatfish	6,190	6,305	up 115 (2%)
Rex sole	9,729	9,565	down 164 (2%)
Shallow water flatfish	56,242	56,242	same (0%)
Flathead sole	47,422	49,133	up 1,711 (4%)
Arrowtooth flounder	215,882	213,150	down 2,732 (1%)
Subtotal	335,465	334,395	down 1,070 (0%)

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

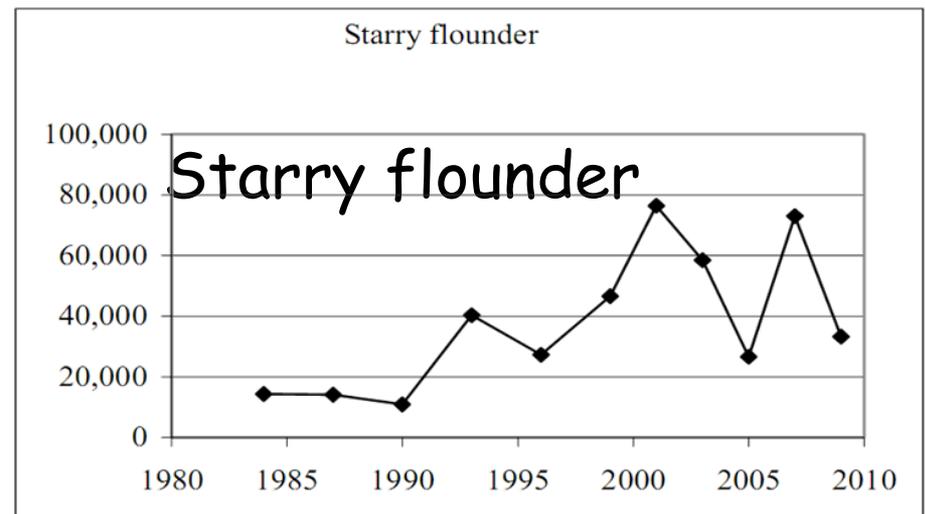
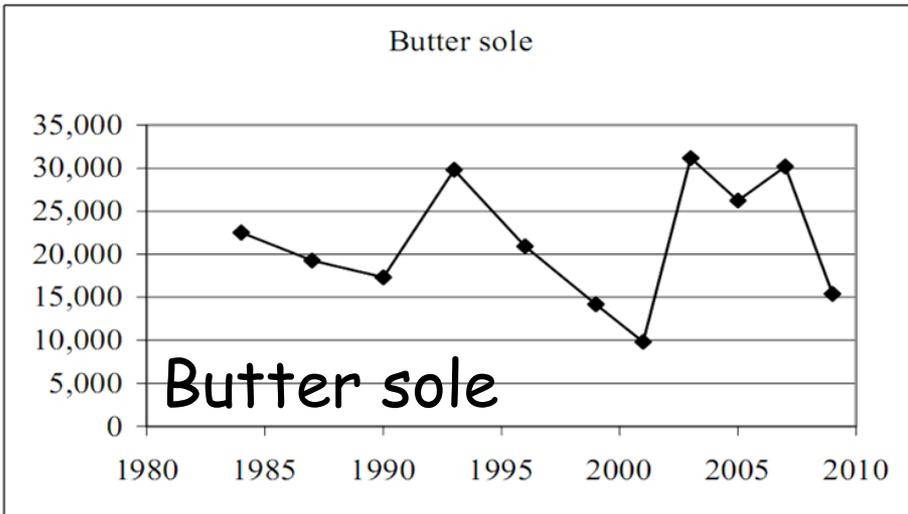
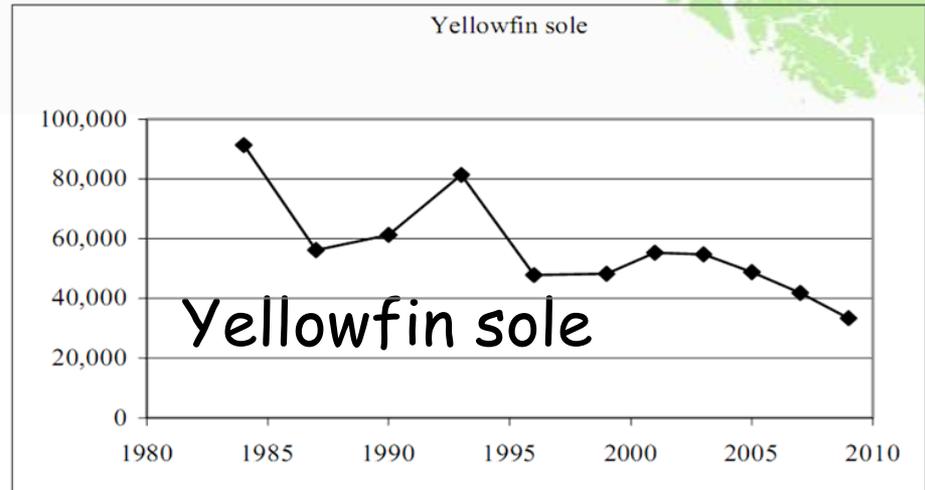
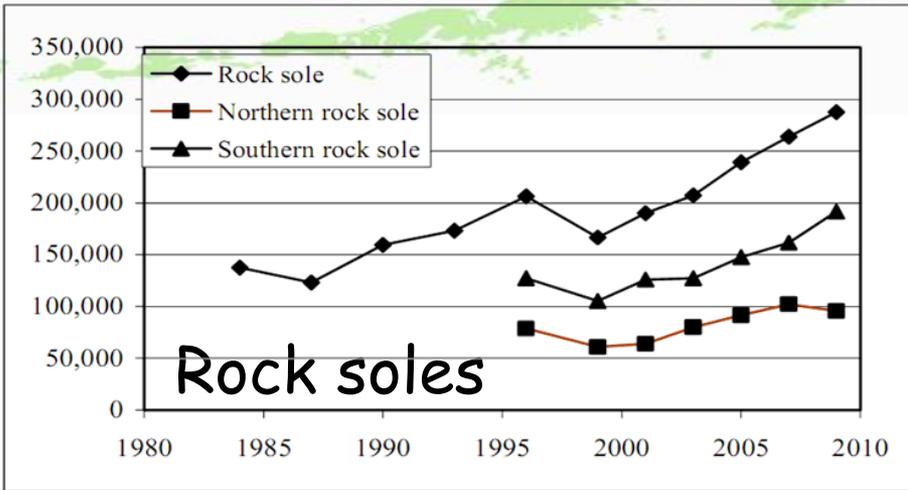
Shallow water flats: N and S rock sole Tier 4, others Tier 5

# Flatfish 2011 ABC's

334,395 t combined



# 4. Shallow water flatfish



Summary:  
Chapter:

Page 19  
Page 469

# 4. Shallow water flatfish

## Rely on survey

Decreased from 2007 last year, unchanged this year.

Shallow water flatfish

Biomass      OFL      ABC

2011	398,961	67,768	56,242
2012		67,768	56,242

	ABC	OFL
Northern Rock sole	16,085	18,953
Southern Rock sole	26,064	30,460
<b>Rock sole subtotal</b>	<b>42,149</b>	<b>49,413</b>
Yellowfin sole	4,229	5,508
Butter sole	1,950	2,539
Starry flounder	4,210	5,483
English sole	2,363	3,078
Sand sole	355	463
Alaska plaice	986	1,284
<b>Total</b>	<b>56,242</b>	<b>67,768</b>

**NOTE:**

**Rock soles presented in September**

Revised chapter of work in progress

Likely elevate part of this group to Tier 3

# 5. Deepwater flatfish

Dover sole

Deepsea sole

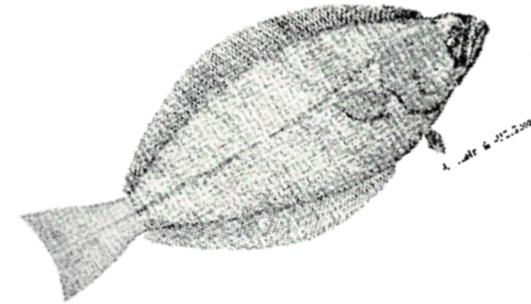
Greenland turbot

## Dover sole: age-structured, two-sex model

- ♦  $M$  estimated externally
- ♦ Survey catchability either
- ♦ Sex-specific fishery and survey selectivity

## Tuned to

- ♦ Catch history, survey biomass
- ♦ Length compositions: fishery and survey
- ♦ Some survey age compositions



Summary: p. 20, Chapter: p. 527

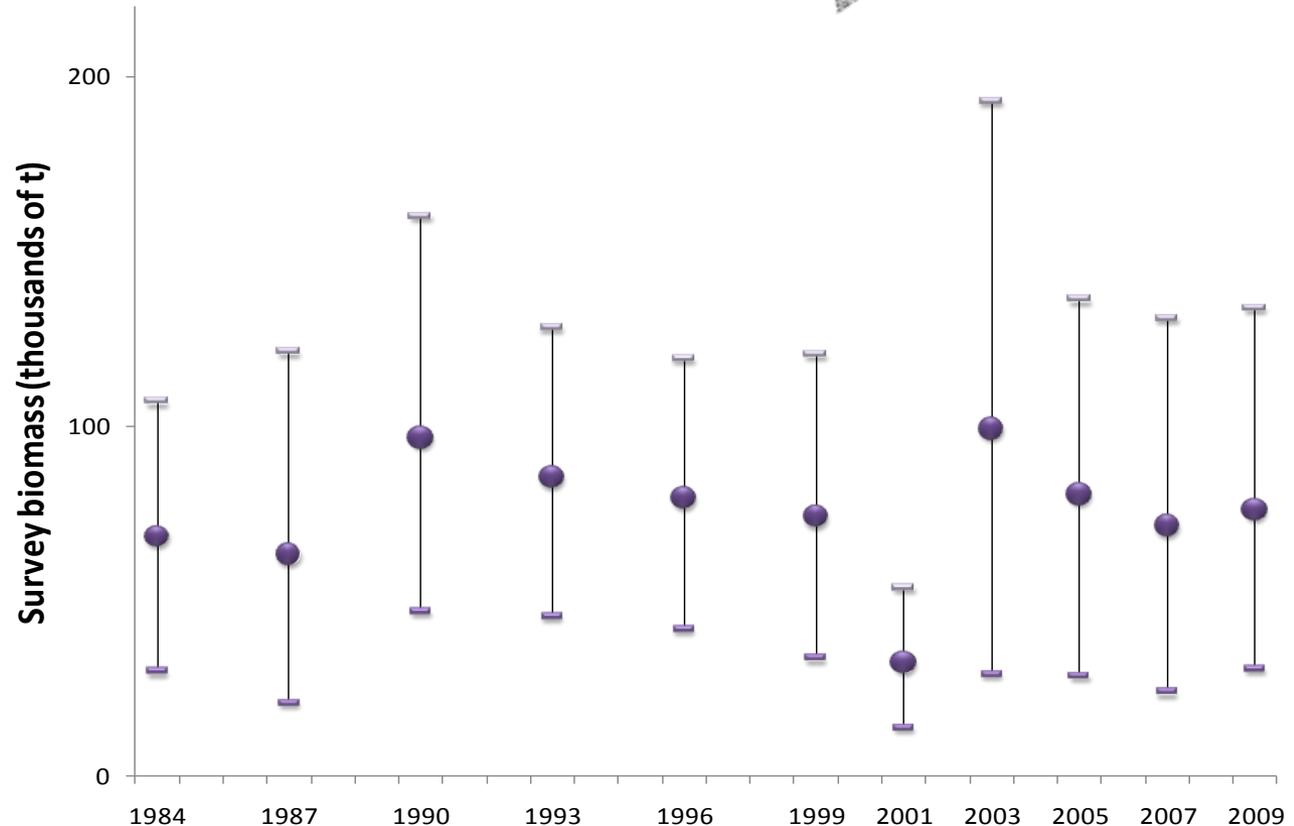
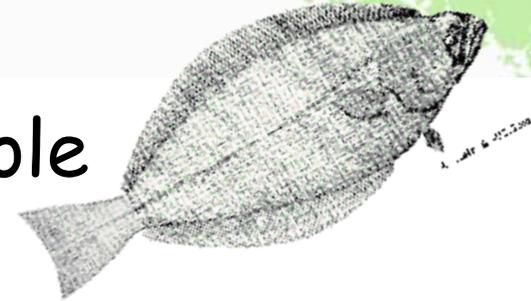
Fishery length compositions:	1991-2004
Survey length compositions:	1999, 2001, 2003, 2005, 2007, 2009
Survey age compositions:	1993, 1996, 1999, 2001, 2003, 2005, 2007

# Deepwater flatfish survey estimates

Deepwater flatfish

	Biomass	OFL	ABC
2011	89,691	7,823	6,305
2012		8,046	6,486

Dover sole



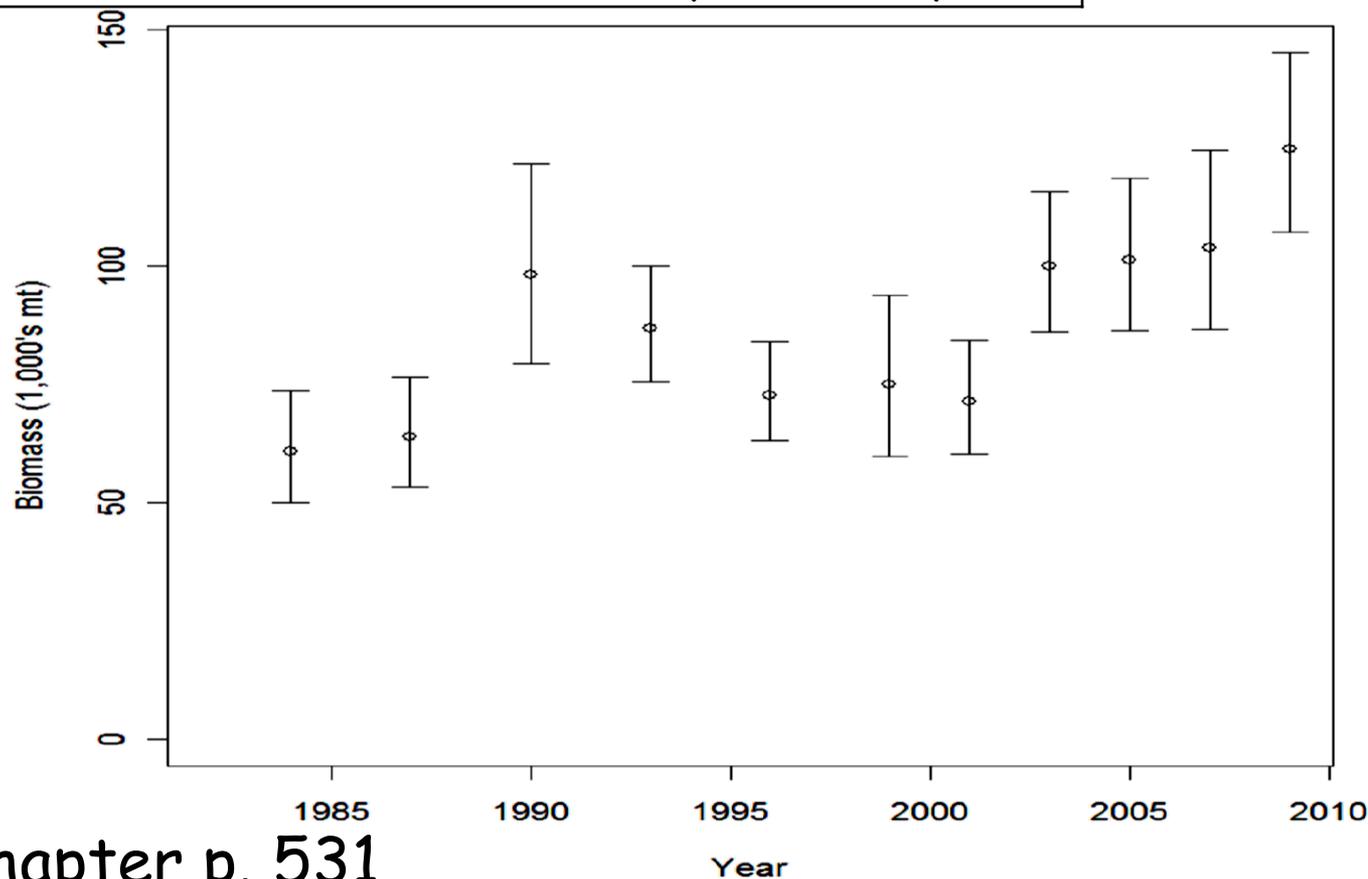
Deepsea sole + Greenland turbot average about 200 t of biomass

# 6. GOA Rex Sole

Rex sole	Biomass	OFL	ABC
2011	86,729	12,499	9,565
2012		12,279	9,396

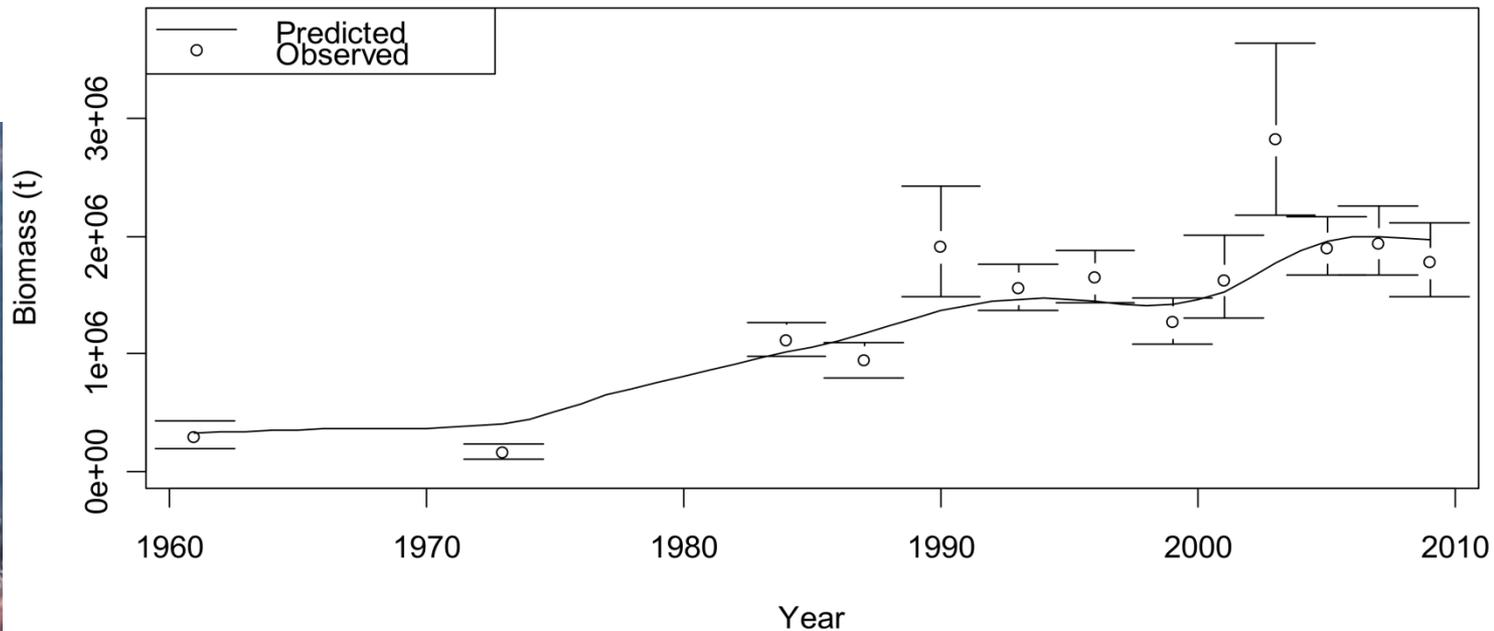


MSC Certified in 2010: rock soles, ATF, and flathead



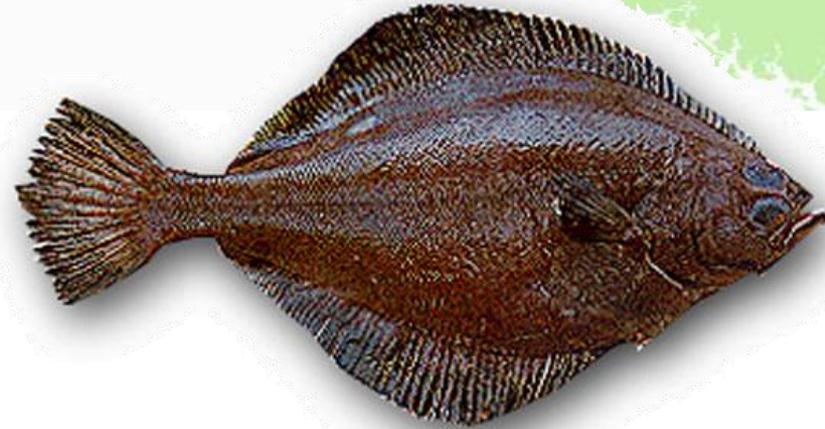
# 7. GOA Arrowtooth flounder

Year	Female spawning Biomass	OFL	ABC
2011	2,121,440	251,068	213,150
2012		248,576	211,027



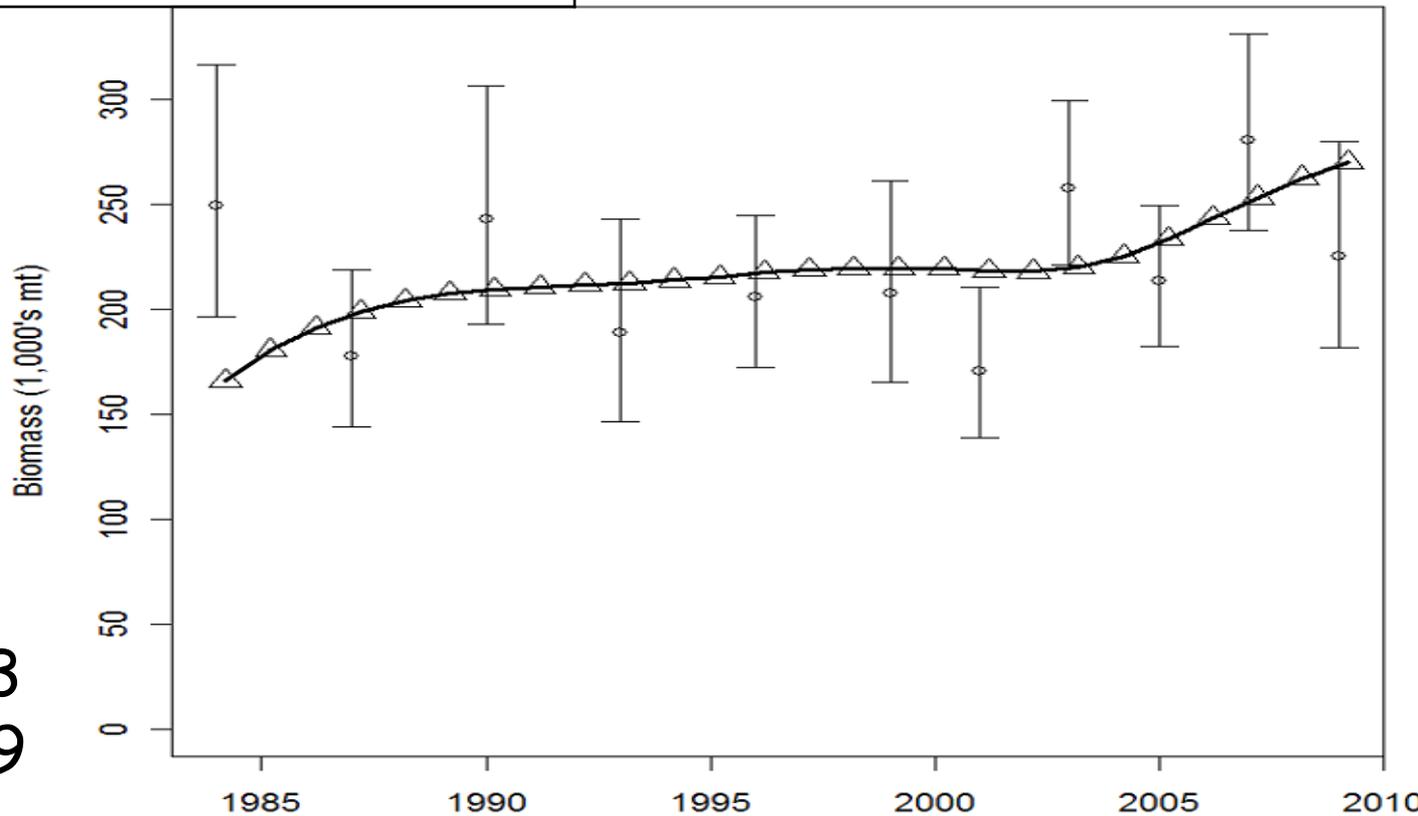
Summary p. 22, Chapter p. 535

# 8. GOA Flathead Sole



	Biomass	OFL	ABC
2011	325,357	61,412	49,133
2012		63,202	50,591

2011	325,357	61,412	49,133
2012		63,202	50,591



Summary p. 23  
Chapter p. 539

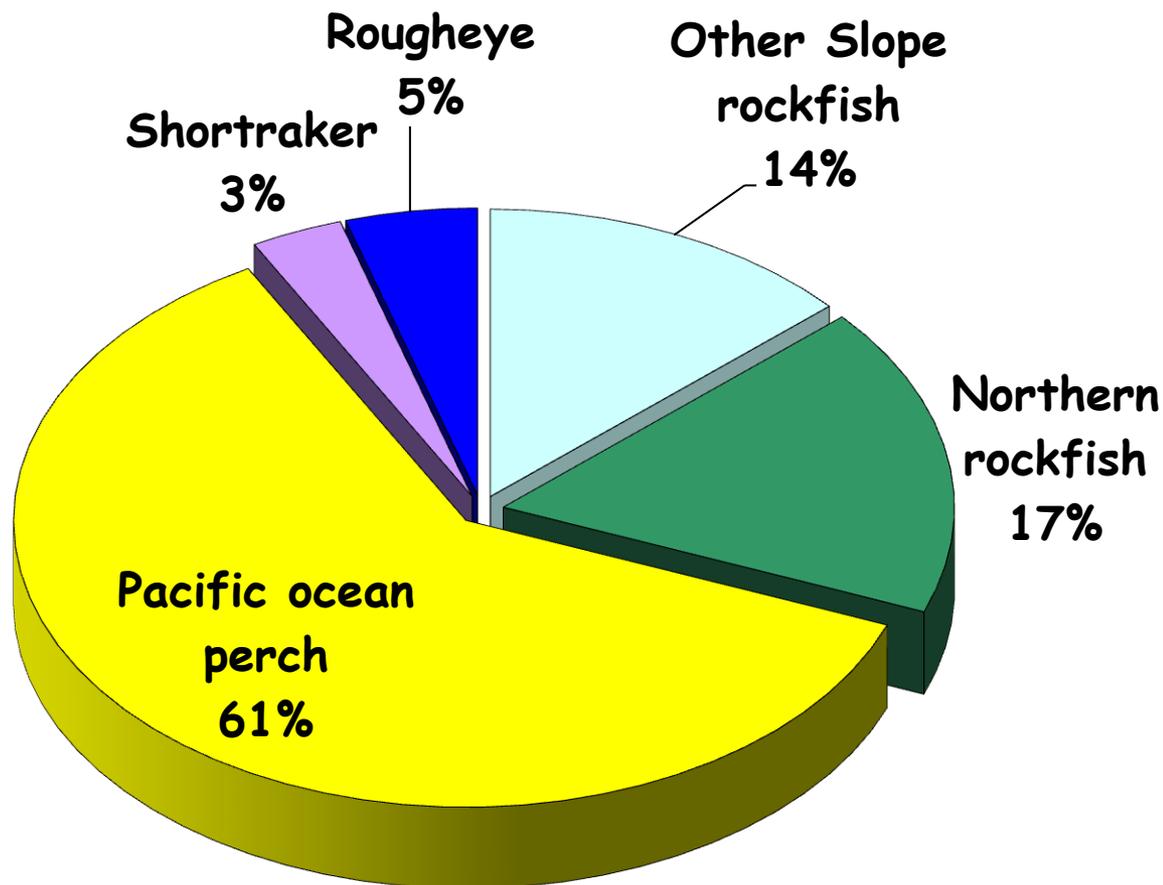
# Rockfish

	2010 ABC	2011 ABC	Change	
Other Slope rockfish	3,749	3,752	up 3	(0%)
Northern rockfish	5,098	4,854	down 244	(5%)
Pacific ocean perch	17,584	16,997	down 587	(3%)
Shortraker - Other slope	914	914	same	(0%)
Rougheye/Blackspotted	1,302	1,312	up 10	(1%)
Pelagic shelf rockfish	5,059	4,754	down 305	(6%)
Demersal Shelf Rockfish	295	300	up 5	(2%)
Thornyhead rockfish	1,770	1,770	same	(0%)
Sub-total	35,771	34,653	down 1,118	(3%)

Summary: Page 24

Chapter: Page 543

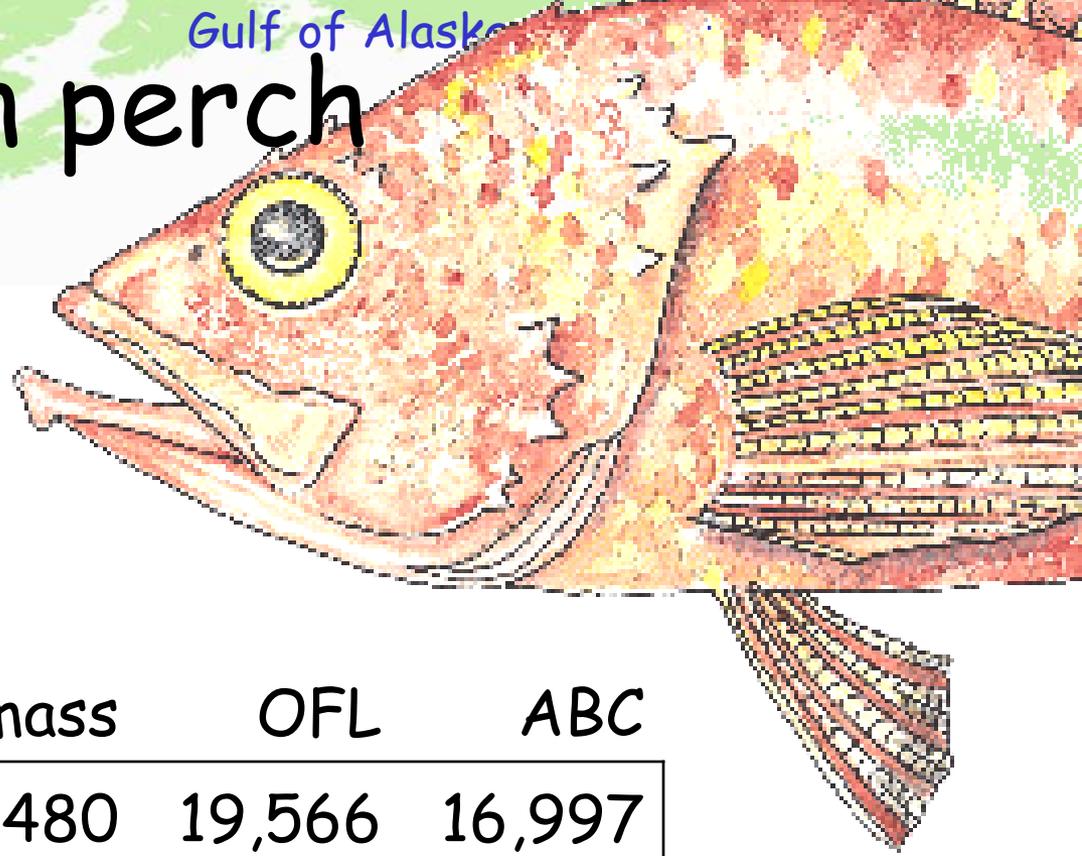
# Slope Rockfish 2011 ABC's 27,829 t total



# POP ABC Summary

	2010 ABC	2011 ABC	Change	
Other Slope rockfish	3,749	3,752	up 3	(0%)
Northern rockfish	5,098	4,854	down 244	(5%)
Pacific ocean perch	17,584	16,997	down 587	(3%)
Shortraker - Other slope	914	914	same	(0%)
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Demersal Shelf Rockfish	295	300	up 5	(2%)
Thornyhead rockfish	1,770	1,770	same	(0%)
Sub-total	35,771	34,653	down 1,118	(3%)

# 9. Pacific ocean perch



	Biomass	OFL	ABC
2011	330,480	19,566	16,997
2012		18,635	16,187

# Northern RF ABC Summary

	2010 ABC	2011 ABC	Change	
Other Slope rockfish	3,749	3,752	up 3	(0%)
Northern rockfish	5,098	4,854	down 244	(5%)
Pacific ocean perch	17,584	16,997	down 587	(3%)
Shortraker - Other slope	914	914	same	(0%)
Rougheye/Blackspotted	1,302	1,312	up 10	(1%)
Pelagic shelf rockfish	5,059	4,754	down 305	(6%)
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Thornyhead rockfish	1,770	1,770	same	(0%)
Sub-total	35,771	34,653	down 1,118	(3%)

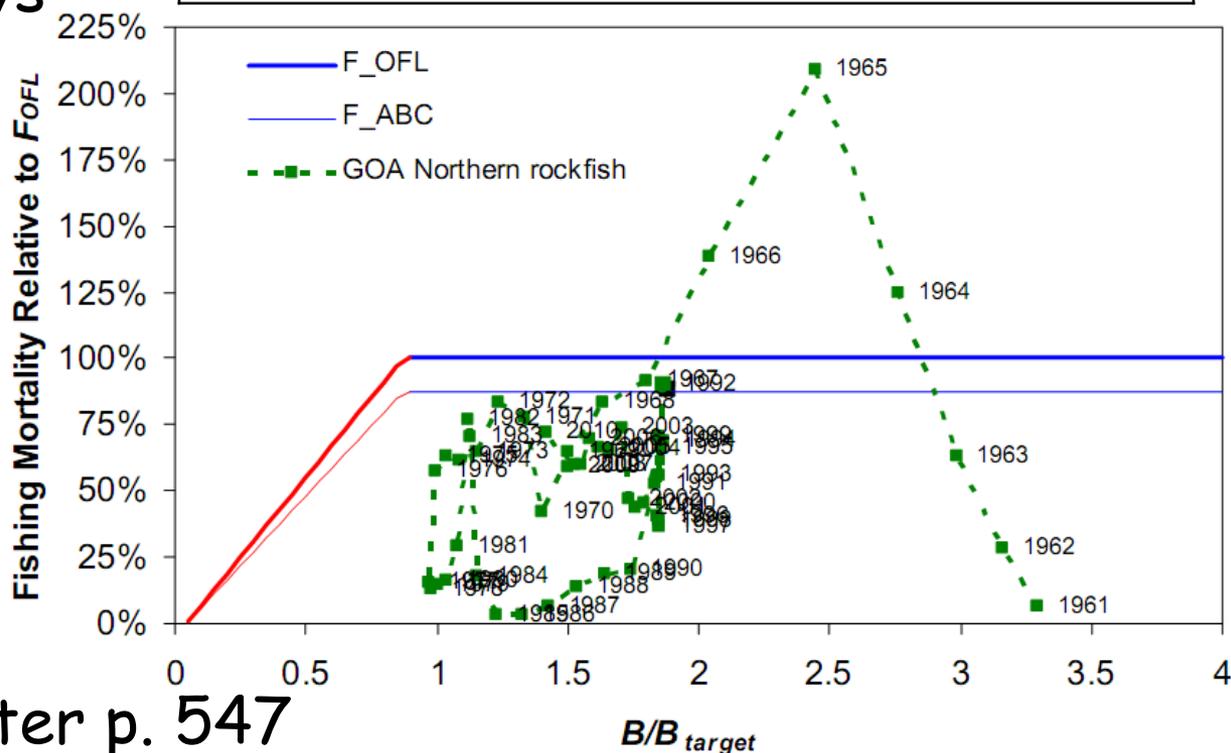
# 10. Northern rockfish

Tier 3a

Research:

- Input sample sizes
- Trawl/untrawlable
- Alternative surveys
- Maturity study

	Biomass	OFL	ABC
2011	100,463	5,784	4,857
2012		5,498	4,616



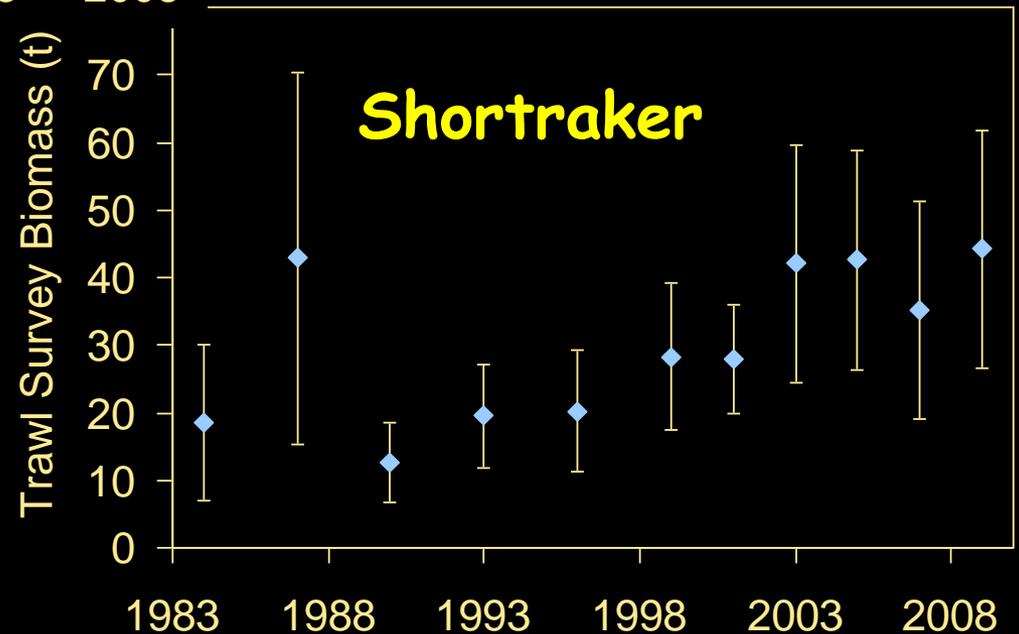
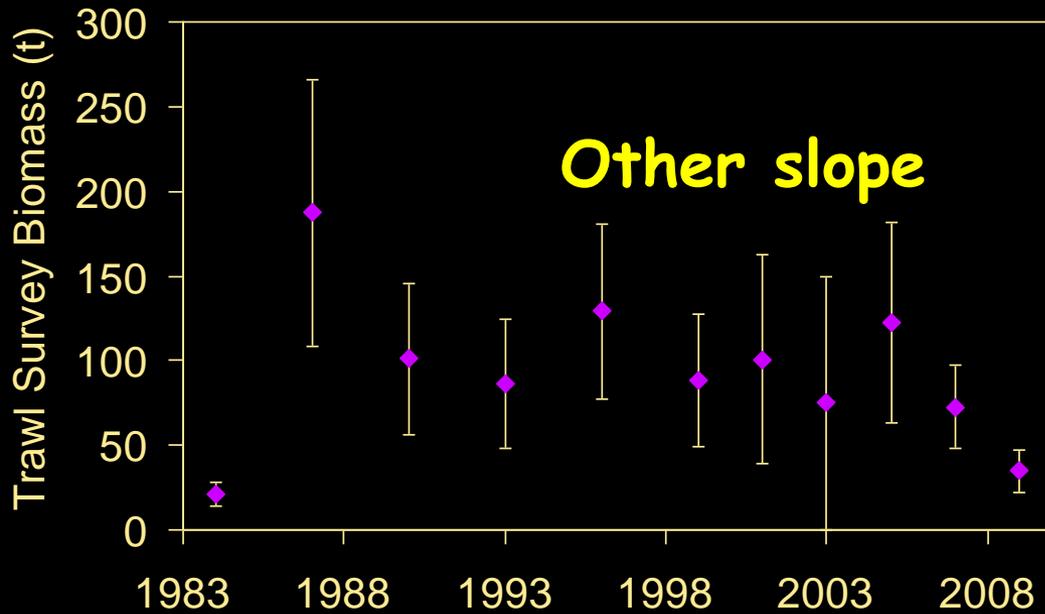
Summary p. 26, Chapter p. 547

# Shortraker - Other slope RF

## ABC Summary

	2010 ABC	2011 ABC	Change	
Other Slope rockfish	3,749	3,752	up 3	(0%)
Northern rockfish	5,098	4,854	down 244	(5%)
Pacific ocean perch	17,584	16,997	down 587	(3%)
Shortraker - Other slope	914	914	same	(0%)
Rougheye/Blackspotted	1,302	1,312	up 10	(1%)
Pelagic shelf rockfish	5,059	4,754	down 305	(6%)
Demersal Shelf Rockfish	295	300	up 5	(2%)
Thornyhead rockfish	1,770	1,770	same	(0%)
Sub-total	35,771	34,653	down 1,118	(3%)

# Other slope, shorttraker rockfish



# 11. Other slope, shortraker rockfish

Summary p. 27, Chapter p. 551

## 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

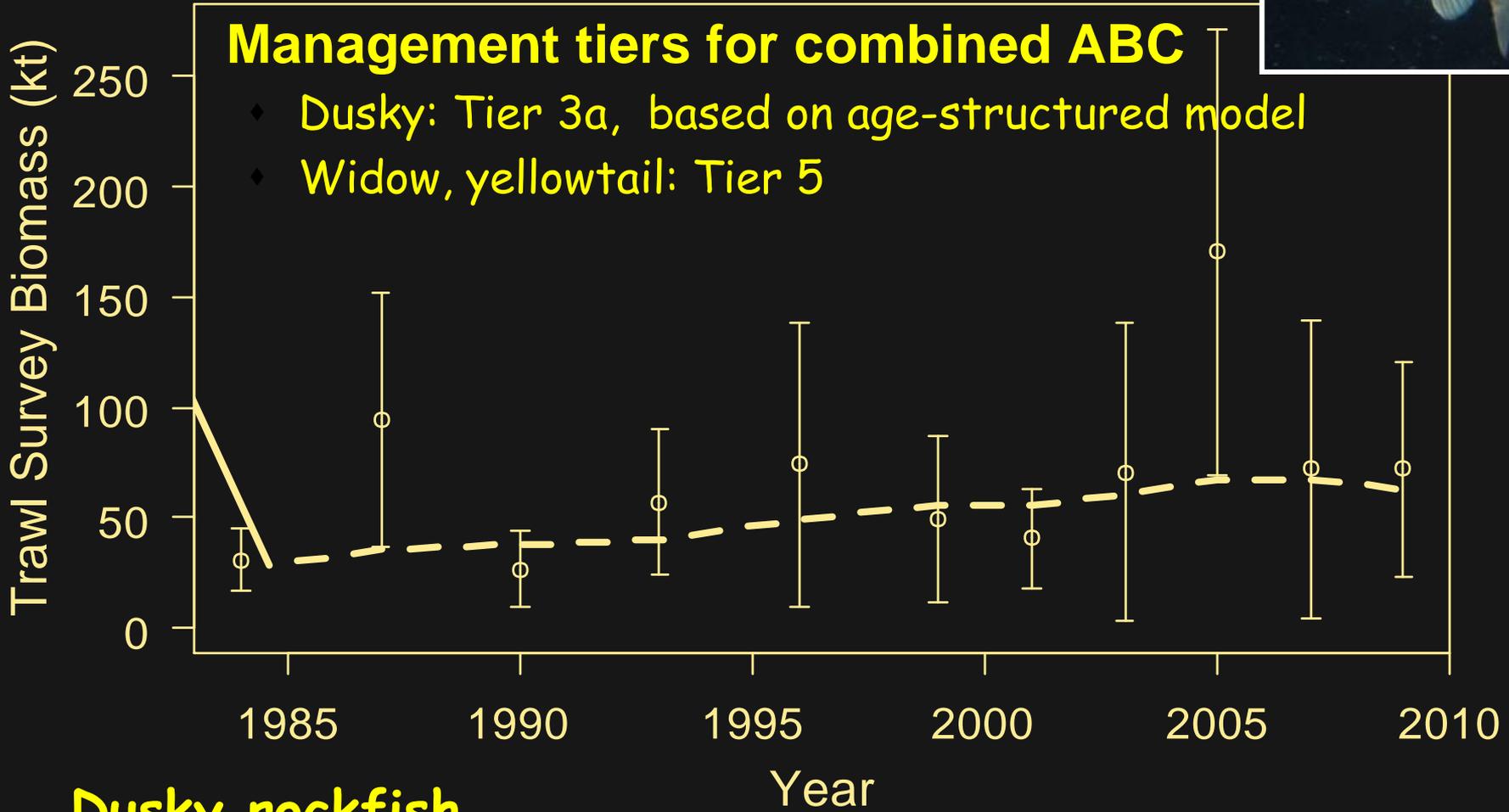
Shortraker	Biomass	OFL	ABC
2011	40,626	1,219	914
2012		1,219	914

Other slope rockfish	Biomass	OFL	ABC
2011	76,867	4,881	3,749
2012		4,881	3,749

# PSR RF ABC Summary

	2010 ABC	2011 ABC	Change	
Other Slope rockfish	3,749	3,752	up 3	(0%)
Northern rockfish	5,098	4,854	down 244	(5%)
Pacific ocean perch	17,584	16,997	down 587	(3%)
Shortraker - Other slope	914	914	same	(0%)
Rougheye/Blackspotted	1,302	1,312	up 10	(1%)
Pelagic shelf rockfish	5,059	4,754	down 305	(6%)
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Thornyhead rockfish	1,770	1,770	same	(0%)
Sub-total	35,771	34,653	down 1,118	(3%)

# 12. Pelagic Shelf rockfish



**Dusky rockfish**

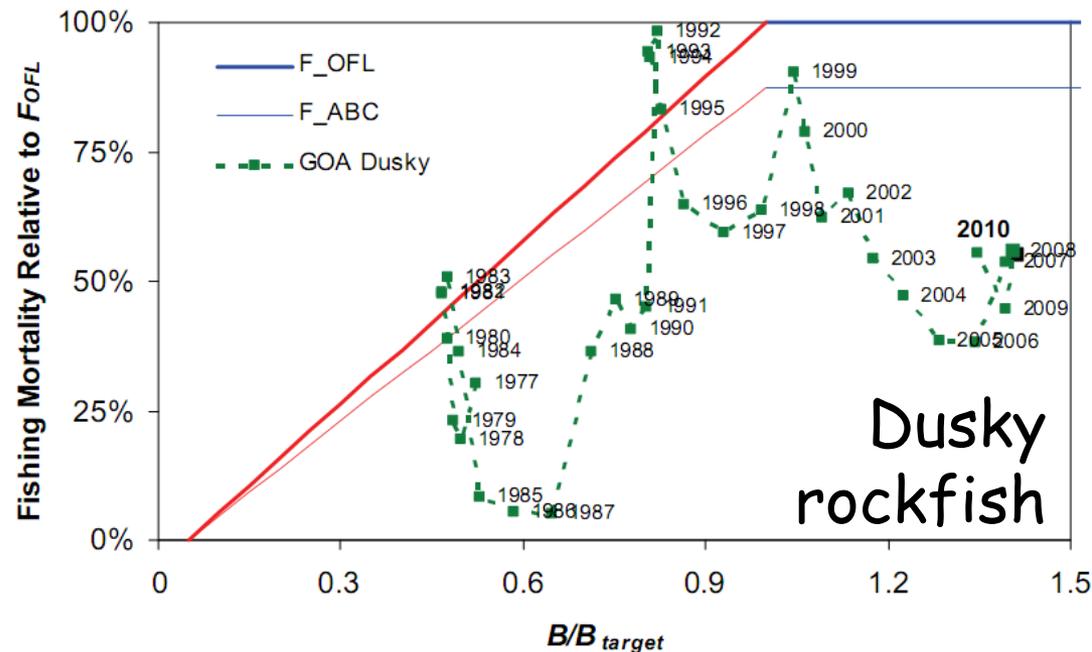
# Pelagic shelf rockfish summary

Pelagic shelf rockfish	Biomass	OFL	ABC
2011	66,498	5,770	4,754
2012		5,387	4,438

**Issue:** Dusky's should be split from yellowtail and widow rockfish

**Complication:** Pilot program category may be mis-matched

**Minutes page 5 2<sup>nd</sup> para**



# Rougheye-blackspotted ABC Summary

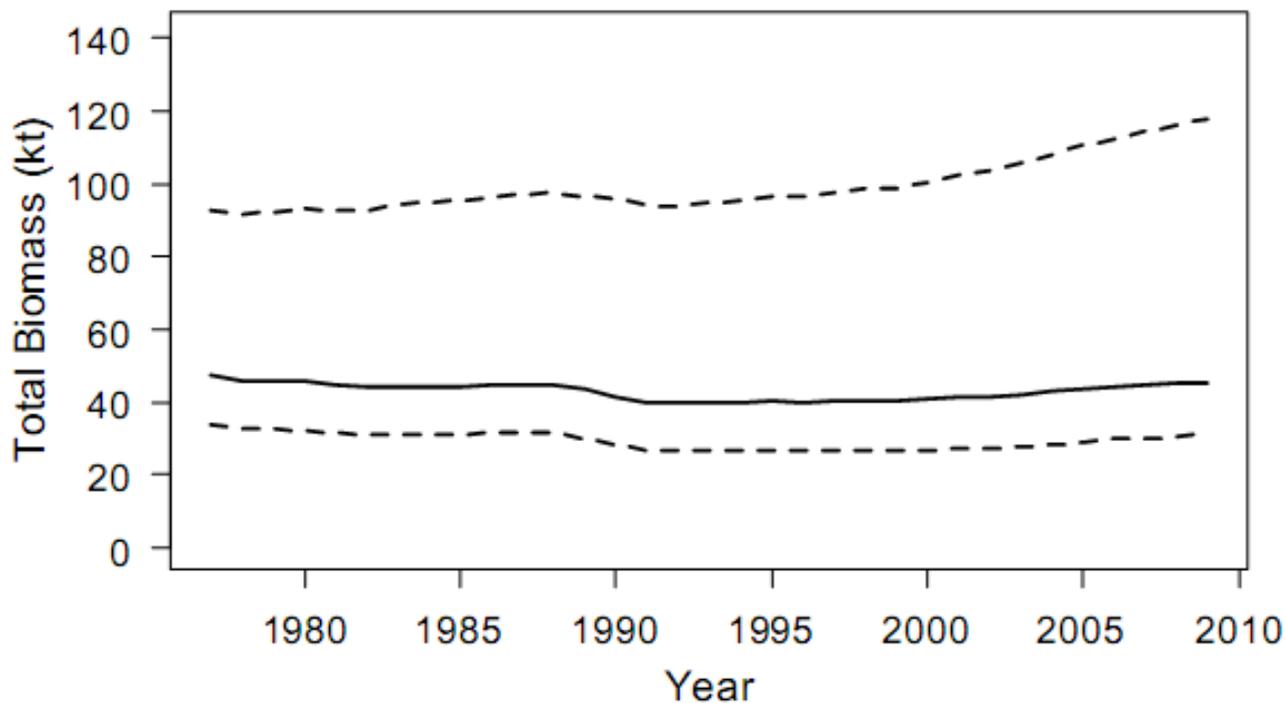
	2010 ABC	2011 ABC	Change	
Other Slope rockfish	3,749	3,752	up 3	(0%)
Northern rockfish	5,098	4,854	down 244	(5%)
Pacific ocean perch	17,584	16,997	down 587	(3%)
Shortraker - Other slope	914	914	same	(0%)
<b>Rougheye/Blackspotted</b>	1,302	1,312	up 10	(1%)
Pelagic shelf rockfish	5,059	4,754	down 305	(6%)
Demersal Shelf Rockfish	295	300	up 5	(2%)
Thornyhead rockfish	1,770	1,770	same	(0%)
Sub-total	35,771	34,653	down 1,118	(3%)

# 13. RE/BS rockfish summary

**Tier 3a**

**Stable/slight  
declining stock  
trend**

Rougeye/BS	Biomass	OFL	ABC
2011	45,907	1,579	1,312
2012		1,579	1,312



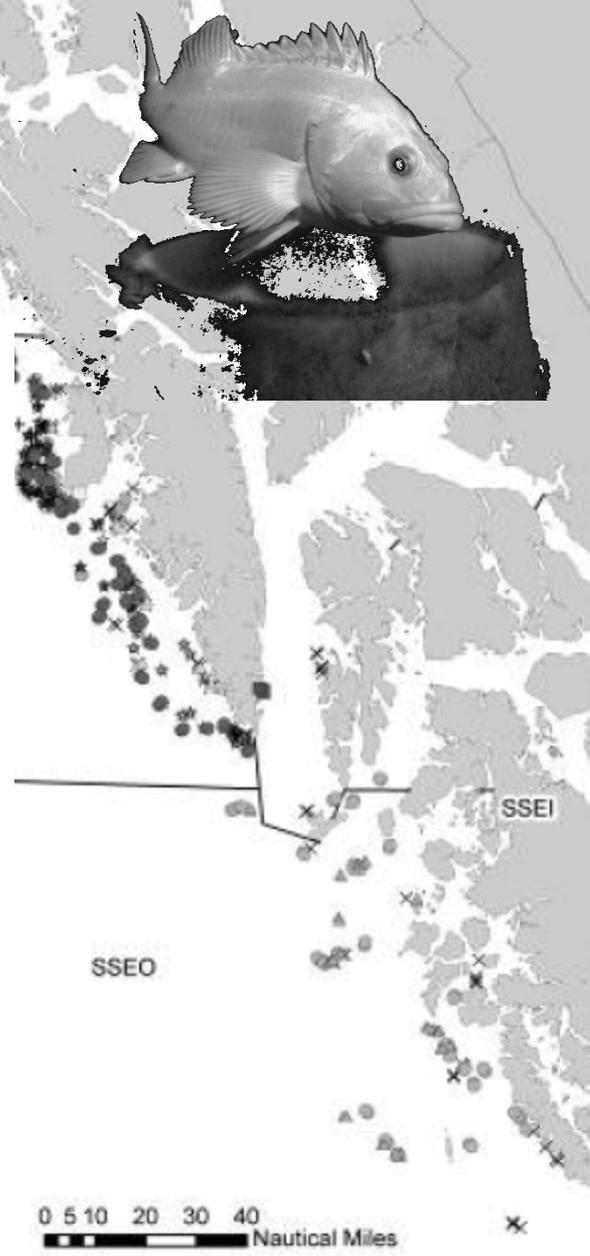
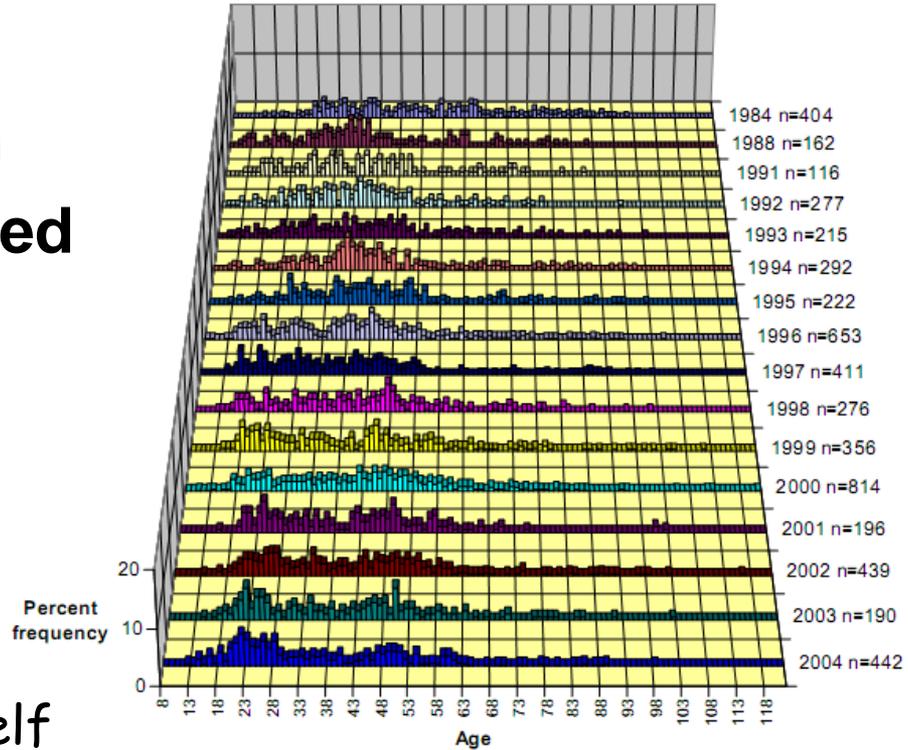
# Demersal shelf rockfish ABC Summary

	2010 ABC	2011 ABC	Change	
Other Slope rockfish	3,749	3,752	up 3	(0%)
Northern rockfish	5,098	4,854	down 244	(5%)
Pacific ocean perch	17,584	16,997	down 587	(3%)
Shortraker - Other slope	914	914	same	(0%)
Rougheyeye/Blackspotted	1,302	1,312	up 10	(1%)
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Demersal Shelf Rockfish	295	300	up 5	(2%)
Thornyhead rockfish	1,770	1,770	same	(0%)
Sub-total	35,771	34,653	down 1,118	(3%)

# 14. Demersal shelf rockfish



Tier 4  
 Progress on  
 age structured  
 model was  
 presented



Demersal shelf  
 rockfish

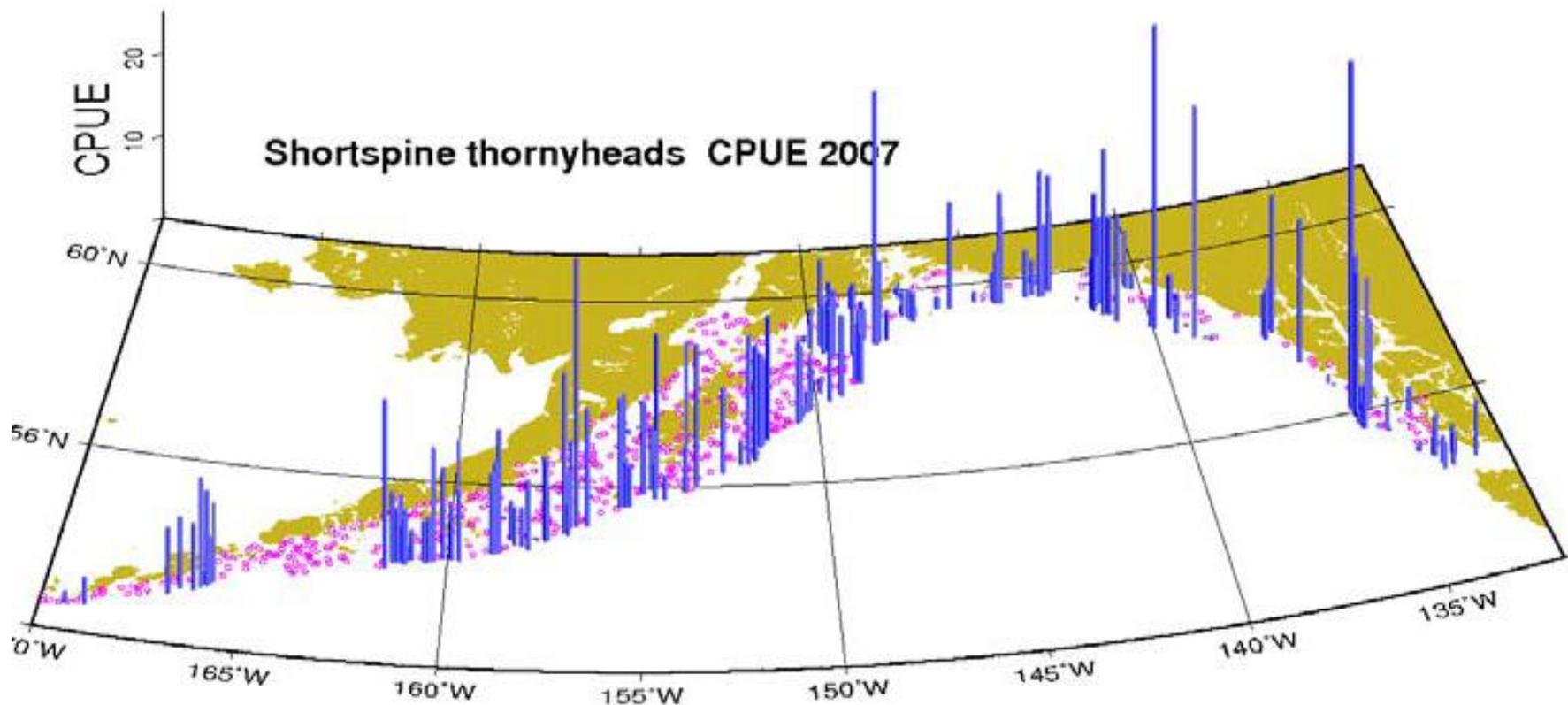
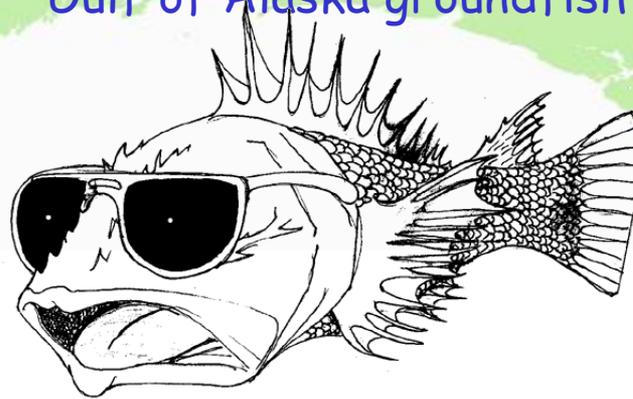
	Biomass	OFL	ABC
2011	14,395	479	300
2012		479	300

# Thornyhead rockfish ABC Summary

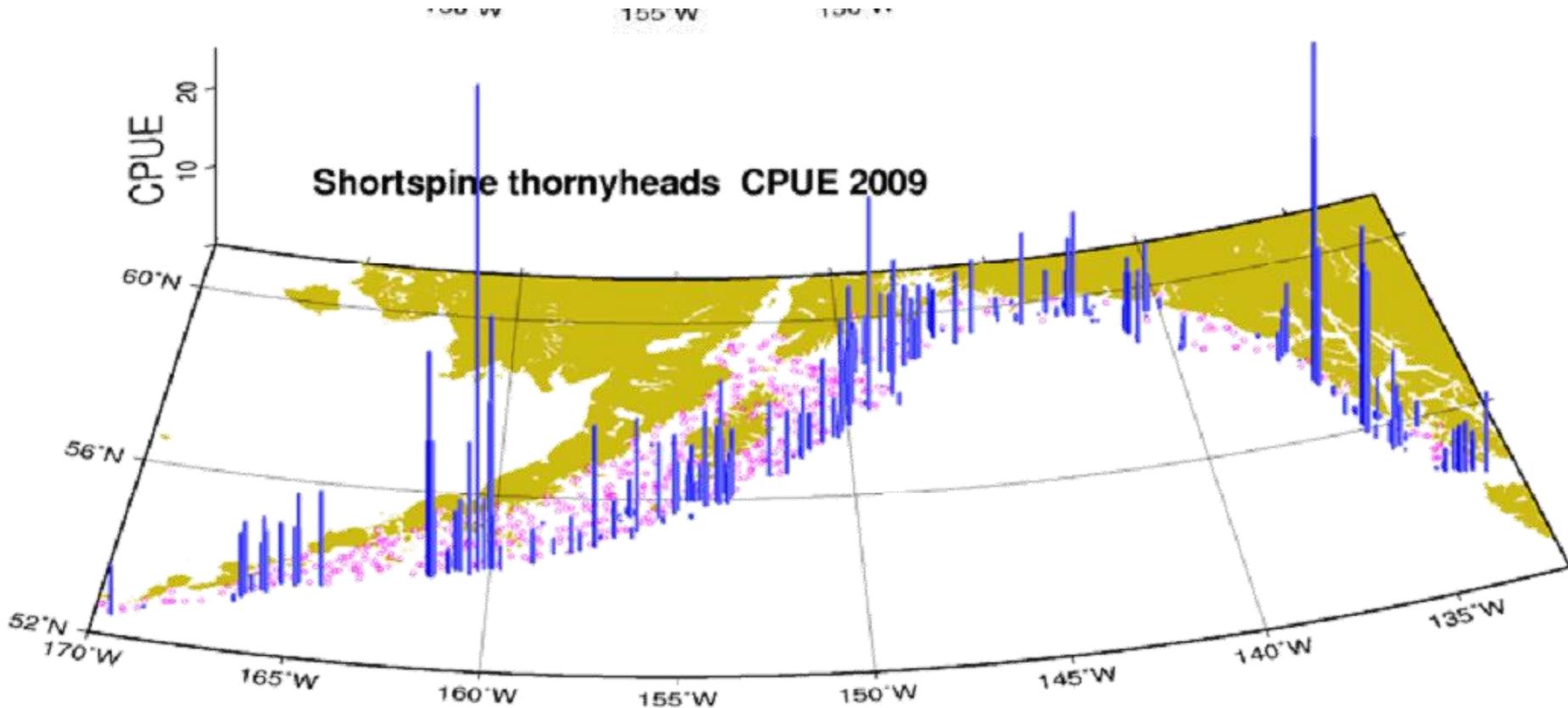
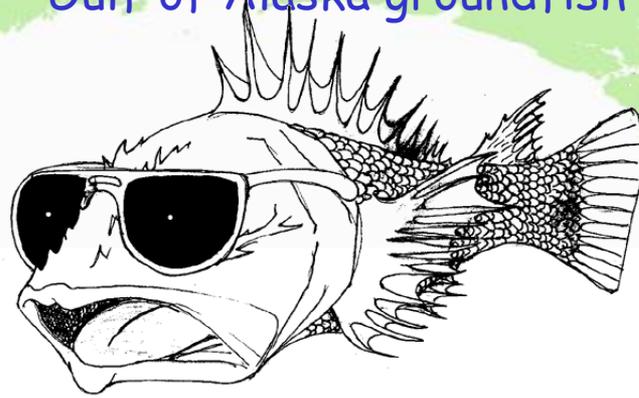
	2010 ABC	2011 ABC	Change	
Other Slope rockfish	3,749	3,752	up 3	(0%)
Northern rockfish	5,098	4,854	down 244	(5%)
Pacific ocean perch	17,584	16,997	down 587	(3%)
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<b>Thornyhead rockfish</b>	1,770	1,770	same	(0%)
Sub-total	35,771	34,653	down 1,118	(3%)

# 15. Shortspine thornyheads

- Tier 5 species



# Shortspine thornyheads

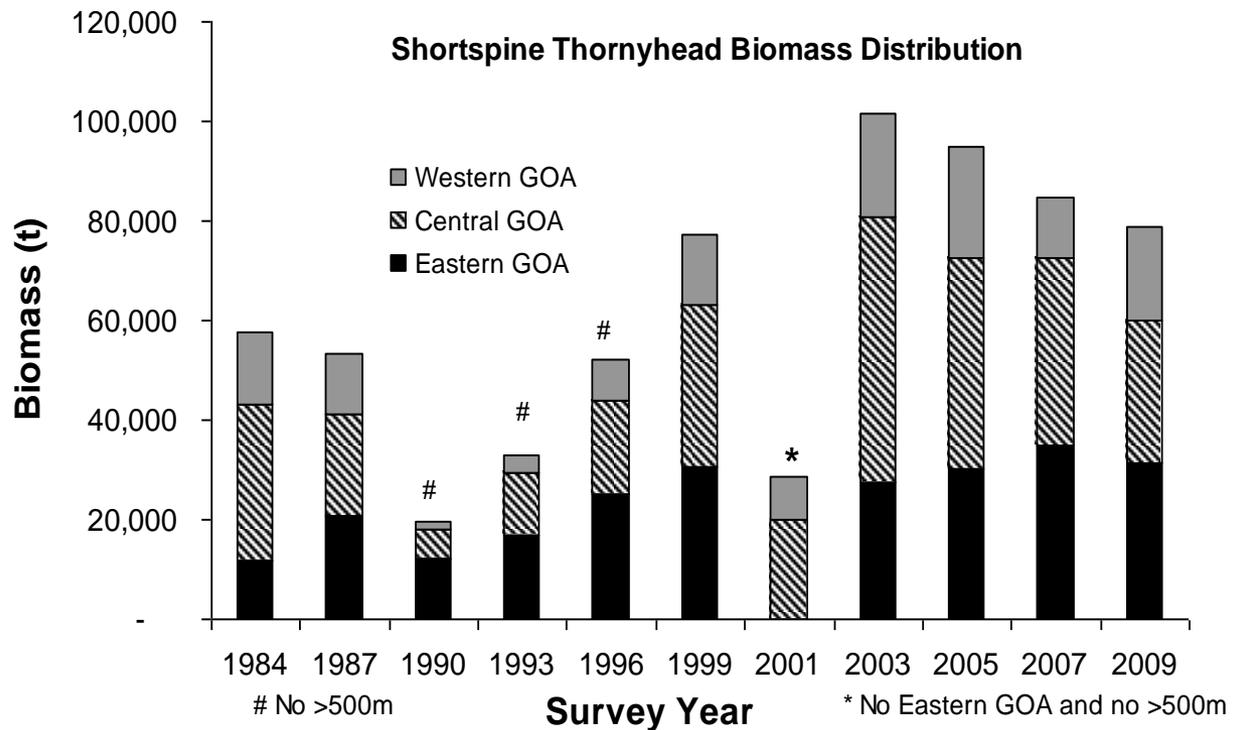


# Shortspine thornyheads



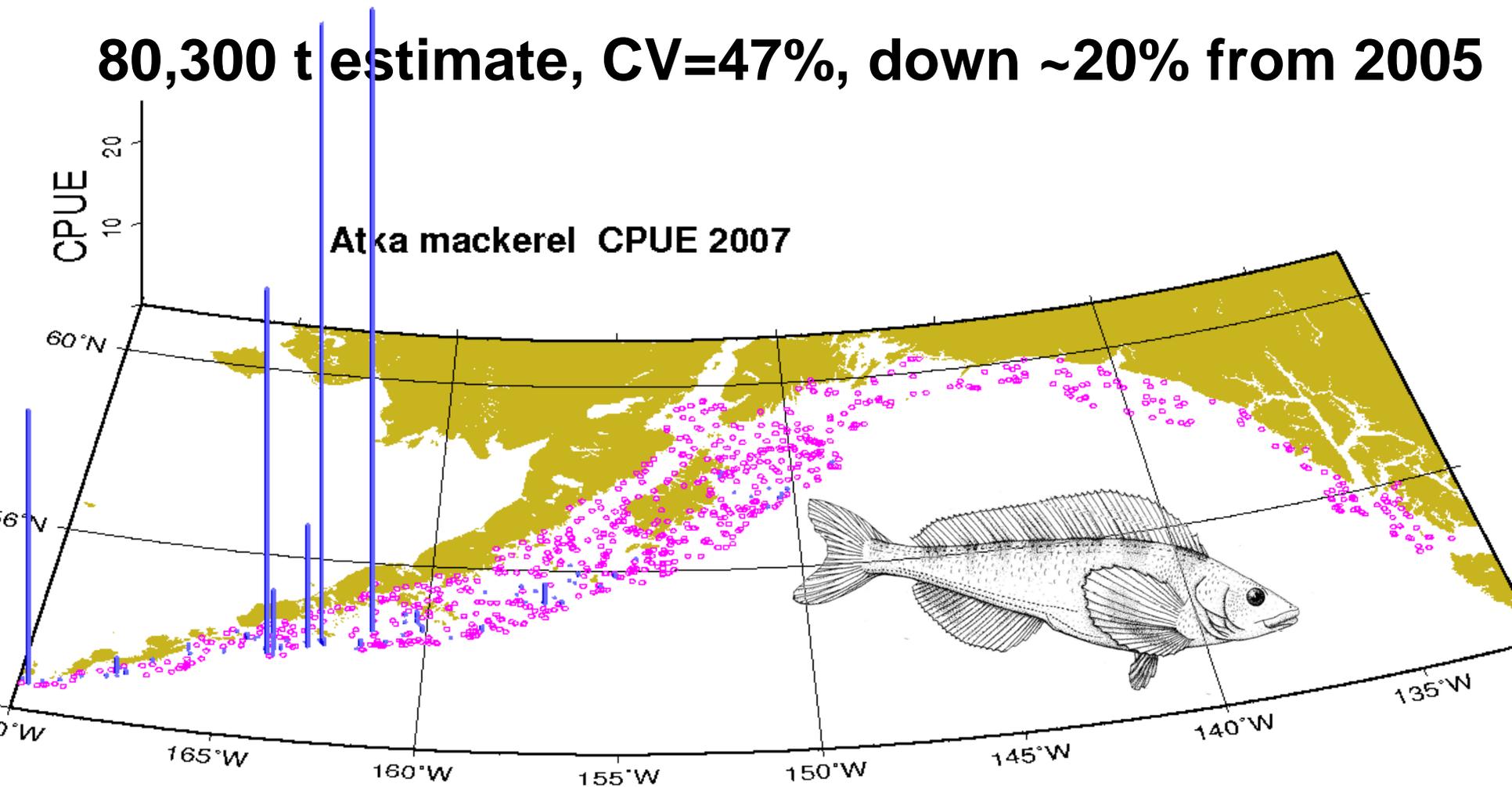
	Biomass	OFL	ABC
2011	78,795	2,360	1,770
2012		2,360	1,770

**Tier 5**



# Atka mackerel 2007 survey

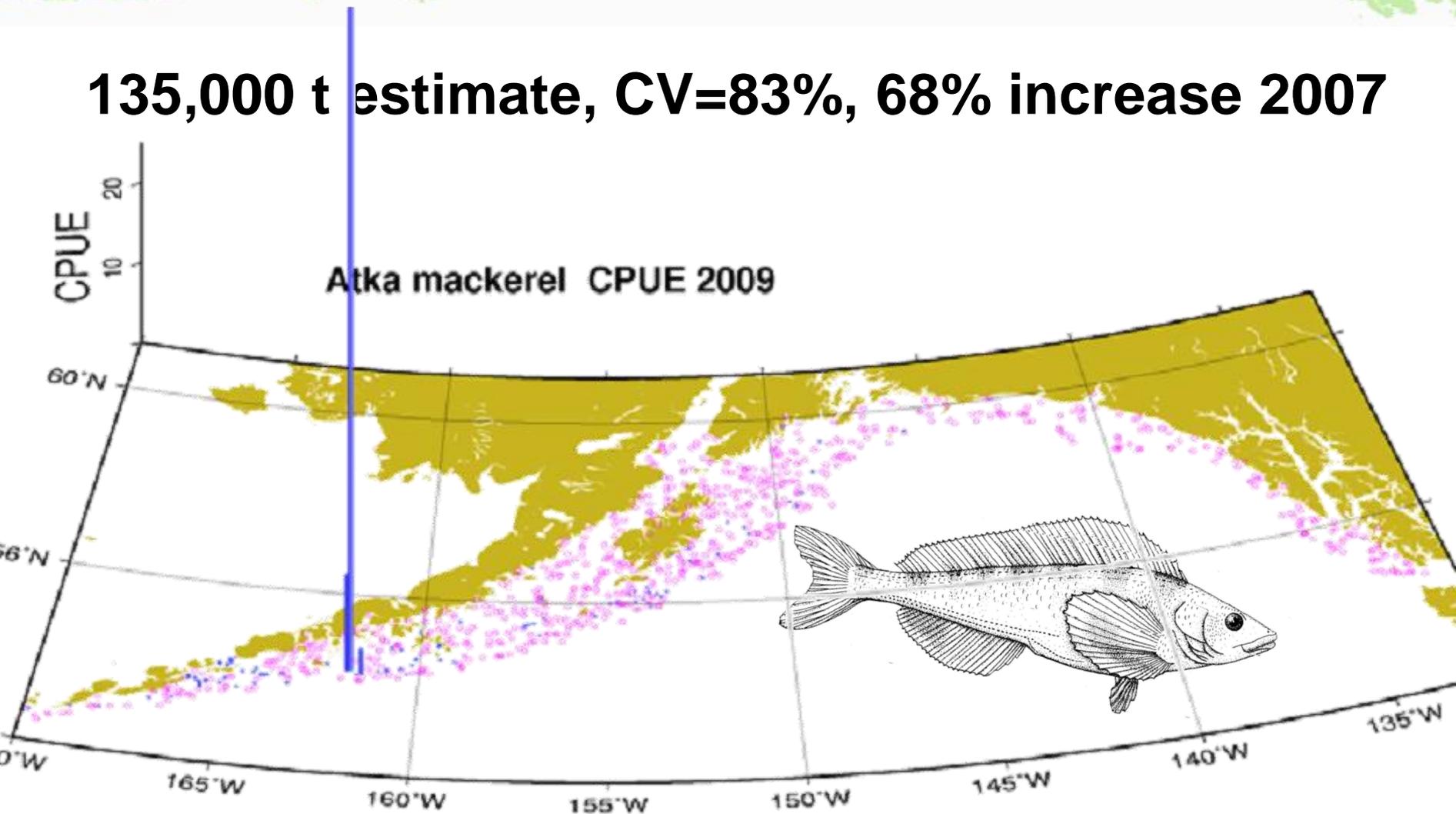
**80,300 t estimate, CV=47%, down ~20% from 2005**



Summary p. 33, Chapter p. 601

# GOA Atka mackerel 2009 survey

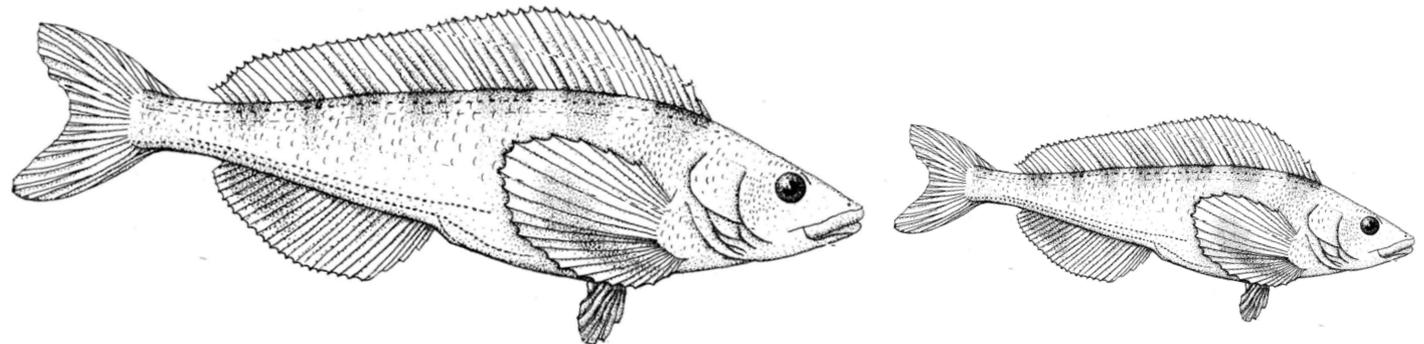
**135,000 t estimate, CV=83%, 68% increase 2007**



# Atka mackerel

- **Tier 6 species**
- **No directed fishing since 1996**
  - ♦ Bycatch mainly in rockfish fishery increasing slightly
- **TAC set to meet incidental catch levels**
- **ABC = 4,700**
  - ♦ 2010 catches around 2,400 †

**No change  
from 2009**



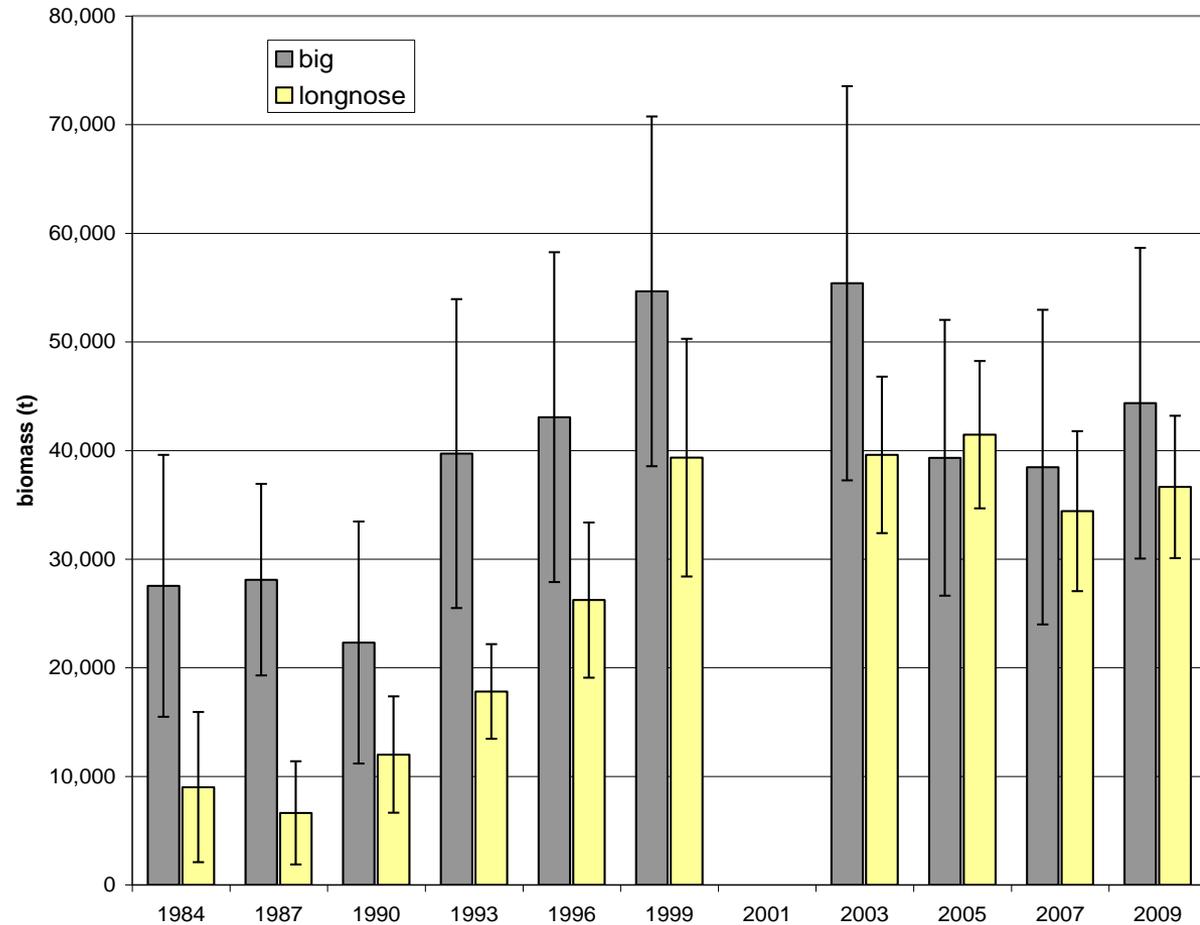
# ABC: Skates



Species	2010	ABC		Change
	Catch	2010	2011	
Pollock	75,189	84,745	96,215	up 11,470 (14%)
Pacific Cod	58,660	79,100	86,800	up 7,700 (10%)
Sablefish	9,998	10,370	11,290	up 920 (9%)
Flatfish	12,757	119,583	121,245	up 1,662 (1%)
Arrowtooth flounder	23,015	215,882	213,150	down 2,732 (1%)
Rockfish	24,870	35,771	34,653	down 1,118 (3%)
Atka mackerel	2,409	4,700	4,700	same (0%)
Skates	4,944	8,273	8,273	same (0%)
Other Species	1,793	7,075	11,199	up 4,124 (58%)
<b>Total</b>	<b>213,635</b>	<b>565,499</b>	<b>587,525</b>	<b>up 22,026 (4%)</b>

# 17. Skates

- In GOA, two main target species, third**  
Big skate ~50%, longnose about 32%,  
~18% to  
deepwater  
species



# Skates ABC/OFL

## Tier 5

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

Big skates	Biomass	OFL	ABC
2011	44,381	4,438	3,328
2012		4,438	3,328
Longnose skates	Biomass	OFL	ABC
2011	38,031	3,803	2,852
2012		3,803	2,852
Other Skates	Biomass	OFL	ABC
2011	28,908	2,791	2,093
2012		2,791	2,093



## 18. Other species

- **Historically aggregated as “other species”**
- **Species-specific OFL and ABC recommendations**
- **Squid, sharks, sculpins, octopus**
  - ♦ Broken by species groups specifications in 2011

# Tier 6

- **First year new specifications**
  - ♦ Previously OFL and ABC as “other species”
- **Team discussion**
  - ♦ Difficult basis for scientific recommendation using Tiers
  - ♦ Lack of information on life-history characteristics
  - ♦ Lack of reliable data on catch and abundance trends
- **Team recommends criteria be developed for use of reliable ‘minimum’ biomass estimates**
  - ♦ Interim: use Tier 5-like calculation but stays as Tier 6

# 18a. GOA squid



## Alternative Tier 6

Use maximum historical catch level (1997-2007)

ABC setting process very tenuous due to abundance uncertainty

Ecosystem models indicate at least order of magnitude higher than trawl survey estimate

Squid	Biomass	OFL	ABC
2011	unknown	1,530	1,148
2012		1,530	1,148

# 18b. GOA Sharks



1. Historical shark catches revised
2. “Reliable” biomass estimates for sharks unavailable
3. Team OFL and ABC deliberations: modified Tier 6
  - ◆ Catch-related measures difficult to defend
  - ◆ Dogfish estimates suitable as minimum biomass estimates.  
OFL using ( $M \times \text{Biomass}$ ;  $M = 0.097$ )  
ABC using ( $F \times \text{Biomass}$ ;  $F = 0.04$ )
  - ◆ Results in less than max permissible ABC (under Tier 5)

## 4. Other sharks Tier 6

	Biomass	OFL	GOA PT ABC
2011	79,257*	8,262	3,601
2012		8,262	3,601

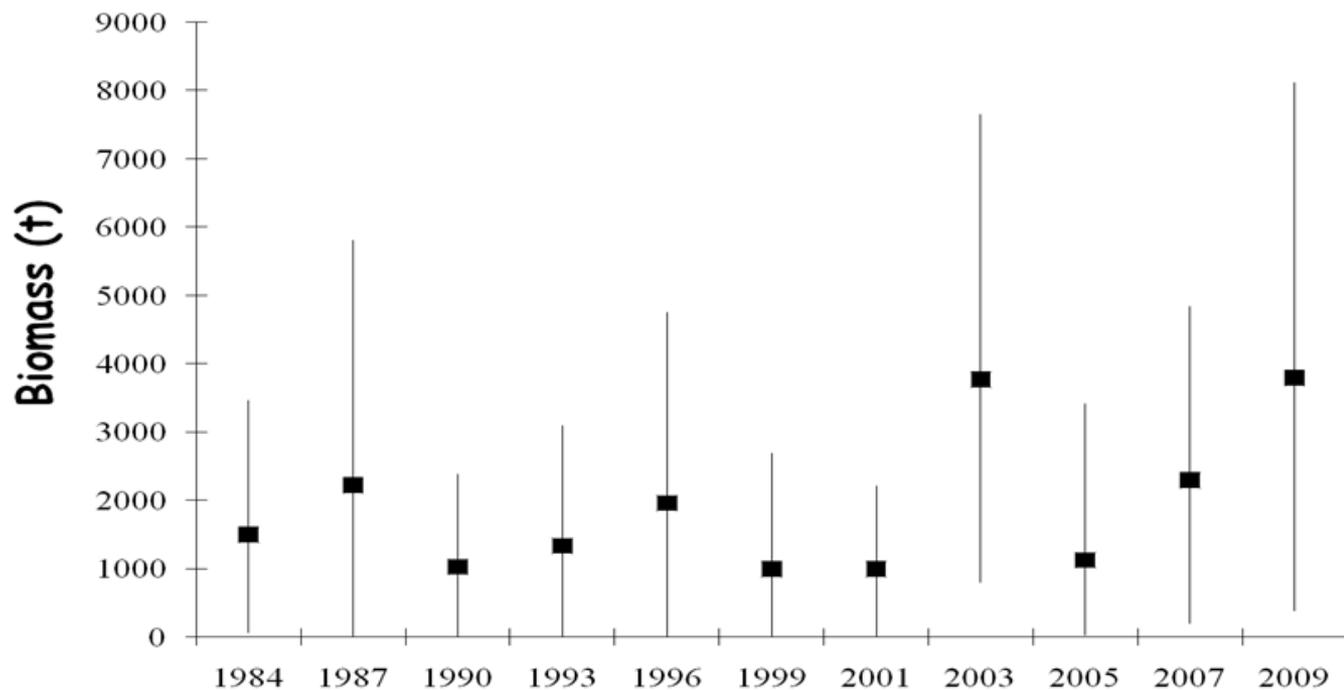
	Biomass	OFL	SSC ABC
2011	79,257*	8,262	6,197
2012		8,262	6,197

# 18c. Octopus

- Team recommended Tier 6 with Tier 5-like estimate

- ♦ Also bycatch-only status for octopus

	Biomass	OFL	ABC
2011	2,400	1,272	954
2012		1,272	954



# 18d. GOA Sculpins

- **Reliable biomass estimates available**
- **Complex-level M**
  - ♦ Estimated by weighting species-specific M rates by survey biomass—Tier 5 management recommended
- **Team recommends research into GOA-specific life-history parameters**
- **Tier 5 based on average biomass from last 4 surveys**

Sculpins	Biomass	OFL	ABC
2011	33,307	7,328	5,496
2012		7,328	5,496

# Appendix: Grenadiers

- **Not part of FMPs**

- ♦ 2006 & 2008 full grenadiers assessment presented since may be moved to FMP

- **Plan Team recommendations**

- ♦ Move into the FMP for management purposes
- ♦ Tier 5 likely suitable
  - Giant grenadiers may be suitable for Tier 3 eventually



# Appendix: GOA forage fish

Summary p. 42,  
Chapter p. 847

- **Executive summary**
- **Part of EC group**
- **Issues highlighted**
  - ♦ GOA IERP will provide additional information and better assessment of forage fish
  - ♦ Listing of eulachon stocks as threatened in N California, OR, WA and southern BC