

Bering Sea-Aleutian Islands

Stock Assessment and Fishery Evaluation Report

Plan Team Report to the NPFMC, December 2010





BSAI Plan Team Members (15 Members from 8 Major Agencies)

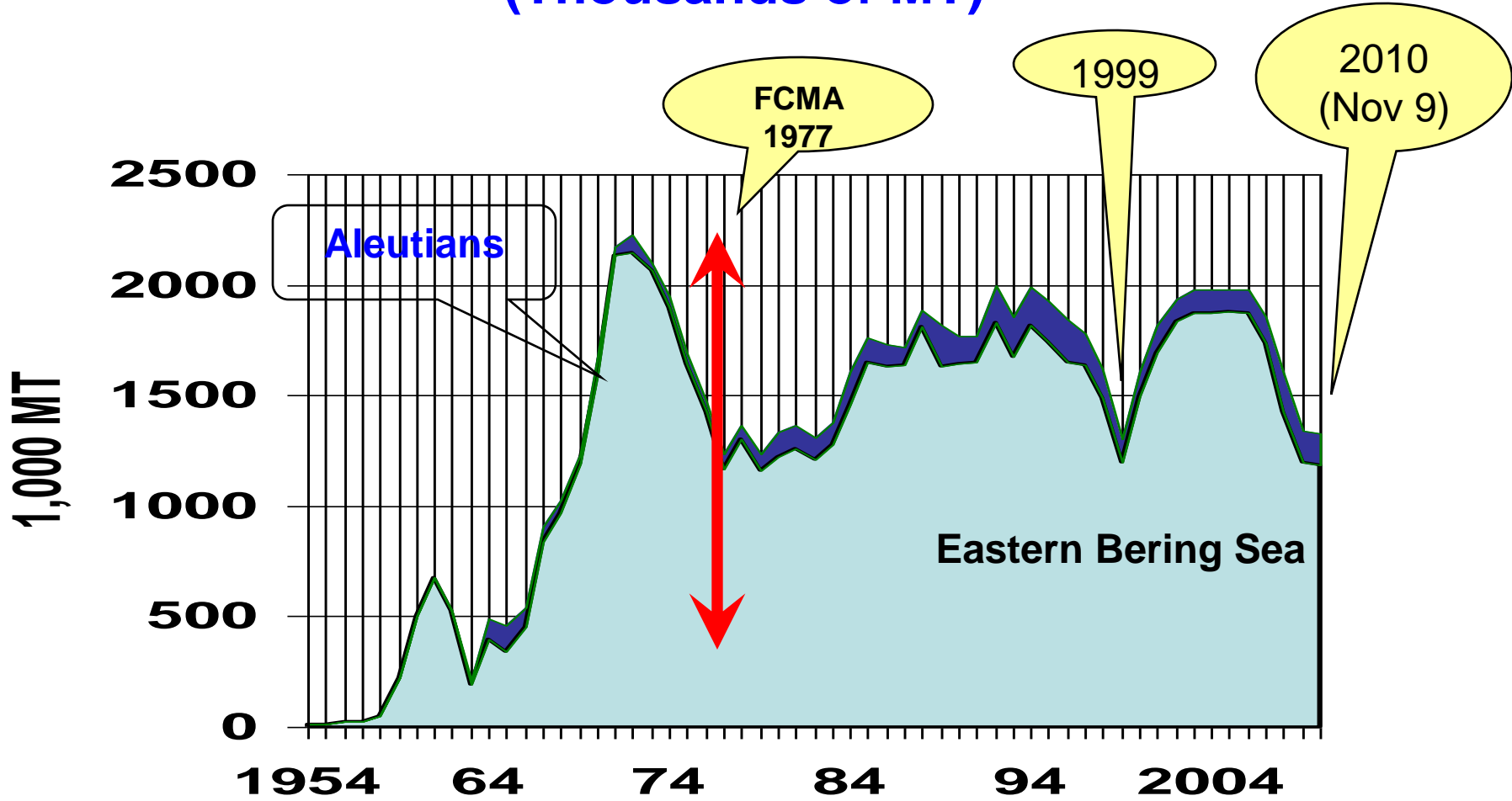
NPFMC	Jane DiCosimo (Plan Coordinator)
NMFS (AFSC)	Loh-Lee Low, Grant Thompson
	Lowell Fritz, Kerim Aydin, Alan Haynie
NMFS (TSMRI)	Mike Sigler, Dana Hanselman
NMFS (Region)	Mary Furuness
USF&W --	Leslie Slater
ADF&G --	Dave Carlile, Dave Bernard
Univ.Alaska--	Brenda Norcross
WDF&W --	Henry Chen
Halibut Comm-	Bill Clark

Stock Assessment & Statistics Expertise – 6

Marine Mammal, Seabird, Ecosystems, Economics Expertise – 1 each

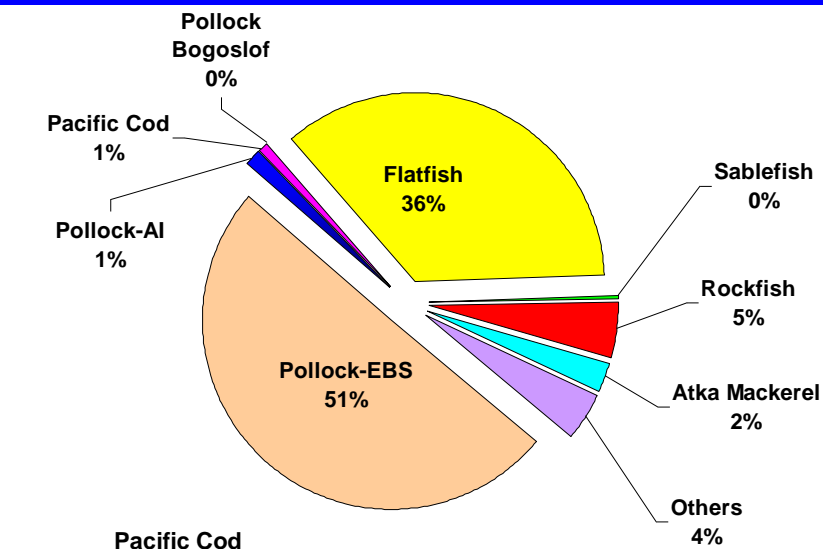
Biology & Management Expertise - 5

Catch History of Total BSAI Groundfish 1954-2010 (Thousands of MT)



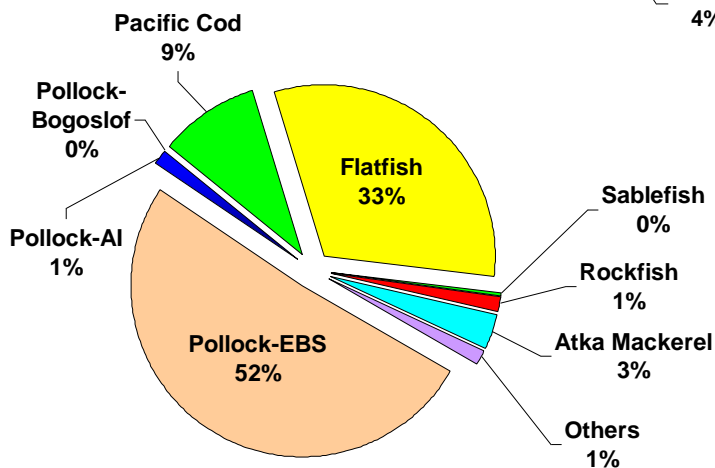
Summary Result of Dec 2010 BSAI Assessment

Exploitable Biomass versus ABCs (Percent Change from 2010-2011)



Biomass = 20.6 mmt

Up 27%



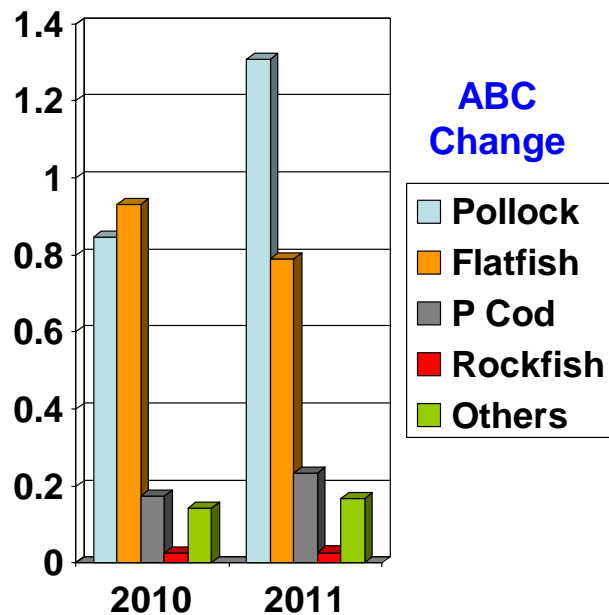
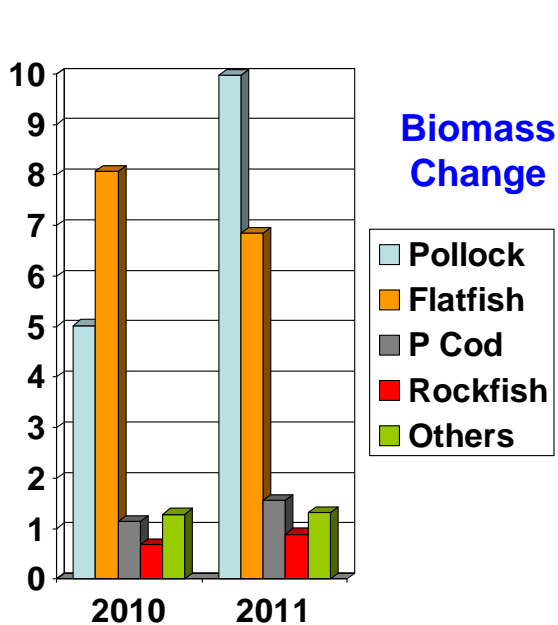
ABC = 2.53 mmt

Up 19%

BSAI Percent Changes by Major Groups

Changes from 2010-2011

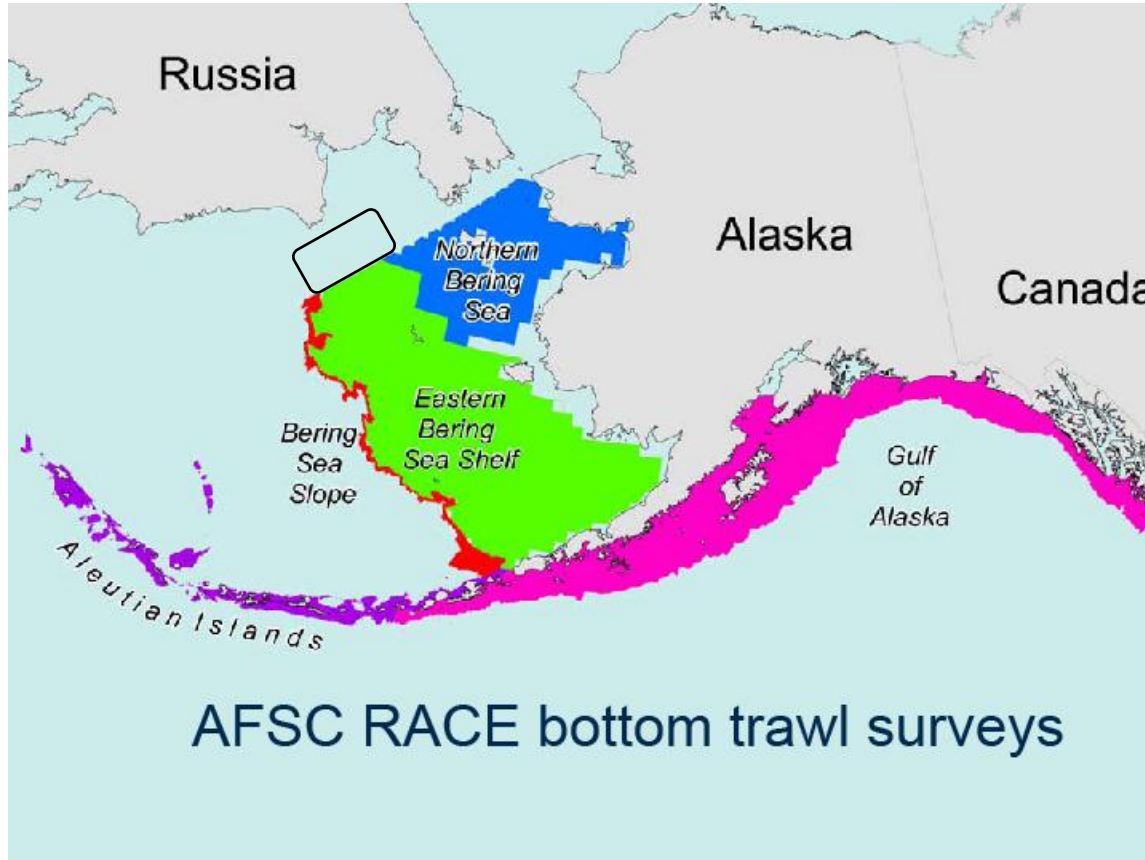
Groups	Biomass	ABC
Gadids	+ 87	+ 51
Flatfish	- 15	- 15
Rockfish	+ 31	+ 26
All Others	+ 3	+ 19
Total	+ 27	+ 19

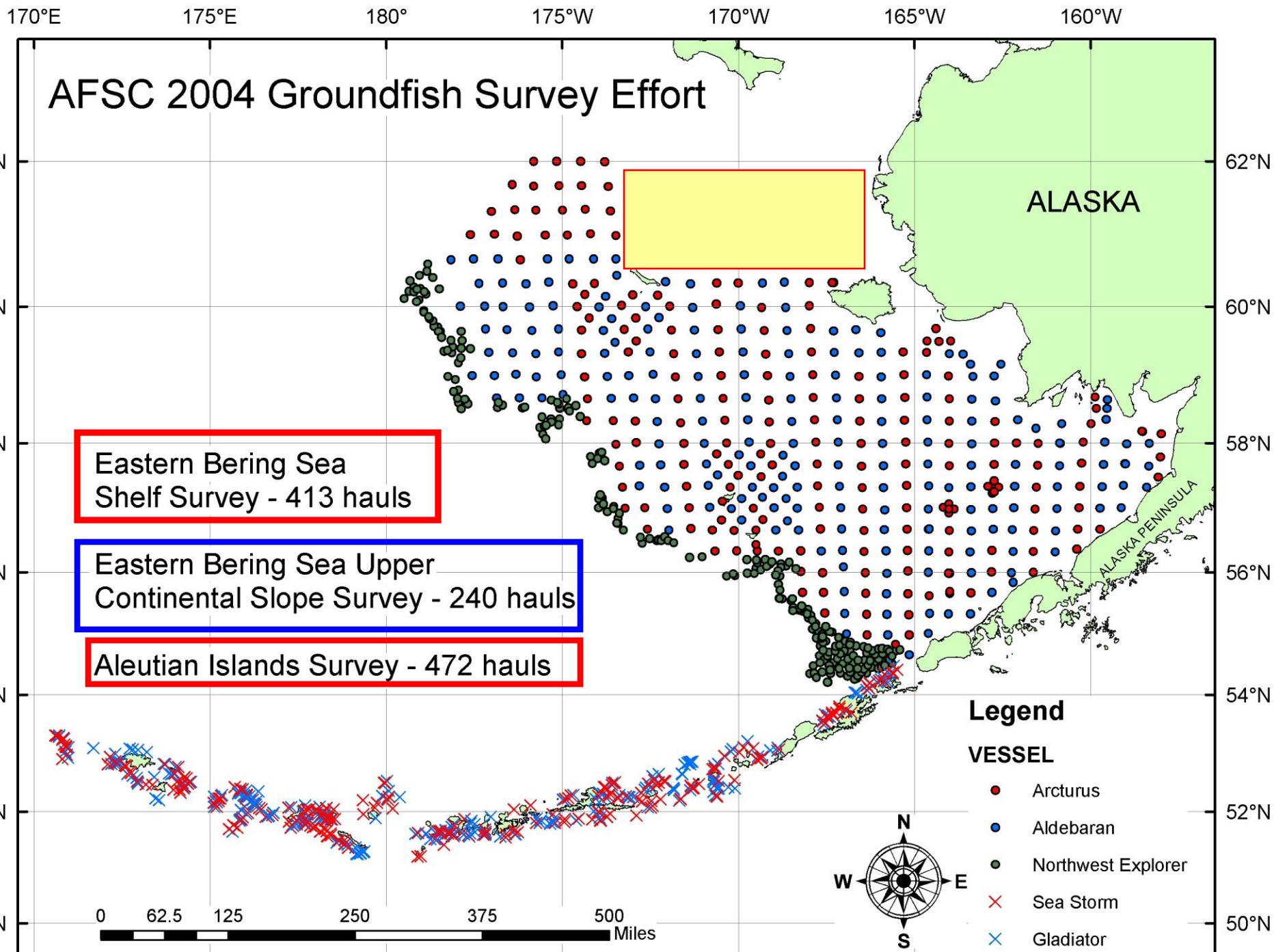


Review of Surveys in 2010

- EBS Bottom Trawl Surveys
- EBS Off-Bottom Hydroacoustic Surveys
- (EBS BASIS Surveys)
- Aleutians Bottom Trawl Surveys
- Sablefish Longline Surveys

NMFS Trawl Survey Areas

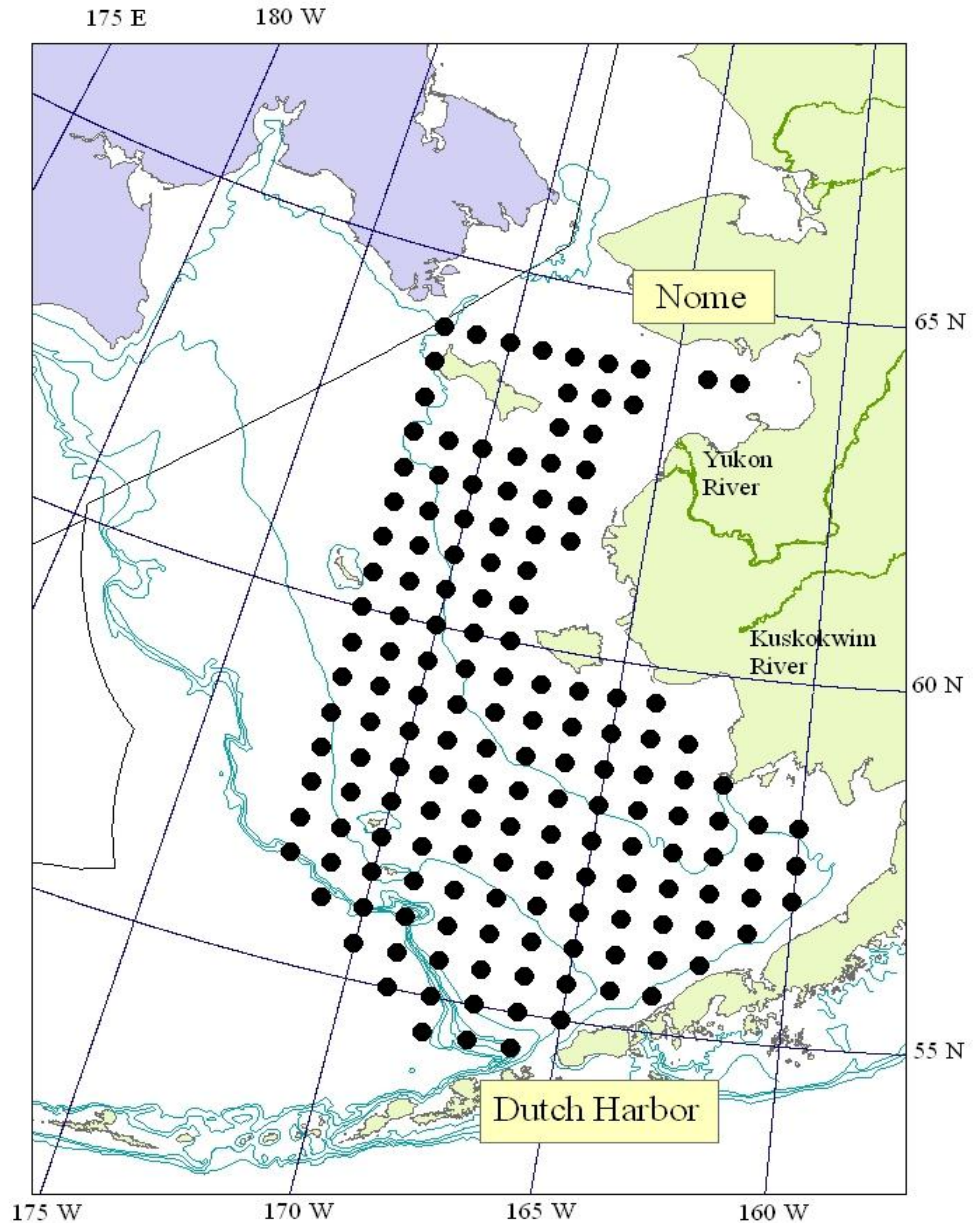




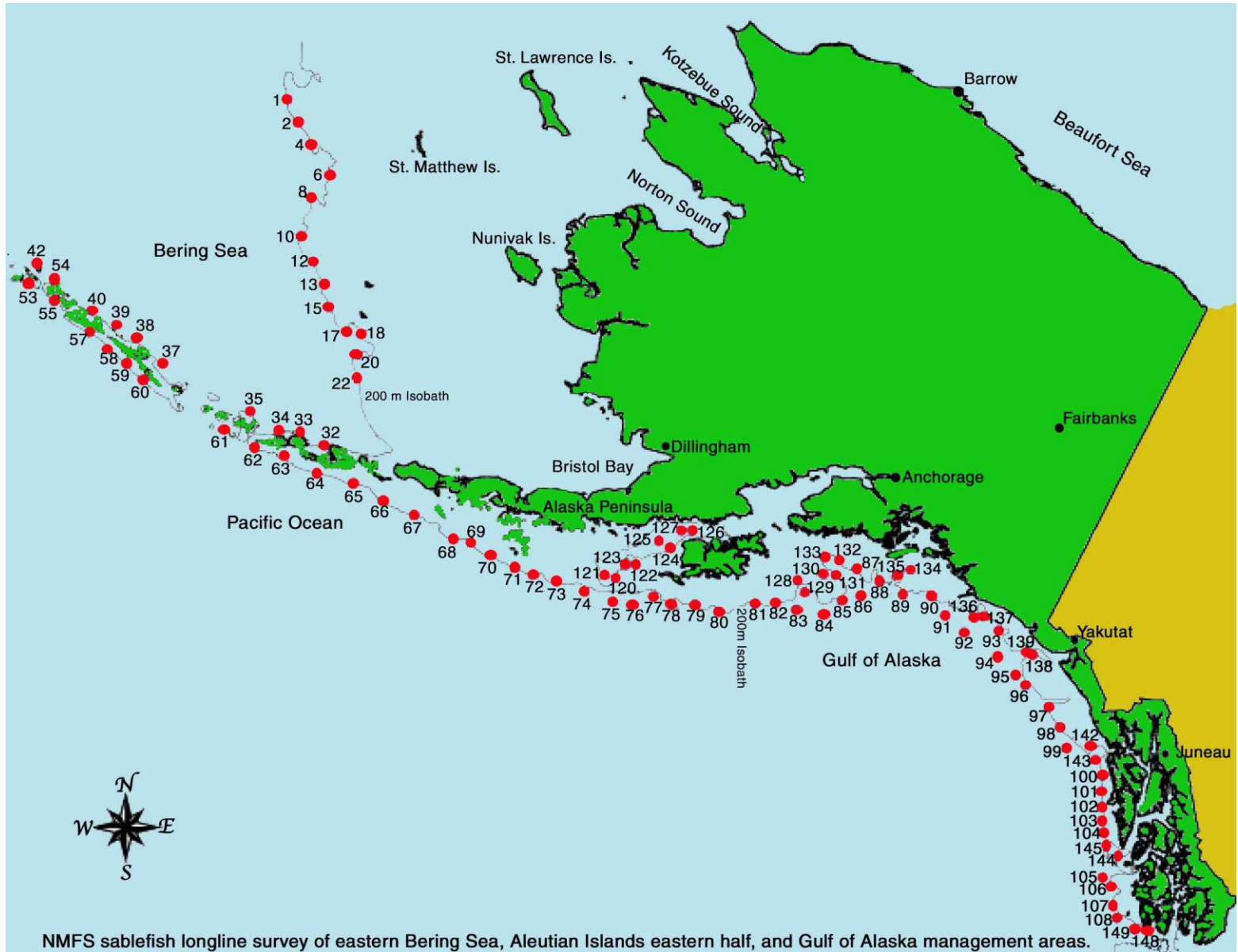
**U.S. BASIS
Cruises, 2003-
2010**

**Near Surface
Surveys of
Young Fish +
Oceanography**

**Covered 3 warm
& 5 cold years**



Sabelfish Longline Survey



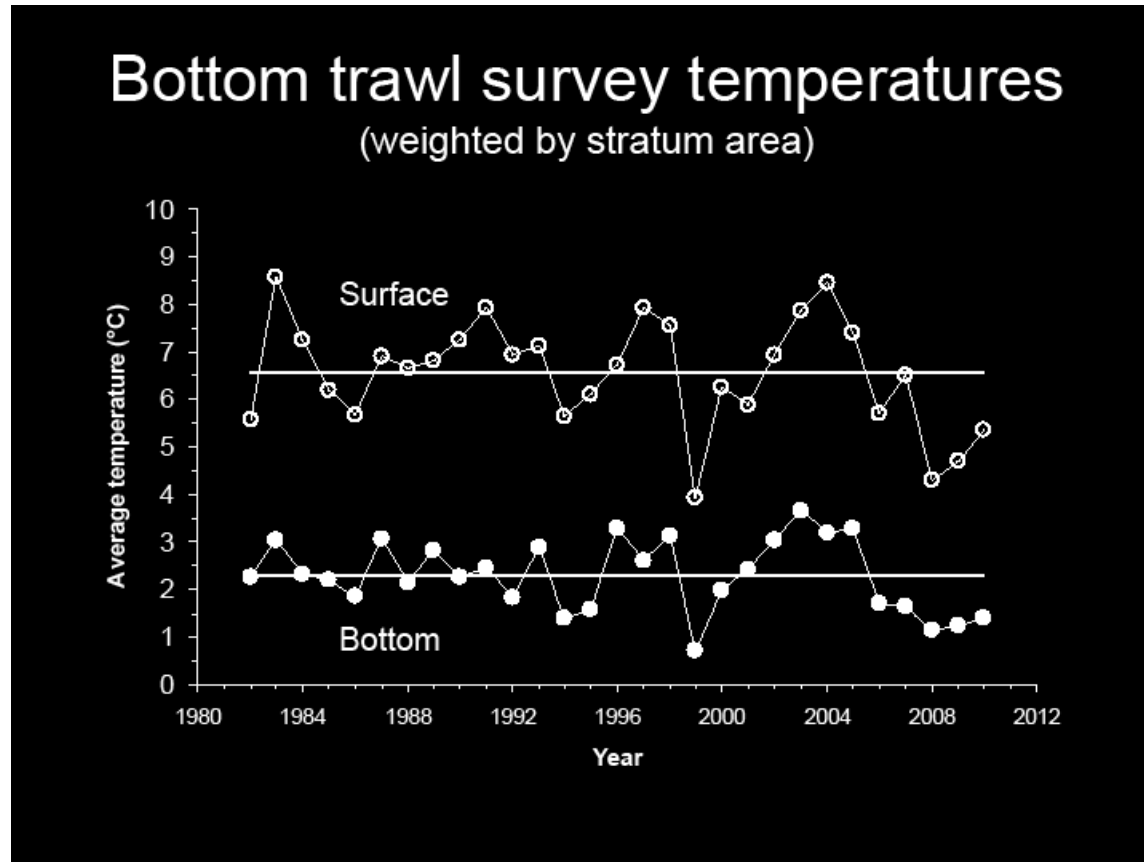
NMFS sablefish longline survey of eastern Bering Sea, Aleutian Islands eastern half, and Gulf of Alaska management areas.

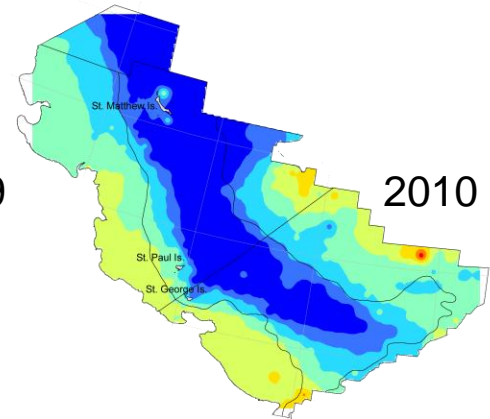
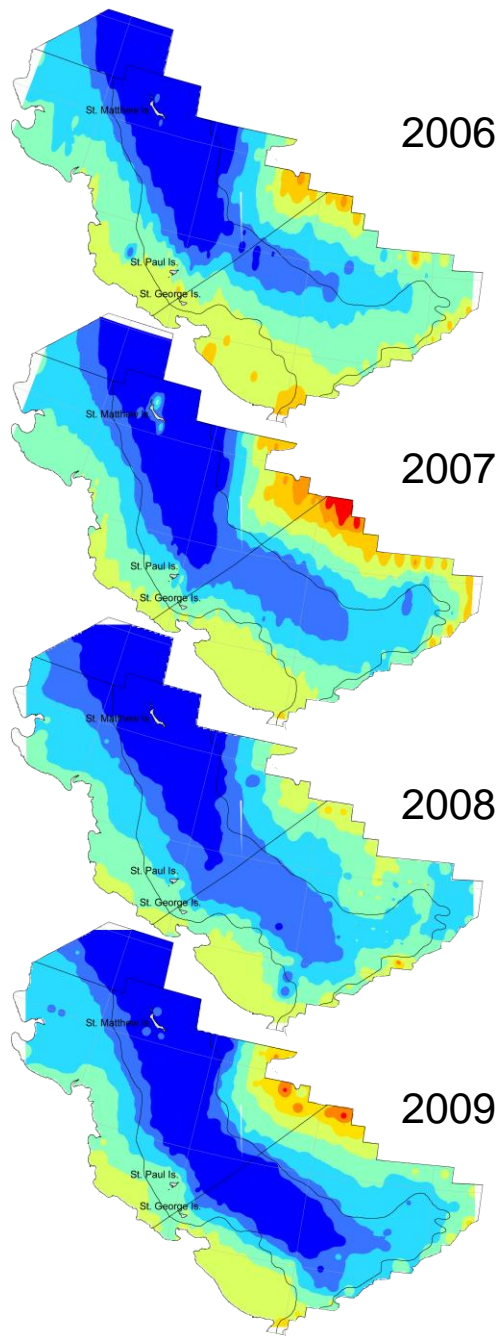
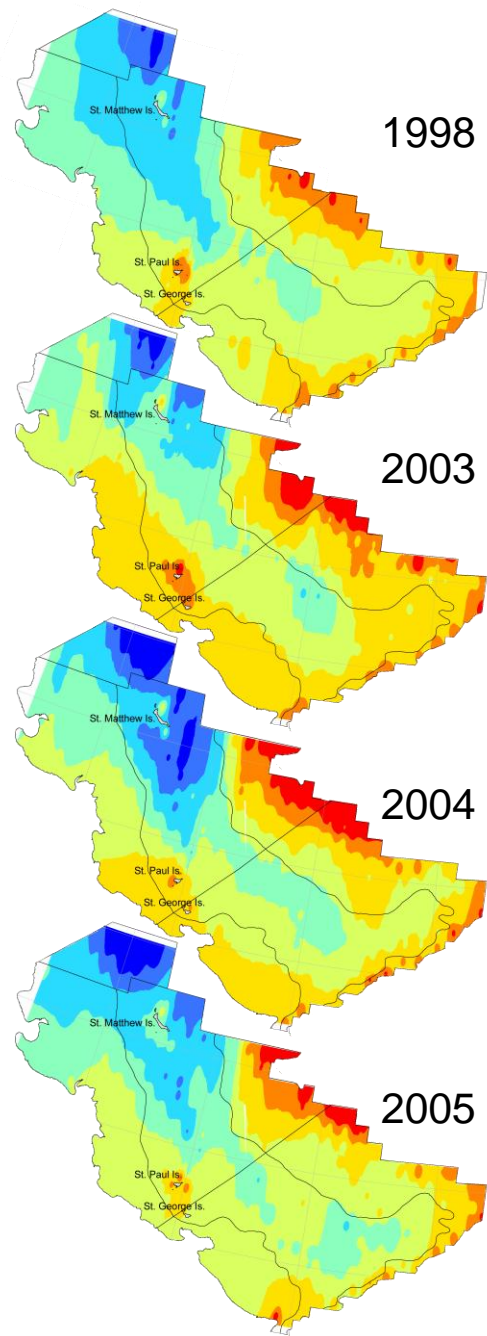
Notes on Aleutians Surveys

- **Surveys are scheduled every 2 years**
- **The 2008 Survey was cancelled but conducted in 2010.**
- **The 4-year survey gap (2006-2010) has material effects on the stock assessments for this year as the surveys have direct affects on assessments of**
 - **Aleutians pollock and Pacific cod**
 - **Atka mackerel**
 - **Aleutians Rockfish complex, including POP**

Bering Sea

Five Years of Below Average Temperatures, 2006-2010

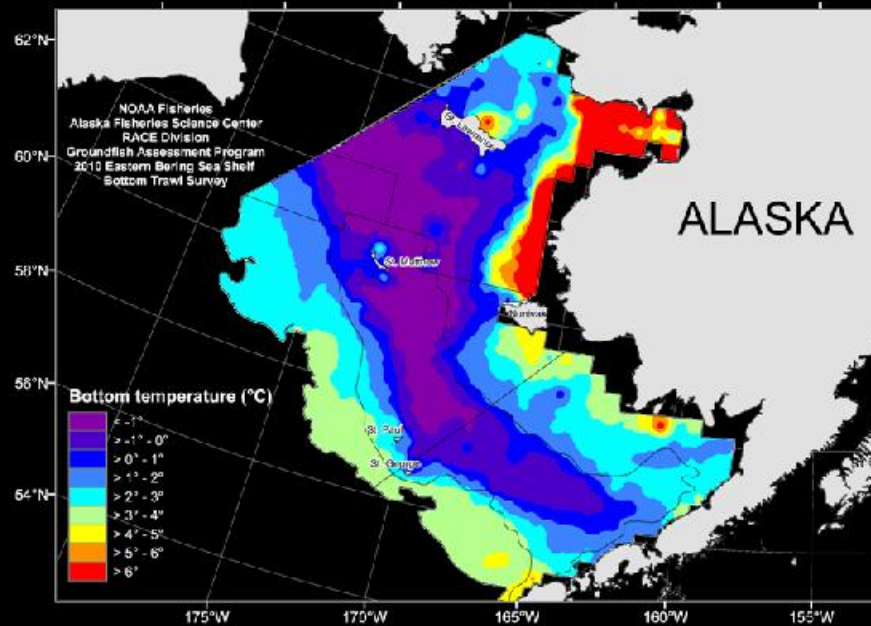




**Eastern Bering Sea
Warm versus Cold
Years**

Summer 2010 Bottom temperature

Bottom trawl survey temperatures



Stock Assessment Theme

1. **Conduct Surveys**
2. **Model the Population Dynamics of the Stocks**
3. **Determine Exploitation Rates**
(Harvest Control Rules by 6-Tier System)

Goal: Yield = Exploitation Rate x Biomass

Harvest Control Rules

Based on Quality of Data

(In Appendix A of SAFE Report)

Tier 1 -- Reliable B, Bmsy, pdf of Fmsy

Tier 2 -- Reliable B, Bmsy, Fmsy, F35, F40

Tier 3 – Reliable B, B40, F35, F40

Tier 4 – Reliable B, F35, F40

Tier 5 -- Reliable B and M

Tier 6 – Reliable Catch History Data

Parameters of Special Attention

Biomass Levels:

B_{msy} (of the exploitable population)

FSB (Female Spawner Biomass)

B 20% (eg. probability of falling below
reference level)

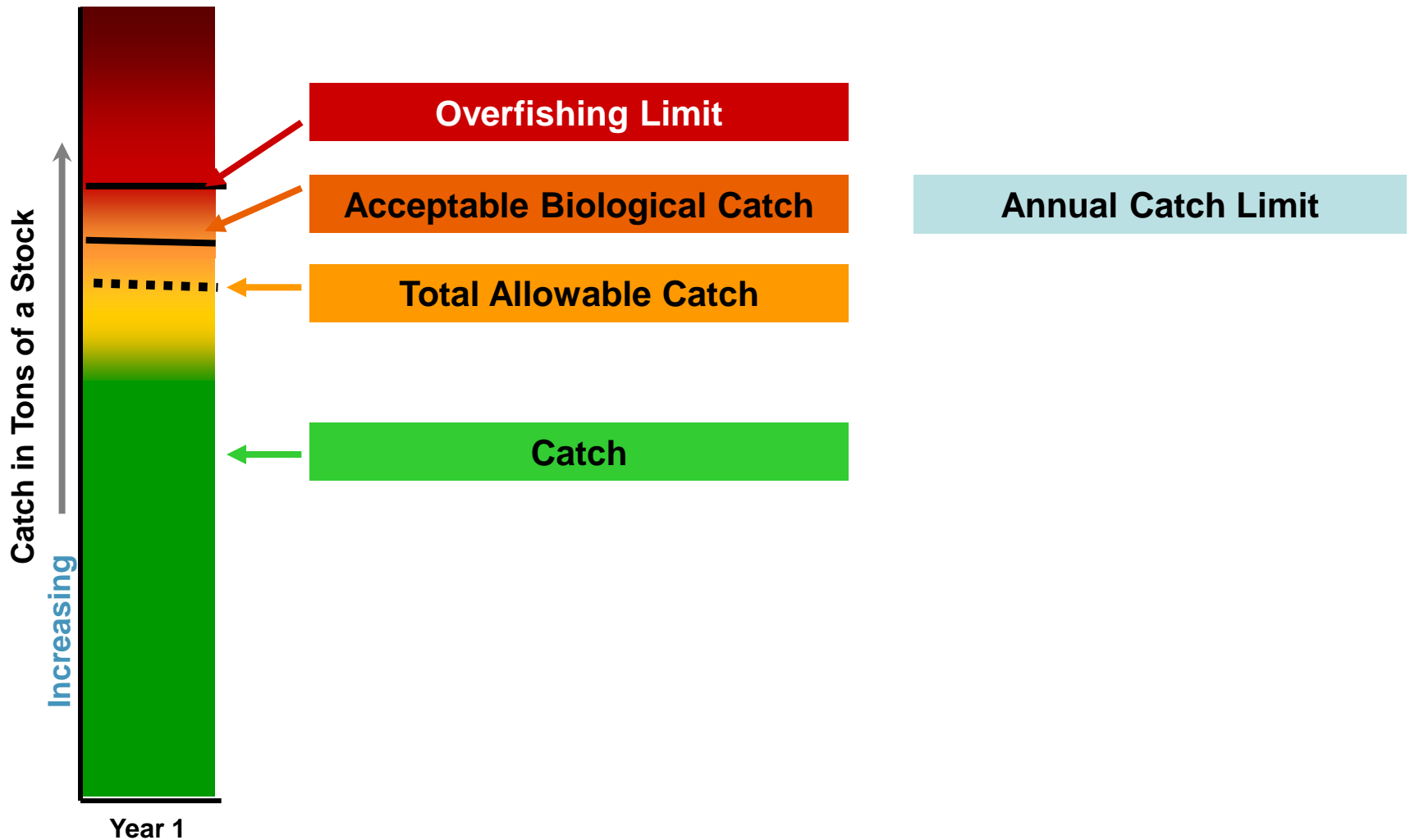
Fishing Mortality Rates:

F *overfishing* ...

F *abc*

Biological Benchmarks

$OFL \geq ABC \geq ACL \geq TAC$



Typical Format of Chapter Overviews with SSC by Grant Thompson

- **Author responses to SSC/Team/Public comments**
- **New data**
- **Changes in analytic approach**
- **Stock status and trend**
 - Total Biomass
 - Female spawner biomass trends
 - Recruitment strengths
- **OFL**
- **ABC**
 - Tier determination
 - 2011 maxABC
 - Recommended ABC (if < max)
- **4-Panel graphical summary**

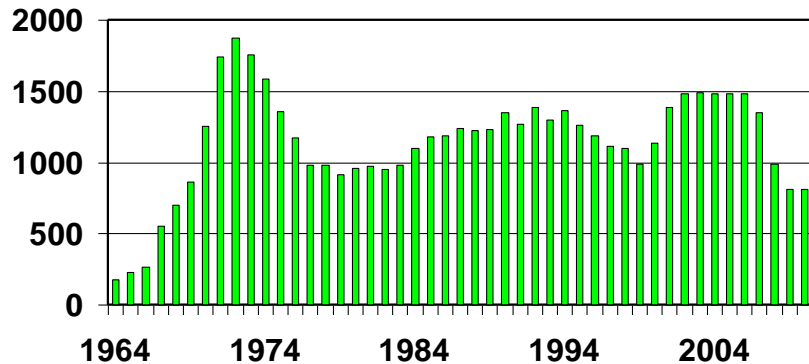
Overview of Species Summary Slides

- By Species Groups
- Details of Stock Analyses will be presented by Jim Ianelli
 - Pollock (EBS)



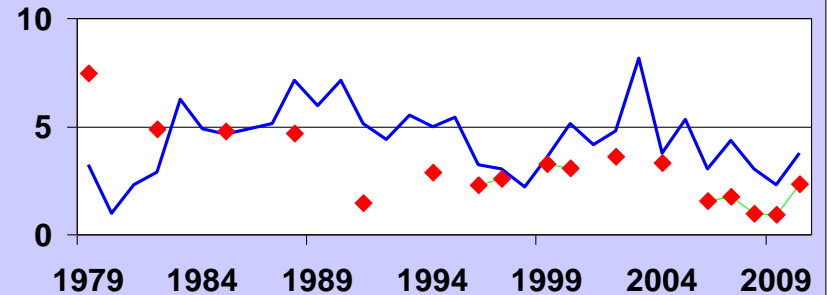
C1 - EBS Pollock Stock Assessment, Dec 2010

Catch (1,000 M.Tons) 1964-2010
2010 Catch through Nov 9

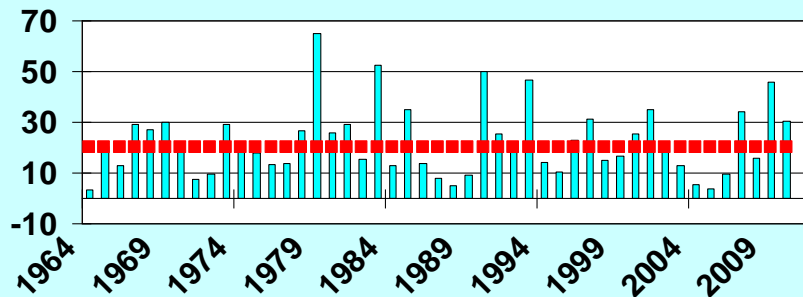


Survey Biomass 1979-2010

Line=On-Bottom Trawl, Up 64% from 2009
 Diamonds Red Dots = Off-Bottom, Up 250% from 2009

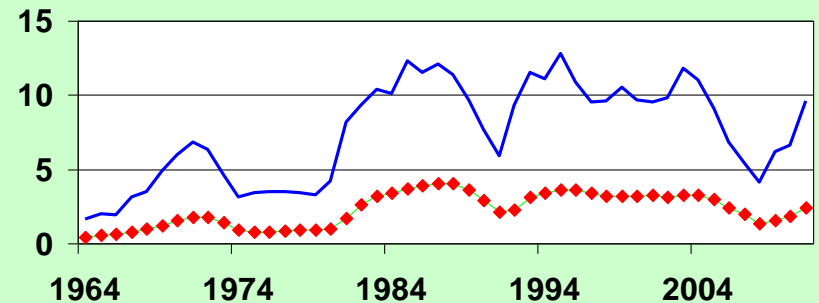


EBS Pollock Age 1 Recruits in Billions
 Average Recruitment 1964-2010 = 20
 Below Average Y-Classes 2002-05
 Above Average = 2006, 2008 & 2009

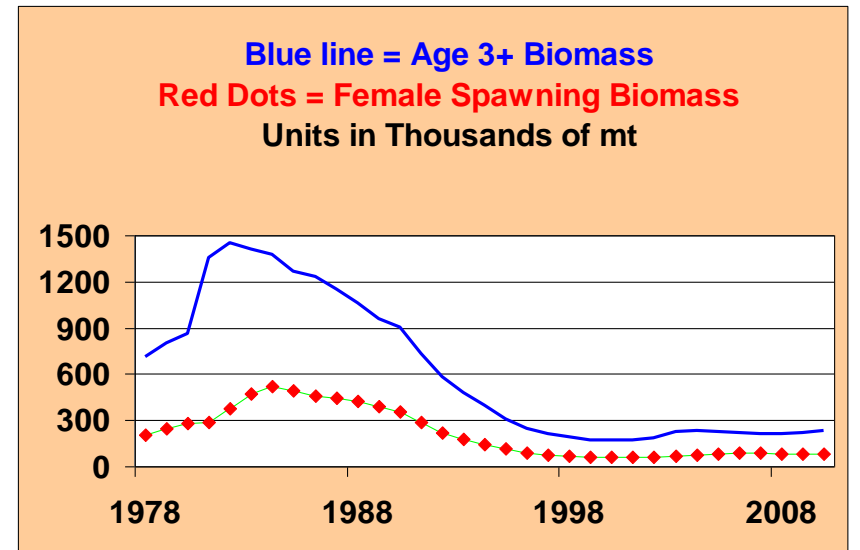
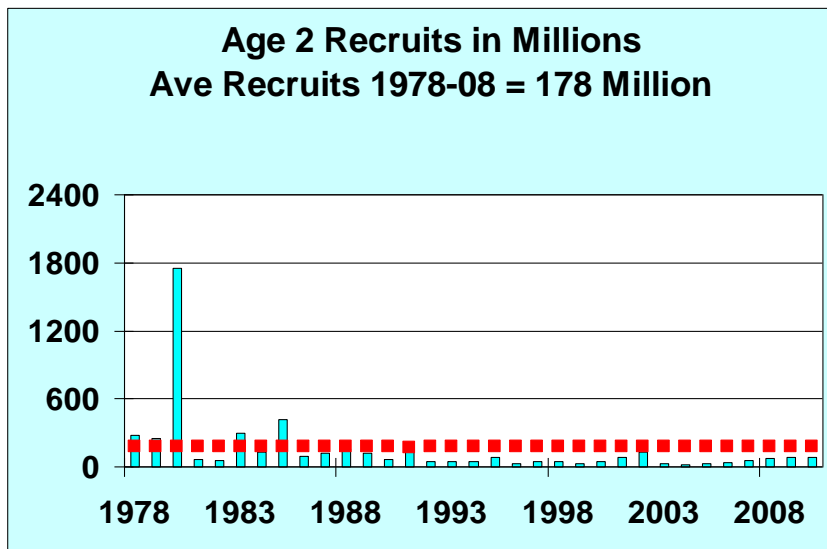
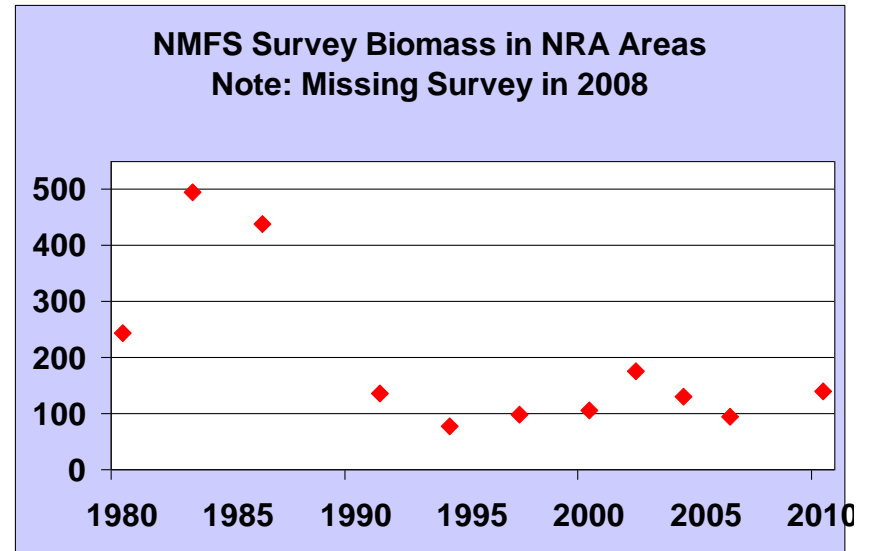
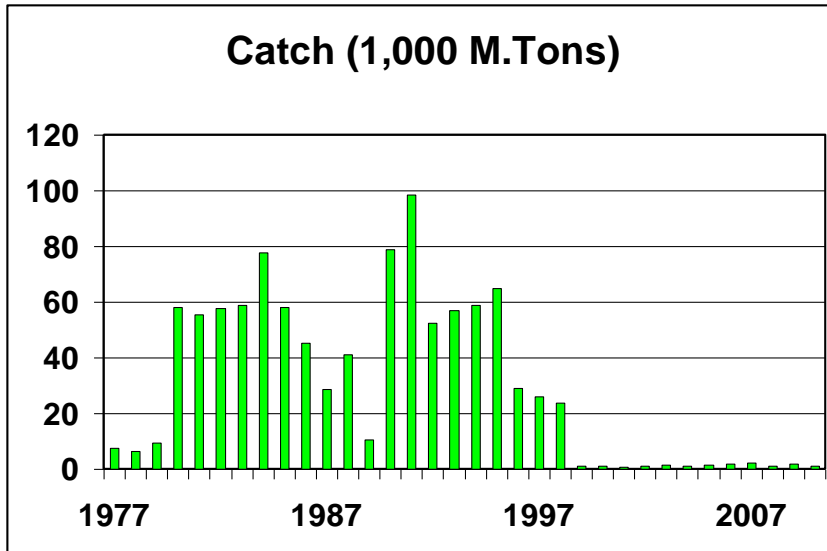


Model Biomass 1964-2011

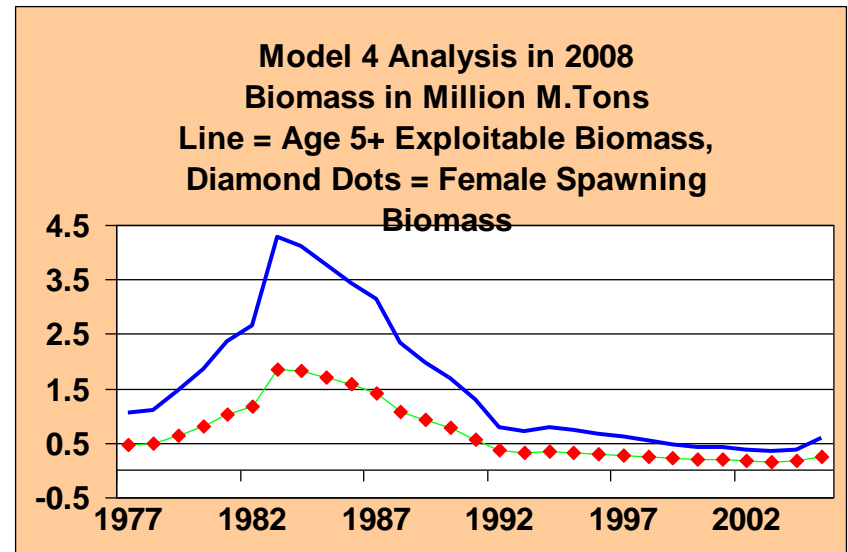
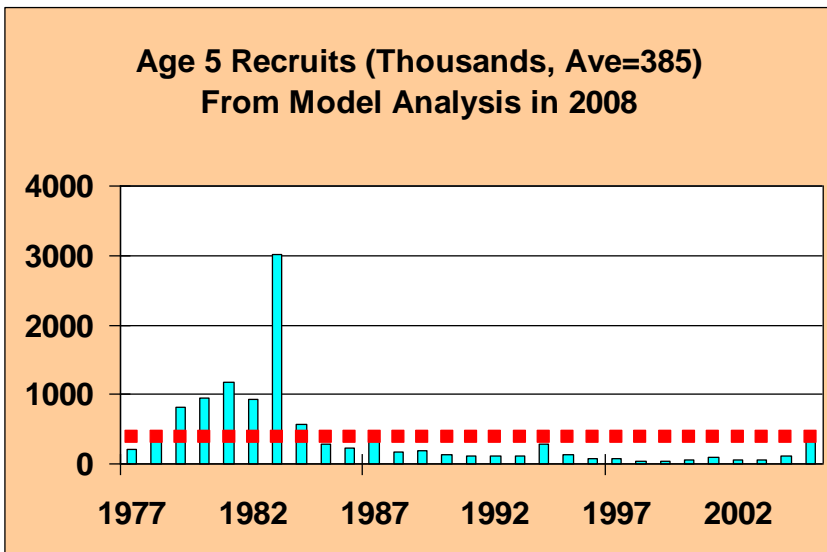
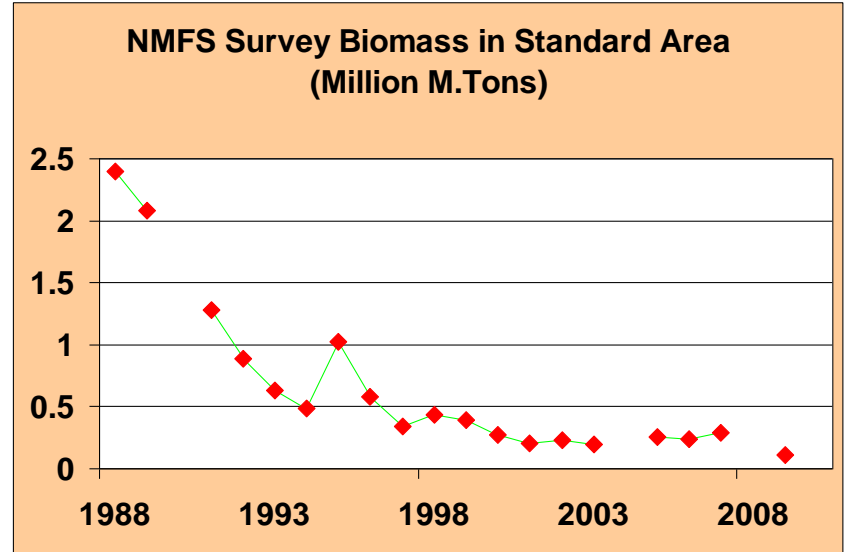
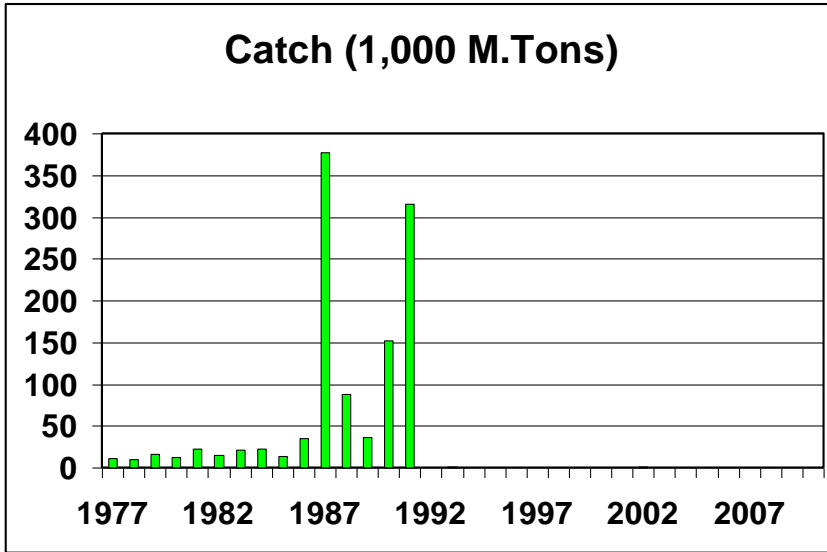
Line=Age 3+ Biomass
 Diamonds Red Dots = Female Spawning Biomass



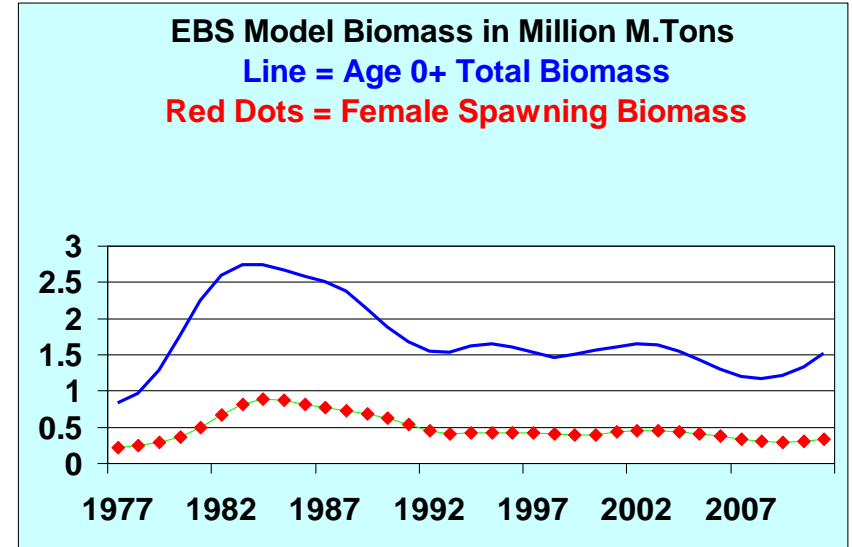
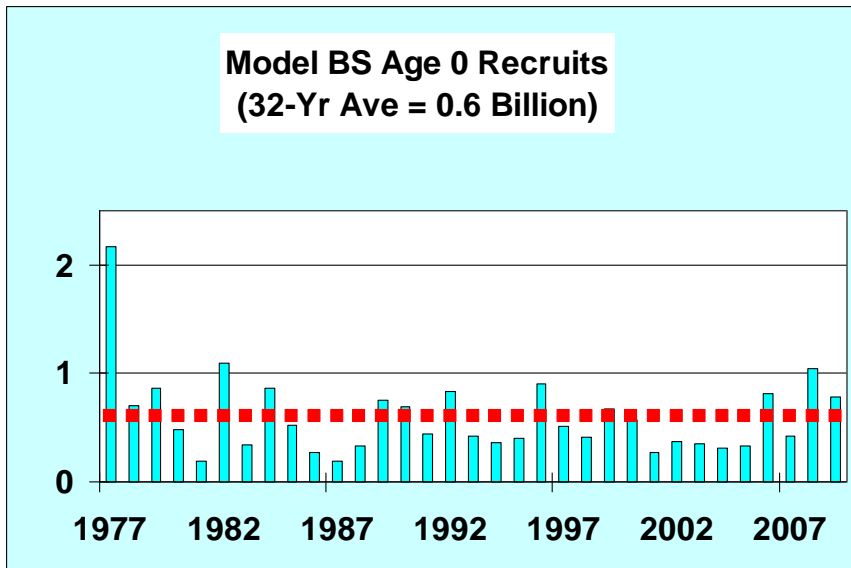
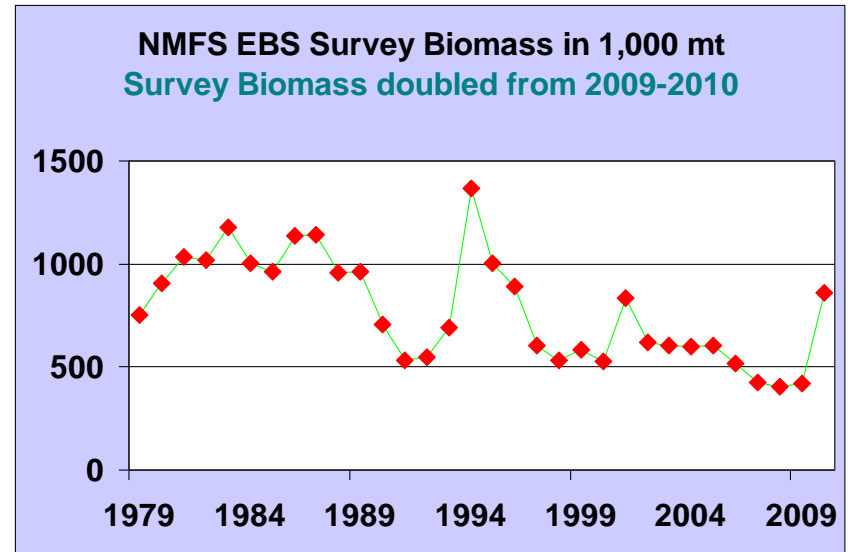
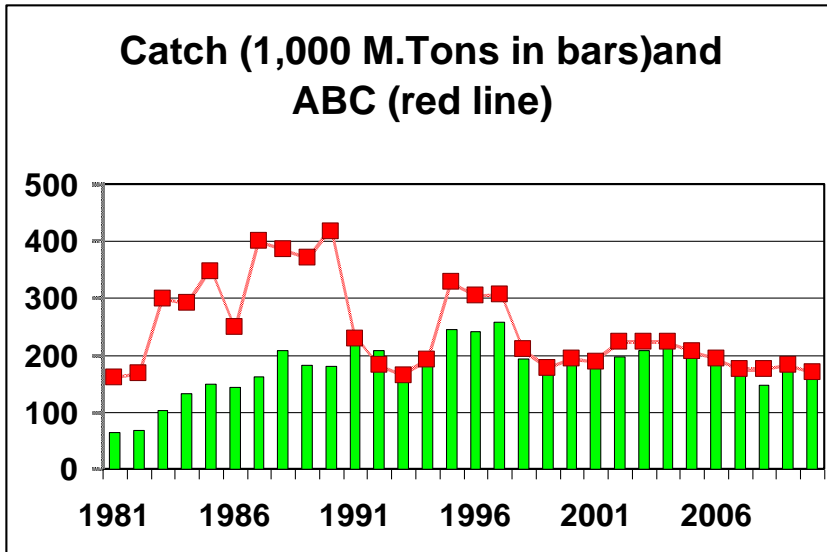
C1a - Aleutian Islands Pollock Assessment, Dec 2010



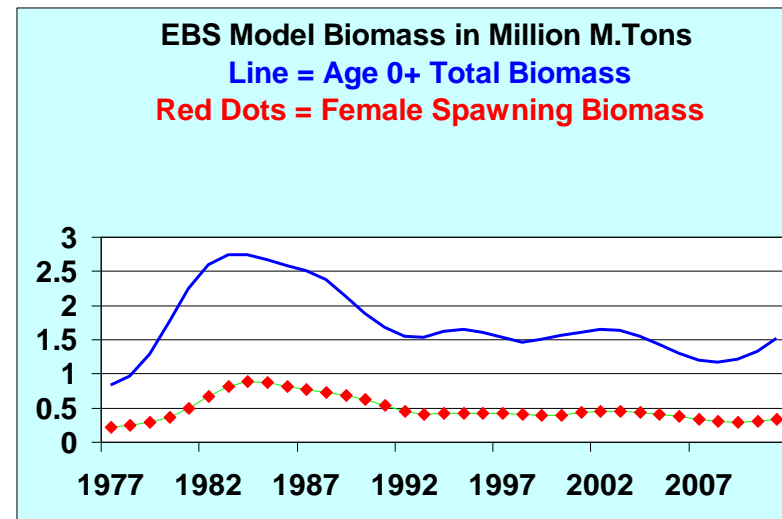
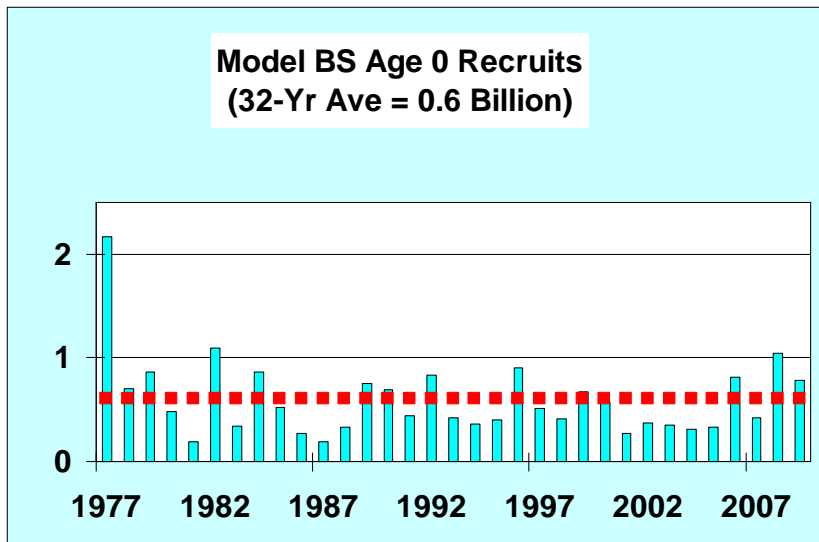
C1b - Bogoslof Island Pollock Assessment, Dec 2010



C2- Pacific Cod Stock Assessment, Dec 2010



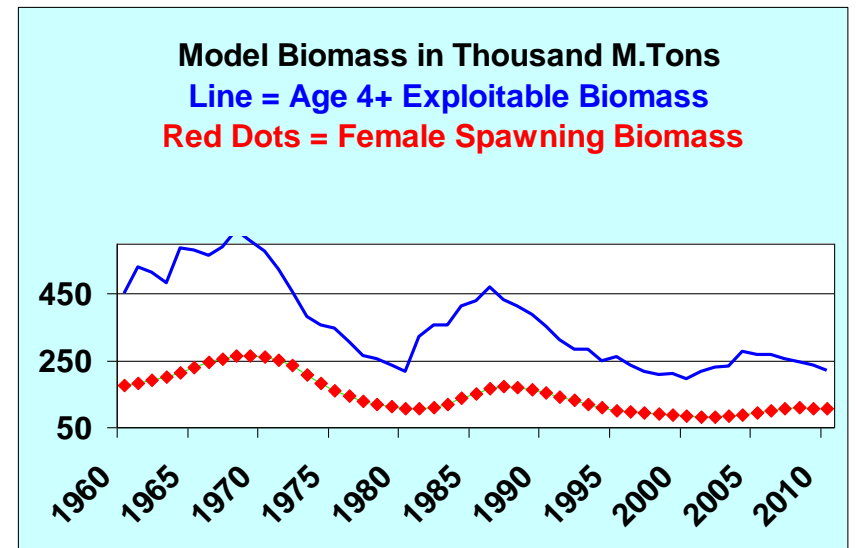
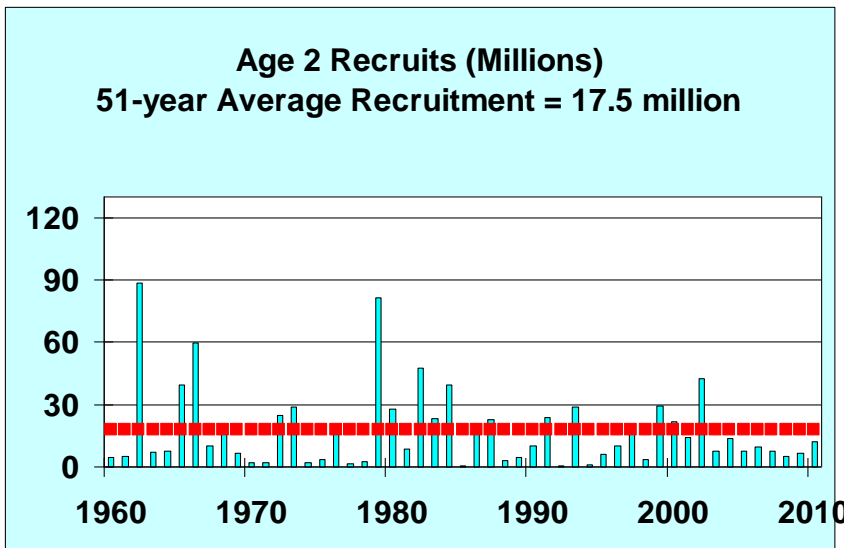
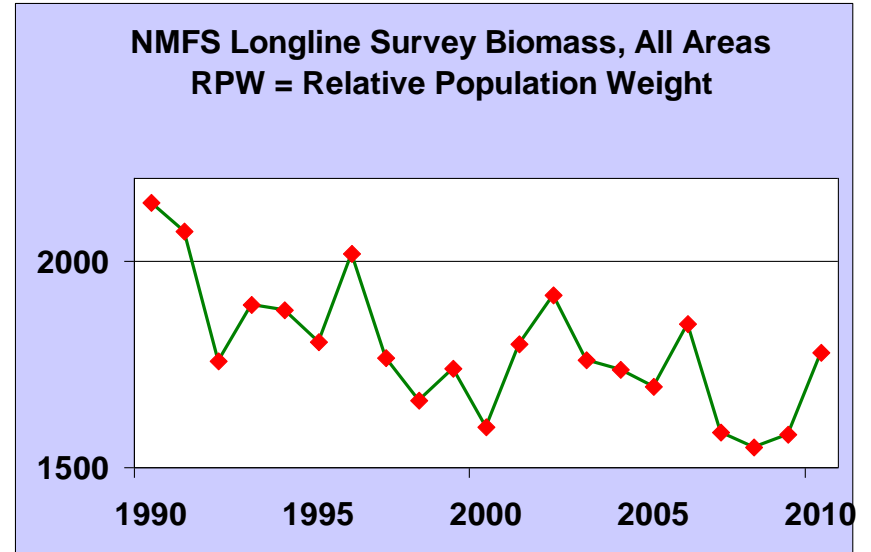
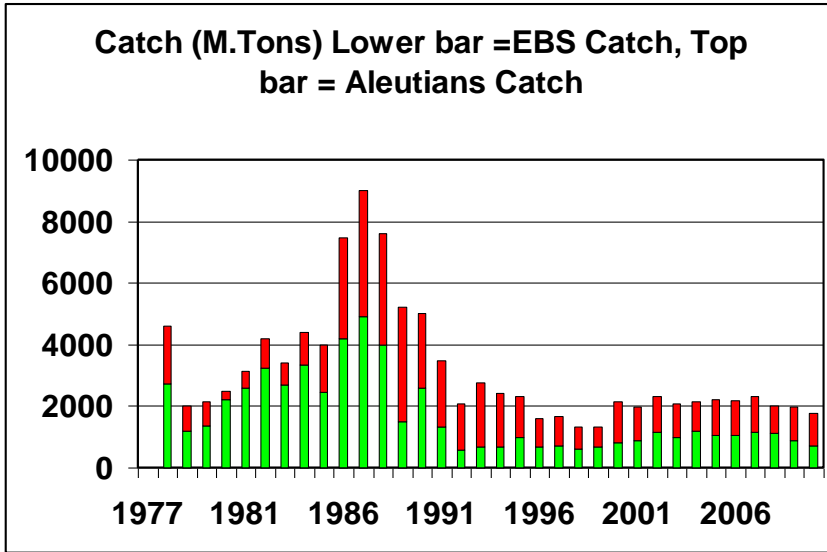
C2- Pacific Cod Stock Assessment, Dec 2010



1. Main Analyst is Grant Thompson, 182-page document
2. Especially responsive to suggestions for Modeling by SSC, Plan Team, & Public. The Plan Team narrowed down his model options to 3.
3. Key aspects of modeling P Cod are:
 - Model by age groups & size groups
 - How to treat M and Selectivity
 - Model fishing gear effects on catch

4. All the models fitted the data adequately. Author and Team selected Model B for its best fit and implementation of suggested changes
5. P Cod stock has declined from 1983 peak; but improving from 2009
6. Recent above average year classes 2006, 2008 and 2009
7. Tier 3 Stock, Not overfished nor approaching overfishing

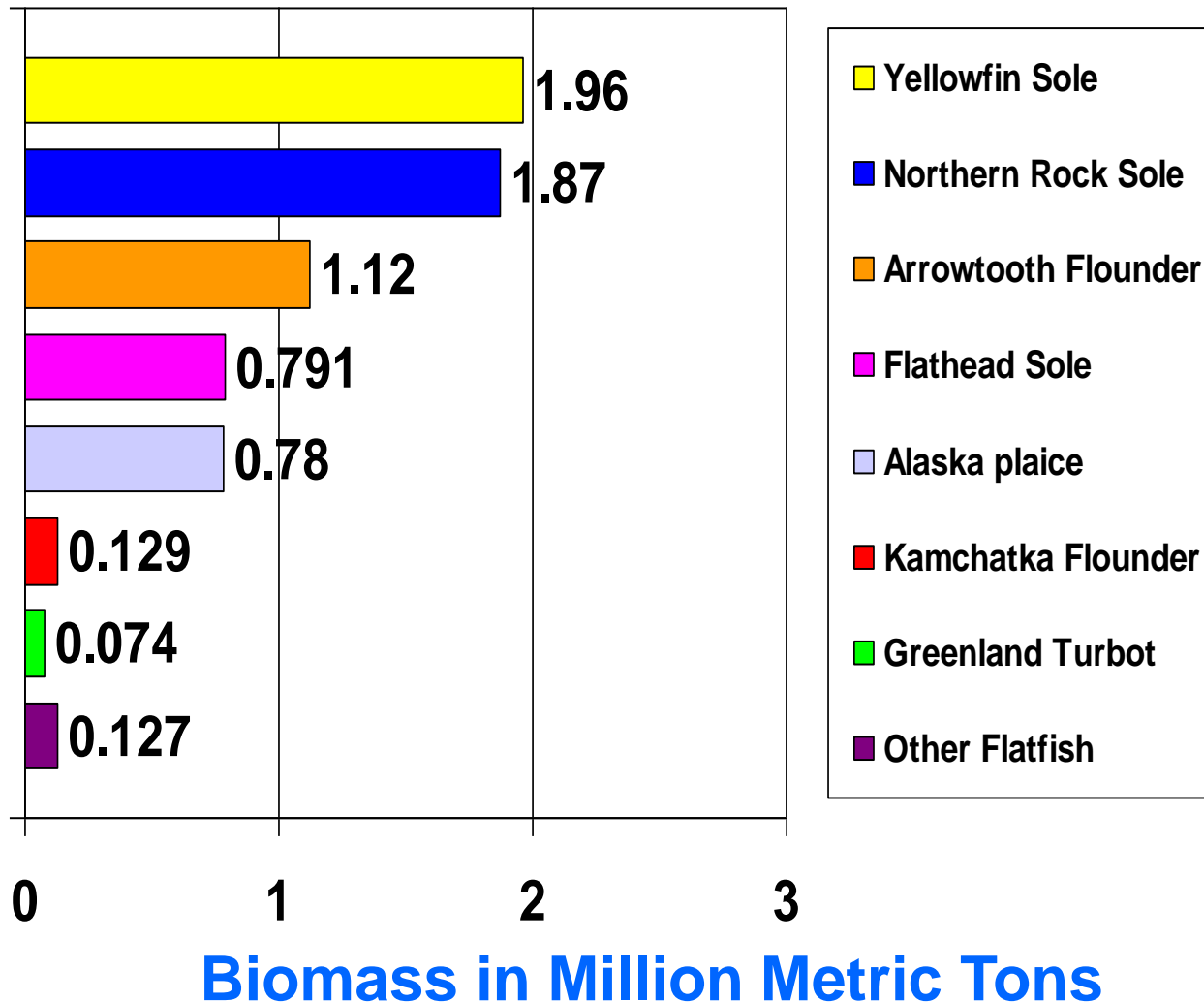
C3 - Alaska-wide Sablefish Stock Assessment, Dec 2010



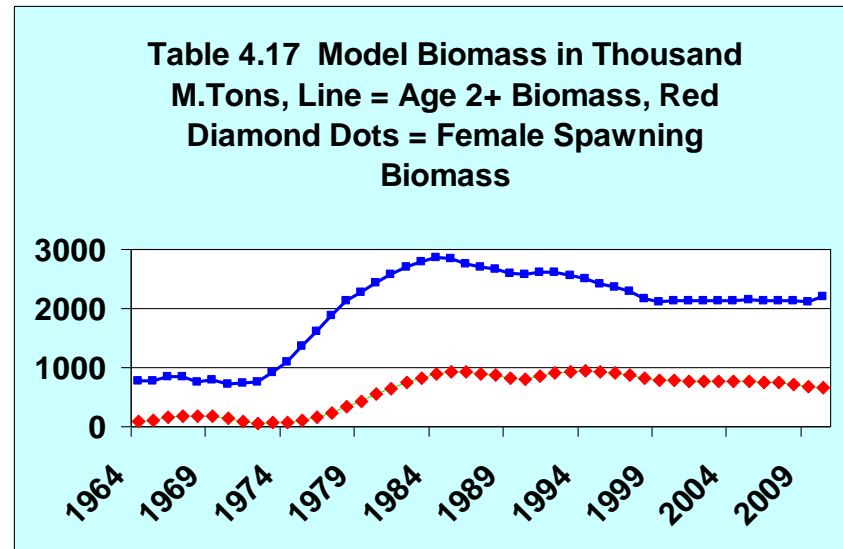
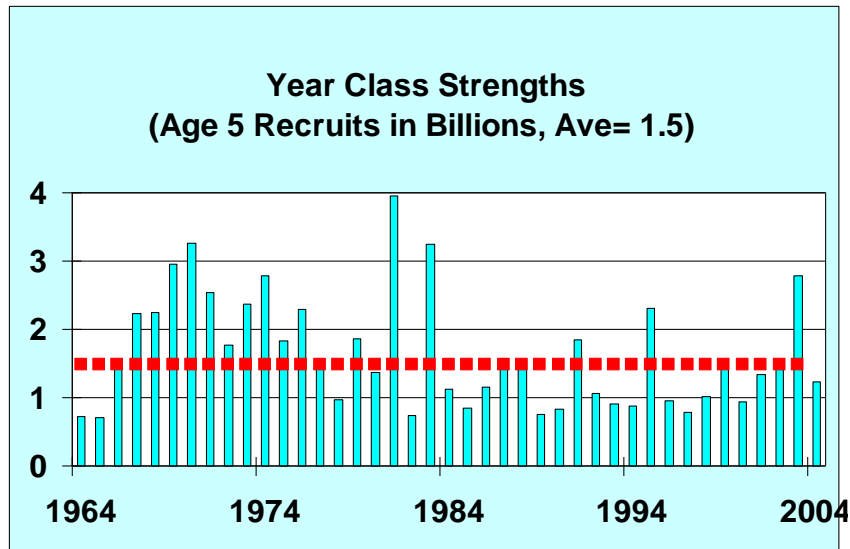
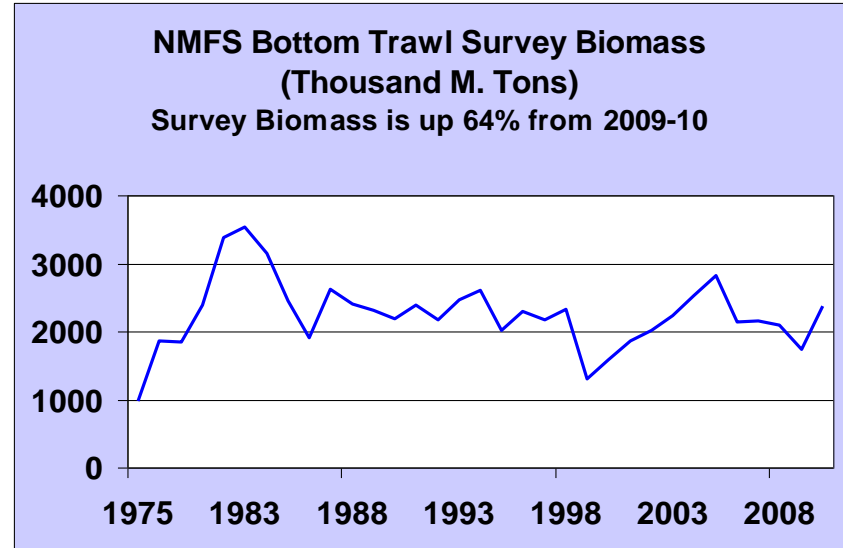
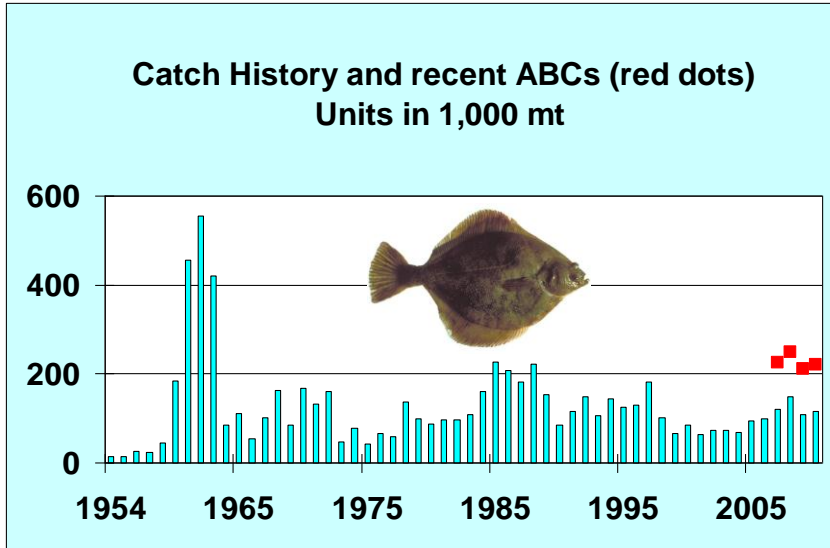
Flatfish Complex Exploitable Biomass, 2010

6.9 MMT or 36% of BSAI Groundfish Complex

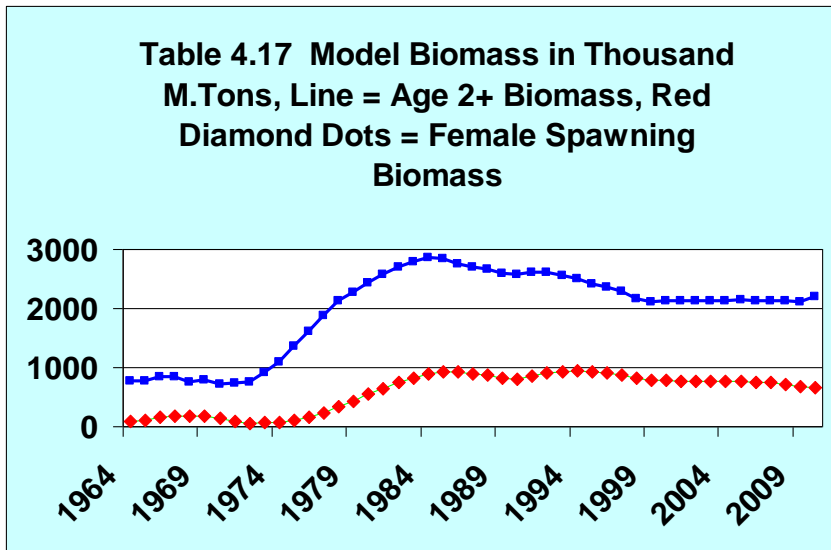
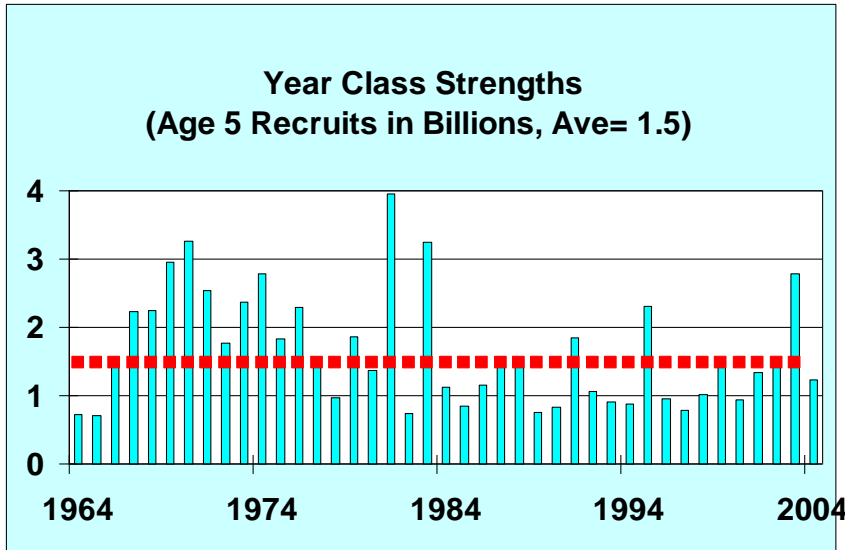
Still High in Abundance



C4 - Yellowfin Sole Stock Assessment, Dec 2010



C4 - Yellowfin Sole Notes, Dec 2010



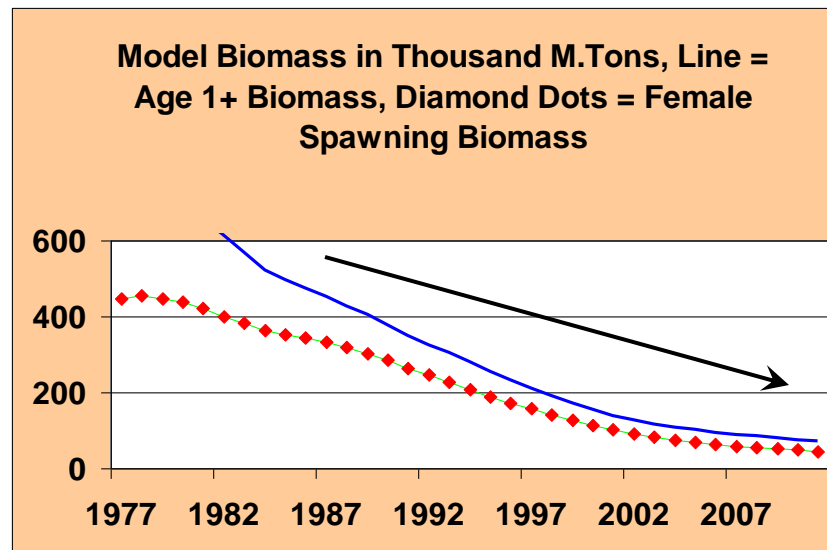
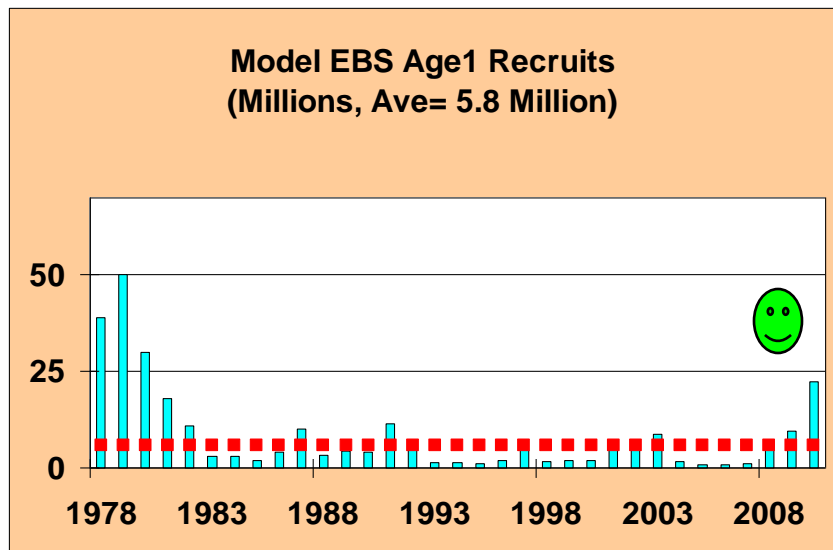
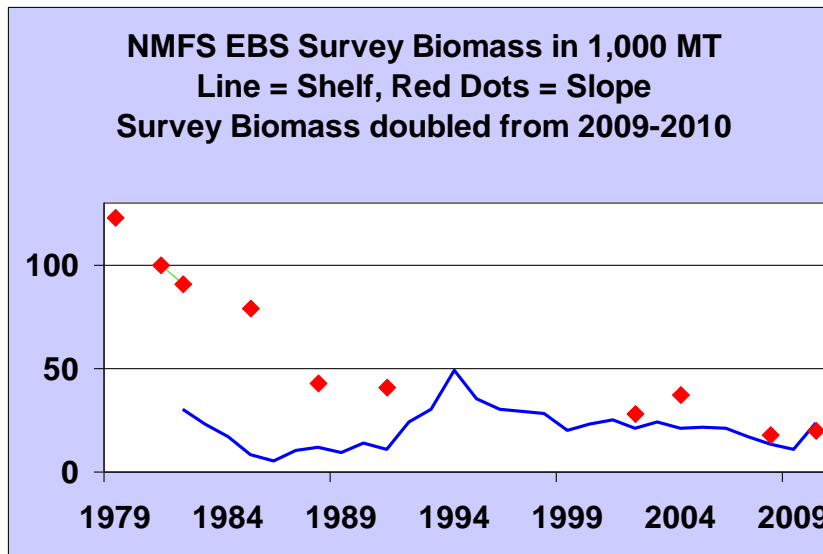
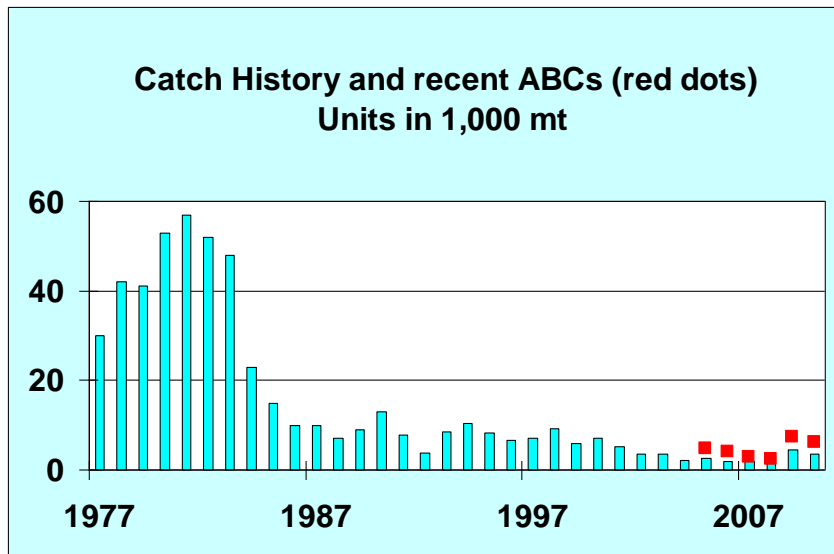
- Tier 1a, Split sex models

- Status and Trend

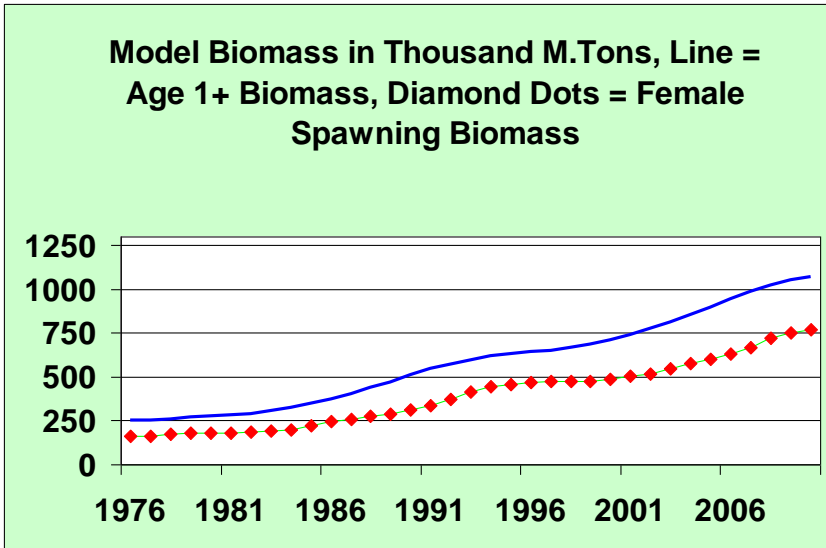
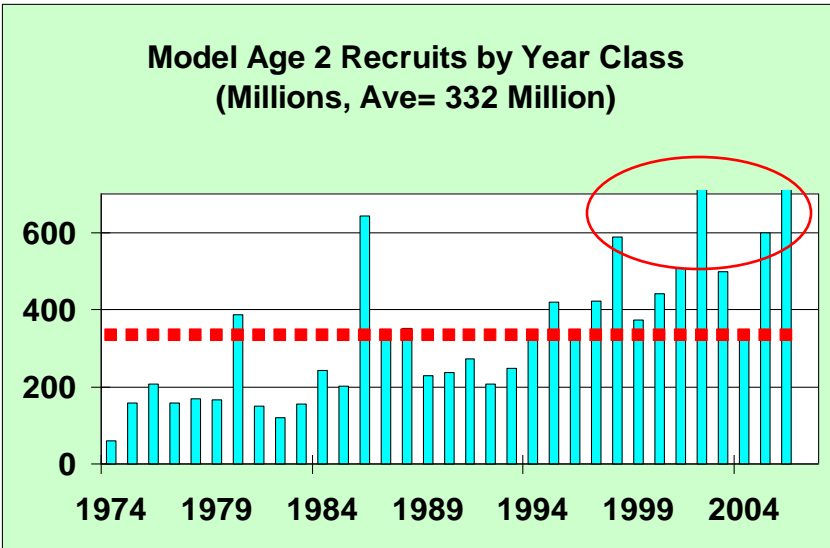
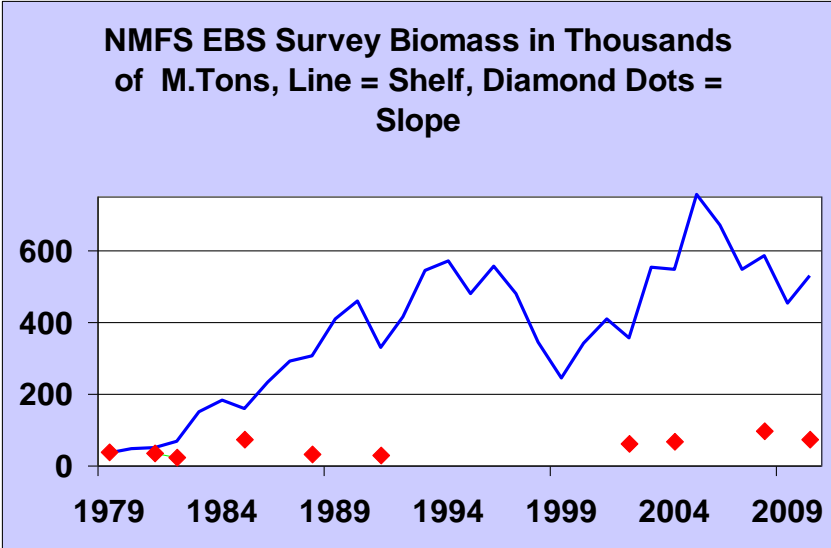
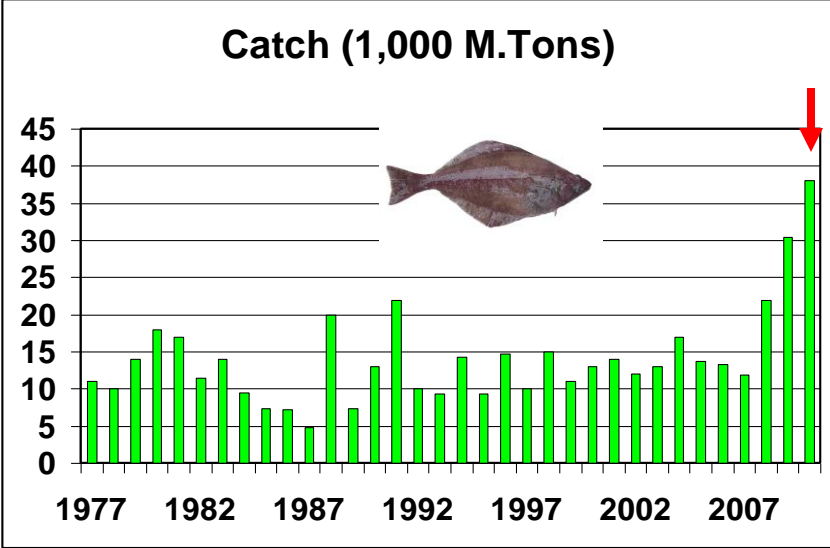
- Recruitment had been above average from 1967-1976, 2 peaks in 1981 & 83 followed by almost 20 years of below average recruitment, except 1995 and 2003

- Age 2+ and Spawning biomass are rather stable and relatively high

C5 - Greenland Turbot Stock Assessment, Dec 2010

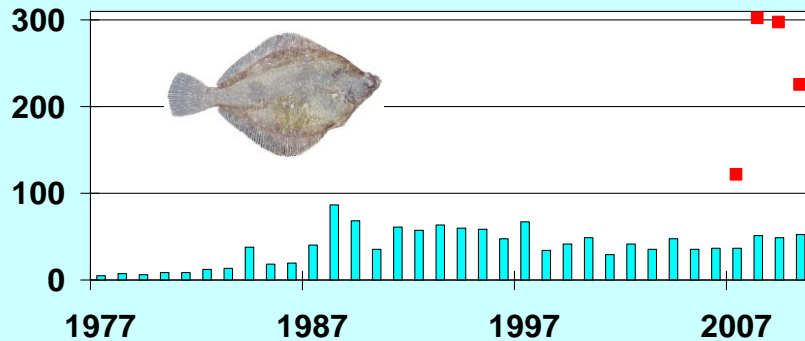


C6 - Arrowtooth Flounder Stock Assessment, Dec 2010

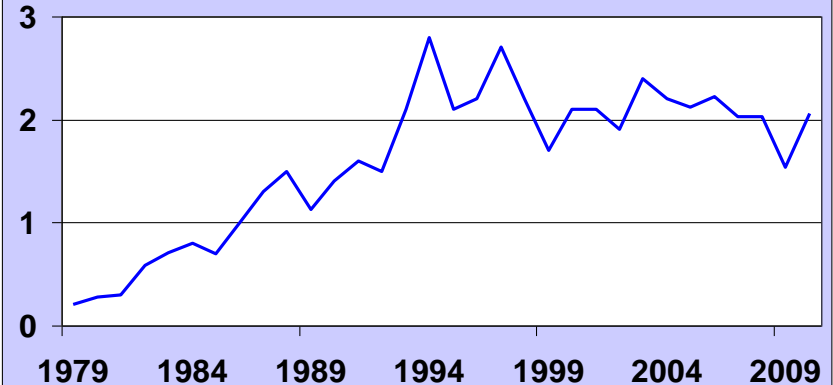


C7 – N. Rock Sole Stock Assessment, Dec 2010

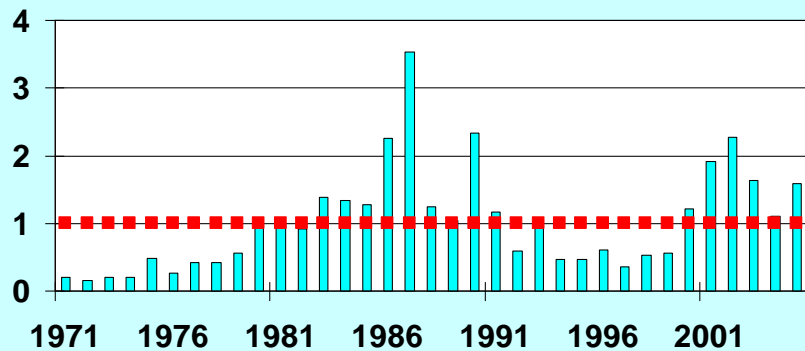
Catch History and recent ABCs (red dots)
Units in 1,000 mt



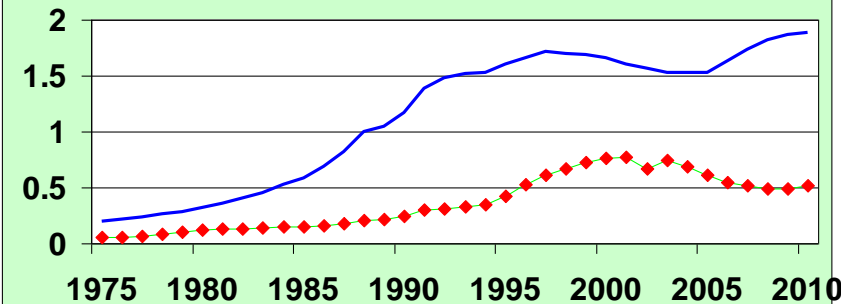
NMFS EBS Survey Biomass
(Million M.Tons)



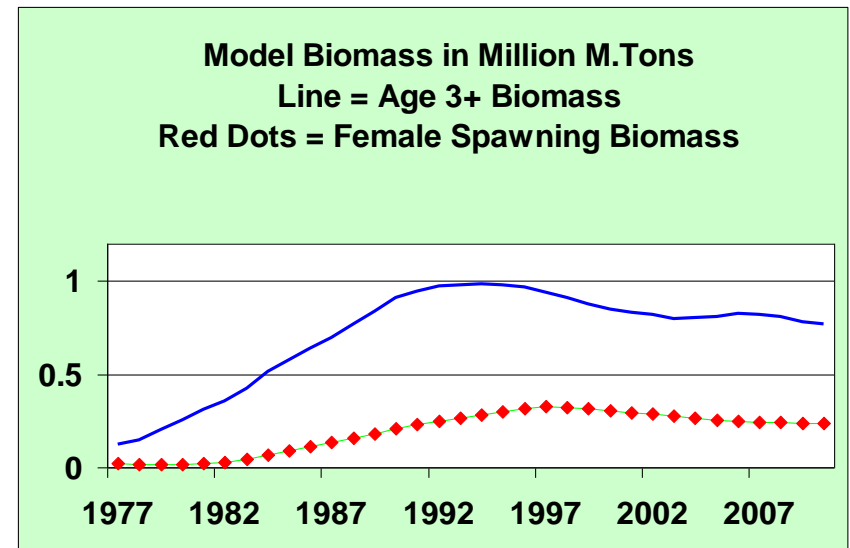
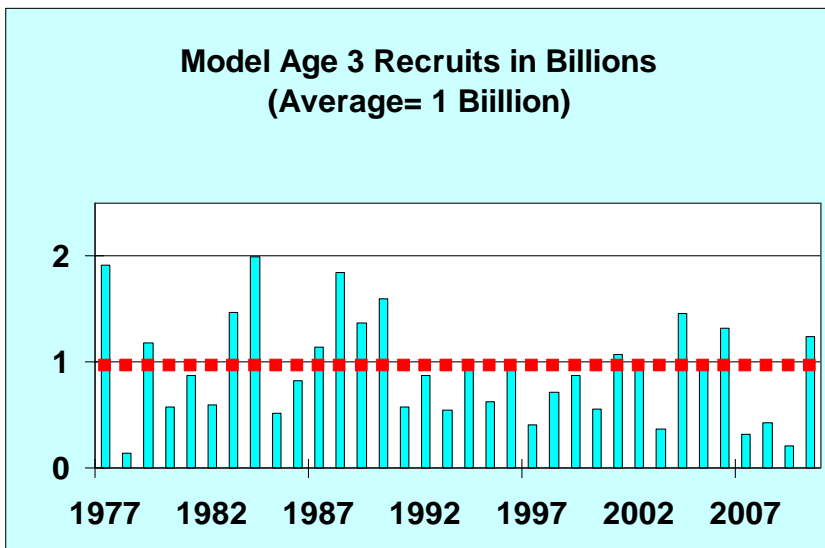
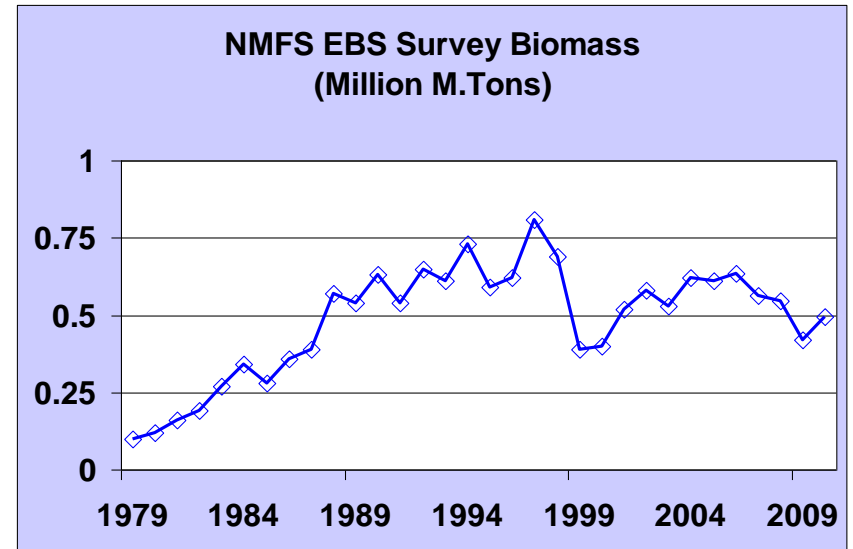
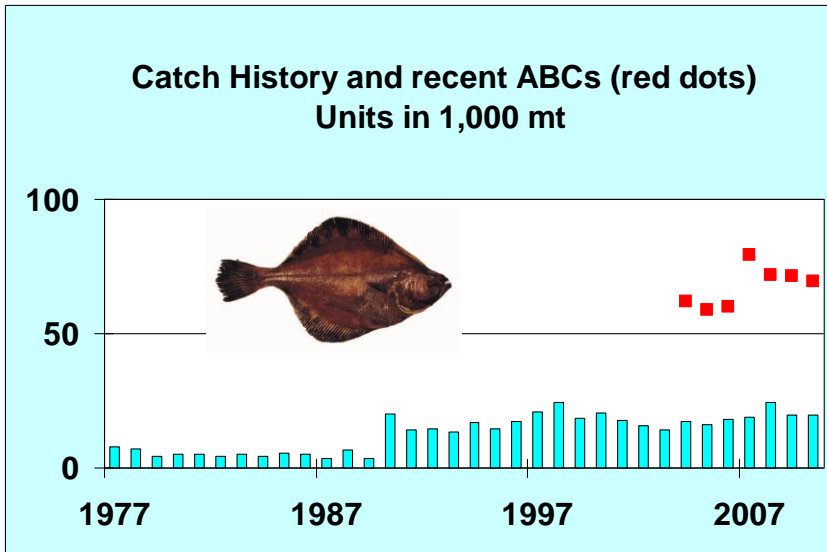
Model Age 4 Recruits by Year Class
(Average = 1 Billion)



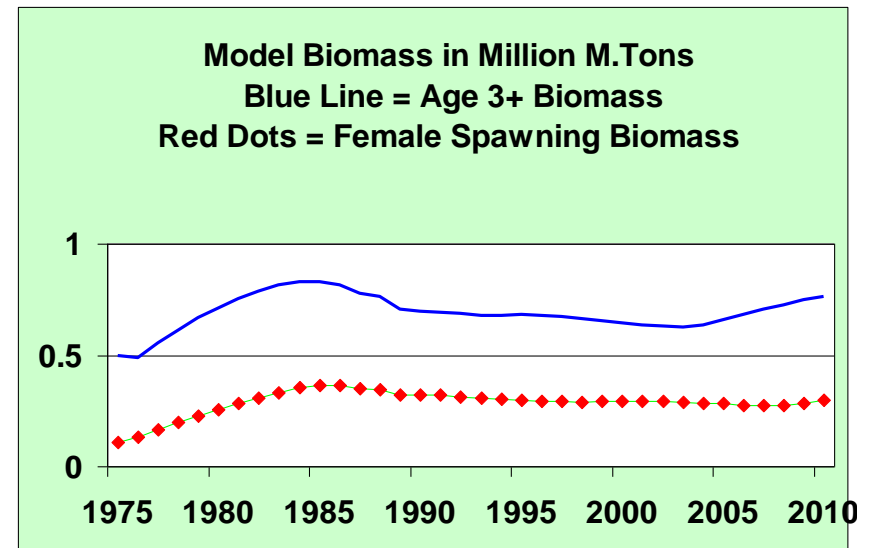
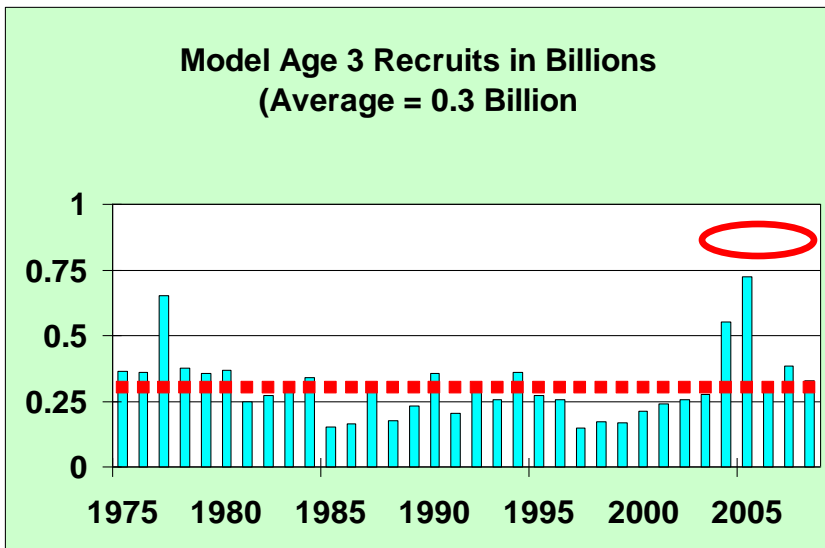
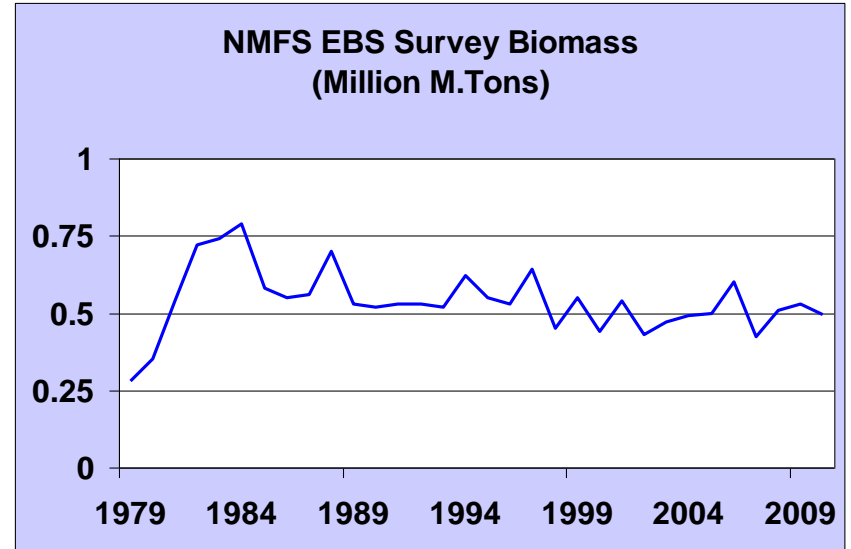
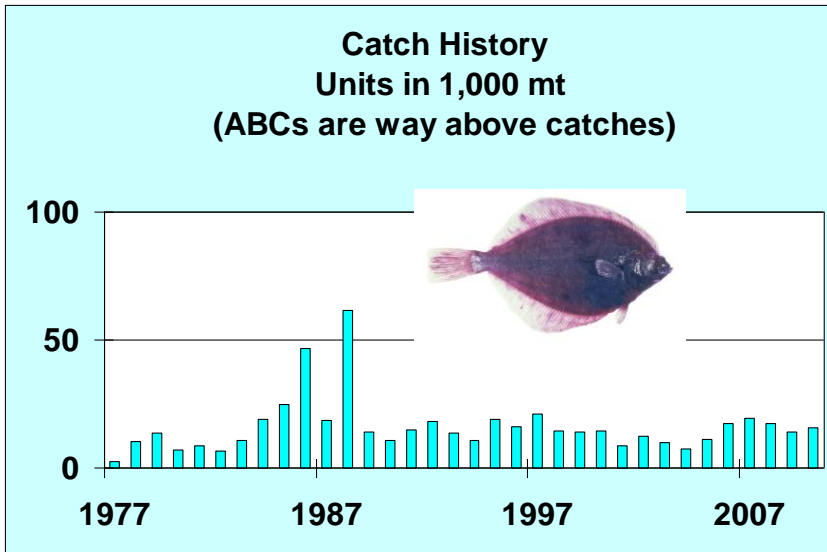
Model Biomass in Million M.Tons, Line =
Age 2+ Biomass, Diamond Dots = Female
Spawning Biomass



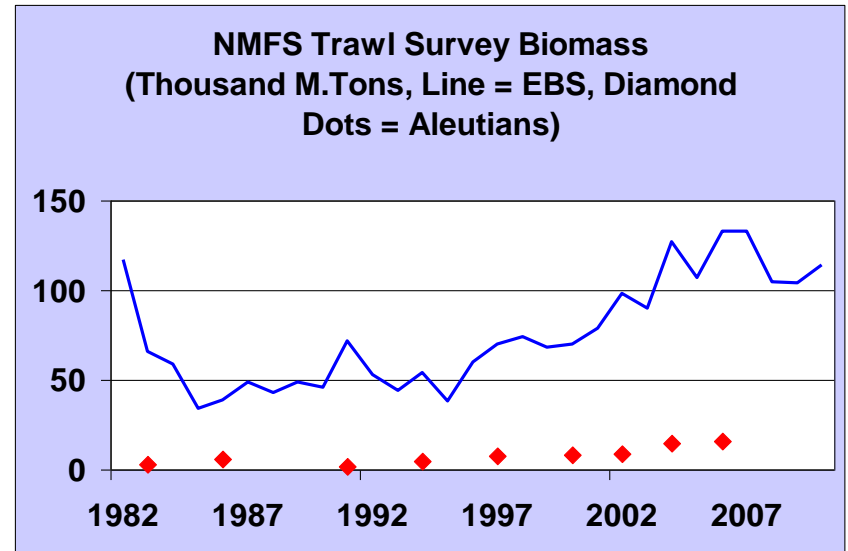
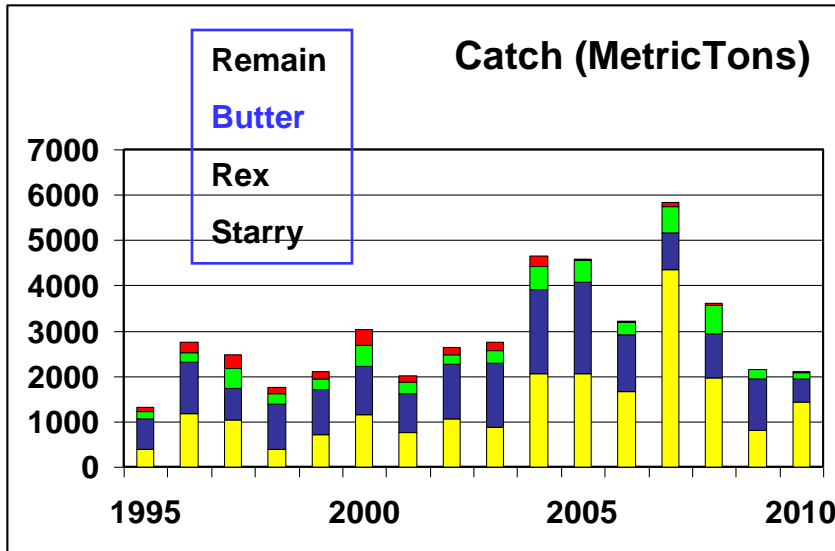
C8 - Flathead Sole Stock Assessment, Dec 2010



C9 - Alaska Plaice Stock Assessment, Dec 2010



C10 - Other Flatfish Group Assessment, Dec 2010



Model Biomass and Recruitment Estimations are not Available

Assessment based on Tier 5 using NMFS Survey Biomass

Assessment Features

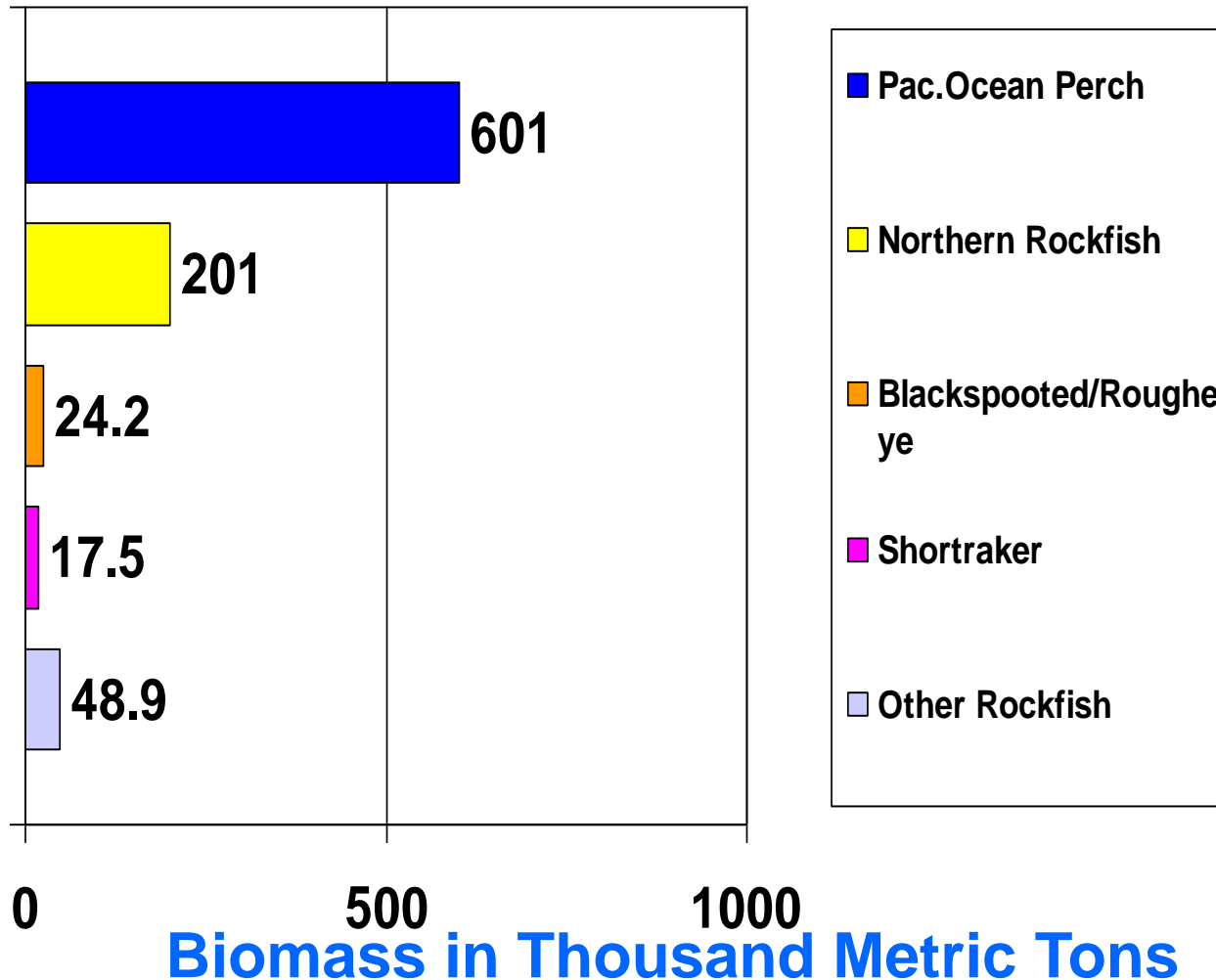
1. Species Composition

- 16 species from EBS, 5 species from Aleutians,
- Starry flounder = 69 % of Biomass
- Rex & Butter Sole = 30%

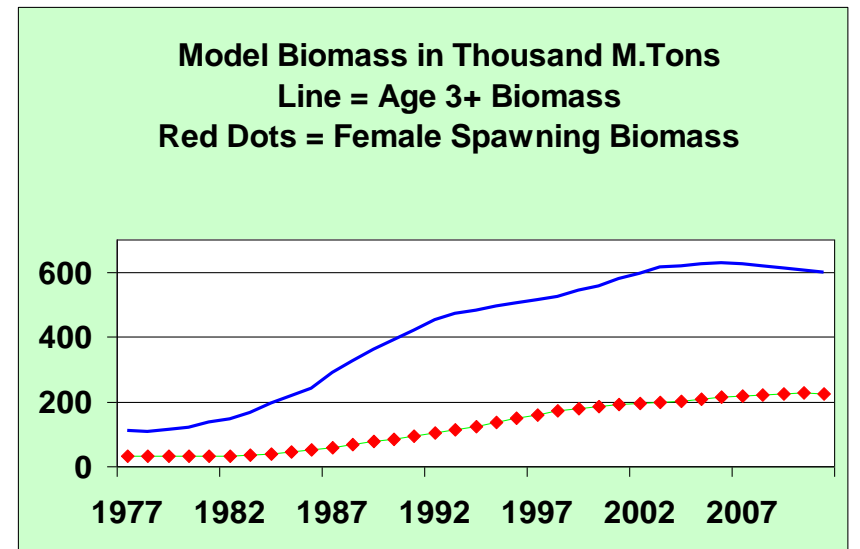
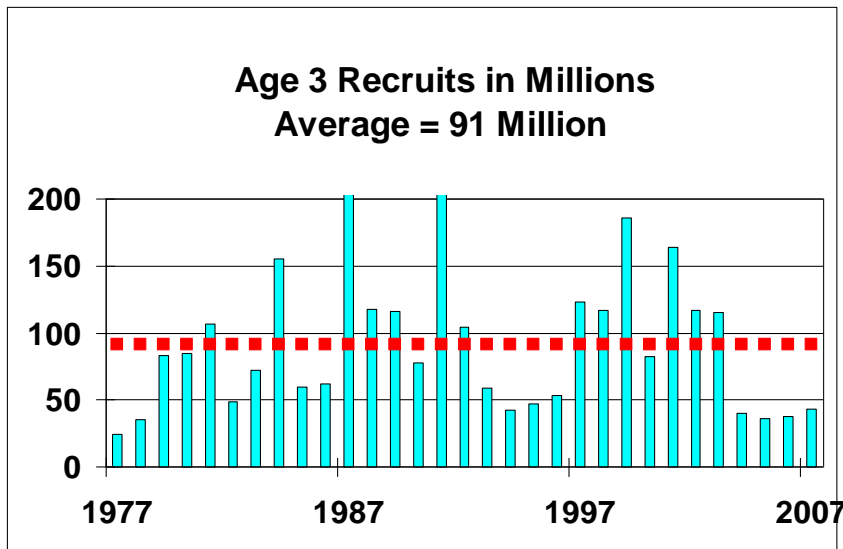
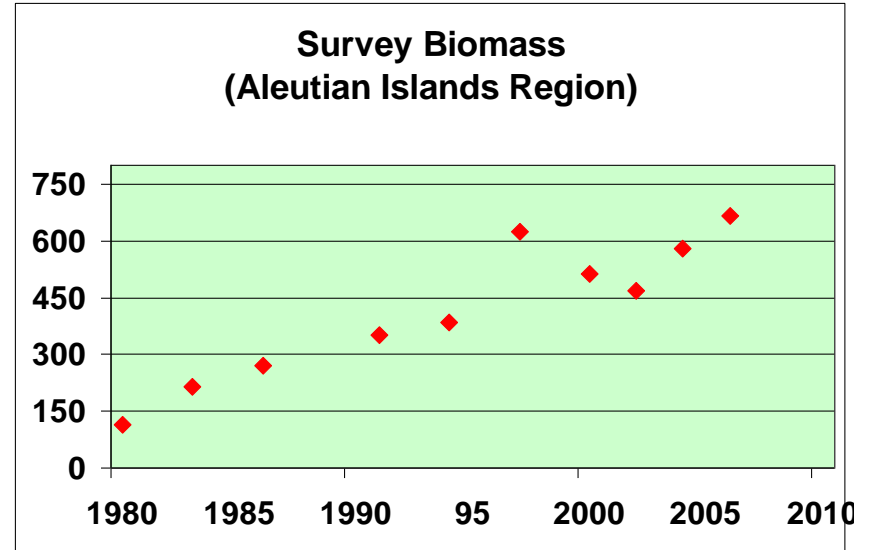
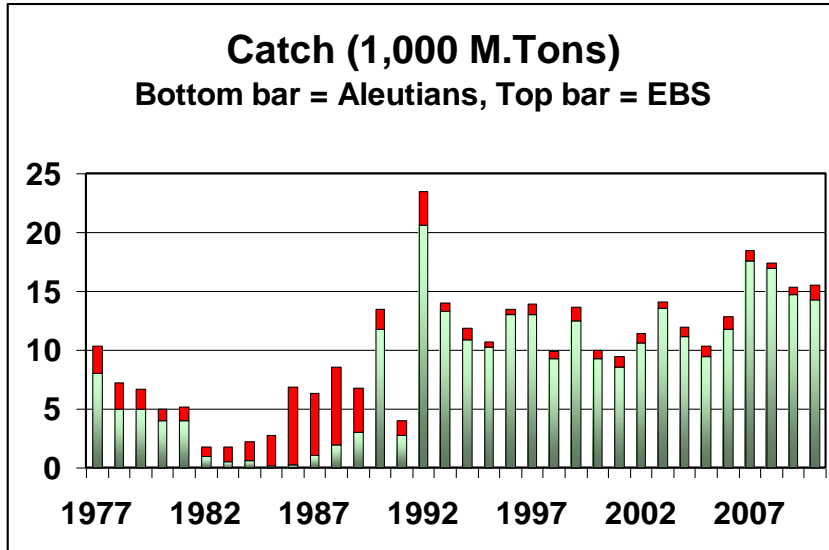
Rockfish Complex Exploitable Biomass, 2010

4% of BSAI Groundfish Biomass

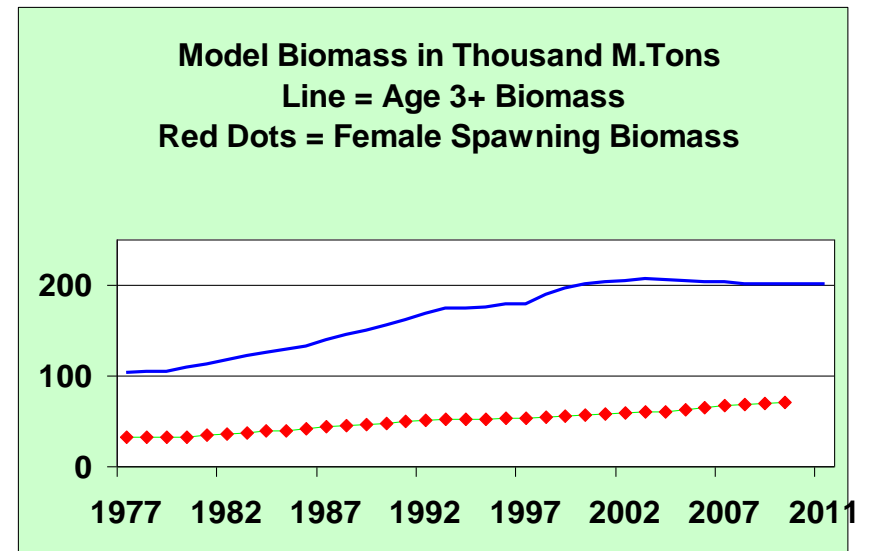
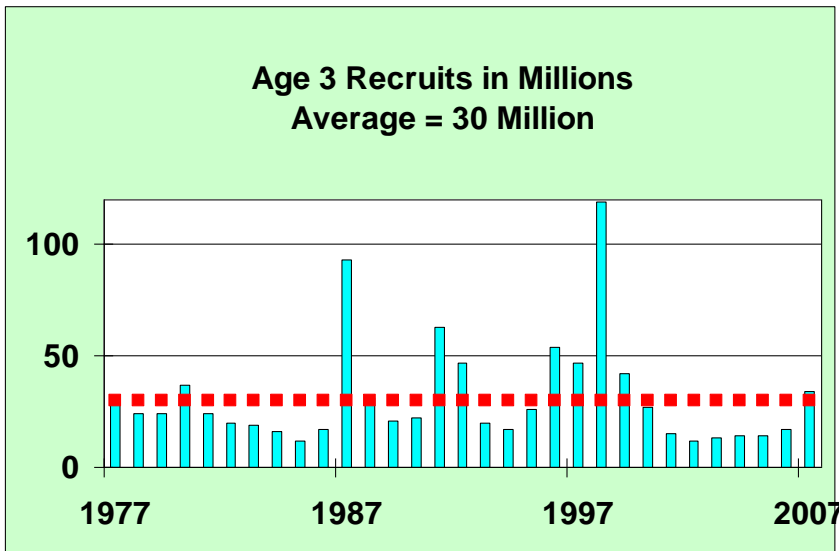
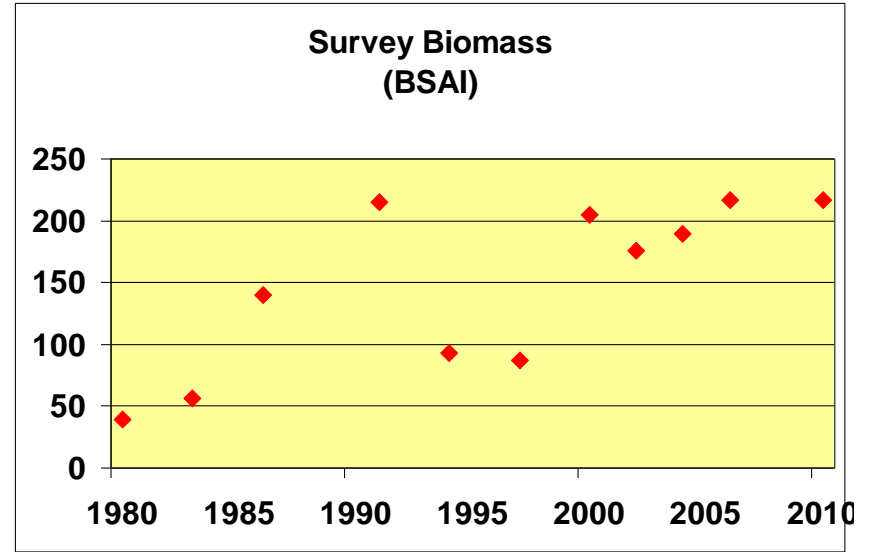
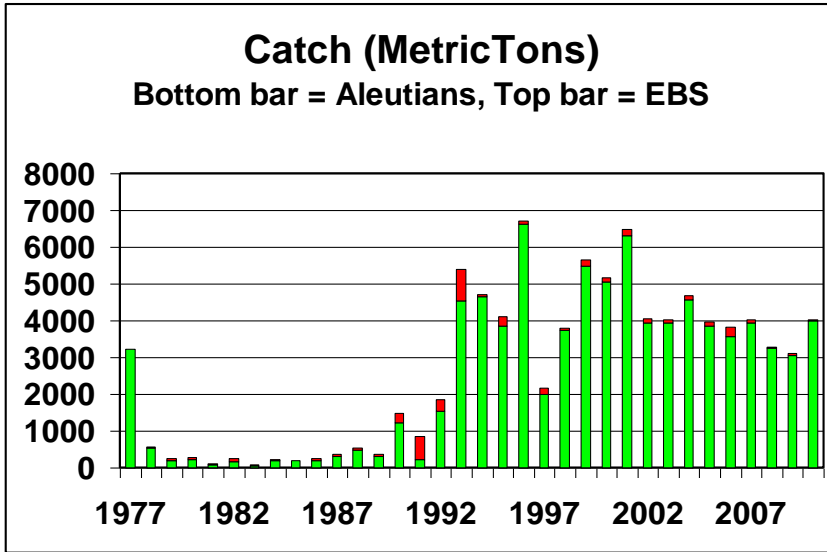
Mostly in Aleutians, POP and N. Rockfish Dominate



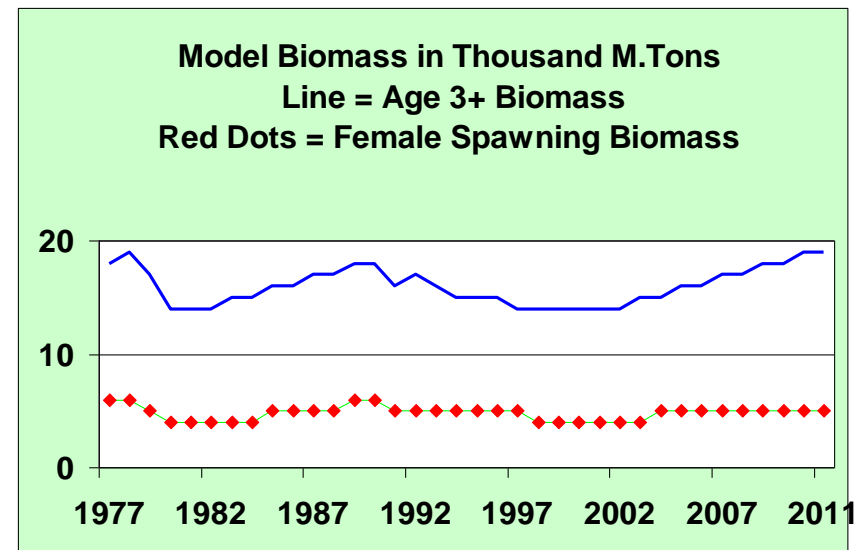
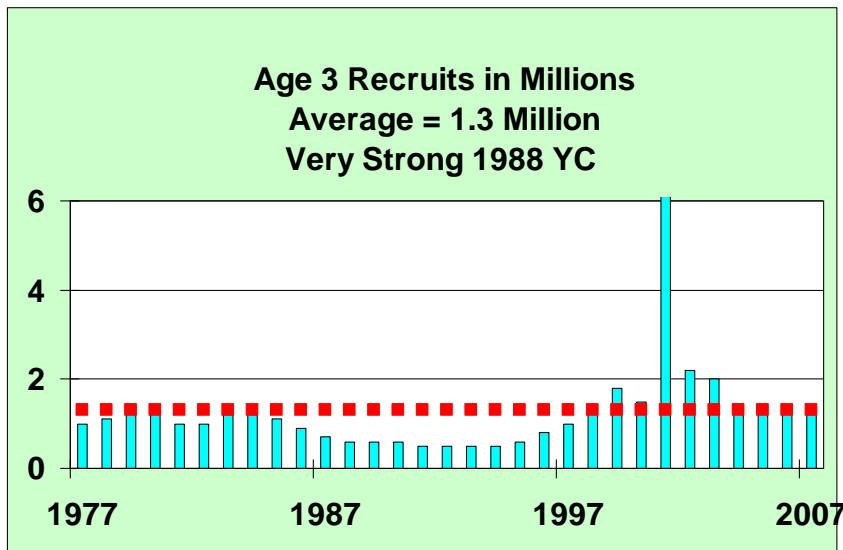
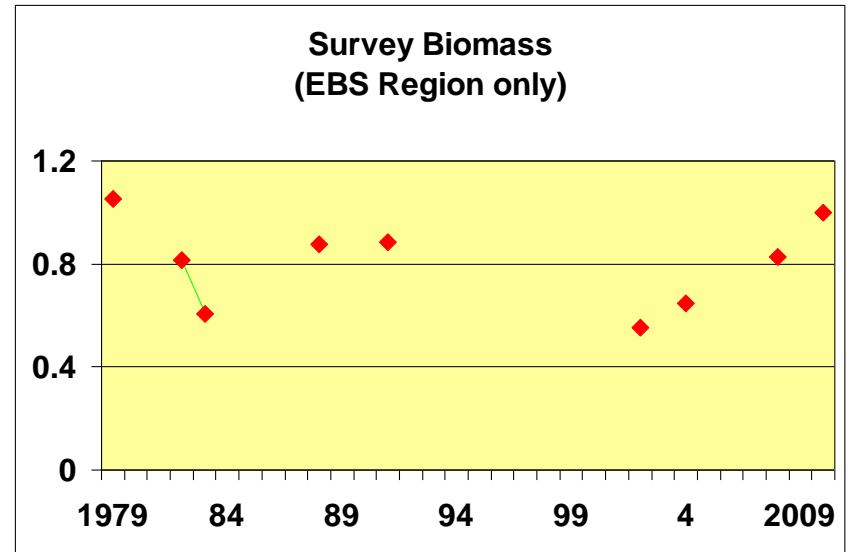
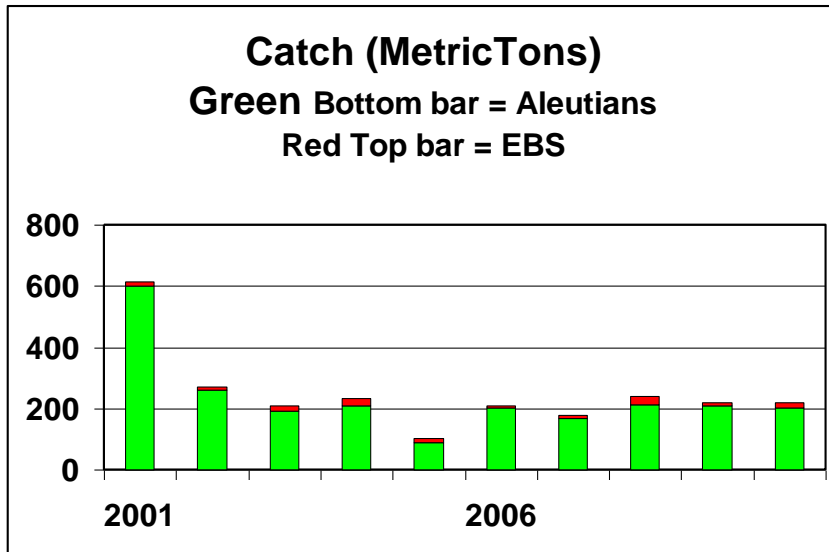
C11 - Pacific Ocean Perch Stock Assessment, Dec 2010



C12 - Northern Rockfish Stock Assessment (Dec 2010)



C13 – Blackspotted/Rougheye Rockfish Stock Assessment (Dec 2010)



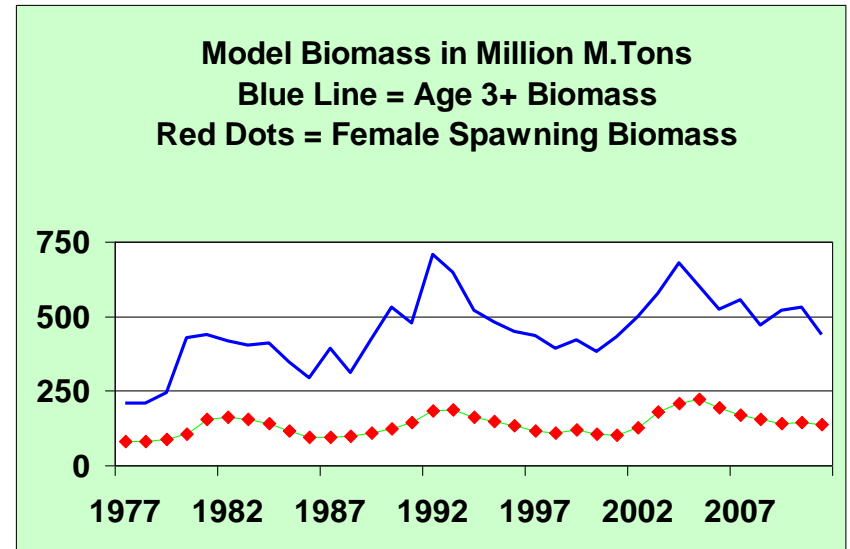
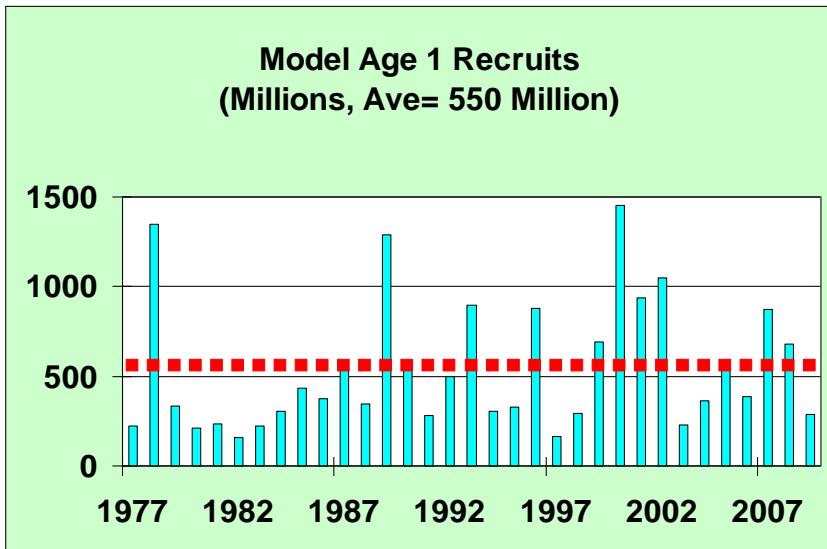
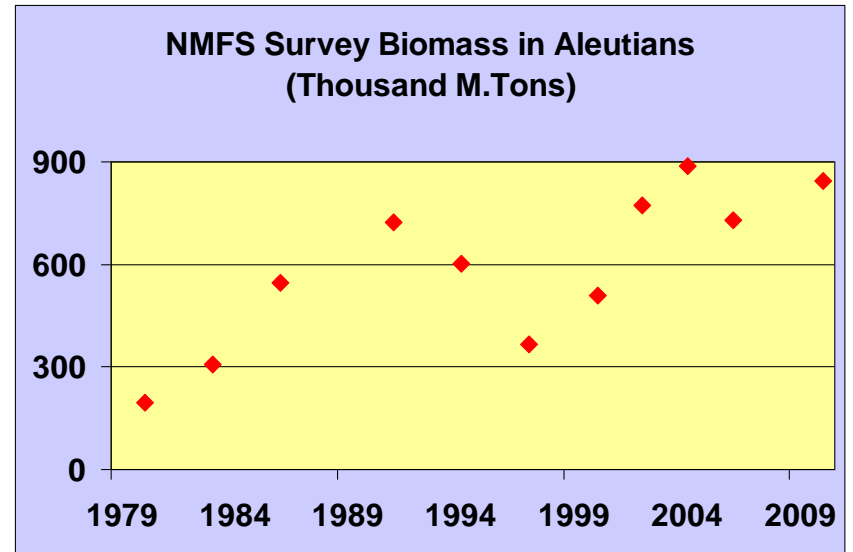
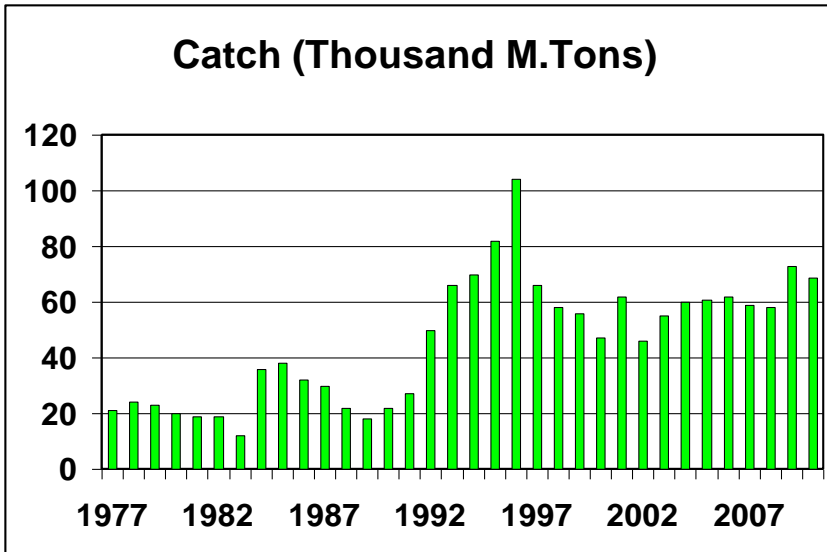
Ch. 14: Shortraker Rockfish

- Analytic approach
 - Same as last year
 - Tier 5
 - $OFL = M \times \text{Biomass} (.03 \times 17,452)$
 - $ABC = 0.75 \times OFL$

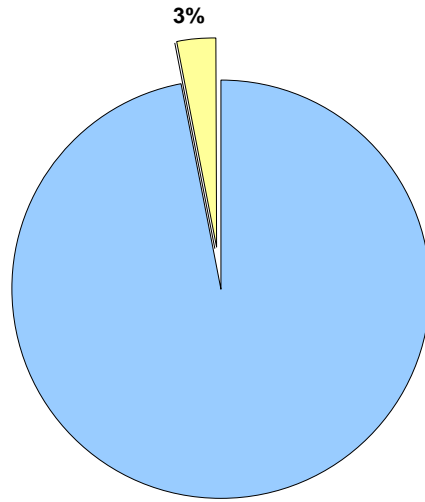
C15: Other Rockfish Complex

- **Former complex included 8 species**
 - Shortspine thornyhead is now separated out, Dusky rockfish dominant
- **Biomass Trend**
 - Survey Biomass has general increase
 - Spawning Biomass trend is unknown
- **Straightforward update of SOS from before**
 - ABC Calculation based on Tier 5

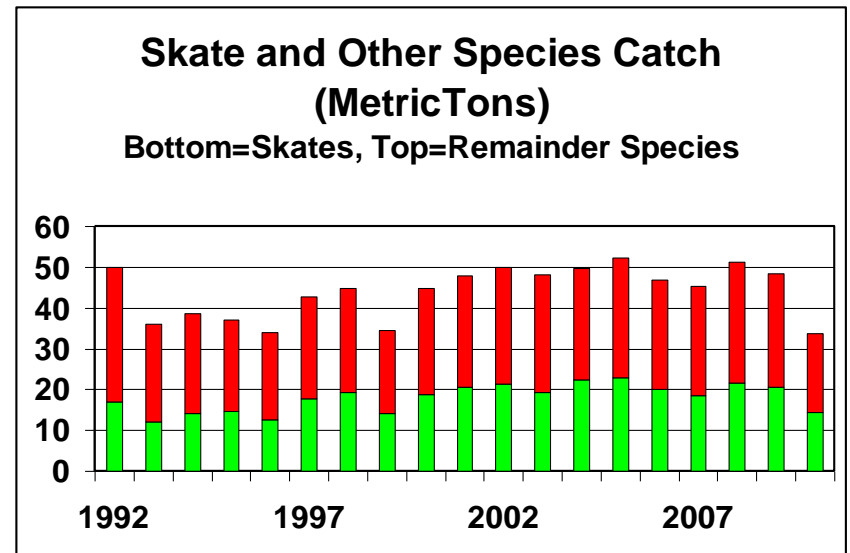
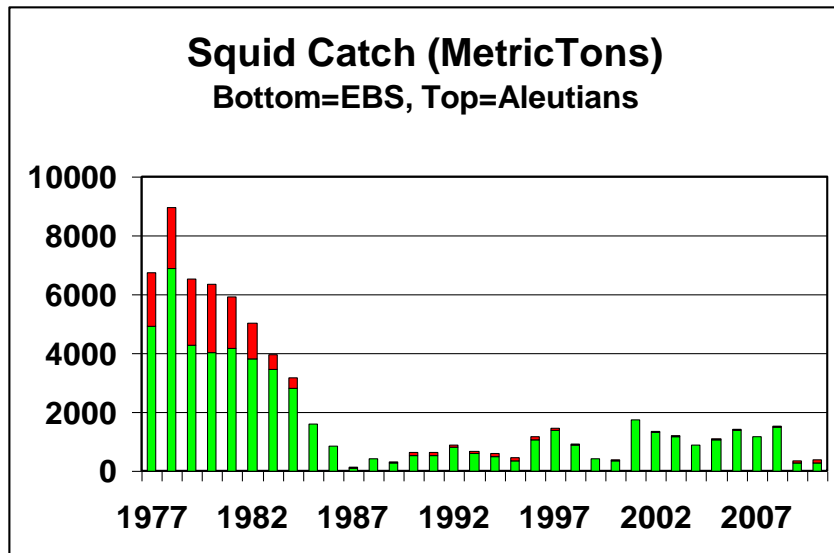
C15 - Atka Mackerel Stock Assessment, Dec 2010



C17-18d. Squid and Other Species Resources, Dec 2009 Assessments



**Squid + Skate + Others
Combined = 3.0 % of BSAI
Groundfish ABC**



C16-20. Squid and Other Species Assessment

ABC Calculated by Species Breakdowns

- 1 Squid ABC is calculated under Tier 6**
average catch from 1977-1995, ABC = 1,970 mt
- 2. Other species: Recommend managing by major taxonomic groups (ABC calculated by Tier 5)**
 - Sharks**
 - Skates**
 - Octopus**
 - Sculpins**

Adjustments to ABCs

- due to Special Ecosystems Concerns

1. The Team did not make specific adjustments to ABCs for ecosystem concerns
2. General Concerns about ecosystem considerations have already been built into the Analyses
3. Ecosystems evaluations have been more extensive each year

Summary (Pollock)

(From Table 5, Team Summary Appendix A)

Stock	ABC 2010 (mt)	ABC 2011 (mt)	ABC Change from 2010
Pollock, EBS	813,000	1,270,000	Up 56%
Pollock, AI	33,100	36,700	Up 11%
Pollock, Bogoslof	156	156	No change

Summary (Cod and Sablefish)

(From Table 5, Team Summary Appendix A)

Stock	ABC 2010 (mt)	ABC 2011 (mt)	ABC Change From 2010
Pacific Cod, BSAI	174,000	235,000	Up 35%
Sablefish, EBS	2,790	2,850	Up 2%
Sablefish, AI	2,070	1,900	Down 9%

Summary (Flatfishes)

(From Table 5, Team Summary Appendix A)

Stock	ABC 2010 (mt)	ABC 2011 (mt)	ABC Change from 2010
YellFn. Sole	219,000	239,000	Up 9%
Grn. Turbot	6,120	6,140	Up ?
Arrow. Fl.	156,000	153,000	Down 2%
N.RockSole	240,000	224,000	Down 6 %
Flathead S	69,200	69,300	No Change
Alaska Plaice	224,000	64,100	Down ???%
Other Flats	17,300	14,500	Down 16%

Summary (Rockfishes)

(From Table 5, Team Summary Appendix A)

Stock	ABC 2008 (mt)	ABC 2009 (mt)	ABC Change From 2009
POP, BSAI	18,860	24,700	Up 30%
Northern R	7,240	8,670	Up 20%
ShortRaker	387	393	Up 1%
Other Rockfish	1,040	1,280	Up 23%

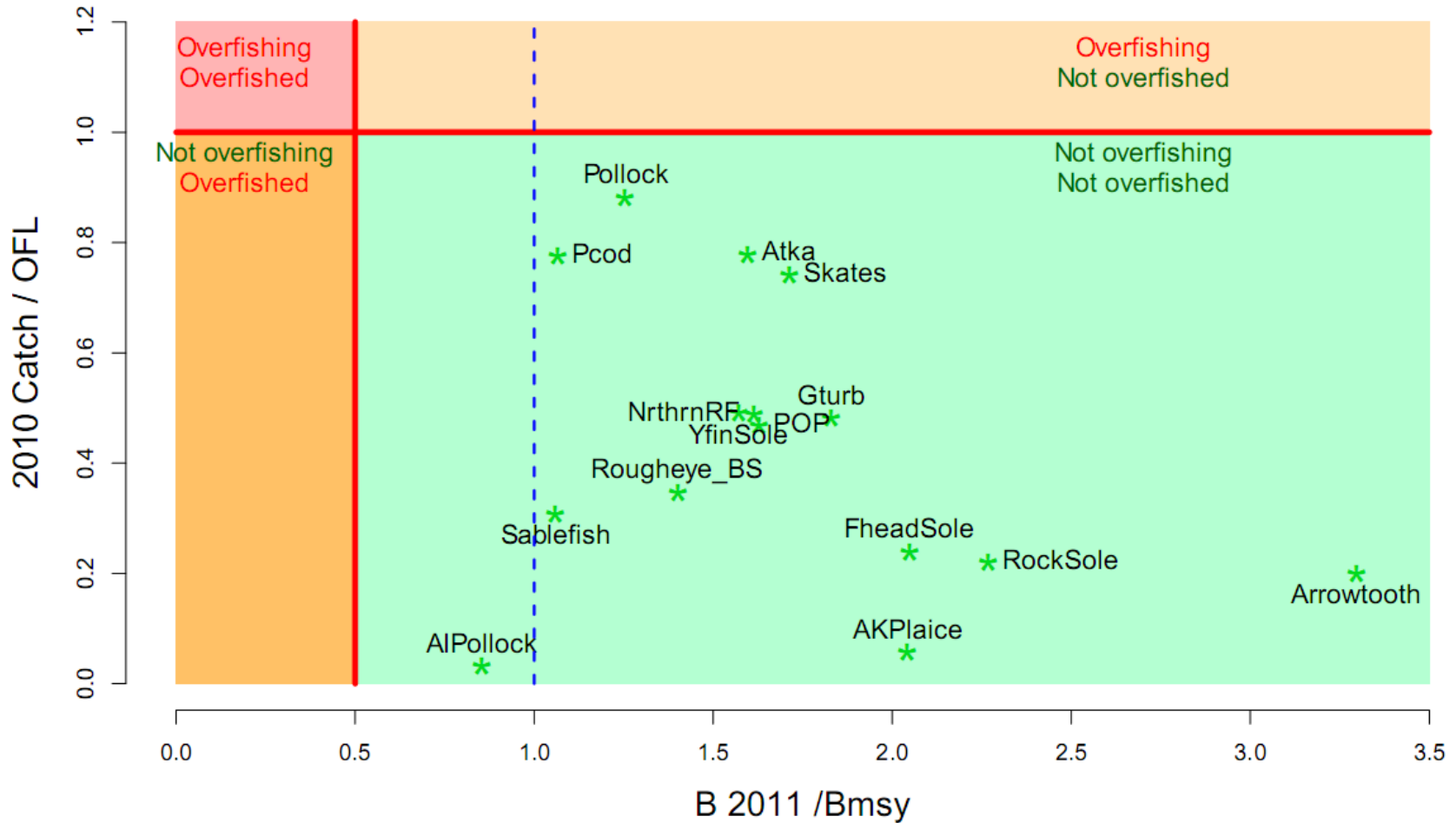
Summary (Atka Mackerel & Other Species)

(From Table 5, Team Summary Appendix A)

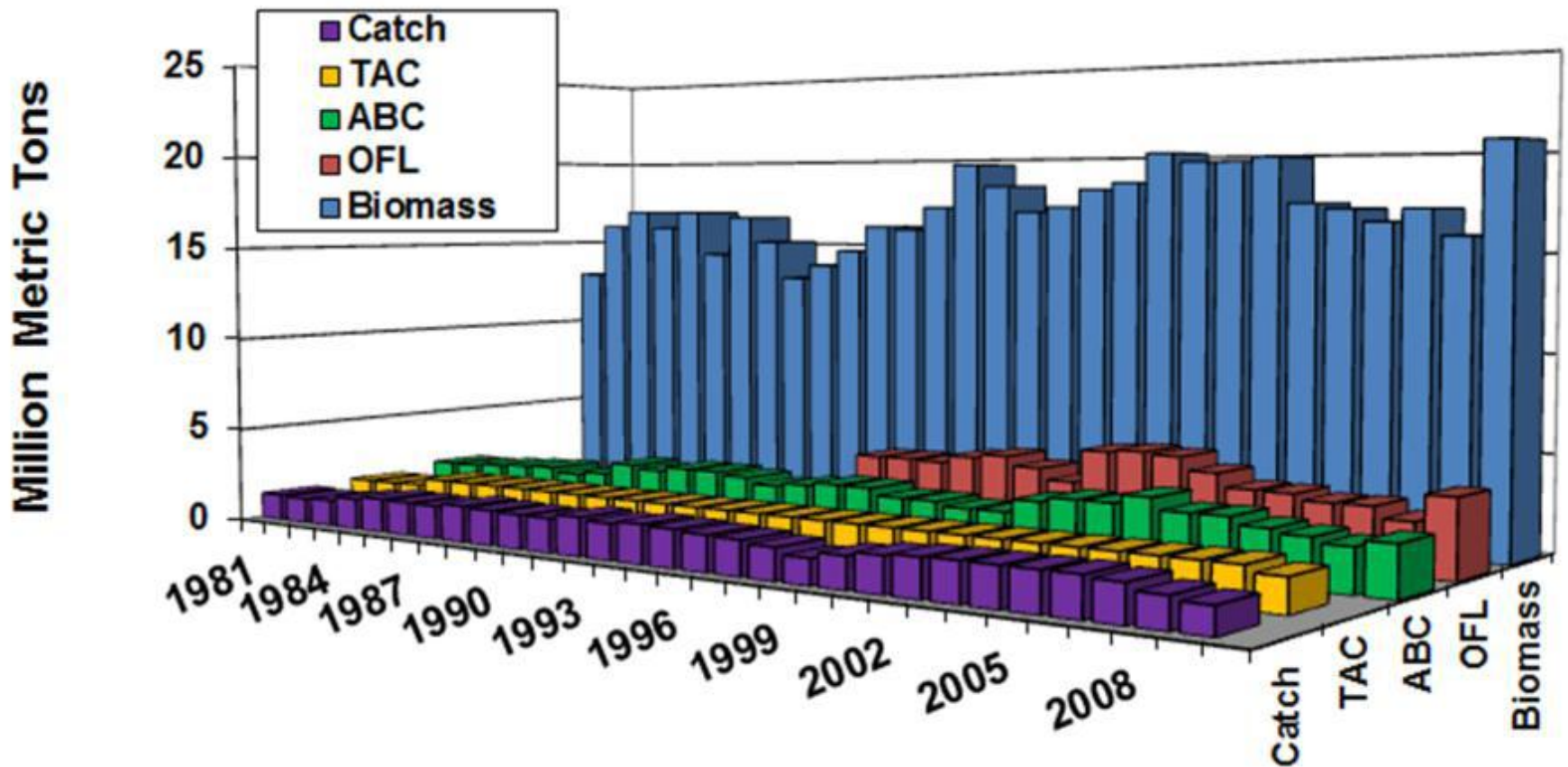
Stock	ABC 2010 (mt)	ABC 2011 (mt)	ABC Change From 2010
Atka Mackerel	74,000	84,300	Up 14%
Squid	1,970	1,970	No Change
Other Species	61,100	76,616	Up 25%

Report Card on Status of Stocks 2011

Bering Sea and Aleutian Islands



Bering Sea & Aleutian Islands Groundfish Catch Limits 1981-2010



End of Presentations

- Extra Slides of Interest Follows

SSC vs Plan Team Estimates, Dec 2010

Stock	SSC ABC (mt)	PT ABC (mt)	Reasons for Change

2010 Safe Documents

1. Summary (Appendix A)
2. Status of Stocks Chapters
(75+ Contributors, 24 Reports)
3. Ecosystems Considerations Chapter
(96+ Contributors)
4. Economics Chapter
(11+ Authors)

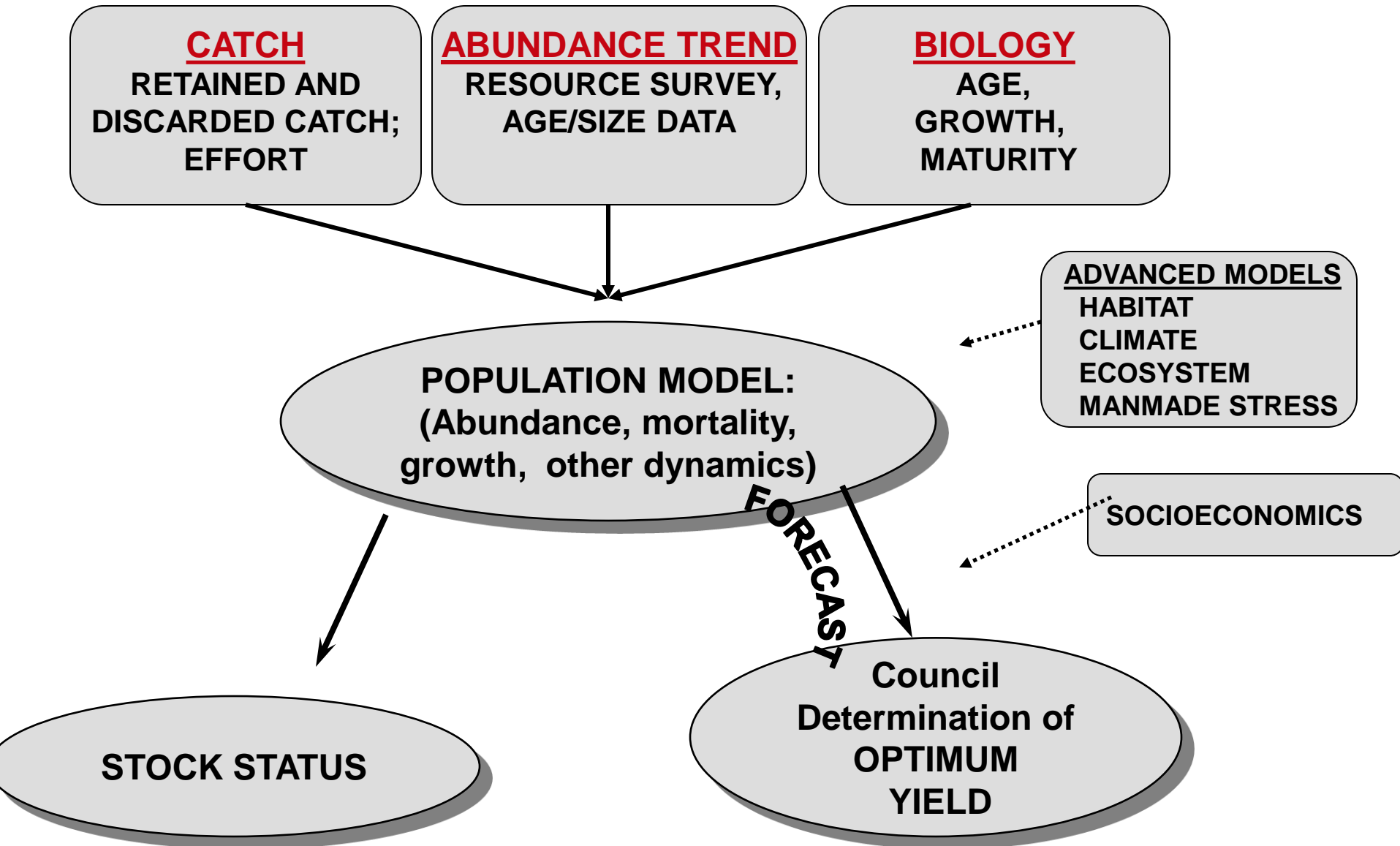
Ecosystem Considerations Chapter

- **Collection of articles from subject experts on Ecosystem Status Indicators**
 - Physical environment & Habitat
 - Productivity of lower trophic levels and forage fish
 - Productivity of Herring, salmon, groundfish, benthic community, marine mammals, seabirds
 - Ecosystem community indicators
- **Climate effects & environmental trends**
- **Fishing effects on ecosystems**
- **Stock chapters now also have ecosystem discussion to add effects of regime shifts, changing climate conditions, food base characteristics, over-winter survival on recruitment, etc**
- **Kerim Aydin made presentation to SSC & AP**

Economics Chapter

- **Figures and Tables**
 - Catches, Discards, Bycatch Rates
 - Ex-vessel Prices of Species
 - Fishery Values
 - Vessel Statistics & Vessel Activities
 - Employment Statistics
 - Currency Exchange Rates
- **Reports of Alaska Groundfish Market Profiles**
 - Pollock Fillet, Surimi and Roe
 - Pacific Cod
 - Sablefish
 - Yellowfin Sole and Rock Sole
 - Arrowtooth Flounder
 - Alaska Groundfish Export Market Forecasts
- **Socio-economics, Cultural and Community Profiles**
- **Other Economics Research and Data Collection Reports**

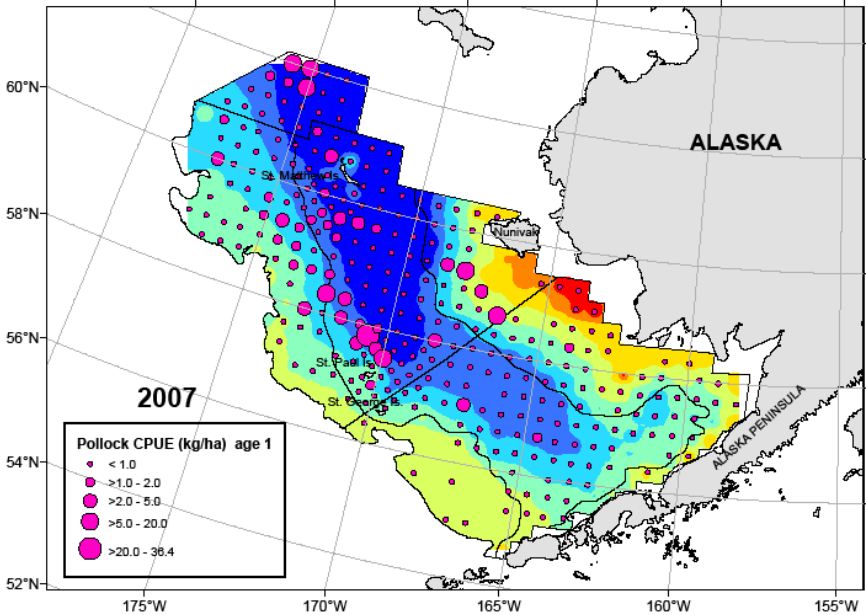
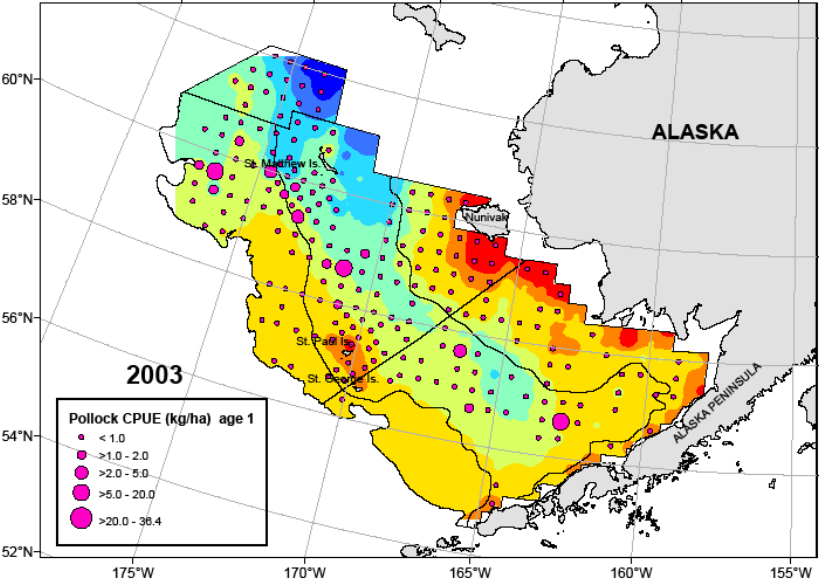
Stock Assessment Process



Age 1 Pollock Distribution

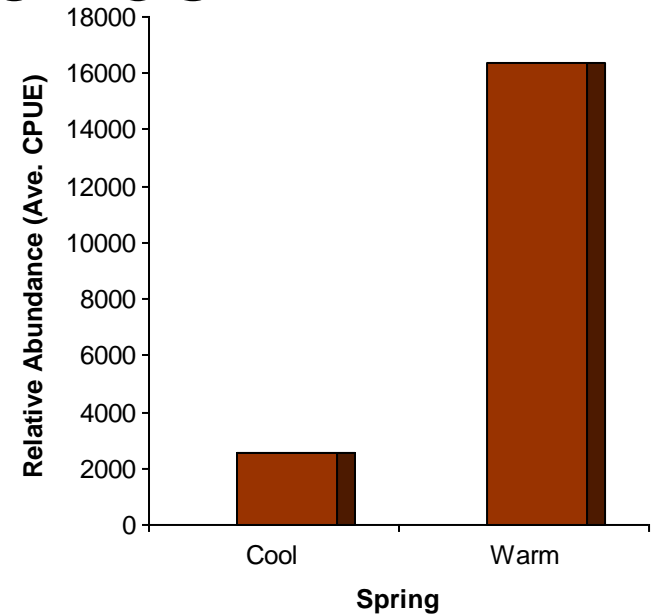
Densities were lower in warm year (2003)

versus cold year (2007)



Age 0 Pollock Abundance

WARM



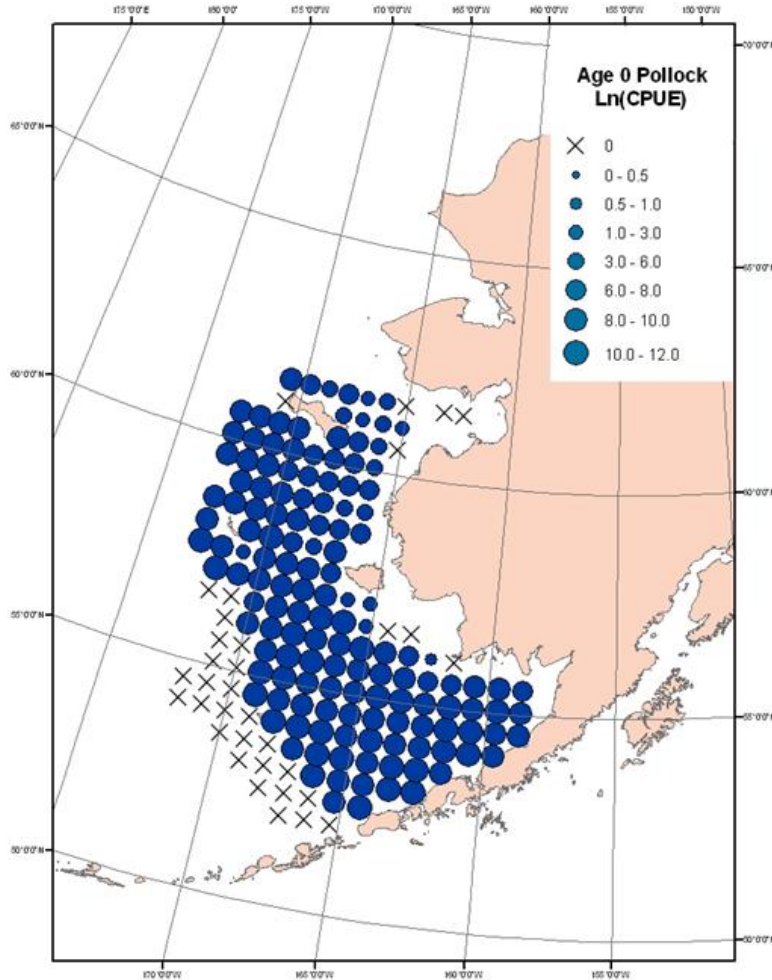
COOL

Slide from Aube Bay Lab BASIS
Cruises from Ed Farley

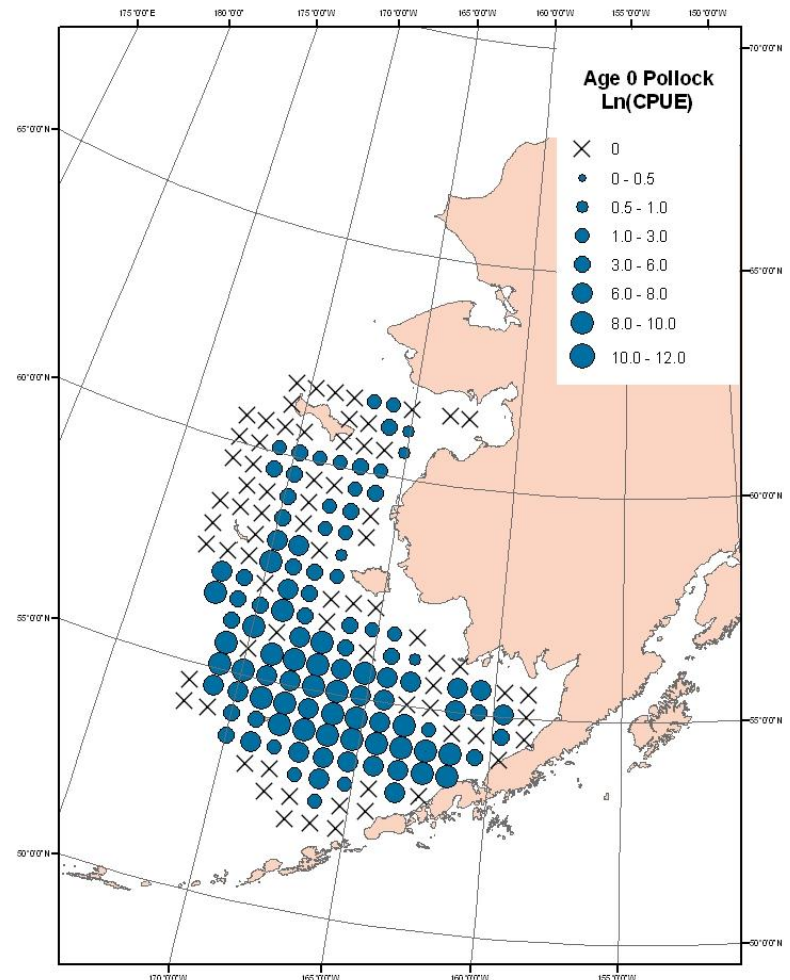
Age-0 Pollock Distribution

Slide from Auke Bay Lab BASIS Cruises from Ed Farley

WARM

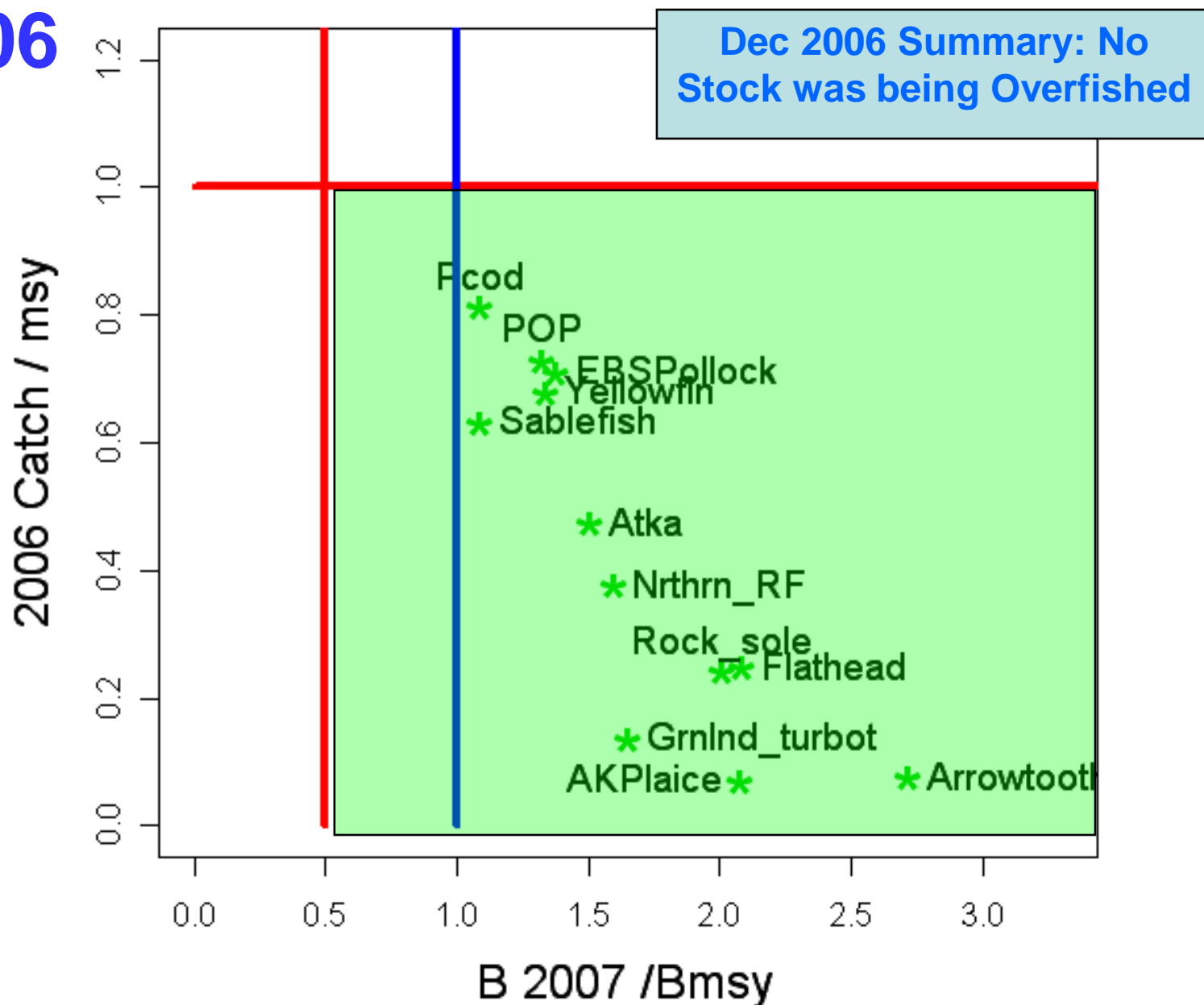


COOL



Bering Sea and Aleutian Islands Region

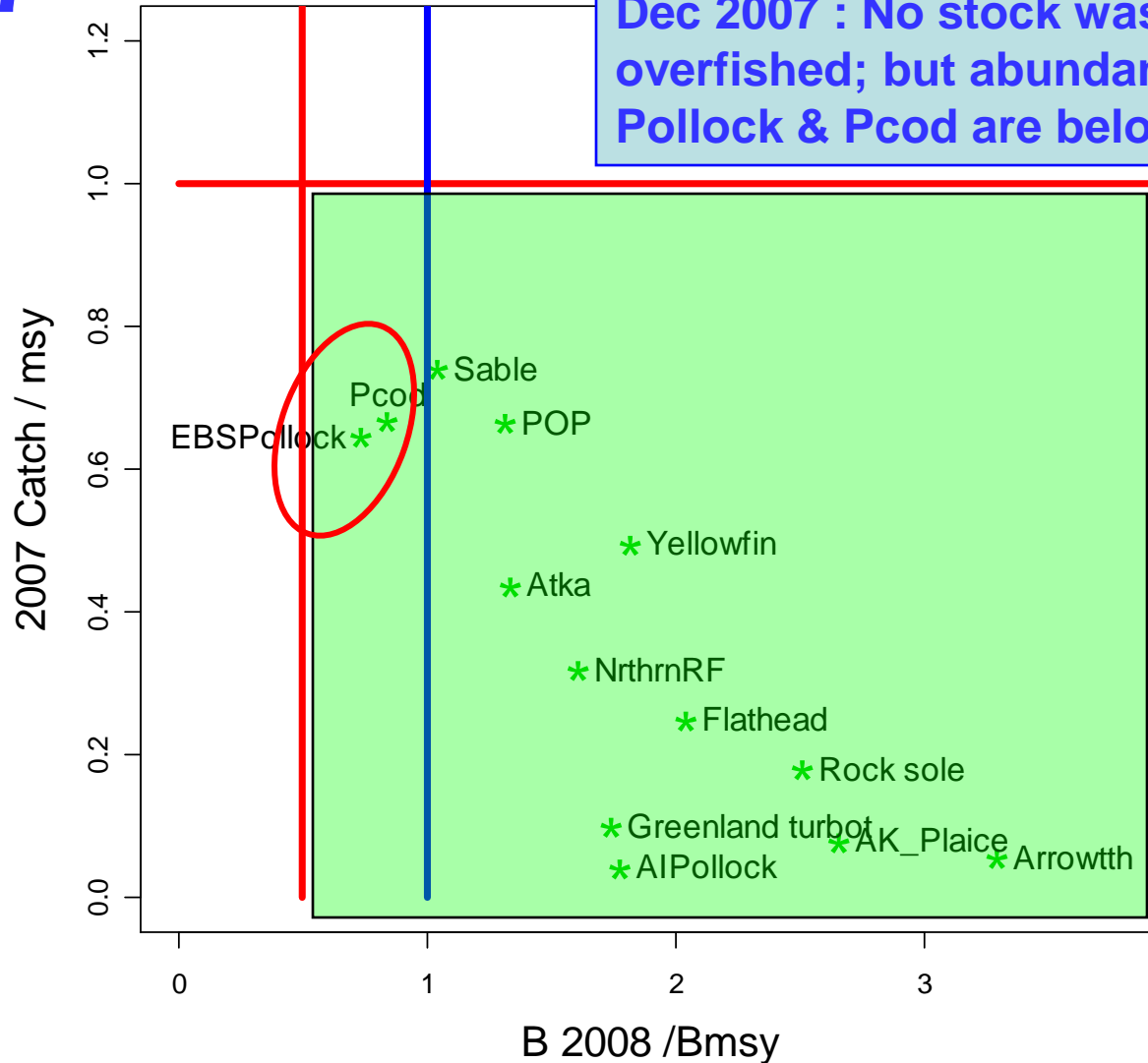
2006



2007

Bering Sea and Aleutian Islands Region

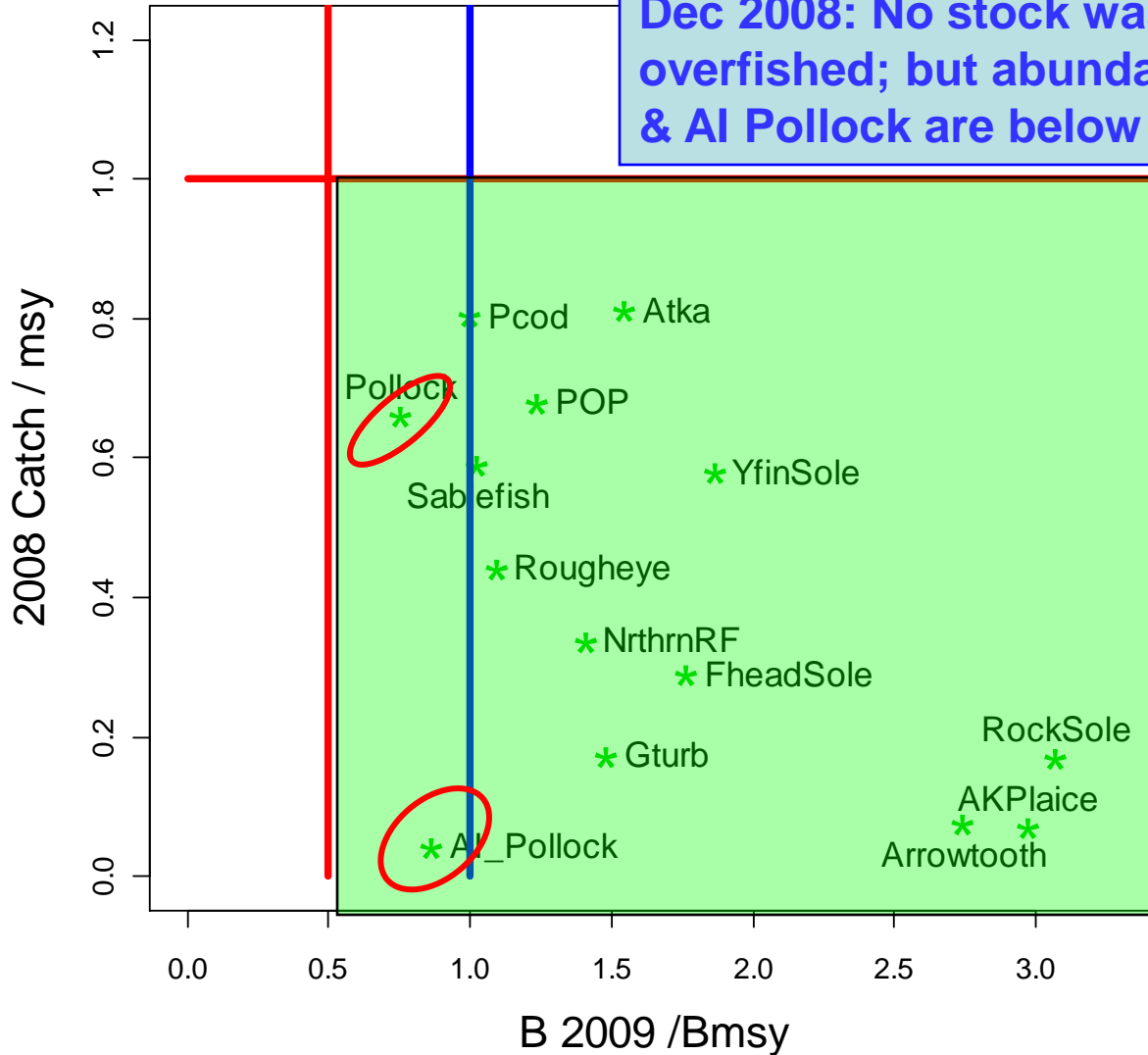
Dec 2007 : No stock was being overfished; but abundance of EBS Pollock & Pcod are below Bmsy



2008

Bering Sea and Aleutian Islands Region

Dec 2008: No stock was being overfished; but abundance of EBS & AI Pollock are below Bmsy



Bering Sea and Aleutian Islands

