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SWFSC-FRD

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Assessment of the Pacific Sardine Resource in 2015 for USA Management in 2015-16



NOAA FISHERIES

Acknowledgments

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Updated Assessment

Data:

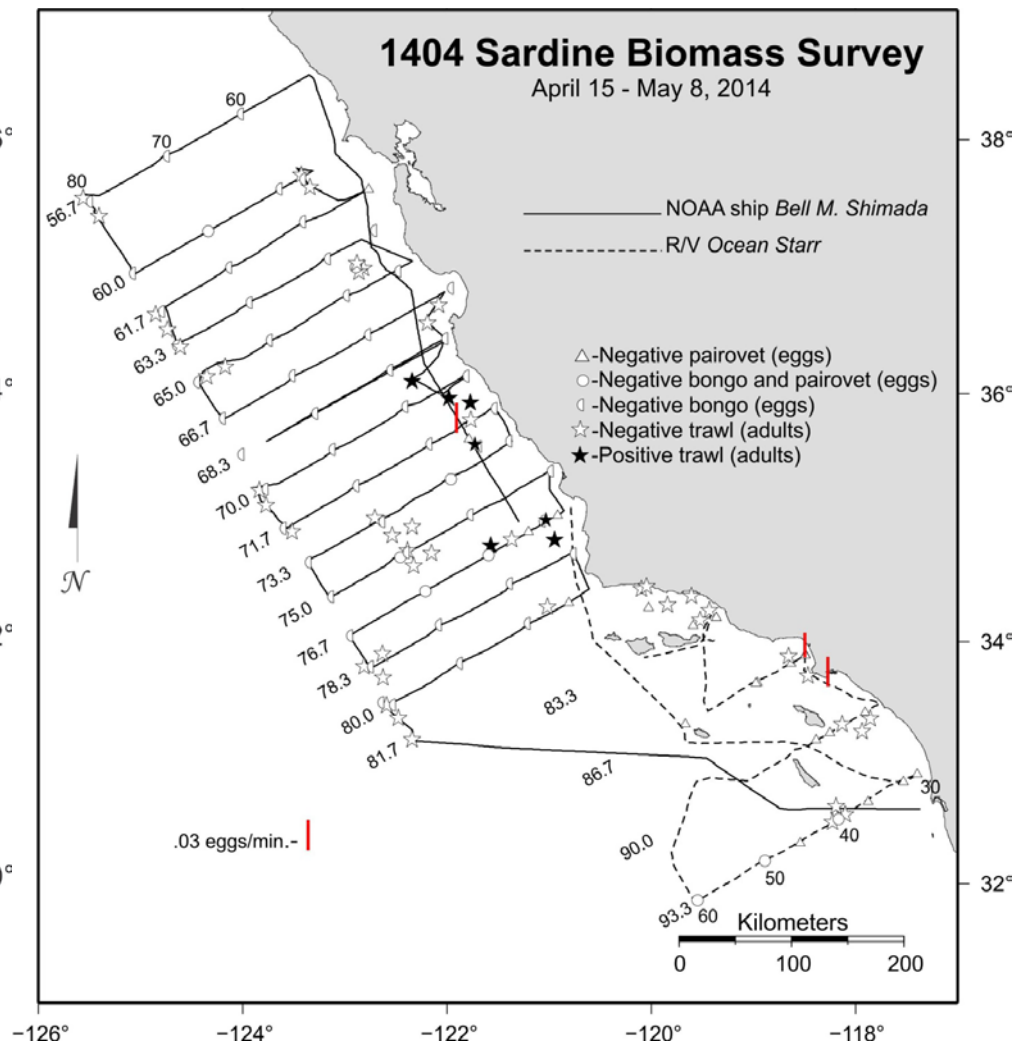
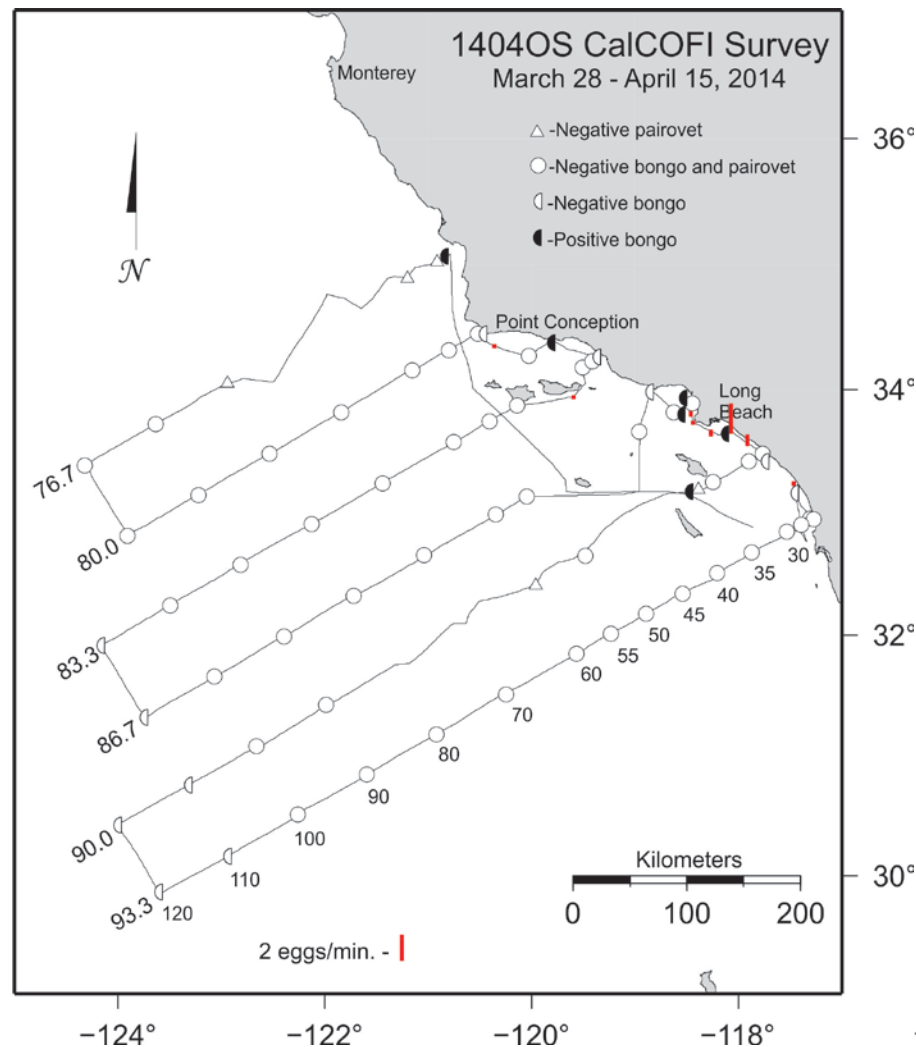
- Fishery
 - o Landings (through 2014)
 - o Lengths (through 2014)
 - o Conditional age-at-length (through 2013)
- Surveys
 - o DEPM Spring 2014 – no estimate produced
 - o ATM biomass - Spring & Summer 2014 biomass and length comps

Parameterization:

- Recruitment deviations advanced by one year
 - o 2014 YC is estimated (albeit poorly)

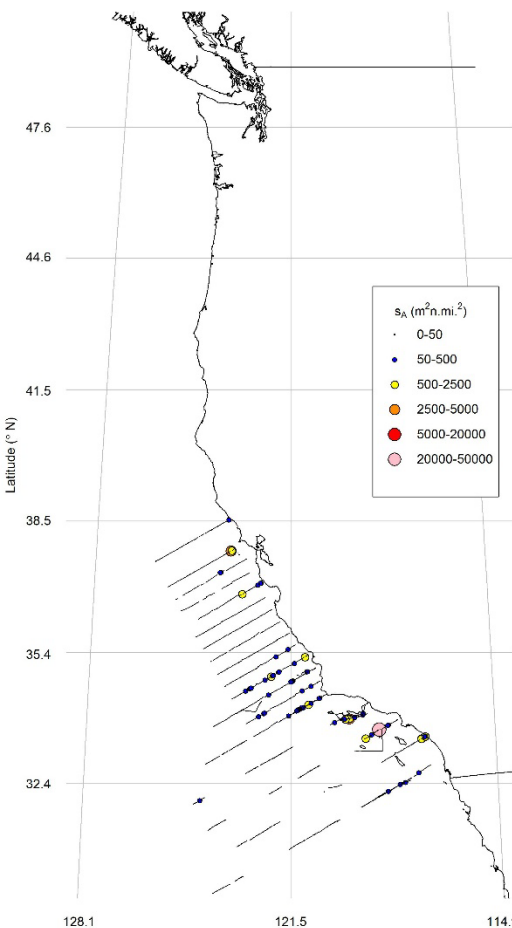


Spring 2014 CalCOFI & DEPM Surveys

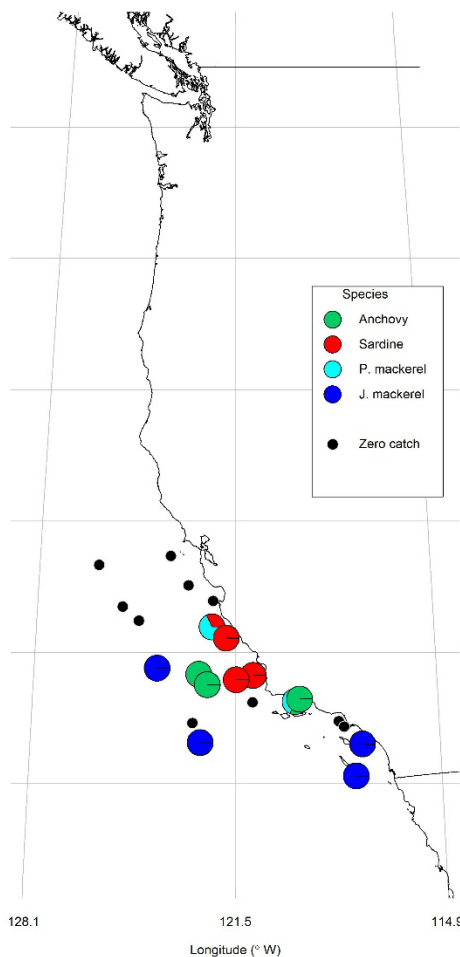


Spring 2014 Acoustic-Trawl Survey

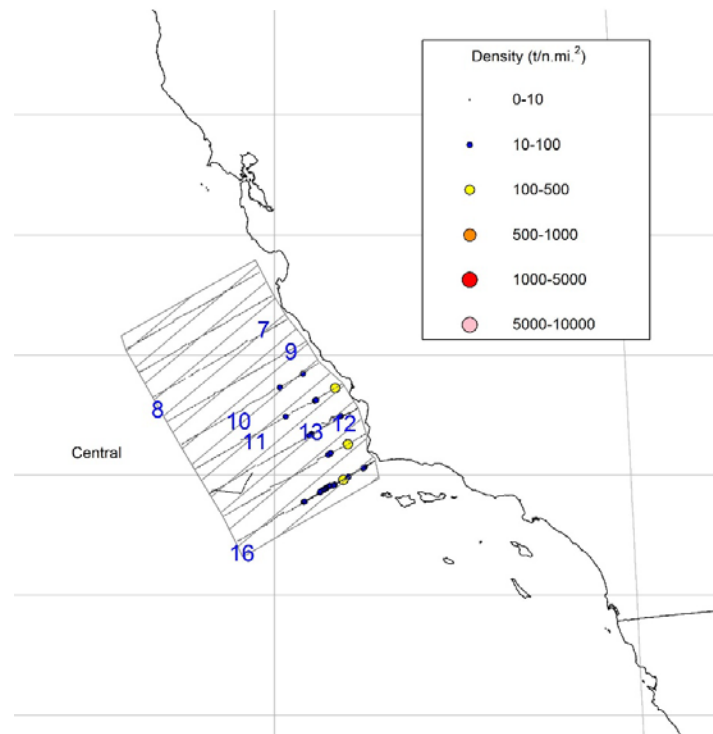
CPS Backscatter



CPS Proportions

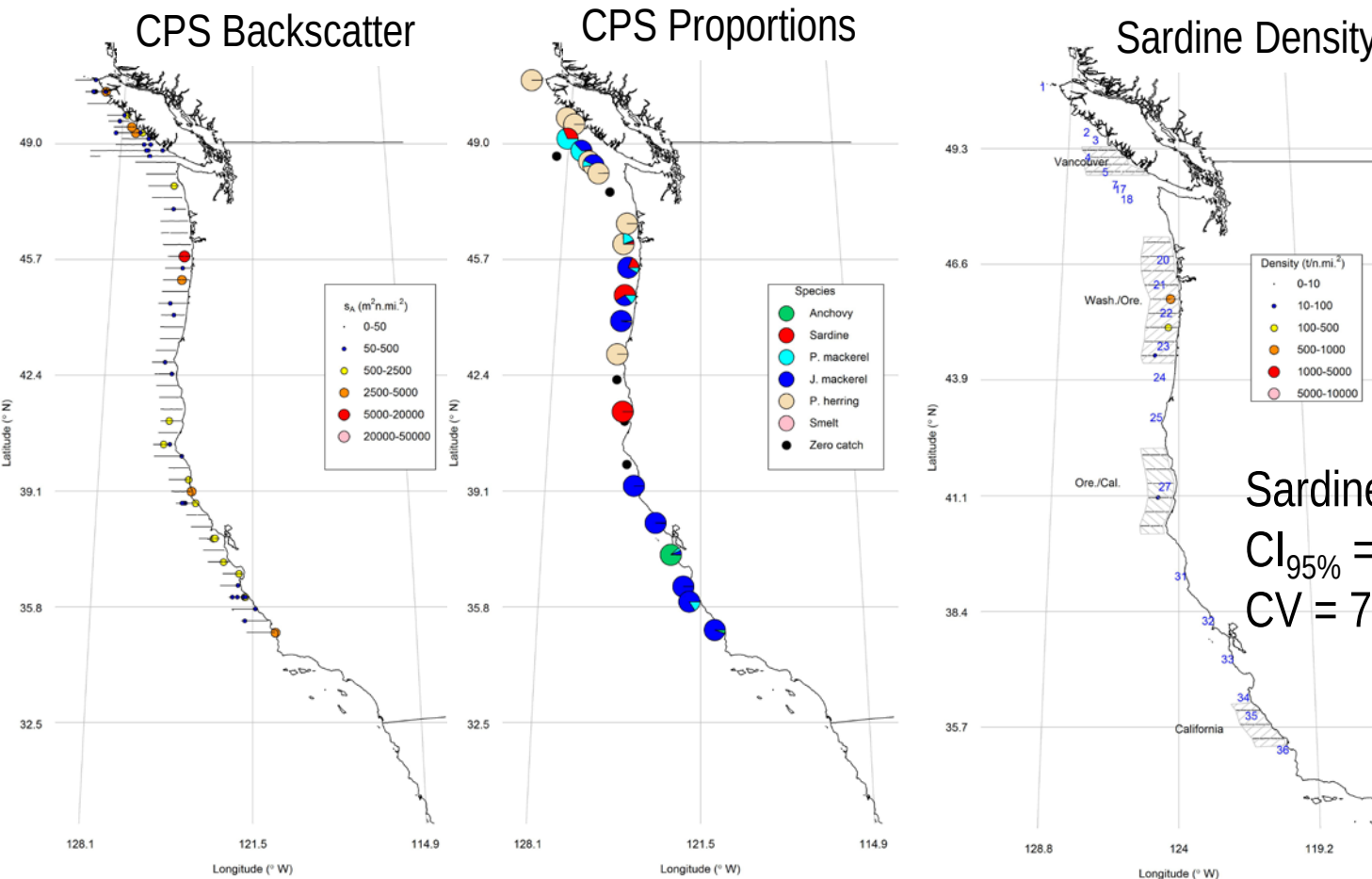


Sardine Density



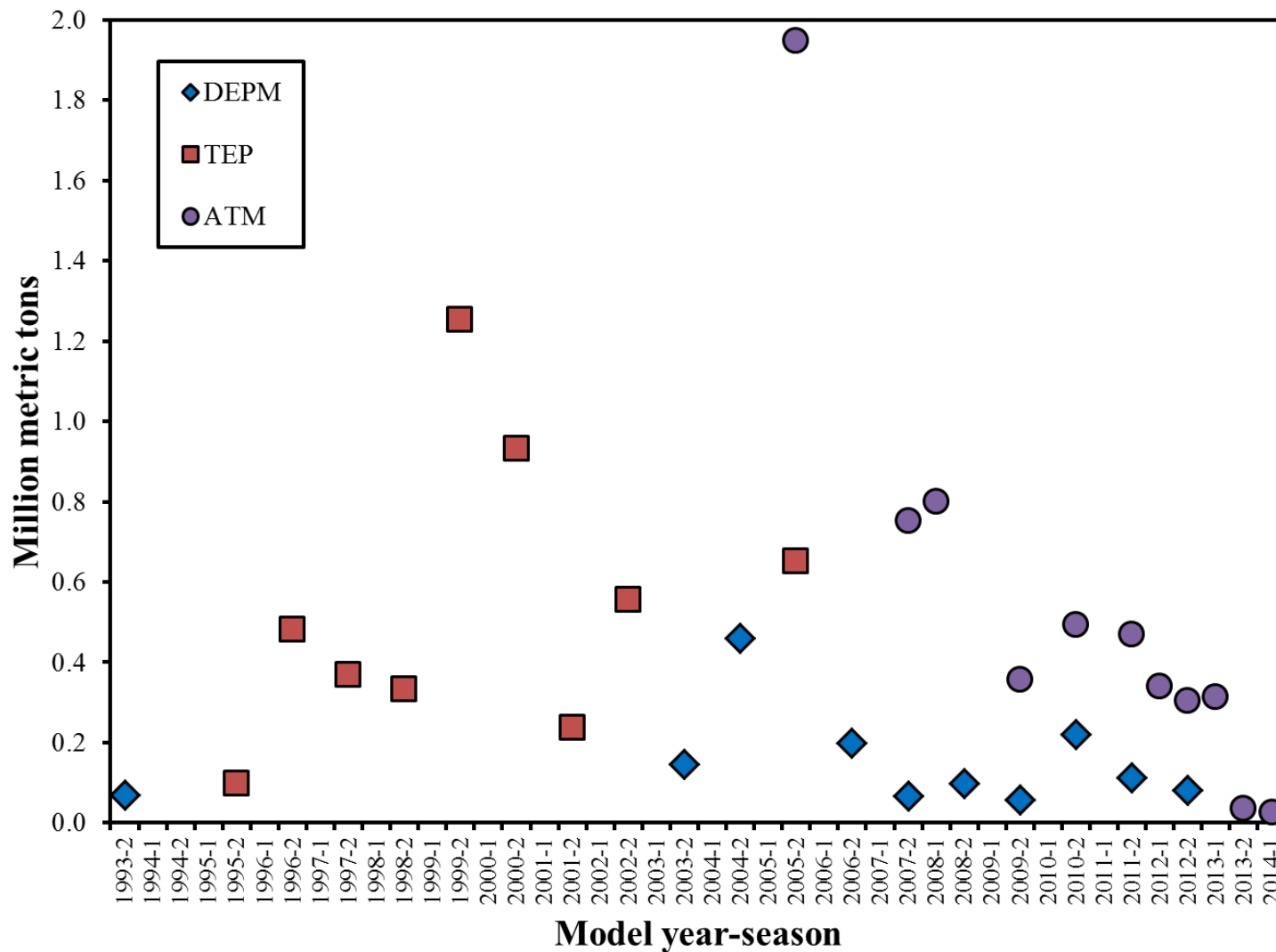
Sardine biomass = 35,300 mt
 $CI_{95\%} = 12,300 - 77,000$ mt
 $CV = 39.6\%$

Summer 2014 Acoustic-Trawl Survey

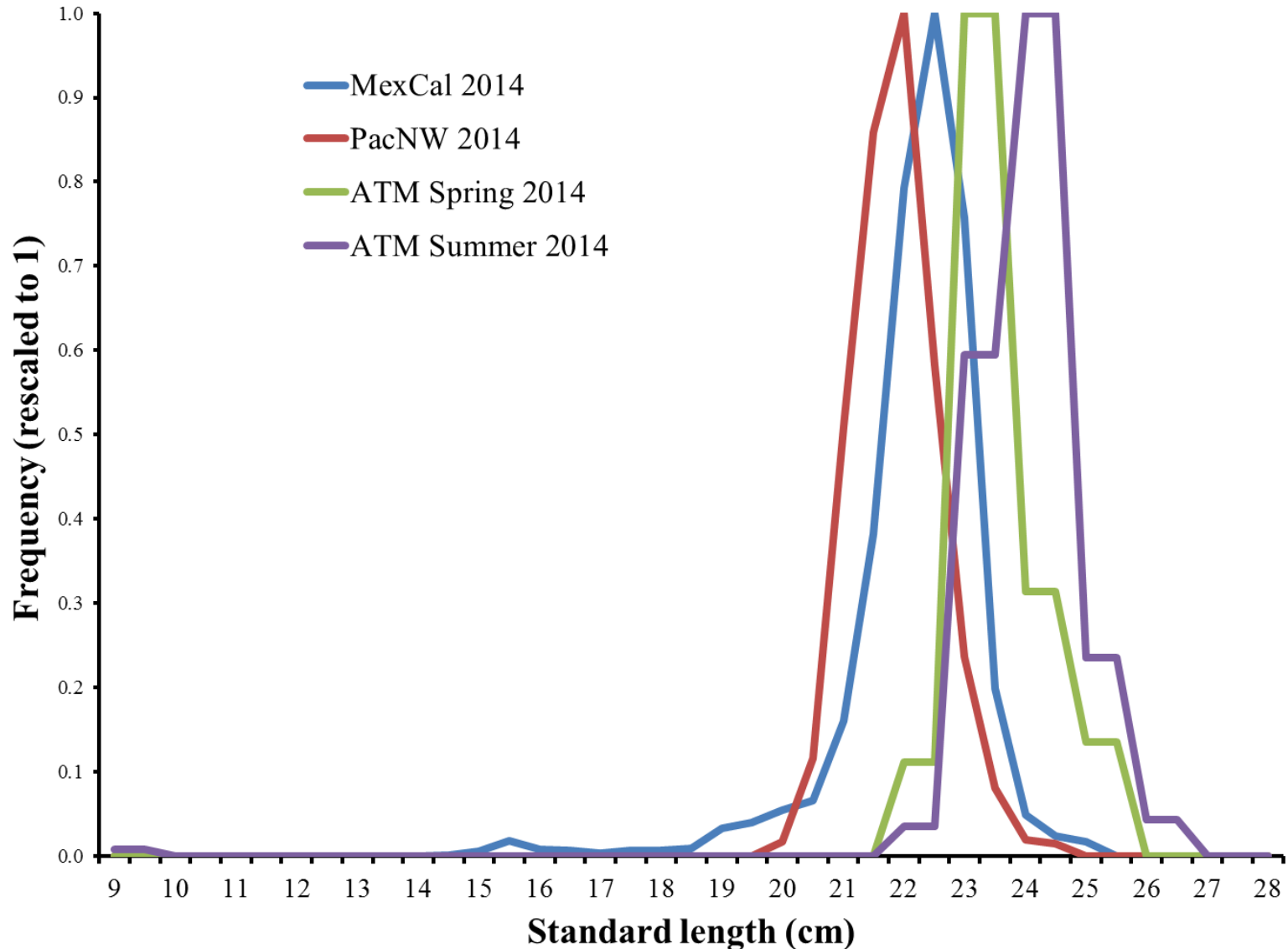


Sardine biomass = 26,300 t
 $CI_{95\%} = 1,570 - 62,700$ t
 $CV = 70.3\%$

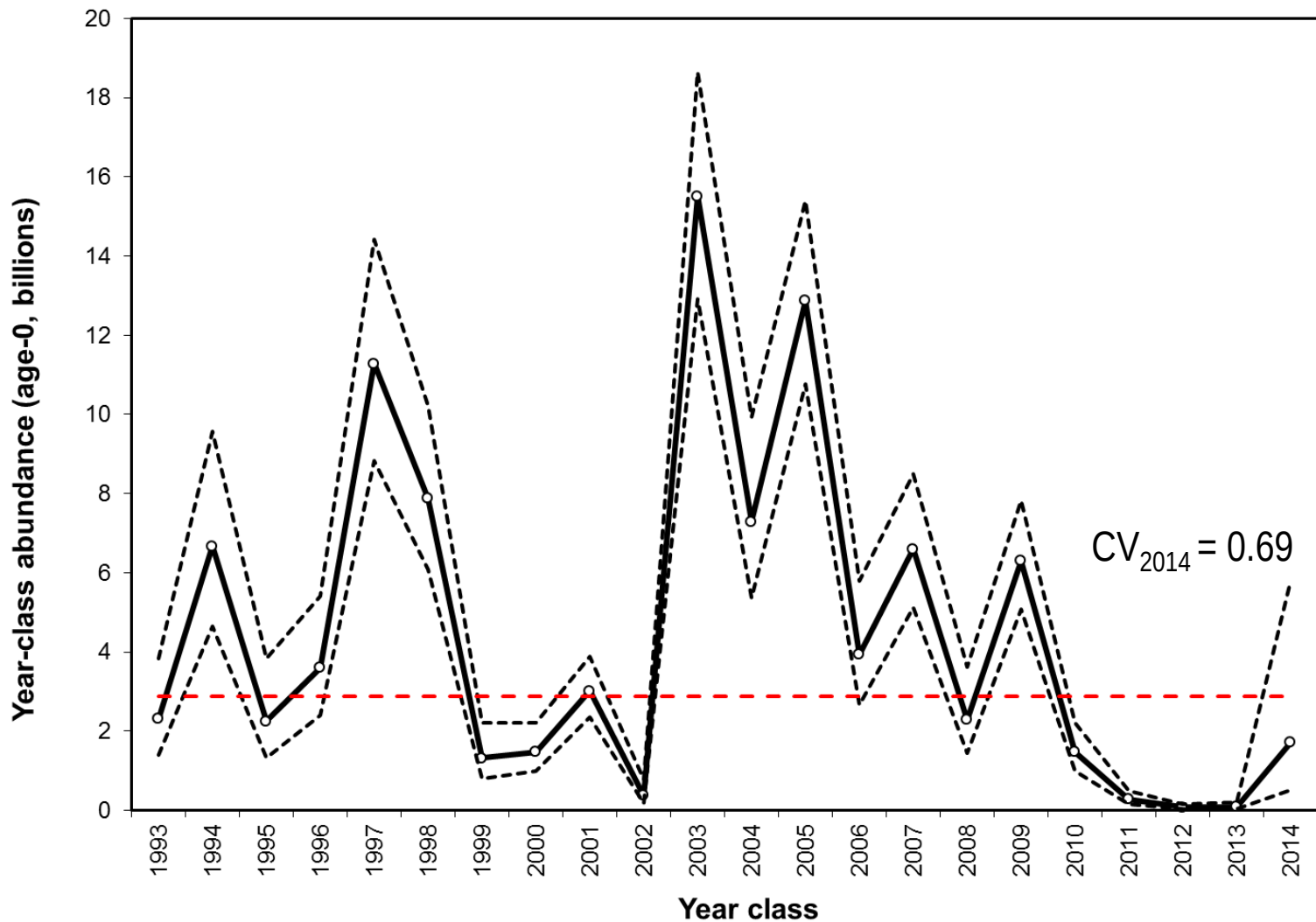
Modeled Survey Time Series



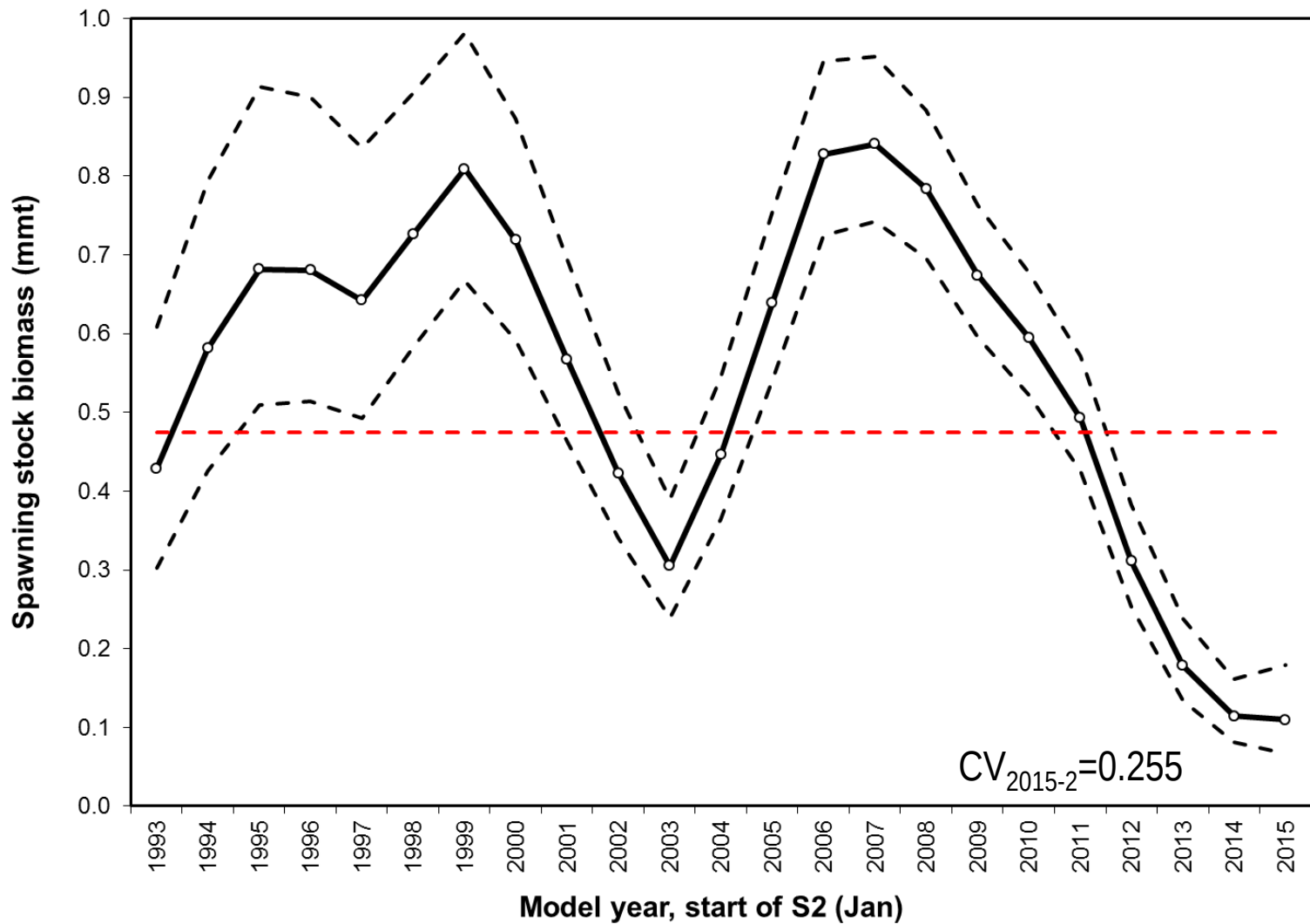
Fishery and Survey Length Compositions in 2014



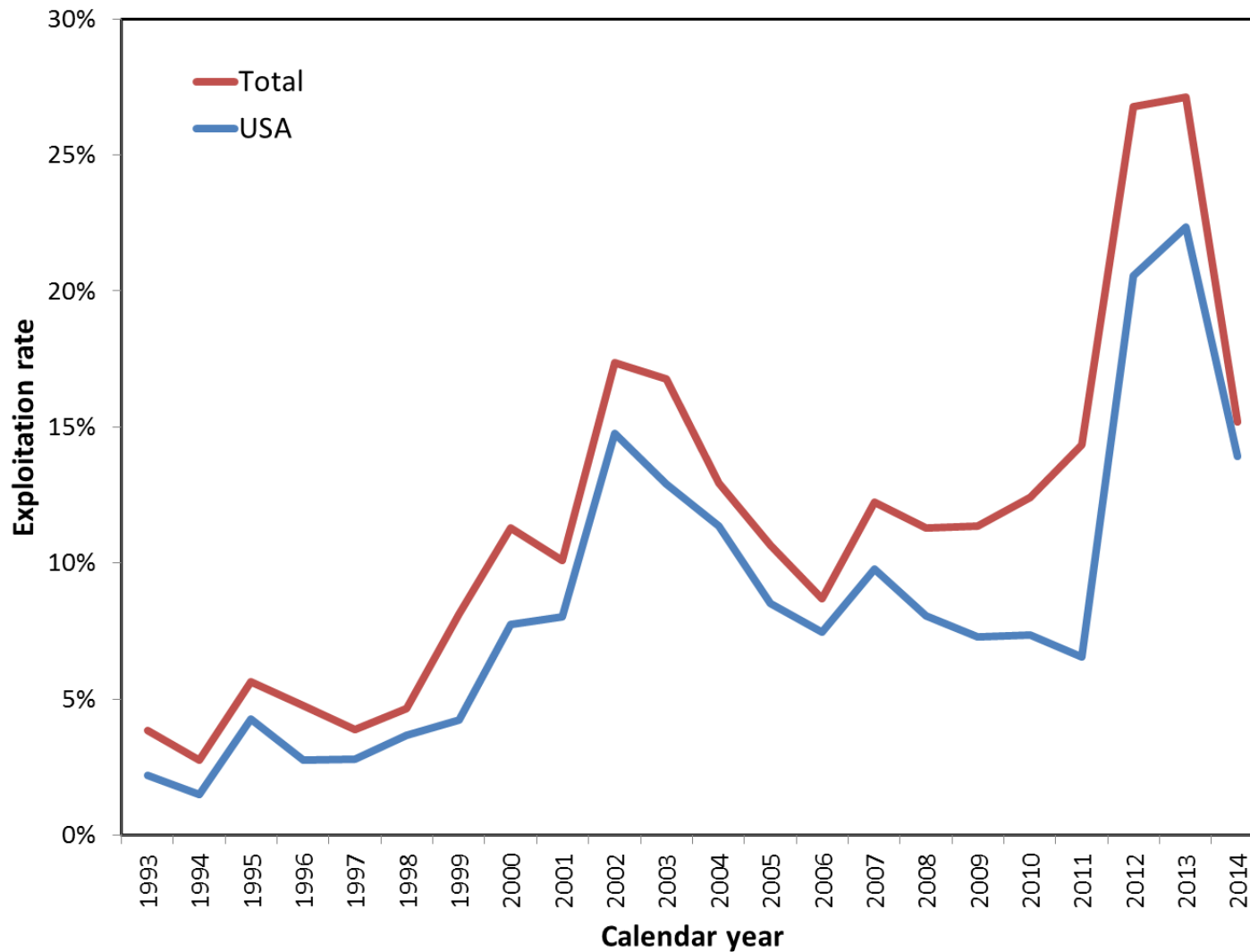
Recruit (age-0) abundance



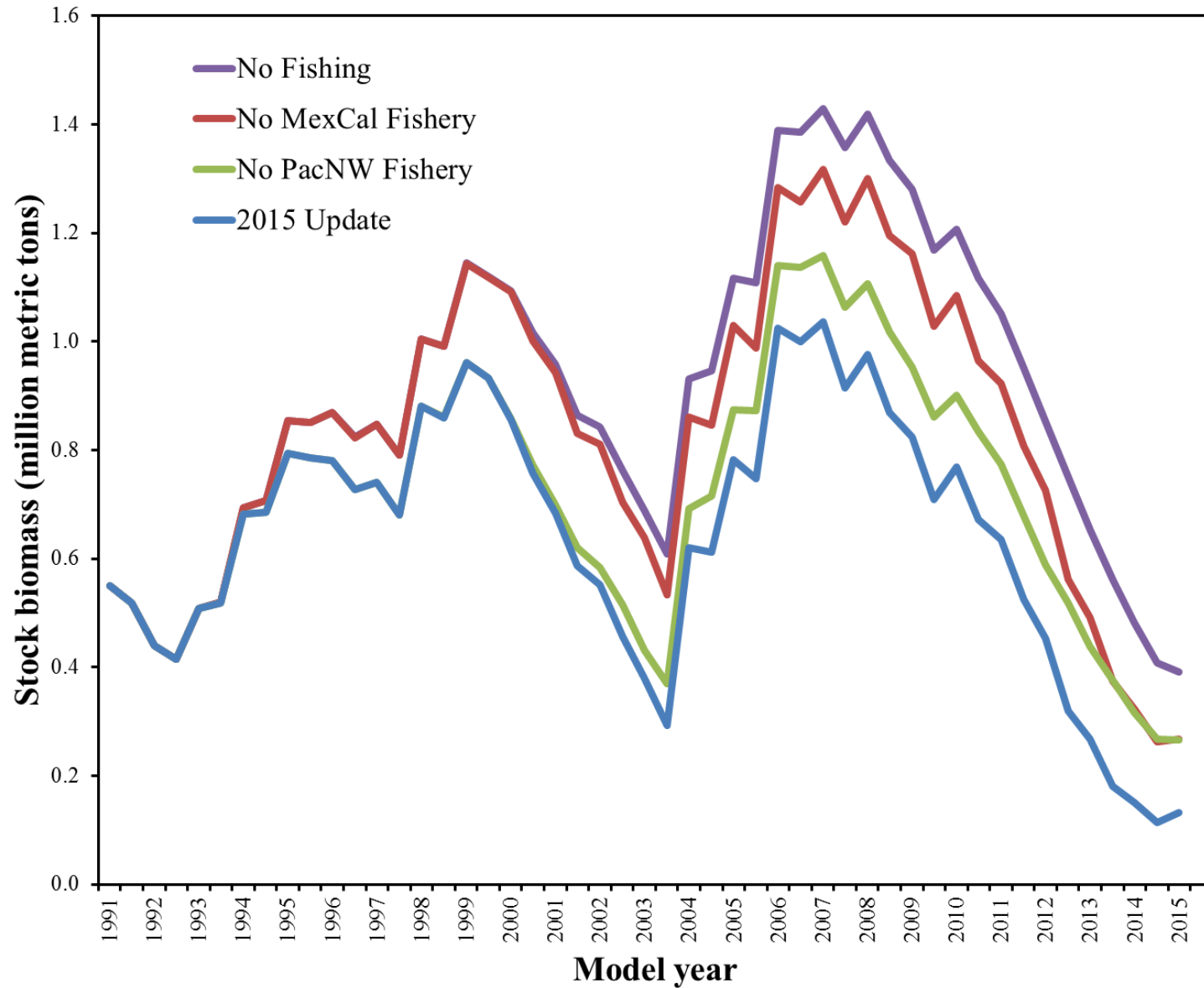
Spawning Stock Biomass



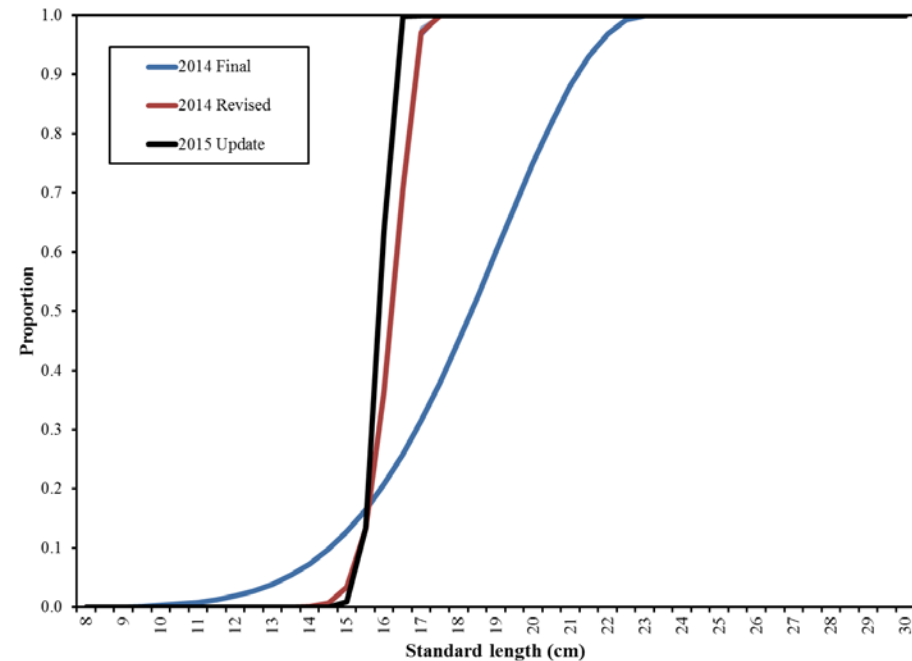
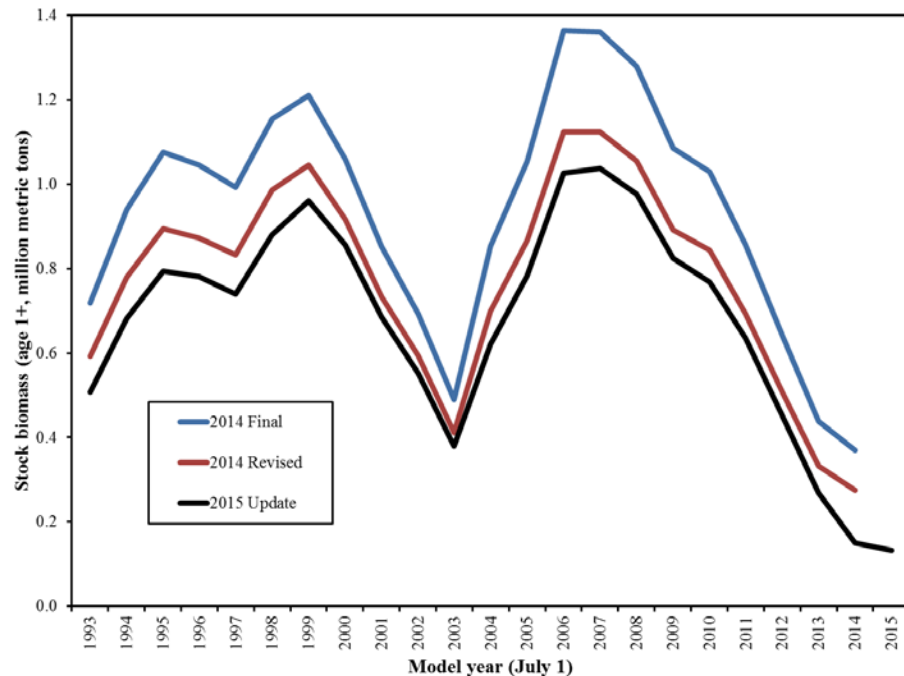
Annual Exploitation Rate



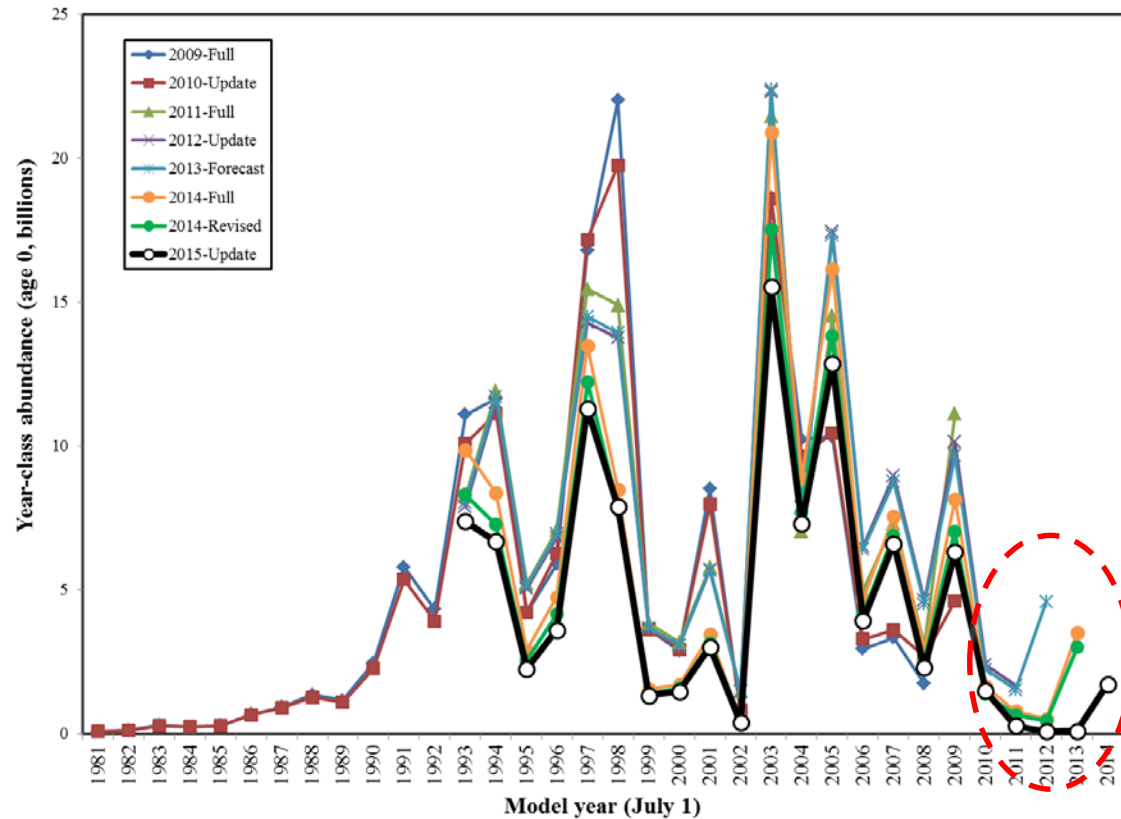
Fishery Impacts



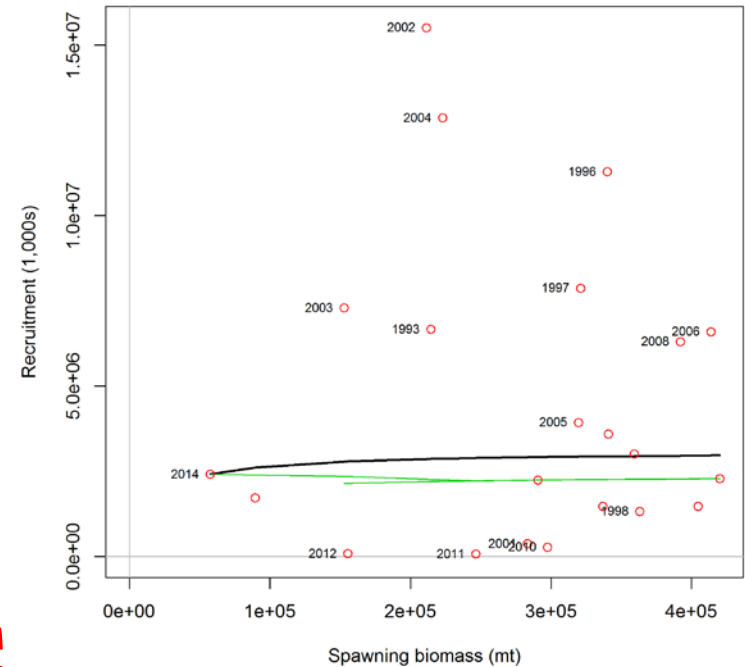
Biomass and Selectivity Estimates for 2014 Final, 2014 Revised, and 2015 Update Models



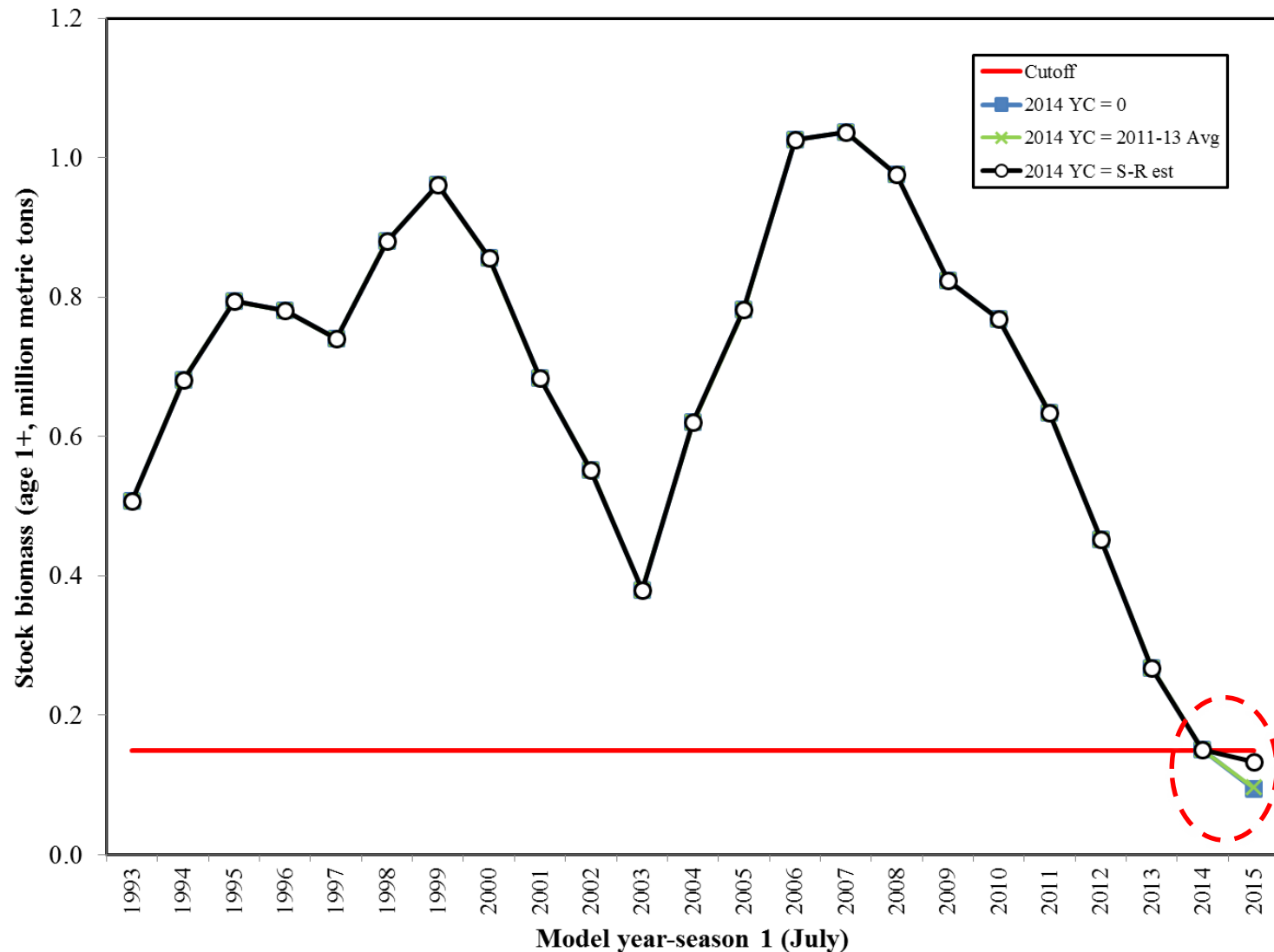
Historical Analysis of Recruitment Update vs. Previously Adopted Models



2015 Beverton-Holt S-R Model



Estimated Stock Biomass Series For Three 2014 YC Scenarios



Harvest Specifications for 2015-16 - Two Recruitment Scenarios

a) HCRs when 2014 YC is derived from S-R Curve.

Harvest Control Rule Formulas									
OFL = BIOMASS * E_{MSY} * DISTRIBUTION; where E_{MSY} is bounded 0.00 to 0.25									
ABC _{P-star} = BIOMASS * BUFFER _{P-star} * E_{MSY} * DISTRIBUTION; where E_{MSY} is bounded 0.00 to 0.25									
HG = (BIOMASS - CUTOFF) * FRACTION * DISTRIBUTION; where FRACTION is E_{MSY} bounded 0.05 to 0.20									
Harvest Formula Parameters									
BIOMASS (ages 1+, mt)	132,884								
P-star	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05
ABC Buffer _{Tier 1}	0.9558	0.9128	0.8705	0.8280	0.7844	0.7386	0.6886	0.6304	0.5531
CalCOFI SST (2012-2014)	15.562								
E_{MSY}	0.157239								
FRACTION	0.157239								
CUTOFF (mt)	150,000								
DISTRIBUTION (U.S.)	0.87								
Harvest Control Rule Values (MT)									
OFL =	18,178								
ABC _{Tier 1} =	17,374	16,594	15,824	15,051	14,259	13,427	12,517	11,460	10,055
HG =	0								

b) HCRs when 2014 YC is based on the average of 2011-2013 YC sizes.

Harvest Control Rule Formulas									
OFL = BIOMASS * E_{MSY} * DISTRIBUTION; where E_{MSY} is bounded 0.00 to 0.25									
ABC _{P-star} = BIOMASS * BUFFER _{P-star} * E_{MSY} * DISTRIBUTION; where E_{MSY} is bounded 0.00 to 0.25									
HG = (BIOMASS - CUTOFF) * FRACTION * DISTRIBUTION; where FRACTION is E_{MSY} bounded 0.05 to 0.20									
Harvest Formula Parameters									
BIOMASS (ages 1+, mt)	96,688								
P-star	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05
ABC Buffer _{Tier 1}	0.95577	0.91283	0.87048	0.82797	0.78442	0.73861	0.68859	0.63043	0.55314
CalCOFI SST (2012-2014)	15.562								
E_{MSY}	0.157239								
FRACTION	0.157239								
CUTOFF (mt)	150,000								
DISTRIBUTION (U.S.)	0.87								
Harvest Control Rule Values (MT)									
OFL =	13,227								
ABC _{Tier 1} =	12,642	12,074	11,514	10,951	10,375	9,769	9,108	8,338	7,316
HG =	0								

