

# Pacific Sardine Harvest Parameters

*Geoff Shester, Ph.D.  
California Campaign Director*

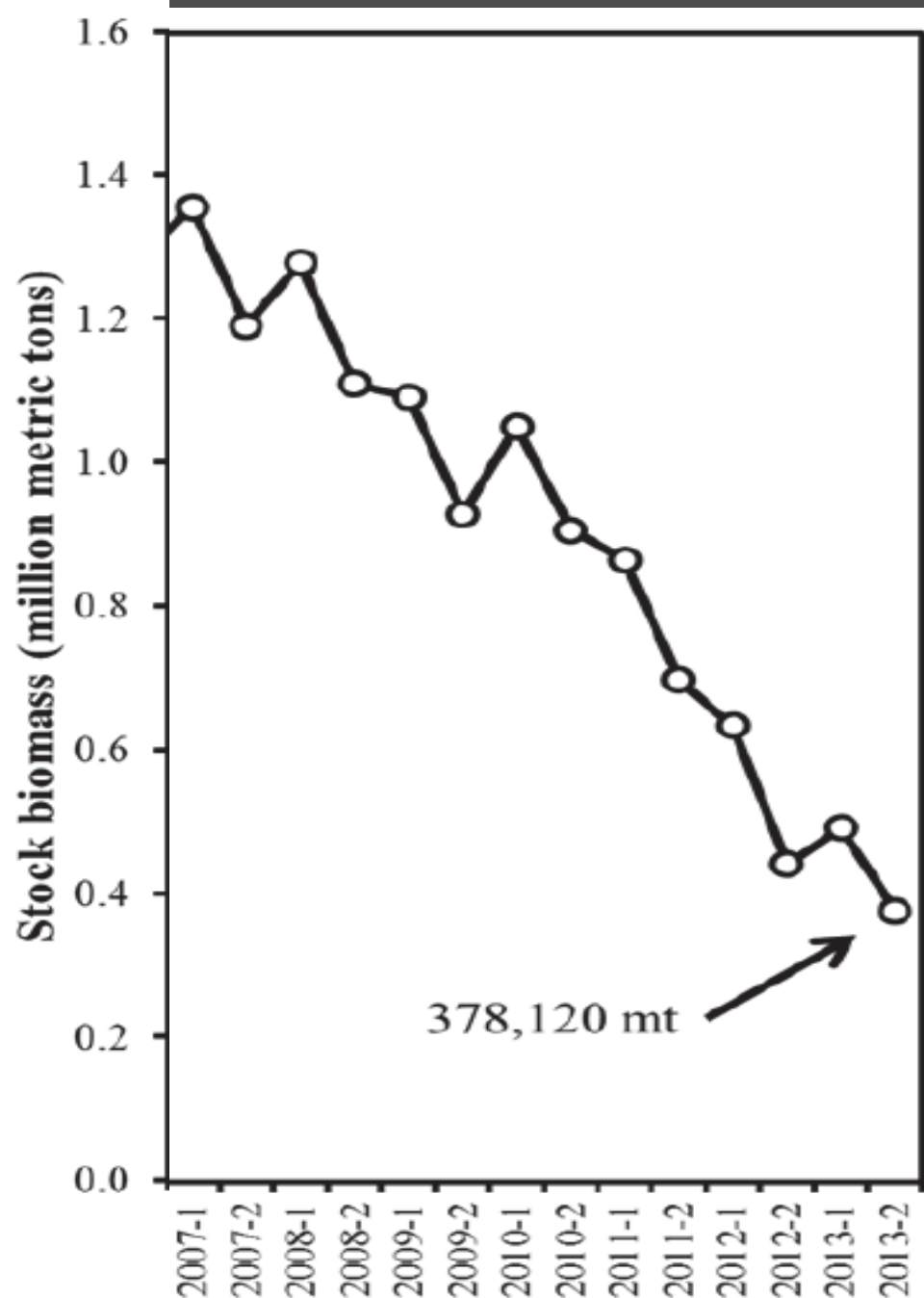
# Summary of Requests

- Do not change FRACTION range at this time (keep bounded at 5-15%)
- Adopt the CalCOFI temperature index (3-year moving average) for setting FRACTION in the Harvest Guideline
- Agendize consideration of full revision of Harvest Guideline (CUTOFF, DISTRIBUTION, etc.)



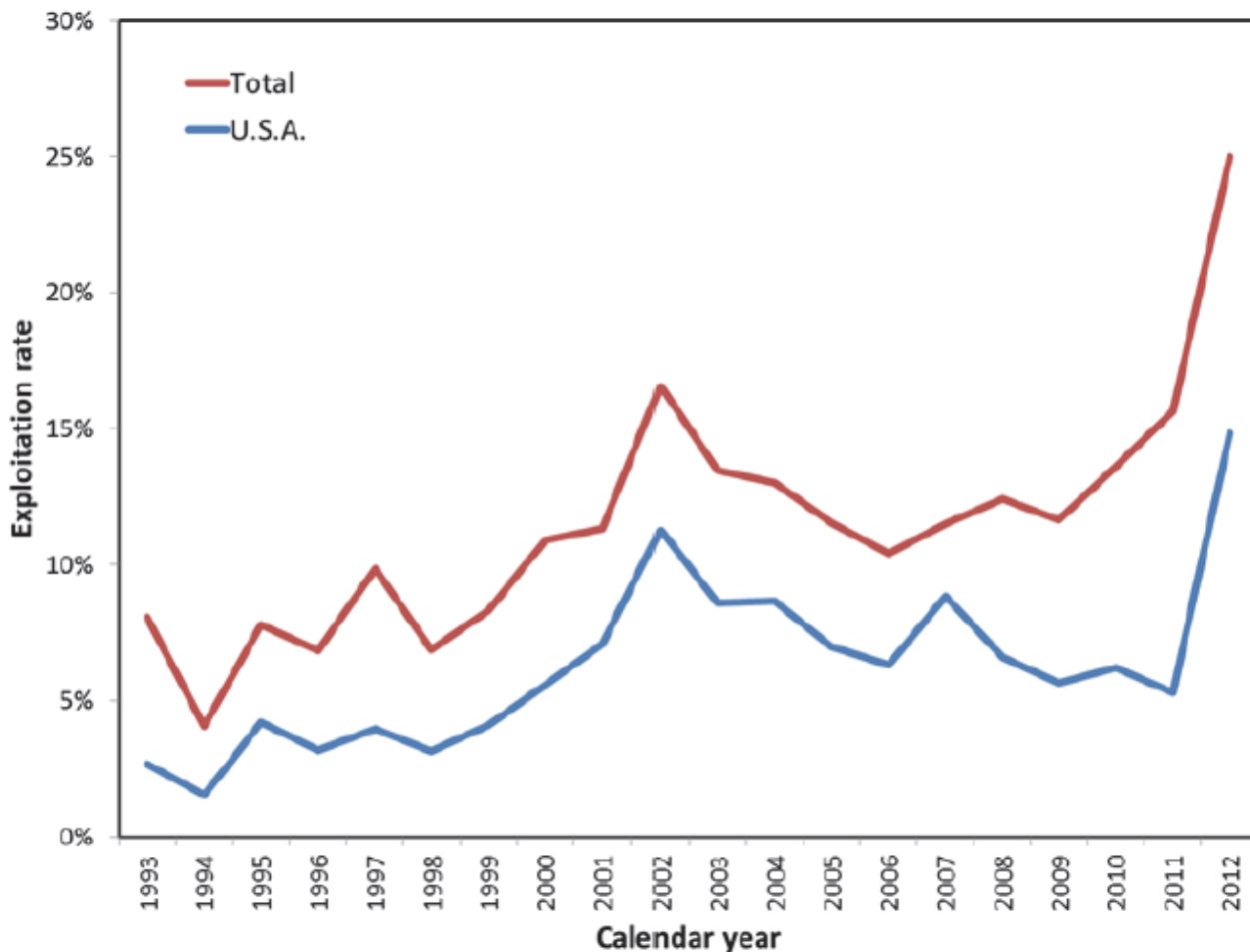
# Do Not Increase Fraction Range

- Current Fraction Range: 5-15%
- 10-20% is a more aggressive harvest range resulting in lower biomass (CPSMT Rpt, Table 3)
- Temperature index and Fraction range are two distinct, separate decisions
- Now is not the time to be fishing sardines more aggressively:
  - HG has been overestimating productivity (73% stock decline in 7 years; low recruitment)



# Sardine Overfishing Occurred in 2012

(Overfishing Limit Set at 18%)



Calendar year	U.S.A.	Total
2000	5.57%	10.91%
2001	7.07%	11.34%
2002	11.26%	16.55%
2003	8.59%	13.46%
2004	8.68%	13.02%
2005	6.99%	11.53%
2006	6.33%	10.43%
2007	8.85%	11.50%
2008	6.59%	12.43%
2009	5.64%	11.64%
2010	6.23%	13.59%
2011	5.30%	15.63%
2012	14.85%	24.98%

# New Evidence of Inadequate Forage

Specifically Sardine and Anchovy

- **California Sea Lions** – Unusual Mortality Event (Melin et al., NOAA, 2014)
- **Brown Pelicans** – Nesting Failures (Harvey 2013)
- **Tufted Puffins** – ESA Listing Petition (NRDC 2014)



*Ingrid Overgard/TMMC*

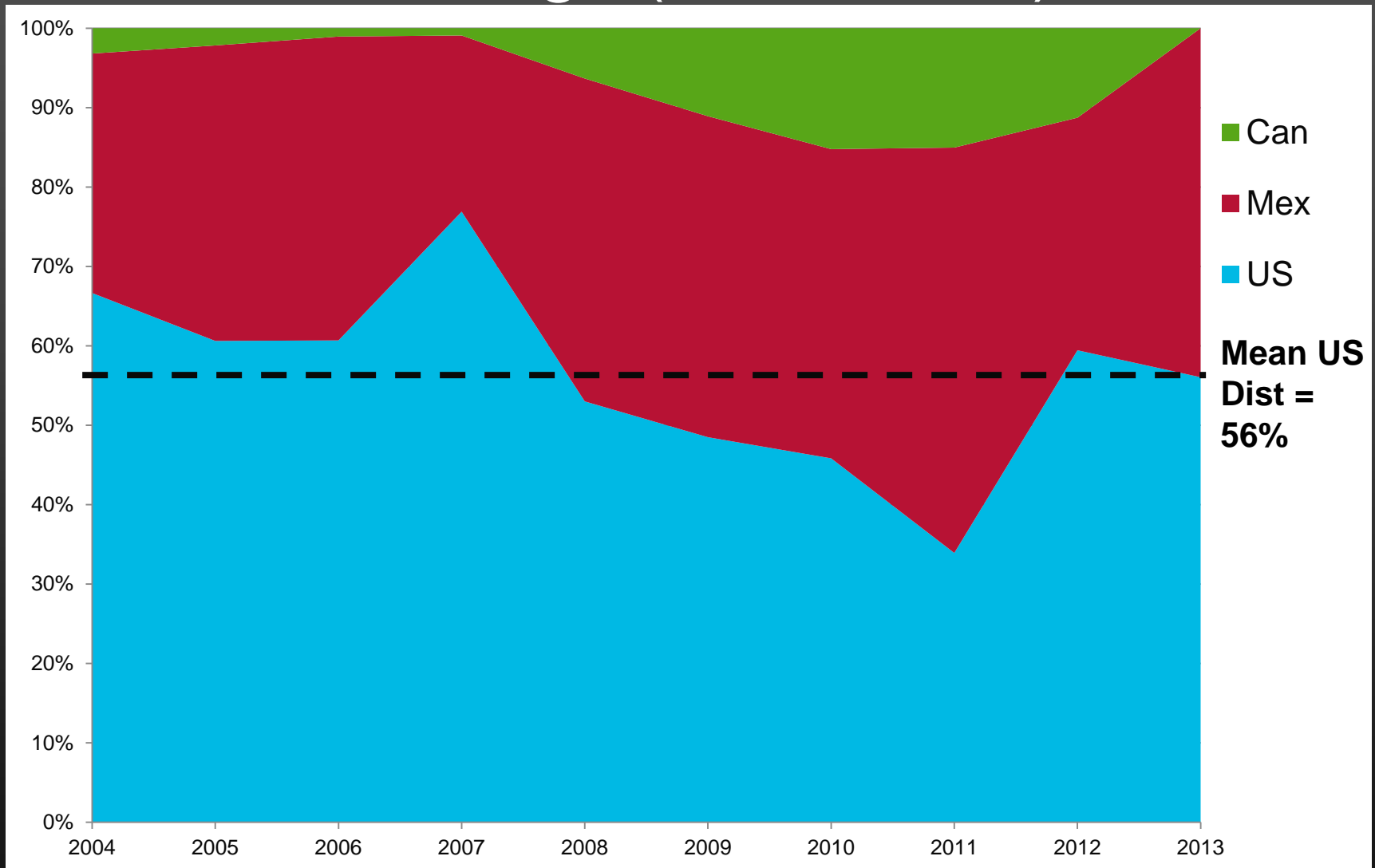


*Ingrid Taylor*



*Geoff Shester/Oceana*

# Actual Distribution of Pacific Sardine Landings (2004-2013)



# Three Ways to Fix DISTRIBUTION

When Mexico and Canada Aren't Following the US Harvest Guideline

- Set HG and OFL based on coastwide assessment then subtract most recent year's landings from Canada and Mexico
- Estimate the portion of the sardine stock in US waters (recommended in CPS FMP) in the stock assessment
- Use CUTOFF to account for foreign catch

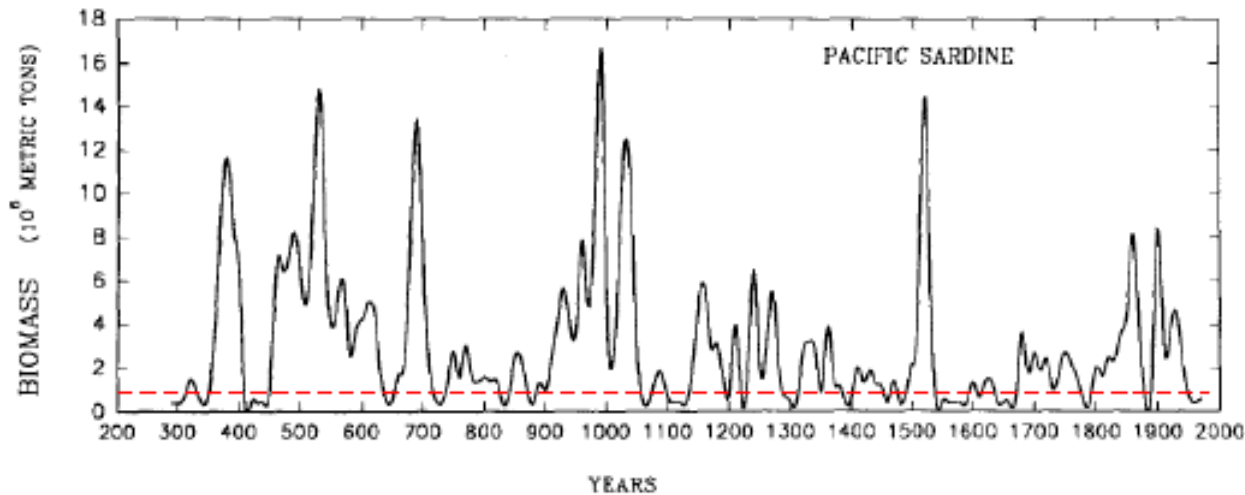
# Oceana's Proposal

Parameters	Current HG	Oceana Proposed Harvest Control Rule
<b>CUTOFF (B1+, mt)</b>	150,000	640,000
<b>FRACTION</b>	5-15% (SIO index)	5-15% (CalCOFI index)
<b>MAXCAT (mt)</b>	200,000	300,000
<b>DISTRIBUTION (U.S.)</b>	87% of TOTAL HG	TOTAL HG - Lmexico - Lcanada
<b>MSST (1+, mt)</b>	50,000	640,000
<b>OFL (TOTAL)</b>	18% of Biomass (1+)	Emsy (0-25%) based on CalCOFI
<b>OFL (US)</b>	87% of TOTAL OFL	TOTAL OFL - Lmexico - Lcanada



# Pacific Sardine

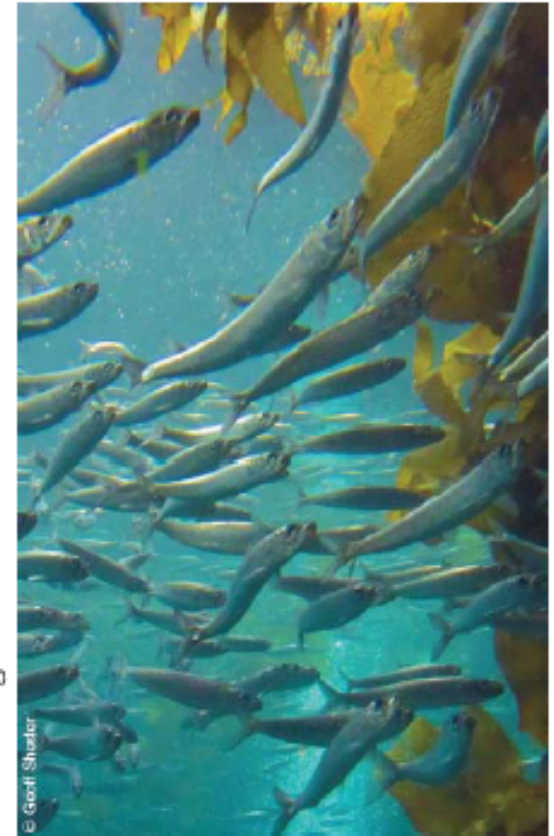
1700-yr hindcast series of Pacific sardine using fish-scale-deposition rates from sediments in the Santa Barbara Basin



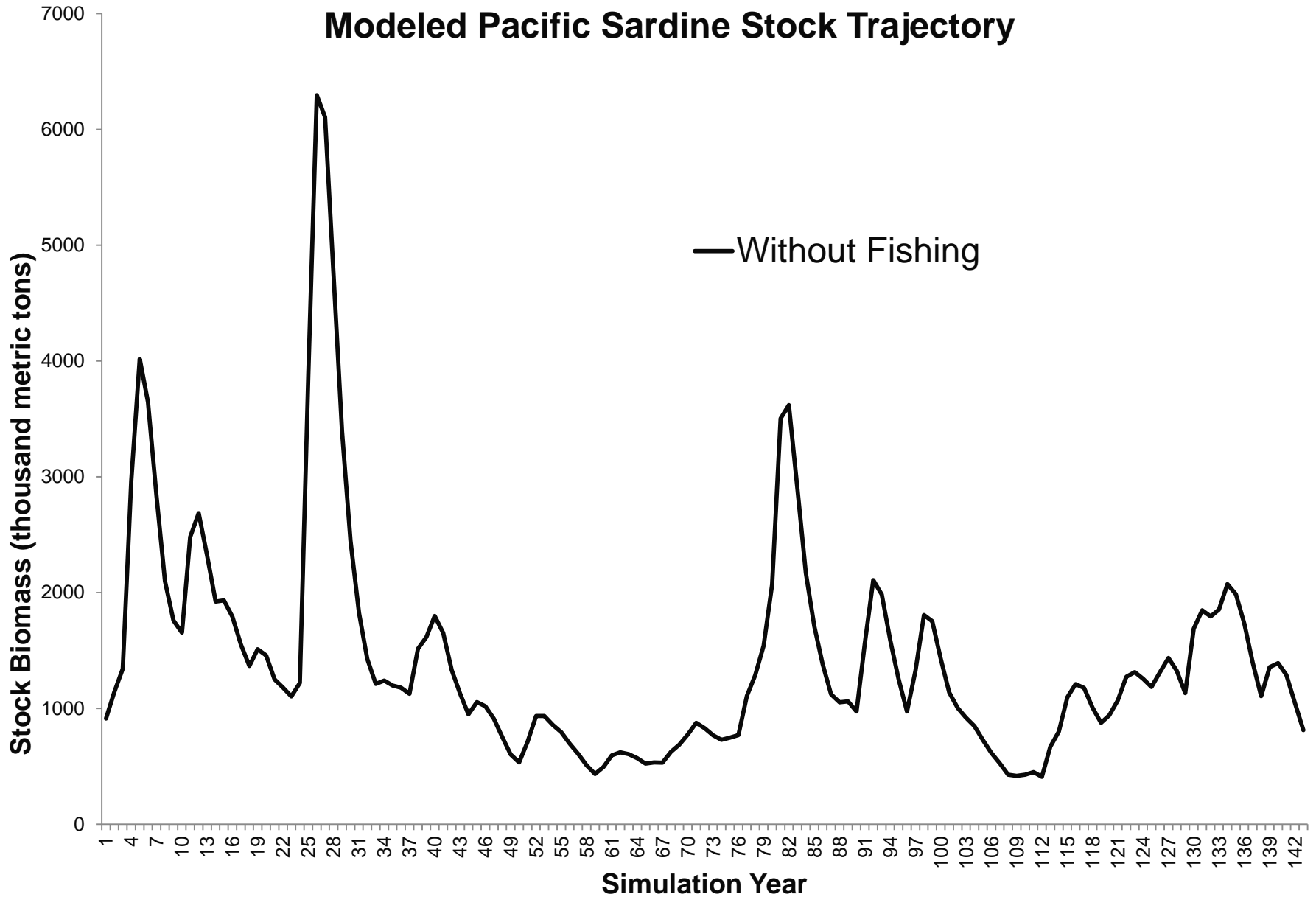
Collapse: less than 1 million tons

Recovery: greater than 4 million tons

Baumgartner et al. (1992)

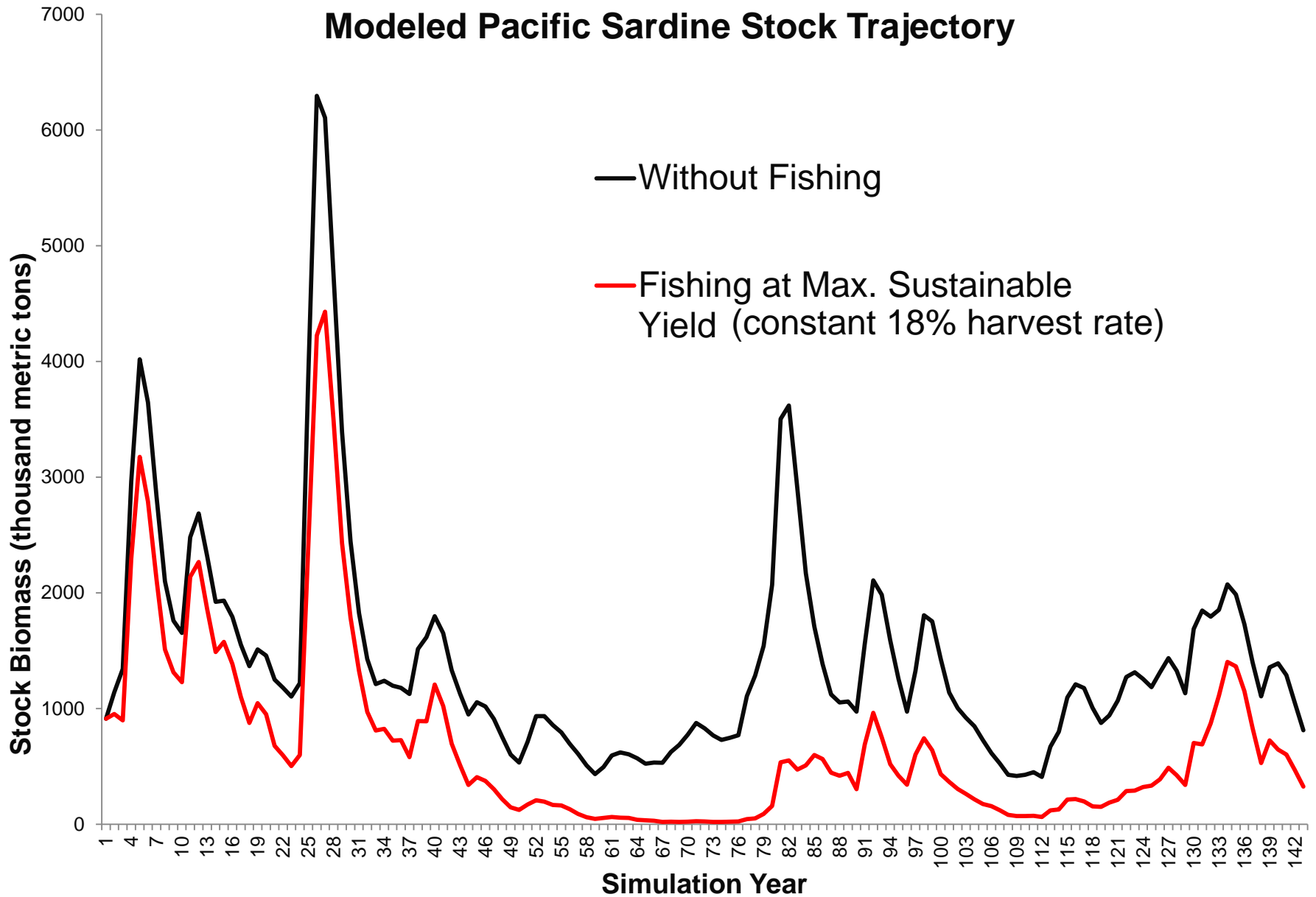


# Modeled Pacific Sardine Stock Trajectory



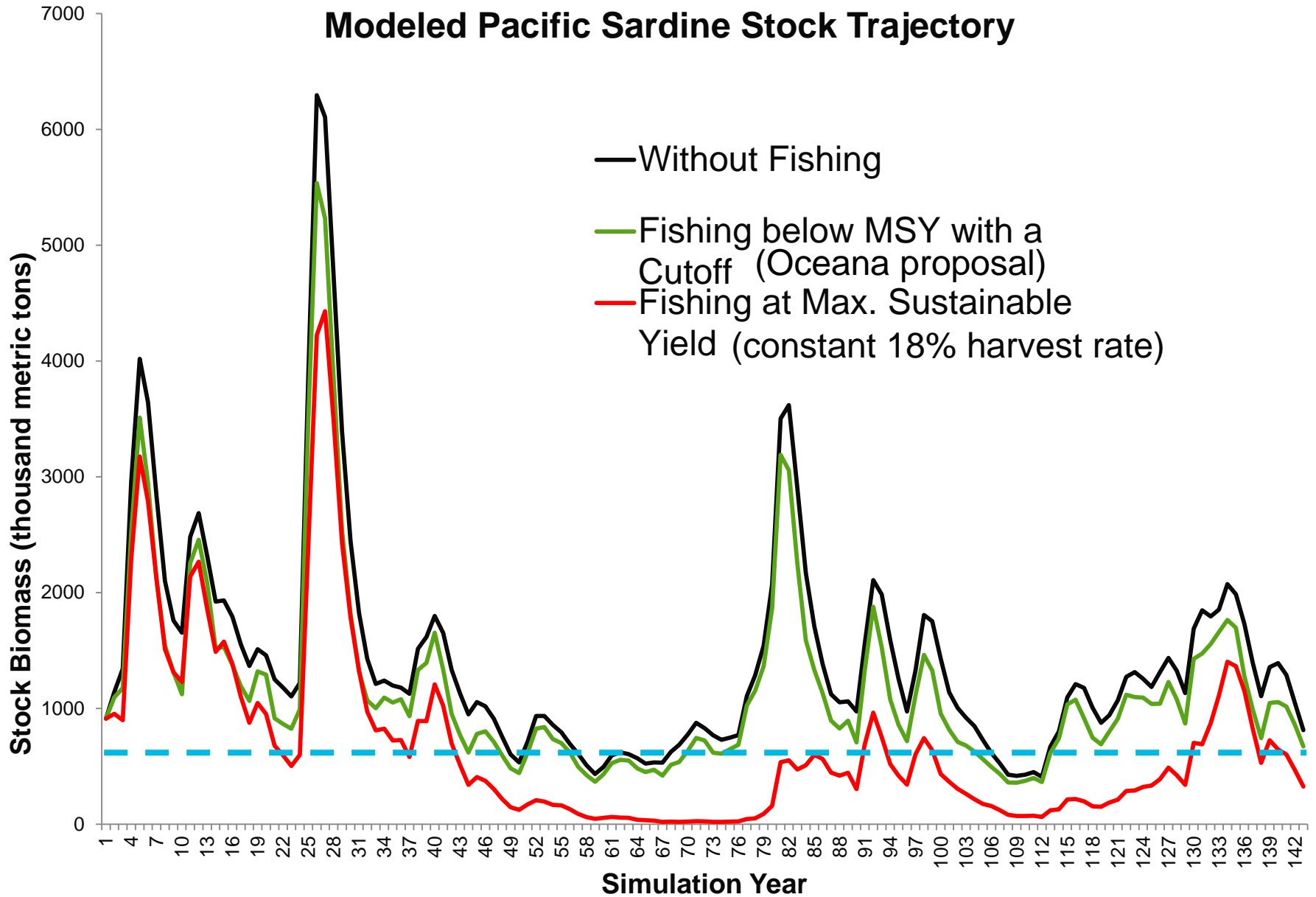
Trajectories based on 2013 Hurtado & Punt model

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# New Operating Model Results

	Oceana proposed ( <i>"Request 6"</i> )	Option J assuming Mex/Can follow US HG ( <i>"Option J"</i> )	Option J with only US following US control rule ( <i>"MF"</i> )
<b>Mean B1+</b>	<b>1,346</b>	<b>1,220</b>	<b>716</b>
<b>% of unfished B1+</b>	<b>0.86</b>	<b>0.78</b>	<b>0.46</b>
<b>% years with B1+&gt;400,000 t</b>	<b>97.75</b>	<b>92.4</b>	<b>58.9</b>
<b>Mean catch (all years)</b>	<b>89.4</b>	<b>105.8</b>	<b>57.2</b>
<b>% years with catch&lt;50,000 t</b>	<b>49.2</b>	<b>31.2</b>	<b>58.8</b>

# CUTOFF is Critical

- CUTOFF must explicitly be used to provide adequate forage to dependent predators (this is a goal of the CPS FMP)
- Current CUTOFF not high enough to:
  - Reduce stock risk
  - Increase biomass
  - Provide forage production
  - Address uncontrolled Mex/Can landings



# Conclusion

- New data and experience since Amendment 8 show we need more precautionary HCR
- Do not adopt more aggressive HCR (10-20% is more aggressive); but use CalCOFI index to set HG FRACTION
- Overhaul of Sardine HCR required to:
  - Provide adequate forage
  - Prevent overfishing
  - Address international dilemma
- Consider & Adopt Oceana's proposed HCR

