

Report by California Ocean Science Trust: Technical Review of Methodology Used by the Department to Estimate Red Abalone Density

Marine Resources Committee Meeting
3/24/2014



M. O'Donnell

Senior Scientist

California Ocean Science Trust

m.odonnell@calost.org



Background

- Initial Request from CDFW
- Role of Ocean Science Trust
 - Independent facilitator
 - Design & maintain process
- Funded by the Ocean Protection Council



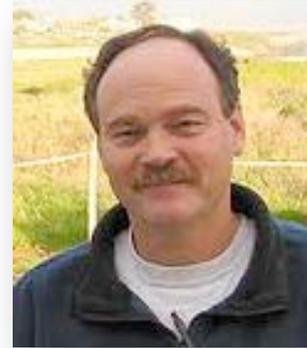
Review Scope

Scientific and technical review of:

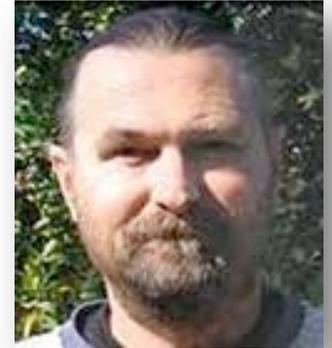
1. survey design, including strengths and weaknesses of current methods for estimating red abalone density;
2. the application of existing methods, including analysis of existing data, and interpretation of results; and
3. uncertainty associated with existing methods for estimating red abalone density in northern California and its adequacy for informing catch limits and other management controls of the recreational red abalone fishery in northern California, as outlined by the ARMP.

SAC Selection & Membership

- Constituent nominations
- Met minimum qualifications
- Names / CVs made available online



Dr. Mark Carr (Chair)
University of California,
Santa Cruz



Dr. Jeremy Prince
Murdoch University,
Australia



Dr. Pete Raimondi
University of California,
Santa Cruz



Dr. Karina Nielsen
Sonoma State University

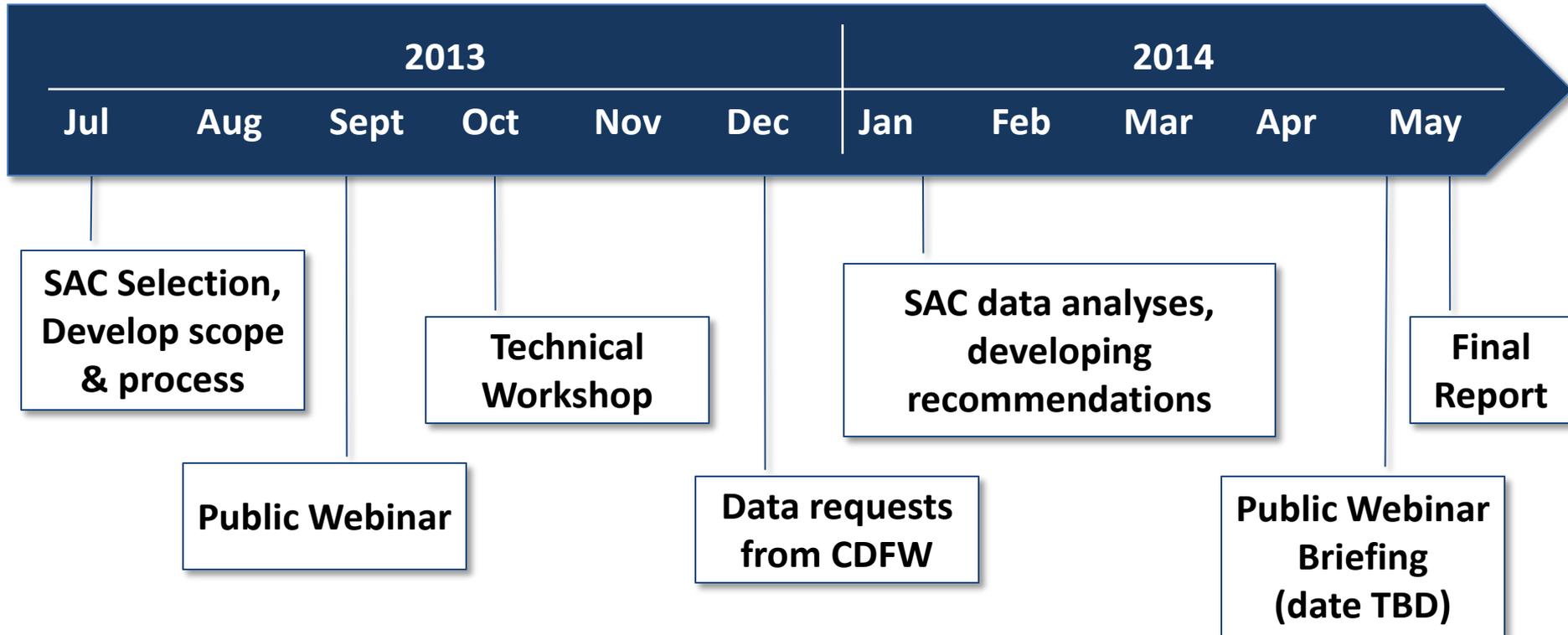


Dr. Steven Schroeter
University of California,
Santa Barbara



Dr. Brian Tissot
Humboldt State University

Review Process



- Constituent engagement throughout process
- Acknowledge CDFW contributions

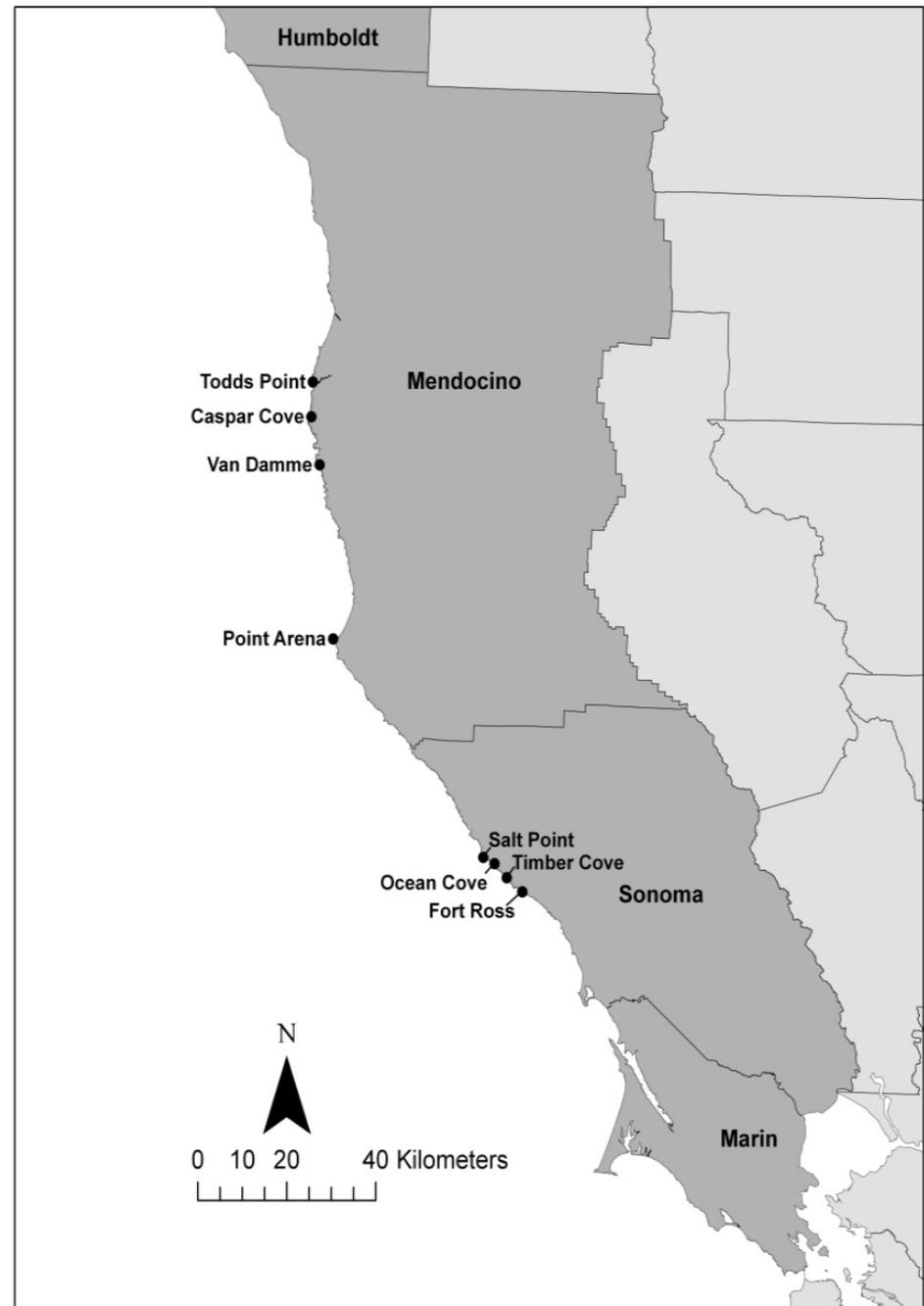
SAC Understanding of ARMP

ARMP Table 7-2

CRITERIA					ACTION
Recruitment		Density (ab/ha) – emergent surveys			
		Refuge (deep)		All depths	
Yes	AND	More than 4,100	AND	More than 8,300	1) Increase TAC by 25% (to maximum of 500,000 ab/yr or 125% of revised TAC)
NA		3,300	AND	6,600	2) Maintain TAC (400,000 ab/yr or revised TAC)
No	AND	Less than 2,500	OR	Less than 5,000	3) Reduce TAC by 25% increments
NA		NA		Less than 3,000 at all surveyed index sites combined	4) Close fishery until stocks are recovered according to recovery criteria AND enough data are collected to shift to long-term management plan
NA		More than 3,300	AND	More than 6,600	5) If recovery criteria are also met, reopen closed fishery under long- term management plan

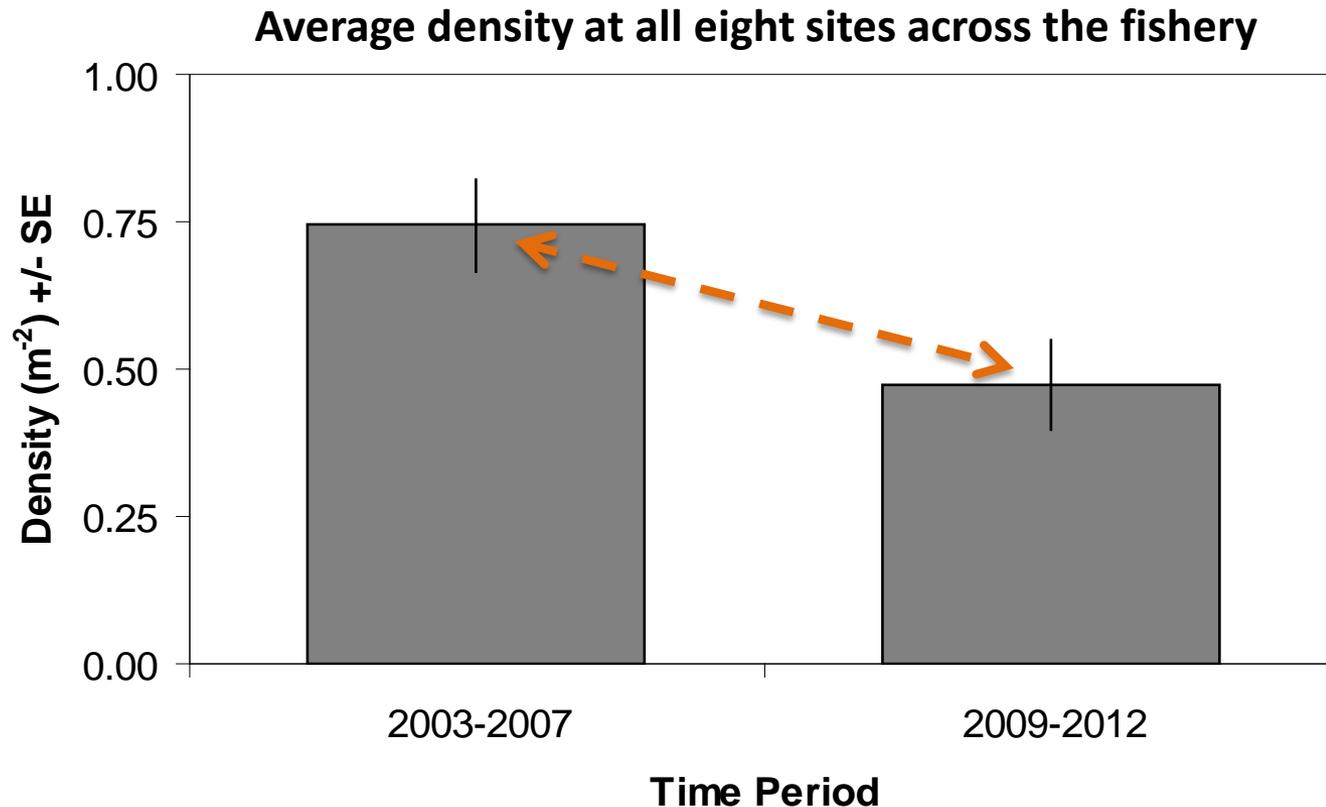
Overview of CDFW Survey Design

- Dive surveys
- 8 index sites, 4 depths, 9 transects
- Avoid 50% sand
- All specified in ARMP
- 3 years to complete survey cycle



Overview of CDFW Data Analyses

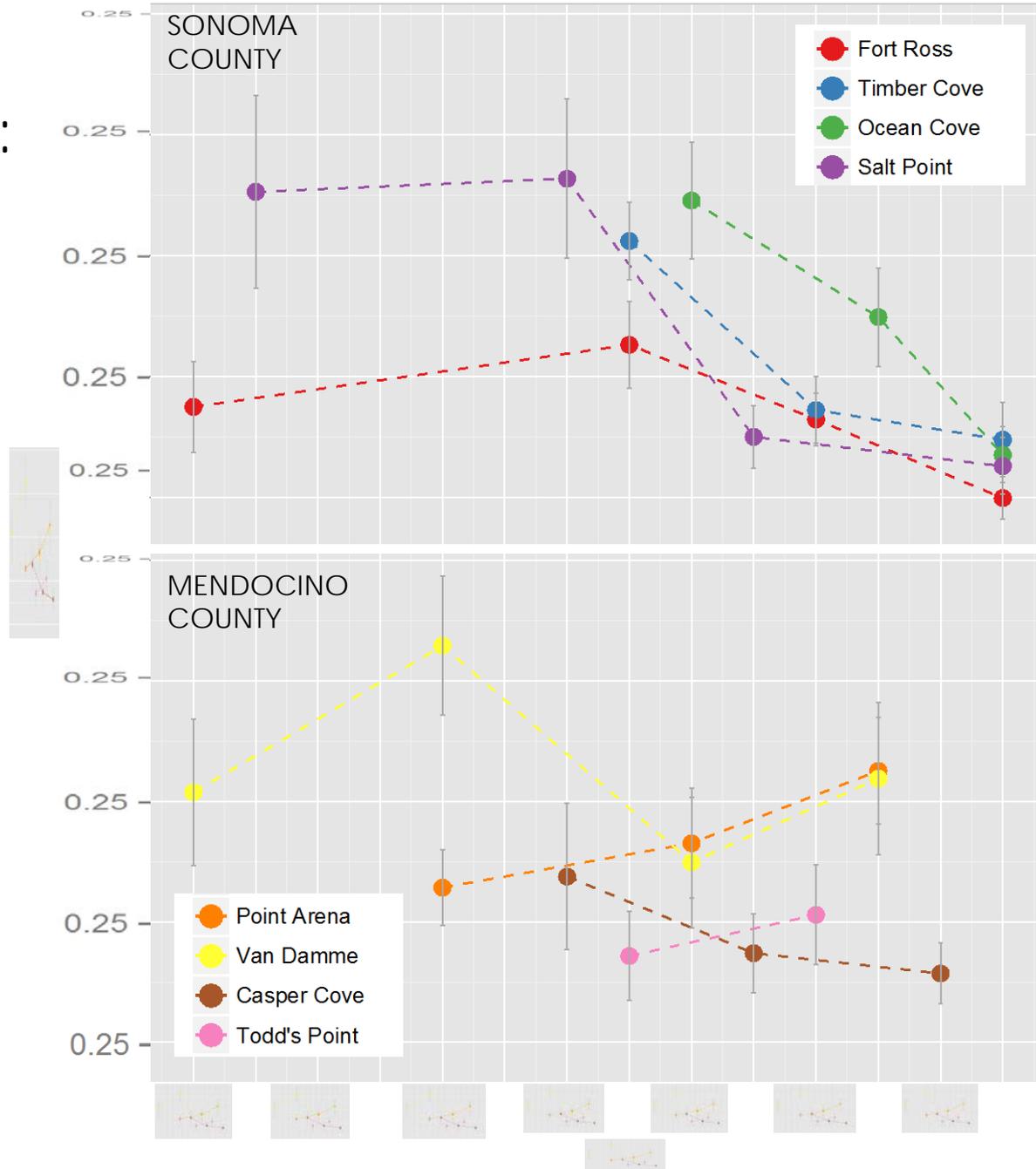
Use of ANOVA to determine if average densities differ significantly between time periods, across fishery / county / site



SAC

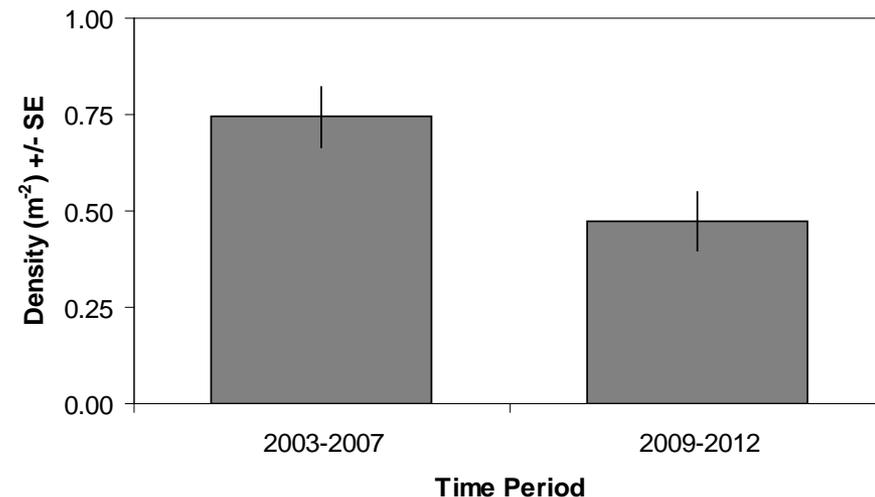
Recommendation: Survey Design

- Dive surveys form a valuable long-term data set
- Room for some modifications to reduce variability in data
 - Accounting for habitat data
 - Fewer deep transects



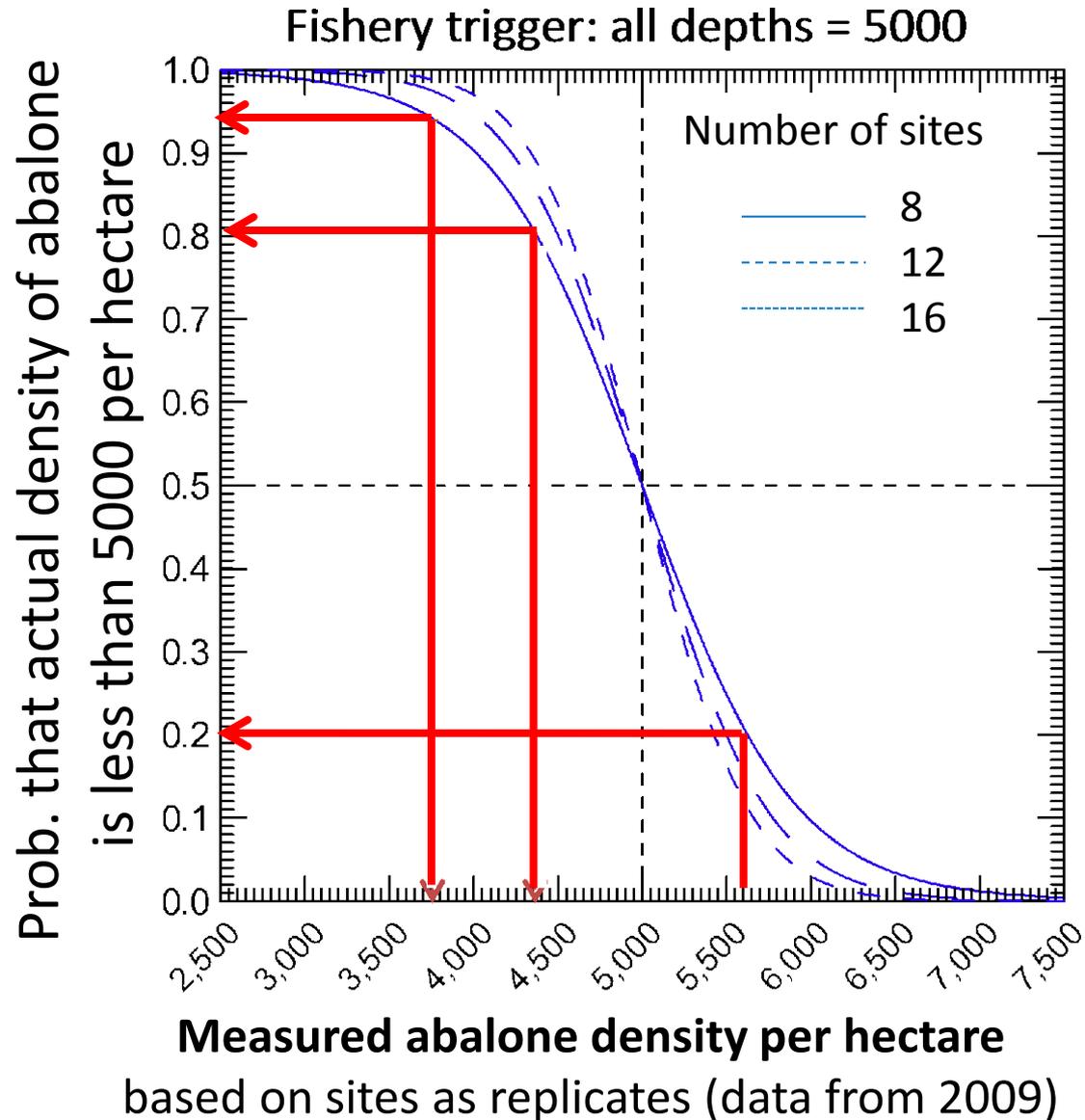
SAC Recommendation: Data Analysis

- ANOVA is not the appropriate analysis
 - Does not indicate if you are above or below the thresholds
 - Concern about unit of replication
 - Understanding of risk and uncertainty embedded in statistics



SAC Recommended Analysis: Cumulative Probability Function

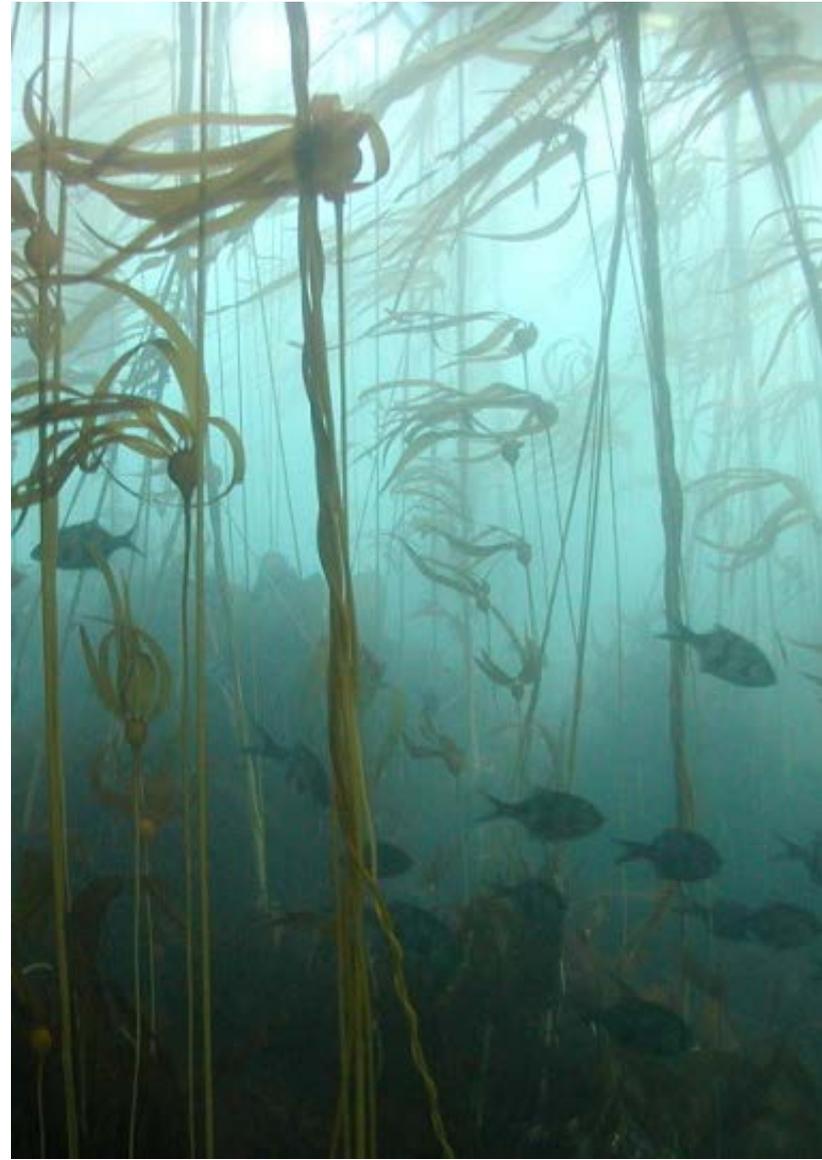
- Explicit about the likelihood of true population above or below threshold
- Transparent uncertainty
- Can be applied to site / county / fishery level management



Breadth of Report

Additional topics will be contained within final report:

- Specifics of statistics
- Incorporating habitat information may lead to better understanding
- Concern about 3 year time lag for completing surveys

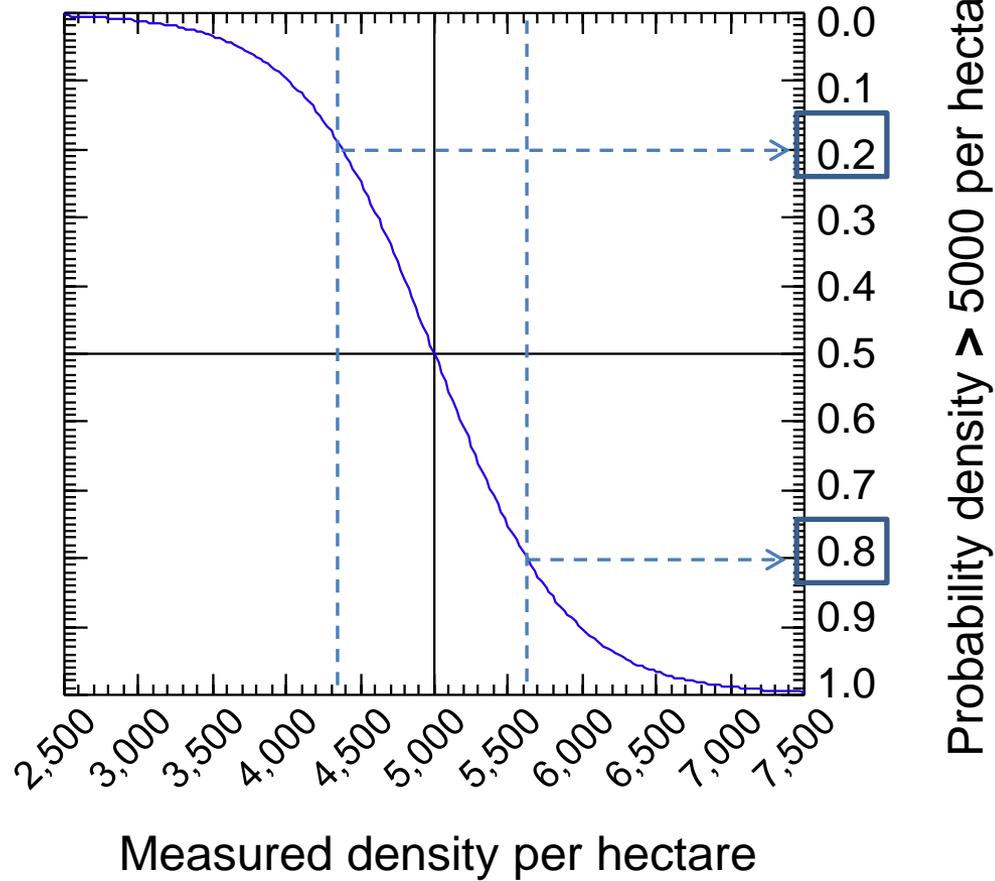


Looking Forward: SAC Long-Term Recommendations

- Shift management focus to tracking condition of population (combined density and sizes of individuals)
- Stronger biological basis for management thresholds
- Make data publically available
- Increasing collaboration with outside experts



Threshold = 5000 per hectare



Using measured variability from CDFW surveys

