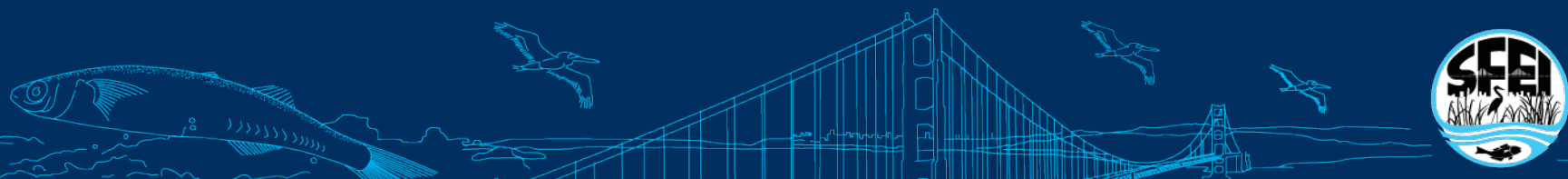




# Power Analysis and Optimization of the RMP Status and Trends Program

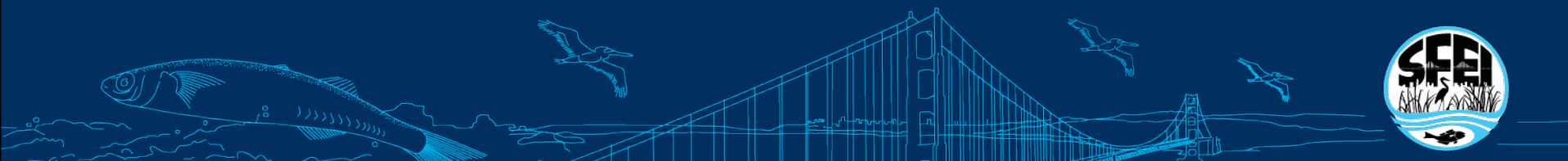
Presentation to the RMP Fish Committee  
November 5<sup>th</sup>, 2008

Aroon Melwani, Ben Greenfield, John Oram  
*San Francisco Estuary Institute*



# Why Power Analysis on Sport fish?

- Adaptive management
- Optimize program
  - Evaluate Status and Trends elements and PS/SS
  - Develop alternative sampling designs
- Track how well the current design is working





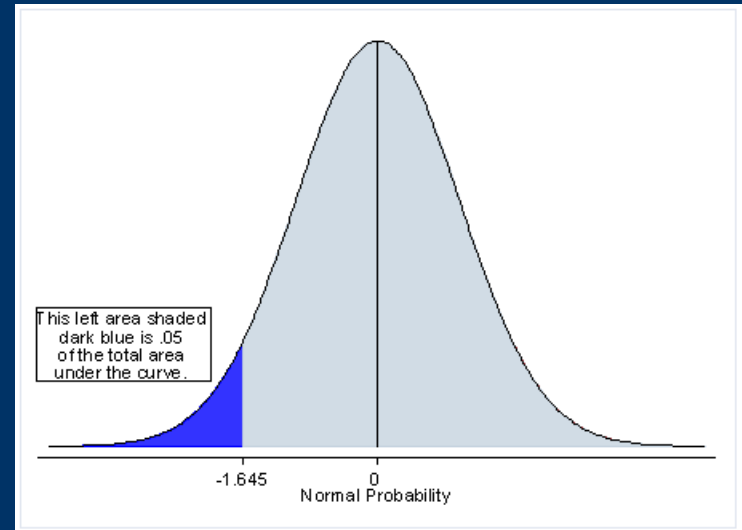
# Objectives of Power Analysis

- Compare to thresholds
  - Focus on thresholds of management significance for the Bay
  - Are we meeting management objectives?
    - TMDL targets (Hg and PCBs)
- Evaluate long-term trends
  - “Given an expected rate of decline over a specified time frame, what is the power of the sampling design to detect a significant negative trend?”



# Threshold Analysis

- Compare concentrations to key thresholds
- Explicit assumptions
- 1-tailed t-test
  
- Determine number of samples required to distinguish average concentrations from threshold 80% and 95% of the time

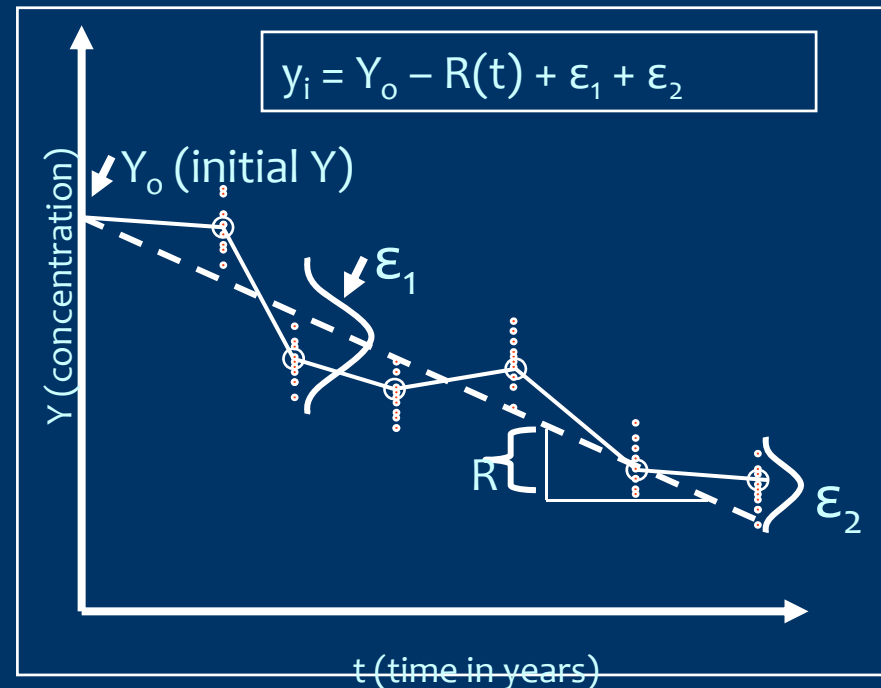
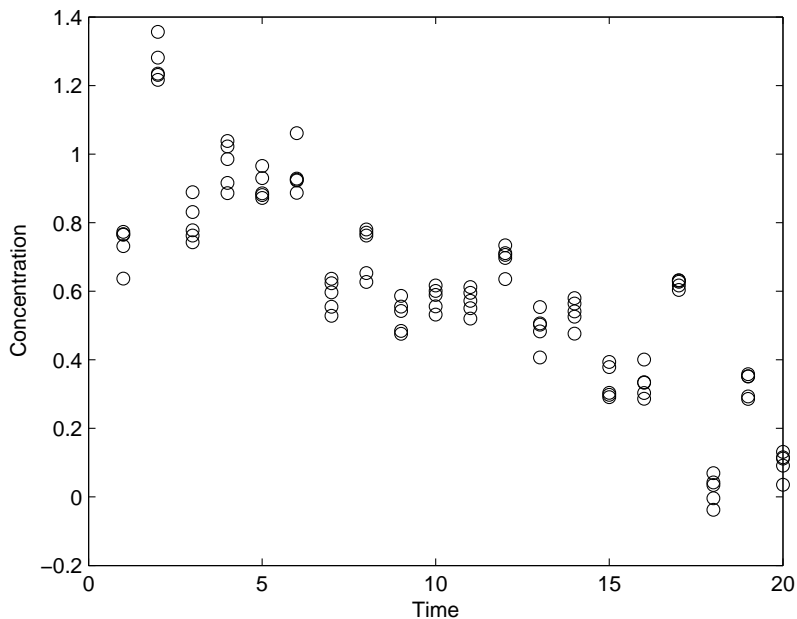


# Threshold Comparison

	Mercury	Total PCBs	Current Design
<b>Species</b>	<b>Number of Samples Required to Achieve 80% Power</b>		
Shiner Surfperch	3	31	12
White Croaker	12	17	12
<b>Species</b>	<b>Number of Samples Required to Achieve 95% Power</b>		
Shiner Surfperch	4	>50	12
White Croaker	19	29	12

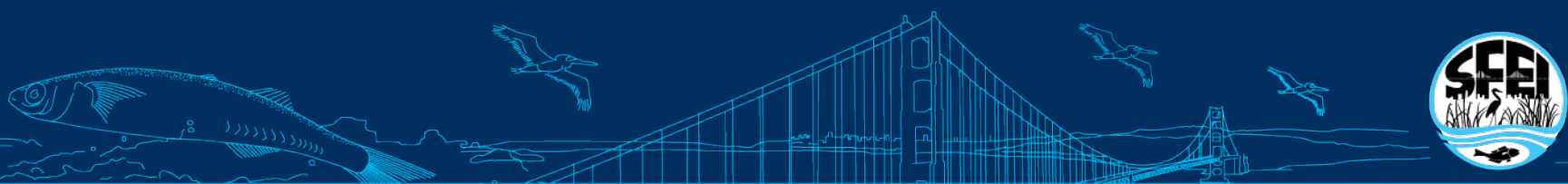
# Trend Analysis

- Simulated data sets – Monte Carlo method
- Variability based on current RMP data
- Trend and time frame based on Regional Board recommendations



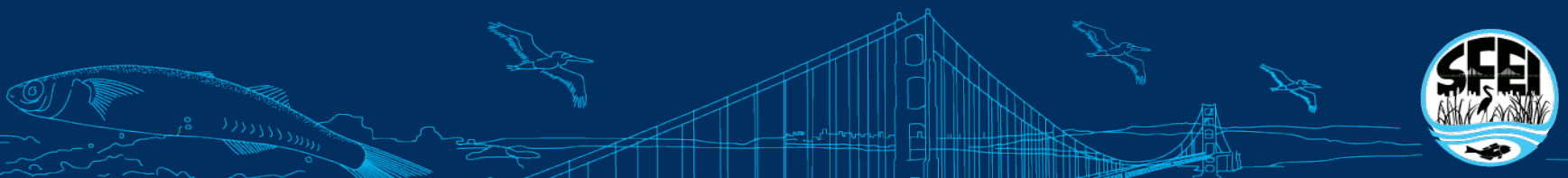
# Trends in Sport fish

			Shiner Surfperch					White Croaker						
			Sampling Interval (years)					Sampling Interval (years)						
			1	2	3	4	5	1	2	3	4	5		
<b>Scenario:</b> PCBs Sportfish 20 Year 3.5% Annual Decline	Samples/year	3	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	98%
		6	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		9	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		12	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		15	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		18	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
<b>Scenario:</b> Mercury Sportfish 30 Year 1% Annual Decline	Samples/year	3	100%	100%	100%	100%	97%	100%	100%	100%	100%	100%	100%	98%
		6	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		9	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		12	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		15	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		18	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%



# Summary of Sport fish Power Analysis

- Current concentrations of PCBs are above thresholds
- Will not detect concentrations below thresholds for some time
- Power to detect trends very good
- Continue with current design to track this decline over time





# Final Report

[www.sfei.org/rmp/reports](http://www.sfei.org/rmp/reports)

## Power Analysis and Optimization of the RMP Status and Trends Program

FINAL REPORT

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