Integrated Modeling Framework for Winter-run Chinook Salmon

Progress through August 2004

Funded by

State Water Contractors &

California Urban Water Agencies

S.P. Cramer & Associates, Inc.

Fisheries Consultants

www.spcramer.com

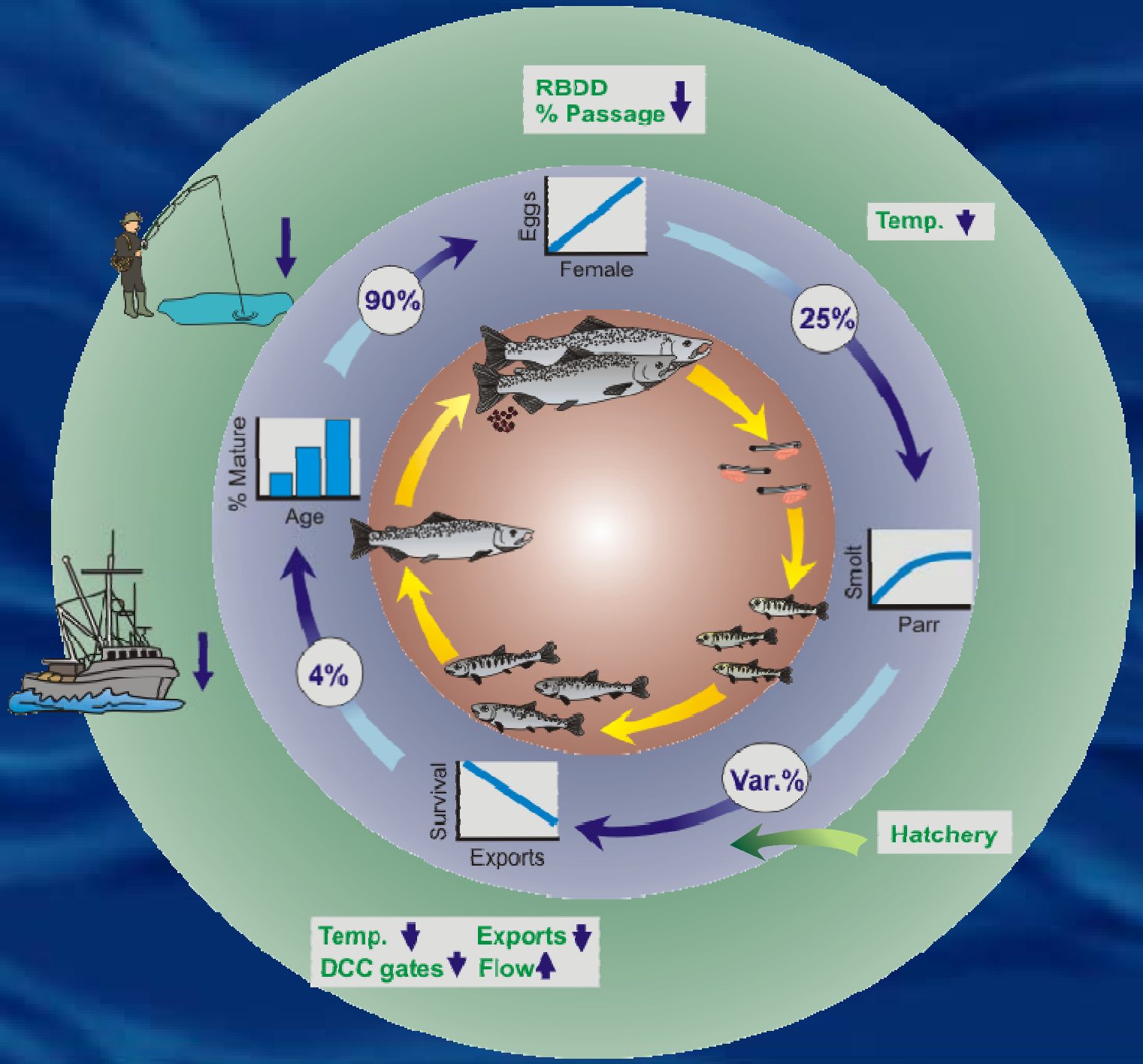
Project Purpose

To Develop a model that resource managers can use to prioritize and implement restoration actions, so as to achieve the greatest fish benefits with available resources

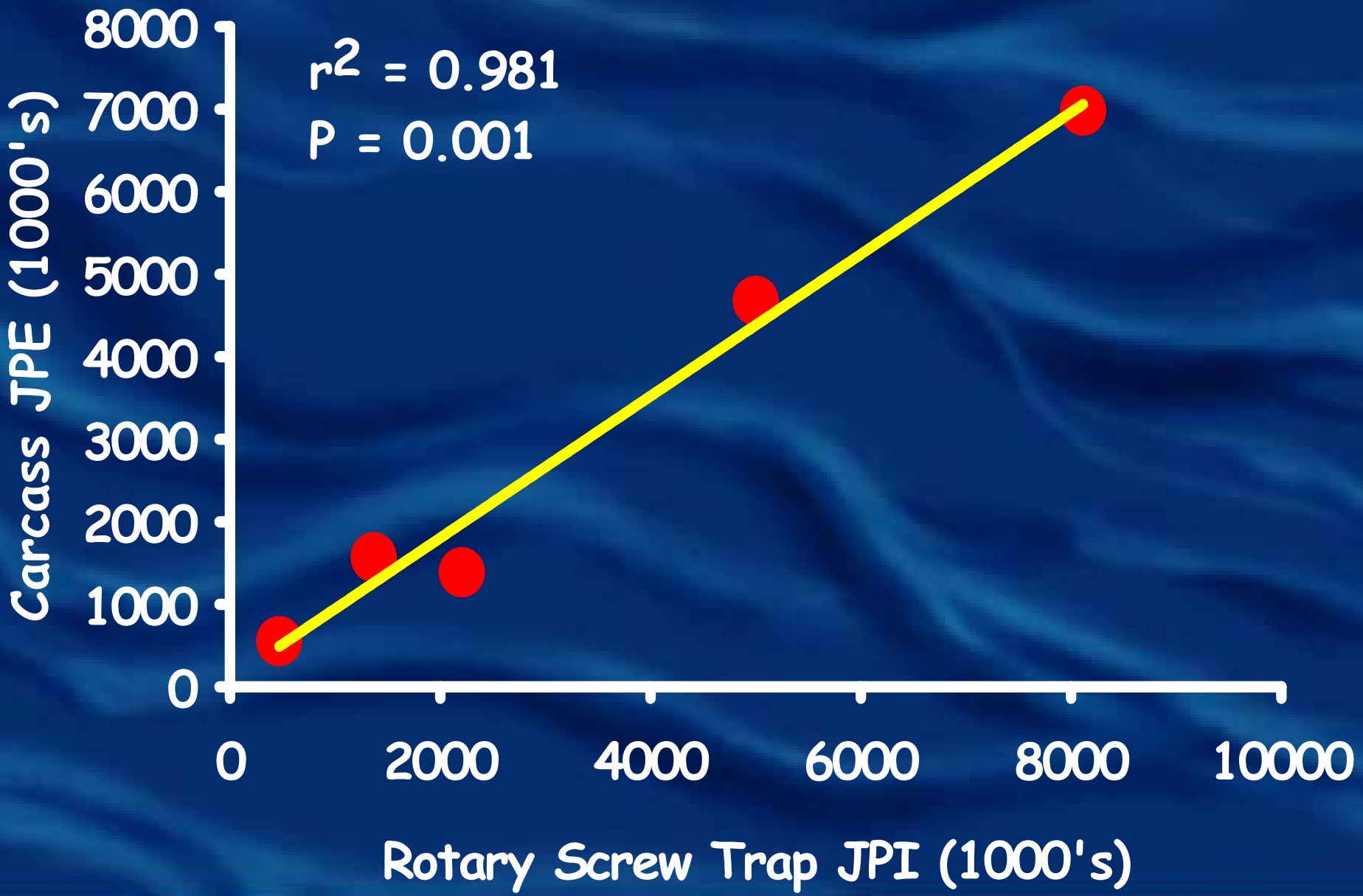
The model should predict relative magnitude of fish production likely to result from alternative combinations of action

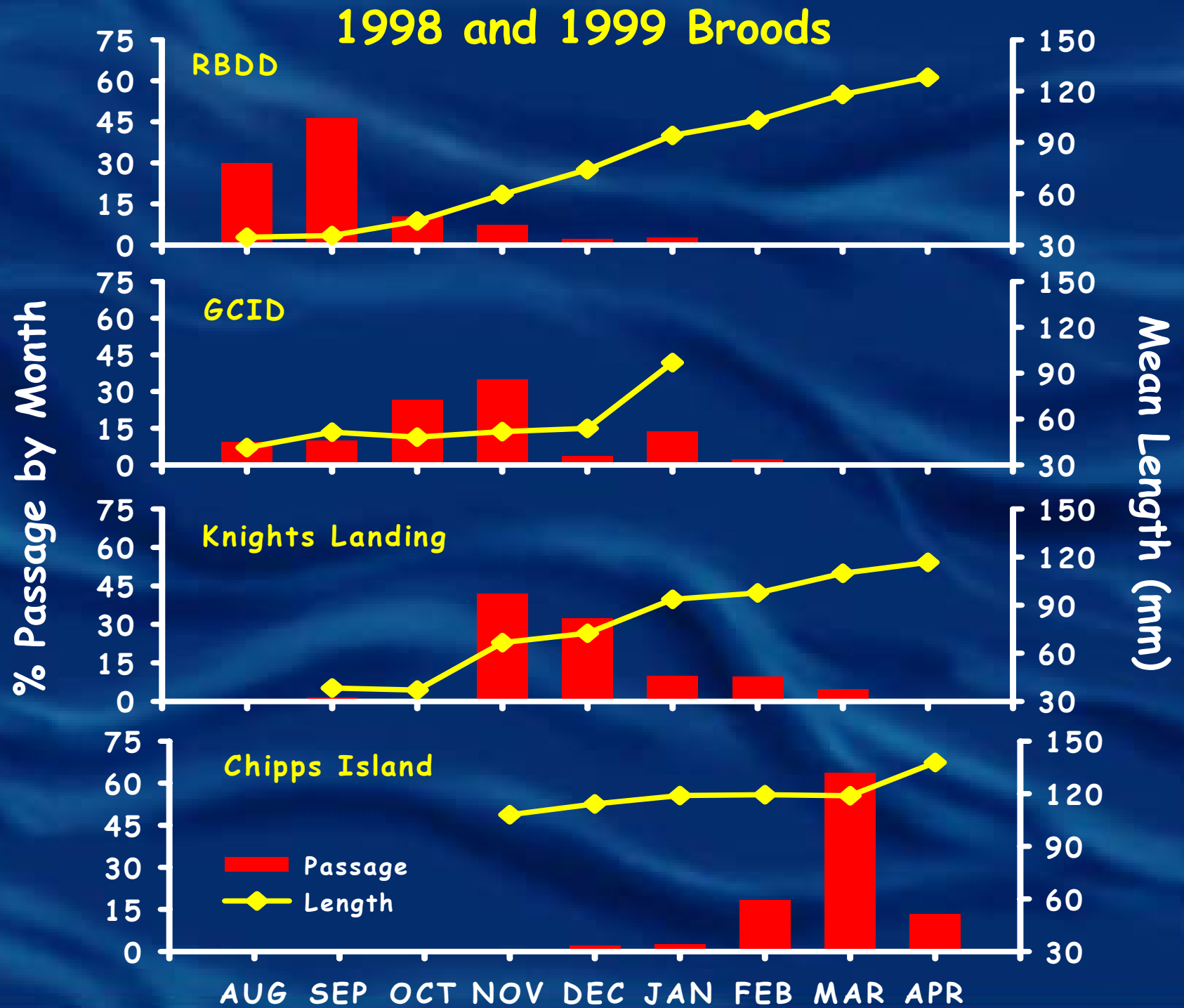
FRAMEWORK GUIDELINES

- Build on Existing Analytical Foundations
- Rely on Demonstrated Cause-Effect Relationships
- Use Readily Available Data
- Focus on Key Factors

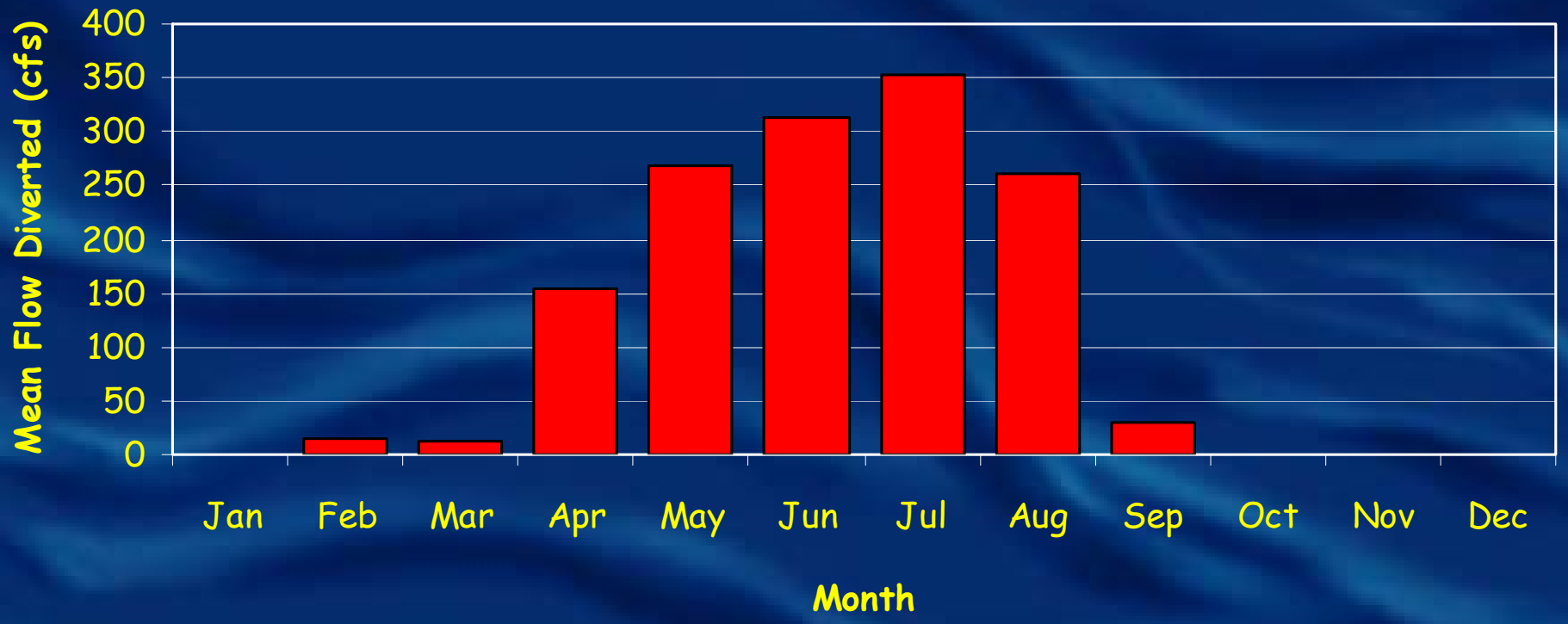

RBDD
% Passage
Temp.
Eggs
Female
90%
25%
% Mature
Age
Smolt
Parr
4%
Var.%
Survival
Exports
Hatchery
Temp.
DCC gates
Exports
Flow

Sacramento Winter-Run Chinook
Indicies of Juvenile Production



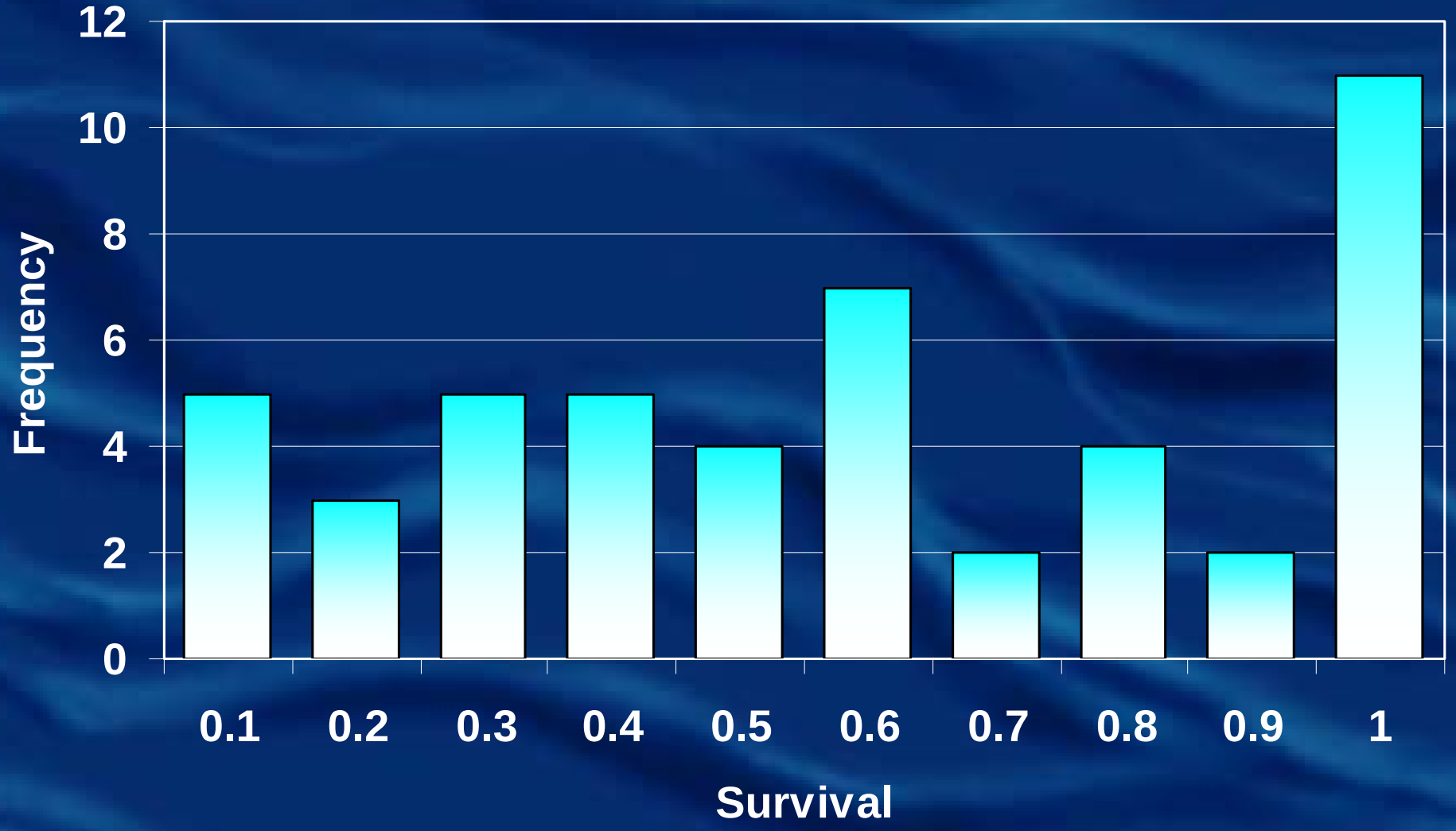

1998 and 1999 Broods
RBDD
GCID
Knights Landing
Chipps Island
% Passage by Month
Mean Length (mm)
Passage
Length
75
60
45
30
15
0
150
120
90
60
30
AUG SEP OCT NOV DEC JAN FEB MAR APR

Monthly Flow Diversion at Wilkins Slough
Reclamation District 108, 1987-91

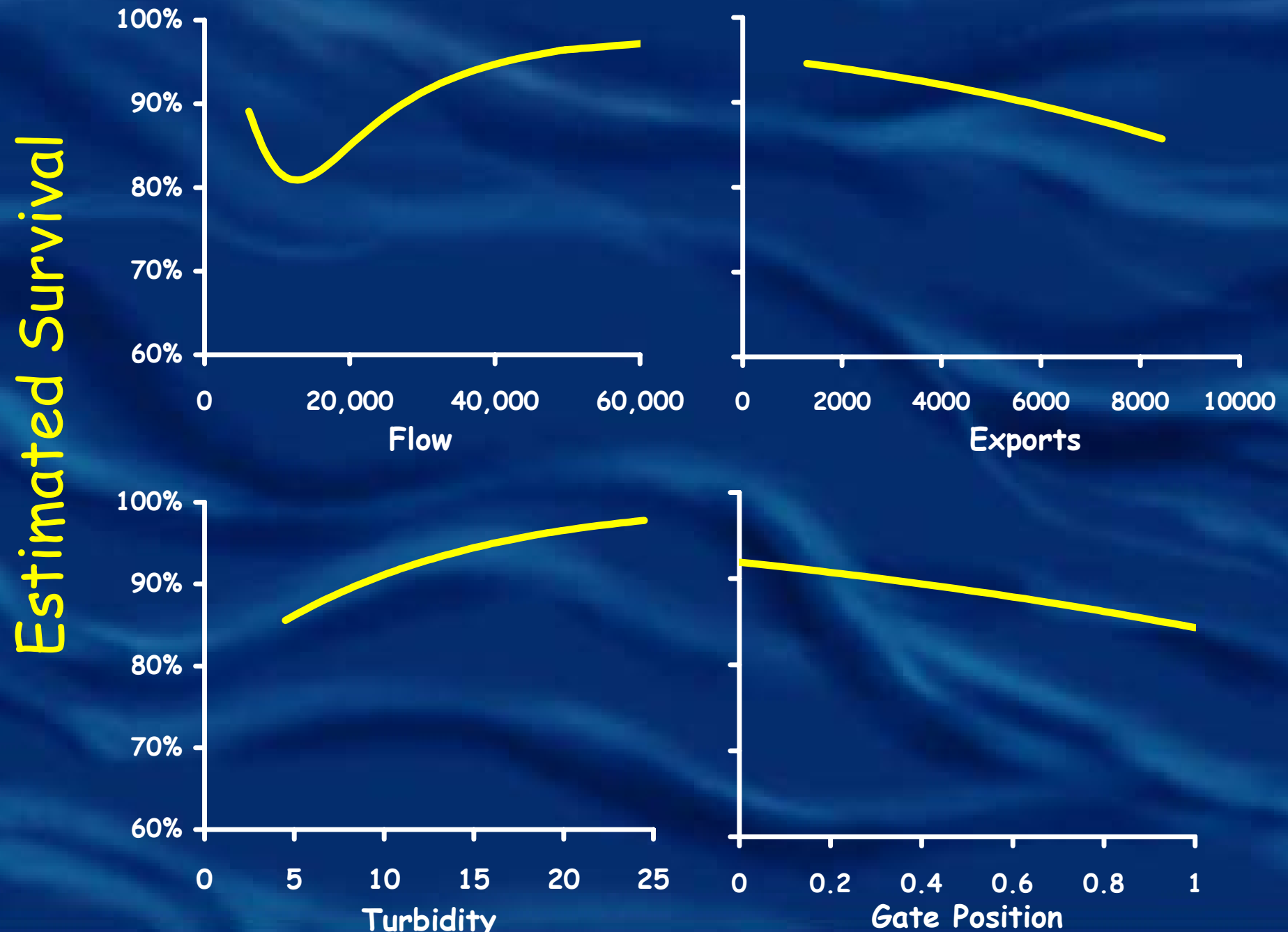


Delta Cross Channel

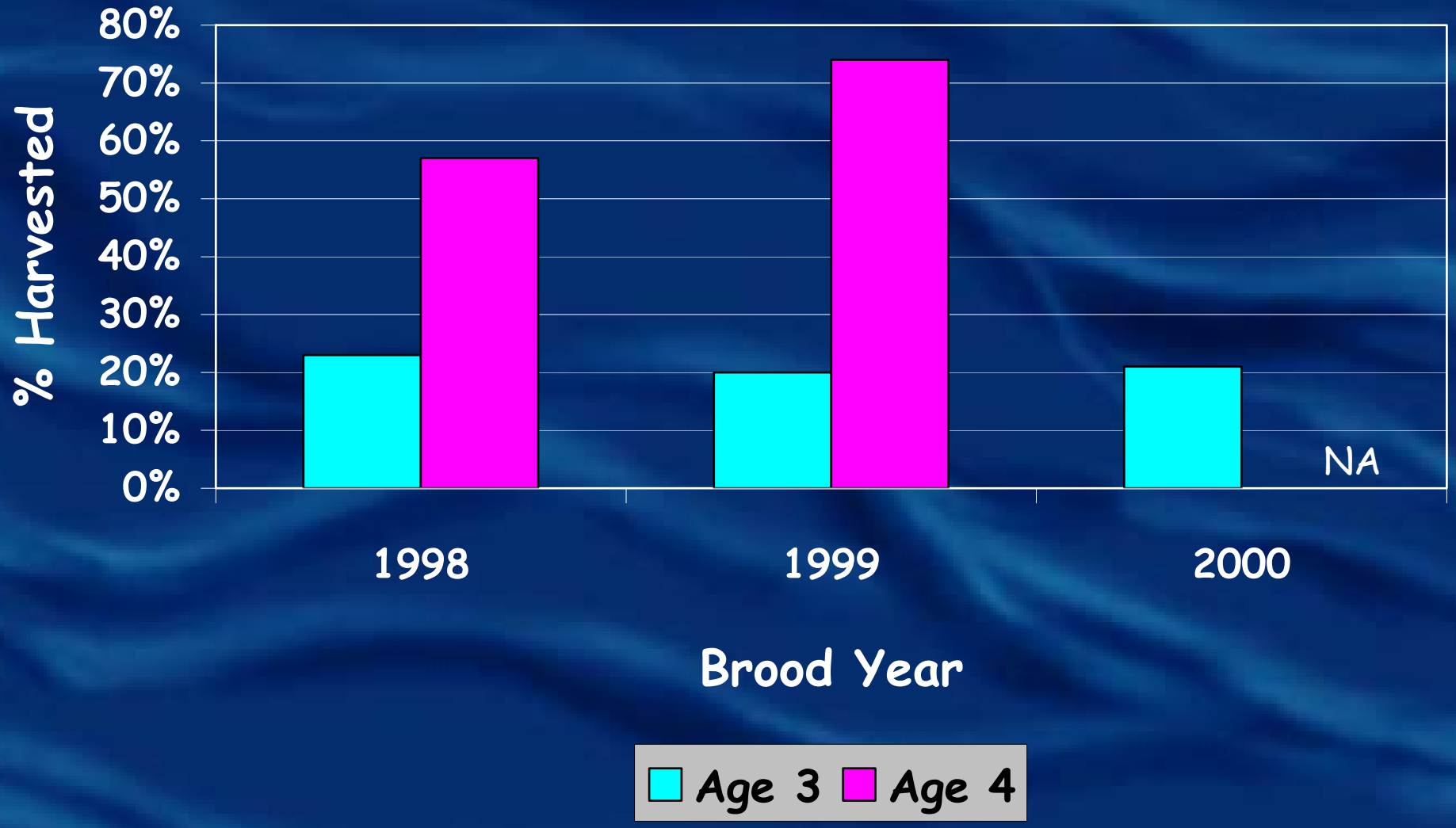
Estimated Delta Survival
Paired CWT Tests Used by Newman (2003)



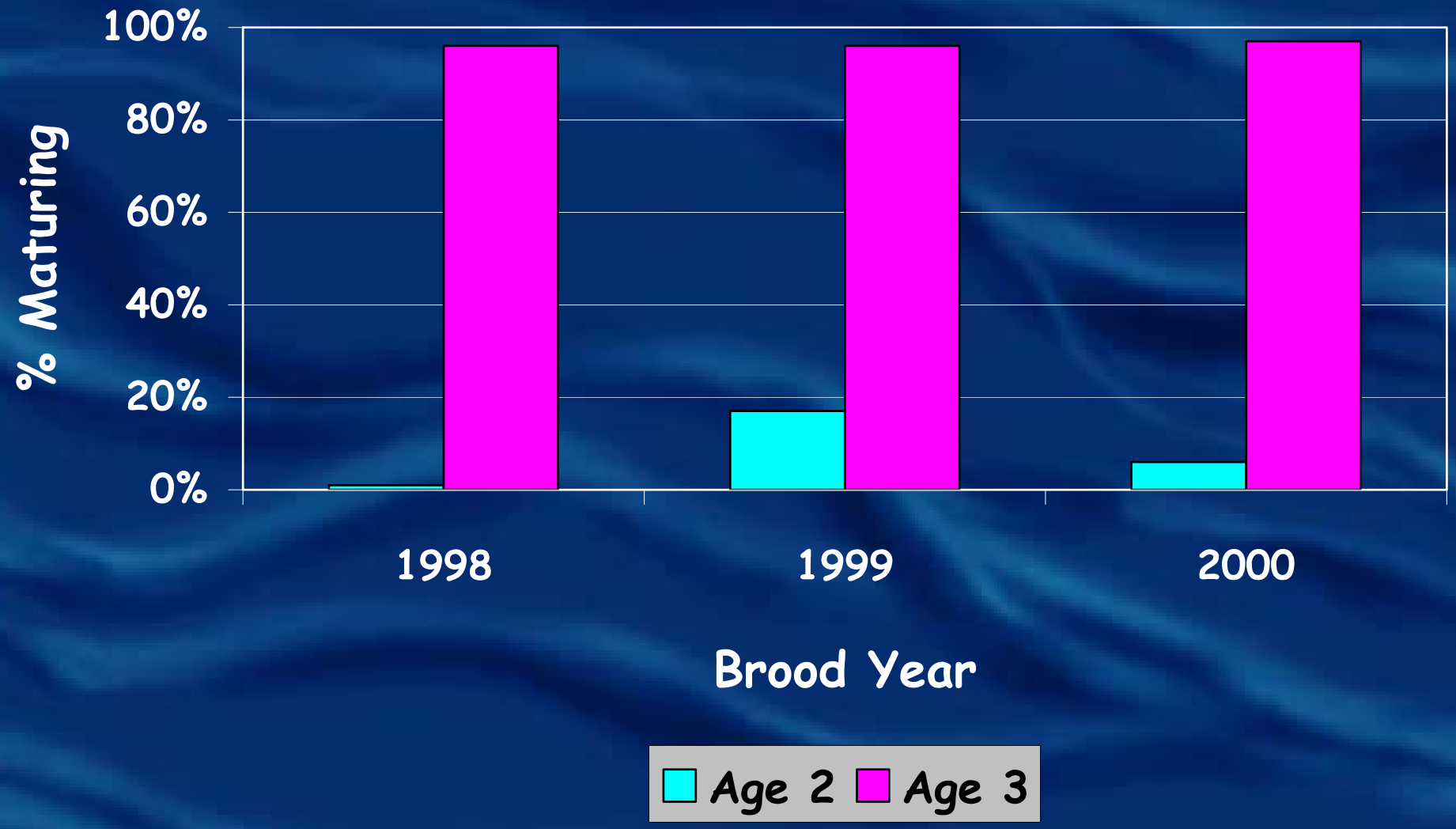
Effect of Parameters on Delta Survival



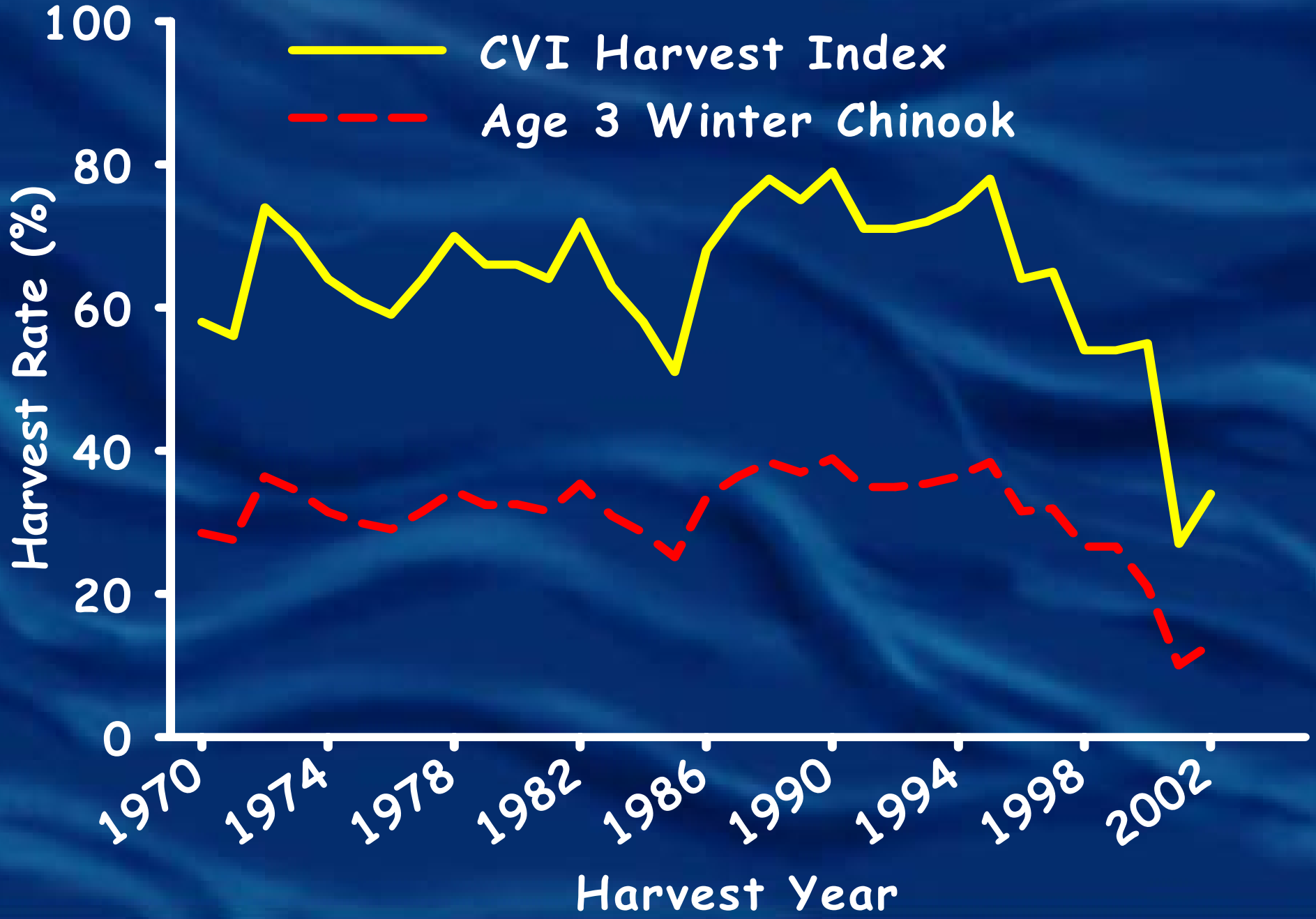
Winter-Run CWT Findings



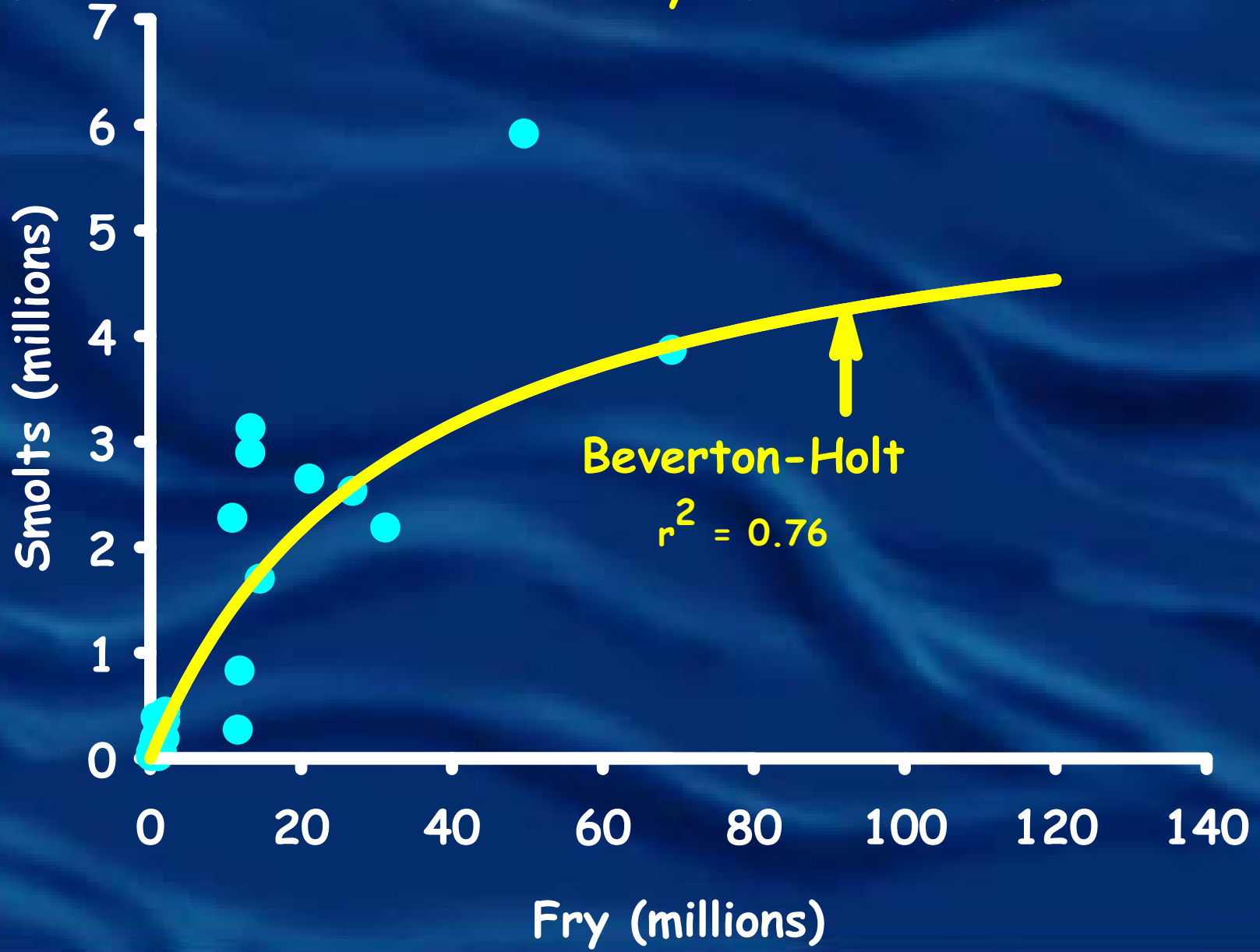
Winter-Run CWT Findings



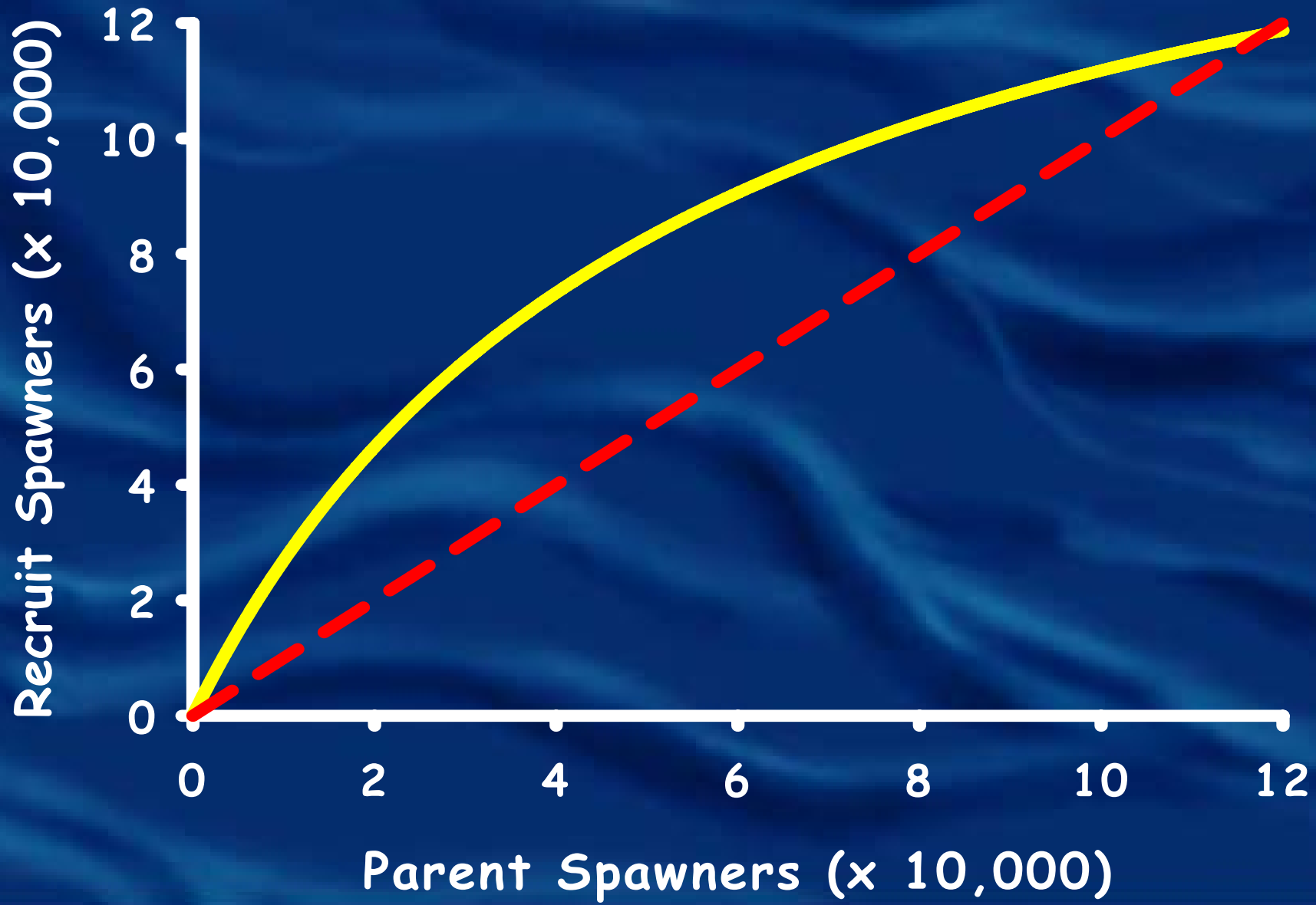
Marine Harvest Rate Indicies



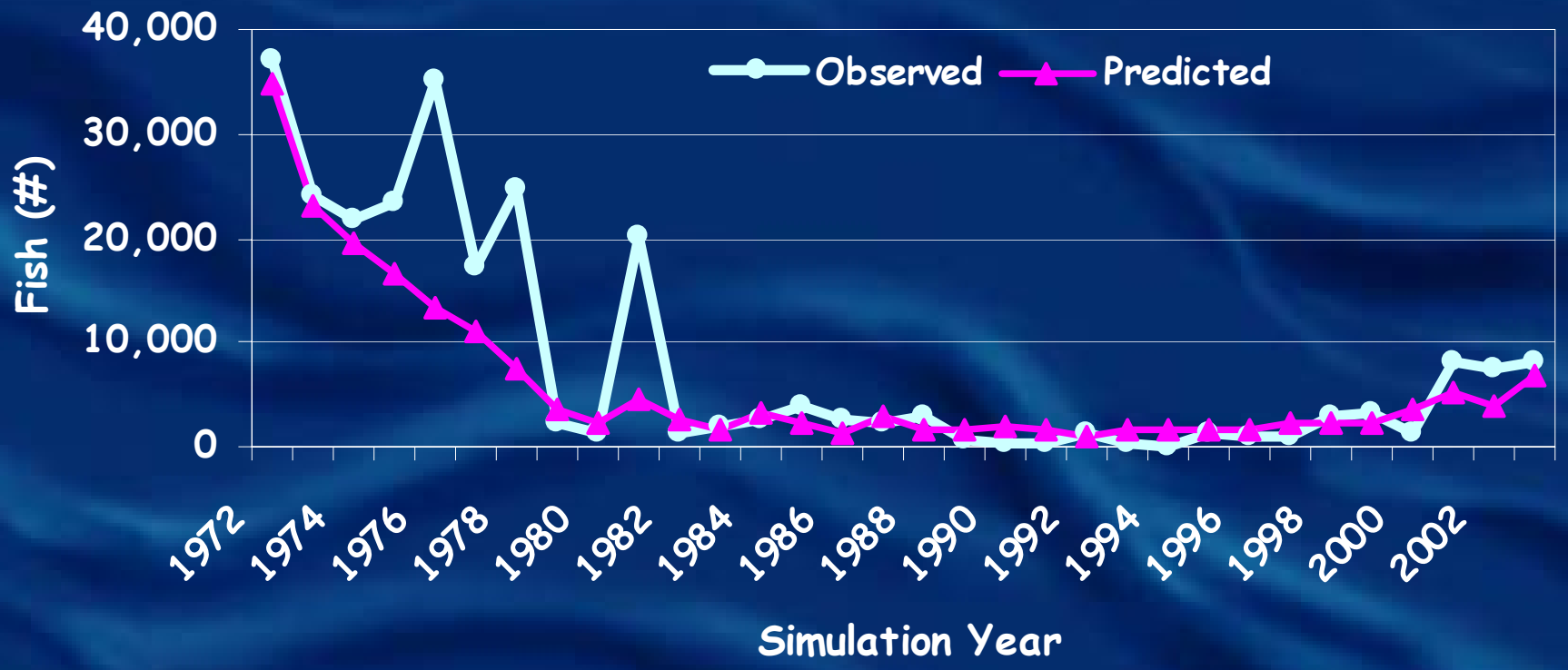
Stock Recruitment Functions
Winter-Run Chinook, 1968-1999 broods



Beverton-Holt Function
Winter-Run Chinook, Full Life Cycle



Winter-Run Chinook Escapement Past RBDD



IMF Links to Fish Recovery Strategies

- Adjust inputs for Habitat, Passage, Hatcheries, or Harvest
- Simulate the future with and without proposed actions
- Compare the difference in predicted spawner escapement between an action and the baseline

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B32 =IF((2.72^C33)/(1+2.72^C33)+B38>1,1,(2.72^C33)/(1+2.72^C33)+B38)

Integrated Modeling Framework for Winter-Run Chinook

Prepared for: California Urban Water Agencies

Prepared by: S.P. Cramer and Associates and Larix Systems, Inc.

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SIMULATION PARAMETERS

Juvenile Production

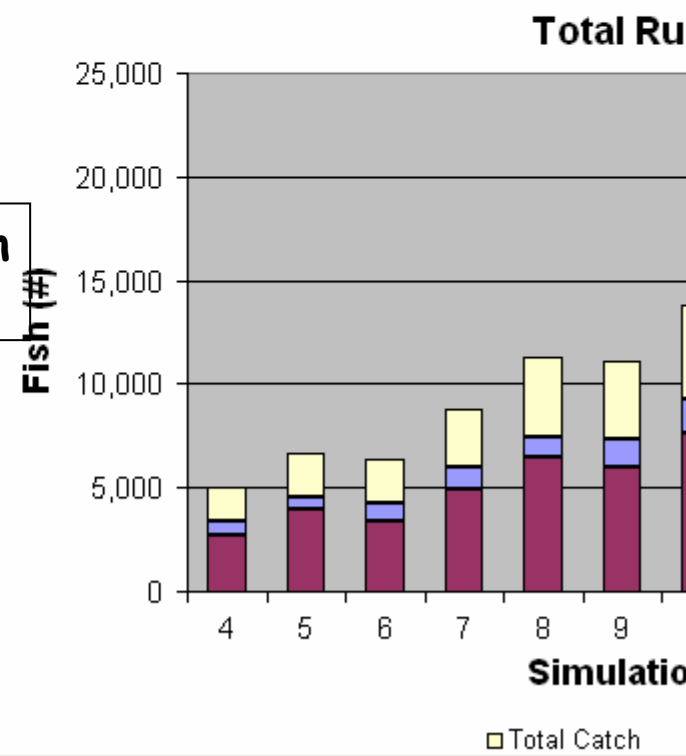
Prespawning Adult Survival Rate	95.00%	
Female Spawner Ratio	65.00%	
No. Eggs per Female Spawner	3,800	
Egg to Fry Survival Rate	25.00%	
August Max Temp @ Balls Ferry	57.0	
Temperature Related Egg Mortality	0%	
Beverton Holt a (smolt capacity)	5,800,000	
Beverton Holt b (fry for half smolt cap.)	33,000,000	
No. Hatchery Smolts Released	200,000	
Post-Release Survival Rate	75.00%	
Hatchery Smolt Survival to Delta	[illegible]	
Prpnt Change in Rearing Capacity	1.00	*(e.g. 1.1= 10% increase)*
Prpnt Change in River Emigration Survl	1.00	*(e.g. 1.1= 10% increase)*
Smolt to Age 2 Survival Rate	4.00%	

Delta Emigration

Delta Migration Survival Parameters	95%
Sacramento River Flow @ Freeport	35,000
Release Temperature	58.0
Export Flow	7,200
Turbidity (NTU)	8

Habitat Restoration effects

SIMULATION RESULTS



Home / Trials / Worksheet / Benchmark / Comparisons / Defaults

Next Steps

- Convert to weekly time steps and river-reach spatial steps
- Develop predictive functions for juvenile migration timing
- Develop predictive functions for size
- Develop predictive functions for juvenile rearing
- Develop predictive functions for Delta pathways