

Delta Action 8

What have we learned?

EWA Conference
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USFWS

Delta Action 8

What have we learned?

- Interior Delta < Mainstem survival
- Relative interior Delta survival weakly correlated to combined SWP and CVP exports
- Need to understand what proportion of juvenile salmon are diverted into the interior Delta

Delta Action 8 Experiment (CVPIA-AFRP)

Purpose: evaluate benefit of
reducing E/I ratio from 65 to 35%
between Nov - Jan.

to benefit juvenile salmon
from all Sacramento basin salmon runs

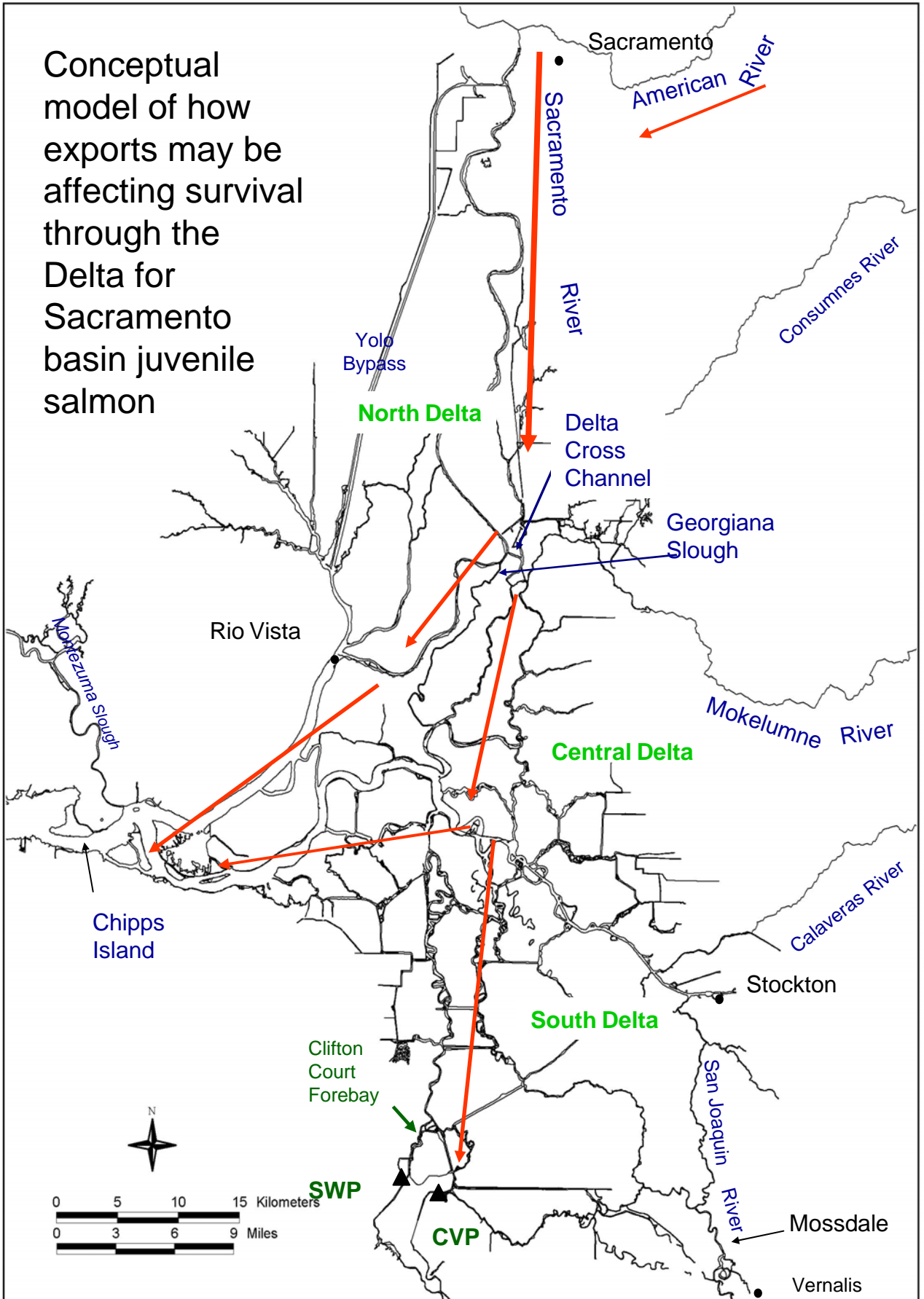
Why?

To determine if Delta Action 9 should be
implemented

Delta Action 8

- No EWA was used in 2006.
- EWA was requested
 - Provide stability in exports
 - in 1999 exports changed significantly during the period
 - 3 vs 17 day average:
3870 vs 8368

Conceptual model of how exports may be affecting survival through the Delta for Sacramento basin juvenile salmon



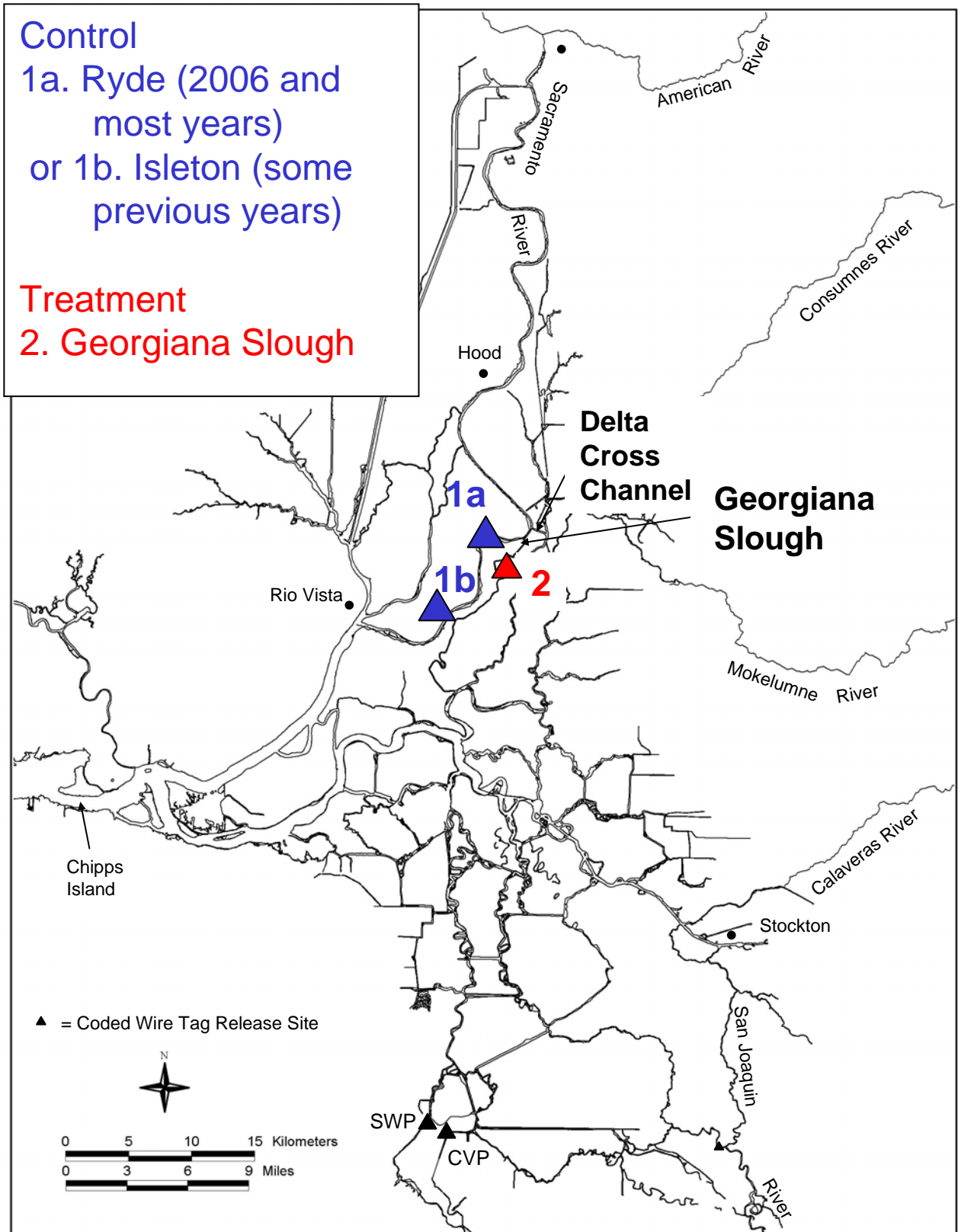


Figure 1: Experimental design for Delta Action 8

Methods:

- Estimate recovery rate at Chipps Island or in the ocean fishery

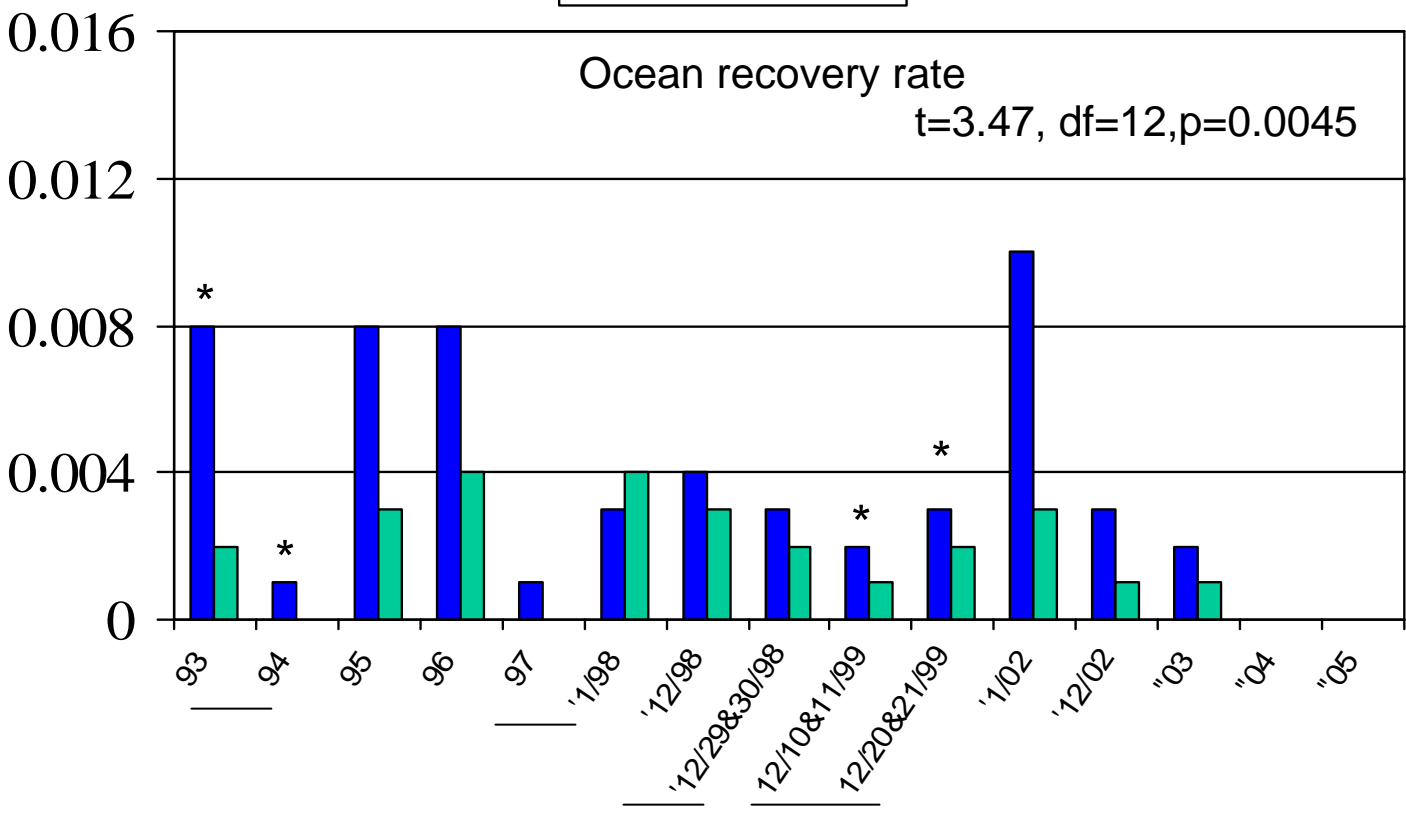
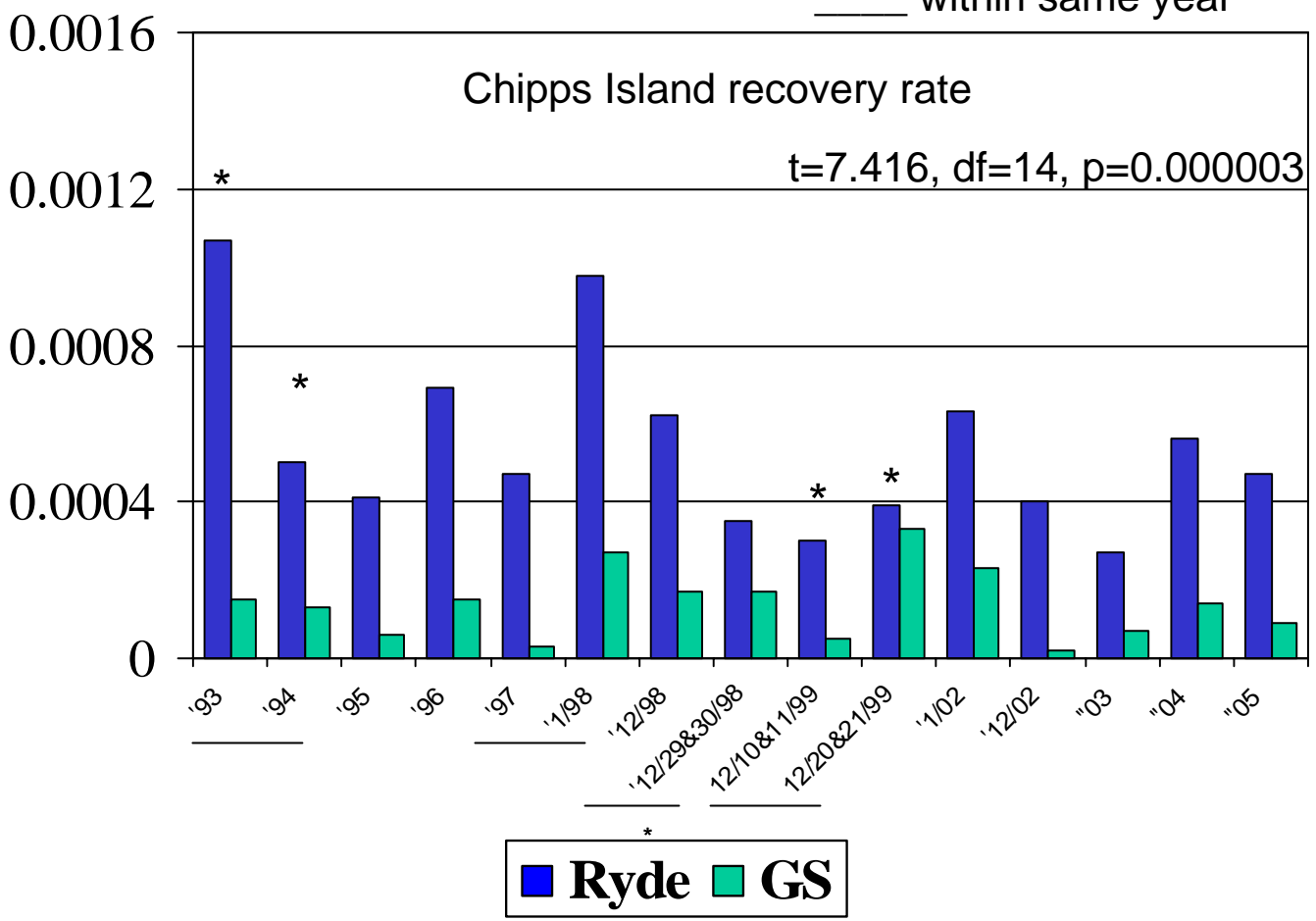
– Recovery Rate = $\frac{\# \text{ recovered}}{\# \text{ released}}$

Ocean fishery would have an expanded # recovered

What have we learned: Interior Delta < Mainstem survival

* = Isleton release

_____ within same year



Recovery rates of marked fish released at Ryde or Isleton and Georgiana Slough between 1993 and 2005

Relative interior Delta survival:

2. Georgiana Slough RR
1a or b. Ryde or Isleton RR

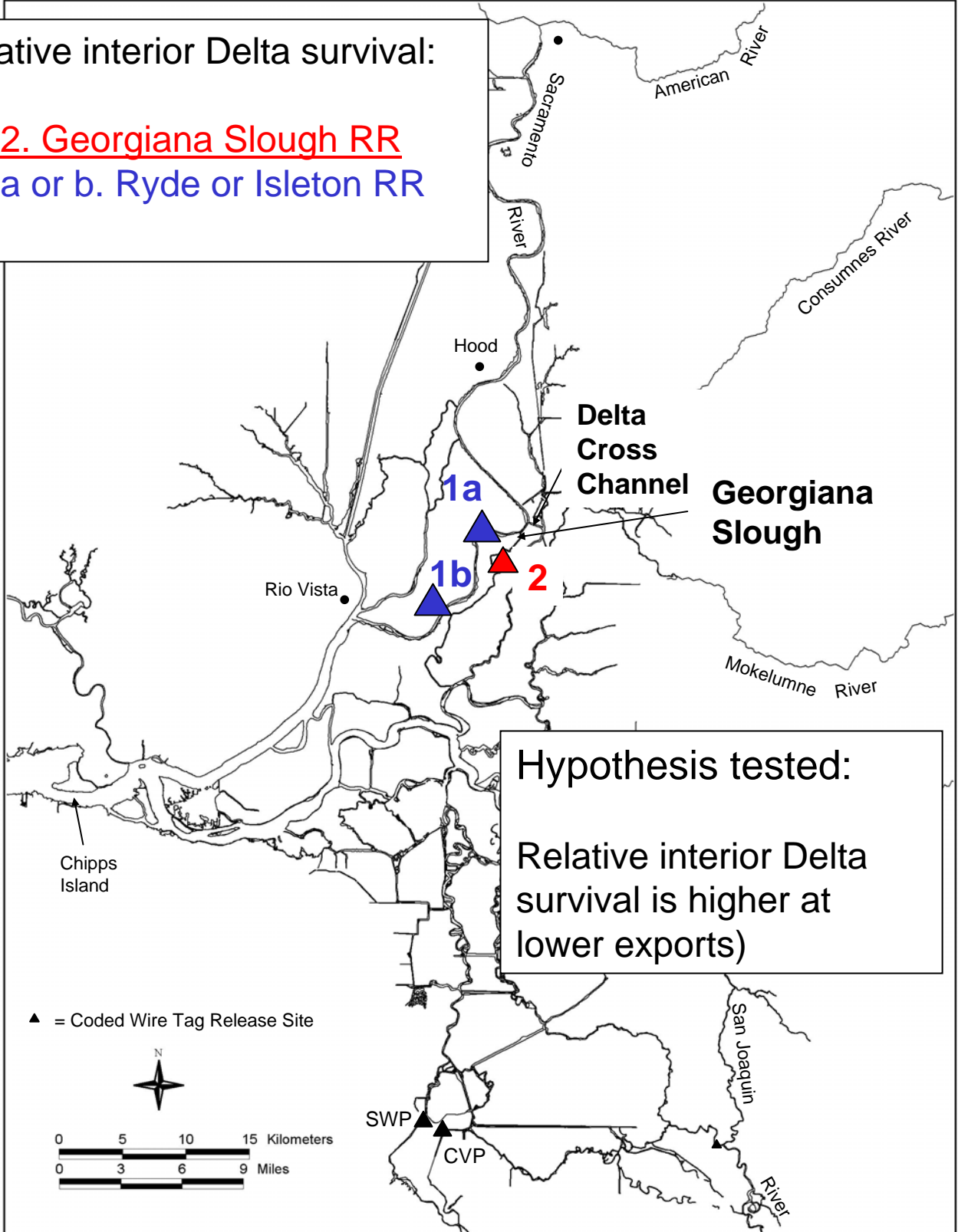
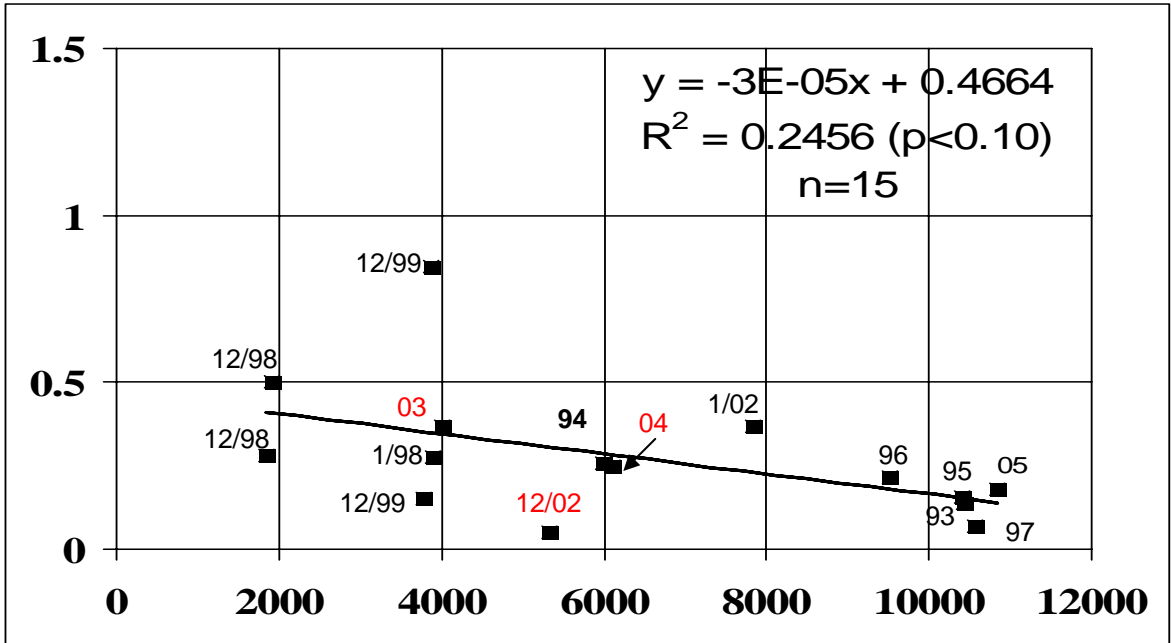


Figure 1: Experimental design for Delta Action 8

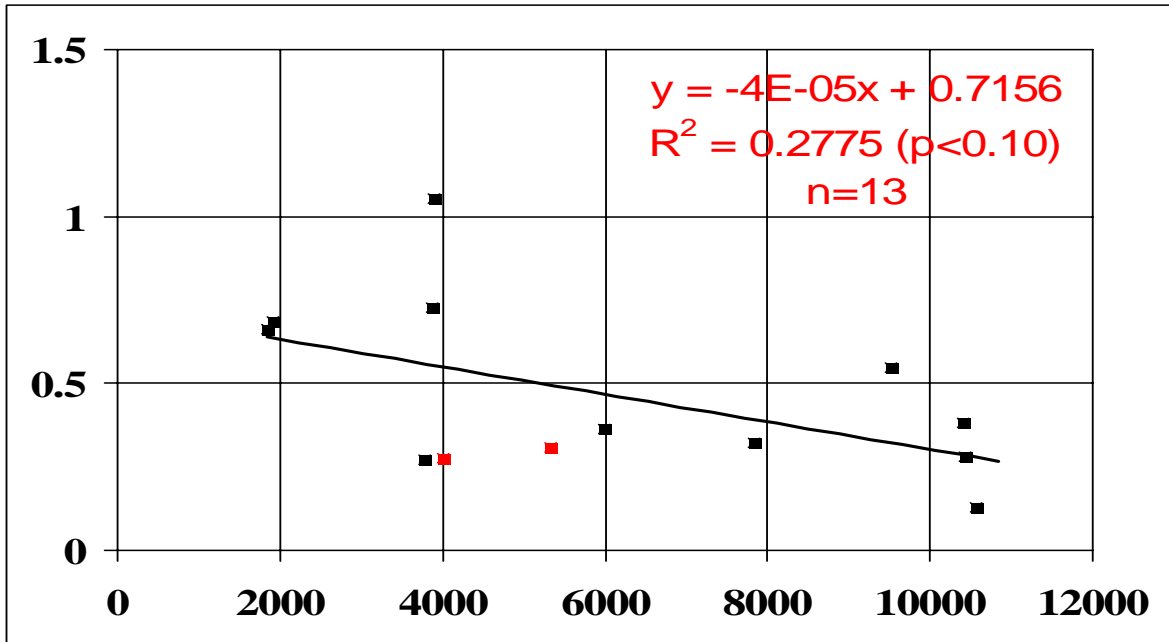
Chippis Island differential recovery rates

Differential Recovery Rates



Combined SWP (CCFI, Banks in 2005) + CVP Exports

Ocean differential recovery rates



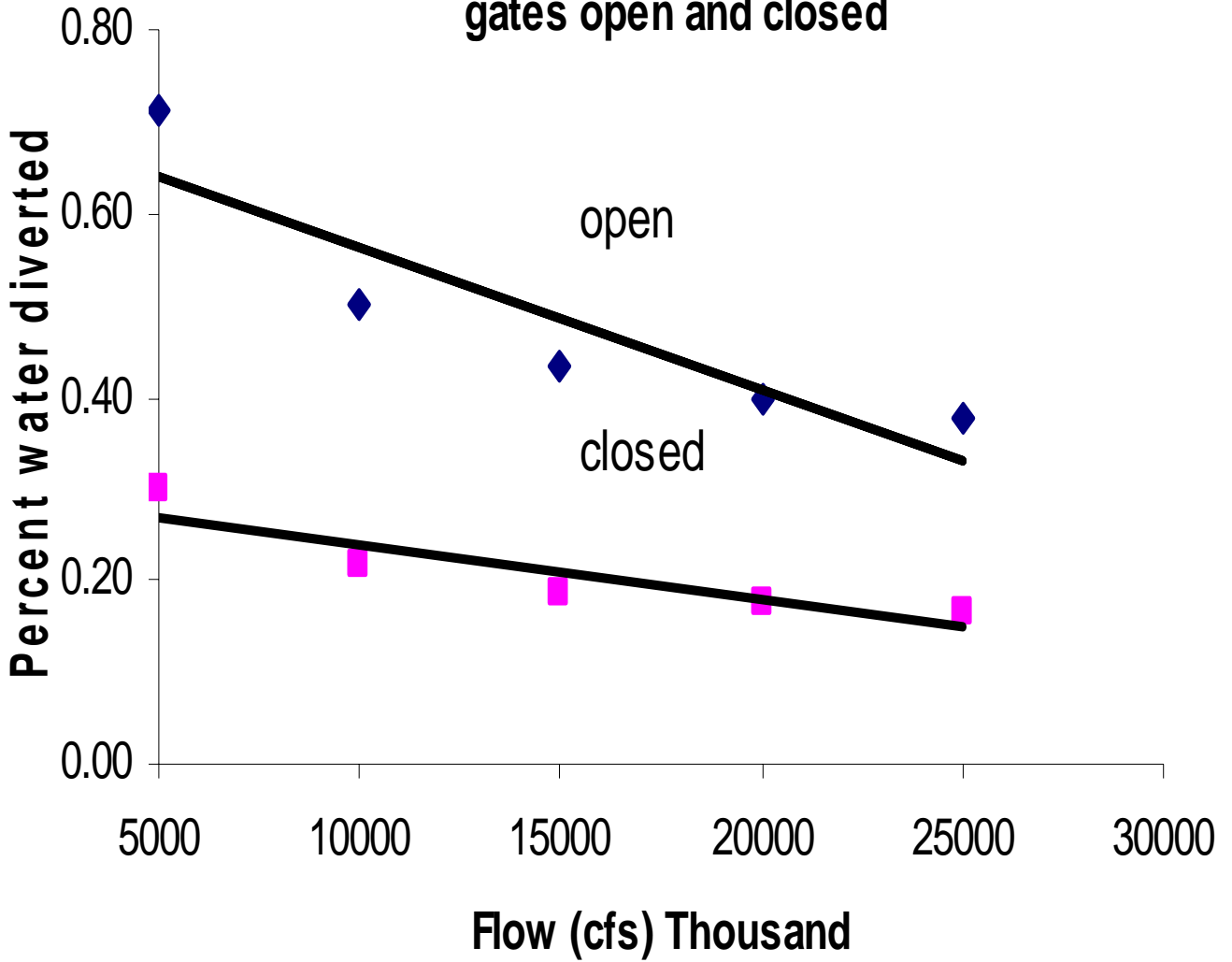
Combined SWP (CCFI) + CVP Exports

CALFED Science has funded a statistical review that includes this relationship/study

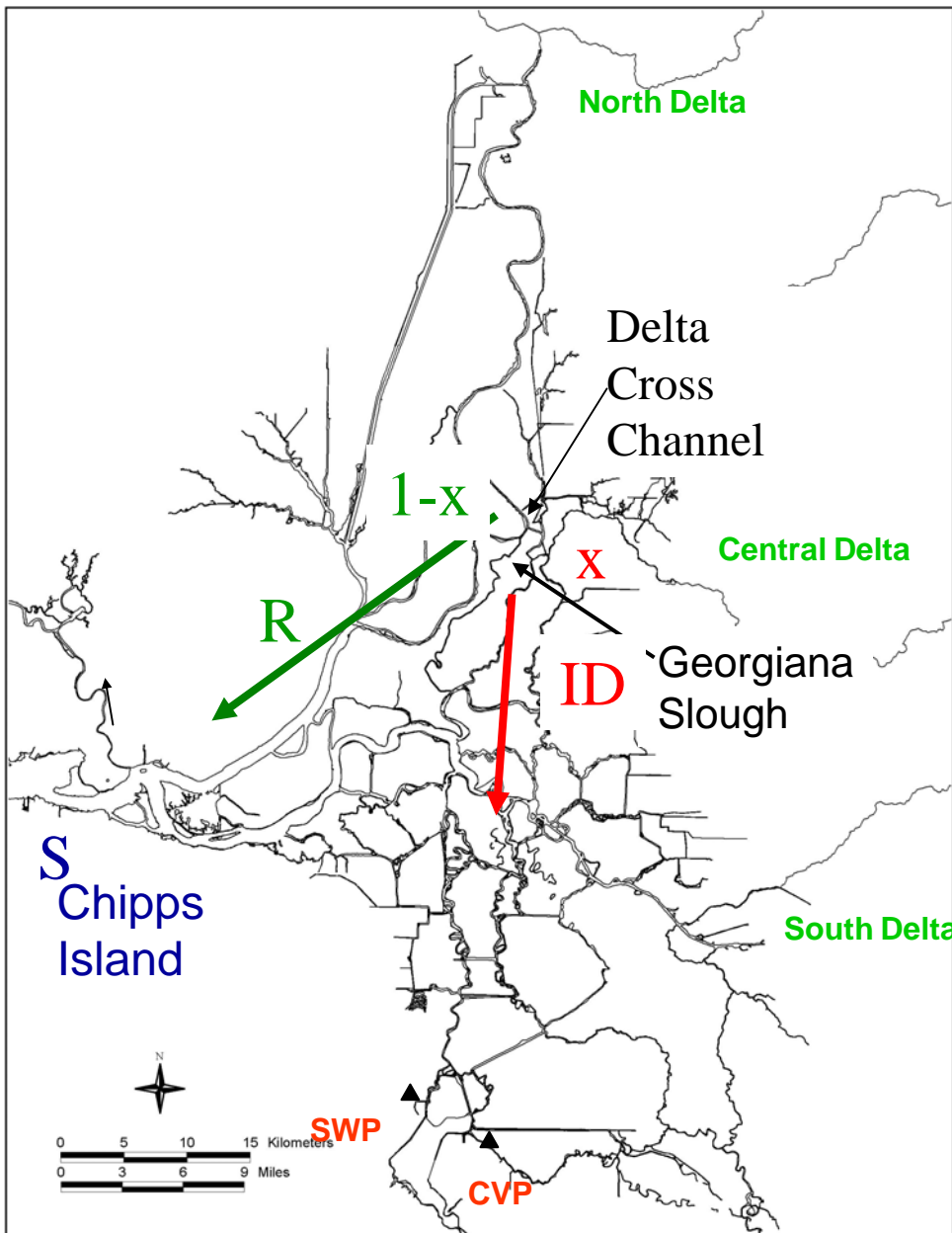
Delta Action 8

- Key ?
 - How important is this relationship to the entire population?
 - How many juvenile salmon are diverted into the interior Delta ?
 - Approaches/assumptions have evolved

% Freeport flow diverted into interior Delta with DCC gates open and closed



Model survival with and without EWA export curtailments to estimate change in Delta survival



$$\text{Daily Delta survival (S)} = ((1-x) * R) + (x * ID)$$

Where :

x = % water diverted into Interior Delta

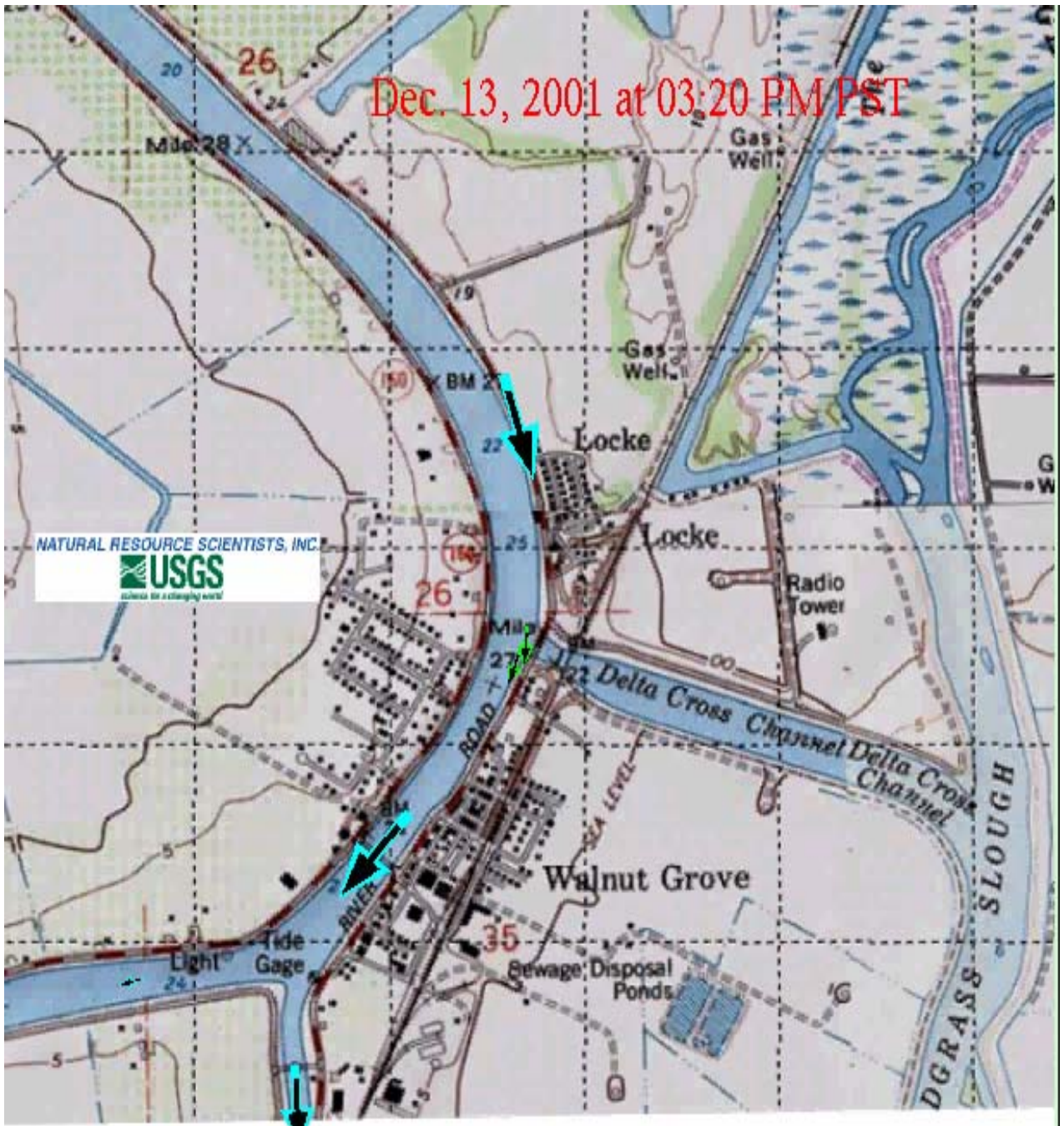
R = Ryde survival = (0.8)

$ID = ((GS/Ryde \text{ survival ratio}) * (Ryde \text{ survival}))$

and $GS/Ryde \text{ survival} = 0.52 - 0.00003 * \text{exports}$

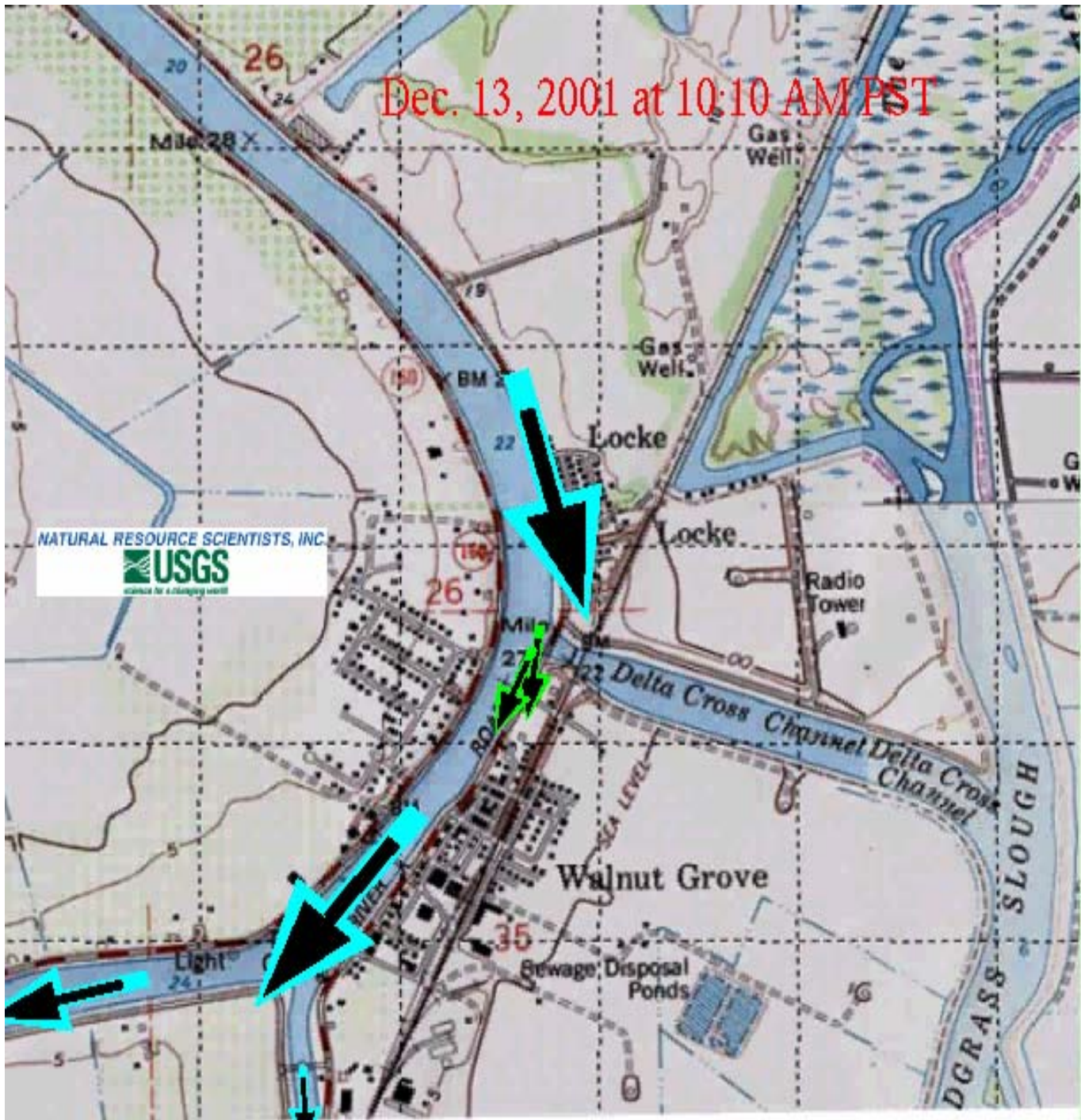
Population S = Sum of (Daily survival * % of population migrating on that day)

Delta Cross Channel CLOSED EBB TIDE



Source: Dave Vogel, Asilomar presentation 2002

Attachment 5: Delta Cross Channel Closed EBB TO FLOOD TIDE



Source: Dave Vogel, Asilomar presentation 2002

What have we learned: Need to understand what proportion of juvenile salmon are diverted into the interior Delta

Experimental Design in 2003-2004

1 Sacramento

2 Vorden

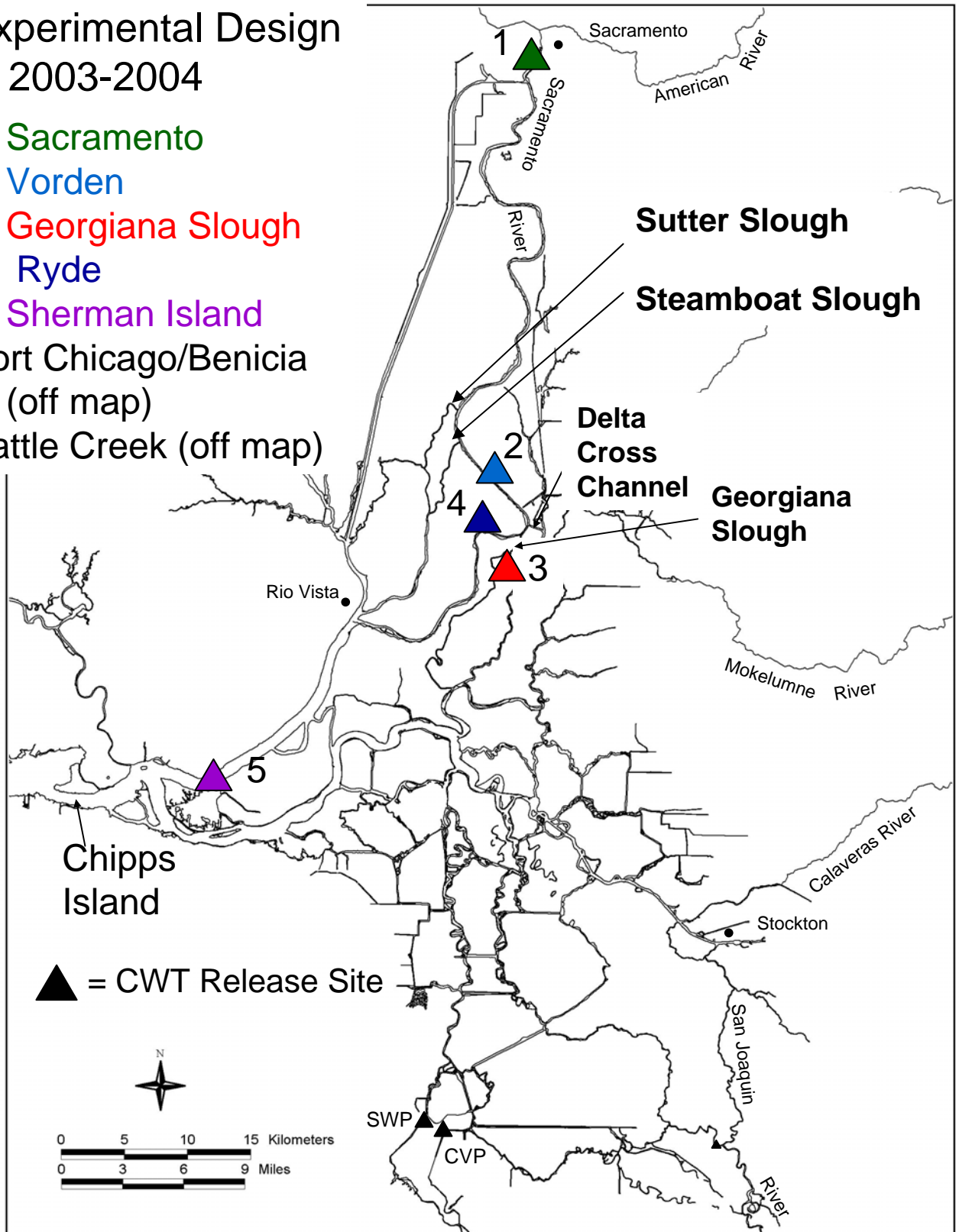
3 Georgiana Slough

4 Ryde

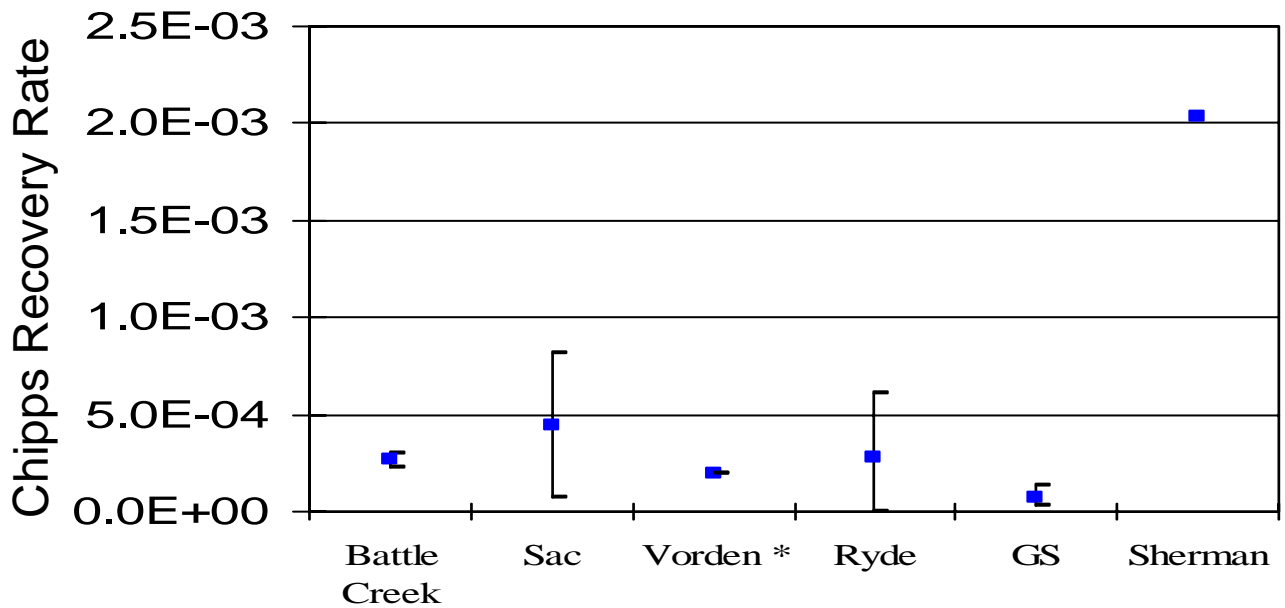
5 Sherman Island

Port Chicago/Benicia
(off map)

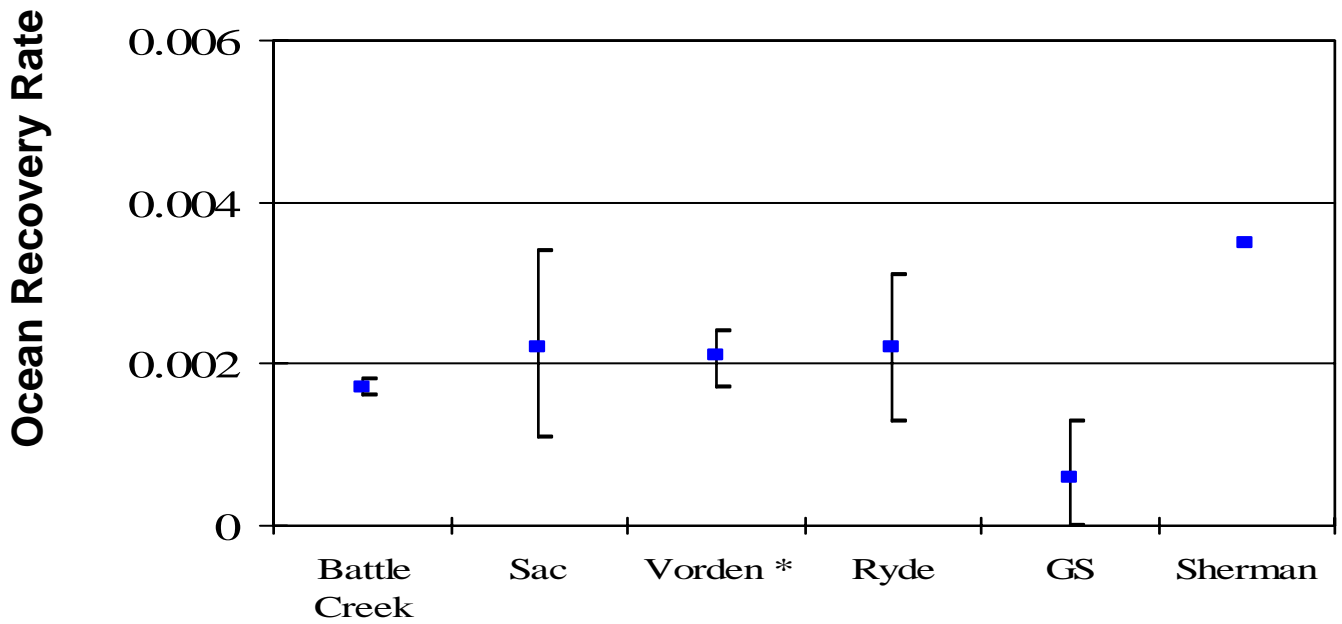
Battle Creek (off map)



Detailed map of the Sacramento-San Joaquin Delta indicating coded wire tag release locations used in December of 2003 and 2004 (triangles).



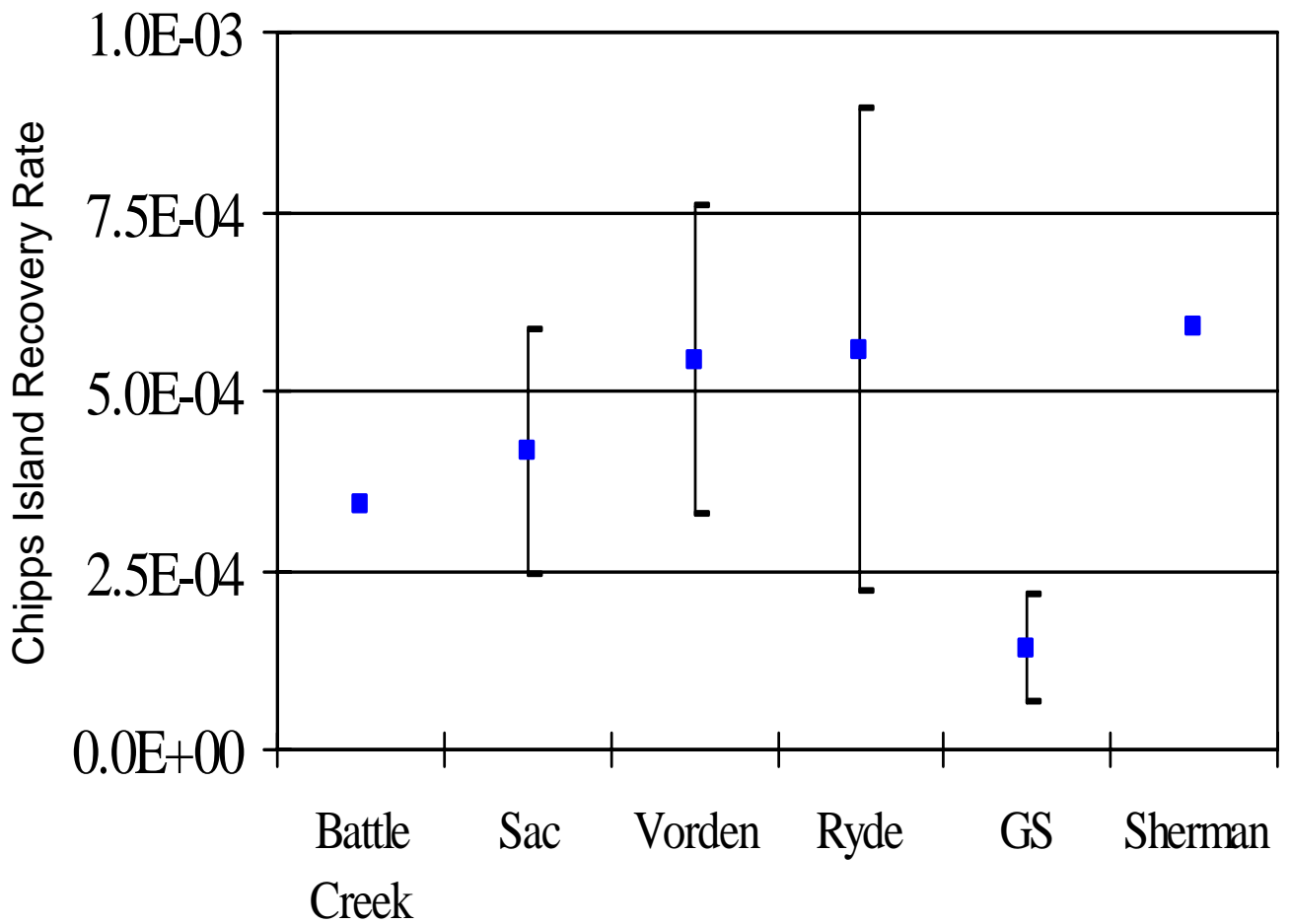
Release Site



Release Site

Mean (+/- 2 SD) Chipps Island and expanded ocean recovery rates generated for releases made in December of 2003.

* Vorden release was made 15 days after the Sacramento release.



Mean (+/- 2 SD) recovery rates for releases made in December of 2004.

Where do we go from here?

- Better estimate fish split into interior Delta
- Estimate survival by reach to put GS/Ryde ratios into context
(Compare between methods)
- Reduce uncertainty in GS/Ryde survival versus export relationship – establish mechanisms