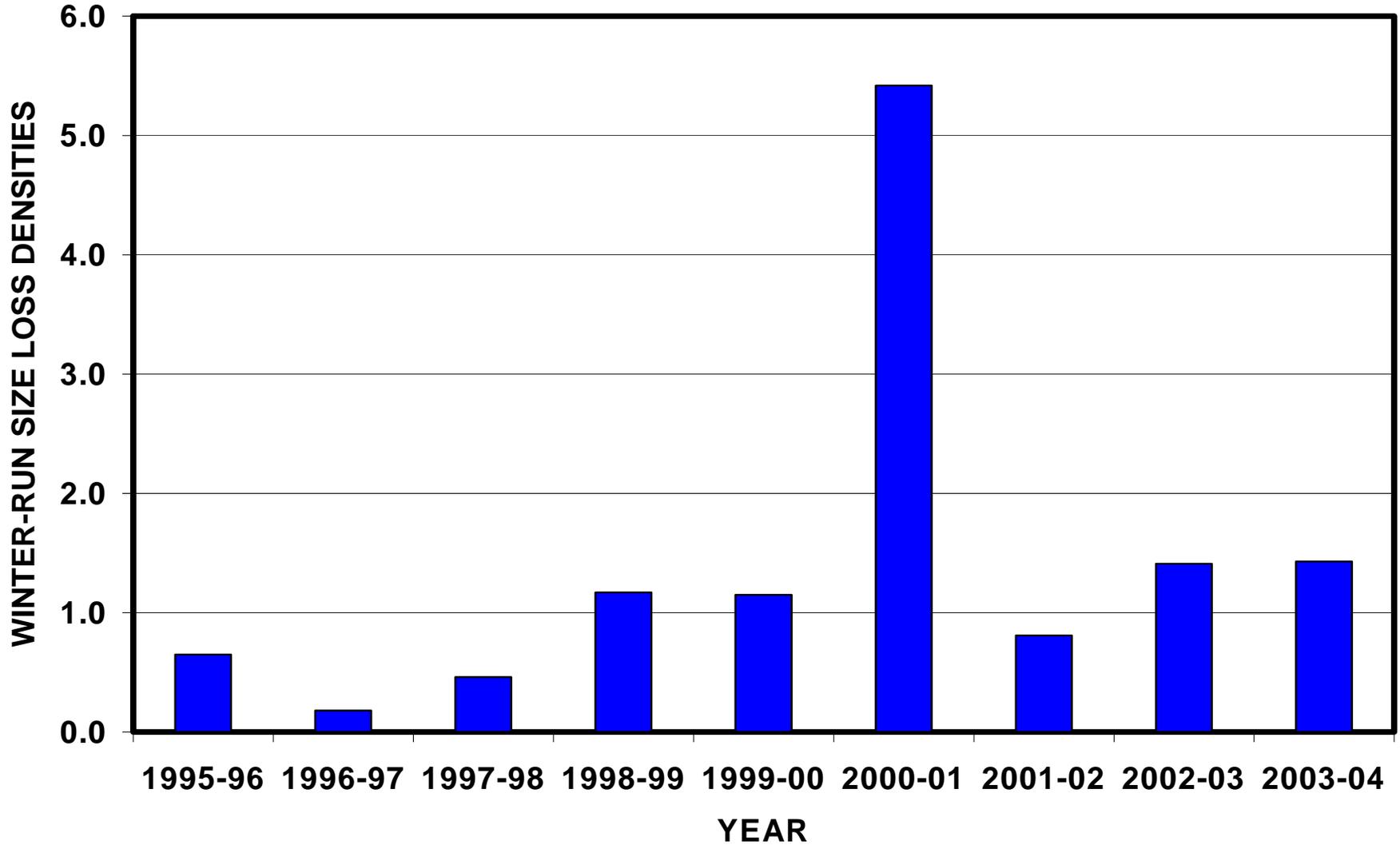


**Relationship of
Delta Cross Channel Gate Operations
To Loss of Juvenile Winter-run Chinook
Salmon at the CVP/SWP Delta Facilities**

Alice Low and Jim White
Habitat Conservation Division

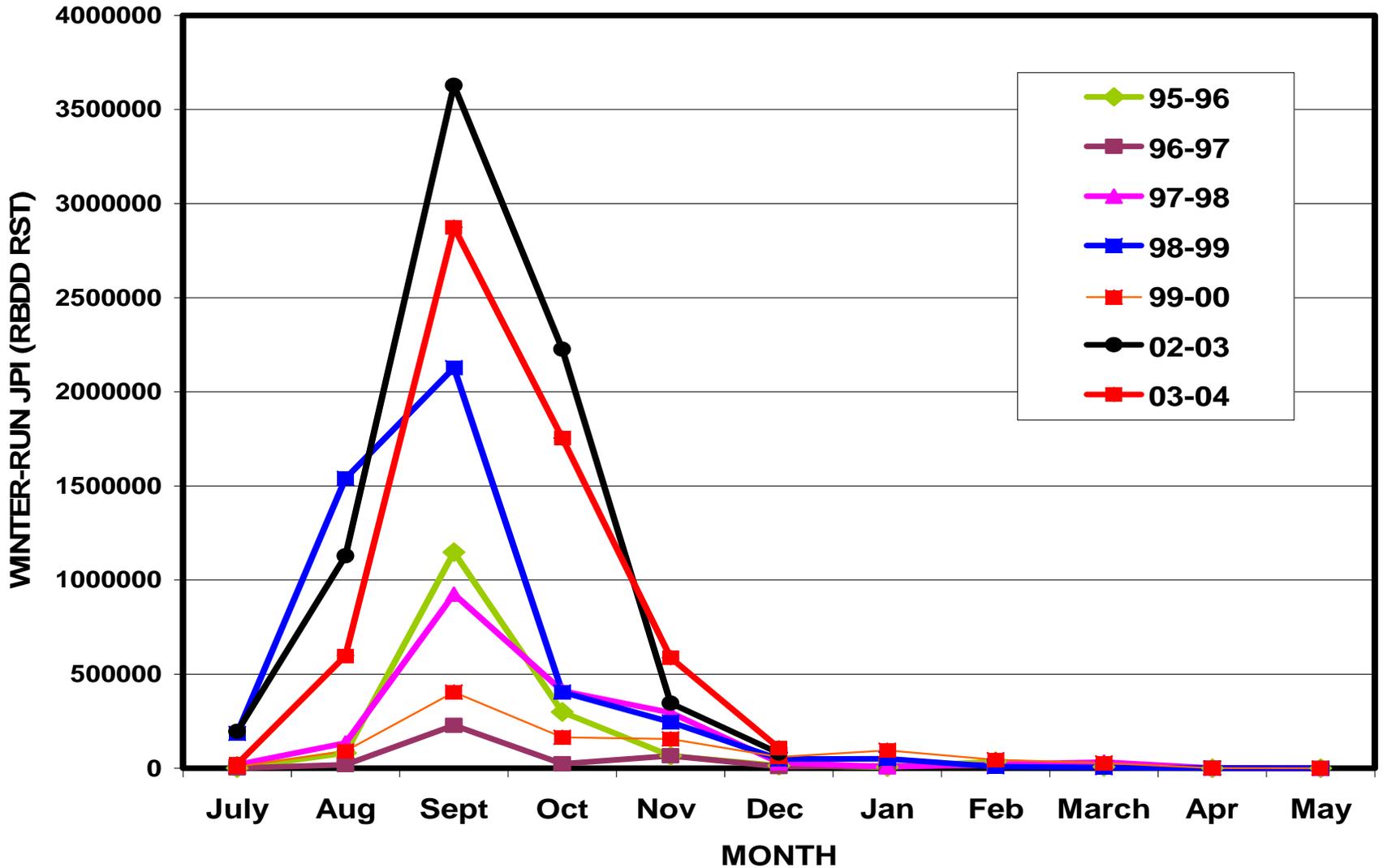
California Department of Fish and Game

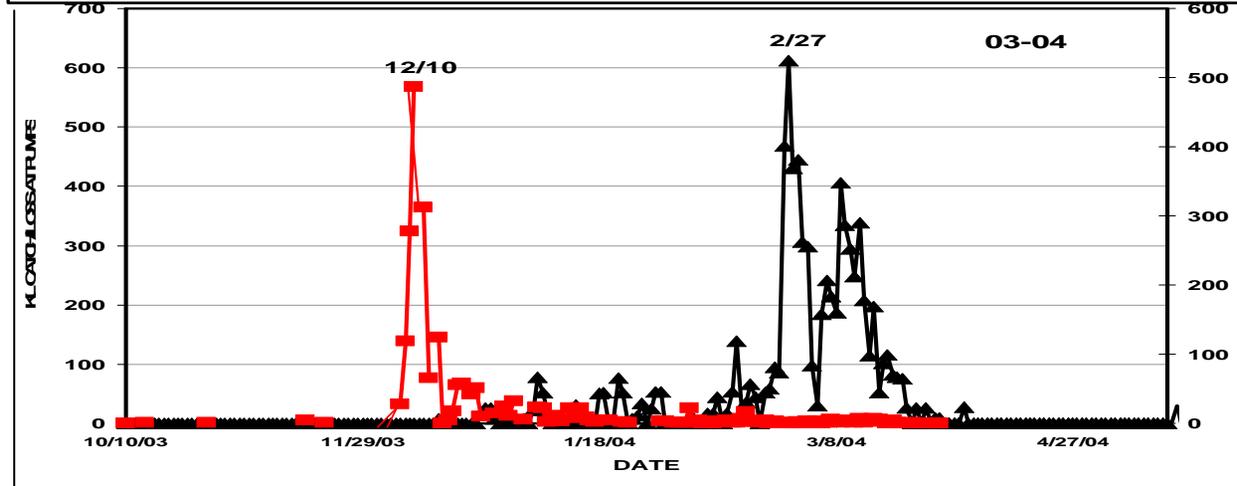
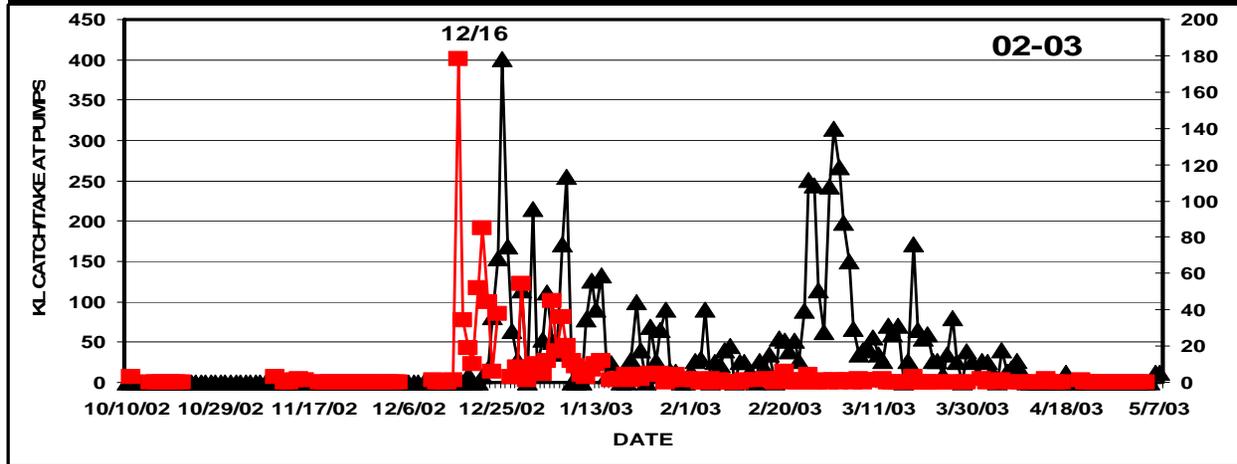
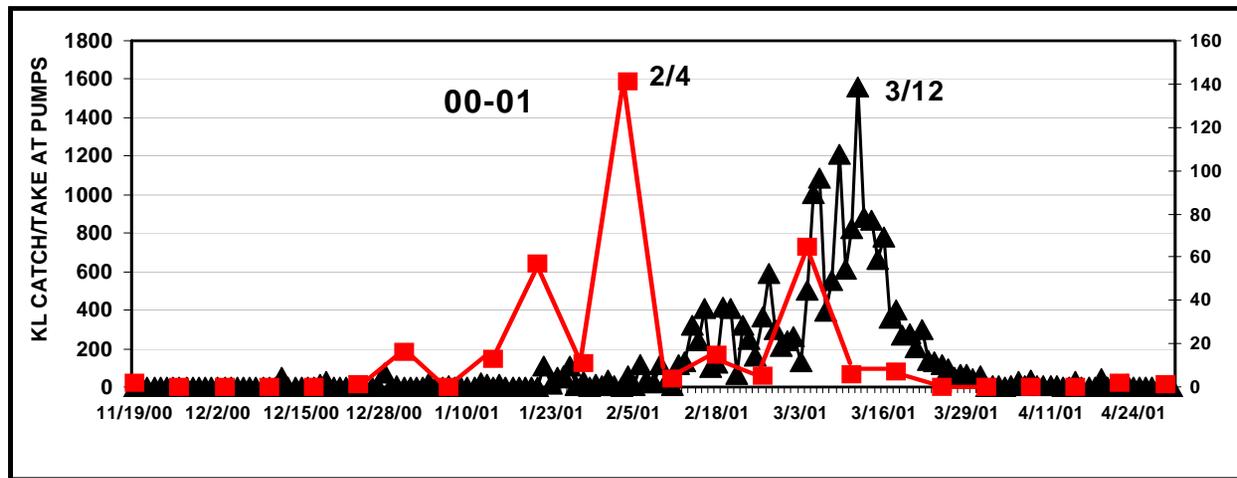
WINTER-RUN SIZE LOSS DENSITIES (CVP/SWP)

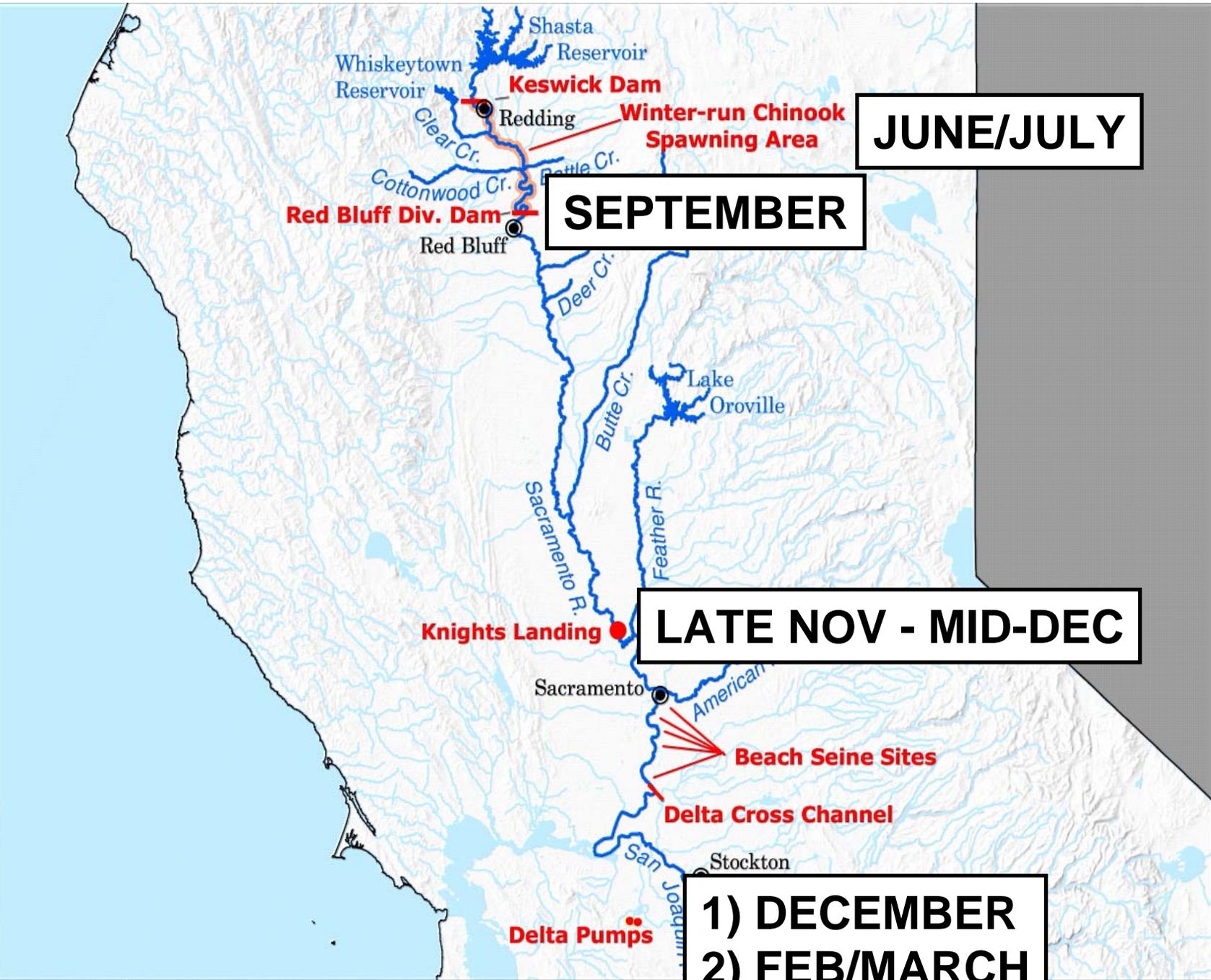


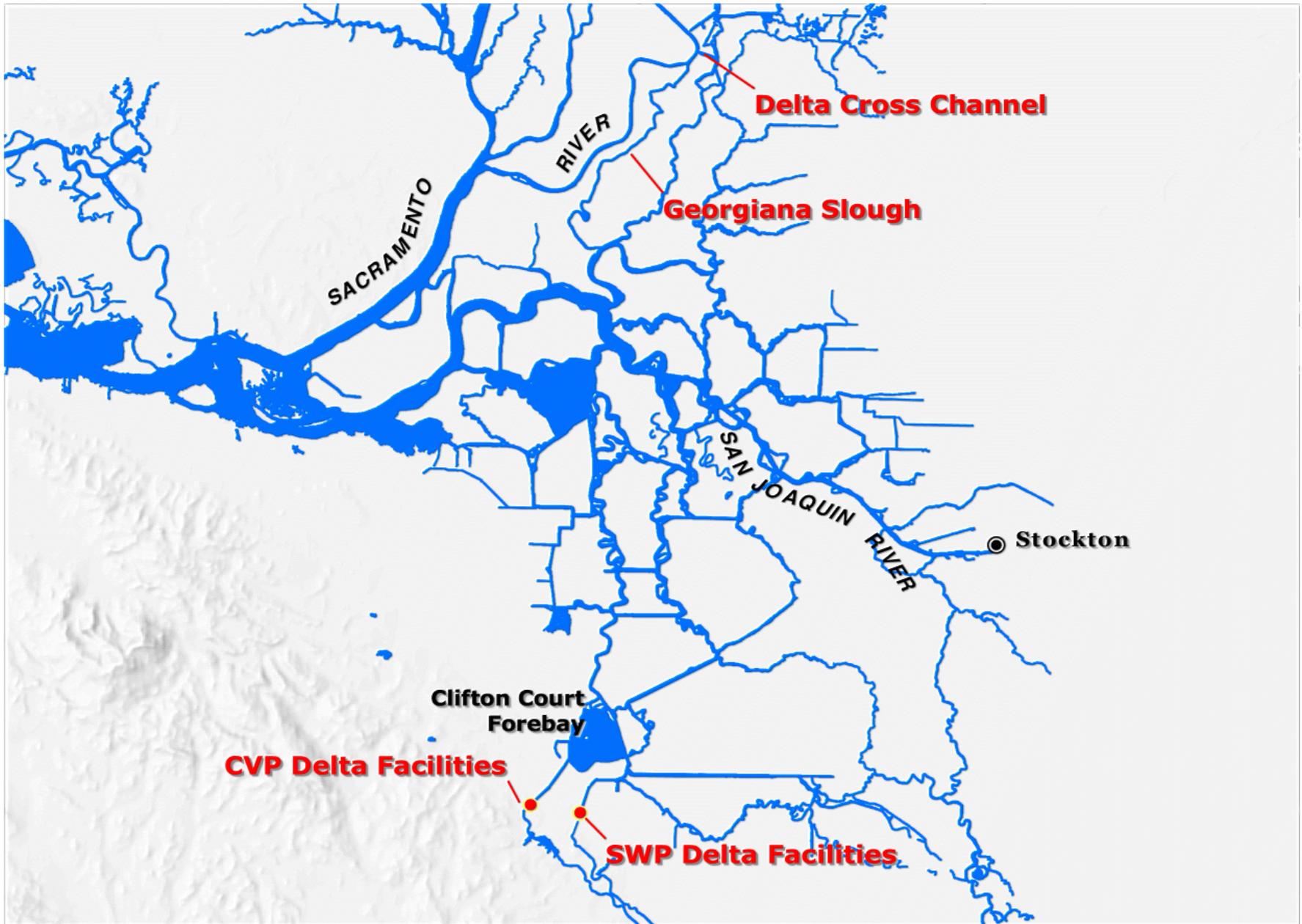


TIMING OF WINTER-RUN PASSAGE AT RED BLUFF DIVERSION DAM









DCC GATE OPERATION

- **1993 Winter-run Biological Opinion:**
 - "Fisheries sampling in the Delta indicates that February through April is the primary period of winter-run Chinook emigration through the Delta."
 - Requires gates closed: February 1 - April 30
 - Variable gate operation: Oct 1 - January 31, based on data from real-time monitoring

ANALYSIS

- Examined relationship between:
 - Proportion of flow entering interior Delta in Nov, Dec, Jan
 - Proportion of winter-run juveniles lost subsequently at Delta facilities (1995 - 2004)

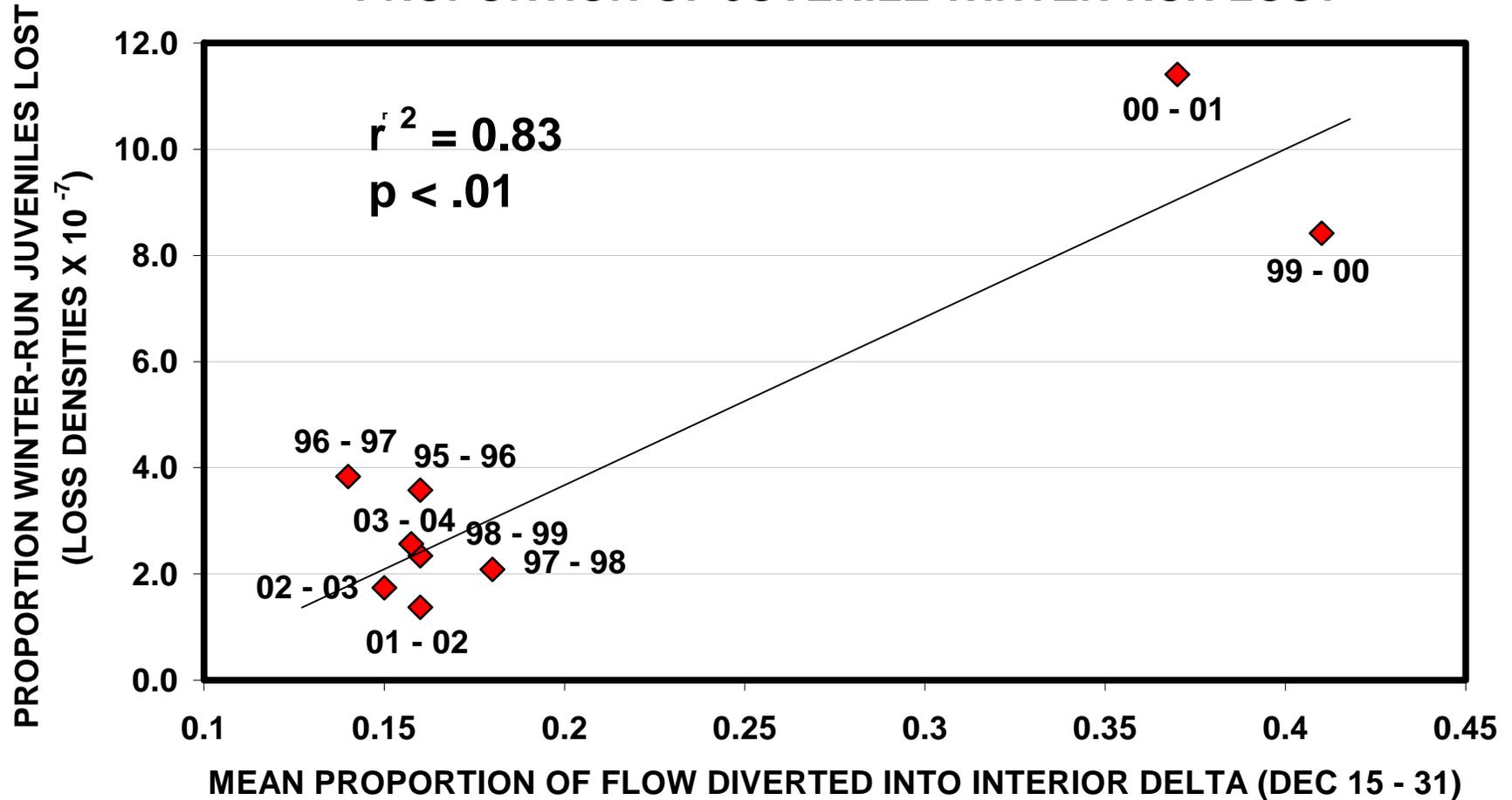
ANALYSIS PARAMETERS

- Proportion of flow entering interior
Delta:
 - Formulas in DAYFLOW
- Proportion of juvenile winter-run population lost:
 - Loss densities at CVP/SWP ÷ Fry equivalents at RBDD RST

RESULTS

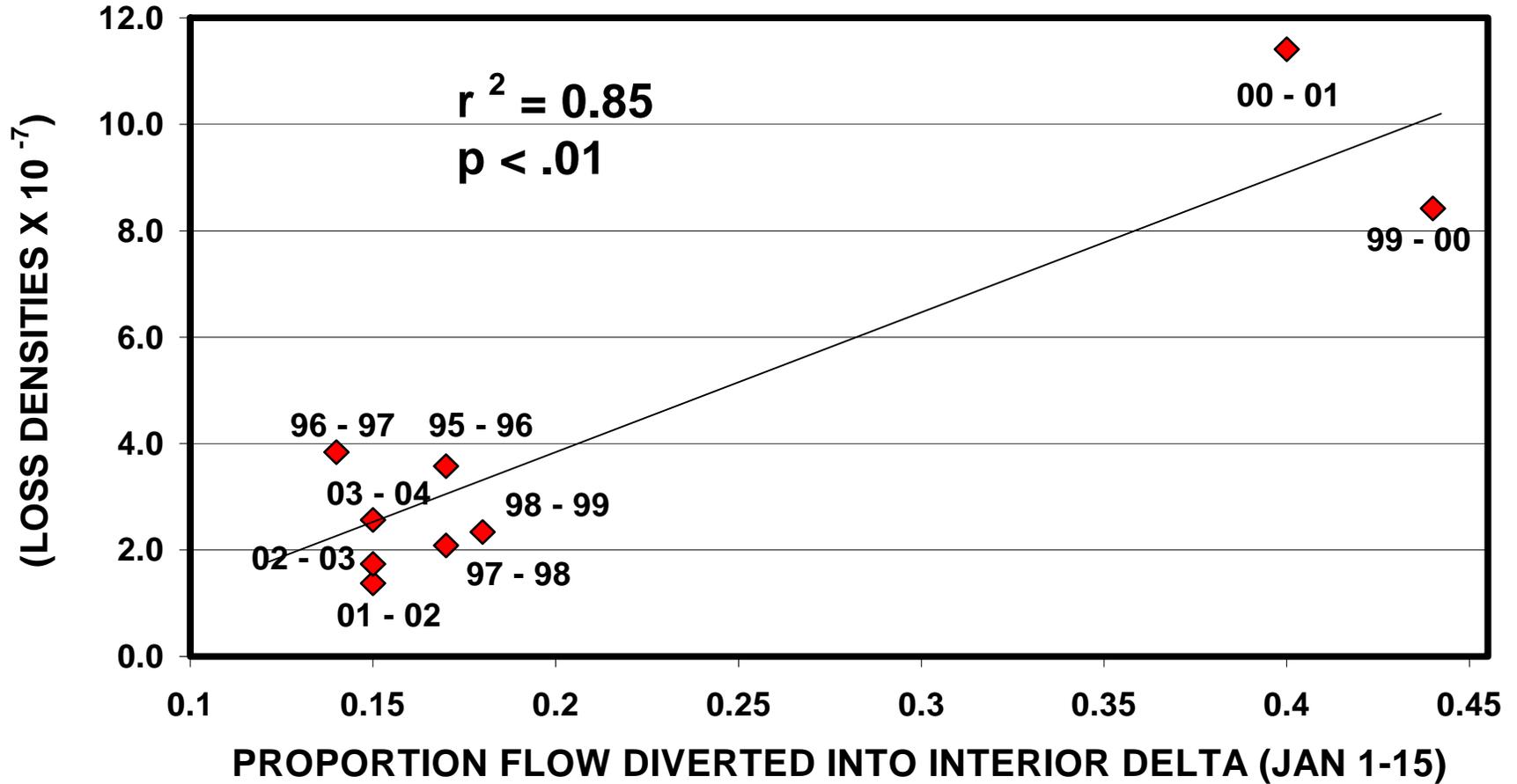
- No significant relationship for Nov
- Significant relationships for Dec and Jan
- Significant relationships for last two weeks of Dec and first two weeks of Jan

**RELATIONSHIP BETWEEN PROPORTION OF FLOW
DIVERTED INTO INTERIOR DELTA (DEC 15 - 31)
PROPORTION OF JUVENILE WINTER-RUN LOST**



**RELATIONSHIP BETWEEN PROPORTION OF FLOW
DIVERTED INTO INTERIOR DELTA (JANUARY 1 - 15)
PROPORTION OF JUVENILE WINTER-RUN LOST**

**PROPORTION JUVENILE WINTER-RUN LOST
(LOSS DENSITIES X 10⁻⁷)**



IMPLICATIONS OF ANALYSIS

- Juvenile winter-run emigrating through the lower Sacramento River in December and January may enter the interior Delta in proportion to flow
- EWA assets might be used for winter-run protection by closing the DCC gates in the winter months, keeping juveniles from entering the interior Delta