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UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF CALIFORNIA

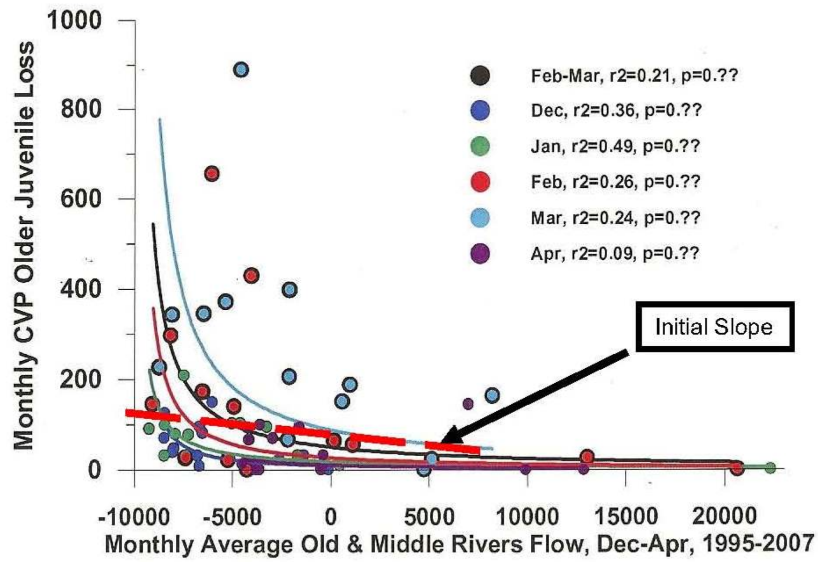
THE CONSOLIDATED SALMON CASES: SAN LUIS & DELTA-MENDOTA WATER AUTHORITY, *et al.* v. LOCKE, *et al.* STOCKTON EAST WATER DISTRICT v. NOAA, *et al.* STATE WATER CONTRACTORS v. LOCKE, *et al.* KERN COUNTY WATER AGENCY, *et al.* v. U.S. DEPARTMENT OF COMMERCE, *et al.* OAKDALE IRRIGATION DISTRICT, *et al.* v. U.S. DEPARTMENT OF COMMERCE, *et al.* THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA v. NATIONAL MARINE FISHERIES SERVICE, *et al.*	**LEAD CASE NO: 1:09-cv-1053-OWW-DLB** Consolidated With: 1:09-cv-1090-OWW-DLB 1:09-cv-1378-OWW-DLB 1:09-cv-1520-OWW-SMS 1:09-cv-1580-OWW-DLB 1:09-cv-1624-OWW-SMS **DECLARATION OF DR. RICHARD B. DERISO IN SUPPORT OF METROPOLITAN WATER DISTRICT'S JOINDER IN MOTION FOR TEMPORARY RESTRAINING ORDER** Date: February 2, 2010 Time: 1:00 p.m. Ctrm: 3 Judge: Oliver W. Wanger

I, Dr. Richard B. Deriso, declare:

1. I have reviewed the National Marine Fisheries Service's ("NMFS") 2009 biological opinion for the Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Central Valley steelhead, Southern Distinct Population Segment of North American green sturgeon, and Southern Resident killer whales ("BiOp"). In the BiOp, NMFS determined that the Central Valley Project ("CVP") and State Water Project ("SWP") jeopardize the continued existence of these listed species and adversely modify their critical habitat. Accordingly, the BiOp includes Reasonable and Prudent Alternatives ("RPAs") that purport to avoid jeopardy and benefit the species. The RPA that is the subject of the motion for a temporary restraining order is Action IV.2.3.

2. Action IV.2.3 is one of the Delta Division RPAs, prescribed to "[c]ontrol the net negative flows toward the export pumps in Old and Middle rivers to reduce the likelihood that fish will be diverted from the San Joaquin or Sacramento River into the southern or central Delta" and entrained at the pumps. BiOp at 630. Specifically, Action IV.2.3 reduces exports to limit negative Old and Middle River ("OMR") flows to -2,500 to -5,000 cfs from January 1 through June 15, depending on the presence of salmonids. BiOp at 648.

3. Action IV.2.3 is based on the Effects of the Proposed Action section of the BiOp at pages 313-432, and particularly the analysis of the relationship between OMR flows and salvage on pages 352-374. The BiOp includes two figures which depict the relationship between monthly older juvenile loss at the CVP and SWP facilities and monthly average December-April OMR flows. BiOp at 361-62 (Figures 6-65 and 6-66). Based on these figures and the results of particle tracking modeling, NMFS concluded that there is a significant relationship between OMR flows and salvage. The RPAs reduce exports in order to reduce salvage and thereby purportedly avoid jeopardy to the species. Figures 6-65 and 6-66 are shown below.



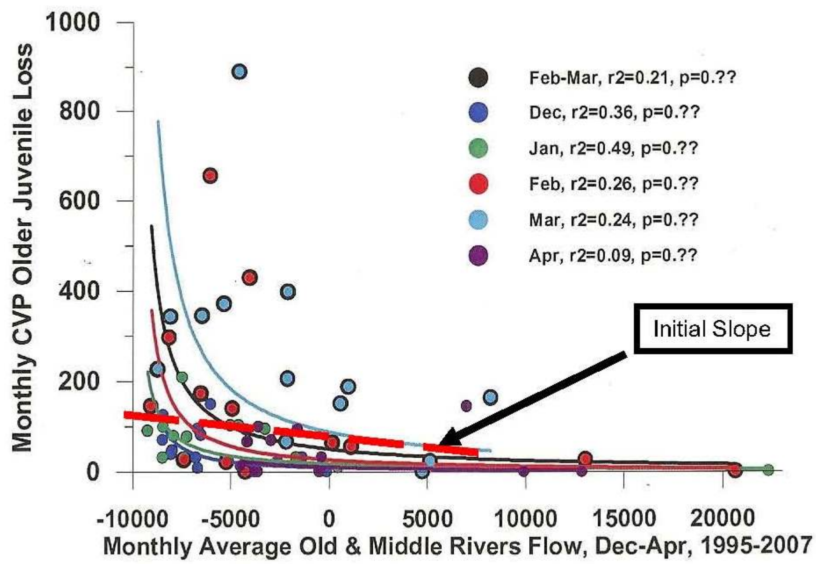


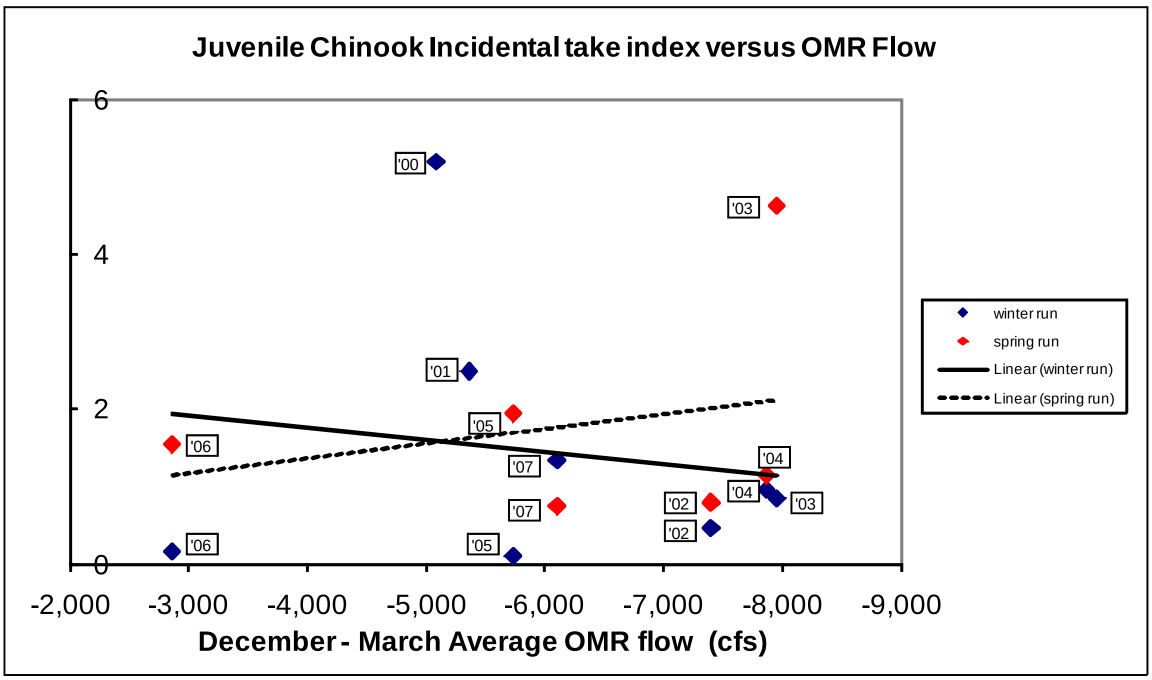
Figure 6-65. Relationship between OMR flows and entrainment at the CVP, 1995-2007 (DWR 2008).

4. In Figures 6-65 and 6-66, NMFS relied on raw salvage numbers as a measure of salmonid loss, rather than a cumulative salvage index or incidental take index. Raw salvage numbers in isolation do not provide a measure of effects to a population. Such an analysis must take into account the overall size of the population and the *proportion* of the population that is lost to salvage.

5. Using an incidental take index instead of raw salvage numbers is the proper approach to analyzing population effects. This approach accords with standard principles of

fisheries population assessment. *See* Declaration of Dr. Richard B. Deriso, Docket #401, *The Delta Smelt Cases*, No. 1:09-cv-407-OWW (E.D. Cal.) at ¶¶ 14-15, 55-57 (explaining the application of this approach). An incidental take index represents the raw number salvaged divided by the total size of the population. It is the appropriate measure of the significance of a mortality event on an overall population.

6. I modeled the relationship between the juvenile incidental take index and December-March average OMR flows. The analysis shows that there is no statistically significant relationship between the take index and OMR flows. This means that OMR flows do not have a significant effect on salmonid abundance. The results are depicted in the figure below.



Juvenile Chinook salmon incidental take index is the incidental take divided by escapement.
The estimates are made separately for the winter-run and spring-run. Incidental take does not include tagged hatchery fish.
Escapement estimates are given for naturally spawning salmon and years 2000-2007, except incidental take estimates were not available for 2000-2001 for spring Chinook salmon on the web site below (#2).
OMR flow axis is reversed so that more negative values occur as one moves progressively left to right.
Best fit regression lines are shown. Note that neither regression line has a slope that differs statistically significantly from a horizontal line.
Data sources:
1. http://www.calfish.org/IndependentDatasets/CDFGFisheriesBranch/tabid/157/Default.aspx
2. http://www.usbr.gov/mp/cvo/fishrpt.html
3. Digitized OMR flow data from Figure E-2 (page 248) of the delta smelt biological opinion.

7. I repeated the analysis using December-March average OMR flows for winter-run salmon and March-May average OMR flows for spring-run salmon, which are better representative months for the two runs. In addition, I used OMR flow data provided by the United States Fish and Wildlife Service ("FWS") pursuant to a Freedom of Information Act ("FOIA") request from Metropolitan, rather than digitizing the data from the delta smelt biological opinion as I did in my first analysis (see notes to figure above). This analysis shows the same result—there is no statistically significant relationship between the take index and OMR flows. This means that OMR flows do not have a statistically significant effect on salmonid abundance. The results are depicted in Figure X below.

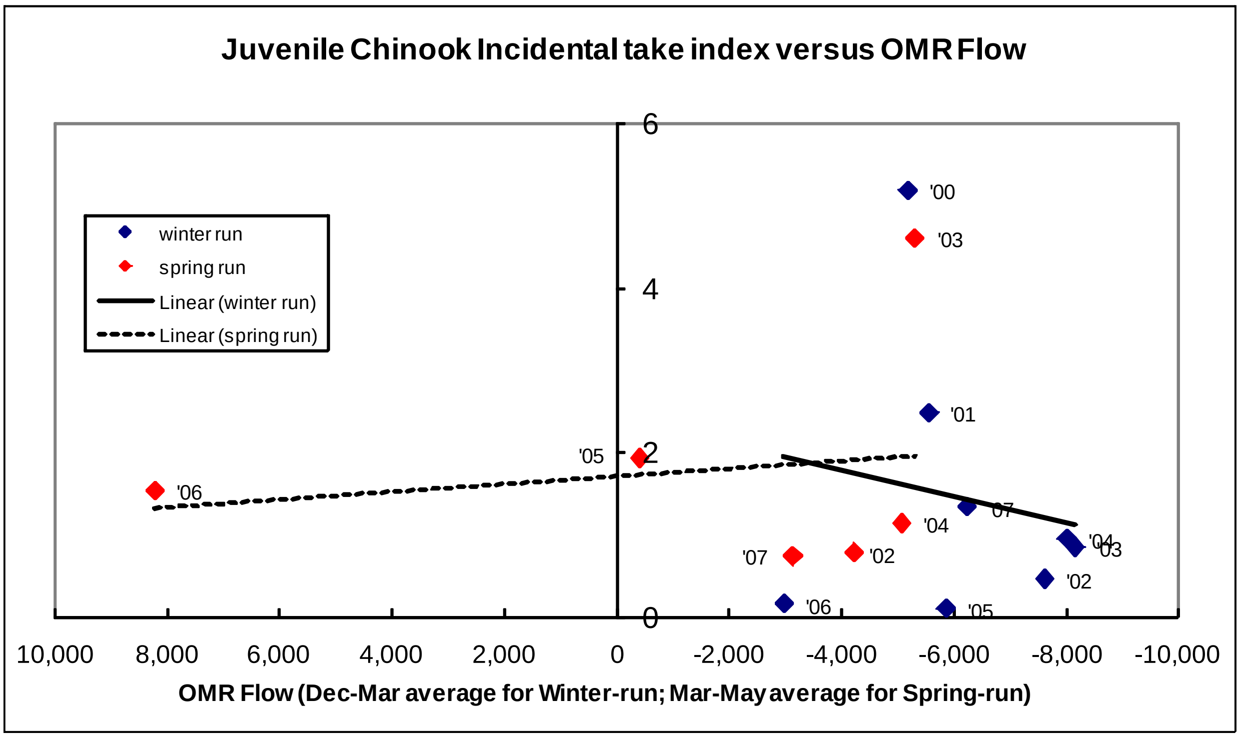


Figure X. Juvenile Chinook salmon incidental take index is the incidental take divided by escapement. The estimates are made separately for the winter-run and spring-run. Incidental take does not include tagged hatchery fish.

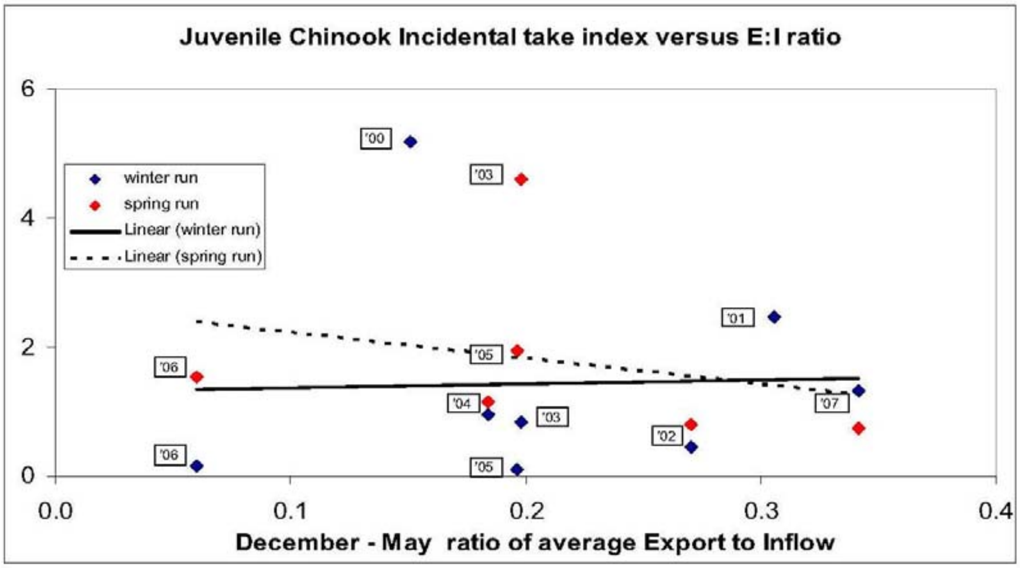
Escapement estimates are for naturally spawning salmon and years 2000-2007, except incidental take estimates were not available for 2000-2001 for spring Chinook salmon.

Best fit regression lines are shown. Note that neither regression line has a slope that differs statistically significantly from a horizontal line.

Months chosen for winter- and spring-run Chinook salmon are based on dates for movement into Delta (Table 6-34 BiOp)

Data sources: grandtab in http://www.calfish.org/IndependentDatasets/CDFGFisheriesBranch/tabid/157/Default.aspx
http://www.usbr.gov/mp/cvo/fishrpt.html
OMR flow data provided by FWS per a FOIA request from MWD

8. I also modeled the relationship between the juvenile incidental take index and the export-to-inflow ratio ("E:I ratio") for December-May. The analysis shows that there is no statistically significant relationship between the take index and the E:I ratio. This means that the E:I ratio does not have a significant effect on salmonid abundance. The results are depicted in the figure below.



Juvenile Chinook salmon incidental take index is the incidental take divided by escapement (data source #1). The estimates are made separately for the winter-run and spring-run. Incidental take does not include tagged hatchery fish. Escapement estimates are given for naturally spawning salmon and years 2000-2007, except incidental take estimates were not available for 2000-2001 for spring chinook salmon on the web site below (data source #2). E:I ratio is the ratio of exports to inflow (data source #3). Best fit regression lines are shown. Note that neither regression line has a slope that differs statistically significantly from a horizontal line.

Data sources:
1. Grandtab at http://www.calfish.org/IndependentDatasets/CDFGFisheriesBranch/tabid/157/Default.aspx
2. http://www.usbr.gov/mp/cvo/fishrpt.html
3. http://www.iep.ca.gov/dayflow/output/index.html

9. I repeated the analysis using the December-March average E:I ratio for winter-run salmon and the March-May average E:I ratio for spring-run salmon, which are better representative months for the two runs. I also used OMR flow data provided by FWS pursuant to the FOIA request from Metropolitan. This analysis shows the same result—there is no statistically significant relationship between the take index and the E:I ratio. This means that the E:I ratio does not have a significant effect on salmonid abundance. The results are depicted in Figure Y below.

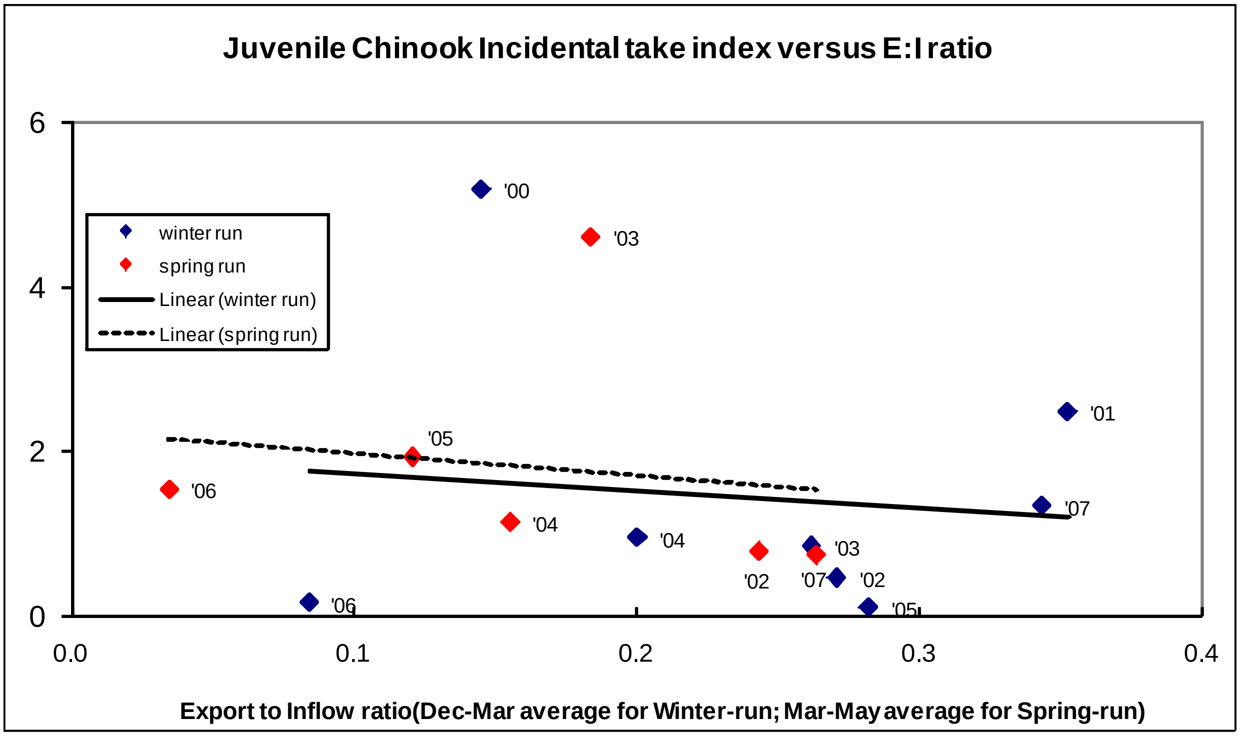


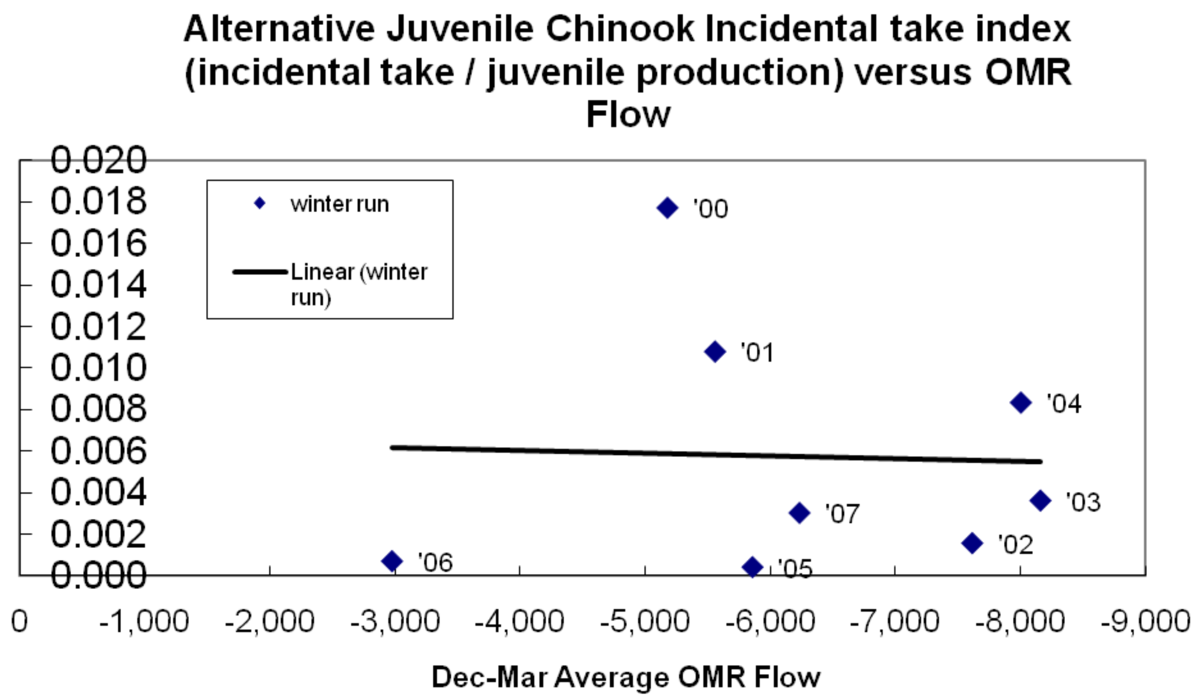
Figure Y. Juvenile Chinook salmon incidental take index is the incidental take divided by escapement. The estimates are made separately for the winter-run and spring-run. Incidental take does not include tagged hatchery fish.
Escapement estimates are for naturally spawning salmon and years 2000-2007, except incidental take estimates were not available for 2000-2001 for spring Chinook salmon. Salmon salvage data for winter- and spring-run naturally spawned Chinook salmon were not shown on the web site below and they are not provided in the BiOp, as best I can tell.
Best fit regression lines are shown. Note that neither regression line has a slope that differs statistically significantly from a horizontal line.
Months chosen for winter- and spring-run Chinook salmon are based on dates for movement into Delta (Table 6-34 in BiOp).

Data sources: grandtab in http://www.calfish.org/IndependentDatasets/CDFGFisheriesBranch/tabid/157/Default.aspx
http://www.usbr.gov/mp/cvo/fishrpt.html
Export and inflow data provided by FWS per FOIA request from MWD

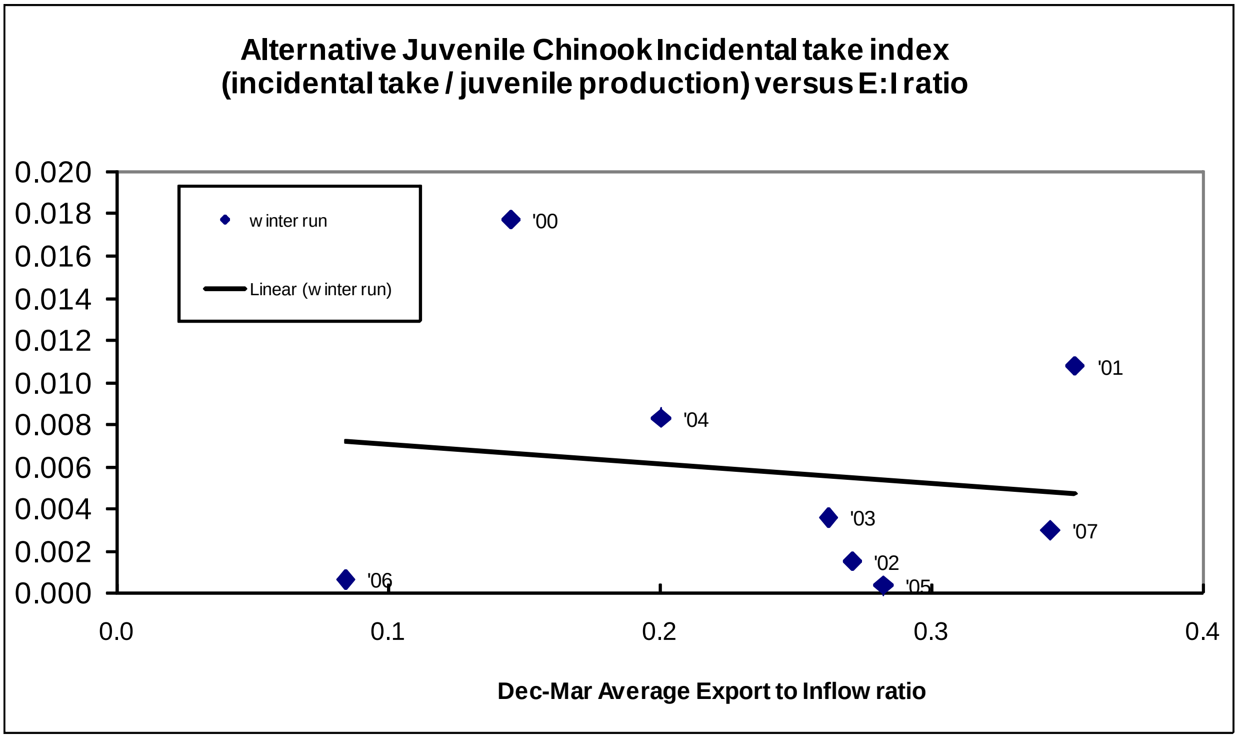
10. The above Figures X and Y are based on the following data:

Year	E:I ratio Dec-Mar	E:I ratio Mar-May	OMR Dec-Mar	OMR Mar-May	Winter-Run Chinook Salmon Incidental Take Index	Spring-Run Chinook Salmon Incidental Take Index
2000	0.145	0.112	-5178.42	-2802.45	5.190	
2001	0.353	0.228	-5558.68	-3370.64	2.475	
2002	0.271	0.244	-7615.35	-4220.59	0.448	0.789
2003	0.262	0.184	-8161.14	-5310.83	0.839	4.609
2004	0.200	0.155	-8004.52	-5071.68	0.942	1.139
2005	0.282	0.121	-5858.41	-417.315	0.087	1.932
2006	0.084	0.034	-2975.74	8221.25	0.152	1.537
2007	0.344	0.264	-6234.28	-3135.6	1.328	0.740

11. It is possible to construct an alternative winter-run incidental take index using data taken solely from the BiOp, rather than using other public sources (see notes to figures above for listing of data sources used). Incidental take is divided by the juvenile production estimates given in Table 4-2 of the BiOp on page 83 to create an alternative take index. Juvenile production estimates are a more direct estimate of abundance than escapement. Repeating the above analyses with the alternative take index reaches the same conclusion as reached with the original incidental take index, namely, that there is no statistically significant correlation between the alternative index and either December-March average OMR flows or the December-March average E:I ratio. The results are shown visually in the figures below.



Alternative juvenile Chinook salmon incidental take index is the incidental take divided by juvenile production (table 4-2 of BiOp).
Incidental take does not include tagged hatchery fish.
Escapement estimates are for naturally spawning salmon and years 2000-2007.
Best fit regression line is shown. Note that the regression line has a slope that does not differ statistically significantly from a horizontal line.
Months chosen for winter and spring-run Chinook salmon are based on dates for movement into Delta (Table 6-34 BiOp)
Data sources:
http://www.usbr.gov/mp/cvo/fishrpt.html
OMR flow data provided by FWS pursuant to
FOIA request from MWD



Alternative juvenile Chinook salmon incidental take index is the incidental take divided by juvenile production as estimated in BiOp Table 4-2.
Escapement estimates are for naturally spawning salmon and years 2000-2007.
Best fit regression line is shown. Note that the regression line has a slope that does not differ statistically significantly from a horizontal line.
Months chosen for winter- and spring-run Chinook salmon are based on dates for movement into Delta (Table 6-34 BiOp)
Data sources:
http://www.usbr.gov/mp/cvo/fishrpt.html
Export and inflow data provided by FWS pursuant to FOIA request from MWD

12. My evaluation of the analysis and modeling underlying the OMR flow restrictions in Action IV.2.3 reveals that NMFS did not utilize the best available scientific methods. When I applied standard principles of fish population dynamics and conducted the same analysis using the incidental take index, the results were fundamentally different from those reached in the BiOp. The modeling shows that there is no statistically significant relationship between OMR flows and abundance or between the E:I ratio and abundance.

I declare under penalty of perjury under the laws of the State of California and the United States that the foregoing is true and correct and that this declaration was executed on February 1, 2009, at Del Mar, California.

RICHARD B. DERISO, Ph.D.