

Bay Delta Conservation Plan Document Review Comment Form

Document: BDCP Effects Analysis Appendix B: Entrainment					Date Comments Requested by:
Comments Submitted By: State Agencies					Date Comments Submitted:
NO.	SECTION #	PAGE #	LINE #	COMMENT	RESOLUTION
1	OA	Overall		This analysis still does not address the question of averaging various time periods together. This analysis still does not address the use of a monthly model to an animal that exists within moments of time.	
2	B.0	B-1	4	Managed wetlands, duck clubs, wildlife refuges are missing	
3	B.0	B-1	5	Recommend clarifying which facilities are covered by BDCP and those that are not.	
4	B.0	B-1	21	Please revise language to clarify that DRERIP is a conceptual, qualitative life history and ecosystem model developed to inform adaptive management decisions regarding restoration actions. As written, one may infer that it is an entrainment model.	
5	B.0	B-2	6	The Miller "Revisiting Assumptions..." paper should be included along with the description of Kimmerer. SF Estuary Vol. 9, Iss. 1	
6	B.0	B-2	7	"Kimmerer data" seems like a sloppy reference. How about "Kimmerer proportional entrainment estimates"?	
7	B.0	B-2	9	The Manly approach is not properly described. It does not build on the OMR approach; rather, it is based on the relationship between entrainment and turbidity as identified by Deriso.	
8	B.0	B-2	11	Use of initial particle distributions that do not reflect actual species distributions can result in misleading conclusions. These limitations must be disclosed and explained thoroughly.	
9	B.0	B-2	12	Consider substituting "IEP trawl surveys" for "trawls.	
10	B.0	B-2	Table B-1	PP ELT is described as taking place from years 11-15 (following permitting of BDCP) and goes on to state "prior to implementation of new intake facility..." My understanding is that PP ELT addresses initial operations under dual conveyance. Please verify this.	

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11	B.0	B-3	7	DRERIP is not a method for evaluating entrainment. While DRERIP may have a role in interpreting the results of the entrainment analysis, interpretation of results is outside the scope of this appendix. If this document is not interpreting the meaning of the entrainment results, the DRERIP reference should be removed. If results will be interpreted in this appendix, then a reference to the Maunder-Deriso and Miller et al. life cycle models should also be included, and the differences, advantages, and disadvantages of the DRERIP conceptual models and the effects hierarchy of Miller et al. should be discussed.	
12	B.0	B-3	15	Section B.7 was not included with the draft Appendix. We request the opportunity to review the synthesis of results before it is provided to peer reviewers.	
13	B.0	B-3	22	Table B-2 and B-254 are the same, but is this reference actually for B-2?	
14	B.0.1	B-4	1	Recommend using a color code system for displaying information (See attached example of color coding). E.g. use green for reduction in entrainment, and red for increase in entrainment, with gradations of color. System of - and + are difficult to read and digest. Also, the estimated population level effect should be displayed in this table. As it is, it is difficult to discern whether, e.g. a 25% decrease or increase in entrainment is important to population dynamics. Or as an alternative, an additional summary table displaying the results normalized by population would be helpful. Also, it would be helpful to explain that the EA is estimating risk, as a note in the figure. In any case, contextualizing how big this change is would be helpful--i.e. a 25% increase of a 1% entrainment risk is a lot different than a 25% increase in a 20% entrainment risk.	

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15	B.0	B-5	Table B-2	This table is very difficult to understand, partly because of the symbols used to represent changes in entrainment. The footnote is also not clear where it states "results that span several categories ... slashes". Please see attached recommendation of color coding	
16	B.0.1	B-6	1	The title of this section states that entrainment of all species will be reduced but the following discussion only addresses salmon. Recommend expanding the discussion.	
17	B.0.1	B-6	2	Focusing on numbers of fish entrained rather than on the percentage of the population entrained can result in serious conclusion errors. All results should be expressed as a percentage of the standing crop rather than an absolute entrainment.	
18	B.0.1	B-6	7	A sentence begins, "BDCP increases..." As the Appendix is expected to include analyses of more than 1 alternative, is should clear which alternative is being referenced. There are also other areas where such reference clarity would be helpful.	
19	B.0.1	B-6		It is unclear which period the entrainment loss comparisons between EBC and PP are for. Is this an average of both ELT and LLT? Consider adding language to specify.	
20	B.0.1	B-7	3	"...winter-run Chinook salmon are well below 1%..." Need to state percentage of what -- I assume the estimated population.	
21	B.0.1	B-7	6	Should identify the absolute change in entrainment.	
22	B.0.1	B-7	11	The sentence states a 50 to 90% increase in spring run salvage in below normal and dry years; however, at the beginning of the paragraph it says "somewhat lower". Clarifying language explaining the seeming discrepancy is advised.	

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23	B.0.1	B-8	18	Miller, in addition to identifying OMR and X2 as factors correlated with larval-juvenile proportional entrainment, identified other factors that need be considered, especially turbidity. Recommend revising language to more fully explain other factors.	
24	B.0.1	B-8	13	Please describe what analytical method was used to support this finding.	
25	B.0.1	B-8	25	Miller not only concluded that Kimmerer's estimates were biased high for three assumptions for which bias could be quantified, but that 8 other assumptions also led to upward bias, which could not be quantified. The implications of this should be discussed. Recommend including a description of the pre-screen salvage losses	
26	B.0	B-9	7	The reference to the low "actual number of fish" is misleading in some sense. Although the number salvaged may be "low", this could be higher by a factor of 50 when pre-screen losses are accounted for.	
27	B.0.1	B-9	11	Please add the relative percent of the Longfin population affected by entrainment. It is included for other species and should be added for Longfin because the distribution is typically highest in downstream areas.	
28	B.0.1	B-9	18	The Yolo Bypass method results in higher entrainment. However, this appears to be because this method produces more fish. This should be explained and that the net benefit of implementing the Yolo Bypass CM will still result in more splittail in abundance; thus more entrainment. The relative proportion should be identified	
29	B.0.1	B-9	19	The 7 fold increase in entrainment needs to state the net increase due to the implementation of the Yolo Bypass program and the net is still more fish into the system. The relative proportion should be identified.	
30	B.0	Summary B-10	11 to 22	How will impingement events be monitored? Please see work on the subject from UC Davis.	

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31	B.2	B-5	1	This definition (withdrawal of organisms from the water) doesn't capture the concept of indirect effects of entrainment, of drawing fish into less suitable areas in the Delta.	
32	B.1	B-5	6	This plan is not covering CCWD and Freeport. If referenced, it should clear that these facilities are not covered by BDCP.	
33	B.2	B-5	15	Salvaged fish are not transported in refrigerated trucks.	
34	B.2	B-5	15	The statement, "...primary numeric measure of the impacts of entrainment..." should be expanded to include a discussion that notwithstanding the measure, the importance of entrainment must be considered relative to the standing crop or "proportional entrainment." Without such an explanation, the conclusion might erroneously focus on an absolute number.	
35	B.2	B-5	16	Something going on with page numbering - this the second page B-5. Anyway, the sentence beginning on this page seems awkward. Consider revising to read something like: "The estimated number of fish salvaged is the primary ..."	
36	B.2	B-5	18	Should revised the statement, "...do not generally survive..." based upon recent CHTR studies by DWR that indicate a substantial percentage of Delta Smelt do actually survive the salvage process. Castillo et al. reported that marked delta smelt dumped in front of the louvers at Skinner were later caught in the Delta. Talk to the DWR BDO for more information.	
37	B.2	B-5	19	Fragile fish species such as delta smelt <u>can</u> survive the CHTR phase of the salvage process. Higher survival for adult delta smelt than juvenile delta smelt.	
38	B.2	B-5	19 and others	"Salvage" needs to be explicitly defined since it is used often in this document as the same as "entrainment" or as a vague subcomponent of the salvage facility processes. Several within facility and CHTR studies show that delta smelt survival the salvage facility processes.	

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39	B.2	B-5	25	Entrainment cannot be totally eliminated suggest changing eliminate to minimize	
40	B.2.1	B-8	Figure B-1	It might be useful to acknowledge that Predation (lower right box) is also affected by lots of the environmental variables that influence "Water Diversion Avoidance" of the prey.	
41	B.2	B-8	Fig B-1	Deterrent Stimuli Box - is labeling bubbles a physical barrier correct when sound and bubbles are part of a non-physical barrier?	
42	B.2.1	B-8	Figure 1	Conceptual model element "Salvage" does not include fish holding, and release. Element "Predation" should include "Intra-facility" predation	
43	B.2.1	B-8	Fig B-1	Salvage won't reduce entrainment. Not sure if sedimentation or sediment inputs. If the latter, than I would expect a positive relationship with turbidity, especially during high flow events. If you mean the former, for example, aquatic plants trapping suspended sediments, than I don't think this is a relevant factor to include in this conceptual model. Note also that most arrows point to the water diversion avoidance box. I don't think this is the factor we are primarily concerned with. I submit that fish population is the stock or outcome we are interested in understanding. We need to understand how this stock will change when we consider all sources of entrainment, for example, diversions in the northern intakes and south export facilities. This conceptual model doesn't seem to accurately depict some of the more relevant stocks and flows and linkages in the system.	
44		B-9 to B-12	heading	The ordering of the headings is off. It went from B.1 to B.2 and back to B.1.1, and B.2 again.	
45	B.1.1	B-9	1	Shouldn't the first line read: "B.2.1"?	
46	B.1.1	B-9	1	Line numbers disappear.	

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47	B.1.1	B-9	1	The opening paragraph explains that this section looks only at historical patterns and numbers of fish entrained. While it does state that the overall importance of entrainment will be discussed in another section, it should really be much more emphatic that the numbers presented in the section are essentially meaningless without proper context and comparison to the species population. Request that the end of the paragraph be revised to provide such an explanation so as to not mislead the reader.	
48	B.1.1	B-9	18	The narrative suggests that the SWP and CVP have received the most scrutiny because they are the largest. However, there are other large (up to Jones capacity) facilities in the Delta that do not receive the same level of attention. There are a variety of reasons for this. Suggest revising the language simply to state, "The SWP and CVP south Delta pumping facilities have been the subject of most scientific investigation and management actions relating to entrainment."	
49	B.1.1	B-9	21	This paragraph highlights the problem of just presenting the numbers. First, as to entrainment by the Projects, the numbers provided seem large but are in fact meaningless because they aren't properly contextualized; do they represent 1% or 25%? Without proper context, one cannot conclude whether these figures are important or not. Also, while entrainment at smaller diversions is, "...not believed to be as substantial...", no mention is made that actual entrainment isn't measured at the vast majority of in-Delta diversions.	
50	B.1.1.	B-9	21	Why was the period of 1979 to 1993 used as the salvage example period?	
51	B.1.1.	B-9	26	The example of salvage is for salmon and Delta smelt and then Brown 1996 is cited regarding losses of fish but at that time, losses were only calculated for salmon; perhaps some clarification?	

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52	B.1.1	B-9	31	Modify the sentence beginning on line 2 to read: "...peak salvage levels in 1999..."	
53	B.1.1	B-9	37	Modify the second sentence of the fifth paragraph to read: "Salvage is a variable proportion of entrainment, the actual proportion depending on louver efficiency, pre-screen loss levels, and many other factors, but is considered a reasonable index of total entrainment."	
54	B.1.1	B-10	2	Modify the sentence beginning on line 2 to read: "...peak salvage levels in 1999..."	
55	B.1.1	B-10	3	Analysis states salvage "peak numbers" were in 1999 and 2000. However, these are peaks only within the range of years identified, starting in 1991. Should also state that population numbers were higher during this period.	
56	B.1.1	B-10	4	It states that splittail and longfin had "high level of salvage" in some years. However, wasn't the total population larger in these years as well? High relative to what?	
57	B.1.1	B-10	9	Past reduced annual salvage on Figure B-2 do not reflect past management changes based on turbidity events	
58	B.1.1	B-10	10	The text suggests we somehow have control over "management of turbidity events into the Central Delta". How so? Do you mean we <i>respond</i> to turbidity conditions?	
59	B.1.1	B-10	14	The conclusion of the last sentence in the paragraph is based, at least in part, upon, the statement, "the [SWP/CVP entrainment] only source of mortality that is catalogued and reported every single day." There are other sources of mortality also accounted for, harvest for example. So, the concluding point shouldn't be that we evaluate entrainment because it is measured; rather, we evaluate to determine if it is important to the population. Request revising the language.	
60	B.1.1	B-11	1	Fragile fish species such as delta smelt <u>can</u> survive the CHTR phase of the salvage process. Higher survival for adult delta smelt than juvenile delta smelt.	

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61	B.1.1	B-11	4	Check louver efficiency sentence for accurately; SWP should have a higher relative efficiency compared to the CVP	
62	B.1.1	B-11	11	Miller actually concluded that proportional entrainment was likely less than 13% and cautioned that use of OMR for larval-juvenile entrainment probably results in upward bias of the estimate.	
63	B.1.1	B-11	14	After the statement, "...reduced abundance of delta smelt in the south Delta.", consider adding that this is likely due to changes in habitat (increases in egeria), operational changes to decrease turbidity excursions into the southern delta by controlling exports, and other changes in basic ecology of the Delta starting with phytoplankton to zooplankton to fish and the shift in productivity to other fish species like lage mouth bass rather than just a decline. Also, it would be good to reference the work by Glibert about how increased nitrogen discharges are playing a role in this shift.	
64	B.1.1	B-11	14	Miller does not necessarily imply large fractional entrainment in any year. He corrected only a few of Kimmerer's biases. If all biases were corrected, it is unknown whether remaining entrainment would be significant. Same comment on Para 4.	

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65	B.1.1	B-11	14	<p>Kimmerer's analysis indicates that proportional entrainment of salmon and delta smelt can be high enough to cause concern, relative to other sources of mortality, in some years. However, Miller's critique of Kimmerer's analysis suggests otherwise for Delta smelt, and that conclusion is consistent with other analyses that have found no important, statistically significant effects of entrainment on subsequent abundance (Manly 2006, Maunder and Deriso 2011, Miller et al. 2011). Thomson et al. 2009 and MacNally et al. 2009 reported weak effects of winter and/or spring exports, which are not necessarily a good measure of entrainment. However, the 95% confidence limits for estimates of effects of exports include positive values, indicating that negative effects of exports are not significant at the 5% level of significance. Mathematical models of salmon escapement (Check with Cramer Fish Sciences on cites) have found no significant effects of salmon entrainment on subsequent escapement.</p>	
66	B.1.1	B-11	Third Paragraph	<p>Consider deleting the paragraph that begins with the sentence "The numbers and proportions of delta smelt entrained in the south Delta pumps..." The references cited are not very good ones to support the statement, plus it assumes that exports alone were considered as the only way to recover these fishes.</p>	
67	B.1.1	B-11	21	<p>A sentence states, "...failed to find strong signals...". Please consider that at least 2 published papers (Drs. Maunder/Deriso '11 and and Drs. Miller/Manly '11) have identified food abundance as an important factors (i.e. "strong signal"). Also, the recent AFS conference abstracts contain a summary of another life cycle model by Rose et al. that also identifies food as an important factor.</p>	

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68	B.1.1	B-12	5	Statements in the first paragraph on this page, and many statements in preceding paragraphs excessively trivialize entrainment impacts. The language used tends to suggest we are "looking for our keys under the street lamp", which is a distortion. The loss of 13% of an endangered species population to a single source is a matter worthy a lot of attention. This is especially true given the possibility that current entrainment levels don't fully reflect historical impacts. This entire attempt at contextualization should be rewritten.	
69	B.1.1	B-12	19	After last sentence, it is worthwhile to state that the entrainment analysis is also being undertaken to help determine the level of take that will be sought under the permits.	
70	B.2.2.1	B-13	22	The 75% predation refers to salmonids and not all prey species. Discuss Castillo's work on prescreen loss of delta smelt	
71	B.2.2.3	B-13	31	Thank you for using the full name of the "Skinner" facility.	
72	B.2.2.3	B-13	33	The John E. Skinner Delta Fish Protective Facility louvers fish instead of screens fish away from the pumps.	
73	B.2.2.3	B-13	37	Fish pass through secondary systems of louvers and perforated plates.	
74	B.2.2.3	B-14	7	At the end of the 1st sentence, it would be worthwhile to add that the mitigation for fish loss is covered by the Delta Fish Agreement and FRPA between DFG and DWR signed in 1986 and that this program is 10 years ahead in mitigation credits for salmon in general.	
75	B.2.4	B-15		The criteria for screen design at new North Delta intakes are described for Delta smelt. While protection for Delta smelt is certainly critical, an important question is whether this screen design is compatible with optimal design for juvenile winter-run and spring-run salmon. As with Delta smelt, it may be helpful to add a short description of how the screens will minimized salmonid entrainment.	

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76	B.2.2	B-22	14	It is worthwhile to explain why exports increase in April and May under the PP. This is due to the absence of the SJR I/E ratio from the EBC.	
77	B.2.2	B-22-23	Fig. B-5	The left-hand column of Table B-5 displays differences in south Delta exports between scenarios EBC1 and EBC2 for the various water year types. For all years, but especially wetter years, the differences in exports between scenarios seems surprisingly small, given that one scenario incorporates the Fall X2 smelt RPA and the other does not. It would be helpful to the reader if the associated text provided an explanation for the small nature of the differences. Also, the right-hand column for Above Normal, Below Normal, and Dry years shows large increases in April-May exports when comparing the EBC2 (with X2) and PP scenarios. Again some explanation of this result would be helpful.	
78	B.2.3	B-24	4	Consider adding that OMR flows, as discussed here, are tidally averaged.	
79	B.2.3	B-24	4	The use of compass headings to describe OMR flows obscures the point that the normative condition is seaward flows. It would be beneficial to include the tidal influence of OMR flows	
80	B.2.3	B-24	23	It is unclear which time period is being discussed in this paragraph. Is this during the near-term or late long term?	
81	B.2.3	B-25	4	The definition of "normative" OMR flows is inaccurate. OMR flows could not be consistently positive without project operations as Old and Middle Rivers experience significant tidal action twice a day, every day, which is primarily responsible for reversing OMR flow.	

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82	B.2.3	B-25	30	It is worthwhile to explain why exports increase in April and May under the PP. This is due to the absence of the SJR I/E ratio from the EBC. Also, please add that the OMR flows under the PP are still about -2,000 cfs. The 150% increase is a red flag but the actual amount of the increase is very small. Refer the reader to Figure B-6 for a better understanding of what is actually going on here. The 150% increase is very misleading.	
83	B.2.3	B-30	8	Assumes all agricultural diversions have similar size intakes which is false. Caution needs to be exercised when considering this method due to the mentioned bias.	
84	B.3.1	B-31	Table B-4	Is this table intended to show exposure or entrainment? If the former, for SWP/CVP South Delta Pumps adult steelhead, all races of salmon should be "X"	
85	B.3.2	B-32	2	The methods descriptions are generally well-written and informative. There does seem to be, however, uneven discussion of the assumptions associated with the method. Of particular concern is how well the data being used conforms with the requirements of the statistical methods employed in developing the methods. For example, were data transformations employed? Section B.3.4.1 does not appear to acknowledge that estimated salvage values have associated statistical error.	
86	B.3.2	B-33	Table B-5	The format of the table is a bit awkward. Consider adding rows to delineate the Locations and Species in column one. For example, add a row with a Location sub-heading at the top of the table, and add a row with a Species sub-heading half-way down the page. Also, shouldn't "larva" be either "larvae" or "larval" for the smelt?	
87	B.3.3	B-34	2	Table B-6 is missing entrainment methods. For example, do not see the Yolo Bypass inundation method for splittail.	
88	B.3.3	B-34	Table B-6	This table is very helpful.	

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89	B.3.3	B-34	Table B-6	Salvage-density method assumes a linear relationship between flow and entrainment which ignores position of population in the estuary. If the main population is below the influence of the South Delta pumps, little entrainment will occur. Caution needs to be exercised when considering this method due to the mentioned bias.	
90	B.3.3	B-36	Row 1	The limitations of the particle tracking model should also indicate 1) that uniform distribution is an unrealistic assumption, 2) that simulation periods greater than 2 weeks overestimate entrainment, .and 3) that turbidity is an unaccounted for factor.	
91	B.3.4.1	B-36	28	Not all prescreen loss is due to predation, but rather predation is part of prescreen loss. I would change sentence to reflect that predation is part of prescreen loss.	
92	B.3.4.1	B-36	29-30	Is there a citation for pre-screen predation losses for this sentence? Citations are given for louver efficiency, and losses during transport for salvaged fish.	
93	B.3.4.2	B-37	1-15	The normalization procedure described here seems biased. It would be more straightforward, and unbiased to divide the raw monthly salvage or loss by the abundance index. This is a more common method of normalization. As it is, this procedure will de-emphasize loss in low abundance years and emphasize it in high abundance years. DWR would like to meet with the ICF team to discuss this method.	
94	B.3.4.1	B-37	29	Recommend including a discussion of how entrainment is currently calculated to account for indirect effects of project operations. Need to explain the limitations of current approach. This is particularly relevant here because it appears that these estimates are used in the analysis.	

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95	B.3.4.2	B-38	2	Need to explain when data was not normalized, why, and then properly qualify the analysis. Should include inability to normalize in the chart that identifies the limitations of various methods.	
96	B.3.4.5.2	B-44	23	The correlation between salvage versus days of Yolo Bypass inundation raises several questions. First, the Inundation correlation is not as good as the flow correlation; does this then indicate that flooding of the Bypass is a less dominant force in splittail population dynamics than is currently believed. Second, the reason Yolo Inundation is being tested is that BDCP intends to increase the frequency of inundation of the Bypass. If Bypass inundation is the key factor in splittail dynamics, then lowering the Fremont Weir needs to be accounted for. Another question is whether the relationship with salvage that currently exists will continue to exist when the Bypass floods more frequently and at lower Sac River flows. Since we can't know this now, we must properly explain the limitations of this analytical approach. Also, based on the predicted results, the Yolo Bypass inundation analysis must assume that floodplain inundation will greatly increase the number of splittail. If so, this assumption must be explicitly stated. Lastly, there is nothing occurring operationally, as a result of inundation, that would cause the predicted change in entrainment. The net effect needs to be better explained.	

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97	B.3.5.1	B-45	10	The methods described in this section are all based on analysis/development of relationships based on recent times during which delta smelt distribution may have become restricted and abundance has declined. There is for, example, evidence that the southern delta made a greater contribution to delta smelt habitat in the early 1970s than it has recently, perhaps due to increased water exports at the CVP/SWP intakes (Nobriga 2008). If this is true then it seems likely that the analysis presented understate the ongoing effect of southern delta entrainment, and diminish the perception of improvements that could be achieved shifting exports to the north Delta through dual conveyance. At the very least the this section should acknowledge the limited, and possibly distorted, perspective the analysis based on recent data provides. Please provide a logic for the time periods used.	
98	B.3.5.1.1	B-46	8-13	These qualifiers are fine, but it is important that each of the methods be treated in the same way. This was the only method for which text was added to explain its limitations. To keep the discussion balanced, this text should be removed, or similar text should be added for all the other methods, and there needs to be an explanation of what all the caveats are in the text.	
99	B.3.5.1	B-46	10	A limitation of current entrainment correlations is that OMR and turbidity are assumed to be independent of each other. However, recent operational experience and the RMA model suggest that turbidity is in fact a function of OMR and that reductions in OMR to be less negative than about -6000 cfs can cause a non linear reduction in turbidity and in turn reductions in turbidity can have a non linear impact on entrainment. The net effect can thus be doubly non linear such that small reductions in exports can lead to large reductions in entrainment. Therefore, the current approaches that don't account for this possibility are quite conservative. Turbidity should be accounted for.	

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100	B.3.5.1.2	B-47	Entire Section	<p>The adult entrainment equation based on historical data seems reasonable; however, to apply it for impact analysis relies on an additional equation for Secchi depth that depends entirely on Sacramento River flows. It is unlikely that this historical relationship will apply in the future as the Delta is dramatically restored. We also have questions on the approach used on larval mortality. Consider providing additional discussion, referencing appropriate studies, to justify the methods used here.</p> <p>DWR would like to meet with the ICF team to discuss this method.</p>	
101	B.3.5.1.1	B-47	7	The sentence states, "Negative calculated values for proportional loss were changed to zero before calculating summary statistics." Question whether this approach would mask actual variation.	
102	B.3.5.1.2	B-47	7	It would be helpful to the reader if the "reasons" for adjustment were listed in a table along with the posited magnitude/direction of biases. Miller has provided such a table in presentations.	
103	B.3.5.1.2	B-47	9	Does the one sentence starting on this line really do justice to Kimmerer's 2011 published rebuttal to Miller's critique?	
104	B.3.5.2	B-51	32	This method uses salvage data from 1975-1991. However, delta smelt salvage has changed in recent year where few delta smelt are salvaged in December (DFG salvage data base). The author should consider how changing December-January analysis to current years such as 1993-2010 might change results. In this section, and others, explain why these time periods were chosen.	

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105	B.3.6.1	B-56	6	As stated above, the limitations of PTM need to be clearly stated. This section should explain that Delta smelt have spawned before the end of April and so the PTM analysis of distributions based on SKT data for May adds little value. Also, because uniform distribution doesn't occur, the section should more fully explain why the analysis is a theoretical comparative of two operational scenarios and that the output likely overestimates the effects of actual entrainment.	
106	B.3.6.1	B-56	14	The sentence, "PTM results generally assume..." should also articulate that the assumption is valid for no more than 2 weeks of a Delta smelt's initial life stage.	
107	B.3.6.2	B-66	9	As stated above, the limitations of PTM need to be clearly stated. Uniform distribution also doesn't occur for longfin. Lastly, the assumption that longfin act as passive particles is even less likely and more temporally constrained than with DS.	
108	B.3.6.2	B-66	11	The reference to Delta smelt entrainment approach appears incorrect; should be B.3.6.1?	
109	B.3.6.2	B-66	14	After the sentence that begins, "The index...", please add an indication of the percentage of Longfin smelt distribution actually affected by entrainment. There should be an abundance index used here to put into context the relative effect of entrainment on Longfin smelt. This is done for other species and can/should be done here as well.	

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110	B.3.6.2	B-66	16	The starting distributions/insertion points for longfin are unlikely; too far upstream. The 2081 locations were used for triggering management actions; they do not represent a typical population distribution. In fact, larvae at these locations are rare. These locations should be discarded and replaced with adult distribution data from the latest FMWT or SKT. Also, the assumption that distribution is uniform is not plausible; the analysis should consider the weight of distribution.	
111	B.3.6.2	B-66	18	A short explanation of how the PTM analysis for BDCP analysis inconsistent with the DFG 2081 approach would be helpful.	
112	B.3.7	B-67	25	Using CWT tags only account for hatchery fish and not wild fish. Peak monthly salvage of wild salmon usually occur in different months than hatchery salmon for spring and winter run salmon (DFG salvage data base). The stated bias should be mentioned.	
113	B.3.6.2	B-67	Fig 22	Figure B22 suggests that a large fraction of longfin , even a majority under drier conditions, are spawning upstream of Decker Island. What data source was used? The available evidence clearly indicates that the vast majority of longfin spawn below the confluence of the Sacramento and San Joaquin Rivers, including in Suisun Bay, the Napa River, and even in San Pablo and Central Bay. The Bay Study Otter Trawl (which trawls the bottom) shows the number of prespawning longfin in November and December increasing with salinity with a peak in the vicinity of 40,000 EC. Even the Bay Study MWT (near the surface) shows the peak in the distribution of Jan/Feb age two fish at around 7,000 EC, which is way down in Suisun Bay. Are these significant portions of the population included in this analysis? If not, why not?	

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114	B.3.8	B-68	23	Although the main stimuli is sound for the species studied, the inclusion of the bubble barrier and strobe lights are important to the efficacy of this system and suggests that other stimuli such as turbulence and light (vision) are important criteria for quantitative evaluation of the effectiveness. These criteria were not used in the mentioned evaluation.	
115	B.4	B-71	10	Throughout the "Results" section, and the remainder of App. B, many different entrainment related terms are used. It is not clear that the terms are always used consistently, or even accurately. Examples of these terms, include: salvage, expanded salvage, salvage data, entrainment loss, entrainment index, indirect loss, and many others. The paragraphs beginning on this page/line provides an example of inconsistent use of terms, where "salvage" and "entrainment loss" (two very different things) appear to be equated. The clarity of the results discussion would be greatly enhanced, if 1) it began with a glossary of such terms with precise definitions and 2) a careful "fine tooth comb" accounting of the use of terms was undertaken. Section B.3.4.1 actually does a pretty good job of describing how some categories of numbers are derived.	
116	B.4.1.1.1	B-73		The heading for Table B-12 (and most other tables in App. B) is insufficient for providing the reader with "stand-alone" information with which to interpret the results presented.	
117	B.4.1.1.1	B-73		Table B-12 (and numerous similar tables) contains values for the "mean monthly entrainment index" along with "95% confidence intervals. It is unclear what is meant by the MMEI term, but also the CI's seem unreasonable narrow. Generally the 95% CIs seem to be on the order of + or - 10%. This seems unreasonable, given that daily estimates of salvage probably don't have that level of precision. There appears to be a need to clearly layout (and assess) the method used to derive the CIs.	

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118	B.4.1.3	B-102	1	The change to accounting for young of the year spring run IS more realistic, but IS should go all the way and just use the fall & spring run numbers to proportional changes.	
119	B.4.1.5	B-168	Entire Section	The inability to show project benefits may be an artifact of the way in which the analysis was done. Specifically, a range of fish distributions were applied to a range of hydrologies, but the two did not seem to match appropriately. For example, dry April female distributions were used to examine entrainment effects for a whole variety of months and years (e.g. Feb 48, June 34, March 2001). DWR would like to meet with the ICF team to discuss this method.	
120	B.4.1.5	B-169	3	The limitations of the particle tracking model should be clearly stated, including 1) that uniform distribution is an unrealistic assumption, 2) that simulation periods greater than 2 weeks overestimate entrainment, .and 3) that turbidity is an unaccounted for factor.	
121	B.4.1.5.2	B-193	Table B-138	Entrainment of delta smelt only increases during May for below normal water years for PP compared to EBC scenarios, but decreases during June-July. It should be stated in the paper that increases in entrainment only occur in May under PP.	
122	B.4.1.5.2	B-193	Table B-139	Entrainment of delta smelt only increases during May for dry water years for PP compared to EBC scenarios, but decreases during June-July. It should be stated in the paper that increases in entrainment only occur in May under PP.	

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123	B.4.1.5.2	B-197		The juvenile/larval delta smelt results presented in Table B-147 (based on Kimmerer 2008) are remarkably different than the results (tables B-148 through B-150) presented for "adjusted Kimmerer approach" (Miller 2011). For example, the EBC1 vs. PP_ELT comparison for dry years in in Table B-147 shows a 35% reduction in entrainment, while the same comparison in Table B-148 shows a 13% increase. These differences are particularly hard to comprehend, given that the basic proportional loss levels derived from the two methods (e.g. comparing Figures B-43 and B-45) do not differ much. It is problematic for the reader that no insights are offered in the text for the differences in results presented in the tables. The "inclusive" approach of assessing impacts using many different methods is not helpful when the results are wildly different, but the document does not seek to explain the differences. The text needs to carefully describe, in detail, why the two methods yield such different results. For example, what particular adjustments by Miller contribute the most to the differences? Frankly, the non-intuitive magnitude in the results differences between methods makes the reader wonder whether mistakes have not been made in the analyses.	
124	B.4.1.5.3	B-205	6	For adult Delta smelt, the salvage density method has limitations. Kimmerer's method, as revised by Miller, produces estimates of proportional entrainment rather than absolute salvage, attempts to account for larval entrainment, and uses total population estimates that are nearer in time to the period of entrainment. Request using the revised Kimmerer method.	

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125	B.4.1.5.3	B-217	5	This adult delta smelt section based on Manly's work is notable for the fact that the author does a reasonable job of explaining (as opposed to just presenting) the results. Generally, the individual results sections are very lean on explanations. These sections would benefit greatly from a brief discussion of the results in terms of species biology/life history and the relevant hydrological/hydrodynamic differences between scenarios. This is a lot of work, but without it the reader has no context for the observed differences and the author has not done due diligence in assessing whether the results make sense.	
126	B.4.1.10.1	B-298	3	Should the section reference be B.3.4?	
127	B.4.1.10.1	B-298	16	This paragraph is confusing. The numbers for the total annual estimated expanded salvage under the PP should be included for both the CVP and the SWP to make the comparison clearer.	
128	B.4.1.10.1	B-298	21	Suggest adding a paragraph here that describes the limitation of the data in making statements about population-level effects of the entrainment. Something like, "Lamprey do not have a population index because they are caught so infrequently in regular sampling efforts, and so the level of entrainment in the EBCs and in the PPs cannot be put into a population context."	
129	B.4.1.10.1	B-299	4	Table B-240 would be better displayed as a graph, with salvage estimates and error bars. Figure B-86 does this, but it is not mentioned in the text.	

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130	B.4.1.11.1	B-301	6	This section devoted to "results" related to proposed(?) Non-P barriers begins abruptly a paragraph devoted to the role of water column position. Section B.4.1.11.1 would benefit from an introductory paragraph that gives some context to the discussion of results that follows. A bigger problem with this entire section is that it seems to brush by a fundamental limitation of using Non-P barriers at the CVP/SWP intakes, which is that they will operate in a "dead end" situation without bypass flows. This operational context is so different than is typically associated with these barriers that the reader is owed some considerable discussion of the point. Depending on the outcome of this discussion, the entries in the last ("effectiveness") column of Table B-243 might all be "low".	
131	B.4.1.10.1	B-302	3	Figure B-86 is a very useful display of the information in the preceding tables and shows a comparison among the scenarios. It should receive more prominence/attention/explanation.	
132	B.4.1.11.1	B-302	11	Too simplistic statement: if hearing ability was the only factor in deterrence then simple sonic barriers would be sufficient	
133	B.4.1.11.1	B-302	16	Hydrodynamic conditions at these locations may seriously limit the usefulness of these nonphysical barriers.	
134	B.4.1.11.1	B-303	Table B-243	Based on the previous comment above; the effectiveness potential rating for the following species/life stage should be lowered: Juvenile salmonids, juvenile and adult delta smelt, and juvenile longfin smelt* *Older juvenile longfin smelt (1 year-olds) are not seen typically at these facilities. A description would be helpful to determine the thresholds used for "Low, Medium, and High" in Table B-243 to develop a common understanding	
135	B.4.1.11.1	B-304	10	Replace "...the salvage process..." with "entrainment"	

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136	B.4.2.1.1	B-304	19	This and other subsections of Section B.4.2 focus entirely on direct loss (entrainment and impingement). There is considerable discussion in App. B of intake-related predation mortality at the existing CVP/SWP intakes in the southern Delta. Why the different approach? Either have a consistent discussion of predation at the proposed north Delta intakes or remove the entrainment discussion from the appendix.	
137	B.5	B-349	7	The effects (results) summary beginning here is largely identical to that provided in the Executive Summary. The ES should be aimed more at describing the "bottom line" of the results, while the Results explanations contain more detail (Sec B.5). There should be less emphasis of reporting out of numbers and more of an explanation and interpretations of the numbers. Also, it is hard to imagine an "executive" wading through Table B-2 (254), and getting much out of it. For the purposes of section B.5, there is too little provided in the way of explanation of the results. The section should endeavor more to explain the relative magnitude entrainment loss plays as a stressor by life stages for each species and for the species as a whole.	
138	B.5	B-353	9	Increased entrainment of spring run salmon occurred in below normal and dry water years for PP compared to EBC scenarios. This is a potential concern for DFG	
139	B.5	B-354	17	Increased south Delta exports during the delta smelt juvenile period in above normal water years gave increased entrainment for PP compared to EBC scenarios. This is a potential concern for DFG	
140	B.5	B-355	6	Increased south Delta exports during the longfin smelt juvenile period in below normal water years gave increased entrainment for PP compared to EBC scenarios. This is a potential concern for DFG	