APPENDIX C

Request for Correction of Information in the Draft Effects Analysis of the Biological Opinion on the Continued Long-Term Operations of the Central Valley Project and the State Water Project

DETAILED REQUEST LIST

The following requests are specific requests for correction of highly influential information that is contained in the Effects Analysis. This information will materially affect decisions governing the OCAP will and have economic effects well in excess of $500 million.

Many of the following requests relate to the Effects Analysis statements regarding delta smelt and how the species responds to Project operations. Delta smelt has a one-year life cycle. Almost all (95%) of them live only one year. Many factors affect survival of delta smelt throughout its one-year life cycle. In order for a factor to have important effects, these effects must show up in the abundance of the spawning adults at the end of their one-year life cycle. If, for example, one factor has an effect on one life stage, and other factors have much larger effects on other life stages, the effect of the one factor on subsequent spawning abundance could be relatively trivial. In assessing the importance of various factors, effects on subsequent spawning abundance cannot be overemphasized. Those are the effects that determine long-term population levels or abundance and, ultimately, whether an effect will jeopardize the continued existence of the species. In preparing these requests it became apparent that fully explaining the circumstances of the delta smelt's life cycle and the importance of particular relationships repeatedly became unwieldy. Therefore, in these specific requests for corrections, we refer to subsequent spawning abundance as "abundance," and we will refer to effects on subsequent spawning abundance as "abundance effects."

Correction Request 1 (Effects Analysis pages 1-2)

Request that the Effects Analysis be corrected to remove all assumed effects, and address only those effects which are supported by data and analysis.

Correction Required because:

- Assumption of effects of an agency action is inconsistent with the ESA which requires the Biological Opinion be based on data.
- The explicit assumption that Project operations are affecting delta smelt indirectly and directly is:
  - ✓ Biased because it does not disclose that the effects of the Project operations have been repeatedly demonstrated to be unimportant;
  - ✓ Biased because is assumes that all effects of Project operations are adverse, with no basis for such an assumption;
  - ✓ Biased because it fails to disclose, that of the factors enumerated as potential stressors of smelt populations, neither the effects of those factors nor their relationships with Project operations are analyzed in the Effects Analysis, so only suppositions, rather than data, are presented;
  - ✓ Biased because the Effects Analysis provide no data regarding the 'mixture of factors' affecting delta smelt and how they interact with each other or Project operations;
  - ✓ Inaccurate as a number of factors exist independent of Project operations; and

- ✓ Inaccurate as the Effects Analysis presents no data as to the effects or their magnitude, and the relationships between the factors are all unknown and unquantified, making it impossible to state with any reliability that their effects are adverse.

The purpose of the Effects Analysis is to determine the effects of the action on the listed species and critical habitat, if any, and to then assess the magnitude of those effects[1]. As an initial matter, we note that the Effects Analysis is explicitly premised, not on a determination based on the data, but on a series of **assumptions** set forth at the outset. This is in clear violation of the standards of the ESA.

> *'The FWS is following Bennett and Moyle (1996) and Bennett (2005), and the consensus emerging from the POD investigation (Sommer et al. 2007, Baxter et al. 2008), by **assuming** that delta smelt abundance trends have been driven by a mixture of factors, some of which are affected or controlled by water Project operations and others that are not'* [2]
>
> *'...a second **assumption** of this analysis is that the proposed Project is affecting delta smelt throughout the year either directly through entrainment or indirectly through influences on food supply and habitat suitability.'* [3]
>
> *'...A third **assumption** is that any of these three types of effects will adversely affect delta smelt, either alone or in combinations.'* [4]

Under section 7(a)(2) of the ESA and the Joint Consultation Regulations:

- ✓ The FWS must use the best scientific and commercial data available in the Biological Opinion[5].

Assuming effects is not consistent with the requirement that data form the basis of effects.

- ✓ The assumptions violate the ESA data requirement for biological opinions and IQA standards for information.

The courts have opined on the ESA's requirement that decisions be based on data, noting:

- ✓ The purpose of this requirement, "is to ensure that the ESA not be implemented haphazardly, on the basis of speculation or surmise[6]."

The Office of Management and Budget's (OMB) Guidance for application of the Information Quality Act for highly influential scientific assessments[7] is consistent with the approach required by the court. The standard is further clarified by the courts who note that:

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[1] 50 C.F.R. 402.14(g)(3).
[2] Draft Effects Analysis at 1
[3] Draft Effects Analysis at 1
[4] Draft Effects Analysis at 2
[5] 16 U.S.C. 1536(a)(2); 50 C.F.R. 402.14(g)(8)
[6] *Bennett v. Spear*, 520 U.S. 154, 176 (1997).
[7] The FWS IQA guidelines (found at http://www.fws.gov/informationquality/topics/IQAguidelines-final82307.pdf) incorporate the Office of Management and Budget Guidelines for Information Quality (The Office of Management

- ✓ While the FWS "can draw conclusions based on less than conclusive scientific evidence, it cannot base its conclusions on no evidence[8]."
- ✓ Reliance on suppositions or untested hypotheses constitutes a violation of the ESA.
- ✓ When making a determination or recommendation, the FWS cannot "disregard scientifically superior evidence[9]."

In the Effects Analysis, the FWS assumes that the Project operations have important effects on the abundance of delta smelt, based on speculation, supposition, and untested hypotheses. The best available data does not support these assumptions. Further, the FWS disregards scientifically superior evidence in the form of no fewer than 15 analyses that demonstrate no important effects of Project operations on delta smelt abundance[10].

The current state of knowledge, supported by data and analysis, regarding the effect of Projects on delta smelt is:

- ➢ There is no statistically valid support for any substantial effects of CVP and SWP operations on fish populations.
- ➢ There are clearly some effects because fish are regularly entrained in the pumps, and statistical analyses have measured these effects and found they are small (1-2%) on the population[11].
- ➢ The only "evidence" for effects higher than the measured 1-2% effect consists of unsubstantiated "expert biological opinion", not data or analysis.
- ➢ The necessary statistical predicate for asserting Project operations[12] have important effects on delta smelt abundance is correlation between abundance indices and export pumping. To date, such a correlation appears nonexistent, despite the agencies 15 year search for such a correlation.

The reason for the demonstrated lack of correlation between Project operations and delta smelt abundance is now clear from analyses by Kimmerer (Kimmerer 2008) and Manly (Manly 2007). It is that other factors, not linked to Project operations, have large effects on delta smelt abundance. These effects are so much larger (Kimmerer estimates them as 500 times larger) than water Project operations effects that they render water Project operations effects trivial. Assuming that water Project effects are important when, in fact, they are trivial, leads to huge, adverse socio-economic effects on California that, as demonstrated clearly in recent years, produce no increases in delta smelt abundance because abundance is controlled by other factors.

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and Budget (OMB) published guidelines pursuant to the IQA in the Federal Register on February 22, 2002 (67 FR 8452), directing agencies to address the requirements of the law.
http://www.whitehouse.gov/omb/fedreg/reproducible2.pdf)

[8] *National Ass'n of Home Builders v. Norton*, 340 F.3d 835, 847 (9th Cir. 2003) (citation omitted).

[9] *Trawler Diane Marie, Inc. v. Brown*, 918 F. Supp. 921, 930 (E.D.N.C. 1995).

[10] September 8, 2008 comment letter submitted by the Council for Endangered Species Act Reliability; Appendices 6 and 12.
http://bestscience.org/index.php?option=com_content&view=article&id=8&Itemid=5&736f78abdb4a802825199ce3f2dd3223=28513d54552268b2fa511ed1671ee1f1

[11] Manley and Chotkowski Arch. Hydrobiol. 167 1-4 593-607 September 2006.

[12] Generally assumed to be operation of the export pumps.

Request for Correction of Information in the Draft Effects Analysis of the Biological Opinion on the Continued Long-Term Operations of the Central Valley Project and the State Water Project

Statements in the Effects Analysis concerning water Project effects are inconsistent with the ESA in that they base the biological opinion of the effects of the Project on assumptions rather than data.

The statements are inconsistent with the requirements of the IQA in that they:

- ✓ Are inaccurate in that they fail to recognize the data and analysis that contradict the assumptions;
- ✓ Are incomplete in that myriad contradictory data and analysis is not included or referenced; and
- ✓ Are biased in that the assumptions are designed to implicate Project operations for effects that are not in fact, effects of the Project.

Correction Request 2 (Effects Analysis page 1)

Request that general assumptions and statements regarding direct adverse effects of entrainment by Delta export pumps on delta smelt abundance be removed and replaced with specific statements regarding only those effects whose existence is supported by data.

Request that general assumptions and statements regarding indirect water Project effects acting through multiple unknown, undefined, and unmeasured 'factors' or 'stressors' having adverse effects be removed and replaced with specific statements regarding only those effects whose existence is supported by data.

'...a second assumption of this analysis is that the proposed Project is affecting delta smelt throughout the year either directly through entrainment or indirectly through influences on food supply and habitat suitability.' [13]

The above statement from the Effects Analysis is inconsistent with the requirements of the ESA that determinations be based on data. There is no data that supports the assumption that Project operations have important direct adverse effects on delta smelt abundance through entrainment. In fact, available data contradict the assumption that there are important adverse effects due to Project pumping.

- The FWS acknowledges that "currently published analyses of long-term associations between delta smelt salvage and subsequent abundance do not support the hypothesis that entrainment is driving population dynamics year in and year out (Bennett 2005; Manly and Chotkowski 2006; Kimmerer 2008)"[14].
- The assumption ignores the results of multiple analyses – including but not limited to those the Effects Analysis references – all of which have found the absence of an important relationship between direct entrainment and abundance of delta smelt[15].
- One of the peer reviewers in a published paper outside the context of this biological opinion concludes that "no effect of export flow on subsequent midwater trawl abundances is evident"[1617].

[13] Draft Effects Affects at 1

[14] Effects Analysis at 5

[15] Council for Endangered Species Act Reliability; September 8, 2008 letter to the FWS commenting on the 90-day finding on the petition to list the delta smelt as endangered. The comment letter cites over 15 statistical analyses which examined potential relationships between delta smelt and Project pumping. None of these analyses identified important effects due to water Project pumping.

- The Effects Analysis assesses the direct effects arising from entrainment of delta smelt and suggests that "delta smelt entrainment can best be characterized as a sporadically significant influence on population dynamics[18]." But the Effects Analysis never explains how these 'sporadic' effects are significant, particularly in the context of broader analyses that demonstrate no important adverse effects at the population level. This is particularly important when the fact that the delta smelt has a life cycle of one year is considered. A "sporadically significant influence" would show up each year it affected a fish with a one-year life cycle[19].
- The Effects Analysis makes the assumption that entrainment affects delta smelt, but fails to recognize that annual entrainment losses are obscured by effects of other factors[20].

The Effects Analysis assumes that Project pumping has indirect effects on delta smelt abundance based on analyses that are inaccurate, incomplete, unclear, and biased. Further, in clear violation of the Joint Consultation Regulations and Handbook, the Effects Analysis identifies the effects of factors which are occurring independent of Project operations as indirect Project effects.

Under section 7(b)(3)(A) of the ESA, the FWS must prepare "a written statement setting forth the Secretary's opinion, and a summary of the information on which the opinion is based, detailing how [the action that is the subject of consultation] affects the species or its critical habitat"[21]. In other words, the FWS must prepare a biological opinion that includes, *inter alia*, "[a] detailed discussion of the effects of the action on listed species or critical habitat"[22]. That discussion must be predicated on data, not supposition[23].

The Effects Analysis violates the ESA by failing to base its findings on the best available data and further bases its findings on assumptions.

The statement is inconsistent with the requirements of the IQA in that it is:

- ✓ Inaccurate and biased in that it leads the reader to believe that Project effects are far more important than is the case;
- ✓ Inaccurate and biased in that it implies that water Project operations are an important factor in the decline of delta smelt populations;

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[16] Wim J. Kimmerer, *Losses of Sacramento River Chinook Salmon and Delta Smelt to Entrainment in Water Diversions in the Sacramento-San Joaquin Delta*, SAN FRANCISCO ESTUARY & WATERSHED SCIENCE at 25 (June 2008).

[17] Kimmerer proceeds to state that the lack of a relationship "suggests that ... losses have effects that are episodic and that therefore their effects should be calculated rather than inferred from correlative analyses." *Id.* But this is conjecture, even where, as here, it is posited by a qualified expert in the field.

[18] Effects Analysis at 5

[19] A "sporadically significant influence" would show up each year it affected a fish with a one-year life cycle, such as delta smelt, but no such "sporadically significant influences" have been detected in any of the multiple analyses which have examined the data. Such sporadic influence would be easily detected and demonstrate readily identified patterns, and most importantly, would demonstrate important effects on delta smelt abundance. In 2003, the year with the highest relative salvage (adult salvage/previous FMWT index) of adult delta smelt on record, far higher than any other year, the FMWT index actually increased by 50%.. The reference to such effects is a red herring designed to confuse and obfuscate the point that to date the data demonstrate entrainment and Project pumping have no important effects that can be detected.

[20] Kimmerer 2008.

[21] 16 U.S.C. 1536(b)(3)(A).

[22] 50 C.F.R. 402.14(h)(2).

[23] U.S.C. 1536(a)(2); 50 C.F.R. 402.14(g)(8), *Bennett v. Spear*, 520 U.S. 154, 176 (1997).

- ✓ Inaccurate and biased in that it implies that water Project operations will result in further important declines of delta smelt populations;
- ✓ Incomplete, as it assumes Project operations (entrainment) affect delta smelt without disclosing that data and analysis demonstrate those effects are unimportant;and
- ✓ Incomplete in that it fails to disclose that recent analysis estimates that roughly 98% of the decline can be attributed to factors other than Project operations[24].

Correction request 3 (Effects Analysis Pages 4-5)

Request that the statement that Central Valley Project and State Water Project (the "Projects") operations affect delta smelt directly through entrainment be corrected and replaced with the statement found later in the analysis that acknowledges data demonstrate entrainment is not driving population dynamics[25] and that while effects have been identified, they are unimportant.

The Effects Analysis emphasizes the fact that Project pumping has effects on delta smelt and on the hydrodynamics of the Delta. However, the information presented is incomplete and fails to acknowledge that no important effects have been detected, despite over 15 years of efforts to identify such effects. Further, the Effects Analysis fails to acknowledge that 15 years of manipulating pumping and reducing pumping volumes has failed to provide any benefit to delta smelt. The information on the relationship between Project operations and smelt abundance presented in the Effects Analysis is incomplete, inaccurate, and biased.

> *The entrainment of delta smelt into the Banks and Jones pumping plants is a direct effect of SWP and CVP operations[26].*
>
> *The population-level effects of delta smelt entrainment vary; delta smelt entrainment can best be characterized as a sporadically significant influence on population dynamics[27].*
>
> *Major population declines during the early 1980s (Moyle et al. 1992) and during the recent "POD" years (Sommer et al. 2007) were both associated with hydrodynamic conditions that greatly increased delta smelt entrainment losses as indexed by numbers of fish salvaged[28].*
>
> *However, currently published analyses of long-term associations between delta smelt salvage and subsequent abundance do not support the hypothesis that entrainment is driving population dynamics year in and year out (Bennett 2005; Manly and Chotkowski 2006; Kimmerer 2008)[29].*

There is no relationship between direct entrainment and subsequent abundance. The data does not support the existence of a relationship and in fact demonstrates no important effects from entrainment. Nevertheless, the FWS assumes an effect in violation of the requirements of the ESA and the IQA

[24] See related Requests for Correction contained in this letter
[25] Effects Analysis at 5
[26] Effects Analysis at 4
[27] Effects Analysis at 5
[28] Effects Analysis at 5
[29] Effects Analysis at 5

The Effects Analysis fails to recognize the results of multiple analyses – including but not limited to those it references – all of which have found the absence of an important relationship between direct entrainment and subsequent abundance. For example, the FWS own peer reviewer in a published paper outside the context of this biological opinion concludes that "no effect of export flow on subsequent midwater trawl abundances is evident."[30][31] Instead, the Effects Analysis assesses the direct effects arising from entrainment of delta smelt and suggests that "delta smelt entrainment can best be characterized as a sporadically significant influence on population dynamics"[32].

The Effects Analysis never explains how these 'sporadic' effects are significant, particularly in the context of broader analyses that demonstrate no important effects. In fact, in the same paragraph the FWS acknowledges that "currently published analyses of long-term associations between delta smelt salvage and subsequent abundance do not support the hypothesis that entrainment is driving population dynamics year in and year out (Bennett 2005; Manly and Chotkowski 2006; Kimmerer 2008)."

Discussion of effects of entrainment of delta smelt into the Project facilities relies heavily on Kimmerer (2008) and Grimaldo et al. (in review). Because Grimaldo et al. is unavailable to the public, it does not meet the "best scientific and commercial data *available*" standard of the ESA.[33] Also, Grimaldo's analysis is based on the assumption that salvage, as a measure of entrainment, has important effects on abundance of delta smelt. This assumption is contradicted by data and analysis, and is demonstrably false.

As Grimaldo is unavailable, it does not meet the requirements of the ESA, nor does it meet the requirements of the IQA Guidelines that require analytical work be reproducible. At this point, Grimaldo is not reviewable, much less reproducible.

The other work cited as the basis of the Effects Analysis determinations[34], Kimmerer (2008), estimated that annual entrainment of delta smelt of all age classes was 10-60% per year from 2002-2006[35]. However, Kimmerer also acknowledges that the effects of these losses are obscured by a subsequent 50-fold variability in survival of delta smelt from summer to fall, and acknowledges that summer zooplankton abundance is an explanation for this variability[36]. The FWS has data and analyses that support this explanation, but to date, in an arbitrary and capricious manner, has failed to recognize that other factors, such as contaminants and food supply caused the delta smelt decline, independent of export pumping.

- In failing to recognize the multiple analyses that support the fact that long-term associations between salvage and subsequent abundance are not driving population dynamics on an annual basis, the Effects Analysis uses biased, incomplete and inaccurate information. Instead of using data, as

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[30] Wim J. Kimmerer, *Losses of Sacramento River Chinook Salmon and Delta Smelt to Entrainment in Water Diversions in the Sacramento-San Joaquin Delta*, SAN FRANCISCO ESTUARY & WATERSHED SCIENCE at 25 (June 2008)

[31] Kimmerer proceeds to state that the lack of a relationship "suggests that ... losses have effects that are episodic and that therefore their effects should be calculated rather than inferred from correlative analyses." *Id.* But this is conjecture, even where, as here, it is posited by a qualified expert in the field.

[32] Effects Analysis at 5.

[33] 16 U.S.C. 1536(a)(2); 50 C.F.R. 402.14(g)(8).

[34] Kimmerer 2008.

[35] Wim J. Kimmerer, *Losses of Sacramento River Chinook Salmon and Delta Smelt to Entrainment in Water Diversions in the Sacramento-San Joaquin Delta*, SAN FRANCISCO ESTUARY & WATERSHED SCIENCE at 25 (June 2008).

[36] Wim J. Kimmerer, *Losses of Sacramento River Chinook Salmon and Delta Smelt to Entrainment in Water Diversions in the Sacramento-San Joaquin Delta*, SAN FRANCISCO ESTUARY & WATERSHED SCIENCE at 25 (June 2008).

required by the ESA, the Effects Analysis relies on speculation and surmise while ignoring the best available data.

- In asserting that export pumping is the cause of smelt decline and ignoring data demonstrating that other factors, including food supply, are the best available basis for smelt decline, the FWS is asserting effects based on speculation and surmise while ignoring the best available data.
- In assuming that export pumping is the cause of delta smelt abundance declines while ignoring multiple studies demonstrating no important effects on delta smelt abundance from export pumping, the Effects Analysis is biased and drawing conclusions which require them to ignore the best available data.
- In relying on Kimmerer, the Effects Analysis fails to critically examine the analysis contained in the work, which is flawed[37].

This discussion illustrates how the Effects Analysis asserts that entrainment has a significant effect on delta smelt abundance, with no supporting data, and in such a manner as to require that they ignore the best available data. Further, the Effects Analysis fails to accurately characterize the relationship between Project pumping and delta smelt abundance, fails to fully disclose the limitations of the research it cites, and presents the data in a biased manner.

The Effects Analysis fails to comply with the requirements of the IQA in that the highly influential information included on these pages is:

- ✓ Inaccurate and biased in that it emphasizes the fact that Project pumping has effects on delta smelt and on the hydrodynamics of the Delta without acknowledging that the effects of tides and weather dwarf the effects of Project operations;
- ✓ Inaccurate and biased in that it implies there is a relationship between direct entrainment and subsequent abundance, when in fact, none has been detected;
- ✓ Inaccurate, incomplete and biased in that it implies a relationship based on the existence of 'sporadic effects' and never explains how these 'sporadic' effects are significant, particularly in the context of broader analyses that demonstrate no important effects;
- ✓ Incomplete and biased in that it fails to acknowledge that no important effects of Project operations have been detected, despite over 15 years of efforts to identify such effects; and
- ✓ Incomplete and biased in that it fails to acknowledge that 15 years of manipulating Project operations and reducing pumping volumes has failed to provide any benefit to delta smelt;

Correction Request 4 (pages 1 and 31)

Request correction of statements in the Effects Analysis that attribute effects of independent factors such as predation, contaminants, introduced species, food supply, aquatic macrophytes, and micosystis to indirect effects of Project operations.

[37] See related Requests for Correction contained in this letter.

Request that unsupported Effects Analysis statements attributing adverse effects of other identified factors to Project operation be removed or clarified to recognize:

- These adverse factors would exist even if Project operations were to cease, and thus are not the indirect effects of Project operations;
- The FWS has no data as to either the existence or extent of the adverse effects of many of the listed factors;
- The FWS has no data to support the assertion that Project operations incrementally increase the adverse effects of the listed independent factors;
- The hydrodynamics of the Delta are largely controlled by the tides and weather;
- The FWS has no data to identify which, if any, hydrodynamic conditions result in adverse effects to delta smelt;
- The FWS has no data to support the assertion that direct and/or indirect adverse effects resulting from Project operations are having an important effect on delta smelt abundance; and
- Extremely stable low outflow conditions in the fall occur naturally, and CVP and SWP operations actually increase flow levels and alleviate conditions that may be caused by low outflow.

The Effects Analysis attributes the effects of independent factors to the OCAP, stating these effects are indirect effects of the Projects. The effects of these factors would exist with or without the OCAP and are therefore not effects of the action. The Effects Analysis states that a multitude of factors affect delta smelt, including predation, contaminants, introduced species, entrainment, habitat suitability, food supply, aquatic macrophytes, and micosystis and that:

> *"[t]he magnitude of the adverse effects of many of these factors on delta smelt is related to hydrodynamic conditions in the delta, which in turn are controlled to a large extent by CVP and SWP operations[38]."*

The effects of a federal action are defined by the FWS as "the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline"[39]. If an effect would occur whether or not the action takes place, it is not an effect of the action[40]. Furthermore, if an effect could occur but is not reasonably certain to occur, it is not an effect of the action[41].

The introduction includes a general statement that multiple factors independent of CVP and SWP operations are affecting delta smelt and states that the adverse effects of these independent factors are still somehow attributable to CVP and SWP operations. This assertion is repeated later in the Effects Analysis as well[42]. In the introduction to the Effects Analysis the FWSs offers a cursory, hand waving explanation of unspecified Project influence, acting through unspecified and unmeasured stressors, which exert unexplained, unmeasured, and undefined adverse effects on delta smelt[43]. Further, the introduction misrepresents historic conditions[44],

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[38] Effects Analysis at 1

[39] 50 C.F.R. 402.02

[40] *Endangered Species Consultation Handbook* at 4-27 (March 1998). *Accord* 73 Fed. Reg. 47,868, 47,870 (Aug. 15, 2008) (preamble to proposed amendments to the joint consultation regulations); 51 Fed. Reg. 19,926, 19,932 (June 3, 1986) (preamble to final rule establishing the joint consultation regulations)

[41] 50 C.F.R. 402.02 (definition of "effects of the action" including indirect effects). *Accord* 73 Fed. Reg. at 47,870

[42] Effects Analysis at 31.

[43] Effects Analysis at 1

[44] Effects Analysis at 1

misstates the hydrodynamic effects of the water Project pumping by implying that pumping, rather than the tides and weather are the primary forces acting on the hydrodynamics of the Delta[45].

The Effects Analysis states that a multitude of factors affect delta smelt, including predation, contaminants, introduced species, entrainment, habitat suitability, food supply, aquatic macrophytes, and micosystis and that "[t]he magnitude of the adverse effects of many of these factors on delta smelt is related to hydrodynamic conditions in the delta, which in turn are controlled to a large extent by CVP and SWP operations[46]."

This statement in the introductory paragraph of the Effects Analysis must be corrected because it is inaccurate, incomplete and biased. There are three specific issues:

- First, it is inaccurate and incomplete because it lists a number of factors that adversely affect delta smelt and attributes a share of responsibility for "many" of these to the CVP and SWP operations. However, the reader is left to wonder which factors are indirectly controlled by CVP and SWP operations and what incremental adverse effects result from Project operation.
- Second, it is biased in that it includes the unsupported assertion that the adverse effects of many of the factors are related to hydrodynamic conditions in the Delta. However, the FWS is unable to quantify many of the generalized effects and whether they are in fact adverse, in terms of type, severity, duration or location.
- Third, it includes the statement, which is inaccurate, unsupported by any data, and biased; that hydrodynamic conditions in the Delta are controlled to a large extent by CVP and SWP operations, while completely ignoring the effect of tides and weather.

Correction Request 5 (Effects Analysis page 2 and related references throughout the document)

Request correction of the Effects Analysis to eliminate the assumption that three assumed Project effects will adversely affect delta smelt either alone or in combination.

Request correction of the Effects Analysis to acknowledge that Project operations do not have important adverse abundance effects on delta smelt due to entrainment.

Request Effects Analysis be revised to be consistent with the requirements of the ESA and identify only those effects whose existence is supported by the best scientific and commercial data available.

The effects analysis states:

> *'...A third assumption is that any of these three types of effects will adversely affect delta smelt, either alone or in combinations.'* [47]

- The statement relies on hypothesis, not data;
- The statement is inaccurate in that none of the assumed effects are substantiated by the best available scientific data;
- The statement is inaccurate and biased in that it assumes effects of water Projects in the absence of data, and only by ignoring contradictory data; and

[45] Effects Analysis at 1
[46] Effects Analysis at 1
[47] Draft Effects Analysis at 2

- The statement is inconsistent with the requirement of the ESA which requires that the contents of the biological opinion be based on data, not assumptions.

The Effects Analysis cites a study completed in 2000[48] as the basis for this assumption. The cited paper speaks to a general approach that considers many factors acting all once. The citation does not address the specifics of the Delta, delta smelt, or water Project effects. Furthermore, despite the fact that this paper has been available for 8 years, the recommended analytical approach has not been applied to the Delta. In fact, the paper is first referenced in this Effects Analysis. The FWS proposes to base a biological opinion with adverse consequences for millions of people and costs in the billions of dollars on an untested hypothesis. This is in clear violation of both the requirements of the ESA and the IQA.

Correction Request 6 (Effects Analysis pages 4-21 and related statements throughout the Effects Analysis)

Request correction of the Effects Analysis to recognize the data and analysis demonstrate no relationship between direct entrainment and abundance of delta smelt[49].

Request correction of the assumption that there is a linear relationship between flows in Old and Middle River (OMR) and delta smelt salvage.

Request correction of the Effects Analysis by removal of references to *Grimaldo et al* as the work is not publicly available and thus does not meet the transparency and reproducibility standards of the IQA.

The data demonstrate there is no relationship between direct entrainment and subsequent abundance and in fact demonstrate no important effects from entrainment[50]. This data and analysis has been provided to the FWS on multiple occasions[51]. Nevertheless, the FWS assumes an effect, in contradiction of the data that supports a conclusion of no important effects, and in direct violation of the ESA which requires data to support effects.

Having made the unsupported assumption[52] that entrainment has population level effects on delta smelt, the Effects Analysis proceeds to analyze salvage as a measure of entrainment. The Effects Analysis then makes two corollary errors which in and of themselves are unimportant except for the fact that they rely on a substantial error in the assumption that entrainment has population level effects. The salvage analysis:

- Incorrectly assumes that there is a linear relationship between OMR flow and salvage which overestimates salvage during low flow conditions; and
- It relies on an analytically indefensible comparison between historical data and conditions and simulated data and conditions to predict Project effects.

The Effects Analysis fails to recognize the results of multiple analyses – including, but not limited to, those its references – all of which have found the absence of a meaningful relationship between direct entrainment and abundance. For example, the FWS's own peer reviewer in a published paper outside the context of this biological

[48] Rose 2000; EA at 2; Interestingly, the author of this paper which forms the basis of the approach the EA uses, is also one of the peer reviewers.
[49] See detailed discussions in related Correction Requests included in this document
[50] [50] Council for Endangered Species Act Reliability, September 8, 2008 comment letter on the 90 day finding on the Petition to list the delta smelt; Kimmerer 2008
[51] Wim J. Kimmerer, *Losses of Sacramento River Chinook Salmon and Delta Smelt to Entrainment in Water Diversions in the Sacramento-San Joaquin Delta*, SAN FRANCISCO ESTUARY & WATERSHED SCIENCE at 25 (June 2008)
[52] In fact, this assumption is patently contradicted by the available data.

opinion concludes that "no effect of export flow on subsequent midwater trawl abundances is evident."[53][54] Instead, the Effects Analysis assesses the direct effects arising from entrainment of delta smelt and suggests that "delta smelt entrainment can best be characterized as a sporadically significant influence on population dynamics[55]." The Effects Analysis never explains how these 'sporadic' effects are significant, particularly in the context of broader analyses that demonstrate no important effects. However, in the same paragraph the FWS acknowledges that "currently published analyses of long-term associations between delta smelt salvage and subsequent abundance do not support the hypothesis that entrainment is driving population dynamics year in and year out (Bennett 2005; Manly and Chotkowski 2006; Kimmerer 2008)." .

Discussion of effects of entrainment of delta smelt into the Project facilities relies heavily on Kimmerer (2008) and Grimaldo et al. (in review). Because Grimaldo et al. is unavailable to the public, it does not fall within the "best scientific and commercial data available" standard[56] and it is not possible to provide detailed comments on this document.

Kimmerer (2008) estimated that annual entrainment of delta smelt of all age classes was 10-60% per year from 2002-2006[57]. However, Kimmerer also acknowledges that the effects of these losses are obscured by a subsequent 50-fold variability in survival of delta smelt from summer to fall, and acknowledges that an explanation for the variability: variations in summer zooplankton abundance[58].

The FWS has data and analyses that support this explanation, but to date, in an arbitrary and capricious manner, has failed to recognize food supply independent of export pumping as a cause of delta smelt decline.

- In failing to recognize the multiple analyses that support the fact that long-term associations between salvage and abundance are not driving population dynamics on an annual basis, the FWS relies on speculation and surmise while ignoring the best available data.
- In asserting that export pumping is the cause of smelt decline and ignoring data demonstrating that food supply is the basis for smelt decline, the FWS is asserting effects based on speculation and surmise while ignoring the best available data.
- In assuming that export pumping is the cause of delta smelt abundance declines while ignoring multiple studies demonstrating no important effects on delta smelt abundance from export pumping, the FWS is drawing conclusions which require them to ignore the best available data.

[53] Wim J. Kimmerer, *Losses of Sacramento River Chinook Salmon and Delta Smelt to Entrainment in Water Diversions in the Sacramento-San Joaquin Delta*, SAN FRANCISCO ESTUARY & WATERSHED SCIENCE at 25 (June 2008)

[54] Kimmerer proceeds to state that the lack of a relationship "suggests that ... losses have effects that are episodic and that therefore their effects should be calculated rather than inferred from correlative analyses." *Id.* But this is conjecture, even where, as here, it is posited by a qualified expert in the field.

[55] Effects Analysis at 5.

[56] 16 U.S.C. 1536(a)(2); 50 C.F.R. 402.14(g)(8).

[57] Wim J. Kimmerer, *Losses of Sacramento River Chinook Salmon and Delta Smelt to Entrainment in Water Diversions in the Sacramento-San Joaquin Delta*, SAN FRANCISCO ESTUARY & WATERSHED SCIENCE at 25 (June 2008).

[58] Wim J. Kimmerer, *Losses of Sacramento River Chinook Salmon and Delta Smelt to Entrainment in Water Diversions in the Sacramento-San Joaquin Delta*, SAN FRANCISCO ESTUARY & WATERSHED SCIENCE at 25 (June 2008).

The Effects Analysis relies on Grimaldo et al. (in review), which is based on a linear model. The Effects Analysis is a highly influential scientific assessment[59]. Thus, failure to provide access to the basis for the determination violates the FWS's peer review guidelines, OMB Guidelines, and the ESA's requirement that available data be used as the basis for a decision.

First, even though Grimaldo is a linear model, the Effects Analysis uses it to predict annual winter salvage by relating salvage to OMR flows[60]. The relationship between salvage and OMR flows is non-linear as the FWS is well aware, based on data and analyses provided to the FWS. Ms. Sheila Greene, a biologist with the California Department of Water Resources, produced analyses as early as March, 2007 that showed January and February salvage compared to OMR flows[61]. Manly (2007) also evaluated salvage in relation to OMR flows and found the relationship is non-linear, resembling an exponential relationship. Kimmerer (2008) used a non-linear distribution to estimate entrainment in relation to OMR flows. Regardless, the Effects Analysis authors knowingly rely on a clearly inaccurate relationship to identify a spurious relationship.

By referencing a study that is unavailable to the public and embarking on highly technical and site specific discussions regarding delta smelt and discrete flows, the Effects Analysis attempts to clothe hypothesis in fact. The entrainment analysis in the Effects Analysis is a cynical attempt at obfuscation by detailing numerous highly technical analyses and assumptions which confuse the reader and lead them to believe that there is data to support an assertion that export pumping has important effects on delta smelt abundance, when in fact, there are none. There are multiple methods for examining pumping and localized effects on the numbers of smelt entrained. However, to date all of these analyses, which represent the best available data, demonstrate repeatedly that, despite the localized effects, entrainment has no important effect on delta smelt abundance indices.

Correction Request 7 (Effects Analysis pages 21 through 23 and related statements throughout the Effects Analysis)

Request correction of the Effects Analysis to recognize that there are no data to support an assertion that Project operations are having important effects on densitites of *Pseudodiaptomus forbesi* in delta smelt habitat areas in summer.

Request correction of the Effects Analysis to recognize that there are no data so support an assumption that entrainment is affecting delta smelt abundance.

Request correction of the Effects Analysis to recognize that *Pseudodioptomus forbesi* densities in Suisun Bay are not correlated with Project exports.

The Effects Analysis attempts to bolster the assumption that Project pumping affects delta smelt abundance by asserting it reduces food supply levels by entraining *Pseudodiaptomus forbesi*. This is yet another attempt to subvert clear evidence, supported by data, that other factors independent of water Project operations are the basis for declines in delta smelt abundance.

In order to tie water Project operations to the decline in delta smelt abundance, the Effects Analysis asserts that food supply declines are the result of entrainment of *Pseudodiaptomus forbesi* due to water Project operations. The Effects Analysis, with no supporting data and in clear violation of both the ESA and IQA, asserts in the Effects

[59] Final Bulletin, Attachment 3.
[60] Effects Analysis at 6-7.
[61] Declaration of Sheila Greene *NRDC v. Kempthorne*

Analysis that entrainment of one of the delta smelt's preferred copepod prey species, *Pseudodiaptomus forbesi*, in the summer (June-September) occurs at levels sufficient to result in adverse population-level effects on delta smelt.

Pseudodiaptomus forbesi is the primary prey for juvenile delta smelt during summer months. In combination with juvenile delta smelt abundance in the summer it is a primary determinant of abundance effects, as measured by the FMWT index[62]. However, the Effects Analysis' contention that *Pseudodiaptomus forbesi* densities in areas inhabited by most delta smelt in the summer are significantly adversely affected by its entrainment at the CVP and SWP export pumps in the south Delta is complete supposition and not supported by any data whatsoever, in clear violation of the requirements of both the ESA and the IQA.

Analytically, if entrainment of *Pseudodiaptomus forbesi* were affecting delta smelt food supplies, and, as a result, delta smelt abundance, the relationship would manifest itself as a correlation between export volumes and *Pseudodiaptomus forbesi densities*[63]. No such correlation has been identified.

Data from Delta sub-areas can be used to address the relationships between *Pseudodiaptomus forbesi* densities in areas of the Delta that are important to delta smelt in the summer. The 2005 Peer Review[64] suggested such investigation. Specifically the peer review suggested that three variables that should be important to the issue of *Pseudodiaptomus forbesi* availability and water export operations in specific areas of the Delta. The areas suggested for examination were: the lower Sacramento River, Chipps Island, and Suisun Bay. The variables examined were: abundance of *Pseudodiaptomus forbesi* in the San Joaquin River side of the Delta (lower San Joaquin River, near Franks Tract, the southeast Delta, and the east-southeast Delta), Delta inflow, and water exports. The analyses found strong correlations between Delta sub-area densities and total *Pseudodiaptomus forbesi*. This indicates that when *Pseudodiaptomus forbesi* densities are relatively high in one habitat sub-area they tend to be high in other sub-areas. No correlations were found between copepod densities and exports. Additionally, there was a highly significant correlation between *Pseudodiaptomus forbesi* densities in Suisun Bay and those in Suisun Marsh. This means that if Suisun Bay densities are being supported by other population centers, the most likely source is Suisun Marsh. The analyses referred to above are obvious, simple, straightforward and based on data readily available to the FWS, so there is no excuse for ignoring such analyses in favor of an unsupported assertion in this Effects Analysis.

In the case of the delta smelt, the Effects Analysis appropriately considers the specific species of copepod preferred by the delta smelt, *Pseudodiaptomus forbesi*, rather than some more general measure of food such as total calanoid copepod biomass. Prey selectivity, the preference of fish for a particular species of prey, is well-

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[62] Council for Endangered Species Act Reliability September 8, 2008 comment letter on the FWS 90-day finding to reclassify the delta smelt as endangered, Appendix 12

[63] A fundamental premise of statistical analysis is that both correlation and causation are necessary to accurately identify cause and effect relationships. While it is possible for correlation to exist where there is no cause and effect relationship, it is not possible for a cause and effect relationship to exist without correlation. In the case of delta smelt and Project pumping, the EA is asserting a cause and effect relationship where there is no identifiable correlation.

[64] *Review Panel Report: San Francisco Estuary Sacramento-San Joaquin Delta Interagency Ecological Program on Pelagic Organism Decline;* December 29, 2005

known for fish in general[65] and for delta smelt in particular.[66] Failure to account for prey selectivity can result in obscuring or eliminating important relationships between abundance and food limitation, leading to spurious correlations between abundance and any factor trending up or down with time, such as exports, for example. However, the conclusions and assumptions made in the application of this knowledge are not defensible in the context of the requirements of the ESA and IQA.

It is known that between 1989 and the present – the period after which the introduced *Pseudodiaptomus forbesi* became well established in the Delta – on average about one-half of overall population of delta smelt have occupied the lower Sacramento River in summer (see Figure 1 for area locations). On average, the remaining one-third of the population has resided just downstream, in the Chipps Island area and in Suisun Bay. If population augmentation from upstream is a major contributor of *Pseudodiaptomus forbesi* to the lower Sacramento River, it likely comes from upstream in the Sacramento River, rather than from the San Joaquin River side of the Delta. Subsidization of copepod densities from upstream in the Sacramento River would not be significantly affected by their entrainment at the export pumps. Similarly, if subsidization of *Pseudodiaptomus forbesi* densities actually occurs in Suisun Bay, those subsidies likely come from Suisun Marsh, which is adjacent to Suisun Bay, is hydraulically connected with it, and produces high densities of *Pseudodiaptomus forbesi* relative to Suisun Bay.

Finally, in 18 of the 19 years preceding 2007, water exports during the June to September period were greater than the average San Joaquin River flow. Under those prevailing conditions, it is unlikely that any effective subsidization of downstream *Pseudodiaptomus forbesi* densities could have occurred from the San Joaquin River side of the Delta – the majority of that water is diverted to the CVP and SWP. During that period, densities of *Pseudodiaptomus forbesi* in downstream areas where most delta smelt reside ranged from high levels (3,000/m3) in the lower Sacramento River area, to moderately high levels (2,000/m3) in the Chipps Island area, to relatively lower levels (1,000/m3) in Suisun Bay, indicating that any lower Delta copepod subsidy to areas supporting higher densities of delta smelt is derived from Sacramento River and north Delta sources. Of additional importance, the FMWT index of delta smelt abundance showed increases in value (delta smelt population size) in six of those same 19 years, indicating no consistent impact on delta smelt population size due to *Pseudodiaptomus forbesi* limitation in summer. If entrainment of *Pseudodiaptomus forbesi* were having important, adverse effects on *Pseudodiaptomus forbesi* in downstream areas in the summer, and those effects led to low abundance of delta smelt in fall, the fact that all San Joaquin River water was being diverted by exports pumps should have produced consistently low values of both *Pseudodiaptomus forbesi* in summer and the FMWT index in the fall. Available data show that neither occurred.

The data as well as logical analysis based on scientific principles demonstrate that the contention that export curtailments from June though September to enhance *Pseudodiaptomus forbesi* densities in downstream areas inhabited by most delta smelt and cause increases in spawning abundance as measured by the FMWT index is without foundation. Further, the FWS's failure to acknowledge the data and readily available information that

[65] O'Hare, James, "Prey selectivity of planktivorous fish: Analysis of stomach contents in four Pomacentrids at Lizard Island, Great Barrier Reef" (2008). ISP Collection. Paper 54.; Kao T. Li, James K. Wetterer, Nelson G. Hairston Jr. (1985) Fish Size, Visula Resolution, and Prey Selectivity. Ecology: Vol. 66, No. 6, pp. 1729-1735.; Mechanisms of selectivity in a nocturnal fish: a lack of active prey choice., Holzman R, Genin A., Oecologia. 2005 Dec;146(2):329-36. Epub 2005 Oct 28.

[66] Feeding Habits of Juvenile and Adult Delta Smelt from the Sacramento-San Joaquin River Estuary, J. Lott, Interagency Ecological Program Newsletter, Winter 1998.; Evidence of Food Limitation in Larval Delta Smelt, M. Nobriga, Interagency Ecological Program Newsletter, Winter 1998.

refutes this is a clear demonstration that the information included in the Effects Analysis is inaccurate, incomplete, and biased,

Correction Request 8 (Effects Analysis pages 27-31 and related statements throughout the Effects Analysis)

Request correction of the Effects Analysis to recognize that there are no data to support an assumption that Project operations are affecting habitat suitability.[67]

Request correction of the Effects Analysis to recognize that 'habitat' consists of many more variables than just X2, turbidity, and temperature.

Request correction of the Effects Analysis to recognize that the 'correlation' between delta smelt spawning abundance and previous fall X2 is based on a single data point.

Request correction of the Effects Analysis to recognize that previous fall X2 is not a predictor of the recent abundance decline.

Request correction of the Effects Analysis to recognize the referenced study which forms the basis of the statements regarding Project operation effects on habitat included in the Effects Analysis contained an explicit warming that other factors, particularly food limitation, could be important.

Request correction of the Effects Analysis to recognize that food limitation in the spring, which is independent of Project operations is a better predictor of future delta smelt abundance than previous fall X2.

Request correction of the Effects Analysis to recognize that food abundance is highly correlated with the recent decline in delta smelt abundance.

Request correction of the Effects Analysis to recognize that when food abundance is accounted for, the effect of previous fall X2 on delta smelt abundance is unimportant.

The Effects Analysis of Project effects on habitat suitability has major flaws:

The use and application of the term 'habitat' in this context is explicitly wrong and therefore compromises all the conclusions that are drawn regarding water export impacts on delta smelt. Habitat is a species-specific concept. For the delta smelt, the term habitat encompasses the biotic and physical resources used by the fish, and physical circumstances that support those resources. Those resources include, but are not limited to, delta waters that exhibit a constrained range of temperatures, salinity, turbidity, and dissolved oxygen; water not compromised by contaminants that affect delta smelt or their prey, and in which predation is below some yet-to-be-identified minimum; water that is subject to appropriate hydrodynamic circumstances, related to currents and tidal and flood patterns; substrates with composition that has a limited range of grain sizes and organic content, and cover vegetation, rock outcroppings, and ecotonal situations that may be especially exacting as well as areas that provide food in abundances adequate to support growth, dispersal, and reproduction by delta smelt.

The subset of habitat attributes that are essential for delta smelt survival and persistence vary through time with the life history stages of the delta smelt, as it meets its needs for spawning and egg incubation, juvenile rearing

[67] See discussions in related Request for Corrections included in this letter

and dispersal, and adult growth, mating, and dispersal[68]. The suggestion that previous fall X2 can serve as a sole and adequate surrogate for the multitude of environmental attributes that constitute delta smelt habitat for purposes of analysis and environment assessment in support of CVP and SWP operations policy is indefensible.

The lens of delta water that has salinity that can support delta smelt, which moves both daily and seasonally within the delta hydroscape, is a necessary element of the habitat that is suitable for delta smelt, but it is not nearly sufficient by itself to define the geographic position of delta smelt for purposes of assessing effects of the CVP and SWP on the fish. So inappropriate is the use of X2 as a surrogate for delta smelt habitat, that Feyrer et al. (2007) were limited to using X2 to represent, not habitat, but what they referred to as EQ (environmental quality). In fact, Feyrer et al. commit much of the narrative discussion in their article to describing the additional physical and biotic environmental attributes that would have to be integrated into their analysis before they could defensibly characterize the geographical position of delta smelt habitat. In clear violation of the IQA requirements for accuracy, completeness and in a particularly biased manner, the Effects Analysis fails to provide this information.

Instead, ignoring the authors' cautions, the Effects Analysis improperly defines delta smelt habitat and the extent and distribution of habitat as it pertains to impacts from the CVP and SWP on the fish. Furthermore, the Effects Analysis includes the astounding assertion that delta smelt habitat itself is being entrained in the export pumps[69]. This assertion is clearly unfounded and unsupported by any data whatsoever.

Ignoring data and analysis that produce far better predictive capability, on significantly more data than one point, the Effects Analysis asserts that previous fall X2 is an indicator of fall habitat suitability and therefore assumes water Project exports are a primary driver of delta smelt habitat suitability[70]. This is based on a correlation reported at the 2008 Interagency Ecological Program Annual Workshop in Pacific Grove, California. The correlations rely on one data point from 1999 to generate statistically significant effects. These assertions ignore the fact that previous FMWT alone is better at predicting the recent low values of STN than FMWT and previous fall X2[71]. In other words, when fall X2 becomes part of the prediction equation, the prediction is less, not more accurate at predicting the recent decline than simply relying on past abundance as a predictor of future abundance. This indicates that some other factor, unaccounted for in Feyrer et al's analysis, caused the recent decline.

The Effects Analysis ignores Feyrer et al's warnings that inclusion of other factors would improve their analysis. An analysis by Manly (Manly 2008) includes those other factors. That analysis found food limitation and temperature to be important. Previous fall X2 had no statistically significant effects on subsequent summer abundance once other, more important factors were included in the analysis.

Finally, the Effects Analysis contains statements that appear to be crafted to marginalize data and analytical results that demonstrate that CVP and SWP operations have insignificant effects on delta smelt abundance. The Effects Analysis includes the seemingly begrudging acknowledgement that "currently published analyses of long-term associations between delta smelt salvage and subsequent abundance do not support the hypothesis that entrainment is driving population dynamics year in and year out..."[72]. In fact, all analyses of salvage and

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[68] It should be noted that here as well as in other areas, the FWS has opted to rely on supposition rather than actual research to determine the specific habitat requirements of delta smelt. For example, to date, little to nothing is known about where delta smelt actually spawn and no eggs have been found in the field (Bennet 2005); See also Council for Endangered Species Act Reliability comments on the FWS 90-day findings on the petition to uplist the delta smelt.

[69] Effects Analysis at 1-2

[70] Effects Analysis at 30;

[71] The comparison is between the regression lines produced by the analyses.

[72] Effects Analysis at 5

subsequent abundance completed to date indicate that there is no statistically significant relationship between the two variables.

Correction Request 9 (Effects Analysis pages 3-4 and related pages in the Effects Analysis)

Request correction of the Effects Analysis to examine a range of temperature scenarios. Currently, the Effects Analysis assumes only higher temperatures.

Request correction of the Effects Analysis to include a discussion of the limitations of existing climate models.

Request correction of the Effects Analysis to recognize that climate change will occur independent of Project operations, and thus is not an 'effect' of the Projects.

The Effects Analysis assumes that climate change will occur, and the assumption is valid based on the fact that the earth's climate is ever-changing in such complicated ways, it is not possible to accurately model the changes. However, the extent to which climate will change, and the direction, timing, and magnitude of the change is unknown.

Information on the relative sensitivity to assumptions whose validity cannot be tested in the Intergovernmental Panel on Climate Change (IPCC) models and other models that predict warming is readily available[73].

Further, climate change is not a matter for the biological opinion to address as it is not an effect of the Project under the definition of direct and indirect effects. The effects of a federal action are defined by the FWS as "the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline[74]." If an effect would occur whether or not the action takes place, it is not an effect of the action[75]. Furthermore, if an effect could occur but is not reasonably certain to occur, it is not an effect of the action[76].

While the FWS may examine potential scenarios based on climate change assumptions, it may not predicate any effect of the Project based on a purely speculative future climate scenario which is not an effect of the Project. The ESA requirement for preparation of the biological opinion does not require the FWS to predict the future. It merely requires an evaluation of the effects of a federal action under existing circumstances. A series of assumptions can be assembled that predicts a catastrophic climate change, but that does not mean that the assumptions meet the standards of the ESA or the IQA. Failure to meet those standards precludes use of those assumptions as highly influential information.

The discussion of climate change does not meet the requirements of the ESA because it is not based on data. The discussion of climate change does not meet the requirements of the IQA because:

- ✓ It is incomplete and biased in that it fails to disclose the assumptions behind the predictions for warmer temperatures;

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[73] http://epw.senate.gov/public/index.cfm?FuseEffects Analysisction=Minority.Blogs&ContentRecord_id=f80a6386-802a-23ad-40c8-3c63dc2d02cb

[74] 50 C.F.R. 402.02.

[75] *Endangered Species Consultation Handbook* at 4-27 (March 1998). *Accord* 73 Fed. Reg. 47,868, 47,870 (Aug. 15, 2008) (preamble to proposed amendments to the joint consultation regulations); 51 Fed. Reg. 19,926, 19,932 (June 3, 1986) (preamble to final rule establishing the joint consultation regulations).

[76] 50 C.F.R. 402.02 (definition of "effects of the action" including indirect effects). *Accord* 73 Fed. Reg. at 47,870.

- ✓ It is incomplete and biased in that it fails to disclose the significant scientific disagreement surrounding the assumptions; and
- ✓ It is incomplete and biased in that it fails to examine the full range of potential climate change, instead assuming only temperature increases.

Correction Request 10 (Effects Analysis pages 2-27 and related statements)

Request correction of the Effects Analysis to abandon its reliance on *Grimaldo et al.* which is not only unavailable, but which relies on an analytically flawed premise, thus violating the requirement of the ESA that the biological opinion be based on the best *available* data, and the requirement of the IQA that analysis be accurate.

The Effects Analysis relies on Grimaldo et al. (in review) which uses a linear model. The model was used to predict annual winter salvage by relating delta smelt salvage to OMR flows[77]. However, salvage is non-linear as was demonstrated by the data and analyses provided to the FWS. Ms. Sheila Greene, a biologist with the California Department of Water Resources, produced analyses as early as March, 2007 that show January and February salvage compared to OMR flows[78]. Because the salvage is non-linear, use of a linear model is facially inaccurate and violates the IQA. Manly also evaluated salvage in relation to OMR flows and found the relationship is non-linear, resembling an exponential relationship[79]. Kimmerer (2008) used a non-linear distribution to estimate entrainment in relation to OMR flows.

By referencing a study that is unavailable to the public and embarking on highly technical and site specific discussions regarding delta smelt and discrete flows, the FWS is attempting to make a hypothesis appear to be fact. The Effects Analysis details numerous highly technical analyses and assumptions which confuse readers and lead them to believe there is data to support an assertion that export pumping has important abundance effects on delta smelt, when in fact, there is no such data.

There are multiple methods for examining pumping and localized effects on the numbers of delta smelt entrained. However, to date all of these analyses, which represent the best available data, demonstrate repeatedly that despite the localized effects, entrainment has no important abundance effects on delta smelt.

Correction Request 11 (Effects Analysis pages 2-27 and related statements)

Request that the analytically flawed comparison of actual historical conditions to simulated conditions be removed.

Request correction that the flawed analytical approach comparing actual to modeled scenarios be replaced by the analytically correct comparison of modeled scenarios to modeled scenarios.

Request that the Effects Analysis estimate the effects of the proposed Project by comparing how predicted larval-juvenile entrainment in scenario 7.0 compares to the other studies.

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[77] Effects Analysis at 6-7.
[78] Declaration of Sheila Greene *NRDC v. Kempthorne*.
[79] Manly and Chotkowski, Arch. Hydrobiol. 167 1-4 593-607 September 2006.

The Effects Analysis compares monthly or seasonal results of *simulated* scenarios to *actual* historical monthly salvages and uses them to estimate CVP and SWP entrainment effects. Comparing simulated conditions to actual historical values is the way that models are adjusted to ensure their results are accurate, at least for the time period of the comparison[80]. **However, such comparisons are not appropriate as a basis for comparing historical conditions with those resulting from changes to historical conditions for a number of reasons.**

The outcome of these comparisons is highly influential information as it is the basis upon which operational controls on water Project operations will be predicated. Such highly influential information is governed by the OMB Guidelines which have been adopted by the FWS in their entirety.

The Effects Analysis appropriately uses the historical median salvage for 1987-2007 to evaluate differences between the modeled scenarios and baseline conditions. However, the FWS fails to note that the reason for the use of this particular time frame is that it captures the ecosystem change which occurred with the invasion of the Amur River clam *corbula amurensis.* Thus, this truncated period rather than the entire data set for Project operations represents existing conditions in the system. The choice made by the FWS is highly influential information because the choice of time frame examined affects the outcome of the examination.

The Effects Analysis scenario 7.0 was identified as the baseline condition for comparison with future condition scenarios 8.0 through 9.5[81]. However, instead of evaluating future conditions relative to scenario 7.0, which would at least have examined comparable data; the FWS compared all scenarios to an actual historical median salvage. Even the Peer Review noted that a historical baseline is difficult to use in this situation because the system has changed so frequently[82]. However, the peer review failed to note the inappropriateness of comparing modeled scenarios to historical data. In fact, the Peer Review expressed surprise at how much scenario 7.0, the current conditions baseline, differed from historical data[83]. This suggests that the peer reviewer failed to understand or acknowledge the fact that no meaningful information can be derived from a comparison of historical data to simulated current or future conditions using CALSIM II. This is because the very basis of CALSIM II assumes conditions far removed from any actual present or historic conditions.

Recomputing winter OMR flow differences to compare to scenario 7.0 – which is the analytically proper approach, – results in drastic reductions in the reported differences. Table 3b from the Effects Analysis is reproduced below, with a corrected version immediately following.

Table 3b. Winter OMR flow percent difference from historic median value to CALSIM II model median value

WY Type	7	7.1	8	9	9.1	9.2	9.3	9.4	9.5
Wet	409%	432%	452%	450%	433%	287%	256%	584%	491%
AN	39%	53%	56%	57%	47%	33%	34%	52%	49%
BN	169%	197%	191%	174%	167%	135%	180%	179%	164%
Dry	17%	26%	21%	20%	15%	24%	35%	5%	5%
Critical	-10%	-2%	-1%	0%	-9%	6%	3%	-15%	-24%

Table 3b. Corrected. Winter OMR flow percent difference from CALSIM II model 7 median value to

[80] For example, CALSIM II has been calibrated to specific years in its historical period 1922-2003 by modeling historical operational criteria, hydrology, and demands. The calibration is not for every single year, but for years that are most likely to require alteration of normal operational procedure, such as drought years and flood years.
[81] *See* U.S. Bureau of Reclamation, OPERATIONS AND CRITERIA PLAN BIOLOGICAL ASSESSMENT 9-33 (2008).
[82] Peer Review at 5.
[83] Peer Review at 5.

CALSIM II model median value									
WY Type	7	7.1	8	9	9.1	9.2	9.3	9.4	9.5
Wet		5%	8%	8%	5%	-34%	-30%	34%	16%
AN		10%	12%	13%	5%	-5%	-4%	9%	7%
BN		12%	8%	2%	-1%	-13%	4%	4%	-2%
Dry		8%	4%	3%	-1%	6%	15%	-10%	-11%
Critical		8%	10%	11%	1%	17%	14%	-6%	-15%

Clearly, the corrected values are greatly reduced from those evaluated in the Effects Analysis. Likewise, predicted salvages of the modeled scenarios were based on comparison with predicted salvage using historical OMR flows. Comparing the modeled scenarios with scenario 7 results in far less incremental impacts than those computed in the Effects Analysis. In the Effects Analysis, the FWS predicts delta smelt salvage to be up to 65% greater in wet years when compared to historical OMR flows[84]. Comparing to scenario 7.0 wet years shows that predicted salvage would range from -12% to 13% using the equation found in Figure 1 and applying it to December-March OMR flows shown on Table 3a of the Effects Analysis. Scenario 9.4 shows the greatest difference (13%); this is the scenario that modeled climate change in the Delta region to result in drier years with lesser warming. Without considering future climate change, scenario 8 shows only a 3% difference in salvage from scenario 7.0.

Predicted larval-juvenile entrainment comparisons in the Effects Analysis have no comparative basis. The Effects Analysis states that <20% of the larval-juvenile population was entrained in 67 percent of the years from 1995-2005, but only 44% of the years from 1967-1994. Since the Effects Analysis must estimate the impacts of the proposed Project against a baseline, which is specified as scenario 7.0, the real comparison should be how predicted larval-juvenile entrainment in scenario 7.0 compares to the other studies. This critical information isn't provided in the Effects Analysis.

The comparison violates the IQA in at least two ways:

- ✓ It is biased and inaccurate in that it compares data that is not comparable and thus the results are flawed; and
- ✓ It is incomplete in that it fails to provide a comparison between the baseline and other modeled scenarios, which is the primary purpose of the biological opinion.

Correction Request 12 (Effects Analysis failure to include information)

Request correction of the Effects Analysis to recognize superior scientific data demonstrating that food availability is a better predictor of delta smelt abundance than low salinity habitat availability (X2)

The Effects Analysis recognizes the importance of food in determining delta smelt abundance[85]. And, while the Effects Analysis recognizes that the survival of larval and juvenile delta smelt are critical to abundance (see Bennett 2007), it nowhere considers that availability of food for larvae and juveniles in spring is more likely to control subsequent summer juvenile abundance than is the availability of larger areas of low salinity water the previous fall, despite having this information. Larvae and juvenile delta smelt feed predominately on the carangid copepods *Eurytemora* and *Pseudodiaptomus forbesi* in the spring. *Eurytemora* are more abundant in early spring, falling to low densities in May or June; *Pseudodiaptomus forbesi* densities rise soon after and persist through the summer. The late-spring low point of combined availability of these two copepods could be a time of food stress for larval

[84] Effects Analysis at 8.
[85] Effects Analysis at 22 (citing analysis by Miller and Mongan).

and juvenile delta smelt. This springtime "food gap" has occurred each year during the recent years of dramatic delta smelt abundance declines, but the gap did not occur in years that preceded the abundance declines. Notwithstanding the X2 status in the previous fall, if delta smelt cannot survive the spring food gap, they will die and not contribute to summer population measures.

Taking natural logs of available data for delta smelt population size from 1987 to 2006, ln STN (the summer delta smelt index value) shows a statistically significant relation with ln (spring minimum average *Eurytemora* (E) + *Pseudodiaptomus forbesi* (P) density) and ln previous year's FMWT (the fall delta smelt index value) of the form

ln STN = -5.8 + 0.64 ln (previous FMWT) + 0.61 ln (minimum E+P density)

This equation accounts for 65% of the variation in the summer delta smelt index values from 1987 to 2006, with previous FMWT index values significant at p = 0.0008, and the minimum sample density of *Eurytemora* plus *Pseudodioptomus forbesi* significant at p = 0.01. With these data, a statistically significant relationship exists irrespective of whether the 1999 data are included. And, adding September-December average X2 values to the regression equation does not improve the significance of the relationship. These analyses which have been provided to the FWS on multiple occasions, are not referenced and not considered in the Effects Analysis. The analyses demonstrate that food availability, not outflow patterns, is a predictor of subsequent delta smelt abundance. The Feyrer at al. analysis, when corrected to include food limitation as suggested, shows no such prediction based on previous fall X2(salinity).

The Effects Analysis does not meet the requirements of the ESA by failing to use the best available data for predicting the effects of water Project operations when they ignore the superior predictive capability of food supply, and arbitrarily and capriciously rely on the poorer predictive capability of X2 (low salinity habitat availability).

By ignoring the superior predictive ability of food supply to X2, the Effects Analysis fails to comply with the IQA by providing incomplete information in the analysis of water Project operation effects on delta smelt.

The Effects Analysis is biased in that by failing to recognize the superior ability of springtime food supply to fall low salinity in determining delta smelt abundance, it erroneously implies that Project operations affect delta smelt abundance.

Correction Request 13 (Effects Analysis page 31 and other related statements)

Request correction of the Effects Analysis statement that extremely stable low outflow conditions in the fall are the result of CVP and SWP operations;

Request that:

- **All statements, insinuations, and direct assertions that Project operations cause low flows in the fall be corrected to accurately represent that low flows occur naturally and Project flows increase naturally occurring flows in the fall;**
- **Recognize that the adverse effects of fall low flows occur independently of Project operations; and**
- **Recognize that Project operations likely provide a benefit in the fall by increasing naturally low flows.**

The Effects Analysis attributes extremely stable low outflow conditions in the fall to CVP and SWP operations and concludes that such conditions will likely contribute to numerous factors that harm the delta smelt, such as higher water toxicity and the potential suppression of phytoplankton production by ammonia entering the system from wastewater treatment plants.

This statement is so vague, speculative, biased, inaccurate and incomplete, that it does not belong in the Effects Analysis.

- The assertion that extremely stable low outflow conditions in the fall is a new condition attributable to the operation of the CVP SWP is false. Ambler et al. pointed out that seasonal changes in hydrography in the Delta are mostly direct responses to the annual periodicity of river discharge, which is "consistently low during summer-fall"[86].
- In the fall, when the Effects Analysis contends that low flows caused by CVP and SWP operations would contribute to indirect effects, river flows are, in fact, *higher* with CVP and SWP operations than they would be absent such operations. Analysis of the hydrographs for the Sacramento and San Joaquin Rivers in all year types demonstrates this fact. This information is readily available to the authors of the Effects Analysis.

Each of the indirect effects of Project operations which the Effects Analysis asserts are addressed in separate requests for correction. However, the statement that Project operations contribute to "extremely stable low outflow conditions resembling dry or critical years proposed for the fall across all water year types"[87] is highly influential information.

In clear violation of the IQA, the authors of the Effects Analysis represent the information in a biased, unclear, inaccurate and directly misleading manner in order to support their completely unfounded assertion that declines in delta smelt abundance are the result of Project operations.

The statements in the Effects Analysis related to fall low flows are inconsistent with the requirements of the ESA in that they attribute effects to Project operation which are neither direct nor indirect.

The statements in the Effects Analysis related to fall low flows are inconsistent with the requirements of the IQA in that they:

- ✓ Are inaccurate as they attribute effects to Project operations that occur independently;
- ✓ Are biased and incomplete as they fail to recognize Project flows actually increase naturally low flows in the fall; and
- ✓ Are biased, inaccurate, and incomplete as they fail to recognize that Project flows actually provide a benefit by increasing naturally low flows.

Correction Request 14 (Omission)

Request correction of proportional larvae-juvenile entrainment estimates by Kimmerer to account for mistakes in that analysis that caused estimates to be too high;

The Effects Analysis ignores the fact that one of the primary sources for the Effects Analysis, Kimmerer (2008), contains an analytical error that causes the overestimation of proportional entrainment for larvae-juveniles. The entrainment estimates are too high because the analysis assumes that 'natural mortality' is uniform across the

[86] Julie W. Ambler et al., *Seasonal cycles of zooplankton from San Francisco Bay*, 129 HYDROBIOLOGIA 177, 181 (1985).
[87] Effects Analysis at 31

habitat. In fact, because of higher water clarity near the pumps in recent years, "natural mortality' was higher near the pumps[88] and therefore, mortality due to entrainment is lower.

Correction Request15 (Omission)

Request correction of Kimmerer (2008) estimates of proportional adult entrainment to account for mistakes in the analysis that caused estimates to be too high.

The Effects Analysis ignores the fact that one of its primary sources, Kimmerer (2008), contains an analytical error that causes the over estimation of proportional entrainment for adults. The adult entrainment estimates are too high by a factor of two because the analysis fails to account for the fact that adult delta smelt in OMR are only in the upper 4 meters of the water column. The Kimmerer analysis acknowledges this when estimating total adult population.

Correction Request16

Request correction of the discussion of Kimmerer 2008 to provide complete information in a manner consistent with that required by the IQA by:

- **Listing the numerous and explicit assumptions made by Kimmerer, and which are not necessarily realistic;**
- **Disclosing the confidence intervals associated with the estimates;**
- **Clarifying that the cited 'losses' referenced by the Effects Analysis, are in fact, 'estimated cumulative losses';**
- **Disclosing that the Effects Analysis only identifies the two years of highest estimated cumulative losses;**
- **Disclosing the entire range of losses identified by Kimmerer; and**
- **Acknowledging and correcting errors in Kimmerer's estimates of adults and larval-juvenile proportional losses[89]**

- When discussing entrainment in 2003 and 2004, the Effects Analysis states that "[a]ccording to Kimmerer (2008), 2003 and 2004 were years when entrainment accounted for 50% and 19% of losses of adults from the population"[90]. The FWS does not provide any discussion of the numerous explicit assumptions made by Kimmerer, or the confidence intervals associated with his estimates.
- While Kimmerer characterizes his results as "estimated cumulative losses," the Effects Analysis simply labels them as "losses"[91].
- Kimmerer estimated cumulative losses of adult delta smelt for the years 2002 through 2006, the FWS highlighted the two years in which Kimmerer estimated the highest losses. In the subsequent two years of 2005 and 2006, Kimmerer estimated losses of 7% and 4%, respectively with 95% confidence intervals of

[88] Lindberg, Joan and Baskerville-Bridges, Brad, Presentation to Estuarine Ecology Team (December 2006)
[89] Explicitly addressed in a Request for Correction in this letter.
[90] Effects Analysis at 7.
[91] Compare Wim J. Kimmerer, Losses of Sacramento River Chinook Salmon and Delta smelt to Entrainment in Water Diversions in the Sacramento-San Joaquin Delta, SAN FRANCISCO ESTUARY & WATERSHED SCIENCE at 20 (June 2008) with Effects Analysis at 7.

2 to 12% and 1 to 6%, respectively, and because of errors made in the analysis, these estimates are too high[92].

Such incomplete and biased information is inconsistent with the requirements of the IQA, misleads decision-makers and inevitably leads to unsupportable conclusions. Such incomplete and biased information results in a biased outcome that grossly misguides management responses which (as in this case) will result in astronomical costs with little to no return in terms of benefits to the species.

Correction request 17 (Effects Analysis page 31 and related statements)

Request correction of the statement that an effect of Project operations is to cause stable low flows in the fall[93], by revising it to acknowledge that low outflows occur naturally and that Project flows increase flows beyond that which would occur normally.

Request correction of the statement that an indirect effect of Project operations is to contribute to toxicity, by revising it to acknowledge toxics are contributed independent of Project operations and that Project flows in the fall dilute independently occurring toxic loading.

Request correction of the Effects Analysis to recognize that Project flows provide a benefit by diluting toxic concentrations in the fall.

The effects of an action are defined by the FWS as "the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline"[94]. If an effect would occur whether or not the action takes place, it is not an effect of the action[95]. Furthermore, if an effect could occur but is not reasonably certain to occur, it is not an effect of the action[96].

Stable low outflow conditions, high CVP and SWP exports, and high export to inflow ratios (E:I) do not change the discharge of contaminants contributed independently from upstream sources in the Delta, such as those from wastewater treatment plants and urban and agricultural runoff. While increasing releases from the reservoirs upstream of the contaminant sources can affect the contaminant concentrations in the Delta, by diluting them, these concentrations are not an effect of the Project and their occurrence is independent of Project operations. The Effects Analysis contends that low flows caused by CVP and SWP operations will increase toxicity in the fall.

However, it is a fact that river inflows to the Delta are higher *with* Project operations than they would be without Project operations. These existing Project flows provide a benefit by diluting contaminant concentrations. Increasing fall reservoir releases beyond what is already described in existing regulations would be an even greater deviation from the natural hydrograph and lead to more stable hydrologic conditions. The FWS states these increased flows would lead to conditions favoring the establishment of nonnative fishes, which could harm the

[92] Addressed explicitly in a separate correction request in this letter.
[93] Effects Analysis at 31
[94] 50 C.F.R. 402.02
[95] *Endangered Species Consultation Handbook* at 4-27 (March 1998). *Accord* 73 Fed. Reg. 47,868, 47,870 (Aug. 15, 2008) (preamble to proposed amendments to the joint consultation regulations); 51 Fed. Reg. 19,926, 19,932 (June 3, 1986) (preamble to final rule establishing the joint consultation regulations)
[96] 50 C.F.R. 402.02 (definition of "effects of the action" including indirect effects). *Accord* 73 Fed. Reg. at 47,870

delta smelt[97]. This statement is made with no data or analysis to support it. In addition to contaminant concentrations which are the effect of the independent action of upstream dischargers, rain events, which are also independent of Project operations, often result in some of the highest contaminant concentrations[98]. This is a hydrodynamic condition over which the CVP and SWP have no control.

Correction Request 18 (Effects Analysis page 31 and related statements)

Request correction of the statement that an indirect effect of Project operations is to suppress phytoplankton production by causing stable low flows in the fall.

Ammonium concentrations in the Delta are a result of activities which occur independently of water Project operations. As with toxicity more generally, increasing releases from reservoirs upstream of wastewater treatment plants dilute these independently occurring ammonium levels. In the fall, river flows are higher with Project operations than they would be without Project operations. Thus project operations actually dilute ammonium concentrations. And yet, the Effects Analysis asserts that project operations increase ammonium concentrations.

The FWS does not say how the concentrations would be increased, what they would be increased from. Stable low outflow conditions, high CVP and SWP exports, and high E:I ratios cannot change the discharge levels of ammonium from upstream sources such as wastewater treatment plants. To the extent that the water Projects are increasing fall flows beyond those occurring naturally, the effect of the water Projects' operation is to dilute existing ammonium concentrations and improve habitat quality

The statement is inconsistent with the requirements of the ESA in that it identifies an independent effect (ammonium concentration) as an effect of the project.

The statement is inaccurate, biased, and incomplete as it fails to recognize that project flows actually dilute ammonium concentrations in the fall.

Correction Request 19

Request correction of the statement that an indirect effect of Project operations is to increase reproductive success of the invasive Amur River clam *Corbula amurensis* by causing stable low flows in the fall as available data contradict the assertion[99].

The FWS states that Project operations result in increased reproductive success of the invasive Amur River clam *Corbula amurensis* without supporting the statement with any data or analysis. In fact, available data undermine the assertion. According to Jan Thompson, reproductive success of the clam is driven by food availability rather than flows. Thompson states that bivalve grazing rates are the lowest in spring and early summer of both wet and

[97] Effects Analysis at 31.
[98] U.S. Bureau of Reclamation, OPERATIONS AND CRITERIA PLAN BIOLOGICAL ASSESSMENT at V-1 (2008)
[99] Effects Analysis at 31

dry years[100]. This suggests that flows do not control bivalve abundance. Kimmerer (2004)[101] found that while CVP and SWP controlled flows can have some effect on clam distribution and abundance, "the big flow events and droughts, which have the greatest effect on the benthos, are not under direct human control." Clearly, based on the information available, it takes flow changes larger than those resulting from Project operations to have significant effects on the distribution of Amur River clams.

Request correction of the statement by removing it from the Effects Analysis as it is not based on data and does not meet the requirements of the IQA or the ESA.

Final Correction Request 20 (Effects Analysis page 31 and related statements)

Request correction of the statement that an indirect effect of Project operations is elevated entrainment of lower trophic levels because no data support the statement.

Request correction of the statement that Project operations create stable low flows in the fall, to reflect that stable low flows occur naturally and that Project operations increase flows beyond that which would naturally occur.

Entrainment of lower trophic levels is a very broad assertion with no accompanying scientific support. The FWS does not identify which lower trophic organisms are supposedly suffering from elevated entrainment. According to Kimmerer, "Lower trophic level organisms (and functional groups) did not respond strongly or consistently to flow"[102]. And, "statistical analyses have not yet shown an effect of export pumping on zooplankton abundance"[103]. To the extent that this assertion is related to that subsection of the Effects Analysis that posits a relationship between *Psuedodiaptomous forbesi* entrainment and delta smelt abundance, we have addressed it elsewhere[104].

Most researchers point to the introduction of the invasive clam *Corbula amurensis* as the major cause of declines in trophic productivity[105]. The Bureau of Reclamation acknowledges the effects of *C. amurensis* on phytoplankton, as well as the fact that, after its invasion, populations of pelagic fishes have declined in spite of favorable flow conditions[106]. The Effects Analysis ignores this information and fails to provide data or other scientific support for how fall Project operations negatively impact abundance of lower trophic organisms.

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[100] Thompson J, F Parchaso, K Gehrts, D Messer. *Bivalves as ecosystem engineers: before and after the invasion of Corbula amurensis in the northern San Francisco Estuary*. 5TH BIENNIAL CALFED SCIENCE CONFERENCE (2008).

[101] Kimmerer WJ. 2004. *Open water processes of the San Francisco Estuary: from physical forcing to biological responses*. San Francisco Estuary and Watershed Science [online serial]. Vol. 2, Issue 1 (February 2004), Article 1. http://repositories.cdlib.org/jmie/sfews/vol2/iss1/art1.

[102] Kimmerer WJ. 2004. *Open water processes of the San Francisco Estuary: from physical forcing to biological responses*. San Francisco Estuary and Watershed Science [online serial]. Vol. 2, Issue 1 (February 2004), Article 1.

[103] *Id.* at 92.

[104] See Correction Request 3b.

[105] Nobriga 2002; Kimmerer 2004; Bennett 2005; Feyrer et al. 2007; Sommer et al. 2007; Baxter et al. 2008; Jassby 2008.

[106] U.S. Bureau of Reclamation, OPERATIONS AND CRITERIA PLAN BIOLOGICAL ASSESSMENT 7-6 (2008).

In addition, Ambler et al. note that, with few exceptions, all of the common zooplankton taxa occur at higher densities during the wet season (January-May) than during the dry season (June-December)[107]. Kimmerer et al. note that reproduction of copepods varies with seasons[108]. Jassby et al. clearly show that chl-*a*, an indicator of food web productivity, increases to a peak during summer and decreases to a low point during fall[109]. As a practical matter, even without data, given the timing of peak abundance of these lower trophic level organisms, it is difficult to understand how stable, low outflow conditions in the fall could cause the alleged effect. Without supporting data it is not possible to arrive at a defensible conclusion that this is the case. The ESA requires that data support the FWS's findings in the biological opinion.

Request correction of the statement by removing it from the Effects Analysis as it is not based on data and thus does not meet the requirements of the IQA or the ESA.

Correction Request 21 (Effects Analysis page 27-31 and related statements throughout the Effects Analysis)

Request correction of the statement that Project operations create stable low flows in the fall, to reflect that stable low flows occur naturally and that Project operations increase flows beyond that which would naturally occur.

Request correction of the analysis to recognize fall Project operations cannot increase the risk of entrainment in agricultural diversions during a time when such diversions are not operating.

Kimmerer and Nobriga are cited to support the FWS's assumption that the frequency of delta smelt entrainment in unscreened diversions is increased by CVP and SWP operations in the fall[110].

The Effects Analysis makes the argument that extremely stable, low outflow conditions for fall will move X2 to the east and result in a shift in delta smelt distribution upstream. The Effects Analysis then makes the assumption that this shift will likely increase the frequency with which delta smelt encounter unscreened diversions. Implicit in this analysis is the assumption that entrainment of delta smelt by Delta agricultural diversions has important effects on abundance of delta smelt. No analysis supports this assumption. Myriad analyses showing no important effects of larger SWP and CVP entrainment on subsequent spawning abundance of delta smelt indicate that Delta agricultural diversions will also have no important effects.

In addition, agriculture in the Delta region is largely comprised of annual crops, which make up 86 percent of Delta agriculture's applied water demands (California Water Plan 2005). The majority of these crops are harvested in the fall with corresponding significant decreases in water demands. Project operations cannot increase the risk of entrainment in agricultural diversions during a time when such diversions are not operating.

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[107] Julie W. Ambler et al., *Seasonal cycles of zooplankton from San Francisco Bay*, 129 HYDROBIOLOGIA 177, p. 184 (1985).

[108] *Chronic food limitation of egg production in populations of copepods of the Genus Acartia in the San Francisco Estuary*, 28 ESTUARIES 4, p. 541 (2005)

[109] *Annual primary production: Patterns and mechanisms of change in a nutrient-rich tidal ecosystem*, 47 LIMNOLOGY AND OCEANOGRAPHY 34, p. 703 (2002)

[110] Wim J. Kimmerer & Matthew L. Nobriga, *Investigating particle transport and fate in the Sacramento-San Joaquin Delta using a particle tracking model*, 6 SAN FRANCISCO ESTUARY AND WATERSHED SCIENCE 1 (2008).

Request for Correction of Information in the Draft Effects Analysis of the Biological Opinion on the Continued Long-Term Operations of the Central Valley Project and the State Water Project

The Effects Analysis fails to comply with the requirement of the ESA that effects be based on data. The conclusion reached by the Effects Analysis does not flow from the data and analysis they have relied upon to allege the indirect effects from water Project operations.

The Effects Analysis fails to comply with the IQA because it is inaccurate, incomplete and biased in that it fails to acknowledge that little agricultural pumping occurs during the time effects are alleged.

Correction Request 22 (Effects Analysis page 31 and related statements throughout the Effects Analysis)

Request correction of the statement that an indirect effect of Project operations is to provide environmental conditions for non-native fishes to thrive by causing stable low flows in the fall as the statement is not supported by data.

Request correction of the statement that Project operations create stable low flows in the fall, to reflect that stable low flows occur naturally and that Project operations increase flows beyond that which would naturally occur.

The assertions that stable low outflow conditions in the fall are attributable to the CVP and SWP and that such conditions contribute to abundance of non-native fishes are set forth without explanation and without any supporting data. The Effects Analysis provides no explanation of the environmental conditions that are being affected by Project operations, which non-native fishes are benefiting, or how these non-native fishes impact delta smelt.

The study the Effects Analysis cites[111] does not relate non-native fishes to delta smelt, does not evaluate the effects of Project operations on environmental conditions, nor does it draw any conclusions as to changes in environment on non-native fishes that the FWS could rely on as an indirect effect of Project operations.

The Effects Analysis's statement is particularly egregious in light of the fact that introduction of many of the existing non-native species predate the decline of the delta smelt by decades and in some cases, by a century or more.

Request correction of the Effects Analysis by removing the statement as it is not supported by any data.

Correction Request 23 (Omitted Information)

Request the Effects Analysis provide a discussion of the overall population level 'take' by export pumping as required by the ESA[112].

Request that the Effects Analysis provide an explicit discussion of Kimmerer (2008) conclusions regarding the population level effect of export pumping on delta smelt.

Request the Effects Analysis provide an explicit discussion of Manly/Chotkowski (2006) conclusions regarding the population level effect of export pumping on delta smelt.

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[111] Nobriga et al. 2005.

[112] *Arizona Cattle Growers Association v. US Fish and Wildlife Service* 273 F.3d 1229 (9th Cir. 2001).

The Effects Analysis spends over 40 pages discussing the effects of Project pumping. As has been noted repeatedly in this Request, multiple statistical analyses of export pumping and delta smelt population declines have failed to find any important effects of the pumping.

The analyses have been undertaken over the past 15 years, since the delta smelt was first listed. From the start, the export pumps were considered the "most obvious" culprit for the declines. However, over time, multiple analyses have failed to identify any important effects of the pumps on abundance of delta smelt. It is important to note that these statistical analyses have detected **trivial** effects of export pumping on smelt, which are confirmed by periodic observations of dead fish at the export pumps. The fact that the statistical analyses detected these minor effects demonstrates that the analytical tools being used are sensitive enough to detect this take and its effect on the species at the population level.

However, uniformly, the statistical analyses have failed to detect any **important** effects. Manly and Chotkowski (2006) found that effects may be between 1-2% of the population. Kimmerer 2008 examined adult delta smelt abundance across years and asked what effect export pumping had on abundance. He noted that entrainment of all the life stages of delta smelt might be affecting the subsequent spawning abundance by 10 percent **at most**. However, based on the change in population indices each year, other factors are having an effect 500 times greater. This means that only 0.2 per cent of the total change in population is attributable to entrainment of **all** life stages of delta smelt (not just adults). It also means that 99.8% of the effects on delta smelt abundance are due to factors independent of water Project export pumping.

The biological opinion of which the EA is a part, and the related incidental take statement, will govern the operation of the Projects responsible for providing most of the water supply for an entire state. The biological opinion identifies the effects of the Projects. To the extent there is 'take' of a protected species, the incidental take statement must specify the amount or extent of take that is anticipated and any reasonable and prudent measures and terms and conditions that implement them. These terms and conditions are designed to minimize take and these "cannot alter the basic design, location, scope, duration or timing of the action, and may involve only minor changes"[113] to the proposed action. The biological opinion generally, and the incidental take statement in particular, are highly influential scientific assessments. The population level effects of Project pumping are highly influential scientific information. Failure to acknowledge the minimal level of effect on delta smelt abundance could result in catastrophic limitations on the water supply available to Californians with very little benefit accruing to delta smelt.

The biological opinion fails to comply with the IQA in that it is:

- ✓ Incomplete in that it fails to provide a population level context for the effects of Project operations;
- ✓ Incomplete and biased in that it fails to recognize that other (unidentified) factors are having effects on delta smelt abundance 500 times greater than those of Project operations;
- ✓ Inaccurate and biased in that it attributes myriad effects of these other factors to indirect Project effects, when if in fact the Project operations were affecting all of those factors and increasing their adverse effects, such influence would be captured in statistical analysis which is able to identify very small Project effects;

[113] 50 C.F.R. § 402.14(i)(2)

- ✓ Incomplete in that it fails to recognize that 99.8% of the declines in delta smelt abundance are due to other factors independent of Project pumping and that data and analysis support this determination;
- ✓ Incomplete and biased in that it fails to recognize that location of smelt at any time during the year does not affect the population level effects of taking during entrainment in any important way; and
- ✓ Incomplete and biased in that it fails to recognize that the take of the species due to export pumping at any level at any given time of year does not have important effects on delta smelt population abundance.

Correction Request 24

Request that the Effects Analysis be corrected to explicitly consider the conservation and recovery efforts currently underway to benefit delta smelt.

The Effects Analysis considers multiple potential adverse effects on delta smelt including global warming, and changes in project operations. However, the EA fails to consider the long term effects of the multiple public and private efforts to conserve the delta smelt.

In the past 8 years, the state and federal governments have spent over $1billion on habitat restoration in the delta. These expenditures will benefit the delta smelt over time well into the future. Further, there are other private and public efforts underway to benefit the species as well. The Fish and Wildlife Service is a necessary partner in all of these efforts and so is well aware of them.

The Effects Analysis provides incomplete information as it fails to document and consider the myriad conservation efforts underway to benefit smelt.

Correction Request 25

Request correction of the peer review of the Effects Analysis to comply with the FWS and OMB Final Bulletin for Peer Review by using only reviewers who meet the NAS Policy for evaluating conflicts;

Request correction of the scope of the review instructions given to peer reviewers to be consistent with that required under the OMB Final Bulletin.

The FWS must seek an independent peer review of the Effects Analysis as the document is a highly influential scientific assessment[114]. As the OMB has observed, "[p]eer review is one of the important procedures used to

[114] Cite OMB and FWS peer review policy http://www.fws.gov/informationquality/peer_review/index.html.

ensure that the quality of published information meets the standards of the scientific and technical community"[115]. However, for a peer review to serve its intended purpose, it must be designed and implemented with certain considerations in mind, including the selection of the reviewers and scope of the review.

As a matter of law, all federal agencies – including the FWS – must comply with the Final Bulletin.[116] The Final Bulletin establishes mandatory peer review standards, a transparent process for public disclosure, and opportunities for public input. In selecting its reviewers, the applicable federal agency must consider conflict of interest, independence, expertise, and balance. If peer reviewers are not federal employees, the agency must adopt or adapt the National Academy of Sciences Policy on Committee Composition and Balance and Conflict of Interest (NAS Policy)[117] with respect to evaluating the potential for conflicts. Panel members should not be placed in a situation where others could reasonably question, and perhaps discount or dismiss, the work of the peer review panel simply because of the existence of such conflicting interests.

The OMB Bulletin requires that the agency consider barring participation by scientists with an interest that could be directly affected by the work of the panel. A reviewer should not have a personal stake in the outcome of the review in terms of career advancement, or personal or professional relationships.[118] Further, agencies must make a special effort to examine prospective reviewers' work as an expert witness, consulting arrangements, scientific and technical advisory board memberships, honoraria and sources of grants and contracts.

Dr. Wim Kimmerer was selected to the review panel despite the fact that the Effects Analysis relies heavily on articles and papers authored or co-authored by him.[119] The Effects Analysis contains more than 25 references to Dr. Kimmerer's work. The FWS thus placed Dr. Kimmerer in the difficult position of reviewing and evaluating his own work. The NAS Policy provides that an individual should not serve as a member of a committee with respect to an activity in which a critical review and evaluation of the individual's own work, or that of his or her immediate employer, is the central purpose of the activity, because that would constitute a conflict of interest. Furthermore, there is general recognition in the scientific community that peer reviewers must have little personal stake in the outcome of the review. Dr. Kimmerer unquestionably has a stake here in light of the extent to which the Effects Analysis relies on his own work. Because of the heavy reliance on Dr. Kimmerer's work in the Effects Analysis, Dr. Kimmerer has a conflict of interest.

Among other peer reviewer of the Effects Analysis, John Durand is a graduate student at both the University of California, Davis and San Francisco State University. Dr. Peter Moyle serves as his faculty advisor at the University of California, Davis and is in a position to exercise substantial influence over Mr. Durand's academic success. Dr. Moyle testified as a key expert witness for plaintiff environmental groups in the remedy hearings in *Natural*

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[115] 70 Fed. Reg. 2664, 2665 (Jan. 14, 2005).

[116] The FWS states that "[w]hile we have always consulted experts to ensure that our science is sound, through this peer review process we will follow the guidelines for Federal agencies spelled out in the [OMB Bulletin]." (Available at http://www.fws.gov/informationquality/peer_review/index.html.)

[117] Available at http://www.nationalacademies.org/coi/bi-coi_form-0.pdf.

[118] Gary K. Meffe et al, *Independent Scientific Review in Natural Resource Management*, 12 CONSERVATION BIOLOGY 268 (1998).

[119] *See, e.g.*, Effects Analysis at 41-43.

Resources Defense Council v. Kempthorne, E.D. Cal. Case No. 05-1207. In the course of the litigation, Dr. Moyle has been a strong advocate of enacting greater protections for fish within the delta by restricting the operations of the CVP and SWP. In light of his professional relationship with Dr. Moyle and Dr. Moyle's continued advocacy of particular policy positions which support restriction of CVP and SWP operations, Mr. Durand has a conflict of interest.[120]

Moreover, with respect to Mr. Durand, Dr. Kimmerer serves as his faculty advisor at San Francisco State University. By utilizing Mr. Durand as a reviewer, the FWS has placed him in the uncomfortable position of critically reviewing and evaluating his advisor's scholarly work in the advisor's presence.[121] This circumstance not only leaves open the possibility that critical review of the articles will not occur, but also that the peer review will perpetuate and legitimize any errors that do exist.

The Final Bulletin also requires that that reviewers be independent and not have participated in the development of the work product[122]. Significant consulting and contractual relationships with the agency sponsoring peer review may raise questions regarding independence. Likewise, when the agency and a researcher work together (e.g., through a cooperative agreement) to design or implement a study, there is less independence from the agency. Additionally, agencies must rotate peer review responsibilities across the available pool of qualified reviewers.

The Effects Analysis' pervasive reliance on Dr. Kimmerer's prior work is akin to Dr. Kimmerer actually participating in the drafting and development of the Effects Analysis. Mr. Durand has been the recipient of CALFED funding to develop conceptual models for the Delta. Moreover, Mr. Durand is a student of and is co-authoring two papers with Dr. Kimmerer, which raises issues of whether he has sufficient independence from Dr. Kimmerer's influence to objectively evaluate the validity of the Effects Analysis. In light of the above-described circumstances, it is clear that the FWS erred when it selected and used Dr. Kimmerer and Mr. Durand as reviewers of the Effects Analysis.

The peer review must be conducted by independent reviewers with the requisite technical expertise to examine the modeling and statistical analyses before the FWS. These experts are readily available throughout the country. This is evidenced by the fact that 9 scientists who were actually independent of the entire Pelagic Organism Decline (POD) effort provided a genuinely independent review of the 2005 POD Synthesis document. The consequences of the assessment contained in this Effects Analysis is highly influential and will be far more costly and far-reaching. It is impossible to justify failing to provide for a truly independent and thorough peer review. The FWS's failure to do so is consistent with historic practices and weaknesses specifically identified in the comments of the 2005 independent peer reviewers regarding the Interagency Ecological Program:

"...The program relies too heavily on local perspectives and resources for problem analysis, research and solutions. This can give rise to a culture of common assumptions that impedes exploration of alternative possibilities. "

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[120] The FWS did not comply with the strictures of the Final Bulletin when it selected peer reviewers for the Effects Analysis.

[121] Mr. Durand does not meet the generally accepted criteria for use as a peer reviewer because of the possibility that he is unable to perform the review tasks "free of intimidation or forceful persuasion by others associated with the decision process." Meffe et al. at 269.

[122] Fed. Reg. at 2675-2676

The FWS must identify reviewers who—while perhaps less familiar with the Delta – have the scientific background and knowledge in relevant fields such as biology, biostatistics, and hydrology to evaluate whether the data and analytical results in the Effects Analysis were portrayed in an accurate, complete, unbiased, and comprehensive manner; in short to ensure that the FWS did indeed rely on the best scientific and commercial data available, as required by the ESA, and to ensure that the information was presented in a clear, accurate, unbiased and complete manner, as required by the IQA.

The FWS's direction regarding the scope of the peer review was also insufficient. The Final Bulletin provides that "the intensity of peer review should be commensurate with the significance of the information being disseminated and the likely implications for policy decisions"[123]. The Final Bulletin emphasizes that "the need for rigorous peer review is greater when the information ... presents conclusions that are likely to change prevailing practices, or is likely to affect policy decisions that have a significant impact." Specifically, the language included identifies highly influential scientific assessments as requiring the most rigorous peer review available. The Effects Analysis will influence the water supplied by the SWP and CVP. The water Project operations are vital to more than 25 million people throughout California. They also supports more than three million acres of the most productive farmland in the United States. The cost of the interim reductions based on baseless assertions that delta smelt abundance index declines are due to export pumping has exceeded $500 million. Further reductions in these water supplies will be devastating to California's economy and to the nation's food security. However, in contravention of all the guidance in the Final Bulletin, "the review was conducted in a four-day period under a tight schedule"[124]. This is certainly not sufficient time to allow the peer reviewers to fully assess the data and analytical results discussed in the Effects Analysis and assess whether any data excluded from the Effects Analysis should have been included. The FWS was thus required to give the peer reviewers sufficient time to properly evaluate the Effects Analysis and as explained herein, it failed to do so.

Additionally, the Final Bulletin directs agencies "to strive to ensure that their peer review practices are characterized by ... scientific integrity" which includes "the identification of the scientific issues and clarity of the charge to the panel [and] the quality, focus and depth of the discussion of the issues by the panel...." Further, "[t]he charge should ask that peer reviewers ensure that scientific uncertainties are clearly identified and characterized ..., ensure that the potential implications of the uncertainties for the technical conclusions drawn are clear ... [and that they] consider value-of-information analyses that identify whether more research is likely to decrease key uncertainties."

Here, the FWS asked the review panel to "assess whether the appropriate data were used in the analysis and if the analysis was scientifically defensible"[125]. The FWS did not ask the panel to clearly identify and characterize the accuracy, the completeness, whether it was unbiased, and whether the best available data was used. Given the significant importance of the BO, the FWS was required to charge the review panel to conduct a thorough and in-depth evaluation and analysis, including re-analysis of at least a sampling of the data and an assurance that the best available data formed the basis of the Effects Analysis. Instead, the FWS charged the reviewers to simply

[123] 70 Fed. Reg. at 2668.
[124] Peer Review at 2.
[125] Peer Review at 2

determine whether the decisions could be defended. The resulting peer review, is neither independent, complete, nor based on the 'best available scientific data' standard required by the ESA.

For the foregoing reasons, the Peer Review fails to meet prevailing standards for independence, fails to hold the FWS to the requirements of the ESA, and fails to comply with the Final Bulletin and the FWS's own peer review policy.