BDCP1631.

From: Shawn Smallwood <puma@dcn.org>
Sent: Tuesday, July 29, 2014 12:20 AM
To: BDCP.comments@noaa.gov
Subject: Comments on EIR/EIS prepared for Bay Delta Conservation Plan
Attachments: Smallwood comments on Delta Tunnels_072114.docx

I would like to submit my comments on the EIR/EIS that was prepared for the BDCP. My comments are attached in a Word file.

Thank you,

Shawn Smallwood

BDCP1631

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21 July 2014

RE: Comments on the Bay Delta Conservation Plan EIR/EIS

I would like to comment on the draft Environmental Impact Report and Environmental Impact Statement (EIR/EIS) prepared for the Bay Delta Conservation Plan (BDCP). My qualifications for preparing expert comments are the following. I earned a Ph.D. degree in Ecology from the University of California at Davis in 1990, where I subsequently worked for four years as a post-graduate researcher in the Department of Agronomy and Range Sciences. My research has been on animal density and distribution, habitat selection, habitat restoration, interactions between wildlife and human infrastructure and activities, conservation of rare and endangered species, and on the ecology of invading species. I have authored numerous papers on special-status species issues, including "Using the best scientific data for endangered species conservation," published in Environmental Management (Smallwood et al. 1999), and "Suggested standards for science applied to conservation issues" published in the Transactions of the Western Section of The Wildlife Society (Smallwood et al. 2001). I served as Chair of the Conservation Affairs Committee for The Wildlife Society – Western Section. I also served on the Alameda County Scientific Review Committee (SRC) for five years which oversaw monitoring and research of wildlife impacts with wind turbines in the Altamont Pass Wind Resource Area. I am a member of The Wildlife Society and the Raptor Research Foundation, and I've been a part-time lecturer at California State University, Sacramento. I was also Associate Editor of wildlife biology's premier scientific journal, The Journal of Wildlife Management, as well as of Biological Conservation, and I was on the Editorial Board of Environmental Management.

For 25 years I have performed research and consulting on wildlife ecology and conservation, mostly in the Great Central Valley. I have worked on many of the special-status species that will be affected by the BDCP, and I have spent a lot of time in and around the San Joaquin Delta. I also live on the edge of the Delta, in Davis, California. In my research efforts, I have examined the impacts on wildlife caused by land conversions, electric distribution lines, wind turbines, and soil degradation. I have also researched how wildlife interact with agricultural and how agricultural practices can be modified to conserve wildlife.

IMPACTS ASSESSMENT

The EIR/EIS often refers to modeled habitat when referring to impacts to or special-status species. However, the "models" are nothing more than GIS map layers of vegetation cover that someone classified into "natural communities" and onto which someone applied habitat suitability ratings. The modeling was explained in the Bay Delta Conservation Plan, Chapter 5 and Appendix 5J, but details were missing on who took these steps and at what resolution habitat suitability ratings were applied. The modeling was very simplistic and highly dependent on untested assumptions.

According to the BDCP (page 5.2-23), habitat areas were weighted for suitability by using a rating approach known as a Habitat Suitability Index, or HSI. However, none of these weightings were shared in the BDCP or the EIR/EIS or any of the accompanying documents, as far as I could determine. As far as I can tell, some anonymous person(s) assigned HSI values to acreages within the study area for each special-status species, but did not explain the reasons for HSI assignments. The modeling appears to be a black box that the public is expected to trust. Having performed indicator-level assessments myself, I do not trust unidentified personnel to have accurately and consistently assigned habitat values to lands throughout the study area on behalf of special-status species. Not only does this approach misrepresent the operational terms used by ecologists and wildlife biologists, as explained below, but it lacks transparency and conveys over-confidence in the results.

I have performed similar assessments using GIS, including what used to be the foundation of the Yolo County Habitat Conservation Plan before it transitioned into the Yolo County Natural Heritage Program (Smallwood et al. 1998). A key difference between what I did and what has been done in the BDCP is that my characterizations of "ecological integrity" and "conservation opportunity" were intended to identify the places in the study area where mitigation might achieve the greatest gains, whereas the mapping of "habitat" in the BDCP was intended to estimate both project impacts and conservation benefits on a balance sheet. I made no attempt quantify impacts or conservation benefits with such indicator-level maps because doing so would have been scientifically indefensible and legally inappropriate. The BDCP approach was scientifically indefensible and legally inappropriate, and just downright misleading, as I will explain.

The BDCP has misapplied operational terms from the fields of ecology and wildlife biology to minimize project impacts and to maximize predictions of conservation benefits. For example, *natural communities* are defined by ecologists as associations of interacting populations, usually defined by the nature of their interaction or the place in which they live. Ecologists delineate and characterize natural communities by studying species' interactions within defined areas or within sampling plots, and then they compare what they find by using a suite of metrics. The BDCP's use of the term is a vegetation cover type that is readily recognizable by someone viewing aerial photos (e.g., cultivated versus riparian versus grassland) and that is bounded by digital lines that are rarely if ever seen by ecologists when considering natural communities. The BDCP's use of the term is a distortion of the term's original meaning, and results in a convenient tool for eliminating all of the beautiful complexity of species' interactions that are intrinsic to each place. Yes, there are species' interactions that transcend a place and that can be found commonly in other environmental settings that appear similar to a particular place, but there are many more unique interactions – species' interactions that will be found no place else. The BDCP's use of the term, *natural communities*, glosses over this intrinsic value and so diminishes the project's impacts on, for example, vernal pools and their special-status species assemblage by lumping the vernal pools in the project's path with those far away on the outer fringe of the project's vast study area.

Another term misapplied in the BDCP was *habitat restoration*. To improve its balance sheet of project impacts against conservation benefits, the BDCP relied heavily on habitat restoration, which was never defined in terms of individuals or breeding pairs of the special-status species that are supposed to benefit from habitat restoration. The balance sheet's metric was acreage, so the BDCP assumed that restoring an acre of a given natural community would equal the habitat value of that same natural community that was destroyed by the project. This assumption would be inconsistent with both the terms *habitat* and *habitat restoration*. According to the BDCP's assumptions and approach, habitat is defined by people on behalf of the species at issue, whereas wildlife biologists and ecologists define habitat as that portion of the environment used by the species. Ecologists and wildlife biologists do not attempt to inform the species of its habitat, but rather allow the species to inform us. We, as ecologists, measure the distribution and abundance of biological species and relate those measurements to our measures of other environmental variables so that we can infer the species' habitat affinities (Smallwood 2002). Habitat restoration is therefore an attempt to reproduce the environmental conditions that matched our inferences of the species' habitat, so that we can restore the distribution, abundance and social interactions that normally would occupy such conditions (Smallwood 2001). The BDCP's characterization of habitat restoration lacked measurable thresholds of success in terms of the species' use the environment. In my experience this approach will not work.

Habitat restoration is also specific to the places where habitat was destroyed, but the BDCP generally conflates its plan to "create" habitat in other locations with the concept of habitat restoration. Creating habitat at Site B to replace habitat destroyed at Site A will not truly restore the destroyed habitat because it is in the wrong place. There is no chance that habitat can be restored at a different place from where individuals of a particular special-status species used to live. Furthermore, creating habitat at Site B will likely result in destroying or degrading the habitat of individuals already occurring at Site B unless the conditions at Site B were so degraded that the enhancements would benefit the local individuals of the species. But proceeding with habitat restoration, habitat creation, habitat enhancements, or whatever the BDCP wants to call it, would be irresponsible without first demonstrating that the conservation site is in need of the action and will measurably benefit the special-status species at issue.

For example, Swainson's hawks are known to nest in the highest densities within the central portion of the Central Valley, closer to the Sacramento River as it flows into the Delta. The riparian forest in the extreme western portion of the BDCP study area should not be given the same value as the riparian forest nearest the north-south axis of the

Central Valley. In another example, giant garter snakes also occur near the north-south axis of the Central Valley, so the BDCP's balance sheet should not give equal weight to the wetlands and grasslands in the extreme western portion of the study area as compared to those that are going to be destroyed by the project. The same would be true for sandhill cranes and probably many other special-status species.

Even very close to the site of project impacts, habitat restoration can often fail. I helped "restore" habitat of Valley Elderberry Longhorn Beetle (VELB) in what appeared to be a perfect setting from our point of view (Morrison et al. 2003). Along the Merced River near Livingston, California, we translocated mature elderberry shrubs with bore holes made by the beetle, so we knew that we had inoculated the restored site with not only the beetle's key plant species but probably with the beetle itself. We managed and monitored the site for three years using the US Fish and Wildlife Service protocol. Whereas the elderberry shrubs thrived, the VELB failed to occupy the site (an all-too common outcome). Using the BDCP's acreage metric for its balance sheet, we can say we succeeded in restoring habitat of the beetle and having achieved no net loss of VELB habitat, but from the species point of view we failed. This is what is going to transpire writ large if the BDCP's impacts and mitigation approach is allowed to proceed.

Returning to my earlier caveat that habitat restoration should be regarded as legitimate only where the special-status species was known to occur but where habitat conditions had deteriorated, I must add another caveat. One of my efforts to restore habitat was directed toward the Fresno kangaroo rat (*Dipodomys nitratoides*) in a grassland environment over 14 years. Even though Fresno kangaroo rats resided on this grassland, it proved extremely difficult to identify the environmental resources that the species used to rely on before conditions degraded to the level that existed when I began my restoration efforts. It was unknown which food plants were preferred by the species, or whether the varieties of these food plants continued to exist or had gone extinct. We surmised that the species was disturbance-adapted, but we could not determine the nature of the disturbances upon which the species thrived because those disturbances had disappeared from the landscape for a century or longer. In my experience, it is impossible to truly restore the habitat of any special-status species. Nevertheless, sufficient resources should be directed toward efforts to learn which resources are missing from the species' environment, and these efforts should be made using appropriate experimental designs. Without detailing appropriate experimental design and promising sufficient resources, it is misleading to promise habitat restoration over vast acreages for multiple species.

Even worse than promising habitat restoration in the wrong places or without proper experimental design and other resources, would be efforts to restore habitat on piles of bore spoils. I did not see where the EIR/EIS stated that habitat restoration would be attempted on bore spoils, but neither did I see it stated that this would not happen. In fact, the bore spoils were referred to as "*Reusable Tunnel Material,*" which could conceivably mean reusable as acreage for habitat restoration. The EIR/EIS (page 12-139) admitted to having no willing sellers of land that would be used for habitat restoration, so it seems plausible that the Reusable Tunnel Material Areas would be targeted for habitat restoration. Attempting habitat restoration on bore spoils would certainly fail because the soils would be unsuitable for growing the appropriate plants, and because the ground elevation would be eight to ten feet higher than the original ground elevation, so would experience a new, different suite of ecosystem processes. Having performed surveys for wildlife in many environmental settings, such as on silt-filled gravel-mining pits that were retired from mining since one to thirty years earlier, and having intensively studied fossorial mammal ecology, I can predict with considerable certainty that using bore spoils as the substrate for habitat restoration would result in anemic environments of low species diversity. The Reusable Tunnel Material Areas should be regarded as areas of permanent direct impacts, and as having no potential for habitat restoration.

Lack of Precautionary Principle

The foremost principle of impacts assessment and of risk analysis in general is the Precautionary Principle. In the face of high uncertainty when assessing impacts to rare environmental resources, the accepted standard is to err on the side of caution (National Research Council 1986, Shrader-Frechette and McCoy 1992, O'Brien 2000). Instead of adopting the Precautionary Principle in its impacts assessment, however, the EIR/EIS relied on assumptions and an assessment approach that glossed over likely project impacts and exaggerated the conservation benefits of its proposed mitigation measures.

One assessment approach that was contrary to the Precautionary Principle was relating the acreages of habitat impacts to the alleged availability of those habitats across the vast extent of the study area. For example, according to the EIR/EIS (page 12-2046), "*The loss of this combined 403 acres* [of vernal pools] *would represent approximately 3% of the 12,133 acres of the community that is mapped in the study area.*" This conclusion was misleading because most of the vernal pools in the study area are part of the Jepson Prairie complex, which is far from the vernal pools that will be destroyed and which support a different set of special-status species. The impact metric should not have been 3% of the mapped vernal pool acreage in the study area, but rather 100% of the 403 acres that would be destroyed by the project.

Following up on this same example, the EIR/EIS (page 12-2048) claimed, "*However, 600 acres* [of vernal pools] *would be protected (CM3) and up 19 to 67 acres would be restored (CM9) through the course of Alternative 4 implementation.*" A precautionary approach would have assumed that, unfortunately, it would be unrealistic to expect that the destroyed vernal pools could be restored, so there would be no claim that 19 to 67 acres over vernal pools would be restored. A precautionary approach would also reveal whether there are 600 acres of vernal pools in need of protection (that are not already protected), and that if there are this many acres, then there are willing sellers of fee title or conservation easements on the acreage.

The Precautionary Principle would also include appropriate assignments of uncertainty to impacts conclusions and to assumptions underlying the impacts assessment. For example, none of the habitat models appeared to be accompanied by any statements of uncertainty. The model output, which consisted merely of some unidentified person(s) assignment of HSI ratings to digitized GIS map layers of vegetation cover, was either habitat or not habitat, or "high value" habitat or "low value" habitat, or "primary" habitat or "secondary" habitat, judging from the figures in chapter 12. With these designations, there were no error terms, no confidence ranges, nor any cautionary statements warning that the designations could be wrong sometimes. The habitat models, which appeared to be derived from a black box, were presented as 100% accurate.

In another example of the Precautionary Principle missing from the impacts assessment, a key set of assumptions underlying predictions of water outflows and changes in outflows was relied upon without fully considering the uncertainty of those assumptions. Outflows and changes in outflows would substantially affect the impact assessments of biological resources. Therefore, it was no surprise to me to see climate change scenarios considered in projections of outflows and changes in outflows (EIR/EIS page 5.2-10), "*Over the implementation period, regional climate likely will change in response to global changes in 4 climate (Pachauri and Reisinger 2007). While the expectations of climate change are robust, 5 predictions of changes must depend on model projections that may differ from what actually occurs.*" However, even though the EIR/EIS acknowledged that what will actually occur might differ from model projections, this uncertainty failed to translate to the outflow projections relied upon in the EIR/EIS.

According to the EIR/EIS (page 5-64),"*Average annual Delta exports ... under the No Action Alternative would be reduced by about 703 TAF (14%) compared to Existing Conditions (Table 5-5) because of sea level rise and climate change, increased outflows to meet Fall X2 in wet and above normal years, increased projected urban water demands, and other changes explained previously in this section...*" To be consistent with the Precautionary Principle, the outflow projects should have been based not only on this 14% flow reduction, but also on a 0% flow reduction. In other words, the EIR/EIS should have also considered the possibility that the climate change projection will turn out to be wrong. Wrong projections are not unheard of when it comes to climate change, so it would have been reasonable to consider a 0% flow reduction in the No Project Alternative. Another way to do this would have been to assign an uncertainty range to the 14% value, but the tables of outflow projections in Chapter 5 failed to include confidence ranges or error terms.

Reliance on CNDDB Records

The EIR/EIS was over-reliant on data managed at the California Natural Diversity Data Base (CNDDB). The habitat models appeared to be based on them and my reading of the EIR/EIS gave me the impression that whoever did the habitat modeling assigned HSI values to mapped habitat areas based on whether these areas included CNDDB records (e.g., EIR/EIS page 12-140). However, CNDDB records are voluntarily reported and many were not derived from scientific sampling, which means that lack of CNDDB records does not equal species absence. CNDDB records cannot be relied upon to determine the extent of habitat. To help get this message across, the California Department of Fish and Wildlife posts a disclaimer on its California Natural Diversity Data Base web site: "*We work very hard to keep the CNDDB and the Spotted Owl Database as current and up-to-date as possible given our capabilities and* *resources. However, we cannot and do not portray the CNDDB as an exhaustive and comprehensive inventory of all rare species and natural communities statewide. Field verification for the presence or absence of sensitive species will always be an important obligation of our customers.*" Similarly, the California Native Plant Society's Inventory of Rare and Endangered Species states the following: "***A reminder:*** *Species not recorded for a given area may nonetheless be present, especially where favorable conditions occur.*" All conclusions that species were unlikely to occur due to their absences from CNDDB were invalid. Species should be considered likely to occur in the project area if habitat is present and their geographic range maps overlap the project area, or preferably if they were documented in the area by appropriate field surveys.

Transmission Line Impacts

Whereas the EIR/EIS mentioned avian collisions with transmission lines, I did not see any predictions of fatality rates. Without predicting fatality rates due to transmission line collisions the EIR/EIS is deficient.

Hartman et al. (1992) provided an empirical basis for estimating fatality rates of birds caused by collisions with transmission lines. Hartman et al. monitored bird collisions with a transmission line strung across Mare Island, California, and they also performed searcher detection and scavenger removal trials, which are necessary for adjusting fatality rates for the proportions of birds killed but never detected. Hartman et al. reported 85.3 bird fatalities per mile of transect per year along the portion of the circuit overlying hayfields (this line included 3 circuits). Bird mortality was eleven times greater along that portion of the circuit overlying salt ponds, so transmission lines crossing wetland areas posed a much greater hazard to birds than lines crossing upland areas on Mare Island. An appropriate impact estimate would consider the Mare Island findings to be the minimum impact estimate for the BDCP.

I was unable to locate a description of the transmission lines that included length of line, except for a depiction of the lines in the figures. I used a ruler to measure the length of permanent transmission line and I estimated the length of temporary line. I measured 18.8 miles of perment line and guessed about 50 miles of temporary line. On the low end, assuming all of the line spans hayfields or similar crops, multiplying 85.3 birds per transect line per year (Hartman et al. 1992) against 18.8 miles of transmission line yields a predicted fatality rate of 1,604 birds per year, some of which will undoubtedly include sandhill cranes (Yee). Over wetlands, 18.8 miles of transmission line would cause >17,000 fatalities per year. Obviously, the fatality rate extended from the Hartman et al. study would fall somewhere between 1,604 and 17,000 fatalities per year, depending on the distribution of wetlands versus other cover types under the lines. The EIR/EIS should address these impacts and mitigate for them.

Indirect Impacts of Energy Demand

Nine years of construction under Alternative 4 would require annually 2,549 GWH of electricity, according to the EIR/EIS, and project operations would subsequently require 175 GWH annually. This energy will have to come from somewhere, and it will have environmental costs that were not addressed in the EIR/EIS. If it was to come from wind energy, for example, then assuming the wind turbines operated with a 35% capacity factor, then 831 MW of wind energy capacity would be needed to complete the construction and the nine years of construction 57 MW would be needed to run the pumps annual. Based on the average annual fatality rates at California's four major wind resource areas (8 collision fatalities/MW/year), the 831 MW of capacity needed for construction would cause 6,648 bird collisions annually for nine years, or 59,832 birds. The wind energy capacity of 57 MW needed to operate the pumps would cause 456 fatalities per year for as many years as the pumps would operate, or indefinitely. The number of bat fatalities caused by construction would be at least 16,620 bats per year for nine years of construction, or 149,580 bats. Afterwards, operating the pumps would cause 1,140 bat fatalities per year indefinitely. Of course, the source of energy could come from natural gas, hydro, or industrial solar, but these energy sources also have their associated environmental impacts that should be estimated in the EIR/EIS.

MITIGATION

The mitigation promised for reducing or offsetting impacts to most terrestrial special-status species would require willing sellers of fee title or conservation easements of properties that would total large acreages. However, the EIR/EIS (page 12-139) admitted that willing sellers had yet to be identified. This lack of willing sellers is a fundamental flaw of the EIR/EIS.

I was involved in the Natomas Basin HCP during the 1990s, so I remember how that HCP was certified in the absence of a sufficient number of willing sellers (Smallwood 2000) and how a federal judge subsequently ruled the HCP illegal and the associated incidental tale permit invalid due to too few willing sellers that were needed for the promised mitigation. I had warned that willing sellers would be difficult to find, and they were. The EIR/EIS needs to identify where habitat will be protected and where restoration would occur, and it needs to prove that the promised levels of protection and restoration will be feasible.

Another fundamental flaw of the mitigation plan is the EIR/EIS's deferral of the formulation of the details of the plan to some unspecified, later date. According to the EIR/EIS (page 12-139), "*Detailed plans for restoration, enhancement, and preservation actions have not been prepared for multiple reasons: (1) because the habitat restoration and enhancement would be implemented, if feasible, in areas with willing sellers, none of whom has been identified; (2) to maintain flexibility in the BDCP for adaptive management; and (3) because BDCP implementation has a long timeframe.*" Whichever the reason, this deferral of the formulation of the mitigation measures effectively prevents me and other members of the public from participating meaningfully with this important aspect of the environmental review of a project that will destroy many thousands of acres of habitat of special-status species.

Impact BIO-44: Red-legged frog

The following mitigation measures were proposed for California red-legged frog (EIR/EIS page 12-2114). My comments in normal font follow each measure in *italics*.

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"Increase native species diversity and relative cover of native plant species, and reduce the introduction and proliferation of nonnative species (Objective L2.6, associated with CM11, CM13, and CM20). How would native species diversity be increased? I work in the areas where California red-legged frogs occur to the west and south of the Clinton Forebay, and in fact I have contributed many of the CNDDB records of California red-legged frogs in this area, so I am familiar with the wildlife and plant community there. I am perplexed by this proposed measure to increase species diversity in the area, which is mostly annual grassland. Exactly what would be done to increase species diversity while somehow not damaging the local flora and fauna? I am very skeptical that species diversity could or even should be increased to benefit the frog.

It would be helpful if the EIR/EIS would explain why increased species diversity would benefit California red-legged frog. In all of my research and survey work with this species, I have never encountered evidence to suggest that species diversity was a limiting factor for this species. I have performed research on the possible impact of methylated mercury in the streams. I have performed research on the siltation of breeding ponds, and I developed a management plan to restore pond function for the frog. I have, during the course of my surveys, found ponds that were choked out by cattails, and stream pools that were isolated by severe streambed incision or degraded by riprap. I have noted that California red-legged frogs occur where ground squirrels were relatively abundant in the upland areas adjacent to streams and ponds. But never in 20 years of surveys and research on this species have I noticed or seen reference to species diversity having anything to do with the abundance and distribution of California red-legged frogs.

Whereas I have seen it hypothesized that non-native species might be detrimental to California red-legged frogs, I have yet to see evidence that bullfrogs or other exotic species have limited the distribution of California red-legged frogs. I would not rule out bullfrogs as a limiting factor, but neither would I gamble that eradicating bullfrogs would help conserve red-legged frogs.

Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3). This measure lacks any meaningful details that would translate to conserving California red-legged frogs. There are large tracks of annual grassland that are devoid of the species because they are outside the current range of California red-legged frog or because they lack any suitable water features where the frog would spend part of its life. The specific portion of the study area that hosts California red-legged frog is west and south of Clinton Forebay, which appears to be targeted for dumping bore spoils. Dumping bore spoils in this area will destroy the only California red-legged frogs that occur in the project area, although the species also occurs to the west along the southwestern fringe of the study area. Other than this southwestern fringe, there is no other place within the study area where protecting grasslands will also conserve California red-legged frogs. Within the southwestern fringe, there is no threat to California red-legged frogs other than poisoning to control California ground squirrels, which construct burrows used by the frog. Therefore, due to the plan to dump bore spoils in the only portion of the project area where California red-legged frogs could be protected, and due to the habitat to the west being under no threat of conversion to other uses, the proposed mitigation measure will be ineffective.

Protect stock ponds and other aquatic features within protected grasslands to provide aquatic breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with CM3). Protecting stock ponds seems unnecessary because cattle ranchers will either protect their stock ponds or not based on their needs. Is the plan to commit ranchers to protecting stock ponds? And how would such protection be carried out? By excluding cattle? If so, cattle are the reason stock ponds exist.

Again, the only portion of the study area that hosts California red-legged frog is west and south of Clinton Forebay, which appears to be targeted for dumping bore spoils. Protecting stock ponds in this area would be ridiculous because they will be covered by bore spoils. Protecting stock ponds along the southwest fringe of the study area would also be ridiculous because the ranchers already maintain their ponds for use by cattle.

Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with CM11). Having worked with fossorial mammals for nearly 30 years, I can conclude with high confidence that this measure is an empty promise. I have mapped the dimensions of burrows and I have mapped the distribution and abundance of mammal burrows across large areas (Smallwood and Erickson 1995; Smallwood and Geng 1997; Smallwood and Morrison 1997; Smallwood et al. 1997; Smallwood et al. 1998a; Smallwood et al. 1999a,b; Smallwood et al. 2001a,b;), including across hundreds of hectares of grassland west of Clinton Forebay (Smallwood et al. 2009). Burrow availability cannot be increased through artificial means, as attempts to do so have proven cost-ineffective and have failed. I would be curious to learn how the preparers of the EIR/EIS might think that natural burrows might be increased. In summary, this mitigation measure is an empty promise; even if it was implemented, it would not succeed.

Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and duration and suitable composition of vegetative cover to support breeding for covered amphibian and aquatic reptile species (Objective GNC2.5, associated with CM11)." This measure appears to suggest that some portion of existing grasslands would be destroyed so that ponds could be created. Such a measure would add to project impacts in the near term but would face high uncertainty over whether any benefits would be realized in the long term. The EIR/EIS should identify where and under what circumstances this measure would be implemented. It should also quantify the number of California red-legged frogs that would be able to occupy the created habitat (Smallwood 2001).

Impact BIO-46: California Tiger Salamander

The following mitigation measures were proposed for California tiger salamander (EIR/EIS page 12-2122). My comments follow each measure.

"Increase the size and connectivity of the reserve system by acquiring lands adjacent to and between existing conservation lands (Objective L1.6, associated with CM3). Those portions of the study area where California tiger salamander occurs do not appear to me to lack for connectivity or habitat patch size, which might be reasons why the species has persisted there. The EIR/EIS needs to explain how increased size and connectivity would be achieved, and it would be achieved without harming the salamanders that already live there. The EIR/EIS needs to explain where and under exactly which circumstances this measure would be implemented, and how the implementation would translate into meaningful units of demography that will be conserved (Smallwood 2001). The acreage basis of success that is used in the EIR/EIS is meaningless unless those acreages can be linked directly to numbers and demography of California tiger salamander.

Increase native species diversity and relative cover of native plant species, and reduce the introduction and proliferation of nonnative species (Objective L2.6, associated with CM11). As I commented for California red-legged frog, I have yet to see the hypothesis or any evidence that species diversity has anything to do with the distribution and abundance of California tiger salamander. The EIR/EIS should explain the relationship between species diversity and conserving the salamander; else this measure is empty rhetoric.

Protect and improve habitat linkages that allow terrestrial covered and other native species to move between protected habitats within and adjacent to the Plan Area (Objective L3.1, associated with CM3, CM8, and CM11). How is this measure any different from the first one listed? The EIR/EIS should provide details of this measure, which is so vague that it carries absolutely no value.

Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3). This measure should specify exactly where 150 acres of alkali seasonal wetland will be protected, and its benefits should be predicted in terms of meaningful demographic units (Smallwood 2001). I assume the 150 acres of alkali seasonal wetland already exists, so it ought to be explained how protecting them will make any difference to the local salamanders. Are these 150 acres under threat of development?

Provide appropriate seasonal flooding characteristics for supporting and sustaining alkali seasonal wetland species (Objective ASWNC2.1, associated with CM3 and CM11). The seasonal flooding characteristics already exist, or else the alkali seasonal wetland would not exist. I am familiar with the alkali seasonal wetland in CZ8 because I have performed research next to it for 15 years. I have not seen any threat to the seasonal flooding of this wetland, nor do I see any means of providing any different or the same flooding regime. This measure appears to be an empty promise.

Increase burrow availability for burrow-dependent species in grasslands surrounding alkali seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective ASWNC2.3, associated with CM11). Having worked with fossorial mammals for nearly 30 years, I can conclude with high confidence that this measure is an empty promise. I have mapped the dimensions of burrows and I have mapped the distribution and abundance of mammal burrows across large areas (Smallwood and Erickson 1995; Smallwood and Geng 1997; Smallwood and Morrison 1997; Smallwood et al. 1997; Smallwood et al. 1998a; Smallwood et al. 1999a,b; Smallwood et al. 2001a,b;), including across hundreds of hectares of grassland west of Clinton Forebay (Smallwood et al. 2009). Also, the hills around this wetland support ample numbers of California ground squirrels that are under no threat other than the occasional dispensing of poisoned bait to reduce squirrel numbers. This mitigation measure is an empty promise.

Protect 600 acres of existing vernal pool complex in in CZ 1, CZ 8, and/or CZ 11, primarily in core vernal pool recovery areas identified in the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (U.S. Fish and Wildlife Service 2005) (Objective VPNC1.1, associated with CM3). The vernal pool complexes in CZ1 and CZ8 do not appear to be in need of protection, nor will protecting them offset the number of California tiger salamanders that will be killed by dumping bore spoils on them west and south of Clinton Forebay.

Restore vernal pool complex in in CZ 1, CZ 8, and/or CZ 11 to achieve no net loss of vernal pool acreage (up to 67 acres of vernal pool complex restoration, assuming that all anticipated impacts [10 wetted acres] occur and that the restored vernal pool complex has 15% density of vernal pools) (Objective VPNC1.2, associated with CM3 and CM9). Restoring the vernal pools in CZ1, CZ8, and CZ11 would likely damage the existing vernal pools. The EIR/EIS needs to explain why these vernal pools are in need of being restored. Otherwise, this measure seems both vague and potentially reckless.

Increase the size and connectivity of protected vernal pool complex within the Plan Area and increase connectivity with protected vernal pool complex adjacent to the Plan Area (Objective VPNC1.3, associated with CM3). This is the third iteration of the same measure listed for this species. Repeating the same measure seems like an attempt to add filler text or to give the appearance that there is more offered in mitigation than truly intended. Again, the EIR/EIS needs to identify where and under what circumstances this measure would be implemented and how it would translate into specific numbers or meaningful demographic units of the species (Smallwood 2001).

Protect the range of inundation characteristics that are currently represented by vernal pools throughout the Plan Area (Objective VPNC1.4, associated with CM3). This measure is absurd. How will the range of inundation characteristics be protected? Will someone insert a flow regulator? The EIR/EIS, if it is serious, needs to explain how vernal pool management will improve on nature.

Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3). As I commented on the same measure proposed for California red-legged frog, this measure needs detail on how it will translate into numbers or meaningful demographic units of California tiger salamanders that will be conserved. The EIR/EIS needs to demonstrate that willing sellers exist in sufficient number to achieve the protection of 8,000 acres of grassland, and it needs to explain why the particular grasslands need to be protected. Currently there are large tracts of grassland south of Byron that are being converted to wine grapes. Given that wine grapes are high-value crops, is the mitigation fund going to be large enough to afford buying out whatever might be left of this grassland acreage?

Restore 2,000 acres of grasslands to connect fragmented patches of protected (Objective GNC1.2, associated with CM3 and CM8). This measure is too vague to be taken seriously. Where are these 2000 acres? Why would restoring these grasslands not destroy the habitat value that these grasslands already have? The EIR/EIS needs to demonstrate the need for the restoration, as well as the measurable objectives; otherwise 2000 acres of brome grasses lacking California tiger salamanders might result.

Protect stock ponds and other aquatic features within protected grasslands to provide aquatic breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with CM3). As explained in response to the same measure promised for red-legged frogs, protecting stock ponds seems unnecessary because cattle ranchers will either protect their stock ponds or not based on their needs. Committing ranchers to stock ponds seems impractical and unlikely to succeed. And how would such protection be carried out? By excluding cattle? If so, cattle are the reason stock ponds exist.

Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with CM11). This is the second time this measure appeared as mitigation for California tiger salamander. I already commented on it.

Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and duration and suitable composition of vegetative cover to support breeding for covered amphibian and aquatic reptile species (Objective GNC2.5, associated with CM11)." This is the second time this measure appeared as mitigation for California tiger salamander. I already commented on it.

Impact BIO-49: Giant Garter Snake

The following mitigation measures were proposed for giant garter snake (EIR/EIS page 12-2231). My comments follow each measure.

"*Increase native species diversity and relative cover of native plant species, and reduce the introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).* This same measure was listed for California red-legged frog and California tiger salamander, and my comment on it is the same – the EIR/EIS needs to explain the relationship between species diversity and giant garter snake numbers or success. Why is species diversity important to the persistence of giant garter snakes? How does it translate to meaningful units of demography? I have never encountered the hypothesis that species diversity is a limiting factor to giant garter snake. If it was, then surely it would have been a topic of discussion during the environmental review of the

Natomas Basin HCP, but this factor never came up. This measure lacks foundation and is vague in how it would be implemented.

Within the 65,000 acres of tidal natural communities (L1.3), restore or create 24,000 acres of tidal freshwater emergent wetland in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective TFEWNC1.1, associated with CM3 and CM4). The EIR/EIS needs to provide details about where and under what circumstances this measure would be implemented. If it was along the shoreline of the Yolo Flood Control Basin, for example, then it would be useless because giant garter snakes do not, and apparently cannot, live in this Basin. Giant garter snakes require ample availability of hibernacula above 100-year flood stage (Smallwood 2001), which does not occur in the Yolo Flood control Basin except for the levees which are too narrow and barren to support the snake.

Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic and nontidal freshwater emergent wetland natural communities, with suitable habitat characteristics for giant garter snake and western pond turtle (Objective NFEW/NPANC1.1, associated with CM3 and CM10). The EIR/EIS needs to identify where these 1200 acres are to be created.

Protect 48,625 acres of cultivated lands that provide suitable habitat for covered and other native wildlife species (Objective CLNC1.1, associated with CM3 and CM11). This measure reminds of the Natomas Basin HCP, which had promised to protect 8,000 acres of rice fields. One of the problems with the Natomas Basin HCP was the lack of willing sellers of rice fields, and another was the notion that such protections could overcome agricultural market conditions. Is this measure going to force the production of alfalfa, for example? If the market is not right for alfalfa, then it would be foolish to require the farmers to grow alfalfa. This measure is empty in value, unless the EIR/EIS can explain how it would work.

Target cultivated land conservation to provide connectivity between other conservation lands (Objective CLNC1.2, associated with CM3). This measure is extremely vague. How would this measure translate to conservation of giant garter snakes? Would it replace the number of snakes or snake populations that would be destroyed by the project? The EIR/EIS needs to provide much more detail before such a measure can be taken seriously.

Maintain and protect the small patches of important wildlife habitats associated with cultivated lands that occur in cultivated lands within the reserve system, including isolated valley oak trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3 and CM11). This measure needs more detail in both where it would be implemented and how it would conserve giant garter snakes.

Of the at least 1,200 acres of nontidal marsh created under (Objective NFEW/NPANC1.1), create 600 acres of aquatic habitat giant garter snake aquatic habitat that is connected to the 1,500 acres of rice land or equivalent-value habitat *described below in Objective GGS1.4 (Objective GGS1.1, associated with CM3, CM4, and CM10).* The EIR/EIS needs to identify where this measure would be implemented and how it would translate into giant garter snake conservation.

Of the 8,000 acres of grassland protected under Objective GNC1.1 and 2,000 acres restored under Objective GNC1.2, create or protect 200 acres of high-value upland giant garter snake habitat adjacent to the at least 600 acres of nontidal perennial habitat being restored and/or created in CZ 4 and/or CZ 5 (Objective GGS1.2, associated with CM3 and CM8). Creating and protecting high-value upland habitat are two different actions and have very different costs. The EIR/EIS needs to identify where this measure would be implemented and how many more giant garter snakes could live within the study area compared to how many live there now. Also, it needs to be explained what is meant by "high-value" habitat.

Protect giant garter snakes on restored and protected nontidal marsh and adjacent uplands (Objectives GGS1.1 and GGS1.2) from incidental injury or mortality by establishing 200-foot buffers between protected giant garter snake habitat and roads (other than those roads primarily used to support adjacent cultivated lands and levees). Establish giant garter snake reserves at least 2,500 feet from urban areas or areas zoned for urban development (Objective GGS1.3, associated with CM3). The EIR/EIS needs to identify where this measure would apply or where it would benefit giant garter snakes, or otherwise it seems like an empty promise. Where is there a need for this measure?

Create connections from the White Slough population to other areas in the giant garter snake's historical range in the Stone Lakes vicinity by protecting, restoring, and/or creating at least 1,500 acres of rice land or equivalent-value habitat (e.g., perennial wetland) for the giant garter snake in CZ 4 and/or CZ 5. Any portion of the 1,500 acres may consist of tidal freshwater emergent wetland and may overlap with the 24,000 acres of tidally restored freshwater emergent wetland if it meets specific giant garter snake habitat criteria described in CM4. Up to 500 (33%) of the 1,500 acres may consist of suitable uplands adjacent to protected or restored aquatic habitat (Objective GGS1.4, associated with CM3 and CM4). This measure proposed to force rice cultivation on landowners or farmer who may not wish to grow rice or who may have to abandon rice production should market conditions dictate. Furthermore, the notion that rice fields are important to giant garter snakes is false (Smallwood 2001). The giant garter snake occurs in agricultural irrigation canals and ditches, and they rarely occur in rice fields, although there is no evidence these areas are anything but ecological sinks for the giant garter snake. There is no convincing evidence that the giant garter snake benefits from rice cultivation in any way, and there is ample evidence that it is harmed by rice cultivation. Using Wylie's (1998) telemetry data, I conducted a use and availability analysis and found that the giant garter snake avoids using rice fields based on the availability of rice (Smallwood 1999).

The giant garter snake has declined to the brink of extinction while rice cultivation expanded in the Sacramento Valley. Prior to rice cultivation, the Sacramento Valley produced more alfalfa hay and other crops, and more wetlands were available to the giant garter snake. At this point in time, it is scientifically unfounded to conclude that rice fields serve as suitable giant garter snake habitat. Based on the scientific evidence, the opposite conclusion should have been reached – rice cultivation is helping to drive the giant garter snake toward extinction. To focus recovery efforts on maintenance of rice cultivation is to assist in the extinction of the giant garter snake.

Of the at least 1,200 acres of nontidal marsh created under Objective NFEW/NPANC1.1, create 600 acres of connected aquatic giant garter snake habitat outside the Yolo Bypass in CZ 2 (Objective GGS2.1, associated with CM3 and CM10). The EIR/EIS needs to be more specific about where these 600 acres of habitat are to be created. It needs to identify success criteria, and it needs to explain why creating habitat next to an unoccupied flood control basin would be a good idea for conserving giant garter snakes. Creating habitat would mean that some other habitat or land use would need to be destroyed, so the EIR/EIS should explain what will be sacrificed for this created habitat. Also, if it is grassland or fields used for alfalfa production, then this created habitat might come at the cost of Swainson's hawk habitat, so the EIR/EIS needs to be transparent about his measure's impacts on Swainson's hawk and on agricultural production in the region.

Of the 8,000 acres of grasslands protected under Objective GNC1.1 and the 2,000 acres restored under Objective GNC1.2, create or protect 200 acres of high-value upland habitat adjacent to the 600 acres of nontidal marsh created in CZ 2 outside of Yolo Bypass (GGS2.1) (Objective GGS2.2, associated with CM3 and CM8). My comments above also apply to this measure.

To expand upon and buffer the newly restored/created nontidal perennial habitat in CZ 2, protect 700 acres of cultivated lands, with 500 acres consisting of rice land and the remainder consisting of compatible cultivated land that can support giant garter snakes. The cultivated lands may be a subset of lands protected for the cultivated lands natural community and other covered species (Objective GGS2.3, associated with CM3). My comments on this measure are the same as my comments above. Forcing rice cultivation seems ridiculous because market conditions will change and because rice cultivation more likely harms rather than helps giant garter snakes.

Protect giant garter snakes on created nontidal marsh (Objective GGS2.1) and created or protected adjacent uplands (Objective GGS2.2) from incidental injury or mortality by establishing 200-foot buffers between protected giant garter snake habitat and roads, and establishing giant garter snake reserves at least 2,500 feet from urban areas or areas zoned for urban development (Objective GGS2.4, associated with CM...) I already commented on this same measure, which appears above.

Protect, restore, and/or create 2,740 acres of rice land or equivalent-value habitat (e.g., perennial wetland) for the giant garter snake in CZ 1, CZ 2, CZ 4, or CZ 5. Up to 500 acres may consist of tidal freshwater emergent wetland and may overlap with the at least 5,000 acres of tidally restored freshwater emergent wetland in the Cache Slough ROA if this portion meets giant garter snake habitat criteria specified in CM4. Up to 1,700 acres may consist of rice fields in the Yolo Bypass if this portion meets the *criteria specified in CM3, Reserve Design Requirements by Species. Any remaining acreage will consist of rice land or equivalent-value habitat outside the Yolo Bypass. Up to 915 (33%) of the 2,740 acres may consist of suitable uplands adjacent to protected or restored aquatic habitat (Objective GGS3.1, associated with CM3, CM4, and CM10)."* This measure needs to be more specific about where some of these acreages would be located. Also, giant garter snakes do not routinely live in the Yolo Bypass because it lacks suitable hibernacula and refugia. Protecting rice cultivation in the Yolo Bypass will not conserve the snake for this reason and for reasons explained earlier. Rice is not suitable giant garter snake habitat, despite a few snakes having been found in rice fields. This snake needs natural wetland environments with ample adjacent uplands.

Impact BIO-83: Swainson's Hawk

The following mitigation measures were proposed for Swainson's hawk (EIR/EIS page 12-2255). My comments follow each measure.

"Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated with CM7). The EIR/EIS needs to provide more detail about this measure, such as where the restoration or creation of habitat will occur and which types of existing environments will have to be destroyed or modified to accommodate this measure. The EIR/EIS needs to explain why restoring or creating habitat on 3000 acres of seasonally inundated floodplain would benefit Swainson's hawk. This measure, as described is vague and inadequate.

Plant and maintain native trees along roadsides and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11). This measure might be effective, but the EIR/EIS needs to identify willing sellers of the cultivated lands that are to be "protected." Also, it needs to be explained how the loss of crop yields due to shading from trees will be compensated, if at all, and how trees will be managed when planted under or near electric distribution lines. I have performed many surveys for Swainson's hawk (Smallwood 1995, Smallwood et al. 1996, and Smallwood, unpublished data), and during these surveys I have seen many trees that could have been used by nesting Swainson's hawks lose their value to Swainson's hawks because the utilities severely trimmed the trees to prevent line interference.

Establish 20- to 30-foot-wide hedgerows along fields and roadsides to promote prey populations throughout protected cultivated lands (Objective SH2.2, associated with CM11). This measure might help conserve Swainson's hawk, but it should be accompanied by an experimental design and monitoring to test whether the hedgerows do provide Swainson's hawks with increased prey, and if so, then to want extent. Planting hedgerows seems like a good idea, but the EIR/EIS cited no evidence that it will be effective. The EIR/EIS also needs to present the costs of implementing this measure, including a maintenance plan and its cost.

Increase prey abundance and accessibility for grassland-foraging species (Objectives ASWNC2.4, VPNC2.5, and GNC2.4, associated with CM11). The EIR/EIS should explain how prey abundance would be increased. Are bread crumbs going to be fed to the mice in grasslands? If the EIR/EIS is to be taken seriously, then it needs to include realistic mitigation measures and it needs to tie the measures to measureable objectives related to conserving the special-status species.

Conserve at least 1 acre of Swainson's hawk foraging habitat for each acre of lost foraging habitat (Objective SH1.1, associated with CM3 and CM11). Whereas this measure is consistent with mitigation requirements of the California Department of Fish and Wildlife, the cost of it will be very high. The EIR/EIS needs to show where willing sellers will enable the conservation of this size of an area.

Protect at least 42,275 acres of cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value habitat in CZs 2, 3, 4, 5, 7, 8, 9, and (Objective SH1.2, associated with CM3 and CM11). The EIR/EIS needs to explain what composes "high-value" habitat, and as stated above, it needs to demonstrate that 42,275 acres are available to be protected. The EIR/EIS needs to clarify whether protecting cultivated lands means locking in the production of certain crops even when market conditions or water availability might change. This measure seems unrealistic.

Of the at least 42,275 acres of cultivated lands protected as Swainson's hawk foraging habitat under Objective SH1.2, up to 1,500 acres can occur in CZs 5 and 6, and must have land surface elevations greater than –1 foot NAVD88 (Objective SH1.3, associated with CM3). The EIR/EIS should explain the justification of this measure and why it will adequately conserve Swainson's hawk.

Protect at least 10,750 acres of grassland, vernal pool, and alkali seasonal wetland as Swainson's hawk foraging habitat (Objective SH1.4, associated with CM3). The EIR/EIS should identify where these acres will be protected, and it should demonstrate why protecting these acres will conserve Swainson's hawks any more effectively than had these acres not been protected.

Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3). Unless something has changed recently, Swainson's hawks have not lived within the Grizzly Island Marsh Complex. There is only one CNDDB record of Swainson's hawk occurring in this Marsh. This measure appears to be empty and will do very little if anything to conserve Swainson's hawk.

Maintain and protect the small patches of important wildlife habitats associated with cultivated lands within the reserve system including isolated valley oak trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3." The EIR/EIS needs to identify where these patches of habitat occur and it needs to explain how protecting these patches will translate into nesting pairs of Swainson's hawks that will benefit.

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