SPI HCP pages 88-92 regarding Battle Creek omit references regarding adverse impacts

References Omitted

1. Battle Creek Watershed Conservancy. 2019. Battle Creek Watershed Based Plan. Prepared With Funding From The California State Water Board's Timber Regulation and Forest Restoration Program Grant Agreement No. D1513502. 63 pages.

2. Bottaro, R.J. and L.A. Earley. 2019. Monitoring adult Chinook Salmon, Rainbow Trout, and Steelhead in Battle Creek, California, from March through November 2017. USFWS Report. U.S. Fish and Wildlife Service, Red Bluff Fish and Wildlife Office, Red Bluff, California. 72 pages.

3. California Trout. 2017. State of the Salmonids II: Fish in Hot Water. The foundation of State of the Salmonids II: Fish in Hot Water is based on 32 rigorously researched, peerreviewed biological and ecological species accounts prepared by Dr. Peter B. Moyle, Patrick J. Samuel, and Dr. Robert A. Lusardi. Each account has been externally reviewed and will be published as Salmon, Steelhead, and Trout in California: Status of Emblematic Fishes, Second Edition, which can be viewed and downloaded from California Trout's website, www.caltrout.org, and the University of California, Davis Center for Watershed Sciences website, www.watershed.ucdavis.edu.

4. CSPA. 2011. "Assessment of Battle Creek Monitoring Data".

5. Green, Peter. 2018. Review of SPI Bioassessment of Digger Creek.

6. Henkle, Jameson E., Professor Gregory B. Pasternack, Dr. Andrew B. Gray. 2016. Final Technical Report 2015 Battle Creek Watershed Hydrology And Sediment Assessment. University of California, Davis SWAMP-MR-RB5-2016-0003. 256 pages.

7. Kier Associates 2003. Use of Spatial Data for Battle Creek Watershed Conditions Assessment. 37 pages.

8. Kier Associates. 2009. Aquatic Habitat Conditions in Battle Creek and Their Relationship to Upland Management. 34 pages.

9. Lewis, Jack. 2016. An Analysis of Water Temperature and the Influences of Wildfire and Salvage Logging in the Battle Creek Watershed, northern California. 45 pages.

10. Lewis. 2016. "Technical Memorandum re Swales". Review of SPI-produced "Post-Wildfire Salvage Logging..." document.

11. Lewis. 2018. Expert Opinion letter regarding cumulative watershed impacts, written for Artemis THP 2-17-070, upper Digger Creek planning watershed.

12. Lewis, J., Rhodes, J.J. & Bradley, C. 2018 online/2019 in print. Turbidity Responses from Timber Harvesting, Wildfire, and Post-Fire Logging in the Battle Creek Watershed, Northern California. Environmental Management 63, 416–432 (2019). https://doi.org/10.1007/s00267-018-1036-3

13. Lewis et al. 2018. Figures main. "Turbidity Responses from Timber Harvesting, Wildfire, and Post-Fire Logging in the Battle Creek Watershed, Northern California".

14. Lewis et al. 2018. Figures supplemental. "Turbidity Responses from Timber Harvesting, Wildfire, and Post-Fire Logging in the Battle Creek Watershed, Northern California".

15. Myers. 2012. "Myers Final Battle Creek watershed analysis 070312".

16. Myers. 2012. Technical Memorandum 8/4/2012. This was prepared for a different THP, but the reference to the problems in the CalFire Task Force report is general and on page 5.

17. Myers. 2013. "Myers Temp Turbidity memo 100113". Comparison of Temperature and Turbidity Trends in the Battle Creek Watershed.

18. Myers. 2013. "Tech Memo site inspection 030413". Review of SPI-produced "Post-Wildfire Salvage Logging..." (referred to as James and Krumland 2018 in HCP)

19. Pacific Watershed Associates. 2017. Ponderosa Way Road Assessment and Sediment Reduction Plan, Part 1 Tehama County, California PWA Report No. 171019201 July, 2017.

20. Reid, Leslie. 1999. Letter to Fred Keeley, Speaker pro tem, Assembly of the California Legislature. Forest Practice Rules and cumulative watershed impacts in California. 11 pages.

21. Stanley, C. E., R. J. Bottaro, and L. A. Earley. 2022. Monitoring adult Chinook Salmon, Rainbow Trout, and Steelhead in Battle Creek, California, from March through November 2020. USFWS Report. U.S. Fish and Wildlife Service, Red Bluff Fish and Wildlife Office, Red Bluff, California.

22. Trombulak and Frissell. 2000. "Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities". Conservation Biology.

23. USFWS. 2015. "Memo: Increase in fine sediment in south fork Battle Creek."

24. Lewis. 2014. "An Analysis of Turbidity in Relation to Timber Harvesting in the Battle Creek Watershed, northern California". 28 pages.

Excerpts from references:

1. Battle Creek Watershed Conservancy. 2019. Downstream impacts (below logging) are detailed in the BCWC report: "Within the first two winters post-fire, increased rates of debris flows were initiated primarily in Digger Creek and Lower South Fork Battle Creek (Terraqua 2018). However, the most severe sediment inputs to perennial stream channels are observed in the third winter post-fire (2015 water year) which brought high intensity rainfall and flooding to the Battle Creek watershed. Stream flows from this storm event peaked at 15,300 cfs at the lower Battle Creek stream gauge (USGS station #11376550, online query). South Fork Battle Creek peaked at 7,700 cfs, while North Fork Battle Creek peaked at 3,258 cfs (DWR, BAS and BNF gauges respectively). Note that the South Fork gauge captures approximate half the drainage area as the North Fork gauge (Appendix 1, Figure 1). Observations during and after the flood events in the 2015 water year indicate that fish habitat and water quality are being affected by high sediment loads. There is evidence that anadromous habitats have experienced an increase in sediment deposition and the loss of important pool habitat (USFWS 2015a), public road segments have experienced failures (CVRWQCB 2015), and the Coleman National Fish Hatchery is being affected by high suspended sediment concentrations (USFWS 2015b)."

2. Bottaro 2019:"Battle Creek adult monitoring program has seen some worrisome trends continue in the watershed in combination with the lowest spring Chinook population estimate since the program started 23 years ago. These trends have been documented over the past several years and include increased sediment inundating holding pools and covering up spawning habitat, high temperatures potentially stressing fish during holding and spawning periods... Since 2013 we have also had lower than average redd counts compared to the total adult Chinook in Battle Creek. In the past five years, these numbers have ranged from 31% to 57% of the population successfully spawning with this year only 33% of the population making it to spawn. One reason for this may be higher water temperatures during the holding and spawning periods, which have been documented reaching upwards of 70 degrees in the upper watershed....

This season we noted that most of these fines have moved out of the South Fork with holding pools returning back to normal depths and the majority of the fine sediments moving outside of the spawning areas (USFWS memorandum, unpublished). Even though this was a positive trend for the South Fork, the movement of fine sediments has now stretched throughout the entire main stem

and all the way to the mouth of Battle Creek. These fine sediments are now effecting spawning areas and holding pools in all the lower reaches (Reaches 4-6). "

3. California Trout 2017: "At the current rate, California stands to lose 45% of its remaining native salmonids, including 11 of 21 anadromous species and 3 of 10 of its inland species, in the next 50 years unless significant actions are taken to stem the decline. (Figure 3). Under present conditions, 23 of the remaining 31 species (74%) are likely to be extinct in the next 100 years."

4. CSPA 2011: "Summary • Historical aerial photo imagery that in the last 10 years 35%, 29 square miles of forested land has been clear-cut by timber harvesting operations. • The timber harvest activities of the past decade are the dominant activity in the watersheds with pollution producing potential. • The Four-Creeks post-clear-cut water quality has higher turbidity than the downstream FWS pre-clear-cut water quality data, indicating changed conditions in the upstream environment. • Canyon Creek and Rock Creek are the most impacted streams and show the greatest occurrence of high turbidity registering 81 exceedances of the Basin Plan Water Quality Standard for turbidity. • The Four Creeks monitoring program has registered at least 100 exceedances of the Basin Plan Water Quality Standard for turbidity. • Based on our review of the submitted data we feel confident that it is reasonable to conclude that the turbidity exceedances of the Basin Plan water Quality Standard are attributable to the timber harvest activities in the Battle Creek watershed(s)."

5. Green, Peter. 2018: Review of SPI's "Bioassessment and Water Quality for South and North Forks of Digger Creek: "This report does not identify, by either detailed map or coordinates, where the water quality sampling was conducted. Without this information, the report has no relevance to identifying impacts that may be present from past harvests. So, the material in the report provided fails to apply to how water quality has already been affected in the part of the creeks below logging. (The data may actually be from further upstream, which would be misleading.)"

6. Henkle et al. 2016 "Battle Creek is a mountainous forested catchment whose aquatic ecology has been affected by a history of anthropogenic activities, including land use and engineered water resource infrastructure – both of which continue today. In light of laws and policies that express the will of society, it is imperative that best practices be used to maintain the physical and chemical aspects of the watershed in a good condition to support local and regional recovery of anadromous salmonids to biological good condition (sensu California Fish and Game Code Section 5937) and obtain the ecosystems services they provide... when present in excess, sediment can impair water quality, ruin aquatic habitat, and even cause acute and/or chronic illnesses in aquatic organisms. As a result, catchments subjected to historic and on-going anthropogenic impacts should be outfitted with a nested array of water discharge and sediment flux monitoring stations to track conditions... Battle Creek has a minimal water monitoring network and, apart from this brief study and private efforts in the uplands, no operational sediment monitoring network. This precludes the ability of environmental managers to determine the status of sediment with respect to modern standards.

7. Kier Associates 2003: "The KRIS Battle Creek project drew together electronic mapping data using Arc Info and Arc View that are useful for this analysis. Remote sensing data based on Landsat, provided by the U.S. Forest Service and California Department of Forestry, allow assessment of vegetation and tree sizes and the change in vegetation from 1991 to 1999. Road data were provided by the U.S. Geologic Survey (USGS), Lassen National Forest (LNF) and Sierra Pacific Industries (SPI). Other electronic mapping data used are geology, rain-on-snow risk and steepness of slope, which Lassen National Forest has found of use in examining cumulative watershed effects (Armentrout et al., 1998; USFS, 1999). Data were also obtained from Lassen National Park. These data can be used to understand the extent of land uses, including timber harvest, which may potentially change hydrology, sediment yield and the quality of aquatic habitat (Reeves et al., 1993). "

8. Kier 2009 "**Summary** Kier Associates provided geographic data (GIS) and technical assistance to Terraqua (2004) in assessing upland conditions and potential sediment sources in the Battle Creek watershed. The information below is not part of the Battle Creek Watershed Assessment, but was produced independently as was the upland characterization (Kier Associates 2003). Both were provided to Terraqua (2004) and information in this report was also circulated to the Battle Creek Watershed Conservancy (BCWC) and the Battle Creek Working Group (BCWG) for consideration in web page format as part of the KRIS Battle Creek V 2.0. A major private timberland owner with a seat on the BCWC requested that discussion of upland conditions and linkage to aquatic habitat be omitted from the final version and there was no request for retention by the BCWG. Below each type of aquatic habitat data collected by Terraqua (2004) is analyzed and relationships with upland conditions (i.e. steepness, unstable soil types) and land management (logging, road building) explored...

Cumulative Watershed Effects and Potential for Maintaining and Restoring Battle Creek Winter run Chinook Salmon pg 25-26 Although Terraqua (2004) was limited in scope to assessing sediment sources and gathering and interpreting aquatic baseline data, the data they collected clearly show a pattern of widespread cumulative effects damage as evidenced by poor ratings for salmonid suitability throughout the Battle Creek basin. Cumulative watershed effects (CWE) related to timber harvest have been the subject of three recent California studies (Ligon et al., 1999; Dunne et al., 2001; Collison et al., 2003), which all describe the lack of effectiveness of California Forest Practice Rules (FPR) in protecting aquatic habitat and salmon and steelhead populations. The Timber Harvest Permit (THP) process set up under the California FPR's are supposed to serve in lieu for the California Environmental Quality Act (CEQA), which specifically acknowledges and defines CWE:

o “Cumulative impacts’ are defined as ‘two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. o Individual effects may be changes resulting from a single project or a number of separate projects.

o The cumulative impacts from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably

foreseeable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time."

Regional Literature on Cumulative Watershed Effects: Ligon et al. (1999) studied California CWE problems related to timber harvest and found them to be driven by the extent of disturbance and that they may be manifest in channel systems well downstream and offsite. Ligon et al (1999) said that "FPRs, particularly in their treatment of assessing cumulative effects, are not adequate to ensure achievement of properly functioning habitat conditions for salmonids" and the "primary deficiency of the FPRs is the lack of a watershed analysis approach capable of assessing cumulative effects attributable to timber harvesting and other non-forestry activities on a watershed scale."

10. Lewis. 2016, regarding SPI 2016 sediment study (James Krumland 2018) "Due to the choice of control sites, it is clear that the study cannot be used to evaluate the effects of salvage logging."

11. Lewis. 2018. Expert Opinion letter: "If protection of water quality is the objective, it should not matter whether current impairments have been caused by land use activity or a natural disturbance. Recognizing the current highly impaired condition, no project should be approved that could reasonably add to those effects. While it is difficult to quantify, there can be little doubt that more clearcutting will add to those effects... Clearly, recovery is very slow and past timber operations have left a strong imprint on this watershed. It is my considered opinion that the proposed THP will add to the existing cumulative impacts that have already done significant damage to water quality (esp. temperatures) in lower Digger Creek as well as the surrounding tributaries that flow into the lower North and South Forks of Battle Creek, affecting all points downstream."

12. Lewis et al. 2018/2019: "Battle Creek contains important cold-water habitat for threatened and endangered runs of Chinook Salmon in the Sacramento River system. About 48% of privately owned timberlands in the North Fork (NFB drainage) have been logged since clearcutting began in 1998. In the Ponderosa fire area >11,000 ha have been affected by a combination of clearcutting, roads, wildfire, post-fire logging, and herbicide. Each of these factors appears to have been important in elevating turbidity levels. Our analysis of turbidity data from 2009 to 2015 at 13 watershed locations indicates that the sites with the most harvesting and highest road densities had the highest turbidity before the fire and throughout the entire monitoring period. Turbidity remains strongly associated with harvesting after statistically accounting for road effects. Importantly, roads are an inseparable part of logging operations... Our results are consistent with previous assessments of the effects of post-fire logging on water quality (Kattelmann 1996; Beschta et al. 2004; Smith et al. 2012; Wagenbrenner et al. 2016). Despite site-specific application of BMPs, ground-based logging with high road densities was strongly associated with the magnitude of turbidity and sedimentrelated aquatic impacts, apparently forestalling the post-fire recovery of water quality. These findings suggest that adverse cumulative impacts on water quality may not be completely avoidable using current BMPs without also limiting the rate and total area affected by logging operations."

15. Myers. 2012 Watershed Analysis: "The Battle Creek watershed with its increasing area subject to timber harvest is essentially an uncontrolled experiment in watershed management. Evidence reported and reviewed herein suggests the watershed could be reaching a threshold at which either or both flow or sediment transport from the watershed could increase substantially. The evidence includes:

• The generally poor habitat conditions found in 2001/2

• The lack of improvement by 2006, as reported in Tussing and Ward (2008), not due to that year's high flows

• Increased turbidity through managed portions of the watershed

• Observed sediment in the stream

• Pathways for sediment to reach the streams

• The frequent presence of multiple channels"

16. Myers 2012 regarding 2011 Cal Fire Task Force report SPI cites often: "The Interagency Task Force [ITF] report, which the THP discusses, does not assess sediment conditions in the streams; it focuses only on conditions on harvest sites and found just one example of a low-magnitude sediment delivery. In contrast, during a brief tour from public roads in the watershed in April 2012, Myers (2012) saw several examples of sediment and turbidity moving along roadside drainages and from at least one harvest access road. This visit occurred during a minor rain event. The ITF visit occurred during September 2011, a time when many signs of erosion and sediment could have been obliterated due to four to six months of dry weather. The ITF report should be relied on only sparingly until the work can be repeated during a wetter period so that sediment movement and erosion processes can actually be observed. The ITF report also does not assess sediment conditions in the streams. **The statement that the ITF 'saw no significant direct water quality impact related to clearcut harvesting in the assessment area' is meaningless because the ITF did not assess stream conditions."**(Emphasis added.)

18. Myers 2013 review of SPI's post fire sediment study, referred to in HCP as James Krumland 2018: "In conclusion, the inspection report and the study it reports on proves nothing. The study design is inadequate because the control sites are too steep, not comparable to the sites that received a logging treatment."

19. Pacific Watershed Associates. 2017 "But whereas salmonid populations have evolved and flourished with the natural processes of rainfall and erosion in the area, the impact of the wildfire and

anthropogenically induced erosion (e.g., from logging and road construction) has resulted in high rates of runoff, soil loss, erosion, numerous debris flows, and accelerated sediment delivery to streams and a major degradation of salmon and steelhead trout habitat (see Post Ponderosa Fire Sediment Impacts to Coleman NFH, staff memo from U.S. Fish and Wildlife Service, dated 24 June 2015)...

The 2012 Ponderosa Fire, past construction practices, salvage logging, fuel break construction, ineffective or poor road drainage, and deferred or locally ineffective maintenance activities have all contributed to the altered hillslope drainage patterns, increased runoff, debris flows and accelerated hillslope and road erosion. It has also likely resulted in correlative off-site impacts including downstream channel instability, bank erosion, water quality impacts, and degraded aquatic habitat."

20. Reid, Leslie. 1999. "1. There is nothing mysterious about cumulative impacts. Most environmental impacts are influenced by multiple land-use activities, so most impacts are cumulative impacts. Projects must be evaluated to understand how they will influence existing or potential future impacts, and this is the essence of a cumulative impact assessment. Examination of recently approved THPs and SYPs indicates that plans are being approved that do not contain technically valid cumulative impact assessments.

2. As currently implemented, California Forest Practice rules have not prevented the cumulative watershed impacts that led to the recent listing of multiple northern California streams as impaired by sediment under section 303(d) of the Clean Water Act.

3. Recent studies demonstrate that current Forest Practice rules are not adequate to prevent forestryrelated changes to the production and transport of sediment, water, and woody debris in watersheds. Changes in these “watershed products” are the most common causes for downstream cumulative impacts."

21. Stanley et al 2022 on monitoring: "Severe drought conditions in our study area from 2012–2016 have had significant lasting effects on fish populations in Battle Creek. Water temperatures during the incubation period of these years were higher than optimal ranges leading to an anticipated lower than average return of spring Chinook in following years, which based upon our monitoring appears to be true (Stanley et al. 2020). In recent years including 2020, lower than average spring Chinook adult fish (Table 3; Figure 16) and redd (Table 4) observations have been recorded. The number of redds attributed to spring Chinook (n = 11) is nearly one-third the total observed in 2019 (n = 30) and well below the average number of redds observed annually since 1995 ($\bar{x}$= 84). Water temperatures in North Fork (Figure 10) and South Fork (Figure 11) during 2020 exceeded the multi-annual average for nearly the entirety of the spring Chinook holding and spawning periods. While there were no days on the North Fork where water temperatures were classified as poor during either holding (Table 13) or spawning (Table 14), there are multiple days of poor suitability in both the South Fork and main stem Battle Creek, which may have led to pre-spawn mortality."

24. Lewis 2014. Hydrologist Jack Lewis addressed the deficiencies of the Cal Fire 2011 Task Force report. "The Interagency Task Force (ITF) report (CALFIRE et al., 2011) on Battle Creek has been cited in recent THPs to suggest that there are no

significant direct water quality impacts in Battle Creek related to clearcut harvesting. Such interpretations are inappropriate as a lack of evidence of impacts using the ITF rapid assessment methodology does not constitute evidence of no impacts."