UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NOAA FISHERIES SERVICE
WEST COAST REGION
650 Capitol Mall, Suite 5-100
Sacramento, California 95814-4706

January 15, 2016

In response, refer to:
WF/WCR/FERC P-12496-002

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D.C. 20426

Re: NOAA Fisheries Service's Comments on Final Reports for the Lassen Lodge Hydroelectric Project, Federal Energy Regulatory Commission Project No. 12496-002, South Fork Battle Creek, California.

Dear Secretary Bose:

NOAA Fisheries Service (NMFS) provides comments on the following Final reports in Enclosures A-C: (A) "*Final Fish Habitat at 31 cfs Report*" (FHR); (B) "*Final Sediment Transport Report*" (SMR); and (C) "Final *Water Temperature Model Report*" (TMR). These three reports were provided by Rugraw, LLC (Applicant) for the Lassen Lodge Hydroelectric Project, Federal Energy Regulatory Commission (FERC) Project No. 12496-002 (Project).

Thank you for the opportunity to provide comments. If you have questions regarding these documents, please contact William E. Foster (916-930-3617) of my staff.

Sincerely,

Steve Edmondson
FERC Branch Supervisor
NMFS, West Coast Region

Enclosures

cc: FERC Service List for P-12496.

Enclosure A

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Lassen Lodge, LLC	**)**	**Project No. P-12496-002**
Lassen Lodge Hydroelectric Project	**)**	
South Fork Battle Creek	**)**	

NOAA FISHERIES SERVICE'S COMMENTS ON
FINAL FISH HABITAT REPORT

Final Fish Habitat Report (FHR), Page 5:

> *"There is no capacity for winter-run Chinook, because temperatures during the May and June spawning season are lethal to incubating eggs."*

NMFS: This conclusion is not credibly supported by the record and therefore should not be followed. Consequently, Sacramento River (SR) winter-run Chinook salmon should not be excluded. The Applicant's statement appears to have been based on estimates using relatively dry water year data. There would be different and higher flows in May-June, during wetter years, which may result in more suitable temperatures. The highest flows in wettest years may extend out to June. However, this is difficult to model as the existing temperature model and synthetic flow record were developed with relatively lower synthetic flows and with limited water year data. The existing model and flow record are inadequate to extrapolate higher/wetter flows and corresponding water temperatures because of the lack of wet year data.

FHR, Page 11:

> *"The 2-year return flow for the 7-day low is only 4.4 cfs (NHC 2014) (Table 1), and the majority of the project reach went completely dry in the summers of both 2014 and 2015."*

NMFS: The Applicant should also provide the high flow values for wetter years. The temperature model and synthetic flow record rely on inadequate water year data. In normal to wet years, conditions would likely improve significantly. However, this is not presented or included in the modeling because this report appears focused on highlighting the "lowest/dryest" information (as if that occurs all the time).

<u>FHR, Page 14</u>:

> *"In comparison to the measured and synthetic historic record of flow from 1929 through 2014, the 5 to 45 cfs range that was monitored covered conditions corresponding to the 7-day low flow of 4.4 cfs that recurs on average every 2 years, and to the median flow of about 45 cfs at start of summer (early July)."*

NMFS: This Report refers to the "low/dryest" and the "median flow in July," but does not include higher flows that would occur in wetter years. This is especially important in winter for California Central Valley (CCV) steelhead. We noted previously our concerns on how the synthetic flow record and water temperature data were calculated. Finally, the additional flows that this report evaluates, 5-45 cubic-feet-per-second (cfs), are only just within the FERC-mandated three to six higher flow ranges needed to accurately model flows beyond 200 cfs to 1,700-2,000 cfs.

<u>FHR, Page 14</u>:

> *"Together, these data provided a depth and width of each channel unit that corresponded with the flow each day from March 20 through the end of June."*

NMFS: The report authors note that there was flow data only at the very top and at the very bottom of the bypassed reach. These data were then applied as if these conditions consistently occurred at each of the other transects. They also only modeled from May to June, which represents a period when flows are descending into the dryer/low flow period. Accurately assessing impacts will require modeling of higher flows in the winter/early-spring for CCV steelhead.

<u>FHR, Page 21</u>:

> *"The project team also measured depths and velocities at spawnable gravel patches within the units surveyed in both years."*

and

> *"Measurement protocols were the same as the first survey, except that gravel patches were measured higher than two feet above the water surface."*

NMFS: The above suggests that the report focused mainly on spawning patches of wetted gravel and limiting the dry to only two feet out from the water's edge. However, it is not clear if this meant two feet vertically or just two feet from the water's edge. Also, we had commented before that the Applicant's concept for gravel patch area includes defensible space and that defensible space can include other habitat and substrate types (i.e., not just a patch of all gravel). Rather than incorporating our comments, this final report excludes defensible area around redds and only includes the smaller redd area within a gravel patch area. The Applicant also may not have noted the availability of additional cover or holding habitats associated with redds.

<u>FHR, Page 23</u>:

> *"The exceedance durations, based on the 1929 to 2014 measured and synthetic flow record, are 6 days per year at 250 cfs, and 2 days per year at 300 cfs. Again, the flow data suggest opportunities for upstream passage would be far from sufficient to sustain a population over time, and are likely to prohibit passage completely or only during rare circumstances."*

NMFS: We disagree regarding fish passage into the Project's bypassed reach. This segment of the reach, up to Angel Falls, is designated as critical habitat for CCV steelhead. We are interested in the winter and higher flows, especially for CCV steelhead (flows can get up to 1,700-2,000 cfs). CCV steelhead and other salmonids should not be excluded from this reach because of the Project's diversions creating lower flows and adverse water temperatures in the bypassed reach. We expect that salmonids would make it into the reach, especially in the wettest years. Further, salmonids would inhabit available holding and rearing habitats where such habitat is found based on the water year conditions. Fish will move downstream and out of the reach in order to locate suitable habitats. Alternately, if flows are higher and production exceeds local rearing habitats, juveniles will locate additional habitats downstream. Accordingly, assessing the habitat value of a reach should be based upon whether it could support one or more anadromous life-stages and thus contribute to a larger population in a larger geographic area. For example, if any river system was divided into short enough segments there would likely be insufficient habitat to support an entire population, however, each individual segment is an important component of the larger reach and collectively contributes to maintaining proper ecological function supporting a population.

FHR, Page 24:

> *"Figure 11. Composite annual flow regime of the South Fork Battle Creek entering the project reach, as determined from the measured and synthetic flow record for 1929 through 2014 compiled by NHC (2014). Solid line is the daily median value, and the shaded area extends to the 25th and 75th percentiles for daily flows in the 85 year time series."*

NMFS: The synthetic flow record does not reflect higher flows. The Applicant's own reports have suggested that flows can reach the 1,000-2,000 cfs range. However, the synthetic flow record fails to capture or portray the highest and wettest flow levels.

The Applicant should develop flow exceedance tables by water year type based on the synthetic flow record. The flow tables should include the 95th and 5th flow exceedance levels. The applicant should also clearly demonstrate the periods over which they would be diverting based on their proposed diversion amounts and minimum instream flows.

FHR, Pages 28-29:

> *"The differences in magnitude of depth change between the monitored channel units over the course of April and May were modest, ranging from 0.7 to 1.3 feet for a flow range of 8.9 to 26.8 cfs (Table 7)."*
>
> [Table 7 caption]: *"Change in average depth (feet) of riffles, or maximum depth of pools, between April 1 (26.8 cfs) and June 1 (9.2 cfs) at the cross sections with pressure transducers. Note the magnitude and range of changes in depth."*

and

> *"The range of depth change was also similar at the two gauges, as seen in Figure 14."*
>
> [Figure 14 caption]: *"Depth change recorded by pressure transducers at five channel units in the Project reach during late March through June of 2015."*

NMFS: Some consistency is needed in the dates and flows over the table and figure. Data is from late March to July 1. Data should be organized by date and the corresponding flow. The flow values presented are also very low and only account for the period of descending flows during a critically dry year. Conditions could be radically different in very wet years during the peak flow periods that correspond to CCV steelhead's spawning periods. The point of the analysis should focus on the range of flows that the Project might impact, which is approximately 13 to 125 cfs. The report only presents data at 13 and 32 cfs. Assessing the Project's impacts will require analysis at 125 and 150 cfs or in winter months, not just the possible minimum flows.

FHR, Page 44:

> *"...that spawners were assumed to use only the area required for an average sized redd. We had previously assumed the fish would require the area they typically defended, which studies have shown is four times the size of the average red. However, all fish do not spawn at the same time, so the area defended would not limit spawning area for fish not competing for space at the same. Secondly, we added the criteria that gravel patches must have at least the minimum velocity (0.3 m/s) to be suitable for spawning, and this was not met for most submerged gravel patches at either 13 or 31 cfs."*

NMFS: The report incorrectly assumes that all the defensible space must consist of gravel in order for the gravel patch to be suitable for spawning, rather than allowing for other types of habitat within the defensible space area. Most CCV steelhead spawning times are at significantly higher flows in winter, which means that most patches (if not all) would at least have detectable flow velocity. NMFS requests that the Applicant include evaluations as to whether the gravel patches would be predicted to have suitable velocities at 50, 100, 125, and 150 cfs.

FHR, Uncertainty in Measurements and Predictions, Pages 50-53:
(*Predicted vs. Observed Channel Unit Dimensions*) and
(*Effect of Measuring Multiple Transects per Unit on Estimation of Rearing Capacity*).

The Applicant compared channel unit measurement data and corresponding channel unit rearing capacity data between the two surveys: The 13 cfs survey used one transect per unit verses the 31 cfs survey that used three transects per unit; thus they found better estimates and statistical fit with the 3-transect-per-unit data (noted below):

> *"These biases indicate the method employed by Cramer and Ceder (2013) was not able to reliably predict changes in width and depth in response to flow." [Page 50].*
> *"These results indicate that the prediction method used by Cramer and Ceder (2013), although it predicted general trends, yielded predictions with poor precision." [Page 51].*
> *"... single transect measurements compared to the mean of three measurements, suggesting three measurements may better represent channel dimensions." [Page 52].*
> *"... rearing capacity estimates were more precise with three transects sampled in a portion of channel units than with one transect sampled in all channel units." [Page 53].*

NMFS: The Applicant focuses too much on the limited rearing habitat in this small reach. The Applicant's proposed minimum bypass flow is based only on a low flow that theoretically produces more fish than the local rearing habitat may support. However, we do not agree that such a minimum flow should be set based only on local rearing habitat limitations. CCV steelhead will use seasonal habitats of intermittent streams for spawning and rearing (Maslin and McKinney 1994 – as cited CDFG Fish Bulletin 179: Volume One). We expect some amount of production because fish would move downstream as needed to find additional rearing habitat. Further, the "sediment movement – making it unstable for redds" concept is misplaced. Gravel normally moves through a steeper system often used by CCV steelhead and there are different degrees of filling/scouring that occurs seasonally. We note that resident *O. mykiss* were detected during the early survey, so there is some potential for production. However, salmonids would move out of the area as it became progressively warmer and dryer. Conditions during wetter years would be different and more conducive to CCV steelhead over-summering.

FHR, Conclusions (Sentence 1 of 4), Page 54:

[1] *"Our data indicate that the key limiting factors to production of salmonids in the project reach are the low flows in the fall, and frequent mobility of gravels that might be used for spawning."*

NMFS: NMFS does not believe that the Applicant's visual observations between 2013 and 2015 (surveys conducted using different criteria, and using a methodology prone to estimation error) is a reasonable basis for determining that the reach is prone to excessive scour – or more so than what is typical of a steeper, confined reach such as this. Furthermore, the observations appear to point out that there is a properly functional continuum of sediment supply and transport in the reach. Salmonids have evolved to cope with gravel mobility. What is more important to know (what the report does not discuss), is what are the high spawning and winter/early-spring flows that would be utilized by CCV steelhead. NMFS suggests that flows may be much higher than the synthetic flow record portrays and CCV steelhead do not need such high flows every year. The reach contains designated critical habitat that should not be adversely modified or destroyed by Project operations.

FHR, Conclusions (Sentence 2 of 4), Page 54:

[2] *"Though flows are favorable in the spring and early summer, conditions under low flows in the fall are the bottleneck that determines the number of rearing fish that can be supported, and the number of salmon that can find suitable spawning opportunities."*

NMFS: The winter flows that CCV steelhead use for spawning are not included in the report and the very high flows, up to 2,000 cfs, are not mentioned, nor do they appear in the synthetic flow record. Most of the synthetic flow data is based on dryer conditions and not on very wet years. Habitat value and function is based on available flows. Flows in the bypassed reach should not be based on the rearing capacity within this small reach. Salmonids will move downstream to find additional rearing habitat (as they currently do).

FHR, Conclusions (Sentence 3 of 4), Page 54:

[3] *"Further, multiple obstacles to upstream passage are likely to exclude* anadromous fish *from the reach."*

NMFS: This conclusion is not credibly supported by the record and NMFS disagrees. An assessment of passage at higher winter flows for CCV steelhead, where they often are able to swim up the channel margins around the prominent low flow drops in the center of the channel, has not been completed.

FHR, Conclusions (Sentence 4 of 4), Page 54:

[4] *"Thus, resident rainbow trout are species of fish likely to be present, and spawning flows of less than 10 cfs will support production of more parr than the limited rearing capacity can sustain."*

NMFS: It is important that habitat quality and access for salmonids not be prevented or adversely affected by the Project operations. CCV steelhead would be most likely to access the reach, followed by CV spring-run and SR winter-run Chinook salmon. While Chinook may only have access to habitat during wet years, it is important that Project operations not further reduce the number of years when this habitat is available. Flows in the bypassed reach should not be limited to a level that theoretically produces more fish than the local rearing habitat can support because fry would travel downstream to find additional habitat. Limiting flows to such an extent could alter critical habitat, create unsuitable water temperatures, and limit habitat availability and function. It is NMFS' goal to protect natural production and not have Project operations alter critical habitat via unsuitable flows or water temperatures.

Enclosure B

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Lassen Lodge, LLC	**)**	**Project No. P-12496-002**
Lassen Lodge Hydroelectric Project	**)**	
South Fork Battle Creek	**)**	

NOAA FISHERIES SERVICE'S COMMENTS ON
INTERIM SEDIMENT MODEL REPORT

Interim Sediment Model Report (SMR), "Key Finding #1, Page 8:

> *"In general, sediment transport capacity increases significantly in the reach downstream from Angel Falls because the channel steepens, narrows and coarsens. So, sediment that is temporarily interrupted by diverting flow during project operations is likely to be remobilized during non-operation high flow periods and during periods when sediment sluicing and sediment bypass are occurring as part of the overall project operation plan. These effects are discussed in Sections 2, 3 and 4 in the report."*

NMFS: Rugraw's (Applicant) "Key Findings" are helpful throughout report. But, this opening suggests that while the Project may have "temporary" impacts, natural processes would mitigate. However, the purpose of the modeling is to understand the specific effects of the Project's "temporary" impacts on salmonid resources.

SMR, Section 2.4, Page 16:

> *"The model was calibrated to observed high water marks determined from a photograph taken during the 1997 flood (Photo 10). The flow on the date when the photograph was taken was estimated using the velocity-area method to be about 1,700 cfs."*

NMFS: It appears that the Applicant used their original bankfull data from when they did the 13 cfs survey. It is not clear if they used newer data from when they did the 34 cfs survey. Thus, the model may not model well up to 1,700-2,000 cfs.

SMR, Sections 2.4-2.6, Page 16/17:

> (Pg 16) - "*Shvidchenko et al (2001) developed a method for predicting threshold conditions for movement of individual size fractions in coarse grained sediment mixtures. This method*

> *accounts for intergranular effects by incorporating a so-called "hiding function" which adjusts the mobility of individual size fractions depending on their relative grain size and standard deviation of the sediment mixture. A detailed description of the method is provided in Appendix A."*

> (Pg 17) - *"Coarse bed material transport in the diversion reach of SF Battle Creek was calculated using the modified Parker equation derived specifically for application in streams with gravels and cobbles. The equation was originally formulated by Parker (1990) and modified for application to sediment mixtures of arbitrary composition using the threshold method of Shvidchenko et al (2001). A detailed description of the modified equation is provided in Appendix A."*

SMR, Section 2.6, Page 18:

> *"The estimated existing conditions annual bed load yield (gravel, cobbles, and boulders) in the diversion reach of SF Battle Creek was calculated using mean daily flow duration curves for a dry year (Water Year, or WY, 1964), normal year (WY 1961), wet year (WY 1965), and synthetic long-term flow record (WYs 1929-2014). Results are shown in Table 4."*

NMFS: It is unclear and potentially problematic why the Applicant chose these water years for the sediment model. These differ from those water years used in the water temperature model. Perhaps they should have either: (a) used the same water years as was used in the water temperature model; or (b) used the water years specified in FERC's Order. The Applicant should describe the ramifications of using a consistent set of water years in both modeling reports as well as in the Final Fish Habitat Report.

SMR, Section 2.7, Page 18:

> *"Results of the calculations are presented numerically in Table 5 and graphically in Figure 21. For a typical dry year, calculated annual deposition ranges from about 810 tons/year for Qop=200 cfs to 850 tons/year for Qop=350 cfs. For a typical wet year, calculated annual deposition behind the diversion structure ranges from about 2,150 tons/year for Qop=200 cfs to 2,630 tons/year for Qop=350 cfs."*

NMFS: The Applicant only calculated sediment deposition over 200-350 cfs. The Applicant should also analyze the 5-2,000 cfs range that the Applicant noted in previous pages:

> *"...the flow on the date when the photograph was taken was estimated using the velocity-area method to be about 1,700 cfs."* (page 16)
>
> and
>
> *"...then, reach-average sediment loads were estimated for a range of flows from 5 cfs to 2,000 cfs for each reach..."* (page 18).

NMFS: More transport/deposition occurs at flows higher than 350 cfs (and less when flow is < 200 cfs). The Project's operating range of between 5-95 cfs may affect any flows and flows affect sediment load.

SMR, Section 3, Pages 44-70 (Same Topics Above, but for Powerhouse Tailrace Reach):

NMFS: The Applicant only looked at sediment transport/deposition at two places: At the diversion and at the powerhouse. The Applicant should explain how gravel transport and deposition occurs in between these two sites affect results. This is not adequately explained. The Applicant erroneously concludes that because the powerhouse reach is "much steeper," whatever is mobilized above will be transported downstream and not change or affect the reach. The Applicant should explain how the up and down ramping of the Project's flows affect gravel transport and deposition downstream of the tailrace It is clear that sediment would move and deposit in various places in the reach between these two sites as well. However, there is no modeling of how or where sediment might deposit somewhere upstream. The Final Fish Habitat Report only describes that some patches from the 13 cfs study were gone in the 34 cfs study and other new patches appeared. However, this would be expected as old and new patches mobilize and deposit in response to flows and this is a normal function that salmonids can adapt too.

"Key Finding" for Powerhouse Reach:

> *"According to the NHC's threshold diagram developed for the local bed deposits, sand (0.062-2 mm) can be transported by flows less than about 150 cfs, very fine gravel (2-4 mm) generally begins to move at flows between 100-200 cfs, fine gravel (4-8 mm) at 300-400 cfs, medium gravel (8-16 mm) at around 500-600 cfs, coarse gravel (16-32 mm) at 900-1,000 cfs, and very coarse gravel (32-64 mm) at flows greater than 1,000 cfs. Cobbles (64-256 mm) and boulders (256-4096 mm) are not transported in significant amounts." The bed deposits found in the powerhouse tailrace reach are larger and appear to be significantly less mobile (or, in other words, require significantly higher flows for mobilization) compared to bed deposits found the diversion structure reach."*

NMFS: The steepness may limit deposition, but it could still occur depending on flow level.

> FERC's Order stated, *"We have concerns about the spatial extent of the study area. The intention when requiring this sediment transport study was to evaluate effects on: (1) sediment accumulation behind the dam; (2) loss of sediment downstream of the dam; (3) changes in sediment grain size distribution in the project reach; and (4) changes in channel geomorphology that could affect habitat for fish and invertebrates. If a large part of the project area is not modeled, you must be able to demonstrate that reaches being modeled are representative of the project area as well."*

NMFS: The Applicant has not assessed whether the temporary interruptions in sediment supply at the diversion dam would alter the sediment supply and transport dynamics of the reach over the time scale of one spawning season. For example, would it take a year or two (or longer during a drought period) for the diversion dam to fill before it spills sediment (or is sluiced out) – and would the supply of spawning gravel be negatively affected over this temporary impact? It appears that over a longer time frame, the diversion dam would not impact the sediment supply continuum since most sediment would eventually pass through the dam.

Although it is likely that sediment would move and deposit in various places in the subreaches between these two sites, there is no modeling of how that might occur or to show what amount of sediment might deposit between these two areas. It is simplistic and inaccurate to assume that whatever is transported out of the "diversion area" immediately arrives at the "powerhouse area." The Final Fish Habitat Report only notes that some patches from the 13 cfs study were gone in the 34 cfs study and other new patches appeared. This is a normal and expected process as patches mobilize and deposit in response to flows. The Applicant claims that such variability will scour out eggs from patches and affect production. However, bed load transport is a normal process that fish are adapted to. Salmonids are adapted to these natural degrees of gravel deposition and scouring and the modeling is supposed to examine how the Project affects that process at key times in the salmonid's lifecycle. However, the report only provides a snap shot at two locations and does not describe what happens in between these two locations.

Enclosure C

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Lassen Lodge, LLC	**)**	**Project No. P-12496-002**
Lassen Lodge Hydroelectric Project	**)**	
South Fork Battle Creek	**)**	

NOAA FISHERIES SERVICE'S COMMENTS ON
INTERIM WATER TEMPERATURE MODEL REPORT

Interim Water Temperature Model Report (TMR),
Section 2, Project Level Objectives, Page 2:

FERC's Order stated:

> "*Include model scenarios for critical* [CD], *dry* [DD], *below normal* [BN], *above normal* [AN], *and wet* [WT] *water years, which are based on historical data from CD 2014, DD 2007, BN 2002, AN 2004 or 2005, and WT 2006, respectively*."

What Rugraw (Applicant) used:

> *CD 2014, DD 2007, BN 2013, AN 2004,* [no AN 2005] *and WT 2006.*

NMFS: The Applicant may not have used some water years proposed by FERC. BN years are different and the Applicant chose to use AN 2004 instead of AN 2005. Please describe the ramifications of using a consistent set of water years in both modeling reports as well as in the Final Fish Habitat Report.

TMR, Section 3.3.1.1, Hydraulic Geometry, Pages 4-5:

FERC's Order stated:

> *"(a) At a subset of channel units, obtain field data for physical habitat at one flow level in addition to the existing data for 13 cfs. The second flow level should be between approximately 30 to 95 cfs.*
> *(b) At a subset of channel units, obtain field data for physical habitat at a total of three to six flow levels (i.e., 13 cfs and two to five additional flow levels). The subsample should include all channel unit types that were identified in the full sample."*

NMFS: It is not clear if the geometric data was from the original 13 cfs study (where data was from one low flow and an "approximated bankfull") or if it also includes the new data from the 34 cfs study ordered by FERC. The new geometry data should be included, as it was intended to "true-up" the original geometric data for a subset of 20 sites (using 3 transects, instead of just 1, per subreach).

TMR, Section 3.3.1.3, Page 5 and Section 3.4, Calibration, Page 13:

> *"The selection of model calibration years depended on the available temperature data. The three years 2007, 2013 and 2014 were selected as the calibration years because data were the available at the top of the reach and at one or more downstream locations (Table 3)."*

NMFS: The Applicant's model calibration used three relatively "dryer" years and no "wetter" years. These are three "dryer" years (DD/BN/CD) and no AN or WT years were used. The model should be calibrated against wetter years as data becomes available, and until this time should be considered an interim product, particularly when evaluating temperatures and fish suitability in wetter periods.

TMR, Section 3.6, Model Application, Synthetic Water Temperature Record, Pages 22-26:

> *"Specifically, 2014 (Critical), 2007 (Dry), 2013 (Below Normal), 2004 (Above Normal) and 2006 (Wet). For these years there were no available temperature data covering the entire April-October modeling period at the top of the reach, i.e., headwater boundary at the proposed intake site. To address this data shortfall, a synthetic water temperature record was developed to fill in the period or portion of the period when data were absent, depending on the hydrologic year type. This synthetic sub-daily temperature data required the following steps: (a/b/c)."*

NMFS: Some of the approximation steps done are hard to follow. The Applicant stated they had to make-up some "synthetic temperature data." Please explain if the three steps used here are valid and how this influences the model's output. The Applicant should explain the ramifications of using a consistent set of water years in both modeling reports as well as in the Final Fish Habitat Report.

TMR, Section 4, Summary and Model Application Approach, Pages 35-36:

Page 35:

> **"***Overall, the model performed well, given the limited amount of available data*."

and

> "*Ultimately, 2007 data were used to assess a range of operations, wherein bypass flows of 5, 8, 13, and 25 cfs were assessed*."

NMFS: The Applicant concludes that the model performed well given limited data. However, the Applicant should describe how all the "averaging" and "simulated/synthetic flow" and "limited temperature data" affect how the model portrays reality. Furthermore, the model was calibrated using three relatively dryer water years 2007 (BN), 2013 (DD), 2014 (CD). The model should be calibrated using 2004 (AN), 2006 (W) years as well. Finally, NMFS requests that additional scenarios be run using much higher bypass flows that would occur in the winter to early spring so that the effects from Project operations on CCV steelhead habitat can be estimated.

Page 36:

> "*Results of the various bypass flows were compared to the baseline using daily average temperature*."

and

> "*The powerhouse/tailrace return site for the 5 cfs baseflow showed the largest impact, up to 1.5ºC increase, while the highest daily average temperatures during the period were approximately 18ºC*."

and

> "*Assuming the average annual air temperature represents the temperature of the earth (average annual air temperature was 14 ºC at Lassen Lodge for 2007), water temperatures less than 14 ºC increased through the conveyance system, while water temperatures greater than 14 ºC decreased through the conveyance system*."

Water temperatures should be stated using the Environmental Protection Agency's (EPA) (2003) recommended temperature thresholds to protect salmonids. The EPA (2003) criteria use a 7-day average daily maximum (7DADM) instead of the daily average. In addition, the EPA's (2003) criteria include the following water temperatures: 13ºC for salmonid spawning and egg incubation; 16ºC for salmonid rearing; and 18ºC for salmonid migration. These specific criteria are applicable in this proceeding because the Project it is located in the upper reaches of the South Fork Battel Creek watershed.

While the 5 cfs bypass flow would heat the most, all four test flows are relatively close together and there are no runs using significantly higher flows (such as 75, 150, and 500 cfs) that would occur in winter to spring. The model runs were also done over a 3-month period (May to July) that is relatively warmer and dryer (using dry and critically dry water year data). Model runs using above normal to wet water year data over fall, winter, and spring periods are also needed to assess how the Project operations affect CCV steelhead and CV Chinook over the whole year.

Finally, regarding the pipeline/tunnel model, the Applicant states, *"…(average annual air temperature was 14ºC at Lassen Lodge for 2007)…*" and used that temperature to represent the ambient ground temperature. "Average annual" is a very general term. Over the course of a year (and in different water years) the ambient air and ground temperature would change seasonally. So, it would be better to have more accurate ambient "air/ground" temperatures so that the results are more reflective of a particular season. Lastly, it is logical to assume that water in a pipeline travels faster and is subject to less heating than compared to water in a bypassed stream channel. Therefore, it is not clear why water in this pipeline/tunnel model would cool, when, in most pipelines, it is logical to assume that the water in a pipeline tends to warm. These latter two points highlight why utilizing "synthetic data" could be inducing bias into modeling results. The use of accurate seasonal meteorology (air and ground temperatures), tied to different water years, should be used in both the water and tunnel temperature models.

Enclosure D

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Lassen Lodge, LLC	**)**	**Project No. P-12496-002**
Lassen Lodge Hydroelectric Project	**)**	
South Fork Battle Creek	**)**	

CERTIFICATE OF SERVICE

I hereby certify that I have this day served, by first class mail or electronic mail, a letter to Secretary Bose, Federal Energy Regulatory Commission containing the NOAA Fisheries Service's comments on Final reports for the above Project. This Certificate of Service is served upon each person designated on the official Service List compiled by the Commission in the above-captioned proceeding.

Dated this 15th day of January 2016

William E. Foster
National Marine Fisheries Service

Document Content(s)