Upper Main Eel Temperature and Sediment TMDLs
Comment Responsiveness Summary
December 28, 2004

Commenter 1: United States Forest Service; Mendocino N.F. - James D, Fenwood, Forest Supervisor

Comment 1-1: "National Forest System land above Van Arsdale should be de-listed for temperature. Besides the main Eel River, this includes tributary streams to the main Eel River of Bucknell, Benmore, Soda and Panther Creeks and all land above Scott Dam (Lake Pillsbury)."

Response: The process for listing and delisting in California takes place on a 2 year cycle. While the 2004 list itself has not been completed by the State of California, solicitation of the data for the list has been completed. Therefore, the USFS might consider providing the State with information for the 2006 list. EPA Region 9 encourages the USFS to consult with the North Coast Regional Water Quality Control Board staff before developing and/or submitting information regarding delisting of listed segments.

Comment 1-2: There are several locations in the draft that allude to the fact that temperature is not a concern in these areas. Page 26 "provide cooler steam temperature and is likely to continue under all management scenarios." Page 27 "stream does not heat during its flow from the Eel River above Lake Pillsbury to Van Arsdale." Pg 28 "warmest stream temperature likely for the reach between Van Arsdale and Outlet Creek."

Response: Some of the stream temperature information cited by the USFS could be relevant to the possible delisting of portions of the stream. It is important to note that the most important comparison in this TMDL is between the measured current stream temperatures compared to the (usually modeled) natural stream temperatures. This comparison reflects the wording of the water quality standard. The current stream temperatures between Lake Pillsbury and Van Arsdale (as referenced on page 26) appear to provide cooler than natural stream temperatures. However, recently available information from the summer of 2004 temperature data showed unusually warm temperatures for 2 weeks in this reach, and EPA recommends further analysis of the data and causes of the warm temperatures during future considerations of listing, delisting or TMDL revision. The references on page 27 and 28 refer to EPA's development of potential natural stream temperatures below Van Arsdale and not the actual monitored temperatures. EPA would encourage the USFS to work together with EPA before using the TMDL analysis to support a delisting request.

Comment 1-3: "For the Middle Fork Eel River TMDL, the Forest made comments on using the "natural" condition to model stream temperature (P.22). As with the Middle Fork Eel

River TMDL, the same concern exists for this TMDL as our field data shows it unlikely the ground can grow the size of trees used in the model."

Response: The tree height information used by the Upper Main Eel TMDL was compared to both the USFS information and site potential information from the California Forestry Handbook (Arvola, 1978.) The rating curve that most closely matched the Douglas Fir tree plot data provided by the USFS in the Middle Fork Eel was selected for use. The maximum tree height is 40.1 meters (131-6 feet.) These values represent approximately a site class III and IV for Douglas Fir which is consistent with the site classes found in Tomki Creek. EPA recommends that this tree height, although reasonable on average, should not be substituted for actual site specific conditions. EPA recommends that the Regional Board use information on no alterations to natural shade. This can be measured on a project by project basis.

Comment 1-4: "Plus, the main streams, such as the Eel River and Rice Fork, have a high portion of chaparral and oak vegetarian growing along the streams instead of conifers."

***Response: The modeling assumes that riparian areas currently considered consisting of chaparral and oak are naturally chaparral and oak. The natural condition of the watershed did not include growing conifers in grassland, chaparral or oak ar*eas.**

Comment 1-5: "Also, the Forest is under the Northwest Forest Plan which has aquatic conservation strategy of protecting riparian values along streams."

Response: The modeling assumes that the aquatic conservation protection strategy of protecting riparian values along streams by the USFS results in the natural condition for riparian conifers. Other conditions may also affect streamside shade, such as removal of vegetation by streamside roads, grazing or stream channel widening from sediment input. EPA understands that the Northwest Forest Plan does not provide funds to restore these types of impacts to natural shade. The USFS should discuss at what level these impacts to natural shade need to be analyzed for any delisting efforts.

Comment 1-6: USFS recommends that EPA and the NCRWQCB consider: 1) removing all or parts of the water bodies associated with USFS lands in the Upper Main Eel River watershed from the list of impaired waterbodies (for sediment); or 2) require relatively minor, if any, changes in management on USFS lands as part of the TMDL Implementation Plan. This suggestion is based on the following statement from the draft TMDL (EPA October 25, 2004):

(p.58). "On USFS land, it appears that sediment loading is largely due to natural causes…USFS lands may meet sediment local allocations if future management practices and the intensity of management are not changed from the recent past, as provided under

NWFP." The Forest Service would like to pursue discussions with EPA and NCWQCB on de-listing some of the watersheds

Response: See response to comment 1.1

Comment 1-7: USFS does not believe that more in-stream sediment data is warranted for the Upper Main Eel River watershed (EPA 2004, p. 57), especially given its relatively good condition. The cost associated with this monitoring exceeds its benefits due to extreme variability in in-stream parameters, large time lags between altered hill slope processes and channel response, and significant difficulty in establishing cause & effect relationships. USFS considers source assessment and remediation and hill slope monitoring to be a higher priority for scarce federal and state watershed protection and restoration funding.

Response: The TMDL itself does not require collection of sediment data by land managers. Instream monitoring, however, is an integral part of TMDL implementation and effectiveness evaluation. It is likely that instream monitoring will be part of any TMDL implementation plan developed by the State. The USFS should be aware that the North Coast RWQCB is in the process of developing a document on Salmonid Habitat Targets For Sediment-Related Parameters(dated: November, 2004). The actual geographic extent and frequency of monitoring should be discussed with the State.

Comment 1-8: "Aquatic insect production is listed as one of the proposed sediment indicators and targets, but EPT, taxa richness and percent dominant taxa are listed under the description of this indicator (p. 36). If EPT, taxa richness, and % dominant taxa are the desired measures, the indicator should be referred to as "macro invertebrate community composition". While USFS does not believe this monitoring is necessary for this watershed, if it is required, USFS proposes that its bioassessment method, rather than those of Caliofornia Department of Fish and Game (CDFG), should be used on its lands. Field and lab protocols used by USFS can be found at http://www.usu.edu/buglab/. These methods are generally consistent with those used by the EPA Environmental Monitoring and Assessment Program and results have been shownto consistent CDFG methods (Herbst 2003, Ode 2003). In addition, USFS suggest that multivariate approaches to bioassessment based on the presence and absence of macro invertebrate species (e.g., River Invertebrate Prediction and Classification System, RIVPACS) could be used to analyze monitoring results."

Response: EPA has revised the final TMDL to reflect the potential use of the suggested metrics. We encourage the USFS to work with the North Coast Regional Board on their Salmonid Freshwater Habitat Targets For Sediment-Related Parameters (11, 2004) and other watershed indicator projects.

USFS Editorial comments on the Chapter 4 – Sediment TMDL

(P. 34) Second paragraph, second to last sentence: "higher rate of landslides than private lands se public lands" Unclear as to what "se" should be.

Response: "se" deleted. Final document reflects edit.

(p. 43) Fourth paragraph, first sentence, USFS photo years are incorrect. Suggest replacing the first sentence with the following: "The USFS analyzed 1952, 1969, 1979, and 1998 photographs for part of the Tomki Creek, Rice Fork, Soda Creek, and Upper Main Eel CALWAA watershed units. Additionally, the USFS used 1981, 1988, and 2003 photographs in selected areas to evaluate landslide re-vegetation rates. PWA analyzed photos taken in 1952, 1965, 1981, and 1999 for the Outlet Creek and Tomki Creek CALWAA watershed units."

Response: Final document reflects change.

(p. 43) Fourth paragraph, second to last sentence: "the Northwest Forest Plan on public lands in the early 1980's – "should be early 1990's".

Response: Final document reflects change.

(p. 44) Last paragraph, second to last sentence: This sentence is unclear.

Response: The language was amended.

(p. 47) Table 9: Suggest adding (1940-2004) to the title as in Table 12.

Response: Final document reflects change.

(p. 49) Table 10: Suggest adding (1940-2004) to the title as in Table 12; suggest modifying the title to something like: Sediment Delivery Pre/Post 1970 by Domain, Management Association and Earthflow/Non-Earthflow.

Response: Date added.

(p. 50) Table 11: Suggest adding (1940-2004) to the titles as in Table 12; also suggest adding "All Sources".

Response: Date added

(p. 51) Figure 8: Suggest adding (1940-2004) to the title.

Response: Date added.

(p. 55) Second paragraph: Second sentence on road and harvest related landslides could be made more concise.

Response: Comment considered and document reworked.

Comment : References

Herbst, D. 2003. Summary of recent findings regarding a comparison of data generated by CDFG, USFS, Lahontan RWQCB, and EPA-EMAP macro invertebrate field protocols. Presentation given to the Surface Water Ambient Monitoring Program (SWAMP) Bioassessment Monitoring Committee, Lahontan Regional Water Quality Control Board Office, South Lake Tahoe, September 25.

Ode, P.R. 2003. Summary of recent findings regarding a comparison of data generated by CDFG, USFS and EPA-EMAP macro invertebrate field protocols. Presentation given to the Surface Water Ambient Monitoring Program (SWAMP) Bioassessment Monitoring Committee, Lahontan Regional Water Quality Control Board Office, South Lake Tahoe, September 25.

Response: EPA has reviewed these references and added them to the reference section of the document.

Commenter 2:
Pacific Gas and Electric Company, R. Eugene Geary, Senior Biologist

Comment 2-1: "Pacific Gas & Electric would like to thank the EPA for the opportunity to review and comment on the draft report Upper Main Eel River and Tributaries Total Maximum Daily Loads for Temperature and Sediment. Unfortunately, PG&E's review has revealed some significant concerns regarding the technical accuracy of the Q2ESHADE temperature model developed by Tetra Tech model for the upper main Eel River upon which major sections of the report is based. As discussed below, the errors identified to date with the temperature model are so significant that the model cannot be relied upon to reach any reliable conclusions regarding Total Maximum Daily Loads (TMDLS) for temperature in the upper Eel River."

Response: EPA responded to PG&E's concern with additional data review and modeling. EPA used several datasets as inputs to the Upper Eel TMDL, including information regarding stream width, depth and velocity from a fish habitat and instream flow study (IFIM study) that PG&E provided. In response to PG&E comments, EPA had discussions with PG&E staff and PG&E did not express concerns with the modeling approach. However, PG&E had significant concerns regarding the use of the data that they supplied. As a result, EPA and its consultant Tetra Tech, revisited the use of the data with PG&E's modeler and another PG&E consultant. After consultation, Tetra Tech averaged the IFIM data and repopulated the model and performed additional model calibrations. The final TMDL reflects the result of the revised modeling outputs. Tetra tech performed additional model performance analysis - of hourly and daily

calibrations -- in response to PG&E concerns. The average percent error was 0.32% for Tomki Creek and 0.013% for the Main stem (-1.44 - 0.94%) Statistics on the mean error, absolute mean error, root-mean square error and the relative error are presented in the updated Appendix A. When reviewing model performance at all three temporal scales, the statistical and graphical results show that the model follows the observed data closely and is a good predictor of stream temperature. Therefore, EPA disagrees that the model should not be relied used to support development of a TMDL.

EPA's general guideline is to rely on the best available information in setting TMDLs. EPA's review concluded that the information used was the best available. In addition, the Qual2Emodel appears sufficient for the comparative analysis needed. EPA would encourage PG&E to work with EPA on scoping the stream temperature analysis for the Middle Main Eel TMDL (which will be developed during 2005) to determine if improvements in the IFIM dataset are possible, so the system could be better characterized.

Comment 2-2: "Accordingly, PG&E strongly urges the EPA to correct the modeling errors and issue a second draft of the report for public comment. PG&E would be happy to work with EPA in this regard."

Response: The final TMDL is based upon revised model output that took into account PG&E's concerns. EPA does not believe that a second comment period is necessary because the TMDL decision and the analytical basis was unchanged from the draft. The revised modeling did result in changes in the magnitude of differences between scenarios. However, the basic conclusion of the TMDL remains the same - alterations in flow alter stream temperatures under many conditions in this stream reach. In addition, revised modeling indicated that the FERC/NMFS June 2004 flow requirements are within the range of possible natural stream temperatures. This is the same conclusion as the draft TMDL.

Specifically for dry years, the final modeling predicted even less alteration in temperature with flow or starting temperature than the draft modeling. However, the draft TMDL concluded that differences during this year type were not significant. For wet and very wet years, although the final modeling predicted a smaller difference of temperature with flow, the differences are still apparent and still within the range of natural.

Comment 2-3: "When first reviewing this document, PG&E technical staff noted the Maximum Weekly Average Temperature (MWAT) patterns predicted by the Tetra Tech model that were not consistent with basic stream physics. For example, Figure 4 (page 31) suggests that for two assumed start temperatures (22-5 C and 24.5C) and a flow of 20 cfs in both scenarios, the MWAT predictions in the model do not converge over 31 miles of channel. This outcome is not realistic; scenarios with the same low flow but different

starting temperatures should exhibit comparable temperatures within the first few miles of modeled channel. Subsequent investigation has shown that there are significant errors in the construction of stream temperature model for the upper Eel River, such that no legitimate conclusions can be based on the model results presented in the current draft TMDL report."

Response: See response to comment 2-1. In addition, the revised model now shows a convergence of stream temperatures over the stream channel at the same flow, but different starting temperatures. This is especially pronounced at low flows. EPA has concluded that the model is adequate for establishing the TMDL.

Comment 2-4: "Although the information presented in the TMDL Appendix A describing the Tetra Tech model is insufficient to permit technical review of the model, EPA and Tetra Tech staff subsequently provided PG&E with the input files used to produce the simulations presented in the draft TMDL report."

Response: EPA hopes that providing the model assisted in PG&E's review and evaluation.

Comment 2-5: "Eel River widths are grossly underestimated. The wetted stream widths calculated by the model decrease abruptly at Tomki Creek from roughly 30 meters wide upstream down to approximately 3 meters wide; thereafter, the modeled widths remained approximately 1-3 meters for the remainder of study reach. In reality, the width of the Eel River at the modeled reach ranges from 5 - 32 meters wide (based on representative instream flow study transects). Since wetted area is a key parameter in modeling stream heating and cooling, this is a fundamental error that invalidates all main stem Eel River temperature predictions in the draft TMDL report, as well as any conclusions based on those predictions."

Response: The model used the IFIM data provided by PG&E. This data describes the width, depth, velocity and flow. The model uses this information to develop mathematical equations, so the resultant values shown in the model output files will not match the data provided. In addition, the IFIM data provides more detail than the model can use. Given PG&E's concern, EPA input the data into the model a second time --- for the final TMDL --- after discussing various methods of averaging the detailed data provided. Because EPA inputted the best information available into the model and no preferable modeling approaches were suggested, EPA is setting the final TMDL based on the revised model. In summary, EPA finds that the model performs sufficiently for setting the TMDL. We believe that this approach adequately addresses the commenter's concerns.

Comment 2-6: "Hourly temperature predictions in the model are distorted. Another indication of a fundamental problem with the model is the fact that at the point in the

model where Eel River widths are grossly underestimated, the model predicts the warmest temperatures to occur at night and the coldest temperatures during the day. Proper representation of the stream widths may correct this anomaly."

Response: As discussed in previous comments data was reinterpreted and the modeling revised with PG&E's assistance. Also, additional model performance for hourly and daily calibrations is now available in Appendix A.

Comment 2-7: "Some tributary water temperatures showed predictions of 47 C. The model predicts tributary water temperatures of 47 C, which are well beyond the most extreme high water temperatures that are known to occur in this area, and may have contributed to the anomalous model results."

Response: The model was revised with PG&E's assistance. The upper end of one tributary still shows this abnormality, however, it is not present in the downstream reach. As this is a small data point and the calibrations show good model performance for all three temporal scales, EPA believes this is not a large enough problem to investigate further.

Comment 2-8: "The initial model conditions may distort the MWAT predictions for 2003. The initial model temperature for the entire river appears to be set at a constant 17 C. It will take time for the model to dissipate the initial condition and establish a true simulation for the entire river. This period should be determined, and model predictions during this initial period should be excluded from the calculations of MWAT values. This could be a particular issue for the 2003 data that were supposedly used to develop the model, since there was a heat spell in mid-July, closely corresponding to the start of the period that the model is supposed to represent."

Response: Based on PG&E's concern, Tetra Tech conducted additional sensitivity analyses regarding the initial conditions of the model. Using the revised model, initial conditions of 17C and 30C and the actual starting temperature (based on observed data) were analyzed. The sensitivity results indicate that the model reaches equilibrium within 1-4 days. More detailed results are given in final Appendix A. EPA believes the magnitude of the effect of the initial condition is not problematic to the conclusions.

Comment 2-9: "No information is provided on the year type represented in the model. The draft TMDL report should present information on the meteorology ranking of the 2003 summer period chosen for modeling. The ranking should be based on a long-term data base from a nearby airport or meteorological station. Was 2003 selected to represent a median climate condition?"

Response: Data from 2003 was used for modeling solely because it provided the most stream temperature data of all the stream temperature years available to EPA. During the summer of 2003, EPA conducted additional stream

temperature monitoring to supplement the DFG locations that have been monitored from 1996 - 2003. EPA conducted monitoring at an additional three sites between Van Arsdale and Outlet Creek. These sites, sited to be near DFG locations, provided an additional verification that stream temperature site location was not unusual and thus increased the confidence of the stream temperature site data as representative of a mixed condition. As PG&E has noted in its IFIM data, the Upper Main Eel has pool/riffle combinations and EPA was concerned that location of monitors be as representative as possible.

Although 2003 was not selected to represent a median climate condition, EPA reviewed the meteorology of 2003. The meteorology of the summer of 2003 can be represented by the US Monthly Surface Data from NOAA (NNDC store online) which shows that at the Potter Valley PH July 2003 had a monthly mean of 76.6 F (1970-2003 average of 72.9F) and an August monthly mean of 71.7F (1970-2003 monthly mean average of 71.9F). Therefore, July 2003 was one of the warmest since 1970, but August was very close to the median. We believe that this meteorology is adequate for modeling temperature changes from flow changes. EPA encourages PG&E to continually monitor all parameters in order to capture a fuller range of meteorology in future years.

EPA recommends that PG&E consider several additions to the current temperature monitoring plan to better characterize the stream system for future temperature modeling that it will be performing for, e.g., future FERC relicensing. These monitoring recommendations include the following.

1) Duplicative monitoring on important sites to assure temperature monitoring is successful. This is important given how often temperature monitors are lost or stolen in the area. Given the consistency of the stream temperatures that EPA found with DFG locations, representativeness of these monitors is not considered problematic. This is except for the site below Van Arsdale, which occasionally may stratify - illustrated by a decreased diurnal variation occasionally.

2) Additional local meteorological data. Most temperature models use wind speed, wet and dry bulb and air temperature. While the Ukiah information appeared to predict well, uncertainty would be reduced by collecting data closer to the stream site.

3) Monitoring of the stratification in Lake Pillsbury. This will assist in determining when temperature spikes and dips at the cable crossing are due to conditions in Lake Pillsbury and which are due to management of the releases.

4) Revisiting of the width, depth and velocity information from the IFIM dataset. This dataset was constructed many years ago and may need to be updated before any future modeling.

Comment 2-10: "Starting temperatures in the model do not appear to match actual temperatures. The actual 90-minute thermograph data which EPA sent to PG&E for the Eel River at Cape Horn Dam for 2003 do not appear to correspond to the hourly data used in the model to represent existing conditions at this location. The diurnal variation in the starting model temperatures appears to be significantly greater than the actual temperatures. Also, no explanation is provided as to how the starting temperatures in the assumed natural scenarios are entered into the model. PG&E suggests that actual 2003 data from above Lake Pillsbury (especially the Rice Fork Eel River) would be a good surrogate for your assumed cool starting temperature, while data from the Middle Fork Eel River drainage from the same elevation as Cape Horn Dam (especially the Lower Black Butte River) would make a good surrogate for your assumed warm starting conditions (Table 1)."

Response: The starting temperatures were assumed to be a constant 20.9C based on the average temperature during 2003. This starting temperature is assumed to hold under the increased flows during wet and very wet years. Diurnal variation is not used as the model uses a constant temperature. The starting temperatures for the natural scenarios are also input as constant stream temperatures.

EPA reviewed the natural stream temperatures suggested by PG&E. Although they were developed from a different source, EPA found the natural starting temperatures to be essentially the same as those used by EPA. Therefore, EPA has not changed the starting temperatures chosen for the natural scenarios.

Specifically, PG&E suggested that the actual 2003 data from above Lake Pillsbury be used as a surrogate for the assumed natural cool starting temperature. This is equal to a constant 22.6 C; EPA used 22.5C. PG&E's suggestion on the surrogate temperature for the warm natural is 25.5 - 26.3C; EPA's scenario for naturally warm varied by year type between 25C during dry years, 24.3C during wet years and 23.5C during very wet years. While the warm natural temperatures suggested by PG&E appear higher, PG&E only used data from 2003. The stream temperatures at Lower Black Butte range from 23.9C - 26.3C MWAT (1998 - 2003); the MWAT stream temperature for the Middle Fork above Black Butte is 23.1 - 25.5C. EPA did not run another scenario with the highest value suggested by PG&E (the highest value for the 6 years monitored for Lower Black Butte.) Given that summer 2003 had average stream flow at gauge 11473900 (Middle Fork Eel near Dos Rios), EPA determined it was inappropriate to use this starting stream temperature during the wet or very wet years scenarios. The results of dry years showed that varying starting temperatures did not result in significant differences in downstream temperatures.

Comment 2-11: "Given the limited time the EPA allowed for review of the draft TMDL report, we have not been able to complete a thorough evaluation of the draft temperature model. In addition, since the above-mentioned errors are present in the current model, we believe a detailed review of the revised model for the next draft of the TMDL will be more productive."

Response: The time allowed for public comment for the draft TMDL was 30 days consistent with EPA Region 9 public review time for EPA established TMDLs. As discussed in the response to comment 2-1 and comment 2-2 , EPA revised the modeling using a reinterpretation and averaging of the data. Because EPA had adequately addressed the commenter's concerns and concluded that the draft conclusions and final conclusions of the TMDLs are essentially the same, EPA is issuing a final TMDL.

PG&E may want to consider that after EPA sets a TMDL, the State of California can update the TMDL. Because the North Coast RWQCB is responsible for setting priorities regarding their TMDL schedule, EPA encourages PG&E to discuss any future data collection or modeling with the North Coast Regional Water Quality Control Board in support of revising the TMDL. In addition, given the limitations associated with the current data, PG&E should review its stream temperature monitoring plan.

Comment 2-12: "In order to assist the EPA in revision of the temperature model and draft TMDL report, PG&E is providing a detailed summary of stream transect information from the 1980 instream flow study conducted by PG&E and the resource agencies for the Eel River between Cape Horn Dam and Outlet Creek as Attachment A. The basic data files for these transects were provided to Tetra Tech last summer, but were apparently misinterpreted."

Response: EPA appreciates the assistance that PG&E provided during discussions regarding the re-use of the IFIM data and how to best represent the net effects of detailed cross section data. To assure that the IFIM data was completely understood, EPA re-populated and recalibrated the model with the data provided by PG&E. As discussed in comment 2-1, the revised model predicted smaller alterations in temperature with alterations in flow and starting temperatures at Van Arsdale. However, the basic conclusion of the final TMDL is still the same as the draft TMDL - alterations in flow alter stream temperature. In addition, the stream temperatures predicted under the June 2004 flow requirements are within the range of possible natural stream temperatures.

Comment 2-13: "Because of the significant errors in the draft TMDL report, EPA should issue another draft for public comment after corrections have been made. PG&E requests that the second draft include the following details [see comments 2-14 through 2-20, below] to facilitate review."

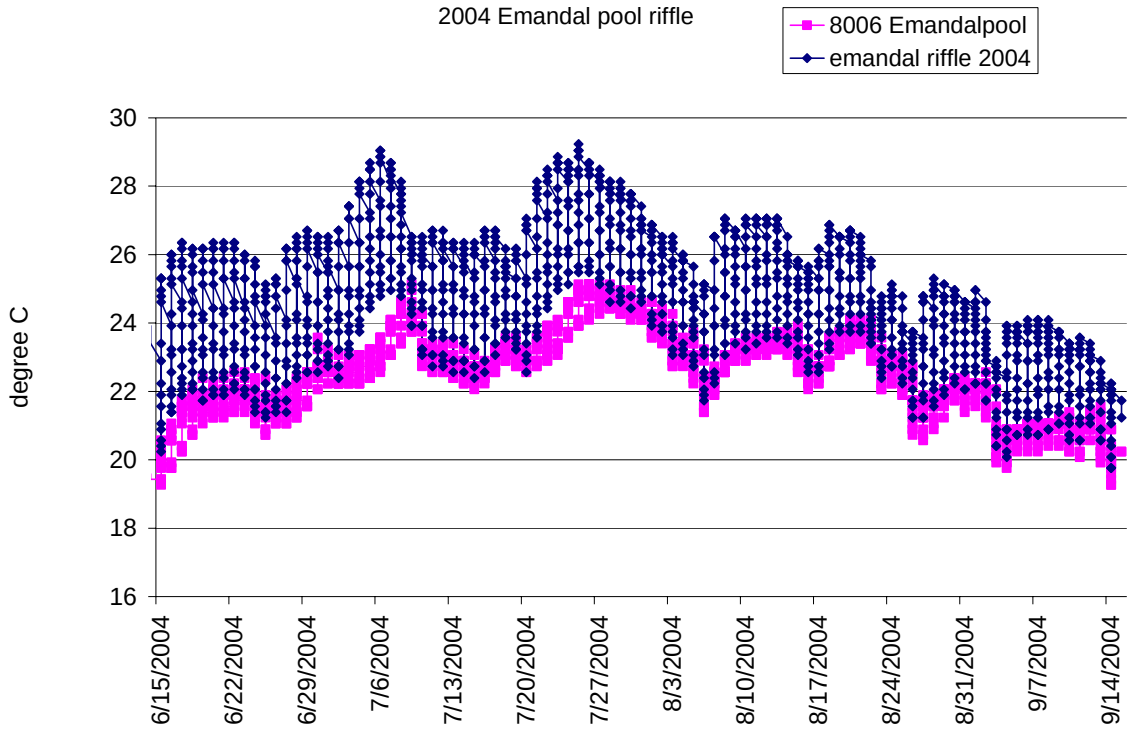
Response: See response to comment 2-2 along with responses to comments 2-14 through 2-20.

Comment 2-14: "Present and analyze the pertinent river hydraulics for the entire study reach in the context of widths, velocities, and depths. Discuss how the model conceptualizes the measured river hydraulics. The model scheme should take into account the percentage distribution of different habitat characteristics such as runs, riffles, and shallow and deep pools."

Response: Tetra Tech reviewed the river hydraulics in relation to the original PG&E data. The files resulting from the reinterpretation of the IFIM data are not included in the technical appendix as they are voluminous. However, EPA will be able to provide these files from the final runs to interested parties as Tetra Tech provided these to PG&E did during the draft comment period. The IFIM data needed to be interpreted and average because the data is in more detail than the model can use. Given PG&E's concern, EPA input the data into the model a second time --- for the final TMDL --- after discussing various methods of averaging the detailed data provided. Because EPA inputted the best information available into the model and no preferable modeling approaches were suggested, EPA is setting the final TMDL based on the revised model. In summary, EPA finds that the model performs sufficiently for setting the TMDL. We believe that this approach adequately addresses the commenter's concerns.

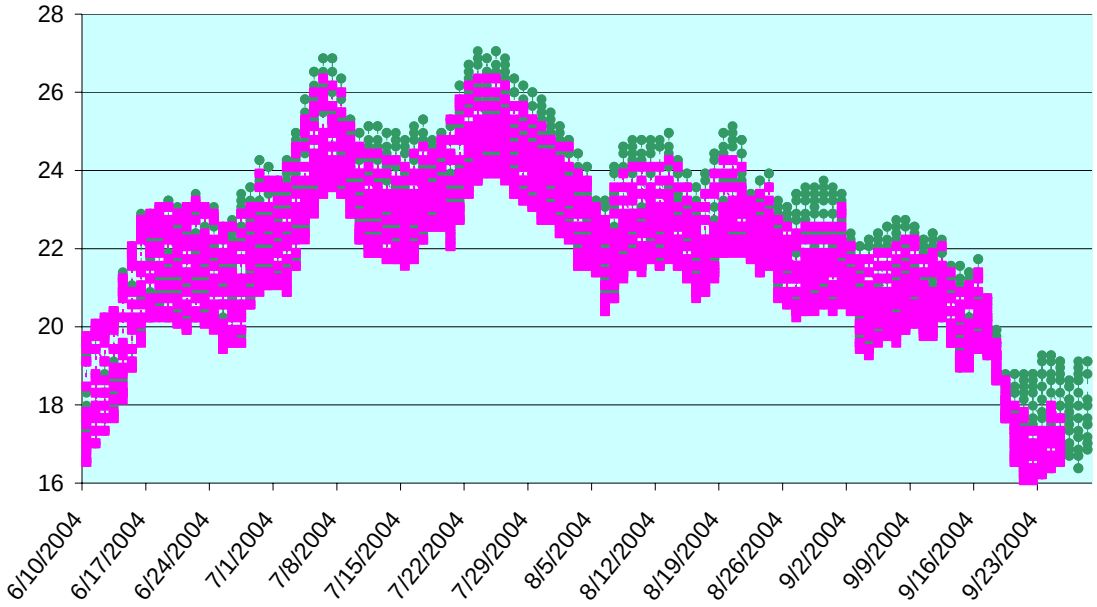
Comment 2-15: "Explain how this model handles temperature stratification in deep pools and state model assumptions and the inherited limitations. Sensitivity tests should be conducted to determine important parameters in the context of the uncertainty relative to the modeling accuracy."

Response: The stream temperature model does not account for how increases in flow influence the temperature stratification in deep pools. The 2004 temperature monitoring data by DFG provides information on 2 pool riffle combinations near Tomki Creek and one pool/riffle combination near Emandal. One pool continued to stratify and one pool did not stratify. Specifically, data from 2004 for the pool riffle combination near Emandal indicates that this pool continues stratifying even under the 15 cfs summer flow. This same pool and riffle was also monitored in previous years. Graphs 1 – 3 illustrate the temperature patterns during 2002 - 2004. This data is preliminary, specifically, the temperatures at Van Arsdale were unusually warm (>24˚C) during much of July. Thus this information should be considered preliminary as it was an unusual pattern.

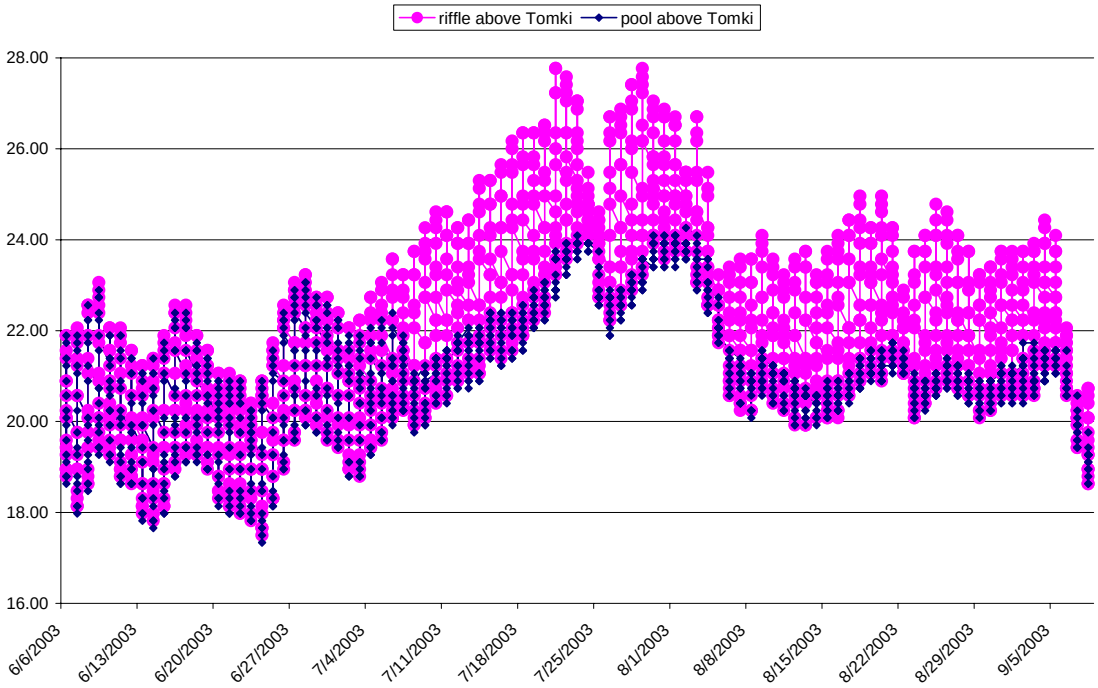


However, the 2004 data from one pool riffle complex near Tomki Creek indicate that the pool did not stratify. In the previous years the pool stratified for much of the summer. This lack of stratification could be due to the increased flow from the Potter Valley Project and is a loss in refugia for summering steelhead. During 2004 data from the other pool/riffle complex was not available due to the loss of one monitor. Results from future monitoring under increased flow conditions would assist in determining how widespread and common this loss of stratification is in the area. EPA recommends that PG&E increase the monitoring of pool riffle combinations over time. Monitoring of additional pool riffles is important given the mixed results of the 2004 data. Monitoring in this stretch of the Eel River needs to account for the yearly loss of monitors.

2004 Pool/riffle above Tomki



03-Eel pool riffle above Tomki



Comment 2-16: “Compare the calibration run with the actual data on an hourly basis and present these statistics. In addition, evaluate and present a validation data set (data from a year other than that used for calibration). Use of 2004 data (which represented both different flow and meteorology) may be most useful, but any year with different meteorology would be an improvement.”

Response: As described in comment 2-1, additional model performance information - on an hourly and daily average basis - was conducted by Tetra Tech in response to PG&E’s concerns. EPA and Tetra Tech agree that the best validation dataset would have been the 2004 data - which represent both different flow and meteorology. EPA intended to use this data when it became available. However, the 2004 stream temperature data show a unique warm water release (approximately 24C) from Lake Pillsbury from approximately July 1 - July 19. Historically, the stream temperature released from Lake Pillsbury was much cooler and less variable. Thus EPA did not use the 2004 data, as EPA does not have enough information to properly account for the temperature spike. Specifically, EPA would need information on temperature stratification in Lake Pillsbury, along with information on dam operations. In addition, the Q2Eshade model presently uses constant starting temperatures, and could not account for the widely varying temperatures during summer 2004. EPA agrees that continued stream temperature monitoring combined with different flow and meteorology will provide useful information in any future TMDLs or stream temperature modeling.

Comment 2-17: “Present longitudinal graphs of modeled daily stream temperatures for representative conditions, in addition to longitudinal MWAT graphs, so that the physics of the simulations can be more easily visualized.”

Response: Much additional model performance information is now provided in response to PG&E’s concern. This information can be found in final Appendix A.

Comment 2-18: “Present comparisons of the meteorology rankings for all years simulated, and explain the rationale for selecting those years.”

Response: See response to comment 2-6 above.

Comment 2-19: “Present the actual starting temperatures at Cape Horn Dam that were used in the model simulations and an explanation of why they were selected.”

Response: See response to comments 2-8 and 2-10.

Comment 2-20: “Present information on how much time is required for the model to equilibrate from starting conditions, and how far before the period of interest the model simulations were started to avoid this effect.”

Response: See response to comment 2-7 and 2-16

Commenter 3: Kitty Barr

Comment 3-1: "Concerning the Upper Eel River not meeting water quality standards we wish the following comments to be put on record: the Upper Main Eel River is already overly impacted from ever increasing agriculture water use, residential and commercial expansion, habitat disruption and pollution. We all are acutely aware of the decrease of various native fish species and other aquatic life. It is essential to protect this waterway and restore the fish habitat. Therefore, everything should be done to stop the sedimentation, pollution or other disruption by any means necessary. No additional water take should be allowed. We want the rivers to come back to a healthy state and stop the abuses."

Response: Thank you for your comments and concerns related to the Upper Eel River TMDL. The TMDL addresses water temperature and sedimentation in the Upper Eel River. The issue of water allocation is beyond the scope of this TMDL.

Commenter 4: Gareth Barr

Comment 4-1: "Please include my comments on record concerning the Upper Eel River TMDL. We must not allow any increased water usage of our rivers. There are too many people, too much agriculture, commercial and industrial take, too much sedimentation from surrounding human activities. Temperature changes occur due to increase human demand. It is not for aesthetics alone that this river must be protected and restored; after all our rivers, our environment is the bio-base we all (including all our brother and sister species) depend upon for SURVIVAL.

We urge the United States Environmental Protection Agency to do everything possible to protect our waterways and restore aquatic life and habitat."

Response: Thank you for your comments and concerns related to the Upper Eel River TMDL. The TMDL addresses Eel River water temperature and sedimentation. The TMDL is the basis upon which the North Coast Regional Water Quality Control Board will conduct implementation work in the Upper Eel River watershed to alleviate excess sedimentation and high water temperatures.

Commenter 5: Bryan Furman

Comment 5-1: "I request the analysis not be approved without going back, including the Soil Survey map units, even if it is only a transfer of map units to the STRS sites."

Response: Federal regulations afford EPA and States substantial discretion to select analytical methods used to develop TMDLs. The methods used here are consistent with many other TMDLs and provides information that assists in management planning. We concur that other methods of estimating sediment sources are available and that use of methods that evaluate detailed soils distribution could yield accurate estimates. However, the comment includes no analysis that supports a conclusion that the methods used in the TMDL Sediment Source Analysis (SSA) were inaccurate. Therefore, no changes in the SSA TMDLs are warranted based on the comment. The methods suggested by the commenter would likely increase the time and resources needed to develop the TMDLs.

Comment 5-2: "This analysis included no comments or references to completed modern Soils Surveys in Mendocino and Lake Counties. In my work, Geologists and Soil Scientist were crucial to planning. This plan only goes to the level of 5 geological formations, a broad paintbrush and not useful for planning or implementation and specifically evaluating cell sampling. On my first visit to a landowner I have prepared a soil map of his property and take along an auger to verify the soil mapping units."

Response: The scale of the sampling provides useful basin planning information. The current methodology has met our needs in developing TMDLs in the past, given the available funds we have available to commit to TMDL development. The EPA established TMDL will eventually be scheduled for adoption into the Regional Board Basin Plan as an amendment and at that time the public will be able to comment on measures developed by the Regional Board to implement the TMDL.

Comment 5-3: Page 44: "A the stratified random sampling (STRS) study was performed to estimate small sediment sources (USEPA, 1999b, 2002)." Page B-1 "A grid of 41.8 acre cells was then applied over the entire basin and the dominant terrain type for each cell was determined" and then applied to 5 Terrain/Geology Types. (Table B-1) Again, had the soil map units, printed on aerial photography, and on 7.5 minute USGS Quadrangle scale, are readily available in existing modern Soil Surveys it would have significantly tightened the broad stroke of identifying upland sources of erosion."

Response: Please refer to response 5.1.

Comment 5-4: "Soil Surveys are done far more accurately and precisely than 73 grid cell samples and would have added sound site specific capabilities to the 73 grid cells without increasing costs."

Response: We believe utilizing soil units instead of bedrock units would have considerably increased the costs to conduct the surveys. As stated earlier, many more STRS plots would have been required to ensure a statistically significant number of erosional features were mapped and measured in each of

the many soil units. In addition, the larger than 3000 yds^3 landslides mapped in the air photo portion of the analysis would have involved multiple soil units. Attempting to divide the volumes to soil units would have been difficult with large error bars. EPA notes that the commenter is addressing primarily the precision of the sediment source analysis; the comment does not provide any information that EPA's sediment source analysis was incorrect, or that EPA failed to identify the sources of sediment. EPA believes that expenditure of the time and financial costs for a more detailed process is not needed at this scale. The level of analysis suggested by the commenter may be most useful at the implementation phase.

Comment 5-5: "Sediment Indicators, Watershed Indicators, pages 41-42 An easy way discuss issues here is to look at the energy of the watershed, the soil map unit interpretation with the acknowledgement that roads of whatever type are part of the stream system. In the Tomki Pilot Project we discuss the energy of the system, gravity flow of rainfall as the beneficial and negative effects. The sole negative effect being human influence and subsequent road building, grazing and logging which all alter the energy flow in a watershed and the Tc (Time of Concentration) that can blow out a stream that supports salmon habitat. A watershed without human influence is basically in equilibrium and supports a lively mix of flora, fauna including Salmon and Steel head.

That equilibrium is thrown out of whack by human influence, not natural events.

The question is, with human influence, how can the rainfall energy be controlled

The first big factor is identifying the causes of accelerated flow/energy and its ability to carry sediment downslope. I believe they have been readily identified as human influence of logging, grazing, and loss of ground cover, roads and uniformed activities on mass wasting prone sites. The answers are also simple, reduce the energy in the watershed. Reduce exposure of bare soil to rainfall impact. Build roads only on stabile geologic and soil types. Culvert every ephemeral, seasonal and perennial stream in situ to prevent accelerating runoff and creating gullies as a direct feed of sediment to the stream. Again I encourage the use of a Soil Survey as a basic resource."

Response: The Watershed Indicators and Targets recommend decreasing road lengths, increasing road inspections and corrections, reducing road density, out-sloping roads, and avoiding/eliminating activities in unstable areas.

Comment 5-6: Extrapolation – Page 49 Sediment Delivery extrapolation from the 73 STRS cells for the Upper Eel without soils information is only useful for basin planning and identifying point in time conditions. With soil mapping information it would have bound the STRS to soils which then could be extrapolated more accurately.

Response: The scale of the sampling provides useful basin planning information. The EPA established TMDL will eventually be scheduled for adoption into the Regional Board Basin Plan as an amendment.