



August 26, 2010

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State Water Resources Control Board
Division of Water Quality
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RE: PUBLIC SOLICITATION OF WATER QUALITY DATA AND INFORMATION FOR 2012
CALIFORNIA INTEGRATED REPORT - SURFACE WATER QUALITY ASSESSMENT AND LIST
OF IMPAIRED WATERS [Clean Water Act Sections 305(b) and 303(d)]

Greetings: Jeffrey Shu and State Board

This cover letter accompanies our temperature data submission and will explain our views on the status of stream water temperatures in the San Lorenzo River (Santa Cruz County California) and the reasoning for our understanding that these water temperatures have become elevated over time by human caused (anthropogenic) alterations in watershed conditions. It is our assertion that the Federal Water Pollution Control Act requires that this water body be listed as "impaired" for the pollutant "temperature" and that a TMDL be subsequently prepared to address and correct this problem.

Salmonids (coho salmon, *Oncorhynchus kisutch*, and steelhead trout, *Oncorhynchus mykiss*) in this watershed are the signature species adversely impacted by high water temperature. Coho salmon are especially stressed by excessively warm water and have been extirpated from the San Lorenzo River, as well as from numerous other California coastal watersheds or reaches within by excessively warm water [1].

Streams retain solar heat and become warmer as the water flows downstream because the thermal load is cumulative [2].

[1] Summer Rearing: Summer rearing habitat is consistently in poor condition across the ESU (Central CA Coast), with a few notable exceptions. All six summer rearing habitat indications were poor in the Russian and San Lorenzo Rivers and Walker Creek, suggesting this life stage is limiting salmon productivity for those populations. Several watersheds have Poor ratings for at least four of the six indicators. High summer water temperatures limit juvenile survival in 11 of 28 populations; only four watersheds are rated as good... CCC Coho Salmon ESU Draft Recovery Plan (p).109

[2] Once water temperatures become warm along the course of any river they remain warm, except for stream reaches gaining significant groundwater inflow. Presence of dense riparian canopy can delay downstream warming trends, but when a stream is opened up and warmed, it does not cool appreciably in downstream shaded zones, but again has a delayed rate of warming. A Review and Synthesis of Effects of Alterations to the Water Temperature Regime on Freshwater Life Stages of Salmonids, with Special Reference to Chinook Salmon EPA 910-R-99-010

Coho salmon are more sensitive to high stream temperatures than are steelhead. The determination of maximum suitable stream water temperatures for salmon species is complex, and different life stages vary in their responses to thermal stress. However, temperature limits have been established above which coho salmon no longer occupy a stream. In other words, above this temperature, coho will not be present even in streams that they historically occupied successfully. Work on the Matolle River in Humboldt and Mendocino Counties has established a MWMT (Maximum Weekly Maximum Temperature and also known as the 7-day average maximum daily water temperature (7DADM)) of 18°C or a MWAT (Maximum Weekly Average Temperature) of 16.7°C as limiting to coho salmon [3].

Steelhead exist at warmer temperatures than coho salmon, especially when there is sufficient food to maintain their higher metabolic rates at warmer stream temperatures. However, eventually steelhead will succumb to disease, starvation, or thermal stress as water temperatures continue to rise. The EPA recommended summer maximum daily maximum temperature thresholds (impairment criteria) for salmon and trout in terms of the 7-day moving average of the daily maximum (7DADM) is 16°C for core rearing areas and 18°C for non-core rearing areas. These maximum temperature thresholds were provided in *The EPA Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards* (2003). The reasoning is that when water temperature is elevated above these maximum temperature thresholds, in various watershed reaches, salmonid growth becomes impaired and the habitat becomes unsuitable. According to Katharine

[3] In an attempt to define the upper thermal tolerance of coho salmon *Oncorhynchus kisutch*, we examined the relationship between the presence of this species and the summer temperature regime in 21 tributaries of the Mattole River of northwestern California. We characterized the temperature regime of each tributary by determining the highest average of maximum daily temperatures over any 7-d period (maximum weekly maximum temperature, MWMT) and the highest average of mean daily temperatures over any 7-d period (maximum weekly average temperature MWAT), by the use of hourly measurements throughout the summer. Coho salmon presence was determined by divers in late summer. Both variables that were used to describe the temperature regime provided good-fitting models of the presence or absence of coho salmon in separate logistic regressions, and both correctly determined the presence or absence in 18 of 21 streams, given the previous probability of a 50% likelihood of coho salmon presence. Temperature regimes in the warmest tributaries containing juvenile coho salmon had MWMT of 18.0°C or less or MWAT of 16.7°C or less; conversely, all of the streams where MWMT was less than 16.3°C or MWAT was less than 14.5°C contained juvenile coho salmon. These results, combined with historical and current watershed conditions that affect stream temperatures, suggest that management strategies to restore and conserve coho salmon in the Mattole River drainage should focus on the water temperature regime. Such a focus is also likely to benefit other declining species requiring cold water, including the tailed frog *Ascaphus truei* and southern torrent salamander *Rhyacotriton variegatus*.

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Corresponding author: hwelsh@fs.fed.us Distribution of Juvenile Coho Salmon in Relation to Water

Temperatures in Tributaries of the Mattole River, California

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Carter of the North Coast Regional Water Quality Control Board (2008), for steelhead trout, results from laboratory studies using variable temperatures show maximum growth occurs at average daily temperatures between 15.5-18°C, and that under feeding rates similar to natural conditions at various times of the year maximum growth rates occurred at mean temperatures of 13.3°C (spring season), 15.2°C (fall season) and 16.2°C (summer season). Non-core juvenile rearing is defined as moderate to low-density salmon and trout rearing usually occurring in the mid or lower part of the basin, as opposed to areas of high density rearing which are termed “core” rearing areas. This criterion is derived from analysis and synthesis of past laboratory and field research. The USEPA believes that the threshold 7DADM of 18°C will protect against lethal conditions, prevent migration blockage, provide optimal or near optimal juvenile salmonid growth conditions, and prevent high disease risk by minimizing the exposure time to temperatures which can lead to elevated disease rates. This guidance was the basis for the North Coastal Regional Water Quality Control Board listing certain watersheds in northern California as water temperature impaired.

According to Donald Alley, fishery biologist with 30 years of experience in monitoring salmonid populations in the San Lorenzo River drainage, the concept of lower watershed reaches being considered non-core areas is invalid for the San Lorenzo watershed. Although lower mainstem reaches may have lower densities of steelhead than upper watershed reaches, the fewer juvenile steelhead that are restricted to fastwater habitat are large and contribute a significant portion of the annual steelhead smolts. Although the San Lorenzo Lagoon is seriously degraded, healthy lagoons of Central Coast watersheds are known to produce large numbers of juvenile smolts annually, such as has been found in Soquel and Waddell creeks (Alley 2010; Bond 2006). Therefore, the entire San Lorenzo watershed should be considered core rearing area for salmonids[4].

The purpose of this letter is not to explore all of the variables concerning water temperature effects upon these salmonid species. Our purpose to submit supporting water temperature data that demonstrate temperature impairment in the San Lorenzo River Basin according to the law and the Basin Plan for the Central Coast Regional Water Quality Control Board.

[4] Carter, K. 2008. Appendix 4. Effects of Temperature, Dissolved Oxygen/Total Dissolved Gas, Ammonia, and pH on Salmonids- Implications for California's North Coast TMDLs.

Alley, D.W. 2010. Soquel Creek Lagoon Monitoring Report, 2009. Prepared by D.W. ALLEY & Associates for the City of Capitola.

Bond, M. H. 2006. The importance of estuary rearing to Central California steelhead (*Oncorhynchus mykiss*) growth and marine survival. Master's thesis. University of California, Santa Cruz.

Bond, M. H., S. A. Hayes, C. V. Hanson, and R. B. MacFarlane. 2008. Marine survival of steelhead (*Oncorhynchus mykiss*) enhanced by a seasonally closed estuary. *Canadian Journal of Fisheries and Aquatic Science* 65:2242-2252.

From the CCRWQCB Basin Plan:

Beneficial Uses

1) Cold Fresh Water Habitat (COLD)

Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.

2) Rare, Threatened, or Endangered Species (RARE)

Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened, or endangered.

3) Migration of Aquatic Organisms (MIGR)

Uses of water that support habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.

4) Spawning, Reproduction, and/or Early Development (SPWN)

Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

5) Commercial and Sport Fishing (COMM)

Uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes. NOTE: ALL NATIVE SPAWNING SALMONIDS (excluding certain Chinook from the Sacramento River or Klamath River) ON THE CENTRAL COAST ARE "NO TAKE" ESA LISTED WILDLIFE.

II.A. ANTI-DEGRADATION POLICY

Temperature

At no time or place shall the temperature be increased by more than 5°F above natural receiving water temperature.

NOTE: This standard was developed to address thermal loading from industrial discharges such as power plants, and from large impoundments and other water storage and conveyance infrastructure.

The Temperature TMDL prepared by the North Coast Regional Water Quality Control Board for the Mattole River in Mendocino and Humboldt Counties may be the document most appropriate for comparative analysis in regard to the pollutant "temperature". There are however major differences between the Mattole and the San Lorenzo River in regard to the landscape-specific reasons for a rise in water temperatures.

In the case of the Mattole, the river corridor was heavily logged in the 1950s and '60s, resulting in a dramatic widening of the river channel due to the loss of old growth trees that held together the bank structure of the river and narrowed and shaded the original channels. The San Lorenzo River and its tributaries were logged far earlier, beginning back to the 1860s. The history of impacts upon the San Lorenzo is far more complex and lengthy than in the Mattole (*see D. attached Rood map*). The San Lorenzo River experienced periods of severe damage and then periods during which impacts declined only to re-multiply again later in time. Commercial and residential development began very early along the San Lorenzo, especially in the lower river within the current city limits of Santa Cruz, and upstream in the vicinities of the town sites of Felton, Ben Lomond, Brookdale and Boulder Creek. The San Lorenzo Valley was converted early on from a dense redwood forest to small towns situated along the River with numerous residences and businesses often right on the river banks, surrounded by clear-cut hillsides. This extensive construction resulted in a transformation of many riparian areas, eliminating the occurrence of large, old-growth redwoods and Douglas fir and other large riparian shade trees and preventing the re-appearance of long stretches of cool micro-climate that provided cooler water temperatures that coho salmon need in summer. This condition extends along much of the mainstem River and major tributaries, especially in the eastern side of the valley which has low gradient streams that would have been heavily utilized by coho salmon and are still important for steelhead. For example, urbanization in Scotts Valley and surrounding areas greatly impacts Bean and Zayante creeks. All this change has permanently added to the solar thermal load in the river. The issue of cumulative impact complicates this story immensely simply when the issue of stream flow diversion is considered. Diversion rates were low in the late 19th and early 20th centuries. So that when logging was intense, high more natural stream flows may have tended to offset damage done to other habitat elements. Summer rearing habitat, which is so flow impaired today, probably benefited from these higher stream flows and less human occupation of the watershed.

Temperature as a Cumulative Impact

Increased water temperature in the San Lorenzo River results from complex interactions between several cumulative impacts. These cumulative impacts include (not in order of importance):

1) Streamside residential and commercial building sites have removed large riparian shade trees from the rivers' banks. This is an extensive impact involving many miles of the San Lorenzo mainstem and its major tributaries. Restoration of the original riparian corridor with old-growth conifers may be impossible in many locations or require many centuries in other, less occupied areas. **Nonetheless, restoration of riparian shade and microclimate will be essential to lowering stream temperatures and correcting the temperature impairment.**

With development also comes the proliferation of impermeable surfaces that prevent percolation of winter precipitation, aquifer recharge and maintenance of high summer

baseflow. Stormflow runoff from urban areas is sudden and spiky. This leads to additional streambank erosion, greater streambed sedimentation, shortened salmonid spawning opportunities and increased salmonid redd scour from higher peak runoff.

2) Logging has removed the old-growth coniferous forest and maintains the forest in an earlier successional stage of smaller conifers. One quarter of the entire land area of Santa Cruz County is zoned for timber production and most of this land has been cut by clear-cut or selectively at least 3 times and often more. Until the 1970's, regulation on timber harvests was minimal. The total acreage logged in the San Lorenzo River Basin from 1990 to 2006 is 12,165.5 acres, or 19 square miles. (sum of two reports, 4554.5 + 8348 acres minus duplicates of 737 acres) [5]. The largest and most valuable redwood trees grow near permanent water, usually along large perennial and small ephemeral watercourses and springs. Removal of these large riparian zone trees is a long-term and cyclically recurring impact. Shade and tree removal allows additional thermal loading (heat) to reach streams and increases the water temperature and the temperature of the near-stream microclimate [6]. It takes more than a human lifetime to replace a logged, 125 ft. tall redwood and replace the shade lost to streams when it was cut, to say nothing of the time it would take to replace 300 ft. tall old-growth redwoods that were logged earlier along all watercourses. There has been a progressive loss (from each logging entry vs rate of growth assuming 10 to 14 year re-entry cycles) of large redwood and Douglas fir adjacent to streams providing shading in large parts of the San Lorenzo River Basin.

The CDF streamside tree cutting rules for the Southern Sub-District of the Coast District (Santa Cruz Mountains) in the "Coastal Anadromy Zone" (range of salmonid species) are

[5] This total of 12,165.5 acres is derived from two reports: "Santa Cruz Mountains Timber Harvest Plans 1990 to 2000 Chris Brinegar (San Jose State University) and from the Watershed Sanitary Survey for the San Lorenzo Valley and North Coast Watersheds, March 2007; Appendix C. "Acres of commercial timber operations active from 2001-2006 in the San Lorenzo River Watershed, by sub-watershed." *Cross checking was done to remove duplication of identical THPs and NTMPs. Brinegar does not appear to have included NTMPs so the total acreage is likely to be higher.*

[6] Riparian Buffer and Density Management Influences on Microclimate of Young Headwater Forests of Western Oregon Paul D. Anderson, David J. Larson, and Samuel S. Chan "Headwater riparian zones are characterized by microclimate gradients extending from the stream into the upslope forest. These gradients appear strongest within 10 m of the stream center. Although thinned stands may have buffer and stream-center light environments that differ from unthinned stands, the stream exerts a strong influence on near-stream microclimate. In general, thinned stands are warmer and drier, but upslope thinning has little detectable effect on stream-center microclimate." **Stream Temperature Responses to Forest Harvest and Debris Flows in Western Cascades, Oregon 2000, Johnson-Jones; Canadian Journal of Fisheries and Aquatic Science:** "Our results support the hypotheses that stream temperatures in these basins are driven by fluxes of shortwave solar radiation that can be modified by riparian shading and that conduction from the soils and alluvial substrates is of greater importance than generally recognized. Although regrowth of deciduous riparian vegetation [*insert*[occurs only in cases of intensive conifer removal] resulted in a return to pre-harvest stream temperatures approximately 15 years postharvest, site-specific factors may produce shorter or longer recovery times for stream temperatures at other sites. There is a need to better understand the spatial and temporal factors influencing the direct shading of stream channels for successful riparian restoration activities to moderate high stream temperatures."

now the most permissive (weakest) on the entire coast of California within the "Coastal Anadromy Zone".

This astonishing change was adopted by the CA Board of Forestry right at the point in history when coho salmon are going extinct south of San Francisco Bay. This decision occurred in part due to pronouncements by the Central Coast Regional Water Quality Control Board when they claimed that there was "little to no impact from timber harvest"[upon water quality]. This remarkable and, in our opinion, fictitious statement by the Central Coast Board was conveyed to members of the California Board of Forestry during deliberations over updates to what are now known as the "Anadromous Salmonid Protection Rules" and were formerly known as the "Threatened and Impaired Rules" (1999).

It is important to also note here, that during this time, the Central Coast Board wrote in an official document, that there were apparently no water temperature problems in Santa Cruz Mountain watersheds. This erroneous conclusion about water temperatures was apparently based upon a cursory review of water temperature records formerly collected as a condition of Timber Waiver "permits" (now essentially automatically issued). The fact that this particular THP based temperature data record was predominantly taken from small headwaters stream segments (coolest parts of entire watersheds) seems to not have been considered by the Regional Board [see footnote 2].

The difference in the CA Forest Practice Rules between the Southern Sub-District (SSD) and the rest of the CA coast north to the Oregon border involves protection for Class II streams (supporting aquatic life, but not year-round fish presence). Unlike the rest of the Coast District where Class II streams have a salmonid species protection zone width of 100 to 200 feet [large Class II include no-cut], stream protection regulations in the SSD provide no additional protection width for the stream zone (beyond the standard WLPZ applying everywhere else in CA outside the range of endangered salmonids. Instead the SSD now has the minimal width of the "channel zone" as a salmonid Class II protection. Practically speaking this is about 6 to 8 feet in a Class II stream rather than 100 to 200 feet that applies north of San Francisco Bay.

The Class III rules (ephemeral streams) are identical across the entire Coastal Anadromy Zone, and result in the actual retention of few commercial conifer trees. Class I (fish bearing) rules now allow a narrower protection zone which is identical across the entire Coast District.

The CA Forest Practice Rules are complex. Clear-cut logging is no longer permitted in the Southern Sub-District, so the effect of these new rules is somewhat ameliorated. However, it is important to understand that in the case of clear-cutting or "even-age management", the stream protection zones (WLPZ) are wider and more protective than with any form of "selection" logging anywhere in CA. **Notwithstanding, the amount of direct peak sunlight energy that reaches Class II streams in the Southern Sub-District will now be**

higher and more intense than anywhere else in Coastal California logging country from Watsonville to the Oregon border. This is a simple fact, not a personal opinion.

The last few years PG&E powerline vegetation clearing has become a significant impact in the numerous situations where powerlines follow creeks. No regulation occurs.

3) Surface water diversion and well pumping from individual homes and public and private water agencies have major negative fishery impacts for many reasons. Water extraction leads to reduced passage flows and fewer coho and steelhead spawning opportunities through the difficult San Lorenzo River gorge below Felton. It limits baseflows during the important spring growth period and difficult summer survival period.

The December trend in mean and maximum streamflow fell 36% and 46%, respectively, between 1937 and 1997 in the San Lorenzo River, with aquifer depletion resulting from surface diversions and well pumping, as well as reservoir filling being the most viable explanation. Mean and minimum streamflow trends for October, typically the month of lowest baseflow, show a 17% and 32% decrease, respectively, for the 60-year period [7].

With regard to temperature specifically; streams with low flows transport water at slower velocities, and, therefore absorb more heat energy diurnally. Also, slow moving water loses less heat from evaporative cooling induced by stream turbulence. As slower moving water heats up more, it transports less food to drift-feeding salmonids, reducing food supply as food demand increases with fish metabolism. Warmer water also holds less oxygen and promotes disease as thermal stress increases.

4) Stream sedimentation (San Lorenzo has a sediment TMDL); the huge sediment load in this river fills pools in the river and its tributaries because the rate of sediment loading overwhelms the capacity of the river to move the sediment out to sea. Shallow pools (and featureless silt filled "glides" or "mud pavements" common in the main stem of the river) do not allow bottom stratified cold-water refuges to form in pools. In specific circumstances a 1 degree C reduction in water temperature in deeper pools may be sufficient to provide habitat for juvenile coho salmon.

5) The loss of large woody debris in the San Lorenzo has resulted in less frequent and shallower pools. This is because large fallen trees, if left in stream channels, would provide scour to create and deepen pools. The loss of large woody debris has also eliminated overwintering habitat that provides fish refuge during larger stormflows. Santa Cruz County has changed policy in regard to this impact and large woody debris in our creeks should begin to increase.

[7] Alley, D.W., J. Dvorsky, J. Ricker, K. Schroeder, Santa Cruz County Planning and J.J. Smith. 2004. San Lorenzo River Salmonid Enhancement Plan. Prepared for Santa Cruz County Environmental Health Services by D.W. ALLEY & Associates and Swanson Hydrology and Geomorphology.

Lower River Flood Control Channel and Lagoon- City of Santa Cruz

The construction of the lower river flood control channel in 1958 (after the 1955 flood) permanently ended any restoration of mature riparian stands of redwood, douglas fir, cottonwood, sycamore, maple, red alder and willows that would have otherwise formed and armored the banks of the river, keeping the channel narrower, more shaded, deeper and more complex.

Until the later 1990s, all vegetation in this flood control channel was annually stripped down to the sand to form a trapezoidal ditch. Currently, small trees and shrubs are allowed to grow for short cycles. However they are cut and removed every fall once they reach 3 inches in diameter, leaving the lower river almost completely exposed to the heat energy of the sun. Large riparian trees in more natural riparian settings can sometimes create deep-water thermal refuges for salmon along the thalweg of a river, and near and within the roots of the large trees. This is impossible in the San Lorenzo below the Highway 1 Bridge, through virtually the entire length of the river within the city limits of Santa Cruz. The numerous tall trees that would otherwise grow along a more natural coastal river of this type, would better shade the channel and reduce solar heating of the water in summer. Under the management of the Army Corp of Engineers and the City of Santa Cruz, the growth of these large trees is prevented both as a flood-water velocity (roughness) issue and to deny homeless people camping places along the river channel.

Santa Cruz County Zoning and Planning Policies

Local governments have major impacts upon environmental health, water quality, and land use through their general policies toward the environment. When local governments passively allow environmental damage to occur they become part of the cumulative impacts that cause environmental deterioration like warming stream temperatures that lead to wildlife extirpation.

In the San Lorenzo River Basin, houses and commercial buildings exist directly along the banks of the main stem of the river and nearly all of its tributaries. These building sites often severely reduce the shade that would otherwise exist and limit heating of stream waters. Much of this is the result of land-subdivision from a century ago. It is also the result of local government Planning code or the lack thereof. Example photographs of this situation are included in appendix D.

Santa Cruz County has a Riparian Corridor Protection Ordinance but it is almost completely unenforced. This statement is based upon decades of direct personal experience with the County Planning Department and from observing the progressive loss of trees along many parts of the river system even in situations where modern building permits were issued and County supervision supposedly took place. This frequent failure to enforce this and similar ordinances has become systematic over time as employees of the Planning Department are told not to take actions to enforce the code without specific citizen complaints. This culture of indifference to County environmental codes is progressive. I

personally know of two former County Planning employees who were directed by superiors in this department not to initiate enforcement of these environmental codes (personal conversation).

This letter is not intended to be an essay upon the complexities of local code enforcement. Nonetheless, I have read EPA approved TMDL documents, and the corrective actions that are listed in these TMDLs constantly refer to the existence and enforcement of city and county rules and codes. When these codes are ignored the TMDL becomes meaningless.

It is the direct legal obligation of the State and Regional Water Boards and the EPA to both effectively supervise and to require effective action from the local and regional governments that they oversee in the course of enforcing both the federal Clean Water Act and the state Porter Cologne Water Quality Control Act.

Historical Evidence of Causes for Water Temperature Impairment in the San Lorenzo River

It is impossible for us to compare present water temperatures in the San Lorenzo River directly to those of the past because no historical temperature data record exists. However, there is circumstantial evidence that indicates that water temperatures were once cooler throughout the watershed. The fact that native coho salmon (requiring cooler water temperatures than presently exist) have been extirpated from the San Lorenzo watershed is evidence of elevated water temperatures compared to the past. Furthermore, we know that an old growth redwood and Douglas fir forest existed throughout the watershed based on the record of sawmills constructed since 1840 (Rood (1975- attachment E.). A digitized map of known sawmills is provided in our information packet. These mills existed throughout the mainstem and in all tributaries. We know that clear cutting occurred in the vicinity of all mills and that when all trees were removed in the vicinity of the mill, it was relocated to uncut areas usually upstream. We see evidence of old growth redwood stumps still standing along stream margins throughout the present day successional forest, and huge redwood stumps with their rootwads still remain in many tributary stream channels, dislodged from streambanks after early logging operations. With the additional shading that old growth trees would have provided, we know that stream temperatures would have been cooler because our data show that more shaded tributaries have the coolest water temperatures today (i.e. Fall and Boulder creeks-see temperature data record). There is much more solar energy reaching stream channels today, with other factors leading to warmer conditions, such as reduced summer flows (especially during drought), shallower pools resulting from higher sedimentation, and the lower river through the flood control channel with its coastal "lagoon" left with little shade at all.

In conclusion, these aforementioned destructive land and water use alterations, combined with the data we are submitting thoroughly demonstrate the need for a listing of "Temperature Impairment" under Sections 305(b) and 303(d) of the Federal Water Pollution Control Act. For the temperature monitoring sites with data for the entire summer of 2005, 7DADM temperature metrics exceed the 16°C criteria for core salmonid

rearing areas except heavily shaded Fall Creek and most exceed the 18°C criteria for non-core rearing areas for extended periods, with the exception of Fall, Boulder and upper Zayante creeks (having heavy shading or deep canyons), Newell Creek (receiving cold reservoir water from the bottom of Newell Creek Dam) and the headwaters of the San Lorenzo mainstem at Waterman Gap (streamside vegetation dominated by taller conifers). Middle and lower mainstem sites were especially warm and restrict steelhead to only fastwater habitat that consists of only 20-30% of the various stream reaches.

Regards,



Kevin Collins
Board President

Catalogue of Stream Water Temperature Data Files and List of Digital file Attachments

- A. Data Record (continuous with this letter as pages 12 and 13)
- B. San Lorenzo River Sampling Sites, Alley (file name San Lorenzo Sampling Sites 2001 Alternate.bmp)
- C. San Lorenzo Watershed 2009 Site Map.pdf (also same sampling sites)
- D. Photo_Examples_Residential_Riparian.pdf
- E. Rood (1975) thesis on Santa Cruz County Sawmills-map.pdf (thesis available)
- F. Data Quality Control letter_Data Submittal Information from D.W. Alley-signed.pdf (also in paper copy)
- G. QAQC letter City of Santa Cruz-Bean.pdf (also in paper copy)
- H. THP Spreadsheets_Brinegar.pdf (also available SLR and North Coast Sanitary Survey)
- I. City sampling locations.pdf (additional to Excel file information)
- J. AlleyTemperature-GPS-Readings.pdf

LWC 2012(303d) Temperature Data Catalogue with Principle Comment

Note: This Catalogue includes two independent data records,

- 1) D.W. Alley. Data supplied both as Excel with full data tables, and as a PDF graph.
- 2) City of Santa Cruz Water Dept. Environmental Projects Analyst Zeke Bean.

Alley produced 2 averages with City data therefore City data is supplied in its original form and with Alley averages (2 versions). The Lompico Watershed Conservancy is grateful for the assistance of this public water agency and Mr. Zeke Bean.

Note: Water temperatures in July consistently higher probably due to sun exposure period. Beginning dates vary between 2005 and 2006 Alley records.

Note: D.W. Alley 2001 maps originally produced to display fish population sampling sites then the same locations were used for temperature monitoring.

This schedule prepared by Kevin Collins (LWC)

Alley Record	Daily Maximum Highest	7Day Average Daily Maximum Highest
Bean 14b 2005		
Bean 14c 2005	temporarily over 20C	
Bear 18a 2005	temporarily over 20C	7DADM > 19C
Bear 18a 2006	temporarily over 22C	7DADM > 20C
Boulder 17a 2005		
Boulder 17a 2006	temporarily over 20C	7DADM > 18C
Branciforte 21a 2005		
Carbonera 20a 2005		
SLR 1 2005	consistently over 21C	7DADM > 21C
SLR 1 2006	temporarily over 22C	7DADM > 23C
SLR 2 2005	consistently over 21C	7DADM > 21C
SLR 3 2005	temporarily over 22C	7DADM > 21C
SLR 4 2005	consistently over 20C	7DADM > 20C
SLR 4 2006	temporarily over 22C	7DADM > 19C
SLR 6 2005	consistently over 18C	7DADM > 18C
SLR 6 2006	consistently over 21C	7DADM > 19C
SLR 7 2005	temporarily over 22C	7DADM > 21C
SLR 7 2006	temporarily over 25C	7DADM > 24C
SLR 8 2005	consistently over 20C	7DADM > 20C
SLR 8 2006	temporarily over 22C	7DADM > 22C
SLR 10 2005	Note: Redeployed after being stolen: begins 8/21/05	
SLR 11 2005	consistently over 18C	
SLR 11 2006	consistently over 19C	7DADM > 19C
SLR 12b 2005		
SLR 12b 2006	temporarily over 23C	7DADM > 22C

Zayante 13a 2006	temporarily over 19C	7DADM > 20C
Zayante 13d 2005	consistently over 18C	7DADM > 18C
Zayante 13d 2006	temporarily over 21C	7DADM > 21C
Fall 15 2005		
Newell 16 2005		

City of Santa Cruz Water Dept. Record (partial) Graphs Calculated by D.W. Alley

SLR Mainstem, Upstream of Tait Street Diversion 2005, record begins 8/11/2005

temporarily over 20C	7DADM > 19C
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SLR Mainstem, Downstream of Tait Street Diversion 2005 (same starting dates)

temporarily over 20C	7DADM > 19C
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Entire City Record as Provided- comprises 2 complex Excel files that include data from multiple sampling sites, location maps and other information.

1) City of Santa Cruz Summer 05 TEMP LOGGING - for NMFS 031209.xls

2) 2009Tempdata zb.xls