October 20, 2006

State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812

SUBJECT: Clean Water Act Section 303(d) List - Revision

Dear Chairperson and Board Staff,

Campbell Timberland Management, on behalf of Hawthorne Timber Company, would like to again reiterate our belief that data and analysis techniques used in the evaluation of stream temperature impairment were not appropriate for use in Northern California Coastal Basins. On January 17, 2006 we sent a memo (attached) stating our position and reasons for our concern. It would be greatly appreciated if you would again review the memo and provide us with comments as to why, if it is the case, you feel our statements do not justify delisting, or not listing, the following Water Segments:

- Eel River HU, South Fork HA
- Mendocino Coast HU, Rockport HA, Ten Mile River HAS
- Mendocino Coast HU, Noyo River HA, Noyo River
- Mendocino Coast HU, Noyo River HA, Pudding Creek

Also attached is the Executive Summary of a document produced by Stillwater Sciences titled "Stream Temperature Indices, Thresholds, and Standards Used To Protect Coho Salmon Habitat: A Review". A full copy of the document can be provided to you upon request.

Thank you for considering our concerns and please feel free to call our office if you have any questions.

Sincerely,

Kevin Faucher
Staff Hydrologist

Attached: January 17, 2006 Memo
Stillwater Executive Summary

January 17, 2006

Craig J. Wilson
Chief, Water Quality Assessment Unit
Division of Water Quality
State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812

SUBJECT: CLEAN WATER ACT SECTION 303(d) LIST - REVISION

Dear Mr. Wilson,

On June 10, 2005 Campbell Timberland Management responded to your request for numeric data and information regarding the 303(d) listing process on behalf of the Hawthorne Timber Company (HTC). Please consider the following as you begin revising the list of 303(d) watersheds.

First and foremost, it is not appropriate for staff to use thresholds established by Sullivan (2000) to set regulatory standards for streams in California. The Sullivan paper is a Report issued by the Sustainable Ecosystem Institute in Portland Oregon. It has not been subject to the level of peer-review required for publishing in a typical science journal. The development of guidelines based on this document is inconsistent with the Staff Report that states guidelines were based on scientifically based and peer-reviewed information. Additionally, there is no evidence to suggest coho in Northern California respond to fluctuations in temperature the same way coho respond in other parts of the Pacific Northwest. While the Sullivan approach has obvious merit, more peer review and studies to validate the findings are necessary.

The Staff Report does not consider the inherent potential of a watershed's temperature regime. As evidenced by the data we submitted in 2004, there is tremendous spatial and temporal variability observed throughout coastal watersheds. Why then would the Water Board attempt to apply a single-value, one size fits all threshold for temperature throughout an entire watershed? Clearly there are select stream reaches that may never achieve the 14.8 degree maximum for coho simply due to landscape factors such as orientation, underlying geologic formations and vegetative characteristics. No where in the Staff Report is there an acknowledgement that proposed targets may not be achievable in all places at all times.

The analytical methods used in the Staff Report are flawed. Listing determinations based on the percentage of occurrences (pooled by watershed) that exceed 14.8 creates bias. For example, since 2002 Campbell has removed thermographs from historic locations deemed “cool” and placed them in “warm” areas to better isolate and characterize areas of concern. This in turn has a substantial effect on the results of the analysis. Without consistent temporal and spatial sampling across a watershed it does not seem appropriate to pool the data for analysis.

Additionally, Campbell requests that Staff consider whether it is appropriate to pool historic data from the mid and late nineties in order to characterize today’s instream conditions. Since 1999 there has been a change in ownership/management on the Hawthorne property, there are increase regulations that require a greater level of canopy retention along watercourses and most importantly: trees are growing every day and the watersheds in question are continuing to recover from historic practices.

Pudding Creek Case Study

The proposal to list Pudding Creek for temperature is a case in point. After reviewing the historic data from Pudding Creek (Appendix A) it is evident that the analyses were reliant on data from three different locations within the watershed. Furthermore, sampling intensity at each location is not consistent throughout the data record. A closer look at the data shows that a high percentage of exceedance values occurred in 1997 during an unseasonable dry summer. Pooling the entire data set, the Sullivan threshold was exceeded approximately 21.5 percent of the time, however the year-to-year variance ranges from 3.1 to 66.5 percent. It should also be considered that monitoring locations have not recorded a Maximum MWAT of over 16.9 since 1997. Over the last five years, the Maximum MWAT recorded was 15.9.

Based on this information we respectfully request that Pudding Creek is removed from the list of water bodies proposed for 303(d) listing (temperature impairment).

Thank you for evaluating the Ten Mile tributaries separate from the mainstem channel relative to proposed listings. We encourage and are willing to further cooperate with staff in pursuit of a similar investigation in the Big and Noyo Rivers.

Please call if you have any questions. Our staff is also prepared to meet in person and discuss these topics at your convenience.

Sincerely,

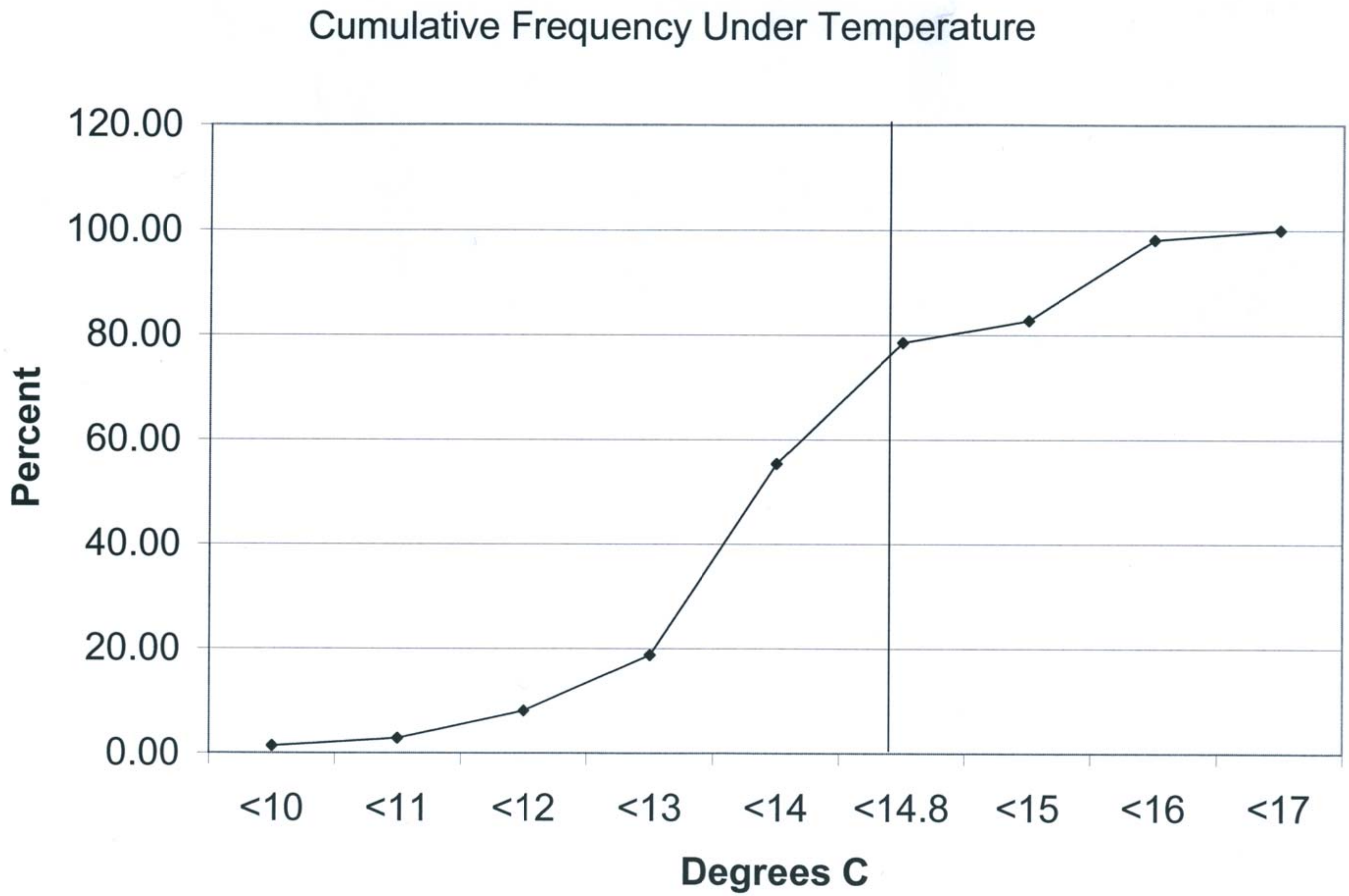
Stephen P. Levesque
Area Manager

Attachment: Appendix A

Appendix A

Annual Exceedance Values. Pudding Creek Watershed, 1994 - 2003

		Monitoring Site				Percent Exceeded
Year	Parameter	PUD1	PUD2	Pud5	Annual Totals	All Sites
1994	MWAT (n)	135.0	132.0		267.0	0.0
	Count Exceed				0.0	
1995	MWAT (n)		132.0	113.0	245.0	22.0
	Count Exceed		47.0	7.0	54.0	
1996	MWAT (n)	112.0	105.0	105.0	322.0	8.4
	Count Exceed		27.0		27.0	
1997	MWAT (n)	124.0	106.0		230.0	66.5
	Count Exceed	75.0	78.0		153.0	
1998	MWAT (n)		114.0		114.0	30.7
	Count Exceed		35.0		35.0	
1999	MWAT (n)		135.0		135.0	21.5
	Count Exceed		29.0		29.0	
2000	MWAT (n)		151.0		151.0	12.6
	Count Exceed		19.0		19.0	
2001	MWAT (n)		127.0		127.0	3.1
	Count Exceed		4.0		4.0	
2003	MWAT (n)		105.0		105.0	41.0
	Count Exceed		43.0		43.0	
Totals	MWAT (n)	371.0	1107.0	218.0	1696.0	21.5
	Count Exceed	75.0	282.0	7.0	364.0	


Cumulative Frequency Under Temperature
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Percent
<10
<11
<12
<13
<14
<14.8
<15
<16
<17
Degrees C

EXECUTIVE SUMMARY

STREAM TEMPERATURE INDICES, THRESHOLDS, AND STANDARDS USED TO PROTECT COHO SALMON HABITAT: A REVIEW

Prepared by
Stillwater Sciences
Arcata, California

Prepared for
Campbell Timberland Management
Fort Bragg, California

May 2002

Executive Summary

Most fish maintain body temperatures that closely match their environment (Moyle 1993). As a result, temperature has a strong influence on almost every life history stage of Pacific salmon and steelhead (Berman 1998), including metabolism, growth and development, timing of life history events such as adult migration and emergence from the redd, and susceptibility to disease (Groot et al. 1995). The goal of this paper is to lay the foundation for developing a strategy for addressing the cumulative effects of land management practices on temperature and, by extension, anadromous salmonid populations, particularly coho salmon.

This report reviews the most commonly employed indices of temperature impairment and the methods used to set thresholds for these indices. For the purposes of this report, we define an index as a means of summarizing temperature data that is related to a biological objective. We define thresholds as the value of an index that temperature must remain below to avoid adverse impacts. Standards then, are defined as a combination of an index and threshold(s), which can be applied by a regulating body. This report then discusses potential approaches for developing indices and thresholds (i.e., regulatory temperature standards) appropriate for northern California, and how to determine where in a watershed these standards should be applied to protect anadromous salmonid populations in lands actively managed for timber production.

Before regulatory temperature standards are developed for northern California, three important questions should be addressed:

1. What indices should be used for evaluating stream temperatures in regards to salmonid habitat?
2. What temperature thresholds are appropriate for protecting salmonids in northern California?
3. Where in the watershed should standards be applied?

Many watersheds in northern California are listed, or proposed for listing, for temperature impairment under Section 303(d) by the North Coast Regional Water Quality Control Board (the Board). The Board apparently bases its listing recommendations on a number of sites where the maximum weekly average temperature (MWAT) threshold proposed by Sullivan et al. (2000) has been exceeded (CRWQCB 2001). While the Sullivan et al. (2000) approach is promising (as discussed below) its application to northern California watersheds requires consideration of regional or site-specific conditions.

Indices and thresholds

This report reviewed a number of different approaches that are used to define temperature indices and thresholds, however, this executive summary only includes our recommendations for the most appropriate methods for establishing temperature standards. Temperature standards are developed to protect fish from both acute temperature effects (e.g., mortality or emigration), and sub-lethal effects, which include temperature-related reductions in growth or other vital functions which may lead to mortality at a later date.

Acute Standards. Acute temperature standards could be based on an annual maximum temperature (i.e., all daily maximum temperatures should be below the threshold), or based on an MWAT. It appears that the recently developed method used by Sullivan et al. (2000) for developing an annual maximum threshold (26°C as a daily maximum for one day) uses the best available science. Sullivan et al. (2000) have developed their method from an equation developed by Brungs and Jones (1977) that relates LT50 (the temperature producing 50% mortality at a given exposure time) to exposure time, but they have modified the formula to predict LT10 (the temperature producing 10% mortality at a given exposure time). The standard they suggest depends on typical diurnal temperature patterns found in their study area, and they recommend conducting site-specific investigations of temperature patterns when temperatures exceed 24°C. It may also be possible to set acute temperature standards using an MWAT or a maximum weekly maximum temperature (MWMT). This index would address situations when temperatures do not reach the annual maximum temperature (e.g., 24°C) but when sustained periods (e.g., a week) of high temperatures result in either mortality or emigrations of rearing fry. Welsh et al. (2001) and Hines and Ambrose (unpublished report) related the presence or absence of juvenile salmon in northern California streams to an MWAT. Their approach, modified to ensure that juvenile fish were actually present in streams prior to the onset of high temperature and corrected for confounding variables, could be used to determine if MWAT or MWMT is an appropriate index for an acute response, and if so what the appropriate threshold would be.

Sub-lethal Standards. Determining sub-lethal temperature standards that ensure sufficient growth is more problematic. The bioenergetics approach used by Sullivan et al. (2000) is a promising method. It may be possible to identify indices and thresholds for northern California by using a refined application of the Sullivan et al. bioenergetics approach if key uncertainties can be addressed. We recommend that the following tasks be conducted before the approach is applied in northern California:

- Assess the appropriateness of using the MWAT index to characterize sub-lethal, long-term temperature patterns in northern California. Sullivan concluded that in Washington streams, an MWAT could be used to represent the temperature regime for an entire summer, but this remains to be tested in northern California.
- Develop realistic food availability parameters for use in bioenergetic modeling. Sullivan et al. (2000) assume in their model that all fish have access to 30% of maximum rations. Food supply varies considerably among sites (Walters and Post 1993, as cited in Sullivan et al. 2000) and is highly unlikely to be the same in Washington streams as in northern California streams.
- Determine the importance of summer growth for juvenile coho salmon in northern California. It is generally assumed, based on research in Washington and Oregon streams, that summer growth is crucial for juvenile salmonids. This assumption formed the basis for the thresholds suggested in the Sullivan et al. (2000) approach. In some California streams, however, it has been observed that significant growth of juvenile salmonids occurs in the spring and fall (Shapalov and Taft 1954, Bell 2001, B. Harvey, pers. comm., 2000), and that summer growth rates can be extremely low or negative (Harvey and Nakamoto 1996, W. Duffy, unpublished data). The bioenergetic ecology of juvenile coho salmon needs to be better understood before setting temperature standards to protect rearing juvenile salmonids.

Application of temperature standards

Following the development of appropriate temperature indices and thresholds, there will still be a question of where to apply the temperature standards within a basin. Even under undisturbed conditions, it is highly likely that northern California coastal streams would have had reaches that were too hot for salmonids in the summer. If one assumes that in a forest managed for timber production that tree heights, and therefore shade, will typically be less than historical conditions, then the length of stream with temperatures unsuitable for salmon would increase. This issue is addressed explicitly in the EPA's South Fork Eel TMDL (EPA 1999). It is crucial to determine what loss of suitable habitat is acceptable for maintaining and restoring coho salmon populations. We recommend that this issue be addressed collaboratively by the Board, land managers, and outside experts. The first step is to address the spatial distribution of historical high temperatures and the influence of current and future land management on temperature regimes. Other issues would then need to be explored to determine how much suitable habitat is necessary, including (1) minimum coho salmon population sizes for viability, and (2) the distribution of habitat suitable for different coho salmon life stages (i.e., in some watersheds a small reduction in suitable reaches of stream could eliminate all the habitat for a particular life-stage).

Recommendations

Based on this analysis and review, we recommend the following short-term measures to develop interim temperature standards protective of fish in northern California:

- conduct a focused field study to assess the degree to which an MWAT threshold can protect juvenile coho salmon from direct mortality or temperatures that cause juvenile coho salmon to emigrate. The study should control for stream size and sample only streams that are seeded. This study would serve to increase the applicability of the Hines and Ambrose (unpublished report) and Welsh et al. (2001) approaches;
- conduct an analysis of available data for northern California streams to determine if the MWAT index can be used to characterize sub-lethal effects upon juvenile coho salmon in northern California streams. The essential question of the study is if the MWAT index can characterize the temperature regime for the entire summer. This study would help determine if the Sullivan et al. approach is applicable in northern California.
- determine the bioenergetic ecology of juvenile coho in northern California, including the seasonal variation in food availability, and seasonal growth patterns; and
- use a modeling approach to address the issue of the spatial application of temperature standards within a basin. The modeling should be complemented by a collaborative scientific analysis of the degree to which stream shading can be reduced from historical conditions while still fully protecting coho populations.

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