Tillamook Bay Watershed

TOTAL MAXIMUM DAILY LOAD (TMDL)
& WATER QUALITY MANAGEMENT PLAN (WQMP)

Response to Public Comments

Prepared by:
Oregon Department of Environmental Quality
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Introduction

This Response to Public Comments addresses comments received regarding the Draft Tillamook Bay Watershed Total Maximum Daily Load (TMDL) and Water Quality Management Plan (WQMP) dated January 2001. Written comments were received during a public comment period that extended from February 2, through April 2, 2001. Oral comments were received during a public hearing held on March 22, 2001 at the First Christian Church in Tillamook, OR. (see Attachment 1).

List of Comments provided on Tillamook Bay Watershed TMDL
The following individuals provided comments on the TMDL during the Public Comment Period. Oral comments were received and recorded at a public meeting at the First Christian Church in Tillamook on March 22, 2001.

Commentator	**Affiliation**
Written Comments	
Dick Blum	Local Resident
Gregg Bryden	Kennedy/Jenks Consultants on behalf of City of Tillamook
Beverly Griffin	City of Bay City
Chris Jarmer	Oregon Forest Industries Council
Chris Knutsen	Oregon Department of Fish and Wildlife
Ted Lorensen	Oregon Department of Forestry
Shawn Reiersgaard	Tillamook County Creamery Association
Tyson Smith	Northwest Environmental Defense Center
Michael Tehan	National Marine Fisheries Service
Martha Turvey	United States Environmental Protection Agency – Region 10
Michael J. Wolf	Oregon Department of Agriculture
Oral Comments	
Gregg Bryden	Kennedy/Jenks Consultants - on behalf of City of Tillamook
Mark Labhart	Oregon Department of Forestry
Jim Paul	Oregon Department of Forestry

Responses to the comments
Following this Introduction is an index to the comments and DEQ's responses to those comments. The comments are summarized in the index to give context to the reader. The summarized comment may not represent the entire comment, or the entire response, but will give the reader some guidance as to what the subject is. The number associated with each comment in the index is actually the number of the response to that comment. Following the index, each of the comments is included in its entirety, organized by commentator. We have included the full text of comments to guard against confusion over intent of the comment or the response. Responses immediately follow each comment and are in *italic* font to avoid confusion.

Changes to the Draft TMDL
Changes were made to portions of the TMDL based both on comments and on internal review of the document. Where changes have been made based on a comment, that is stated in the response to a given comment. There were four changes made to the documents resulting from internal review. These are as follows:

1. An error was found in the calculation of the dilution ratio of saltwater to freshwater in the Bay. This ratio is the basis for determining the allowable bacterial concentration at the river mouths, and subsequently, determines the allocations of bacteria in runoff and in point source discharges. The error was found through an attempt to provide more information in the technical appendix for bacterial modeling. The specific error was the magnitude of the conductivity of seawater available for mixing within the bay. The number had simply been wrongly calculated and was too high. A new value based on samples taken at the mouth of the Bay was used to recalculate the dilution ratio. The new ratio is higher throughout the Bay, resulting in a higher target at the mouth of the Rivers – 42 MPN/100 ml fecal coliform instead of the previously calculated 28 MPN/100 ml fecal coliform.

2. Due to the recalculation of the target at the river mouths as described above, allowable concentrations in runoff for all land-uses were recalculated. These concentrations were derived in the same way as previously, through the model of bacterial runoff based on equal proportional reductions for all landuses in a river subbasin, but were run to meet the recalculated river mouth target of 42 MPN/100 ml fecal coliform.
3. As a result of the above changes and a comment from the Tillamook County Creamery Association, we have included an allowance for instream bacterial decay in determining the effluent limits for discharges to the rivers in the watershed. This has resulted in site and season specific allocations for each of these dischargers. Coupled with the higher target for river mouths, all of these dischargers have higher allocations than proposed in the Draft TMDL. Discharges to the Bay will receive higher allocations based on the recalculated target at the river mouths, but will not have an allowance for instream decay.
4. The critical period for temperature based on chum salmon spawning was incorrect. The critical period should extend from October 1 though May 31, rather than through April 30. This extends by one month the period during which discharges to the rivers will have to meet permit limits based on the spawning standard (55°F).

These changes and others indicated in the following responses to comments have been made to the TMDL submitted to EPA.

Summary of Comments and Index of Responses

Dick Blum—Tillamook, OR

My questions involve Appendix D, Element 2: Goals and Objectives, Goal 2 and Goal 3 on page 179. When the instream temperature and sediment goals are met in 2010, how many salmon and steelhead will be coming into the Trask River in 2011, 2012; in the Kilchis, Wilson, Miami and Tillamook? How many have come into these rivers and left these rivers as smolts each year of the last 20 years? Not knowing the number of fish these rivers historically supported and not setting a baseline is ridiculous. Not counting them is dishonest. $750 billion has been spent on salmon in this time frame.
Counting should have been a top priority.

On page 2 there are temperature profiles for 1998 for the Trask River. How many fish came into the Trask River in 1998? How many left the Trask River in 1999? How many fish need to come into the Trask River each year to be considered normal?

DB1
The TMDL was developed as a requirement of the Federal Clean Water Act resulting from an observed impairment to water quality, in this case, temperature. The numeric temperature criterion used to determine impairment was based on salmonid fish migration and rearing (64°F), and is applied statewide where salmonids occur and year around except where and when spawning occurs. The spawning numeric criterion (55°F) is applied only where and when salmonids spawn.

Last summer we witnessed how DEQ takes the temperature in the North Fork of the Trask River; in one foot of water at high noon in direct sunlight! Fifty feet away were cold water pools twelve feet deep! Is that the method DEQ uses in all the rivers? That's sort of like killing salmon with an aluminum baseball bat because the "inferior" hatchery fish are too strong to spawn with the wild fish. We were told the "wild" fish could not compete with these strong hatchery fish. (Doug DeHart on Ron Yochouts Fall Creek Hatchery endangered Coho ODFW fish killing tape) We know the first hatchery in Oregon was constructed on the Clackamas River in 1877 by a commercial cannery. Their reason was that some years enough fish didn't return to support a cannery. We probably have the historic normal right now.

DB2
DEQ has specific protocols for the long-term placement of temperature monitors. The protocols generally require temperature recorders to be place in well-mixed parts of the stream out of direct sunlight. Data used in the TMDL were not from stations with probes placed as you have described.

And for the people who want to go back lets be honest and go back to the historic numbers of predators at the time too; pinnipeds, Caspian Tern are alien, Cormorants and dozens more need to be adjusted to historical norms.

We know that in the 1930's all the way to the late 1980's the steelhead and salmon runs were great. Four major Tillamook Burns didn't slow them down even though the rivers would run brown for years after each burn with silt with the slightest rain. (1933, 1939, 1945 and 1951 were the four burns) Water temperature? There wasn't any riparian protection in miles of these watersheds.

Bacteria in the water. Those were the years when the dairymen would wash off their manure spreaders in the river; when the Tillamook County Creamery Assoc. and many smaller cheese factories would flush their waste into the rivers. Some old time observers of those years report the coho smolts picking off the bits off cheese and the bugs that washed free from the manure and mud slides.

The record runs off fish are returning. The ocean conditions have changed. Again! Anyone who has watched the raising of the Mammoth saw that even thousands of years ago there have been some major meltdowns.

Global warming? Yeah. Right!

DB3
The TMDL recognizes changing climate and natural contributions of pollutants. The Federal Clean Water Act requires reduction in human-induced pollutants when water quality standards are exceeded.

Gregg Bryden; for City of Tillamook – Kennedy/Jenks Consultants

Kennedy/Jenks Consultants prepared the following comments on the January 2001 Draft Tillamook Bay Watershed Total Maximum Daily Load (TMDL) on behalf of the City of Tillamook. We are presenting our concerns regarding the potential impact of the TMDL on the City of Tillamook Sewage Treatment Plant (STP) discharge at river mile 1.9 on the Trask River.

Our concerns relate to the applicability of the 55 degree Fahrenheit (°F) salmonid spawning, egg incubation, and emergence standard and the temperature and bacteria wasteload allocation calculations for the City of Tillamook STP.

Applicability of 55°F Water Quality Standard
Table 8 of the Draft TMDL includes the 55°F numeric criterion in the temperature wasteload allocations for the Tillamook STP for discharges from October through April. The 55°F standard is intended to protect waters that "…support native salmonid spawning, egg incubation, and fry emergence from the egg and from the gravels in a basin…"[(OAR 34~~2~~0 041-0205 (2)(A)(iii)]. The 55°F numeric criterion is not appropriate for the silted slow moving tidally influenced lower reaches of the Trask River , including the area influenced by the Tillamook STP discharge. This habitat does not include gravel habitat suitable for spawning, egg incubation , and fry emergence. In response to our inquiry about gravel spawning habitat in the vicinity of the Tillamook Discharge, Mr. Chris Knutsen, Oregon Department of Fish and Wildlife Habitat Protection Biologist indicated in his 9 March 2001 letter that, "[t]o the best of our knowledge, there is no spawning, incubation, fry emergence occurring in this area." A copy of Mr. Knutsen's letter is provided as an attachment to this letter.

In light of this information, the City of Tillamook is requesting that DEQ reconsider application of the 55°F numeric criterion to its calculation of the City of Tillamook STP's wasteload allocation.

KJC1
The information used to determine the life stage timing patterns were provided by ODFW's District Biologist. In conversations with and review of comments from ODFW (Chris Knutsen), it is clear that there is currently potential spawning habitat in the lower reaches of the river. Mr. Knutsen stated that "chum salmon do have the physiologic capability to spawn in the brackish water located downstream and some suitable spawning gravels may be present." Mr. Knutsen agreed that there is a potential for use by chum salmon below the discharges. It has been the policy of DEQ to defer to ODFW in determining the status of habitat use for the purpose of applying water quality standards. Given the potential for spawning, we must apply the spawning criterion for chum salmon to the lower reaches of the rivers. As new information becomes available, such as through an ODFW update of fish distribution maps, or other distributional surveys acceptable to ODFW, the TMDL may be modified as described under adaptive management.

Calculation of Temperature and Bacteria Wasteload Allocation
Section 3.1.6.1 of the Draft TMDL indicates that information on discharge temperatures for point sources is limited for many of the facilities. We are concerned that accurate temperature and flow data was used in calculating the temperature waste load allocation shown on Table 8. Also, section 3.1.8.1 describes fairly simple equations used to calculate the temperature wasteload calculations. These calculations do not account for tidal influence or the flows and mixing at the Tillamook STP discharge.

KJC2
Data from the City's Discharge Monitoring Reports (DMRs) were used to characterize effluent flows and temperatures. The values used in the example wasteload allocations are commonly observed in the DMRs and in general, the City of Tillamook STP was not one of the facilities for which data were limiting.

The calculations are typical of those used for mass load analyses in wastewater permits. However, if information indicating additional mixing is available, this can be applied during the permit renewal process. Given that the allocations are based on the equations in the TMDL, the most appropriate values for each of the variables will be used when the permit limits are determined.

We understand that the Trask River is not 303(d) water quality limited for bacteria. However, a wasteload allocation of a most probable number of 28 fecal coliform organisms per 100 ml is proposed in Table 17 of the TMDL to meet the shellfish standard of 14 MPN/100 ml in Tillamook Bay. This bacteria wasteload allocation does not account for die-off, mixing and tidal effects in the Trask River before reaching Tillamook Bay.

KJC3
The wasteload allocations have been revised to reflect two things: an error in the dilution calculation resulted in too low a dilution ratio at the river mouths; and a decay rate has been applied to effluent from each of the point sources of bacteria. The dilution ratio has been revised from 2:1 to 3:1 dilution resulting in a target concentration at the mouth of 42 MPN/100 ml, rather than 28 MPN/100 ml. Secondly, a decay rate has been applied to each of the discharges dependent on velocity, distance upstream of the river mouth, and temperature of the receiving water. This has resulted in allocations being set for high flow and low flow periods separately. These new allocations are increased over the original value of 28 MPN/100 ml. The decay rate is described more fully in the response to comment NEDC5, below.

We would like the opportunity to review the data that was used to calculate Tillamook STP's wasteload allocations to ensure appropriate temperatures and flows were applied in the calculations. Also, we propose to apply a more accurate mixing model, such as CORMIX to account for tidal effects in the wasteload allocations. These calculations could be made part of modifications to Tillamook STP's NPDES discharge permit.

KJC4
We welcome review of the data as well as investigations of appropriate modeling to determine permit limits. It is appropriate to apply mixing zone models with appropriate site-specific data to develop permit limits as allowed within the TMDL.

Conclusion
We appreciate the opportunity to comment on the Draft TMDL proposed for the Tillamook Watershed. We trust that you will agree the application of appropriate numeric standards and use of the most accurate data for wasteload allocation calculations helps focus The City of Tillamook's limited resources where they will be most beneficial to restoring water quality in the Tillamook Basin. Incorporating more flexibility into the TMDL and permit process will assure resources are applied appropriately.

Beverly Griffin – City of Bay City

Bay City's permit written in 1992 was written specifically with the shellfish bacteria limit in mind. The treatment design, the disinfections and the permit levels were based on this limit. Permit page 2 of 11 (lagoon system) seta a 200 fx/100mls fecal permit level and defines a mixing zone of 100ft. radius from the discharge point. Permit page 4 of 11 (SBR plant start up) sets an 80 fc/100mls fecal permit and defines a mixing zone of 50ft radius from the discharge point. Bay City's wastewater treatment plant upgrade was built based on these parameters. Quoting from the spec document written March 25, 1994 and approved by all the agencies.

"ULTRAVIOLET DISINFECTION"

PURPOSE: To reduce pathogen levels in the SBR effluent to a level that corresponds with 80 colonies fecal coliform per 100 ml monthly geometric mean.

SYSTEM DESCRIPTION: Intermittent decant from the SBR's enter the Ultraviolet Disinfections (UV) channel at a maximum rate of 1520 gpm (2.2 MGD). This flow passes by two sets of UV lamp modules for disinfections by ultraviolet waves. The disinfections efficiently assumes 65% minimum transmission, 30 mg/l maximum TSS. The retention time will be 8.06 seconds, and the UV dose will be 32,240-microwatt sec/cm2 after 8760 hrs and at 65% transmission. A counterweighted level control gate keeps the UV lamps covered with water during the decant cycles by permitting water out at a rate to keep the water depth at 2 feet. As decant stops, the lamps stay on until the decant in the channel is disinfected (8.06 sec.), then turn off. The channel is drained during no decant times as recommended by the manufacturer by drainpipe under level control gate.

In compliance with the Environmental Assessment done in June 1991, we have also extended our outfall 1000 feet into the channel, (the channel at the time of the construction of the other outfall had silted in), this was to give us a better mixing zone to meet the standard for shellfish at 14 fc/100mls fecal concentration. In July 1991 it was also determined that we had "NO Significant Impact."

The Waste Water Treatment plant upgrade was meant to operate and meet all permit levels until the year 2011 with a population of 1451. It is now 2001 and we have a population of 1170. UV was purchased to meet the same shellfish standard of today, I feel with this upgraded treatment system we would be unable to meet the new permit level. We would violate several times a year. In 1997 alone we would have been in violation 7 months, in 1998 2 months, and in 1999 another month.

CBC1

Allocations for the discharges to the Bay have been revised to reflect a change in the dilution ratio allowed for discharge of rivers to the Bay. The change in dilution ratio resulted from discovery of an error in the original calculation. The new dilution ratio is 3:1 (instead of 2:1), which will result in an effluent allocation in the Bay of 42 FC cts/100 ml. We still are not applying a saltwater decay rate in excess of the dilution ratio, though part of the justification of adopting the 3:1 ratio for the Bay discharges lies in this increased decay in saltwater. A review of the data submitted by Bay City indicates that, with the revised effluent allocation of 42 FC cts/100 ml, there were only four cases that would have been over the limit, and two of these were only 2-3 FC cts/100 ml over.

[Cites Discharge Monitoring Report data]

The surge basin (ponds) has had the added benefit of becoming a wildlife haven. We have deer, beavers, muskrats, otters, coyotes, nutria, a resident red-tail hawk family, a bald eagle family, blue heron families, and a larger variety of ducks, shore birds, geese, and birds. Frogs can be heard nightly and welcome me as I open up in the mornings. Although this wildlife is enjoyable and probably the environment you are searching for on a larger scale in the water shed they do present a added burden when I process their waste. Warm temperatures encourage algae growth in the ponds, the tanks , and the UV chamber, this explains the higher fecal counts in the summer, and the beginning of fall season supports the same findings in your report, which is the first initial flushing of the summer bacteria accumulation of the land surface. This year without the pond influent and normal rainfall we had excellent fecal removal. Of course we are always trying to do the best we can, removing all the fecal colonies possible. However this practice should not lock us into unnecessary treatment. We wish for a margin of safety for ourselves before violating permit levels. The tight permit level of 28fc/100mls would have us violating when reality was , the Bay did not need the high margin of safety you have given it. Environmental and news groups would jump right on the word violation and scream how polluted our bays are because of wastewater treatment plants not being operated correctly and EPA and DEQ are not doing their job, when the reality would be that these violations had not polluted the Bay and interfered with Shellfish harvest or presented a health hazard. I feel it is important that realistic permit levels are set, ones that can allow reasonable treatment all year without violation. The parameter is awful close to secondary and potable water standards.

What has changed in DEQ's scientific analysis of the shellfish standard of 80fc/100mls previously , to the 28fc/100mls of today? This 65% cut in the allowable limit for the same standard seems very extreme. What was so different with the 1995 science and today's science? Is it the difference in scientist? Could another scientist come to another conclusion? I believe it could be in the modeling and the parameters that

were inserted. It would be beneficial to look at the modeling with the safety factors included to see the actual percentage allowed to the margin of safety. Would it be 65%? Is this really a justifiable margin of safety or are we going overboard?

Quoting from the document. Page 69 3.3 Margin of Safety: 3.3.2 implicit Margins of Safety used in the Tillamook Bay Watershed TMDLs, the last paragraph:

The Margin of Safety for the bacteria TMDL is also addressed though conservative modeling. First, no salinity or temperature effects on bacteria decay rate were considered.

CBC2
Previously the Department did not account for the already high background concentrations of bacteria. This resulted in a relatively large dilution rate for the City of Bay City discharge to the Bay. Water that is already contaminated with bacteria does not allow the same dilution as bacteria-free water. The Clean Water Act requires DEQ to consider background concentrations in assuring that a source does not cause a water quality standards violation.

Temperature effects on decay rate were included for instream decay in the rivers. This was not extended to the Bay, though the dischargers to the bay are still given a dilution ratio as calculated for the rivers. Although commercial shellfish harvesting is not allowed near the Bay City discharge, recreational harvest apparently has occurred. Since the Bay City discharge is in an area where the protected use (shellfish harvest) occurs, and since the discharge near this use could affect public health, DEQ's rules do not allow a mixing zone in which decay can occur.

Increased salinity in the bay would be expected to decrease the bacteria concentrations through higher decay rates.

Secondly, the model accounted for dilution by summer storm base flow under all conditions; winter storm base flow would be higher and lead to greater dilution in stream for a given runoff load.

By underestimating the dilution effects of base flow in winter storms the modeled concentrations will appear higher than actual."

I think too high a safety factor is figured in. To disregard salt water having any killing effect on the discharge before traveling across the bay and a dilution of only 2 to 1 is not giving a true value to what is occurring. The effects of temperature and salinity as a natural disinfectant need to be considered. It is the whole basis for bacteria die-off. During the winter months when bacteria run off is the highest, Mother Nature has provided the dilution by way of rain to facilitate bacteria cleanup. To disregard this ability of nature is also unrealistic. The Rivers, Bay and Ocean is Mother Natures treatment plant and disinfectant. We should work with her not by overloading, but to simply disregard her abilities when making our model is unrealistic. I can understand perhaps a somewhat lower limit, a limit of 60fc/100mls would be a 25% decrease giving plenty of room for a margin of safety. The limit of 28fc/100mls would put a hardship on a small population of people trying to achieve a goal that is based on Mother Nature not helping with the bacteria dilution and die off rate.

CBC3
A margin of safety is required in all TMDLs. These MOS can be explicit or implicit. We have chosen to use conservative assumptions in modeling and arrive at a conservative Loading Capacity, rather than apply an arbitrary percentage error to the loading capacity and allocations. Either way, the allocations must be conservative enough that errors in assessment or modeling will not result in a violation of water quality standards.

Chlorine will disinfect, it does work. But the long-term side effects that chlorine and sulfur dioxide have is still undetermined. Potable water regulations are right now looking at the effects of chlorine by-products as having an unhealthy effect on people. This and the hazards of dealing with the chemicals, (both to the workers and the residents in the area), makes this type of disinfections undesirable to me. UV works with

no side effects and no chemical is being added to the water cycle. It's downfall is blockage by suspended solids, algae, and chemicals, (to name a few), that hide the bacteria. It has been my observation that algae does not settle with the rest of the mixed liquor, it stays suspended and results in solids and fecal removal problems, At our present permit level algae can be kept under control by dilution. Suspended solids are usually only a problem during high windstorms that keeps the tanks in an uproar these days are few and are generally combined with a high dilution of normal wastewater solids. Chemicals are on a case-to-case basis, we have next to none, possible sources in Bay City for chemical pollution, because we have little to no industry. My DMR data will show since we have switched to UV, disinfections happen. The history shows that the times we would be in violation with this extreme proposed limit is during unusually high storm events, (such as the flood of 1996), while treating influent from the ponds, and during warm weather that encourages large amounts of algae growth in the ponds, the tanks and the UV chamber.

CBC4

A review of the data submitted by Bay City indicates that, with the revised effluent allocation of 42 FC cts/100 ml, there were only four cases that would have been over the limit, and two of these were only 2-3 FC cts/100 ml over. We analyzed the bacterial data from all the dischargers in the basin prior to setting the allocations and believed that, with one exception, all were capable of meeting the allocations. With a higher allocation, we are more convinced of this.

The year around parameter of 14fc/100mls does not allow nor does it consider the un-harvestable days due to Mother Nature. Un harvestable days are when its too stormy and windy to be safe on or in the waters, there would be too high of a freshwater concentration for a good product, and the tides would be too high to harvest without a mechanical means. Historically shellfish have been harvested at low tides, on sand spits that are out of the water. Annually several low tides are not low enough to expose sand spits, thus harvest does not happen. Shellfish have their season too. Shellfish molt annually and should not be harvested during the molt. Thus when the Wilson River is above 7 feet shellfish harvest could not take place if the Bay was open for harvest. Bacteria would not be the factor involved with no harvest of shellfish, but all of the other reasons, mentioned would play a part. A recreational standard during the days shellfish can't be harvested should be considered. Oysters and Eastern (softshell) clams are not native to Tillamook Bay. Oysters were introduced in 1928 and Eastern clams were introduced at the time lumber was shipped from Tillamook Bay to the East Coast. The Clam seed was in the ballast of the ships and dumped into the Bay. The protection of an un-native, strictly commercial species being paid for by the citizens of Tillamook County does not seem fair to the citizens and or the other industries.

CBC5

The standard does not currently allow for a suspension during unharvestable times as defined by current closure periods or conditions. Moreover, the standard is not based on preservation of any species of shellfish, but on public health and the consequences of direct consumption of contaminated shellfish.

The TMDL objective is to improve water quality without being constrained by existing water quality. The improving condition should reduce the frequency and length of closures due to degraded water quality. The Departement believes that the application of the standard can be improved by refinement of the definition of when and where the beneficial use exists. This approach should be addressed in interim steps in a compliance plan or standards review. The Department also believes that the Wasteload Allocations are acheiveable based on historical performance by the treatment plants..

Restoring the natural flushing action of the Bay would also serve as a solution to bacteria contamination. The core of Engineers has interrupted the flushing process of the Bay over the years by the construction of the Jetties, the dike on the south upper end, and by ending dredging activities. The natural flushing and flow of the bay would allow for more capacity of bacteria dilution and the salt water concentration die off rate would be greater. Not only would flooding be prevented, but this would also restore the bay to its more natural state. I know that restoring the mouth of the bay and the south dike would interfere with the goal of recreation, dredging would not. This benefit would increase the dilution factor and increase the saltwater surface area. This would lead to a faster and higher decay rate with less bacteria overloading days. Flooding would become less of a problem and as the other measures inland that effect silt entering the Bay were implemented the amount of dredging with lessen. You could compare the Bay to Cannon Beaches

lagoons system (as explained to me by Pete Dalke at the March 21, 2001 meeting in Bay City), the lagoons are filled with sludge and solids and are now overloaded. The don't know if an upgrade is warranted until they dredge the lagoons, freeing up area for treatment, that measure may take care of the over loading problem.

CBC6
Though there is some benefit to the dilution and decay afforded by seawater entering the Bay, there will always be a retention of water in the Bay for some period of time. The inputs from activities on shore will always be limited by the assimilative capacity of the Bay. Using the Bay as a treatment facility is not an option.

My last comment is that I don't understand the 90th percentile parameter. It is very confusing to me figuring out when we have a violation and when we don't. "10% of the samples can't exceed 86fc/100mls", is this a weekly, monthly, annually, or historically set parameter? A simple 60fc/100mls is a lot easier to understand and deal with. Again, I thank you for this opportunity to comment and hope you will consider my comments.

CBC7
No more than 10% of samples may exceed the limit of 129 FC cts/100 ml (based on the newly calculated dilution ratio). This part of the criterion is designed to hold down the upper end of bacterial concentrations. Means and medians can both allow a substantial number of high values without exceeding a limit. The 90th percentile value (which is greater than all but 10% of the values in a distribution) still allows some extreme values, but limits them further. The 90th percentile value for the data used to assess the City of Bay City's discharge was 62 FC cts/100 ml.

Thank you for your comments.

Chris Jarmer – Oregon Forest Industries Council

OFIC has commented and provided information on draft TMDLs before including the Coquille, The Grande Ronde, the Tualatin, and the Sucker Greyback. Technical information concerning temperature modeling submitted with those comments are reference here and made part of our comments concerning the Tillamook. In addition, comments on DEQ policy concerning temperature and non-point sources made in those comments are also referenced here and made part of the record.

Specifically, OFIC still disagrees with DEQ's contention that maximum system potential shade existed across the landscape or that it occurred anywhere through time in this or other watersheds. Forested landscapes in the Tillamook Bay Watershed were subject to intense, stand replacement storm events and fires at irregular intervals, most recently stand replacement fires in 1933, 1939, 1945 and flood events in winter 1995 and spring 1996. Photographic evidence shows significantly reduced shade levels after these events. Maximum system potential shade likely never existed in most Tillamook subbasins, let alone the entire watershed.

OFIC1
DEQ has not suggested that there is one type of stand that will provide the "right amount of shade." Rather, system potential was defined based on existing conditions and assuming tree heights and densities that were observable in each of the subbasins, and after discussions with professional foresters from the ODF and USFS. Historical analysis of stand age distributions suggest that large areas have alternated at various time scales between old mature forests and highly disturbed landscapes. This distribution of large, old trees has formed a patchwork through time throughout the Coast Range that varied with disturbance regime. Despite this dynamic range of landscapes, there were clearly extremely long periods of time (in human terms) when disturbance regimes allowed large tracts of land to achieve old-growth stature and age distributions.

Summary of historical distribution of forest types and associated shade (ODF 2001).

	Age of Riparian Forest (years)				
	0-3 (Stand Type 1)	4-50 (ST 2)	50-100 (ST 2-3)	100-200 (ST 3-4)	200+ (ST 4-5)
Portion of the Landscape Historically in this Age Class (adapted from Botkin et al. 1995)	**5-15%**	**10-15%**	**15-20%**	**15-20%**	**40-50%**
Relative shade levels (based on forest succession dynamics)	**Very Low to Moderate**	**Moderate to Very High**	**High to Very High**	**Moderately High to High**	**Moderately High**

ODF in their comments provided background estimates for the historical distribution of stand ages. In these data, they suggest that between 55% and 70% of forests were older than 100 years, and 70% to 90% were older than 50 years. Reconstructions of stand ages in the Tillamook Forest suggest that prior to 1850, the Northern Coast Range was largely populated by older forests (>100 years, with a majority >200 years) and that these persisted until the Tillamook Burn series of fires beginning just prior to 1940 (Coulter etal, 1996). We believe that these forests would have provided system potential shade (by definition) and that they developed and persisted though long intervals between major and minor disturbances.

Disturbance is part of the natural scheme. Effective shade changes over time as streamside forests grow and die. Stream shade is not constant from stream reach to stream reach even in mature forests. System potential shade would clearly peak at some age of streamside vegetation. Subsequent shade levels would then have to cycle down (and perhaps up again) over time. Modeling that does not take this variation in both space and time into account is inappropriate. It is interesting to note the even with a shade condition that doesn't exist naturally, 26% of the streams would still exceed temperature standards (top of page 5, draft TMDL).

OFIC2

We acknowledge that disturbance plays a major role in determining stand age, structure, composition, and shade provision. We believe though, that the time scales pertinent to these characteristics are very long – longer than the vast majority of trees in the Tillamook Forest have been alive. Discussions of appropriate levels of disturbance cannot ignore that riparian areas in the Tillamook forest are very young and are perhaps just beginning to provide the moderate level of shade attributed to young forests (see table above).

We disagree with the assertion that the level of shade simulated in the model does not exist. We have measured shade of this magnitude among many of these forest riparian areas. The targeted shade levels are well within the observed values, and the stand sizes and ages are based on description of a mature stand of trees, for which we consulted local foresters. Mature stands were not based on maximum heights or densities, but on direct field observations and growth rate data indicating the advance of trees from early rapid- to later slow-growth phases. This data was considered for all the major species of forest trees present in the basin. The age of a mature stand is estimated at 70-100 years, based on these growth data.

The TMDL discusses shade as a reach averaged effective shade, which takes into account variations within a reach.

Modeling suggests that, at system potential, not all reaches of the mainstems of each river will achieve the 64 F numeric criteria. Approximately 73% of these mainstem reaches will attain the numeric criteria as compared to less than 2% that meet the numeric criteria under current condition. Areas that because of topography, aspect or persistent width will not produce sufficient effective shade will still be warmer than 64°F. This is particularly true in the lower parts of most watersheds where the rivers will be at their widest, even after restoration. This limits the effectiveness of vegetation to intercept sunlight before it reaches surface waters. In general, though, most smaller tributaries and creeks as well as the majority of mainstem reaches are expected to meet the numeric criteria.

In addition, we continue to question DEQ's interpretations of natural stream warming patterns. It appears that DEQ contends that colder temperatures in headwater streams necessarily translate into colder temperatures downstream, regardless of other processes. DEQ's own Heat Source model shows that downstream temperatures reach a natural equilibrium with downstream ambient conditions at some point regardless of upstream temperatures.

We know that at a reach level, input stream temperature is only one parameter that helps determine output temperature. Flow levels, groundwater input, shade, stream size, valley bottom shape, air temperature, elevation latitude, aspect, and a host of other parameters affect output temperature. Surely at times one or a combination of several of these parameters dominate the reach and therefore the output temperature. Therefore, a cooler input temperature may or may not produce a cooler output temperature. A 2-degree cooler input temperature may produce an indistinguishably different output temperature over a reach as short as a few hundred meters.

Given these factors, it is difficult to accept the DEQ's argument that the cumulative temperatures of all headwater streams have the only (or the strongest) influence on bay input water temperature. We find it revealing that on page 4 of the draft TMDL, DEQ states:

> "Effective shade is the most straightforward parameter to measure and is *easily translated* into quantifiable water management objectives." (emphasis added)

Unfortunately, what is easiest is often least accurate. DEQ must continue to develop their understanding of the complex relationships of this very complicated process. A better understanding will ultimately result in better water management objectives and appropriately protect beneficial uses.

OFIC3

The equilibrium temperature hypothesis states that stream temperatures will converge toward and stabilize at a specific temperature given the thermal environment and stream hydrology. This hypothesis oversimplifies stream thermodynamics. While the logic employed in creating the stream equilibrium temperature hypothesis is valid, it is important to consider that data collected in other subbasins (e.g., Tualatin River Subbasin) do not support the hypothesis.

In the Tualatin, stream temperatures rarely converged to a common temperature to remain constant. Of the streams sampled with FLIR in the summer of 1999, data indicate that equilibrium temperatures do not develop and persist. Instead stream temperatures are dynamic and variable. Thermal and hydrologic processes are variable, often dramatically, in both time and space. Stream temperatures indicate this variability. Spatial variability is primarily caused by longitudinal changes in riparian conditions, topography, channel morphology, microclimates (air temperature, relative humidity and wind speeds) and mixing (tributaries, reservoir releases and subsurface waters). Equilibrium temperatures seldom are allowed to develop because the thermal conditions and stream hydrology do not exist as an equilibrium condition over time or space. The level of variability may be dampened as stream flow increases, however. Provided that equilibrium temperatures are not observed in data or analysis, generalizations based on equilibrium theory are not advised.

For purposes of the TMDL load allocation, forest landowners must comply with the Forest Practices Act via ORS 527.770 (Best Management Practices to Maintain Water Quality) and Oregon Administrative Rules in Division 635, 640, 645, 650, 655 and 660 (Water Protection Regulations). If a forestland owner is deemed to comply with these BMPs then the forest landowner is in compliance with applicable water quality standards and the TMDL load allocation. The TMDL should clearly reflect Oregon law and regulation.

OFIC4

This has been reflected in the Water Quality Management Plan under Element 6: Reasonable Assurance of Implementation under the Regulatory/Structured Programs – Forestry.

Given that the TMDL language asserts that water temperatures will exceed the temperature standard in 26% of streams, we suggest DEQ consider conducting a "Use Attainability Analysis" before finalizing the

TMDL. Based on the information in the TMDL DEQ does not expect the proposed measures will restore the river temperature in the lower Tillamook basin to 64°F temperature standard in this river system.

OFIC5
Use Attainability Analysis, as defined under Section 131.10(j) of the Water Quality Standards Regulations, are required when a State wishes to remove a designated beneficial use. In this case, we do not wish to remove the beneficial use for which the Temperature Standard was set (Salmonid Fish Rearing). The Department is following the policy set out in OAR 340-41-120(11)(c and d) which recognizes that not all waters will attain the numeric criteria. Plans are to be developed to address the anthropogenic sources of heating. Once these sources are addressed and the natural conditions are the cause of water temperatures exceeding the standard, the natural surface water temperature will become the numeric criteria. This can be done through the development of a site-specific standard but would be done at some point in the future when anthropogenic sources of heating are controlled.

OFIC is committed to assisting the DEQ develop this better understanding by continued cooperation is these types of projects. This cooperation will continue to improve the quality of this and subsequent TMDLs. If you do not have comments submitted in prior TMDLs mentioned above, please let me know. We can provide more specific technical backups and citations for our statements above if you would like.

Chris Knutsen – Oregon Department of Fish and Wildlife

Page 7; Winter Steelhead in the Tillamook Basin are still listed by the National Marine Fisheries Service as a candidate species (Federal Register, March 19, 1998), not a "Threatened" species.

ODFW1
This change has been made in the document.

Page 25; Figure 5: The figure caption indicated the range of dates for spawning of each species. We suggest that the author change the caption to read spawning and incubation as this is what the dates listed in the body of the figure represent.

ODFW2
This change has been made in the document.

The maps for summer and winter steelhead show migration through Tillamook Bay as a Blue Line. We recommend that the lines through the Bay be changed to green to accurately reflect the migration corridor as indicated in the map legend. The author should be aware that we have very little evidence of summer steelhead spawning and survival to adult. Summer steelhead are not native to the basin and virtually all production is of hatchery origin.

ODFW3
The lines through the bay have been changed to a lighter blue and the legend reflects that this represents migration.

Page 26; Table 4: The section of the table labeled "Rearing" doesn't indicate if it is freshwater of estuary rearing. Species such as summer steelhead, winter steelhead, and coho may rear in freshwater for one (coho) or more years (steelhead) before migrating to the ocean; however, the table indicates that there is no "rearing" of steelhead or coho in August. The table should be changed to indicate rearing during this month.

ODFW4
The suggested change has been made in the Table.

The table indicates that rearing of fall chinook occurs through October. While this may be true, most of the late spring and summer rearing occurs within the estuary. Given that you are including estuarine residency time in your table, it would be a good idea to represent rearing of chum in estuarine environment as well

(none currently listed). For your information, Ellis (1999 TBNEP Monitoring Report) showed that peak occurrence of chum salmon in the Tillamook estuary occurred in April, with residency extending through July.

ODFW5
The table is intended to represent habitat use in freshwater with the purpose of determining a critical period for applying the temperature standard. These uses are based on a discussion with an ODFW district biologist (Rick Klumph). We strove to distinguish between the overall range of use and peak use as indicated in the table. At that time, the indication was that the range of freshwater use by fall chinook extended into October. We were not intending to represent estuarine rearing in the table and so will not make that change. For our purposes, and believing that the table still represents real fish use (e.g., some rearing in freshwater through October), since the temperature standard for rearing and migration is 64 ºF year round in freshwater, no difference in application of the standard would occur from the addition of estuarine rearing periods.

Page 44; Table 8: Pacific Campground: The numeric criterion of 55°F is listed for the period October through April. This captures all salmonid spawning and incubation in the area downstream of the facility except winter steelhead (December through July) and perhaps spring chinook (September through January). ODFW has observed winter steelhead spawning as far down as Donaldson Boat Ramp during summer 2000; we have not confirmed spring chinook spawning downstream of Pacific Campground but have observed fish in the area during the late summer and believe that suitable spawning substrate is present.

ODFW6
Donaldson Boat Ramp is well upstream of all discharges to the Wilson River. After discussion with ODFW staff (Chris Knutsen), this comment no longer relevant.

Tillamook Creamery: We do not have any documented spawning of salmonid species downstream of the creamery point of discharge. However, chum salmon do have the physiologic capability to spawn in the brackish water located downstream and some suitable spawning gravels may be present. If the critical period identified in the table (October through April) is intended to capture potential spawning and incubation, a footnote should be added to indicate as such.

ODFW7
ODFW states in their comments, and have confirmed to us that chum spawning habitat is available and potentially usable in the lowland areas where all of the Discharges to the rivers are located. Lacking other objective data we believe is reasonable that we apply the spawning standard to the area during the period indicated in Table 4 based on discussion with ODFW staff.

City of Tillamook STP: Same comments as for Tillamook Creamery, above.

Tillamook Industrial Park STP: Staff could not recall observing a discharge point from the park into the Trask River. We are aware of a discharge from the Park into Anderson Creek a tributary to the Tillamook River. Nevertheless, the same spawning and incubation potential exists for chum, winter steelhead, and spring chinook in this section of the Trask River as is listed in the three sites above.
AND
Page 62: Table 14. Port of Tillamook Bay: Anderson Creek is a tributary of Tillamook River, not the Trask River as indicated.

ODFW8
The Port of Tillamook Bay has a permitted discharge to the Trask River at River Mile 5.2. There has been no reported discharge to the Trask for over 2 years, but the permit is still in force. There is also a stormwater discharge to Anderson Creek, but this is a separate issue.

Ted Lorensen/Jim Paul/Mark Labhart – Oregon Department of Forestry
The comments have been divided into parts indicated by (letters). Written comments by Lorensen also cover the oral comments of Paul and Labhart, and responses are combined here.

"System potential" and Effective shade
(a) System Potential as described in document, does not reflect a natural condition;
(b) The system potential condition is further defined on forestlands as a 100% Douglas-fir forest, approximately 80-100 years of age, extending out to 100 feet on both sides of all streams in the Tillamook Bay watershed. (c) The shade targets were determined by modeling this fixed condition throughout the entire forested portion of the watershed, with a 125-foot height and mixed forest used in the lowlands. (d) Given that the temperature standards were developed based on what is believed "to protect, maintain and improve the quality of the waters of the state for . . . the propagation of . . . fish and aquatic life . . . "(ORS 468B.015(2)), and the shade targets were designed to achieve water quality standards, the TMDL proposes that the riparian forest condition modeled to achieve the water quality standards is the condition known to be beneficial and protective of fish.

ODF1
a. System Potential is, by definition, a natural condition or a condition that is managed to reflect a natural condition. System potential reflects a condition that does not include anthropogenic impacts, but does include natural disturbance. The modeled System Potential in the document does assume that a dense riparian community can (and will with time) develop, and that if that community develops, the shade resulting from it would result in lower stream temperatures. It does not preclude the potential for disturbances on a variety of scales of time or space. If these natural disturbances do occur, then the shade regime will be different. However, given a system with minimal disturbance, and no anthropogenic impacts, we believe these levels of shade and accompanying temperatures are possible, natural, and that they have occurred in the past.

b. There is no statement or implication that the riparian areas would be populated with a monoculture of douglas fir trees. The stated purpose of defining riparian conditions was to estimate what a mature stand of trees with variable species composition would provide if allowed to grow without disturbance. To this end we consulted with ODF and USFS foresters to define what trees would comprise a mature system. Mature was defined as the age at which growth rates for the various trees decreased relative to younger trees (i.e., the growth curves included in Appendix A began to "flatten out"). This maturity was established at 70-100 years of age for conifers and lesser periods for hardwood species. For upland areas, the height of trees in these "mature" stands were estimated as the average expected height of all the conifers for which growth curves were presented. For lowlands, the average included a higher percentage of hardwood species, resulting in a lesser tree height. Tree heights <u>were not</u> based on the tallest possible trees of any species.

While an assumed width of this riparian area was 100 feet for modeling purposes, this is not established as a target or assumed to be required to provide System Potential Shade.

c. Modeling did not assume the condition extended to all forested parts of the watershed. Only to the riparian areas of major rivers and tributaries. However, targets should assume that shade will develop on all tributaries.

d. We agree with this assessment of the standard, its application, and modeling of conditions that would result in lower temperatures.

Near stream disturbance zone
a. In attempting to model the "system potential" condition, the TMDL arbitrarily reduces the mean NSDZ and reduced the variability of the NSDZ. No data is presented to explain why it is believed that this better represents historical conditions. b. If narrowing the mean channel width as described in the system potential 'model' were actually achieved, channel complexity would be reduced, an increase in average stream gradient would occur, and stream flow would be accelerated. c. All of these conditions are characteristic of a simplified channel morphology and associated habitat characteristics that are less

desirable than the current channel conditions in terms of fish habitat quality. It is also possible that the result of such a model is to produce targets or outcomes that are not achievable.

ODF2

We anticipate the reduction in near-stream disturbance zone (NSDZ) widths to occur over a long time frame. These changes will occur along with the redevelopment of riparian vegetation in much of the watershed. Areas that currently have well developed vegetation and relatively stable stream banks will continue to evolve. As with the discussion of vegetation above, attempts to reduce median NSDZs throughout the subbasin may be altered by natural events. In this sense, nature holds the ultimate trump card. The intention is to remove anthropogenic influences that continue to result in excessive NSDZs.

a. Many reaches of each of the river subbasins in the Tillamook Bay watershed are "overwidened" resulting from past practices in concert with natural events that have eroded stream banks. Although natural floods and fires have been significant causal factors in streambank erosion, forestry, agricultural, mining and road-building activities have all contributed to the current condition. The distribution of widths within each of the subbasins indicates that the volume of water carried by the river can readily be carried by narrower channels in many areas.

b. The TMDL does not refer to the mean channel width, but the median of the Near Stream Disturbance Zone. The distinction is important because our intention was to provide for areas that were naturally and persistently wide to fit within the target. Given that the systems as described are overly wide, many areas can have reduced NSDZ widths without altering channel complexity, gradient, or velocity. They are running through channels now that may be sufficiently small and complex while still carrying the volume of the river during high flows, but the disturbance zone is unnaturally wide and do not allow shade to be as effective under natural conditions.

c. The narrowing of NSDZs that are currently too wide would not result in decreased complexity, increased gradient or velocity (see above). In fact, this should eventually result in greater channel complexity, increased shade, more large wood deposits, better sediment-holding capacity, and an increased number of pools in those areas that are currently too wide.

Remotely Sensed Data

a. The DEQ should be aware that an assessment of the Western Oregon Digital Image Project (WODIP) satellite vegetation coverage (referenced on p. A-91) was conducted by Congalton et al. (2000), where it was determined that a 25-30% accuracy could be attained in the mapping of vegetation from this satellite data. This is a reasonable estimate of the accuracy of satellite imagery, given that riparian vegetation communities can exhibit a high level of diversity within 25 meters of a stream. Remotely sensed data with a 25-meter pixel resolution assigns a single value to a 25x25-meter area, when the actual riparian area can exhibit multiple vegetation communities within this distance from the stream. Given the relatively poor accuracy of this data source for classifying riparian vegetation, its utility for this purpose is questionable.

WODIP satellite vegetation coverage (BLM 1998) is referenced in helping to determine the spatial input parameters of riparian height and riparian canopy density. It remains unclear how DEQ field observations, aerial photograph interpretation, and this satellite data were used together to acquire these input parameters. Previous DEQ responses on this issue have not provided much more clarity than is in the TMDL document. From previous public presentations by the DEQ, it appears the satellite data was used to map the vegetation, and the resulting polygons representing vegetation types were then overlaid onto digital orthoquads as a check to test the accuracy of the satellite data.

b. This issue is essentially one of whether or not a sample size is sufficient to represent a population. The Landsat (i.e. WODIP) data is a relatively coarse-scale data-base and, as stated above, does not effectively depict vegetation changes in riparian areas over short distances (<25M). Since this is being used as a basis to determine the vegetation layer used to estimate "system potential" shade, it is important that this data layer is corrected with representative ground-based or higher resolution data. The relative sample size of the higher resolution data, as well as the quality of that data, will determine the range of error that will result from the correction of the Landsat data. Given the range of error (i.e. average deviation) of □7.5%

depicted in the measured vs. predicted shade figure that was included in a recent DEQ response to comments on the Tualatin TMDL, it appears that the sample size used to correct the Landsat data may have been inadequate to reduce the range of error to a relatively small margin.

Is an average deviation of 7.5% shade acceptable in terms of the TMDL shade targets? If so, this variation should be incorporated into the target. Currently the look-up figures for the shade targets result in an absolute value without a range of error. If this deviation is not acceptable, the representative ground-based data and/or higher-resolution remote sensing data used in helping to determine the spatial input parameters of riparian height and riparian canopy density should be re-evaluated and improved upon in order to reduce the range of error.

ODF3

a. Areas where WODIP vegetation data discriminated among vegetational stand characteristics (essentially, non-agricultural areas) were overlaid on Digital Orthophotographic Quadrats (DOQs), though not for the purpose of testing the accuracy of the WODIP data. Each digitized river was overlain on WODIP and DOQs through its entire length, and vegetation was plotted based on direct observation. Where WODIP matched the DOQs, it was used in original form. Where the existing data departed from conditions observed in the DOQs, the layer developed from WODIP was corrected at relatively high resolution (<1:5000). In this way, WODIP was a labor-saving device that provided a basic layer, but the end product was more accurate than WODIP. Moreover, for sections of the rivers where ground-truthing was done (Lower Wilson and Trask Rivers) the digitized vegetation layers were very accurate. This ground-truthing included direct measures of tree heights of various species, riparian composition, channel and NSDZ widths, and buffer widths.

b. As described above, obtaining shading estimates throughout the watershed included a painstaking process of overlaying the entire length of a stream on the latest available DOQs, and individual polygons were drawn around vegetational/landuse features throughout the watershed. This was also done where WODIP data were available, and the vegetational/landuse layer was changed where there was a departure from the DOQ image. Therefore, the error term for the WODIP grids are not relevant because of this separate effort to determine landuse and vegetational characteristics.

Effective shade can vary considerably over a short distance, in some cases resulting from the effect of a single tree or mountain. Field collected values were based on averages of several samples per station, and GIS derived values were sampled at 100-ft intervals. Given that these were not really estimating the exact points in space, the error term is quite small. Averaged over a reach, this amount of error is acceptable.

Department recommendation for revising the temperature TMDL methodology
The department recommends an alternative approach to the methodology presented in the temperature TMDL. The definition of "system potential" should be modified to be consistent with what is known about historical conditions in the Tillamook Bay Watershed in terms of forest succession and disturbance cycles. The shade targets should be representative of a distribution of shade conditions across the basin that emulates those shade conditions that persisted historically and are believed to have occurred when salmonid populations were thriving. Given the role of disturbance, this would result in highly variable shade conditions, both spatially and temporally, where different portions of the riparian landscape would experience different shade levels at any given time.

ODF4

We appreciate the recommendation and look forward to continued cooperation with ODF in determining the effectiveness of management practices for protecting water quality.

We believe DEQ's present approach is appropriate for determining loading rates and targets for water quality protection and is consistent with ODFs goal for managing streamside stands along fish-use streams. That is, "to grow and retain vegetation along streams so that, over time, average conditions across the landscape become similar to those of mature unmanaged streamside stands". Although the evolutionary history of salmonids is indeed marked by widely varying conditions of temperature, shading, channel complexity of rivers, availability of spawning grounds, and many other factors, it is inappropriate

for us to guess what the model watershed should look like and manage disturbances to try and meet those conditions for a given population of fish. Even though there has always been a disturbance regime that cleared large tracts of forest, this was based on return rates of hundreds to thousands of years. Using ODF's description of stand ages through history in the Coast Range, between 70% and 90% of stands were 50 years old or more, with 40%-50% of those greater than 200 years, and 55%-70% greater than 100 years of age. Clearly a significant portion of Coast Range forestlands were of very large, old trees. This supports the idea that there were very long periods of "recovery" between the natural events (fires, floods, diseases, etc.) that caused widespread resetting of the forest age classes. Given these very long periods and the large percentage of trees in the older age classes historically, it seems appropriate to manage for "mature" stands of riparian trees with the assumption that natural disturbances will continue in the future and cause the "right amount" of disturbance in the watershed. Although, as demonstrated by ODF, there were large areas of old (>200 years) forests throughout the North Coast Basin through time, DEQ has not suggested that trees of this age class are the only appropriate size and density. We have indicated that "mature" trees, approximately 70-100 years of age or older would provide system potential shade. We also believe this is consistent with ODF's goal for managing vegetation in streamside areas where vegetation retention requirements found in the general prescription were developed by examining the confer basal area that would be expected for an unmanaged streamside area at the age of 120 years. This still leaves a wide range of age classes once riparian stands are this old or older.

Shawn Reiersgaard – Tillamook County Creamery Association
General Comments:
OAR 340-41-025 sets out the promulgated water quality standards established to protect designated beneficial uses in the North Coast Basin. In 1998, pursuant to §303(d) of the Clean Water Act, DEQ developed a list of stream segments in the North Coast Basin that may not meet applicable water quality standards.

Based upon the §303(d) listing, DEQ is required to establish a Total Maximum Daily Load for each pollutant in each stream segment in order to assure the attainment of applicable water quality standards. This draft TMDL, however, imposes waste load allocations and load allocations in freshwater stream segments based upon water quality standards applicable only to estuarine shellfish growing areas. This in fact revises existing water quality standards, is inconsistent with §303(d) of the Clean Water Act, and violates the state and federal Administrative Procedure Acts.

TCCA1
The TMDL has not set new water quality standards for water quality in rivers; rather the TMDL is designed to achieve existing standards in the Tillamook Bay considering all sources of bacteria within the watershed. The TMDL does this by applying existing standards for a waterbody that receives waste from another waterbody. This is the case with Tillamook Bay, which is impaired by contaminated water in the watershed that discharges to Tillamook Bay. Section 303(d) requires that TMDLs include all sources in determining the loading capacity for an impaired waterbody. This includes natural or background sources as well as upstream sources. Bacterial concentrations within rivers upstream of the Bay are highly influenced by human activities. Moreover, the bacteria allocations in the TMDL vary throughout the watershed, and may exceed the target upstream of the mouth as long the target is reached at the mouth.

TCCA is concerned that DEQ has over-simplified the Tillamook Bay watershed and river system in developing this draft TMDL. While we sympathize with DEQ's time and personnel constraints in completing this TMDL, we are concerned that the models used to develop the TMDL are overly simple, are not-well tailored to the Tillamook Bay watershed and do not reflect the best available data. As a result, we are concerned that the draft TMDL does not accurately represent how the Tillamook Bay watershed system actually functions or the actual linkages between pollutant loads, water quality conditions and impacts on beneficial uses.

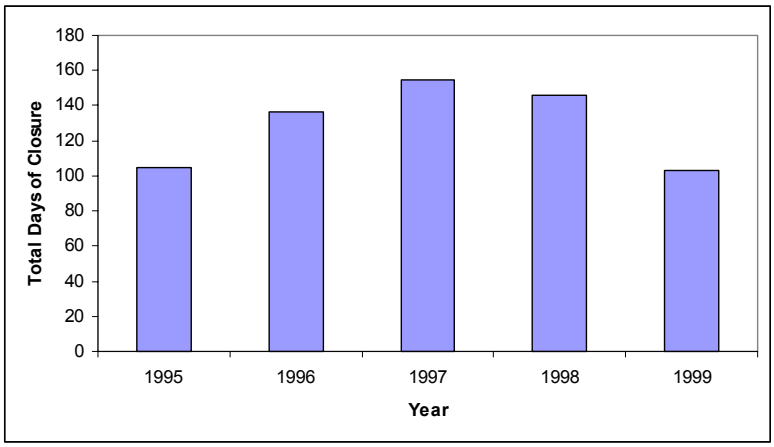
TCCA2
We believe that the current TMDL was developed with models appropriately rigorous for setting TMDLs. DEQ and coordinating agencies and individuals collected data directly in the watershed for two years. Digital data sources used were the most complete and up-to-date available. The sheer amount of data

included in the temperature modeling was unprecedented. The model used for temperature includes a wide range of data sources aside from a considerable amount of field data. All of the data was specific to the Tillamook Basin, and included field data, digital descriptions of terrain, rainfall, vegetation, landuse, gradient, channel width, and many other data types.

The model used to estimate bacterial loading to Tillamook Bay considers flow rates in the individual rivers, location of potential source of bacteria relative to receiving waters, slope and elevation, velocity of water, time of travel to receiving waters, overland and instream decay, dilution within the Bay, and historical bacterial concentrations. Models were developed in part based on information developed and documented by the TBNEP and made extensive use of the GIS data. All of these parameters were developed with data directly from the Tillamook Bay Watershed where possible. Data that were not specific to this watershed included some estimates of bacterial concentrations for given landuse, runoff coefficients, and decay rates which were derived from published and widely accepted studies of similar landuses and systems. These latter features were not available from local studies. We believe that the model has taken into account all the necessary parameters to determine an appropriate load capacity and wasteload and load allocations.

The Tillamook Bay watershed is the focus of extensive community restoration efforts directed toward improving water quality and salmonid habitat. The community's commitment is evident in the development and implementation of Tillamook County Performance Partnership's Comprehensive Conservation Management Plan (CCMP). This plan was developed to specifically address water quality and habitat issues in the watershed.
Water quality is improving throughout the watershed. In fact, water quality in the bay has improved to the point that the duration of bay closure to shellfish harvest in the conditionally approved portion of the bay has decreased by 29%.

TCCA3



We appreciate the important contributions the community is making toward improving water quality. We also pledge to contribute to these efforts over the years with both technical assistance and appropriate grant funding. As seen in this document, the CCMP is the core of the Water Quality Management Plan that will be submitted along with the TMDL. Although there have been significant improvements in water quality, beneficial uses are still not supported a significant portion of the time, and many areas are persistently out of compliance with temperature standards during summer and with shellfish harvesting standards during high river flows. Although shellfish harvest closures are based on river flows rather than direct measurements of bacterial contamination, recent evidence of contamination during runoff and high flow events indicates high bacterial concentrations occur.

Executive Summary:
Page 1, paragraph 3. This paragraph implies that the Rivers are the sole source of bacteria to the Bay. Other sections of the document make it clear that there are direct discharges of bacteria within the Bay.

TCCA4
To clarify this we have added the following text to this paragraph:
"There are also two Wastewater Treatment Plants and three businesses with permitted discharges directly to the Bay."

Chapters 1 and 2:
Page 7, § 1.1, paragraph 4. This paragraph implies that the waters of the Tillamook Bay have concentrations of bacteria that commonly exceed recreational use standards. This is incorrect.

TCCA5
Although there have been apparent improvements in bacterial concentrations over the years, exceedances of the recreational use standard continue to occur. Concentrations of bacteria in all samples collected at several stations suggest there are parts of the Bay that commonly do not meet the recreational standard. Using the old fecal coliform standard of no more than 10% of samples exceeding 400 MPN/100 ml, three of four stations would be listed as impaired.

Station	Percent of samples >400 FC/100 ml			
	1960-69	1970-79	1980-89	1990-99
412008 - Tillamook Bay at South Dolphin	35%	30%	20%	30%
412016 - Tillamook Bay at Northeast Bay	20%	6%	5%	14%
412015 – Tillamook Bay near Hobsonville Pt.	3%	8%	1%	13%
412014 - Tillamook Bay at North Bay	6%	7%	7%	3%

Station	5-sample Geometric Mean >200 FC/100 ml			
	1960-69	1970-79	1980-89	1990-99
412008 - Tillamook Bay at South Dolphin	18%	17%	3%	10%
412016 - Tillamook Bay at Northeast Bay	10%	0%	0%	0%
412015 – Tillamook Bay near Hobsonville Pt.	0%	0%	0%	0%
412014 - Tillamook Bay at North Bay	0%	0%	0%	0%

Page 9, § 1.3.2 Water quality is one of *four priority problems* identified in the CCMP.

TCCA6
We agree. The sentence has been changed.

Page 15, § 2.2, paragraph 4. It is inappropriate to single out the dairy industry as a source of fecal coliform in the watershed. It is particularly inappropriate when using soft data such as "hundreds of thousands of tons of manure annually."

TCCA7
This was a quote from the Tillamook Bay National Estuary Project Environmental Characterization (July 1998. While we believe the quote is readily backed by solid data demonstrating that hundreds of thousands of tons of manure are produced annually, however, we have removed the reference to manure and added balance to the statement by discussing contributions from other sources. The replacement text reads:

"The 40 square miles of lowland supports rural residential, rural industrial, and urban land uses as well as 28,600 dairy cattle (TBNEP, July 1998), all of which are important sources of bacterial contamination."

Temperature TMDL:
Page 5, paragraph 2. The contention that facilities discharging during the critical chum spawning period (October through April) will have to meet a 55^{o}F waste load allocation is not supported by data. Although the TCWRC web page shows chum spawning in the lower reaches of the river, there is no data that supports this. In conversations with Chris Knutsen, ODFW, his department does not believe that the lower

reaches of the rivers support chum salmon spawning, nor is there any anecdotal evidence that the lower reaches ever have supported spawning chum salmon.

Chum salmon spawning is not a beneficial use in the lower reaches of rivers in the Tillamook watershed. Consequently, the 55°F water quality standard does not apply, and it is inappropriate to apply a 55°F discharge effluent limitation to point sources that discharge to the lower reaches of rivers in the Tillamook watershed.

TCCA8
The information used to determine the life stage timing patterns were provided by ODFW's District Biologist. In conversations with and review of comments from ODFW (Chris Knutsen), it is clear that there is currently potential spawning habitat in the lower reaches of the river. Mr. Knutsen stated that "chum salmon do have the physiologic capability to spawn in the brackish water located downstream and some suitable spawning gravels may be present." Mr. Knutsen agreed that there is a potential for use by chum salmon below the discharges. It has been the policy of DEQ to defer to ODFW in determining the status of habitat use for the purpose of applying water quality standards. Given the ODFW finding of potential for spawning, we must apply the spawning criterion for chum salmon to the lower reaches of the rivers. As new information becomes available, such as through an ODFW update of fish distribution maps, or other distributional surveys acceptable to ODFW, the TMDL may be modified as described under adaptive management.

DEQ should develop temperature management plans rather than a TMDL to ensure compliance with state water quality standards for temperature. OAR 340-0410026(3)(a)(D); OAR 340-041-120(11)(e). Under DEQ regulations, compliance with state water quality standards is met when a thermal source is in compliance with its established temperature management plan. OAR 340-041-026(3)(a)(vi). Temperature management plans are in place for forestry sources through the Forest Practices Act and for agricultural sources through the North Coast Basin Agricultural Water Quality Management Plan. See Draft TMDL p. 10; OAR 340-41-120(11)(e)(A) and (B). Specific temperature management plans for point sources, including TCCA, should be developed as part of NPDES permit renewals. OAR 340-041-026(3)(a)(D)(iv). TCCA has been discussing proposed aspects of a temperature management plan with the DEQ since it submitted its NPDES permit renewal application in December of 1997.

TCCA9
The Department disagrees with the Associations interpretation of state administrative rules and the overriding federal law. The Association is correct that under the various basin rules compliance with a TMP will shield a source from enforcement for violation of a numeric criterion. However, regardless of temperature management plans, segments are WQL if they fail to meet the applicable numeric criteria. OAR 340-041-0120(11)(d) and 340-041-0026(4).

Under the Clean Water Act, a TMDL is required for these water quality limited segments. 33 USC §1313(d); 40 CFR § 130.7. It follows that if a TMDL is required, wasteload and load allocations are required. The TMPs can serve as the WQMP for purposes of the implementing the TMDL. The TMP can continue then to serve to shield a source from enforcement for violation of a numeric criteria while the TMDL is being implemented. However a WLA is a requirement of the implementing regulations governing CWA Section 303(d).

The Association is correctly working with the Department to develop a TMP, which provides a mechanism for developing an implementation plan within their NPDES permit. This approach is more practical than requiring that the Association immediately comply with the numeric temperature criteria. The TMP is a mechanism for implementing the TMDL, but not for changing the temperature standard.

Page 22, § 3.1.2, paragraph 1. A temperature standard that specifies that all "anthropogenic impacts that cause stream heating should be removed", and bases TMDL compliance on a stream potential of "no anthropogenic warming" sets the compliance bar impossibly high. The TMDL should acknowledge that human activity occurs in the Tillamook Bay watershed and will continue to provide anthropogenic warming conditions to the waters of the state.

TCCA10
The basis of the TMDL requirement is that anthropogenic sources of pollutants are only allowed if the loading capacity for a water body is not exceeded by the summation of loads from natural and anthropogenic sources. The loading capacity of the rivers will be exceeded relative to the current standard even with all anthropogenic sources of pollution removed. This means there is no allocation of heat loads for non-natural sources.

Page 23, § 3.1.3, paragraph 1. Beneficial uses and associated water quality standards should be applied *specifically* in the watershed where the beneficial use is reasonable and historically supported. See comment 1, above.

TCCA11
Beneficial uses are defined for the basin in OAR 340-41-0202 and are presented in Tables 3 and 10 of the TMDL. Beneficial uses are protected where historically or potentially attainable. A beneficial use that does not occur due to current, human-induced impairments to habitat or water quality would not legitimately be disregarded for purposes of application of water quality standards. In determining where beneficial uses required protection and standards should apply, we relied on the best information available. ODFW data indicates that the lower reaches of Tillamook Bay Watershed Rivers are appropriate habitat for chum salmon. Although there is no indication that chum use these areas now, ODFW has indicated that there is potential for this use. Based on this and ODFW information on the timing of habitat use by salmonids, appropriate standards were applied to the lower reaches.

Page 27, § 3.1.4.1, paragraph 1. "Monitoring has shown that water quality temperatures in the Tillamook Bay Watershed *often exceed* numeric criteria of the State water quality standard." Often exceed numeric criteria is an unwarranted extrapolation of the data presented in the TMDL document. Replace the word "often" with "can."

TCCA12
Data collected by a variety of sources (NRCS, DEQ, and Volunteer Monitoring) are available from at least five separate years. These data clearly show the temperature numeric criteria have been exceeded. We will made the change from "often exceed" to "have commonly exceeded at many stations" to reflect that data collection is in the past tense.

Page 31, § 3.1.6.1, table 6. The data associated with the Tillamook Creamery is misleading. The flow rate of 0.75 cfs occurred during a flood event where flood water entered the collection system. This flow rate does not even approximate a dry weather design flow. It is more appropriate to use a value based upon typical range of plant operation. For example volume of effluent discharged by TCCA in 2000:

0.47 cfs average.
0.25 cfs minimum.
0.71 cfs maximum.

The table also cites the critical temperature of the Tillamook Creamery as 91^{o}F. This value is misleading in that it is little more than a snap shot of a discharge temperature on a single day. Actual discharge temperature is dependent upon the amount of effluent discharged. As the volume of effluent discharged increases the temperature of the effluent is tempered. This is especially true whenever storm water enters the collection system.

TCCA is particularly concerned that this misleading data will be used to develop temperature discharge limits that will be incorporated in the TCCA NPDES permit.

TCCA13
It is common practice to base limits on relatively severe conditions. This is the basis for using a 7Q10 (the 7-day average of minimum daily flows with a 10-year return period) low flows in setting limits for discharges. We relied on data that was available from Discharge Monitoring Reports or personal

communication (in the example of the Tillamook Creamery) for calculating the examples in the Allocation Table. Given the defined conditions in the table, the listed allocations are correct. However, we did not rely entirely on 7Q10 data river flow data, or on specific flows and temperatures for a given discharge in determining wasteload allocations. By providing the mass balance equation for temperature discharges, each permit may have limits for any combination of river flows, effluent flows, and effluent temperatures. This allows tremendous flexibility in determining discharge limits, while still ensuring that water quality standards will be met.

Page 36, § 3.1.7.1. Using percent effective shade as a surrogate for solar radiation loading capacity is problematic in implementation. It is unclear how the system potential will be determined in a specific location, what actions a landowner will be expected to perform, and how compliance will be monitored.

TCCA14
There is no expectation that compliance with the standard will be determined on a foot-by-foot scale in the watershed. Effective shade is expressed on a reach averaged basis, meaning that the average shade for a relatively long stretch of river or stream will be determined as part of monitoring efforts. Noncompliance with the allocations would result from purposeful changes to riparian vegetation or channel morphology that decreased shade or retarded its natural recovery (in the case of the North Coast Basin Agricultural Water Quality Management Area Plan) not permitted by existing rules or ordinances. Lack of riparian vegetation would only be a violation if the area in question came under the jurisdiction of one of the landuse authorities (e.g., Forest Practices Act, SB1010 Plan, County Ordinances).

Page 37, § 3.1.7.1, paragraph 2. While channel morphology may be affected by riparian vegetation conditions, relying upon improvements in riparian conditions to improve channel morphology is an agonizing slow process. The TMDL should acknowledge that some in-stream work is necessary to achieve the desired channel morphology.

TCCA15
We agree that the process of restoring channel morphology will proceed very slowly if no active restoration occurs. However, the TMDL does not require active channel morphology restoration. Moreover, there is nothing in the TMDL that limits projects that would result in increases of riparian vegetation or decreases in NSDZ width. DEQ would encourage that activity if it is appropriate.

Page 44, § 3.1.8.1 table 8. TCCA has several concerns about the statements made and conclusions reached in this table:

- The numeric temperature criteria for October through April assumes spawning of chum salmon; the available data does not support this as a beneficial use—historic or potential.

TCCA16
a. See response TCCA8 above.

- The facility flow value is too high (see comment #6 above).
- Because the calculated values for the TCCA temperature waste load allocation is based on a too high of "dry weather" flow, and a too high discharge temperature the calculated values are excessively restrictive.

a. See response TCCA13 above.

- To base TCCA's NPDES permit on calculations derived from non-representative data is inappropriate.
- The draft waste load allocation assigned to TCCA is neither technology-based nor necessary to achieve water quality standards; it is, therefore, inconsistent with both federal and state law. Water quality-based effluent limitations are to be set at levels necessary to achieve water quality standards. 40 C.F.R. §122.44(d); ORS 468B.020(2)(b), 468B.025(1)(b).

c. The data used for evaluating WLAs in the TMDL are site specific to each source. The data are representative. The Water Quality Based Effluent Limitation based on the representative data are consistent with the TMDL, state and federal requirements. The TMDL must also address critical conditions. The metric for the temperature standard is the 7 day average of the daily maximum, which does represent a critical condition. However, the Department did not intend that these critical conditions would be the sole basis was for determining WLAs or Permit Limits

There is considerable flexibility in the method for determining discharge limits and the specific data used in Table 8 can be updated as this determination is being made. Using maximum effluent temperatures and flows along with low receiving water flows is not unreasonable when determining discharge limits. We believe the method for determining these limits is appropriate, objective, and that they are necessary to achieve water quality standards.

DEQ has assigned TCCA a waste load allocation that reduces TCCA's existing temperature effluent limitation while reserving 37 ½% of the identified assimilative capacity of the Wilson River for temperature for future point sources (25% is expressly reserved for future sources, while 12 ½ % is reserved for "permitted" sources, although the TMDL identifies TCCA as the only existing temperature point source). OAR 340-41-026(3) imposes much more stringent standards on new and increased dischargers than on existing sources. There is simply no authority for reducing the effluent limitation of an existing source in favor of unknown future dischargers, and DEQ has identified no reason for doing so.

Further, the draft TMDL states that its temperature Margin of Safety is implicit (p. 5). Yet, the draft WLA assigned to TCCA reflects an explicit reservation of 50% of the temperature assimilative capacity for uncertainty and a margin of safety. This explicit margin of safety is duplicative and unnecessary to achieve water quality standards according to DEQ's model, and the additional assimilative capacity should be assigned to TCCA.

TCCA17
The margin of safety must take into account any lack of knowledge concerning the relationship between effluent and water quality. The temperature model calibration precision defined in the TMDL provides a reasonable description of the relationship between effluent limits and water quality. The Department believes the model inherently contains the margin of safety that addresses the mechanistic relationships between heat load and instream temperature.

The reference to margin of safety in the allocation of assimilative capacity to point sources in the TMDL was incorrect. Future growth, development, and pollution trading options account for 75% of the eventual assimilative capacity. . The remaining 25% of eventual assimilative capacity will be allocated to permitted discharges as described in the TMDL.

The Department agrees that it will be difficult to assign WLAs to new sources to a water quality limited stream. However, we disagree that there is no authority to assign WLAs for future growth and development. The definition of WLA includes future sources.

The Department does not agree that the potential assimilative capacity must be allocated to the Association. Oregon's water quality management policies and programs recognize that Oregon's waterbodies have a finite capacity to assimilate waste. Unused assimilative capacity is an exceedingly valuable resource that enhances instream values. If BMPs or other NPS actions provide any practical assimilative capacity in the future, this would be allocated consistently with the antidegradation policy, environmental effects criteria, and economic effects criteria.

The TMDL does provide for tradeoffs between point and NPS. The Department will therefore reserve the potentially available assimilative capacity for use in pollution trading strategies or for allocation once NPS controls provide practical assimilative capacity.

Page 51, § 3.2.2, paragraph 2. The last three sentence of this paragraph seem contradictory.

TCCA18
This text has been changed as follows:
~~*In general, there is a strong linear relationship between the two indicators and collection of one type allows reasonably accurate estimates of the other*~~*. Although the relationship is significant, bacterial concentration estimates in environmental samples are not very precise, as indicated by substantial variability among paired and duplicate samples. This results in relatively large errors in estimates of fecal coliform bacteria from E. coli concentrations and vice versa.*

Page 55, § 3.2.5.2, paragraph 6. I believe that this paragraph is referring to the Tillamook River Basin, not the Tillamook Bay Watershed.

TCCA19
This change has been made.

Page 55, § 3.2.5.2, paragraph 7. There is a general confusion in this document about where the TCCA outfall is located. According to TCCA's NPDES permit, the TCCA outfall is located at river mile 1.7.

TCCA20
This change has been made. All references to the location of the TCCA outfall will refer to river mile 1.7.

The February 1, 2000 Memorandum of Agreement between the U.S. Environmental Protection Agency and the Oregon Department of Environmental Quality Regarding Implementation of Section 303(d) of the Federal Clean Water Act requires DEQ to provide reasonable assurances that the TMDL will be implemented. TCCA is unaware of existing legal authorities that will obligate private parties to establish riparian forests providing 80% effective shade.

TCCA21
DEQ recognizes that meeting the temperature standard through restoration of riparian areas will require the cooperation of private landowners as well as public agencies throughout the basin. The Oregon Forest Practices Act, The Northwest Forest Plan on federal lands, and state Agricultural Water Quality Management Area Plans are the vehicle for providing System Potential vegetation on forest and agricultural land. We also realize that the restoration of riparian communities will take a very long time. There has been significant progress made over time through local planting and fencing programs. We hope the effects of these efforts will begin to make improvements in water quality on a small scale and encourage private landowners to make the necessary contributions to these improvements.

Compliance with the proposed temperature allocation will require cooling of the wastewater treatment effluent. Preliminary studies indicate that passive cooling, or the use of an evaporative cooling tower, will not meet the proposed discharge temperatures. Refrigeration of the effluent discharged will be required to meet the proposed TCCA temperature allocations. Refrigeration of the effluent will be costly, require significant electricity, and increase the volume of anhydrous ammonia stored onsite. The DEQ should consider these potential adverse environmental impacts associated with the draft TMDL.

TCCA22
The DEQ has not identified nor evaluated all of the options available for the Association. It would be our expectation that the TMP will be used to identify and evaluate options. However, the Department does not believe that refrigeration of effluent would necessarily be the best option. The economic and environmental costs of such an option would be considered as part of the TMP.

Bacteria Comments:

The draft TMDL for bacteria is based upon protection of shellfish harvesting for both the rivers and Tillamook Bay. Shellfish harvesting is not, however, a designated beneficial use for freshwater streams in the North Coast-Lower Columbia River Basin. OAR 340-41-202 and Table 1. Freshwater streams within

the North-Coast Lower Columbia River Basin are required to meet bacteria standards designed to protect water contact recreation. OAR 340-41-205(2)(e)(i). Now the standard is an E. *coli* standard; prior to 1996, the freshwater bacterial standard set a limit of 200 fecal coliform organisms per 100 ml.

Oregon's 303(d) list identifies freshwater streams within the Tillamook Bay subbasin as water quality limited on the basis of the freshwater standard. A TMDL identifies "levels necessary to attain and maintain the applicable narrative and numerical [water quality standards]…." 40 C.F.R. § 130.7(c)(1) (emphasis added). The applicable bacteria water quality standard for freshwater streams within the Tillamook Bay subbasin is the E. *coli* standard promulgated in OAR 340-41-205(2)(e)(i). DEQ's proposal to establish a bacteria TMDL that limits freshwater streams to 28 fecal coliform colonies per 100/ml effectively skirts the triennial review process to revise the freshwater water quality standard without recourse to the rulemaking procedures set out in Oregon's Administrative Procedures Act. This is inconsistent with both federal and Oregon law. The TMDL should be established at levels that will assure attainment of the applicable E. *coli* standard in freshwater streams and estuarine waters other than shellfish growing waters.

The standard for all rivers and streams in the watershed should correspond to OAR 340-41-205 (2)(e)(A)(I): a 30-day log mean of 126 *E. coli* organisms per 100 ml, based upon a minimum of five samples; and no single sample exceeding 406 *E. coli* organisms per 100 ml. Further, this standard should only be in place when recreational contact is likely. It is appropriate to wave this standard whenever a river or stream rises above flood stage.

TCCA23
See response TCCA1 in general comments above.

Bacteria data collected on behalf of the Tillamook County Performance Partnership indicates that it is possible to achieve the 30-day log mean standard on most rivers and streams. The data also indicates that it is impossible to achieve the standard of no single sample exceeding 406 *E. coli* per 100 ml.

The background bacteria level of 10 Fecal Coliform colonies per 100 ml, as specified by the DEQ is too low. Bacteria data has been collected weekly on the Wilson River at Mills Bridge (the forest/agriculture demarcation) since 1997.

Geomean	1997	1998	1999	2000
Total Coliform	30.6	190.3	172.2	273.1
Fecal Coliform	80.1	15.5	13.0	18.0
E. *coli*	12.5	10.7	13.2	28.4

Samples collected by TCCA for the Tillamook County Performance Partnership
Bacteria colonies per 100 ml

Maximum	1997	1998	1999	2000
Total Coliform	652.8	9,450.0	24,192.0	24,131.0
Fecal Coliform	1,265.0	40.0	62.0	60.0
E. *coli*	466.3	192.0	496.0	2,310.0

Samples collected by TCCA for the Tillamook County Performance Partnership
Bacteria colonies per 100 ml

TCCA24

DEQ used a value of 25 COUNTS/100 ml as background concentration for instream concentrations from forested areas. This background concentration was derived from a geometric mean of historical winter data from several upstream stations on each of the rivers, as follows:

STORET No.	***Station Description***
412219	*MIAMI RIVER @ 1ST BR. ON MIAMI R. FOREST RD.*
412186	*KILCHIS RIVER AT BRIDGE*
412198	*SOUTH FORK WILSON RIVER JUST OFF HWY 6*
412200	*WILSON RIVER AT POWERLINE CROSSING*
412199	*WILSON RIVER AT HWY 6 (RIVER MILE 32.75)*
412193	*EAST FORK TRASK RIVER U/S FISH HATCHERY*
412227	*TILLAMOOK RIVER AT RIVER MILE 17.5*
412213	*SIMMONS CREEK AT MUNSON CREEK ROAD*

Statistics for Forestry Background sites used to determine background bacteria concentrations (Fecal Coliform Counts/100ml).

Statistic	***Winter***	***Summer***
Median	*10*	*10*
Geometric Mean	*22.5*	*14.0*
90th-percentile Value	*145*	*30*
Maximum Value	*1000*	*180*
Number of Sample Values >406	*4*	*0*
Percent of Sample Values >406	*3%*	*0%*
Number of Samples (n)	*136*	*44*

This concentration is greater than what has been measured in other forested areas during storm studies (e.g., Nestucca River concentrations in forested area ranged from 1 to 6 COUNTS/100 ml, with a geometric mean of 3.7). We appreciate that there may be other influences on water quality in the Mills Bridge area and believe the values from farther up in the watershed more realistically represent background conditions. The TMDL applies to these landuses near Mills Bridge as well as other landuses. Sources in this area should be meeting the runoff allocations for the appropriate landuses.

We delineated the area above Mills Bridge. The Land use statistics are outlined below:

Land Use	***Acres***	***Percent***
11 Open Water	*123*	*0.12*
21 Low Intensity Residential	*50*	*0.05*
23 Commercial/Industrial/Transportation	*34*	*0.03*
33 Transitional	*1187*	*1.14*
41 Deciduous Forest	*24526*	*23.64*
42 Evergreen Forest	*58717*	*56.60*
43 Mixed Forest	*18870*	*18.19*
51 Shrubland	*196*	*0.19*
71 Grasslands/Herbaceous	*26*	*0.03*
81 Pasture/Hay	*7*	*0.01*
Total	*103735*	*100*

Residential, transportation and open water categories are most directly above the Mills Bridge and near the stream. There were no registered CAFO above the bridge.

The proposed reduction of 90-99% in Fecal Coliform is unnecessary, unrealistic, and untenable. Requiring this level of improvement will discourage the community from even attempting any environmental

restoration activities. See Temperature TMDL comment 13 above (no reasonable assurances of implementation). Although the local TMDL review team supported the concept of interim goals no interim goals are addressed in the TMDL.

TCCA25

The TMDL is designed to achieve the existing water quality standards. Standards or beneficial use changes occur under different programs under the clean water act.

The reductions indicated for the various landuse allocations were not arbitrarily chosen. They were the direct extension of the bay standard of 14 COUNTS/100 ml, and estimated dilution ratio of 2:1, and the subsequent river mouth limit of 28 COUNTS/100 ml. In reviewing the TMDL, DEQ found an error in the dilution ratio calculation. A new calculation allows a dilution ratio of 3:1, resulting in a river mouth target of 42 COUNTS/100 ml. Given these restrictions, reductions were recalculated on the same basis for all landuses in a given flow category, as they had been before. That means that a percent-reduction was applied equally to agriculture, rural residential, rural industrial, and urban landuses to arrive at the allocated runoff concentrations and ensure fairness.

Page 61, Table 13. It is inexplicable that the DEQ model assumes no bacteria die-off or dilution between the TCCA outfall and the mouth of the Wilson River. This is inconsistent with the model in Appendix B. It is similarly inexplicable that point sources which discharge directly to the bay (e.g. Bay City) have exactly the same dilution as sources that discharge several miles up the river. A TMDL must have some rational basis in available science, or it is arbitrary and capricious and therefore contrary to law. See Anderson v. Public Employees Retirement Board, 134 Or. App. 422 (1995); Jones v. Employment Division, 30 Or. App. 103 (1977).

TCCA26

We have recalculated the effluent allocations for point sources and included decay rates in these new allocations. This was done in concert with recalculating non-point source allocations due to the discovery of an error in the dilution ratio estimate. The new dilution ratio is 3:1 (instead of 2:1) resulting in a target concentration of 42 FC cts/100 ml (instead of 28 FC cts/100 ml) at the mouth of each of the Rivers. Based on this new instream target, and instream decay rates, the effluent allocations are presented in Table 18 for summer period, and for fall-winter-spring (FWS) periods. These periods are distinguished by different flow and temperature regimes. Low flows (and water velocities) and higher water temperatures typical of summer conditions allow greater decay than high flows and low temperatures characteristic of FWS conditions. These allocations are considerably higher than the instream target for many of the dischargers in the summertime, but are only slightly greater than the instream target during FWS. In cases where the allocation in summer was greater than the bacteria standard for recreational contact, the standard will be the allocation.

Shellfish growing areas in Tillamook Bay are determined by historic bacteria analysis, and by the proximity to point sources that have the potential to discharge substances harmful to human health. For this reason it is extremely unlikely that those areas of the bay identified as prohibited will ever be opened to shellfish harvest. Although the shellfish standard applies only to "shellfish growing waters," not all estuarine waters, (340-41-205(2)(e)(A)), DEQ's draft TMDL disregards the promulgated standard in favor of a "long term goal" of shellfish harvesting throughout the Bay.

In fact, a variety of factors other than FC counts determine the suitability of shellfish growing areas. Much of Tillamook Bay will remain classified as "prohibited" from shellfish growing simply because of its proximity to a POTW, regardless of ambient FC concentrations. OAR 630-100-010 (National Shellfish Sanitation Program, Guidance for the Control of Molluscan Shellfish).

Regardless of water quality, some areas of the Tillamook Bay will never, and have never supported commercial shellfish production and harvest. Applying shellfish growing water quality standards in those areas that cannot support and have not supported that beneficial use is inappropriate.

It is appropriate for DEQ to craft a TMDL that will achieve legally applicable water quality standards to support designated beneficial uses. It is inappropriate for DEQ to use the TMDL process to favor

commercial interests in ways not contemplated by existing law.

TCCA27
The shellfish harvesting classification applies where populations of shellfish exist in concentrations that may be harvested (Cannon, Deborah, personal communication). This includes native shellfish and is not restricted to simply the existing oyster harvesting area of Tillamook Bay. For Tillamook Bay there does not appear to be an explicit definition of where the populations exist. The National Shellfish Registry identifies the entire Tillamook Bay classified as shellfish harvesting waters.

Historical bacterial measures do not by themselves identify shellfish harvesting water. The historical measures are used to identify subclassifications of shellfish harvesting waters. The USEPA generally maintains that fish and shellfish advisories and certain shellfish growing area classifications based on waterbody specific information demonstrates impairment of CWA section 101(a) fishable uses. This applies to fish and shellfish consumption advisories and certain shellfish area classifications for all pollutants that constitute potential risks to human health regardless of the source of the pollutant (USEPA Guidance, Use of Fish and Shellfish Classifications in 303(d) and 305(b) listings).
Bacteria criteria for shellfish harvesting has been consistent for many years with USEPA Quality Criteria developed since 1976. USEPA stated that the microbiological suitability of water for recreational harvesting of shellfish should be based on fecal coliform levels (14 MPN/100ml median or no more than 10% of samples exceeding 43 MPN/100ml). The bacteria criteria for shellfish growing waters provides assurance that the beneficial use for recreational fishing for estuarine shellfish is protected.

We do not agree that the standard was intended or written to protect only commercial shellfish growing waters. There is not a definition of "shellfish growing waters" in the Oregon Administrative Rules or Revised Statutes. The intent was and remains to protect human health associated with harvest of shellfish from bay waters. As such other resources that are harvested by recreational fishers must be protected to the same degree. We acknowledge that the standard is very strict. We believe, though, that it must be applied wherever there is a reasonable expectation that estuarine shellfish will be collected for human consumption. ODFW distribution maps indicate shellfish beds of a variety of species throughout the Bay. This fact guides us toward applying the standard to all shellfish growing waters of the Bay.

The Department does agree that river stage, habitat, and seasons may influence when the beneficial use of shellfish harvesting can exist. To date, none of this information has been developed. The Department believes such information can and should be developed as part of implementation plans as defined above. This information can appropriately be used in the development of interim targets and be incorporated by adaptive management into future TMDL updates.

It is unreasonable to enforce restrictive shellfish growing standards when shellfish harvest is unlikely or impossible. Shellfish harvest should be prohibited whenever a river reaches flood stage. This type of harvest restriction should be addressed in the TMDL.

TCCA28
Shellfish harvesting restrictions enforced by the Oregon Department of Agriculture are based on the knowledge that under some circumstances of river flow and rainfall, the likelihood of contamination is high. These restrictions were developed using historical data and their use is still appropriate given recently collected data. Despite a reduced number of days out of compliance in the Bay in recent years, concentrations are still commonly elevated under the conditions described for harvest restrictions. However, assuming that closure periods represent a natural condition or that defining them is protective enough of public health ignores the obvious fact that if concentrations of bacteria entering the Bay were lower, especially during high flows, there would be fewer days where shellfish harvesting was restricted, and additional areas where harvesting would be approvable. In light of the excessive concentrations of bacteria entering the Bay from the watersheds, large reductions in concentration are called for.

Moreover, the allocations developed in this TMDL suggest the standard will be met in areas where there is a 3:1 dilution ratio in the bay. For most of the year, this level of dilution is only available in the current conditionally approved areas or the Bay.

Much of the data used to assess the water quality of the bay was collected during extreme storm events. It is unlikely that shellfish were harvested, or will be harvested, during this time due to safety concerns and shellfish quality.

TCCA29

Data used for assessing the bay were from long-term monitoring programs run by DEQ, ODA, or both. These data were not oriented toward storms, and more likely reflect bacterial concentrations during drier weather due to the inherently more dangerous conditions on the Bay during storms.

Modeling of bacterial accumulation in the Watershed was done based on two storms of measurably different flows and bacterial concentrations. Given that nonpoint source runoff is a major source, if not the major source of bacterial contamination to the Bay, a model designed for runoff estimation was appropriate. It follows that runoff (storms) events were the focus. Modeling of storm events was appropriate for determining the allowable limits on runoff concentrations from various landuses. Basing them on storms with high concentrations of bacteria may seem to make compliance more difficult. However, as early season storms supplied higher concentrations of bacteria to the rivers, and these are what reduction rates are based upon, much of the winter period that is characterized by lower concentrations of bacteria will consequently have lower reduction rates. In effect, compliance will be easier to achieve during parts of the year than others. This is based on the very real condition that bacterial concentrations vary among rainfall events, in part a result of their magnitude and timing relative to accumulation of bacteria on the land through a variety of processes.

The water quality criteria do not allow distinctions based on weather or the likelihood of harvest (in the case of shellfish standard). In fact, shellfish restrictions last for a prolonged period following cessation of high river flows regardless of the physical ability to harvest.

The 2:1 dilution of river water by bay water is not well supported in the TMDL. It is my understanding that the conductivity data is generally collected at low tide when the dilution would be at the absolute lowest. Because the conductivity data was not included with the TMDL, it is impossible for us to comment upon the validity of the data or the accuracy of the calculation. However, the salinity data included in Appendix D, page 171, would seem to indicate that Bay water near the river mouths is predominantly comprised of seawater. The dilution model is not based upon good science, and the related waste load allocations and load allocations are therefore invalid. See Anderson v. Public Employees Retirement Board, 134 Or. App. 422 (1995); Jones v. Employment Division, 30 Or. App. 103 (1977).

TCCA30

Data used for the dilution modeling was from a wide variety of tidal and salinity conditions at many stations. The range of conductivities near the mouths of the rivers ranged from a low of 45 µS/cm to 44000 µS/cm (approximate salinities of 0.0 ppt to 28.4 ppt). The narrative description of salinity in the bay indicated in the WQMP has been changed to reflect this.

Statistic	***Summer***		***Winter***	
Tillamook Bay at Memaloose Point	*Conductivity*	*Salinity*	*Conductivity*	*Salinity*
Maximum	*35200*	*22.1*	*42000*	*26.9*
Minimum	*120*	*0.0*	*45*	*0.0*
90th Percentile	*31400*	*19.4*	*23500*	*14.1*
10th Percentile	*203.6*	*0.1*	*73.8*	*0.0*
Tillamook Bay at South Dolphin	***Summer***		***Winter***	
Maximum	*44000*	*28.4*	*44000*	*28.4*
Minimum	*137*	*0.0*	*83*	*0.0*
90th Percentile	*38822*	*24.7*	*32770*	*20.4*
10th Percentile	*574.8*	*0.2*	*113.1*	*0.0*

The assumptions behind the proposed 28 FC limit are flawed. Specifically, page 53, § 3.2.5.1 of the text states "Median concentrations in both the summer and winter generally meet the standard for shellfish harvesting when the approved areas are open for harvesting (Figure 18)"—despite extensive historical evidence that FC loading in the rivers is generally higher than 28 FC colonies per 100 mls. It is also clear from the data presented in figure 18 that the bacteria concentration at the mouth of the rivers is at least three times greater than the proposed standard of 28 FC per 100 mls, yet shellfish harvest standards are meet in the designated beneficial use areas. The TMDL's own data should overrule the dilution model.

TCCA31
The cited bacterial concentrations while the Bay is "open" for shellfish harvesting are skewed toward good weather; low river velocities (longer retention time) and more saline conditions in the Bay. Under these conditions, bacterial decay rates are higher than when velocities are high (faster transit through the Bay) and the Bay is inundated with fresh (and contaminated) water. These differences in decay rate would easily explain the differences between modeled target and concentrations observed in the upper Bay. However, the data also shows that concentrations in the upper Bay under all conditions are, though somewhat higher, similar to the target of 42 MPN/100 ml. This suggests that the model is reasonable at estimating appropriate concentrations in the Rivers.

Page 59, § 3.2.5.3, paragraph 4. The Tillamook County Creamery Association, in conjunction with the Tillamook County Performance Partnership, has conducted an extensive monitoring program of the Wilson River from the forest/agriculture demarcation line since October 1997. This data has been submitted to the DEQ, and is available from both the Tillamook Coastal Watershed Resource Center and TCCA. It is important to consider this data when developing a TMDL for the Wilson River.

TCCA32
*We appreciate having received this data. The contribution of forestlands to bacterial loads was based on stations farther upstream and in tributaries (see response **TCCA24** above). The consequences of using data that indicated higher concentrations from these forestlands than were found in upland areas would have been higher loading to the bay, resulting in lower allocations to point and nonpoint sources in the watershed. Given that the forested areas are considered background contributors, higher background bacterial concentrations would have required higher reductions from point and non-point sources to meet the ultimate limit of 42 COUNTS/100 ml at the river mouths.*

Page 61, § 3.2.6.1, table 13. The location of the TCCA outfall is wrong. The outfall is located at river mile 1.7, not river mile 1.3.
AND
Page 66, § 3.2.8.1, table 17. The location of the TCCA outfall is wrong. The outfall is located at river mile 1.7, not river mile 1.3.

TCCA33
We have corrected these errors.

Page 66/67, § 3.2.8.2. "Farm buildings and pastures that have manure applied to them are set at zero allocation because of the effluent guidelines requiring CAFOs to have a zero discharge to surface water." Virtually all Tillamook County dairy farms are too small to be subject to federal CAFO effluent guidelines. Instead, Tillamook County farms are permitted by the Oregon Department of Agriculture. Pastures that have had manure applied to them at agronomic loading rates, and in accordance with best management practices or a waste management plan, receive an agriculture storm water exemption. This is not the same thing as a zero discharge requirement.

TCCA34
Facilities that were modeled as CAFOs were those that have a CAFO permit with ODA. The CAFO permit is an NPDES permit and therefore, they are subject to the federal CAFO effluent guidelines. Any facilities that were too small to fit the definition of a CAFO were not specifically modeled. They would fit into the "agricultural" land use category. Hobby farms would also fit into the "agricultural" land use category.

The language that explains the requirements for CAFOs came from meetings with EPA CAFO inspectors and ODA representatives. These representatives concurred on the language used in the TMDL. In short, we believe the requirements of the CAFO permits issued through the ODA do require that there be zero discharge of waste from these operations.

Section 303(b)(2) of the Clean Water Act requires only that water quality standards take "into consideration" industrial water quality needs; nothing in the Act requires that water quality standards be established to protect industrial uses that are more sensitive than ecological or human health uses. The shellfish cultivated in Tillamook Bay are non-native species that do not reproduce in the Bay. The shellfish industry came to the Tillamook Bay in the1930s (see p. 15), *after* the bay had been significantly impacted by anthropogenic activity. If an environmental assessment had been performed at that time it is unlikely that the shellfish industry would have been permitted to the extent that it was. It's worth noting that EPA supports the designation of beneficial uses that distinguish between protection of indigenous populations and cultivated stock. See *Water Quality Standards Handbook – Second Edition* §2.1.2 (EPA, 1994). If the water quality needs of the non-native shellfish cultivation industry in Tillamook Bay cannot be met without revising fresh water quality standards throughout the Tillamook Bay watershed, DEQ should evaluate whether the shellfish cultivation industrial use can be attained without widespread social and economic impacts to a community whose economy is grounded in forestry and agriculture

TCCA35
The EPA considers this use under section 101 of the CWA as swimming and not industrial. Also the definition of shellfish harvesting is not restricted to the oyster industry but includes native shellfish. The TMDL is therefore written to protect that use as well as industrial use..

Page 133: "Table 1" appears to refer to Table 24. "Figure 1" appears to refer to Figure 53.
Page 135: "Table 2" appears to refer to Table 25.
Page 137: "Figure 4" appears to refer to Figure 54.

TCCA36
These errors have been corrected.

Page 139-40 and Table 31: It is inappropriate to attribute instream values to TCCA. TCCA's wastewater discharge has at all times since 1997 met its effluent limitations for bacteria at its permitted compliance points.

TCCA37
The Department believes it is appropriate to attribute the increase in instream bacteria to, at least in a significant part, the discharge from the Association. The observation that the TCCA complies with their bacteria limit at the compliance point does not mean that the source of bacteria to the Wilson River is not associated with TCCA discharge. The TCCA outfall has unique problems associated with regrowth of bacteria on the effluent pipe. This bacteria provides a substantial source to the river. The TMDL and permit compliance will address this documented bacteria source. The instream data demonstrates a significant increase from upstream of TCCA to downstream of TCCA , This instream increase is consistent with data collected by TCCA showing high fecal coliform concentrations being discharged from TCCA's outfall pipe to the Wilson River.

Page 144: Figure 60 shows that the model overestimates bacteria concentrations at the mouth of the Wilson River by a factor of approximately 2. This indicates that the model does not predict actual conditions with any reasonable degree of accuracy and is an inappropriate basis for regulation.

TCCA38
The model uses the same runoff concentration for a given land use, regardless of the location in a given watershed. It is likely that land use runoff concentrations vary in the vicinity of each outfall. Additionally, sources not included in the model may be contributing to the instream values.

The differences between modeled and measured concentrations in the lower parts of each river (particularly the Tillamook) are likely due to tidal dilution. This is explained in the text on page 145 of the Draft TMDL, following Figure 60. Values that account for this tidal dilution are plotted for the Tillamook River and compare closely to measured concentrations. This suggests the model is accurately estimating bacterial concentrations well throughout the watershed and that relatively high concentrations are entering the Bay during runoff events despite the influence of tidal dilution.

Pages 146-49: The TMDL calculations are shown only as equations, not as actual calculations. Appendix B should, at a minimum, include the numeric values substituted for each equation variable. As it is, the Appendix does not include the information necessary to duplicate the DEQ's calculations.

TCCA39
We believe the comment is referring to the dilution ratio calculations. An example dilution ratio has been included in the appendix for clarity.

Equation 3 assumes seawater has no bacteria. This is plainly an incorrect assumption: There are multiple direct discharges of bacteria to seawater in and around Tillamook Bay, including municipal sanitary treatment plants, commercial and recreational boats, stormwater runoff, leaking septic systems and a very large marine mammal population.

TCCA40
Despite these concerns, seawater in the Bay appears to be quite clean before mixing with river water and other discharges. Waters in the Bay that are more saline (have mixed less with freshwater) were associated with lower bacterial concentrations, even in areas with high concentrations of marine mammals. Although there are low concentrations of bacteria in these samples, this station has already been mixed some with freshwater; the likely source of bacteria. This suggests that seawater as it enters the bay is generally free of bacterial contamination. The other sources of bacteria listed in this comment are assumed to be controlled by design in the modeling.

Station 412418 –Bayocean Spit Near Mouth of Tillamook Bay at Anchorage Block in Crab Harbor. Values in Fecal Coliform Counts/100 ml.

Statistic	***Salinity > 20 ppt***	***Salinity < 20 ppt***
Median	*2*	*22*
90th Percentile	*8.1*	*85.1*
Maximum	*13*	*110*

Appendix D:
Page 181: The TCCA outfall is at RM 1.7, not RM 2.

TCCA41
This error has been corrected.

Page 182: In the Bacteria TMDL, general NPDES permits are listed in Table 14. Table 14 indicates that many of these discharges either contain fecal coliform or have not been sampled. In § 3.2.8.1, these point sources are given a bacteria WLA of zero. The WQMP identifies no measures directed at assuring that the WLA for the Table 14 point sources will be implemented through permit revisions or some other enforcement mechanism.

TCCA42
The WQMP indicates that DEQ will be pursuing stormwater management plans on one or more geographic bases (e.g., regional, countywide, citywide, etc.) to ensure that best management practices are applied as appropriate. The areal extent of these plans will depend in part on the desire of communities that are contained in the basin to share resources and responsibilities in drafting these plans. Some of the

indicated point sources were included in the modeling of bacterial loads to the Bay as indicated. Others will be controlled based on the land use (e.g., urban) allocation developed for this type of activity.

Page 186-87, Identification of Responsible Participants: TCCA has no legal obligation or authority to assume responsibility for implementation of any aspect of the TMDL other than its own wastewater treatment facility. TCCA does not assume responsibility for livestock management training, excluding livestock from streams (which the WQMP estimates may cost more than $8 million), encouraging protection or enhancement on private lands, providing technical assistance or providing funding for habitat protection or enhancement projects. TCCA , as a private citizen, has been and remains supportive of water quality improvement projects in the Tillamook Bay watershed, but there is no basis in law for DEQ's delegation of these enforcement and funding responsibilities to TCCA. Please delete this section from the WQMP.

Page 202: For the reasons stated in comment 3, supra, please delete the reference to TCCA as an available source of funding for riparian restoration.

TCCA43
Much of the WQMP is based on the TBNEP CCMP that is now being implemented through the TBPP, of which TCCA is a member. DEQ appreciates the fact that any activities that are not specifically required by ordinance, statute, or rule will be implemented only on a voluntary basis. DEQ also recognizes that TCCA involvement in and sponsorship of many of these activities, while strictly voluntary, has been and would be a tremendous benefit to the goal of improving water quality in the subbasin. However, we will remove the reference to the varied assistance that is indicated for the TCCA.

Tyson Smith – Northwest Environmental Defense Council
Introduction
The Department undoubtedly faces a difficult task in assessing both the point and non-point sources of pollution in such a diverse stream setting. NEDC certainly recognizes the significant effort that went into the model development and application for this TMDL. While many portions of the TMDL effectively address water quality and riparian health needs, other sections need to be more adequately developed to ensure compliance with the Clean Water Act and Oregon law. Moreover, the presence of threatened species in the basin further increases the importance of developing a comprehensive plan that will adequately address all water quality impacts on the species.

The overall goal of the TMDL must be attainment of water quality standards. 33 U.S.C. § 1313, 40 C.F.R. § 130.7 (c). NEDC is concerned that the TMDL and WQMP will not meet this goal. To that end, these comments attempt to address deficiencies in both the TMDL and its implementation through the WQMP. However, NEDC's goal is not only to compel more extensive and relevant documents relating to the Tillamook Basin, but also to urge the Department to develop TMDLs and WQMPs that actually improve water quality throughout Oregon, rather than serve as roadblocks that must simply be cleared to continue environmentally destructive practices. The TMDL and WQMP have the potential to become powerful tools with useful results in the preservation and restoration of Oregon's waterways and must not be looked upon as a necessary evil. The attitude and approach of this document as a whole suggests an improvement in the process of TMDL and WQMP development in the past two years, but there is still considerable room for change.

Temperature
General Comments on the Temperature TMDL
First, the utility and application of surrogate measures for temperature in the TMDL is questionable. In general, the utilization of percent effective shade as a surrogate measure, rather than simple loadings, is a commendable step in a more holistic approach to achieving water quality standards. However, this approach has its limitations, so it must be applied in a more stringent manner. The TMDL must more thoroughly assess the sources of shade and relevant data. Specifically, the TMDL should point out what type of shade will be required in the WQMP. The TMDL should address shade provided by conifers versus shade provided by other water-consumptive or invasive species. The models use a very simplistic approach that fails to take into account all relevant factors, such as groundwater inputs, intergravel flow and

stagnation. Each of these factors plays an important role in the percent shade dynamic by influencing the morphology and amount of water in a stream.

NEDC1
The TMDL has presented potential near stream vegetation species compositions appropriate for the conditions found in the Tillamook Bay Watershed. These species compositions are representative of a mature overstory that is likely to produce the potential effective shade surrogate measures. Other factors that affect temperature were addressed where data was available. Others mentioned, in general, have a cooling effect on the water and were not included as a benefit to temperature regimes, but instead, were assumed to provide no cooling effect as part of the implicit margin of safety.

Second, the temperature models and analysis are flawed. The approach to applying system potential is fraught with peril - especially when the only anthropogenic activities that are removed in DEQ's consideration are point sources, the destruction of streamside vegetation, channel widening and reduced summertime base flows. The TMDL must allow for **no measurable surface water temperature increase resulting from anthropogenic activities**. OAR 340-41-202(2)(b)(A). Yet, the TMDL does not appear to account for the following anthropogenic activities: increased temperature of runoff associated with overland flow over impervious surfaces, changes in groundwater withdrawal patterns, land-use or forestry practices, current impacts from permitted point sources, and other potential thermal impacts caused by humans. This does not follow the text or spirit of "anthropogenic activity" requirement from above. The system potential must be based on the removal of *all* anthropogenic sources, not just the point sources. DEQ has the burden of proving that the current model is physically based and that it takes into account the important factors mentioned above. This result is not apparent in the temperature TMDL. The limitation of the assumptions means that the system potential calculated is incorrect and that further temperature reductions should be required.

NEDC2
The Department feels that the primary sources of anthropogenic heat are accounted for in the temperature TMDL. The temperature modeling effort accounts for current condition hydrology, riparian and atmospheric parameters. In addition, existing point source flow and temperatures were incorporated into the current conditions model calibration. Under the system potential modeling scenarios, all point sources were reduced to their calculated wasteload allocation and non-point source solar loading was reduced to an estimated background condition. Predicted system potential temperatures reflect these considerations.

Margins of Safety
As mentioned above, TMDLs must include a margin of safety to account for any lack of knowledge concerning the relationship between load allocations and wasteload allocations and water quality. 33. U.S.C. § 1313, 40 C.F.R. § 130.7 (c) (1). The TMDL suggests that the primary margin of safety for the temperature and bacteria TMDLs is implicit in the use of conservative assumptions in the models. However, the margin of safety, to be effective, must be more concrete. It is not illogical to presume that anything more than system potential riparian conditions are possible, feasible, or reasonable. First, a surrogate is being used to determine system potential and a surrogate does not take into account all factors that make up system potential. Second, there could be very drastic changes in stream thermal profiles if groundwater inputs were not affected by such varied activities as paving over of recharge zones or groundwater withdrawals for agriculture purposes. Indeed, the impact of inputs from the various impoundments is only addressed in passing. These considerations affect the validity of the alleged conservatisms.

The use of wind speed and groundwater inflow as conservatism may be justified, but there must be some quantifiable evidence to ensure that they are indeed conservative. The graphs concerning the effect of air temperature and wind speed are offered somehow as suggestions of conservatism without including any analysis of how they relate to the models employed. In addition, any conservatism that comes about from these supposed implicit margins of safety are very quickly offset by the very liberal assumptions in the use of mixing zones. The logic in allowing the MOS to be used as a potential justification for allowing discharge in excess of the standards is self-defeating.

The TMDL claims groundwater inflow as part of its margin of safety. However, the use of groundwater inflow may already be included in the existing analysis of system potential via surrogate measures. Until the groundwater component is clearly identified and quantified, it is insufficient to assume that it is a conservative estimate. Again, there is no investigation into the pattern of groundwater withdrawals during the critical periods and their impacts on instream flow. Without taking into account all the uses and anthropogenic impacts, the TMDL is woefully lacking comprehensive analysis. Rather than claiming the inflow as a conservative measure of the models, the TMDL should address the effect that such inflow might have on the attainment of the standards. It may turn out to be a valid conservatism. However, it could also turn out to be source of significant improvement for water quality if included in potential pollutant control measures. The TMDL should at the very least fully investigate the issue.

When implicit margins of safety are utilized, it is not sufficient to state that assumptions are conservative and therefore a margin of safety is built-in. It is not enough to mention a few supposedly conservative assumptions without also investigating what assumptions might be too liberal. The very liberal assumptions in the use of mixing zones more than offsets any perceived conservative assumptions. Indeed, the burden of proving that the margin of safety is valid lies with DEQ. There should be at least some attempt to quantify the impacts of the assumptions. In the case of a water-quality limited stream where the temperature might be lethal to protected species, a margin of safety should be very explicit. The margins of safety contained in the TMDL are insufficient and fail to comply with the letter or spirit of the law. Some of the margins of safety, like groundwater inflow, should be fully investigated as part of the TMDL to determine what beneficial impacts such flow might have if all the pollution control options were available.

DEQ should use explicit margins of safety for all TMDLs. In water-quality limited streams, DEQ must use explicit margins of safety to adequately comply with water quality standards.

Despite the above comments regarding implicit margins of safety in general, the temperature TMDL does recognize some of the limitations of the implicit margin of safety. I am very pleased to see the inclusion of some explicit margins of safety though they may not be called such by name. First, the allocation of 50% of the assimilative capacity to uncertainty and margins of safety is an excellent step forward. By recognizing the inherent limitations of the model and providing a buffer, the TMDL will more likely be effective at bringing about the desired stream temperatures. Secondly, the decision to reserve some of the assimilative capacity for future development is equally forward-thinking and a great way to ensure that the TMDL will remain a true tool for protecting streamside environments. Third, the assignment of 100% of the loading allocation for non-point sources to the natural sources is equally commendable. It is sometimes difficult to make that leap to "no anthropogenic sources" and I am glad that DEQ made that step in the right direction by recognizing the fact that a water-quality limited stream by definition has no assimilative capacity.

NEDC3

The TMDL includes a detailed description and accounting of heat sources and their result on stream temperature in the mainstems of five major rivers in the Tillamook Basin. lack of riparian shading is the chief cause of excessive temperatures in all of the river systems. The relative importance of mixing zones (small areas in the rivers outside of which no measurable increase in temperature are allowed relative to ambient water) compared to the basinwide increase in streamside shading is very small. The inclusion of the various physical and hydrological features named in the margin of safety is reasonable, justifiable, and allowed based on generally accepted understanding of the cooling effects of groundwater, wind, etc. Moreover, the system potential condition allocates all nonpoint source heating to natural sources with none left for anthropogenic activities. This in itself is a very conservative approach to allocating pollutants among source.

Mixing Zones

The use of mixing zones for temperature is not a viable method for the determination of effluent limits for point sources in water quality limited streams. By definition, there is no assimilative capacity left in the Tillamook Basin rivers if they are water quality limited for temperature. Any discharge of heat above the numeric criteria simply cannot be diluted by water that is already in excess of the water quality standard for temperature. Furthermore, it does not appear that DEQ considered the cumulative impacts of several point

sources on the temperature of the water with regard to mixing zones. If 3 separate point sources are each provided an allocation to increase the background temperature by .25 degrees F. at the edge of their mixing zones, this would appear to allow for a 0.75 degree F cumulative increase, assuming that each discharger will actually be meeting their allocation at the edge of their mixing zone. A cumulative increase of this scope certainly seems contrary to the "no measurable surface water temperature increase resulting from anthropogenic activities" component of Oregon's water quality standard for temperature. Additionally, there is no mention of the size or scope of the mixing zone. Even the calculations that determine the allowable discharge within the mixing zone fail to mention how long the zone extends. By not specifically listing the length, DEQ prevents the public from adequately commenting on the TMDL. Furthermore, the use of a mixing zone is incompatible with an implicit margin of safety as the mixing zone itself is utilizing a liberal assumption.

NEDC4
The Department model does account for cumulative effects of not only point sources, but for non-point sources as well. The expressed concern about cumulative increase from multiple (3) sources fails to account for thermal balance. The allocation s do not allow incremental increases. The Department believes the allocations are consistent with the state standard.. This approach does not allow acute temperature effects within the zone of dilution, and by definition allows no temperature effects outside of the zone of dilution. Discussion of point sources (methodology and calculations) can be found in section 3.1.7.2 through 3.1.8.1 of the TMDL. The Oregon temperature standard defines "no measurable" as being equal or less than 0.25 ^{o}F.

Bacteria TMDL
DEQ has employed and utilized a very empirical model with limited detail for determining the bacteria TMDL. There has been limited ground-truthing of the model and only partial calibration. Furthermore, the model fails to take into account several very important factors that might have an impact on the bacteria loading. For example, the model only considers Horton-type overland flow and does not include any Dunne-type flow that is important in environments with steeply incised channels. This type of flow can often carry significant volumes of bacteria as a result of leaky septic systems or animal wastes. Furthermore, it is not apparent that the model has been properly adjusted for ultraviolet radiation, temperature or overland decay. All of these factors play crucial roles in the determination of projected loadings.

NEDC5
The bacteria model is based on accepted approaches for estimating runoff volumes. The Soil Conservation Service (SCS) curve number and rational method both predict overland flow. A recorded storm hydrograph includes Hortonian overland flow, subsurface flow, and saturation overland flow. The difference between the modeled Hortonian overland flow and the flow recorded at multiple gages in the basin is simply referred to as "baseflow" in the model. Values for baseflow were estimated by hydrograph separation for several summer and winter storms in each of the 5th field watersheds. The "baseflow" estimates were added to the modeled runoff to account for all of the flow contributing to the hydrograph. The decay rate was taken from literature values for instream E coli decay. The decay rate was adjusted for temperature using temperatures recorded in the Tillamook Bay Watershed.

Bacteria and virus die-off is a function of sunlight, temperature, salinity, predation, settling, resuspension and aftergrowth. Typically, bacteria die-off is modeled as a net first order decay as follows (Principles of Surface Water Quality Modeling and Control, Robert Thomann and John Mueller, 1987, Harper and Row, New York):

$$K_B = K_{B1} + K_{BI} + K_{BS} - K_a$$

Where:
K_B = net first order decay rate
K_{B1} = basic death rate as a function of temperature, salinity, predation
K_{BI} = death rate due to sunlight
K_{BS} = net loss (gain) due to settling (resuspension)
K_a = aftergrowth rate

Because of the lack of explicit data, DEQ used a simple first order decay rate adjusted for temperature. Although lower radiation would reduce decay rates, DEQ believes that a simple first order decay rate best reflects the available information.

The effects of temperature on the decay rate can be quantified with the following equation: $(k)_T = (k)_{20}(\Theta)^{(T-20)}$ *where T is in C°, $(K)_T$ is the rate at T°C, $(K)_{20}$ is the rate at 20°C and Θ is the temperature adjustment factor (Thomann and Mueller). Typical values for Θ are 1.022 to 1.024. Decreased temperatures in the Tillamook Bay Watershed are expected as a result of increased shading. To address the impact of decreased temperature on the bacteria decay rates, average current condition temperatures and allocated temperatures were estimated from the graphs in the draft TMDL (Figure13). The graphs display the maximum daily temperature. The post allocation temperature and resulting decay rates are used in the final bacteria TMDL.*

The use of an implicit margin of safety is not appropriate in water-quality limited streams. The assumption of no groundwater inputs is not necessarily a conservative assumption. The groundwater inputs to the stream could be contributing to the background level and the potential for those inputs containing more bacteria from the various land uses must be included to insure compliance with water-quality standards.

Additionally, the margins of safety for the bacteria model may not be accurate. On Page 69 of the Draft TMDL, DEQ claims that winter storm baseflow would be higher and lead to greater dilution" of bacteria loadings in the stream. Although this is true on its face, the application of such a statement to a justification of a conservative estimate is tenuous at best. During winter storm events, the amount, type and duration of runoff may result in a considerable increase in runoff loading that might overwhelm the "greater dilution." Absent any scientific data or modeling results to the contrary, that estimate is not an appropriate way to determine the conservatism of the Bacteria TMDL.

NEDC6
The vast majority of water flowing through the streams of the Tillamook Bay Watershed originates in the forested uplands with very low concentrations of bacteria. The bulk of bacteria sources occur in the lower reaches of the watershed and is accounted for in the modeling. Moreover, leaking septic systems, the principal potential source of contaminated groundwater, were an explicit factor in the model that was applied based on a failure rate estimated following a detailed septic survey of the area. While we agree that winter baseflow originating in areas with considerable development or industrial use could be contaminated, this is not the condition in the Tillamook Bay Watershed. The assumption that baseflow provides dilution in this basin is well supported by the vast amount of water from undeveloped areas and the low concentrations of bacteria observed in water from forestlands.

Water Quality Management Plan
Habitat and Vegetation
The holistic approach to habitat and substrate management is a positive step. However, DEQ must insure that the approaches and goals of the habitat improvement are implemented according to a timeline to insure that excessive delay does not irreversibly alter the quality of the habitat. Also, the impacts of grazing on the various indicators of healthy habitats are glossed over, understated and sometimes ignored. The changes in land use should be specified more clearly to put more pressure on the root causes of the habitat destruction. Also, water quantity in the streams should be included as an indication of healthy habitat. As earlier section of the TMDL pointed out, there has been a tremendous loss of trees and other streamside vegetation since the beginning of the last century. It should be apparent to the Department that some of these reductions are a result of a loss in instream flow.

NEDC7
The WQMP appended to the TMDL document includes locally developed goals and timelines, funding requirements and potentially responsible parties. Where state law mandates restoration activities, that has explicitly become a part of the plan through Administrative Rules and required Management Plans. Restoration activities on private land will require the permission and voluntary commitment of landowners.

There is no evidence that riparian areas in the Tillamook Basin wasted away from a lack of groundwater in riparian areas. In general, upland riparian areas have become populated naturally with either conifer or deciduous hardwood trees or a mix of the two. In lowland areas, planting projects have been very successful where applied.

This TMDL lacks the detailed analysis to determine how the current conditions impact what pollution control actions are needed. For example, the likelihood of attainment of standards should be based upon the resiliency of the riparian area. Because recovery of riparian zones is not linear, but highly dependent on the type and quantity of the restoration efforts, the TMDL should establish the importance of this key foundation, possibly including this type of energy diffusion into the system potential model. There does not appear to be any section in the TMDL that directs the level of effort necessary to reach the water quality standards; it is merely a modeling exercise of the relationship between riparian vegetation and thermal pollution.

NEDC8
We disagree that the TMDL has been a mere modeling exercise. It demonstrates quite clearly the importance of riparian shade and width of the Near Stream Disturbance Zone. The TMDL provides quantitative limits throughout the basin for thermal loading and determines the effective shade necessary to attain system potential temperatures. The degree of restoration, the average height of trees necessary, the types of trees appropriate, the length of time required for their maturation, are all provided in the TMDL. However, as stated above much of the restoration in the basin will be done on private lands on a voluntary basis. DEQ will continue to support efforts to restore watershed beneficial uses through funding and technical assistance.

DEQ should consult with the National Marine Fisheries Service to ensure that the WQMP complies with the Endangered Species Act.
Because of the presence of threatened species within the Tillamook Basin and the likelihood that pollution control measures will not be timely enough to prevent the further degradation of the species in question, DEQ should consult with the National Marine Fisheries Service to get input on possible methods of protecting this beneficial use of the stream. Again, the goals of the TMDL must be kept in mind at every stage of the process. The WQMP has certainly not investigated all the possible controls available that would protect salmonids. Furthermore, there is no reference to the status of the water body under the National Marine Fisheries "proper functioning condition" approach, which could impact threatened fish species. Without a proper understanding of the current conditions, the TMDL cannot possible elucidate the necessary requirements to achieve attainment.

NEDC9
The National Marine Fisheries Service has commented on drafts of the TMDL (see comments in this document) and DEQ has made a presentation of the TMDL and loading allocation to NMFS. NMFS retains the opportunity to consult with other federal agencies (e.g., EPA) to determine whether the TMDL is appropriate. There is no legal provision for direct "consultation" as defined in the Endangered Species Act between NMFS and DEQ on TMDLs – that is a matter between the federal agencies. Regardless, we will continue to solicit input from agencies having Endangered Species Act interests in TMDLs.

The goal of the TMDL must be attainment.
The goal of any TMDL must be attainment of water quality standards. CWA 303(d), 33 U.S.C. § 1313. Much of the proposed TMDL and WQMP treat attainment like a theoretical construct based on questionable applications of simple models. There is not sufficient analysis of what will be required to restore the integrity of the stream to water quality standards. The WQMP should state not only the goals and objectives, but also the necessary steps to get the basin to those objectives and goals. Tables in the WQMP and the TMDL repeatedly list the desired conditions, time frames, and goals, but never really indicate how they will be achieved. In fact, based on the use of mixing zones and allowing point source discharge above the attainment goals, it is questionable that even stringent and flawless application of the TMDL would yield the desired results. The TMDL should establish goals and allocations and the WQMP should establish the methodology for attainment. A more thorough and rigorous analysis of the models and methods used is needed to determine whether the proposed allocations would achieve the desired results.

NEDC10
The requirement of the TMDL is that anthropogenic sources of pollutants be allocated to ensure that they are not causing an impairment of water quality. In the current temperature TMDL, anthropogenic sources of heat have been both implicitly and explicitly included in the analysis, and 100% of the nonpoint sources of heat have been allocated to nature; none is allocated to human activity. There is no more that can be reduced regardless of the resulting temperature regime in the rivers. Point sources are not allowed to discharge at temperatures above the attainment goals for either temperature or bacteria. In the case of temperature, allocations are based on no measurable increase over background with an absolute limit of 0.25°C to account for the precision of temperature measuring capabilities. Bacterial limits were set at the limit derived for river mouths. If a water quality standard is not met in the absence of anthropogenic pollutants, it may be the result of natural conditions.

The temperature model has been peer-reviewed and ultimately judged both an appropriate and rigorous approach for modeling temperature accumulation with respect to a variety of potential sources.

The TMDL lacks the necessary analysis of attainment time frames.
The time frame for attainment of standards is directly applicable to the support of beneficial uses because of the presence of threatened species within the watershed. The time between the initiation of goals and the actual attainment could have a substantial impact on the likelihood of the species survival. Neither the TMDL nor the WQMP develop any analysis of the justifications for the time frames chosen for goals, targets and objectives. There is little discussion of the time frames with regard to realistic attainment, fastest attainment or a quantification of the impacts of control measures on attainment. The TMDL and WQMP must address these issues.

Although the TMDL correctly notes that attainment is dependent upon the restoration of the natural shading of the stream, the attainment of that shading may be so incremental and over such an expanded time frame, that overall attainment may never be achievable. The TMDL/WQMP acknowledges that improvements are likely to aggregate over time, yet it fails to recognize that other non-linear actions might be taken to obtain a better foundation for future improvements. Without such a physical foundation, the standards will likely never be reached or will be reached so far into the future that sensitive species will be unable to survive the wait. EPA's new regulations on TMDLs, while currently not applicable to this TMDL, will impose specific time frames on attainment for the very reasons cited above. See, 40 C.F.R. § 130.33 (b)(10)(i)-(viii). This underscores the importance of time frames to the effectiveness of a TMDL.

Despite the above concerns, this WQMP is much more detailed and better outlines specific goals and "Actions." NEDC is pleased that DEQ is moving toward a management plan that has a better chance of success. By cooperation between the major sources of pollution and DEQ, coupled with a definitive timeline for meeting milestones, the Tillamook Basin has a better chance of long-term success. The WQMP for the Tillamook Basin TMDL is much improved from other basins in the state. NEDC commends DEQ for adopting the "Element" approach to the WQMP since such an approach leads to more concrete plans for attainment. This is a vastly improved WQMP relative to other basins around the state.

NEDC11
According to the Memorandum of Agreement between the United States Environmental Protection Agency and the State of Oregon Department of Environmental Quality Regarding the Implementation of Section 303(d) of the Federal Clean Water Act (2/1/2000), the Department is to provide implementation plans that contain:

- *Timeline for implementation, including a schedule for revising permits, and a schedule for completion of measurable milestones (including appropriate incremental, measurable water quality targets and milestones for implementing control actions);*
- *Timeline for attainment of water quality standards, including an explanation of how implementation is expected to result in the attainment of water quality standards;*

The Department along with numerous partners worked on the implementation plan that was provided. This plan was developed under the Tillamook Bay National Estuary Program. Both a timeline for implementation and a timeline for attainment of water quality standards were provided. As indicated in the draft WQMP, the Department plans to work cooperatively with the Tillamook Bay Performance Partnership to track, review and, if needed, revise elements of the implementation as part of an adaptive management strategy. The timelines that were laid out in the plan are generally consistent with those suggested by EPA in the proposed TMDL guidance. DEQ has also added more specific implementation language for point sources.

CONCLUSION

As difficult and time consuming as the development of a TMDL is, the Department has the opportunity to make significant strides toward maintaining the health of Oregon's waterways. It is clear that DEQ is taking its job seriously in attempting to identify the loadings and measures of the Tillamook Basin, but there are still major areas that need to be addressed. A cooperative approach is preferred to an adversarial one, but DEQ must ensure that it does not go too far in protecting the local interests of the stakeholders over the interests of Oregonians and the Tillamook Bay and Basin. The cooperation that is apparent between the stakeholders and DEQ has yielded a much improved TMDL from those in other basins, yet the NEDC still urges DEQ to revise the TMDL to include a more thorough assessment of all water quality impacts and revise the Temperature and Bacteria TMDLs to remove all anthropogenic sources and mixing zones and to use explicit margins of safety.

Comment noted.

In closing, NEDC would like to stress our support for the continued evolution of TMDL development across the state. It is clear that DEQ is taking the necessary steps to address our concerns on a basin by basin manner. We certainly wish that all of our concerns could be recognized within the individual TMDLs that we comment on, but we realize that a continuing improvement in the quality and accuracy of future TMDLs is equally important. We look forward to your response to our concerns and hope that the issues we've outlined are addressed within the final TMDL. Thank you for the opportunity to comment on the TMDL and WQMP for the Tillamook Basin.

Michael Tehan – National Marine Fisheries Service

This responds to the Oregon Department of Environmental Quality's (ODEQ) Ferry 2, 2001, Public Notice requesting comments on the Draft Tillamook bay Watershed Total Maximum Daily Load (TMDL) and Water quality Management Plan. The National Marine Fisheries Service (NMFS) appreciates the opportunity to review and provide our general comments on the subject document with regard to temperature. The following comments are based on NMFS' statutory responsibilities for the protection and enhancement of marine, estuarine, and anadromous fishery resources. This letter does not constitute formal compliance with the Endangered Species Act or the Magnuson-Stevens Act.

The NMFS appreciates ODEQ's application of a scientifically-based approach to address the identified temperature exceedences in the Tillamook Bay watershed. The temperature TMDL approach described on page 21 of the subject document effectively considers the physical attributes of the watershed in a manner necessary to determine system potential riparian vegetation and channel morphology. ODEQ's approach will likely improve Properly Functioning Condition (PFC) for temperature and potentially provide increased input of microflora and fauna (i.e., nutrients and prey species) into the affected stream systems in a manner that benefits listed anadromous fish.

We also appreciate the fact that the temperature standard, as currently written, specifies that "no measurable surface water temperature increase resulting from anthropogenic (human induced) activities is allowed…" This provides a measure of assurance that the standard will indeed be met. What we believe would better explain the point source aspect of the TMDL would be to clarify the information provided in Section 3.1.8.1 Wasteload Allocations (page 42) and Table 8 (page 43) of the document.

Section 3.1.8.1 describes ODEQ's mixing zone policy for effluent temperatures. The language in the document needs to clarify the size and location of the mixing zone in relation to salmonid habitat, and in what manner listed anadromous fish or their habitat could be impacted in the areas of the mixing zones for the appropriate dischargers identified in Table 8. The document also needs to provide a clearer description of the application of the Load Allocation Allowable Effluent Temperatures in relation to achieving the 64°F numeric criterion.

NMFS1
The critical period of application of water quality criteria was determined based on existing ambient data. In determining the application of criteria based on presence of endangered salmonids, we assumed that each of the point source facilities discharges to an area that must be protected year-round for salmonid migration and rearing, and from October through April for chum salmon spawning. The basis of this application of spawning criteria is the "possible presence" of chum spawning habitat in the area downstream of the discharges as identified by the Oregon Department of Fish and Wildlife. To the best of our knowledge, there currently are no documented spawning areas in these reaches and their existence is uncertain. We have decided despite the uncertainty of spawning to apply the spawning criterion during the entire critical period. We based this decision on the Oregon Department of Fish and Wildlife's determination that chum salmon are capable of spawning in the habitat below the point sources and their best professional judgement that spawning habitat may exist in areas below the point sources. (see comment number ***ODFW6*** *, Chris Knutsen, ODFW, this document).*

The WLA is based in part on the mixing zone being no more than ¼ of the volume of the river under critical low flows (7Q10), and that the temperature may not be more than 0.25 ºF higher than that of the receiving waters outside this zone when the predicted temperature of the receiving waters is at system potential. The actual mixing zone is specified in the permit and may be less than that providing ¼ of the stream volume. The no measurable change of 0.25F at system potential is a limit on the precision of temperature measurement instruments and recognizes that a measured difference up to 0.25 ºF would not be reliably different from the anticipated ambient temperatures at system potential

The Waste Load Allocation Allowable Temperature, while it may vary depending upon receiving water and effluent flows and temperatures, is the maximum temperature that an effluent at the given flow rate can have without causing a measurable (>0.25 ºF) increase in temperature outside of the defined mixing zone. These temperatures, or others that correspond to other flow rates and effluent temperatures will become effluent limits within the NPDES permits granted to the dischargers by ODEQ . It is important to point out that as permits are modified to reflect WLAs, that a maximum allowable temperature will be included to ensure that the discharge temperature is not acutely lethal.

Text has been added to the document to clarify these details.

The discussion of Critical Period for wasteload allocation on page 42 should be clarified to indicate the level of protection afforded to listed salmonids. Although it appears that ODEQ has considered this in the development of wasteload allocations in the TMDL, the subject plan needs to document the extent to which chum salmon spawning habitat could be impacted by flow releases from the identified point source discharges.

NMFS2
Based on the temperature standard, chum spawning habitat will not be impacted by the releases of wastewater if it meets the limits of the wasteload allocations.

The TMDL, as described in the subject document, is based on a watershed approach to the allocation of point and non-point source pollutant loadings. Therefore, we recommend that the load and wasteload allocations be related back to how they effect a change to watershed health and function, with particular emphasis on PFC for salmonid habitat. The analysis of watershed health trends should include a discussion of how potential continuing site-specific violations of the 64°F under the present TMDL compare to the available salmonid habitat as described in the document and how ODEQ believes that overall habitat will be improved through implementation of the TMDL. For example, ODEQ emphasizes that potential

reductions in stream temperature afforded by the implementation of this TMDL in Figures 16 (page 48) and 17 (page 49) of the document. However, ODEQ also recognizes that even with implementation of the stream potential condition allocated in the TMDL, "…26% of the reaches would experience maximum daily temperatures greater than 64°F and none would exceed 68°F."

NMFS3

The allocations for both point and nonpoint sources of heat are designed to limit influence of heat on water quality and to result in compliance with numeric temperature criteria everywhere possible. The criteria being applied were adopted specifically to protect salmonid fish. In cases of both point and nonpoint sources, the TMDL calls for the complete removal of anthropogenic warming of surface waters. This is done by limiting point sources to no measurable increase in temperature and by allocating all nonpoint source heating to natural sources. This extends not only to vegetation, but to channel morphology as well. There is really nothing else that can be limited to reduce heat influx. The combined effects of increased vegetation, stabilized streambanks, and narrowed near stream disturbance zones will improve habitat conditions considerably relative to current conditions.

Although, as stated, a portion of the watershed will not meet the numeric criteria portion of the temperature standard under all conditions, these areas will be limited to mainstem reaches of the major rivers. Virtually all of the smaller order streams in the watershed will meet the criteria designed both for migration and rearing, and for spawning. Where mainstem reaches do not meet the numeric criteria with achievement of System Potential (SP), this will not be a result of anthropogenic sources of heat. Rather, these will be in areas that, due to site specific geology, topography, and aspect, system potential vegetation will not produce (this is important because system potential does not ask for "maximum possible shade" only what a mature riparian condition can produce)enough shade to reduce solar radiation influence. It must be said that the achievement of SP will result in vast improvements in water quality, watershed health, and in quality of salmonid habitat. Moreover, at SP those areas that are naturally warmer will be a source of habitat diversity.

We believe that describing these changes to temperature in the context of watershed health, with particular emphasis on PFC of salmonid habitat, will help the dischargers and landowners better understand the positive effect they can have on salmonid recovery through active and effective participation in this TMDL's implementation.

NMFS4

We believe the true assessment of PFC in the Tillamook Bay watershed is a worthwhile task, but not necessary for this TMDL. The size and diversity of habitat types, land-uses and authorities among the five major river watersheds would require stratification of the watershed, and take considerable time by professionals that are not available presently. An "armchair" attempt to analyze the basin for PFC would certainly be inadequate and inaccurate. Despite this, we believe the TMDL will result in great improvements that may be put in the context of PFC.

Proper Functioning Condition of a riparian area is defined (BLM 1998) by the adequacy of vegetation, landform, and/or large woody debris to:

- *Dissipate stream energy associated with high waterflow, thereby reducing erosion and improving water quality;*
- *Filter sediment, capture bedload, and aid floodplain development;*
- *Improve flood-water retention and ground water recharge;*
- *Develop root masses that stabilize streambanks against cutting action;*
- *Develop diverse ponding and channel characteristics to provide the habitat and water depth , duration and temperature necessary for fish production, waterfowl breeding, and other uses;*
- *Support greater biodiversity.*

The end result of having these values is stream channels that are stable through relatively common high flow events, and perhaps high quality wildlife habitat. Further, PFC is based on the comparison of a site to its potential and capability in providing certain habitat values. We have demonstrated in the TMDL that

the watershed has the potential to provide shade and to narrow near stream disturbance zones, and that the landscape is capable under appropriate management structure of meeting this potential condition. We believe that the System Potential described in the TMDL occurred historically and provided all the above characteristics. The loss of many of these habitat values has occurred through a combination of natural events (basin wide wild fires) and land use/management practices.

The System Potential (SP) described in the TMDL will result in dense assemblages of riparian vegetation on both sides of lotic water bodies, and generally narrower near stream disturbance zones, particularly in areas that are currently overly wide and unstable. This SP is designed to protect waters from solar radiation that causes stream heating and consequent violation of water quality standards. Vegetational features, landform, and amounts of large woody debris are all expected to improve with the development of SP, although the precise description of streamside vegetation and streambed is not part of the allocation.

We believe all aspects of PFC as defined above, will be improved significantly by implementation of the TMDL and associated Water Quality Management Plan (WQMP). Not withstanding that, there will be many challenges to restoration and protection throughout the watershed. The basin is composed of many different landowners, some public, some private. Practices that landowners apply to their lands to protect habitat are either implemented by law (e.g., Forest Practices Act, SB1010 Agricultural Plans), or left to the landowner to decide. The level of protection will be a result of the effectiveness of the rules and the ability of the community to steer its resources and efforts toward appropriate levels of protection. The WQMP contains actions that have been approved as priorities by a group representing a wide range of local interests developed as a community effort through the Tillamook Bay National Estuary Project and its Comprehensive Conservation and Management Plan.

Thank you for the opportunity to comment….

Martha Turvey – United States Environmental Protection Agency

Scope Page 21
The document should clarify the statement , "all lands with streams," regarding perennial or intermittent streams that drain to Tillamook Bay. You may want to add that the allocations apply to all land uses and sources within this area.

EPA1
Language has been added to include all intermittent and perennial streams, and point source and nonpoint source contributions.

Table 6, page 31: It is recommended that you move the language in Section 3.1.8.1 on page 42 to this section, thereby clarifying why the Rockaway Beach STP and Twin Rocks STP are included in the table.

EPA2
Text clarifying this has been added to the indicated paragraph.

Page 53: The description of commercial shellfish closure conditions applies to the northern part (main bay and lower bay area) of the conditionally approved area. The Southern part (known as the Cape Meares area) is also closed when rainfall exceeds 1 inch in a 24-hour period and remains closed for 7 days after such a rainfall event or 7 days after the Wilson river falls to a stage of less than 7 feet. I believe that in May 2000, Oregon Department of Agriculture (defined a new area (West Bay) with its own set of closure criteria. You may want to contact Deb Cannon, ODA to get accurate wording and include it in the final document.

EPA3
The text has been altered to define closures and closure duration more generically, but cites the Tillamook Management Plan for Commercial Shellfish Harvesting, which will be appended to the document.

Page 55: The next to last paragraph has two references to Tillamook Bay Watershed and it should probably read "Tillamook River Basin."

EPA4
This change has been made.

Loading Capacity; Page 64: At the end of this paragraph you should add the conclusion that the load capacity for all water during all times of the year is 28 counts/100 ml fecal and that the load capacity will also lead to attainment of the E. coli standard.

EPA5
Text has been added to clarify that the loading capacity at the river mouths is 42 Counts/100ml fecal and that this loading capacity will lead to the attainment of both the shellfish criterion in the Bay, and the recreational criterion in the Rivers and Bay.

Non-point source Allocations, page 66: In the second paragraph there is the assumption that "where a reduction of 99 percent did not meet the targeted in-stream concentrations, the runoff targets resulting from this degree of reduction is the allocation." Please explain how this will lead to attainment of the criteria.

EPA6
A change in the dilution ratio resulting from the discovery of an error in the calculation has led us to change the allocations. With these new allocations, all of the reductions listed in the table result in an instream concentration that meets the target at the mouth of each river.

Table 18, page 67: It is not clear why you have included the Wilson River Flow data in this table. It would be clearer to show one river at a time or explain why this table is presented in this manner.
EPA7
The record of flow in the Wilson River was of the highest quality in the subbasin. Modeling of flow for the other rivers was based on Wilson River flows. As such, flow in the other rivers is calculated from that of the Wilson under specified flow/runoff regimes. This has been changed in the table and explanatory text has been added.

It appears that in-stream targets above 28 counts/100 ml would lead to the attainment of the Load Capacity and Water Quality Criteria. Please explain how these targets will result in the attainment of the criteria.

EPA8
A change in the dilution ratio resulting from the discovery of an error in the calculation has led us to change the allocations. With these new allocations, all of the reductions listed in the table result in an instream concentration that meets the target at the mouth of each river.

A numeric (quantified) loading capacity and load allocation must be included in the TMDL. Please include them in either this table of the text. If room permits you should retain the individual target runoff concentrations numbers because this is very useful information for implementation purposes.

EPA9
The Instream Target is the Loading Capacity as described in the text, and the Target Runoff Concentrations are the Allocations. These components have been relabeled in the table to clarify their functions.

General
EPA would like to extend its support for the identified implementation activities through funding, technical assistance, and active participation.

We appreciate this offer of continued support.

Page 179: Table 36 is missing the time period and supporting data elements for Bacteria.

EPA10
These pieces of information have been added to the table.

Michael J. Wolf – Oregon Department of Agriculture
Page 10, Senate Bill 1010:
The North Coast Basin Agricultural Water quality Management Area Plan was approved by the ODA Director in consultation with the Board of Agriculture in June 2000. The language confuses two separate types of plans: The basin-wide North Coast Basin Agricultural Water Quality Management Area Plan and individual farm plans. We suggest insertion of the following replacement sentences at the end of the paragraph:
"However, Senate Bill 1010 allows the ODA to use civil penalties when necessary to enforce against agricultural activity that is found to transgress parameters of administrative rules ODA has adopted in association with an approved basin Water Quality Management Plan. ODA has expressed its intention to work with the local stakeholders and other state and federal agencies to implement the North Coast Basin Water Quality Management Plan and to enforce the associated Oregon Administrative Rules where necessary."

ODA1
The suggested change has been made.

Page 179, Goal 1, Objective 4:
The CAFO Program has already met this objective.

ODA2
We believe ODA takes issue with Objective 5 (Inspect all CAFOs by 2004), rather than Objective 4 (Achieve compliance with rules developed under SB1010 Agricultural Water Quality Management Area Plan by 2010). In general, language that was taken from the Tillamook Bay National Estuary Project Comprehensive Conservation and Management Plan will be left intact to avoid confusion. We will note separately in the text that these inspections have been completed and are done on an annual basis.

Page 179, Goal 2
Objective #1: Can we expect instream temperatures to meet salmonid requirements by 2010? It may be better to discuss interim trending goals as in the bacteria objectives. The temperature TMDL defines shade levels necessary to maintain cooler water temperature. We propose that interim shade objectives and corresponding interim temperature objectives be defined.

ODA3
We do not believe that instream temperatures that meet requirements of salmonids can be achieved by 2010. We do believe that significant decreases in temperature in smaller streams can accrue in this time frame with ongoing restoration projects currently underway in the Basin. The 2010 milepost will be a good point to look at the progress made and determine the benefits achieved while planning for further projects if appropriate. In general, language that was taken from the Tillamook Bay National Estuary Project Comprehensive Conservation and Management Plan will be left intact to guard against introducing confusion. Since these are the goals of this important implementation document, we accept them as a starting point and expect they will be modified as appropriate under an adaptive management approach.

Page 182, Agriculture
A section 11 is referenced in this paragraph. There is no section 11. Please change this paragraph as follows:
"…defines conditions that agricultural practices must allow to develop or are not allowed to cause. A regulatory backstop is provided by enforceable rules."

ODA4
This sentence should refer to "Element 11," where Legal Authorities are described. The recommended change has been made to the text.

Page 183 Agriculture
Please make following changes to this paragraph:
"…practices that individual landowners would use to ensure that their operations attain the proper conditions. Through development of the individual voluntary farm plans, landowners would use their personal…"

ODA5
The suggested changes to the text have been made.

Page 185, Non-point sources
Action 3: This action has been accomplished

ODA6
This accomplishment has been indicated in the table.

Page 200, Action 5
Estimated costs should be between $100,000 and $200,000 if we assume that the Tillamook SWCD fencing program continues.

ODA7
The costs in the WQMP reflect the cost of the entire effort over time. The costs suggested above are consistent with those in the WQMP if extended over a period of 15 to 20 years.

Page 206
In the title for Appendix D-1, replace the word "Coordinated" with the word "Comprehensive."

ODA8
The recommended change has been made.

ODA is committed to working with our private landowner, local and federal government partners to implement the Comprehensive conservation and Management Plan. The ODA will work to implement those actions that are consistent with its resources and policies. Some of the actions in Appendix D-1 do not meet this requirement. Our comments regarding the CCMP identify current inconsistencies.

Action 1 Step 1: The North Coast Basin Agricultural Water Quality Management Area Plan provides guidance, and the associated Oregon Administrative Rules for the North Coast Basin provide the enforceable Pollution Control Measures (PCMs). It is inaccurate to say that the Area Plan will require landowner action. The area Rules require or prohibit certain conditions on the land and landowners are required to abide by these conditions. The list under this step is a mixture of requirements under the rules and goals under the plan. We suggest the following language changes: "Implement the North Coast Basin 1010 water quality management area plan to provide incentives for landowners to:…"

ODA9
There is nothing in Action 1, Step 1 that says "the Area Plan will require landowner action." We believe the intent of SB1010 and the AWQMAP for the North Coast Basin is to ensure that the listed conditions become a part of the landscape. Though it may not be incumbent upon the landowner to be the active means of developing many of these conditions, they are expected to allow them to occur within the limits of the plan.

In general, language that was taken from the Tillamook Bay National Estuary Project Comprehensive Conservation and Management Plan (CCMP) will be left intact to guard against introducing confusion. In this case, we do not believe it is appropriate to change the text of the CCMP as cited.

We will add suggested language to the introductory paragraph of Appendix D-1 to this effect: Some elements of the CCMP are not requirements of the SB1010 plan, and some are addressed by other statutes. Further, although the North Coast Basin Agricultural Water Quality Management Area Plan (NCB AWQMAP) does not require landowners to be the active means of restoration, many of the Pollution Control Measures require landowners to allow defined conditions to develop. The NCB AWQMAP will be implemented along with incentives for landowners to more effectively achieve the goals of the Plan.

Page 207
The second "Action 2" should likely read "Action 3."

ODA10
This change has been made.

Action 2: Implement Revised Confined Animal Feeding…
The ODA CAFO program has achieved annual inspection for all CAFOs with permits in Tillamook County. ODA will not implement Step 1 since we have already accomplished step 4.

ODA11
The text will acknowledge that ODA is currently inspecting 100% of permitted CAFOs annually.

Page 208, Step 5
ODA does not plan to conduct aerial surveys of CAFO operations or conduct unannounced inspections.

ODA12
Step 5 describes initiatives that the CCMP developers believed were important. There may still be initiatives to address these issues by the framers of the CCMP. We believe it would be inappropriate to delete individual initiatives simply because they have not been achieved by the original timeline.

Page 223, Action 3
ODA does not plan to require the exclusion of livestock access to streams. We do intend to work with private landowners and our public partners to control livestock access to streams in order to protect water quality while maintaining important livestock watering and pasture access. Minimizing the number of instream crossings will help to protect water quality.

ODA13
We appreciate both the intent and the distinction in what the AWQMAP will provide for stream protection. We will maintain the existing text because it represents the result of the planning process. Clearly control of livestock includes a range of potential practices from instream watering /crossing to exclusion. Although the CCMP apparently favored exclusion, significant control may provide effective protection.

References
Coulter, K., P. Williams, and P. Benner. 1996. An Environmental History of the Tillamook Bay Estuary and Watershed. Publication of the Tillamook Bay National Estuary Project. 68 pp plus Figures.