UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINSTRATION
NATIONAL MARINE FISHERIES SERVICE
WASHINGTON HABITAT BRANCH OFFICE
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Department of Ecology
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Mr. Tom Fitzsimmons, Director
Washington Department of Ecology
P.O. Box 47600
Olympia, Washington 98504-7600

Re: Comments on Proposed Changes to the State Surface Water Quality Standards

Dear Mr. Fitzsimmons:

The National Marine Fisheries Service (NOAA Fisheries) has completed its review of the Department of Ecology's (Ecology) proposed changes to Washington State's Surface Water Quality Standards (Chapter 17.173-201A WAC). The new language proposes revisions to existing criteria for temperature, dissolved oxygen, bacteria, and ammonia. Also the rule proposes new criteria directed toward protecting bull trout, new criteria to protect agricultural water supplies, language to prevent degradation of water quality, and moving from a "class-based" system to a "use-based" system for designating beneficial uses of fresh water. NOAA Fisheries conducted the review of the proposed rule from the standpoint of what is required to attain viable salmon runs, and maintaining elements we think are necessary to recover those salmon runs in Washington. As you know, many stocks in Washington are currently listed as threatened or endangered under the Endangered Species Act (ESA).

NOAA Fisheries' review focused on proposed changes to the temperature, dissolved oxygen and ammonia standards and on the antidegradation implementation plan.

Temperature

Changing the surface water quality' standards from a "class-based" to a "use-based" format places an emphasis on some salmonid life stages. Ecology's proposed standards are meant to protect these stages. Proposed temperature measurements based on seven-day averages of the daily maximum (7DADMax) will replace the current standard of one-day maximums. Ecology believes the longer term average is more indicative of how temperature affects fish health. The new standards propose the 7DADMax for spawning and rearing of salmon, steelhead and trout to be 16°C. The standard is based on the hypothesis that streams with different summer maximum 7DADMax temperatures cool down by the time spawning begins in the fall. Water temperatures at the time of spawning should be less than 12.5 - 14°C (7DADMax). NOAA Fisheries does not believe this standard to be protective of a salmon population's spatial structure and genetic diversity. NOAA strongly recommends Ecology adopt the 13°C criteria called for in the EPA Regional Temperature Guidelines (due out later this month) that we believe would adequately protect spawning salmon, late emergent steelhead, and Puget Sound spring/summer ocean-type chinook rearing. At a minimum, the 13'C criteria should be applied in a targeted manner and the beneficial use designation include the full spatial and temporal extent of known and potential

spawning. For example, some stocks of Hood Canal summer-run chum, listed as threatened under the ESA, begin spawning in early August when surface water temperatures could coincide with summer maximums. Clearly the 16°C 7DADMAX standard would not afford the necessary protection to these stocks. It is well documented in the literature the effects temperature can have on gamete maturation in returning adult salmon and embryo development and survival rates. Laboratory and field studies show that when adult fish are exposed to constant or average temperatures above 13-15.5°C during the final part of the upstream migration or during holding prior to spawning, there is a detrimental effect on the size, number, and fertility of eggs held in vivo (EPA 2001; Hicks, 2002). There are several other salmonid stocks throughout Washington where NOAA Fisheries has this same concern. Lake Ozette sockeye, Skagit River summer-run chinook, Nooksack River spring chinook, Cowlitz, Lewis and Kalama River spring chinook are a few notable examples. We urge Ecology to ensure each of these unique systems are identified and a more appropriate standard of 13 °C is put into place. NOAA Fisheries suggest Ecology work with Washington State's co-managers of this state's salmonid stocks, the Tribes and the Washington Department of Fish and Wildlife, to identify those basins which support salmon stocks requiring the 13°C standard. Adequately protective water quality will be critical for the maintenance and recovery of these salmon.

Also, NOAA Fisheries encourages Ecology adopt the draft EPA temperature guidelines which recommend setting temperature standards to protect steelhead smoltification. The EPA guidelines suggest, and NOAA Fisheries supports, 14°C 7DADMax to protect this phase of steelhead development. At the time of smoltification, anadromous salmonids experience reduced ATPase levels at constant or acclimation temperatures greater than 11-13°C. Reduced ATPase levels can result in delayed or ineffective transition to the marine environment. Temperatures of 14-15°C can cause cessation of the seaward migration.

In addition, Ecology's management choice to apply the standards generally to salmonids versus by species and population, does not seem to be compatible with the Washington State's Salmon Strategy. Ecology asserts that these standards are adequately protective of freshwater life history stages of salmonids. NOAA Fisheries asks that Ecology consider whether the proposed standards support locally directed salmonid recovery in the watersheds. It appears Ecology is operating under the working hypothesis that the organism response level data the standards are based upon, is adequately protective of population level relationships to watershed habitat landscapes to enable maintenance and recovery of viable populations.

Since this is an untested hypothesis, a central question for the rule should be how will Ecology work with the Regional Recovery Planning efforts to test the effectiveness and validity of this proposed action, in concert with past and future recovery actions. The Puget Sound Technical Recovery Team (TRT) and Shared Strategy have provided a working draft of Watershed Recovery Planning technical guidance (Dated February 3, 2003) for Puget Sound Recovery Planning. The Northern Tier TRTs and the Northwest Fisheries Science Center are coordinating on this guidance and expect that it will be applied Region wide. NOAA Fisheries suggest that watershed recovery planners need Ecology participation in the watershed assessment process and discuss how the agency intends to address the recovery planning implications as part of the rule

implementation. Given the current lack of data on the relationships between the standards and population response, a monitoring and adaptive management strategy to test for effectiveness and validity of the standards seems warranted.

Finally, Section 173-201A-200 (1)(c)(ii)(B) states that incremental temperature increases resulting from the combined effect of all nonpoint source activities in the waterbody, must not, at any time, exceed 2.8°C outside designated mixing zones. This standard is applied when the natural condition of the water is cooler than the criteria in table 200(l)(c), aquatic life temperature criteria in freshwater. NOAA Fisheries is concerned that a watershed may be allowed to warm when the watershed is currently at a cooler temperature more supportive for anadromous fish and their prey resources. In addition, this provision appears not to be linked in any way to 173-201A-300, Part III of the proposed rule which addresses the state's policy on antidegradation. Specifically 200(1)(c)(ii)(B) does not comport with the "overriding public interest" test required in 173-201A-300(4). NOAA Fisheries believes this high cumulative temperature increase could adversely affect listed salmon if indiscriminately applied, and suspect circumvention of policies described in Part III of the rule was not Ecology's intent.

Antidegradation

We understand the antidegradation rule allows degradation of higher quality waters of the state that are above the beneficial uses criteria unless those waters are designated as an "outstanding resource water." This antidegradation rule may allow degradation of the existing baseline conditions and does not appear to require impact reduction measures to offset potential harmful effects to listed fish. For example, early spawning Union River Summer chum enjoy August temperatures well below the 16°C 7DADMAX proposed in the rule to protect this beneficial use. It appears the antidegradation rule will allow temperatures to climb to this proposed 16°C standard. NOAA Fisheries would find that this degradation allowance would put the Union River Summer chum population at an unacceptable risk. As noted above, NOAA Fisheries believes the 16°C standard to be too high to support spawning, incubation and smoltification of several different runs of salmon. Allowing cooler streams to degrade to this high temperature standard, (and as covered below, too low of a dissolved oxygen standard) in many cases would place salmonid stocks in too great a peril.

Ecology should provide clarification on what constitutes the "overriding public interest" to allow a lowering (or degradation) of water quality for a water body. Also, there does not appear to be a fair value to salmon and other natural resources included in the process. Regarding consideration of the ESA, in our view there needs to be special attention given to those resource attributes (including prey base) that are necessary for maintaining and/or returning viable salmonid runs in Washington State.

We understand that the antidegradation rule does not address the cumulative impacts of many Tier II actions within a waterbody. Theoretically, conditions could be degraded to the 303(d) list threshold if enough Tier II actions were approved. We suggest Tier II actions be tracked for each water body. Are we correct in our understanding that no overall water body criteria limit is included in this proposal?

How will restoration/rehabilitation efforts that improve the beneficial uses of a water body be incorporated in water body ratings over time? Will gains from restoration activities be allowed to disappear through the Tier II process?

Tier III waters have certain eligibility requirements, these are listed in 173-201A-330(1)(a-d). Noticeably missing are waters key in supporting critical life stages of ESA listed salmon. These areas should also be eligible for Tier III status.

Use-Based Memo

Page 2 of 4. Please provide an explanation of how Ecology would define a waterbody use designation as "not attainable".

The Use Attainability Analysis (UAA) is designed to enable a downgrade or removal of the level of use protection designated in the state standards. How will this tool be implemented in conjunction with the antidegradation rule? Theoretically (worst case scenario) multiple Tier II analyses could result in the reduction of beneficial uses and a waterbody could be downgraded through a UAA process.

The loss of the narrative classification system is another concern to NOAA Fisheries. Issues such as sediment and stream flow are dropped from consideration under the new classification system. While these issues are not easily described with numeric criteria, without action addressing these water quality variables, the ecological health supporting viable populations of salmon cannot be fully protected or restored. Streams without sufficient water, or water with high sediment burdens through egg-laden gravels may achieve standards, but misses the mark set in the goals of the Clean Water Act of "restore and maintain the chemical, physical, and biological integrity" of the waters of the state, and misses the mark imposed by the ESA.

Dissolved Oxygen

The Clean Water Act requires that state waters be cleaned up and restored. The goal of the Endangered Species Act is to recover listed species and the ecosystems upon which they depend. Listed salmonids also need oxygenated water to hatch, emerge, grow and reproduce successfully. Changes from natural dissolved oxygen (DO) variation levels place listed salmonids at risk for survival and must be minimized as much as possible to recover viable salmonid populations.

Waters with beneficial uses for salmonid spawning and rearing at a minimum need intergravel DO concentrations of 8 milligrams (mg) per liter to protect salmon (Spence *et al.* 1996; ODEQ 1995). Laboratory studies and field studies indicate that intergravel DO concentration less than 8 mg per liter reduce survival and size at emergence of fry. Juvenile chinook swimming speed and growth are decreased below 8 mg per liter (Spence *et al.* 1996). Emergence of aquatic insects, a critical food source for chinook is also altered at DO levels lower than 8 mg per liter (Spence *et al.* 1996).

Ecology is proposing a 90 day average daily minimum (90 DADMin) of 9.5 mg DO per liter and a one day minimum (1DMin) of 7.0 mg DO per liter for spawning salmonids. A 90 DADMin of 8.5 mg DO per liter and a IDMin of 6.0 mg DO per liter is proposed for salmonid rearing-only waters. It is our understanding that these criteria were developed from Ecology's data when salmon are present in the water body, from the Department of Fish and Wildlife and Tribes Salmon and Steelhead Stock Inventory (SASSI) report, from field research, and from the results of laboratory tests.

The proposed criteria are year-round criteria developed under the assumption that measurement during the summer will provide protection during the fall when many salmonids spawn. However, as described above, some listed salmonid populations spawn during July, August and September when the proposed criteria will not provide adequate protection spawning and incubation. For example, the Washington Department of Fish and Wildlife has documented Spring chinook spawning in late July in Canyon Creek, a tributary to the North Fork Nooksack River. Spring Chinook redds have also been documented during the second week of August in the South Fork Nooksack River. Spring chinook spawn in the upper Sauk and Suattle Rivers from late July through early September (WDFW and WWTIT, draft SASSI, 2002). These populations are only a few of the salmonid populations that spawn before the fall season.

We understand the proposed criteria of 9.5 mg DO per liter 90-DADmin was determined by Ecology to meet the 8 mg DO per liter for daily minimum intergravel DO during the fall based on a 1.5 mg DO per liter differential between the surface water and intergravels. We understand the one-day minimum proposed criteria of 7.0 mg DO per liter is based upon laboratory studies which may or may not be protective in the field when considering other factors such as flow rate. EPA (1986) recommends a 3.0 mg DO per liter differential between the surface water and intergravels. The 3.0 mg per liter loss in DO from surface water to the intergravels often occurs in relatively clean gravels; highly sedimented gravels may experience DO losses of more than 6 mg per liter (ODEQ 1995). We believe Ecology's 1.5 mg per liter differential estimate for DO between surface water and intergravel is not adequately conservative to ensure salmonid survival and recovery to viable populations. Based upon EPA's 3.0 mg per liter DO differential between intergravel and surface waters and an 8.0 mg per liter daily minimum (Spence *et al.* 1996; ODEQ 1995), we believe a 11.0 mg per liter DO for the 90 DADMin coupled with a 8.0 mg per liter lDMin will protect salmonid spawning beneficial uses (NMFS 1999).

A 90 DADM of 8.5 mg DO per liter and a 1 Dmin of 6.0 mg DO per liter is proposed for waters with rearing beneficial uses only. Fish growth appears to be determined by the daily minimum of DO, not the average or maximum (NMFS 1999). Studies reviewed in ODEQ (1995 (a)) indicate possible 5-20% reductions in growth of juvenile coho salmon between 8.0 and 6.5 mg DO per liter. Dahlberg et al (1968, as cited in ODEQ 1995) found that a reduction in DO to 7.5 mg per liter resulted in a 5 % reduction in swimming speed. Dahlberg noted that swimming speed declined markedly below 7-8 mg DO per liter. Although the ecological significance of reduced swimming ability has not been well documented the cumulative effect of reduced growth and reduced swimming ability below 8.0 mg DO per liter are of concern for salmonid survival and recovery. We suggest a minimum of 8.0 mg DO per liter for protection of rearing beneficial uses. Due to the limited evaluation time, we have not evaluated the proposed 90

DADM 8.5 mg DO per liter criterion but intend to do so (if it is retained in the rule) during our §7 consultation with EPA as required under the ESA.

The use of single numeric standards for DO may be impossible to achieve and adequately protect listed species with variable spawning times. In addition, the natural variability of conditions from headwaters to the mouth throughout the year, variable flows, and the range of natural geologic variability throughout the state complicate the selection of single metrics. The criteria proposed might be protective for some listed salmonid species but will not be protective for all listed salmonid species. An alternative to single numeric criteria might be to give serious consideration to identifying early spawning stocks, per our recommendation for temperature, in cooperation with the state's co-managers, the Department of Fish and Wildlife and the Tribes, to develop separate and more protective DO criteria for water bodies with populations that spawn before September 15 and streams that need increased protection of DO in the spawning gravels.

Other comments:

1. Ecology is proposing 1-day minimum and 90-DADMin standards for dissolved oxygen to protect beneficial uses of state waters. We understand these standards are based on 3-4 grab samples collected during a 90-day period to determine the lowest single DO and the 90-day average for the year. To mark the lowest DO values of the day, typically samples are collected after the lowest oxygen levels occur, usually very early in the morning before sunrise. Capturing the lowest DO values through intermittent sampling - one day per month between Sam-5pm - most likely would tend to miss the lowest DO level for both minimum standards. Our concern is that DO measured under this monitoring regime does not accurately capture minimum levels of dissolved oxygen in the system to determine if water quality is protective for fish or is even in compliance with the standards.

If ambient monitoring program data alone is used to determine compliance with the standards, NOAA Fisheries would like to better understand how 3 to 4 grab samples per 90 day period will accurately estimate without bias? We recommend Ecology investigate the performance of a 3 or 4 sample protocol using an existing data-set. Power testing or other methods supervised by a biometrician would provide Ecology and NOAA Fisheries greater assurance about this protocol, or suggest other improvements. It is possible the protocol is too coarse of a sampling protocol to detect harmful fluctuations in DO. It is also possible 3 or 4 samples over a 90 day period will not provide enough statistical certainty around a true mean value. Additionally, very low DO levels for very short time periods can result in lethal conditions for listed fish. After testing for statistical power, Ecology may find there is a high probability that the proposed sample monitoring system will not capture these events.

2. How will Ecology determine compliance with Water Quality Standards if both the 1 Drain and the 90 DADM are needed to determine if the Water Quality Standards are met? How will compliance be determined if the 1 Dmin is violated but the 90 DADM is reached?

3. We understand a .2 mg per liter cumulative deduction in DO is proposed for water bodies that do not naturally meet the water quality criteria to accommodate for some human impacts. How

can Ecology justify further reductions from water quality standards for listed species, if listed species are present in these waters? How will "cumulative impacts" be accounted for and tracked?

4. How is the baseline determined for natural water bodies that do not meet the water quality standard from which the .2 mg per liter reduction is allowed? We understand that an estimated "attainable" baseline will be calculated for water bodies with "human made" structural limitations. Please provide more detail about how "achievable" DO targets will be determined?

5. We understand that water bodies will be allowed to fall below the criteria in the table only once every ten years on average. Does this mean the standards can be violated once before the water body is listed as 303 (d)? How are the ten-year averages determined?

6. Please provide more implementation detail about how DO measurements are collected by Ecology's ambient water quality monitoring program.

7. If criteria are based on assumptions about intergravel DO levels we suggest Ecology develop some provision in the standards that ensures average mimimum dissolved oxygen intergravel levels are 8 to 8.5 milligrams per liter.

8. How does Ecology determine "natural levels" for Lakes DO in order to compare the effects of any proposed changes?

Agricultural Water Supply

We support the proposed criteria for protecting agricultural water supplies. We suggest a pH of 6.5 to 8.4 for the protection of salmonids when water from agricultural lands is discharged directly or passively without treatment into water bodies containing salmonids.

Ammonia

Ecology recommends changes to the existing criteria where the water is not listed as salmonid habitat. They propose to keep the existing criteria where the water is designated as salmonid habitat, and use EPA 1999 criteria. As Ecology states, the EPA 1999 proposed change in criteria are less stringent and may not be protective of all life stages of salmonids. The biggest uncertainty is the lack of available data on salmonids. EPA 1999 recommends 2.43 mg N/L vs. current values of 1.29-1.36 mg N/L. It appears Ecology has recommended a partial adoption of the EPA criteria, thus allowing higher concentrations to be discharged into waters of the state.

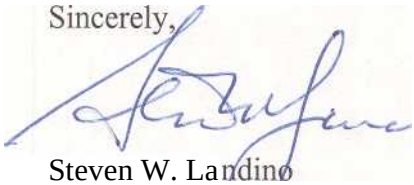
Because the EPA 1999 criteria does not appear to be protective of all life stages of salmonids, NOAA Fisheries recommends that Ecology keep the existing criteria for all waters, regardless of the waterbody use designation. Having multiple designations of areas, and different requirements for each area could result in NPDES permittees requesting receiving water designation changes, which could allow waters to be downgraded.

Needed Definitions:

NOAA Fisheries recommend Ecology provide definitions for "irreversible human changes" and "irreversible impact." Understanding these terms will be important during our §7 consultation with EPA on their adoption of the final surface water quality standards.

In closing, NOAA Fisheries believes good water quality is paramount in regaining viable salmon populations in Washington State. We define a viable salmonid population as an independent population of any Pacific salmon that has a negligible risk of extinction due to threats from demographic variation, local environmental variation, and diversity changes over a 100-year time frame. We define an independent population as any collection of one or more local breeding units whose population dynamics or extinction risk over a 100-year time period are not substantially altered by exchanges of individuals with other populations (NOAA 2000). NOAA Fisheries has identified four parameters which form the key to evaluating salmon population status. They are: abundance, population growth rate, population spatial structure, and diversity. NOAA Fisheries focuses on these parameters because they are reasonable predictors of extinction risk (viability) and they reflect general processes that are important to all populations of all species. For example, *many* factors influence abundance, (e.g., habitat quality, interactions with other species, harvest programs, etc.). Many of these factors are species- or ESU-specific. A population's spatial structure and diversity depends fundamentally on habitat quality, spatial configuration, and dynamics as well as the dispersal characteristics of individuals in the population. Adjusting temperature and dissolved oxygen standards to those basins with late summer spawning, early-mid-summer steelhead smolting, and Puget Sound ocean-type spring/summer chinook juvenile rearing, will help ensure affected salmonid population spatial structure and diversity is protected. To attain viable populations of salmon again, we must maintain the water quality attributes required by salmon, NOAA Fisheries strongly urges Ecology give careful consideration to our comments provided above.

Sincerely,



Steven W. Landino
Washington tat Branch Chief

Attachment - References

cc: Randy Smith, EPA
Ken Berg, USFWS
Billy Frank, NWIFC
Jeff Keonings, WDFW
Mike Crouse, NOAA Fisheries

References

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