

Application of Water Quality Criteria for Salmonid  
Spawning/Incubation  
in the Imnaha River Basin, Oregon  
(State Conservation Measure 4)

## Background

As part of the Oregon State water quality temperature standard approval process, the Department of Environmental Quality (DEQ) agreed to complete 11 State Conservation Measures. State Conservation Measure 4 reads:

*During the 1999 – 2002 Triennial Review, DEQ will identify the geographic area and time period to which the spawning criteria for temperature and dissolved oxygen apply and will propose appropriate beneficial use designations, provided adequate information is available. DEQ will work with the Services (US Fish and Wildlife Service and National Marine Fisheries Service), Oregon Department of Fish and Wildlife (ODFW), and others with relevant fish life history information to identify the geographic area and time period that spawning occurs. Within one year of the final BO (Biological Opinion), DEQ will identify the geographic area and time periods that the criteria will apply in three pilot basins identified by NMFS (National Marine Fisheries Service) in the BO provided adequate information is available. DEQ can apply the criteria in these basins in advance of rulemaking, because the spawning use designation is currently at the broad basin scale.*

While this document is in part a response to State Conservation Measure 4, the primary purpose is to identify where and when the Department will apply the spawning criteria of the water temperature standard. The application of the spawning criteria affects new and renewing permits, 401 water quality certifications for dredge and material fill and removal and hydroelectric projects, and Total Maximum Daily Load (TMDL) development. Examples of nonpoint source (NPS) activities that will also be affected include SB1010 agriculture plans, stormwater management plans, Forest Practice Act best management practices, and urban development ordinances.

The pollutant parameters in question that affect spawning and egg incubation through fry emergence are water temperature and dissolved oxygen (DO). The spawning criterion goal is to ensure water quality protection is adequate for spawning and egg incubation through fry emergence. Oregon Administrative Rule (OAR) 340-041-<basin> states:

(2) No wastes shall be discharged and no activities shall be conducted which either alone or in combination with other wastes or activities will cause violation of the following standards in the waters of the <basin>:

- (a) Dissolved oxygen (DO): the changes adopted by the Commission on January 11, 1996, become effective July 1, 1996. Until that time, the requirements of this rule that were in effect on January 10, 1996 apply:
  - (A) For water bodies identified by the Department as providing salmonid spawning, during the periods from spawning until fry emergence from the gravels, the following criteria apply:
    - (i) The dissolved oxygen shall not be less than 11.0 mg/l. However, if the minimum intergravel dissolved oxygen, measured as a spatial median, is 8.0 mg/l or greater, then the DO criterion is 9.0 mg/l;
    - (ii) Where conditions of barometric pressure, altitude, and temperature preclude attainment of the 11.0 mg/l or 9.0 mg/l criteria, dissolved oxygen levels shall not be less than 95 percent of saturation,
  - (B) For waterbodies identified by the Department as providing salmonid spawning during the period from spawning until fry emergence from the gravels, the spatial median intergravel dissolved oxygen concentration shall not fall below 6.0 mg/l;
  - (C) A spatial median of 8.0 mg/l intergravel dissolved oxygen level shall be used to identify areas where the recognized beneficial use of salmonid spawning, egg incubation and fry emergence from the egg and from the gravels may be impaired and therefore require action by the Department. Upon determination that the spatial median intergravel dissolved oxygen concentration is below 8.0 mg/l, the Department may, in accordance with priorities

established by the Department for evaluating water quality impaired waterbodies, determine whether to list the waterbody as water quality limited under the Section 303(d) of the Clean Water Act, initiate pollution control strategies as warranted, and where needed cooperate with appropriate designated management agencies to evaluate and implement necessary best management practices for nonpoint source pollution control;

(b) Temperature: The changes adopted by the Commission on January 11, 1996, become effective July 1, 1996. Until that time, the requirements of this rule that were in effect on January 10, 1996, apply. The method for measuring the numeric temperature criteria specified in this rule is defined in OAR 340-041-0006(54):

(A) To accomplish the goals identified in OAR 340-041-0120(11), unless specifically allowed under a Department-approved surface water temperature management plan as required under OAR 340-041-0026(3)(a)(D), no measurable surface water temperature increase resulting from anthropogenic activities is allowed:

(iii) In waters and periods of the year determined by the Department to support native salmonid spawning, egg incubation, and fry emergence from the egg and from the gravels in a basin which exceeds 55.0°F (12.8°C);

## Introduction -

In order to apply the spawning criteria in Oregon two types of information are needed. The first type is *when* the spawning use occurs (see Attachment A) and the second type is *where* spawning through fry emergence occurs (see Attachment B). DEQ obtained both types of information from the Oregon Department of Fish and Wildlife (ODFW). ODFW is in the process of developing a database to house consistent and comprehensive life stage timing information and updating distribution information for anadromous (except cutthroat trout) salmonids. This is a multi-year, statewide project that includes a pilot project that will test data collection, database development, GIS mapping products, and public access via the Internet procedures and methods prior to the completion of the larger project.

In the spirit of inter-agency cooperation, ODFW agreed that the pilot project basins for their database project would be the same basins that have been identified by NMFS as priorities for revising the spawning timing. The basins are the Imnaha River Basin, North and Middle Fork basins of the John Day River Basin, and the Hood River Basin. This document identifies life stage timing by species for application of the spawning criteria for DO and temperature (55°F/12.8°C) for the Imnaha River Basin.

Currently ODFW has species distribution maps available at: <http://rainbow.dfw.state.or.us/maps.html>. As stated above, this information is being updated over a two-year time period. However, DEQ expects the application of the spawning criteria specified in this document to be applied to the spawning habitat distribution for each species regardless of ODFW's distribution mapping update schedule. In order to ensure that the most accurate information available is being used, the ODFW home page at: <http://www.dfw.state.or.us/> or the map site listed above should be viewed periodically to check for updates to the species distribution maps. Until the updated distribution information is released, ODFW District Biologists, having local knowledge and years of experience in the field, should be consulted for distribution information if necessary.

The life stage information provided in this document is based on the ODFW pilot project information. Until the life stage timing database is finalized and released, the information in this document should be considered the most current available. Again, the ODFW website home page listed above should be checked periodically for the release of the life stage timing database.

**Methodology for Life Stage Timing (Periodicity)**

ODFW district biologists, in consultation with other local area agency biologists such as US Fish and Wildlife Service (USFWS) and Tribal biologists, developed life stage presence and timing charts, referred to as periodicity charts, for each species present in the Imnaha sub-basin of the Grande Ronde Basin (see Table 1). The information used to develop the periodicity charts came from professional opinion, the Stock Summary Reports for the Columbia River Anadromous Salmonids, Volume II, and the Status of Oregon's Bull Trout. The periodicity charts were finalized only after all biologists agreed with and approved the species presence and life stage timing.

Table 1. Agency name and title for Imnaha River Basin biologists consulted for species life stage and presence.

Agencies Consulted	Staff Name and Title
Oregon Department of Fish and Wildlife (ODFW)	Brad Smith, District Biologist
Oregon Department of Fish and Wildlife (ODFW)	Bill Knox, Assistant District Biologist
Oregon Department of Fish and Wildlife (ODFW)	Brian Jonasson, Research Fish Biologist
Nez Perce Tribe	James Harbeck, Fisheries Biologist
Nez Perce Tribe	Don Bryson, Fisheries Biologist
US Fish and Wildlife Service (USFWS)	Aaron Garcia, Fisheries Biologist
US Fish and Wildlife Service (USFWS)	William Conner, Fisheries Biologist

The biologists when developing the periodicity charts identified specific stream segments for life stage timing. The basin segments identified for the Imnaha Basin are the Imnaha River below Big Sheep Creek and the Imnaha River above and including Big Sheep Creek.

As per request by DEQ the biologists also identified periods of peak use and periods of lesser use for spawning and egg incubation through fry emergence in two-week time period blocks (see Attachment A). Also at DEQ's request periods of peak use and lesser use are provided in the form of percentages and are based on best professional judgement which incorporates information sources such as fish spawning surveys, mark-recapture project work, and smolt trap passage information. DEQ acknowledges that several parameters are involved in the timing of spawning activity, such as streamflow, temperature, and photo-period. Streamflow and temperature can vary across the landscape as well as year to year. With this information in mind, DEQ is interested in when the biologists think the greatest number of fish spawn per species in order to apply the criteria appropriately.

In the Imnaha Basin a period of peak use was defined as 70 percent of a life stage activity use while periods of lesser use were defined as 30 percent of a life stage activity use. For example, Fall Chinook below Big Sheep Creek have a peak period of spawning from November 1 through November 30 - which means that biologists expect that 70 percent of all spawning of Fall Chinook below Big Sheep Creek takes place within one month. The periods of lesser use are 10 percent from October 15 through October 30 and 20 percent from December 1 through December 31.

The Imnaha Basin provides habitat for three threatened or endangered anadromous species: Fall Chinook, Spring Chinook, and Summer Steelhead. Therefore, DEQ will apply the spawning criteria to periods of lesser use. However, the spawning criteria will not apply to the first or final two-week time periods when 1) they are identified as periods of lesser use and 2) they occur during the time of maximum summer temperatures. Maximum summer temperatures typically occur between July 15 and August 15 in Oregon (see Table 2). For example, temperature data collected in the Imnaha Basin by DEQ in 2000 indicates that the week of July 30 through August 5 had the highest weekly seven day moving average of the summer for most sites.

Bull Trout and *Onchorynchus mykiss*, *O. mykiss*, are also present in the basin. Bull Trout have a separate temperature criterion, 50°F/10°C, and will be addressed with their own application document. *O. mykiss* are included in the 55°F/12.8°C spawning temperature criteria. These three species are hard to discern from each other when they are juveniles without DNA analysis. Adult Redband Trout and Adult Rainbow Trout are also hard to discern from one another without DNA analysis.

Table 2. Periods of Use by Species: Peak, Lesser, and DEQ Application (u/s indicates upstream).

<b>Imnaha Basin Segments with Level of Use</b>	<b>Fall Chinook</b>	<b>Spring Chinook</b>	<b>Summer Steelhead</b>	<b><i>O. mykiss</i> Resident</b>
Mouth Imnaha River upstream to Big Sheep Creek – <i>Peak Use</i>	11/1 - 3/30	Not Applicable	4/15 - 7/15	4/15 - 7/15
Mouth Imnaha River u/s to Big Sheep Creek – <i>Peak &amp; Lesser Use</i>	10/15 - 6/30	Not Applicable	3/15 - 7/31	3/15 - 7/31
Mouth Imnaha River upstream to Big Sheep Creek – <b><i>DEQ Application</i></b>	<b>10/15 - 6/30</b>	<b>Not Applicable</b>	<b>3/15 - 7/15</b>	<b>3/15 - 7/15</b>
Imnaha R above and including Big Sheep Creek - <i>Peak Use</i>	Not Applicable	8/1 - 4/30	4/15 - 7/15	4/15 - 7/15
Imnaha R above and including Big Sheep Creek - <i>Peak &amp; Lesser Use</i>	Not Applicable	7/15 - 5/15	3/15 - 7/31	3/15 - 7/31
Imnaha R above and including Big Sheep Creek – <b><i>DEQ Application</i></b>	<b>Not Applicable</b>	<b>8/1 - 5/15</b>	<b>3/15 - 7/15</b>	<b>3/15 - 7/15</b>

### Spawning Criteria Application

DEQ will apply the spawning criteria to spawning habitat for the time periods shown in Table 3.

Table 3. Spawning and Incubation through Fry Emergence Criteria Application.

<b>Imnaha Basin Segments</b>	<b>Application</b>	<b>Dates</b>
<i>Imnaha River upstream to confluence with Big Sheep Creek</i>	<i>Overall Application</i>	<i>10/15 – 7/15</i>
Check individual species distribution maps for specific locations:	Fall Chinook	10/15 – 6/30
	Spring Chinook	Not Applicable
	Summer Steelhead	3/15 – 7/15
	<i>O. mykiss</i> - Resident	3/15 – 7/15
<i>Imnaha River above and including Big Sheep Creek</i>	<i>Overall Application</i>	<i>8/1 – 7/15</i>
Check individual species distribution maps for specific locations:	Fall Chinook	Not Applicable
	Spring Chinook	8/1 – 5/15
	Summer Steelhead	3/15 – 7/15
	<i>O. mykiss</i> - Resident	3/15 – 7/15

Note: The Bull trout temperature criterion (50°F/10°C) applies year round to bull trout spawning, rearing and adult presence in areas identified in Status of Oregon's Bull Trout (ODFW, 1997). These areas include portions of the main stem Imnaha River, Big Sheep Creek, and Little Sheep Creek sub-basins. The Bull trout criterion supercedes the 55°F spawning criterion.

### Review of Spawning Criteria Application

The Imnaha River Basin is included in the pilot project that ODFW is conducting to specify salmonid life stage timing and to update species distribution. The application of the criteria will be reviewed and, if necessary, revised by DEQ when the ODFW database project is completed and finalized for this basin.

Attachment A

**Mouth Innaha River upstream to Big Sheep Creek - Anadromous Species**

Life Stage/Activity/Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Upstream Adult Migration</b>												
Summer Steelhead		X X								X X		
Spring Chinook					X X X X	X X X X						
Fall Chinook											X X	
<b>Adult Holding</b>												
Summer Steelhead	X X	X X X								X X X X		
Spring Chinook					X X X X	X X X X						
Fall Chinook		Not applicable										
<b>Adult Spawning</b>												
Summer Steelhead			X X X X									
Spring Chinook		Not applicable										
Fall Chinook											X	
<b>Egg Incubation through Fry Emergence</b>												
Summer Steelhead				X X X X X X								
Spring Chinook		Not applicable										
Fall Chinook												
<b>Juvenile Rearing</b>												
Summer Steelhead	X X	X X X X	X X			X X X X	X X X X	X X X X	X X X X	X X X X	X X X X	X X X X
Spring Chinook	X X	X X X X	X X	X X	X X	X X X X	X X X X	X X X X	X X X X	X X X X	X X X X	X X X X
Fall Chinook												
<b>Downstream Juvenile Migration</b>												
Summer Steelhead				X X X X X X								
Spring Chinook			X X X X X X	X X X X								
Fall Chinook												
<p>Each block represents a two-week time period.</p> <p>█ Represents periods of peak use based on professional opinion.</p> <p>▒ Represents lesser level of use based on professional opinion.</p> <p>░ Represents periods of presence - no level of use indicated.</p> <p>X Represents periods of use based on reported observation from # 203320.</p> <p>Peak use equates to 70% of life stage activity occurring in this time frame.</p> <p>Lesser use equates to 30% of life stage activity occurring in this time frame.</p> <p>StreamNet ID # 203320 - Stock Summary Reports for Columbia River Anadromous Salmonids.</p>												

Attachment A (cont.)

**Mouth Innaha River upstream to Big Sheep Creek - Non-Anadromous Species**

Life Stage/Activity/Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Adult Fluvial/Adfluvial Migration</b>												
Bull Trout Fluvial					█	█						
<i>O. mykiss</i> Resident	█	█	█	█	█	█	█	█	█	█	█	█
Cutthroat Trout		Likely no use										
<b>Adult/Sub-Adult Rearing</b>												
Bull Trout Fluvial	█	█	█	█	█	█	█	█	█	█	█	█
<i>O. mykiss</i> Resident	█	█	█	█	█	█	█	█	█	█	█	█
Cutthroat Trout		Likely no use										
<b>Adult Spawning</b>												
Bull Trout Fluvial		None observed										
<i>O. mykiss</i> Resident					█	█	█					
Cutthroat Trout		Likely no use										
<b>Egg Incubation through Fry Emergence</b>												
Bull Trout Fluvial		None observed										
<i>O. mykiss</i> Resident					█	█	█	█				
Cutthroat Trout		Likely no use										
<b>Juvenile Rearing</b>												
Bull Trout Fluvial		None observed										
<i>O. mykiss</i> Resident	█	█	█	█	█	█	█	█	█	█	█	█
Cutthroat Trout		Likely no use										
<b>Juvenile Migration</b>												
Bull Trout Fluvial	█	█	█	█					█	█	█	█
<i>O. mykiss</i> Resident	█	█	█	█					█	█	█	█
Cutthroat Trout		Not applicable										
		Likely no use										
<p>Each block represents a two-week time period.</p> <p>█ Represents periods of peak use based on professional opinion.                  █ Represents lesser level of use based on professional opinion.                  █ Represents periods of presence - no level of use indicated.</p> <p>Peak equates to 70% of life stage activity occurring in this time frame.                  Lesser use equates to 30% of life stage activity occurring in this time frame.</p> <p><i>O. mykiss</i>: Refers to resident Redband Trout, Rainbow Trout, and Juvenile Steelhead. These three species are hard to discern from each other when they are juveniles without DNA analysis. Adult Redband Trout and Adult Rainbow Trout are also hard to discern from one another without DNA analysis.</p>												

Attachment A (cont.)

**Innaha River above and including Big Sheep Creek - Anadromous Species**

Life Stage/Activity/Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Upstream Adult Migration</b>												
Summer Steelhead		X	X									
Spring Chinook						X	X	X	X			
Fall Chinook												
			Not applicable									
<b>Adult Holding</b>												
Summer Steelhead		X	X	X								
Spring Chinook						X	X	X	X			
Fall Chinook												
			Not applicable									
<b>Adult Spawning</b>												
Summer Steelhead			X	X								
Spring Chinook							X	X	X	X		
Fall Chinook												
			Not applicable									
<b>Egg Incubation through Fry Emergence</b>												
Summer Steelhead				X	X	X	X	X				
Spring Chinook	X	X	X	X	X				X	X	X	X
Fall Chinook												
			Not applicable									
<b>Juvenile Rearing</b>												
Summer Steelhead	X	X	X	X	X	X	X	X	X	X	X	X
Spring Chinook	X	X	X	X	X	X	X	X	X	X	X	X
Fall Chinook												
			Not applicable									
<b>Downstream Juvenile Migration</b>												
Summer Steelhead			X	X	X	X	X					
Spring Chinook						X						
Fall Chinook												
			Not applicable									
<p>Each block represents a two-week time period.</p> <p>■ Represents periods of peak use based on professional opinion.</p> <p>▒ Represents lesser level of use based on professional opinion.</p> <p>X Represents periods of use based on reported observation from # 203320.</p> <p>Peak use equates to 70% of life stage activity occurring in this time frame.</p> <p>Lesser use equates to 30% of life stage activity occurring in this time frame.</p> <p>StreamNet ID # 203320 - Stock Summary Reports for Columbia River Anadromous Salmonids.</p>												



Attachment A (cont.)

**Innaha River above and including Big Sheep Creek - Non-Anadromous Species**

Life Stage/Activity/Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Adult Fluvial/Adfluvial Migration</b> Bull Trout Fluvial O. mykiss Resident Cutthroat Trout					█	█	█					
		Likely no use										
<b>Adult/Sub-Adult Rearing</b> Bull Trout Fluvial O. mykiss Resident Cutthroat Trout	█	█	█	█	█	█	█	█	█	█	█	█
		Likely no use										
<b>Adult Spawning</b> Bull Trout Fluvial O. mykiss Resident Cutthroat Trout					█	█			█	█		
		Likely no use										
<b>Egg Incubation through Fry Emergence</b> Bull Trout Fluvial O. mykiss Resident Cutthroat Trout	█	█	█	X1 X1	X1 X1			█	█	█	█	█
		Likely no use										
<b>Juvenile Rearing</b> Bull Trout Fluvial O. mykiss Resident Cutthroat Trout	█	█	█	█	█	█	█	█	█	█	█	█
		Likely no use										
<b>Juvenile Migration</b> Bull Trout Fluvial Sub-Adult O. mykiss Resident Cutthroat Trout	█	█	█	█					█	█	█	█
		Not applicable										
		Likely no use										

Each block represents a two-week time period.  
 █ Represents periods of peak use based on professional opinion.  
 █ Represents lesser level of use based on professional opinion.  
 █ Represents periods of presence - no level of use indicated.  
 X1 Represents periods of use based on reported observation from # 51858.

Peak use equates to 70% of life stage activity occurring in this time frame.  
 Lesser use equates to 30% of life stage activity occurring in this time frame.

StreamNet ID # 51858 - Status of Oregon's Bull Trout.

O. mykiss: Refers to resident Redband Trout, Rainbow Trout, and Juvenile Steelhead. These three species are hard to discern from each other when they are juveniles without DNA analysis. Adult Redband Trout and Adult Rainbow Trout are also hard to discern from one another without DNA analysis.

Attachment B





