Final ODFW response to Court of Appeals decision on Clackamas municipal water right extensions 4/18/2016

INTRODUCTION

The Court of Appeals, in its December 31, 2014 opinion in WaterWatch of Oregon vs. Water Resources Department (WRD), concluded that the "determination that the permits, as conditioned, will maintain the persistence of listed fish species in the affected waterway lacks both substantial evidence and substantial reason." The court made this determination because "the record lacks substantial evidence of what a short-term drop below persistence flows means versus a long-term drop….Additionally, the department failed to adequately explain how its findings support its conclusion that the undeveloped portions of the permits, as conditioned, will maintain the persistence of the listed fish species when, on their face, the conditions fail to ensure that diversion of the undeveloped portions of the permits will not contribute to long-term drops below persistence flows."

The following discussion is provided by the Oregon Department of Fish and Wildlife (ODFW) and is intended to provide the evidence and substantial reasoning the court sought for the following questions.

1. The difference between short and long term drops.
2. Why short-term drops are compatible with fish persistence.
3. Why the municipal permit extensions with the WRD conditions described below will maintain the persistence of the listed fish species.

As described below, ODFW recommends certain modifications to the Fish Persistence Conditions included in OWRD's 2011 final orders. ODFW has worked with WRD to develop revised Fish Persistence Conditions, which are set forth in Appendix C. For the reasons described below, ODFW concludes that the modified Fish Persistence Conditions in Appendix C will maintain the persistence of listed species.

General considerations

Before addressing the court's specific questions, ODFW provides the following general reasoning and considerations used for determining fish persistence.

<u>Fish persistence</u>

- ODFW views fish persistence as a population-based analysis, which means we look at the population and its health within a watershed context. We consider the reach being affected by the water withdrawals and ask how that reach relates to the population and watershed as a whole, what services the reach provides to the target fish populations, how the fish populations use the reach and how important the reach is at any given time to the population as a whole.
- Within a given watershed there are different types and qualities of habitat. In most cases fish will use the best quality habitat first before using similar reaches of lesser- quality habitat.
- ODFW also recognizes that fish populations use different types of habitat in different ways and at different times depending on where they are in their life cycle. For example, areas with spawning gravels are very important when fish are spawning, but may be of only average importance as rearing habitat outside of spawning season.
- ODFW will also consider whether streamflow in the reach is the limiting factor for maintaining fish persistence in the basin, given the other factors that are affecting listed species persistence.
- Fish persistence is affected by annual variability in many factors, including climate, habitat and

streamflow. In cases where supplemental flows from a reservoir are available, ODFW prefers to manage those flows adaptively rather than be bound by an inflexible mandate.

Fish Habitat

Fish habitat can be divided into three basic categories, corresponding to different life stages:

- Migration: for anadromous species, migration to and from the ocean; for resident species, access to different habitats within the watershed,
- Rearing: access to food sources, shelter and refugia, and
- Spawning: for salmonids, access to spawning gravels for egg deposition and development through the emergence of fry from the gravel.

These habitats can overlap and the life stages can occur at the same or different times of year and can be different depending on the species involved. An appropriate amount of each habitat needs to be available at the correct time to allow a fish species to persist.

Stream Reach affected by Municipal Extension Withdrawals

The Clackamas River and its tributaries provide approximately 40 to 276 miles of stream habitat for four anadromous salmonids, depending on the species (Table 1). The mainstem reach to which the target flows apply runs from River Mill Dam to the mouth, 23.5 miles. The lowest 3.1 miles of this mainstem reach, where the municipal diversions are located, is the affected reach.

-The affected reach is a migration corridor for all four species.

-The affected reach provides spawning habitat for fall Chinook only. By stream length, and assuming even distribution of gravels, there are 40 miles of potential fall Chinook spawning habitat in the Basin, making the affected reach 7.8% of fall Chinook spawning habitat. However, ODFW surveyors estimate only 2-5% of fall Chinook spawning occurs in this reach (Eric Brown, ODFW).

- The affected reach represents only 1-2% of rearing habitat for spring Chinook and winter steelhead in the Basin.

-By stream length, the affected reach is 7.8% of fall Chinook rearing habitat. However, fall Chinook juveniles exhibit a range of outmigration timing. It is likely that many or most fall Chinook juveniles in the Clackamas migrate downstream out of the Clackamas before August and would not be present in this reach during the period when flow withdrawals are an issue.

In summary, the main function of the affected reach is as a migration corridor. It provides a small portion of spawning habitat for fall Chinook, and a smaller percentage of (poor-quality) rearing habitat for spring Chinook and steelhead. It is not rearing or spawning habitat for coho salmon.

Table 1. Use of the 3.1 mile affected reach by key anadromous species in the Clackamas Basin.

		Use of 3.1 mile reach			% of basin habitat	
Species	Total miles	passage	spawning	rearing	spawning	rearing
Fall Chinook	40	x	x	x	7.8% *	7.8%**
Spring Chinook	144	x	0	x	0.0%	2.2%
Coho	254	x	0	0	0.0%	0.0%
Steelhead	276	x	0	x	0.0%	1.1%

*Actual spawning in the reach is 2-5% based on survey data and professional judgment (Eric Brown, ODFW, pers. comm.)

**many fall Chinook juveniles likely migrate out before August in this reach.

Source: ODFW NRIMP database https://nrimp.dfw.state.or.us/nrimp/default.aspx

EVIDENCE AND SUBSTANTIAL REASONING

Basis of streamflow predictions with future municipal use

In the following discussion, comparisons are made between river conditions with existing water withdrawals, vs. future conditions with full development of the municipal water rights. The current conditions are based on 2000-2014 data from USGS gage #14211010, located at RM 1.7, and water withdrawal records from each POD. Future conditions were modeled by Rob Annear, Geosyntec. We used the Annual Scaled scenario, which is considered a high-end estimate of future water use. Current and future conditions take into account all diversions, including those downstream of the gage.

In the Annual Scaled model, for each water right, the maximum recorded daily diversion for each year is scaled up to its future total amount (developed plus undeveloped). For example, Lake Oswego has total rights of 59 cfs, of which 25 cfs are Developed and 34 cfs Undeveloped (Table 2). If its maximum recorded daily diversion for a given year was 20 cfs, the Annual Scaled diversion for this day is set at 59 cfs, and diversions for all other days are scaled up using the ratio 59/20. A recorded diversion of 15 cfs would be scaled up to 15 x (59/20) = 44.2 cfs (Figure 1).

The results of the Annual Scaled model therefore mimic the 2000-2014 daily historical pattern of water use, but peg it each year to a likely maximum amount of use under the water right. In other words, the full legal water right is assumed to be used for part of each year; the full legal right is assigned to the date(s) of actual maximum use, and the other dates are scaled accordingly. This estimate of the likely effects of full use of the cities' water rights in the future and is based on existing data.

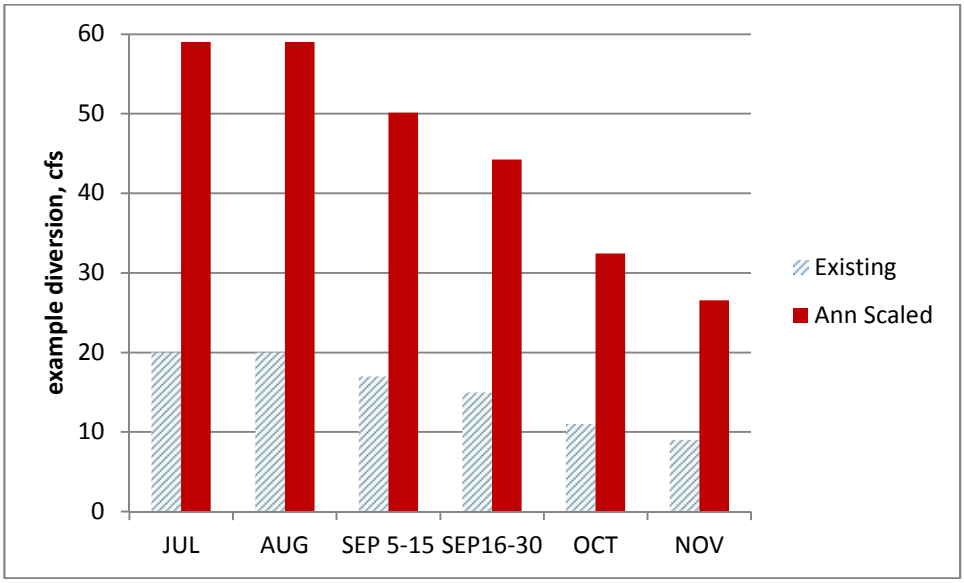


Figure 1. Conceptual illustration of the Annual Scaled calculations, comparing Lake Oswego's existing use vs. future use of 59 cfs developed and undeveloped rights. Approximate monthly values are used here; in practice the model uses daily average values.

The Annual Scaled model likely produces withdrawal estimates in the high range for two reasons:
- Actual municipal withdrawals occur at intervals over the lowest 3.1 miles. However, the model output is based below the last diversion, at about RM 0.7.

- SFWB holds water right permits for the South Fork of the Clackamas River and Memaloose Creek (S-3778 and S-9982). Together, these water rights total 50 cfs. However, of the 50 cfs theoretically available under the permits, only about half is actually available in the lower 3.1 miles of the Clackamas reach in a median year. Because the Annual Scaled model is based on the amount of the water right rather than the amount of water actually available, the model overestimates the effect of future withdrawals under these two permits, which are contingent upon water availability in the South Fork Clackamas and Memaloose Creeks, by 20-25 cfs, or more during dry periods.

Table 2. Municipal water rights in the lower 3.1 miles of the Clackamas River.

Municipality	Permit	Cfs	Developed	Undevel.
Lake Oswego	S-32410	50	25***	25
*Lake Oswego	S-37839	9	0	9
*North Clackamas	S-35297	62	19.47	42.53
*North Clackamas	S-46120	8	5.01	2.99
*North Clackamas	S-43170	1.73	0	1.73
SFWB	S-22581	60	22.4	37.6
**SFWB	S-9982	30	3	27
**SFWB	S-3778	20	5	15
Totals		**240.7**	**79.9**	**160.8**

*These water rights are junior to the instream water right Certificate 59451.
**50 cfs from these two permits limited by water availability in tributaries in the upper basin.
*** This 25.0 cfs portion of the permit has been confirmed under Certificate 78332 for partial perfection of the permit

It should also be pointed out that four of the municipal extensions are junior to the instream water right (see Table 2). The municipalities would be subject to regulation by WRD if the flows dropped below the instream water right. The instream water right flows are less than the fish persistence flows (see Table 3) and are subject to a domestic use protection from regulation, so it might be useful for WRD to state how the different rights would be regulated with regard to the existing instream water right. This could come into play September 16-June 30 if flow dropped to 640 cfs and July 1-September 15 if flow dropped to 400 cfs.

Table 3. Instream water right and ODFW recommended flow from Basin Report.

Month	**Instream right** Certificate 59451	**Basin Minimum = ODFW recommended**
Jan	640	800
Feb	640	800
Mar	640	800
Apr	640	800
May	640	800
Jun	640	650
Jul	400	650
Aug	400	650
Sep	400/640	650/800
Oct	640	800
Nov	640	800
Dec	640	800

By comparing the results of the Annual Scaled Model with the target flows, ODFW determined the percentage of time the target flows will be missed, and the magnitude and duration of the shortfall, under the Annual Scaled model water use scenario. These results allow ODFW to make a determination whether municipal use of the undeveloped portions of the permits will likely result in short-term or long-term drops below target flows.

The difference between short and long term drops below target flows

ODFW's target flows are not flows that must be constantly met in order to maintain the persistence of the affected species. Rather, they are flows necessary over the long term to maintain persistence. The target flows are based on the understanding that stream flows naturally exhibit variation both within a given year and from year to year, and that the affected fish species have adapted to these variations. A short-term drop below target flows is a drop that allows the population of the affected species to remain fairly stable over time. A long-term drop below target flows is a drop that results in either a new normal at a lower population level or a continued decline in population level.

Whether a given drop or set of drops below target flows constitutes a short-term or a long-term drop has to do with the frequency and magnitude of the drop, when the drop occurs and the spatial extent and characteristics of the reach where the drop occurs. All of these factors determine the response of the population to drops below target flows.

Under the Annual Scaled model water use scenario, the drops below target flows happen only part of the time within a given year, do not happen every year, are usually not a large magnitude (see following

section and Table 4), and occur over a small percentage of basin habitat (Table 1). For these reasons, ODFW did not consider the projected drops below target flows resulting from municipal use of the undeveloped portions of the permits to be "long-term" in regard to the impact on any populations in the basin.

However, while the Annual Scaled model scenario represents a likely maximum use scenario (and therefore likely overestimates actual use under the fully developed permits), ODFW also considered that the municipalities will have the legal right to use the full quantity of water allowed under the permits if the permits are fully developed. While such a scenario is unlikely for the reasons described above, ODFW accounted for it in its advice by recommending a curtailment condition during certain parts of the year. In ODFW's view, the curtailment condition is necessary in a "full permitted use" scenario to avoid long-term drops below persistence flows.

Predicted drops below target flows under the Annual Scaled model, and why they constitute short-term drops that are compatible with maintaining the persistence of listed fish species

As described above, streamflow variation, including drops below target flows, can be viewed from two different aspects: variation from year to year, and variation within a year.

1. Variation from year to year

Variation in flow from year to year is a common condition for fish populations. One year will be an above-average flow year and another will be a below-average flow year. If flow is the limiting variable, fish populations can expand in above-average years and contract in below-average years.
In the Clackamas River under existing conditions (i.e. including current water use by the municipalities), the target flows are rarely or never missed except in the latter half of September and in October. Under the Annual Scaled water use scenario, using daily average flows, the target flow is missed 30.1% of the time August 1 – September 4, 19.4% of the time September 5-15, 40% of the time September 16-30, and 17.4% of the time in October (Table 4).

While the Annual Scaled model usage represents an increase in missed target flows in August, September, and October, these missed flows still represent short-term drops that do not threaten fish persistence. For August-September 4, September 5-15, September 16-30, and October, target flows are estimated to be missed one or more days in 8, 6, 9, and 7 of the 15 modeled years. For these same time periods, target flows are expected to be missed by 100 cfs or more 9.7, 6.0, 19.6, and 4.1 percent of the time, based on daily average flows (Table 4).

Regarding where these target flows apply, ODFW analyzed the effect on the lower 3.1 miles of the total 23.5 mile reach, which represents 13 percent of the total reach. In the mainstem upstream of RM 3.1, target flows will be missed very rarely regardless of the municipal diversions in question (based on gage records for the Clackamas near Estacada). In other words, flow levels will be unaffected by these withdrawals in 87% of the reach.

Table 4. Percentage of time missing flow targets, and magnitude of shortfall in cfs, for Existing vs. Annual Scaled scenarios. Percent time for a scenario is based on daily calculated flow values for the gaging period 2000-2014. For example, there are 15 years x 31 days = 465 daily values for October. The total time missing the target for Annual Scaled is 81 days; 81/465 = 17.4% of the time.

Month	Scenario	Total % time missing target	% time missing by 1-50 cfs	% time missing by 50-100 cfs	% time missing by >100 cfs
July	Existing	0	0	0	0
	Ann.Scaled	4.3	1.3	1.3	1.7
Aug-Sep4	Existing	1.1	1.0	0.2	0
	Ann.Scaled	30.1	12.6	7.8	9.7
Sep5-15	Existing	3.6	3.6	0	0
	Ann.Scaled	19.4	5.4	7.9	6.0
Sep16-30	Existing	19.1	7.1	7.1	4.9
	Ann.Scaled	40	8.9	11.6	19.6
October	Existing	6	4.7	1.1	0.2
	Ann.Scaled	17.4	7.7	5.6	4.1
November	Existing	1.8	1.3	0.2	0.2
	Ann.Scaled	3.6	1.3	1.8	0.4

A standard technique for looking at frequency and magnitude of flow changes from year to year is flow exceedance, which combines frequency and magnitude into one plot. In Figure 2, flows for the Labor Day to September 15 period are plotted as a percentage of time that a given flow level occurs. For the existing condition (blue line), a flow of 781 cfs is exceeded 80% of the time; for the Annual Scaled, a flow of 651 cfs is exceeded 80% of the time. The triangle under the 650 cfs dotted line at the right of the figure represents both the magnitude and frequency of the drop below 650 cfs for this scenario.

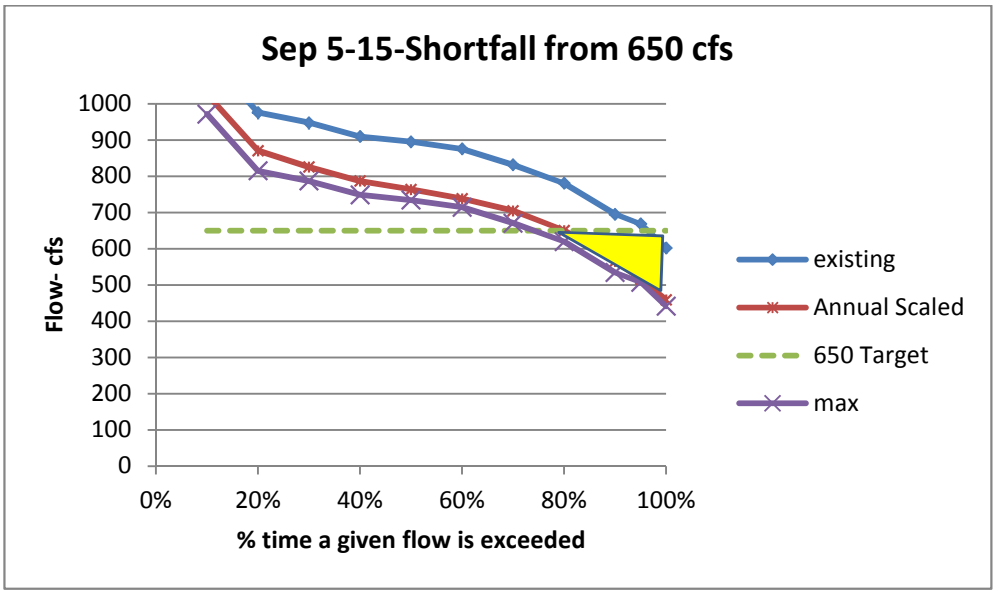


Figure 2. Flow exceedance for existing vs. Annual Scaled conditions for September 5-15. The yellow triangle represents combined frequency and magnitude of the drop below target flows.

2. Variation within a given year

Variation within a given year is a seasonal flow change that the fish have evolved with over time and to which their life cycle has adapted. In the Clackamas basin, low flows occur in the late summer and early fall. With fall rains, flows increase to well above target flows and continue to be high through the winter and spring, until summer when flows begin to drop again (Figure 3). This pattern holds under the Annual Scaled model usage scenario, in which target flows are rarely or never missed except in August, September, and October. In this scenario, August, September, and October low flows can be viewed as an annual condition to which the fish have historically adapted and responded when flows increase with the fall rains.

Figure 3. Approximate median monthly flows at the mouth of the Clackamas River for existing conditions and with 161 cfs undeveloped water subtracted, showing seasonality of flow conditions.

Summary of reasons why use of the undeveloped portions of the municipal water permits is compatible with long-term fish persistence

This summary addresses the frequency, magnitude and spatial extent of anticipated drops below target flows based on the Annual Scaled model. The following section further addresses reach and basin characteristics that affect whether drops below target flows are properly characterized as short-term or long-term.

Within-year and year-to-year variation in the lower Clackamas, based on water use under the Annual Scaled model, are short-term flow effects that are compatible with long term fish persistence because:

- Target flows are rarely or never missed November through July. Based on year-to-year variation over the 15 modeled years, target flows would be met all days for 7 years for the period August 1-September 4; 9 years for September 5-15; 6 years for September 16-30, and 8 years for October 1-31. These numbers are based on average daily flows in the 3.1 mile reach under the Annual Scaled estimate.
- Within a given year, when flows are missed, they rebound in the fall as precipitation increases and municipal demand decreases.
- Target flows will be met in the mainstem above RM 3.1 almost all the time (see above).
- As described in more detail below, in the basin as a whole, low flows are not a key

limiting factor in the Recovery Plan.

Low-flow impacts could become a concern for long-term fish persistence if the low-flow period lasts longer every year, the target flows are frequently missed by a large percentage, low flows do not recover with precipitation, or low flows begin to extend over a greater length of river. None of these apply to the lower Clackamas River.

Additional reasons why the municipal permits, as conditioned, will not contribute to long-term drops below flows needed to maintain the persistence of listed fish species

1. Quality/Quantity of Habitat in Lower 3.1 miles of River:

As noted, flow reductions from municipal withdrawals affect the lower 3.1 miles of the Clackamas River, which represents 1-2% of the overall habitat in the basin for steelhead and spring Chinook, and perhaps up to 5% for fall Chinook. ODFW considered the relative importance of the habitat for listed fish species in the lower 3.1 miles in the context of habitat in the basin as a whole.

2. Limiting factors in the Basin:

In the 2006 advice to OWRD, ODFW considered the factors limiting persistence of listed fish species in the basin. The ODFW concluded that the major factor affecting fish persistence was the quality of the physical habitat, not stream flows; target flows were being met within most of the basin for the listed fish species of concern. Additional evidence is now available and published which supports this conclusion: The Lower Columbia River Conservation and Recovery Plan for Oregon Populations of Salmon and Steelhead (ODFW 2010).

Chapter 5 of the Plan identifies the limiting factors and threats to salmon and steelhead populations in each of the basins in the Lower Columbia, including the Clackamas Basin. “Key limiting factors” and “Secondary limiting factors” are summarized by species. Relevant to this analysis are Table 5.7 - fall Chinook, Table 5.9 -spring Chinook, and Table 5.11 -winter steelhead. Coho salmon do not spawn or rear in the 3.1 mile reach, and chum salmon, which are functionally extinct in the Clackamas, would not spawn or rear during the summer or early fall period.

For juvenile fall and spring Chinook and steelhead, the key limiting factor in the Clackamas basin is “6e Physical habitat quality” (Table 5). This refers to impaired habitat complexity and diversity, including access to off-channel habitats. In the basin including tributaries, low flows were not identified in the Conservation and Recovery Plan (ODFW 2010) as either a key or secondary factor for adult fall Chinook, spring Chinook, or steelhead. For juveniles, low flows were not listed as a key factor for any of the three species. Altered hydrology due to upslope land use (not diversions) was a secondary factor. Reduced flow related to water temperature, was also a secondary factor (Table 5).

Table 5 (below) lists limiting factors and threats related to habitat issues within the Clackamas Basin. The Recovery Plan also describes many other factors that affect the populations, including estuary habitat and the effects of hydropower, harvest, hatcheries, and predation. Complete tables of key and secondary effects are found in the Recovery Plan, Appendix 1.

Table 5. Key and Secondary factors and threats for Clackamas Basin fall and spring Chinook salmon and steelhead (ODFW 2010).

Adult		Juvenile	
Key	none	Key	6e impaired habitat diversity due to land uses
Secondary	6d: impaired gravel recruitment due to large hydro dams	Secondary	5c Altered hydrology from upslope land use
	9b: elevated water temperature due to large hydro reservoirs		6a Fine sediment from roads
			6e impaired habitat diversity due to land uses
			9a water temperature due to land uses or reduced streamflows
			9b water temperature due to large hydro reservoirs

3. Life Cycle Timing

During periods when target flows are expected to be missed most often, the 3.1 mile reach is not providing important habitat for listed fish in the context of basin populations.
Rearing: For the time period July, August and early September, ODFW's Fish Timing Tables (Appendix 2) show that for listed species the predominant use is rearing; however ODFW is not aware of any quantitative data on juvenile use of this 3.1-mile reach of the Clackamas in the summer. If the fish were uniformly distributed in the basin, only about 2% would be rearing in this 3.1 mile reach. The actual use is probably much lower, because this reach is poor quality habitat with warmer water temperatures compared to upstream (Table 6).

The level of steelhead juvenile use in the 3.1 mile reach is unknown but likely very low in terms of basin habitat for steelhead which has available about 276 miles of habitat in the basin (Table 1). Chinook juveniles exhibit two basic life history strategies: ocean-type (juveniles migrate out a few months after emergence) and stream-type (juveniles spend more than a year in freshwater). It is believed that ocean-type juveniles in this reach would migrate out by July, and stream-type juveniles are mainly upstream of RM 30 (Luke Whitman, ODFW, pers. comm.). Accordingly, the lower 3.1 miles of the river does not provide important juvenile habitat during low-flow periods.

Table 6. Mean monthly water temperatures (degrees F) at two locations on the mainstem Clackamas River.

	RM 23	RM 2	Difference
June	54.3	57.4	3.1
July	61.7	66.0	4.3
August	62.2	66.6	4.3
September	57.6	60.8	3.2

Spawning: Of the listed species, only fall Chinook use this reach for spawning. Very little spawning is known to occur here. ODFW surveys have found only 5 redds total in the reach over a 4 year survey period (Eric Brown, ODFW).

Moreover, the duration and magnitude of missing fall target flows are greatest in the late September period (Table 4), but most spawning occurs later in the season. ODFW estimates that about 10% of spawning would occur in late September, vs. 30% in October and 60% November and later (Todd Alsbury, ODFW District Biologist), when flow effects are negligible. Since the effect of the municipal withdrawals on flow are least when most of the spawning occurs, the effect on fall Chinook spawning within the reach is not expected to be significant.

How the curtailment condition helps maintain the persistence of listed species

Curtailment is a systematic way of lowering the maximum allowed diversion rate in proportion to the percentage shortfall from the target flow. For example, if an undeveloped water right is 10 cfs, and the target flow at a given time is being missed by 20%, then the maximum use of the undeveloped right is cut back by 20% to 8 cfs.

Important characteristics of curtailment:

-Curtailment reduces the magnitude of the shortfall but does not change the percent time of the shortfall.

-Curtailment lowers the amount of the undeveloped portion that may be diverted; it may or may not cause an actual reduction in diversion, depending on demand at that time. If a city is diverting its full undeveloped portion during a period when the target flow is missed by 20%, it will have to curtail the undeveloped portion by 20%. But if during that period the city was diverting less than 80% of its undeveloped portion, no cutback would be required.

As described above, ODFW has concluded that the drops below target flows predicted by the Annual Scaled water use model constitute short-term drops that are consistent with maintaining the persistence of listed species. ODFW has also concluded that the Annual Scaled water use model represents the likely maximum water use under the municipal permits if and when they are fully developed (and represents a likely overestimate of actual use).

However, the municipalities will have the legal right to use the full quantity of water allowed under the permits once the permits are fully developed. While such a scenario is unlikely, ODFW accounted for it in its advice by recommending the adoption of a curtailment condition during certain parts of the year. In ODFW's view, the curtailment condition is necessary once the permits are fully developed to avoid long-term drops below persistence flows.

Modified recommended condition to maintain fish persistence (1)

Curtailment is a standard condition that ODFW recommends on most municipal extensions. In order to evaluate the need for curtailment, the combined effect of all diversions needs to be taken into consideration. After further review ODFW believes it needs to address two concerns with the curtailment formulas to align the advice with subsequent fish persistence advice provided in other basins.

- The calculation needs to include all the municipal withdrawals associated with determining when curtailment occurs, and
- The time interval used for determining the percentage curtailment should be as short as possible.

The 2006 ODFW advice established the percentage shortfall based on the gage measurement. However, this method does not include water withdrawals below the gage and therefore, reduces the actual curtailment for all the municipal extensions. As an example this means that during the September 16-30

period (when the persistence flow would be 800 cfs), if flow at the gage is 700, this would be a 12.5% shortfall from the 800 cfs target flow:

a) % shortfall at gage = (800-700)/800 = 12.5%

However, this does not take into account the Lake Oswego diversions coming out downstream of the gage. The Lake Oswego diversions (up to 25 cfs developed + 34 cfs undeveloped = 59 cfs) should be put into the equation in order to make sure that curtailment limits potential use when missing the target becomes a possibility. When flow at the gage is below 859 cfs, the full Lake Oswego 59 cfs diversion (assuming full use) would cause the target to be missed, so if Lake Oswego is using the full amount, the gage reading minus 59 cfs is used to calculate curtailment.

For the present example, including the Lake Oswego diversions in the curtailment percentage gives 700 – 59 = 641 cfs at the mouth:

b) % shortfall at mouth = (800-641)/800 = 19.9%

Since all diversions in the reach are having an effect on flow at the mouth, all the undeveloped rights in the affected reach should be curtailed by 19.9%. In this example, ODFW advice would be that every POD would be limited to 100-19.9 = 80.1% of its total undeveloped amount. In practice the municipalities would be curtailed based on the actual amount of total extension water they are currently using and other permit requirements.

In addition to accounting for diversions occurring below the gage, ODFW also recommends adding the total withdrawals for all the municipalities into the equation based on average daily flows. This will assure curtailment begins when flows fall below the fish persistence levels at the mouth, and will also assure that adjustments are made on a timely basis when flows drop and/or demand fluctuations. Therefore, to avoid large fluctuations in river flows and curtailment amounts ODFW recommends a water right condition be included in the water permits calculating curtailment amounts and total water use on a daily basis.

Curtailment in the case of the lower Clackamas is a condition that will be most noticeable in a situation where the flow target is missed by a high percentage and demand is near maximal. For example, if in late September the flow dropped to 550 cfs at the mouth, the percentage shortfall would be 31.2% from the 800 cfs target. If cities were at that time using the full 160.8 cfs of undeveloped water, they would be cut back to 110.6 cfs, a reduction of 50.2 cfs (but if they were using only 110 cfs at the time, they would not be curtailed). During low flows and with maximal demand, curtailment is largest.
The curtailment condition does not apply to the period of July 1 up to the first Monday in September. As described above, this is because the lower 3.1 miles of habitat already constitutes poor quality habitat for the listed species during this time period. The additional estimated diversions of water during this period are unlikely to result in the failure to maintain the persistence of listed species.

Modified recommended condition to maintain fish persistence (2)
Although ODFW has chosen not to recommend curtailing water withdrawals in the lower 3.1 miles of the river July 1st through the first Monday in September (Labor Day) it is important to recognize that missing the target flows will have an effect on the ecology of this portion of the river. Therefore ODFW

recommends that as a further condition to reduce the magnitude by which target flows may be missed, upon the first occurrence of target flows being missed at the mouth of the Clackamas River July 1st through the first Monday in September, the water user must enact the first level or stage of alert in their water curtailment plan that includes mandatory water conservation measures and/or curtailment actions. Once enacted, implementation of the conservation measures and/or curtailment actions must continue through the first Monday in September. By taking measures to reduce water use in this manner, the degree to which target flows are missed will be decreased.

How the Timothy Lake condition pertains to persistence of listed species: preferred uses for available Timothy Lake releases

Under an agreement between the municipalities and PGE, which controls the dam at Timothy Lake, the municipalities have the right to request releases from Timothy Lake when water is available as specified in the agreement. The agreement does not guarantee the availability of a particular quantity of water. However, ODFW concluded that a condition pertaining to the municipalities' use of these flows was important for two reasons. First, while Timothy Lake releases are not necessary to maintain the persistence of listed species, if shaped and timed correctly, releases of any available water could make a contribution to the overall health of listed species. Second (and more critically from a fish persistence perspective), if shaped and timed incorrectly, releases of available Timothy Lake water could have a detrimental effect on fish persistence.

ODFW's 2006 advice to WRD on the permit extensions were based on a 2005 Timothy Lake agreement that made two separate blocks of water available to the municipalities. The Timothy Lake agreement between PGE and the municipalities was renegotiated in 2011. The 2011 agreement is based on lake elevations rather than blocks (volumes) of water. Functionally, the two agreements are similar in that there are two periods when water might be available to the Municipalities to augment flows. One time period is Memorial Day to Labor Day. The second period is after Labor Day into the spring of the next year. ODFW recognizes that this water will not always be available each year and the amount available will vary, however, the benefit of shaping when and how much water is used is important to provide as much habitat as possible for these listed species.

ODFW recognizes that if the municipalities are curtailed in the summer they would in effect be incentivized to release any available Timothy Lake water to reduce their curtailment as much as possible during August and early September. This is because municipal demand is highest from August through Labor Day. But for the reasons described above, this period is relatively unimportant to listed fish species in the lower 3.1 miles of the river. If Timothy Lake water is used, ODFW prefers to provide the additional water when it would do the most good to maintain the persistence of listed fish in the basin.

The distance from Timothy Lake to the mouth of the Clackamas is 67 miles and any additional releases would benefit habitat and fish in this reach. Steelhead spawning through emergence occurs in about 46 miles of the Clackamas and Oak Grove Fork downstream of Timothy Lake (NRIMP data). During spring through July, steelhead fry are emerging from the gravels and in some years, naturally declining water flows may cause some redds to dry out in June or July, reducing the population of fry that emerge. During such years, if the flows can be augmented, additional fry will be allowed to emerge. Additional water flowing down 46 miles of spawning and emergence habitat during the last part of the emergence

period in July is a significant potential benefit. But if ODFW determined there was no benefit to providing augmented flows under the circumstances existing in a given year, then the municipalities could call for the water when it most benefited them.

If curtailment rules were instituted during summer, municipalities would likely hold Timothy Lake water back for use in August to avoid curtailment, rather than use it in July to provide a tangible benefit to fish in the overall basin. Additional flows in August would benefit rearing habitat, but since flows are normally being met for rearing during this time period in most of the basin (except the last 3.1 miles in some years) there would not be as much of an additional benefit compared to getting steelhead fry out of the gravels.

After Labor Day, ODFW advised curtailment when target flows are not being met. September is a relatively high water use period for municipalities and water from Timothy Lake could be provided in September when flow targets are most likely to be missed (Table 4). However, ODFW believes the most beneficial strategy is to hold the water from Timothy Lake until October when fall Chinook are more likely to have begun spawning. This can help keep flows steady and redds covered with water until fall rains bring up the river flows naturally. Under the 2011 agreement, up to 150 cfs could be released through October, benefiting about 24.5 miles of mainstem spawning habitat (including the lower 3.1 mile reach). ODFW considers using any available water to enhance Chinook spawning success in October an important benefit for the entire 24.5 miles of habitat. This can increase Chinook reproduction and the species' likelihood of recovering and persisting in the basin.

<u>Modified recommended condition to maintain fish persistence.</u>

ODFW's 2006 advice asked for an annual meeting with the municipalities to determine how to use the augmentation water provided from Timothy Lake. However, under the new Timothy Lake agreement PGE has indicated they will not know whether water is available for augmentation until a couple of weeks before they are able to release the water. ODFW now recommends that an annual strategy be developed based on the current year's projected water availability The strategy will include two flow augmentation periods (June 1st to Labor Day) and (Labor Day to Oct 31st). The June 1st to Labor Day period will determine whether flows are needed for steelhead spawning and incubation or can be used for flow augmentation later in the summer. The Labor Day to Oct 31st period will determine the timing for flow augmentation for chinook spawning. The permittees will consult with PGE to determine when and if water is available for flow augmentation. The permittees will notify ODFW about the timing and the amount of flow that can be released. If the available water cannot meet the strategy targets, then the permittees and ODFW will modify the water augmentation strategy to maximize fishery benefits. The permittees will then submit a flow augmentation request to PGE.

SUMMARY

For the reasons described above, ODFW concludes that the Fish Persistence Conditions included in OWRD's 2011 final orders, with the following modifications, will maintain the persistence of listed species:

- Account for Lake Oswego's water withdrawals in curtailment calculations, rather than base calculations on the gage reading.
- Recommend calculating curtailment amounts on a daily basis to minimize fluctuations in river flows and curtailment requirements.
- Recommend enactment of the first level or stage of alert in the water user's water curtailment plan that includes mandatory water conservation measures and/or curtailment actions when the river is at or below the target flows. Further, once enacted, implementation of the conservation measures and/or curtailment actions must continue through the first Monday in September.
- Update requirement to consult with ODFW when water is available under the 2011 Timothy Lake agreement.

-The 2010 Conservation and Recovery Plan does not identify water withdrawal as either a key or secondary limiting factor for adult Chinook or steelhead in the Clackamas Basin. Water withdrawal, as related to temperature, is listed as a secondary factor for juveniles.

-Modeled drops below persistence flows are short term, both inter-and intra-annually.

-Flow effects on rearing habitat are confined to a short reach that provides less than 2% of basin habitat.

-Almost all basin spawning takes place upstream of the affected reach. Only fall Chinook spawn in the affected lower 3.1 miles and this reach represents less than 5% of their spawning habitat. The biggest shortfalls from target flows occur in the early part of spawning season, whereas most of the spawning occurs later in the season.

-Shaping and timing Timothy Lake water for flow augmentation will provide additional habitat over a longer reach, and will improve overall fish persistence for the listed fish species in the watershed as a whole.

MODIFIED FISH PERSISTENCE CONDITIONS

ODFW recommends the fishery resource protection conditions as set forth in Appendix C to maintain the persistence of fish species listed as sensitive, threatened or endangered under state or federal law. The fish persistence conditions were formulated in coordination with OWRD and are consistent with the advice given to OWRD in this response.

References

ODFW 2010. Lower Columbia River Conservation and Recovery Plan for Oregon Populations of Salmon and Steelhead. Final document. August 2010.

Appendices

A. Limiting factor tables from the Conservation and Recovery Plan.
B. Fish distribution and timing in the Clackamas River.
C. Fishery resource protection conditions

Appendices

Appendix A	Excerpt from Lower Columbia River Conservation and Recovery Plan (ODFW 2010).
Appendix B	Life stage timing for anadromous fish in the Clackamas River.
Appendix C	Fishery resource protection conditions.

Appendix A Excerpt from Lower Columbia River Conservation and Recovery Plan (ODFW 2010)

5.5 Limiting Factors and Threats for Lower Columbia River Chinook

Key and secondary limiting factors and threats that contribute to the current status of Oregon's LCR Chinook populations are in Tables 5-7 through 5-9. A discussion of these threats and factors follows.

Table 5-7. Key and secondary threats and limiting factors for Lower Columbia River fall Chinook.

CHINOOK (Fall)			Threats and Limiting Factors					
Population	Threat Level	Life History Stages	Tributary Habitat	Estuary Habitat	Hydro	Harvest	Hatchery	Predation
Youngs Bay	Key	Adult				7a	7c	
		Juvenile	5c, 6e	3a, 3b, 5b, 6c				
	Secondary	Adult	4c					
		Juvenile	5c, 6a	1a, 6e, 9a, 9b, 9c				8b
Big Creek	Key	Adult				7a	7c	
		Juvenile	5c, 6e	3a, 3b, 5b, 6c				
	Secondary	Adult	4c					
		Juvenile	5c, 6a	1a, 6e, 9a, 9b, 9c				8b
Clatskanie	Key	Adult				7a	7c	
		Juvenile	6e	3a, 3b, 5b, 6c				
	Secondary	Adult						
		Juvenile	5c, 6b	1a, 6e, 9a, 9b, 9c, 9d				8b
Scappoose	Key	Adult				7a	7c	
		Juvenile	5c, 6e	3a, 3b, 5b, 6c				
	Secondary	Adult						
		Juvenile	5c, 6b	1a, 6e, 9a, 9b, 9c, 9d				8b
Clackamas	Key	Adult				7a	7c	
		Juvenile	6e	3a, 3b, 5b, 6c				
	Secondary	Adult	6d, 9b					
		Juvenile	5c, 6a, 6e, 9a, 9b	1a, 6e, 9a, 9b, 9c, 9d				8b
Sandy	Key	Adult				7a	7c	
		Juvenile	6e	3a, 3b, 5b, 6c				
	Secondary	Adult	6d					
		Juvenile	5c, 6a	1a, 6e, 9a, 9b, 9c, 9d	4b			8b
Lower Gorge	Key	Adult	6f			7a	7c	
		Juvenile	6f	3a, 3b, 5b, 6c				
	Secondary	Adult						
		Juvenile	5c	1a, 6e, 9a, 9b, 9c, 9d				8b
Upper Gorge	Key	Adult	6f, 6g			7a	7c	
		Juvenile	6f, 6g	3a, 3b, 5b, 6c				
	Secondary	Adult			4a			
		Juvenile	1a, 5c, 6g, 8a	1a, 6e, 9a, 9b, 9c, 9d	4a			8b
Hood	Key	Adult				7a	7c	
		Juvenile	5d, 6e	3a, 3b, 5b, 6c				
	Secondary	Adult			4a			
		Juvenile	1a, 5a, 5c, 6a, 6g, 8a, 9c	1a, 6e, 9a, 9b, 9c, 9d	4a			8b

Table 5-8. Key and secondary threats and limiting factors for Lower Columbia River late fall Chinook.

CHINOOK (Late Fall)			Threats and Limiting Factors					
Population	Threat Level	Life History Stages	Tributary Habitat	Estuary Habitat	Hydro	Harvest	Hatchery	Predation
Sandy	Key	Adult				7a	7c	
		Juvenile	6e	3a, 3b, 5b, 6c				
	Secondary	Adult	6d					
		Juvenile	5c, 6a	1a, 6e, 9a, 9b, 9c, 9d	4b			8b

Table 5-9. Key and secondary threats and limiting factors for Lower Columbia River spring Chinook.

CHINOOK (Spring)			Threats and Limiting Factors					
Population	Threat Level	Life History Stages	Tributary Habitat	Estuary Habitat	Hydro	Harvest	Hatchery	Predation
Clackamas	Key	Adult					7c	
		Juvenile	6e	3a, 3b, 5b, 6c	4b			
	Secondary	Adult	6d, 9b			7a, 7b		
		Juvenile	5c, 6e, 9a, 9b	1a, 6e, 9a, 9b, 9c, 9d				8b
Sandy	Key	Adult					7c	
		Juvenile	6e	3a, 3b, 5b, 6c				
	Secondary	Adult	4a, 6d			7a, 7b		
		Juvenile	5c, 6a	1a, 6e, 9a, 9b, 9c, 9d	4b			8b
Hood	Key	Adult				7a	7c	
		Juvenile		3a, 3b, 5b, 6c				
	Secondary	Adult			4a			8d
		Juvenile	1a, 5a, 5c, 5d, 6a, 6g, 8a, 9c	1a, 6e, 9a, 9b, 9c, 9d	4a			8b

Code	Limiting Factor	Threat
1a	Competition (hatchery fish)	Smolts from all Columbia Basin hatcheries
3a	Food web (reduced macrodetrital inputs)	Columbia Basin hydropower reservoirs, revetments, and disposal of dredge material
3b	Food web (increased microdetrital inputs)	Columbia Basin hydropower reservoirs
4a	Habitat access (impaired passage)	Large dam(s)
4b	Habitat Access (impaired downstream passage)	Large dam(s)
4c	Habitat access (impaired upstream passage)	Hatchery weir
4d	Habitat access (impaired upstream passage)	Road crossings
4e	Habitat access (impaired upstream passage)	Road crossings, small dams, and diversions
5a	Hydrograph/water quantity (altered hydrology)	Low-head hydro diversions
5b	Hydrograph/water quantity (altered hydrology)	Columbia Basin hydropower dams (impaired access to off-channel habitat, dewatering of redds below, and altered plume dynamics, estuarine habitat, and food web)
5c	Hydrograph/water quantity (altered hydrology)	Upslope land uses
5d	Hydrograph/water quantity (altered hydrology: reduced downstream flows)	Irrigation withdrawals (impaired physical habitat, access to habitat)
5e	Hydrograph/water quantity (altered hydrology: reduced downstream flows)	Municipal withdrawals
5f	Hydrograph/water quantity (altered hydrology: reduced downstream flows)	Hatchery withdrawals (impaired passage and reduced habitat)
6a	Physical habitat quality (excessive fine sediment)	Rural roads
6b	Physical habitat quality (excessive fine sediment)	Rural roads and land use
6c	Physical habitat quality (impaired sediment/sand routing)	Columbia Basin hydropower dams
6d	Physical habitat quality (impaired gravel recruitment)	Large dam(s)
6e	Physical habitat quality (impaired habitat complexity and diversity, including access to off-channel habitats)	Past and/or current land use practices
6f	Physical habitat quality (impaired habitat quality and disconnected habitat)	Transportation corridor development and maintenance

6g	Physical habitat quality (reduced habitat quality/quantity)	Inundation from Bonneville
7a	Population traits (impaired abundance and diversity)	Consumptive, targeted fishery
7b	Population traits (impaired abundance and diversity)	Fisheries targeted at other stocks or species
7c	Population traits (impaired productivity and diversity)	Stray hatchery fish interbreeding with wild fish
8a	Predation (non-salmonid fish)	Bonneville Reservoir and Columbia Basin flow regulations
8b	Predation (birds)	Land use practices that create more favorable conditions for Caspian terns and cormorants to prey on salmonid juveniles in estuary
8c	Predation (hatchery fish)	Smolts from all Columbia Basin hatcheries
8d	Predation (marine mammals)	Bonneville Dam and Columbia Basin flow regulations
9a	Water quality (elevated water temperature)	Land uses that impaired riparian condition or reduced steamflows (e.g. water withdrawals for agricultural, industrial, or municipal uses)
9b	Water quality (elevated water temperature)	Large hydropower reservoirs
9c	Water quality (toxins)	Agricultural chemicals used throughout the Columbia Basin
9d	Water quality (toxins)	Urban and industrial practices

The following threats and factors limit viability of Oregon's LCR fall, late fall and spring Chinook populations. Appendix E provides more information on the threats and factors limiting the different Chinook populations during specific life stages.

5.5.1 Tributary Habitat

- *Altered hydrograph/water quantity from upslope land use (5c).*
  Key threat: Youngs Bay, Big Creek, Scappoose fall Chinook Secondary threat: all LCR fall, late fall and spring Chinook populations

  Altered hydrologic processes and/or reduced water quantity due to land use practices on upland slopes are a key concern for fall Chinook fry in the Youngs Bay, Big Creek and Scappoose population areas. They pose a secondary concern for winter steelhead eggs, alevins, and summer parr in these population areas. They are a secondary concern for all other LCR fall Chinook populations and Sandy late fall Chinook from the egg through summer parr life stages. They pose a secondary concern for spring Chinook populations from the egg through winter parr life stage.

  As discussed for coho in Section 5.4.1, land use practices on upland slopes have reduced soil stability, increased the extent of impermeable surfaces, reduced vegetative cover, and altered drainage systems. As a result, they have reduced the interception and infiltration of precipitation on upland ecosystems and, thus, affected water storage in the soil and delivery to streams. Many stream systems now exhibit higher peak flows and lower base flows than they did historically.

- *Altered hydrograph/water quantity due to irrigation withdrawals (5d).*
  Key threat: Hood fall Chinook Secondary threat: Hood spring Chinook

  Reduced instream flow due to irrigation withdrawals affects the Hood fall and spring Chinook populations by reducing juvenile rearing habitat quality and restricting access to historical habitat areas. The limiting factors are the same as those described for coho in Section 5.4.1.

- *Reduced physical habitat quality/habitat access due to past and/or current land use practices (6e).* Key threat: Youngs Bay, Big, Clatskanie, Scappoose, Clackamas, Sandy and Hood fall Chinook; Sandy late fall Chinook; Clackamas and Sandy spring Chinook
  Secondary threat: Clackamas fall Chinook; Clackamas spring Chinook

  Reduced habitat quality and complexity, and connectivity with off-channel habitats limits juvenile fall, late fall and spring Chinook viability in all population areas, with the exception of the Lower

Gorge and Upper Gorge areas. The limiting factors are the same as those described for coho in Section 5.4.1.

- *Degraded physical habitat quality due to transportation corridor development and maintenance (6f).* Key threat: Lower Gorge and Upper Gorge fall Chinook

  Activities associated with highway and rail development have degraded habitat quality and connectivity for adult and juvenile fall Chinook in the Lower Gorge and Upper Gorge population areas. The limiting factors are the same as those described for coho in Section 5.4.1.

- *Degraded physical habitat quality, inundation from Bonneville Dam (6g).*
  Key threat: Upper Gorge fall Chinook
  Secondary threat: Upper Gorge and Hood fall Chinook; Hood spring Chinook

  Inundation and loss of lowland riparian hardwood communities along the Columbia River has reduces habitat quality for adult and juvenile fall Chinook in the Upper Gorge area, and for juvenile fall and spring Chinook in the Hood population. The limiting factors are the same as those described for coho in Section 5.4.1.

- *Competition with hatchery fish from Columbia River hatcheries (1a).*
  Secondary threat: Upper Gorge and Hood fall Chinook; Hood spring Chinook

  Competition with hatchery fish for limited habitat and food supplies in the mainstem Columbia River estuary, and in the Columbia above Bonneville Dam has reduced juvenile abundance and productivity for Upper Gorge and Hood fall Chinook and Hood spring Chinook. The limiting factors are generally the same as those described for coho in Section 5.4.1.

- *Impaired habitat access due to dam construction and operations (4a).*
  Secondary threat: Sandy spring Chinook

  The Bull Run water system dams in the Sandy River system hinder upstream passage of spring Chinook to potential spawning and rearing habitat above the dams.

- *Reduced habitat access due to hatchery weirs (4c).*
  Secondary threat: Youngs Bay and Big Creek fall Chinook

  Hatchery weirs in the Youngs Bay and Big Creek population areas impede or prevent adult fall Chinook access to historical spawning and rearing habitat. In the Youngs Bay area, a weir at Klaskanine Hatchery on the North Fork Klaskanine River is believed to hinder fall Chinook access; however, it is unclear how much of the upstream habitat is suitable for fall Chinook. A weir at Big Creek Hatchery blocks fall Chinook access in the Big Creek area. Again, however, the quality of fall Chinook habitat above this hatchery weir is believed to be limited. Fall Chinook are not passed above the weir.

- *Altered hydrograph/water quantity due to low head hydro diversions (5a).*
  Secondary threat: Hood fall Chinook; Hood spring Chinook

  Low-head hydro diversions in the Hood River basin impair habitat access and physical habitat quality for juvenile fall and spring Chinook. Farmers and Middle Fork irrigation districts operate five small hydro plants year-round along their irrigation canals and pipelines. Depending on irrigation demand, some or all of the water is returned to the stream at various points. Their combined generation water

rights total 158 cfs, although actual peak use varies (Coccoli et al. 1999). The maximum winter hydro diversion is 45 cfs from Middle Fork Irrigation District sources (Conners, Middle Fork Irrigation District pers comm., in Coccoli et al. 1999). Farmer's Irrigation District on the mainstem Hood River (RM 11.5) diverts approximately 80 cfs of water from the mainstem Hood River at RM 10, and an additional 30 cfs from other upstream sources for use as both irrigation and hydroelectric production. Depending upon irrigation demand, some or all of the water is returned to the mainstem Hood River at RM 4.5. Screens at the diversions prevent fish entrainment. A small hydro plant is also operated by a private individual on Odell Creek near its mouth.

- *Degraded physical habitat quality, excessive fine sediment, due to roads (6a).*
  Secondary threat: Youngs Bay, Big Creek, Clackamas, Sandy, Hood fall Chinook; Sandy late fall Chinook; Sandy and Hood spring Chinook

  Forest and rural roads have altered sediment routing and led to an overabundance of fine-grained sediments, excess of course-grained sediments, inadequate course-grained sediments, and/or contaminated sediment in stream channels. Excessive fine sediment reduces egg development and survival during the incubation life stage.

- *Degraded physical habitat quality, excessive fine sediment due to roads and land use (6b).*
  Secondary threat: Clatskanie and Scappoose fall Chinook

  Land use practices and road development on unstable slopes have disrupted natural processes that controlled erosion and sediment routing. As a result, excessive amounts of fine sediment have entered the stream system, reducing the quality of spawning gravels and incubation habitat.

- *Degraded physical habitat quality, impaired gravel recruitment due to large dams (6d).* Secondary threat: Clackamas and Sandy fall Chinook; Sandy late fall Chinook; Clackamas and Sandy spring Chinook

  Impaired gravel recruitment behind dams affects Chinook spawning habitat quality in the Clackamas and Sandy areas. A geomorphic analysis of the Clackamas River downstream of River Mill Dam shows that gravel recruitment is impaired in the two-mile reach below River Mill Dam (Wampler and Grant 2003). Sediment trapping by the dams has resulted in coarsening of the grain size, channel incision and erosion of margin deposits. Studies also show that high quality spawning gravel is limited in portions of the Sandy River[27] and in the Bull Run River below the dams. Portland General Electric (2002) found that gravels suitable for spawning substrate are limited in some reaches of the middle Sandy River because of high water velocities. Analysis of spawning gravel in the lower Bull Run River by R2 Resource Consultants (1998) and Beak Consultants (2000) indicates that lack of suitable spawning gravel in the reach is limiting Chinook production.

- *Predation from non-salmonid fish in Bonneville Reservoir and Columbia River mainstem (8a).*
  Secondary threat: Upper Gorge and Hood fall Chinook; Hood spring Chinook

- Predation by non-salmonid fish in Bonneville Reservoir and the mainstem Columbia River impacts juvenile Chinook from the Upper Gorge and Hood populations. Pikeminnows congregate at dam bypass outfalls and hatchery release sites to feed on smolts, which dominate their diet at these locations. Impacts from pikeminnow and other non-salmonid fish are generally the same as those described for coho in Section 5.4.1.

[27] This situation may improve with the removal of Marmot Dam in 2007.

- *Degraded water quality, elevated water temperatures due to land use practices (9a).*
  Secondary threat: Clackamas fall Chinook; Clackamas spring Chinook

  High summer water temperatures are a concern for juvenile Chinook in the Clackamas population. EDT results for the watershed identify summer water temperature as limiting juvenile spring Chinook summer rearing (Primozich and Bastasch 2004). Adult fall Chinook are also affected by high summer and fall water temperatures in the lower river, which occur during their spawning period and reduce egg survival. These high water temperatures are primarily the result of decreased riparian forest in the tributaries and mainstem, ponding behind the dams, and other upriver factors, while conditions in the lower Clackamas area have only a minor impact on the conditions (Primozich and Bastasch 2004).

- *Degraded water quality, elevated water temperatures due to large hydropower reservoirs (9b).*
  Secondary threat: Clackamas fall Chinook; Clackamas spring Chinook

  Water impoundment in reservoirs above Clackamas hydropower dams results in solar heating and elevated river water temperatures below the hydropower projects. The elevated water temperatures in the Clackamas River during late summer and early fall limit Chinook spawning success in the lower basin.

- *Degraded water quality, toxins from agricultural sources (9c).*
  Secondary threat: Hood fall Chinook; Hood spring Chinook

  Agricultural chemicals, including organophosphates and other insecticide levels above state water quality standards, impair juvenile Chinook growth and survival in the Hood River drainage. Water quality is primarily affected by pesticides and bacteria in the lower basin (Baldwin, Indian, Lenz, Odell, and Neal creeks) (Shively et al. 2006). Low flows concentrate pollutants.

5.5.2 Estuary Habitat

- *Altered food web, reduced macrodetrital input due to Columbia Basin hydropower reservoirs, revetments, and disposal of dredge material (3a).*
  Key threat: all LCR fall, late fall and spring Chinook populations

  Reduced macrodetrital-based input in the Columbia River estuary significantly affects the viability of all Oregon LCR Chinook populations. The limiting factors are generally the same as those described for coho in Section 5.4.2.

- *Altered food web, increased microdetrital input due to Columbia Basin hydropower reservoirs (3b).*
  Key threat: all LCR fall, late fall and spring Chinook populations

  The substitution of the estuary's current microdetrital-based food web, made up of decaying phytoplankton delivered from upstream reservoirs, for the historical macrodetrital-based web has reduced productivity in the estuary. The limiting factors are generally the same as those described for coho in Section 5.4.2.

- *Altered hydrograph/water quantity due to Columbia Basin hydropower dams (5b).*
  Key threat: all LCR fall, late fall and spring Chinook populations

  Alteration of the Columbia River hydrograph significantly affects all LCR Chinook populations. The limiting factors are generally the same as those described for coho in Section 5.4.2.

- *Impaired physical habitat quality due to Columbia Basin hydropower dams (6c).*
  Key threat: all LCR fall, late fall and spring Chinook populations

  Impaired physical habitat quality in the estuary, especially sediment and sand routing, impacts all LCR Chinook populations. The limiting factors are generally the same as those described for coho in Section 5.4.2.

- *Competition with hatchery smolts (1a).*
  Secondary threat: all LCR fall, late fall and spring Chinook populations

  Competition with hatchery fish from all Columbia River hatcheries for limited habitat and food supplies in the Columbia River estuary affects productivity of all LCR Chinook populations. The limiting factors are generally the same as those described for coho in Section 5.4.2.

- *Impaired physical habitat quality due to past and/or current land use practices (6e).*
  Secondary threat: all LCR fall, late fall and spring Chinook populations

  Physical habitat quality in the Columbia River estuary, including habitat complexity/diversity and loss of access to off-channel habitats, has been degraded through past and current land use practices. The degraded habitat conditions now limit viability of all LCR Chinook populations. The limiting factors are generally the same as those described for coho in Section 5.4.1.

- *Degraded water quality, high water temperatures due to land use practices (9a).*
  Secondary threat: all LCR fall, late fall and spring Chinook populations

  Land use practices that degrade riparian conditions or reduce streamflows have contributed to elevated water temperatures in the estuary. In conjunction with water withdrawals, elevated stream temperatures often exist because of a lack of intact, functional and contiguous riparian management zones and sufficient streamside buffers. Channel widening may also be a contributing factor.

- *Degraded water quality, high water temperatures due to large hydropower reservoirs (9b).*
  Secondary threat: all LCR fall, late fall and spring Chinook populations

  Elevated water temperatures due to reservoir construction and operations affect juveniles from all LCR Chinook populations. The limiting factors are generally the same as those described for coho in Section 5.4.2.

- *Degraded water quality, toxins from agricultural sources (9c).*
  Secondary threat: all LCR fall, late fall and spring Chinook populations

  Contaminants from agricultural practices are found throughout the Columbia River estuary. A wide range of commonly used pesticides have been detected at sampling sites near Bonneville Dam and at the confluence of the Willamette and Columbia rivers (LCREP 2007a,b; Fresh et al. 2005). Detected water-soluble pesticides include simazine, atrazine, chlorpyrifos, metolachlor, diazinon, and carbaryl. Short-term exposure to these types of pesticides at environmentally relevant concentrations has been associated with disruption of olfactory function in salmonids; leading to difficulty in homing, predator avoidance, and finding prey (Scholz et al. 2000; Sandahl et al. 2002, 2005; Tierney et al. 2008). Moreover, mixtures of some of these pesticides (e.g., malathion and diazinon or chlorpyriphos) may be acutely lethal to salmonids (Laetz et al. 2009). Certain trace metals, such as lead and arsenic, have also been introduced to the environment through pesticides, such as lead

arsenate, which is used as an insecticide for apples (Fresh et al. 2005). Additionally, a number of chlorinated pesticides, including DDTs, chlordanes, and endosulfans, are still present in soils and sediments in the Columbia Basin, even though they were banned in the United States in the 1970s (USEPA 2009). These compounds have been observed in tissues and stomach contents of juvenile Chinook salmon from the lower Columbia River and estuary and, in some cases, DDTs have accumulated in salmon tissues to concentrations above estimated toxic effects thresholds (Beckvar et al. 2005; Johnson et al. 2007; LCREP et al 2007b).

- *Degraded water quality, toxins from urban and industrial sources (9d).*
  Secondary threat: Clatskanie, Scappoose, Clackamas, Sandy, Lower Gorge, Upper Gorge, Hood fall Chinook; Sandy late fall Chinook; Clackamas, Sandy and Hood spring Chinook

  Toxic contaminants from urban and industrial practices reduce habitat quality for juvenile LCR Chinook from the Clatskanie, Scappoose, Clackamas, Sandy, Lower Gorge, Upper Gorge and Hood populations. Generally studies have shown that PCB and PAH concentrations in salmon and their prey in the lower Columbia and lower Willamette are comparable to those in organisms in other moderately to highly urbanized areas (Fresh et al. 2005; LCREP 2007; Johnson et al. 2007), and in some cases are above estimated threshold levels for toxic effects (Meador et al. 2002, 2008). In a study by Loge et al. (2005), cumulative delayed disease-induced mortalities were estimated at 3 percent and 18 percent for juvenile Chinook residing in the Columbia River estuary for 30 to 120 days, respectively, with about 50 percent of that mortality estimated to be due to effects of toxic contaminants such as PCBs and PAHs. The limiting factors are generally the same as those described for coho in Section 5.4.2.

5.5.3 Hydropower and Flood Control Management

- *Impaired habitat access due to dam construction and operations (4a).*
  Secondary threat: Upper Gorge and Hood fall Chinook; Hood spring Chinook

- Bonneville Dam impairs adult and juvenile Chinook access to and from habitats in the Upper Gorge and Hood population areas. Operational practices and/or flows can delay passage at the dam. Powerdale Dam on the mainstem Hood River also hinders access of adult Chinook returning to historical spawning areas in the basin above the dam. The dam is scheduled to be removed by 2010. The limiting factors are generally the same as those described for coho in Section 5.4.3.

- *Impaired habitat access, downstream passage due to dam construction and operations (4b).*
  Key threat: Clackamas spring Chinook
  Secondary threat: Sandy fall Chinook; Sandy late fall Chinook; Sandy spring Chinook

  Impaired downstream passage past the Clackamas hydropower project is a concern for the Clackamas spring Chinook population. Mortality of downstream migrating juveniles occurs at North Fork Dam, Faraday Powerhouse and River Mill Dam. In a DEIS for the Clackamas Hydro Project, FERC (2006) estimated the current average mortality for smolts passing through the hydro complex at 24.6 percent for Chinook. The dams may also delay adult salmon and steelhead passage to upriver habitat and reduce spawner success and distribution.

  In the Sandy Basin, mortality of fall, late fall and spring Chinook fry as they migrate downstream past the Little Sandy Dam is a concern for the populations. Lingering impacts on population abundance and productivity due to mortality of fry migrating past Marmot Dam before it was removed in October 2007 are also a concern for the populations.

5.5.4 Harvest Management

- *Loss of population traits due to consumptive, targeted fisheries (7a).*
  Key threat: all LCR fall Chinook populations; Sandy late fall Chinook; Hood spring Chinook Secondary threat: Clackamas and Sandy spring Chinook

  Incidental or direct mortality from targeted fisheries on the same species in the ocean and Columbia estuary reduces abundance and productivity of all Oregon LCR fall Chinook populations, Sandy late fall Chinook, and Hood spring Chinook (see Appendix D for most recent harvest limits).

  Fall Chinook: LCR fall Chinook are caught in ocean fisheries and in non-Treaty fisheries in the mainstem Columbia River below Bonneville Dam. The majority of harvest impacts to LCR tule Chinook populations occur in ocean fisheries, which have been responsible for about 70 percent of the harvest impact since 2002 (NMFS 2008). Direct harvest mortality of fall-run Chinook salmon in the Lower Columbia River has also been, and continues to be, relatively high. Over the last 10 years, the total harvest rates on most of the LCR fall Chinook populations below Bonneville Dam are thought to have averaged roughly 60; the rate on the Youngs Bay and Big Creek populations have been higher, averaging an estimated 75 and 65 percent, respectively (Chapter 4, Table 4-8; ISRP & IEAB 2005, ISRP & IEAB 2007, North et al. 2006). The fishery mortality rates shown in Figure 5-11 for Clatskanie tule fall Chinook typify the total harvest rates for LCR fall Chinook populations from ocean and Columbia River fisheries since 1950 (Appendix C). The allowable harvest rate established by NMFS for naturally-spawning tule fall Chinook has decreased from 49 percent in 2006 to 42 percent, 41 percent, and 38 percent for 2007-2009 fisheries.

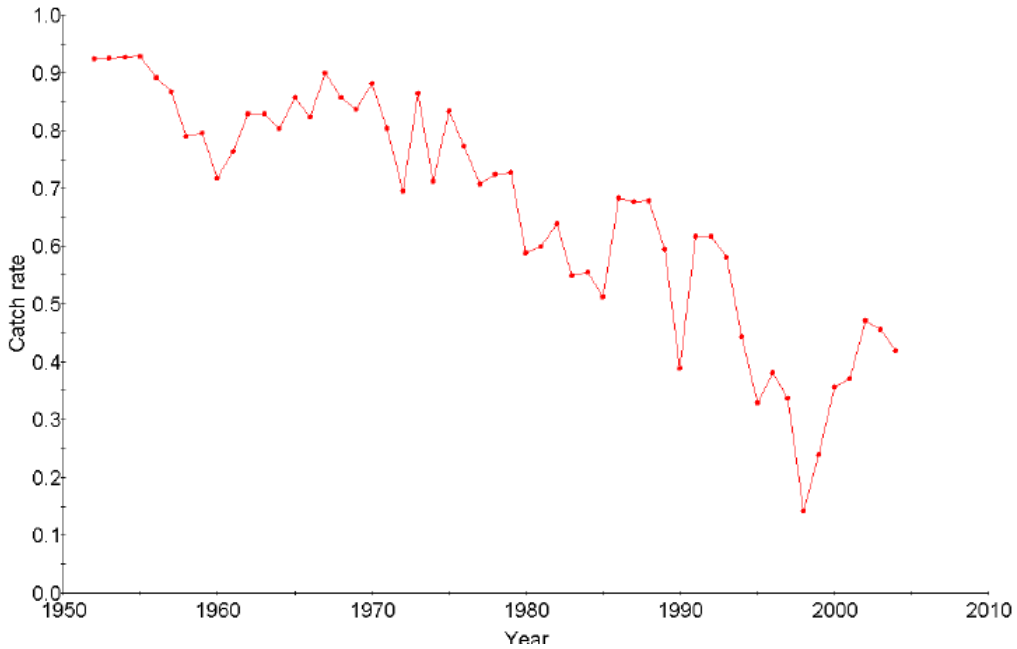


Figure 5-11. Fishery-related mortality for Clatskanie fall Chinook salmon population (from McElhany et al. 2007).

Late Fall Chinook: Incidental or direct mortality from targeted fisheries on the same species in the ocean and estuary is a key concern for the Sandy River late fall Chinook population. Late-run fall Chinook salmon are captured in many of the same ocean fisheries as their early fall-run counterparts; although overall, inshore sport and net harvest impacts are somewhat less for late-run fall Chinook.

In recent years the Sandy late fall Chinook population is thought to have experienced a total harvest rate of 50 percent (Chapter 4, Table 4-8). From 1999-2002 the average harvest rate for late-fall run fish was 30.7 percent, using Lewis River fish as a proxy. Since 2002, the annual harvest rate on the run has averaged 19.6 percent. Figure 5-12 shows the pattern of total fishery exploitation rates estimated for Sandy late fall Chinook from all fisheries since 1981, as described in Appendix C.

Figure 5-12. Fishery-related mortality for Sandy late fall Chinook salmon population (from McElhany et al. 2007).

Spring Chinook: Incidental or direct mortality from targeted ocean troll and estuary fisheries is a key concern for the Hood River population of LCR spring Chinook. Targeted ocean fisheries pose a secondary concern for the Clackamas and Sandy populations[28]. LCR spring Chinook populations are caught in ocean fisheries, primarily in Alaska and off Vancouver Island, in spring season fisheries in the Columbia River mainstem below Bonneville Dam, and in tributary fisheries targeting hatchery-origin fish. Zone 6 fishery impacts warrant further consideration. In recent years, the fishery exploitation rate on LCR spring Chinook was estimated to have been approximately 25 percent (Chapter 4, Table 4-8). This harvest rate poses a higher risk for the Hood spring Chinook population than for the Clackamas and Sandy populations because the Hood population is already at a high risk of extinction and is less able to absorb a 25 percent harvest rate than the other two, healthier populations. Figure 5-13 illustrates the pattern of total fishery exploitation rates for Sandy spring Chinook other LCR spring Chinook populations since 1950.

[28] The difference in ranking of the impact of ocean and estuary fisheries on Hood River spring Chinook compared to Clackamas and Sandy spring Chinook is because the planning team believes that the low abundance and poor status of Hood River spring Chinook means that they are less resilient to the impact of fisheries than Clackamas or Sandy spring Chinook.

Figure 5-13. Fishery-related morality for Sandy spring Chinook population (from McElhany et al. 2007).

- *Loss of population traits due to fisheries targeted at other stocks or species (7b).*
  Secondary threat: Clackamas and Sandy spring Chinook

  Incidental catch and mortality from recreational and commercial (gill and tangle net) fisheries targeting other stocks in the lower Columbia River also threatens the viability of Clackamas and Sandy spring Chinook. These fisheries target hatchery produced spring Chinook, but incidentally catch wild spring Chinook.

5.5.5 Hatchery Management

A number of hatcheries in the lower Columbia River region produce LCR Chinook. Hatcheries in other ESUs/DPSs in the Columbia Basin also release Chinook, which migrate through the lower Columbia as juveniles and adults and can also impact populations in the region. In 2004, NMFS estimated that hatchery facilities in Oregon and Washington supported 17 Chinook programs (NMFS 2004). The actual number of artificial production programs changes yearly based on funding and broodstock availability, and today the number of programs producing LCR stocks is somewhat lower (Turner 2008). For example, WDFW closed the Elochoman Hatchery in fall 2008, eliminating a fall Chinook program. Some smaller programs identified by NMFS in 2004 have also been terminated (Turner 2008). Table 5-10 shows programs in Oregon that produce Chinook for release in Lower Columbia River drainages. Figure 5-14 shows Chinook hatchery production in the larger Columbia River basin from 1990 to 2007.

Together these artificial production programs release millions of fall Chinook, spring Chinook, coho, chum and steelhead into Lower Columbia River subbasins each year. In 2008, programs for LCR stocks released a total of 39,107,500 fall Chinook and 6,054,350 spring Chinook into lower Columbia River subbasins (Turner 2008).

Table 5-10. Current hatchery programs in Oregon that produce LCR Chinook.

Species	Stratum	Population	Type	Purpose	Hatchery	Stock	Release #	Release Stage
Fall Chinook	Coastal	Youngs Bay	Segregated	Augmentation	CCF	SAB	1,350,000	smolt
					Klaskanine	Big Crk Tule	2,100,000	fingerling
		Big Creek	Segregated	Augmentation	Big Crk	Big Crk Tule	3,700,000	fingerling
		Clatskanie	none	---	---	---	---	---
		Scappoose	none	---	---	---	---	---
	Cascade	Clackamas	none	---	---	---	---	---
		Sandy	none	---	---	---	---	---
	Gorge	Lower Gorge	Segregated	Augmentation	Bonneville	URB and Tule	4,794,000	smolt
		Upper Gorge	none	---	---	---	---	---
		Hood	none	---	---	---	---	---
Spring Chinook	Cascade	Sandy	Integrated	Augmentation	Sandy	Sandy	300,000	smolt
	Gorge	Hood	Integrated / Segregated	"Re-Intro. / Augmentation	Round Butte	Hood (orig. Deschutes)	150,000	smolt
	N/A	Youngs Bay	Segregated	Augmentation	Gnat Crk	MF Willamette	925,000	smolt
		Clackamas	Segregated	Augmentation	Clackamas	Clackamas	1,000,000	smolt
							150,000	pre-smolt
							60,000	unfed fry

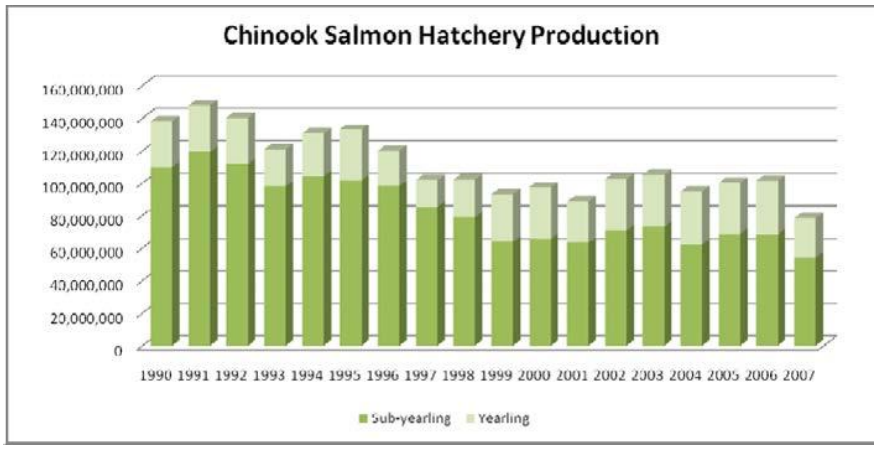


Figure 5-14. Chinook hatchery production in the Columbia River basin (Fish Passage Center data).

Hatchery releases create large returns of adult hatchery origin fish to the Columbia River, many of which are captured in fisheries. The number of adult LCR hatchery fall Chinook returning to the Columbia River from 1980 to 1999 ranged from 40,000 (1999) to 344,100 (1987) and averaged 106,900 adults. From 2000 to 2007, the number of returning LCR hatchery Chinook adults ranged from 27,000 (2000) to 156,400 (2002). The period saw lower returns of LCR wild fall Chinook. From 2000 to 2007, the number of adult LCR wild fall Chinook returning to the mouth of the Columbia River ranged from 4,300 (2007) to 26,000 fish (2003) (Joint Columbia River Management Staff 2008).

- *Loss of population traits, Stray hatchery fish interbreeding with wild fish (7c).*
  Key threat: all LCR fall, late fall and spring Chinook populations

  The prevalence of hatchery fish spawning in local spawning areas (called straying) where they interbreed with wild fish reduces viability of all LCR Chinook populations. As reported in Chapter 4 and described in Appendix C, an analysis of CWT recoveries and hatchery tagging rate information indicates that a substantial proportion of spawners in the population areas are hatchery strays—at

least 90 percent for all LCR fall Chinook populations. Hatchery fish comprise approximately 42 percent of spring Chinook spawners in the Clackamas, 53.6 percent of those in the Sandy, and 90 percent of the spring Chinook on spawning grounds in the Hood River basin (Chapter 4, Table 4-8). Hatchery strays have had a lesser, though still key, effect on the Sandy late-fall Chinook population, with stray rates averaging 24 percent. The limiting factors are generally the same as those described for coho in Section 5.4.5.

5.5.6 Predation

- *Increased predation by birds due to land use practices (8b).*
  Secondary threat: all LCR fall, late fall and spring Chinook populations

  Modification of estuarine habitats has increased the number and/or predation effectiveness of Caspian terns, double-crested cormorants, and a variety of gull species in the Columbia River estuary (LCREP 2006; Fresh et al. 2005). The limiting factors are generally the same as those described for coho in Section 5.4.6.

- *Increased predation by marine mammals due to dam development and flow regulations (8d).* Secondary threat: Hood spring Chinook

  Adult spring Chinook destined for the Hood River are affected by predation from marine mammals (sea lions). The sea lions prey on the spring Chinook as they migrate through the lower Columbia River and attempt to pass over Bonneville Dam (USACE 2007). Fall Chinook from Hood River are less impacted by this predation because they usually arrive later when fewer sea lion are present below the dam.

5.6 Limiting Factors and Threats for Lower Columbia River Steelhead

Key and secondary limiting factors and threats that contribute to the current status of Oregon's LCR steelhead populations are in Tables 5-11 and 5-12. A discussion of these threats and factors follows.

Table 5-11. Key and secondary threats and limiting factors to Lower Columbia River winter steelhead.

STEELHEAD (Winter)			Threats and Limiting Factors					
Population	Threat Level	Life History Stages	Tributary Habitat	Estuary Habitat	Hydro	Harvest	Hatchery	Predation
Youngs Bay	Key	Adult						
		Juvenile	5c, 6e	3a, 3b, 5b, 6c				
	Secondary	Adult	4c			7b	7c	
		Juvenile	5c, 5e, 6a, 9a	1a, 6e, 9a, 9b, 9c				8b
Big Creek	Key	Adult					7c	
		Juvenile	5c, 6e	3a, 3b, 5b, 6c				
	Secondary	Adult	4c			7b		
		Juvenile	5c, 5e, 6a, 9a	1a, 6e, 9a, 9b, 9c				8b
Clatskanie	Key	Adult						
		Juvenile	6e	3a, 3b, 5b, 6c				
	Secondary	Adult				7b		
		Juvenile	5c, 6b, 9a	1a, 6e, 9a, 9b, 9c, 9d				8b
Scappoose	Key	Adult						
		Juvenile	6e	3a, 3b, 5b, 6c				
	Secondary	Adult				7b		
		Juvenile	5c, 6b, 9a	1a, 6e, 9a, 9b, 9c, 9d				8b
Clackamas	Key	Adult						
		Juvenile	6e	3a, 3b, 5b, 6c				
	Secondary	Adult				7b	7c	
		Juvenile	5c, 6a, 9a, 9b	1a, 6e, 9a, 9b, 9c, 9d	4b			8b
Sandy	Key	Adult					7c	
		Juvenile	6e	3a, 3b, 5b, 6c				
	Secondary	Adult	4a, 4c, 6d			7b		
		Juvenile	5c, 5e, 6a	1a, 6e, 9a, 9b, 9c, 9d				8b
Lower Gorge	Key	Adult	6f					
		Juvenile	6f	3a, 3b, 5b, 6c				
	Secondary	Adult	4c			7b	7c	
		Juvenile	5c, 5f	1a, 6e, 9a, 9b, 9c, 9d				8b
Upper Gorge	Key	Adult	6f, 6g					
		Juvenile	6f, 6g	3a, 3b, 5b, 6c				
	Secondary	Adult	4c		4a	7a, 7b	7c	8d
		Juvenile	1a, 5c, 6g, 8a	1a, 6e, 9a, 9b, 9c, 9d	4a			8b
Hood	Key	Adult						
		Juvenile	5d, 6e	3a, 3b, 5b, 6c				
	Secondary	Adult	4a		4a	7a, 7b	7c	8d
		Juvenile	1a, 5a, 5c, 6a, 6g, 8a, 9a, 9c	1a, 6e, 9a, 9b, 9c, 9d	4a			8b

Table 5-12. Key and secondary threats and limiting factors to Lower Columbia River summer steelhead.

STEELHEAD (Summer)			Threats and Limiting Factors					
Population	Threat Level	Life History Stages	Tributary Habitat	Estuary Habitat	Hydro	Harvest	Hatchery	Predation
Hood	Key	Adult					7c	
		Juvenile	5d, 6e	3a, 3b, 5b, 6c				
	Secondary	Adult			4a	7a		8d
		Juvenile	1a, 5a, 5c, 6a, 6g, 8a, 9a, 9c	1a, 6e, 9a, 9b, 9c, 9d	4a			8b

Code	Limiting Factor	Threat
1a	Competition (hatchery fish)	Smolts from all Columbia Basin hatcheries
3a	Food web (reduced macrodetrital inputs)	Columbia Basin hydropower reservoirs, revetments, and disposal of dredge material
3b	Food web (increased microdetrital inputs)	Columbia Basin hydropower reservoirs
4a	Habitat access (impaired passage)	Large dam(s)
4b	Habitat Access (impaired downstream passage)	Large dam(s)
4c	Habitat access (impaired upstream passage)	Hatchery weir
4d	Habitat access (impaired upstream passage)	Road crossings
4e	Habitat access (impaired upstream passage)	Road crossings, small dams, and diversions
5a	Hydrograph/water quantity (altered hydrology)	Low-head hydro diversions
5b	Hydrograph/water quantity (altered hydrology)	Columbia Basin hydropower dams (impaired access to off-channel habitat, dewatering of redds below, and altered plume dynamics, estuarine habitat, and food web)
5c	Hydrograph/water quantity (altered hydrology)	Upslope land uses
5d	Hydrograph/water quantity (altered hydrology: reduced downstream flows)	Irrigation withdrawals (impaired physical habitat, access to habitat)
5e	Hydrograph/water quantity (altered hydrology: reduced downstream flows)	Municipal withdrawals
5f	Hydrograph/water quantity (altered hydrology: reduced downstream flows)	Hatchery withdrawals (impaired passage and reduced habitat)
6a	Physical habitat quality (excessive fine sediment)	Rural roads
6b	Physical habitat quality (excessive fine sediment)	Rural roads and land use
6c	Physical habitat quality (impaired sediment/sand routing)	Columbia Basin hydropower dams
6d	Physical habitat quality (impaired gravel recruitment)	Large dam(s)
6e	Physical habitat quality (impaired habitat complexity and diversity, including access to off-channel habitats)	Past and/or current land use practices
6f	Physical habitat quality (impaired habitat quality and disconnected habitat)	Transportation corridor development and maintenance
6g	Physical habitat quality (reduced habitat quality/quantity)	Inundation from Bonneville
7a	Population traits (impaired abundance and diversity)	Consumptive, targeted fishery
7b	Population traits (impaired abundance and diversity)	Fisheries targeted at other stocks or species
7c	Population traits (impaired productivity and diversity)	Stray hatchery fish interbreeding with wild fish
8a	Predation (non-salmonid fish)	Bonneville Reservoir and Columbia Basin flow regulations
8b	Predation (birds)	Land use practices that create more favorable conditions for Caspian terns and cormorants to prey on salmonid juveniles in estuary
8c	Predation (hatchery fish)	Smolts from all Columbia Basin hatcheries
8d	Predation (marine mammals)	Bonneville Dam and Columbia Basin flow regulations
9a	Water quality (elevated water temperature)	Land uses that impaired riparian condition or reduced steamflows (e.g. water withdrawals for agricultural, industrial, or municipal uses)
9b	Water quality (elevated water temperature)	Large hydropower reservoirs
9c	Water quality (toxins)	Agricultural chemicals used throughout the Columbia Basin
9d	Water quality (toxins)	Urban and industrial practices

The following threats and factors limit viability of Oregon's LCR steelhead populations. Appendix E provides more information on the threats to the different steelhead populations at each life stage.

5.6.1 Tributary Habitat

- *Altered hydrograph/water quantity from upslope land use (5c).*
  Key threat: Youngs Bay and Big Creek winter steelhead
  Secondary threat: all LCR winter and summer steelhead populations

  Altered hydrologic processes and/or reduced water quantity due to land use practices on upland slopes are a key threat to Youngs Bay and Big Creek winter steelhead during the winter parr life stage and a secondary concern for the populations from the egg through summer parr life stages. The altered flows pose a secondary threat to all other LCR winter and summer steelhead populations from the egg through winter parr life stage. The limiting factors are the same as those described for coho in Section 5.4.1. Forest practices have particularly impacted habitat for winter parr in the Youngs Bay and Big Creek watersheds. The drainages contain a large amount of private timber land that has been extensively harvested.

- *Altered hydrograph/water quantity due to irrigation withdrawals (5d).*
  Key threat: Hood winter steelhead; Hood summer steelhead

  Reduced instream flow due to irrigation withdrawals affects juvenile winter and summer steelhead in the Hood River drainage by reducing rearing habitat quality and restricting access to historical habitat areas. The limiting factors are the same as those described for coho in Section 5.4.1.

- *Reduced physical habitat quality/habitat access due to past and/or current land use practices (6e).* Key threat: Youngs Bay, Big Creek, Clatskanie, Scappoose, Clackamas, Sandy, and Hood winter steelhead; Hood summer steelhead

  Reduced habitat quality and complexity, and connectivity with off-channel habitats significantly limit juvenile winter and steelhead viability in all population areas, except the Lower Gorge and Upper Gorge population areas. Land use practices such as channelization, diking, wetland conversion, stream clearing, splash damming and gravel extraction have simplified tributary habitat, reducing refugia and resting places. The limiting factors are the same as those described for coho in Section 5.4.1.

- *Degraded physical habitat quality due to transportation corridor development and maintenance (6f).* Key threat: Lower Gorge and Upper Gorge winter steelhead

  Activities associated with highway and rail development have degraded habitat quality and connectivity in the Lower Gorge and Upper Gorge winter steelhead population areas. Habitat conditions on lower stream reaches of have particularly been impacted. The limiting factors are the same as those described for coho in Section 5.4.1.

- *Degraded physical habitat quality, inundation from Bonneville Dam (6g).*
  Key threat: Upper Gorge winter steelhead
  Secondary threat: Upper Gorge and Hood winter steelhead; Hood summer steelhead

  Inundation and loss of lowland riparian hardwood communities along the Columbia River has reduces habitat quality for adult and juvenile winter steelhead from the Upper Gorge area. It has also reduced habitat quality for juvenile winter and summer steelhead from Hood River population areas. The limiting factors are the same as those described for coho in Section 5.4.1.

- *Competition with hatchery fish from Columbia River hatcheries (1a).*
  Secondary threat: Upper Gorge and Hood winter steelhead; Hood summer steelhead

  Competition with hatchery fish for limited habitat and food supplies in the mainstem Columbia River estuary, and in the Columbia above Bonneville Dam has reduced juvenile abundance and productivity for Upper Gorge and Hood winter steelhead and Hood summer steelhead. The limiting factors are generally the same as those described for coho in Section 5.4.1.

- *Impaired habitat access due to dam construction and operations (4a).*
  Secondary threat: Sandy and Hood winter steelhead

  The Bull Run water system dams in the Sandy River system and Laurance Lake Dam in the Hood River watershed hinder upstream passage of adult winter steelhead returning to historical spawning areas above the dams in the Sandy and Hood River population areas. The limiting factors for Hood steelhead are generally the same as those described for coho in Section 5.4.1.

- *Reduced habitat access due to hatchery weirs (4c).*
  Secondary threat: Youngs Bay, Big Creek, Sandy, Lower Gorge, and Upper Gorge winter steelhead

  Hatchery weirs in the Youngs Bay, Big Creek, Sandy, Lower Gorge, and Upper Gorge areas impede or prevent winter steelhead access to spawning and rearing habitat that was historically productive. The weirs exist at Klaskanine Hatchery on the North Fork Klaskanine River in the Youngs Bay population area; at Big Creek Hatchery in the Big Creek area; at Sandy Hatchery on Cedar Creek in the Sandy area; at Bonneville Hatchery on Tanner Creek and Cascade Hatchery on Eagle Creek in the Lower Gorge area; and at Oxbow Hatchery on Herman Creek in the Upper Gorge population area. Unmarked steelhead are now passed over the weirs at Klaskanine and Big Creek hatcheries, but may experience a delay in migration as they wait to be passed. Steelhead are not passed above the weirs at Sandy and Bonneville hatcheries. The weir at Cascade Hatchery stops almost all upstream steelhead migration to the area between the dam (RM 0.8) and a natural waterfall at RM 2.0. The fish ladder at the Oxbow Hatchery diversion dam on Herman Creek remains a partial passage barrier, especially at low flows in the fall, and does not meet passage criteria. Approximately two miles of anadromous fish habitat lie upstream of the diversion intake.

- *Altered hydrograph/water quantity due to low head hydro diversions (5a).*
  Secondary threat: Hood winter steelhead; Hood summer steelhead

  Low-head hydro diversions in the Hood River basin impair habitat access and physical habitat quality for juvenile winter and summer steelhead. The limiting factors are generally the same as those described for Chinook in Section 5.3.1.

- *Altered hydrograph/water quantity due to municipal water withdrawals (5e).*
  Secondary threat: Youngs Bay, Big Creek, and Sandy winter steelhead

  Municipal water withdrawals affect juvenile winter steelhead in the Youngs Bay, Big Creek and Sandy watersheds. Youngs Bay winter steelhead are impacted by water withdrawals from the Lewis and Clark River. The river is the primary water source for the City of Warrenton and three of its tributaries (Big South Fork, Little South Fork, and Camp C Creek) serve as secondary sources (Woodward-Clyde 1997). The withdrawals have high potential for dewatering habitat in the Youngs Bay watershed assessment area (Bischoff et al. 2000a).

Big Creek winter steelhead are primarily affected by water withdrawals in the Bear Creek watershed for the City of Astoria's municipal use. Withdrawals from the Bear Creek watershed average 100 percent during the summer low flow periods of June through October (Bischoff et al. 2000c) and occur high in the drainage.

Sandy winter steelhead are impacted by reduced instream flows due to City of Portland water withdrawals. Storage and diversion of water by the Bull Run water supply system alters natural discharge patterns below the dam. The system consists of two storage reservoirs (Dams No. 1 and No. 2) on the Bull Run River, together with an outlet structure on Bull Run Lake, a natural water body near the headwaters. The water supply is an unfiltered water source with the capacity to serve over 800,000 people in the Portland metropolitan area. Municipal uses currently withdraw about 26 percent of the Bull Run River annual flow. Fish may be trapped in isolated mainstem pools below the Headworks Dam when flows decrease as a result of water storage in upstream reservoirs, and may be subject to high mortality due to predation (SRBP 2005).

- *Altered hydrograph/water quantity due to hatchery withdrawals (5f).*
  Secondary threat: Lower Gorge winter steelhead

  Water withdrawals for Bonneville Hatchery reduce stream flows in Tanner Creek below the hatchery. The loss of flow concentrates rearing juvenile fish to remaining habitat areas and can periodically dewater existing redds.

- *Degraded physical habitat quality, excessive fine sediment, due to roads (6a).*
  Secondary threat: Youngs Bay, Big Creek, Clackamas, Sandy and Hood winter steelhead; Hood summer steelhead

  Impaired physical habitat quality due to fine sediment from forest and rural roads affects juvenile winter and summer steelhead abundance and productivity in the Youngs Bay, Big Creek, Clackamas, Sandy, and Hood population areas. The roads have altered sediment routing and led to an overabundance of fine-grained sediments, excess of course-grained sediments, inadequate course-grained sediments, and/or contaminated sediment. Excessive fine sediment reduces egg development and survival during the incubation life stage.

- *Degraded physical habitat quality, excessive fine sediment due to roads and land use (6b).*
  Secondary threat: Clatskanie and Scappoose winter steelhead

  Land use practices and road development on unstable slopes have disrupted natural processes that controlled erosion and sediment routing. As a result, excessive amounts of fine sediment have entered the stream system, reducing the quality of spawning gravels and incubation habitat.

- *Degraded physical habitat quality, impaired gravel recruitment due to large dams (6d).*
  Secondary threat: Sandy winter steelhead

  High quality spawning gravel is limited in portions of the Sandy River and in the Bull Run River below the dams. The limiting factors are the same as those described for Chinook in Section 5.3.1.

- *Predation from non-salmonid fish in Bonneville Reservoir and Columbia River mainstem (8a).*
  Secondary threat: Upper Gorge and Hood winter steelhead; Hood summer steelhead

  Predation by non-salmonid fish in Bonneville Reservoir and the mainstem Columbia River impacts Upper Gorge and Hood winter steelhead, and Hood summer steelhead. Pikeminnows prey on

migrating juvenile steelhead, often congregating at the dam bypass outfall and hatchery release sites to feed on smolts. Walleyes and smallmouth bass also prey on juvenile salmonids.

- *Degraded water quality, elevated water temperatures due to land use practices (9a).*
  Secondary threat: Youngs Bay, Big Creek, Clatskanie, Scappoose, Clackamas, and Hood winter steelhead; Hood summer steelhead

  High summer water temperatures affect juvenile steelhead productivity in the Youngs Bay, Big Creek, Clatskanie, Scappoose, Clackamas and Hood River areas. The temperatures can be lethal, contribute to disease, and/or act as temporary adult migration barriers. The limiting factors are the same as those described for coho in Section 5.4.1.

- *Degraded water quality, elevated water temperatures due to large hydropower reservoirs (9b).*
  Secondary threat: Clackamas winter steelhead

  Water impoundment in reservoirs above Clackamas River hydropower dams results in solar heating and contributes to elevated river water temperatures below the hydropower projects. The elevated summer water temperatures limit juvenile steelhead summer rearing.

- *Degraded water quality, toxins from agricultural sources (9c).*
  Secondary threat: Hood winter steelhead; Hood summer steelhead

  Agricultural chemicals, including organophosphates and other insecticide levels above state water quality standards, impair juvenile steelhead growth and survival in the Hood River drainage. The limiting factors are the same as those described for coho in Section 5.4.1.

5.6.2 Estuary Habitat

- *Altered food web, reduced macrodetrital input due to Columbia Basin hydropower reservoirs, revetments, and disposal of dredge material (3a).*
  Key threat: all LCR winter and summer steelhead populations

  Reduced macrodetrital-based input in the Columbia River estuary significantly affects the viability of all Oregon LCR steelhead populations. The limiting factors are generally the same as those described for coho in Section 5.4.2.

- *Altered food web, increased microdetrital input due to Columbia Basin hydropower reservoirs (3b).*
  Key threat: all LCR winter and summer steelhead populations

  The substitution of the estuary's current microdetrital-based food web, made up of decaying phytoplankton delivered from upstream reservoirs, for the historical macrodetrital-based web has reduced productivity in the estuary. The limiting factors are generally the same as those described for coho in Section 5.4.2.

- *Altered hydrograph/water quantity due to Columbia Basin hydropower dams (5b).*
  Key threat: all LCR winter and summer steelhead populations

  Alteration of the Columbia River hydrograph significantly affects all LCR steelhead populations. The limiting factors are generally the same as those described for coho in Section 5.4.2.

- *Impaired physical habitat quality due to Columbia Basin hydropower dams (6c).*
  Key threat: all LCR winter and summer steelhead populations

  Impaired physical habitat quality in the estuary, especially sediment and sand routing, impacts juveniles in all LCR steelhead populations. The limiting factors are generally the same as those described for coho in Section 5.4.2.

- *Competition with hatchery smolts (1a).*
  Secondary threat: all LCR winter and summer steelhead populations

  Competition with hatchery fish from all Columbia River hatcheries for limited habitat and food supplies in the Columbia River estuary affects productivity of all LCR steelhead populations. The limiting factors are generally the same as those described for coho in Section 5.4.2.

- *Impaired physical habitat quality due to past and/or current land use practices (6e).*
  Secondary threat: all LCR winter and summer steelhead populations

  Physical habitat quality in the Columbia River estuary, including habitat complexity/diversity and loss of access to off-channel habitats, has been degraded through past and current land use practices. The degraded habitat conditions limit viability of all LCR steelhead populations. The limiting factors are generally the same as those described for coho in Section 5.4.2.

- *Degraded water quality, high water temperatures due to land use practices (9a).*
  Secondary threat: all LCR winter and summer steelhead populations

  Land use practices that degrade riparian conditions or reduce streamflows have contributed to elevated water temperatures in the estuary. The limiting factors are generally the same as those described for coho in Section 5.4.2.

- *Degraded water quality, high water temperatures due to large hydropower reservoirs (9b).*
  Secondary threat: all LCR winter and summer steelhead populations

  Elevated water temperatures due to reservoir construction and operations affect juveniles from all LCR steelhead populations. The limiting factors are generally the same as those described for coho in Section 5.4.2.

- *Degraded water quality, toxins from agricultural sources (9c).*
  Secondary threat: all LCR winter and summer steelhead populations

  Contaminants from agricultural practices are found throughout the Columbia River estuary. A wide range of commonly used pesticides have been detected at sampling sites near Bonneville Dam and at the confluence of the Willamette and Columbia rivers (LCREP 2007a,b; Fresh et al. 2005). Short-term exposure to the types of pesticides at environmentally relevant concentrations has been associated with disruption of olfactory function in salmonids; leading to difficulty in homing, predator avoidance, and finding prey (Scholz et al. 2000; Sandahl et al. 2002, 2005; Tierney et al. 2008). Mixtures of some of the pesticides (e.g., malathion and diazinon or chlorpyriphos) may be acutely lethal to salmonids (Laetz et al. 2009). The limiting factors are generally the same as those described for coho in Section 5.4.2.

- *Degraded water quality, toxins from urban and industrial sources (9d).*

Secondary threat: Clatskanie, Scappoose, Clackamas, Sandy, Lower Gorge, Upper Gorge and Hood winter steelhead; Hood summer steelhead

Toxic contaminants in the estuary from urban and industrial practices reduce habitat quality for juvenile steelhead from the Clatskanie, Scappoose, Clackamas, Sandy, Lower Gorge, Upper Gorge and Hood areas. The limiting factors are the same as those described for coho in Section 5.4.2.

5.6.3 Hydropower and Flood Control Management

- *Impaired habitat access due to dam construction and operations (4a).*
  Secondary threat: Upper Gorge and Hood winter steelhead; Hood summer steelhead

  Bonneville Dam impaired adult and juvenile steelhead access to and from habitats in the Upper Gorge and Hood population areas. Operational practices and/or flows can delay upstream passage at the dam. Powerdale Dam on the mainstem Hood River also hinders access of adult steelhead returning to historical spawning areas in the basin above the dam. The limiting factors are generally the same as those described for coho in Section 5.4.3.

- *Impaired habitat access, downstream passage due to dam construction and operations (4b).*
  Secondary threat: Clackamas winter steelhead

  The Clackamas hydropower project on the Clackamas River impairs downstream steelhead passage. Mortality of downstream migrating juveniles occurs at North Fork Dam, Faraday Powerhouse and River Mill Dam. In a DEIS for the Clackamas Hydro Project, FERC (2006) estimated the current average mortality for smolts passing through the hydro complex at 2.7 percent for steelhead. The dams may also delay adult steelhead passage to upriver habitat and reduce spawner success and distribution.

5.6.4 Harvest Management

LCR winter and summer steelhead are not harvested in ocean, but are harvested in the Columbia River (estuary and mainstem above Bonneville) and tributary freshwater fisheries and are affected by direct and incidental fishery mortality. They are also captured incidentally in recreational and gillnet fisheries targeting other stocks in the Columbia River estuary. Impacts on the populations from all freshwater fisheries have averaged roughly 10 percent since the implementation of mark-selective recreational fisheries during the 1990s (NMFS 2008). Most if this is catch and release mortality in tributary fisheries. Mainstem impacts are currently limited to two percent for summer or winter steelhead.

Harvest mortality rates for Clackamas wild steelhead are shown in Figure 5-15. Because of its proximity to a major metropolitan area, the historical harvest rates show for Clackamas steelhead are probably higher than those on steelhead populations in less populated areas. Fishery impact rates on heavily fished steelhead populations in the Portland area were significantly reduced in 1992 with adoption of regulations that prohibit the retention of non-fin clipped fish. As a result, harvest rates on Clackamas wild winter steelhead dropped from a peak of 82 percent in 1968 to the current rate of less than ten percent.

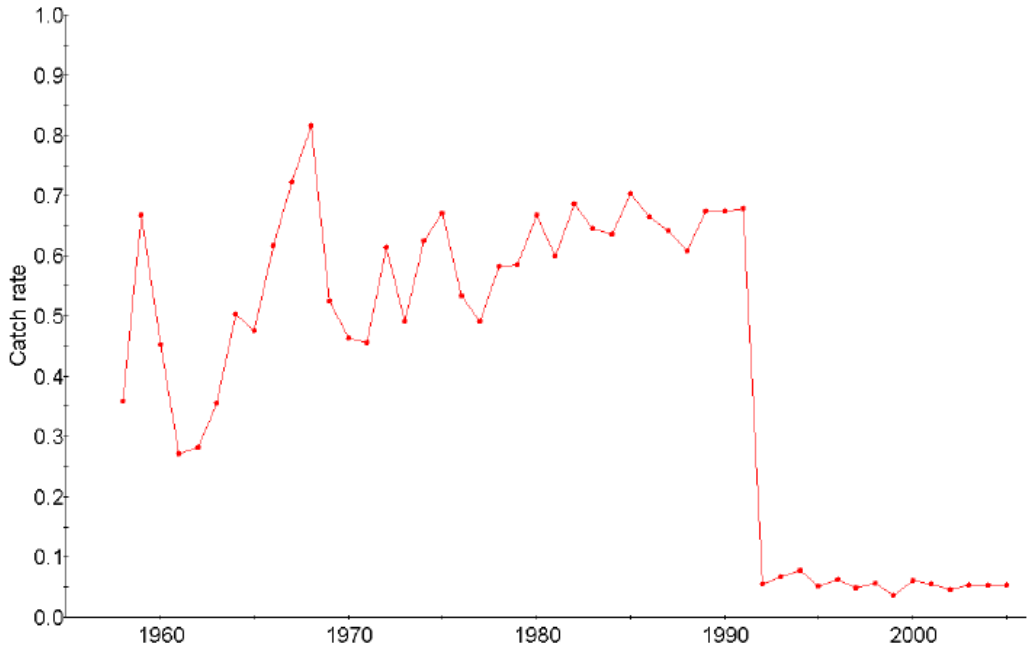


Figure 5-15. Fishery-related morality for Clackamas steelhead population (from McElhany et al. 2007).

- *Loss of population traits due to consumptive, targeted fisheries (7a).*
  Secondary threat: Upper Gorge and Hood winter steelhead; Hood summer steelhead

  Winter and summer steelhead from the Upper Gorge and Hood River areas are affected by fisheries in the Columbia River downstream of Bonneville Dam and in Zone 6 above Bonneville Dam. Direct mortality from the fisheries, which include the Zone 6 gillnet fishery, treaty platform and hook/line fisheries, is considered a secondary concern for the steelhead populations.

  The harvest rate on Upper Gorge and Hood steelhead populations from the treaty Indian fisheries in Zone 6 above Bonneville Dam is approximately five percent. Treaty Indian steelhead harvest is non-mark selective, and takes place in treaty subsistence platform fisheries and in fall gillnet fisheries. Some treaty steelhead harvest also occurs near tributary mouths, including the Hood River. The majority of the fish are caught in the treaty Indian fall season fisheries. Treaty Indian fall fisheries are managed to limit impacts on wild steelhead to no greater than 15 percent based on pre-season run size expectations. Commercial harvest of steelhead by non-Indians has been prohibited since 1975.

- *Loss of population traits due to fisheries targeted at other stocks or species (7b).*
  Secondary threat: all LCR winter steelhead populations

  Incidental mortality of wild winter steelhead in mainstem winter/spring gill and tangle net fisheries is monitored via an onboard observation program. Impacts to wild winter steelhead in this commercial fishery averaged 0.34% during 2005-2009, which is far less than the two percent allowable impact. Incidental winter steelhead mortality in mainstem Columbia River and lower Willamette recreational fisheries is monitored for a majority of the season through a creel program. The estimated impact rate on wild winter steelhead in the mainstem recreational fishery averaged 0.10% during 2005-2009. Wild winter steelhead incidental impact in most tributary recreational fisheries is not directly monitored, but is assumed to average 2-3% (LeFleur and King 2004; NMFS 2005(b); NMFS 2006(b)). These fisheries were listed as a secondary concern for wild winter steelhead because the Planning Team felt there was uncertainty associated with mortality rate estimates. However, the

current combined fisheries impact rate is low enough that it does not threaten the recovery of any steelhead population.

Hood River wild summer steelhead are also subject to incidental harvest in the Columbia and Hood River fisheries. However, harvest is not considered a key or secondary concern for the population. As reported in Chapter 4 (Table 4-8) the total fishery associated mortality rate for wild summer steelhead returning to the Hood River in recent years was 15 percent.

5.6.5 Hatchery Management

Hatcheries in the lower Columbia River region, as well as in other ESUs and DPSs in the Columbia Basin, produce LCR steelhead. In 2004, NMFS estimated that hatchery facilities in Oregon and Washington supported 10 steelhead programs (NMFS 2004). The actual number of artificial production programs changes yearly based on funding and broodstock availability, and today the number of programs producing LCR stocks is somewhat lower (Turner 2008). Table 5-13 shows programs in Oregon that produce steelhead for release in Lower Columbia River drainages. Figure 5-16 shows steelhead hatchery production in the larger Columbia River basin from 1990 to 2007.

Together these artificial production programs release millions of fall Chinook, spring Chinook, coho, chum and steelhead into Lower Columbia River subbasins each year. In 2008, programs for LCR stocks released an estimated 1,416,250 summer steelhead and 2,101,716 winter steelhead into lower Columbia River subbasins (Turner 2008).

Table 5-13. Current hatchery programs in Oregon that produce LCR winter and summer steelhead.

Species	Stratum	Population	Type	Purpose	Hatchery	Stock	Release #	Release Stage
Winter Steelhead	Coastal	Youngs Bay	Segregated	Augmentation	Klaskanine	Big Crk	40,000	smolt
		Big Creek	Segregated	Augmentation	Big Crk, Gnat Crk	Big Crk	100,000	smolt
		Clatskanie	none none	---	---	---	---	---
		Scappoose	Integrated	---	---	---	---	---
	Cascade	Clackamas		Augmentation	Clackamas, Eagle Crk	Clackamas	165,000	smolt
			Segregated		NFH			
		Clackamas		Augmentation	Eagle Crk	Eagle Crk	100,000	smolt
			Integrated		NFH			
		Sandy	none	Augmentation	Sandy	Sandy	160,000	smolt
	Gorge	Lower Gorge	none	---	---	---	---	---
		Upper Gorge	Integrated	---	---	---	---	---
		Hood StW		Augmentation	Oak Springs	Hood	50,000	smolt
Summer Steelhead	Gorge	Hood StS	none (eliminated)	---	---	---	---	---
	N/A	Clackamas	Segregated	Augmentation	Clackamas	S Santiam	175,000	smolt
		Sandy	Segregated	Augmentation	Sandy	S Santiam	80,000	smolt

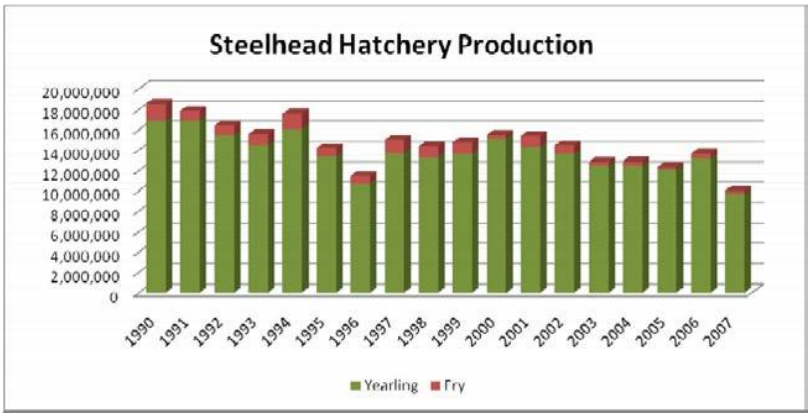


Figure 5-16. Steelhead hatchery production in the Columbia River basin (Fish Passage Center data).

- *Loss of population traits, Stray hatchery fish interbreeding with wild fish (7c).*
  Key threat: Big Creek and Sandy winter steelhead; Hood summer steelhead
  Secondary threat: Youngs Bay, Clackamas, Lower Gorge, Upper Gorge, and Hood winter steelhead

  The prevalence of hatchery fish spawning in local spawning areas (called straying) where they interbreed with wild fish reduces viability of all LCR steelhead populations, with the exception of Clatskanie and Scappoose winter steelhead. The limiting factors related to this threat are generally the same as those described for coho in Section 5.4.5.

  Overall, as reported in Chapter 4 (Table 4-8) the estimated percentage of hatchery strays for the different LCR steelhead populations varies widely, ranging from 53.2 percent for the Hood summer steelhead population to 5 percent for the Clatskanie and Scappoose winter steelhead populations. Hatchery strays are believed to comprise about 40 percent of Big Creek winter steelhead spawners and 52 percent of Sandy winter steelhead spawners. The percentage of hatchery strays in the Youngs Bay, Clackamas, Lower Gorge, Upper Gorge and Hood winter steelhead populations' ranges from 10 percent (Lower and Upper Gorge) to 30 percent (Hood).

  Currently, hatchery steelhead escapement in Hood River is controlled upstream of Powerdale Dam. The ability to remove out-of-basin hatchery-origin fish[29] from the population will be lost at Powerdale Dam after 2010, as the dam will be decommissioned.

5.6.6 Predation

- *Increased predation by birds due to land use practices (8b).* Secondary threat: all LCR winter and summer steelhead populations

  Modification of estuarine habitats has increased the number and/or predation effectiveness of Caspian terns, double-crested cormorants, and a variety of gull species in the Columbia River estuary (LCREP 2006; Fresh et al. 2005). For example, new islands formed through the disposal of dredged materials have attracted terns away from their traditional habitats. Reduced sediment in the river has increased terns' efficiency in capturing steelhead juveniles migrating to saltwater at the same time that the birds need additional food for their broods. The limiting factors are generally the same as those described for coho in Section 5.4.6.

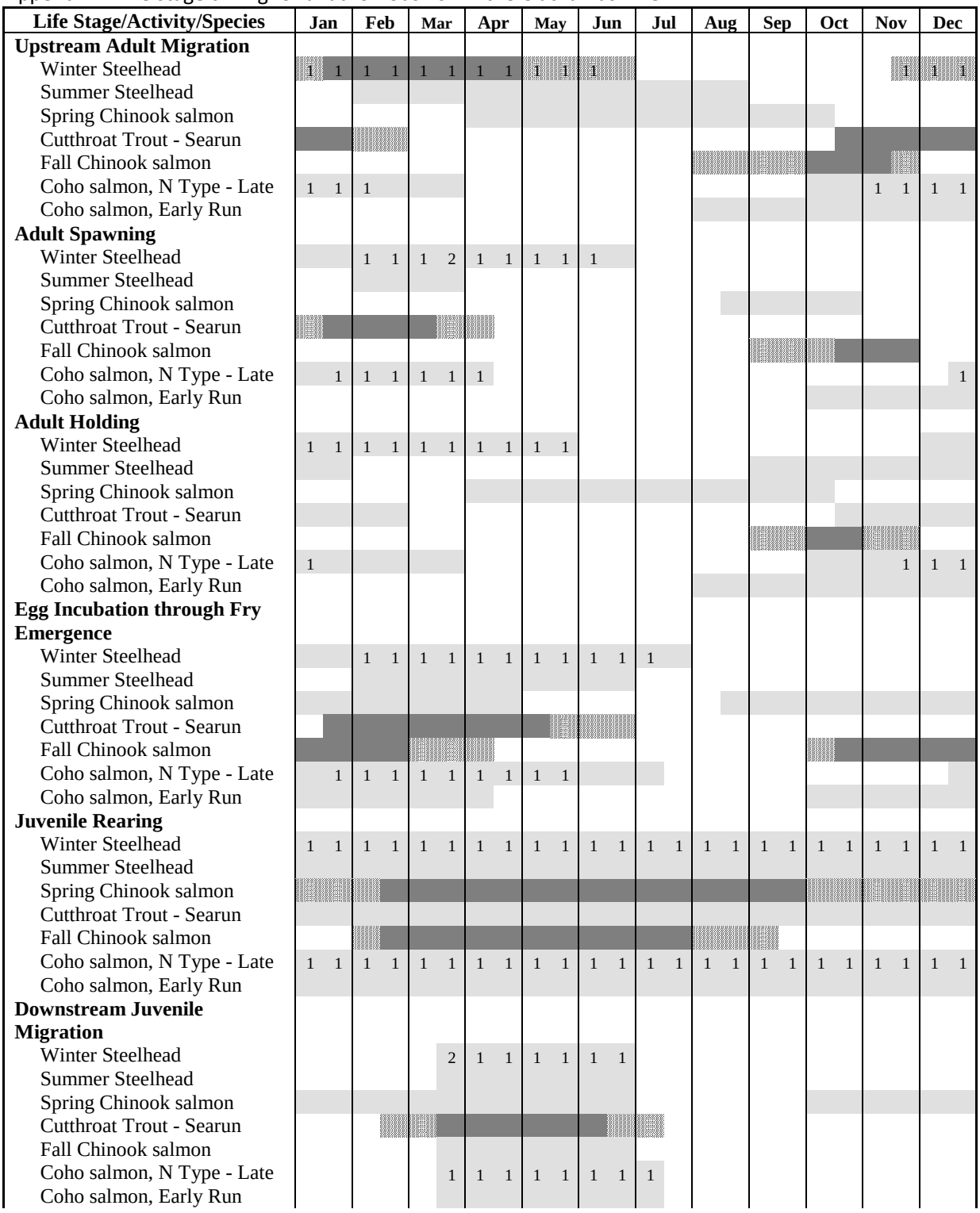
[29] Summer steelhead hatchery releases were discontinued in the Hood River 2008.

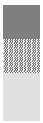
- *Increased predation by marine mammals due to dam development and flow regulations (8d).* Secondary threat: Upper Gorge, Hood winter steelhead; Hood summer steelhead

  Adult winter steelhead destined for the Upper Gorge and Hood River areas are affected by predation from marine mammals (sea lions) that prey on them as they prepare to pass over Bonneville Dam (USACE 2007). Summer steelhead from Hood River are less impacted by this predation because they usually arrive later when fewer sea lion are present below the dam.

Appendix B Life stage timing for anadromous fish in the Clackamas River.

Appendix 2. Life stage timing for anadromous fish in the Clackamas River





Represents periods of peak use based on professional opinion.

Represents lesser level of use based on professional opinion.

Represents periods of presence, either with no level of use OR uniformly distributed level of use indicated

Based on professional opinion, 90% of the life-stage activity occurs during the time frame shown as the peak use period.
Based on professional opinion, 10% of the life-stage activity occurs during the time frame shown as the lesser use period.

Documents

1. Reference # 52399
2. Reference # 395

This document was created on 12/19/2003.
Input to this data was contributed by
Dick Caldwell, ODFW
Jim Muck, ODFW
Jim Grimes, ODFW

Modifying conditions as shown in the CORRECTED FINAL ORDER INCORPORATING PROPOSED ORDER IN CASE INVOLVING SOUTH FORK WATER BOARD PERMIT S-9982 with certificate of service dated April 26, 2011, which were incorporated by reference into the REVISED FINAL ORDER INCORPORATING PROPOSED ORDER IN CASE INVOLVING SOUTH FORK WATER BOARD PERMITS S-22581, S- 3778, S-9982, signed by Dwight French May 8, 2013.

MODIFIED CONDITIONS FOR PERMIT S-3778

NOTE: Unless otherwise noted, additions to the original condition are shown in "underline" text, deletions are shown in "~~strikethrough~~" text (formulas have not been underlined for the sake of readability).

1. Development Limitations

A maximum diversion 5.0 cfs of water is currently allowed under Permit S-3778. Any ~~D~~diversion of water beyond 5.0 cfs (not to exceed the maximum amount authorized under the permit, being 20.0 cfs) ~~under Permit S-3778~~ shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86 that authorizes access to a greater rate of diversion of water under the permit consistent with OAR 690-086-0130(7). ~~A~~ The required WMCP shall be submitted to the Department within 3 years of this Final Order incorporating XXXX. ~~an approved extension of time application. Use of~~ The amount of water used under Permit S-3778 shall be consistent with this and subsequent WMCP's approved under OAR Chapter 690, Division 86 on file with the Department.

The Development Limitation established in the above paragraph supersedes any prior limitation of the diversion of water under this permit that has been established under a prior WMCP or Extension final order issued by the Department.

The deadline established in this ~~PFO~~ this Final Order incorporating XXXX for submittal of a WMCP shall not relieve a permit holder of any existing or future requirement for submittal of a WMCP at an earlier date as established through other orders of the Department. A WMCP submitted to meet the requirements of this order may also meet the WMCP submittal requirements of other Department orders.

2. Conditions to Maintain the Persistence of Listed Fish

The developed portion of the permit, 5.0 cfs, is *not* subject to these fish persistence conditions. *The undeveloped portion of the permit subject to these fish persistence conditions is 15.0 cfs.*

a. Prior to diversion of any water beyond 5.0 cfs under Permit S-3778, a permit amendment to relocate the current authorized Point of Diversion (POD) on the South Fork Clackamas River located in NWSW Section 29, Township 4 South, Range 5 East, W.M. to a POD(s) located

within the lower 3.1 miles on the mainstem of the Clackamas River, must be approved by the Department in accordance with ORS 540.510.

b. Use of water beyond 5.0 cfs under Permit S-3778 may only be made from water diverted within the lower 3.1 miles on the mainstem of the Clackamas River, and only if available at the original point of diversion located within the NWSW, Section 29, Township 4 South, Range 5 East, W.M.

Determining Water Use Reductions

c. ~~Minimum fish flow needs~~ Target flows needed to maintain the persistence of listed fish species in ~~on~~ the Lower Clackamas River as recommended by ODFW are in Table 1, below~~,. and are to be measured at USGS Gage Number 14211010, Clackamas River near Oregon City, Oregon, or its equivalent.~~ Target flows are to be met at the mouth of the Clackamas River.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG})[1] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) The maximum amount of the undeveloped portion of Permit S-3778 that can be diverted as a result of this fish persistence condition is determined in proportion to the amount by which the target flows shown in Table 1 are missed based on the adjusted mean daily flow (Q_{ADJ}) as described in 2.a.(1), above. The percent of missed target flows is defined as:

$$(1 - [Q_{ADJ} / Q_T]) \times 100\%,$$

where Q_{AdJ} is the adjusted mean daily flow at the mouth, and Q_T is the target flow (from Table 1).

[1] D_{BG} stands for "Diversion Below the Gage" and is based on daily water use under Application S-57585 (up to 50 cfs, of which to date 25.0 cfs has been partially perfected under Certificate 78332), and under Application S-50819 (up to 9 cfs). [50 cfs + 9 cfs = 59 cfs = the maximum value of D_{BG}]. The City of Lake Oswego holds these water rights and diverts water under these rights below USGS Gage Number 14211010. The mean daily flow as measured at the gage must be corrected for the amount actually being diverted below the gage under these specified water rights or their successive water rights so long as the points of diversion remain below the gaging station.

The percent by which the target flow is missed applied to the undeveloped portion of the permit provides the maximum amount of undeveloped portion of Permit S-3778 that can be diverted as a result of this fish persistence condition, and is defined as:

$$E - (E \times \% \text{ missed target flow}),$$

where E is the undeveloped portion of the permit, being 15.0 cfs.

When $Q_{ADJ} \geq Q_T$, the amount of the undeveloped portion of the permit that can be diverted would not need to be reduced as a result of this fish persistence condition.

(3) From the day after the first Monday in September through June 30, and when $Q_{ADJ} < Q_T$, the maximum amount of the undeveloped portion that may be diverted under this fish persistence condition must be re-calculated daily.

NOTE: The content of the original text has been moved from sub-section e to sub-section d, and visa versa.

Proportional Reductions from the day after the first Monday in September through June 30

d. From the day after the first Monday in September through June 30 the maximum total amount of the undeveloped portion of ~~the~~ Permit S-3778 that can legally be diverted shall be reduced as described in Section 2.c, above. ~~in proportion to the amount by which the flows shown in Table 1 are not met based on a seven day rolling average of mean daily flows (measured on the Clackamas River at USGS Gage Number 14211010, Clackamas River near Oregon City, Oregon, or its equivalent), as illustrated in the examples below.~~

Example 1: Target Flow Met

If ~~On~~ on June 15, the ~~last seven~~ mean daily flow~~s~~ as measured at USGS Gage Number 14211010 ~~were~~ was ~~750, 725,~~ 700~~, 650, 625, 600 and 575~~ cfs, and the amount being diverted below the gage (DBG) was 34 cfs, then the adjusted flow (Q_{ADJ}) would be 666 cfs (700 – 34 = 666). ~~The seven day rolling average is 661 cfs.~~ The maximum total amount of the undeveloped portion of the permit that could legally be diverted under this permit would not be reduced because the ~~7 day average of mean daily flows~~ adjusted mean daily flow on that day is greater than the 650 target flow for June 15. In this example, $Q_{ADJ} \geq Q_T$.

Example 2: Target Flow Missed

~~If on June 15, the average of the last seven mean daily flows was 578 cfs, then the target flows would be missed by 11% (100 - [(578/650)* 100)]. Ifthe maximum total amount of the undeveloped portion of the permit that can legally be diverted under this permit is 10 cfs, then the maximum total amount of the undeveloped portion of the permit that could be legally diverted under this permit would be reduced by 11%. The maximum total amount~~

~~of the undeveloped portion of the permit that could be legally diverted under the permit under this condition would be 8.9 cfs (10 [1.0 x 0.11] = 8.9).~~

NOTE: With the exception of Table 1, the remainder of the text in this sub-section is added to the original text, but not shown in <u>underline</u> text.

Step 1: If on September 20, the mean daily flow (Q_A) at the gage was 700 cfs, and 59 cfs was being diverted below the gage (D_{BG} = 59), then the adjusted flow (Q_{ADJ}) would be <u>641 cfs</u>.

$$700 - 59 = 641$$

Step 2: Given that the adjusted mean daily flow (Q_{ADJ}) was 641 cfs (from Step 1), and the target flow (Q_T) is 800 cfs, then the target flow would be missed by <u>19.9%.</u>

$$(1 - [641 / 800]) \times 100\% = 19.9\%$$

Step 3: Given that the undeveloped portion of this permit (E) is 15.0 cfs, and the undeveloped portion of the permit needs to be reduced by 19.9% (from Step 2), or <u>2.99 cfs</u>, then the maximum amount of the undeveloped portion of Permit S-3778 that could be diverted as a result of this fish persistence condition would be <u>12.0 cfs</u>. (This maximum amount may be limited as illustrated in Step 4, below.)

$$(15.0 \times 19.9) / 100\% = 2.99$$

$$15.0 - 2.99 = 12.0$$

Step 4: The calculated maximum amount of water that could be diverted under the permit due to the fish persistence condition may not exceed the amount of water to which the water user is legally entitled to divert. In this example, if the amount of water legally authorized for diversion under this permit is 10.0 cfs (for example, authorization provided through a WMCP), then <u>10.0 cfs</u> would be the maximum amount of diversion allowed under this permit including the developed portion of the permit, being 5.0 cfs.

(Conversely, if the amount of water legally authorized for diversion under this permit is 20.0 cfs, then <u>17.0 cfs</u> (12.0 from Step 3 + the 5.0 developed portion) would be the maximum amount of diversion allowed under this permit.)

Table 1[1]

~~Minimum~~ Fish Persistence Target Flows ~~Needs on~~ at the Mouth of the Lower Clackamas River ~~Measured at USGS Gage 14211010, Clackamas River Near Oregon City, Oregon~~	
Month	Cubic Feet per Second
June -August	650
September	650/800[~~2~~1]
October - May	800

[1] ~~Table 1 was called Table 2 in the Proposed Final Order (PFO)~~

[~~2~~1] 650 cfs Sept. 1 through Sept. 15 and ~~850~~ 800 cfs September 16 through September 30

NOTE: In sub-section e, additions to the original text are shown in "underline" text, deletions are shown in "~~strikethrough~~" text.

Timothy Lake Releases June 1 through October 31

e. In cooperation with the holders of Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, the permittee must ~~have an annual meeting~~ meet with ODFW annually to devise a strategy to maximize fishery benefits from flow augmentation that ~~can be derived~~ may be available through ~~from~~ the Water Storage ~~a~~Agreement[2] with Portland General Electric (PGE) for the release of stored water from Timothy Lake. The permittees shall arrange a meeting with ODFW to develop a written flow augmentation strategy based on the current year's projected water availability. The strategy will include two flow augmentation periods, being from June 1st through the first Monday in September, and the day after the first Monday in September through Oct 31st. The June 1st through the first Monday in September period will determine whether flows are needed for steelhead spawning and incubation or can be used for flow augmentation later in the summer. The day after the first Monday in September through Oct 31st period will determine the timing for flow augmentation for chinook spawning. The permittees must consult with PGE to determine if and when water is available for flow augmentation. The permittees must notify ODFW about the timing and the amount of flow that can be released. If the available water cannot meet the strategy targets then the permittees and ODFW will modify the flow augmentation strategy to maximize fishery benefits. The permittees must then submit a flow augmentation request to PGE.

It is OWRD's intent that ODFW and the permittees reach agreement on the strategy. However, if after making a good faith effort ODFW and the permittees are unable to reach agreement on a strategy ODFW shall devise the strategy. In either case, the strategy shall be documented in writing and the permittees shall comply with the strategy. The annual meeting and resulting strategy and consultations may cover issues other than Timothy Lake

[2] Or any similar agreement intended to supersede the existing agreement.

releases that are relevant to both use under Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, and to listed fish species; however, the strategy may include actions pertaining to such issues only upon mutual agreement by ODFW and the permittees.

NOTE: Sub-section f is added to the original text, but not shown in <u>underline</u> text.

Water Management Conservation Plan (WMCP) Water Conversation Measures/ Curtailment Actions from July 1 through the first Monday in September

f. From July 1st through the first Monday in September, when target flows are not met based on a seven day rolling average of mean daily flows, the water user must implement consistent with the water curtailment element of their WMCP, water conservation measures and/or curtailment actions as described in 2.f.(2) and (3), below.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}) [3] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) Upon the first occurrence of the adjusted flow at the mouth (Q_{ADJ}) being less than the target flow (Q_T) in Table 1 (i.e., when $Q_{ADJ} < Q_T$), based on a seven day rolling average of mean daily flows, the water user must enact the first level or stage of alert in their water curtailment plan that includes mandatory water conservation measures and/or curtailment actions consistent with 2.f.(3), below.

(3) Once enacted, implementation of the water conservation measures and/or curtailment actions as described in 2.f.(2), above, must continue through the first Monday in September.

[3] See fn 1

Modifying conditions as shown in the CORRECTED FINAL ORDER INCORPORATING PROPOSED ORDER IN CASE INVOLVING SOUTH FORK WATER BOARD PERMIT S-9982 with certificate of service dated April 26, 2011, which were incorporated by reference into the REVISED FINAL ORDER INCORPORATING PROPOSED ORDER IN CASE INVOLVING SOUTH FORK WATER BOARD PERMITS S-22581, S- 3778, S-9982, signed by Dwight French May 8, 2013.

MODIFIED CONDITIONS FOR PERMIT S-9982

NOTE: Unless otherwise noted, additions to the original condition are shown in "underline" text, deletions are shown in "~~strikethrough~~" text (formulas have not been underlined for the sake of readability).

1. Development Limitations

A maximum diversion 3.0 cfs of water is currently allowed under Permit S-9982. Any ~~D~~diversion of water beyond 3.0 cfs (not to exceed the maximum amount authorized under the permit, being 30.0 cfs) ~~under Permit S-9982~~ shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86 that authorizes access to a greater rate of diversion of water under the permit consistent with OAR 690-086-0130(7). ~~A~~ The required WMCP shall be submitted to the Department within 3 years of this Final Order incorporating XXXX. ~~an approved extension of time application. Use of~~ The amount of water used under Permit S-9982 shall be consistent with this and subsequent WMCP's approved under OAR Chapter 690, Division 86 on file with the Department.

The Development Limitation established in the above paragraph supersedes any prior limitation of the diversion of water under this permit that has been established under a prior WMCP or Extension final order issued by the Department.

The deadline established in this ~~PFO~~ this Final Order incorporating XXXX for submittal of a WMCP shall not relieve a permit holder of any existing or future requirement for submittal of a WMCP at an earlier date as established through other orders of the Department. A WMCP submitted to meet the requirements of this order may also meet the WMCP submittal requirements of other Department orders.

2. Conditions to Maintain the Persistence of Listed Fish

The developed portion of the permit, 3.0 cfs, is *not* subject to these fish persistence conditions. *The undeveloped portion of the permit subject to these fish persistence conditions is 27.0 cfs.*

a. Prior to diversion of any water beyond 3.0 cfs under Permit S-9982, a permit amendment must be approved by the Department in accordance with ORS 540.510 to relocate (1) the current authorized point of diversion (POD) on the South Fork Clackamas River located in the SWSW, Section 29, Township 4 South, Range 5 East, W.M., and (2) the current

authorized (POD) on Memaloose Creek located in the SESW, Section 29, Township 4 South, Range 5 East, W.M. to POD(s) located within the lower 3.1 miles on the mainstem of the Clackamas River.

b. Use of water beyond 3.0 cfs under Permit S-9982 may only be made from water diverted within the lower 3.1 miles on the mainstem of the Clackamas River, and only if available at the original points of diversion located on the South Fork Clackamas River and Memaloose Creek.

Determining Water Use Reductions

c. ~~Minimum fish flow needs~~ Target flows needed to maintain the persistence of listed fish species in ~~on~~ the Lower Clackamas River as recommended by ODFW are in Table 1, below~~;. and are to be measured at USGS Gage Number 14211010, Clackamas River near Oregon City, Oregon, or its equivalent.~~ Target flows are to be met at the mouth of the Clackamas River.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG})[4] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) The maximum amount of the undeveloped portion of Permit S-9982 that can be diverted as a result of this fish persistence condition is determined in proportion to the amount by which the target flows shown in Table 1 are missed based on the adjusted mean daily flow (Q_{ADJ}) as described in 2.a.(1), above. The percent of missed target flows is defined as:

$$(1 - [Q_{ADJ} / Q_T]) \times 100\%,$$

where Q_{AdJ} is the adjusted mean daily flow at the mouth, and Q_T is the target flow (from Table 1).

[4] D_{BG} stands for "Diversion Below the Gage" and is based on daily water use under Application S-57585 (up to 50 cfs, of which to date 25.0 cfs has been partially perfected under Certificate 78332), and under Application S-50819 (up to 9 cfs). [50 cfs + 9 cfs = 59 cfs = the maximum value of D_{BG}]. The City of Lake Oswego holds these water rights and diverts water under these rights below USGS Gage Number 14211010. The mean daily flow as measured at the gage must be corrected for the amount actually being diverted below the gage under these specified water rights or their successive water rights so long as the points of diversion remain below the gaging station.

The percent by which the target flow is missed applied to the undeveloped portion of the permit provides the maximum amount of undeveloped portion of Permit S-9982 that can be diverted as a result of this fish persistence condition, and is defined as:

$$E - (E \times \% \text{ missed target flow}),$$

where E is the undeveloped portion of the permit, being 27.0 cfs.

When $Q_{ADJ} \geq Q_T$, the amount of the undeveloped portion of the permit that can be diverted would not need to be reduced as a result of this fish persistence condition.

(3) From the day after the first Monday in September through June 30, and when $Q_{ADJ} < Q_T$, the maximum amount of the undeveloped portion that may be diverted under this fish persistence condition must be re-calculated daily.

NOTE: The content of the original text has been moved from sub-section e to sub-section d, and visa versa.

Proportional Reductions from the day after the first Monday in September through June 30

d. From the day after the first Monday in September through June 30 the maximum total amount of the undeveloped portion of ~~the~~ Permit S-9982 that can legally be diverted shall be reduced as described in Section 2.c, above. ~~in proportion to the amount by which the flows shown in Table 1 are not met based on a seven day rolling average of mean daily flows (measured on the Clackamas River at USGS Gage Number 14211010, Clackamas River near Oregon City, Oregon, or its equivalent), as illustrated in the examples below.~~

Example 1: Target Flow Met

If ~~On~~ on June 15, the ~~last seven~~ mean daily flow~~s~~ as measured at USGS Gage Number 14211010 ~~were~~ was ~~750, 725,~~ 700~~, 650, 625, 600 and 575~~ cfs, and the amount being diverted below the gage (DBG) was 34 cfs, then the adjusted flow (Q_{ADJ}) would be 666 cfs (700 – 34 = 666). ~~The seven day rolling average is 661 cfs.~~ The maximum total amount of the undeveloped portion of the permit that could legally be diverted under this permit would not be reduced because the ~~7 day average of mean daily flows~~ adjusted mean daily flow on that day is greater than the 650 target flow for June 15. In this example, $Q_{ADJ} \geq Q_T$.

Example 2: Target Flow Missed

~~If on June 15, the average of the last seven mean daily flows was 578 cfs, then the target flows would be missed by 11% (100 - [(578/650)* 100)]. Ifthe maximum total amount of the undeveloped portion of the permit that can legally be diverted under this permit is 10 cfs, then the maximum total amount of the undeveloped portion of the permit that could be legally diverted under this permit would be reduced by 11%. The maximum total amount~~

~~of the undeveloped portion of the permit that could be legally diverted under the permit under this condition would be 8.9 cfs (10 [l 0 x 0.11] = 8.9).~~

NOTE: With the exception of Table 1, the remainder of the text in this sub-section is added to the original text, but not shown in <u>underline</u> text.

Step 1: If on September 20, the mean daily flow (Q_A) at the gage was 700 cfs, and 59 cfs was being diverted below the gage (D_{BG} = 59), then the adjusted flow (Q_{ADJ}) would be <u>641 cfs</u>.

$$700 - 59 = 641$$

Step 2: Given that the adjusted mean daily flow (Q_{ADJ}) was 641 cfs (from Step 1), and the target flow (Q_T) is 800 cfs, then the target flow would be missed by <u>19.9%.</u>

$$(1 - [641 / 800]) \times 100\% = 19.9\%$$

Step 3: Given that the undeveloped portion of this permit (E) is 27.0 cfs, and the undeveloped portion of the permit needs to be reduced by 19.9% (from Step 2), or <u>5.37 cfs</u>, then the maximum amount of the undeveloped portion of Permit S-9982 that could be diverted as a result of this fish persistence condition would be <u>21.6 cfs</u>. (This maximum amount may be limited as illustrated in Step 4, below.)

$$(27.0 \times 19.9) / 100\% = 5.37$$

$$27.0 - 5.37 = 21.6$$

Step 4: The calculated maximum amount of water that could be diverted under the permit due to the fish persistence condition may not exceed the amount of water to which the water user is legally entitled to divert. In this example, if the amount of water legally authorized for diversion under this permit is 15.0 cfs (for example, authorization provided through a WMCP), then <u>15.0 cfs</u> would be the maximum amount of diversion allowed under this permit including the developed portion of the permit, being 3.0 cfs.

(Conversely, if the amount of water legally authorized for diversion under this permit is 25.0 cfs, then <u>24.6 cfs</u> (21.6 from Step 3 + the 3.0 developed portion) would be the maximum amount of diversion allowed under this permit.)

Table 1~~1~~

~~Minimum~~ Fish Persistence Target Flows ~~Needs on~~ at the Mouth of the Lower Clackamas River ~~Measured at USGS Gage 14211010, Clackamas~~	
Month	Cubic Feet per Second
June -August	650
September	650/800~~2~~[1]
October - May	800

~~1 Table 1 was called Table 2 in the Proposed Final Order (PFO)~~

~~2~~[1] 650 cfs Sept. 1 through Sept. 15 and ~~850~~ 800 cfs September 16 through September 30

NOTE: In sub-section e, additions to the original text are shown in "underline" text, deletions are shown in "~~strikethrough~~" text.

Timothy Lake Releases June 1 through October 31

e. In cooperation with the holders of Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, the permittee must ~~have an annual meeting~~ meet with ODFW annually to devise a strategy to maximize fishery benefits from flow augmentation that ~~can be derived~~ may be available through ~~from~~ the Water Storage ~~a~~Agreement[5] with Portland General Electric (PGE) for the release of stored water from Timothy Lake. The permittees shall arrange a meeting with ODFW to develop a written flow augmentation strategy based on the current year's projected water availability. The strategy will include two flow augmentation periods, being from June 1st through the first Monday in September, and the day after the first Monday in September through Oct 31st. The June 1st through the first Monday in September period will determine whether flows are needed for steelhead spawning and incubation or can be used for flow augmentation later in the summer. The day after the first Monday in September through Oct 31st period will determine the timing for flow augmentation for chinook spawning. The permittees must consult with PGE to determine if and when water is available for flow augmentation. The permittees must notify ODFW about the timing and the amount of flow that can be released. If the available water cannot meet the strategy targets then the permittees and ODFW will modify the flow augmentation strategy to maximize fishery benefits. The permittees must then submit a flow augmentation request to PGE.

It is OWRD's intent that ODFW and the permittees reach agreement on the strategy. However, if after making a good faith effort ODFW and the permittees are unable to reach agreement on a strategy ODFW shall devise the strategy. In either case, the strategy shall be documented in writing and the permittees shall comply with the strategy. The annual meeting and resulting strategy and consultations may cover issues other than Timothy Lake releases that are relevant to both use under Permits S-46120, S-35297, S-43170, S-22581,

[5] Or any similar agreement intended to supersede the existing agreement.

S-3778, S-9982, S-32410 and S-37839, and to listed fish species; however, the strategy may include actions pertaining to such issues only upon mutual agreement by ODFW and the permittees.

NOTE: Sub-section f is added to the original text, but not shown in underline text.

Water Management Conservation Plan (WMCP) Water Conversation Measures/ Curtailment Actions from July 1 through the first Monday in September

f. From July 1st through the first Monday in September, when target flows are not met based on a seven day rolling average of mean daily flows, the water user must implement consistent with the water curtailment element of their WMCP, water conservation measures and/or curtailment actions as described in 2.f.(2) and (3), below.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}) [6] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) Upon the first occurrence of the adjusted flow at the mouth (Q_{ADJ}) being less than the target flow (Q_T) in Table 1 (i.e., when $Q_{ADJ} < Q_T$), based on a seven day rolling average of mean daily flows, the water user must enact the first level or stage of alert in their water curtailment plan that includes mandatory water conservation measures and/or curtailment actions consistent with 2.f.(3), below.

(3) Once enacted, implementation of the water conservation measures and/or curtailment actions as described in 2.f.(2), above, must continue through the first Monday in September.

[6] See fn 1

Modifying conditions as corrected in the REVISED FINAL ORDER INCORPORATING PROPOSED ORDER IN CASE INVOLVING SOUTH FORK WATER BOARD PERMITS S-22581, S- 3778, S-9982, signed by Dwight French May 8, 2013.

MODIFIED CONDITIONS FOR PERMIT S-22581

NOTE: Unless otherwise noted, additions to the original condition are shown in "underline" text, deletions are shown in "~~strikethrough~~" text (formulas have not been underlined for the sake of readability).

1. Development Limitations

A maximum diversion 22.4 cfs of water is currently allowed under Permit S-22581. Any ~~D~~diversion of water beyond 22.4 cfs (not to exceed the maximum amount authorized under the permit, being 60.0 cfs) ~~under Permit S-22581~~ shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86 that authorizes access to a greater rate of diversion of water under the permit consistent with OAR 690-086-0130(7). ~~A~~ The required WMCP shall be submitted to the Department within 3 years of this Final Order incorporating XXXX. ~~an approved extension of time application. Use of~~ The amount of water used under Permit S-22581 shall be consistent with this and subsequent WMCP's approved under OAR Chapter 690, Division 86 on file with the Department.

The Development Limitation established in the above paragraph supersedes any prior limitation of the diversion of water under this permit that has been established under a prior WMCP or Extension final order issued by the Department.

The deadline established in this ~~PFO~~ this Final Order incorporating XXXX for submittal of a WMCP shall not relieve a permit holder of any existing or future requirement for submittal of a WMCP at an earlier date as established through other orders of the Department. A WMCP submitted to meet the requirements of this order may also meet the WMCP submittal requirements of other Department orders.

2. Conditions to Maintain the Persistence of Listed Fish

The developed portion of the permit, 22.4 cfs, is *not* subject to these fish persistence conditions. *The undeveloped portion of the permit subject to these fish persistence conditions is 37.6 cfs.*

Determining Water Use Reductions

a. ~~Minimum fish flow needs~~ Target flows needed to maintain the persistence of listed fish species in ~~on~~ the Lower Clackamas River as recommended by ODFW are in Table 1, below~~,~~. ~~and are to be measured at USGS Gage Number 14211010, Clackamas River near Oregon City, Oregon, or its equivalent.~~ Target flows are to be met at the mouth of the Clackamas River.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}).[7] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) The maximum amount of the undeveloped portion of Permit S-22581 that can be diverted as a result of this fish persistence condition is determined in proportion to the amount by which the target flows shown in Table 1 are missed based on the adjusted mean daily flow (Q_{ADJ}) as described in 2.a.(1), above. The percent of missed target flows is defined as:

$$(1 - [Q_{ADJ} / Q_T]) \times 100\%,$$

where Q_{AdJ} is the adjusted mean daily flow at the mouth, and Q_T is the target flow (from Table 1).

The percent by which the target flow is missed applied to the undeveloped portion of the permit provides the maximum amount of undeveloped portion of Permit S-22581 that can be diverted as a result of this fish persistence condition, and is defined as:

$$E - (E \times \% \text{ missed target flow}),$$

where E is the undeveloped portion of the permit, being 37.6 cfs.

When $Q_{ADJ} \geq Q_T$, the amount of the undeveloped portion of the permit that can be diverted would not need to be reduced as a result of this fish persistence condition.

(3) From the day after the first Monday in September through June 30, and when $Q_{ADJ} < Q_T$, the maximum amount of the undeveloped portion that may be diverted under this fish persistence condition must be re-calculated daily.

[7] D_{BG} stands for "Diversion Below the Gage" and is based on daily water use under Application S-57585 (up to 50 cfs, of which to date 25.0 cfs has been partially perfected under Certificate 78332), and under Application S-50819 (up to 9 cfs). [50 cfs + 9 cfs = 59 cfs = the maximum value of D_{BG}]. The City of Lake Oswego holds these water rights and diverts water under these rights below USGS Gage Number 14211010. The mean daily flow as measured at the gage must be corrected for the amount actually being diverted below the gage under these specified water rights or their successive water rights so long as the points of diversion remain below the gaging station.

NOTE: The content of the original text has been moved from sub-section c to sub-section b, and visa versa.

Proportional Reductions from the day after the first Monday in September through June 30

b. From the day after the first Monday in September through June 30 the maximum total amount of the undeveloped portion of ~~the~~ Permit S-22581 that can legally be diverted shall be reduced as described in Section 2.a, above. ~~in proportion to the amount by which the flows shown in Table 1 are not met based on a seven day rolling average of mean daily flows (measured on the Clackamas River at USGS Gage Number 14211010, Clackamas River near Oregon City, Oregon, or its equivalent), as illustrated in the examples below.~~

Example 1: Target Flow Met

If ~~On~~ on June 15, the ~~last seven~~ mean daily flow~~s~~ as measured at USGS Gage Number 14211010 ~~were~~ was ~~750, 725,~~ 700~~, 650, 625, 600 and 575~~ cfs, and the amount being diverted below the gage (DBG) was 34 cfs, then the adjusted flow (Q_{ADJ}) would be 666 cfs (700 – 34 = 666). ~~The seven day rolling average is 661 cfs.~~ The maximum total amount of the undeveloped portion of the permit that could legally be diverted under this permit would not be reduced because the ~~7 day average of mean daily flows~~ adjusted mean daily flow on that day is greater than the 650 target flow for June 15. In this example, $Q_{ADJ} \geq Q_{T.}$

Example 2: Target Flow Missed

~~If on June 15, the average of the last seven mean daily flows was 578 cfs, then the target flows would be missed by 11% (100 - [(578/650)* 100)]. Ifthe maximum total amount of the undeveloped portion of the permit that can legally be diverted under this permit is 10 cfs, then the maximum total amount of the undeveloped portion of the permit that could be legally diverted under this permit would be reduced by 11%. The maximum total amount of the undeveloped portion of the permit that could be legally diverted under the permit under this condition would be 8.9 cfs (10-[I 0 x 0.11] = 8.9).~~

NOTE: With the exception of Table 1, the remainder of the text in this sub-section is added to the original text, but not shown in underline text.

Step 1: If on September 20, the mean daily flow (Q_A) at the gage was 700 cfs, and 59 cfs was being diverted below the gage (D_{BG} = 59), then the adjusted flow (Q_{ADJ}) would be 641 cfs.

$$700 - 59 = 641$$

Step 2: Given that the adjusted mean daily flow (Q_{ADJ}) was 641 cfs (from Step 1), and the target flow (Q_T) is 800 cfs, then the target flow would be missed by 19.9%.

$$(1 - [641 / 800]) \times 100\% = 19.9\%$$

Step 3: Given that the undeveloped portion of this permit (E) is 37.6 cfs, and the undeveloped portion of the permit needs to be reduced by 19.9% (from Step 2),

or 7.48 cfs, then the maximum amount of the undeveloped portion of Permit S-22581 that could be diverted as a result of this fish persistence condition would be 30.1 cfs. (This maximum amount may be limited as illustrated in Step 4, below.)

$$(37.6 \times 19.9) / 100\% = 7.48$$

$$37.6 - 7.48 = 30.1$$

Step 4: The calculated maximum amount of water that could be diverted under the permit due to the fish persistence condition may not exceed the amount of water to which the water user is legally entitled to divert. In this example, if the amount of water legally authorized for diversion under this permit is 28.0 cfs (for example, authorization provided through a WMCP), then 28.0 cfs would be the maximum amount of diversion allowed under this permit including the developed portion of the permit, being 22.4 cfs.

(Conversely, if the amount of water legally authorized for diversion under this permit is 55.0 cfs, then 52.5 cfs (30.1 from Step 3 + the 22.4 developed portion) would be the maximum amount of diversion allowed under this permit.)

Table 1~~1~~

~~Minimum~~ Fish Persistence Target Flows ~~Needs on~~ at the Mouth of the Lower Clackamas River ~~Measured at USGS Gage 14211010, Clackamas~~	
Month	Cubic Feet per Second
June -August	650
September	650/800~~21~~
October - May	800

~~1 Table 1 was called Table 2 in the Proposed Final Order (PFO)~~

~~21~~ 650 cfs Sept. 1 through Sept. 15 and 800 cfs September 16 through September 30

NOTE: In sub-section c, additions to the original text are shown in "underline" text, deletions are shown in "~~strikethrough~~" text.

Timothy Lake Releases June 1 through October 31

c. In cooperation with the holders of Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, the permittee must ~~have an annual meeting~~ meet with ODFW annually to devise a strategy to maximize fishery benefits from flow augmentation that ~~can be derived~~ may be available through ~~from~~ the Water Storage ~~a~~Agreement[8] with Portland General Electric (PGE) for the release of stored water from Timothy Lake. The permittees shall arrange a meeting with ODFW to develop a written

[8] Or any similar agreement intended to supersede the existing agreement.

flow augmentation strategy based on the current year's projected water availability. The strategy will include two flow augmentation periods, being from June 1st through the first Monday in September, and the day after the first Monday in September through Oct 31st. The June 1st through the first Monday in September period will determine whether flows are needed for steelhead spawning and incubation or can be used for flow augmentation later in the summer. The day after the first Monday in September through Oct 31st period will determine the timing for flow augmentation for chinook spawning. The permittees must consult with PGE to determine if and when water is available for flow augmentation. The permittees must notify ODFW about the timing and the amount of flow that can be released. If the available water cannot meet the strategy targets then the permittees and ODFW will modify the flow augmentation strategy to maximize fishery benefits. The permittees must then submit a flow augmentation request to PGE.

It is OWRD's intent that ODFW and the permittees reach agreement on the strategy. However, if after making a good faith effort ODFW and the permittees are unable to reach agreement on a strategy ODFW shall devise the strategy. In either case, the strategy shall be documented in writing and the permittees shall comply with the strategy. The annual meeting and resulting strategy and consultations may cover issues other than Timothy Lake releases that are relevant to both use under Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, and to listed fish species; however, the strategy may include actions pertaining to such issues only upon mutual agreement by ODFW and the permittees.

NOTE: Sub-section d is added to the original text, but not shown in underline text.

Water Management Conservation Plan (WMCP) Water Conversation Measures/ Curtailment Actions from July 1 through the first Monday in September

d. From July 1st through the first Monday in September, when target flows are not met based on a seven day rolling average of mean daily flows, the water user must implement consistent with the water curtailment element of their WMCP, water conservation measures and/or curtailment actions as described in 2.d.(2) and (3), below.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}) [9] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

[9] See fn 1

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) Upon the first occurrence of the adjusted flow at the mouth (Q_{ADJ}) being less than the target flow (Q_T) in Table 1 (i.e., when $Q_{ADJ} < Q_T$), based on a seven day rolling average of mean daily flows, the water user must enact the first level or stage of alert in their water curtailment plan that includes mandatory water conservation measures and/or curtailment actions consistent with 2.d.(3), below.

(3) Once enacted, implementation of the water conservation measures and/or curtailment actions as described in 2.d.(2), above, must continue through the first Monday in September.

Modifying conditions as found in the FINAL ORDER INCORPORATING PROPOSED ORDER IN CASES INVOLVING LAKE OSWEGO PERMITS S-32410, S-37839, with Certificate of Filing dated April 21, 2011

MODIFIED CONDITIONS FOR PERMIT S-32410

(Modified by Permit Amendment T-8538)

NOTE: Unless otherwise noted, additions to the original condition are shown in "underline" text, deletions are shown in "strikethrough" text (formulas have not been underlined for the sake of readability).

1. Development Limitations

No ~~D~~diversion of water is currently allowed under the unperfected portion of Permit S-32410 (modified by Permit Amendment T-8538). ~~beyond the~~ [The permit was originally issued for 50.0 cfs of which 25.0 cfs has been confirmed in Certificate 78332.] Any diversion of the remaining unperfected portion of water under the permit, being 25.0 cfs, shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86 that authorizes access to a greater rate of diversion of water under the permit consistent with OAR 690-086-0130(7). ~~A~~ The required WMCP shall be submitted to the Department within 3 years of this Final Order incorporating XXXX. ~~an approved extension of time application. Use of~~ The amount of water used under Permit S-32410 (modified by Permit Amendment T-8538) shall be consistent with this and subsequent WMCP's approved under OAR Chapter 690, Division 86 on file with the Department.

The Development Limitation established in the above paragraph supersedes any prior limitation of the diversion of water under this permit that has been established under a prior WMCP or Extension final order issued by the Department.

The deadline established in this ~~PFO~~ this Final Order incorporating XXXX for submittal of a WMCP shall not relieve a permit holder of any existing or future requirement for submittal of a WMCP at an earlier date as established through other orders of the Department. A WMCP submitted to meet the requirements of this order may also meet the WMCP submittal requirements of other Department orders.

2. Conditions to Maintain the Persistence of Listed Fish

The undeveloped portion of the permit subject to these fish persistence conditions is 25.0 cfs.[10]

[10] The permit was issued for a total of 50.0 cfs; 25.0 cfs of the permit was partially perfected under Certificate 78332.

Determining Water Use Reductions

a. ~~Minimum fish flow needs~~ Target flows needed to maintain the persistence of listed fish species in ~~on~~ the Lower Clackamas River as recommended by ODFW are in Table 1, below~~;. and are to be measured at USGS Gage Number 14211010, Clackamas River near Oregon City, Oregon, or its equivalent.~~ Target flows are to be met at the mouth of the Clackamas River.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG})[11] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) The maximum amount of the undeveloped portion of Permit S-32410 that can be diverted as a result of this fish persistence condition is determined in proportion to the amount by which the target flows shown in Table 1 are missed based on the adjusted mean daily flow (Q_{ADJ}) as described in 2.a.(1), above. The percent of missed target flows is defined as:

$$(1 - [Q_{ADJ} / Q_T]) \times 100\%,$$

where Q_{AdJ} is the adjusted mean daily flow at the mouth, and Q_T is the target flow (from Table 1).

The percent by which the target flow is missed applied to the undeveloped portion of the permit provides the maximum amount of undeveloped portion of Permit S-32410 that can be diverted as a result of this fish persistence condition, and is defined as:

$$E - (E \times \% \text{ missed target flow}),$$

where E is the undeveloped portion of the permit, being 25.0 cfs.

When $Q_{ADJ} \geq Q_T$, the amount of the undeveloped portion of the permit that can be

[11] D_{BG} stands for "Diversion Below the Gage" and is based on daily water use under Application S-57585 (up to 50 cfs, of which to date 25.0 cfs has been partially perfected under Certificate 78332), and under Application S-50819 (up to 9 cfs). [50 cfs + 9 cfs = 59 cfs = the maximum value of D_{BG}]. The City of Lake Oswego holds these water rights and diverts water under these rights below USGS Gage Number 14211010. The actual daily average flow measured at the gage must be corrected for the amount actually being diverted below the gage under these specified water rights or their successive water rights so long as the points of diversion remain below the gaging station.

diverted would not need to be reduced as a result of this fish persistence condition.

(3) From the day after the first Monday in September through June 30, and when $Q_{ADJ} < Q_T$, the maximum amount of the undeveloped portion that may be diverted under this fish persistence condition must be re-calculated daily.

NOTE: The content of the original text has been moved from sub-section c to sub-section b, and visa versa.

Proportional Reductions from the day after the first Monday in September through June 30

b. From the day after the first Monday in September through June 30 the maximum total amount of the undeveloped portion of ~~the~~ Permit S-32410 (modified by Permit Amendment T-8538) that can legally be diverted shall be reduced as described in Section 2.a, above. ~~in proportion to the amount by which the flows shown in Table 1 are not met based on a seven-day rolling average of mean daily flows (measured on the Clackamas River at USGS Gage Number 14211010, Clackamas River near Oregon City, Oregon, or its equivalent), as illustrated in the examples below.~~

Example 1: Target Flow Met

If ~~On~~ on June 15, the ~~last seven~~ mean daily flow~~s~~ as measured at USGS Gage Number 14211010 ~~were~~ was ~~750, 725,~~ 700~~, 650, 625, 600 and 575~~ cfs, and the amount being diverted below the gage (D_{BG}) was 34 cfs, then the adjusted flow (Q_{ADJ}) would be 666 cfs (700 – 34 = 666). ~~The seven day rolling average is 661 cfs.~~ The maximum total amount of the undeveloped portion of the permit that could legally be diverted under this permit would not be reduced because the ~~7 day average of mean daily flows~~ adjusted mean daily flow on that day is greater than the 650 target flow for June 15. In this example, $Q_{ADJ} \geq Q_T$.

Example 2: Target Flow Missed

~~If on June 15, the average of the last seven mean daily flows was 578 cfs, then the target flows would be missed by 11% (100 - [(578/650)* 100)]. If the maximum total amount of the undeveloped portion of the permit that can legally be diverted under this permit is 10 cfs, then the maximum total amount of the undeveloped portion of the permit that could be legally diverted under this permit would be reduced by 11%. The maximum total amount of the undeveloped portion of the permit that could be legally diverted under the permit under this condition would be 8.9 cfs (10 [10 x 0.11] = 8.9).~~

NOTE: With the exception of Table 1, the remainder of the text in this sub-section is added to the original text, but not shown in underline text.

Step 1: If on September 20, the mean daily flow (Q_A) at the gage was 700 cfs, and 59 cfs was being diverted below the gage (D_{BG} = 59), then the adjusted flow (Q_{ADJ}) would be 641 cfs.

$$700 - 59 = 641$$

Step 2: Given that the adjusted mean daily flow (Q_{ADJ}) was 641 cfs (from Step 1), and the target flow (Q_T) is 800 cfs, then the target flow would be missed by 19.9%.

$$(1 - [641 / 800]) \times 100\% = 19.9\%$$

Step 3: Given that the undeveloped portion of this permit (E) is 25.0 cfs, and the undeveloped portion of the permit needs to be reduced by 19.9% (from Step 2), or 4.98 cfs, then the maximum amount of the undeveloped portion of Permit S-32410 that could be diverted as a result of this fish persistence condition would be 20.0 cfs. (This maximum amount may be limited as illustrated in Step 4, below.)

$$(25.0 \times 19.9) / 100\% = 4.98$$

$$25.0 - 4.98 = 20.0$$

Step 4: The calculated maximum amount of water that could be diverted under the permit due to the fish persistence condition may not exceed the amount of water to which the water user is legally entitled to divert. In this example, if the amount of water legally authorized for diversion under the undeveloped portion of this permit is 15.0 cfs (for example, authorization provided through a WMCP), then 15.0 cfs would be the maximum amount of diversion allowed under the undeveloped portion of this permit, rather than 20.0 cfs from Step 3.

(Conversely, if the amount of water legally authorized for diversion under this permit is 25.0 cfs, then 20.0 cfs (from Step 3) would be the maximum amount of diversion allowed under this permit.)

Table 1~~[1]~~

~~Minimum~~ Fish Persistence Target Flows ~~Needs on~~ at the Mouth of the Lower Clackamas River ~~Measured at USGS Gage 14211010, Clackamas River Near Oregon City, Oregon~~	
Month	Cubic Feet per Second
June -August	650
September	650/800~~[2]~~[1]
October - May	800

~~[1] Table 1 was called Table 2 in the Proposed Final Order (PFO)~~

~~[2]~~[1] 650 cfs Sept. 1 through Sept. 15 and ~~850~~ 800 cfs September 16 through September 30

NOTE: In sub-section c, additions to the original condition are shown in "underline" text, deletions are shown in "~~strikethrough~~" text.

Timothy Lake Releases June 1 through October 31

c. In cooperation with the holders of Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, the permittee must ~~have an annual meeting~~ meet with ODFW annually to devise a strategy to maximize fishery benefits from flow augmentation that ~~can be derived~~ may be available through ~~from~~ the Water Storage ~~a~~Agreement[12] with Portland General Electric (PGE) for the release of stored water from Timothy Lake. The permittees shall arrange a meeting with ODFW to develop a written flow augmentation strategy based on the current year's projected water availability. The strategy will include two flow augmentation periods, being from June 1st through the first Monday in September, and the day after the first Monday in September through Oct 31st. The June 1st through the first Monday in September period will determine whether flows are needed for steelhead spawning and incubation or can be used for flow augmentation later in the summer. The day after the first Monday in September through Oct 31st period will determine the timing for flow augmentation for chinook spawning. The permittees must consult with PGE to determine if and when water is available for flow augmentation. The permittees must notify ODFW about the timing and the amount of flow that can be released. If the available water cannot meet the strategy targets then the permittees and ODFW will modify the flow augmentation strategy to maximize fishery benefits. The permittees must then submit a flow augmentation request to PGE.

   It is OWRD's intent that ODFW and the permittees reach agreement on the strategy. However, if after making a good faith effort ODFW and the permittees are unable to reach agreement on a strategy ODFW shall devise the strategy. In either case, the strategy shall be documented in writing and the permittees shall comply with the strategy. The annual meeting and resulting strategy and consultations may cover issues other than Timothy Lake releases that are relevant to both use under Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, and to listed fish species; however, the strategy may include actions pertaining to such issues only upon mutual agreement by ODFW and the permittees.

NOTE: Sub-section d is added to the original text, but not shown in underline text.

Water Management Conservation Plan (WMCP) Water Conversation Measures/ Curtailment Actions from July 1 through the first Monday in September

d. From July 1st through the first Monday in September, when target flows are not met based on a seven day rolling average of mean daily flows, the water user must implement

[12] Or any similar agreement intended to supersede the existing agreement.

consistent with the water curtailment element of their WMCP, water conservation measures and/or curtailment actions as described in 2.d.(2) and (3), below.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}) [13] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) Upon the first occurrence of the adjusted flow at the mouth (Q_{ADJ}) being less than the target flow (Q_T) in Table 1 (i.e., when $Q_{ADJ} < Q_T$), based on a seven day rolling average of mean daily flows, the water user must enact the first level or stage of alert in their water curtailment plan that includes mandatory water conservation measures and/or curtailment actions consistent with 2.d.(3), below.

(3) Once enacted, implementation the water conservation measures and/or curtailment actions as described in 2.d.(2), above, must continue through the first Monday in September.

[13] See fn 1

Modifying conditions as found in the FINAL ORDER INCORPORATING PROPOSED ORDER IN CASES INVOLVING LAKE OSWEGO PERMITS S-32410, S-37839, with Certificate of Filing dated April 21, 2011

MODIFIED CONDITIONS FOR PERMIT S-37839

NOTE: Unless otherwise noted, additions to the original condition are shown in "underline" text, deletions are shown in "~~strikethrough~~" text (formulas have not been underlined for the sake of readability).

1. Development Limitations

No ~~D~~diversion of water ~~any~~ is currently allowed under Permit S-37839. Diversion of any water (not to exceed the maximum amount authorized under this permit, being 9.0 cfs) shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86 that authorizes access to a greater rate of diversion of water under the permit consistent with OAR 690-086-0130(7). ~~A~~ The required WMCP shall be submitted to the Department within 3 years of this Final Order incorporating XXXX. ~~an approved extension of time application. Use of~~ The amount of water used under Permit S-37839 shall be consistent with this and subsequent WMCP's approved under OAR Chapter 690, Division 86 on file with the Department.

The Development Limitation established in the above paragraph supersedes any prior limitation of the diversion of water under this permit that has been established under a prior WMCP or Extension final order issued by the Department.

The deadline established in this ~~PFO~~ this Final Order incorporating XXXX for submittal of a WMCP shall not relieve a permit holder of any existing or future requirement for submittal of a WMCP at an earlier date as established through other orders of the Department. A WMCP submitted to meet the requirements of this order may also meet the WMCP submittal requirements of other Department orders.

2. Conditions to Maintain the Persistence of Listed Fish

The undeveloped portion of the permit subject to these fish persistence conditions is 9.0 cfs.

Determining Water Use Reductions

a. ~~Minimum fish flow needs~~ Target flows needed to maintain the persistence of listed fish species in ~~on~~ the Lower Clackamas River as recommended by ODFW are in Table 1, below~~,~~. ~~and are to be measured at USGS Gage Number 14211010, Clackamas River near Oregon City, Oregon, or its equivalent.~~ Target flows are to be met at the mouth of the Clackamas River.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}).[14] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) The maximum amount of the undeveloped portion of Permit S-37839 that can be diverted as a result of this fish persistence condition is determined in proportion to the amount by which the target flows shown in Table 1 are missed based on the adjusted mean daily flow (Q_{ADJ}) as described in 2.a.(1), above. The percent of missed target flows is defined as:

$$(1 - [Q_{ADJ} / Q_T]) \times 100\%,$$

where Q_{AdJ} is the adjusted mean daily flow at the mouth, and Q_T is the target flow (from Table 1).

The percent by which the target flow is missed applied to the undeveloped portion of the permit provides the maximum amount of undeveloped portion of Permit S-37839 that can be diverted as a result of this fish persistence condition, and is defined as:

$$E - (E \times \% \text{ missed target flow}),$$

where E is the undeveloped portion of the permit, being 9.0 cfs.

When $Q_{ADJ} \geq Q_T$, the amount of the undeveloped portion of the permit that can be diverted would not need to be reduced as a result of this fish persistence condition.

(3) From the day after the first Monday in September through June 30, and when $Q_{ADJ} < Q_T$, the maximum amount of the undeveloped portion that may be diverted under this fish persistence condition must be re-calculated daily.

[14] D_{BG} stands for "Diversion Below the Gage" and is based on daily water use under Application S-57585 (up to 50 cfs, of which to date 25.0 cfs has been partially perfected under Certificate 78332), and under Application S-50819 (up to 9 cfs). [50 cfs + 9 cfs = 59 cfs = the maximum value of D_{BG}]. The City of Lake Oswego holds these water rights and diverts water under these rights below USGS Gage Number 14211010. The actual daily average flow measured at the gage must be corrected for the amount actually being diverted below the gage under these specified water rights or their successive water rights so long as the points of diversion remain below the gaging station.

NOTE: The content of the original text has been moved from sub-section c to sub-section b, and visa versa.

Proportional Reductions from the day after the first Monday in September through June 30

b. From the day after the first Monday in September through June 30 the maximum total amount of the undeveloped portion of ~~the~~ Permit S-37839 that can legally be diverted shall be reduced as described in Section 2.a, above. ~~in proportion to the amount by which the flows shown in Table 1 are not met based on a seven day rolling average of mean daily flows (measured on the Clackamas River at USGS Gage Number 14211010, Clackamas River near Oregon City, Oregon, or its equivalent), as illustrated in the examples below.~~

Example 1: Target Flow Met

If ~~On~~ on June 15, the ~~last seven~~ mean daily flow~~s~~ as measured at USGS Gage Number 14211010 ~~were~~ was ~~750, 725,~~ 700~~, 650, 625, 600 and 575~~ cfs, and the amount being diverted below the gage (D_{BG}) was 34 cfs, then the adjusted flow (Q_{ADJ}) would be 666 cfs (700 – 34 = 666). ~~The seven day rolling average is 661 cfs.~~ The maximum total amount of the undeveloped portion of the permit that could legally be diverted under this permit would not be reduced because the ~~7 day average of mean daily flows~~ adjusted mean daily flow on that day is greater than the 650 target flow for June 15. In this example, $Q_{ADJ} \geq Q_{T.}$

Example 2: Target Flow Missed

~~If on June 15, the average of the last seven mean daily flows was 578 cfs, then the target flows would be missed by 11% (100 - [(578/650)* 100)]. If the maximum total amount of the undeveloped portion of the permit that can legally be diverted under this permit is 10 cfs, then the maximum total amount of the undeveloped portion of the permit that could be legally diverted under this permit would be reduced by 11%. The maximum total amount of the undeveloped portion of the permit that could be legally diverted under the permit under this condition would be 8.9 cfs (10-[10 x 0.11] = 8.9).~~

NOTE: With the exception of Table 1, the remainder of the text in this sub-section is added to the original text, but not shown in underline text.

Step 1: If on September 20, the mean daily flow (Q_A) at the gage was 700 cfs, and 59 cfs was being diverted below the gage (D_{BG} = 59), then the adjusted flow (Q_{ADJ}) would be 641 cfs.

$$700 - 59 = 641$$

Step 2: Given that the adjusted mean daily flow (Q_{ADJ}) was 641 cfs (from Step 1), and the target flow (Q_T) is 800 cfs, then the target flow would be missed by 19.9%.

$$(1 - [641 / 800]) \times 100\% = 19.9\%$$

Step 3: Given that the undeveloped portion of this permit (E) is 9.0 cfs, and the

undeveloped portion of the permit needs to be reduced by 19.9% (from Step 2), or 1.79 cfs, then the maximum amount of the undeveloped portion of Permit S-37839 that could be diverted as a result of this fish persistence condition would be 7.2 cfs. (This maximum amount may be limited as illustrated in Step 4, below.)

(9.0 x 19.9) / 100% = 1.79

9.0 – 1.79 = 7.2

Step 4: The calculated maximum amount of water that could be diverted under the permit due to the fish persistence condition may not exceed the amount of water to which the water user is legally entitled to divert. In this example, if the amount of water legally authorized for diversion under this permit is 5.0 cfs (for example, authorization provided through a WMCP), then 5.0 cfs would be the maximum amount of diversion allowed under this permit, rather than 7.2 cfs from Step 3.

(Conversely, if the amount of water legally authorized for diversion under this permit is 7.5 cfs, then 7.2 cfs (from Step 3) would be the maximum amount of diversion allowed under this permit.)

Table 1[~~1~~]

~~Minimum~~ Fish Persistence Target Flows ~~Needs on~~ at the Mouth of the Lower Clackamas River ~~Measured at USGS Gage 14211010, Clackamas River Near Oregon City, Oregon~~	
Month	Cubic Feet per Second
June -August	650
September	650/800[~~2~~1]
October - May	800

[~~1~~] ~~Table 1 was called Table 2 in the Proposed Final Order (PFO)~~

[~~2~~1] 650 cfs Sept. 1 through Sept. 15 and ~~850~~ 800 cfs September 16 through September 30

NOTE: In sub-section c, additions to the original condition are shown in "underline" text, deletions are shown in "~~strikethrough~~" text.

Timothy Lake Releases June 1 through October 31

c. In cooperation with the holders of Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, the permittee must ~~have an annual meeting~~ meet with ODFW annually to devise a strategy to maximize fishery benefits from flow augmentation that ~~can be derived~~ may be available through ~~from~~ the Water Storage ~~a~~Agreement[15] with Portland General Electric (PGE) for the release of stored water

[15] Or any similar agreement intended to supersede the existing agreement.

from Timothy Lake. The permittees shall arrange a meeting with ODFW to develop a written flow augmentation strategy based on the current year's projected water availability. The strategy will include two flow augmentation periods, being from June 1st through the first Monday in September, and the day after the first Monday in September through Oct 31st. The June 1st through the first Monday in September period will determine whether flows are needed for steelhead spawning and incubation or can be used for flow augmentation later in the summer. The day after the first Monday in September through Oct 31st period will determine the timing for flow augmentation for chinook spawning. The permittees must consult with PGE to determine if and when water is available for flow augmentation. The permittees must notify ODFW about the timing and the amount of flow that can be released. If the available water cannot meet the strategy targets then the permittees and ODFW will modify the flow augmentation strategy to maximize fishery benefits. The permittees must then submit a flow augmentation request to PGE.

It is OWRD's intent that ODFW and the permittees reach agreement on the strategy. However, if after making a good faith effort ODFW and the permittees are unable to reach agreement on a strategy ODFW shall devise the strategy. In either case, the strategy shall be documented in writing and the permittees shall comply with the strategy. The annual meeting and resulting strategy and consultations may cover issues other than Timothy Lake releases that are relevant to both use under Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, and to listed fish species; however, the strategy may include actions pertaining to such issues only upon mutual agreement by ODFW and the permittees.

NOTE: Sub-sections d and e are added to the original text, but not shown in underline text.

Water Management Conservation Plan (WMCP) Water Conversation Measures/ Curtailment Actions from July 1 through the first Monday in September

d. From July 1st through the first Monday in September, when target flows are not met based on a seven day rolling average of mean daily flows, the water user must implement consistent with the water curtailment element of their WMCP, water conservation measures and/or curtailment actions as described in 2.d.(2) and (3), below.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}) [16] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

[16] See fn 1

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) Upon the first occurrence of the adjusted flow at the mouth (Q_{ADJ}) being less than the target flow (Q_T) in Table 1 (i.e., when $Q_{ADJ} < Q_T$), based on a seven day rolling average of mean daily flows, the water user must enact the first level or stage of alert in their water curtailment plan that includes mandatory water conservation measures and/or curtailment actions consistent with 2.d.(3), below.

(3) Once enacted, implementation the water conservation measures and/or curtailment actions as described in 2.d.(2), above, must continue through the first Monday in September.

Relationship to Instream Flows Established under ORS 537.346.

e. Permit S-37839 is junior in relative priority to Certificate 59491 (priority date August 26, 1968) and thus may be subject to regulation when the instream flows established in the certificate are not met, except for domestic or livestock uses.

Modifying conditions as found in the FINAL ORDER INCORPORATING PROPOSED ORDER IN CASES INVOLVING NCCWC/SWA PERMITS S-46120, S-35297, S-43170, with Certificate of Filing dated April 21, 2011

MODIFIED CONDITIONS FOR PERMIT S-35297

(Modified by Permit Amendment T-7389)

NOTE: Unless otherwise noted, additions to the original condition are shown in "underline" text, deletions are shown in "~~strikethrough~~" text (formulas have not been underlined for the sake of readability).

1. Development Limitations

A maximum diversion 19.47 cfs of water is currently allowed under Permit S-35297 (modified by Permit Amendment T-7389). Any ~~D~~diversion of water beyond ~~32.99~~ 19.47 cfs (not to exceed the maximum amount authorized under the permit, being 62.0 cfs) ~~under Permit S-35297 (modified by Permit Amendment T-7389)~~ shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86 that authorizes access to a greater rate of diversion of water under the permit consistent with OAR 690-086-0130(7). ~~A~~ The required WMCP shall be submitted to the Department within 3 years of this Final Order incorporating XXXX. ~~an approved extension of time application. Use of~~ The amount of water used under Permit S-35297 (modified by Permit Amendment T-7389) shall be consistent with this and subsequent WMCP's approved under OAR Chapter 690, Division 86 on file with the Department.

The Development Limitation established in the above paragraph supersedes any prior limitation of the diversion of water under this permit that has been established under a prior WMCP or Extension final order issued by the Department.

The deadline established in this ~~PFO~~ Final Order incorporating XXXX for submittal of a WMCP shall not relieve a permit holder of any existing or future requirement for submittal of a WMCP at an earlier date as established through other orders of the Department. A WMCP submitted to meet the requirements of this order may also meet the WMCP submittal requirements of other Department orders.

2. Conditions to Maintain the Persistence of Listed Fish

The developed portion of the permit, 19.47 cfs, is *not* subject to these fish persistence conditions. *The undeveloped portion of the permit subject to these fish persistence conditions is 42.53 cfs.*

Determining Water Use Reductions

a. ~~Minimum fish flow needs~~ Target flows needed to maintain the persistence of listed fish species in ~~on~~ the Lower Clackamas River as recommended by ODFW are in Table 1, below~~;. and are to be measured at USGS Gage Number 14211010, Clackamas River near Oregon City, Oregon, or its equivalent.~~ Target flows are to be met at the mouth of the Clackamas River.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG})[17] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) The maximum amount of the undeveloped portion of Permit S-35297 that can be diverted as a result of this fish persistence condition is determined in proportion to the amount by which the target flows shown in Table 1 are missed based on the adjusted mean daily flow (Q_{ADJ}) as described in 2.a.(1), above. The percent of missed target flows is defined as:

$$(1 - [Q_{ADJ} / Q_T]) \times 100\%,$$

where Q_{AdJ} is the adjusted mean daily flow at the mouth, and Q_T is the target flow (from Table 1).

The percent by which the target flow is missed applied to the undeveloped portion of the permit provides the maximum amount of undeveloped portion of Permit S-35297 that can be diverted as a result of this fish persistence condition, and is defined as:

$$E - (E \times \% \text{ missed target flow}),$$

where E is the undeveloped portion of the permit, being 42.53 cfs.

[17] D_{BG} stands for "Diversion Below the Gage" and is based on daily water use under Application S-57585 (up to 50 cfs, of which to date 25.0 cfs has been partially perfected under Certificate 78332), and under Application S-50819 (up to 9 cfs). [50 cfs + 9 cfs = 59 cfs = the maximum value of D_{BG}]. The City of Lake Oswego holds these water rights and diverts water under these rights below USGS Gage Number 14211010. The mean daily flow as measured at the gage must be corrected for the amount actually being diverted below the gage under these specified water rights or their successive water rights so long as the points of diversion remain below the gaging station.

When $Q_{ADJ} \geq Q_T$, the amount of the undeveloped portion of the permit that can be diverted would not need to be reduced as a result of this fish persistence condition.

(3) From the day after the first Monday in September through June 30, and when $Q_{ADJ} < Q_T$, the maximum amount of the undeveloped portion that may be diverted under this fish persistence condition must be re-calculated daily.

NOTE: The content of the original text has been moved from sub-section c to sub-section b, and visa versa.

Proportional Reductions from the day after the first Monday in September through June 30

b. From the day after the first Monday in September through June 30 the maximum total amount of the undeveloped portion of ~~the~~ Permit S-35297 that can legally be diverted shall be reduced as described in Section 2.a, above. ~~in proportion to the amount by which the flows shown in Table 1 are not met based on a seven day rolling average of mean daily flows (measured on the Clackamas River at USGS Gage Number 14211010, Clackamas River near Oregon City, Oregon, or its equivalent), as illustrated in the examples below.~~

Example 1: Target Flow Met

If ~~On~~ on June 15, the ~~last seven~~ mean daily flow~~s~~ as measured at USGS Gage Number 14211010 ~~were~~ was ~~750, 725,~~ 700~~, 650, 625, 600 and 575~~ cfs, and the amount being diverted below the gage (DBG) was 34 cfs, then the adjusted flow (Q_{ADJ}) would be 666 cfs (700 – 34 = 666). ~~The seven day rolling average is 661 cfs.~~ The maximum total amount of the undeveloped portion of the permit that could legally be diverted under this permit would not be reduced because the ~~7 day average of mean daily flows~~ adjusted mean daily flow on that day is greater than the 650 target flow for June 15. In this example, $Q_{ADJ} \geq Q_T$.

Example 2: Target Flow Missed

~~If on June 15, the average of the last seven mean daily flows was 578 cfs, then the target flows would be missed by 11% (100 - [(578/650)* 100)]. Ifthe maximum total amount of the undeveloped portion of the permit that can legally be diverted under this permit is 10 cfs, then the maximum total amount of the undeveloped portion of the permit that could be legally diverted under this permit would be reduced by 11%. The maximum total amount of the undeveloped portion of the permit that could be legally diverted under the permit under this condition would be 8.9 cfs (10 [l 0 x 0.11] = 8.9).~~

NOTE: With the exception of Table 1, the remainder of the text in this sub-section is added to the original text, but not shown in underline text.

Step 1: If on September 20, the mean daily flow (Q_A) at the gage was 700 cfs, and 59 cfs was being diverted below the gage (D_{BG} = 59), then the adjusted flow (Q_{ADJ}) would be 641 cfs.

$$700 - 59 = 641$$

Step 2: Given that the adjusted mean daily flow (Q_{ADJ}) was 641 cfs (from Step 1), and the target flow (Q_T) is 800 cfs, then the target flow would be missed by 19.9%.

$$(1 - [641 / 800]) \times 100\% = 19.9\%$$

Step 3: Given that the undeveloped portion of this permit (E) is 42.53 cfs, and the undeveloped portion of the permit needs to be reduced by 19.9% (from Step 2), or 8.46 cfs, then the maximum amount of the undeveloped portion of Permit S-35297 that could be diverted as a result of this fish persistence condition would be 34.1 cfs. (This maximum amount may be limited as illustrated in Step 4, below.)

$$(42.53 \times 19.9) / 100\% = 8.46$$

$$42.53 - 8.46 = 34.1$$

Step 4: The calculated maximum amount of water that could be diverted under the permit due to the fish persistence condition may not exceed the amount of water to which the water user is legally entitled to divert. In this example, if the amount of water legally authorized for diversion under this permit is 25.0 cfs (for example, authorization provided through a WMCP), then 25.0 cfs would be the maximum amount of diversion allowed under this permit including the developed portion of the permit, being 19.47 cfs.

(Conversely, if the amount of water legally authorized for diversion under this permit is 55.0 cfs, then 53.57 cfs (34.1 from Step 3 + the 19.47 developed portion) would be the maximum amount of diversion allowed under this permit.)

Table 1~~[1]~~

~~Minimum~~ Fish Persistence Target Flows ~~Needs on~~ at the Mouth of the Lower Clackamas River ~~Measured at USGS Gage 14211010, Clackamas River Near Oregon City, Oregon~~	
Month	Cubic Feet per Second
June -August	650
September	650/800~~[21]~~
October - May	800

~~[1] Table 1 was called Table 2 in the Proposed Final Order (PFO)~~

~~[21]~~ 650 cfs Sept. 1 through Sept. 15 and ~~850~~ 800 cfs September 16 through September 30

NOTE: In sub-section c, additions to the original text are shown in "underline" text, deletions are shown in "~~strikethrough~~" text.

Timothy Lake Releases June 1 through October 31

c. In cooperation with the holders of Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, the permittee must ~~have an annual meeting~~ meet with ODFW annually to devise a strategy to maximize fishery benefits from flow augmentation that ~~can be derived~~ may be available through ~~from~~ the Water Storage ~~a~~Agreement[18] with Portland General Electric (PGE) for the release of stored water from Timothy Lake. The permittees shall arrange a meeting with ODFW to develop a written flow augmentation strategy based on the current year's projected water availability. The strategy will include two flow augmentation periods, being from June 1st through the first Monday in September, and the day after the first Monday in September through Oct 31st. The June 1st through the first Monday in September period will determine whether flows are needed for steelhead spawning and incubation or can be used for flow augmentation later in the summer. The day after the first Monday in September through Oct 31st period will determine the timing for flow augmentation for chinook spawning. The permittees must consult with PGE to determine if and when water is available for flow augmentation. The permittees must notify ODFW about the timing and the amount of flow that can be released. If the available water cannot meet the strategy targets then the permittees and ODFW will modify the flow augmentation strategy to maximize fishery benefits. The permittees must then submit a flow augmentation request to PGE.

It is OWRD's intent that ODFW and the permittees reach agreement on the strategy. However, if after making a good faith effort ODFW and the permittees are unable to reach agreement on a strategy ODFW shall devise the strategy. In either case, the strategy shall be documented in writing and the permittees shall comply with the strategy. The annual meeting and resulting strategy and consultations may cover issues other than Timothy Lake releases that are relevant to both use under Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, and to listed fish species; however, the strategy may include actions pertaining to such issues only upon mutual agreement by ODFW and the permittees.

NOTE: Sub-sections d and e are added to the original text, but not shown in underline text.

Water Management Conservation Plan (WMCP) Water Conversation Measures/ Curtailment Actions from July 1 through the first Monday in September

d. From July 1st through the first Monday in September, when target flows are not met based on a seven day rolling average of mean daily flows, the water user must implement

[18] Or any similar agreement intended to supersede the existing agreement.

consistent with the water curtailment element of their WMCP, water conservation measures and/or curtailment actions as described in 2.d.(2) and (3), below.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}) [19] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) Upon the first occurrence of the adjusted flow at the mouth (Q_{ADJ}) being less than the target flow (Q_T) in Table 1 (i.e., when $Q_{ADJ} < Q_T$), based on a seven day rolling average of mean daily flows, the water user must enact the first level or stage of alert in their water curtailment plan that includes mandatory water conservation measures and/or curtailment actions consistent with 2.d.(3), below.

(3) Once enacted, implementation of the water conservation measures and/or curtailment actions as described in 2.d.(2), above, must continue through the first Monday in September.

Relationship to Instream Flows Established under ORS 537.346.

e. Permit S-35297 is junior in relative priority to Certificate 59491 (priority date August 26, 1968) and thus may be subject to regulation when the instream flows established in the certificate are not met, except for domestic or livestock uses.

[19] See fn 1

MODIFIED CONDITIONS FOR PERMIT S-43170

(Modified by Permit Amendment T-7434)

NOTE: Unless otherwise noted, additions to the original condition are shown in "underline" text, deletions are shown in "strikethrough" text (formulas have not been underlined for the sake of readability).

1. Development Limitations

No ~~D~~diversion of ~~any~~ water is currently allowed under Permit S-43170 (modified by Permit Amendment T-7434). Diversion of any water (not to exceed the maximum amount authorized under this permit, being 1.73 cfs) shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86 that authorizes access to a greater rate of diversion of water under the permit consistent with OAR 690-086-0130(7). ~~A~~ The required WMCP shall be submitted to the Department within 3 years of this Final Order incorporating XXXX. ~~an approved extension of time application. Use of~~ The amount of water used under Permit S-43170 (modified by Permit Amendment T-7434) shall be consistent with this and subsequent WMCP's approved under OAR Chapter 690, Division 86 on file with the Department.

The Development Limitation established in the above paragraph supersedes any prior limitation of the diversion of water under this permit that has been established under a prior WMCP or Extension final order issued by the Department.

The deadline established in this ~~PFO~~ this Final Order incorporating XXXX for submittal of a WMCP shall not relieve a permit holder of any existing or future requirement for submittal of a WMCP at an earlier date as established through other orders of the Department. A WMCP submitted to meet the requirements of this order may also meet the WMCP submittal requirements of other Department orders.

2. Conditions to Maintain the Persistence of Listed Fish

The undeveloped portion of the permit subject to these fish persistence conditions is 1.73 cfs.

Determining Water Use Reductions

a. ~~Minimum fish flow needs~~ Target flows needed to maintain the persistence of listed fish species in ~~on~~ the Lower Clackamas River as recommended by ODFW are in Table 1, below~~,~~. ~~and are to be measured at USGS Gage Number 14211010, Clackamas River near~~

~~Oregon City, Oregon, or its equivalent.~~ Target flows are to be met at the mouth of the Clackamas River.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}).[20] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) The maximum amount of the undeveloped portion of Permit S-43170 that can be diverted as a result of this fish persistence condition is determined in proportion to the amount by which the target flows shown in Table 1 are missed based on the adjusted mean daily flow (Q_{ADJ}) as described in 2.a.(1), above. The percent of missed target flows is defined as:

$$(1 - [Q_{ADJ} / Q_T]) \times 100\%,$$

where Q_{AdJ} is the adjusted mean daily flow at the mouth, and Q_T is the target flow (from Table 1).

The percent by which the target flow is missed applied to the undeveloped portion of the permit provides the maximum amount of undeveloped portion of Permit S-43170 that can be diverted as a result of this fish persistence condition, and is defined as:

$$E - (E \times \% \text{ missed target flow}),$$

where E is the undeveloped portion of the permit, being 1.73 cfs.

When $Q_{ADJ} \geq Q_T$, the amount of the undeveloped portion of the permit that can be diverted would not need to be reduced as a result of this fish persistence condition.

[20] D_{BG} stands for "Diversion Below the Gage" and is based on daily water use under Application S-57585 (up to 50 cfs, of which to date 25.0 cfs has been partially perfected under Certificate 78332), and under Application S-50819 (up to 9 cfs). [50 cfs + 9 cfs = 59 cfs = the maximum value of D_{BG}]. The City of Lake Oswego holds these water rights and diverts water under these rights below USGS Gage Number 14211010. The actual daily average flow measured at the gage must be corrected for the amount actually being diverted below the gage under these specified water rights or their successive water rights so long as the points of diversion remain below the gaging station.

(3) From the day after the first Monday in September through June 30, and when $Q_{ADJ} < Q_T$, the maximum amount of the undeveloped portion that may be diverted under this fish persistence condition must be re-calculated daily.

NOTE: The content of the original text has been moved from sub-section c to sub-section b, and visa versa.

Proportional Reductions from the day after the first Monday in September through June 30

b. From the day after the first Monday in September through June 30 the maximum total amount of the undeveloped portion of ~~the~~ Permit S-43170 (modified by Permit Amendment T-7434) that can legally be diverted shall be reduced as described in Section 2.a, above. ~~in proportion to the amount by which the flows shown in Table 1 are not met based on a seven day rolling average of mean daily flows (measured on the Clackamas River at USGS Gage Number 14211010, Clackamas River near Oregon City, Oregon, or its equivalent), as illustrated in the examples below.~~

Example 1: Target Flow Met

If ~~On~~ on June 15, the ~~last seven~~ mean daily flow~~s~~ as measured at USGS Gage Number 14211010 ~~were~~ was ~~750, 725,~~ 700~~, 650, 625, 600 and 575~~ cfs, and the amount being diverted below the gage (D_{BG}) was 34 cfs, then the adjusted flow (Q_{ADJ}) would be 666 cfs (700 – 34 = 666). ~~The seven day rolling average is 661 cfs.~~ The maximum total amount of the undeveloped portion of the permit that could legally be diverted under this permit would not be reduced because the ~~7 day average of mean daily flows~~ adjusted mean daily flow on that day is greater than the 650 target flow for June 15. In this example, $Q_{ADJ} \geq Q_T$.

Example 2: Target Flow Missed

~~If on June 15, the average of the last seven mean daily flows was 578 cfs, then the target flows would be missed by 11% (100 - [(578/650)* 100)]. If the maximum total amount of the undeveloped portion of the permit that can legally be diverted under this permit is 10 cfs, then the maximum total amount of the undeveloped portion of the permit that could be legally diverted under this permit would be reduced by 11%. The maximum total amount of the undeveloped portion of the permit that could be legally diverted under the permit under this condition would be 8.9 cfs (10 [10 x 0.11] = 8.9).~~

NOTE: With the exception of Table 1, the remainder of the text in this sub-section is added to the original text, but not shown in underline text.

Step 1: If on September 20, the mean daily flow (Q_A) at the gage was 700 cfs, and 59 cfs was being diverted below the gage ($D_{BG} = 59$), then the adjusted flow (Q_{ADJ}) would be 641 cfs.

$$700 - 59 = 641$$

Step 2: Given that the adjusted mean daily flow (Q_{ADJ}) was 641 cfs (from Step 1), and the target flow (Q_T) is 800 cfs, then the target flow would be missed by 19.9%.

$$(1 - [641 / 800]) \times 100\% = 19.9\%$$

Step 3: Given that the undeveloped portion of this permit (E) is 1.73 cfs, and the undeveloped portion of the permit needs to be reduced by 19.9% (from Step 2), or 0.34 cfs, then the maximum amount of the undeveloped portion of Permit S-43170 that could be diverted as a result of this fish persistence condition would be 1.4 cfs. (This maximum amount may be limited as illustrated in Step 4, below.)

$$(1.73 \times 19.9) / 100\% = 0.34$$

$$1.73 - 0.34 = 1.4$$

Step 4: The calculated maximum amount of water that could be diverted under the permit due to the fish persistence condition may not exceed the amount of water to which the water user is legally entitled to divert. In this example, if the amount of water legally authorized for diversion under this permit is 1.0 cfs (for example, authorization provided through a WMCP), then 1.0 cfs would be the maximum amount of diversion allowed under this permit, rather than 1.4 cfs from Step 3.

(Conversely, if the amount of water legally authorized for diversion under this permit is 1.5 cfs, then 1.4 cfs (from Step 3) would be the maximum amount of diversion allowed under this permit.)

Table ~~1~~[1]

~~Minimum~~ Fish Persistence Target Flows ~~Needs on~~ at the Mouth of the Lower Clackamas River ~~Measured at USGS Gage 14211010, Clackamas River Near Oregon City, Oregon~~	
Month	Cubic Feet per Second
June -August	650
September	650/800[~~2~~1]
October - May	800

~~1 Table 1 was called Table 2 in the Proposed Final Order (PFO)~~

[~~2~~1] 650 cfs Sept. 1 through Sept. 15 and ~~850~~ 800 cfs September 16 through September 30

NOTE: In sub-section c, additions to the original condition are shown in "underline" text, deletions are shown in "~~strikethrough~~" text.

Timothy Lake Releases June 1 through October 31

c. In cooperation with the holders of Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, the permittee must ~~have an annual meeting~~ meet with ODFW annually to devise a strategy to maximize fishery benefits from flow augmentation that ~~can be derived~~ may be available through ~~from~~ the Water Storage aAgreement[21] with Portland General Electric (PGE) for the release of stored water from Timothy Lake. The permittees shall arrange a meeting with ODFW to develop a written flow augmentation strategy based on the current year's projected water availability. The strategy will include two flow augmentation periods, being from June 1st through the first Monday in September, and the day after the first Monday in September through Oct 31st. The June 1st through the first Monday in September period will determine whether flows are needed for steelhead spawning and incubation or can be used for flow augmentation later in the summer. The day after the first Monday in September through Oct 31st period will determine the timing for flow augmentation for chinook spawning. The permittees must consult with PGE to determine if and when water is available for flow augmentation. The permittees must notify ODFW about the timing and the amount of flow that can be released. If the available water cannot meet the strategy targets then the permittees and ODFW will modify the flow augmentation strategy to maximize fishery benefits. The permittees must then submit a flow augmentation request to PGE.

   It is OWRD's intent that ODFW and the permittees reach agreement on the strategy. However, if after making a good faith effort ODFW and the permittees are unable to reach agreement on a strategy ODFW shall devise the strategy. In either case, the strategy shall be documented in writing and the permittees shall comply with the strategy. The annual meeting and resulting strategy and consultations may cover issues other than Timothy Lake releases that are relevant to both use under Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, and to listed fish species; however, the strategy may include actions pertaining to such issues only upon mutual agreement by ODFW and the permittees.

NOTE: Sub-sections d and e are added to the original text, but not shown in underline text.

Water Management Conservation Plan (WMCP) Water Conversation Measures/ Curtailment Actions from July 1 through the first Monday in September

d. From July 1st through the first Monday in September, when target flows are not met based on a seven day rolling average of mean daily flows, the water user must implement consistent with the water curtailment element of their WMCP, water conservation measures and/or curtailment actions as described in 2.d.(2) and (3), below.

[21] Or any similar agreement intended to supersede the existing agreement.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}) [22] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) Upon the first occurrence of the adjusted flow at the mouth (Q_{ADJ}) being less than the target flow (Q_T) in Table 1 (i.e., when $Q_{ADJ} < Q_T$), based on a seven day rolling average of mean daily flows, the water user must enact the first level or stage of alert in their water curtailment plan that includes mandatory water conservation measures and/or curtailment actions consistent with 2.d.(3), below.

(3) Once enacted, implementation the water conservation measures and/or curtailment actions as described in 2.d.(2), above, must continue through the first Monday in September.

Relationship to Instream Flows Established under ORS 537.346.

e. Permit S-43170 is junior in relative priority to Certificate 59491 (priority date August 26, 1968) and thus may be subject to regulation when the instream flows established in the certificate are not met, except for domestic or livestock uses.

[22] See fn 1

MODIFIED CONDITIONS FOR PERMIT S-46120

(Modified by Permit Amendment T-7434)

NOTE: Unless otherwise noted, additions to the original condition are shown in "underline" text, deletions are shown in "~~strikethrough~~" text (formulas have not been underlined for the sake of readability).

1. Development Limitations

A maximum diversion 5.01 cfs of water is currently allowed under Permit S-46120 (modified by Permit Amendment T-7434). Any ~~D~~diversion of water beyond 5.01 cfs (not to exceed the maximum amount authorized under the permit, being 8.0 cfs) ~~under Permit S-46120 (modified by Permit Amendment T-7434)~~ shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86 that authorizes access to a greater rate of diversion of water under the permit consistent with OAR 690-086-0130(7). ~~A~~ The required WMCP shall be submitted to the Department within 3 years of this Final Order incorporating XXXX. ~~an approved extension of time application. Use of~~ The amount of water used under Permit S-46120 (modified by Permit Amendment T-7434) shall be consistent with this and subsequent WMCP's approved under OAR Chapter 690, Division 86 on file with the Department.

The Development Limitation established in the above paragraph supersedes any prior limitation of the diversion of water under this permit that has been established under a prior WMCP or Extension final order issued by the Department.

The deadline established in this ~~PFO~~ Final Order incorporating XXXX for submittal of a WMCP shall not relieve a permit holder of any existing or future requirement for submittal of a WMCP at an earlier date as established through other orders of the Department. A WMCP submitted to meet the requirements of this order may also meet the WMCP submittal requirements of other Department orders.

2. Conditions to Maintain the Persistence of Listed Fish

The developed portion of the permit, 5.01 cfs, is *not* subject to these fish persistence conditions. *The undeveloped portion of the permit subject to these fish persistence conditions is 2.99 cfs.*

Determining Water Use Reductions

a. ~~Minimum fish flow needs~~ Target flows needed to maintain the persistence of listed fish species in ~~on~~ the Lower Clackamas River as recommended by ODFW are in Table 1, below~~:. and are to be measured at USGS Gage Number 14211010, Clackamas River near Oregon City, Oregon, or its equivalent.~~ Target flows are to be met at the mouth of the Clackamas River.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}).[23] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) The maximum amount of the undeveloped portion of Permit S-46120 that can be diverted as a result of this fish persistence condition is determined in proportion to the amount by which the target flows shown in Table 1 are missed based on the adjusted mean daily flow (Q_{ADJ}) as described in 2.a.(1), above. The percent of missed target flows is defined as:

$$(1 - [Q_{ADJ} / Q_T]) \times 100\%,$$

where Q_{AdJ} is the adjusted mean daily flow at the mouth, and Q_T is the target flow (from Table 1).

The percent by which the target flow is missed applied to the undeveloped portion of the permit provides the maximum amount of undeveloped portion of Permit S-46120 that can be diverted as a result of this fish persistence condition, and is defined as:

$$E - (E \times \% \text{ missed target flow}),$$

where E is the undeveloped portion of the permit, being 2.99 cfs.

[23] D_{BG} stands for "Diversion Below the Gage" and is based on daily water use under Application S-57585 (up to 50 cfs, of which to date 25.0 cfs has been partially perfected under Certificate 78332), and under Application S-50819 (up to 9 cfs). [50 cfs + 9 cfs = 59 cfs = the maximum value of D_{BG}]. The City of Lake Oswego holds these water rights and diverts water under these rights below USGS Gage Number 14211010. The mean daily flow as measured at the gage must be corrected for the amount actually being diverted below the gage under these specified water rights or their successive water rights so long as the points of diversion remain below the gaging station.

When $Q_{ADJ} \geq Q_T$, the amount of the undeveloped portion of the permit that can be diverted would not need to be reduced as a result of this fish persistence condition.

(3) From the day after the first Monday in September through June 30, and when $Q_{ADJ} < Q_T$, the maximum amount of the undeveloped portion that may be diverted under this fish persistence condition must be re-calculated daily.

NOTE: The content of the original text has been moved from sub-section c to sub-section b, and visa versa.

Proportional Reductions from the day after the first Monday in September through June 30

b. From the day after the first Monday in September through June 30 the maximum total amount of the undeveloped portion of ~~the~~ Permit S-46120 (modified by Permit Amendment T-7434) that can legally be diverted shall be reduced as described in Section 2.a, above. ~~in proportion to the amount by which the flows shown in Table 1 are not met based on a seven day rolling average of mean daily flows (measured on the Clackamas River at USGS Gage Number 14211010, Clackamas River near Oregon City, Oregon, or its equivalent), as illustrated in the examples below.~~

Example 1: Target Flow Met

If ~~On~~ on June 15, the ~~last seven~~ mean daily flow~~s~~ as measured at USGS Gage Number 14211010 ~~were~~ was ~~750, 725,~~ 700~~, 650, 625, 600 and 575~~ cfs, and the amount being diverted below the gage (DBG) was 34 cfs, then the adjusted flow (Q_{ADJ}) would be 666 cfs (700 – 34 = 666). ~~The seven day rolling average is 661 cfs.~~ The maximum total amount of the undeveloped portion of the permit that could legally be diverted under this permit would not be reduced because the ~~7 day average of mean daily flows~~ adjusted mean daily flow on that day is greater than the 650 target flow for June 15. In this example, $Q_{ADJ} \geq Q_T$.

Example 2: Target Flow Missed

~~If on June 15, the average of the last seven mean daily flows was 578 cfs, then the target flows would be missed by 11% (100 - [(578/650)* 100)]. Ifthe maximum total amount of the undeveloped portion of the permit that can legally be diverted under this permit is 10 cfs, then the maximum total amount of the undeveloped portion of the permit that could be legally diverted under this permit would be reduced by 11%. The maximum total amount of the undeveloped portion of the permit that could be legally diverted under the permit under this condition would be 8.9 cfs (10-[l 0 x 0.11] = 8.9).~~

NOTE: With the exception of Table 1, the remainder of the text in this sub-section is added to the original text, but not shown in underline text.

Step 1: If on September 20, the mean daily flow (Q_A) at the gage was 700 cfs, and 59 cfs was being diverted below the gage (D_{BG} = 59), then the adjusted flow (Q_{ADJ}) would be 641 cfs.

$$700 - 59 = 641$$

Step 2: Given that the adjusted mean daily flow (Q_{ADJ}) was 641 cfs (from Step 1), and the target flow (Q_T) is 800 cfs, then the target flow would be missed by 19.9%.

$$(1 - [641 / 800]) \times 100\% = 19.9\%$$

Step 3: Given that the undeveloped portion of this permit (E) is 2.99 cfs, and the undeveloped portion of the permit needs to be reduced by 19.9% (from Step 2), or 0.60 cfs, then the maximum amount of the undeveloped portion of Permit S-46120 that could be diverted as a result of this fish persistence condition would be 2.4 cfs. (This maximum amount may be limited as illustrated in Step 4, below.)

$$(2.99 \times 19.9) / 100\% = 0.60$$

$$2.99 - 0.60 = 2.4$$

Step 4: The calculated maximum amount of water that could be diverted under the permit due to the fish persistence condition may not exceed the amount of water to which the water user is legally entitled to divert. In this example, if the amount of water legally authorized for diversion under this permit is 6.5 cfs (for example, authorization provided through a WMCP), then 6.5 cfs would be the maximum amount of diversion allowed under this permit including the developed portion of the permit, being 5.01 cfs.

(Conversely, if the amount of water legally authorized for diversion under this permit is 8.0 cfs, then 7.41 cfs (2.4 from Step 3 + the 5.01 developed portion) would be the maximum amount of diversion allowed under this permit.)

Table 1~~[1]~~

~~Minimum~~ Fish Persistence Target Flows ~~Needs on~~ at the Mouth of the Lower Clackamas River ~~Measured at USGS Gage 14211010, Clackamas River Near Oregon City, Oregon~~	
Month	Cubic Feet per Second
June -August	650
September	650/800~~[21]~~
October - May	800

~~[1] Table 1 was called Table 2 in the Proposed Final Order (PFO)~~

~~[21]~~ 650 cfs Sept. 1 through Sept. 15 and ~~850~~ 800 cfs September 16 through September 30

NOTE: In sub-section c, additions to the original text are shown in "underline" text, deletions are shown in "~~strikethrough~~" text.

Timothy Lake Releases June 1 through October 31

c. In cooperation with the holders of Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, the permittee must ~~have an annual meeting~~ meet with ODFW annually to devise a strategy to maximize fishery benefits from flow augmentation that ~~can be derived~~ may be available through ~~from~~ the Water Storage ~~a~~Agreement[24] with Portland General Electric (PGE) for the release of stored water from Timothy Lake. The permittees shall arrange a meeting with ODFW to develop a written flow augmentation strategy based on the current year's projected water availability. The strategy will include two flow augmentation periods, being from June 1st through the first Monday in September, and the day after the first Monday in September through Oct 31st. The June 1st through the first Monday in September period will determine whether flows are needed for steelhead spawning and incubation or can be used for flow augmentation later in the summer. The day after the first Monday in September through Oct 31st period will determine the timing for flow augmentation for chinook spawning. The permittees must consult with PGE to determine if and when water is available for flow augmentation. The permittees must notify ODFW about the timing and the amount of flow that can be released. If the available water cannot meet the strategy targets then the permittees and ODFW will modify the flow augmentation strategy to maximize fishery benefits. The permittees must then submit a flow augmentation request to PGE.

It is OWRD's intent that ODFW and the permittees reach agreement on the strategy. However, if after making a good faith effort ODFW and the permittees are unable to reach agreement on a strategy ODFW shall devise the strategy. In either case, the strategy shall be

[24] Or any similar agreement intended to supersede the existing agreement.

documented in writing and the permittees shall comply with the strategy. The annual meeting and resulting strategy and consultations may cover issues other than Timothy Lake releases that are relevant to both use under Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, and to listed fish species; however, the strategy may include actions pertaining to such issues only upon mutual agreement by ODFW and the permittees.

NOTE: Sub-sections d and e are added to the original text, but not shown in underline text.

Water Management Conservation Plan (WMCP) Water Conversation Measures/ Curtailment Actions from July 1 through the first Monday in September

d. From July From July 1st through the first Monday in September, when target flows are not met based on a seven day rolling average of mean daily flows, the water user must implement consistent with the water curtailment element of their WMCP, water conservation measures and/or curtailment actions as described in 2.d.(2) and (3), below.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}) [25] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) Upon the first occurrence of the adjusted flow at the mouth (Q_{ADJ}) being less than the target flow (Q_T) in Table 1 (i.e., when $Q_{ADJ} < Q_T$), based on a seven day rolling average of mean daily flows, the water user must enact the first level or stage of alert in their water curtailment plan that includes mandatory water conservation measures and/or curtailment actions consistent with 2.d.(3), below.

(3) Once enacted, implementation of the water conservation measures and/or curtailment actions as described in 2.d.(2), above, must continue through the first Monday in September.

Relationship to Instream Flows Established under ORS 537.346.

e. Permit S-46120 (modified by Permit Amendment T-7389) is junior in relative priority to

[25] See fn 1

Certificate 59491 (priority date August 26, 1968) and thus may be subject to regulation when the instream flows established in the certificate are not met, except for domestic or livestock uses.

MODIFIED CONDITIONS FOR PERMIT S-3778 – CLEAN COPY

1. Development Limitations

A maximum diversion 5.0 cfs of water is currently allowed under Permit S-3778. Any diversion of water beyond 5.0 cfs (not to exceed the maximum amount authorized under the permit, being 20.0 cfs) shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86 that authorizes access to a greater rate of diversion of water under the permit consistent with OAR 690-086-0130(7). The required WMCP shall be submitted to the Department within 3 years of this Final Order incorporating XXXX. The amount of water used under Permit S-3778 shall be consistent with this and subsequent WMCP's approved under OAR Chapter 690, Division 86 on file with the Department.

The Development Limitation established in the above paragraph supersedes any prior limitation of the diversion of water under this permit that has been established under a prior WMCP or Extension final order issued by the Department.

The deadline established in this Final Order incorporating XXXX for submittal of a WMCP shall not relieve a permit holder of any existing or future requirement for submittal of a WMCP at an earlier date as established through other orders of the Department. A WMCP submitted to meet the requirements of this order may also meet the WMCP submittal requirements of other Department orders.

2. Conditions to Maintain the Persistence of Listed Fish

The developed portion of the permit, 5.0 cfs, is *not* subject to these fish persistence conditions. *The undeveloped portion of the permit subject to these fish persistence conditions is 15.0 cfs.*

a. Prior to diversion of any water beyond 5.0 cfs under Permit S-3778, a permit amendment to relocate the current authorized Point of Diversion (POD) on the South Fork Clackamas River located in NWSW Section 29, Township 4 South, Range 5 East, W.M. to a POD(s) located within the lower 3.1 miles on the mainstem of the Clackamas River, must be approved by the Department in accordance with ORS 540.510.

b. Use of water beyond 5.0 cfs under Permit S-3778 may only be made from water diverted within the lower 3.1 miles on the mainstem of the Clackamas River, and only if available at the original point of diversion located within the NWSW, Section 29, Township 4 South, Range 5 East, W.M.

Determining Water Use Reductions

c. Target flows needed to maintain the persistence of listed fish species in the Lower Clackamas River as recommended by ODFW are in Table 1, below. Target flows are to be met at the mouth of the Clackamas River.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}) [26] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) The maximum amount of the undeveloped portion of Permit S-3778 that can be diverted as a result of this fish persistence condition is determined in proportion to the amount by which the target flows shown in Table 1 are missed based on the adjusted mean daily flow (Q_{ADJ}) as described in 2.a.(1), above. The percent of missed target flows is defined as:

$$(1 - [Q_{ADJ} / Q_T]) \times 100\%,$$

where Q_{AdJ} is the adjusted mean daily flow at the mouth, and Q_T is the target flow (from Table 1).

The percent by which the target flow is missed applied to the undeveloped portion of the permit provides the maximum amount of undeveloped portion of Permit S-3778 that can be diverted as a result of this fish persistence condition, and is defined as:

$$E - (E \times \% \text{ missed target flow}),$$

where E is the undeveloped portion of the permit, being 15.0 cfs.

When $Q_{ADJ} \geq Q_T$, the amount of the undeveloped portion of the permit that can be diverted would not need to be reduced as a result of this fish persistence condition.

[26] D_{BG} stands for "Diversion Below the Gage" and is based on daily water use under Application S-57585 (up to 50 cfs, of which to date 25.0 cfs has been partially perfected under Certificate 78332), and under Application S-50819 (up to 9 cfs). [50 cfs + 9 cfs = 59 cfs = the maximum value of D_{BG}]. The City of Lake Oswego holds these water rights and diverts water under these rights below USGS Gage Number 14211010. The mean daily flow as measured at the gage must be corrected for the amount actually being diverted below the gage under these specified water rights or their successive water rights so long as the points of diversion remain below the gaging station.

(3) From the day after the first Monday in September through June 30, and when $Q_{ADJ} < Q_T$, the maximum amount of the undeveloped portion that may be diverted under this fish persistence condition must be re-calculated daily.

Proportional Reductions from the day after the first Monday in September through June 30

d. From the day after the first Monday in September through June 30 the maximum total amount of the undeveloped portion of Permit S-3778 that can legally be diverted shall be reduced as described in Section 2.c, above.

Example 1: Target Flow Met

If on June 15, the mean daily flow as measured at USGS Gage Number 14211010 was 700 cfs, and the amount being diverted below the gage (DBG) was 34 cfs, then the adjusted flow (Q_{ADJ}) would be 666 cfs (700 – 34 = 666). The maximum total amount of the undeveloped portion of the permit that could legally be diverted under this permit would not be reduced because the adjusted mean daily flow on that day is greater than the 650 target flow for June 15. In this example, $Q_{ADJ} \geq Q_{T.}$

Example 2: Target Flow Missed

Step 1: If on September 20, the mean daily flow (Q_A) at the gage was 700 cfs, and 59 cfs was being diverted below the gage ($D_{BG} = 59$), then the adjusted flow (Q_{ADJ}) would be 641 cfs.

$$700 - 59 = 641$$

Step 2: Given that the adjusted mean daily flow (Q_{ADJ}) was 641 cfs (from Step 1), and the target flow (Q_T) is 800 cfs, then the target flow would be missed by 19.9%.

$$(1 - [641 / 800]) \times 100\% = 19.9\%$$

Step 3: Given that the undeveloped portion of this permit (E) is 15.0 cfs, and the undeveloped portion of the permit needs to be reduced by 19.9% (from Step 2), or 2.99 cfs, then the maximum amount of the undeveloped portion of Permit S-3778 that could be diverted as a result of this fish persistence condition would be 12.0 cfs. (This maximum amount may be limited as illustrated in Step 4, below.)

$$(15.0 \times 19.9) / 100\% = 2.99$$

$$15.0 - 2.99 = 12.0$$

Step 4: The calculated maximum amount of water that could be diverted under the permit due to the fish persistence condition may not exceed the amount of water to which the water user is legally entitled to divert. In this example, if the amount of

water legally authorized for diversion under this permit is 10.0 cfs (for example, authorization provided through a WMCP), then 10.0 cfs would be the maximum amount of diversion allowed under this permit including the developed portion of the permit, being 5.0 cfs.

(Conversely, if the amount of water legally authorized for diversion under this permit is 20.0 cfs, then 17.0 cfs (12.0 from Step 3 + the 5.0 developed portion) would be the maximum amount of diversion allowed under this permit.)

Table 1

Fish Persistence Target Flows at the Mouth of the Lower Clackamas River	
Month	Cubic Feet per Second
June -August	650
September	650/800[1]
October - May	800

[1] 650 cfs Sept. 1 through Sept. 15 and 800 cfs September 16 through September 30

Timothy Lake Releases June 1 through October 31

e. In cooperation with the holders of Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, the permittee must meet with ODFW annually to devise a strategy to maximize fishery benefits from flow augmentation that may be available through the Water Storage Agreement[27] with Portland General Electric (PGE) for the release of stored water from Timothy Lake. The permittees shall arrange a meeting with ODFW to develop a written flow augmentation strategy based on the current year's projected water availability. The strategy will include two flow augmentation periods, being from June 1st through the first Monday in September, and the day after the first Monday in September through Oct 31st. The June 1st through the first Monday in September period will determine whether flows are needed for steelhead spawning and incubation or can be used for flow augmentation later in the summer. The day after the first Monday in September through Oct 31st period will determine the timing for flow augmentation for chinook spawning. The permittees must consult with PGE to determine if and when water is available for flow augmentation. The permittees must notify ODFW about the timing and the amount of flow that can be released. If the available water cannot meet the strategy targets then the permittees and ODFW will modify the flow augmentation strategy to maximize fishery benefits. The permittees must then submit a flow augmentation request to PGE.

It is OWRD's intent that ODFW and the permittees reach agreement on the strategy. However, if after making a good faith effort ODFW and the permittees are unable to reach agreement on a strategy ODFW shall devise the strategy. In either case, the strategy shall be documented in writing and the permittees shall comply with the strategy. The annual meeting and resulting strategy and consultations may cover issues other than Timothy Lake

[27] Or any similar agreement intended to supersede the existing agreement.

releases that are relevant to both use under Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, and to listed fish species; however, the strategy may include actions pertaining to such issues only upon mutual agreement by ODFW and the permittees.

Water Management Conservation Plan (WMCP) Water Conversation Measures/ Curtailment Actions from July 1 through the first Monday in September

f. From July 1st through the first Monday in September, when target flows are not met based on a seven day rolling average of mean daily flows, the water user must implement consistent with the water curtailment element of their WMCP, water conservation measures and/or curtailment actions as described in 2.f.(2) and (3), below.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}) [28] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) Upon the first occurrence of the adjusted flow at the mouth (Q_{ADJ}) being less than the target flow (Q_T) in Table 1 (i.e., when $Q_{ADJ} < Q_T$), based on a seven day rolling average of mean daily flows, the water user must enact the first level or stage of alert in their water curtailment plan that includes mandatory water conservation measures and/or curtailment actions consistent with 2.f.(3), below.

(3) Once enacted, implementation of the water conservation measures and/or curtailment actions as described in 2.f.(2), above, must continue through the first Monday in September.

[28] See fn 1

MODIFIED CONDITIONS FOR PERMIT S-9982 – CLEAN COPY

1. Development Limitations

A maximum diversion 3.0 cfs of water is currently allowed under Permit S-9982. Any diversion of water beyond 3.0 cfs (not to exceed the maximum amount authorized under the permit, being 30.0 cfs) shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86 that authorizes access to a greater rate of diversion of water under the permit consistent with OAR 690-086-0130(7). The required WMCP shall be submitted to the Department within 3 years of this Final Order incorporating XXXX. The amount of water used under Permit S-9982 shall be consistent with this and subsequent WMCP's approved under OAR Chapter 690, Division 86 on file with the Department.

The Development Limitation established in the above paragraph supersedes any prior limitation of the diversion of water under this permit that has been established under a prior WMCP or Extension final order issued by the Department.

The deadline established in this Final Order incorporating XXXX for submittal of a WMCP shall not relieve a permit holder of any existing or future requirement for submittal of a WMCP at an earlier date as established through other orders of the Department. A WMCP submitted to meet the requirements of this order may also meet the WMCP submittal requirements of other Department orders.

2. Conditions to Maintain the Persistence of Listed Fish

The developed portion of the permit, 3.0 cfs, is *not* subject to these fish persistence conditions. *The undeveloped portion of the permit subject to these fish persistence conditions is 27.0 cfs.*

a. Prior to diversion of any water beyond 3.0 cfs under Permit S-9982, a permit amendment must be approved by the Department in accordance with ORS 540.510 to relocate (1) the current authorized point of diversion (POD) on the South Fork Clackamas River located in the SWSW, Section 29, Township 4 South, Range 5 East, W.M., and (2) the current authorized (POD) on Memaloose Creek located in the SESW, Section 29, Township 4 South, Range 5 East, W.M. to POD(s) located within the lower 3.1 miles on the mainstem of the Clackamas River.

b. Use of water beyond 3.0 cfs under Permit S-9982 may only be made from water diverted within the lower 3.1 miles on the mainstem of the Clackamas River, and only if available at the original points of diversion located on the South Fork Clackamas River and Memaloose Creek.

Determining Water Use Reductions

c. Target flows needed to maintain the persistence of listed fish species in the Lower Clackamas River as recommended by ODFW are in Table 1, below. Target flows are to be met at the mouth of the Clackamas River.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}) [29] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) The maximum amount of the undeveloped portion of Permit S-9982 that can be diverted as a result of this fish persistence condition is determined in proportion to the amount by which the target flows shown in Table 1 are missed based on the adjusted mean daily flow (Q_{ADJ}) as described in 2.a.(1), above. The percent of missed target flows is defined as:

$$(1 - [Q_{ADJ} / Q_T]) \times 100\%,$$

where Q_{AdJ} is the adjusted mean daily flow at the mouth, and Q_T is the target flow (from Table 1).

The percent by which the target flow is missed applied to the undeveloped portion of the permit provides the maximum amount of undeveloped portion of Permit S-9982 that can be diverted as a result of this fish persistence condition, and is defined as:

$$E - (E \times \% \text{ missed target flow}),$$

where E is the undeveloped portion of the permit, being 27.0 cfs.

When $Q_{ADJ} \geq Q_T$, the amount of the undeveloped portion of the permit that can be diverted would not need to be reduced as a result of this fish persistence condition.

[29] D_{BG} stands for "Diversion Below the Gage" and is based on daily water use under Application S-57585 (up to 50 cfs, of which to date 25.0 cfs has been partially perfected under Certificate 78332), and under Application S-50819 (up to 9 cfs). [50 cfs + 9 cfs = 59 cfs = the maximum value of D_{BG}]. The City of Lake Oswego holds these water rights and diverts water under these rights below USGS Gage Number 14211010. The mean daily flow as measured at the gage must be corrected for the amount actually being diverted below the gage under these specified water rights or their successive water rights so long as the points of diversion remain below the gaging station.

(3) From the day after the first Monday in September through June 30, and when $Q_{ADJ} < Q_T$, the maximum amount of the undeveloped portion that may be diverted under this fish persistence condition must be re-calculated daily.

Proportional Reductions from the day after the first Monday in September through June 30

d. From the day after the first Monday in September through June 30 the maximum total amount of the undeveloped portion of Permit S-9982 that can legally be diverted shall be reduced as described in Section 2.c, above.

Example 1: Target Flow Met

If on June 15, the mean daily flows as measured at USGS Gage Number 14211010 was 700 cfs, and the amount being diverted below the gage (DBG) was 34 cfs, then the adjusted flow (Q_{ADJ}) would be 666 cfs (700 – 34 = 666). The maximum total amount of the undeveloped portion of the permit that could legally be diverted under this permit would not be reduced because the adjusted mean daily flow on that day is greater than the 650 target flow for June 15. In this example, $Q_{ADJ} \geq Q_T$.

Example 2: Target Flow Missed

Step 1: If on September 20, the mean daily flow (Q_A) at the gage was 700 cfs, and 59 cfs was being diverted below the gage ($D_{BG} = 59$), then the adjusted flow (Q_{ADJ}) would be 641 cfs.

$$700 - 59 = 641$$

Step 2: Given that the adjusted mean daily flow (Q_{ADJ}) was 641 cfs (from Step 1), and the target flow (Q_T) is 800 cfs, then the target flow would be missed by 19.9%.

$$(1 - [641 / 800]) \times 100\% = 19.9\%$$

Step 3: Given that the undeveloped portion of this permit (E) is 27.0 cfs, and the undeveloped portion of the permit needs to be reduced by 19.9% (from Step 2), or 5.37 cfs, then the maximum amount of the undeveloped portion of Permit S-9982 that could be diverted as a result of this fish persistence condition would be 21.6 cfs. (This maximum amount may be limited as illustrated in Step 4, below.)

$$(27.0 \times 19.9) / 100\% = 5.37$$

$$27.0 - 5.37 = 21.6$$

Step 4: The calculated maximum amount of water that could be diverted under the permit due to the fish persistence condition may not exceed the amount of water to which the water user is legally entitled to divert. In this example, if the amount of

water legally authorized for diversion under this permit is 15.0 cfs (for example, authorization provided through a WMCP), then 15.0 cfs would be the maximum amount of diversion allowed under this permit including the developed portion of the permit, being 3.0 cfs.

(Conversely, if the amount of water legally authorized for diversion under this permit is 25.0 cfs, then 24.6 cfs (21.6 from Step 3 + the 3.0 developed portion) would be the maximum amount of diversion allowed under this permit.)

Table 1

Fish Persistence Target Flows at the Mouth of the Lower Clackamas River	
Month	Cubic Feet per Second
June -August	650
September	650/800[1]
October - May	800

[1] 650 cfs Sept. 1 through Sept. 15 and 800 cfs September 16 through September 30

Timothy Lake Releases June 1 through October 31

e. In cooperation with the holders of Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, the permittee must meet with ODFW annually to devise a strategy to maximize fishery benefits from flow augmentation that may be available through the Water Storage Agreement[30] with Portland General Electric (PGE) for the release of stored water from Timothy Lake. The permittees shall arrange a meeting with ODFW to develop a written flow augmentation strategy based on the current year's projected water availability. The strategy will include two flow augmentation periods, being from June 1st through the first Monday in September, and the day after the first Monday in September through Oct 31st. The June 1st through the first Monday in September period will determine whether flows are needed for steelhead spawning and incubation or can be used for flow augmentation later in the summer. The day after the first Monday in September through Oct 31st period will determine the timing for flow augmentation for chinook spawning. The permittees must consult with PGE to determine if and when water is available for flow augmentation. The permittees must notify ODFW about the timing and the amount of flow that can be released. If the available water cannot meet the strategy targets then the permittees and ODFW will modify the flow augmentation strategy to maximize fishery benefits. The permittees must then submit a flow augmentation request to PGE.

It is OWRD's intent that ODFW and the permittees reach agreement on the strategy. However, if after making a good faith effort ODFW and the permittees are unable to reach agreement on a strategy ODFW shall devise the strategy. In either case, the strategy shall be documented in writing and the permittees shall comply with the strategy. The annual meeting and resulting strategy and consultations may cover issues other than Timothy Lake

[30] Or any similar agreement intended to supersede the existing agreement.

releases that are relevant to both use under Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, and to listed fish species; however, the strategy may include actions pertaining to such issues only upon mutual agreement by ODFW and the permittees.

Water Management Conservation Plan (WMCP) Water Conversation Measures/ Curtailment Actions from July 1 through the first Monday in September

f. From July 1st through the first Monday in September, when target flows are not met based on a seven day rolling average of mean daily flows, the water user must implement consistent with the water curtailment element of their WMCP, water conservation measures and/or curtailment actions as described in 2.f.(2) and (3), below.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}) [31] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) Upon the first occurrence of the adjusted flow at the mouth (Q_{ADJ}) being less than the target flow (Q_T) in Table 1 (i.e., when $Q_{ADJ} < Q_T$), based on a seven day rolling average of mean daily flows, the water user must enact the first level or stage of alert in their water curtailment plan that includes mandatory water conservation measures and/or curtailment actions consistent with 2.f.(3), below.

(3) Once enacted, implementation of the water conservation measures and/or curtailment actions as described in 2.f.(2), above, must continue through the first Monday in September.

[31] See fn 1

MODIFIED CONDITIONS FOR PERMIT S-22581 – CLEAN COPY

1. Development Limitations

A maximum diversion 22.4 cfs of water is currently allowed under Permit S-22581. Any diversion of water beyond 22.4 cfs (not to exceed the maximum amount authorized under the permit, being 60.0 cfs) shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86 that authorizes access to a greater rate of diversion of water under the permit consistent with OAR 690-086-0130(7). The required WMCP shall be submitted to the Department within 3 years of this Final Order incorporating XXXX. The amount of water used under Permit S-22581 shall be consistent with this and subsequent WMCP's approved under OAR Chapter 690, Division 86 on file with the Department.

The Development Limitation established in the above paragraph supersedes any prior limitation of the diversion of water under this permit that has been established under a prior WMCP or Extension final order issued by the Department.

The deadline established in this Final Order incorporating XXXX for submittal of a WMCP shall not relieve a permit holder of any existing or future requirement for submittal of a WMCP at an earlier date as established through other orders of the Department. A WMCP submitted to meet the requirements of this order may also meet the WMCP submittal requirements of other Department orders.

2. Conditions to Maintain the Persistence of Listed Fish

The developed portion of the permit, 22.4 cfs, is *not* subject to these fish persistence conditions. *The undeveloped portion of the permit subject to these fish persistence conditions is 37.6 cfs.*

Determining Water Use Reductions

a. Target flows needed to maintain the persistence of listed fish species in the Lower Clackamas River as recommended by ODFW are in Table 1, below. Target flows are to be met at the mouth of the Clackamas River.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}) [32] as shown in the following equation:

[32] D_{BG} stands for "Diversion Below the Gage" and is based on daily water use under Application S-57585 (up to 50 cfs, of which to date 25.0 cfs has been partially perfected under Certificate 78332), and under Application S-50819 (up to 9 cfs). [50 cfs + 9 cfs = 59 cfs = the maximum value of D_{BG}]. The City of Lake Oswego holds

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) The maximum amount of the undeveloped portion of Permit S-22581 that can be diverted as a result of this fish persistence condition is determined in proportion to the amount by which the target flows shown in Table 1 are missed based on the adjusted mean daily flow (Q_{ADJ}) as described in 2.a.(1), above. The percent of missed target flows is defined as:

$$(1 - [Q_{ADJ} / Q_T]) \times 100\%,$$

where Q_{AdJ} is the adjusted mean daily flow at the mouth, and Q_T is the target flow (from Table 1).

The percent by which the target flow is missed applied to the undeveloped portion of the permit provides the maximum amount of undeveloped portion of Permit S-22581 that can be diverted as a result of this fish persistence condition, and is defined as:

$$E - (E \times \% \text{ missed target flow}),$$

where E is the undeveloped portion of the permit, being 37.6 cfs.

When $Q_{ADJ} \geq Q_T$, the amount of the undeveloped portion of the permit that can be diverted would not need to be reduced as a result of this fish persistence condition.

(3) From the day after the first Monday in September through June 30, and when $Q_{ADJ} < Q_T$, the maximum amount of the undeveloped portion that may be diverted under this fish persistence condition must be re-calculated daily.

Proportional Reductions from the day after the first Monday in September through June 30

b. From the day after the first Monday in September through June 30 the maximum total amount of the undeveloped portion of Permit S-22581 that can legally be diverted shall be reduced as described in Section 2.a, above.

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these water rights and diverts water under these rights below USGS Gage Number 14211010. The mean daily flow as measured at the gage must be corrected for the amount actually being diverted below the gage under these specified water rights or their successive water rights so long as the points of diversion remain below the gaging station.

Example 1: Target Flow Met

If on June 15, the mean daily flows as measured at USGS Gage Number 14211010 was 700 cfs, and the amount being diverted below the gage (DBG) was 34 cfs, then the adjusted flow (Q_{ADJ}) would be 666 cfs (700 – 34 = 666). The maximum total amount of the undeveloped portion of the permit that could legally be diverted under this permit would not be reduced because the adjusted mean daily flow on that day is greater than the 650 target flow for June 15. In this example, $Q_{ADJ} \geq Q_{T.}$

Example 2: Target Flow Missed

Step 1: If on September 20, the mean daily flow (Q_A) at the gage was 700 cfs, and 59 cfs was being diverted below the gage ($D_{BG} = 59$), then the adjusted flow (Q_{ADJ}) would be 641 cfs.

$$700 - 59 = 641$$

Step 2: Given that the adjusted mean daily flow (Q_{ADJ}) was 641 cfs (from Step 1), and the target flow (Q_T) is 800 cfs, then the target flow would be missed by 19.9%.

$$(1 - [641 / 800]) \times 100\% = 19.9\%$$

Step 3: Given that the undeveloped portion of this permit (E) is 37.6 cfs, and the undeveloped portion of the permit needs to be reduced by 19.9% (from Step 2), or 7.48 cfs, then the maximum amount of the undeveloped portion of Permit S-22581 that could be diverted as a result of this fish persistence condition would be 30.1 cfs. (This maximum amount may be limited as illustrated in Step 4, below.)

$$(37.6 \times 19.9) / 100\% = 7.48$$

$$37.6 - 7.48 = 30.1$$

Step 4: The calculated maximum amount of water that could be diverted under the permit due to the fish persistence condition may not exceed the amount of water to which the water user is legally entitled to divert. In this example, if the amount of water legally authorized for diversion under this permit is 28.0 cfs (for example, authorization provided through a WMCP), then 28.0 cfs would be the maximum amount of diversion allowed under this permit including the developed portion of the permit, being 22.4 cfs.

(Conversely, if the amount of water legally authorized for diversion under this permit is 55.0 cfs, then 52.5 cfs (30.1 from Step 3 + the 22.4 developed portion) would be the maximum amount of diversion allowed under this permit.)

Table 1

Fish Persistence Target Flows at the Mouth of the Lower Clackamas River	
Month	Cubic Feet per Second
June -August	650
September	650/800[1]
October - May	800

[1] 650 cfs Sept. 1 through Sept. 15 and 800 cfs September 16 through September 30

Timothy Lake Releases June 1 through October 31

c. In cooperation with the holders of Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, the permittee must meet with ODFW annually to devise a strategy to maximize fishery benefits from flow augmentation that may be available through the Water Storage Agreement[33] with Portland General Electric (PGE) for the release of stored water from Timothy Lake. The permittees shall arrange a meeting with ODFW to develop a written flow augmentation strategy based on the current year's projected water availability. The strategy will include two flow augmentation periods, being from June 1st through the first Monday in September, and the day after the first Monday in September through Oct 31st. The June 1st through the first Monday in September period will determine whether flows are needed for steelhead spawning and incubation or can be used for flow augmentation later in the summer. The day after the first Monday in September through Oct 31st period will determine the timing for flow augmentation for chinook spawning. The permittees must consult with PGE to determine if and when water is available for flow augmentation. The permittees must notify ODFW about the timing and the amount of flow that can be released. If the available water cannot meet the strategy targets then the permittees and ODFW will modify the flow augmentation strategy to maximize fishery benefits. The permittees must then submit a flow augmentation request to PGE.

   It is OWRD's intent that ODFW and the permittees reach agreement on the strategy. However, if after making a good faith effort ODFW and the permittees are unable to reach agreement on a strategy ODFW shall devise the strategy. In either case, the strategy shall be documented in writing and the permittees shall comply with the strategy. The annual meeting and resulting strategy and consultations may cover issues other than Timothy Lake releases that are relevant to both use under Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, and to listed fish species; however, the strategy may include actions pertaining to such issues only upon mutual agreement by ODFW and the permittees.

[33] Or any similar agreement intended to supersede the existing agreement.

Water Management Conservation Plan (WMCP) Water Conversation Measures/ Curtailment Actions from July 1 through the first Monday in September

d. From July 1st through the first Monday in September, when target flows are not met based on a seven day rolling average of mean daily flows, the water user must implement consistent with the water curtailment element of their WMCP, water conservation measures and/or curtailment actions as described in 2.d.(2) and (3), below.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}) [34] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) Upon the first occurrence of the adjusted flow at the mouth (Q_{ADJ}) being less than the target flow (Q_T) in Table 1 (i.e., when $Q_{ADJ} < Q_T$), based on a seven day rolling average of mean daily flows, the water user must enact the first level or stage of alert in their water curtailment plan that includes mandatory water conservation measures and/or curtailment actions consistent with 2.d.(3), below.

(3) Once enacted, implementation of the water conservation measures and/or curtailment actions as described in 2.d.(2), above, must continue through the first Monday in September.

[34] See fn 1

MODIFIED CONDITIONS FOR PERMIT S-32410 – CLEAN COPY
(Modified by Permit Amendment T-8538)

1. Development Limitations

No diversion of water is currently allowed under the unperfected portion of Permit S-32410 (modified by Permit Amendment T-8538). [The permit was originally issued for 50.0 cfs of which 25.0 cfs has been confirmed in Certificate 78332.] Any diversion of the remaining unperfected portion of water under the permit, being 25.0 cfs, shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86 that authorizes access to a greater rate of diversion of water under the permit consistent with OAR 690-086-0130(7). The required WMCP shall be submitted to the Department within 3 years of this Final Order incorporating XXXX. The amount of water used under Permit S-32410 (modified by Permit Amendment T-8538) shall be consistent with this and subsequent WMCP's approved under OAR Chapter 690, Division 86 on file with the Department.

The Development Limitation established in the above paragraph supersedes any prior limitation of the diversion of water under this permit that has been established under a prior WMCP or Extension final order issued by the Department.

The deadline established in this Final Order incorporating XXXX for submittal of a WMCP shall not relieve a permit holder of any existing or future requirement for submittal of a WMCP at an earlier date as established through other orders of the Department. A WMCP submitted to meet the requirements of this order may also meet the WMCP submittal requirements of other Department orders.

2. Conditions to Maintain the Persistence of Listed Fish

The undeveloped portion of the permit subject to these fish persistence conditions is 25.0 cfs.[35]

Determining Water Use Reductions

a. Target flows needed to maintain the persistence of listed fish species in the Lower Clackamas River as recommended by ODFW are in Table 1, below. Target flows are to be met at the mouth of the Clackamas River.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon

[35] The permit was issued for a total of 50.0 cfs; 25.0 cfs of the permit was partially perfected under Certificate 78332.

City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}) [36] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) The maximum amount of the undeveloped portion of Permit S-32410 that can be diverted as a result of this fish persistence condition is determined in proportion to the amount by which the target flows shown in Table 1 are missed based on the adjusted mean daily flow (Q_{ADJ}) as described in 2.a.(1), above. The percent of missed target flows is defined as:

$$(1 - [Q_{ADJ} / Q_T]) \times 100\%,$$

where Q_{AdJ} is the adjusted mean daily flow at the mouth, and Q_T is the target flow (from Table 1).

The percent by which the target flow is missed applied to the undeveloped portion of the permit provides the maximum amount of undeveloped portion of Permit S-32410 that can be diverted as a result of this fish persistence condition, and is defined as:

$$E - (E \times \% \text{ missed target flow}),$$

where E is the undeveloped portion of the permit, being 25.0 cfs.

When $Q_{ADJ} \geq Q_T$, the amount of the undeveloped portion of the permit that can be diverted would not need to be reduced as a result of this fish persistence condition.

(3) From the day after the first Monday in September through June 30, and when $Q_{ADJ} < Q_T$, the maximum amount of the undeveloped portion that may be diverted under this fish persistence condition must be re-calculated daily.

[36] D_{BG} stands for "Diversion Below the Gage" and is based on daily water use under Application S-57585 (up to 50 cfs, of which to date 25.0 cfs has been partially perfected under Certificate 78332), and under Application S-50819 (up to 9 cfs). [50 cfs + 9 cfs = 59 cfs = the maximum value of D_{BG}]. The City of Lake Oswego holds these water rights and diverts water under these rights below USGS Gage Number 14211010. The actual daily average flow measured at the gage must be corrected for the amount actually being diverted below the gage under these specified water rights or their successive water rights so long as the points of diversion remain below the gaging station.

Proportional Reductions from the day after the first Monday in September through June 30

b. From the day after the first Monday in September through June 30 the maximum total amount of the undeveloped portion of Permit S-32410 (modified by Permit Amendment T-8538) that can legally be diverted shall be reduced as described in Section 2.a, above.

Example 1: Target Flow Met

If on June 15, the mean daily flows as measured at USGS Gage Number 14211010 was 700 cfs, and the amount being diverted below the gage (D_{BG}) was 34 cfs, then the adjusted flow (Q_{ADJ}) would be 666 cfs (700 – 34 = 666). The maximum total amount of the undeveloped portion of the permit that could legally be diverted under this permit would not be reduced because the adjusted mean daily flow on that day is greater than the 650 target flow for June 15. In this example, $Q_{ADJ} \geq Q_{T.}$

Example 2: Target Flow Missed

Step 1: If on September 20, the mean daily flow (Q_A) at the gage was 700 cfs, and 59 cfs was being diverted below the gage (D_{BG} = 59), then the adjusted flow (Q_{ADJ}) would be 641 cfs.

$$700 - 59 = 641$$

Step 2: Given that the adjusted mean daily flow (Q_{ADJ}) was 641 cfs (from Step 1), and the target flow (Q_T) is 800 cfs, then the target flow would be missed by 19.9%.

$$(1 - [641 / 800]) \times 100\% = 19.9\%$$

Step 3: Given that the undeveloped portion of this permit (E) is 25.0 cfs, and the undeveloped portion of the permit needs to be reduced by 19.9% (from Step 2), or 4.98 cfs, then the maximum amount of the undeveloped portion of Permit S-32410 that could be diverted as a result of this fish persistence condition would be 20.0 cfs. (This maximum amount may be limited as illustrated in Step 4, below.)

$$(25.0 \times 19.9) / 100\% = 4.98$$

$$25.0 - 4.98 = 20.0$$

Step 4: The calculated maximum amount of water that could be diverted under the permit due to the fish persistence condition may not exceed the amount of water to which the water user is legally entitled to divert. In this example, if the amount of water legally authorized for diversion under the undeveloped portion of this permit is 15.0 cfs (for example, authorization provided through a WMCP), then 15.0 cfs would be the maximum amount of diversion allowed under the undeveloped portion of this permit, rather than 20.0 cfs from Step 3.

(Conversely, if the amount of water legally authorized for diversion under this permit is 25.0 cfs, then 20.0 cfs (from Step 3) would be the maximum amount of diversion allowed under this permit.)

Table 1

Fish Persistence Target Flows at the Mouth of the Lower Clackamas River	
Month	Cubic Feet per Second
June -August	650
September	650/800[1]
October - May	800

[1] 650 cfs Sept. 1 through Sept. 15 and 800 cfs September 16 through September 30

Timothy Lake Releases June 1 through October 31

c. In cooperation with the holders of Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, the permittee must meet with ODFW annually to devise a strategy to maximize fishery benefits from flow augmentation that may be available through the Water Storage Agreement[37] with Portland General Electric (PGE) for the release of stored water from Timothy Lake. The permittees shall arrange a meeting with ODFW to develop a written flow augmentation strategy based on the current year's projected water availability. The strategy will include two flow augmentation periods, being from June 1st through the first Monday in September, and the day after the first Monday in September through Oct 31st. The June 1st through the first Monday in September period will determine whether flows are needed for steelhead spawning and incubation or can be used for flow augmentation later in the summer. The day after the first Monday in September through Oct 31st period will determine the timing for flow augmentation for chinook spawning. The permittees must consult with PGE to determine if and when water is available for flow augmentation. The permittees must notify ODFW about the timing and the amount of flow that can be released. If the available water cannot meet the strategy targets then the permittees and ODFW will modify the flow augmentation strategy to maximize fishery benefits. The permittees must then submit a flow augmentation request to PGE.

It is OWRD's intent that ODFW and the permittees reach agreement on the strategy. However, if after making a good faith effort ODFW and the permittees are unable to reach agreement on a strategy ODFW shall devise the strategy. In either case, the strategy shall be documented in writing and the permittees shall comply with the strategy. The annual meeting and resulting strategy and consultations may cover issues other than Timothy Lake releases that are relevant to both use under Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, and to listed fish species; however, the strategy may include actions pertaining to such issues only upon mutual agreement by ODFW and the permittees.

[37] Or any similar agreement intended to supersede the existing agreement.

Water Management Conservation Plan (WMCP) Water Conversation Measures/ Curtailment Actions from July 1 through the first Monday in September

d. From July 1st through the first Monday in September, when target flows are not met based on a seven day rolling average of mean daily flows, the water user must implement consistent with the water curtailment element of their WMCP, water conservation measures and/or curtailment actions as described in 2.d.(2) and (3), below.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}) [38] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) Upon the first occurrence of the adjusted flow at the mouth (Q_{ADJ}) being less than the target flow (Q_T) in Table 1 (i.e., when $Q_{ADJ} < Q_T$), based on a seven day rolling average of mean daily flows, the water user must enact the first level or stage of alert in their water curtailment plan that includes mandatory water conservation measures and/or curtailment actions consistent with 2.d.(3), below.

(3) Once enacted, implementation the water conservation measures and/or curtailment actions as described in 2.d.(2), above, must continue through the first Monday in September.

[38] See fn 1

MODIFIED CONDITIONS FOR PERMIT S-37839 – CLEAN COPY

1. Development Limitations

No diversion of water is currently allowed under Permit S-37839. Diversion of any water (not to exceed the maximum amount authorized under this permit, being 9.0 cfs) shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86 that authorizes access to a greater rate of diversion of water under the permit consistent with OAR 690-086-0130(7). The required WMCP shall be submitted to the Department within 3 years of this Final Order incorporating XXXX. The amount of water used under Permit S-37839 shall be consistent with this and subsequent WMCP's approved under OAR Chapter 690, Division 86 on file with the Department.

The Development Limitation established in the above paragraph supersedes any prior limitation of the diversion of water under this permit that has been established under a prior WMCP or Extension final order issued by the Department.

The deadline established in this Final Order incorporating XXXX for submittal of a WMCP shall not relieve a permit holder of any existing or future requirement for submittal of a WMCP at an earlier date as established through other orders of the Department. A WMCP submitted to meet the requirements of this order may also meet the WMCP submittal requirements of other Department orders.

2. Conditions to Maintain the Persistence of Listed Fish

The undeveloped portion of the permit subject to these fish persistence conditions is 9.0 cfs.

Determining Water Use Reductions

a. Target flows needed to maintain the persistence of listed fish species in the Lower Clackamas River as recommended by ODFW are in Table 1, below. Target flows are to be met at the mouth of the Clackamas River.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}) [39] as shown in the following equation:

[39] D_{BG} stands for "Diversion Below the Gage" and is based on daily water use under Application S-57585 (up to 50 cfs, of which to date 25.0 cfs has been partially perfected under Certificate 78332), and under Application S-50819 (up to 9 cfs). [50 cfs + 9 cfs = 59 cfs = the maximum value of D_{BG}]. The City of Lake Oswego holds these water rights and diverts water under these rights below USGS Gage Number 14211010. The actual daily average flow measured at the gage must be corrected for the amount actually being diverted below the gage

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) The maximum amount of the undeveloped portion of Permit S-37839 that can be diverted as a result of this fish persistence condition is determined in proportion to the amount by which the target flows shown in Table 1 are missed based on the adjusted mean daily flow (Q_{ADJ}) as described in 2.a.(1), above. The percent of missed target flows is defined as:

$$(1 - [Q_{ADJ} / Q_T]) \times 100\%,$$

where Q_{AdJ} is the adjusted mean daily flow at the mouth, and Q_T is the target flow (from Table 1).

The percent by which the target flow is missed applied to the undeveloped portion of the permit provides the maximum amount of undeveloped portion of Permit S-37839 that can be diverted as a result of this fish persistence condition, and is defined as:

$$E - (E \times \% \text{ missed target flow}),$$

where E is the undeveloped portion of the permit, being 9.0 cfs.

When $Q_{ADJ} \geq Q_T$, the amount of the undeveloped portion of the permit that can be diverted would not need to be reduced as a result of this fish persistence condition.

(3) From the day after the first Monday in September through June 30, and when $Q_{ADJ} < Q_T$, the maximum amount of the undeveloped portion that may be diverted under this fish persistence condition must be re-calculated daily.

Proportional Reductions from the day after the first Monday in September through June 30

b. From the day after the first Monday in September through June 30 the maximum total amount of the undeveloped portion of Permit S-37839 that can legally be diverted shall be reduced as described in Section 2.a, above.

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under these specified water rights or their successive water rights so long as the points of diversion remain below the gaging station.

Example 1: Target Flow Met

If on June 15, the mean daily flows as measured at USGS Gage Number 14211010 was 700 cfs, and the amount being diverted below the gage (D_{BG}) was 34 cfs, then the adjusted flow (Q_{ADJ}) would be 666 cfs (700 – 34 = 666). The maximum total amount of the undeveloped portion of the permit that could legally be diverted under this permit would not be reduced because the adjusted mean daily flow on that day is greater than the 650 target flow for June 15. In this example, $Q_{ADJ} \geq Q_{T.}$

Example 2: Target Flow Missed

Step 1: If on September 20, the mean daily flow (Q_A) at the gage was 700 cfs, and 59 cfs was being diverted below the gage (D_{BG} = 59), then the adjusted flow (Q_{ADJ}) would be 641 cfs.

$$700 - 59 = 641$$

Step 2: Given that the adjusted mean daily flow (Q_{ADJ}) was 641 cfs (from Step 1), and the target flow (Q_T) is 800 cfs, then the target flow would be missed by 19.9%.

$$(1 - [641 / 800]) \times 100\% = 19.9\%$$

Step 3: Given that the undeveloped portion of this permit (E) is 9.0 cfs, and the undeveloped portion of the permit needs to be reduced by 19.9% (from Step 2), or 1.79 cfs, then the maximum amount of the undeveloped portion of Permit S-37839 that could be diverted as a result of this fish persistence condition would be 7.2 cfs. (This maximum amount may be limited as illustrated in Step 4, below.)

$$(9.0 \times 19.9) / 100\% = 1.79$$

$$9.0 - 1.79 = 7.2$$

Step 4: The calculated maximum amount of water that could be diverted under the permit due to the fish persistence condition may not exceed the amount of water to which the water user is legally entitled to divert. In this example, if the amount of water legally authorized for diversion under this permit is 5.0 cfs (for example, authorization provided through a WMCP), then 5.0 cfs would be the maximum amount of diversion allowed under this permit, rather than 7.2 cfs from Step 3.

(Conversely, if the amount of water legally authorized for diversion under this permit is 7.5 cfs, then 7.2 cfs (from Step 3) would be the maximum amount of diversion allowed under this permit.)

Table 1

Fish Persistence Target Flows at the Mouth of the Lower Clackamas River	
Month	Cubic Feet per Second
June -August	650
September	650/800[1]
October - May	800

[1] 650 cfs Sept. 1 through Sept. 15 and 800 cfs September 16 through September 30

Timothy Lake Releases June 1 through October 31

c. In cooperation with the holders of Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, the permittee must meet with ODFW annually to devise a strategy to maximize fishery benefits from flow augmentation that may be available through the Water Storage Agreement[40] with Portland General Electric (PGE) for the release of stored water from Timothy Lake. The permittees shall arrange a meeting with ODFW to develop a written flow augmentation strategy based on the current year's projected water availability. The strategy will include two flow augmentation periods, being from June 1st through the first Monday in September, and the day after the first Monday in September through Oct 31st. The June 1st through the first Monday in September period will determine whether flows are needed for steelhead spawning and incubation or can be used for flow augmentation later in the summer. The day after the first Monday in September through Oct 31st period will determine the timing for flow augmentation for chinook spawning. The permittees must consult with PGE to determine if and when water is available for flow augmentation. The permittees must notify ODFW about the timing and the amount of flow that can be released. If the available water cannot meet the strategy targets then the permittees and ODFW will modify the flow augmentation strategy to maximize fishery benefits. The permittees must then submit a flow augmentation request to PGE.

   It is OWRD's intent that ODFW and the permittees reach agreement on the strategy. However, if after making a good faith effort ODFW and the permittees are unable to reach agreement on a strategy ODFW shall devise the strategy. In either case, the strategy shall be documented in writing and the permittees shall comply with the strategy. The annual meeting and resulting strategy and consultations may cover issues other than Timothy Lake releases that are relevant to both use under Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, and to listed fish species; however, the strategy may include actions pertaining to such issues only upon mutual agreement by ODFW and the permittees.

[40] Or any similar agreement intended to supersede the existing agreement.

Water Management Conservation Plan (WMCP) Water Conversation Measures/ Curtailment Actions from July 1 through the first Monday in September

d. From July 1st through the first Monday in September, when target flows are not met based on a seven day rolling average of mean daily flows, the water user must implement consistent with the water curtailment element of their WMCP, water conservation measures and/or curtailment actions as described in 2.d.(2) and (3), below.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}) [41] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) Upon the first occurrence of the adjusted flow at the mouth (Q_{ADJ}) being less than the target flow (Q_T) in Table 1 (i.e., when $Q_{ADJ} < Q_T$), based on a seven day rolling average of mean daily flows, the water user must enact the first level or stage of alert in their water curtailment plan that includes mandatory water conservation measures and/or curtailment actions consistent with 2.d.(3), below.

(3) Once enacted, implementation the water conservation measures and/or curtailment actions as described in 2.d.(2), above, must continue through the first Monday in September.

Relationship to Instream Flows Established under ORS 537.346.

e. Permit S-37839 is junior in relative priority to Certificate 59491 (priority date August 26, 1968) and thus may be subject to regulation when the instream flows established in the certificate are not met, except for domestic or livestock uses.

[41] See fn 1

MODIFIED CONDITIONS FOR PERMIT S-35297 – CLEAN COPY
(Modified by Permit Amendment T-7389)

1. Development Limitations

A maximum diversion 19.47 cfs of water is currently allowed under Permit S-35297 (modified by Permit Amendment T-7389). Any diversion of water beyond 19.47 cfs (not to exceed the maximum amount authorized under the permit, being 62.0 cfs) shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86 that authorizes access to a greater rate of diversion of water under the permit consistent with OAR 690-086-0130(7). The required WMCP shall be submitted to the Department within 3 years of this Final Order incorporating XXXX. The amount of water used under Permit S-35297 (modified by Permit Amendment T-7389) shall be consistent with this and subsequent WMCP's approved under OAR Chapter 690, Division 86 on file with the Department.

The Development Limitation established in the above paragraph supersedes any prior limitation of the diversion of water under this permit that has been established under a prior WMCP or Extension final order issued by the Department.

The deadline established in this Final Order incorporating XXXX for submittal of a WMCP shall not relieve a permit holder of any existing or future requirement for submittal of a WMCP at an earlier date as established through other orders of the Department. A WMCP submitted to meet the requirements of this order may also meet the WMCP submittal requirements of other Department orders.

2. Conditions to Maintain the Persistence of Listed Fish

The developed portion of the permit, 19.47 cfs, is *not* subject to these fish persistence conditions. *The undeveloped portion of the permit subject to these fish persistence conditions is 42.53 cfs.*

Determining Water Use Reductions

a. Target flows needed to maintain the persistence of listed fish species in the Lower Clackamas River as recommended by ODFW are in Table 1, below. Target flows are to be met at the mouth of the Clackamas River.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River

near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}) [42] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) The maximum amount of the undeveloped portion of Permit S-35297 that can be diverted as a result of this fish persistence condition is determined in proportion to the amount by which the target flows shown in Table 1 are missed based on the adjusted mean daily flow (Q_{ADJ}) as described in 2.a.(1), above. The percent of missed target flows is defined as:

$$(1 - [Q_{ADJ} / Q_T]) \times 100\%,$$

where Q_{AdJ} is the adjusted mean daily flow at the mouth, and Q_T is the target flow (from Table 1).

The percent by which the target flow is missed applied to the undeveloped portion of the permit provides the maximum amount of undeveloped portion of Permit S-35297 that can be diverted as a result of this fish persistence condition, and is defined as:

$$E - (E \times \% \text{ missed target flow}),$$

where E is the undeveloped portion of the permit, being 42.53 cfs.

When $Q_{ADJ} \geq Q_T$, the amount of the undeveloped portion of the permit that can be diverted would not need to be reduced as a result of this fish persistence condition.

(3) From the day after the first Monday in September through June 30, and when $Q_{ADJ} < Q_T$, the maximum amount of the undeveloped portion that may be diverted under this fish persistence condition must be re-calculated daily.

[42] D_{BG} stands for "Diversion Below the Gage" and is based on daily water use under Application S-57585 (up to 50 cfs, of which to date 25.0 cfs has been partially perfected under Certificate 78332), and under Application S-50819 (up to 9 cfs). [50 cfs + 9 cfs = 59 cfs = the maximum value of D_{BG}]. The City of Lake Oswego holds these water rights and diverts water under these rights below USGS Gage Number 14211010. The mean daily flow as measured at the gage must be corrected for the amount actually being diverted below the gage under these specified water rights or their successive water rights so long as the points of diversion remain below the gaging station.

Proportional Reductions from the day after the first Monday in September through June 30

b. From the day after the first Monday in September through June 30 the maximum total amount of the undeveloped portion of Permit S-35297 that can legally be diverted shall be reduced as described in Section 2.a, above.

Example 1: Target Flow Met

If on June 15, the mean daily flow as measured at USGS Gage Number 14211010 was 700 cfs, and the amount being diverted below the gage (DBG) was 34 cfs, then the adjusted flow (Q_{ADJ}) would be 666 cfs (700 – 34 = 666). The maximum total amount of the undeveloped portion of the permit that could legally be diverted under this permit would not be reduced because the adjusted mean daily flow on that day is greater than the 650 target flow for June 15. In this example, $Q_{ADJ} \geq Q_{T.}$

Example 2: Target Flow Missed

Step 1: If on September 20, the mean daily flow (Q_A) at the gage was 700 cfs, and 59 cfs was being diverted below the gage (D_{BG} = 59), then the adjusted flow (Q_{ADJ}) would be 641 cfs.

$$700 - 59 = 641$$

Step 2: Given that the adjusted mean daily flow (Q_{ADJ}) was 641 cfs (from Step 1), and the target flow (Q_T) is 800 cfs, then the target flow would be missed by 19.9%.

$$(1 - [641 / 800]) \times 100\% = 19.9\%$$

Step 3: Given that the undeveloped portion of this permit (E) is 42.53 cfs, and the undeveloped portion of the permit needs to be reduced by 19.9% (from Step 2), or 8.46 cfs, then the maximum amount of the undeveloped portion of Permit S-35297 that could be diverted as a result of this fish persistence condition would be 34.1 cfs. (This maximum amount may be limited as illustrated in Step 4, below.)

$$(42.53 \times 19.9) / 100\% = 8.46$$

$$42.53 - 8.46 = 34.1$$

Step 4: The calculated maximum amount of water that could be diverted under the permit due to the fish persistence condition may not exceed the amount of water to which the water user is legally entitled to divert. In this example, if the amount of water legally authorized for diversion under this permit is 25.0 cfs (for example, authorization provided through a WMCP), then 25.0 cfs would be the maximum amount of diversion allowed under this permit including the developed portion of the permit, being 19.47 cfs.

(Conversely, if the amount of water legally authorized for diversion under this permit is 55.0 cfs, then 53.57 cfs (34.1 from Step 3 + the 19.47 developed portion) would be the maximum amount of diversion allowed under this permit.)

Table 1

Fish Persistence Target Flows at the Mouth of the Lower Clackamas River	
Month	Cubic Feet per Second
June -August	650
September	650/800[1]
October - May	800

[1] 650 cfs Sept. 1 through Sept. 15 and 800 cfs September 16 through September 30

Timothy Lake Releases June 1 through October 31

c. In cooperation with the holders of Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, the permittee must meet with ODFW annually to devise a strategy to maximize fishery benefits from flow augmentation that may be available through the Water Storage Agreement[43] with Portland General Electric (PGE) for the release of stored water from Timothy Lake. The permittees shall arrange a meeting with ODFW to develop a written flow augmentation strategy based on the current year's projected water availability. The strategy will include two flow augmentation periods, being from June 1st through the first Monday in September, and the day after the first Monday in September through Oct 31st. The June 1st through the first Monday in September period will determine whether flows are needed for steelhead spawning and incubation or can be used for flow augmentation later in the summer. The day after the first Monday in September through Oct 31st period will determine the timing for flow augmentation for chinook spawning. The permittees must consult with PGE to determine if and when water is available for flow augmentation. The permittees must notify ODFW about the timing and the amount of flow that can be released. If the available water cannot meet the strategy targets then the permittees and ODFW will modify the flow augmentation strategy to maximize fishery benefits. The permittees must then submit a flow augmentation request to PGE.

It is OWRD's intent that ODFW and the permittees reach agreement on the strategy. However, if after making a good faith effort ODFW and the permittees are unable to reach agreement on a strategy ODFW shall devise the strategy. In either case, the strategy shall be documented in writing and the permittees shall comply with the strategy. The annual meeting and resulting strategy and consultations may cover issues other than Timothy Lake releases that are relevant to both use under Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, and to listed fish species; however, the strategy may

[43] Or any similar agreement intended to supersede the existing agreement.

include actions pertaining to such issues only upon mutual agreement by ODFW and the permittees.

Water Management Conservation Plan (WMCP) Water Conversation Measures/ Curtailment Actions from July 1 through the first Monday in September

d. From July 1st through the first Monday in September, when target flows are not met based on a seven day rolling average of mean daily flows, the water user must implement consistent with the water curtailment element of their WMCP, water conservation measures and/or curtailment actions as described in 2.d.(2) and (3), below.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}) [44] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) Upon the first occurrence of the adjusted flow at the mouth (Q_{ADJ}) being less than the target flow (Q_T) in Table 1 (i.e., when $Q_{ADJ} < Q_T$), based on a seven day rolling average of mean daily flows, the water user must enact the first level or stage of alert in their water curtailment plan that includes mandatory water conservation measures and/or curtailment actions consistent with 2.d.(3), below.

(3) Once enacted, implementation of the water conservation measures and/or curtailment actions as described in 2.d.(2), above, must continue through the first Monday in September.

Relationship to Instream Flows Established under ORS 537.346.

e. Permit S-35297 is junior in relative priority to Certificate 59491 (priority date August 26, 1968) and thus may be subject to regulation when the instream flows established in the certificate are not met, except for domestic or livestock uses.

[44] See fn 1

MODIFIED CONDITIONS FOR PERMIT S-43170 – CLEAN COPY
(Modified by Permit Amendment T-7434)

1. Development Limitations

No diversion of water is currently allowed under Permit S-43170 (modified by Permit Amendment T-7434). Diversion of any water (not to exceed the maximum amount authorized under this permit, being 1.73 cfs) shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86 that authorizes access to a greater rate of diversion of water under the permit consistent with OAR 690-086-0130(7). The required WMCP shall be submitted to the Department within 3 years of this Final Order incorporating XXXX. The amount of water used under Permit S-43170 (modified by Permit Amendment T-7434) shall be consistent with this and subsequent WMCP's approved under OAR Chapter 690, Division 86 on file with the Department.

The Development Limitation established in the above paragraph supersedes any prior limitation of the diversion of water under this permit that has been established under a prior WMCP or Extension final order issued by the Department.

The deadline established in this Final Order incorporating XXXX for submittal of a WMCP shall not relieve a permit holder of any existing or future requirement for submittal of a WMCP at an earlier date as established through other orders of the Department. A WMCP submitted to meet the requirements of this order may also meet the WMCP submittal requirements of other Department orders.

2. Conditions to Maintain the Persistence of Listed Fish

The undeveloped portion of the permit subject to these fish persistence conditions is 1.73 cfs.

Determining Water Use Reductions

a. Target flows needed to maintain the persistence of listed fish species in the Lower Clackamas River as recommended by ODFW are in Table 1, below. Target flows are to be met at the mouth of the Clackamas River.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage

(D_{BG}) [45] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2)The maximum amount of the undeveloped portion of Permit S-43170 that can be diverted as a result of this fish persistence condition is determined in proportion to the amount by which the target flows shown in Table 1 are missed based on the adjusted mean daily flow (Q_{ADJ}) as described in 2.a.(1), above. The percent of missed target flows is defined as:

$$(1 - [Q_{ADJ} / Q_T]) \times 100\%,$$

where Q_{AdJ} is the adjusted mean daily flow at the mouth, and Q_T is the target flow (from Table 1).

The percent by which the target flow is missed applied to the undeveloped portion of the permit provides the maximum amount of undeveloped portion of Permit S-43170 that can be diverted as a result of this fish persistence condition, and is defined as:

$$E - (E \times \% \text{ missed target flow}),$$

where E is the undeveloped portion of the permit, being 1.73 cfs.

When $Q_{ADJ} \geq Q_T$, the amount of the undeveloped portion of the permit that can be diverted would not need to be reduced as a result of this fish persistence condition.

(3) From the day after the first Monday in September through June 30, and when $Q_{ADJ} < Q_T$, the maximum amount of the undeveloped portion that may be diverted under this fish persistence condition must be re-calculated daily.

[45] D_{BG} stands for "Diversion Below the Gage" and is based on daily water use under Application S-57585 (up to 50 cfs, of which to date 25.0 cfs has been partially perfected under Certificate 78332), and under Application S-50819 (up to 9 cfs). [50 cfs + 9 cfs = 59 cfs = the maximum value of D_{BG}]. The City of Lake Oswego holds these water rights and diverts water under these rights below USGS Gage Number 14211010. The actual daily average flow measured at the gage must be corrected for the amount actually being diverted below the gage under these specified water rights or their successive water rights so long as the points of diversion remain below the gaging station.

Proportional Reductions from the day after the first Monday in September through June 30

b. From the day after the first Monday in September through June 30 the maximum total amount of the undeveloped portion of Permit S-43170 (modified by Permit Amendment T-7434) that can legally be diverted shall be reduced as described in Section 2.a, above.

Example 1: Target Flow Met

If on June 15, the mean daily flows as measured at USGS Gage Number 14211010 was 700 cfs, and the amount being diverted below the gage (D_{BG}) was 34 cfs, then the adjusted flow (Q_{ADJ}) would be 666 cfs (700 – 34 = 666). The maximum total amount of the undeveloped portion of the permit that could legally be diverted under this permit would not be reduced because the adjusted mean daily flow on that day is greater than the 650 target flow for June 15. In this example, $Q_{ADJ} \geq Q_{T.}$

Example 2: Target Flow Missed

Step 1: If on September 20, the mean daily flow (Q_A) at the gage was 700 cfs, and 59 cfs was being diverted below the gage (D_{BG} = 59), then the adjusted flow (Q_{ADJ}) would be 641 cfs.

$$700 - 59 = 641$$

Step 2: Given that the adjusted mean daily flow (Q_{ADJ}) was 641 cfs (from Step 1), and the target flow (Q_T) is 800 cfs, then the target flow would be missed by 19.9%.

$$(1 - [641 / 800]) \times 100\% = 19.9\%$$

Step 3: Given that the undeveloped portion of this permit (E) is 1.73 cfs, and the undeveloped portion of the permit needs to be reduced by 19.9% (from Step 2), or 0.34 cfs, then the maximum amount of the undeveloped portion of Permit S-43170 that could be diverted as a result of this fish persistence condition would be 1.4 cfs. (This maximum amount may be limited as illustrated in Step 4, below.)

$$(1.73 \times 19.9) / 100\% = 0.34$$

$$1.73 - 0.34 = 1.4$$

Step 4: The calculated maximum amount of water that could be diverted under the permit due to the fish persistence condition may not exceed the amount of water to which the water user is legally entitled to divert. In this example, if the amount of water legally authorized for diversion under this permit is 1.0 cfs (for example, authorization provided through a WMCP), then 1.0 cfs would be the maximum amount of diversion allowed under this permit, rather than 1.4 cfs from Step 3.

(Conversely, if the amount of water legally authorized for diversion under this permit is 1.5 cfs, then 1.4 cfs (from Step 3) would be the maximum amount of diversion allowed under this permit.)

Table 1

Fish Persistence Target Flows at the Mouth of the Lower Clackamas River	
Month	Cubic Feet per Second
June -August	650
September	650/800[1]
October - May	800

[1] 650 cfs Sept. 1 through Sept. 15 and 800 cfs September 16 through September 30

Timothy Lake Releases June 1 through October 31

c. In cooperation with the holders of Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, the permittee must meet with ODFW annually to devise a strategy to maximize fishery benefits from flow augmentation that may be available through the Water Storage Agreement[46] with Portland General Electric (PGE) for the release of stored water from Timothy Lake. The permittees shall arrange a meeting with ODFW to develop a written flow augmentation strategy based on the current year's projected water availability. The strategy will include two flow augmentation periods, being from June 1st through the first Monday in September, and the day after the first Monday in September through Oct 31st. The June 1st through the first Monday in September period will determine whether flows are needed for steelhead spawning and incubation or can be used for flow augmentation later in the summer. The day after the first Monday in September through Oct 31st period will determine the timing for flow augmentation for chinook spawning. The permittees must consult with PGE to determine if and when water is available for flow augmentation. The permittees must notify ODFW about the timing and the amount of flow that can be released. If the available water cannot meet the strategy targets then the permittees and ODFW will modify the flow augmentation strategy to maximize fishery benefits. The permittees must then submit a flow augmentation request to PGE.

It is OWRD's intent that ODFW and the permittees reach agreement on the strategy. However, if after making a good faith effort ODFW and the permittees are unable to reach agreement on a strategy ODFW shall devise the strategy. In either case, the strategy shall be documented in writing and the permittees shall comply with the strategy. The annual meeting and resulting strategy and consultations may cover issues other than Timothy Lake releases that are relevant to both use under Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, and to listed fish species; however, the strategy may

[46] Or any similar agreement intended to supersede the existing agreement.

include actions pertaining to such issues only upon mutual agreement by ODFW and the permittees.

Water Management Conservation Plan (WMCP) Water Conversation Measures/ Curtailment Actions from July 1 through the first Monday in September

d. From July 1st through the first Monday in September, when target flows are not met based on a seven day rolling average of mean daily flows, the water user must implement consistent with the water curtailment element of their WMCP, water conservation measures and/or curtailment actions as described in 2.d.(2) and (3), below.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}) [47] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) Upon the first occurrence of the adjusted flow at the mouth (Q_{ADJ}) being less than the target flow (Q_T) in Table 1 (i.e., when $Q_{ADJ} < Q_T$), based on a seven day rolling average of mean daily flows, the water user must enact the first level or stage of alert in their water curtailment plan that includes mandatory water conservation measures and/or curtailment actions consistent with 2.d.(3), below.

(3) Once enacted, implementation the water conservation measures and/or curtailment actions as described in 2.d.(2), above, must continue through the first Monday in September.

Relationship to Instream Flows Established under ORS 537.346.

e. Permit S-43170 is junior in relative priority to Certificate 59491 (priority date August 26, 1968) and thus may be subject to regulation when the instream flows established in the certificate are not met, except for domestic or livestock uses.

[47] See fn 1

MODIFIED CONDITIONS FOR PERMIT S-46120 – CLEAN COPY

(Modified by Permit Amendment T-7434)

1. Development Limitations

A maximum diversion 5.01 cfs of water is currently allowed under Permit S-46120 (modified by Permit Amendment T-7434). Any diversion of water beyond 5.01 cfs (not to exceed the maximum amount authorized under the permit, being 8.0 cfs) shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86 that authorizes access to a greater rate of diversion of water under the permit consistent with OAR 690-086-0130(7). The required WMCP shall be submitted to the Department within 3 years of this Final Order incorporating XXXX. The amount of water used under Permit S-46120 (modified by Permit Amendment T-7434) shall be consistent with this and subsequent WMCP's approved under OAR Chapter 690, Division 86 on file with the Department.

The Development Limitation established in the above paragraph supersedes any prior limitation of the diversion of water under this permit that has been established under a prior WMCP or Extension final order issued by the Department.

The deadline established in this Final Order incorporating XXXX for submittal of a WMCP shall not relieve a permit holder of any existing or future requirement for submittal of a WMCP at an earlier date as established through other orders of the Department. A WMCP submitted to meet the requirements of this order may also meet the WMCP submittal requirements of other Department orders.

2. Conditions to Maintain the Persistence of Listed Fish

The developed portion of the permit, 5.01 cfs, is *not* subject to these fish persistence conditions. *The undeveloped portion of the permit subject to these fish persistence conditions is 2.99 cfs.*

Determining Water Use Reductions

a. Target flows needed to maintain the persistence of listed fish species in the Lower Clackamas River as recommended by ODFW are in Table 1, below. Target flows are to be met at the mouth of the Clackamas River.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon

City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}) [48] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) The maximum amount of the undeveloped portion of Permit S-46120 that can be diverted as a result of this fish persistence condition is determined in proportion to the amount by which the target flows shown in Table 1 are missed based on the adjusted mean daily flow (Q_{ADJ}) as described in 2.a.(1), above. The percent of missed target flows is defined as:

$$(1 - [Q_{ADJ} / Q_T]) \times 100\%,$$

where Q_{AdJ} is the adjusted mean daily flow at the mouth, and Q_T is the target flow (from Table 1).

The percent by which the target flow is missed applied to the undeveloped portion of the permit provides the maximum amount of undeveloped portion of Permit S-46120 that can be diverted as a result of this fish persistence condition, and is defined as:

$$E - (E \times \% \text{ missed target flow}),$$

where E is the undeveloped portion of the permit, being 2.99 cfs.

When $Q_{ADJ} \geq Q_T$, the amount of the undeveloped portion of the permit that can be diverted would not need to be reduced as a result of this fish persistence condition.

(3) From the day after the first Monday in September through June 30, and when $Q_{ADJ} < Q_T$, the maximum amount of the undeveloped portion that may be diverted under this fish persistence condition must be re-calculated daily.

[48] D_{BG} stands for "Diversion Below the Gage" and is based on daily water use under Application S-57585 (up to 50 cfs, of which to date 25.0 cfs has been partially perfected under Certificate 78332), and under Application S-50819 (up to 9 cfs). [50 cfs + 9 cfs = 59 cfs = the maximum value of D_{BG}]. The City of Lake Oswego holds these water rights and diverts water under these rights below USGS Gage Number 14211010. The mean daily flow as measured at the gage must be corrected for the amount actually being diverted below the gage under these specified water rights or their successive water rights so long as the points of diversion remain below the gaging station.

Proportional Reductions from the day after the first Monday in September through June 30

b. From the day after the first Monday in September through June 30 the maximum total amount of the undeveloped portion of Permit S-46120 (modified by Permit Amendment T-7434) that can legally be diverted shall be reduced as described in Section 2.a, above.

Example 1: Target Flow Met

If on June 15, the mean daily flow~~s~~ as measured at USGS Gage Number 14211010 was 700 cfs, and the amount being diverted below the gage (DBG) was 34 cfs, then the adjusted flow (Q_{ADJ}) would be 666 cfs (700 – 34 = 666). The maximum total amount of the undeveloped portion of the permit that could legally be diverted under this permit would not be reduced because the adjusted mean daily flow on that day is greater than the 650 target flow for June 15. In this example, $Q_{ADJ} \geq Q_{T.}$

Example 2: Target Flow Missed

Step 1: If on September 20, the mean daily flow (Q_A) at the gage was 700 cfs, and 59 cfs was being diverted below the gage (D_{BG} = 59), then the adjusted flow (Q_{ADJ}) would be 641 cfs.

$$700 - 59 = 641$$

Step 2: Given that the adjusted mean daily flow (Q_{ADJ}) was 641 cfs (from Step 1), and the target flow (Q_T) is 800 cfs, then the target flow would be missed by 19.9%.

$$(1 - [641 / 800]) \times 100\% = 19.9\%$$

Step 3: Given that the undeveloped portion of this permit (E) is 2.99 cfs, and the undeveloped portion of the permit needs to be reduced by 19.9% (from Step 2), or 0.60 cfs, then the maximum amount of the undeveloped portion of Permit S-46120 that could be diverted as a result of this fish persistence condition would be 2.4 cfs. (This maximum amount may be limited as illustrated in Step 4, below.)

$$(2.99 \times 19.9) / 100\% = 0.60$$

$$2.99 - 0.60 = 2.4$$

Step 4: The calculated maximum amount of water that could be diverted under the permit due to the fish persistence condition may not exceed the amount of water to which the water user is legally entitled to divert. In this example, if the amount of water legally authorized for diversion under this permit is 6.5 cfs (for example, authorization provided through a WMCP), then 6.5 cfs would be the maximum amount of diversion allowed under this permit including the developed portion of the permit, being 5.01 cfs.

(Conversely, if the amount of water legally authorized for diversion under this permit is 8.0 cfs, then 7.41 cfs (2.4 from Step 3 + the 5.01 developed portion) would be the maximum amount of diversion allowed under this permit.)

Table 1

Fish Persistence Target Flows at the Mouth of the Lower Clackamas River	
Month	Cubic Feet per Second
June -August	650
September	650/800[1]
October - May	800

[1] 650 cfs Sept. 1 through Sept. 15 and 800 cfs September 16 through September 30

Timothy Lake Releases June 1 through October 31

c. In cooperation with the holders of Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, the permittee must meet with ODFW annually to devise a strategy to maximize fishery benefits from flow augmentation that may be available through the Water Storage Agreement[49] with Portland General Electric (PGE) for the release of stored water from Timothy Lake. The permittees shall arrange a meeting with ODFW to develop a written flow augmentation strategy based on the current year's projected water availability. The strategy will include two flow augmentation periods, being from June 1st through the first Monday in September, and the day after the first Monday in September through Oct 31st. The June 1st through the first Monday in September period will determine whether flows are needed for steelhead spawning and incubation or can be used for flow augmentation later in the summer. The day after the first Monday in September through Oct 31st period will determine the timing for flow augmentation for chinook spawning. The permittees must consult with PGE to determine if and when water is available for flow augmentation. The permittees must notify ODFW about the timing and the amount of flow that can be released. If the available water cannot meet the strategy targets then the permittees and ODFW will modify the flow augmentation strategy to maximize fishery benefits. The permittees must then submit a flow augmentation request to PGE.

   It is OWRD's intent that ODFW and the permittees reach agreement on the strategy. However, if after making a good faith effort ODFW and the permittees are unable to reach agreement on a strategy ODFW shall devise the strategy. In either case, the strategy shall be documented in writing and the permittees shall comply with the strategy. The annual meeting and resulting strategy and consultations may cover issues other than Timothy Lake releases that are relevant to both use under Permits S-46120, S-35297, S-43170, S-22581, S-3778, S-9982, S-32410 and S-37839, and to listed fish species; however, the strategy may

[49] Or any similar agreement intended to supersede the existing agreement.

include actions pertaining to such issues only upon mutual agreement by ODFW and the permittees.

Water Management Conservation Plan (WMCP) Water Conversation Measures/ Curtailment Actions from July 1 through the first Monday in September

d. From July From July 1st through the first Monday in September, when target flows are not met based on a seven day rolling average of mean daily flows, the water user must implement consistent with the water curtailment element of their WMCP, water conservation measures and/or curtailment actions as described in 2.d.(2) and (3), below.

(1) To determine if target flows are met, the actual flows are to be determined or measured by the water user at USGS Gage Number 14211010 on the Clackamas River near Oregon City, Oregon, and must be adjusted for municipal diversions that occur below the gage (D_{BG}) [50] as shown in the following equation:

$$Q_A - D_{BG} = Q_{ADJ},$$

where Q_A is the mean daily flow as measured at the gage, D_{BG} is the amount of municipal water being diverted below the gage, and Q_{ADJ} equals the resulting adjusted mean daily flow at the mouth.

(2) Upon the first occurrence of the adjusted flow at the mouth (Q_{ADJ}) being less than the target flow (Q_T) in Table 1 (i.e., when $Q_{ADJ} < Q_T$), based on a seven day rolling average of mean daily flows, the water user must enact the first level or stage of alert in their water curtailment plan that includes mandatory water conservation measures and/or curtailment actions consistent with 2.d.(3), below.

(3) Once enacted, implementation of the water conservation measures and/or curtailment actions as described in 2.d.(2), above, must continue through the first Monday in September.

Relationship to Instream Flows Established under ORS 537.346.

e. Permit S-46120 (modified by Permit Amendment T-7389) is junior in relative priority to Certificate 59491 (priority date August 26, 1968) and thus may be subject to regulation when the instream flows established in the certificate are not met, except for domestic or livestock uses.

[50] See fn 1