

these determinations is contained in the ODFW database.

v. Salmon and Steelhead Spawning Through Fry Emergence. EPA considered identifying specific locations and all the distinct time periods where the ODFW database shows salmon or steelhead spawning, egg incubation or fry emergence to occur, but doing so even for one basin resulted in over 30 different time periods for this use designation. Because such an approach would be very complicated and difficult to implement, EPA instead reviewed all of the data and developed an approach that protects this use with fewer different time frames in a basin.

After reviewing the timing information for spawning through fry emergence for all salmon species and steelhead, EPA determined that designating this use from October 15 through May 15 where it occurs would protect this use for all waters in the State except for those waters where the salmon and steelhead core juvenile rearing is the designated use. In those waters, chinook (salmon) spawning may occur prior to October 15 and steelhead fry emergence may occur later than May 15. To account for chinook spawning in these waters prior to October 15, EPA decided to designate this use as occurring either two weeks after the start of non-peak chinook spawning or at the time of peak chinook spawning, whichever date is earliest. The rationale for designating this use two weeks after the start of chinook spawning is that the use designation is for the whole river segment where chinook spawning occurs but the early spawning generally occurs in the higher elevation part of the river segment. EPA believes it is reasonable to apply the criterion two weeks after the start of spawning upstream because the criterion applies throughout the water body, including the downstream extent of the use where spawning typically occurs later.

To account for steelhead fry emergence after May 15 in waters where salmon and steelhead core juvenile rearing is the designated use, EPA decided that designating the salmon and steelhead spawning through fry emergence use where it occurs in these waters through June 15 would be protective. Although steelhead fry emerge later than June 15 in some waters, those waters are typically the upstream (*i.e.*, high elevation) portion of where this use is designated. Thus, in order to attain the criterion for this use (*i.e.*, 13°C/55°F) on June 15 in the downstream extent of waters where this use would be designated, temperatures would need to be colder on June 15 in the upstream waters and therefore

would not likely reach 13°C/55°F until later in the year.

Lastly, because the timing information is well known for salmonid spawning in the lower mainstem rivers and the temperature variation within these segments is small, EPA decided to also propose a salmon and steelhead spawning through fry emergence use where and when spawning and fry emergence occur (based on the ODFW database) in waters where salmon and steelhead migration is the designated use. Of the three rivers for which EPA is proposing the migration use, the Snake River is the only one where spawning and fry emergence also occurs. As a result, it was unnecessary for EPA to develop a generalized methodology to protect the spawning use for this waterbody.

In summary, EPA proposes to designate the times and places for salmon and steelhead spawning through fry emergence use as follows:

(1) For waters where EPA is proposing to designate salmon and trout juvenile rearing and migration (*i.e.*, the 18°C/64°F summer maximum criterion applies) and where ODFW distribution information shows salmon (chinook, coho, chum) or steelhead spawning occurs, EPA is also proposing to designate the salmon and steelhead spawning through fry emergence use from October 15 through May 15.

(2) For waters where salmon and steelhead core juvenile rearing is the proposed designated use (*i.e.*, the 16°C/61°F summer maximum criterion applies), EPA also proposes to designate the salmon and steelhead spawning through fry emergence use for the following waters and associated timeframes:

(a) For waters where ODFW distribution information shows chinook spawning and steelhead spawning occurs, beginning the earliest of (i) 2 weeks after the beginning of chinook spawning, or (ii) the start of peak chinook spawning, or (iii) October 15; and ending June 15;

(b) For waters where ODFW distribution information shows chinook spawning occurs (and no steelhead spawning occurs), beginning the earliest of (i) 2 weeks after the beginning of chinook spawning, or (ii) the start of peak chinook spawning, or (iii) October 15; and ending May 15;

(c) For waters where ODFW distribution information shows steelhead spawning occurs (and no chinook spawning occurs), from October 15 to June 15; and

(d) from October 15 to May 15 for any waters where other salmon spawning (*e.g.*, coho or chum) occurs.

(3) For waters where EPA is proposing to designate a salmon and steelhead migration use (*i.e.*, 20°C/68°F criterion applies) and where ODFW distribution information indicates salmon or steelhead spawning occurs, EPA is also proposing to designate the salmon and steelhead spawning through fry emergence use from the beginning of spawning to the end of fry emergence, as indicated on the maps at <http://www.epa.gov/r10earth/federaloregonwqs.htm>.

C. Temperature Criteria for Salmonid Uses

1. Background

Each salmonid life stage has an optimal temperature range. Physiological optimum temperatures are those where physiological functions (*e.g.*, growth, swimming, heart performance) are optimized. These temperatures are generally determined in laboratory experiments. Ecological optimum temperatures are those where fish do best in the natural environment considering food availability, competition, predation, and fluctuating temperatures. All are important considerations when establishing numeric temperature criteria. Exposure to temperatures above the optimal range results in an increased severity of harmful effects, often referred to as sub-lethal or chronic effects (*e.g.*, decreased juvenile growth which results in smaller, more vulnerable fish; increased susceptibility to disease which can lead to mortality; and decreased ability to compete and avoid predation), as temperatures rise until at some point they become lethal. See Temperature Guidance, pp.18–19.

Water temperatures significantly affect the distribution, health, and survival of native salmonids in the Pacific Northwest. Since salmonids are ectothermic (cold-blooded), their survival is dependent on external water temperatures, and they will experience adverse health effects when exposed to temperatures outside their optimal range. Salmonids have evolved and thrived under the water temperature patterns that historically existed (*i.e.*, prior to significant anthropogenic impacts that altered temperature patterns) in Pacific Northwest streams and rivers. Although evidence suggests that historical water temperatures exceeded optimal conditions for salmonids at times during the summer months on some rivers, the temperature diversity in these unaltered rivers provided enough cold water during the summer to allow salmonid populations as a whole to thrive.