Appendix E1

Fish and Wildlife Issues Relating to Water Resources in Hood River County

Fish and wildlife issues relating to water resources in Hood River County
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Prepared for the County Water Resources Steering Committee
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The federal Clean Water Act requires states to designate beneficial uses, select water quality parameters and set standards to for those parameters. The key uses for identifying water quality problems are primarily (but not exclusively) drinking water, human contact recreation and aquatic species, since these uses are the most sensitive.

Since the potable water subcommittee will deal with drinking water and the irrigation subcommittee will deal with water quantity as it relates to irrigation, I will focus on aquatic species needs and human contact recreation. I am assuming that other wildlife needs are probably met if aquatic species needs are met.

It should go without saying that fish need water. They also need water that is cold and clean enough to complete their life cycle.

Hood River County is home to a number of anadromous fish species, most of which are listed under the federal Endangered Species Act as "threatened." There are a number of reaches in the Hood River and its tributaries where water temperature standards are not met for certain fish species at certain times of the year. These include Indian Creek, Whiskey Creek, Neal Creek, Clear Branch, and Middle Fork Hood River. The mainstem Hood River no longer exceeds the temperature standard because PacifiCorp no longer diverts water at Powerdale Dam. I have attached a page from the Hood River Subbasin Plan with a map of exceedences sites.

In addition, the table below lists stream segments were water quality parameters are exceeded for pesticides and metals. The source of the metals is unknown and may be natural.

Table 2. Violations of Oregon's Water Quality Criteria in the Hood River Management Area (Source: 2004/06 303(d) list[3]).

Stream Segment	Water Quality Parameters			
	Chlorpyrifos	Azinphos methyl	pH	Arsenic, beryllium, copper, iron, manganese, and/or zinc
East Fork Hood River (Mile 0-27.4)				B, C, I
Evans Creek (0-8)				B, C, I
Hood River (0-14.6)				B, C, I
Indian Creek (Mile 0-7.8)	X			
Lenz Creek (0-1.5)	X		X	A, B, I, M
Middle Fork Hood River (0-9.5)				B, I
Mitchell Creek (0-2.3)				Z
Neal Creek (0-5.6)	X	X		A, B, I, M
West Fork Hood River (0-14.4)				B

Elevated nitrogen and phosphorous (nutrient) concentrations exceeding recommended criteria were measured by DEQ in 1998 in Odell, McGuire, Neal, Lenz, Trout, Wishart, Whiskey, Baldwin, and Indian Creeks, and in 2001 and 2002 in Baldwin, Graham, Rhoades(tributary to Lenz Creek), Tieman, and Odell Creeks. The Oregon Watershed Assessment Manual recommends using a value of 0.3 mg/L for nitrogen (as total nitrate) to evaluate water quality[4]; scientific literature reports that concentrations greater than 0.3 mg/L can trigger algal blooms[5]. The value of 0.3 mg/L does not have any regulatory standing, as Oregon currently does not have nitrogen standards for surface water. The maximum nitrate concentration measured in 1998 was 4.0 mg/L in McGuire Creek and 4.84 in Rhoades Creek in 2001. Nitrogen concentrations generally increased in a downstream direction in response to adjacent land uses.

Oregon currently does not have phosphorus standards. The expected natural concentration of total phosphorous in forested streams is less than 0.02 mg/L[6]. To prevent nuisance algal growth in cold-water streams that do not discharge directly to a lake or reservoir, EPA recommends a total phosphorous concentration of 0.10 mg/L or less[7]. The maximum concentration measured in 1998 sampling was 1.2 mg/L in Odell Creek. Phosphorous concentrations tended to increase in a downstream direction; for example, samples taken in the upper Neal Creek system were close to expected natural levels.

Bacteria are used to determine the safety for human contact recreation. In 1998, DEQ sampling showed exceedences of the state standard at sites on Wishart, Baldwin, Odell, McGuire, Whiskey, Spring and Indian Creeks. In 2008, sampling by Columbia Riverkeepers showed exceedences of the state standard at sites on Indian, Whiskey, and Phelps Creeks.

I have also attached a page from the 2006 Hood River Basin Aquatic Habitat Restoration Strategy that lists critical information gaps.

Water Quality Impairment: Water quality monitoring activities indicate that water temperature, turbidity and fine sediment, pesticide contamination, and nutrient enrichment are elevated in several stream reaches. These are briefly discussed below.

Temperature: Several stream segments were included in the 1998 Oregon 303-d List for exceeding Oregon water quality criteria (Figure 2). The 2002 Oregon 303-d List includes tributaries exceeding standards for the pesticides chlorpyifos and Guthion, and the metals iron and zinc. Temperatures exceeding state criteria have been measured in stream reaches influenced by water diversion, reservoir storage, and reduced riparian shade levels. In a few reaches, temperatures exceeding criteria, particularly the 10° C bull trout criterion, may occur under apparently natural conditions.

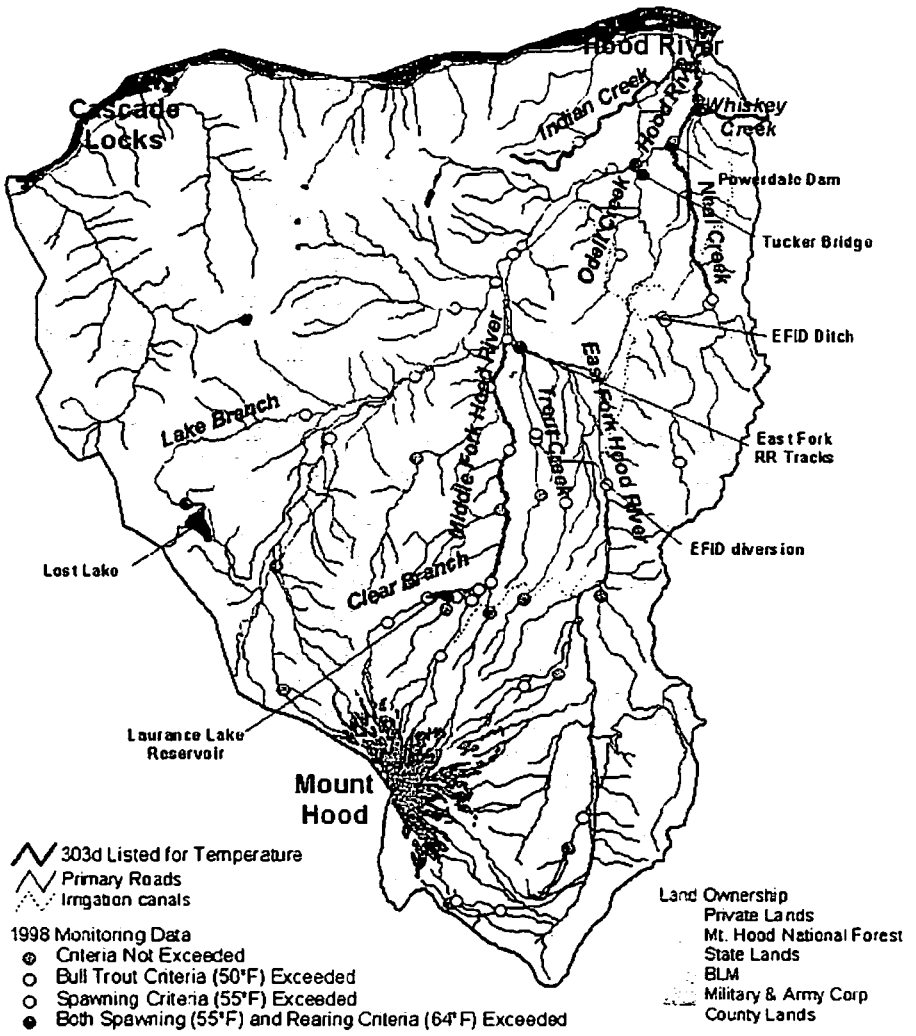

Figure 3. Stream segments where 1998 Oregon temperature standards are exceeded.

Locations where water temperatures are of particular concern are discussed below.

- *Clear Branch below Laurance Lake Reservoir.* Lower Clear Branch exceeds the bull trout criteria of 10° C. The bottom-outlet reservoir retains heat during spring and summer, eventually discharging water that can at times be 3° to 9° C warmer than Clear Branch inflows above the reservoir. Temperature increases occur during critical summer rearing and fall spawning periods for bull trout (Buchanan et. al., 1997). A longitudinal temperature profile of Clear Branch and the Middle Fork Hood River from an August 2, 2002 Forward Looking Infrared study graphically depicts warming below the reservoir (Appendix B, Fig. 2).
- *East Fork Hood River below the East Fork Irrigation Diversion.* Monitoring between 1990 and 1998 indicates that the 17.8° C criteria is consistently exceeded. A comparison of monitoring sites found that the lower East Fork at River Mile 3.7 had the warmest temperatures in the subbasin with average daily maximums of 21.0° and 21.5° C (USFS, 1996. Potential causes include extensive water diversion and solar heating due to a wide braided channel.
- *Neal Creek.* 1998 monitoring data shows a maximum 7-Day Moving Average (7DMA) of 20.7° C at the mouth, while the mouths of the East and West Forks showed maximum 7DMAs of 14.8° and 17° C, respectively. West Fork Neal Creek temperatures appear to be increased by the East Fork Irrigation District ditch system. Low riparian shade levels exist along several miles of the creek.
- *Hood River from Powerdale Dam to the Powerhouse* (R.M. 4.0 to R.M.1.0). The 17.8° C criteria was exceeded based on 1995 and 1996 monitoring. The hydro diversion of up to 500 c.f.s. contributed to warming in the bypass reach. Dam removal is scheduled for June 2010 under a 2003 settlement agreement filed with the Federal Energy Regulatory Commission. Interim measures in the agreement include minimum instream flow increases predicted to help meet state criteria.

Nutrient Enrichment: Phosphorous and nitrogen concentrations are elevated in some lower Hood River tributaries, notably Odell, Lenz, and Baldwin Creeks (HRWG, 1996). Potential sources include fertilizer, livestock waste, septic systems, wastewater discharge, and soil erosion. Several industrial and municipal wastewater discharge permits are administered by DEQ in the subbasin. Elevated phosphorous inflows and internal loading in the Laurance Lake Reservoir has stimulated annual cyanobacterial algal blooms since 1997. The lake is classified as mesotrophic, and lake P levels have ranged from 0.016-0.047 mg/L (Penuelas, R, 1999). The interaction of the 1996 flood and natural geologic factors are suspected as the source of the elevated P inflows.

Turbidity and Fine Sediment: Turbidity and sediment inputs from human activities include: (1) fine sediment runoff from forest roads; (2) irrigation system interbasin transfers, overflows, and return flows; (3) exposed soils in livestock areas adjacent to streams; (4) winter sanding of roads and parking lots; and (5) landslides from forest or irrigation activities. Turbidity and fines in the Neal Creek are heavily influenced by the creek's use as a conveyance for irrigation water from the glacial East Fork Hood River to

to the lower east Hood River valley. Data collected by DEQ during the irrigation season on 8/6/98 showed that turbidity in Neal Creek downstream of the EFID ditch (impairment source) was 35 NTU and TSS was 36 mg/L (Appendix B, Figure 1).

Pesticide Contamination: Organophosphate and other insecticides are used on orchards in the winter, spring, and summer, and may be used year round in urban areas. The timing of use overlaps with adult and juvenile steelhead migration, spawning, early life stage development, and the life stages of other fishes and aquatic species. Between 1999 and 2003, water samples were collected at multiple locations during periods of pesticide use in orchards. DEQ toxicologists have monitored water, fish, and macroinvertebrates at selected sites and control sites since 1999. OSU has also collected water samples including 48-hour hourly auto-sampling events in Neal Creek. *Chlorpyrifos* (Lorsban) was detected in Neal and Indian creeks, with some samples exceeding both the acute and chronic state water quality criteria (DEQ 1999). Between 1999 and 2002, the maximum *chlorpyrifos* concentrations in Neal Creek grab samples ranged from 0.2 to 0.48 ug/L, or between 2.5 to 6 times the acute water quality criterion, and between 5 to 12 times the chronic criterion. *Azinphos methyl* (Guthion) was detected in the Hood River, Neal, Indian, and Trout creeks. Concentrations above the chronic water quality criteria were found in Neal and Indian creeks and the Hood River. Between 1999 and 2002, maximum *azinphos methyl* concentrations in Neal Creek grab samples in ranged from 0.04 to 0.186 ug/L (Jenkins, J. 2003), or between 4 and 19 times the chronic water quality criterion. No acute criterion is established for Guthion. Bioassay work by DEQ in 2001 and 2002 found that caged steelhead held in Neal and Lenz creeks exposed to high pesticide levels had depressed brain acetylcholine esterase activity compared to steelhead held at sites with low or no pesticide contamination or control fish. Within-season changes in macroinvertebrates were detected in sampling locations after periods of spray application. Post-spray collections had lower numbers of dominant species than in pre-spray collections (Foster, E. et al, 2003). Concerns about stream contamination have prompted a major effort by local growers to implement pesticide best management practices in orchards.

Riparian Resources

Riparian shade levels and large woody debris recruitment potential were assessed along 170 miles of stream length on non-federal lands in the Mainstem, East Fork, and Middle Fork Hood River watersheds using 1995 and 1999 aerial photographs (Nelson, C. 2000, Salmenin, E. 1999). Riparian large wood recruitment was unsatisfactory along 64 percent of the stream length assessed in the lower Hood River and its tributaries compared to 54 percent in the East and Middle Fork watersheds. Shade levels in the lower Hood River watersheds were found to be high (>70 percent shade) along 51percent of the total riparian area assessed, medium along 21percent, and low (<40 percent shade) along 28 percent. Results were similar in the East and Middle Fork subwatersheds. A detailed assessment of riparian vegetation was conducted by DEQ in 2001 for the Western Hood River Basin Total Maximum Daily Load study temperature model. The model predicted that achieving system potential riparian shade conditions reduced maximum daily temperatures in the East Fork Hood River, the Hood River, and Neal Creek compared to existing riparian conditions (DEQ, 2001).

information regarding Oregon's 303(d) listing procedures, and to obtain more information regarding the Western Hood Subbasin's 303(d) listed streams, visit the ODEQ web page at **http://www.deq.state.or.us/**.

During the summer of 1998, temperature monitoring instruments recorded hourly stream temperatures at various locations throughout the Hood River watershed. **Figure 10** displays the 1998 continuous monitoring locations and an assessment of the temperature standard using the 7-day temperature statistic and application of the spawning criteria presented above. Monitoring has shown that water temperatures in the Western Hood Subbasin exceed numeric criteria of the State water quality standard.

Table 5. Western Hood Subbasin Stream Segments on the 1998 303(d) List for Temperature

Stream Name	Stream Segment Listed	Stream Miles	Criteria
Clear Branch	Mouth to Laurence Lake	1.4	Oregon Bull Trout 50°F (10°C)
Hood River	Powerdale Powerhouse to Diversion Dam	3.9	Fish Rearing 64°F (17.8°C)
Hood River, Middle Fork	Mouth to Clear Branch	9.0	Oregon Bull Trout 50°F (10°C)
Indian Creek	Mouth to Headwaters	7.5	Fish Rearing 64°F (17.8°C)
Lake Branch	Rivermile 10 to Lost Lake	1.0	Fish Rearing 64°F (17.8°C)
Neal Creek	Mouth to East/West Fork confluence	6.0	Fish Rearing 64°F (17.8°C)
Whiskey Creek	Mouth to Headwaters	2.5	Fish Rearing 64°F (17.8°C)

Chapter 5 – Critical Information Gaps

Several information gaps emerged during the development of this strategy. By highlighting these information gaps, the working group hopes this will inform future decisions regarding monitoring, inventory, and refined assessment efforts in the basin. Listed in random order, the key information gaps were:

- Lack of a basin-wide streamflow assessment that characterizes natural streamflows and results of water withdrawals.
- Lack of a recent basin-wide inventory and continued monitoring of chemical pollutants in streams and rivers.
- Lack of biological information regarding the distribution and abundance of the following fish species: fall Chinook, coho, and Pacific lamprey.
- Lack of biological information regarding the key spawning and rearing areas, known as "hot spots," for most fish species.
- Lack of consistent and comparable watershed condition data in a GIS format that would allow a more quantitative evaluation of conditions throughout the basin.
- Lack of on-the-ground knowledge or validation of many potential watershed restoration activities in most of the 6th field watersheds throughout the basin.

-From 2006 Hood River Basin Aquatic Habitat Restoration Strategy by USFS, Dan Shively et al