4b Analysis for Yellowjacket Creek

The Washington Department of Ecology (Ecology) Integrated Report (IR), which was submitted to EPA in May 2008, has excluded two listings (19868, and 19869) for temperature on Yellowjacket Creek from the 303(d) list and placed these waterbodies in category 4b of the IR. These water bodies were listed in Category 4b of the 2004 IR. Ecology's basis for excluding these waterbodies from the 303(d) list is outlined in this evaluation.

Identification of Segment and Statement of Problem Causing Impairment

Yellowjacket Creek is one of three subwatersheds in the Cispus River within the Lower Cispus River watershed. Yellowjacket Creek flows northerly into the Lower Cispus River, and contributes about 27 percent of the Lower Cispus watershed drainage area. The entire Yellowjacket Creek watershed is under management of the USDA Forest Service, Gifford Pinchot National Forest.

The impaired segments are:

- 19868, from river kilometer 2.3 to 4.8.
- 19869, from river kilometer 0.0 to 1.0.

The upper stream reach coincides with the upper extent of anadromous habitat. These reaches of Yellowjacket Creek were determined to be impaired based on data collected in 1996, and 1999 through 2003.

The four human caused sources that altered natural processes and contributed to increased temperatures are:

1. reduced riparian shade;
2. degraded channel conditions (widened and shallowed);
3. increased sediment load to the stream channel; and
4. to a lesser extent, increased drainage network as a result of road building and associated roadside ditches.

The primary sources of temperature impairment in the lower 1.5 miles of Yellowjacket Creek are reduced riparian shade and stream widening. Timber harvest of riparian forest areas that occurred in the mid to late 1900s removed shade producing trees. Increased channel width resulted from removal of large instream wood, and from landslides (natural and human induced) and road related sediment. Flood damage in 1996 is the primary cause of more recent road related erosion and culvert failure in Yellowjacket Creek, although previous floods have resulted in similar episodes of accelerated sedimentation to the lower reaches of Yellowjacket Creek (see figure 1). Increased drainage network from high road density also contributed to stream widening, but to a lesser extent than the sediment contributed from failed roads and landslides.

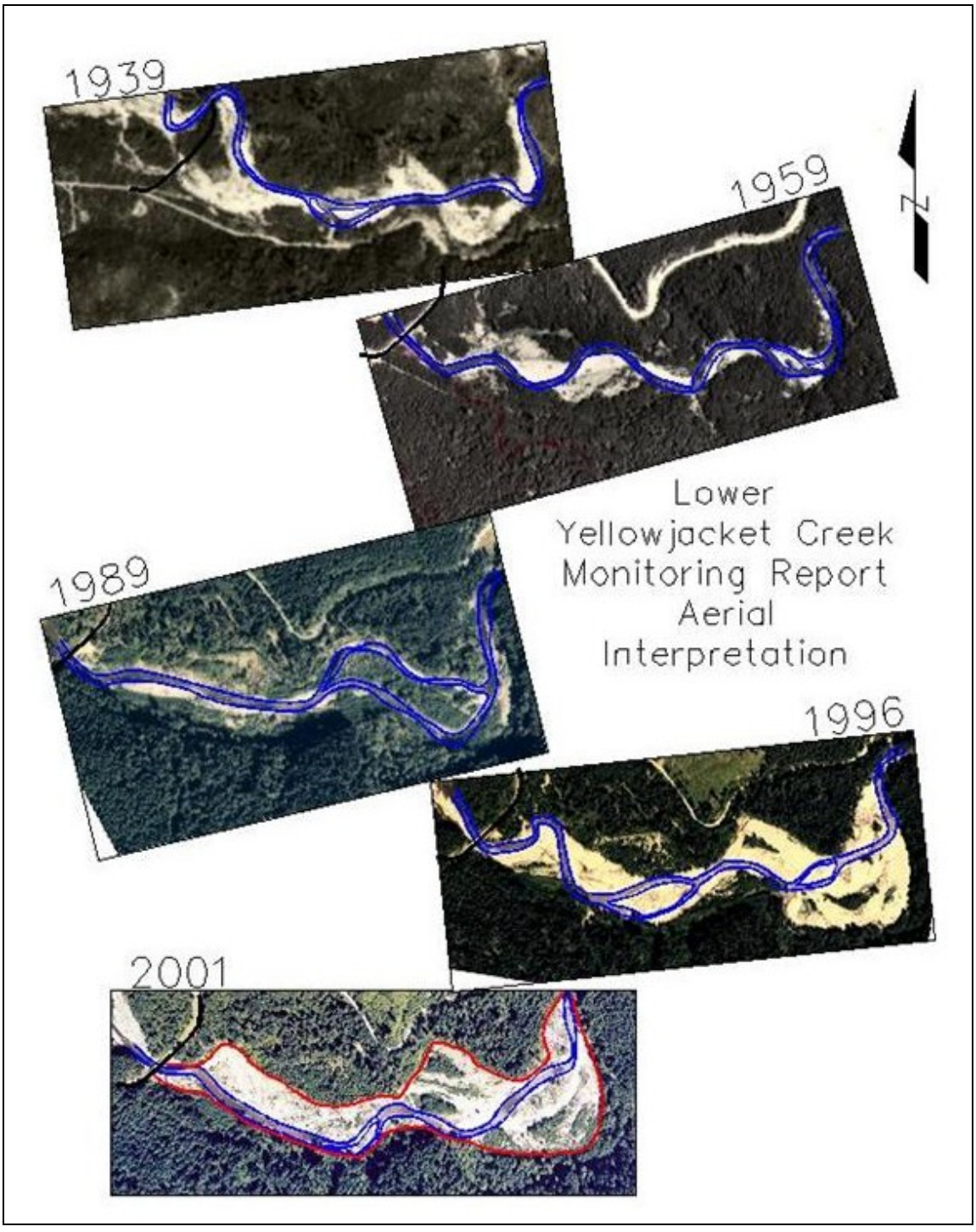

Figure 1. Yellowjacket Creek historical aerial photographs

Description of Pollution Controls and How They Will Achieve Water Quality Standards

The designated use for temperature impaired segments 19868 and 19869 is core summer salmonid habitat, and the temperature criterion is 16 degrees Centigrade, year-round. In addition, the segments have a supplemental spawning criterion of 13 degrees centigrade from February 15 to June 15.

Most riparian areas in the watershed will be restored by passive restoration, which means letting the areas recover on their own. This process can take 100 years or more. In addition, the Forest Service is planning some active riparian restoration projects, which generally involve thinning riparian stands to encourage the remaining trees to grow faster and therefore provide more shade sooner. Stream temperatures in the smaller tributaries in the upper watershed should improve within the next five to ten years as vegetation grows and streambank stability increases (barring any additional natural disturbances or extreme climatic trends). Stream temperatures in the lowest reaches of the Yellowjacket Creek watershed will take longer than five years to show improvement because the stream has widened and shallowed from excessive sediment inputs. In this area, lowered stream temperatures will depend as much on the stream recovering its natural geometry and stability as on restoring riparian shade.

Work that the Forest Service has done and plans to do to address road related sediment problems will also help to solve the temperature impairments in Yellowjacket Creek. The stream has widened and shallowed because of human caused sedimentation, and as roads are repaired, decommissioned, and routinely maintained, the sediment load to streams will decrease.

However, stream recovery takes time even when sediment delivery is decreased. Streams may take a decade or more to move past excessive sediment loads, and the amount of time this takes depends on the magnitude of flow events that occur. Consequently, stream widths may narrow temporarily and then widen again after a flow event that is large enough to move some of the excessive sediment load stored within the streams. As channel stability improves through time, other restoration treatments, such as placement of large wood in the channel, will become more viable.

It is anticipated that with the completion of identified high priority work, episodic inputs of accelerated sediment from roads, undersized or aging culverts, and bank instability will be decreased from the channel condition imprints observed historically. The overall effectiveness of these treatments should become evident by increased watershed stability in response to future flood events. Monitoring of BMP effectiveness and periodic aerial photo interpretation would help define recovery trends and timeframes.

Estimate or Projection of Time When Water Quality Standards Will be Met

Waters in Yellowjacket Creek will continue to violate temperature standards until excess sediment has worked its way out of the system and streams have recovered their natural

geometry and the riparian areas have recovered. Given the time it takes for natural systems to recover, Ecology estimates that it will be take 50 years for Yellowjacket Creek to meet the temperature standard.

Schedule for Implementing Pollution Controls

The tables below outline restoration activities completed prior to 2005, restoration completed from 2005 through 2007, and the framework for accomplishing the remaining work by 2012. Additional road decommissioning, accomplished in the Pinto Creek area of the Yellowjacket Creek watershed, is also displayed below.

Work Completed
Table 1 displays vegetation management treatments from 2002 through 2004, 2005 through 2007, and work to be completed by 2012. Table 2 displays road management in a similar format to that of Table 1.

Table 1. Vegetation management priorities identified in Yellowjacket Creek watershed, amount work completed through 2007, and work planned for completion by 2012.

Objective and activity type	Priority work identified	Total work completed		Work Remaining	Comments
		2002-2004	2005 -2007	2008-2012	
Stabilize eroding streambanks and floodplains through revegetation Includes planting of hardwoods and conifers and placement of large wood on floodplains	2.0 miles	1.6 miles	1.0 miles	0.0 miles	Some floodplain was replanted in 2006 because monitoring showed failure of some 2002-2004 plantings to survive
Restore long-term shade in riparian areas Includes thinning and conifer release within Riparian Reserves of perennial streams	192 acres	108 acres	0 acres	84 acres	

Table 2. Road restoration and fish passage priorities identified in Yellowjacket Creek watershed, amount work completed through 2007, and work planned for completion by 2012.

Activity type and objective	Total work to be completed	Total work completed		Total Work remaining	Comments
		2002 - 2004	2005-2007	2008-2012	
Road Decommission and close-stabilize by road number:	7.6 miles	1.7 miles	3.3 miles	2.6 miles	
2904602 2810035 2810040 2900045 7713000 7713686	0.2 0.5 0.1 0.4 5.3 0.3	0.0 0.0 1.7 0.0 0.0	0.2 0.5 0.1 0.4 1.2 0.3	0.0 0.0 0.0 0.0 2.4 0.0	These miles were identified in the 2001 WQRP as high priority for stabilization, and were incorporated

Table 2. Road restoration and fish passage priorities identified in Yellowjacket Creek watershed, amount work completed through 2007, and work planned for completion by 2012.

Activity type and objective	Total work to be completed	Total work completed		Total Work remaining	Comments
		2002 - 2004	2005-2007	2008-2012	
7713689 7713690	0.6 0.2		0.6 0.0	0.0 0.2	into the work identified in the 2005 Cat4b demonstration
Road Improvement by road number:	18.2 miles	0.0 miles	0.0 miles	18.2 miles	
2809000 2810000 2810041	2.9 9.4 5.9			2.9 9.4 5.9	Objective is to limit road related sediment delivery (see table 4 for further detail)
Fish Passage Improvement	1 barrier		1 barrier	none	Removal of fish passage barrier on Pinto Creek at road crossing
Road maintenance			31.4 miles	Annual amount varies	A subset of network annually maintained

Table 3 below displays road decommissioning work completed as a result of leveraging partnership funds through a RAC (Resource Advisory Committee). The network of roads in the Pinto Creek area, identified as medium priority work in the WQRP, was decommissioned in 2006. The opportunity to stabilize these roads arose because flood damage initiated failure of a bridge crossing Yellowjacket Creek. The bridge was not planned for replacement, and a proposal to stabilize the road system accessed by the bridge crossing was funded prior to removal of the bridge. This additional work was accomplished in areas other than the high priority areas modeled in the WQRP, but aids in reducing overall risk to water quality, and will provide assurances that the overall road network in the Yellowjacket Creek watershed is stabilized. The 4.7 miles of roads decommissioned in 2006 are listed by road number below.

Table 3. Road decommissioning work completed in Pinto Creek, tributary to Yellowjacket Creek, in addition to the WQRP recommendations. All work was completed in 2006

Road Number	Road length decommissioned in miles	Comments
2800145	0.9	Road runs stream adjacent to Pinto Creek
2800698	0.4	Completed in 2006 Road runs stream adjacent on South Side of Pinto Creek. Vegetation growth on previous road bed will contribute to vegetated shade in addition to eliminating potential sediment delivery
2810045	1.3	
2810046	0.8	
2810047	0.1	
2810677	0.2	

2810678	0.5	
2810679	0.4	**Total additional road decommissioned: 4.7 miles**

Work Remaining 2008-2012

Table 4 below outlines the remaining vegetation and road work identified in tables 1 and 2 above, and provides information on the status of this remaining work. The work is on target for completion by 2012.

Table 4. Vegetation and Roads treatments scheduled for completion between 2008 and 2012 including comments on the status of each activity.

Vegetation Management	Acres remaining (from table 1)	Current Condition	Status of activity
Thinning and conifer release	84	over dense stands	planning underway
Road Treatments by road number	**Miles remaining (from table 2)**	**Current Condition**	**Status of activity**
7713000	2.4	High priority work	Planning complete; implementation scheduled for 2009 and/or 2010
7713690	0.2	Closing naturally, no culverts, field verification needed to declare stable and completed	Field review planned for 2008 or 2009
2809000	2.9	Open to Passenger Cars; bridge across Yellowjacket Ck washed out in flood	Options being considered for planning include: convert road to trail for recreation use; or decommissioning
2810000	9.4	Seasonally Open This road had dips and some culvert replacements in 1997. Receives maintenance every few years so is in OK shape. Remaining older culverts are rusting.	Highest priority for Legacy Road Funding; anticipated for implementation in 2011
2810041	5.9	Seasonally Open	Legacy Road Funding at a consistent level to FY08 would provide funding to complete this project in 2012
	20.8 total miles remaining		
Road Maintenance	**Each year a subset of all roads in Yellowjacket Creek receive maintenance for drainage; primarily ditch line and culvert work. This work is planned to continue annually from 2008 through 2012.**		

Monitoring Plan to Track Effectiveness of Pollution Controls

Long term temperature monitoring sites have been established along Yellowjacket Creek near the confluence with the Cispus River and at the confluence of two of its major

tributaries, Mc Coy Creek and Pinto Creek. The results of temperature monitoring on Yellowjacket Creek for 1999 through 2006 are displayed in figure 2. Long-term temperature monitoring is also conducted on other tributaries to the Cispus River, and demonstrates that a commitment to long-term temperature monitoring of the Cispus River system is a priority. In addition to temperature monitoring, individual projects were monitored with various objectives.

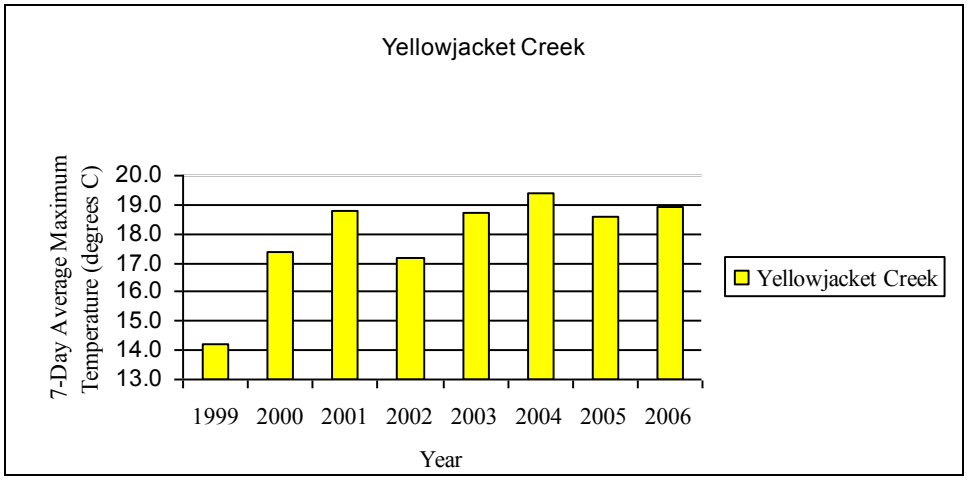

Figure 2. Summary of temperature monitoring on Yellowjacket Creek near the confluence with the Cispus River for 1999 through 2006.

The Yellowjacket Creek RAC Road Decommissioning Project was monitored to evaluate channel migration and down cutting of the newly re-established channel sections. Pre- and post photographs were taken. On Pinto Creek, the fish bearing stream, detailed measurements of channel cross section and longitudinal profile were taken. Photo points and monuments have been established for future monitoring of the site. In addition, field review of the road decommissioning project is planned using the Gifford Pinchot National Forest Restoration Effectiveness Monitoring Protocol. The goal of effectiveness monitoring is to provide information that can be used to improve, alter or change various treatment techniques implemented in this road decommissioning project. Monitoring has not been completed this year. Results will be available in 2008.

Commitment to Revise Pollution Controls as Necessary

The Gifford Pinchot National Forest is required under the Forest Plan for the forest, as amended by the NFWP to adjust and adapt activities if monitoring demonstrates that goals and objectives of the plan are not being met. The WQRP, which ties back to the NWFP, also has provisions for adaptation if water quality and watershed restoration objectives are not progressing. In addition, an interagency aquatic monitoring effort, Aquatic-Riparian Effectiveness Monitoring Protocol (AREMP) has been in place since the inception of the NWFP with requirements to evaluate the effectiveness of the NWFP aquatic conservation strategy, and address watershed condition trends across the NWFP area. The outcomes of AREMP will be critical in determining what is working and what needs to be revised to ensure attainment of the goals and objectives in the NWFP aquatic conservation strategy.

Ecology expects that achievement of the goals in the Forest Service aquatic conservation strategy will achieve compliance with state water quality standards. However, if they do not, Ecology will work with the Forest Service to determine other controls that could be used to achieve compliance.