Appendix E: Analysis of Maximum Site-Specific Effects on Water Quality

Because many significant issues revolve around riparian habitats and aquatic species, Risk Assessments were completed for herbicides proposed for use within the 50-foot riparian buffer to quantify the maximum site-specific effects that could happen to water. It was assumed that PDC would mitigate effects of herbicides used in upland habitats. Analyses of maximum site-specific effects were conducted at two locations (Buckhead Pond and Whiterock Creek) on the Willamette National Forest for the herbicides proposed to be used in the 50-foot stream buffer under Alternative 3 (Glyphosate and Imazapyr).

Risk Assessment Worksheets (SERA EXWS 05-43-28-08a and SERA EXWS 05-43-23-11a) were used for this analysis. These scenarios were developed to determine if herbicide concentrations could exceed a level of concern for fish and other aquatic organisms or consumption of water by humans (two of the significant issues identified during scoping).

The maximum site-specific effects for streams were analyzed under conditions where glyphosate and imazapyr were broadcast near Whiterock Creek (South Santiam 5th field watershed) and along road ditches during summer. For the purposes of this analysis, flow in Whiterock Creek was considered to be 1.8 cfs and the herbicide applied to sandy soil. The Whiterock Creek area has an infestation of false brome.

Maximum site-specific effects for ponds were analyzed under conditions where glyphosate and imazapyr were broadcast near Buckhead Pond (Middle Fork Willamette/Lookout Point 5th field watershed). Buckhead Pond was analyzed for a size of 0.25 acres and 1 meter deep with herbicides applied to sandy soil. The Buckhead Pond has an infestation of Japanese knotweed.

Glyphosate is generally considered a high risk to aquatic organisms and imazapyr is generally considered a moderate risk.

Hazard Quotients[5] (HQ) were calculated for the risk assessments. This analysis showed that all HQs for site specific conditions on the Willamette National Forest where well under a value of 1 (Table E-1) indicating a low concentration of herbicide chemicals in water and a low level of risk to humans or aquatic biota.

[5] Hazard Quotient (HQ) – The ratio of the estimated level of exposure to a substance from a specific pesticide application to a daily dose which is not anticipated to cause any adverse effects in a human population over a lifetime of exposure (these values are derived by the U.S. EPA) for that substance, or to some other index of acceptable exposure or toxicity. A HQ less than or equal to one is presumed to indicate an acceptably low level of risk for that specific application.

Results of the aquatic Glyphosate worksheet analysis showed higher herbicide concentration values for water in Whiterock Creek adjacent to treatment sites compared to Buckhead Pond (Table E-1). Short term peak concentrations for imazapyr showed the opposite effect; concentrations in Buckhead Pond were higher than Whiterock Creek (Table E-1).

Hazard quotient values for imazapyr were extremely low, not reaching any level of concern under both the Whiterock Creek or Buckhead Pond scenarios (Table E-1). The HQ values for both aquatic glyphosate and Imazapyr are lower than the threshold of concern for sensitive fish. They approach thresholds of concern for humans only on the high end of HQ's for water consumed from a pond or stream where glyphosate was spilled.

These numbers associated with peak and long-term concentrations of herbicides in water are likely overestimations of what would actually occur on the Willamette National Forest because these values are based on use of broadcast application methods (which would not be allowed on under the PDC proposed for Willamette National Forest).

Specific effects to fish are discussed in the Fisheries Effects section. Specific effects on drinking water will be discussed in the Human Health Effects section.

Table E-1. Risk Assessment Worksheet Results, Maximum Site Specific Effects

Herbicide And location	**Short-term Peak Concentration (mg/L)**	**Long-term Concentration in water (dose) (mg/L)**	**Toxicity Values for sensitive fish(mg/L)**	**Hazard Quotient for Fish**	**Toxicity Values for Humans (mg/kg body weight)**	**Dose from Consumption of Contaminated Water (mg/kg)**	**Hazard Quotient for Humans**
Glyphosate (2 lbs/ac)					2		
Buckhead Pond	0.015 – 0.020	.0004 – 0.003	0.5 acute 2.57 chronic	0.06 – 0.08		.005-.030	.003-.002
Whiterock Creek	0.057 – 0.140	.0004 – .0007	Same as pond	0.2 – 0.6		Same as pond	Same as pond
Imazapyr (0.45 lbs/ac)					2.5		
Buckhead Pond	0.0002 – 0.0004	0.0001 – 0.0002	5.0 acute 2.7 chronic	2E-05 – 4E-05		.000006-.000020	.000005-.000008
Whiterock Creek	0.0002 – 0.0003	0.0000 – 0.0001	Same as pond	1E-05 – 3E-05		Same as pond	Same as pond

Sources: Precipitation records, local site knowledge; SERA 2003, 2004.