APPENDIX H

Fisheries Analysis by Watershed and Tabular Data

This appendix will address specific effects to listed fish populations and their habitats by subbasin, watershed or subwatershed, in which they occur under this project. This analysis is summarized in Table 62 of the FEIS. Redband trout are Forest Service Region 6 Sensitive species and occur throughout the project area except for some areas on the Fort Rock portion of the Bend/Fort Rock Ranger District where there are no perennial streams or lakes, some areas of the upper Little Deschutes River, and a few other small closed systems that were historically fishless such as Sparks and Hosmer Lakes. Effects analysis for threatened fish species also applies to redband trout, except where effects to redband trout could be greater or different depending on treatment methods. Such effects to redband trout are discussed separately in the FEIS. Maps of these watersheds, streams, and fish distribution are contained in the fisheries report.

LOWER DESCHUTES WATERSHEDS

Willow Creek Watershed -- (Subwatersheds – Upper Willow Creek 170703060201, Rock Springs 170703060202, Middle Willow Creek 17070306020103, Dry Canyon 17070306020104, Lower Willow Creek 17070306020105)

No streams that contain bull trout or their habitat exist within this subwatershed. Bull trout do exist several miles downstream in Lake Simtustus. A population of redband

trout and speckled dace exist in Willow Creek and Rimrock Springs Creek. Most invasive plant infestations are located in the uplands with some sites crossing intermittent streams and running along roads. Sites at Rimrock Springs Wildlife Area (RSWA) and Haystack Reservoir have the greatest potential to affect fish and aquatic biota. Invasive plants located in the 16 project areas are spotted knapweed, Russian knapweed, whitetop, field bindweed, St. Johnswort, Dalmation toadflax, diffuse knapweed, and medusahead. Manual and herbicide methods will be used to treat these species. First choice herbicides for treating these species are clopyralid, sulfometuron, chlorsulfuron, metsulfuron and picloram. Aquatic glyphosate may be used around RSWA because of the sensitive wetland habitat. These herbicides are low to moderate risk to fish and aquatics except for picloram and glyphosate which are high risk. Herbicide and sedimentation effects to fish bearing streams will only be addressed because these are the only two habitat indicators that could be affected.

Manual Methods (Sedimentation)

In most project areas hand pulling will be used on small patches of invasive plants, where there are only a few scattered individuals distributed over a large area or in sensitive areas where the potential effects of hand pulling outweigh the potential effects of herbicide application. Hand pulling will mostly be in areas away from waterbodies but some individual plants may be pulled next to or in the intermittent channel.

Pulling could occur at 1-2 times yearly over all the invasive plant populations. The effect of pulling scattered plants in the uplands and even within the riparian areas would leave small patches of bare soil until covered with organics from the grasslands or new vegetation sprouted which could take 1-3 years depending on location. Pulling could occur at anytime during the spring summer or fall in most project areas. Amounts of sediment produced from pulling would be very small and immeasurable against all of the other actions that have occurred in the watershed. Pulling invasive plants in these subwatersheds will have a no effect or impact on bull trout, reintroduced salmon and steelhead or redband trout.

Cumulative effects of sedimentation to fish populations would be immeasurable against the already high amounts of sedimentation produced by agricultural practices, grazing and roads in these subwatersheds.

Herbicide Application (Chemical Contamination)

Herbicides would be applied to sites using broadcast, patch broadcast or hand spray application. This would be done once a season, generally in the spring or summer. Although the invasive plant polygons show 1,772 acres for the entire watershed (Table 1) the professional estimate of actual acres of invasive plants on the ground is 597 acres. Mapped invasive plant sites total 74.6 acres in 32 locations within 100 feet of perennial waterbodies (Table 2). Actual acres of invasive plants to be treated in these 74.6 acres is less than this because they are not all filled with invasive plants, exactly how much less is not known. Three of the sites were estimated to have more than 10 acres of actual invasive plants, site 75-29 (200 acres), site 75-44 (309 acres) and site 75-24 (33 acres). Site 75-44 is only about half in the watershed. Most of the acreage in these larger sites is large medusahead infestations. Because of the large acreage medusahead will be contained with treatment targeted in areas that are more likely to increase spread such as

along roads or trails. Intermittent streams have buffers depending on application method unless aquatic approved herbicides were used and this would most likely be using aquatic glyphosate for spot spraying of knapweed in the RSWA. The buffer distance between these fish populations and most of the invasive plant sites would allow time for the herbicides to break down. Even if a thunderstorm event occurred in the next few days after application amounts of low and moderate risk herbicides reaching the stream would not be at high enough levels to harm or affect fish living downstream. A PDF to reduce the chance of this requires no herbicide application if precipitation is predicted in the following 24 hour period.

SERA (2004) risk assessments found exposure levels to fish for sulfometuron, chlorsulfuron, metsulfuron and clopyralid to be below levels of concern for Forest Service programs. Some non aquatic formulations of glyphosate contain surfactants which are highly toxic to fish but the U.S. EPA/OPP (1993c in SERA 2003) classified technical grade glyphosate as non-toxic to practically non-toxic in freshwater fish (SERA 2003). Picloram is moderately toxic to aquatic animals, particularly some species of fish. There is substantial variability in the toxicity of picloram to aquatic species. While this variability adds uncertainty to the dose-response assessment, it has no substantial impact on the risk characterization. None of the hazard indices for fish, aquatic invertebrates, or aquatic plants exceed a level of concern (SERA 2003).

Table H-1. Acres and number of locations invasive plant sites occur within specified buffers for intermittent (Int.) streams by subwatershed and total acres and number of infested weed sites by subwatershed. Results represent sites proposed for some form of herbicide treatment.

HUC6 Name	HUC6 Number	Acres within 100' of Int. Streams	Number of areas 100' from Int. Streams	Acres on Int. Stream Channels	Number of Infested Weed Sites	Total Weed Acres in HUC6	Total Sub-watershed Acres
UPPER WILLOW CREEK	170703060201	4.32	1	0.12	3	49.65	30758
RIMROCK SPRING	170703060202	135.58	7	4.12	48	1374.56	11085
MIDDLE WILLOW CREEK	170703060203	21.68	5	0.73	40	181.55	20726
DRY CANYON	170703060204	1.22	3	0.04	43	146.60	34023
LOWER WILLOW CREEK	170703060205	0.00	0	0.00	10	0.59	20373
	Totals	163.68	17.00	5.05	149.00	1772.21	128994

Table H-2. Acres and number of locations invasive plant sites occur within specified buffers for perennial streams, rivers, lakes, and springs by subwatershed. Results represent sites proposed for some form of herbicide treatment.

HUC6 Name	HUC6 Number	Acres within 10' of perennial water	Number of areas 10' from perennial water	Acres within 100' of perennial water	Number of areas 100' from perennial water	Acres within 300' of perennial water	Number of areas 300' from perennial water
UPPER WILLOW CREEK	170703060201	0.06	1	0.56	1	0.92	1
RIMROCK SPRING	170703060202	4.06	16	36.23	21	107.43	13
MIDDLE WILLOW CREEK	170703060203	2.52	3	25.33	4	61.57	6
DRY CANYON	170703060204	1.14	4	12.46	6	47.2	10
LOWER WILLOW CREEK	170703060205	0.00	0	0.00	0	0	0
	Totals	7.78	24.00	74.58	32.00	217.12	30.00

At RSWA, (site 75-20) application of aquatic glyphosate on this four acre site could cause some indirect or sub-lethal effects to redband trout if a rain event happens soon after application because of the proximity to the wetlands high water table, clay loam soils and the small size of the stream (<1.8 cfs). However spot spraying would be the preferred method to avoid killing native vegetation and this combined with the relatively flat terrain would greatly reduce the potential for effects. Clopyralid may also be used at this site but outside of the wetland and stream areas.

At Haystack Reservoir there are two sites (75-24 and 75-08) that run along streams and roads that flow or lead down slope into haystack reservoir. This reservoir does not contain any native fish but is a popular recreational put and take fishery. The professional estimate of acres of invasive plants at these sites was 33.3 and 0.2 acres, respectively. Russian knapweed, diffuse knapweed and medusahead are present and would be treated with clopyralid and sulfometuron. The use of buffer zones along with these low and moderate risk herbicides should prevent any adverse affects to fisheries or aquatics in the reservoir.

The use of picloram for treating Dalmatian toadflax would occur at one 0.64 acre site that is about 100 feet from an intermittent stream and the closest perennial water is approximately 9700 feet downstream. The use of picloram for treating field bindweed would occur at 14 sites that are each less than 0.1 acre and total 1.3 acres. These sites are scattered in the uplands with the closest perennial water approximately 2,900 feet downstream. The small size of these treatment areas combined with the large buffer distances between them and fish bearing streams would likely prohibit any detectable effects to fish and aquatics.

Herbicide application in the Willow Creek watershed will have no affect to bull trout or reintroduced salmon and steelhead because suitable and occupied habitat is several miles downstream. Herbicide application would most likely not have any direct effects to fish

because of low and moderate risk herbicides that will be used near streams. Some indirect effects could occur to algae and macrophytes.

Cumulative effects to fish populations downstream would not be measurable against the larger quantities of herbicides and pesticides used on private agricultural lands in the watershed.

Headwaters Deschutes River Watershed – Lake Simtustus subwatershed (HUC 1707030111)

No streams that contain bull trout or redband trout or their habitat exist within this subwatershed. Both species do exist downslope from project areas within 148 acre Lake Simtustus. Fish are most likely trapped in the lake as downstream migrants from the Metolius/LBC population. Invasive plants located in two project areas are diffuse knapweed and medusahead. Sites are located in the uplands above the lake with one site that is located on an intermittent stream. Manual and herbicide methods will be used to treat these species. First choice herbicides for treating these species are clopyralid and sulfometuron, respectively. These herbicides are low to moderate risk to fish and aquatics. One of the two infested weed site is located on a small unnamed intermittent stream. Downstream herbicide and sedimentation effects to fish in Lake Simtustus will be addressed because these are the only two indicators that could affect this population.

Manual Methods (Sedimentation)

In most project areas hand pulling will be used on small patches of invasive plants, where there are only a few scattered individuals distributed over a large area or in sensitive areas where the potential effects of hand pulling outweigh the potential effects of herbicide application. Hand pulling will mostly be in areas away from waterbodies but some individual plants may be pulled next to or in the intermittent channel. Bull trout and redband trout will be not be effected by the pulling as they use the lake and only the immediate area where intermittent streams enter is there even a remote possibility for any effects. There is no spawning or rearing habitat associated with this lake most fish migrate in from populations upstream.

Pulling could occur at 1-2 times yearly over all the entire invasive plant populations. The effect of pulling scattered plants in the uplands and even within the riparian areas would leave small patches of bare soil until covered with organics from the grasslands or new vegetation sprouted which could take 1-3 years depending on location. Pulling could occur at anytime during the spring summer or fall in most project areas. Pulling invasive plants in this subwatershed will have no effect or impact on bull trout reintroduced salmon, steelhead or redband trout.

Cumulative effects of sedimentation to fish populations downstream would be immeasurable against the already high amounts of sedimentation produced by agricultural practices, grazing and roads in this subwatershed.

Herbicide Application (Chemical Contamination)

Herbicides would be applied to sites using patch broadcast or hand spray application. This would be done once a season, generally in the spring or summer. Although the infested weed polygons show 19.3 acres for the entire watershed (Table 3) the

professional estimate of actual acres of invasive plants on the ground is 9.1 acres. All invasive plant sites are located 300 feet or more away from perennial waterbodies (Table 4). The infested areas are mixes of the above mentioned species but are mostly medusahead. Intermittent streams would have buffers depending on application method unless aquatic approved herbicides were used and this would most likely be using aquatic glyphosate for spot spraying of knapweed. The small size of the invasive plant populations and the buffer distance between these populations and the lake would allow time for the herbicides to break down. Even if a thunderstorm event occurred in the next few days after application any residues that reached the lake would be diluted by mixing from wind and currents in the reservoir.

SERA (2004) risk assessments found exposure levels to fish for sulfometuron, and clopyralid to be below levels of concern for Forest Service programs. Some non aquatic formulations of glyphosate contain surfactants which are highly toxic to fish but the U.S. EPA/OPP (1993c in SERA 2003) classified technical grade glyphosate as non-toxic to practically non-toxic in freshwater fish (SERA 2003). Picloram is moderately toxic to aquatic animals, particularly some species of fish. There is substantial variability in the toxicity of picloram to aquatic species. While this variability adds uncertainty to the dose-response assessment, it has no substantial impact on the risk characterization. None of the hazard indices for fish, aquatic invertebrates, or aquatic plants exceed a level of concern (SERA 2003).

Herbicide application in the Lake Simtustus subwatershed will have no effect on bull trout redband trout or reintroduced salmon and steelhead.

Table H- 3. Acres and number of locations invasive plant sites occur within specified buffers for intermittent (Int.) streams by subwatershed and total acres and number of invasive plant sites by subwatershed. Results represent sites proposed for some form of herbicide treatment.

HUC6 Name	HUC6 Number	Acres within 100' of Int. Streams	Number of areas 100' from Int. Streams	Acres on Int. Stream Channels	Number of Infested Weed Sites	Total Weed Acres in HUC6	Total Sub-watershed Acres
LAKE SIMTUSTUS	170703060103	0.87	1	0.03	5	19.26	12028

There are no invasive plant sites within 300 feet of perennial water.

Cumulative effects to fish populations downstream would not be measurable against the larger quantities of herbicides and pesticides used on private agricultural lands in the watershed and upstream of Lake Simtustus.

Upper Trout Creek Watershed - (6th HUC – Headwaters Trout Creek 170703070103, Foley Creek 170703070102, Opal Creek 170703070101)

Streams in this watershed contain steelhead and redband trout (see Figure 3 of the Fisheries Report). Invasive plant species proposed for herbicide or manual treatments are spotted knapweed, diffuse knapweed, Russian knapweed, sulphur, medusahead, St. Johnswort, and whitetop. First choice herbicides for treating these species are clopyralid,

sulfometuron, metsulfuron and picloram. Picloram should only be used on sulphur cinquefoil as that is the only effective herbicide to really treat this species (Dave Langland, Oregon Dept. of Agriculture, personal communication) Other herbicides are low to moderate risk to fish and aquatic. Invasive plant infestations are located along roads with project areas crossing and running near streams. Herbicides would be applied to sites using patch broadcast or hand spray application. This would be done once a season, generally in spring or summer.

Manual Methods (Sedimentation)

In most project areas hand pulling will be used on small patches of invasive plants, where there are only a few scattered individuals distributed over a large area or in sensitive areas where the potential effects of hand pulling outweigh the potential effects of herbicide application. Hand pulling will mostly be in areas away from waterbodies but some individual plants may be pulled next to perennial streams or in intermittent channels.

Pulling could occur at 1-2 times yearly over all the entire invasive plant populations and would likely only be feasible on smaller infestations. The effect of pulling scattered plants along roadsides and even within the riparian areas would leave small patches of bare soil until covered with organics from the forest or new vegetation sprouted which could take 1-3 years depending on location. Pulling could occur at anytime during the spring summer or fall in most project areas. Amounts of sediment produced from pulling would be very small and immeasurable against the other actions that have occurred in the watershed. Pulling invasive plants in these subwatersheds will have no effect or impact on steelhead or redband trout.

Cumulative effects of sedimentation to fish populations would be immeasurable against sediments produced by timber harvest, grazing, roads and past fires in these subwatersheds.

Herbicide Application (Chemical Contamination)

Herbicides would be applied to sites using patch broadcast or hand spray application. This would be done once a season, generally in the spring or summer. There are four project areas that contain 61 infested weed polygons that total 5.7 acres with the largest at 0.1 acres (Table 4). Mapped invasive plant sites total 0.5 acres in 10 locations within 100 feet of perennial waterbodies (Table 5). Actual acres of invasive plant to be treated in these 0.5 acres is less than this because they are not all filled with invasive plants, exactly how much less is not known.

Table H-4. Acres and number of locations invasive plant sites occur within specified buffers for intermittent (Int.) streams by subwatershed and total acres and number of invasive plant sites by subwatershed. Results represent sites proposed for some form of herbicide treatment.

HUC6 Name	HUC6 Number	Acres within 100' of Int. Streams	Number of areas 100' from Int. Streams	Acres on Int. Stream Channels	Number of Infested Weed Sites	Total Weed Acres in HUC6	Total Sub-watershed Acres
OPAL CREEK	170703070101	0.00	0	0.00	3	0.27	11426
FOLEY CREEK	170703070102	0.00	0	0.00	10	0.62	22009
HEADWATERS TROUT CREEK	170703070103	0.09	1	0.00	59	4.78	16662
	Totals	0.09	1	0.00	72	5.67	50097

Table H-5. Acres and number of locations invasive plant sites occur within specified buffers for perennial streams, rivers, lakes, and springs by subwatershed. Results represent sites proposed for some form of herbicide treatment.

HUC6 Name	HUC6 Number	Acres within 10' of perennial water	Number of areas 10' from perennial water	Acres within 100' of perennial water	Number of areas 100' from perennial water	Acres within 300' of perennial water	Number of areas 300' from perennial water
OPAL CREEK	170703070101	0.00	0	0.10	1	0.20	2
FOLEY CREEK	170703070102	0.00	0	0.06	2	0.33	6
HEADWATERS TROUT CREEK	170703070103	0.03	1	0.34	7	1.50	21
	Totals	0.03	1	0.50	10	2.03	29

Two of these sites contain sulphur cinquefoil each is 0.1 acre in size and would be treated with picloram. Picloram is known to be toxic to fish. One sulphur site is located approximately 100 feet from Auger Creek and the other approximately 600 feet from Potlid Creek. The small size of the sites and buffer distances between them and the streams should prevent herbicides from entering the streams and any adverse affects to fish in these streams. Both intermittent and perennial streams would have buffers depending on application method. The buffer distance between these fish populations and the invasive plant sites would allow time for the herbicides to break down and bind to soils. Because of the small size of the sites and because they are spread throughout three subwatersheds even if a thunderstorm event occurred a few days after application the amounts of herbicide reaching the stream would not be at high enough levels to directly harm or effect fish living downstream.

SERA (2004) risk assessments found exposure levels to fish for sulfometuron, metsulfuron and clopyralid to be below levels of concern for Forest Service programs. Some non aquatic formulations of glyphosate contain surfactants which are highly toxic to fish but the U.S. EPA/OPP (1993c in SERA 2003) classified technical grade

glyphosate as non-toxic to practically non-toxic in freshwater fish (SERA 2003). Picloram is moderately toxic to aquatic animals, particularly some species of fish. There is substantial variability in the toxicity of picloram to aquatic species. While this variability adds uncertainty to the dose-response assessment, it has no substantial impact on the risk characterization. None of the hazard indices for fish, aquatic invertebrates, or aquatic plants exceed a level of concern (SERA 2003).

It is unlikely detectable amounts of herbicide would reach the stream. If they did levels would not be high enough to cause harm to fish or aquatics. Cumulative effects to fish populations downstream on private lands would be difficult to detect against the larger quantities of herbicides and pesticides used on private agricultural lands in the watershed.

Mud Springs Watershed -- (6th HUC - Upper Mud Springs Creek 170703070401, Sagebrush Creek 170703070402)

No streams that contain bull trout or steelhead trout or their habitat exist within this subwatershed. Both species do exist several miles downstream in the Deschutes River and Trout Creek. A population of redband trout does exist in mud springs creek. Invasive plants located in five project areas are spotted knapweed, diffuse knapweed, scotch thistle and medusahead. First choice herbicides for treating these species are clopyralid and sulfometuron, respectively. These herbicides are low to moderate risk to fish and aquatics. Most invasive plants are located in the uplands with some sites crossing intermittent streams and running along roads. No infestations are within 100 feet of perennial streams. Manual and herbicide methods will be used to treat these species. Downstream herbicide and sedimentation effects to fish in perennial streams will only be addressed because these are the only two habitat indicators that could effect fish populations.

Manual Methods (Sedimentation)

In most project areas hand pulling will be used on small patches of invasive plants, where there are only a few scattered individuals distributed over a large area or in sensitive areas where the potential effects of hand pulling outweigh the potential effects of herbicide application. Hand pulling will mostly be in areas away from waterbodies but some individual plants may be pulled next to or in the intermittent channel. Fish will be not be effected by the pulling as they reside in the perennial channels downstream.

Pulling could occur at 1-2 times yearly over all the invasive plant populations. The effect of pulling scattered plants in the uplands and even within the riparian areas would leave small patches of bare soil until covered with organics from the grasslands or new vegetation sprouted which could take 1-3 years depending on location. Pulling could occur at anytime during the spring summer or fall in most project areas. Amounts of sediment produced from pulling would be very small and immeasurable against all of the other actions that have occurred in the watershed. Pulling invasive plants in these subwatersheds will have no effect or impact for bull trout, steelhead or redband trout.

Cumulative effects of sedimentation to fish populations downstream would be immeasurable against the already high amounts of sedimentation produced by agricultural practices, grazing and roads in this subwatershed.

Herbicide Application (Chemical Contamination)

Herbicides would be applied to sites using broadcast, patch broadcast or hand spray application. This would be done once a season, generally in the spring or summer. Although the invasive plant polygons show 363 acres for the entire watershed (Table 6) the professional estimate of actual acres of invasive plants on the ground is 179 acres of which 133 acres contain only medusahead. Mapped infested weed sites total 0.41 acres in one locations within 100 feet of perennial waterbodies (Table 7). Actual acres of invasive plants to be treated in these 74.6 acres is less than this because they are not all filled with invasive plants, exactly how much less is not known. Other polygons with mixes of the above mentioned species are mostly medusahead. Because of the large acreage medusahead will be contained with treatments targeted in areas that are more likely to be spread such as along roads or trails. Intermittent streams would have buffers depending on application method unless aquatic approved herbicides were used and this would most likely be using aquatic glyphosate for spot spraying of knapweed. The buffer distance between these fish populations and the invasive plant sites would allow time for the herbicides to break down. Even if a thunderstorm event occurred in the next few days after application amounts of herbicide reaching the stream would not be at high enough levels to harm or affect fish living downstream.

SERA (2004) risk assessments found exposure levels to fish for sulfometuron and clopyralid to be below levels of concern for Forest Service programs. Herbicide applications in the Mud Springs watershed will have no effect on bull trout or steelhead but could indirectly impact redband trout in the short term by slight short term reductions of aquatic algae and macrophytes.

Cumulative effects to fish populations downstream would not be measurable against the larger quantities of herbicides and pesticides used on private agricultural lands in the watershed.

Table H-6. Acres and number of locations invasive plants occur within specified buffers for intermittent (Int.) streams by subwatershed and total acres and number of invasive plant sites by subwatershed. Results represent sites proposed for some form of herbicide treatment.

HUC6 Name	HUC6 Number	Acres within 100' of Int. Streams	Number of areas 100' from Int. Streams	Acres on Int. Stream Channels	Number of Infested Weed Sites	Total Weed Acres in HUC6	Total Sub-watershed Acres
UPPER MUD SPRINGS CREEK	170703070401	49.55	7	1.56	18	363.17	26203
SAGEBRUSH CREEK	170703070402	0.00	0	0.00	1	0.49	16336
	Totals	49.55	7	1.56	19	363.66	42539

Table H-7. Acres and number of locations invasive plants occur within specified buffers for perennial streams, rivers, lakes, and springs by subwatershed. Results represent sites proposed for some form of herbicide treatment.

HUC6 Name	HUC6 Number	Acres within 10' of perennial water	Number of areas 10' from perennial water	Acres within 100' of perennial water	Number of areas 100' from perennial water	Acres within 300' of perennial water	Number of areas 300' from perennial water
UPPER MUD SPRINGS CREEK	170703070401	0.00	0	0.00	0	0.00	0
SAGEBRUSH CREEK	170703070402	0.00	0	0.41	1	0.49	1
	Totals	0.00	0	0.41	1	0.49	1

UPPER DESCHUTES SUBBASIN

Upper and Lower Metolius River Watersheds (HUC – Upper Metolius 1707030109 and Lower Metolius 1707030110)

The Upper and Lower Metolius River watersheds contain bull trout and redband trout. The reintroduction of chinook and sockeye salmon is expected in the next five years. At ribbon/reed canary grass sites treatments could affect temperature, fine sediment, herbicide input, cover and juvenile rearing areas. All other project areas could potentially affect fine sediment and herbicide input to waterbodies with bull trout or future salmon.

Temperature - Manual (Hand Pulling), Mechanical (Weed Whacking), Cultural (Tarping) or Herbicide (Chemical) Methods

Invasive plants may be removed adjacent to streams that contain listed fish using one or a combination of methods listed above. In most cases this will be only be for a few scattered plants that are located along the waters edge. Most invasive plants to be removed are not riparian dependent species and will occasionally be found only along the edge of water. The exception to this in ribbongrass, reed canarygrass and iris infested sites. At sites that contain these species removal of emergent plants may occur that are growing out of the shallows or along the edge of the water. Measurable changes in water temperature from invasive plant removal are not expected (see hydrology report). Most invasive plants are small plants under 3 feet tall that contribute very little to overall shading in forested riparian settings. Most shading comes from native trees and shrubs or from the aspect of adjacent slopes to a given waterbody.

The greatest potential effects from invasive plant removal would be at ribbon/reed canary grass sites. The Metolius River (treatment area 15-32) has the largest ribbongrass site that covers 119 acres but a recent survey indicates there is only about an acre of actual weeds of which approximately 0.5 acres is emergent vegetation that would be suitable for pulling (USFS 2006 data on file). At ribbon/reed canary sites these methods would most likely only occur once per season of any individual plant. The amount of treatment each season will decrease as the infestation decreases from the subsequent treatments. The duration of invasive plant removal would most likely be short term and range from a one

time occurrence to once or twice a year for up to five years. The rate at which native plants would provide shade for areas plants were removed from through natural recolonization or from replanting of natives is estimated to take between 1 and 5 years. Removal of plants would occur during times to avoid bull trout, redband or salmon spawning activities. Use of the ODFW in water work periods would be used to determine on which waterbody and when removal of invasive plants could occur.

The removal of invasive plants is not expected to contribute to increased temperatures of streams or lakes that could contribute to increased mortality of any fish life stages. Species life histories and appropriately designed ODFW in-water work periods for pulling would avoid the times when more sensitive life stages may be present. Therefore the project will result in a neutral effect for temperature effects to fish and aquatics. The effects from removing noxious weeds on water temperature are expected to be a neutral effect because most weeds are too small and individuals too scattered to provide large amounts of shading. Areas that contain ribbon/reed canary grass may have some localized reduction of streamside shade but this is not expected to effect measurable changes in temperature requirements for bull trout, redband, steelhead or Chinook EFH for any waterbody this is being proposed.

Sedimentation – Manual (hand pulling) or Cultural Methods (tarping, soil enhancement)

Hand pulling will mostly be in areas away from waterbodies but some individual plants may be pulled next to the stream or on islands. Along the Metolius River some of the emergent ribbongrass will be pulled. Tarping may be used in some locations to kill ribbon/reed canary and effects from this would be similar to pulling with less ground disturbance but larger single patches of soil would be devegetated. Replanting with native vegetation and soil enhancement such as mulching and fertilizers would be used on areas that were devegetated to help with water retention and in turn promote growth of native vegetation. Soil enhancement would have a beneficial effect on areas that had been treated by other methods.

Pulling along the Metolius would occur within the project area (15-32) which recent surveys indicate there is approximately one acre of ribbon/reed canary grass, half an acre of which is emergent and suitable for pulling (USFS 2006 data on file). Most of this would occur from Lake Creek down to House of Metolius Private Land (2.7 river miles). Below this point there are fewer scattered populations.

The effect of pulling scattered plants in the uplands and even within the riparian areas would leave small patches of bare soil until covered with organics from the forest or new vegetation sprouted which could take 1-3 years depending on location. Pulling of ribbon/reed canary grass would target emergent plants that have root mats or clumps that are growing on the rivers substrate or at the waters edge. Most of this sediment is already in the system and would get redistributed locally and to other locations just downstream in a small localized pulse. Some of the sediment would be fine silts that could travel for some distance in the water column before settling out. Most sediment would settle and clear in 0-3 hours after pulling occurred at a given location. Pulling could occur at anytime during the spring, summer or fall in most project areas. Areas directly adjacent

to waters with TE listed fish such as the Metolius River pulling would happen during the ODFW in-water work period to avoid redds and newly emerged fry.

Pulling plants in most project areas will not have a noticeable or measurable effect on fish except in the Metolius River where pulling of ribbon/reed canary grass could disturb both bull trout and redband trout juveniles. Adults of these species primarily use deeper main channel habitats and disturbance to them would not be likely. Disturbance could occur to juvenile fish while pulling plants in the shallows. Fine sediments disturbed from the substrate could affect the ability of fish to see predators and some sediment particles might irritate fish gills. Sediment effects would be localized around where individual clumps or plants were pulled. The youngest life stages of fish would be most vulnerable to the effects of pulling while larger fish would be less affected as they generally do not use the shallower margins.

Pulling invasive plants at all of the project areas will have little to no measurable effect on fish because they are often pulled away from the water and occur in scattered individual locations. The exception is project area 15-32 along the Metolius River where pulling could cause disturbance of substrate sediments and to a lesser extent sediments at the waters edge. These actions could make fish relocate to other areas where they would be more vulnerable to predation. It may also cause some individual fish to stop eating for a short period of time, although fry sometimes will feed on insects floating in the water column from the disturbance. It is unlikely, but individual fish could get stepped on during the pulling by people standing in the water. These direct effects to redband trout, bull trout and future salmon habitat will not last more than a few days at any location along the river. The benefits of restoring native vegetation to these areas and stopping the ribbongrass monoculture that is taking over parts of the river would outweigh any short term negative effects or impacts to individual fish. Turbidity and dissolved oxygen from these activities are not expected to reach levels that could noticeably affect survival or fish behavior.

Herbicide Application (Chemical Contamination)

Although the infested weed polygons show 2,533 acres for the entire watershed (Table 8) the professional estimate of actual acres of weeds on the ground is much less with only five sites estimated to have more than 10 acres of actual weeds, site 15-01 (13.8 acres), site 15-05 (16.9 acres), site 15-12 (32.7 acres), site 15-14 (11.8 acres) and site 15-30 (33.9 acres). All of these larger sites except for the 15-01 site are in the Upper Lake Creek subwatershed or the Fly Creek Subwatershed. Sites in Upper Lake Creek subwatershed currently contain no TE listed fish but reintroduction of salmon and bull trout is likely to occur in Link Creek between Blue and Suttle Lakes. Mapped invasive plant sites are located higher in the watershed well upstream of Blue Lake. No TE listed fish have been found or are historically documented in Fly Creek. Fish migration to perennial sections of Fly Creek would be difficult because of a small 8-10 foot waterfall and the intermittent nature of the stream in the lower 4.4 miles (Dachtler 1998). Mapped infested weed sites total 74.6 acres in 32 locations within 100 feet of perennial waterbodies (Table 9). Actual acres of weeds to be treated in these 74.6 acres is less than this because they are not all filled with invasive plants, exactly how much less is not known.

Table H-8. Acres and number of locations invasive plant sites occur within specified buffers for intermittent (Int.) streams by subwatershed and total acres and number of invasive plant sites by subwatershed. Results represent sites proposed for some form of herbicide treatment.

HUC6 Name	HUC6 Number	Acres within 100' of Int. Streams	Number of areas 100' from Int. Streams	Acres on Int. Stream Channels	Number of Infested Weed Sites	Total Weed Acres in HUC6	Total Sub-watershed Acres
DRY CREEK	170703010901	1.44	1	0.05	4	2.38	12497
CACHE CREEK	170703010902	0.98	1	0.03	12	126.58	11867
UPPER LAKE CREEK	170703010903	12.79	4	0.31	53	270.52	11136
LOWER LAKE CREEK	170703010904	10.52	3	0.32	30	244.18	10965
HEADWATERS METOLIUS RIVER	170703010905	21.57	15	0.67	202	385.55	15501
FIRST CREEK	170703010906	5.94	4	0.17	30	122.14	13177
JACK CREEK	170703010907	31.86	5	1.07	24	208.00	9207
CANYON CREEK	170703010908	28.16	4	0.91	59	272.31	21068
ABBOT CREEK	170703010909	2.13	3	0.06	23	233.92	6391
CANDLE CREEK	170703010910	0.00	0	0.00	10	61.97	10957
MIDDLE METOLIUS RIVER	170703011003	27.31	11	0.81	33	279.77	21208
UPPER FLY CREEK	170703011004	1.62	2	0.00	2	10.35	16406
LOWER FLY CREEK	170703011005	0.00	0	0.03	41	129.55	16227
JUNIPER CREEK	170703011006	0.00	0	0.00	1	0.10	15088
LOWER METOLIUS RIVER	170703011007	12.85	7	0.40	31	185.91	24301
	Totals	157.16	60	4.84	555	2533.22	215997

All of these larger sites except for the 15-01 site are in the Upper Lake Creek subwatershed or the Fly Creek Subwatershed. Sites in Upper Lake Creek subwatershed currently contain no threatened or endangered fish but reintroduction of salmon and bull trout is likely to occur in Link Creek between Blue and Suttle Lakes. Mapped invasive plant sites are located higher in the watershed well upstream of Blue Lake. No listed fish have been found or are historically documented in Fly Creek. Fish migration to perennial sections of Fly Creek would be difficult because of a small 8-10 foot waterfall and the intermittent nature of the stream in the lower 4.4 miles (Dachtler 1998). Mapped invasive plant sites total 74.6 acres in 32 locations within 100 feet of perennial waterbodies (Table 9). Actual acres of invasive plants to be treated in these 74.6 acres is less than this because they are not all filled with invasive plants, exactly how much less is not known.

Table H-9. Acres and number of locations invasive plant sites occur within specified buffers for perennial streams, rivers, lakes, and springs by subwatershed. Results represent sites proposed for some form of herbicide treatment.

HUC6 Name	HUC6 Number	Acres within 10' of perennial water	Number of areas 10' from perennial water	Acres within 100' of perennial water	Number of areas 100' from perennial water	Acres within 300' of perennial water	Number of areas 300' from perennial water
DRY CREEK	170703010901	0.00	0	0.00	0	0	0
CACHE CREEK	170703010902	0.00	0	0.00	0	0	0
UPPER LAKE CREEK	170703010903	0.66	7	7.56	18	34.48	24
LOWER LAKE CREEK	170703010904	0.12	2	3.78	6	33.7	11
HEADWATERS METOLIUS RIVER	170703010905	117.47	267	120.51	213	124.83	172
FIRST CREEK	170703010906	0.54	15	4.74	9	13.29	12
JACK CREEK	170703010907	0.00	0	0.00	0	2.22	1
CANYON CREEK	170703010908	1.54	8	14.92	18	51.41	28
ABBOT CREEK	170703010909	0.00	0	0.00	0	0.29	2
CANDLE CREEK	170703010910	0.09	1	2.54	3	8.68	4
MIDDLE METOLIUS RIVER	170703011003	1.09	7	7.25	10	19.16	11
UPPER FLY CREEK	170703011004	0.00	0	0.00	0	0	0
LOWER FLY CREEK	170703011005	1.72	9	16.31	21	37.83	19
JUNIPER CREEK	170703011006	0.00	0	0.00	0	0	0
LOWER METOLIUS RIVER	170703011007	0.32	10	2.80	10	5.53	9
	Totals	123.54	326	180.41	308	331.42	293

The long distance from these bull trout populations which allows for dilution and breakdown of herbicides, the use of PDFs, and the use of moderate and low risk herbicides would prevent any direct effects to listed fish. The 15-01 site does cross an intermittent stream that leads into Brush Creek but effects to bull trout are not expected for the same reasons as the other large sites. No Hazard Quotient (HQ) calculations for any Metolius River subwatershed exceeded 1.0 using the SERA WCR model worksheets. Effects from smaller invasive plant sites within the Upper and Lower Metolius River Subwatersheds would be similar or less than these larger sites and not expected to have any direct effects.

Under Alternative 2, the treatment of reed canary/ribbongrass (site 15-32) with aquatic glyphosate or aquatic imazapyr along the Metolius River is one of the largest mapped sites (119.3 acres) with 117.5 acres mapped within 10 feet of the river. A survey conducted in 2006 (USFS 2006 data on file) found slightly less than one acre of actual reed canarygrass and ribbongrass plants (Table 10). Most of the infestation occurs from Lake Creek down to the House of Metolius Private Land (2.7 river miles). Below this point there are fewer scattered populations. Under Alternative 3, it would not be possible to effectively treat the populations, because they occur primarily within 10 feet of water.

As discussed in Treatment Effectiveness, pulling the rhizomatous species is not an effective control method.

Table H-10. Metolius River ribbongrass infestations and other information collected during the 2006 survey.

Reach	# of Infesta-tions	Total Area ft²	Total Acres	Length of River Bank ft	% of River Bank	% in Slow Water	% Emergent	% on Bank	% on Island or Wood
Lake Cr to House on the Metolius	216	39,950	0.917	3,563	7.586	15.7	42.0	6.9	51.1
Wizard Falls Hatchery to Candle Cr.	13	211	0.005	60	0.132	13.3	60.0	0.0	12.2

Application methods will include spot spraying for plants on the bank and hand application with a dripless wick for emergent plants along the water's edge and plants on islands. These methods should keep most of the herbicide out of the water but it is possible some drift could enter the river some drops could drip from the plants into the water. Glyphosate breaks down fairly rapidly but if a thunderstorm occurred after application residue could also wash into the water. The Metolius is a large flowing waterbody and dilution should prevent any direct effects to fish in the main stem and in areas with moderate velocities. Discharge measured below the Camp Sherman Bridge in September of 1999 was 358 cfs (Dachtler 2000). The only area where direct effects might occur would be in alcove and backwater rearing areas that young of the year bull trout and redband often inhabit. These areas are located along the margins, are often shallow and have slow velocities that can be poorly mixed with the other water in the river. The fish habitat survey done in by Dachtler (2000) on the upper Metolius River counted 27 alcove and backwater pool habitats in the section from Gorge Campground to Lake Creek. These totaled 13,244 ft² of habitat with an average depth of 1.0 ft and an average volume of 560 ft³ (15.86 m³). The following calculation was used to determine what the concentration in of glyphosate would be in the water and how could this potentially effect bull trout or redband trout. If a patch of reed canarygrass and ribbongrass the same size as the average alcove was treated adjacent to the alcove and all of the applied glyphosate entered the alcove.

Application rate = lbs of active ingredient/acre
Aquatic toxicity level is in mg/L

Calculations:

Step 1. (lbs of active ingredient/acre) x (mg/lb) x acre = __mg

Average aquatic glyphosate application rate
= 2 lbs/acre = 907,200 mg /acre x 0.0129 acres = 11,703 mg

Step 2. Alcove: (m^2 x m) / (1000 liter/ 1 m^3) = __Liter

For an average alcove: If average alcove volume is 15.86 m^3
15.86 m^3 x (1000 liters/ m^3) = 15,860 liters

Step 3. Divide Mg by liters to get Mg/L

11,703 Mg/15,860 Liters = 0.74 Mg/L

Step 4. Multiply by potential herbicide plant wash off fraction (SERA 2003), for aquatic glyphosate = 0.5

Step 5. Compare 0.37 Mg/L to toxicity threshold used in the USFS Regional BA (USFS 2005d)

Acute NOEC for Aquatic Glyphosate = 0.1 mg/L ($1/20^{th}$ LC50)

This analysis shows a worst case scenario where the Acute NOEC for aquatic glyphosate is slightly exceeded but it is highly unlikely that all applied glyphosate would enter the alcove at one time because the dripless wick application method would apply glyphosate to the grass and much of it would not reach the ground or water. This also assumes that the alcoves would have no water flowing through them and although they are fairly slow moving there is usually some mixing that occurs with the main river.

The following analysis similar to the previous one was calculated for aquatic imazapyr following the same assumptions.

Application rate = lbs of active ingredient/acre
Aquatic toxicity level is in Mg/L

Calculations:

Step 1. (lbs of active ingredient/acre) x (mg/lb) x acre = __Mg

Average aquatic imazapyr application rate
= 0.45 lbs/acre = 204,117 Mg /acre x 0.0129 acres = 2,633 Mg

Step 2. Alcove: (m^2 x m) / (1000 liter/ 1 m^3) = __Liter

For an average alcove: If average alcove volume is 15.86 m^3

15.86 m^3 x (1000 liters/ m^3) = 15,860 liters

Step 3. Divide Mg by liters to get Mg/L

2,633 Mg/15,860 Liters = 0.17 Mg/L

Step 4. multiply by potential herbicide plant wash off fraction (SERA 2004), for aquatic imazapyr = 0.9

0.17 Mg/L x 0.9 = 0.15 Mg/L

Step 5. Compare 0.15 Mg/L to toxicity threshold used in the USFS Region 6 BA (USFS 2005d)

Acute NOEC for aquatic imazapyr = 0.5 Mg/L (USFS 2005d)

This analysis shows that the Acute NOEC for aquatic imazapyr is not exceeded and it is unlikely that all applied imazapyr would enter the alcove at one time because the dripless wick application method would apply imazapyr to the grass and much of it would not reach the ground or water. This also assumes that the alcoves would have no water flowing through them and although they are fairly slow moving there is usually some mixing that occurs with the main river.

Triclopyr, a high risk herbicide, would be used to treat Scotch broom at one site (15-31) in the Candle Creek subwatershed. This species would be treated with spot spray or wiping on cut stumps. Site 15-31 is mapped to be 100.4 acres but the professional estimate of actual weed infestation on the ground is only 0.95 acres. The 0.95 acres is a mix of scotch broom and four other weed species. Some of this mapped site is adjacent to Candle Creek but the actual small amount of scotch broom present, the selective application method, the use of the PDFs and large volume of water in Candle Creek for dilution if any triclopyr did reach the water would prevent any direct effects to bull trout.

Summer low flow measurements from the most recent fish habitat survey on Candle Creek was 72 cfs measured in August of 1995 (Houslet and Lovtang 1996).

Indirect effects to fish from aquatic plants or algae being affected by the use of sulfometuron and aquatic glyphosate could occur but the amount should be minimal as it is unlikely that large enough amounts of these herbicides will reach the stream because of selective application methods and PDFs that will minimize the risk for water contamination.

SERA (2004) risk assessments found exposure levels to fish for sulfometuron, metsulfuron and clopyralid to be below levels of concern for Forest Service programs. Some non aquatic formulations of glyphosate contain surfactants which are highly toxic to fish but the U.S. EPA/OPP (1993c in SERA 2003) classified technical grade glyphosate as non-toxic to practically non-toxic in freshwater fish (SERA 2003). Triclopyr has a salt/acid formulation that is approved for aquatic use. It is slightly toxic to fish but exceeds the level of concern for coldwater salmonids at the typical application rate (SERA 2003). The salt formulation is highly soluble in water, which allows for increased runoff and leaching potential.

Cumulative effects to fish populations downstream for herbicides would not be measurable because most of the land in these watersheds are forest service lands, there are no major agricultural activities in the watershed and most herbicide application on private lands most likely occur on a small scale to treat weeds around private residences. The actual amount used on private lands is unknown. Cumulative effects from other forest service weed sites in the watershed should be low to non-existent because of the types of herbicides that will be used and the protective methods and PDFs that will be applied in relation to aquatic resources. Past treatments of weeds under the DNF 1998 EA should be mostly broken down by now and these sites were small and located away from waterbodies.

There is a remote possibility glyphosate and aquatic imazapyr could enter an alcove and have sublethal effects on juvenile bull trout or redband trout, although this is unlikely. The benefits of removing ribbongrass and replacing it with native vegetation for the aquatic invertebrates, winter fish habitat, and the Metolius River riparian ecosystem outweigh the slight possibility of effecting a few juvenile fish.

Whychus Creek Subwatersheds (HUC – Upper Whychus Creek 170703010802, Middle Whychus Creek 170703010808, Lower Whychus Creek 170703010809)

Bull trout inhabit the lower mile of Whychus Creek below Alder Springs and redband trout and are found up to near the wilderness boundary. Steelhead and Chinook historically used the creek and steelhead reintroductions are expected to occur within the next five years. Invasive plants in this area are located along road systems, the stream and surrounding uplands. Invasive plants in the six project areas proposed for herbicide treatment are spotted knapweed, diffuse knapweed, Canada thistle, and medusahead. Some large infestations occur of primarily medusahead and diffuse knapweed. Manual and herbicide methods will be used to treat these species. First choice herbicides for treating these species are clopyralid and sulfometuron. These herbicides are low to moderate risk to fish and aquatics. Herbicide and sedimentation effects to fish bearing

streams will only be addressed because these are the only two habitat indicators that could effect these fish populations.

Manual Methods (Sedimentation)

In most project areas hand pulling will be used on small patches of invasive plants, where there are only a few scattered individuals distributed over a large area or in sensitive areas where the potential effects of hand pulling outweigh the potential effects of herbicide application. Hand pulling will mostly be in areas away from waterbodies but some individual plants may be pulled next to perennial streams or in the intermittent channel.

Pulling could occur at 1-2 times yearly over all the entire invasive plant populations. The effect of pulling scattered plants in the uplands and even within the riparian areas would leave small patches of bare soil until covered with organics from the surrounding vegetation or new vegetation sprouted which could take 1-3 years depending on location. Pulling could occur at anytime during the spring summer or fall in most project areas. Amounts of sediment produced from pulling would be very small and immeasurable against all of the other actions that have occurred in the watershed. Pulling invasive plants in these subwatersheds will have a no effect or impact on bull trout, reintroduced steelhead or salmon or redband trout.

Cumulative effects of sedimentation to fish populations from hand pulling would be immeasurable against the already high amounts of sedimentation produced by past agricultural practices, grazing, timber harvest, development and roads in these subwatersheds.

Herbicide Application (Chemical Contamination)

Herbicides would be applied to sites using broadcast, patch broadcast or hand spray application. This would be done once a season, generally in the spring or summer. Although the invasive plant polygons show 746 acres (Table 11) for the three subwatersheds the professional estimate of actual acres of invasive plants on the ground is less than this. Most of the invasive plant acres and acres within 300 feet of perennial fish bearing streams are located in the lower Whychus Subwatershed (Table 12).

The largest site 75-56 has 647 acres of mapped invasive plants but the professional estimate of actual invasive plants on the ground is 143 acres consisting of mainly medusahead and diffuse knapweed. SERA risk assessments found exposure levels to fish for sulfometuron, and clopyralid to be far below levels of concern for forest service programs. This large site located in Lower Whychus Creek has the potential for more sediment and herbicide delivery because of the sparse vegetation and steeper slopes that are associated with the canyon walls. Although flows above alders springs have been higher in recent years due to more water purchased from irrigators for instream flows they are still well below what would naturally be in the stream and can get below approximately 15 cfs in this section. Because of the potential for increased herbicide delivery and potentially low summer flows for dilution of herbicides should they reach water herbicide application should be restricted to no more than 10 acres of treated per year where slopes exceed 10 % within the Whychus Creek canyon and adjacent intermittent canyons and in areas within 300 feet of perennial streams.

Table H-11. Acres and number of locations invasive plant sites occur within specified buffers for intermittent (Int.) streams by subwatershed and total acres and number of invasive plant sites by subwatershed. Results represent sites proposed for some form of herbicide treatment.

HUC6 Name	HUC6 Number	Acres within 100' of Int. Streams	Number of areas 100' from Int. Streams	Acres on Int. Stream Channels	Number of Infested Weed Sites	Total Weed Acres in HUC6	Total Sub-watershed Acres
UPPER WHYCHUS CREEK	170703010802	0.00	0	0.00	9	44.21	18291
MIDDLE WHYCHUS CREEK	170703010808	0.00	0	0.00	1	47.50	14980
LOWER WHYCHUS CREEK	170703010809	62.12	5	1.99	15	654.00	20237
	Totals	62.12	5.00	1.99	25.00	745.71	53508

Table H-12. Acres and number of locations invasive plant sites occur within specified buffers for perennial streams, rivers, lakes, and springs by subwatershed. Results represent sites proposed for some form of herbicide treatment.

HUC6 Name	HUC6 Number	Acres within 10' of perennial water	Number of areas 10' from perennial water	Acres within 100' of perennial water	Number of areas 100' from perennial water	Acres within 300' of perennial water	Number of areas 300' from perennial water
UPPER WHYCHUS CR.	170703010802	0.48	3	4.71	3	11.38	5
MIDDLE WHYCHUS CR.	170703010808	0.00	0	0.00	0	0	0
LOWER WHYCHUS CR.	170703010809	7.59	8	58.34	8	111.42	7
	Totals	8.07	11.00	63.05	11.00	122.80	12.00

There are 11.4 acres of mapped invasive plants within 300 ft of perennial water within the Upper Whychus Subwatershed but this area has more vegetation than on the Grassland because it is in a forested setting and the stream is much larger above the irrigation diversions. Average annual flow in Whychus Creek above the irrigation diversions is 105 cfs (USDA 1998). The use of low to moderate risk herbicides and the large volume of water for dilution should some herbicides enter the stream would negate any direct effects to fish. Following the PDFs will protect aquatic algae and macrophytes from small amounts of herbicides entering the water that could have measurable effects on fish. SERA (2004) risk assessments found exposure levels to fish for sulfometuron and clopyralid to be below levels of concern for Forest Service programs.

Indirect effects to fish from aquatic plants or algae by the use of sulfometuron could occur but the amount should be minimal as it is unlikely that large enough amounts of

this herbicide will reach the stream because of selective application methods and PDFs that will minimize the risk for water contamination.

Cumulative effects to fish populations downstream from herbicides are not expected. There are some agricultural activities and private residences in the watershed with herbicide application occurring on private lands but amounts and types of herbicides used is unknown. Cumulative effects from other forest service weed sites in the watershed should be low to non existent because of the types of herbicides that will be used and the protective methods and PDFs that will be applied in relation to aquatic resources.

No high risk herbicides will be used and first choice herbicides have a very low probability of directly or effecting fish through the use of protective PDFs and selective application methods. There is a slight chance that short term immeasurable indirect effects could occur to aquatic algae and macrophytes.

Lake Billy Chinook Subwatersheds (HUC – Stevens Canyon 170703011101, Carcass Canyon 170703011102, Geneva 170703011103 and Round Butte Dam 170703011104)

Bull trout and redband trout inhabit Lake Billy Chinook (LBC) and the Deschutes River within the Round Butte Dam subwatershed. Only intermittent streams and some small ponds are present in the other three watersheds. Salmon and Steelhead may be reintroduced this section of the Deschutes River in the next five years. Invasive plant infestations in this area are all 300 feet or more away from perennial and fish bearing streams except in the Carcass Canyon subwatershed where one site (75-43) is adjacent to some private ponds. Invasive plant sites are mainly located atop the uplands and are hundreds to thousands of feet away from the river and reservoir. Invasive plants in the ten project areas are spotted knapweed, diffuse knapweed, and medusahead.

Manual and herbicide methods will be used to treat these species. First choice herbicides for treating these species are clopyralid and sulfometuron. These two herbicides are low to moderate risk to fish and aquatics, respectively. Herbicide and sedimentation effects to fish bearing streams will only be addressed because these are the only two habitat indicators that could effect this population in the Lake Billy Chinook Watershed.

Manual Methods (Sedimentation)

In most project areas hand pulling will be used on small patches of invasive plants, where there are only a few scattered individuals distributed over a large area or in sensitive areas where the potential effects of hand pulling outweigh the potential effects of herbicide application. Hand pulling will mostly be in areas away from waterbodies but some individual plants may be pulled next to or in the interim.

Pulling could occur at 1-2 times yearly over all the entire invasive plant populations. The effect of pulling scattered plants in the uplands and even within the riparian areas would leave small patches of bare soil until covered with organics from the grasslands or new vegetation sprouted which could take 1-3 years depending on location. Pulling could occur at anytime during the spring summer or fall in most project areas. Amounts of sediment produced from pulling would be very small and immeasurable against all of the

other actions that have occurred in the watershed. Pulling invasive plants in these subwatersheds will have no effect or impact on bull trout or redband trout.

Cumulative effects of sedimentation to fish populations would be immeasurable against the already high amounts of sedimentation produced by agricultural practices, grazing and roads in these subwatersheds.

Herbicide Application (Chemical Contamination)

Herbicides would be applied to sites using broadcast, patch broadcast or hand spray application. This would be done once a season, generally in the spring or summer. Although the infested invasive plant polygons show 733 acres for these subwatersheds (Table 13) the professional estimate of actual acres of invasive plants on the ground was 159 acres and this is mostly medusahead. Larger medusahead sites will be treated to contain the infestation by treating along travel routes and edges of the population to reduce spread. All infested weed sites are 300 feet or more away from perennial waterbodies except for a medusahead site in the Carcass Canyon Subwatershed that is adjacent to some private ponds (Table 14). SERA (2004) risk assessments found exposure levels to fish for sulfometuron, and clopyralid to be far below levels of concern for forest service programs. This should be true for invasive plant sites treated in these two subwatersheds because they are all located 300 feet or more from the Deschutes River and LBC. The large size of the Deschutes River and LBC in this location will also help to dilute any herbicides should they reach the water which is unlikely, there would be no effect or impact to bull trout, redband trout, or future salmon or steelhead reintroductions or aquatics species because of the distance to perennial water and the use of PDFs to protect aquatic resources.

Table H-13. Acres and number of locations invasive plant sites occur within specified buffers for intermittent (Int.) streams by subwatershed and total acres and number of invasive plant sites by subwatershed. Results represent sites proposed for some form of herbicide treatment.

HUC6 Name	HUC6 Number	Acres within 100' of Int. Streams	# of areas 100' from Int. Streams	Acres on Int. Stream Channels	Number of Infested Weed Sites	Total Weed Acres in HUC6	Total Sub-watershed Acres
STEVENS CANYON	170703011101	0.00	0	0.00	3	10.87	17612
CARCASS CANYON	170703011102	47.30	3	1.42	12	677.38	16128
GENEVA	170703011103	0.72	2	0.00	4	27.20	9393
ROUND BUTTE DAM	170703011104	0.00	0	0.00	4	17.41	18583
	Totals	48.01	5.00	1.42	23.00	732.86	61716

Table H-14. Acres and number of locations invasive plant sites occur within specified buffers for perennial streams, rivers, lakes, and springs by subwatershed. Results represent sites proposed for some form of herbicide treatment.

HUC6 Name	HUC6 Number	Acres within 10' of perennial water	# of areas 10' from perennial water	Acres within 100' of perennial water	Number of areas 100' from perennial water	Acres within 300' of perennial water	# of areas 300' from perennial water
STEVENS CANYON	170703011101	0.00	0	0.00	0	0	0
CARCASS CANYON	170703011102	0.00	0	0.49	1	3.83	1
GENEVA	170703011103	0.00	0	0.00	0	0	0
ROUND BUTTE DAM	170703011104	0.00	0	0.00	0	0	0
	Totals	0.00	0.00	0.49	1.00	3.83	1.00

Odell Subwatersheds (HUC - Odell Lake 170703010201, Odell Creek 170703010202, Moore Creek 170703010203, and Davis Lake 170703010204)

Bull trout and redband trout have been documented in Trapper Creek, Crystal Creek, Fire Creek, Odell Creek, Maklaks Creek and two unnamed tributaries to Odell Creek. Redband trout are also present in Ranger Creek. Trapper Creek is the primary spawning and rearing stream for Odell Lake bull trout. Invasive plant infestations in this area are located along Highway 58 and the railroad which run along the North and South shores of Odell Lake, respectively. In the Moore Creek subwatersheds invasive plant sites proposed for herbicide treatment are mainly located in old timber sale units and are all more than 300 ft from Moore Creek. Moore Creek contains introduced brook trout in the upper end and goes intermittent before reaching Davis Lake.

Invasive plant species in the three project areas proposed for herbicide treatment are spotted knapweed, diffuse knapweed, Canada thistle, Dalmation toadflax, St Johnswort, butter and eggs, tansy ragwort, bull thistle and Scotch thistle. Manual and herbicide methods will be used to treat these species. First choice herbicides for treating these species are clopyralid, metsulfuron and picloram. These herbicides are low risk to fish except for picloram which is high risk. Herbicide and sedimentation effects to fish bearing streams will only be addressed because these are the only two habitat indicators that could affect these fish

Manual Methods (Sedimentation)

In most project areas hand pulling will be used on small patches of invasive plants, where there are only a few scattered individuals distributed over a large area or in sensitive areas where the potential effects of hand pulling outweigh the potential effects of herbicide application. Hand pulling will mostly be in areas away from waterbodies but some individual plants may be pulled next to lakes and streams or in intermittent channels.

Pulling could occur at 1-2 times yearly over all the entire invasive plant populations. The effect of pulling scattered plants in the uplands and even within the riparian areas would leave small patches of bare soil until covered with organics from the grasslands or new vegetation sprouted which could take 1-3 years depending on location. Pulling could occur at anytime during the spring summer or fall in most project areas. Amounts of sediment produced from pulling would be very small and immeasurable against natural processes or all of the other actions that have occurred in the watershed. Pulling of invasive plants in these subwatersheds will have a no effect or impact on bull trout or redband trout.

Cumulative effects of sedimentation to fish populations from hand pulling would be immeasurable against the sedimentation produced by past timber harvest, development, roads, highways and railroads in these subwatersheds.

Herbicide Application (Chemical Contamination)

Herbicides would be applied to sites using broadcast, patch broadcast or hand spray application. This would be done once a season, generally in the spring or summer. Although the infested invasive plant polygons show 372 acres (Table 15) for all the subwatersheds the professional estimate of actual acres of invasive plants on the ground is less than this.

Table H-15. Acres and number of locations invasive plant sites occur within specified buffers for intermittent (Int.) streams by subwatershed and total acres and number of invasive plant sites by subwatershed. Results represent sites proposed for some form of herbicide treatment.

HUC6 Name	HUC6 Number	Acres within 100' of Int. Streams	Number of areas 100' from Int. Streams	Acres on Int. Stream Channels	Number of Infested Weed Sites	Total Weed Acres in HUC6	Total Sub-watershed Acres
ODELL LAKE	170703010201	0.00	0	0.00	49	219.90	23170
ODELL CREEK	170703010202	0.00	0	0.00	16	56.09	13830
MOORE CREEK	170703010203	0.00	0	0.00	6	13.59	14748
DAVIS LAKE	170703010204	0.00	0	0.00	4	82.00	22505
	Totals	0.00	0.00	0.00	75.00	371.57	74254

Most of the invasive plant acres and acres within 300 feet of perennial fish bearing streams are located in the Odell Lake subwatershed (Table 16). Sites 12-02 and 12-16 are located along cross several streams that enter the lake and in several areas come within 300 feet of Odell Lake. Sites 12-02 and 12-16 where estimated to contain 31 and 11 acres of actual weeds but are mapped to be 128 and 125 acres, respectively.

Table H-16. Acres and number of locations invasive plant sites occur within specified buffers for perennial streams, rivers, lakes, and springs by subwatershed. Results represent sites proposed for some form of herbicide treatment.

HUC6 Name	HUC6 Number	Acres within 10' of perennial water	Number of areas 10' from perennial water	Acres within 100' of perennial water	Number of areas 100' from perennial water	Acres within 300' of perennial water	Number of areas 300' from perennial water
ODELL LAKE	170703010201	0.95	14	10.67	27	68.87	34
ODELL CREEK	170703010202	0.30	5	2.77	7	7.15	9
MOORE CREEK	170703010203	0.00	0	0.00	0	0	0
DAVIS LAKE	170703010204	0.00	0	0.00	0	0	0
	Totals	1.25	19.00	13.44	34.00	76.02	43.00

SERA (2004) risk assessments found exposure levels to fish for metsulfuron and clopyralid to be below levels of concern for Forest Service programs so treatment of species with these herbicides should have no direct effects on redband or bull trout. Site 12-16 is located approximately 270 feet from Trapper Creek the primary spawning and rearing stream for bull trout and it does not cross any intermittent tributaries that feed into it. Calculations using the SERA WCR model worksheets indicated that because of the high rainfall rates and porous soils there was a greater risk for direct effects to fish from the use of picloram in the Odell Lake subwatershed. Because of the soil permeability in this area, the high precipitation rates and the low numbers of individuals in this bull trout population, picloram will not be allowed for use in this watershed. The 2nd choice herbicide for butter and eggs and Dalmation toadflax is chlorsulfuron and this is less of a risk to directly affecting fish but could have greater localized indirect effects on aquatic plants and algae which are expected to be short term.

Indirect effects to fish from reducing amounts of aquatic plants or algae by the use of sulfometuron or metsulfuron could occur but the amount should be minimal as it is unlikely that large enough amounts of these herbicides will reach the stream because of selective application methods and PDFs that will minimize the risk for water contamination.

Cumulative effects to fish populations downstream for herbicides is not expected to be measurable because all lands are National Forest System, and no other herbicide applications are known to be occurring. Cumulative effects from other forest service weed sites in the watershed should be low to non existent because of the low and moderate risk types of herbicides that will be used and the protective methods and PDFs that will be applied to protect aquatic resources.

Herbicide application in the Odell and Davis Lake subwatersheds would have no direct effects to bull trout and redband trout because no high risk herbicides will be used and first choice herbicides have very little probability of directly effecting fish through the use of protective PDFs and selective application methods. Some short term immeasurable indirect effects may occur to aquatic algae and macrophytes.

LOWER CROOKED RIVER WATERSHED

Crooked River National Grassland and Lower Crooked River Valley Subwatersheds - (HUC - 1707030511 and 1707030510)

Bull trout inhabit the Crooked River below Opal Springs Dam, redband trout and other fish are found throughout the river. Both species rear in Lake Billy Chinook. Salmon and steelhead may be reintroduced to Crooked River tributaries in the next five years with passage provided at Opal Springs Dam.

Invasive plant infestations in this area are all 300 feet or more away from perenial and fish bearing streams. Invasive plant sites are located atop the flatter mesas and are hundreds to thousands of feet away from the river. Invasive plants in the five project areas are spotted knapweed, diffuse knapweed, Dalmation toadflax, and medusahead. Manual and herbicide methods will be used to treat these species. First choice herbicides for treating these species are clopyralid, sulfometuron, and picloram. These herbicides are low to moderate risk to fish and aquatics except for picloram which is high risk. Herbicide and sedimentation effects to fish bearing streams will only be addressed because these are the only two habitat indicators that could effect this population.

Manual Methods (Sedimentation)

In most project areas hand pulling will be used on small patches of invasive plants, where there are only a few scattered individuals distributed over a large area or in sensitive areas where the potential effects of hand pulling outweigh the potential effects of herbicide application. Hand pulling will mostly be in areas away from waterbodies but some individual plants may be pulled next to or in the intermittent channel.

Pulling could occur at 1-2 times yearly over all the entire invasive plant populations. The effect of pulling scattered plants in the uplands and even within the riparian areas would leave small patches of bare soil until covered with organics from the grasslands or new vegetation sprouted which could take 1-3 years depending on location. Pulling could occur at anytime during the spring summer or fall in most project areas. Amounts of sediment produced from pulling would be very small and immeasurable against all of the other actions that have occurred in the watershed. Pulling invasive plants in these subwatersheds will have no effect or impact on bull trout, redband trout or introduced salmon or steelhead.

Cumulative effects of sedimentation to fish populations would be immeasurable against the already high amounts of sedimentation produced by agricultural practices, grazing and roads in these subwatersheds.

Herbicide Application (Chemical Contamination)

Herbicides would be applied to sites using broadcast, patch broadcast or hand spray application. This would be done once a season, generally in the spring or summer. Although the invasive plant polygons show 212 acres for both subwatersheds (Table 17) the professional estimate of actual acres of on the ground is much less. All infested weed sites are 300 feet or more away from perennial waterbodies.

Table H-17. Acres and number of locations invasive plant sites occur within specified buffers for intermittent (Int.) streams by subwatershed and total acres and number of invasive plant sites by subwatershed. Results represent sites proposed for some form of herbicide treatment.

HUC6 Name	HUC6 Number	Acres within 100' of Int. Streams	Number of areas 100' from Int. Streams	Acres on Int. Stream Channels	Number of Infested Weed Sites	Total Weed Acres in HUC6	Total Sub-watershed Acres
UPPER CROOKED RIVER GORGE	170703051101	4.68	1	0.00	5	47.94	42566
LOWER CROOKED RIVER GORGE	170703051102	3.63	4	0.00	11	164.19	20254
	Totals	8.30	5.00	0.00	16.00	212.13	62820

SERA (2004) risk assessments found exposure levels to fish for sulfometuron and clopyralid to be below levels of concern for Forest Service programs. Picloram is moderately toxic to aquatic animals, particularly some species of fish. There is substantial variability in the toxicity of picloram to aquatic species. While this variability adds uncertainty to the dose-response assessment, it has no substantial impact on the risk characterization. None of the hazard indices for fish, aquatic invertebrates, or aquatic plants exceed a level of concern (SERA 2003).

Invasive plant sites treated in these two subwatersheds are all located 300 feet or more from the Crooked River. The large size of the crooked river will also help to dilute any herbicides should they reach the water which is unlikely. Picloram is toxic to fish and may be used to treat Dalmation toad flax at site 75-08. This site is over a mile from the Crooked River and the professional estimate of actual weeds on the ground was 0.2 acres for three invasive plant species. Even if the entire 0.2 acres was treated with picloram there would be no effect to bull trout, redband trout or aquatics species because of the long buffer distance to perennial water and the use of PDFs to protect aquatic resources.

Cumulative effects of sedimentation to fish populations would be immeasurable against the already high amounts of sedimentation produced by agricultural practices, grazing and roads in these subwatersheds.

McKay Creek and Allen Creek Subwatersheds (HUC –170703050501 and 170703050502)

McKay Creek currently contains redband trout but once supported steelhead. Reintroduction efforts for steelhead are expected to occur within the next few years and will most likely occur during the life of this document so they will be analyzed in anticipation of this.

Weed species in the five project areas proposed for herbicide treatment are spotted knapweed, diffuse knapweed, whitetop, field bindweed, houndstongue, St. Johnswort, sulphur cinquefoil, blessed milkthistle, medusahead and scotch broom. Manual and herbicide methods will be used to treat these species. First choice herbicides for treating these species are clopyralid, chlorsulfuron, metsulfuron, sulfometuron, triclopyr, and picloram. These herbicides are low to moderate risk to fish and aquatics except for

picloram and triclopyr which are high risk. Herbicide and sedimentation effects to fish bearing streams will only be addressed because these are the only two habitat indicators that could effect this population.

Manual Methods (Sedimentation)

In most project areas hand pulling will be used on small patches of invasive plants, where there are only a few scattered individuals distributed over a large area or in sensitive areas where the potential effects of hand pulling outweigh the potential effects of herbicide application. Hand pulling will mostly be in areas away from waterbodies but some individual plants may be pulled next to or in the intermittent channel.

Pulling could occur at 1-2 times yearly over all the entire invasive plant populations. The effect of pulling scattered plants in the uplands and even within the riparian areas would leave small patches of bare soil until covered with organics or new vegetation sprouted which could take 1-3 years depending on location. Pulling could occur at anytime during the spring summer or fall in most project areas. Amounts of sediment produced from pulling would be very small and immeasurable against all of the other actions that have occurred in the watershed. Pulling invasive plants in these subwatersheds will have a no effect or impact on redband trout or future steelhead reintroductions.

Cumulative effects of sedimentation to fish populations would be immeasurable against the already high amounts of sedimentation produced by logging, grazing and roads in these subwatersheds.

Herbicide Application (Chemical Contamination)

Invasive plant infestations in these subwatersheds are primarily along road systems that run up the valley bottoms of McKay Creek, Little McKay Creek and Allan Creek. There are 17.9 acres of infested weed sites with 13 of these acres within 300 feet of fish bearing streams (Tables 18 and 19). These sites are scattered in 221 small infestations that range in size from 0.002 acres to 0.19 acres. Herbicides would be applied to invasive plant populations using broadcast, patch broadcast or hand spray application. Application method would depend on species treated, location and size of infestation. Herbicide treatment would be done once a season, generally in the spring or summer.

Table H-18. Acres and number of locations invasive plant sites occur within specified buffers for intermittent (Int.) streams by subwatershed and total acres and number of invasive plant sites by subwatershed. Results represent sites proposed for some form of herbicide treatment.

HUC6 Name	HUC6 Number	Acres within 100' of Int. Streams	Number of areas 100' from Int. Streams	Acres on Int. Stream Channels	Number of Infested Weed Sites	Total Weed Acres in HUC6	Total Sub-watershed Acres
UPPER MCKAY CREEK	170703050501	0.43	8	0.02	216	17.43	20472
ALLEN CREEK	170703050502	0.00	0	0.00	5	0.48	18251
	Totals	0.43	8.00	0.02	221.00	17.91	38723

Table H-19. Acres and number of locations invasive plant sites occur within specified buffers for perennial streams, rivers, lakes, and springs by subwatershed. Results represent sites proposed for herbicide treatment.

HUC6 Name	HUC6 Number	Acres within 10' of perennial water	Number of areas 10' from perennial water	Acres within 100' of perennial water	Number of areas 100' from perennial water	Acres within 300' of perennial water	Number of areas 300' from perennial water
UPPER MCKAY CREEK	170703050501	0.33	21	5.41	92	12.72	148
ALLEN CREEK	170703050502	0.00	0	0.07	2	0.28	3
	Totals	0.33	21.00	5.48	94.00	13.00	151.00

SERA risk assessments found exposure levels to fish for sulfometuron, metsulfuron, clopyralid and sulfometuron to be below levels of concern for forest service programs.

Although sites are near fish bearing streams sites are small and scattered throughout the subwatersheds the majority of sites on USFS lands are in the Upper McKay subwatershed. The scattered nature of these small infestations, the herbicides used and the PDFs to protect aquatic resources should prevent any direct effects to fish population.

SERA (2004) risk assessments found exposure levels to fish for chlorsulfuron, sulfometuron, metsulfuron and clopyralid to be below levels of concern for Forest Service programs. Triclopyr has a salt/acid formulation that is approved for aquatic use. It is slightly toxic to fish but exceeds the level of concern for coldwater salmonids at the typical application rate (SERA 2003). The salt formulation is highly soluble in water, which allows for increased runoff and leaching potential. Picloram is moderately toxic to aquatic animals, particularly some species of fish. There is substantial variability in the toxicity of picloram to aquatic species. While this variability adds uncertainty to the dose-response assessment, it has no substantial impact on the risk characterization. None of the hazard indices for fish, aquatic invertebrates, or aquatic plants exceed a level of concern (SERA 2003).

Triclopyr may be used to treat and Scotch broom. Picloram may be used to treat field bindweed and sulphur cinquefoil. These three invasive plant species are found at 13 sites with each site less than 0.1 acres. One site that has Scotch broom that is proposed to be treated with triclopyr, it is 0.03 acres in size and plants will most likely be spot sprayed or cut and then painted with herbicide. This site is approximately 1,700 feet away from a perennial stream

Indirect effects to fish from aquatic plants or algae being affected by the use of sulfometuron and chlorsulfuron could occur but the amount should be minimal as it is unlikely that large enough amounts of these herbicides will reach the stream to effect the food chain for fish because of selective application methods and PDFs that will minimize the risk for water contamination.

Cumulative effects to fish populations downstream for herbicides would not be measurable because most of the land in the Upper McKay subwatershed is forest service lands while most of the land in the Allan Creek Subwatershed is private timberlands. There are no major agricultural activities in the watershed and most herbicide application

on private lands most likely occurs on a small scale to treat weeds around private residences or tree plantations. The actual amount used on private lands is unknown. Cumulative effects from other forest service weed sites in the watershed should be low to non existent because of the types of herbicides that will be used and the protective methods and PDFs that will be applied in relation to aquatic resources.

The sites that are to be treated with high risk herbicides are small and scattered therefore effects should be negated with the use of PDFs and application methods. It is very unlikely that amounts of picloram and triclopyr should they reach a stream would be at high enough level to directly affect fish. The small size of invasive plant site and PDFs would help reduce likelihood of adverse effects from herbicide treatment. There could be from possible indirect effects fish from effects to aquatic algae and macrophytes. These effects are not expected to be long lasting or large enough to affect fish populations' size or structure.

LOWER JOHN DAY SUBBASIN

Bridge Creek Watershed

(6TH HUC - Headwaters Bridge Creek 170702040301, Upper Bridge Creek 170702040303, Upper Bridge Bear Creek 170702040304, West Branch Bridge Creek 170702040302)

Streams in this watershed contain steelhead and redband trout. Invasive plant sites are located upstream of known steelhead use. Invasive plants proposed for herbicide or manual treatments are spotted knapweed, yellow starthistle, sulphur cinquefoil, medusahead, St. Johnswort, field bindweed, houndstongue and lesser burdock. First choice herbicides for treating these species are clopyralid, sulfometuron, metsulfuron and picloram. Picloram should only be used on sulphur cinquefoil as that is the only effective herbicide to really treat this species (Dave Langland, Oregon Dept. of Agriculture, pers. comm.). Picloram is a high risk herbicide to fish while the other herbicides are low to moderate risk to fish and aquatics. Invasive plant sites are primarily located along roads with project areas crossing and running near streams. Herbicide and sedimentation effects to fish in perennial streams will only be addressed because these are the only two habitat indicators that could affect fish with these weed species and treatment methods.

Manual Methods (Sedimentation)

In most project areas hand pulling will be used on small patches of invasive plants, where there are only a few scattered individuals distributed over a large area or in sensitive areas where the potential effects of hand pulling outweigh the potential effects of herbicide application. Hand pulling will mostly be in areas away from waterbodies but some individual plants may be pulled next to perennial streams or in intermittent channels.

Pulling could occur at 1-2 times yearly over all the entire invasive plant populations. The effect of pulling scattered plants along roadsides and even within the riparian areas would leave small patches of bare soil until covered with organics from the forest or new vegetation sprouted which could take 1-3 years depending on location. Pulling could occur at anytime during the spring summer or fall in most project areas. Amounts of

sediment produced from pulling would be very small and immeasurable against the other actions that have occurred in the watershed. Pulling invasive plants in these subwatersheds will have no effect or impact on steelhead or redband trout.

Cumulative effects of sedimentation to fish populations from hand pulling invasive plants would be immeasurable against sediments produced by timber harvest, grazing, roads and past fires in these subwatersheds.

Herbicide Application (Chemical Contamination)

Herbicides would be applied to sites using patch broadcast or hand spray application. This would be done once a season, generally in the spring or summer. There are 13 project areas that contain 94 invasive plant polygons totaling 290 acres (Table 20). Mapped invasive plant sites total 19 acres in six locations within 100 feet of perennial waterbodies (Table 21). Actual acres of invasive plants to be treated in these 74.6 acres is less than this because they are not all filled with invasive plants, exactly how much less is not known. The largest site (71-16) at 243 acres was professionally estimated to have only 9.8 acres of actual invasive plants. It crosses two perennial streams with known steelhead use approximately 1.3 miles downstream. It contains houndstongue which is typically treated with metsulfuron. The other two sites (71-10 and 71-32) over 10 acres were professionally estimated to have only 5.5 and 4.5 acres of actual weed plants. Site 71-10 is approximately 650 ft to a non fish bearing perennial stream. It has yellow starthistle and medusahead and will be treated with clopyralid and metsulfuron. Site 71-32 crosses a non fish bearing perennial stream that is located approximately 1.3 miles upstream of a stream used by steelhead. It has houndstongue and will be treated with metsulfuron.

Thirteen sites contain sulphur cinquefoil and one site has field bindweed, each site is less than 0.1 acre in size and all total 1.3 acres. The 1st choice herbicide for these species is picloram, which is known to be toxic to fish. Some of these sites are located along upper Bear Creek and NF Bear Creek a redband trout stream, the closest site to known steelhead usage downstream is approximately 1.4 miles away.

Table H-20. Acres and number of locations invasive plant sites occur within specified buffers for intermittent (Int.) streams by subwatershed and total acres and number of invasive plant sites by subwatershed. Results represent sites proposed for some form of herbicide treatment.

HUC6 Name	HUC6 Number	Acres within 100' of Int. Streams	Number of areas 100' from Int. Streams	Acres on Int. Stream Channels	Number of Infested Weed Sites	Total Weed Acres in HUC6	Total Sub-watershed Acres
HEADWATERS BRIDGE CREEK	170702040301	0.00	0	0.00	4	1.23	28608
WEST BRANCH BRIDGE CREEK	170702040302	6.46	1	0.23	76	257.41	25399
UPPER BRIDGE CREEK	170702040303	0.43	1	0.01	3	26.84	25978
UPPER BRIDGE BEAR CREEK	170702040304	0.10	3	0.00	35	2.33	16850

MIDDLE BRIDGE BEAR CREEK	170702040305	0.00	0	0.00	21	1.71	21537
	Totals	6.99	5.00	0.24	139.00	289.52	118373

Table H-21. Acres and number of locations invasive plant sites occur within specified buffers for perennial streams, rivers, lakes, and springs by subwatershed. Results represent sites proposed for some form of herbicide treatment.

HUC6 Name	HUC6 Number	Acres within 10' of perennial water	Number of areas 10' from perennial water	Acres within 100' of perennial water	Number of areas 100' from perennial water	Acres within 300' of perennial water	Number of areas 300' from perennial water
HEADWATERS BRIDGE CREEK	170702040301	0.00	0	0.00	0	0.10	1
WEST BRANCH BRIDGE CREEK	170702040302	1.71	6	18.37	9	58.86	20
UPPER BRIDGE CR.	170702040303	0.00	0	0.00	0	0.00	0
UPPER BRIDGE BEAR CREEK	170702040304	0.00	0	0.50	10	1.71	27
MIDDLE BRIDGE BEAR CREEK	170702040305	0.00	0	0.00	0	0.16	2
	Totals	1.71	6.00	18.87	19.00	60.83	50.00

The small size of the sites to be treated with picloram and long distance between them and steelhead streams should prevent any direct adverse effects to fish in these streams. Both intermittent and perennial streams would have buffers depending on herbicide and application method. The buffer distance between these fish populations and the invasive plant sites would allow time for the herbicides to break down and bind to soils. Because of the small size of the picloram sites and because they are spread throughout the subwatersheds even if a thunderstorm event occurred a few days after application the amounts of herbicide reaching the stream would likely not be at high enough levels to harm or effect fish living downstream.

SERA (2004) risk assessments found exposure levels to fish for chlorsulfuron, sulfometuron, metsulfuron and clopyralid to be below levels of concern for Forest Service programs. Picloram is moderately toxic to aquatic animals, particularly some species of fish. There is substantial variability in the toxicity of picloram to aquatic species. While this variability adds uncertainty to the dose-response assessment, it has no substantial impact on the risk characterization. None of the hazard indices for fish, aquatic invertebrates, or aquatic plants exceed a level of concern (SERA 2003).

Cumulative effects to fish populations downstream on private lands would be difficult to detect against herbicides and pesticides used on private agricultural lands in the watershed. All lands upstream are Forest Service lands. Cumulative effects from past treatments under the 1998 ONF weed EA are unlikely because these herbicide should be mostly broken down by now and these sites were small and located away from waterbodies.

UPPER JOHN DAY WATERSHEDS

Mountain Creek, Rock Creek, Upper Middle John Day, and the Lower South Fork Watersheds (HUC - 1707020113, 1707020114, 1707020112, 1707020105)

Streams in this watershed contain steelhead and redband trout. Infested weed sites are located upstream of known steelhead use. Weed species identified for herbicide or manual treatments are spotted knapweed, yellow starthistle, sulphur, medusahead, St. Johnswort, field bindweed, houndstongue and lesser burdock. First choice herbicides for treating these species are clopyralid, sulfometuron, metsulfuron and picloram. Picloram should only be used on sulphur cinquefoil as that is the only effective herbicide to really treat this species (Dave Langland, Oregon Dept. of Agriculture, personal communication). Picloram is high risk to fish while the other herbicides are low to moderate risk to fish and aquatics. Weed infestations are primarily located along roads with project areas crossing and running near streams. Herbicide and sedimentation effects to fish in perennial streams will only be addressed because these are the only two habitat indicators that could affect fish with these weed species and treatment methods.

Manual Methods (Sedimentation)

In most project areas hand pulling will be used on small patches of invasive plants, where there are only a few scattered individuals distributed over a large area or in sensitive areas where the potential effects of hand pulling outweigh the potential effects of herbicide application. Hand pulling will mostly be in areas away from waterbodies but some individual plants may be pulled next to perennial streams or in intermittent channels.

Pulling could occur at 1-2 times yearly over all the entire invasive plant populations. The effect of pulling scattered plants along roadsides and even within the riparian areas would leave small patches of bare soil until covered with organics from the forest or new vegetation sprouted which could take 1-3 years depending on location. Pulling could occur at anytime during the spring summer or fall in most project areas. Amounts of sediment produced from pulling would be very small and immeasurable against the other actions that have occurred in the watershed. Pulling invasive plants in these subwatersheds will have no effect or impact on steelhead or redband trout.

Cumulative effects of sedimentation to fish populations from hand pulling invasive plants would be immeasurable against sediments produced by timber harvest, grazing, roads and past fires in these subwatersheds.

Herbicide Application (Chemical Contamination)

Herbicides would be applied to sites using patch broadcast or hand spray application. This would be done once a season, generally in the spring or summer. There are 13 project areas that contain 79 invasive plant polygons that total 22.3 acres (Table 22). Mapped invasive plant sites total 12.2 acres in 23 locations within 100 feet of perennial waterbodies (Table 23). Actual acres of invasive plants to be treated in these is less than this because they are not all filled with invasive plants, exactly how much less is not known. The largest site (71-16) at 243 acres was estimated to have only 9.8 acres of actual plants. It crosses two perennial streams with known steelhead use to occur

approximately 1.3 miles downstream. It contains houndstongue which is typically treated with metsulfuron. The other two sites (71-10 and 71-32) over 10 acres were estimated to have only 5.5 and 4.5 acres of actual invasive plants. Site 71-10 is approximately 650 ft to a non fish bearing perennial stream. It has yellow starthistle and medusahead and will be treated with clopyralid and metsulfuron. Site 71-32 crosses a non fish bearing perennial stream that is located approximately 1.3 miles upstream of a stream used by steelhead. It has houndstongue and will be treated with metsulfuron. Thirteen sites contain sulphur cinquefoil and one site has field bindweed, each site is less than 0.1 acre in size and all total 1.3 acres. The 1st choice herbicide for these species is picloram, which is known to be toxic to fish. Some of these sites are located along upper Bear Creek and North Fork Bear Creek, a redband stream; the closest site to known steelhead usage downstream is approximately 1.4 miles away.

The small size of the sites to be treated with picloram and buffer distances between them and the streams should prevent any direct adverse affects to fish in these streams. Both intermittent and perennial streams would have buffers depending on herbicide and application method. The buffer distance between these fish populations and the invasive plant sites would allow time for the herbicides to break down and bind to soils. Because of the small size of the picloram sites and because they are spread throughout the subwatersheds even if a thunderstorm event occurred a few days after application the amounts of herbicide reaching the stream would not be at high enough levels to harm or effect fish living downstream.

SERA (2004) risk assessments found exposure levels to fish for sulfometuron, metsulfuron and clopyralid to be below levels of concern for Forest Service programs. Picloram is moderately toxic to aquatic animals, particularly some species of fish. There is substantial variability in the toxicity of picloram to aquatic species. While this variability adds uncertainty to the dose-response assessment, it has no substantial impact on the risk characterization. None of the hazard indices for fish, aquatic invertebrates, or aquatic plants exceed a level of concern (SERA 2003).

It is unlikely detectable amounts of herbicide would reach the stream. If they did levels would not be high enough to cause direct harm to fish. Herbicide application in the Bridge Creek Watershed may have some short term effects to algae and aquatic macrophytes; however, this is not expected to result in adverse effects to redband trout or steelhead.

Cumulative effects to fish populations downstream on private lands would be difficult to detect and would not add significantly to herbicides and pesticides used on private agricultural lands in the watershed. Upstream use of herbicides would be limited to this project. Herbicides used under the ONF 98 EA should be broken down and undetectable by the time this project is implemented.

Table H-22. Acres and number of locations invasive plant sites occur within specified buffers for intermittent (Int.) streams by subwatershed and total acres and number of invasive plant sites by subwatershed. Results represent sites proposed for some form of herbicide treatment.

HUC6 Name	HUC6 Number	Acres within 100' of Int. Streams	Number of areas 100' from Int. Streams	Acres on Int. Stream Channels	Number of Infested Weed Sites	Total Weed Acres in HUC6	Total Sub-watershed Acres
WIND CREEK	170702010501	0.00	0	0.00	6	0.49	17589
CORNER CREEK BLACK PINE CR.	170702010502	0.10	1	0.00	15	9.31	18746
BLACK CANYON CR.	170702010503	0.00	0	0.00	13	2.30	20826
JACKASS CREEK	170702010504	0.00	0	0.00	3	2.69	17621
COTTONWOOD CR.	170702011202	0.00	0	0.00	7	1.46	19363
UPPER MOUNTAIN CR.	170702011301	0.00	0	0.00	8	1.05	26402
MIDDLE MOUNTAIN CR.	170702011302	0.00	0	0.00	7	1.99	34850
UPPER ROCK CR.	170702011401	0.12	2	0.00	20	2.98	31271
	Totals	0.22	3	0.00	79	22.27	186668

Table H-23. Acres and number of locations invasive plant sites occur within specified buffers for perennial streams, rivers, lakes, and springs by subwatershed. Results represent sites proposed for some form of herbicide treatment.

HUC6 Name	HUC6 Number	Acres within 10' of perennial water	Number of areas 10' from perennial water	Acres within 100' of perennial water	Number of areas 100' from perennial water	Acres within 300' of perennial water	Number of areas 300' from perennial water
WIND CREEK	170702010501	0.00	0	0.01	1	0.20	2
CORNER CREEK BLACK PINE CREEK	170702010502	2.80	9	9.00	11	9.21	14
BLACK CANYON CR.	170702010503	0.00	0	0.00	0	0.00	0
JACKASS CREEK	170702010504	1.21	10	2.51	7	2.69	3
COTTONWOOD CR.	170702011202	0.03	1	0.47	1	0.75	1
UPPER MOUNTAIN CR.	170702011301	0.00	0	0.00	0	0.00	0
MIDDLE MOUNTAIN CR.	170702011302	0.01	1	0.10	1	0.85	2
UPPER ROCK CREEK	170702011401	0.00	0	0.10	2	0.30	4
	Totals	4.05	21	12.19	23	14.00	26

Table H-24. Road miles in RR/RHCA and in invasive plant treatment area by subwatershed.

Watershed Name	Subwatershed Unit Name	Miles of Road
MIDDLE SOUTH FORK JOHN DAY	PINE CREEK	0.3
MIDDLE SOUTH FORK JOHN DAY	SUNFLOWER CREEK	7.6
LOWER SOUTH FORK JOHN DAY	WIND CREEK	3.7
LOWER SOUTH FORK JOHN DAY	CORNER CREEK/BLACK PINE CREEK	0.2
LOWER SOUTH FORK JOHN DAY	BLACK CANYON CREEK	0.6
MOUNTAIN CREEK	MIDDLE MOUNTAIN CREEK	1.2
ROCK CREEK	UPPER ROCK CREEK	3.3
BRIDGE CREEK	HEADWATERS BRIDGE CREEK	1.4
BRIDGE CREEK	WEST BRANCH BRIDGE CREEK	7.1
BRIDGE CREEK	UPPER BRIDGE CREEK	0.5
BRIDGE CREEK	UPPER BRIDGE BEAR CREEK	14.8
BRIDGE CREEK	MIDDLE BRIDGE BEAR CREEK	0.0
CRANE PRAIRIE	SODA CREEK	1.9
CRANE PRAIRIE	QUINN CREEK	0.8
CRANE PRAIRIE	ELK LAKE	1.6
CRANE PRAIRIE	LAVA LAKES	3.5
CRANE PRAIRIE	CULTUS CREEK	0.5
CRANE PRAIRIE	DEER CREEK	0.5
CRANE PRAIRIE	CULTUS RIVER	0.7
CRANE PRAIRIE	CHARLTON CREEK	0.5
CRANE PRAIRIE	CRANE PRAIRIE	0.3
WICKIUP	ODELL LAKE	5.0
WICKIUP	ODELL CREEK	1.7
WICKIUP	DAVIS LAKE	1.4
WICKIUP	BROWNS CREEK	0.6
WICKIUP	DAVIS CREEK	0.2
WICKIUP	WICKIUP	0.5
FALL RIVER	DUTCHMAN CREEK	2.1
FALL RIVER	SPRING RIVER	0.4
FALL RIVER	FALL RIVER	0.7
FALL RIVER	PRINGLE FALLS	1.5
FALL RIVER	BATES BUTTE	0.5
PILOT BUTTE	COYOTE SPRING	4.2
PILOT BUTTE	BENHAM FALLS	2.1
PILOT BUTTE	BESSIE BUTTE	0.1
PILOT BUTTE	LAVA ISLAND FALLS	1.5
TUMALO CREEK	UPPER TUMALO CREEK	3.1
TUMALO CREEK	LOWER TUMALO CREEK	1.8
DEEP CANYON	THREE CREEK	1.3
DEEP CANYON	TRIANGLE HILL	0.2
SQUAW CREEK	UPPER SQUAW CREEK	2.1
SQUAW CREEK	UPPER TROUT CREEK	1.9
SQUAW CREEK	UPPER INDIAN FORD	0.3
SQUAW CREEK	LOWER TROUT CREEK	0.3

Watershed Name	Subwatershed Unit Name	Miles of Road
SQUAW CREEK	LOWER INDIAN FORD	0.5
SQUAW CREEK	LOWER SQUAW CREEK	1.5
UPPER METOLIUS RIVER	DRY CREEK	0.7
UPPER METOLIUS RIVER	CACHE CREEK	0.5
UPPER METOLIUS RIVER	UPPER LAKE CREEK	11.6
UPPER METOLIUS RIVER	LOWER LAKE CREEK	3.3
UPPER METOLIUS RIVER	HEADWATERS METOLIUS RIVER	3.9
UPPER METOLIUS RIVER	FIRST CREEK	11.6
UPPER METOLIUS RIVER	JACK CREEK	4.0
UPPER METOLIUS RIVER	CANYON CREEK	6.9
UPPER METOLIUS RIVER	ABBOT CREEK	2.8
UPPER METOLIUS RIVER	CANDLE CREEK	0.6
LOWER METOLIUS RIVER	UPPER METOLIUS RIVER	6.2
LOWER METOLIUS RIVER	MIDDLE METOLIUS RIVER	5.9
LOWER METOLIUS RIVER	UPPER FLY CREEK	0.6
LOWER METOLIUS RIVER	LOWER FLY CREEK	3.0
LOWER METOLIUS RIVER	LOWER METOLIUS RIVER	4.7
LAKE BILLY CHINOOK	STEVENS CANYON	0.0
LAKE BILLY CHINOOK	CARCASS CANYON	0.4
LAKE BILLY CHINOOK	GENEVA	0.1
UPPER LITTLE DESCHUTES RIVER	LITTLE ODELL CREEK	0.1
UPPER LITTLE DESCHUTES RIVER	BUNNY BUTTE	1.1
UPPER LITTLE DESCHUTES RIVER	GILCHRIST JUNCTION	0.2
CRESCENT CREEK	LOWER BIG MARSH CREEK	0.1
CRESCENT CREEK	CRESCENT LAKE	3.3
CRESCENT CREEK	COLD CREEK	2.5
CRESCENT CREEK	MIDDLE CRESCENT CREEK	1.5
LITTLE WALKER MOUNTAIN	NORTH PAUNINA	0.3
LONG PRAIRIE	BEAL	0.1
LOWER LITTLE DESCHUTES RIVER	UPPER PAULINA CREEK	0.4
LOWER LITTLE DESCHUTES RIVER	LOWER PAULINA CREEK	0.2
SOUTH FORK BEAVER CREEK	LOWER SOUTH FORK BEAVER CREEK	0.0
UPPER BEAVER CREEK	BEAVERDAM CREEK	1.5
UPPER BEAVER CREEK	POWELL CREEK	2.4
UPPER BEAVER CREEK	SUGAR CREEK	0.5
PAULINA CREEK	UPPER PAULINA CREEK	8.9
PAULINA CREEK	DRY PAULINA CREEK	5.7
LOWER BEAVER CREEK	NORTH WOLF CREEK	0.9
LOWER BEAVER CREEK	WOLF CREEK	13.1
CROOKED RIVER ABOVE NORTH FORK	MAURY CREEK	1.7
CAMP CREEK	INDIAN CREEK	2.1
CAMP CREEK	LOWER CAMP CREEK	0.1
UPPER NORTH FORK CROOKED RIVER	GRAY CREEK	0.0
UPPER NORTH FORK CROOKED RIVER	ELLIOTT CREEK	1.7
UPPER NORTH FORK CROOKED RIVER	HOWARD CREEK	6.6

Watershed Name	Subwatershed Unit Name	Miles of Road
UPPER NORTH FORK CROOKED RIVER	JOHNSON CREEK	2.9
UPPER NORTH FORK CROOKED RIVER	HEADWATERS NORTH FORK CROOKED RIVER	0.1
UPPER NORTH FORK CROOKED RIVER	PETERSON CREEK	0.1
UPPER NORTH FORK CROOKED RIVER	PORTER CREEK	0.2
UPPER NORTH FORK CROOKED RIVER	LOWER BIG SUMMIT PRAIRIE	4.1
DEEP CREEK	JACKSON CREEK	8.9
DEEP CREEK	LITTLE SUMMITT PRAIRIE CREEK	9.9
DEEP CREEK	LOWER DEEP CREEK	11.8
LOWER NORTH FORK CROOKED RIVER	UPPER NORTH FORK CANYON	4.7
UPPER CROOKED RIVER	LOST CREEK	1.6
UPPER CROOKED RIVER	DRAKE CREEK	2.1
UPPER CROOKED RIVER	PINE CREEK	2.9
UPPER CROOKED RIVER	NEWSOME CREEK	9.0
UPPER CROOKED RIVER	UPPER HORSE HEAVEN CREEK	0.4
BEAR CREEK	HEADWATERS BEAR CREEK	9.0
BEAR CREEK	UPPER BEAR CREEK	0.1
BEAR CREEK	LITTLE BEAR CREEK	1.1
UPPER OCHOCO CREEK	HEADWATERS OCHOCO CREEK	14.0
UPPER OCHOCO CREEK	UPPER MARKS CREEK	13.1
UPPER OCHOCO CREEK	LOWER MARKS CREEK	15.4
UPPER OCHOCO CREEK	DUNCAN CREEK	6.2
MILL CREEK	UPPER MILL CREEK	5.1
MILL CREEK	LOWER MILL CREEK	5.7
LOWER OCHOCO CREEK	VEASIE CREEK	0.1
MCKAY CREEK	UPPER MCKAY CREEK	14.8
MCKAY CREEK	ALLEN CREEK	0.7
BADLANDS	KOTZMAN	0.1
CROOKED RIVER VALLEY	LONE PINE CREEK	2.5
CROOKED RIVER VALLEY	MCALLISTER SLOUGH	0.4
CROOKED RIVER GRASSLAND	UPPER CROOKED RIVER GORGE	0.2
CROOKED RIVER GRASSLAND	LOWER CROOKED RIVER GORGE	0.2
HEADWATERS DESCHUTES RIVER	LAKE SIMTUSTUS	0.0
WILLOW CREEK	UPPER WILLOW CREEK	0.1
WILLOW CREEK	RIMROCK SPRING	2.1
WILLOW CREEK	MIDDLE WILLOW CREEK	2.2
WILLOW CREEK	DRY CANYON	2.5
WILLOW CREEK	LOWER WILLOW CREEK	0.2
UPPER TROUT CREEK	OPAL CREEK	2.5
UPPER TROUT CREEK	FOLEY CREEK	3.4
UPPER TROUT CREEK	HEADWATERS TROUT CREEK	7.2
MUD SPRINGS CREEK	UPPER MUD SPRINGS CREEK	3.5
MUD SPRINGS CREEK	SAGEBRUSH CREEK	0.6
	Total	**380.2**

Table H-25. Number of stream crossings by roads within infested invasive plant treatment sites on class 1, 2 and 3 TES fish steam.

HUC	XING WITHOUT TES	XING WITH TES	TOTAL XINGS
170702010304 - SUNFLOWER CREEK	3	12	15
170702010501 - WIND CREEK		5	5
170702010503 - BLACK CANYON CREEK	2	1	3
170702011302 - MIDDLE MOUNTAIN CREEK	2	1	3
170702011401 - UPPER ROCK CREEK		4	4
170702040301 - HEADWATERS BRIDGE CREEK	3	1	4
170702040302 - WEST BRANCH BRIDGE CREEK	13		13
170702040304 - UPPER BRIDGE BEAR CREEK	18	6	24
170703010101 - SODA CREEK	6		6
170703010102 - QUINN CREEK	4		4
170703010103 - ELK LAKE	2		2
170703010104 - LAVA LAKES		5	5
170703010105 - CULTUS CREEK		2	2
170703010106 - DEER CREEK		2	2
170703010107 - CULTUS RIVER		1	1
170703010108 - CHARLTON CREEK	1		1
170703010201 - ODELL LAKE	15	2	17
170703010202 - ODELL CREEK	1	1	2
170703010205 - BROWNS CREEK	1		1
170703010207 - WICKIUP		1	1
170703010306 - BATES BUTTE		1	1
170703010402 - COYOTE SPRING	1		1
170703010501 - UPPER TUMALO CREEK		5	5
170703010802 - UPPER SQUAW CREEK	2		2
170703010803 - UPPER TROUT CREEK	1	1	2
170703010807 - LOWER INDIAN FORD		2	2
170703010809 - LOWER SQUAW CREEK		2	2
170703010903 - UPPER LAKE CREEK	6		6
170703010904 - LOWER LAKE CREEK		2	2
170703010905 - HEADWATERS METOLIUS RIVER	2	4	6
170703010906 - FIRST CREEK		1	1
170703010907 - JACK CREEK		2	2
170703010908 - CANYON CREEK	7	3	10
170703010909 - ABBOT CREEK		2	2
170703011003 - MIDDLE METOLIUS RIVER	1	2	3
170703011005 - LOWER FLY CREEK	1	1	2
170703020105 - GILCHRIST JUNCTION	1		1
170703020204 - CRESCENT LAKE		1	1
170703020205 - COLD CREEK	3	4	7
170703020206 - MIDDLE CRESCENT CREEK		2	2
170703020703 - LOWER PAULINA CREEK	1		1
170703030801 - BEAVERDAM CREEK		1	1
170703030802 - POWELL CREEK	1	6	7
170703030803 - SUGAR CREEK	1	1	2
170703030901 - UPPER PAULINA CREEK	24	3	27
170703030902 - DRY PAULINA CREEK	3	6	9
170703031001 - NORTH WOLF CREEK	1	2	3
170703031002 - WOLF CREEK		11	11
170703040103 - MAURY CREEK		3	3

170703040201 - INDIAN CREEK	6	1	7
170703040302 - ELLIOTT CREEK	2	3	5
170703040303 - HOWARD CREEK	5	8	13
170703040304 - JOHNSON CREEK		11	11
170703040308 - LOWER BIG SUMMIT PRAIRIE	1	2	3
170703040401 - JACKSON CREEK	1	5	6
170703040402 - LITTLE SUMMITT PRAIRIE CREEK	1	5	6
170703040403 - LOWER DEEP CREEK	5	10	15
170703040501 - UPPER NORTH FORK CANYON		4	4
170703040601 - LOST CREEK		1	1
170703040602 - DRAKE CREEK	5	2	7
170703040603 - PINE CREEK	3	1	4
170703040604 - NEWSOME CREEK	2	7	9
170703040605 - UPPER HORSE HEAVEN CREEK	2	1	3
170703040701 - HEADWATERS BEAR CREEK	8	7	15
170703050201 - HEADWATERS OCHOCO CREEK	8	25	33
170703050203 - UPPER MARKS CREEK	13	18	31
170703050204 - LOWER MARKS CREEK	17	20	37
170703050205 - DUNCAN CREEK	7	13	20
170703050301 - UPPER MILL CREEK	3	7	10
170703050302 - LOWER MILL CREEK	2	3	5
170703050501 - UPPER MCKAY CREEK	5	15	20
170703050502 - ALLEN CREEK		1	1
170703051004 - LONE PINE CREEK	1		1
170703051005 - MCALLISTER SLOUGH	2		2
170703060201 - UPPER WILLOW CREEK		1	1
170703060202 - RIMROCK SPRING	2		2
170703060203 - MIDDLE WILLOW CREEK	7		7
170703060204 - DRY CANYON	3		3
170703070101 - OPAL CREEK	4	2	6
170703070102 - FOLEY CREEK	3	3	6
170703070103 - HEADWATERS TROUT CREEK	10	8	18
Totals	**255**	**296**	**551**

Table H- 26. Subwatersheds with infested weed sites 300 feet or greater distance from Class 1, 2, or 3 streams and perennial lakes and ponds and reservoirs.

WATERSHED NAME	SUBWATERSHED NAME	HUC6
LONG PRAIRIE	BEAL	170703020605
UPPER BEAVER CREEK	BEAVERDAM CREEK	170703030801
PILOT BUTTE	BESSIE BUTTE	170703010406
PINE	BIG HOLE	171200050601
WICKIUP	BROWNS CREEK	170703010205
UPPER LITTLE DESCHUTES RIVER	BUNNY BUTTE	170703020104
MC CARTY	BUTTE WELL	171200050504
LAKE BILLY CHINOOK	CARCASS CANYON	170703011102
DEVILS GARDEN	CHINA HAT	171200050701
UPPER CROOKED RIVER	CONANT CREEK	170703040608
LITTLE WALKER MOUNTAIN	CORRAL SPRINGS	170703020501
WICKIUP	DAVIS LAKE	170703010204
DEEP CANYON	DEEP CANYON	170703010604
DEVILS GARDEN	DOME	171200050702
UPPER METOLIUS RIVER	DRY CREEK	170703010901
MC CARTY	DRY CREEK	171200050503
FALL RIVER	DUTCHMAN CREEK	170703010301
CRANE PRAIRIE	ELK LAKE	170703010103
UPPER NORTH FORK CROOKED RIVER	ELLIOTT CREEK	170703040302
SQUAW CREEK	FOURMILE BUTTE	170703010804
LAKE BILLY CHINOOK	GENEVA	170703011103
UPPER LITTLE DESCHUTES RIVER	GILCHRIST	170703020106
LONG PRAIRIE	GREEN BUTTE	170703020602
PILOT BUTTE	GREEN MOUNTAIN	170703010405
SQUAW CREEK	HEADWATERS SQUAW CREEK	170703010801
UPPER LITTLE DESCHUTES RIVER	HEMLOCK CREEK	170703020102
UPPER DRY RIVER	HORSE RIDGE	170703050709
LOWER DRY RIVER	HUNTER	170703050803
LONG PRAIRIE	IPSOOT BUTTE	170703020604
LOWER METOLIUS RIVER	JUNIPER CREEK	170703011006
LOWER LITTLE DESCHUTES RIVER	KAWAK BUTTE WEST	170703020705
BADLANDS	KOTZMAN	170703050604
HEADWATERS DESCHUTES RIVER	LAKE SIMTUSTUS	170703060103
LOWER LITTLE DESCHUTES RIVER	LAPINE	170703020704
BEAR CREEK	LITTLE BEAR CREEK	170703040705
UPPER LITTLE DESCHUTES RIVER	LITTLE ODELL CREEK	170703020103
LITTLE WALKER MOUNTAIN	LITTLE WALKER MOUNTAIN	170703020504
CAMP CREEK	LOWER CAMP CREEK	170703040205
CROOKED RIVER GRASSLAND	LOWER CROOKED RIVER GORGE	170703051102
LONG PRAIRIE	LOWER LONG PRAIRIE	170703020609
SOUTH FORK BEAVER CREEK	LOWER SOUTH FORK BEAVER CR	170703030704
WILLOW CREEK	LOWER WILLOW CREEK	170703060205
BRIDGE CREEK	MIDDLE BRIDGE BEAR CREEK	170702040305
UPPER DRY RIVER	MILLICAN EAST	170703050706
LONG PRAIRIE	MOFFITT BUTTE	170703020603
PILOT BUTTE	MOKST BUTTE WEST	170703010401
WICKIUP	MOORE CREEK	170703010203
UPPER BEAVER CREEK	NORTH FORK BEAVER CREEK	170703030804
LITTLE WALKER MOUNTAIN	NORTH PAUNINA	170703020503
BADLANDS	OBSERVATORY RIDGE	170703050606
PINE	OOSKAN BUTTE	171200050603
LONG PRAIRIE	PAULINA PEAK SOUTH	170703020608
UPPER NORTH FORK CROOKED RIVER	PETERSON CREEK	170703040306

WATERSHED NAME	SUBWATERSHED NAME	HUC6
PINE	PINE LAKE	171200050604
UPPER DRY RIVER	PINE MOUNTAIN	170703050707
DEVILS GARDEN	PORCUPINE	171200050704
UPPER NORTH FORK CROOKED RIVER	PORTER CREEK	170703040307
BADLANDS	POTHOLES	170703050605
LOWER DRY RIVER	REYNOLDS POND	170703050805
DEVILS GARDEN	SIXTEEN BUTTE	171200050703
CRANE PRAIRIE	SODA CREEK	170703010101
FALL RIVER	SPRING RIVER	170703010303
LAKE BILLY CHINOOK	STEVENS CANYON	170703011101
LOWER DRY RIVER	STOOKEY	170703050804
LOWER LITTLE DESCHUTES RIVER	SUGAR PINE BUTTE	170703020706
LONG PRAIRIE	SURVEYORS LAVA FLOW	170703020607
UPPER DRY RIVER	TEEPEE DRAW	170703050708
DEEP CANYON	THREE CREEK	170703010601
DEEP CANYON	TRIANGLE HILL	170703010602
BRIDGE CREEK	UPPER BRIDGE CREEK	170702040303
CROOKED RIVER GRASSLAND	UPPER CROOKED RIVER GORGE	170703051101
LOWER METOLIUS RIVER	UPPER FLY CREEK	170703011004
MOUNTAIN CREEK	UPPER MOUNTAIN CREEK	170702011301
MUD SPRINGS CREEK	UPPER MUD SPRINGS CREEK	170703070401
PRINEVILLE RESERVOIR	UPPER PRINEVILLE RESERVOIR	170703040801
SALT CREEK/WILLAMETTE RIVER	UPPER SALT CREEK	170900010301
LOWER OCHOCO CREEK	VEASIE CREEK	170703050402
LOWER LITTLE DESCHUTES RIVER	WICKIUP JUNCTION	170703020701

Table H-27. Infested weed site acres and high risk road crossing sites for class 1, 2 and 3 streams, perennial lakes ponds and reservoirs by subwatershed. Subwatersheds with TE steelhead or bull trout are in bold.

Subwatershed Number and Name	Acres Within 100 ft of Class 1 Streams	Acres Within 100 ft of Class 2 Streams	Acres Within 100 ft of Class 3 Streams	Acres Within 100 ft Lakes	Acres 300 ft Around Road xings	Total Weed Site Acres in Aquatic Influence Zone	Total Acres of Subwatershed	Total Weed Acres in the Subwatershed	% of Subwatershed in Weed Acres
170702010303 - PINE CREEK			0.0				21107.0	0.6	0.00
170702010304 - SUNFLOWER CREEK		0.1	0.3			0.4	18546.5	11.8	0.06
170702010501 - WIND CREEK							17588.6	0.5	0.00
170702010502 - CORNER CREEK/BLACK PINE CREEK	7.5					7.5	18745.7	9.3	0.05
170702010504 - JACKASS CREEK	2.3					2.3	17620.7	2.7	0.02
170702011202 - COTTONWOOD CREEK	0.5					0.5	19363.0	1.4	0.01
170702011302 - MIDDLE MOUNTAIN CREEK		0.1				0.1	34850.4	2.0	0.01

Subwatershed Number and Name	Acres Within 100 ft of Class 1 Streams	Acres Within 100 ft of Class 2 Streams	Acres Within 100 ft of Class 3 Streams	Acres Within 100 ft Lakes	Acres 300 ft Around Road xings	Total Weed Site Acres in Aquatic Influence Zone	Total Acres of Subwatershed	Total Weed Acres in the Subwatershed	% of Subwatershed in Weed Acres
170702011401 - UPPER ROCK CREEK		0.1	0.0			0.1	31271.1	2.9	0.01
170702040301 - HEADWATERS BRIDGE CREEK					0.1	0.1	28608.4	1.2	0.00
170702040302 - WEST BRANCH BRIDGE CREEK		6.1	11.6		12.5	30.1	25399.0	257.3	1.01
170702040304 - UPPER BRIDGE BEAR CREEK	0.1	0.4	0.1		0.2	0.7	16850.0	2.2	0.01
170703010101 - SODA CREEK				0.0			23332.7	5.6	0.02
170703010102 - QUINN CREEK				0.8		0.8	13257.7	3.3	0.02
170703010104 - LAVA LAKES	2.5			14.4	0.1	17.1	26874.7	31.2	0.12
170703010105 - CULTUS CREEK	0.4				0.7	1.1	22651.9	1.1	0.00
170703010107 - CULTUS RIVER	0.1				0.2	0.3	13289.4	0.8	0.01
170703010108 - CHARLTON CREEK		0.6		2.1		2.7	18940.4	10.6	0.06
170703010109 - CRANE PRAIRIE	0.3			22.4		22.7	25284.9	25.8	0.10
170703010201 - ODELL LAKE		8.4	0.8	1.5	13.9	24.6	23170.1	219.9	0.95
170703010202 - ODELL CREEK	1.8	1.0			3.6	6.4	13830.3	56.1	0.41
170703010206 - DAVIS CREEK				4.3		4.3	17638.7	50.6	0.29
170703010207 - WICKIUP	0.5			8.1		8.6	26963.6	11.8	0.04
170703010305 - PRINGLE FALLS	4.7					4.7	16854.9	21.5	0.13
170703010306 - BATES BUTTE	0.2				0.5	0.7	11243.5	1.5	0.01
170703010402 - COYOTE SPRING	0.3					0.3	15537.2	120.2	0.77
170703010403 - BENHAM FALLS	0.2					0.2	22900.0	73.4	0.32
170703010406 - BESSIE BUTTE				0.0			47956.4	151.7	0.32
170703010407 - LAVA ISLAND FALLS	0.1					0.1	29267.4	132.9	0.45
170703010501 - UPPER TUMALO CREEK	2.2	0.1			0.6	2.9	20744.1	5.7	0.03
170703010502 - LOWER TUMALO	0.1					0.1	16967.5	3.6	0.02

Subwatershed Number and Name	Acres Within 100 ft of Class 1 Streams	Acres Within 100 ft of Class 2 Streams	Acres Within 100 ft of Class 3 Streams	Acres Within 100 ft Lakes	Acres 300 ft Around Road xings	Total Weed Site Acres in Aquatic Influence Zone	Total Acres of Subwatershed	Total Weed Acres in the Subwatershed	% of Subwatershed in Weed Acres
CREEK									
170703010802 - UPPER SQUAW CREEK			4.7		0.7	5.5	18290.5	44.2	0.24
170703010803 - UPPER TROUT CREEK		10.3			1.0	11.3	12105.0	44.8	0.37
170703010807 - LOWER INDIAN FORD		4.6			3.6	8.3	23659.9	276.1	1.17
170703010809 - LOWER SQUAW CREEK	55.9				4.1	60.0	20237.0	654.0	3.23
170703010903 - UPPER LAKE CREEK		3.0	2.3	1.1	2.5	8.8	11136.1	270.5	2.43
170703010904 - LOWER LAKE CREEK		1.3		2.5	1.8	5.6	10965.4	244.2	2.23
170703010905 - HEADWATERS METOLIUS RIVER	116.9	3.2	1.5		2.8	124.4	15501.3	435.4	2.81
170703010906 - FIRST CREEK	4.7				0.8	5.5	13177.3	122.1	0.93
170703010908 - CANYON CREEK	3.8	1.7	0.1		3.8	9.4	21068.4	272.3	1.29
170703010910 - CANDLE CREEK	3.3					3.3	10956.7	62.9	0.57
170703011002 - UPPER METOLIUS RIVER	10.8		1.0			11.8	31553.5	184.0	0.58
170703011003 - MIDDLE METOLIUS RIVER	3.6		2.8		4.0	10.4	21208.1	279.8	1.32
170703011005 - LOWER FLY CREEK	6.0	10.3			0.5	16.8	16226.5	129.5	0.80
170703011007 - LOWER METOLIUS RIVER		2.8		0.0		2.8	24301.0	185.7	0.76
170703011102 - CARCASS CANYON				0.5		0.5	16128.0	677.4	4.20
170703020202 - LOWER BIG MARSH CREEK	0.4					0.4	19535.8	2.7	0.01
170703020204 - CRESCENT LAKE	2.2			44.7	0.9	47.8	17589.5	176.4	1.00
170703020205 - COLD CREEK	3.9	6.3			9.8	20.1	13435.5	133.3	0.99
170703020206 - MIDDLE	2.0				2.3	4.3	18051.4	120.3	0.67

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CRESCENT CREEK									
170703020702 - UPPER PAULINA CREEK				5.2		5.2	13290.2	5.6	0.04
170703020703 - LOWER PAULINA CREEK	1.3				0.6	1.9	19554.1	11.9	0.06
170703030802 - POWELL CREEK		2.0	0.7		2.7	5.4	20096.6	11.2	0.06
170703030803 - SUGAR CREEK	2.0				0.5	2.5	10351.6	5.0	0.05
170703030901 - UPPER PAULINA CREEK		14.2	113.1	6.5	12.7	146.6	18083.0	616.0	3.41
170703030902 - DRY PAULINA CREEK		8.2	9.7	1.5	2.0	21.3	15860.2	222.2	1.40
170703031002 - WOLF CREEK	0.6	4.1			0.2	4.9	21525.3	22.6	0.10
170703040103 - MAURY CREEK		0.2				0.2	19195.8	2.3	0.01
170703040201 - INDIAN CREEK		0.3				0.3	12414.2	1.6	0.01
170703040303 - HOWARD CREEK		0.2				0.2	11706.2	0.6	0.01
170703040304 - JOHNSON CREEK		0.5			0.1	0.5	18399.1	0.6	0.00
170703040306 - PETERSON CREEK				0.4		0.4	16814.7	22.0	0.13
170703040401 - JACKSON CREEK		0.1				0.1	24237.6	27.2	0.11
170703040402 - LITTLE SUMMITT PRAIRIE CREEK	0.1		0.1			0.2	16601.1	1.0	0.01
170703040403 - LOWER DEEP CREEK	0.8	0.6	0.3		0.2	1.8	14577.7	23.6	0.16
170703040501 - UPPER NORTH FORK CANYON		0.1				0.1	19690.8	8.4	0.04
170703040601 - LOST CREEK		0.1				0.1	20388.0	0.2	0.00
170703040602 - DRAKE CREEK		3.4			2.1	5.6	10346.7	33.5	0.32
170703040603 - PINE CREEK		0.1				0.1	29909.0	0.4	0.00
170703040604 - NEWSOME		0.3				0.3	21125.3	6.2	0.03

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CREEK									
170703040605 - UPPER HORSE HEAVEN CREEK			1.4		2.1	3.5	18731.2	43.6	0.23
170703040701 - HEADWATERS BEAR CREEK		0.5	0.2		0.2	1.0	23377.2	3.2	0.01
170703050201 - HEADWATERS OCHOCO CREEK	0.2	0.3	0.0		0.5	0.9	16124.6	8.0	0.05
170703050203 - UPPER MARKS CREEK	0.3	0.1			0.1	0.4	20560.6	6.3	0.03
170703050204 - LOWER MARKS CREEK	0.6	0.1			0.1	0.8	18236.2	6.5	0.04
170703050205 - DUNCAN CREEK			0.1		0.9	1.0	22510.0	9.1	0.04
170703050301 - UPPER MILL CREEK	0.4	0.3	0.1		0.1	0.9	21460.0	1.2	0.01
170703050302 - LOWER MILL CREEK	0.1		0.0		0.2	0.3	24540.2	1.5	0.01
170703050501 - UPPER MCKAY CREEK	1.0	4.1	0.3		0.7	6.1	20471.6	16.8	0.08
170703050502 - ALLEN CREEK		0.1			0.2	0.3	18251.5	0.5	0.00
170703051005 - MCALLISTER SLOUGH			22.1		8.1	30.2	34276.0	734.6	2.14
170703060201 - UPPER WILLOW CREEK		0.6			0.4	0.9	30758.3	49.6	0.16
170703060202 - RIMROCK SPRING		0.8	33.0	2.4	7.5	43.7	11085.2	1374.5	12.40
170703060203 - MIDDLE WILLOW CREEK			25.3		11.8	37.1	20726.4	181.6	0.88
170703060204 - DRY CANYON		7.5		5.0	4.6	17.0	34023.1	146.4	0.43
170703070101 - OPAL CREEK		0.1				0.1	11425.6	0.3	0.00
170703070102 - FOLEY CREEK		0.1				0.1	22008.7	0.6	0.00
170703070103 - HEADWATERS TROUT CREEK	0.2		0.1		0.4	0.7	16662.2	4.6	0.03
Total Weed Site Acres in Aquatic Zone	244.5	109.2	231.8	123.4	130.2	839.1	1731178.7	9145.6	0.53