



**State of Washington**

**DEPARTMENT OF FISH AND WILDLIFE**

Mailing Address: 600 Capitol Way N • Olympia, WA 98501-1091 • (360) 902-2200, TDD (360) 902-2207  
Main Office Location: Natural Resources Building • 1111 Washington Street SE • Olympia, WA

**HABITAT PROGRAM  
TECHNICAL APPLICATIONS DIVISION (TAPPS)**

**LT Murray Wildlife Area Fish Passage Barrier and Diversion Screening  
Scoping and Correction Report**

**August, 2007**

**By Alex Uber**

This report is also available in a pdf format at:  
[http://wdfw.wa.gov/hab/tapps/tapps\\_prods.htm](http://wdfw.wa.gov/hab/tapps/tapps_prods.htm)

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## **Introduction**

This report summarizes work accomplished to date on the LT Murray Wildlife Area (LTMWA) to correct fish passage barriers and non-compliant surface water diversions identified in the *LT Murray Wildlife Area Fish Passage and Diversion Screening Prioritization Inventory*,<sup>1</sup> (Inventory Report). This report is a continuation of the effort to bring WDFW owned lands into compliance with RCW 77.55.030, which states that “a dam or obstruction across or in a stream shall be fitted with a durable and efficient fishway...”, and RCW 77.57.010, which states that “a diversion device used for conducting water from a lake, river, or stream for any purpose shall be equipped with a fish guard...”

Nearly all noncompliant structures identified on the wildlife area were fish passage barrier culverts at logging road crossings. As a result of the Technical Applications Division (TAPPS) effort to remove or replace these fish passage barriers, legacy logging roads were identified that could be abandoned and thereby meet the overlapping objectives of the Department of Natural Resources (DNR) Road Maintenance and Abandonment Plan (RMAP) process. TAPPS personnel worked with WDFW Region 3 (District 8) Wildlife and Habitat programs, and DNR Southeast Region personnel to meet the objectives of TAPPS fish passage barrier correction efforts, while simultaneously meeting or exceeding the objectives of RMAP. As a result, significant RMAP expenditures on the LTMWA have been avoided through abandonment of roads that would have otherwise required significant upgrade effort and expense.

The Inventory Report discusses the potential for salmonid habitat restoration on the LTMWA as it relates to fish passage barriers, located both within and outside of the wildlife area boundary. The discussion presented herein however, shall be limited to the scoping and correction of fish passage barriers located within the wildlife area boundaries only.

## **Site Description**

The 94,352 acre LT Murray Wildlife Area is part of the greater LT Murray ‘Cooperative Management Area’, which encompasses land under WDFW, DNR, US Forest Service (USFS) and private ownership. The wildlife area consists of three major subunits; the LT Murray (LTM), Whiskey Dick, and Quilomene (see, Figure 1). The LTM is 48,000 acres in size and is located west of the Yakima River and Interstate 90, and generally northwest of the City of Ellensburg. It encompasses most of the North Fork Manastash Creek watershed, generally the lower half of the Taneum Creek watershed upstream of I-90, and

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<sup>1</sup> LT Murray Wildlife Area Fish Passage and Diversion Screening Prioritization Inventory, Habitat Program Technical Applications Division Habitat and Passage Projects Section, WFDW, March 2003

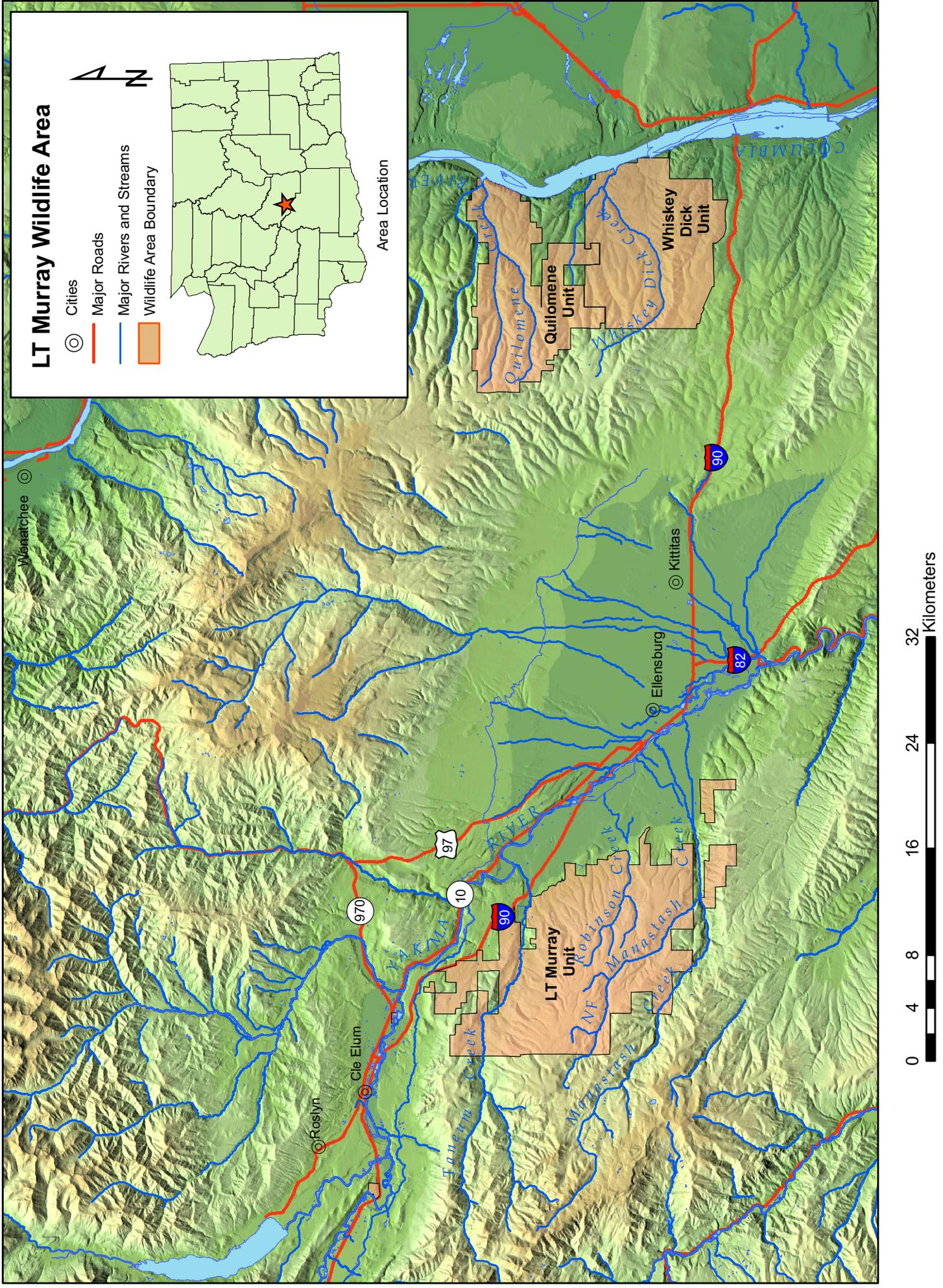


Figure 1. LT Murray Wildlife Area.

the upper portions of Robinson, Joe Watt, Morrison Canyon, and other minor drainages. The Whiskey Dick (28,549 acres) and Quilomene (17,803 acres) subunits are located about 30 miles east of Ellensburg, drain the southeast slope of the Colockum Mountain range, and encompass Whiskey Dick Creek, Quilomene Creek and other smaller, seasonal drainages.

The LTM, and the Quilomene/Whiskey Dick subunits differ significantly in elevation, annual precipitation, and dominant vegetation type. The LTM is located in the eastern foothills of the Cascade Mountains ranging in elevation between 1,200 and 4,700 feet, and is dominated by arid fir and pine forests, with annual precipitation ranging between 60 inches in the upper Taneum Creek watershed and 10 inches on lower Manastash Creek. The Quilomene/Whiskey Dick complex is located in the predominantly shrub-steppe vegetation zone between the Colockum mountain range and the Columbia River. Streams in this area are mainly fed by springs and snowmelt from headwater tributaries which drain the east side of Colockum ridge. Annual precipitation within the Whiskey Dick/Quilomene watersheds is approximately 10 inches.

### Fish Use

Limited fish presence surveys were conducted during project scoping on streams throughout the wildlife area prior to construction activities. These surveys included electroshocking, visual observations, and fish removal during project site dewatering. The fish presence information gained from these surveys generally agree with other fish presence studies on upper Yakima River and tributaries, in that fish-bearing streams in headwater tributaries on the LTM are predominantly utilized by Westslope Cutthroat Trout (*Oncorhynchus clarki lewisi*)<sup>2</sup>. This species was found during scoping in the upper most reaches and tributaries of NF Manastash and Taneum creeks, and was the only fish species observed in the Robinson Creek and Shadow Creek systems. These fish appeared to be numerous in Robinson and Shadow Creeks, where fish relocation was done prior to barrier removal projects. For example, 75 individuals were removed from the culvert plunge pool of site 981502 on Robinson Creek during the removal of this culvert. Non-salmonid fishes were not observed at any of the survey or project locations during pre-project scoping, or during dewatering and fish removal activities undertaken prior to instream work.

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<sup>2</sup> McMichael, Geoffrey, Olsen J., Bartrand E., Fisher N., Hindman J., Leider S., "Yakima River Species Interaction Studies", 1991 Annual Report, Project No. 198910500 (BPA Report DOE/BP-01483-2)



**Photo 1.** Robinson Creek West Slope Cutthroat Trout (*Oncorhynchus clarki lewisi*)

Rainbow Trout (*Oncorhynchus mykiss*) were observed in the mainstem Manastash and Tanuem Creeks. Rainbow trout were found in Joe Watt Creek, a Taneum Creek tributary which is currently entirely diverted into the Taneum Ditch Canal (see Figure 4). These fish were found below an impassable culvert under the Packwood Canal, about 280 meters downstream of the wildlife area boundary. While fish have not been observed upstream of this barrier culvert, given consistent flows in lower Joe Watt Creek within the wildlife area and the presence of fish immediately below the Packwood Canal crossing, it is very likely that historically they were present upstream of this barrier.

Horseshoe Canyon and Morrison Canyon Creeks were found to be non-fishbearing within the wildlife area, due to seasonally insufficient flows. This is consistent with WSDOT fish passage barrier scoping results for the culverts under Interstate 90, completed in 2001<sup>3</sup>. Horseshoe Canyon and Morrison Canyon Creeks flow under Interstate 90 downstream of the LTM.

Brook trout (*Salvelinus fontinalis*) were found in lower Cedar Creek, a Taneum Creek tributary.

Regarding anadromous fish, the upper Yakima River and tributaries were historically the most productive portion of the Yakima River compared to mid and lower mainstem reaches and tributaries<sup>4</sup>. Manastash and Tanuem Creeks and associated tributaries supported anadromous spawning and rearing in their lower reaches within present wildlife area boundaries<sup>5</sup>. Smaller tributary streams of sufficient size and flow such as Robinson Creek very likely supported runs of coho and summer steelhead. However, anadromous fish populations have plummeted in the Yakima River since the mid to late

<sup>3</sup> WSDOT Scoping Reports for sites 991463, 991752, and 991464, TAPPS, 2001

<sup>4</sup> Hubble J., Watson B., Yakima Basin EDT Current/Historic Diagnosis, March 2003

<sup>5</sup> State Conservation Commission, Haring D., Habitat Limiting Factors, Yakima River Watershed, Water Resource Inventory Areas 37 – 39 Washington December 2001

1800's, and currently only remnant runs remain<sup>6</sup>. This decline generally mirrors the agricultural development of the Yakima River through time.

Efforts to maintain minimum flows and address fish passage barriers on lower Taneum Creek have met some success and while very few in number, adult summer steelhead have been confirmed present in the stream in the recent years. However, once Manastash, Robinson, Joe Watt Creek, and other streams leave the LTM, they are either entirely diverted into irrigation canals or fish passage is entirely blocked by impassable diversions or culverts downstream of the wildlife area. On lower Manastash Creek downstream of WDFW owned land, six privately owned and operated mainstem irrigation diversion dams block fish access and dewater the stream between approximately RM 1.5 and 4.9. Currently, efforts are underway on this stream to address fish passage and instream flow problems on Manastash Creek<sup>7</sup>.

On Robinson Creek, more than ten privately owned fish passage barrier culverts and/or diversion dams block fish access before the entire flow of the stream is diverted into the Packwood irrigation canal, which cuts off access from the Yakima River<sup>8</sup>.

Adult spawning steelhead were observed by this author during spring runoff flows in Quilomene, lower Brushy, and Whiskey Dick Creeks, during 2004 and 2005 (see Figure 2). Steelhead have also either been confirmed present or would be expected to be present, in other small streams in the area<sup>9</sup>. Until hatchery outplants began in the early 1960's, naturally produced steelhead were commonly observed and harvested by locals in Tarpiscan and Tekison creeks to the north, and were probably common in Quilomene and Whiskey Dick creeks<sup>10</sup>. Presently, fish of hatchery origin may comprise the majority of the fish currently utilizing these streams, given the impacts of mainstem Columbia River dams and the scope of hatchery outplants into rivers such as the Wenatchee, Entiat and the Methow. These hatchery outplants were used to 'mitigate' the dams impacts on endemic upper Columbia River steelhead stocks.

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<sup>6</sup> Ibid, pp 14 - 16

<sup>7</sup> Kittitas County Conservation District, Manastash Project, 2003.

[http://www.kccd.net/Current\\_Projects/Manastash/Manastash\\_Project.htm](http://www.kccd.net/Current_Projects/Manastash/Manastash_Project.htm)

<sup>8</sup> TAPPS Inventory File for Robinson Creek, Site 981502, 2002

<sup>9</sup> Baldwin C.M. WDFW Region 2, Steelhead Spawning Ground Surveys in Small Tributaries of the Columbia River Upper Middle Mainstem Subbasin during 2005, September 30, 2006.

<sup>10</sup> Pers. Comm., Niel Fullweiler, Life-long resident on land adjacent to the Coluckum Wildlife Area, 2005

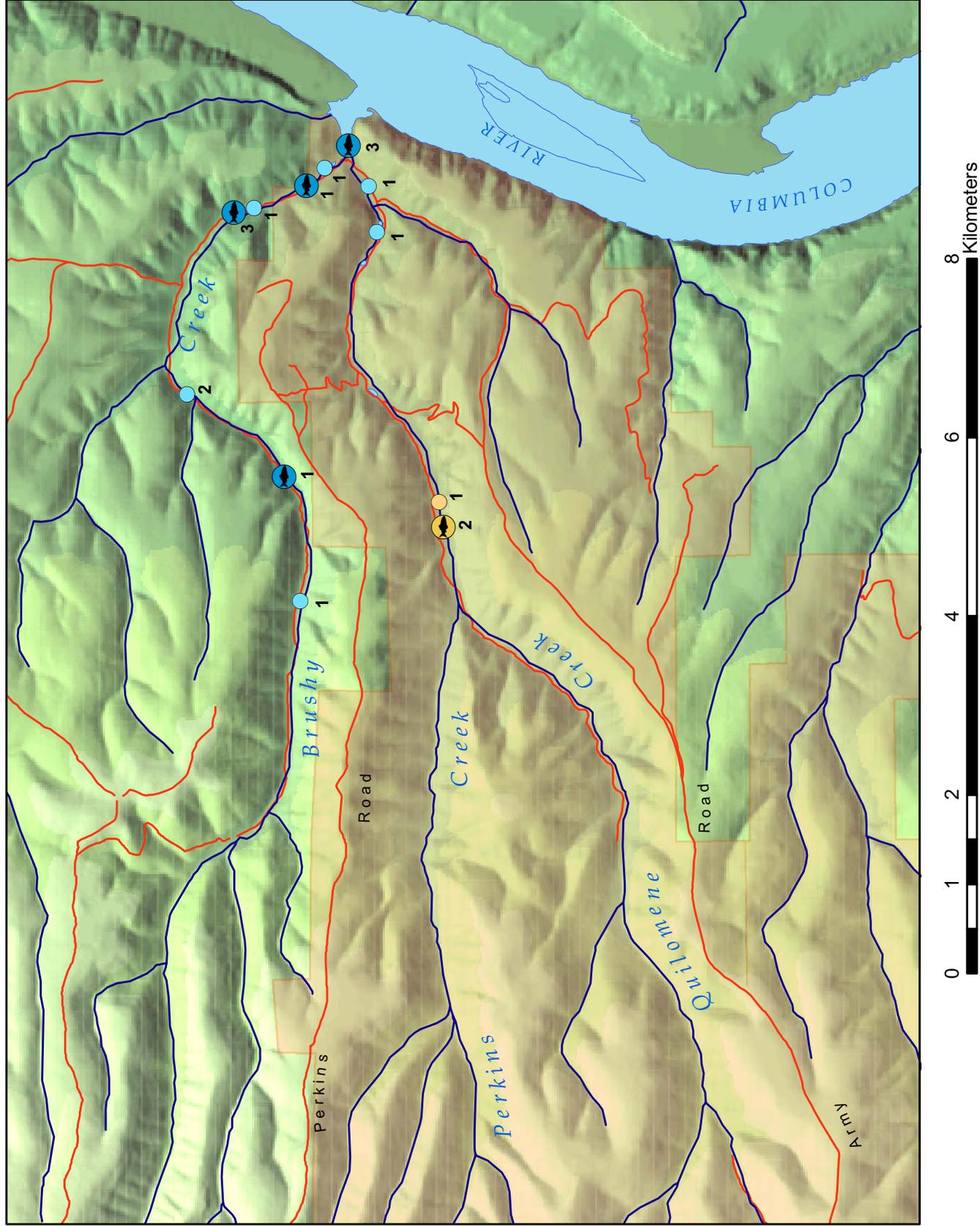


Figure 2. Map of Quilomene Creek showing the locations of steelhead redds surveyed in 2004.

### Land Use History

The LTMWA came under WDFW ownership in the late 1960's through the early 1970's and was purchased primarily to protect deer and elk winter range from development. Prior to this transfer of ownership, land within the present boundaries of the wildlife area was intensively logged and much of it was actively grazed by sheep and cattle<sup>11</sup>. As a condition of the purchase of the wildlife area lands by WDFW, grazing and logging did not cease until 1978 and 1993, respectively. While the condition of the streams and riparian areas within the LTMWA are in various stages of recovery from this history of intensive land use, logging, road building and livestock grazing continues on adjacent private, DNR and federal lands.

On the LTM, many streams are flowing down roadbeds or along roads in ditches. As a result, actively eroding road fills and sedimentation to streams are widespread throughout the wildlife area. Nearly every stream surveyed by TAPPS crews during fish passage barrier inventory surveys was observed to be negatively impacted by past logging, road building, and high grading of large trees out of riparian areas<sup>12</sup>. Notable examples are Whiskey Canyon and Bear Canyon Creeks on the North Fork Manastash watershed, where stream adjacent roads have severely impacted fish habitat (see photo 2).



**Photo 2.** Whiskey Creek Road downstream of site 981556, showing severe roadfill erosion which has filled pools with sediment, buried woody debris, and caused channel instability.

Illegal Off-Road Vehicle (ORV) use on the LT Murray wildlife area has been, and continues to be a significant factor in the deterioration of habitat for both aquatic and terrestrial wildlife. While the 'Green Dot' road management system was instituted in 1990, and ORV use off Green Dot roads is illegal, these rules are often ignored and are difficult to enforce (see Photo 3).

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<sup>11</sup> LT Murray Wildlife Area Management Plan, Washington Department of Fish and Wildlife, May 1997

<sup>12</sup> TAPPS LT Murray Wildlife Area Physical Survey of Potential Habitat Survey Comments, 2002



**Photo 3.** Illegal ORV use through Brushy Creek, a lower Quilomene Creek tributary. Federally listed 'Endangered' steelhead were observed spawning in the immediate vicinity of this site in April 2004.

On the Quilomene/Whiskey Dick subunits, riparian areas were severely overgrazed prior to WDFW ownership<sup>13</sup>. Since the late 1970's WDFW has imposed a no grazing policy on the wildlife area, however stream channel instability, and recovering riparian vegetation are still obvious (see Photo 4). The impacts of overgrazing on arid land streams are well documented, and the recovery of functioning riparian wetlands along these streams may take decades.<sup>14</sup>



**Photo 4.** Channel incision, eroding roadfill, and recovering riparian vegetation along Whiskey Dick Creek.

<sup>13</sup> LT Murray Wildlife Area Management Plan, May 1997. Pers Comm, Lonnie Landry 12/05.

<sup>14</sup> Livestock Grazing on Western Riparian Areas, US Environmental Protection Agency, Chaney E., Elmore W., Platts W.S. 1993

## Methods

Following completion of the inventory of all potential fish-passage barriers and unscreened or inadequately screened diversions on the LT Murray wildlife area and the completion of the Inventory Report in 2003, features identified as non-compliant or having significant habitat gain were evaluated in the field regarding potential impacts to fish life. On the LTM, Road Maintenance and Abandonment Plan (RMAP) forest road inventory information was used in conjunction with the TAPPS fish passage inventory to refine a list of potential restoration tasks on the wildlife area. Scoping reports were completed which summarized potential barrier removal and stream restoration projects on the Robinson, Taneum, NF Manastash, and Quilomene Creek watersheds, and spelled out recommendations for barrier correction work<sup>15</sup>. These were distributed to appropriate WDFW Region 3 wildlife area personnel to promote discussion of potential restoration projects.

At some locations where roads were abandoned to fulfill RMAP requirements, features (typically culverts) with insignificant habitat gain, or features located on streams noted as non-fish bearing, were removed. While these features were not necessarily fish passage barriers, they were often associated with abandoned logging roads with unstable, side-cast roadfills. Left in place, these culverts could eventually plug, causing roadfill failure and sedimentation impacts to downstream fish-bearing waters.

Region 3 WDFW wildlife and habitat program personnel were contacted regarding potential fish passage barrier removal and road abandonment projects. RMAP maps were reviewed to determine how fish passage correction efforts could be coupled with efforts to comply with DNR-mandated 'stream adjacent road' abandonment requirements.

Due to the WDFW/DNR checkerboard land ownership pattern within the greater LTM, discussions with WDFW region 3 personnel included negotiations with DNR regional staff to develop plans to permanently abandon roads in accordance with RMAP requirements. At the request of the DNR, the road abandonment, stream restoration and fish passage barrier removal work accomplished by TAPPS on the LTM was planned so that access to DNR-owned sections of land for future logging was not compromised.

Once project scoping was complete, project plans and designs were developed through WDFW Capital Projects and Engineering (CP&E), and permits were obtained from appropriate permitting entities. WDFW construction crews have been mobilized during the 2003, 2004, 2005 and 2006 construction seasons to complete passage barrier removal projects on the Robinson, NF Manastash, and Taneum Creek watersheds, and will be mobilized to complete projects on the Quilomene/Whiskey Dick subunits of the wildlife area in 2007. A summary of fish passage barrier correction projects completed to date is presented below.

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<sup>15</sup> Internal Preliminary Scoping Reports for Taneum, Manastash, and Quilomene watersheds, Uber A., May 2003

## Fish Passage Barrier Correction Summary

In 2003, 2004, 2005, and 2006 following the acquisition of all required federal, tribal, state, and local permits, WDFW crews completed fish passage barrier removal projects on the LTM. As a result, all human-made fish passage barriers on the Robinson Creek, NF Manastash and Taneum Creek watersheds on WDFW-owned lands have either been removed or replaced with fish passable structures in compliance with RCW 77.57 (see Table 1). This work is categorized by project site ID, watershed and corrective action type below.

Table 1. Summary of fish passage barrier removal projects within the LTM subunit of the LT Murray Wildlife Area

Site ID	Stream	Tributary to	Feature Type	Corrective Action	Year Completed
<b>NF Manastash Creek</b>					
981552	NF Manastash Cr	Manastash Cr	culvert	Replaced with culvert	2004
981554	NF Manastash Cr	Manastash Cr	Wood stringer bridge	Removed	2004
981556	Whisky Canyon Cr	NF Manastash Cr	culvert	Removed	2004
981557	Whisky Canyon Cr	NF Manastash Cr	culvert	Removed	2004
981558	Whisky Canyon Cr	NF Manastash Cr	culvert	Removed	2004
981565	Whisky Canyon Cr	NF Manastash Cr	culvert	Removed	2004
T18R16E-12	Bear Canyon Cr	NF Manastash Cr	culvert	Removed*	2004
T18R16E-6	Bear Canyon Cr	NF Manastash Cr	culvert	Removed*	2004
981524	Bear Canyon Cr	NF Manastash Cr	culvert	Removed	2005
981525	Bear Canyon Cr	NF Manastash Cr	culvert	Removed	2005
981526	Bear Canyon Cr	NF Manastash Cr	culvert	Removed	2005
981577	Unnamed (Trib 'C')	NF Manastash Cr	culvert	Removed	2005
981580	Unnamed (Trib 'C')	NF Manastash Cr	culvert	Replaced with culvert	2005
T18R16E-5	Murray Cr (Trib 'D')	NF Manastash Cr	culvert	None**	N/A
981570	Murray Cr (Trib 'D')	NF Manastash Cr	culvert	Removed	2005
981571	Murray Cr (Trib 'D')	NF Manastash Cr	culvert	Replaced with culvert	2005
<b>Robinson Creek</b>					
981502	Robinson Cr	Yakima R (Packwood Canal)	culvert	Removed	2003
981505	Robinson Cr	Yakima R (Packwood Canal)	culvert	Removed	2003
981506	Robinson Cr	Yakima R (Packwood Canal)	culvert	Removed	2003
T18R16E-11	Robinson Cr	Yakima R (Packwood Canal)	culvert	Removed*	2003
981504	Ainsley Cr	Robinson Cr	culvert	Removed	2003
981521	Ainsley Cr	Robinson Cr	culvert	Removed	2003

Table 1. (cont.)

Site ID	Stream	Tributary to	Feature Type	Corrective Action	Year Completed
981522	Ainsley Cr	Robinson Cr	culvert	Removed	2003
981508	Unnamed	Robinson Cr	culvert	Removed	2003
<b>Taneum Creek</b>					
981514	Joe Watt Cr	Taneum Ditch	culvert	Replaced with culvert	2006
981513	Joe Watt Cr	Taneum Ditch	culvert	Removed	2006
981592	Yahne Cr	Taneum Cr	culvert	Removed	2006
981515	Unnamed	Taneum Cr	culvert	Removed	2006
981590	Unnamed	Taneum Cr	culvert	Removed	2006
981591	Unnamed	Taneum Cr	culvert	Removed	2006
981583	Unnamed	Taneum Cr	culvert	Removed	2006
981519	Shadow Cr	Taneum Cr	culvert	Removed	2006
981650	Shadow Cr	Taneum Cr	dam	Removed	2006
981517	Cedar Cr	Taneum Cr	culvert	Replaced	2007
981585	Unnamed (Trib 'A')	Taneum Cr	other	Removed	2005
981586	Unnamed (Trib 'A')	Taneum Cr	other	Removed	2005

\* Removed following negotiations with DNR Southeast Region personnel

\*\* Replaced by DNR in 2005

Most of the work accomplished on the LTM was completed in conjunction with road abandonment work identified through RMAP review. When a section of road along a stream was abandoned, all culverts associated with the road were removed, even those at non-fishbearing (type 4,5, and 9) stream crossings. Therefore, in addition to the twenty-five (25) features shown as 'removed' or 'replaced' in Table 1, numerous culverts were removed from non-fish bearing streams. A brief discussion of restoration projects, delineated by watershed name and WRIA, is presented below.

#### Robinson Canyon Creek Watershed (WRIA 39.1064)

Robinson Creek flow through an extensive low gradient beaver dam wetland complex throughout its upper reaches. This contributes to perennial flows in Robinson Creek downstream of these wetlands, and a population of westslope cutthroat trout (*Oncorhynchus clarki lewis*) is present in the stream. While Robinson Creek very likely supported anadromous fish runs historically, currently the entire flow of this stream is diverted into the Packwood irrigation canal and numerous impassable dams and diversion structures exist downstream of the WDFW-owned lands. These diversion structures block access from the Yakima River and irrigation withdrawals from Robinson Creek downstream of the wildlife area severely dewater the stream<sup>1</sup>.

<sup>1</sup> TAPPS Inventory File for Robinson Creek, Site 981502, 2002

In the summer of 2003 approximately 8 miles of stream-adjacent road were abandoned in the Robinson Creek watershed. This work included culvert removal, road surface ripping, and excavation of stream-adjacent road fill at appropriate locations. Fish passage barrier culverts were removed at sites 981508, T18R16E-11, 981507, 981506, 981505, 981504, 981502, 981522, and 981521 from mainstem Robinson Creek, Ainsley Creek, and other tributary fish bearing streams on upper Robinson Creek (see Figure 3). In addition, road cross-drain culverts on type 4,5 and 9 streams were removed from abandoned logging roads. The project also included the placement of over 200 pieces of large woody debris at appropriate locations and replanting of all disturbed areas.



**Photo 5.** Site 981502 before culvert and associated road fill removal.



**Photo 6.** Site 981502 following the removal of the barrier culvert and approximately 1000 cubic yards of road fill from the stream channel.

As a result of these culvert removal projects, all man-made fish passage barriers within the Robinson Creek watershed on WDFW-owned lands have been corrected.

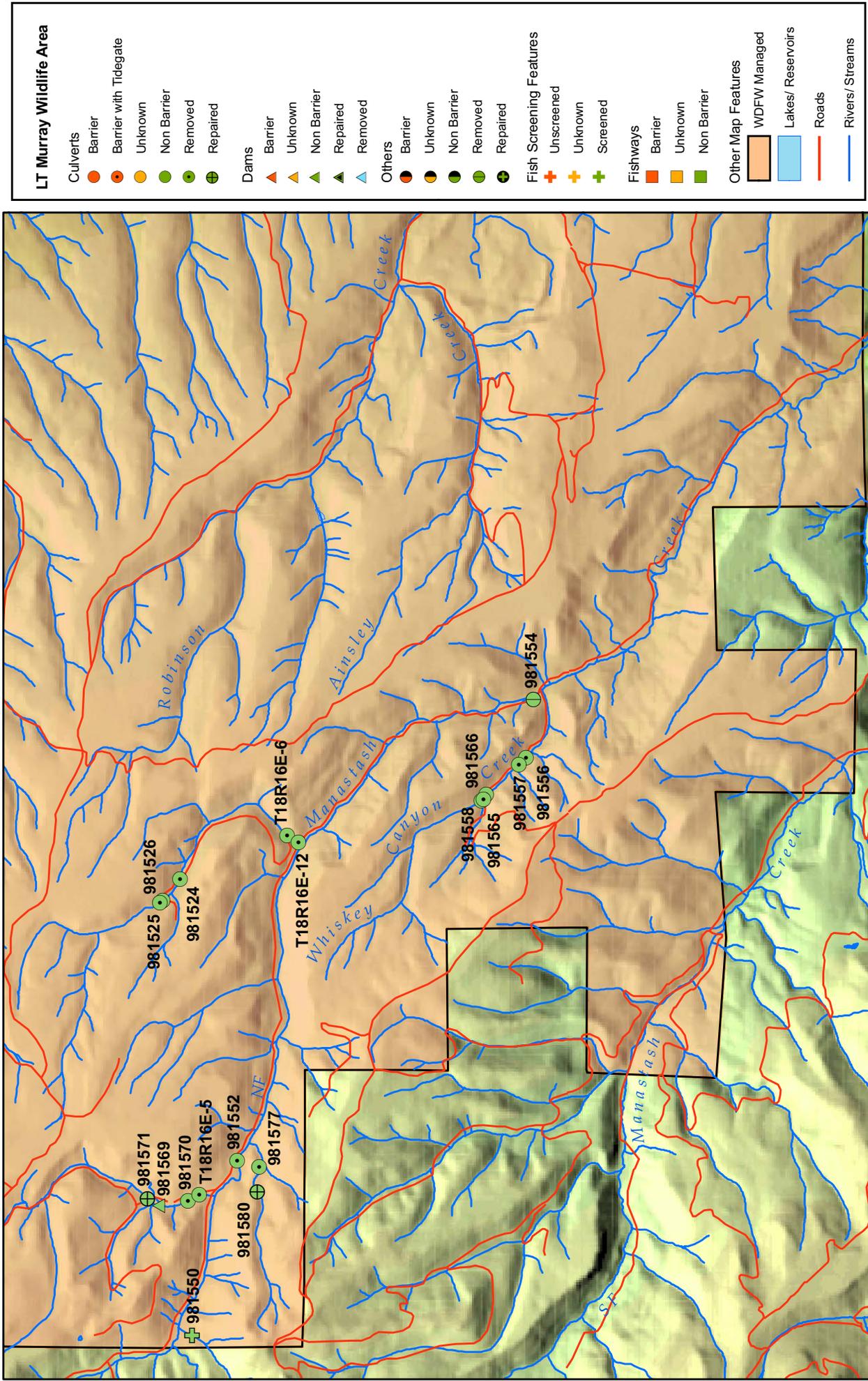


Figure 3. LT Murray Unit, North Fork Manastash Creek.

## NF Manastash Watershed

The North Fork Manastash (NFM) watershed has a high density of roads as a result of past logging, and much of the upper mainstem has been heavily impacted by overgrazing. Livestock grazing continues on USFS land west of the LTM. For example, the USFS allows large herds of sheep to graze the riparian meadows along the upper NFM every summer. In addition, riparian conditions are likely being impacted by a condensed elk and deer population which is not allowed to leave the LTM to access historic winter range forage off WDFW-owned lands, and whose population and browsing behavior is no longer influenced by important natural predators<sup>17</sup>. It is therefore possible that locally intense browsing of riparian vegetation in places like the upper NF Manastash is causing significant changes on the landscape. For example, recent beaver activity was observed to be absent throughout the upper reach between the Shell Rock Road crossing (site 981552 at RM 10.5) and the USFS boundary to the west. The diminishment of beaver-pond wetlands in this area could be contributing to degraded water storage capacity on upper NF Manastash Creek and extremely low summer flows. Currently, severe channel incision and headcutting is occurring throughout this part of the NFM mainstem (see Photo 7).



**Photo 7.** Severe channel incision through what appear to be former beaver pond wetlands, RM 12.3, upper NF Manastash Creek.

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<sup>17</sup> For one example of the potential impacts of concentrated ungulate browsing, see ‘Historic Aspen Recruitment, Elk, and Wolves in Northern Yellowstone National Park, USA, Ripple, W.J., Larsen E. J., *Biological Conservation* 102 (2001) 227-234

Extremely low flows during the summers of 2003, 2004, and 2005 were observed in the NFM by this author, with widespread fish kills observed in summer 2005. During the inventory of the NF Manastash Creek, seven tributaries were surveyed, and other tributaries were deemed non-fish bearing due to their small size and not surveyed. Of the seven tributaries, five are within the LTM on WDFW ownership, with the remainder on USFS land in the headwater reaches of the NF Manastash watershed.

During the 2004 construction season, approximately 8.5 miles of stream adjacent road was abandoned within the NF Manastash watershed on sections of land under WDFW ownership. This project included the removal of 12 culverts and associated fill from four tributary fish bearing streams (see Figure 3). In addition, numerous culverts on type 4, 5 and 9 streams were removed when roads were decommissioned. Where stream adjacent road fill was actively eroding into streams, this material was excavated and spoiled in a location away from the active channel. Some highlights of restoration projects completed to date on the NF Manastash watershed are shown below.

#### NFM Mainstem (WRIA 39.0995)

Two stream crossings were removed from the mainstem NFM within the LTM. One was an old, non-barrier, failing wooden bridge at RM 5.2, which was removed. The other was a culvert at RM 10.5, under the road, which connects the NFM Road with the Shell Rock Road. This culvert was a barrier culvert, which caused the stream to overtop the road when plugged with debris. In 2005, a twelve-foot diameter bottomless culvert was placed at this site (see Photos 8 and 9).



**Photo 8.** Culvert Site 981552 before replacement, NF Manastash Creek, RM 10.39.



**Photo 9.** Site 981552 after replacement following replacement with a 12 foot wide bottomless culvert

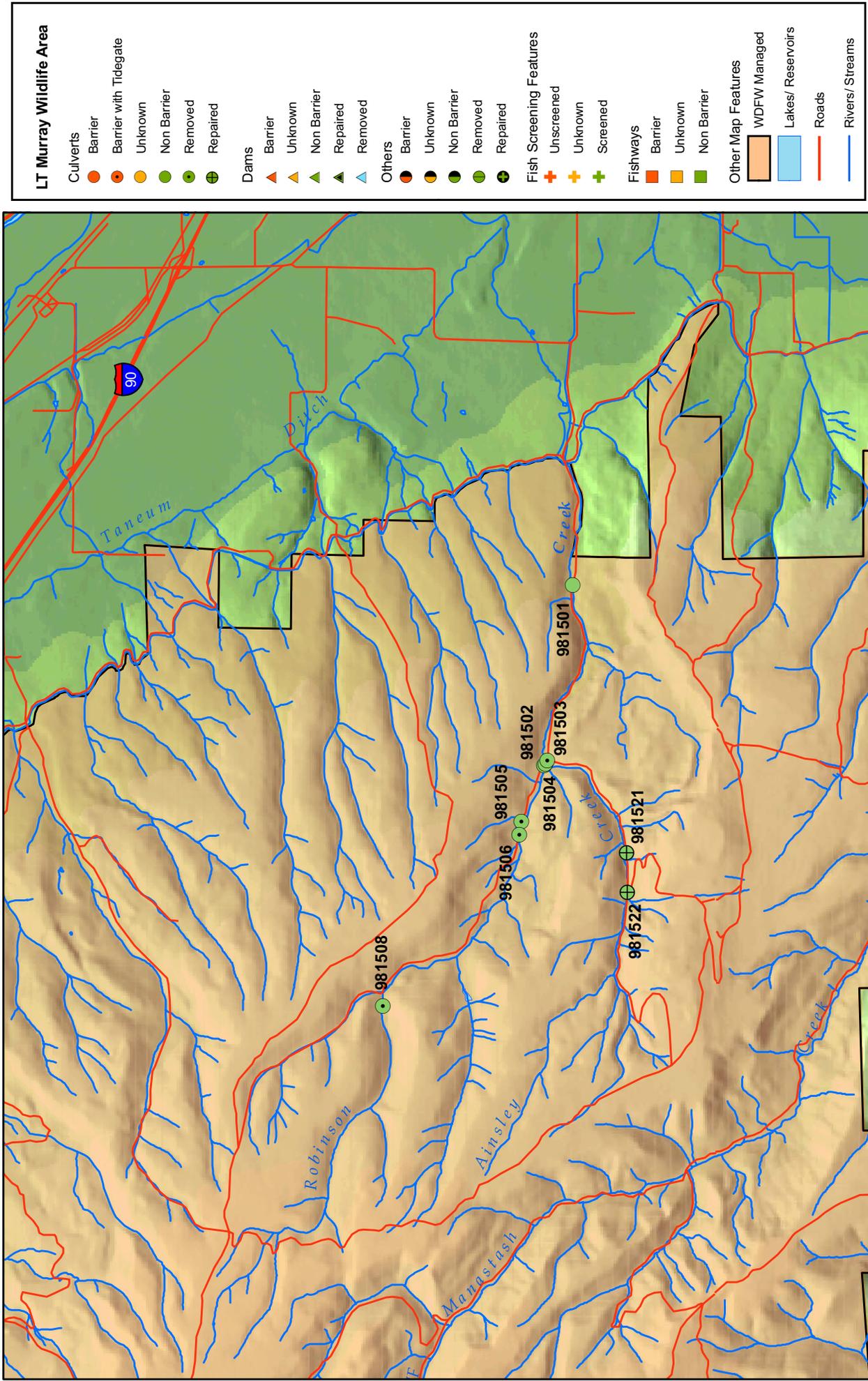


Figure 4. LT Murray Unit, Robinson and Ainsley creeks.

In addition to the barrier correction work described above, through the abandonment of the lower NF Manastash road, about 150 conifer trees with rootwads were placed in the NF Manastash and Whiskey Canyon Creek within stream adjacent road-impacted reaches, and approximately 600 cubic yards of actively eroding road fill was pulled away from the NF Manastash mainstem channel (see photos 10 and 11).



**Photo 10.** Eroding stream-adjacent roadbed along NF Manastash Creek RM 2.2 to 2.4.



**Photo 11.** Road fill re-sloped and Large woody debris placed, NF Manastash Creek RM 2.2 to 2.4.

As a result of restoration projects completed during the 2004 and 2005 construction seasons, all man-made fish passage barriers within the NF Manastash Creek watershed on WDFW-owned lands have been removed or replaced with compliant structures.

#### Whiskey Canyon Creek (WRIA 39.1000)

Whiskey Canyon Creek has been heavily impacted by past logging. Most large trees within the channel migration zone and the riparian area have been removed, logging roads were constructed within the active channel, and undersized culverts were placed in the channel at road crossings. Numerous slash-piles of old, large rotting conifer trees exist at several locations along and within the active channel of the stream. These factors have caused major impacts to the stream and obvious signs of major channel instability and bedload movement, including stream-adjacent road fill erosion are common (see photo 12).

In 2004, approximately 1 mile of stream adjacent road was abandoned along Whiskey Canyon Creek. Undersized and failing culverts at sites 981556, 981557, 981558, and 981565 were removed and the channel restored at these locations (see Figure 3).

Bear Canyon Creek (WRIA 39.1001)

Bear Canyon Creek enters NF Manastash Creek at RM 7.7. The stream is confirmed fish-bearing up to an impassable falls 1,200 meters from the confluence with NF Manastash Creek. Evidence of past logging and roadbuilding are obvious along much of Bear Canyon Creek and the stream flows down an old roadbed at some locations (see Photo 12).



**Photo 12.** Upper Bear Canyon Creek flowing down a logging road, near RM 1.9.

The stream flows through several DNR-owned sections of land, and recent logging activity is evident throughout upper Bear Canyon Creek.

Culverts at sites 981524, 981525, and 981526 were removed from the stream during the 2004 and 2005 construction seasons. In addition, culverts at DNR-owned sites T18 R16E-6 and T18 R16E were removed from lower Bear Canyon Creek, where it flows through DNR-owned land, following discussions with DNR Southeast Region personnel

(see Figure 3). As a result of these efforts, all human-made fish passage barriers have been removed from Bear Canyon Creek.

#### Unnamed Creek (WRIA 39)

This stream enters the mainstem NFM at RM 10.3, just downstream of site 981552 (see Figure 3). Year-round flows are maintained by springs, which enter the stream approximately 350 m from the confluence with the mainstem NFM. Downstream of these springs, a logging road was constructed within the channel migration zone of the stream. As a result the stream flowed down the road and in ditches along the road. The road was later converted to an active Green Dot road, which served to connect the Shell Rock road to the NF Manastash Road, and has remained open to motor vehicle use. Downstream sedimentation impacts have been severe (see Photo 13).

During the 2005 construction season, this 2900-foot section of the road was abandoned and 1500 feet of an alternative access along an adjacent ridgeline was constructed. As part of the abandonment, the barrier culvert at site 981577 was removed and the barrier culvert at site 981580 was replaced with a fish-passable culvert. Completion of this project has eliminated a significant source of sedimentation on the lower section of this stream and in the NFM mainstem. All human-made fish passage barriers have been removed from the stream.



**Photo 13.** Unnamed tributary to NFM (RM10.3) flowing down roadbed. Culvert 981577 crossed road in near foreground, with streamflow left to right.

### Murray Creek (WRIA 39.1002)

Murray Creek enters the NFM mainstem at RM 10.8. The Murray Creek watershed was heavily logged prior to WDFW ownership. As a result, the character of the surrounding landscape has changed from heavily forested with mature conifer to open grassland and scattered patches of immature trees<sup>18</sup>. Large conifer stumps along upper Murray Creek attest to the historic nature of the riparian zone along the stream. Young trees have replaced the logged out forest and dense stands of deciduous trees have grown up in the riparian zone of the stream. Flows in Murray Creek are perennial and are adequate to support fish life. Westslope cutthroat are present in the stream (see Photo 14).



**Photo 14.** Murray Creek westslope cutthroat trout (*Oncorhynchus clarki lewisi*)

Three fish passage barrier features, sites 981570, 981571 and T18 R16E-5 were removed during 2005 and 2006. The culvert crossings at sites 981571 and T18 R16E-5 are located on an active Green Dot road, which remains open to motorized vehicle use. During the 2005 construction season, the culvert at site 981571 was replaced with an 8-foot wide, bottomless culvert (see Photos 15 and 16).

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<sup>18</sup> Pers. comm. Lonnie Landry, WDFW Region 3



**Photo 15.** Site 981571 before replacement.



**Photo 16.** Site 981571 after culvert replacement.

Site T18 R16E-5 is located 72 meters from the confluence with NF Manastash Creek on DNR-owned land, and was replaced with a bridge by DNR in 2006. Site 981570, located on an abandoned road, was removed and not replaced. All man-made fish passage barriers located on WDFW-owned land have been removed from the Murray Creek watershed.

### **Taneum Creek Watershed**

No manmade fish passage barrier features were identified on mainstem Taneum Creek on WDFW owned land, although four irrigation diversion structures exist downstream of the LTM<sup>19</sup>. While these privately owned structures have recently been structurally modified, fish passage is still impaired at some flows at two of the diversions and inadequate instream flows in the lower three miles of Taneum Creek continues to impair fish passage and impact habitat.<sup>20</sup>

Like most of the LTM, the Taneum Creek watershed was heavily logged prior to WDFW ownership and a high logging road density with numerous stream crossings on tributary streams exists on WDFW-owned lands. All human-made fish passage barriers on WDFW-owned land within the Taneum Creek watershed were located on small tributary streams, the upper reaches of which are near the upper limits of fish use. Many of the culverts which were left in place from past logging and road building were undersized and failing. Left in place, these culverts inevitably plug, causing the associated road fill to erode, which delivers excessive sediment to downstream reaches.

During the 2005, 2006 and 2007 construction seasons, road abandonment and barrier removal efforts were completed on eight tributary streams which flow northeasterly, draining the south side of the Tanuem Creek watershed. RMAP based road abandonment and fish passage barrier removal was completed on Joe Watt Creek, Shadow Creek Yahne Creek, and five tributary streams. In addition, a barrier culvert was replaced on lower Cedar Creek (see Figure 4).

<sup>19</sup> TAPPS Habitat Inventory Report for Taneum Creek, Site 981697, 2002

<sup>20</sup> Habitat Limiting Factors, Yakima River Watershed, Water Resource Inventory Areas 37 – 39 Washington State Conservation Commission, Haring D., December 2001, p. 262

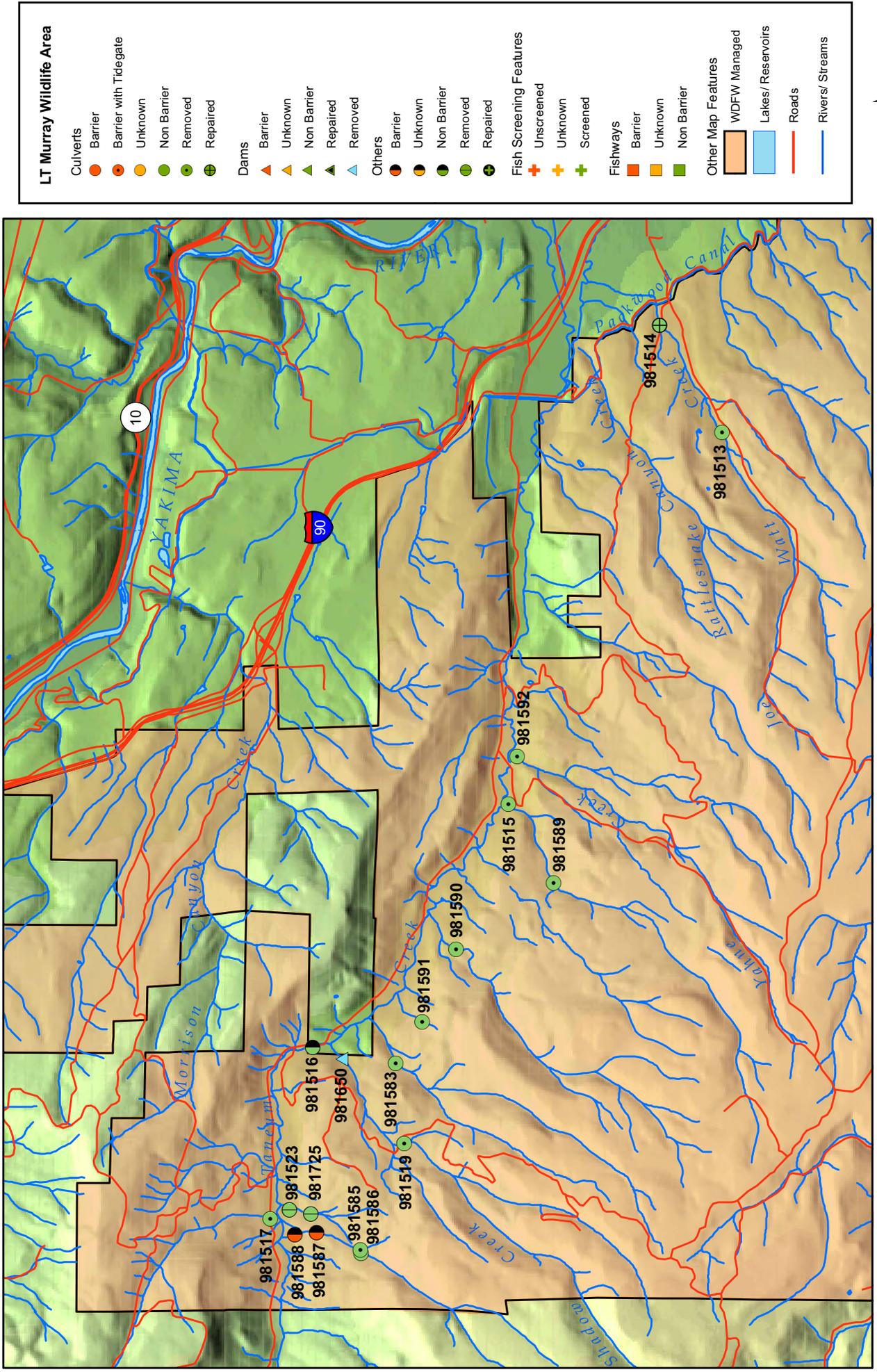


Figure 5. LT Murray Unit, Taneum Creek.

Through the abandonment of about 2.75 miles of former logging roads, fourteen culverts were removed from these streams. In addition, an abandoned, deteriorating concrete dam was removed from lower Shadow Creek. These actions render WDFW-owned land within the Taneum Creek watershed free of human-made fish passage barriers. This work is summarized below.

### Joe Watt Creek

Joe Watt Creek watershed drains the northeast portion of the LTM and, prior to diversion of its entire flow into the Taneum Ditch irrigation canal, entered Taneum Creek at about RM 1.5. Perennial springs along upper Joe Watt Creek maintain flows in the stream within the LTM, and flows were observed to be adequate to support fish life even during the summer of 2005, when many other streams on the LTM were dry. If it does not currently, Joe Watt Creek would very likely support fish within the LTM if the passage barrier at the Packwood Canal culvert were to be corrected.

In 2006, two culverts were removed from Joe Watt Creek, at sites 981513 and 981514 (see Figure 4). The culvert at 981513, an abandoned logging road crossing of Joe Watt Creek 2300 meters upstream of site 981514, was removed along with the associated road fill and not replaced. The Hutchins Road crossing at site 981514 was replaced with an 8 foot diameter round culvert and kept open to motorized vehicle use, since this crossing is frequently used by hunters and other wildlife area users.

### Shadow Creek

Shadow Creek heads on USFS land to the west of the LTM and enters Taneum Creek from the southwest at about RM 4. Currently, motor vehicle access ends about 5.5 miles up Shadow Creek Road from the Taneum Creek Road, near site 981518. Shadow Creek Road was closed to motor vehicle use when a section of it collapsed into upper Shadow Creek. The landslide initiated by the road fill failure delivered a significant quantity of sediment to Shadow Creek.

During 2006, culverts at sites 981518 and 981519 (see Photos 17 and 18), and an abandoned concrete dam at site 981650 were removed from Shadow Creek. Like Robinson Creek, Westslope cutthroat trout (*Oncorhynchus clarki lewis*) were found to be numerous in Shadow Creek during fish relocation efforts at barrier removal sites.



**Photo 17.** Shadow Creek site 981519 before culvert replacement.



**Photo 18.** Shadow Creek site 981519 following culvert removal.

### Yahne Creek, Unnamed Taneum Creek Tributaries

Yahne Creek and four other small, unnamed perennial Taneum Creek tributaries drain the south side of the Taneum Valley (see Figure 4). The steep, benchland topography of the area generally confines the fish bearing sections of these streams to their lower  $\frac{1}{4}$  to  $\frac{1}{2}$  mile reaches. These streams generally exceed 20% in gradient upstream further upstream. It is likely that only these lower reaches of the streams are accessible to fish originating in Taneum Creek.

Through the abandonment of about three miles of legacy logging roads, eight culverts were removed from Yahne Creek and four other small tributaries in 2005 and 2006. Two of these culverts were removed from fish-bearing sections of the streams, while the remaining culverts were removed from upper, non-fish bearing reaches. These culvert removals from known non-fish bearing stream reaches were coincident with the abandonment legacy logging roads.

### Cedar Creek

There is one culvert crossing on Cedar Creek within the LTM, at the Taneum Creek Road crossing at site 981517. Brook trout (*Salvelinus fontinalis*) were found upstream of this culvert during an electroshocking survey in the spring of 2005.

Taneum Creek Road is the main access to USFS land on upper Taneum Creek. The USFS was granted an easement by WDFW for use of the road through the LTM in 1971. Coordination with the USFS was undertaken to allow this 4 foot round culvert to be replaced with an 8 foot diameter bottomless culvert. Culvert replacement included channel restoration in the reach immediately upstream of the Taneum Road culvert, since this portion of the channel appears to have been steepened when Taneum Road was constructed.

## **Future Stream Restoration Needs**

### Quilomene, Whiskey Dick, Skookumchuck Creek Watersheds

Adult steelhead and redds were observed by this author in lower Quilomene and Brushy Creeks in April, 2004 (see Figure 2). In addition, adult steelhead have been observed in lower Skookumchuck and Whiskey Dick Creeks by this author and others<sup>21</sup>. Steelhead using these streams fall within the 'Upper Columbia DPS' (Distinct Population Segment) and are listed as 'endangered' by NOAA Fisheries<sup>22</sup>.

While no structural passage barriers were identified on these streams, many ford crossings exist both on and off the Green Dot road system (see Figures 6 and 7). At some of these crossings, the wetted channel has been widened due to motor vehicle use. When they are present, fish may be attracted to these areas for spawning, since suitable spawning substrate can coalesce at such low locations. Once a redd has been constructed at such a crossing, motor vehicle use can cause direct mortality to incubating fish eggs and fry. Additionally, many ford crossings have developed into fish passage barriers due to insufficient water depth at some flows. This condition develops at ford crossings as motor vehicle use erodes streambanks, which can increase channel widths and thereby decrease stream depths.

Road abandonment and fish passage barrier removal work on the Quilomene and Whiskey Dick Creek watersheds is scheduled to occur at some time in the future. This planned work is summarized by subwatershed below.

Most of the roads within the Whiskey Dick and Quilomene Creek watersheds were established long ago as jeep trails and are generally adjacent to streams, since these corridors offered the least obstructions to travel. As a result, existing roads in these

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<sup>21</sup> Mark Teske, WDFW Region 3, personal communication

<sup>22</sup> See <http://www.nwr.noaa.gov/ESA-Salmon-Listings/Salmon-Populations/Steelhead/>

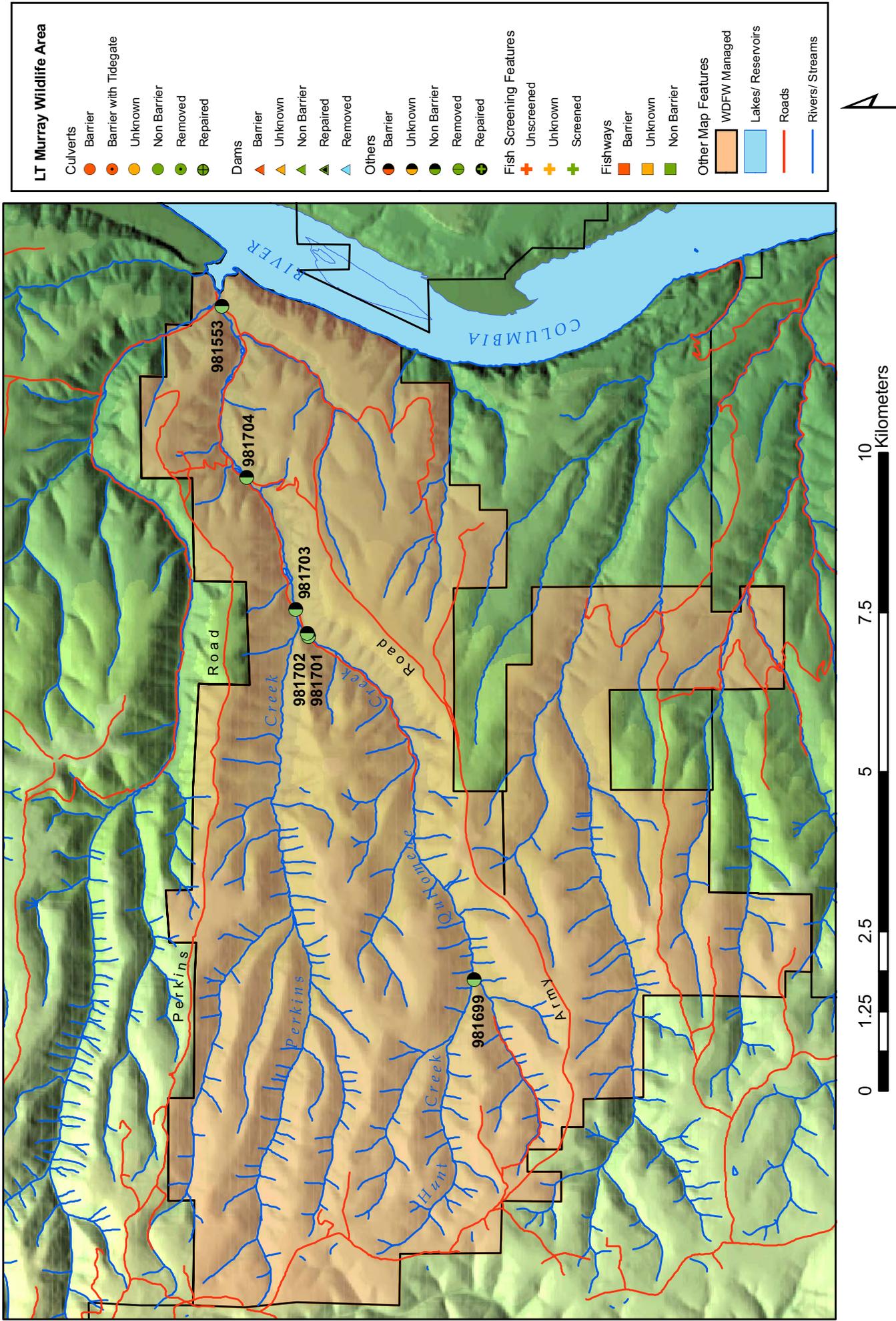


Figure 6. Quilomene Unit, Quilomene Creek.

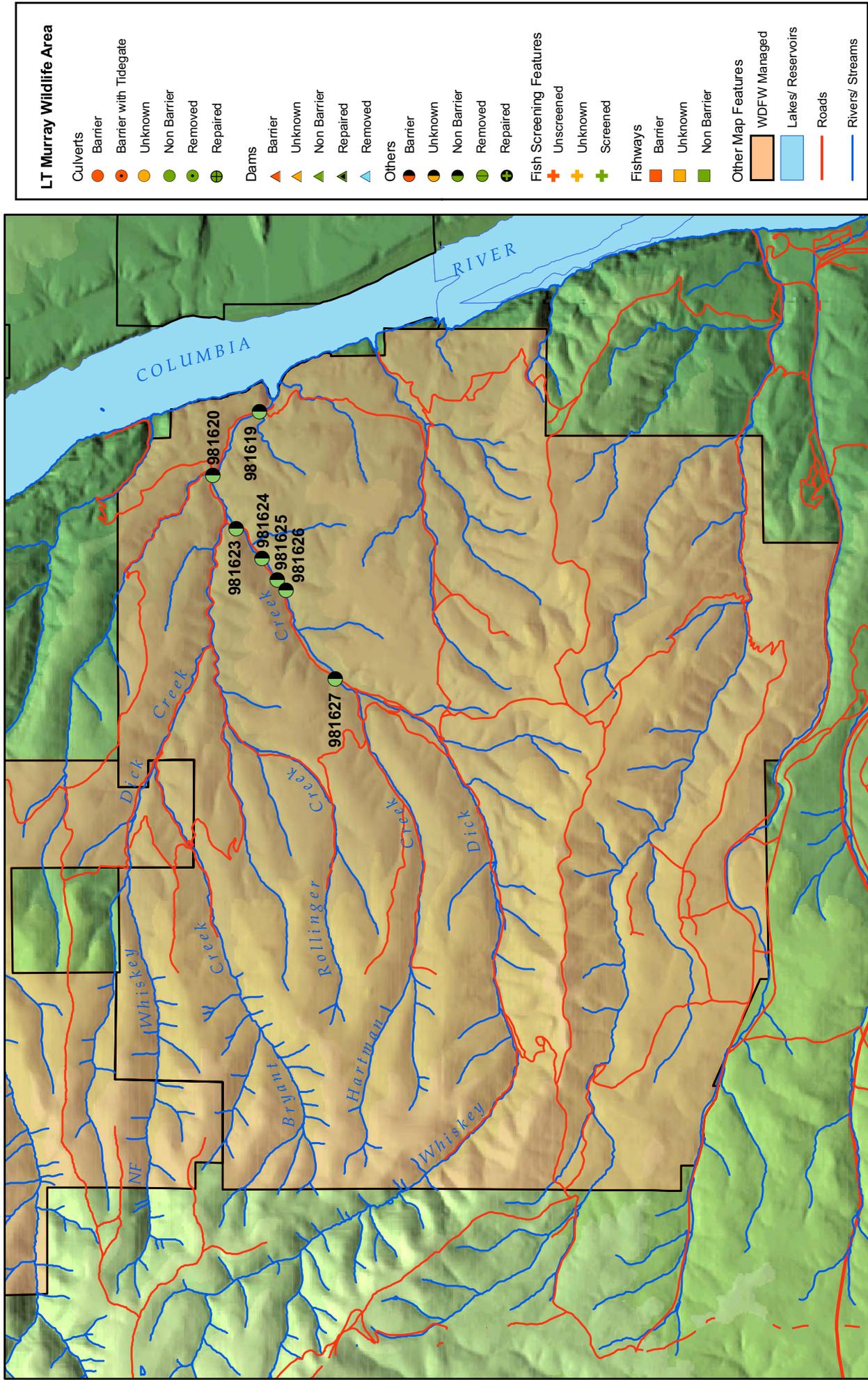


Figure 7. Whiskey Dick Unit, Whiskey Dick Creek.

watersheds have a disproportionate impact on streams because the majority of the roads were built along, and even through streams and riparian areas. Some ford crossings on lower Whiskey Dick Creek are barriers to fish passage at certain flows, and their use has had a detrimental effect on riparian vegetation, bank stability, and normal sedimentation regimes (see Photos 19, 20, 21).



**Photo 19:** Whiskey Dick Creek ford crossing.



**Photo 20:** Streambed just upstream of ford crossing shown in Photo 19.



**Photo 21:** Streambed just downstream of ford crossing shown in Photo 19.

In the future, eight ford crossings, sites 981630, 981631, 981629, 981627, 981626, 981625, 981624 and 981623 will be abandoned through the permanent closure of approximately six miles of stream adjacent road along Whiskey Dick Creek. The ford crossing at site 981619 will remain open to motor vehicle use, but will be upgraded to minimize potential impacts to fish.

## **Discussion**

### LT Murray Subunit

While the habitat improvements described above will benefit resident fish populations on streams within the LTM, they are unlikely to provide significant benefit to anadromous or adfluvial fish populations present in the Yakima River mainstem. The lower reaches of all streams flowing off the LTM have undergone severe habitat degradation including channelization, dewatering due to irrigation withdrawals, and the construction and operation of water diversion structures. In addition, these streams cross numerous county and private roads, and Interstate 90, some of which are barriers to fish passage. The developments have essentially isolated the middle and upper portions of these streams from the mainstem Yakima River.

In the case of Robinson Creek, the entire stream is diverted into the Packwood canal approximately six miles downstream of the wildlife area boundary. On this six-mile stream reach between the wildlife area boundary and the Packwood Canal, there are twelve culverts and nine irrigation diversion structures, eight of which were found to be barriers.

On lower Taneum Creek downstream of the WDFW-owned lands, efforts have been made to address barriers and insufficient instream flows. However, degraded habitat conditions overall on lower Taneum Creek remain detrimental to anadromous fish passage and use<sup>23</sup>.

On Manastash Creek, which has essentially been completely diverted for agricultural use downstream of WDFW-owned lands, efforts are currently underway to address lack of instream flows and passage barriers on private lands. If these actions are successful, the upper Manastash Creek watershed, including North Fork Manastash Creek, may once again be accessible to migrating Yakima River fish.

Habitat improvements on the lower sections of these tributary streams will only benefit migratory fish if they are present in the Yakima River itself. The current status of anadromous fish runs in the upper Yakima River and the Yakima River system overall are at historic lows relative to their estimated abundance prior to the agricultural development of the watershed<sup>24</sup>. Coho and steelhead, the species most likely to utilize

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<sup>23</sup> Habitat Limiting Factors, Yakima River Watershed, Water Resource Inventory Areas 37 – 39 Washington State Conservation Commission, Haring D., December 2001 p. 261

<sup>24</sup>Ibid, pp. 17

the streams within the LTM, have decreased dramatically since the mid to late 1800's. Coho were still known to be widespread throughout the upper Yakima and tributaries in the early 1900's, and streams such as Taneum and Manastash Creeks were probably heavily utilized. Coho were apparently still abundant in Taneum Creek until the construction of the Taneum Ditch in 1910<sup>25</sup>. While Yakima River coho were considered extinct by the 1980's, limited re-introduction efforts using non-endemic coho stocks have met some success in establishing spawning populations, mostly on the mid Yakima River, below Prosser Dam<sup>26</sup>. Since 1999, small numbers have been counted at Roza dam, with less than fifty counted annually except for 2000 and 2001, when 148 and 621 adult coho were counted, respectively<sup>27</sup>. These fish most likely originate from reintroduction efforts by the Yakama Tribe, who are utilizing the Cle-Elum hatchery as a juvenile coho acclimatization facility prior to their release into the Yakima.

While the upper Yakima River above Roza dam very likely historically produced more steelhead than the middle or lower sections of the river, nearly all steelhead production is currently limited to three lower Yakima tributaries, Satus Creek, Naches River and Toppenish Creeks<sup>28</sup>. Of the steelhead that do reach the upper Yakima, a vestigial run still utilizes Taneum Creek.

The list of causes of this decline is a long one. Chronic losses of juveniles and outmigrants at irrigation works and major manipulations of the natural hydrologic function of the mainstem Yakima River have been major contributors<sup>29</sup>.

Anadromous fish recolonization of upper Yakima tributaries such as Manastash and Taneum Creeks remains a high value restoration option since these streams still possess substantial quality spawning and rearing habitat in their upper reaches. While logging and grazing activities continue on federal and DNR land on these watersheds, they are currently protected from other types of development since they remain almost entirely within public ownership.

#### Quilomene and Whiskey Dick Subunits

As noted, adult steelhead and resident rainbow trout have been confirmed present in Whiskey Dick, Quilomene, Brushy, and other mainstem Columbia River tributaries of similar size and character. Steelhead using these streams are included within the 'Upper Columbia River DCP' as designated by NOAA Fisheries, and are listed as 'Endangered'. Coho were also probably common in all streams in the area with adequate flows. However, once abundant mid-Columbia River coho runs collapsed prior to the

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<sup>25</sup> Yakima River Subbasin Plan, Columbia Basin System Planning, Sept. 1990 p. 38

<sup>26</sup> Habitat Limiting Factors, Yakima River Watershed, Water Resource Inventory Areas 37 – 39 Washington State Conservation Commission, Haring D., December 2001, pp. 80

<sup>27</sup> Yakima Klickitat Fisheries Project Data, Roza Dam Annual Passage Data, 12/7/05  
[http://www.cbr.washington.edu/dart/adult\\_annual.html](http://www.cbr.washington.edu/dart/adult_annual.html)

<sup>28</sup> Ibid, Table 15, p. 73

<sup>29</sup> Habitat Limiting Factors, Yakima River Watershed, Water Resource Inventory Areas 37 – 39 Washington State Conservation Commission, Haring D., December 2001, pp. 17 - 21 LFA

construction of Grand Coulee dam in the 1941, and have not recovered in spite of restoration efforts<sup>30</sup>.

Unlike the Yakima River tributaries within the LTM subunit, streams within the Quilomene/Whiskey Dick subunits draining into the mainstem Columbia River exist entirely within WDFW owned lands and are currently relatively unaffected by irrigation withdrawals and passage problems related to diversion structures. While domestic livestock grazing impacts were severe historically, domestic grazing was halted in the late 1970's. However, as of August 2007 there are proposals (pending environmental review) to re-open at least some parts of the Quilomene/Whiskey Dick subunits to livestock grazing. In addition, large numbers of wintering elk concentrated in the best browsing areas along streams may now be limiting the recovery of riparian vegetation and limiting the re-establishment of beaver and other riparian dependent species.

Impacts related to roads and road crossings which have been identified on these streams will be addressed through road abandonment activities planned for the future. Strengthened enforcement of illegal off-road vehicle use will be required to limit impacts to fish-life on these streams.

## **Summary**

### LT Murray Subunit

During the 2003, 2004, 2005 and 2006 construction seasons, 25 fish passage barrier culverts were removed or replaced on WDFW owned lands within the LTMWLA. The majority of this work was accomplished through the permanent abandonment and/or decommissioning of over 17 miles of legacy logging roads on the Robinson, NF Manastash, and Taneum Creek watersheds. These barrier removal projects have resulted in restoration of over 16,000 m<sup>2</sup> of spawning, and over 53,000 m<sup>2</sup> of rearing habitat (see Table 2).

The TAPPS fish passage barrier removal efforts described herein will represent a significant reduction in the scope of work and future costs of RMAP based road abandonment and upgrades which will be required on the LTMWLA, and which are being implemented statewide on WDFW-owned lands.

Prior to WDFW ownership, land within the LTM subunit of the LTMWA had a high road density and was logged with little regard for potential impacts to fish life. The abandonment of these legacy logging roads included the removal of culverts from type 4, 5, and 9 streams, which tributary to the streams shown in Table 3. While the removal of passage barriers on fish-bearing streams provides direct benefit to fish-life by improving access to formerly inaccessible habitat, the removal of culverts and associated roadfill from type 4,5, and 9 streams will prevent future delivery of road related sediments to downstream fish-bearing stream reaches. Through time these efforts will advance the restoration of normal stream sediment, nutrient, and woody debris transport regimes in these streams.

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<sup>30</sup> Mullan, J., Williams, K., Rhodus, G., Hillman T., McIntyre J., Production and Habitat of Salmonids in Mid-Columbia River Tributary Streams, US Fish and Wildlife Service, 1992

Table 2. Fish Passage Barriers, Estimated Spawning and Rearing Habitat Gain, within the LT Murray Wildlife Area

Site ID	Stream	Tributary to	Feature Type	% Passable Prior to Correction	Habitat Gain	
					Spawning (m <sup>2</sup> )	Rearing (m <sup>2</sup> )
<b>NF Manastash Creek</b>						
981552	NF Manastash Cr	Manastash Cr	culvert	33	<b>5,003</b>	<b>16,006</b>
981557	Whisky Canyon Cr	Manastash Cr	culvert	0	<b>488</b>	<b>628</b>
981565	Whisky Canyon Cr	Manastash Cr	culvert	0	311	439
981558	Whisky Canyon Cr	Manastash Cr	culvert	33	348	494
*T18R16E-12	Bear Canyon Cr	Manastash Cr	culvert			<b>13,497</b>
*T18R16E-6	Bear Canyon Cr	Manastash Cr	culvert			12,316
981524	Bear Canyon Cr	Manastash Cr	culvert	0	617	1,537
981525	Bear Canyon Cr	Manastash Cr	culvert	33	740	1,819
981526	Bear Canyon Cr	Manastash Cr	culvert	33	761	1,846
981577	Unnamed (trib 'C')	Manastash Cr	culvert	33	<b>122</b>	<b>143</b>
981580	Unnamed (trib 'C')	Manastash Cr	culvert	33	72	66
*T18R16E-5	Unnamed (trib 'D')	Manastash Cr	culvert			24,269
981570	Unnamed (trib 'D')	Manastash Cr	culvert	67	<b>430</b>	<b>2,035</b>
981571	Unnamed (trib 'D')	Manastash Cr	culvert	67	380	1,083
<b>**NF Manastash Total Habitat Gain:</b>					<b>6,043</b>	<b>32,309</b>
<b>Robinson Creek</b>						
981502	Robinson Cr	Yakima River	culvert	0	<b>6,883</b>	<b>11,962</b>
981505	Robinson Cr	Yakima River	culvert	33	5,953	9,789
981506	Robinson Cr	Yakima River	culvert	67	5,762	9,416
T18R16E-11*	Robinson Cr	Yakima River	culvert			5,410
981504	Ainsley Cr	Robinson Cr	culvert	0	<b>371</b>	<b>1,656</b>
981521	Ainsley Cr	Robinson Cr	culvert	33	0	406
981522	Ainsley Cr	Robinson Cr	culvert	33	0	290
981508	Unnamed	Robinson Cr	culvert	0	<b>1,277</b>	<b>2,194</b>
<b>**Robinson Creek Total Habitat Gain:</b>					<b>8,531</b>	<b>15,812</b>
<b>Taneum Creek</b>						
981514	Joe Watt Cr	Taneum Cr	culvert	67	<b>265</b>	<b>918</b>
981592	Yahne Cr	Taneum Cr	culvert	33	<b>738</b>	<b>875</b>
981515	Unnamed	Taneum Cr	culvert	67	<b>270</b>	<b>477</b>
981583	Unnamed	Taneum Cr	culvert	33	<b>205</b>	<b>510</b>
981519	Shadow Cr	Taneum Cr	culvert	0	<b>362</b>	<b>641</b>
981517***	Cedar Cr	Taneum Cr	culvert	67	<b>282</b>	<b>1,671</b>
<b>**Taneum Creek Total Habitat Gain:</b>	<b>2,122</b>	<b>5,092</b>				
<b>LT Murray Total Habitat Gain:</b>					<b>16,696</b>	<b>53,213</b>

\*Features inventoried by WDNR were not evaluated for percent passability and habitat gain was estimated by WDNR using mapping techniques.

\*\* Habitat gain totals reflect habitat upstream of the lowest barrier on each stream (shown in bold)

\*\*\*Scheduled for 2007 construction season

Completion of these projects has resulted in the removal of all human-made fish passage barriers on WDFW-owned land within the Robinson, Manastash and Taneum Creek watersheds. In total, when projects scheduled for the 2007 construction seasons are completed, all WDFW owned lands on the LT Murray wildlife area will be free of human-made fish passage barriers and noncompliant diversions structures.