

## APPENDIX B.

### Watershed Restoration Efforts Completed On All Ownerships in the Entiat WRIA 46 05/10/2004 Version 2.0

This working draft list summarizes some of the watershed restoration projects and initiatives conducted on both public and private lands in the Entiat and Mad River watersheds over the last several years. It was created using an unpublished list of projects completed on National Forest System Lands between 1992 and 2003, and additional restoration / protection efforts that have occurred on private/non-Forest System lands within the subbasin. This appendix will be updated in subsequent versions of this document.

#### Burned Area Emergency Rehabilitation

A significant amount of rehabilitation work has occurred in the subbasin in association with large scale fires. The following reports contain details of the Burned Area Emergency Rehabilitation measures implemented following the Dinkelman and Tye disturbance events:

- a) Burned Area Emergency Rehabilitation - Final Accomplishment Report for the 1988 Dinkelman Canyon Fire, 1989
- b) Burned Area Emergency Rehabilitation - Final Accomplishment Report for the 1994 Chelan County Fires, 1995

#### Other Restoration-Related Activities

Other restoration projects and initiatives, mostly road-related on National Forest System lands, implemented since 1992 includes the following:

##### 1992

- a) Potato Creek Road Decommissioning: Involved decommissioning of a riparian section on the main road in upper Potato Creek (1.6 miles) that had been replaced by a new hillslope route; Treatment included ripping, drain dip installation and revegetation.
- b) Cougar Creek Area Stream Crossing Rehab: Drainage improvement, site hardening and revegetation at 15 perennial stream crossings on the Tye Ridge Road (5700) in the Billy and Cougar Creek watersheds. Treatments included installation of drain dips, armoring of culvert inlets, outlets and fill slopes, pit-run surfacing at stream crossings, installation of slash filter windrows, revegetation, along with rehabilitation of adjacent non-system roads and disturbed areas. (\$62,000)

c) Reconstruction of the Windy Creek Water Chance: The first of a series of projects targeted at replacing temporary waterchance structures with more natural and stable log weirs.

## 1993

a) Mud Creek Chip-Shred Demonstration Project: Utilized large tub grinder to treat landing pile slash concentrations from the Thin Mud TS; Applied chips for surface erosion control to several test sections of open road and on 3.0 miles of road that were closed. (\$25,000)

b) Mud-Potato Area Road Rehabilitation: Involved rehab work on the dense road network in upper Mud and Potato Creeks; Treatments included drainage improvements (drain dips, ditch relief culverts) and spot surfacing on open roads, as well as road closures (12 miles) and decommissioning (28 miles), with revegetation. (\$17,000)

c) Tyee-Shamel Creek Area Road Rehabilitation: Involved road rehab work on the dense road network in the Shamel Face area; Treatments included drainage improvements (drain dips, ditch relief culverts) and spot surfacing on open roads, as well as road closures (14 miles) and decommissioning (11 miles), with revegetation. (\$35,000)

d) Silver-Pope Area Road Rehabilitation: Stabilization of four major stream crossings and drainage improvement on adjacent road sections on the 5901/5902 roads. Treatments included rip-rap armoring of crossings, gravel surfacing, installation of 2 sub-surface drains, drain dips, and revegetation (alder planting, grass seeding and fertilization). (\$34,000)

e) Lower Potato Creek Road Rehab: Involved drainage improvements on the North Fork Potato Creek Road and a newly relocated section of the main Potato Creek Road by the Forest Road Crew; Treatments included cut slope stabilization, drain dip installation and armoring and spot surfacing. (~\$25,000)

f) Water Chance Reconstruction: Rehabilitated 3 sites associated with road crossings in Mud and North Fork Potato Creeks as described above for the Windy Creek site in 1992.

g) Tommy-Silver-Pope Alder Planting: Involved the planting of surplus alder starts (from Wenatchee FSL) on a number of cut slopes in the Silver-Pope area (approx. 5 acres) and on two debris avalanche tracks in Tommy Creek (approx. 7 acres).

## 1994

a) Mills-Roaring Creek Road Rehab: Involved road rehab work in the Mills/Dinkelman/Roaring Creeks area; Treatments included drainage improvements (drain dips, culvert improvement/installation), road reshaping, crossing improvements,

road closures and revegetation; This work was completed under three separate contracts prior to the start of the Tye Fire. (\$29,000; Mills Creek, Roaring Creek and Old Camp Road contracts)

b) Roaring Creek Riparian Clean-Up: A community-based improvement project targeted at improving conditions in and public awareness of Roaring Creek and its riparian area; Treatments on various ownerships included removal of four abandoned automobiles and other litter, tree planting and closure of user-built ORV trails in the riparian area.

c) Lake Creek Road Rehabilitation: Involved road rehab work in the Lake Creek basin on the 5904 road and spurs; Treatments included armoring of crossings, spot surfacing, installation of 2 sub-surface drains, drain dips, culvert improvement/installation, cut/fill slope reshaping/armoring (rock, logs) and revegetation; This project was contracted in 1994 and was completed in two parts. Lake "Early" was completed in 1994 (\$27,000). Lake "Late" was completed in 1995 (\$80,000).

d) Lower Tye Road Prep: Involved preparation of the lower Tye Road for paving/re-paving; Treatment included cut slope reshaping, ditchline refinement, ditch relief culvert installation and prism reshaping in unpaved sections of this road; This project was partially completed in 1994, shut down during the Tye Fire and completed in the 1995 field season. (\$86,000)

e) Tye Fire Emergency Burned Area Rehabilitation: A massive amount of burned area rehabilitation work was accomplished in the fall of 1994 on roads within the fire area (see Final Accomplishment Report for 1994 Chelan Fires).

f) Mud-Potato Creek Road Rehab: This project was planned and contracted prior to the Tye Fire. Some of the planned work was either completed or modified by Tye Fire Emergency Burned Area road rehab work. The project was redesigned and completed in 1995 and included fill slope stabilization, drain dip and culvert installation, spot surfacing and revegetation. (\$65,000)

g) Lower Tye Road Paving: Involved asphalt paving of a native surface section of the lower Tye Road, as well as repaving of adjacent road segments; This project was contracted in 1994 and completed in 1995. (\$147,000)

h) Tommy Creek Road Rehab: Involved road rehab work on the Tommy Creek Road system; treatments included stream crossing stabilization, drain dip installation, surfacing to the new trailhead, and road closures, with revegetation. The project was contracted in 1994 and completed in 1995 under two separate contracts. (\$12,000)

i) Tye-Berg Area Road Rehab: This project involved road rehab work along the 5700 road from the end of the pavement to Berg Creek. The project was planned and contracted prior to the Tye Fire. Some of the planned work was either completed or modified by Tye Fire Emergency Burned Area work. The project was redesigned and

completed in 1995 and included prism reshaping, drainage improvement (dip/culvert installation, installation of a french drain, relocation of the Camp Nine Trailhead, pit-run surfacing and revegetation. (\$100,000)

## 1995

a) Many of the road rehab projects contracted in 1994 were completed during the 1995 field season, as noted above.

b) Tye Fire Emergency Burned Area Rehabilitation work was continued during the 1995 field season, including the following road-related projects.

(1) Steliko Road Rehab: Involved road drainage improvement (rock-lined ditch and drainage features) on the lower Steliko Road by the Forest Road Crew. (\$5,000)

(2) Stormy Creek Check Dam Maintenance: Involved rework of ten loose rock check dams in lower Stormy Creek to better define the main channel, protect vulnerable banks and begin restoration of fish passage. (\$2,300)

(3) Potato-Stormy "Early" Road Rehab: Involved drainage improvement (drain dip/culvert installation), stream crossing/fill slope stabilization, temporary road relocation, spot surfacing and revegetation on roads in the lower Potato and Stormy Creek drainages, in response to damage from spring runoff. (\$30,000)

(4) Tye-Sugarloaf Road Rehab: Involved spot treatment of problem road sections in the Mad River watershed; Treatments included drainage improvement (2 culverts in Windy Creek; 3 in Tillicum/Indian Creeks; drain dips), prism reshaping, spot surfacing, fill slope stabilization and revegetation. (\$45,000)

(5) Indian Creek Flood Repair: Involved repair of spring runoff damage on the Indian Creek crossing on the Tillicum Road; Treatments included trash rack removal, road surface repair, ditch and culvert cleaning and fill slope reconstruction. (\$5,000)

(6) Pope Creek Flood Repair: Involved restoration of the Pope Creek crossing on the Entiat Valley Road following passage of a debris torrent initiated by spring runoff. (\$8,000)

(7) Bear-Potato Early Road Rehab: Involved continuation of Emergency Burned Area Treatments on road in the Mud and Potato Creek drainages; Treatments included drainage improvement (drain dips, culvert installation), spot surfacing, fill slope stabilization and revegetation. (\$49,000)

(8) Tye Fire Culvert Replacement: Involved the installation of four large, concrete box culverts at four stream crossings in lower Mud and Potato Creeks by the Forest Road Crew. (\$72,000)

(9) Tye Fire Late Road Rehab: Involved drainage improvement, surfacing and revegetation on priority, problem road segments within the fire area that were not treated in any previous contracts; Treatments included drainage improvement (dips, culvert improvement), prism reshaping, spot surfacing, slash filter windrow placement, road decommissioning (riparian road sections in N Fk Mud and Potato Creeks) and revegetation. (\$36,000)

(10) Tye "Follow-Up" Road Rehab: Continuation of the work described in the Tye Fire Late Project, including rehab of the S Fork Mud Creek Road (dips and spot surfacing) and completion of the road decommissioning work. (\$24,000)

(11) Rehab Gravel Replacement: Involved the crushing and stockpiling of a supply of crushed gravel for future maintenance and watershed restoration work. (\$80,000)

(12) Tye Pavement Repair: Involved chip seal coating of 9.3 miles of the Tye Ridge Road from McKenzie Saddle to the Tye Lookout Road as a result of heavy use by Tye Fire traffic. (\$102,000)

(13) North Fork Drainage Improvement: Involved installation of three new culverts on 5380/5390 roads in upper North Fork Potato Creek by the Forest Road Crew. (\$4,000)

c) Steliko Work Center Surfacing: Involved paving of the access road and parking areas at the Steliko Work Center. (\$14,500)

## 1996

a) Early Entiat Road Rehab: Involved the installation of drain dips, spot surfacing and fill slope stabilization on lower Mud and Potato Creeks in response to spring runoff within the Tye Fire Area. (\$35,000)

b) Shamel Creek Road Rehab: Involved repair of one culvert crossing that had been damaged during spring runoff. (\$4,000)

c) Mud-Potato Creek Culverts: Involved installation of several stream crossing structures on road sections in lower Mud and Potato Creeks. Treatments included spot surfacing and armoring of fill slopes. (\$44,000)

d) Tillicum-Miners Road Rehab: Involved road drainage improvement (drain dips, culverts) cut slope stabilization, surfacing and revegetation on the lower Indian Creek Road. (\$38,000)

e) Indian Creek Culvert Replacements: Involved the replacement of two existing, round corrugated metal culverts that were fish passage barriers with open bottom arch culverts. (\$54,000)

f) Tye-Berg Road Rehab: Involved drainage improvement (dip improvement/installation), pit-run surfacing and revegetation on the upper Tye Ridge Road (5700). (\$86,000)

g) Lake Creek Area Road Rehab: Involved completion of drainage improvement and slope stabilization work on the Lake Basin Road (5904) that was started in 1994. Also involved drain dip installation on a portion of the Shady Pass road, culvert improvement at a crossing on the Tommy Creek road and reshaping/resurfacing of a portion of the Tillicum Creek Road (above Tillicum Creek crossing). (\$81,000)

h) Tye Guardrail Installation: Involved installation of 400 feet of guardrail on a steep section of the Tye Ridge Road that had been recently paved in 1995. (\$10,000)

i) Tillicum Fan Restoration: Involved revegetation work on the alluvial fan at the mouth of Tillicum Creek; Treatments included soil decompaction (moldboard plow, disc, harrow), grass seeding, alfalfa cultivation, tree planting and noxious weed removal (hand pulling). This project was completed in 1997 as part of the Entiat Area Road Rehab project. (\$10,000)

j) Swakane Canyon Beaver Habitat: Involved armoring of an existing stream crossing on the Swakane Canyon road to accommodate beaver use of the road fill and culvert as a dam.

## 1997

a) Mills Canyon/Old Camp Road Rehab: Involved drainage improvement work (primarily drain dip installation/reconstruction and prism reshaping) on the Mills Canyon and Old Camp Roads. (\$49,000)

b) Entiat Channel Restoration Project: Involved a variety of in-channel and bank treatments in association with riparian corridor roads and stream crossings in the Stormy, Potato, Mud and Indian Creek drainages; Treatments included maintenance of burned area rehab check dams in Stormy and Potato Creeks, installation of low-profile, upstream pointing rock weirs, and large woody debris placement in channel sections adjacent to corridor roads and at stream crossings. (\$45,000)

c) Entiat River Bank Stabilization and Fish Habitat Restoration Project: Involved more than 1300 feet of bank treatments called "rootwad revetments" followed by riparian shrub plantings during September 1997. Treatments included placement of more than 100 conifer logs with rootwads, erosion control seeding, and planting more than 10,000 native shrubs on private lands in the "Stillwaters" reach of the Entiat River. The project was accomplished by 10 partners. (\$153,000)

d) Entiat Area Road Rehabilitation: Involved drainage improvement and stabilization work on lower Shady Pass and in the Silver-Pope, Mud, Tillicum and Indian Creek drainages; Treatments included drain dip construction/reconstruction, ditch relief culvert installation/rehab, prism reshaping, spot surfacing, armoring of stream crossings and weir placement. Completion of restoration work on the Tillicum fan site included removal of litter/metal debris and an unsafe wooden structure, removal of old concrete structures, bridge abutment and toe slope stabilization, installation of vehicle barriers, spot surfacing, noxious weed removal, native grass seeding and shrub planting. (\$99,000)

e) Shamel/Byers Road Repair: Involved repair of spring runoff damage to a culvert crossing on Shamel Face and a section of road in Byer's Canyon needed for reforestation access; Treatments included culvert improvement, running surface repair, drain dip installation and revegetation. (\$6,000)

f) Upper Indian Road Rehab: Involved repair of spring runoff and storm damage in Upper Indian Creek and Hornet Creek; Treatments included culvert improvement, drain dip installation and fill slope stabilization. (\$5,000)

g) Upper Mud-Potato Area Road Closures: Involved road closures and spot drainage improvements on some open road segments in the road system in upper Mud and Potato Creeks; Treated roads were those used during salvage and post-fire reforestation work, that were no longer needed for access; Treatments included drain dip installation, decompaction by sub-soiling (self-drafting) and revegetation (grass). (\$30,000)

h) Potato Creek Flood Repair: Involved repair of runoff damage to sections of the lower Potato Creek road and the North Fork Potato Creek road, resulting from a severe thunderstorm on 8/26/97. Treatments included slough removal, prism reshaping, culvert repair, crossing stabilization and revegetation.

i) Steliko Work Center Road Rehab: Involved drainage improvements on the Steliko Road adjacent to the FS Work Center and County Maintenance Shop; Treatments included installation of culvert bypass under the Entiat Valley Road, rework of the large rock deflector wall and initial preparation for culvert installation in the warehouse area of the Work Center. Work was completed by County and Forest Service crews.

j) Lake/Fox Creek Widening: Involved correction of public safety hazards at three locations on the main Entiat Valley Road; Treatment included widening and guardrail installation, with surfacing of two sites. (\$74,000)

k) Mud Creek Meadows Soil Rehab: Involved sub-soiling (self-drafting) and grass seeding of several old log landings in the Mud Meadows area above the 5300-217 road. This work was conducted as part of a demonstration training on the use of the self-drafting, winged sub-soiler. (\$4,000)

## 1998

a) 1998 Timber Sale EC Coop (Buy-Back) Work: Sub-soiler work completed on skid trails and landings in Stutzman's EC buy-back plan. This coop work was completed in 1998 and included; 2.88 miles of skid trail treatment on the Mad Billy Timber Sale (\$2,000.00), and 3.38 miles of skid trail treatment on the Round Up Timber Sale (\$1,900.00).

b) Swakane Area Road Rehab: Drainage improvement and reconstruction on several roads in the Swakane area. This work included; 3.10 miles of reconstruction/construction of drain dips and road drainage improvements on Road # 7400 (Derby Canyon Road), 4.25 miles of reconstruction/construction of drain dips, spot surfacing, fillslope/channel rip rap armor on Road # 7415 (Lower Swakane Road), 3.15 miles of reconstruction/ construction of drain dips, spot surfacing, rip rap armor of ditchline, fillslope armor of drain dip outlets on Road # 7415 (Upper Swakane). Total cost \$56,000, contract completed 11/12/98.

This project included approximately \$7,500.00 of work on sections of road on WDFW lands through a Wyden Amendment agreement.

c) Tillicum-Moe Road Rehab: Road improvements on Road # 5810 Moe Ridge and Road # 5800 Tillicum Creek Road. This work included construction and reconstruction of drain dips, road drainage improvements, spot surfacing, ditch pulling of 3.21 miles of road #5810. This project also included insloping of existing road prism for drainage improvement, spot surfacing, ditch cleaning, and general blading and shaping of 5.16 miles of road #5800. Total project cost was \$71,000 and the contract completed 10/26/98.

d) 1998 Steliko Stream Rehab: This project entailed fixing a leak in the channel retaining wall and excavation and replacement of water pipe behind the barn. \$4,004.00; project completed 9/9/98.

e) Spot Surfacing Entiat River Road: This was a road prism stabilization project with erosion control of sections of the upper Valley Road # 5100. Approximately 1 mile of native material road was surfaced over a 4 mile stretch using a Forest Road crew and equipment rental dump trucks. (\$15,000.00)

f) Tye Lookout Road Drainage Improvement: Installation of 46 drain dips and road drainage improvements on 3.85 miles of # 5713 Tye Lookout road. (8/98, \$2,000.00)

g) Sugarloaf Road Rehab near Lookout Road Junction: Spot surfacing of 0.20 miles of road with pit run armour and general blade and shape of road prism to improve road drainage. (\$5,000.00 5/27/98)



h) Preston-Dill Road System Storm Damage Repair: Backhoe work on plugged culverts on roads # 5501, # 5502, # 5503. Removal of storm caused small slides and clearing of debris plugged ditches (8/25/98 \$3000.00)

## 1999

a) Upper Entiat River Road Rehab: Spot surfacing and drainage improvements on approximately 2 miles of the Upper Entiat River Road; included surfacing Three Creek and Spruce Creek CG access roads. (\$20,000 10/99)

b) Tommy Creek Dispersed Site Rehab: Decompaction, traffic control and revegetation of dispersed campsite roads along lower Tommy Creek Road. (\$4,000 10/99)

c) Stormy Creek Check Dam modification: Third and last modification of the loose rock check dams installed in lower Stormy Creek during the 1994 Tyee BAER. (\$5,000 10/99)

d) Indian Creek Dispersed Site Rehab: Decompaction, traffic control and revegetation of dispersed campsite/sheep bedding area at the mouth of Indian Creek, including rework of outlet rock on lower arch. (\$1,000 10/99)

e) Upper Entiat Valley Road Asphalt Surfacing: Asphalt surfacing of approximately 1/3 of the Upper Entiat Road through the North Fork CG. (\$25,000 9/99)

f) Upper Entiat Spawning Channel Restoration: Approximately a quarter mile of previously constructed spawning channel was repaired. Since repair, spring chinook, steelhead and occasionally bulltrout have been observed spawning in the channel. (8/04)

## 2000

South Fork Mud Creek Relocation: Riparian road relocation in South Fork Mud Creek Road (#5340). This included 1.95 miles of new road constructed, 1.10 miles of road reconstructed and 1.85 miles of road obliteration. (\$174,000)

Projects and initiatives on private/non-Forest System lands within the subbasin include:

a) Property Acquisitions: The Chelan-Douglas Land Trust received grant monies from the State Salmon Recovery Funding Board to purchase property along the mainstem Entiat River for the protection of properly functioning riparian/fish/wildlife habitat.

## 2001

Mud Creek Road Relocation: Approximately 3 miles of the Main Mud Creek road (#5300) relocated away from the riparian zone. This project included decommissioning 3.9 miles of road located within riparian zone. (\$241,000)

Projects and initiatives on private/non-Forest System lands within the subbasin include:

a) Property Acquisitions: The Chelan-Douglas Land Trust received grant monies from the State Salmon Recovery Funding Board to purchase property along the mainstem Entiat River for the protection of properly functioning riparian/fish/wildlife habitat.

b) Entiat Instream Structure Installation: The Bureau of Land Management, in cooperation with WDFW and USFS, installed two engineered log jams at river mile 10.3, and two boulder barbs with root wads at river mile 15, in the fall of 2001. These projects were installed as part of an ongoing effort to restore habitat complexity in the Entiat River below the Potato Creek Moraine.

c) Entiat Instream Structure Installation: The Natural Resource Conservation Service, in cooperation with the Chelan County Conservation District, USFWS, and BLM, installed two low profile cross vane structures just below the fire station bridge, and an additional structure above the Dinkleman Canyon Road bridge, in the fall of 2001. The structures have added juvenile rearing and adult resting/holding pool habitat in the lower Entiat River.

## 2002

a) Tommy Fire BAER: 220 acres of uplands were aerially seeded and the drainage on 3 miles of trail was improved following the Tommy Fire. (\$12,400)

b) Entiat River Road Resurfacing: gravel surfacing was added to approximately one mile of road (\$40,000).

## 2003

a) Riparian Road Relocation: Spot seeding and mulching was applied to a two mile section of the Mud Creek Road that was decommissioned in 2001. (\$3800)

b) Spruce Grove Campground Restoration: A buck and pole fence was erected to reduce recreation impacts on the riparian area. (\$3000)