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Annual Report on the Okanogan Land and Resource Management Plan:

Implementation and Monitoring for Fiscal Year 2003

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INTRODUCTION

Monitoring is done to measure progress in Forest Plan implementation. It consists of gathering data, making observations, and collecting and disclosing information. Monitoring is also the means to determine how well objectives of the Plan are being met, and how appropriate the management Standards and Guidelines are for meeting the Forest's outputs, and protecting the environment. Monitoring is used to determine how well assumptions used in development of the Forest Plan reflect actual conditions.

Monitoring and evaluation may lead to change in practices or provide a basis for adjustments, amendments, or Plan revision. Monitoring is intended to keep the Forest Plan dynamic and responsive to change. Upon evaluation of the data and information, determinations are made as to whether or not planned conditions or results are being attained and whether they are within Forest Plan direction. When a situation is identified as being outside the limits of acceptable variability, changes may need to occur.

This report covers Forest Plan monitoring and evaluation for the Okanogan National Forest for Fiscal Year (FY) 2003. Monitoring and evaluation processes are laid out in the amended Okanogan National Forest Land Management Plan (Forest Plan). In 2003, the Forest monitoring team met to review and change some of the monitoring items in response to the Forest Plan Revision effort now underway. Over the years many items have been dropped because they were repetitive or the information was too difficult to obtain with the current budget to give a meaningful discussion and some were not the "right question". These changes are reflected under each item. In addition to content, many of the reporting cycles were changed and will not appear for several years.

In this report you will find various sections explaining the Forest Plan itself, monitoring methods, and evaluation of monitoring practices, standards and outputs under the Forest Plan.

Forest Plan Decisions

The amended Forest Plan is a set of decisions that guide management of the Okanogan National Forest. Taken broadly, it contains three types of decisions:

- Goals, Objectives, and Desired Future Conditions provide general direction regarding where the Forest should be headed as the Forest Plan is put into practice.

- Standards tell how to put the Forest Plan into practice, or give conditions that must be met while the Plan is implemented.

- Land Allocation by management areas (MAs) as described in the Forest Plan and displayed on the Forest Plan Map, in a sense "zone" the Forest into different types of areas that are suitable and available for different types of land management and resource production.

Monitoring is gathering information and observing management activities. Forest Plan monitoring is organized into three levels:

> Implementation monitoring determines whether goals, objectives, standards and management practices are implemented as detailed in the amended Forest Plan, asking, "Did the Forest do what it said it was going to do?"
>
> Effectiveness monitoring determines whether management practices, as designed and executed, are effective in meeting amended Forest Plan standards, goals, and objectives. The question being asked is, "Did the management practice or activity do what was intended?"
>
> Validation monitoring is used to determine whether the data, assumptions and coefficients used in the development of the amended Forest Plan are covered. The question being asked is, "Is there a better way to meet the Forest Plan's goals and objectives?"

Monitoring Methods

The amended Forest Plan defines a process that was designed to monitor implementation of the decisions above. Is the Forest doing what the Plan envisioned? Are the effects and outputs equivalent to what was predicted in the Forest Plan? Are the standards working? Do practices need to be adjusted to meet standards? Does the monitoring process need to be adjusted?

In addition to these monitoring methods, there are also monitoring procedures for timber sales, grazing allotments, fisheries, water quality, wildlife, and project effects. The results of these other types of monitoring are considered in this report.

Monitoring Implementation of the Northwest Forest Plan

The Record of Decision and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (Northwest Forest Plan) amended the Okanogan Forest Plan in April of 1994. The decision resulted in some change in management emphasis for lands administered by the Okanogan Forest, generally west of the lower and middle portions of the Methow River and west of the Chewuch River and Andrews Creek.

The Northwest Forest Plan requires that a monitoring plan be developed and incorporated into current Forest monitoring plans. The following narrative addresses the key implementation monitoring items identified on pages E-5 and E-6 of the ROD and Standards and Guidelines. Many of the effectiveness and validation monitoring items are being monitored through current efforts. As new monitoring direction arrives, it will be incorporated. This section is organized according to the following categories:

Late-Successional Reserves

Riparian Reserves

Matrix

Key Watersheds

Watershed Analysis

Participation

Late-Successional Reserves

1. Is timber harvest consistent with Standards and Guidelines and with Regional Ecosystem Office review requirements?

Planning project that would include stand treatments in the Hunter Mountain LSR and in the Fawn Creek and Grizzly Mountain area are consistent with Standards and Guidelines.

2. Were other management activities consistent with standards and guides?

All projects were designed to be consistent with Standards and Guidelines.

3. Have Late-Successional Reserve assessments been completed?

An Assessment of the Northeastern Cascades Late-Successional Reserves was published in April 1998.

4. Were management activities consistent with LSR assessments?

Management activities were designed to be consistent with the LSR assessment and watershed analysis documents.

Riparian Reserves

1. Width and integrity of Riparian Reserves; did the conditions that existed before management activities were conducted change in ways that are not in accordance with the Standards and Guidelines?

The width and integrity of riparian reserves was maintained for all projects; no changes were made in default guidelines.

2. Was watershed analysis completed prior to management activities where required?

Watershed analysis has been completed where required prior to management activities.

3. Were management activities in Riparian Reserves consistent with Standards and Guidelines?

If possible, management activity was designed to avoid riparian reserves. Activities in portions of riparian reserves were designed to be consistent with ACS objectives, and applicable Standards and Guidelines.

Matrix

1. Did number and distribution of green trees meet Standards and Guidelines in harvested areas?

For applicable timber harvest prescriptions, the number and distribution of green trees meet Standards and Guidelines.

2. Were appropriate amounts of snags and course woody debris retained?

The appropriate amount of snags and course woody debris were retained in timber harvest areas.

3. Was watershed analysis completed prior to harvesting late-successional stands in watersheds with less than 15 percent late-successional forest remaining?

No harvest of late-successional stands occurred.

Key Watersheds

1. Was watershed analysis completed prior to management activities?

Where required, watershed analysis was completed prior to management activity.

2. Was the presence and timing of activities, including restoration projects coordinated?

The presence and timing of activities was coordinated through interdisciplinary participation by various District specialists.

3. Were any new roads built in roadless areas?

No new roads were proposed for roadless areas.

4. Was there a net increase in roads?

In key watersheds, there was no net increase in roads. In most situations, there was a net decrease in roads due to proposed road management (decommissioning).

Watershed Analysis

1. Was presence and timing of watershed analysis appropriate?

Appropriate watershed analysis was completed as required.

Participation

1. Were multiple agencies, the public, and others involved in planning, implementing, and monitoring watershed analysis?

Efforts were made to include the public, and other agency involvement in the process of completing watershed analysis. Government to government consultation with the appropriate American Indian Tribes was conducted on all projects.

2. Was information sharing pursued between all parties such as agencies, publics, and communities?

Yes, see above.

3. Were clear expectations and responsibilities identified?

Yes, where applicable.

4. Were active partnerships developed?

There is an on-going effort to keep local citizens, governments, and organizations informed of proposed projects.

Provincial Advisory Committee Monitoring

Monitoring under the Northwest Forest Plan is done by the Eastern Washington Cascades Provincial Advisory Committee (PAC). In 2003, The Twisp River and Chewuch watersheds were selected for monitoring with attention focused on the density management and fuel reduction projects within Late-successional Reserves. The TPR (Twisp River Pine Restoration) and Grouse Timber Sale. The monitoring review focused on the capability of the dry forest to meet Standards and guidelines for large woody debris and snags and the application of riparian buffers and riparian protection. The monitoring team concluded that both projects had met the intent of the Aquatic Conservation Strategy (ACS) and Standards and Guidelines.

SUMMARY of RECOMMENDED ACTIONS TABLE FOR FISCAL YEAR 2003

Monitoring Items	Results Okay; Continue Monitoring	Change Management Practices	Further Evaluation	Propose Forest Plan Amendment	Other Recommendations
11. Primary Cavity Excavators Habitat Management	●				Re-sample within the fire and salvage logging study area during 2004 and 2005 to monitor snag attrition and the response of primary cavity excavators. Survey snags before and after timber harvest to determine if snag standards are being met.
19. Grizzly Bear Habitat Management	●				Continue to assess the affects of projects on grizzly bears and complete consultation.
31. Status of Aquatic Management Indicator Species (was Anadromous and Resident Fish Management Indicator Species)	●				Continue monitoring program to establish trends for MIS species.

Monitoring Items	Results Okay; Continue Monitoring	Change Management Practices	Further Evaluation	Propose Forest Plan Amendment	Other Recommendations
32. Watershed Condition and Aquatic Habitat			●		Continue to gather sediment data on an annual basis in order to establish trends in sediment composition for the Chewuch and Twisp Rivers. This would help in monitoring the effects of the Thirtymile and Farewell fires. Strict quaility control standards must be followed to reduce sample variability. Adding another sampling reach farther upstream where water temperatures are colder and bull trout spawn should be explored. Further evaluation is needed and is planned as a component of Forest Plan revision. As funds become available, efforts need to be directed at resources for watershed restoration. Continue to work with federal, state and county governments, and the local communities to modify operations of water diversions. Continue to analyze and monitor roads and recreational sites within riparian areas. Modify or remove roads and/or recreational sites that prevent attainment of Aquatic Conservation Strategy Objectives or Riparian Management Objectives.
47. Riparian/ Watershed Standard Implementation (changed from Water Quality/BMPs	●				Continue the monitoring of restored sites and inventory of new sites. Monitoring and maintenance of restored sites and continued public contact and education are essential for successful restoration.
53. Road Miles and Operational Status	●				Results Okay; Continue monitoring. Continue to utilize watershed analysis, roads analysis, and project level analysis to identify the need for roads, and to update forest road inventories.

Monitoring Items	Results Okay; Continue Monitoring	Change Management Practices	Further Evaluation	Propose Forest Plan Amendment	Other Recommendations
55. Actual Annual Wildfire Occurrence	●				Results okay; continue monitoring
63. Mineral Withdrawals	●				Recommend dropping item. Continue to display mineral output.
70. Heritage Resource Site Protection	●				Continue monitoring sites inside project areas. Emphasize site evaluation, especially the evaluation of previously documented cultural resource sites. Complete the Forest's GIS heritage layer by 2005.
71. Heritage Resource Site Preservation	●				Continue to perform condition assessments on historic properties and treat sites as needed. Look for additional sources of funding.
72. American Indian Relations	●				Meet with the Colville Confederated Tribes THPO annually to discuss and evaluate the effectiveness of the Forest's consultation protocol. Consider developing a memorandum of understanding for government-to-government consultation, TCP identification and the sharing of sensitive information in general.
73. Management of Competing and Unwanted Vegetation (Item number changed from 72 to 73)	●				Results Okay: Continue monitoring new invasive species with high potential for spread in the field. Use tools such as GIS to track treatments and to help interpret spread of noxious weeds and help set priorities on treatment areas. Continue to use the prevention strategy in the planning of all ground disturbing projects and implement the Okanogan and Wenatchee National Forests Prevention Strategy.

Evaluation Reports

Monitoring Item #11:

Primary Cavity Excavators – Habitat Management

Objective or Purpose: Habitat Management

Type of Monitoring: Implementation ■ Effectiveness ■ Validation ❑

Method of Monitoring: Estimate numbers of snags and wildlife trees by sampling timber management projects and established transects

Criteria: Forest Plan direction, Standards and Guidelines

Standards: Does greater than 10% of the area have less than 90% of prescribed level of snags?

Frequency Item is Monitored: Annually

Evaluation: A project to estimate snag retention during project implementation has been initiated and the first year of data collection has been completed. The study is designed to determine project effects on existing snags, including logging, post sale activities and prescribed fire.

Monitoring of Primary Cavity Excavator Habitats

The second primary cavity excavator monitoring study was initiated in 2001 and was designed to determine the direct, short-term effects of timber harvest and harvest systems on snag numbers. In addition, a secondary objective was to monitor the effectiveness of meeting forest plan snag standards. To date, the fates of 639 snags over 250 acres of dry forest restoration projects have been monitored. Additional monitoring is underway to determine how different harvest systems and prescribed fires influence snag numbers, and to develop statistically accurate measures of snag attrition rates.

		Before Harvest			After Harvest		
Monitoring Unit	Unit Size	6-<10 in. DBH	10-20 in. DBH	>20 in. DBH	6-<10 in. DBH	10-20 in. DBH	>20 in. DBH
1	20	59	64	18	15	35	12
2	30	55	61	8	20	44	6
3	26	41	25	3	26	12	3
4	18	29	11	3	23	11	3
5	87	98	142	23	NA	NA	NA
6	15	13	15	5	NA	NA	NA
7	70	56	35	10	NA	NA	NA

NA= harvest has not occurred so that post-harvest monitoring is not yet complete.

Recommended Actions: Re-sample within the fire and salvage logging study area during 2004 and 2005 to monitor snag attrition and the response of primary cavity excavators. Survey snags before and after timber harvest to determine if snag standards are being met.

Monitoring Item #19:

Grizzly Bear Habitat Management

Objective or Purpose: Habitat Management

Type of Monitoring: Implementation ■ Effectiveness ❑ Validation ❑

Method of Monitoring: Review National Environmental Policy Act (NEPA) documents for adherence to guidelines. Field verify implementation of guidelines.

Unit of Measure: N/A

Criteria: Forest Plan direction, Standards and Guidelines

Standards: Are Biological Assessments completed and grizzly bear guidelines followed?

Frequency Item is Monitored: Every Year
Evaluation: Biological assessments are completed to address the affects of each project on grizzly bears within the North Cascades Grizzly Bear Recovery Zone. Outside the recovery zone, especially between the North Cascades and Selkirks mountain ranges, projects are assessed for how they affect connectivity. All projects met the interim guidance of "no net loss" of core area by Bear Management Unit (BMU).

Recommended Action: Continue to assess the affects of projects on grizzly bears and complete consultation.

Monitoring Item #31:

Status of Aquatic Management Indicator Species

(formerly Anadromous and Resident Fish Management Indicator Species for Riparian and Aquatic Habitats)
Changed to report every year from a 5-year cycle

Objective or Purpose: Ascertain population trends

Type of Monitoring: Implementation ❑ Effectiveness ■ Validation ❑

Method of Monitoring: Obtain anadromous fish numbers from Washington State Department of Fish and Wildlife (WDFW). Obtain resident fish numbers from WDFW and Forest sampling.

Unit of Measure: Trend in numbers

Criteria: Forest Plan direction, Standards and Guidelines

Standards: Is there more than 10% reduction in fish population over a 5 year period?

Frequency Item is Monitored: Changed to a report every year from a 5-year cycle in 2003 Report

Evaluation: The Forest cooperated with Washington Department of Fish and Wildlife (WDFW) and the U.S. Fish and Wildlife Service (USFWS) to conduct steelhead and bull trout spawning surveys. Douglas County PUD funds spring Chinook and summer Chinook spawning surveys. Spawning reports for spring and summer Chinook salmon are not available at this time. The Forest also conducted fish distribution surveys in several streams. The fish distribution surveys are not intended to estimate population size but to determine spatial distribution and relative abundances of fish species. The following are results for surveys that the Forest participated in.

Steelhead

Steelhead inhabiting the Methow and Okanogan subbasins are part of the Upper Columbia Evolutionary Significant Unit and are listed as Endangered under the Endangered Species Act. Steelhead are not found within the boundaries of the Tonasket Ranger District, so only Methow subbasin results are discussed here. The following results are from October 21, 2003 WDFW memo by Charlie Snow to Rick Kling, "Methow River Basin Steelhead Spawning Ground Surveys in 2003". The objective of the steelhead spawning surveys is to estimate spawning abundance and distribution within the Methow subbasin and monitor potential changes to release of juvenile hatchery steelhead.

Abundance and distribution information is obtained throughout the Methow subbasin by expanding weekly counts from index areas on the Twisp, Methow and Chewuch Rivers. Selected tributaries were also surveyed as river conditions and personnel constraints permitted.

Surveys accounted for a total of 2,019 redds (spawning areas) within the Methow Basin. The Fish Passage Center reported a total of 9,475 steelhead over Wells Dam in 2002 (2003 brood). Approximately 852 steelhead were removed from the spawning population during a sport fishery in 2002-2003, with an additional 427 estimated steelhead attributed to hooking mortality (5%). Based upon the male to female ratio of the Wells Hatchery broodstock (0.73:1), redd counts represent 3,492 steelhead and 42.6% of the estimated escapement above Wells Dam.

The Twisp River was the most heavily utilized spawning area, containing 26.6% (N = 539) of all redds counted in the Methow River basin. Redd counts within the Twisp River index section were 46.3% and 47.1% of the river total in 2003 and 2001, respectively, suggesting little change in the spawning distribution.

Summer steelhead survey reaches and index areas for the Methow River Basin

Reach Code	Reach (rkm)	Index area (rkm)
Methow River		
M1	Confluence (0.0) to Twisp R. (64.0)	Gold Creek Br. (30.4) to Carlton Br. (43.5)
M2	Twisp R. (64.0) to Winthrop Br. (79.6)	NA
M3	Winthrop Br. (79.6) to Mazama Br. (104.6)	Weeman Br. (94.4) to Mazama Br. (104.6)
M4	Mazama Br. (104.6) to Ballard CG (123.2)	NA
Twisp River		
T1	Confluence (0.0) to Buttermilk Br. (20.3)	Twisp Weir (12.8) to Buttermilk Br. (20.3)
T2	Buttermilk Br. (20.3) to Road End CG (42.2)	NA
Chewuch River		
C1	Confluence (0.0) to Camp 4 Br. (32.6)	Boulder Creek (12.8) to 8-Mile Creek (16.0)
C2	Camp 4 Br. (32.6) to 30-Mile CG (48.0)	NA
Beaver Creek		
B1	Hwy 20 (3.2) to Confluence (0.0)	Fish Screen (1.6) to Hwy 153 (0.5)

CG = Campground

Tributary streams surveyed for spawning steelhead in 2003

Date(s)	Subbasin	Stream	Reach	# of Redds
6-May	Methow	Gold Creek	Spot check 0.5 to 3.5	2
7-May	Methow	Lost River	Mouth to Eureka Creek	5
4-Apr to 19-May	Twisp	Buttermilk Creek	Cattle guard to screen	0
1 to 19-May	Twisp	War Creek	Mouth to Bridge	0
1 to 15-Apr	Chewuch	Eight-mile Creek	Mouth to Bridge	20
26-Mar to 16-Apr	Chewuch	Boulder Creek	Mouth to Bridge	0
7-May	Chewuch	Lake Creek	0.5 to 1.5	1
			Total	28

Steelhead spawning surveys in the Methow River basin, 2001-2003
Redd counts are based on total observations (2001; 2002),
and expanded values from comprehensive index area counts (2003).

River/ Reach	2001	2002	2003
Methow River Basin			
M1	--	--	227
M2	--	--	89
M3	--	156	389
M4	--	--	230
B1	--	70	15
Lost River	--	11	5
Gold Creek	--	--	2
WNFH Spring Creek	21	171	61
Subtotal	21	408	1,018
Twisp River Basin			
T1	147	350	514
T2	42	--	182
Buttermilk Creek	--	4	0
War Creek	--	0	0
Subtotal	189	354	696
Chewuch River Basin			
C1	--	105	247
C2	--	--	37
Boulder Creek	--	4	0
8-mile Creek	--	5	20
Lake Creek	--	1	1
Subtotal		115	305
Methow Basin Totals	210	877	2,019

Bull Trout

Bull trout spawning surveys were conducted cooperatively with the U.S. Fish and Wildlife Service in the Methow subbasin. While bull trout by some accounts may have historically inhabited tributaries to the Okanogan River, no bull trout have been observed. Bull trout index areas are not as well established in the Methow as in the Entiat, Wenatchee and Yakima basins, so determining trends is difficult. Surveys using the standard protocol agreed to with Washington Department of Fish and Wildlife and U.S. Fish and Wildlife Service need to be continued.

Methow Basin Bull Trout Redd Counts

Watershed	Stream	Miles	1995	1996	1997	1998	1999	2000	2001	2002	2003
Twisp Watershed											
	Twisp River headwaters	3.5	18	0	2	67	38	72	53	67	
	Twisp River	1.5	-	-	-	-	-	-	19	13	46
	North Creek	0.6	3	-	-	19	63	33	0	2	29
	South Creek	0.5	0	-	-	-	0	0	-	3	NS
	Reynolds Creek	0.3	0	-	-	-	-	-	1	7	NS
	Buttermilk Creek	2.3	0	0	0	0	-	-	-	-	9(WFK)
	E. Fk. Buttermilk Creek	3.3	4	0	-	0	0	0	3	0	2(EFK)
Watershed Total:		12	25	0	2	86	101	105	76	92	86
Upper Methow Watershed											
	Methow River above Trout	5.3	27	15	13	11	1	2	19	54	NS
	Methow River below Trout	3.4	-	-	-	-	-	-	1	-	NS
	Trout Creek	0.5	1	-	-	0	-	-	-	-	NS
	Robinson Creek	1	-	-	1	-	-	-	-	-	NS
	Goat Creek	7.5	-	-	-	-	-	11	0	-	3
Watershed Total:		17.7	28	15	14	11	1	13	20	-	3*
Lost Watershed											
	Lost River above Eureka	3	5	-	-	-	-	-	2	-	NS
	Lost River below Eureka	2.7	-	-	-	-	-	-	0	-	NS
	Eureka Creek	0.3	-	-	-	-	-	-	0	-	NS
	Monument Ck	1	2		-	-	-	-	0	-	NS
Watershed Total:		7	7	0	0	0	0	0	2	-	*

Watershed	Stream	Miles	1995	1996	1997	1998	1999	2000	2001	2002	2003
Early Winters Watershed											
	Early Winters Ck	4	-	9	1	2	0	3	5	6	0
	Cedar Creek	2.5	-	1	-	-	-	-	-	-	NS
	Huckleberry Creek	0.8	-	1	-	-	-	-	-	-	NS
Watershed Total:		5.3	-	11	1	2	0	3	5	-	0
Chewuch Watershed											
	Chewuch River	1.5	-	-	-	-	-	-	9	11	11
	Lake Ck above Black Lake	1.5	22	13	9	8	0	8	21	11	10
	Lake Ck below Black Lake	6.5	-	-	-	-	-	4	2	-	4
Watershed Total:		9.5	22	13	9	8	0	12	32	22	25
Middle Methow Watershed											
	Wolf Creek	4	-	3	3	27	29	15	20	15	18
Lower Methow Watershed											
	Libby Creek	3	-	-	-	-	-	-	0	-	NS
	Crater Creek	1.5	-	2	2	1	0	-	0	2	0
Watershed Total:		4.5	-	2	2	1	0	0	0	-	0
Methow Basin Total	82	-	44	31	135	131	148	155	195	132	

*2003 surveys for West Fork Methow and Lost River not accomplished due to Needles Fire activity.

Snorkel Surveys

Snorkel surveys were completed on Trout Creek, War Creek, and Cutthroat Creek on the Methow Valley Ranger District. The objectives of the survey are to monitor fish distribution and relative abundance. One hundred meter long transects were randomly selected and snorkeled. Fish were counted by species in 5 size categories: 1" to 4", 4" to 8", 8" to 12" 12" to 16" and greater than 16".

Trout Creek

Trout Creek is a 3.8 mile long, second order stream flowing from its origin at the confluence of the North and South Forks of Trout Creek (elevation 4,300') to the confluence with the West Fork Methow River (West Fork Methow, River Mile 5, Methow, River Mile 82). Trout Creek contributes about 15% of the flow of the West Fork Methow River at the confluence at low flow. All three listed fish species in the Methow River Basin (spring Chinook salmon, summer steelhead and bull trout) spawn and rear in the West Fork Methow River. Trout Creek has a high gradient (7%) channel flowing through a v-shaped valley with steep side slopes.

Observations:

- Rainbow trout was the dominant fish species in Trout Creek from the mouth to the confluence of the South and North Forks of Trout Creek. Rainbow trout were most abundant in the 4" to 8" size category (57% of total rainbow observed were in the 4" to 8" size class). A rainbow/steelhead greater than 16" in length was seen at river mile 3.8, just below the confluence of the two forks. The large rainbow/steelhead had a wide, bright red band along the sides of the body similar to steelhead seen in the larger rivers in the Methow River Basin. Because the fish swam into a bedrock crack when approached, the snorkeler observing the fish could only get a rough estimate of size.

- Rainbow/steelhead are spawning in Trout Creek. A 2' x 2' rainbow/steelhead redd was seen by surveyors at river mile 0.4 on July 24, 2003.

- Three bull trout between 11" and 13" in length were observed in the lower 1.2 miles of Trout Creek. No bull trout were observed in upper Trout Creek. Bull trout from the Methow River are likely using Trout Creek to feed on rainbow fry in Trout Creek.

- No cutthroat trout were observed in Trout Creek.

- Bedrock waterfall fish barriers exist in both the North and South Forks of Trout Creek just above the confluence with Trout Creek. No fish were observed above the fish barriers in both forks.

USFWS Genetic Study of Rainbow Trout

Genetic testing of rainbow trout captured in Trout Creek near the confluence with the Methow River by the USFWS found the population to have influences from non-native coastal rainbow trout, likely the product of stocking. Genetic testing has not been done on the population of rainbow trout at the headwaters, which appeared by snorkelers to resemble redband rainbow trout.

War Creek

War Creek is an 11.5 mile long, third order stream flowing from its origins below the Chelan Sawtooths at an elevation of close to 7,000' to the confluence with Twisp River (elevation 2,400'). War Creek contributes about 20% of the flow of the Twisp River at the confluence at low flow (2001 Twisp River Survey Report). All three listed fish species in the Methow River Basin (spring Chinook salmon, summer steelhead and bull trout) spawn and rear in the Twisp River. War Creek has a high gradient (6%) channel flowing through a v-shaped valley with steep side slopes.

Observations

- Rainbow/steelhead trout was the dominant fish species in War Creek from the mouth to the waterfall barrier at river mile 1.2. Of the 263 fish counted in War Creek, 194 were rainbow/steelhead (74%). Over half of the rainbow/steelhead were in the 4" to 8" size category.

- Rainbow/steelhead are likely spawning in War Creek, evidence by 23 rainbow/steelhead fry counted in the 7 transects

- Twenty-four bull trout were seen by snorkelers in the 7 transects. Seventeen of the 24 bull trout were in the 1" to 4" size category, indicating that bull trout are likely spawning (no bull trout redds were seen during bull trout redd surveys conducted in October, 2003). Fluvial bull trout have been observed below the falls in War Creek in the past

- Spring Chinook salmon juveniles are rearing in War Creek below a channel spanning log jam at river mile 0.1. The log jam is a barrier to upstream juvenile migration.

- A small number of cutthroat trout (6) were observed in the 7 transects in the lower 1.2 miles of War Creek. Cutthroat trout are the most abundant fish species above the waterfall barrier.

- A small number of brook trout (6) were observed in the 7 transects in the lower 1.2 miles of War Creek. Brook trout are abundant above the waterfall barrier to the South Fork of War Creek at river mile 3.

USFWS Genetic Study of Rainbow Trout

Genetic testing of rainbow trout and cutthroat trout captured in War Creek below the waterfall by the USFWS found both good representations of interior redband rainbow trout and westslope cutthroat trout as well as rainbow/cutthroat hybrids and rainbow trout with influences from non-native coastal rainbow trout.

Cutthroat Creek

Cutthroat Creek is a 3-mile long, second order stream flowing from its origin (Cutthroat Lake at 4,935') to the confluence with upper Early Winters Creek (River Mile 11). Cutthroat Creek contributes about half the flow of Early Winters at the confluence. Early Winters Creek is a major tributary to the Methow River. All three listed fish species in the Methow River Basin (spring Chinook salmon, summer steelhead and bull trout) spawn and rear in Early Winters Creek. Cutthroat Creek has a high gradient (7%), bedrock controlled channel, with three fish barriers located between the mouth and the Highway 20 bridge crossing of Cutthroat Creek at about RM 0.4

Observations

Cutthroat trout was the only fish species seen in Cutthroat Creek both above and below the 10' high waterfall fish barrier. Cutthroat trout were most abundant in the 4" to 8" size category. Some good spawning habitat exists above a channel spanning log jam at river mile 0.2. Two cutthroat fry were observed in the area, indicating that cutthroat trout are spawning in Cutthroat Creek.

USFWS Genetic Study of Cutthroat Trout

Genetic testing of cutthroat trout captured in Cutthroat Creek by the USFWS found the population to be "one of the best representations of this subspecies". Cutthroat Lake was stocked from a source that was presumably native fish. Further stocking of Cutthroat Creek or Early Winters Creek is "ill-advised" due to the presence of two native salmonids (bull trout in Early Winters Creek, westslope cutthroat trout in Cutthroat Creek and upper Early Winters Creek).

Monitoring Item #32:

Watershed Condition and Aquatic Habitats

(Changed from Fish Habitat and Riparian Condition in 2003, changed to annual reporting from a 5-year cycle, includes Nos. 46 and 48)

Objective or Purpose: Determine if project implementation is resulting in expected condition for Riparian and Aquatic Ecosystems.

Type of Monitoring: Implementation ■ Effectiveness ■ Validation ❑

Method of Monitoring: Environmental Assessment (EA) with field review of sample of projects annually.

Unit of Measure: Percentage of Fish/Riparian standards and guidelines successfully identified and applied

Criteria: Forest Plan direction, Standards and Guidelines

Standards: Is there compliance with Forest-wide direction?

Frequency Item is Monitored: Every year

Monitoring watershed and aquatic habitat conditions is essential to determine to the status of aquatic habitat, provide information for planning land management activities, and monitor the effectiveness of land management activities at meeting Forest Plan direction. Monitoring in 2003 included sediment sampling, water temperature monitoring and stream habitat surveys.

SEDIMENT

Chewuch River Sediment
The following information is from Sediment Monitoring Report Chewuch River and Twisp River, Methow Valley Ranger District, prepared by Darren Cross and Dave Fedak, January 5, 2004. A full copy of the report is available at the Methow Valley Ranger District Office or the Okanogan-Wenatchee National Forest Headquarters Office in Wenatchee, WA.

Fine sediment is a natural component of streambeds. Elevated levels of fine sediment can result from accelerated erosion associated with roads, timber harvest, grazing, and fire, that in turn can adversely affect salmonid spawning and rearing success. The Methow Valley Ranger District has monitored salmonid spawning gravel composition in the Chewuch River since 2000 and the Twisp River since 2001. The Forest Plan states that spawning gravel will consist of no more than 20 percent fine sediment <1.00 mm and that "sediment in streams shall be maintained at levels low enough to support good reproductive success of fish populations as well as adequate in-stream food production by indigenous aquatic communities to support those populations." In 1998, the US Fish and Wildlife Service (USFWS) produced the Framework to Assist in Making ESA Determinations for Bull Ttrout, which became the new standard for acceptable levels of fine sediment; however, the Forest Plan standard is still the standard stated above.

The USFWS lists its revised standards of functionality:

- <12% fines <0.85mm is functioning appropriately;
- 12% to 17% fines < 0.85mm is functioning at risk;
- >17% fines <0.85 is functioning at unacceptable risk.

NOAA Fisheries also adopted the standards for fine sediment for chinook salmon.

Sediment monitoring with the McNeil core sampler was initiated in the Chewuch and Twisp Rivers to determine present sediment conditions and establish a baseline. Monitoring will determine the extent of future analysis, elucidate sediment trends in spawning gravel for the two watersheds, validate the adequacy of current monitoring methods, and assess the appropriateness of the current sediment standard. Results will also be used to describe the range of variability of fine sediment in spawning gravel for the Chewuch and Twisp Rivers, and guide future watershed restoration activities aimed at reducing sources of accelerated fine sediment in spawning habitat.

Samples were collected from four reaches in the Chewuch and Twisp Rivers consistent with the sampling methodology established on the neighboring Wenatchee National Forest. For statistical validity, this methodology specifies a minimum sample size of three reaches per stream, three riffles per reach, and four samples per riffle.

The Chewuch River is managed under the Northwest Forest Plan as a Tier 1 Key Watershed west of the main stem. The eastern side of the watershed including the Lake Creek subwatershed and Pasayten Wilderness is a PacFish Key watershed. The Northwest Forest Plan/PacFish boundary runs up the Chewuch River and crosses at Lake Creek. The Chewuch River provides significant spawning and rearing habitat for spring and late-spawning chinook salmon, summer steelhead, and bull trout. Four reaches were chosen in year 2000 for sampling based on clusters of known chinook spawning sites identified in a 1993 spawning survey of the Chewuch. Each season some changes in riffle sampling locations are made based on the number of fish spawning and water flows. For example, in 2001 a record number of returning chinook combined with very low flows necessitated some riffle location changes. A riffle sampled in 2000 did not have enough flow to provide space for redd construction and sampling.

Reach 1 is in the main channel opposite the confluence with No Snake Creek, RM 21.6 to 21.8. Access is from the Forest Service (FS) 51 road. The site is characterized by a high eroding bank upstream of a rip-rapped area below the road. This year riffle 3 was moved upstream, above the eroding bank. This was to limit the number of riffles which might be directly influenced by the eroding bank.

Reach 2 is in the vicinity of Chewuch campground from RM 17.3 to 17.6. Access is from the FS 5010 road. The reach begins just upstream of the Pacific Watershed Institute constructed logjam below the road, and continues to the Chewuch Campground. The site is characterized by the constructed logjam and rip-rap below the road. This year the location for riffle 1 was moved back to the original site selected in the 2000 survey

Reach 3 is from RM 15.2 to 15.6 in the vicinity of Doe Creek Road (FS 51100 road). Access is from FS 51 road. The site is characterized by wide depositional bars. Following recommendations made in the 2000 Sampling Report new locations were identified for riffles 1 and 3. Riffle 1 is now located at the Big Pine Campground. Riffle 3 is upstream of riffle 1.

Reach 4 is from RM 9.2 just upstream from Memorial Campground to Ohlsen's private road (the first private road off the FS 51 road after crossing the Forest boundary) at RM 9.5. A new location identified as riffle 3 was selected downstream of riffle 1. This new location is occupied more often by salmon and steelhead during spawning. It is also closer in proximity to riffles 1 and 2.

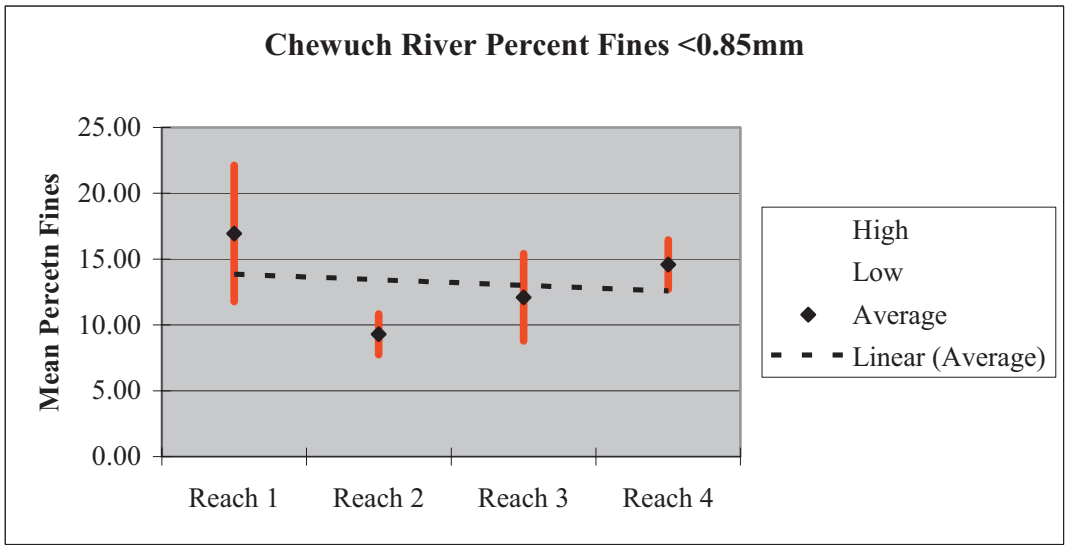
The Chewuch River drainage appears to be naturally high in fine sediment with highly granitic soils. The Thirtymile fire burned approximately 9,324 acres in 2001, and the Farewell fire burned 50,000 acres of the Chewuch watershed in 2003. Both fires occurred above the sediment sampling reaches, so there is a good opportunity to monitor effects of fire on fine sediment delivery into the river. Data collected in 2003 is displayed below, showing the percentage of fine sediment smaller than 0.85mm in spawning substrate of the Chewuch River.

Summary of 2003 Chewuch McNeil Core Data

Reach	Mean % fines <0.85mm	Std dev <0.85mm	95% CI	80% CI	Functional Rating
1	16.95	8.13	11.78<μ<22.11	13.75<μ<20.15	Functioning at risk
2	9.29	2.44	7.74-<μ<10.83	8.33<μ<10.25	Functioning appropriately
3	12.09	5.22	8.77<μ<15.40	10.04<μ<14.14	Functioning at risk
4	14.58	2.96	12.70-<μ<16.46	13.42<μ<15.72	Functioning at risk

Overall, the Chewuch River is functioning at risk for fine sediment in spawning gravel according to USFWS (1998). The data collected in 2003 showed the mean percent fine sediment <0.85mm to be greater than 12% and less than 17% in Reaches 1, 3, and 4. The 2003 spawning gravel composition for the Chewuch River, with 95% confidence intervals is displayed in Figure 1.

2003 Spawning Gravel Composition in the Chewuch River with 95%Confidence Level



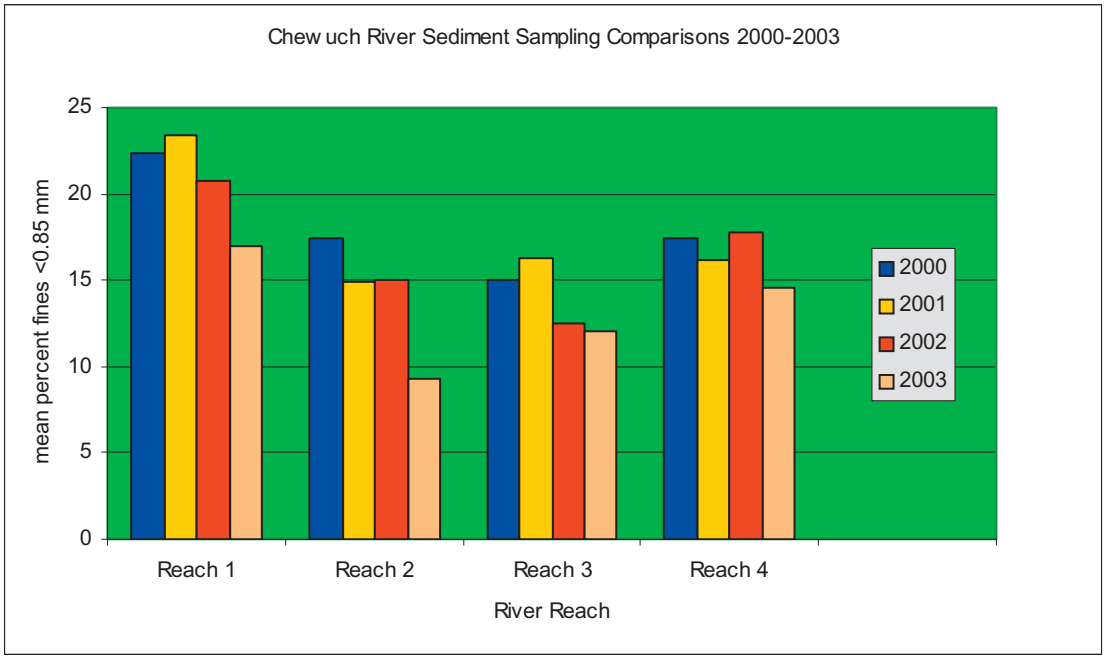
*Reancnch 1 is RM 21.6 and Reach 4 RM 9.2

This table shows the 4-year mean for percent fine sediment to be in line with the 2003 findings. Because the Chewuch River is naturally high in fine sediment, it could be functioning within its natural range of variability and still be functioning properly. Future monitoring is needed to confirm this determination.

Comparison of reach sediment data over time

	Reach 1	Reach 2	Reach 3	Reach 4	Mean*
2000	7.80<μ<21.35	7.27<μ<21.35	11.58<μ<19.09	14.67<μ<18.39	14.54
2001	14.79<μ<24.25	10.43<μ<14.94	9.34<μ<15.02	13.66<μ<16.81	14.90
2002	13.45<μ<13.62	9.57<μ<13.62	7.89<μ<17.47	14.55<μ<20.02	14.34
2003	11.78<μ<22.11	7.74<μ<10.83	8.77<μ<15.40	12.70<μ<16.46	13.22
Mean by Reach**	16.07	11.97	13.07	15.91	

*Mean percent fines <0.85mm averaged over all 4 reaches by Year
**Mean Percent by Reach over time



Twisp River Sediment

The Twisp River watershed is approximately 157,000 acres in size and is managed under the Okanogan Forest Plan as amended by the Northwest Forest Plan as a Tier 1 Key watershed. Approximately 72,000 acres of the watershed is within the Lake Chelan-Sawtooth Wilderness and an additional 30,000 acres are designated Late-successional Reserve. The Twisp River is approximately 30 miles long with the lower 15 miles and 15,700 acres on state and private lands. Within the Twisp River watershed timber harvest and road, construction has occurred mainly in the Poorman, Newby, and Canyon, Little Bridge and Buttermilk sub-watersheds, leaving a large portion of the upper watershed in a relatively pristine condition. Livestock grazing on National Forest lands occurs within the Lime, Canyon, Little Bridge, Coal, Myers, Poorman, Newby, and Buttermilk Creek sub-drainages.

Spring Chinook salmon, summer steelhead trout, and bull trout access nearly the entire 30 miles of the Twisp River. They have access to short (less than 1 mile) segments of Poorman, Eagle, War, Reynolds, South, and North Creeks. Buttermilk and Little Bridge Creeks each have several miles of habitat accessible to anadromous fish. Spring Chinook salmon spawn in the Twisp River between Poorman and South Creeks, with a majority of redds located between Buttermilk and South Creeks. Chinook salmon were seen in each reach during 2003 mid-August core sampling.

Reach 1 begins at the mouth of the Twisp River and extends to RM 2.1 near the mouth of Poorman Creek. Riffle 1 is located in the Twisp at the confluence with the Methow River. Riffle two is located a short distance upstream with assess from the Twisp city park. Riffle 3 is accessed from Borchard Lane upstream of the State Route 20 bridge.

Reach 2 covers from RM 2.1 to the mouth of Little Bridge Creek at RM 9.4. The sampling area is above the acclimation pond for the Methow Salmon Hatchery. Riffle 1 is above the concrete dam in the river near the acclimation pond. Riffle 2 is 600 feet down stream of riffle 1. Riffle 3 is 8.6 miles up the Twisp River road.

Reach 3 extends from RM 9.4 to War Creek at RM 16.9. Access to the sampling site is gained via private property off of the 4220 road. Riffle 1 is immediately below the Buttermilk Creek confluence. Riffles 2 and 3 are located 1 and 1.5 miles up the 4220 road respectively from the Twisp River Road.

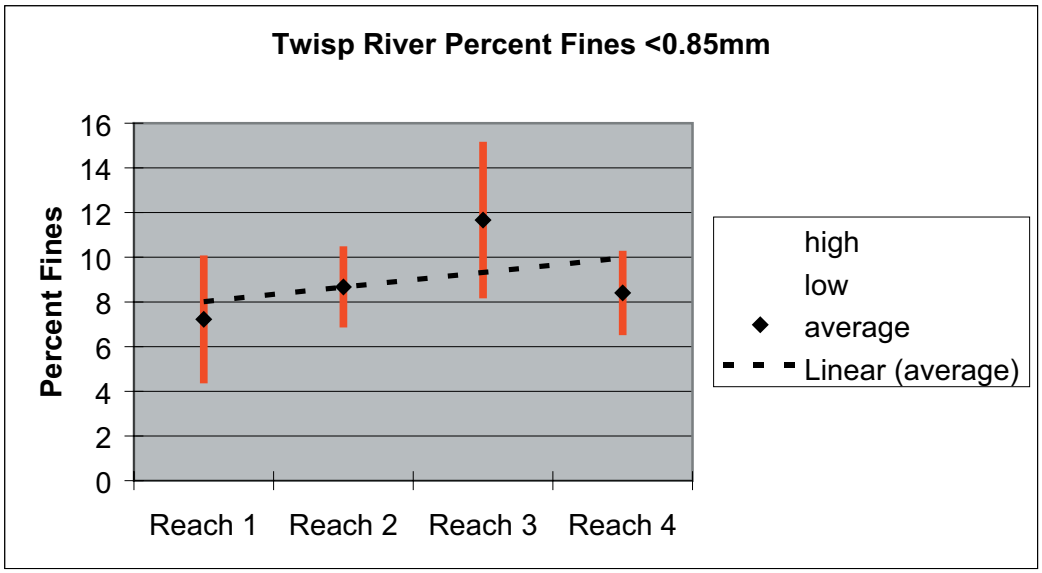
Reach 4 continues from RM16.9 to Mystery Bridge at RM22.2. The sampling area is above the War creek bridge. Riffle 1 is immediately above the War Creek bridge. Riffle 2 is 0.3 miles upstream of Riffle 1 and Riffle 3 is 0.4 miles upstream of Riffle 2.

The geomorphology of the Twisp River drainage is influenced by alpine and continental glaciation and fluvial processes. The drainage is comprised predominantly of hard metamorphic rock that is resistant to weathering, so there are few natural sources of sediment. The Lake Chelan-Sawtooth wilderness accounts for roughly half of the 145,000 acres managed by the Forest Service in the Twisp Watershed. Most land management activity occurs in the lower portion of the watershed in the Little Bridge and Buttermilk Creek sub-watersheds.

Summary of 2003 Twisp River McNeil Core Data

Reach	Mean % fines <0.85mm	Std dev <0.85mm	95% CI	80% CI	Functional Rating
1	7.22	4.23	$4.52<\mu<9.90$	$5.55<\mu<8.88$	Functioning appropriately
2	8.67	2.58	$7.02<\mu<10.31$	$7.65<\mu<9.69$	Functioning appropriately
3	11.67	5.24	$8.33<\mu<14.99$	$9.60<\mu<13.72$	Functioning appropriately
4	8.40	2.69	$6.68<\mu<10.11$	$7.34<\mu<9.46$	Functioning appropriately

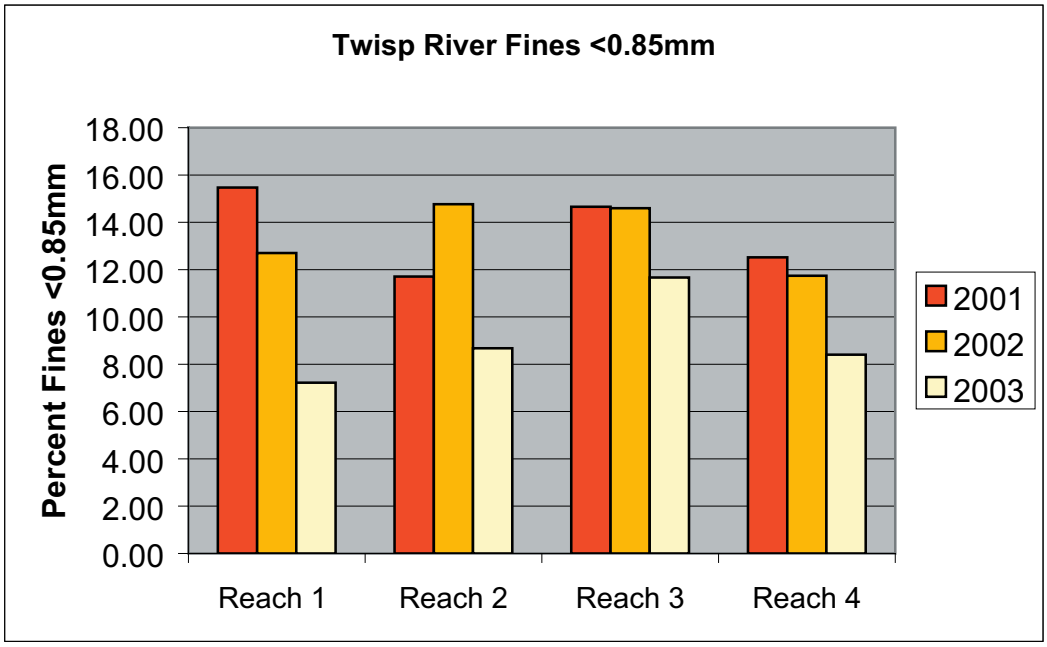
The Twisp River is functioning appropriately for fine sediment by USFWS (1998) standards with all samples containing less than 12% fines measuring 0.85mm or less. The table shows the percent fine sediment in the spawning gravel of the river with associated confidence intervals and functional rating.



Reach 1 is at the Mouth and Reach 4 is at RM 22.2

Twisp River Fine Sediment <0.85mm in Diameter within a 95% Confidence Interval 2001-2003

Reach 1	Reach 2	Reach 3	Reach 4	Mean*	
2001	12.93<μ<18.003	7.65<μ<15.76	12.24<μ<17.07	10.92<μ<14.12	13.59
2002	9.80<μ<15.61	10.98<μ<18.55	11.39<μ<17.80	8.53<μ<14.95	13.45
2003	4.52<μ<9.90	7.02<μ<10.31	8.33<μ<14.99	6.68<μ<10.11	8.99
Mean by Reach**	11.80	11.71	13.64	10.89	



The Twisp River exhibits the same pattern as the Chewuch with a decrease in sediment for the 2003 sample. Flow is the common influence for all reaches and is likely the factor controlling fine sediment in the bedload.

Conclusions and Discussion

Channel morphology, particle size and flow are the primary constituents that control the movement of bedload sediment. Bedload transport is mainly a function of the transporting capacity of the flow and is characteristically intermittent, actively transporting sediment during high flow periods. Higher flows of longer duration tend to favor fine sediment transport rather than deposition. The overall trend of fine sediment levels in the Chewuch and Twisp Rivers may be explained by annual precipitation and runoff because peak stream flow appears to be responsible for transportation and storage of the fine sediment in these two watersheds. Measured fine sediment in the spawning gravel of the Chewuch and Twisp Rivers declined for all reaches in the 2003 data. There is an expected natural variability within samples for mean percent fines <0.85 mm within reaches, between reaches, and from year to year. Consistent and precise methods are applied over a large sample size to reduce sampling error and collect the best possible data. The decrease in sediment appears to be linked to a higher peak flow in the spring of 2003.

Recommendations of Sediment Monitoring

- Continue to gather sediment data on an annual basis in order to establish trends in sediment composition for the Chewuch and Twisp Rivers. This would help in monitoring the effects of the Thirtymile and Farewell fires. Strict quality control standards must be followed to reduce sample variability.

- Adding another sampling reach farther upstream where water temperatures are colder and bull trout spawn should be explored.

STREAM HABITAT SURVEYS

The Methow Valley Ranger District surveyed 10.4 miles of the West Fork Methow, 4.5 miles of Robison Creek, and 7.4 miles of Lake Creek in 2003. All surveys were conducted using the Region 6 Hankin-Reeves level II protocol (USFS Stream Survey Handbook, Pacific Northwest Region 6, 2003). Streams wee also snorkel surveyed to determine fish distribution. The snorkel technique used was a combination of the R6 stream survey protocol (5% of riffle habitat, 10% of pool habitat) and a modified version of the Peterson snorkel survey method, developed by the USFS and adopted by the USFWS to determine the presence of bull trout. Snorkel transects in the 2003 survey were each 100 meters in length, randomly selected, and distributed equally throughout the surveyed segment of stream. Lake Creek was not snorkeled due to danger from snags. The following summarizes results of the habitat surveys. Complete survey reports are available at the Methow Valley Ranger District or the Okanogan and Wenatchee National Forests Headquarters' Office.

West Fork Methow Sream Habitat Survey

The Upper Methow River (West Fork Methow) is an important spawning and rearing stream in the Methow River Basin for Upper Columbia River bull trout and Upper Columbia River summer steelhead. A small number of spring Chinook salmon spawn and rear in the lower 6 miles of the stream (between the confluence of Lost River to a mile above Trout Creek). Westslope cutthroat trout and redband rainbow trout are listed as species of concern by the U. S. Fish and Wildlife Service. Both fish species

are found in the Upper Methow River Basin. Planted eastern brook trout, which can out compete native trout species, were not observed in the Upper Methow River or any of its tributaries.

The West Fork Methow survey started at the confluence with the Lost River and ended at a 10' high bedrock waterfall, fish barrier approximately 10.5 miles upstream. The following summarizes survey results.

Temperature

The Forest Service installed temperature monitors at 6 sites in the Upper Methow River during the summer of 2003, distributed from above the confluence with Lost River at river mile 0.8 to river mile 8.6, about half a mile above Leap Creek. Temperature monitors were also installed near the mouths of two of the largest tributaries in the Upper Methow River, Robinson Creek and Trout Creek. These monitors were in place during the Needle Creek Fire.

Key Findings for West Fork Methow

- The West Fork Methow River above the confluence with Trout Creek is rated as properly functioning for water temperature for both anadromous fish (standards developed by NOAA Fisheries) and for bull trout spawning and rearing (standards developed by the USFWS). The highest 7 day average temperature recorded at the monitor site located at RM 6.9 (above Trout Creek) was 11.30oC on July 28, the highest 7-day maximum temperature was 13.11oC on the same date. The Needle Creek Fire caused stream temperatures to rise above 16oC for one day (September 3) at this temperature monitor site (1 ½ miles above Trout Creek). Water temperatures rose from 11.2oC to 16.5oC within 2 ½ hours when the fire burned over the temperature monitor location. The water temperature dropped back down to 12oC two hours later. Other temperature monitor sites were not burned over as severely and water temperatures did not rise and fall so dramatically.

- The West Fork Methow River did not exceed the 16oC 7-day maximum water temperature standard established by the DOE in any of the four temperature monitor locations in the Upper Methow River located above the confluence with Robinson Creek. (Survey reaches 2 through 6).

- The West Fork Methow River exceeded the 16oC 7- day maximum water temperature State standard (DOE) on 11 days at a monitor site located about midway between the confluence with Lost River (beginning of survey) and the confluence with Robinson Creek (end of reach 1). Water temperatures are warming significantly in the reach despite the influence of very cold water contributed from Robinson Creek (the water temperature at the mouth of Robinson Creek did not exceed 10oC in 2003). Factors causing stream temperatures to increase in the lower reach include the wide, braided stream channel (less stream shading) and the reduced amount of flow in the reach (the river was flowing subsurface for 675 feet about half a mile below the temperature monitor site). The highest 7-day maximum water temperature at the temperature monitor location (RM 0.8) was 16.7oC on July 28; the highest recorded water temperature was 17.3oC on July 31.

- Trout Creek (RM 5.1) and Rattlesnake Creek (RM 3.4) are two of the larger tributaries of the West Fork Methow River. Water temperatures were higher in these two tributaries than in the West Fork Upper Methow River.

- Several large springs and two small tributaries located on the left bank between RM 2.1 and RM 2.3 are providing very cold water to the river.

- See the table below for temperature comparisons at the temperature monitoring sites and at monitoring sites near the mouth of Robinson Creek and Trout Creek.

Stream Flow

The stream flow in the Upper Methow River and in the entire Methow Basin was lower than normal in the first 10 months of 2003 due to the effects of drought conditions that have persisted since 2000 (USGS Mazama Gage Station Data, 1991 to 2003). Heavy rains in the Methow Basin in mid-October, 2003 raised flow levels to above normal conditions (based on the past 10 years mean flow).

At the time of the survey (August 5), about 95% of the flow of the Methow River at the confluence with Lost River was contributed by Lost River. The West Fork Methow flowed subsurface for 675' about 0.1 miles above the confluence with Lost River. Flow gradually increased to the confluence with Robinson Creek (RM 1.6). Most of the channels in the braided segment of the river mid-way through reach 1 were flowing subsurface at the time of the survey. Numerous juvenile Chinook salmon and juvenile rainbow/steelhead were seen in the side channels during snorkel surveys conducted earlier in the summer, when the side channels had flow. A flow measurement of 47.9 cubic feet per second (cfs) was taken in the Methow River about 50' above the confluence with Rattlesnake Creek on August 5, the first day of the survey.

Sediment

The West Fork Methow River naturally has low amounts of fine sediment, especially in the lower 5 miles of the stream (below the confluence with Trout Creek). Much of the sediment transported from the numerous avalanche chutes and tributaries in the West Fork Methow River are gravels and cobble sized particles, with fewer fine sediments. The rock type is primarily sedimentary rocks below Brush Creek, with mostly decomposed granitics from Brush Creek to the Cascade Crest. Stream banks are well-vegetated and bank erosion is very low (only 3% of the banks are actively eroding). Accelerated sediment delivery (coarse grains and fines, including new spawning gravels) is expected from the Needle Creek Fire. The stream survey protocol provides two measurable attributes to help determine the trend of sedimentation in the surveyed segment of the West Fork Methow River.

The survey protocol is designed to measure streambed particle size distribution by conducting Wolman pebble counts (two per reach). The Methow Valley Ranger District has not been conducting sediment sampling surveys with a McNeil Core Sampler in the West Fork Methow River to monitor fine sediments in spawning gravel.

Bank Instability

The dimensions (length and height) of all bank erosion in the surveyed segment of the stream were recorded during the survey to monitor bank stability and identify major sediment sources for potential restoration projects.

In addition to the two measurable attributes mentioned above, a more subjective attribute (cobble embeddedness) was determined by the survey crew at every survey pool. Embeddedness is defined as small cobble and coarse gravel substrate > 35% buried in sediment.

Sediments

Surface fine sediments are well below the guideline of 20% in all six survey reaches. Levels of surface fine sediments in the two C channel reaches (reach 1 from RM 1 to 1.6, and reach 4 from RM 8.2 to 9.3) are among the lowest of all C channel reaches in the Methow River Basin (4% fines in reach 1, 13% in reach 4). Surface fine sediments in the higher gradient reaches range from a low of 6% in reach 2 (RM 1.6 to 5.1) to a high of 13% in reach 3 (RM 5.1 to 8.2).

Bank Erosion

A total of 3,300 feet of bank erosion was seen by surveyors in the 10.4 mile surveyed segment of the West Fork Methow River (3% of the banks were eroding, total of both banks). The amount of bank erosion is very low compared to other streams of similar size on the Methow Valley District. Areas with high amounts of bank instability are listed below:

- RM 0.9 to RM 1.2 (middle of reach 1), over 600 linear feet of erosion caused by bends in the river and dispersed campsites.
- RM 3.2 (below Rattlesnake Creek), a 50' long by 100' high slope failure, naturally caused.
- RM 3.7 (above Driveway Creek), a 160' long x 25' high bank failure, naturally caused..
- RM 7.9 (just below Leap Creek), a 100' long by 70' high bank failure, naturally caused.
- RM 8.2 (at a 90o bend in the river, beginning of low gradient reach), a 125' long by 80' bank failure at a major river bend.
- RM 9.4 (0.1 miles above Cataract Creek), a 100' long by 9' eroding bank caused by a channel spanning log jam.
- Cobble embeddedness was very low, about 1% of the pools were judged by surveyors to be embedded.

2003 West Fork Methow Survey Comparison with 1994 Survey

A comparison cannot be made as pebble counts were not conducted in 1994. All bank erosion was measured in both surveys, with similar results. A total of 4,385' of bank erosion was measured in 1994 (4% of banks eroding), with 3,300' measured in 2003 (3% of banks eroding). The difference could be attributed to a combination of improved habitat (healing banks) and the judgment of the surveyor.

Large Wood

Large woody debris was counted in three size classes; small (>20' in length with a diameter of greater than 6"), medium (>35' in length with a diameter of between 12" and 20") and large (>35' in length with a diameter of greater than 20"). The bole of the tree had to be within the bankfull width of the stream to be counted. Trees standing within the bankfull width are counted but tallied separately. Woody debris was counted in the side channels in the same three size categories. Large woody debris levels are expected to increase dramatically due to the Needle Creek Fire.

Methow River Key Findings

- Reach 1 (Lost River to Robinson Creek, 1.6 miles) is not appropriately functioning for amounts of large wood, with less than half of the 20 pieces per mile USFWS guideline. The amount of large wood in reach 1 is lower than 90% of similar stream types in the North Cascades Eco-Region (Okanogan and Wenatchee National Forest data). Wood may have been removed from the stream in the past by the Forest Service and/or Army Corp of Engineers, and by firewood gatherers (cut trees in the riparian area along the left bank were observed, probably for use as firewood in the numerous dispersed campsites in the reach). The future recruitment potential in this reach is fair to good, with stream banks generally well vegetated with conifers.

- The West Fork Methow River is functioning appropriately for amounts of large wood in the 3.5 mile stream segment between Robinson Creek and Trout Creek. Amounts of large wood are about at the guideline suggested by the USFWS for an appropriately functioning stream. Wood levels are lower in this stream segment than in the reaches above because this reach is a transport reach, with few depositional areas for large wood to deposit. Amounts of wood are heaviest in a half mile long segment just below the confluence with Trout Creek, an area featuring a lower gradient and wider floodplain.

- The West Fork Methow River above the confluence with Trout Creek (RM 5.1) has abundant amounts of large wood in the channel, and far exceeds USFWS guidelines for amounts of large wood for a properly functioning stream. This 5.3 mile segment of stream has over 100 pieces of wood in the bankfull channel greater than 35' long with a diameter of at least 12", among the highest levels of any stream on the Methow Valley District. A total of 78 log jams were counted in this 5.3 mile stream segment (about 15 per mile). Log jams are forming in the lower gradient segments of stream above the broad alluvial fans which are frequent in the West Fork Methow River. The amount of large wood has increased in the past 9 years in this area (see discussion below). Cut log ends at jam sites indicate that log jams were removed in the past (1970s), so while wood levels are high they are probably still below natural levels.

- Large wood was key hiding cover for juvenile spring Chinook salmon and steelhead

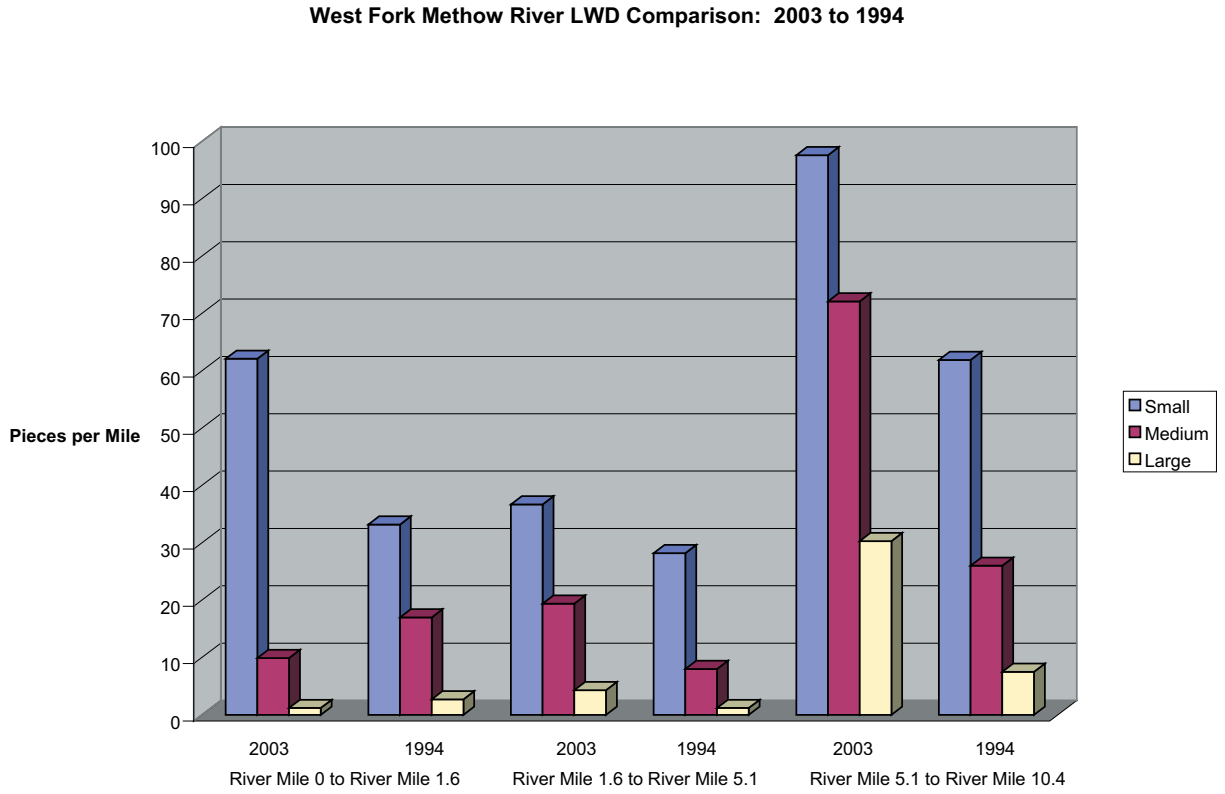
Large Wood 2003 Survey Comparison to 1994 Survey

Large wood in the side channels was not counted in the 1994 survey. The following graph and table compares amounts of large wood in the main channel by size class by stream segment in the two surveys:

Large Woody Debris Comparison – Upper Methow River
1994 Survey with 2003 Survey

Stream Segment	Pieces per Mile by Wood Size Class			
	Small	Medium	Large	Medium & Large
Lost River to Robinson Cr. (1.6 miles)				
2003 Survey	62.1	9.9	1.2	11.1
1994 Survey	33.2	17.0	2.7	19.7
Difference +/-	+ 28.9	- 7.1	- 1.5	- 8.6
% Increase (Decrease)	87%	(72%)	(125%)	(77%)
Robinson Cr. To Trout Cr. (3.5 miles)				
2003 Survey	36.7	19.4	4.3	23.7
1994 Survey	28.2	8.0	1.2	9.2
Difference +/-	+ 8.5	+ 11.4	+ 3.1	+ 14.5
% Increase (Decrease)	30%	142%	258%	158%
Trout Cr. To Fish Barrier (5.3 miles)				
2003 Survey	97.6	72.1	30.3	102.4
1994 Survey	61.9	26.0	7.5	33.5
Difference +/-	+ 35.7	+ 46.1	+ 22.8	+ 68.9
% Increase (Decrease)	58%	177%	304%	206%

Amounts of large woody debris in the upper 5.3 miles of the West Fork Methow River have increased significantly since 1994. The amount of medium and large size pieces of wood in this stream segment have tripled in the past 9 years (33.5 pieces per mile in 1994 to 102.4 pieces per mile in 2003).



Methow River Pools

Survey pools (channel spanning pools) were counted and measured in the main channel (length, width, maximum depth and residual depth). Pools meeting the Forest Plan definition of a "quality" pool (spans at least half the channel with a low flow maximum depth of 3 feet, or depth of 1 ½ feet with 40% or greater hiding cover) were counted in the main channel and in side channels.

Key Findings

- Reach 1, Lost River to Robinson Creek: The reach may be at risk despite being close to meeting the USFWS pool frequency guideline due to the low amount of large wood in the channel which provides fish hiding cover and pool depth. The poor pool habitat in the first mile of the reach is due mainly to the low volume of flow (the stream channel had little flow both above and below the 675' long segment of subsurface flow at RM 0.1). Pools were generally shallow with little hiding cover in the braided segment of the stream between RM 0.7 and RM 1.4. The long pool tail-outs in this segment provided much of the spawning habitat for Chinook salmon and steelhead. Pool habitat is excellent in the upper ¼ mile of the reach, with good cover provided by large wood. About half of similar stream types in the North Cascades Eco-Region had more large pools than found in reach 1.

- Reaches 2 through 6, Robinson Creek to fish barrier at the end of the survey: All five reaches are functioning appropriately for pool habitat. All five reaches meet or exceed USFWS guidelines for pool frequency. The stream segment between Trout Creek and the end of the survey (RM 5.1 to 10.4) has some of the highest quality pool habitat

found on the Methow Valley District. This stream segment exceeds 90% of similar type streams in the North Cascades Eco-Region for numbers of pools and for numbers of large pools (pools with a surface area greater than 215 square feet with a low-flow depth greater than 2.7 feet).

Methow River 2003 Survey Comparison with 1994 Survey

- It is difficult to compare pool habitat data between years due to changes in the stream survey protocol. A 1996 protocol change allowed for counting plunge pools where the width of the pool was greater than the length. In 1994, all habitat units had to have a length greater than its width.

- Pools and % pool habitat increased significantly in 2003 from 1994 in all three stream segments that were compared. Part of the difference is attributable to the protocol change, but other factors include both an increase in pool habitat resulting from increased amounts of large woody material in the channel and differences in the surveyors' judgment (the stream was surveyed by different observers). Surveyor judgment probably accounts for the differences in the average pool residual depth. To be counted, a pool had to have at least one foot of residual depth in the 2003 survey. The 1994 residual depth standard was not stated.

- The table below compares pool data between 1994 and 2003 in the Upper Methow River.

Methow River Pool Habitat Comparison – 1994 to 2003

Stream Segment	Pools per Mile	Pool % Habitat	Avg. Residual Depth
Lost River to Robinson Cr. (1.6 miles)			
2003 Survey	16.1	28.8%	2.14'
1994 Survey	8.1	11.6%	2.60'
Difference +/-	+ 8.0	+ 17.2%	- 0.46'
% Increase (Decrease)	99%	148%	(21%)
Robinson Cr. To Trout Cr. (3.5 miles)			
2003 Survey	11.4	11.3%	2.11'
1994 Survey	5.2	4.0%	2.70'
Difference +/-	+ 6.2	+ 7.3%	- 0.59'
% Increase (Decrease)	119%	183%	(28%)
Trout Cr. To Fish Barrier (5.2 miles)			
2003 Survey	32.0	27.1%	2.13'
1994 Survey	11.5	8.3%	2.20'
Difference +/-	20.5	+ 18.8%	- 0.07'
% Increase (Decrease)	178%	226%	(3%)

Methow River Off-Channel Habitat

The habitat dimensions of all side channels were estimated during the survey (depths were measured). Large woody debris was counted in the same 3 size categories as the main channel. All bank erosion was recorded and Forest Plan "quality" pools were counted in the side channels. Wetland area dimensions were recorded in comments.

Key Findings:

- Three beaver dams (not active) are creating small ponds in a 600' long side channel on the right side of the floodplain about ¼ mile below the confluence with Trout Creek. Juvenile rainbow/steelhead were seen in the ponds and side channel. Evidence of older beaver activity (chewed cottonwood trees) was occasionally seen along the banks of the river below the confluence with Trout Creek.

- Many of the side channels that were flowing during higher flow conditions in the lower 1.6 miles of the stream (reach 1) were dry at the time of the survey. Numerous juvenile spring Chinook salmon and rainbow/steelhead were observed in these side channels during snorkel surveys conducted at higher flow conditions. Side channel habitat was highest in reach 1, with almost 10% of the habitat area consisting of side channels. The 3 mile reach above the confluence with Trout Creek had the second highest amount of side channel habitat, with almost 8% of the habitat area consisting of side channel habitat. No other reach had more than 5% side channel habitat.

2003 West Fork Methow Side Channel Survey Comparison with 1994 Survey

Side channel habitat was slightly higher in the 2003, possibly due to an increase in the amount of large woody material in the stream channel. Data comparison is summarized below.

Methow River % Side Channel Habitat Area

Stream Segment	2003 % Side Channel Habitat	1994 % Side Channel Habitat	Difference + or -
Lost River to Robinson Cr. (1.6 miles)	9.6%	8.2%	+ 1.4%
Robinson Cr. To Trout Cr. (3.5 miles)	4.5%	3.0%	+ 1.5%
Trout Cr. To Fish Barrier (5.2 miles)	2.0%	3.4%	- 1.4%

Robinson Creek Stream Habitat Survey

Robinson Creek provides rearing habitat and some spawning habitat for Upper Columbia River bull trout and possibly for Upper Columbia River summer steelhead. Spring Chinook salmon juveniles could use habitat near the mouth of Robinson Creek for rearing. Westslope cutthroat trout are found in Robinson Creek. The population of rainbow trout in lower Robinson Creek is probably not native interior redband. Planted eastern brook trout, which can out-compete native trout species, are currently not known to be in Robinson Creek.

The Robison Creek survey started at the mouth and proceeded approximately 4.5 miles to the confluence with Amey Creek.

Temperature

The Forest Service installed temperature monitors at 3 sites in Robinson Creek during the summer of 2003: at the mouth, at the top of reach 2 at RM 1.7, and at RM 3.0, just above the confluence with Beauty Creek. Temperature monitors were installed in the West Fork Methow River about 0.2 miles above the confluence with Robinson Creek and 0.7 miles below the confluence with Robinson Creek.

Key Findings for Robinson Creek:

- Robinson Creek is an important cold water source to the West Fork Methow River. The highest recorded stream temperature during the summer of 2003 at a site near the mouth of Robinson Creek was 9.91oC on August 1, . The highest recorded stream temperature during the summer of 2003 in the West Fork Methow River at a site about 0.2 miles above the confluence of Robinson Creek was 15.83oC on July 28. Stream temperatures in the West Fork Methow River warm considerably in the reach below Robinson Creek due to the wide, braided channel and lower stream flow (the reach is a losing reach, with significant subsurface flow).

- Water temperatures cooled significantly in 2003 in Robinson Creek between RM 1.7 and the mouth, probably due to the stream flowing subsurface for 0.2 miles (RM 1.7 to RM 1.5). The maximum water temperature in 2003 at RM 1.7 was 14.39oC on August 1, while the maximum recorded water temperature in 2003 was 9.91oC at RM 0.2, also on August 1. The maximum water temperature recorded at RM 3.0 was 12.26oC on July 31.

Robinson Creek Water Temperature Data Analysis

	RM 0.2	RM 1.7*	RM 3.0	W. Fork Methow above Robinson Creek (RM 1.8)	W. Fork Methow below Robinson Creek (RM 0.8)
Survey Reach	**1**	**2**	**3**		
Approximate Elevation	2,520	3.350	3,600	2,500	2,400
Highest Recorded Temp.	9.91	14.39	12.26	15.83	17.30
Date of Highest Temp.	08-01	08-01	07-31	7-31	7-31
# of Days Max. Temp. > 16o	0	0	0	0	21
Highest 7-Day Max Temp.	9.73	13.81	11.83	15.47	16.69
Date of Highest 7-Day Max	07-28	07-28	07-28	7.28	7-28
# of Days 7-Day Max. > 16o	0	0	0	0	11
Highest 7-Day Avg. Temp.	8.64	10.9	10.1	13.08	13.17
Date of Highest 7-Day Avg.	07-28	07-28	07-28	7-28	7-30
# of Days 7-Day Avg. > 16o	0	0	0	0	0
Highest Temp. by Month					
-July	9.75	14.24	9.12	15.87	14.09
-August	9.91	14.39	9.73	15.67	14.25
-September	8.06	*	8.72	13.48	12.39
Monthly Average Temp.					
-July	7.66	9.1	12.26	10.74	10.76
-August	7.93	12.7	11.79	11.87	12.31
-September	6.84	*	11.32	9.89	10.48

*Incomplete data. Stream was flowing subsurface at this site on 08-10-03.

Robinson Creek Stream Flow

The stream flow in Robinson Creek and in the entire Methow basin was lower than normal in the first 10 months of 2003 due to the effects of drought conditions that have persisted since 2000. Heavy rains during mid-October, 2003, raised flow levels to above normal conditions in the fall and winter of 2003.

Robinson Creek is the largest tributary to the West Fork Methow River at low flow in terms of the amount of flow contributed to the river (Trout Creek may be larger at peak flow). Robinson Creek has the largest drainage area (20 square miles) of any subdrainage in the West Fork Methow River watershed. Mean low flow is about 6 cfs., roughly 15% of the total low flow volume of the West Fork Methow River above the confluence with Robinson Creek. A flow measurement of 10.5 cfs. was taken on August 5, 2003 (the beginning of the survey), about 50 feet above the bridge crossing at RM 0.2.

Robinson Creek was flowing subsurface for 0.2 miles (RM 1.5 to RM 1.7) on the date of the survey (August 12, 2003).

Robinson Creek Sediment

- Surface Fine Sediments: The survey protocol is designed to measure surface substrate particle size by conducting Wolman pebble counts (two per reach) and are not a measure of sediment in spawning. The Methow Valley has not been conducting sediment sampling surveys with a McNeil Core Sampler in Robinson Creek to monitor fine sediments in spawning gravel.

- Bank Instability: The dimensions (length and height) of all bank erosion in the surveyed segment of the stream were recorded during the survey to monitor bank stability and identify major sediment sources for potential restoration projects.

Robinson Creek Key Findings:

- Surface fine sediments are very low (about 2% average) in the 4.5 mile surveyed segment of Robinson Creek. Robinson Creek is a high gradient, high-energy channel, and fine sediments are transported downstream into the West Fork Methow River.

- The banks of Robinson Creek are very stable - very little bank erosion was observed in Robinson Creek. The table below summarizes survey data on substrate, % fines and bank erosion by reach in Robinson Creek.

Robinson Creek Substrate, % Fines, & Bank Erosion by Reach

		Substrate % (from pebble counts)							Bank Erosion	
Reach	River Mile	SA	GR	CO	BO	BR	% Fines < 6mm	D50 mm	Linear Ft/Mile	% of Banks
1	0.0 to 0.4	3%	21%	40%	36%	-	4.5%	155	68	1.7%
2	0.4 to 1.7	0%	9%	33%	46%	13%	0%	332	0	0%
3	1.7 to 2.7	2%	30%	52%	16%	-	2.5%	111	0	0%
4	2.7 to 4.5	0%	23%	23%	22%	32%	1%	2,356	0	0%

SA = sand. GR = gravel. CO = cobble. BO = boulder. BR = bedrock

Robinson Creek Large Wood

Large woody debris was counted in three size classes; small (>20' in length with a diameter of greater than 6"), medium (>35' in length with a diameter of between 12" and 20") and large (>35' in length with a diameter of greater than 20"). The bole of the tree had to be within the bankfull width of the stream to be counted. Trees standing within the bankfull width are counted (not tallied separately in this survey). Woody debris was counted in the side channels in the same three size categories.

Key Findings for Large Wood

- Very little large woody debris currently exists in the lower two miles of the stream, as much of the wood transported from avalanche slides upstream are either captured behind large log jams or smashed into small pieces in the confined, high-gradient bedrock gorge located between RM 0.4 and RM 1.4. Firewood gatherers at the dispersed campsites along the right bank in the lower 0.3 miles may be taking large woody debris from the stream channel, further reducing already low natural amounts of wood in the lower segment of the creek.

- Avalanche slides have contributed numerous pieces of large woody debris to the creek in the stream segment between Beauty Creek and Amey Creek (RM 2.7 to RM 4.5), with two huge log jams located in the middle of the reach (RM 3.7).

Summary of Large Woody Debris by Reach in Robinson Creek

Wood Size	Reach 1 RM 0 to 0.4	Reach 2 RM 0.4 to 1.7	Reach 3 RM 1.7 to 2.7	Reach 4 RM 2.7 to 4.5
Large (> 35' long, > 20" diameter)	0	2.6	7.1	7.6
Medium (> 35' L, > 12" D)	8.3	3.2	15.3	13.8
Subtotal: Large & Medium	8.3	5.8	22.4	22.4
Small (> 20' long, > 6" diameter)	30.5	12.2	32.6	81.6
Total Large Woody Debris	38.8	18.0	55.0	104.0

Robinson Creek Pools

Survey pools (channel spanning pools) were counted and measured in the main channel (length, width, maximum depth and residual depth). Pools meeting the Forest Plan definition of a "quality" pool (spans at least half the channel with a low flow maximum depth of 3 feet, or depth of 1 ½ feet with 40% or greater hiding cover) were not counted.

Pool Habitat Key Findings

- All four reaches are functioning appropriately for pool habitat. All four reaches meet or exceed USFWS guidelines for pool frequency.

- Pools (mainly plunge pools) are formed primarily by boulders and bedrock throughout the surveyed segment of Robinson Creek. Pool habitat is generally deep with good hiding cover provided mainly by large substrate.

Pool Habitat by Reach in Robinson Creek

	Reach 1	Reach 2	Reach 3	Reach 4
Pools per Mile	38.8	32.0	37.8	33.7
Pools > 3′ Deep per Mi.	0	21.1	8.2	5.1
% Habitat Area Pools	13.7%	21.5%	31.4%	24.5%
Riffle/Pool Ratio	5.4 to 1	3.5 to 1	2.1 to 1	3.1 to 1
Pool Residual Depth	1.41′	2.67′	2.12′	2.56′

Robinson Creek Off Channel Habitat

The habitat dimensions of all side channels were estimated during the survey (depths were measured). Large woody debris was counted in the same size categories as the main channel. All bank erosion was recorded and Forest Plan "quality" pools were counted in the side channels. Wetland area dimensions were recorded in comments.

Off-channel habitat is limited in Robinson Creek due to the confinement of the channel and narrow valley. Some good off-channel rearing habitat exists in side channels located mainly in the 0.4 mile long alluvial fan (reach 1). Evidence of past beaver activity was observed in the riparian area of Robinson Creek above the bedrock canyon (beaver chewed cottonwoods). No active beaver dams were observed in the stream.

Lake Creek Stream Habitat Survey

Lake Creek is an important spawning and rearing stream in the Methow River Basin for Upper Columbia River bull trout, and possibly for Upper Columbia River summer steelhead. A small number of spring Chinook salmon spawn and rear in the lower four miles of the stream. Westslope cutthroat trout and rainbow trout are found in Lake Creek, neither fish was considered to be a "pure" native fish species based on genetic studies conducted by the USFWS on each population. Planted eastern brook trout, which can out-compete native trout species, are currently not known to be in Lake Creek. The Lake Creek stream survey started at the mouth (confluence with Chewuch River) and ended about ¾ miles above Black Lake, a distance of about 8.3 miles.

Temperature

The Forest Service installed temperature monitors at 6 sites in Lake Creek during the summer of 2003, distributed from just above Black Lake to RM 0.4 (at bridge on Chewuch River Road). Temperature monitors were also installed in the Chewuch River about ¼ mile above the confluence of Lake Creek and near the mouth.

Lake Creek Temperature Key Findings

- Black Lake, a 0.9 mile long lake located between RM 6.7 and RM 7.6, is significantly warming water temperatures in Lake Creek. The highest water temperature recorded above the inlet to Black Lake was 14.86oC on July 30, 2003, with a maximum 7-day maximum temperature of 14.48oC. The highest water temperature recorded in Lake Creek below the outlet of Black Lake was 20.52oC on August 2, 2003, with a maximum 7-day maximum temperature of 19.31oC. The average water temperature above Black Lake in July and August was 4.5oC cooler than below the lake in 2003.

- Water temperatures in Lake Creek are cooler between Black Lake and the bull trout spawning reach approximately 2.4 miles below Black Lake. The highest maximum water temperature recorded at RM 4.3 was 17.27oC in 2003, 3.25oC cooler than the maximum temperature recorded by the monitor located at RM 6.7 (just below Black Lake). Colder water from side channels flowing from ponds formed below steep talus slopes on both sides of the floodplain are a major factor in cooling water temperatures in Lake Creek. Water flowing into the creek from the side channels was 2oC to 2 ½oC cooler than Lake Creek at the time of the survey. Three tributaries in the reach were supplying cold water to Lake Creek, at RM 4.7 (left bank), RM 5.0 (right bank) and RM 5.1 (left bank). These three tributaries were between 1oC and 3.5oC cooler than Lake Creek at the time of the survey. Upwellings in the reach through the cobble/gravel substrate may also be a factor in cooling water temperatures.

- Water temperatures are slightly warmer between RM 4.3 (bull trout spawning monitor site) and RM 3.1 (above the confluence with Disaster Creek). The maximum temperature recorded at RM 3.1 in 2003 was 18.06oC, about 4.5% higher than at RM 4.3. The water temperature increased very slightly between RM 3.1 and the monitor site at RM 0.4 (0.02oC).

- It is difficult to determine to what extent the Farewell Fire had on stream temperatures in Lake Creek. The fire started on June 29, 2003 and lasted until early August. There was no noticeable "spike" in water temperatures at the sites where the monitor was burned over (at RM 4.3 and 6.7), unlike in the West Fork Methow River where water temperatures jumped up to 6oC within a couple of hours. However, water temperatures recorded by a temperature monitor at RM 0.4 in Lake Creek were significantly higher in 2003 than in 2002. The maximum water temperature at this site was 19.49oC in 2003 compared with 16.68oC in 2003, a 17% increase. Although the hot, dry summer of 2003 was a significant factor in the increase in water temperature, the Farewell Fire undoubtedly had an effect on increased water temperatures in 2003.

- Lake Creek provided cooler water to the Chewuch River despite the warming effects on the creek by the Black Lake and the Farewell Fires. The highest recorded temperature in 2003 at the monitor site in the Chewuch River above the confluence with Lake Creek was 19.49oC, almost 8% higher than Lake Creek's maximum temperature of 18.08oC at the same elevation (about 2,690' in both streams).

Lake Creek Water Temperature Data Analysis

	RM 0.4	RM 3.1	RM 4.3	RM 6.7 (below lake)	RM 7.7 (above lake)	Chewuch River above Lake Creek	Chewuch River at Mouth
Survey Reach	1	3	4	5	7		
Approximate Elevation	2,690	3,200	3,435	3,990	4,000	2,690	1,755
Highest Recorded Temp.	18.08	18.06	17.27	20.52	14.86	19.49	22.38
Date of Highest Temp.	7-30	7-30	7-30	08-02	7-30	7-30	07-30
# of Days Max. Temp. > 16o	27	19	9	49	0	39	*
Highest 7-Day Max Temp.	17.56	17.47	16.79	19.31	14.48	19.02	21.91
Date of Highest 7-Day Max	7-28	7.28	7-28	7-29	7-28	7-27	7-27
# of Days 7-Day Max. > 16o	30	22	8	48	0	37	*
# of Days 7-Day Max. > 17o	6	5	0	43	0	27	*
# of Days 7-Day Max.> 18o	0	0	0	28	0	9	*
# of Days 7-Day Max.> 19o	0	0	0	4	0	1	*
Highest 7-Day Avg. Temp.	15.82	14.91	14.71	16.99	12.80	16.43	18.85
Date of Highest 7-Day Avg.	7-28	7-28	7-28	8-03	7-28	7-27	7-27
# of Days 7-Day Avg. > 16o	0	0	0	40	0	5	*
Highest Temp. by Month							
July	18.08	18.06	17.27	19.71	14.86	19.49	22.28
August	17.92	17.90	17.27	20.52	14.86	19.32	22.22
September	15.69	15.67	14.73	18.57	12.38	16.27	18.47
Monthly Average Temp.							
July	13.11	12.52	12.32	13.38	9.59	13.66	*
August	14.37	13.55	13.43	16.71	11.59	14.83	16.97
September	11.26	10.79	10.74	13.84	8.96	11.28	13.34

*Incomplete data. Temperature monitor was deployed on July 11, 2003.
Note: A temperature monitor at RM 1.5 could not be located due to the Farewell Fire (flags designating site were burned).

Lake Creek Stream Flow

The stream flow in the Lake Creek and in the entire Methow basin was lower than normal in the first 10 months of 2003 due to the effects of drought conditions that have persisted since 2000. Heavy rains in the Methow basin in mid-October, 2003 raised flow levels to above normal conditions in the fall and winter of 2003.

Lake Creek is the largest tributary to the Chewuch River in both amount of flow and channel size. Only the Boulder Creek subwatershed has a larger drainage area than Lake Creek in the Chewuch watershed. Mean low flow is between 11 and 17 cfs., roughly a quarter of the total low flow volume of the Chewuch River. Black Lake, over ¾ mile long and very deep, provides a huge low flow water storage reservoir to the Chewuch River. A flow measurement of 12 cfs. was taken at the beginning of the survey, on August 26, 03, about 400 feet below the bridge crossing at RM 0.4. Lake Creek is free-flowing, with no irrigation diversions.

Lake Creek Sediment

Sediment delivery may become more active in Lake Creek following the Farewell Fire. Much of the high intensity fire was upstream of the lake (the lake will become a sediment repository). The fire will also mobilize coarse sediment and may provide a fresh load of spawning gravel. The stream survey protocol provides two measurable attributes to help determine the trend of sedimentation in the surveyed segment of Lake Creek.

The survey protocol is designed to measure streambed particle size distribution by conducting Wolman pebble counts (two per reach) and is not a direct measure of fine sediment in spawning gravel. The Methow Valley Ranger District has not been conducting sediment sampling surveys with a McNeil Core Sampler in Lake Creek to monitor fine sediments in spawning gravel.

The dimensions (length and height) of all bank erosion in the surveyed segment of the stream were recorded during the survey to monitor bank stability and identify major sediment sources for potential restoration projects.

In addition to the two measurable attributes mentioned above, a more subjective attribute (cobble embeddedness) was determined by the survey crew at every survey pool. Embeddedness is defined as small cobble and coarse gravel substrate > 35% buried in sediment.

Lake Creek Key Sediment Findings:

- Surface fine sediments are low (less than 10%) in the higher gradient transport reaches (reaches 1, 2, 3, and 5). The amount of surface fine sediments were at, or were above, the 20% threshold established by the USFWS in the two low gradient bull trout spawning reaches (reaches 4 (RM 4.3 to RM 5.3, and 7 (RM 7.6 to RM 8.3). Fine sediments were near pre-fire levels in these two reaches (no major weather events had occurred after the fire to mobilize fine sediments).

- A total of 1,300 feet of bank erosion was seen by surveyors in the 7.4 mile surveyed segment of Lake Creek (2% of the banks were eroding, total of both banks). The amount of bank erosion is low compared to other streams of similar size on the Methow Valley District (bank erosion may increase after the fire). Areas with higher amounts of bank instability are listed below:

- RM 3.0 (beginning of reach 3), an area about 150′ long and 40′ high was raw and eroding on the steep slope between the creek and trail (left bank), caused by the Farewell Fire.

- RM 5.5 (just above the Kidney Creek confluence near the beginning of reach 5), about 300′ of eroding banks (both banks) were measured in the area, caused by the Farewell Fire.

- Cobble embeddedness was very low, about 3% of the pools were judged by surveyors to be embedded.

Lake Creek Substrate, % Fines, Bank Erosion & Embeddedness by Reach

		Substrate % (from pebble counts)							Bank Erosion		
Reach	River Mile	SA	GR	CO	BO	BR	% Fines < 6mm	D50 mm	Linear Ft/Mile	% of Banks	% Pools Embedded
1	0 to 0.7	7%	13%	42%	38%	0%	8%	182	94′	0.9%	8%
2	0.7 to 2.9	8%	16%	39%	37%	0%	10%	163	95′	0.9%	7%
3	2.9 to 4.3	8%	20%	38%	34%	0%	11%	157	266′	2.5%	0%
4	4.3 to 5.3	12%	50%	34%	4%	0%	20%	66	130′	1.2%	0%
5	5.3 to 6.7	3%	13%	40%	44%	0%	4%	217	288′	2.7%	0%
7	7.6 to 8.3	21%	62%	17%	0%	0%	25%	25	135′	1.3%	0%

SA = sand. GR = gravel. CO = cobble. BO = boulder. BR = bedrock.

2003 Lake Creek Survey Comparison with 1994 Survey

- Surface Fines: A comparison cannot be made as pebble counts were not conducted in 1994.

- Bank Erosion: The total amount of bank erosion was measured in both surveys. Bank erosion was very low in both surveys. A total of 415′ of bank erosion was measured in 1994 (less than 1% of banks eroding), with 1,300′ measured in 2003 (2% of banks eroding). The difference is attributed to the Farewell Fire. The amount of bank erosion will increase in 2004 after spring run-off scours the de-vegetated banks in the burned areas of the stream.

Lake Creek Large Wood

Large woody debris was counted in three size classes; small (>20′ in length with a diameter of greater than 6”), medium (>35′ in length with a diameter of between 12” and 20”) and large (>35′ in length with a diameter of greater than 20”). The bole of the tree had to be within the bankfull width of the stream to be counted. Trees standing within the bankfull width are counted but tallied separately. Woody debris was counted in the side channels in the same three size categories.

Key Findings

- Lake Creek is functioning appropriately for amounts of large wood. Amounts of large wood are above the guideline suggested by the USFWS for an appropriately functioning stream in all reaches.

- The ¾ mile segment of Lake Creek above Black Lake has abundant amounts of large wood in the channel, and far exceeds USFWS guidelines for amounts of large wood for a properly functioning stream. This segment of stream has over 100 pieces of wood in the bankfull channel greater than 35' long with a diameter of at least 12", among the highest levels of any stream on the Methow Valley District. A total of 27 log jams were counted in this ¾ mile stream segment (about 36 per mile). Log jams create much of the side channel habitat found in reaches 2, 3 and 4 (RM 0.7 to 5.3), and in the ¾ mile long reach 7 (RM 7.6 to 8.3).

- The amount of large wood has not increased significantly in the past 9 years in Lake Creek (see discussion below).

Lake Creek 2003 Survey Comparison to 1994 Survey for Large Wood

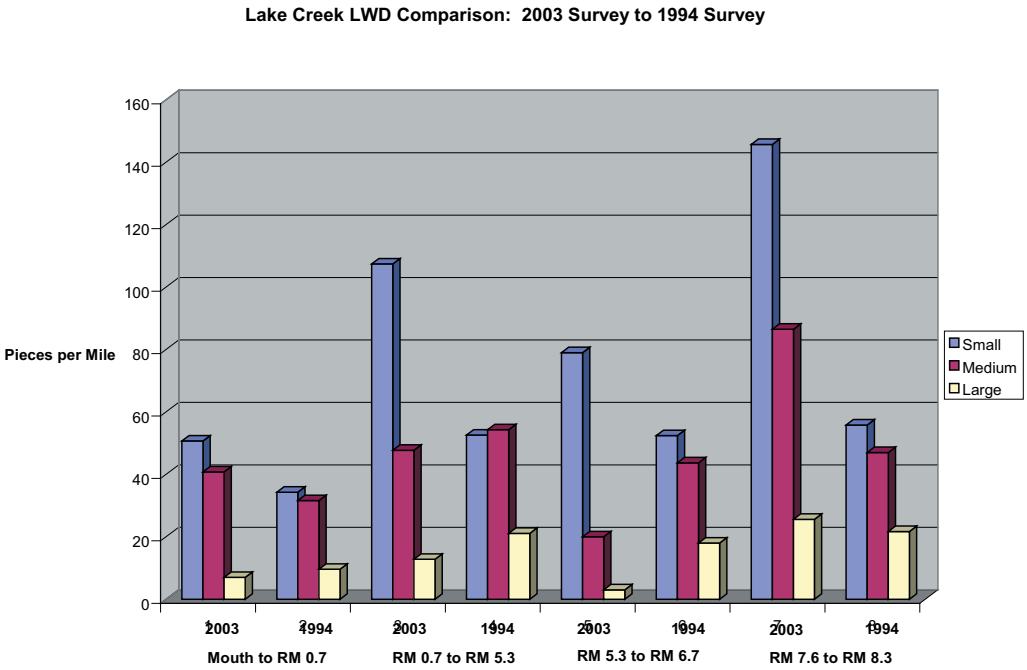
Large wood in the side channels was not counted in the 1994 survey. The following table compares amounts of large wood in the main channel by size class by stream segment in the two surveys:

Large Woody Debris Comparison – Lake Creek 1994 Survey with 2003 Survey

Stream Segment	Pieces per Mile by Wood Size Class			
	Small	Medium	Large	Medium & Large
Mouth to Farewell Creek (0.7 miles)				
2003 Survey	50.7	40.8	7.0	47.8
1994 Survey	34.3	31.6	9.6	41.2
Difference +/-	+ 24.6	+ 9.2	- 2.6	+ 6.6
% Increase (Decrease)	48%	29%	(37%)	16%
Farewell Creek to Kidney Creek (4.6 miles)				
2003 Survey	107.4	47.7	12.8	60.5
1994 Survey	52.6	54.3	21.1	75.4
Difference +/-	54.8	- 6.6	-8.3	-14.9
% Increase (Decrease)	104%	(14%)	(65%)	(20%)
Kidney Creek to Black Lake (1.6 miles)				
2003 Survey	79.0	20.0	3.0	23.0
1994 Survey	52.4	43.7	18.0	61.7
Difference +/-	26.6	-23.7	-15.0	-38.7
% Increase (Decrease)	51%	(118%)	(500%)	(168%)
Above Black Lake (3/4 mile in 2003, 1.5 miles in 1994)				
2003 Survey (3/4 mile)	145.7	86.5	25.6	112.1
1994 Survey (1.5 miles)	55.8	47.0	21.7	68.7

Amounts of large woody debris in the channel have increased in the small size class throughout Lake Creek below Black Lake, while the amounts of medium and large size pieces of wood have decreased. This is perhaps attributable the Farewell Fire, which may have burned the bark off many of the downed trees in the channel (reducing the diameter and size class of the wood) or caused a piece of Large Woody

Debris (LWD) to split in half (reducing larger size pieces of wood and creating more smaller pieces of wood), and/or to surveyor observation differences between the two years. It is likely that amounts of large wood are about the same in the two survey years. The Farewell Fire has not had a noticeable effect on the amount of large woody debris in Lake Creek. Nearly all the trees that burned along the banks in Lake Creek are still standing.



Lake Creek Pools

Survey pools (channel spanning pools) were counted and measured in the main channel (length, width, maximum depth and residual depth). Pools meeting the Forest Plan definition of a "quality" pool (spaning at least half the channel with a low flow maximum depth of three feet, or depth of 1 ½ feet with 40% or greater hiding cover) were counted in the main channel and in side channels.

Key Findings

- All six reaches are functioning appropriately for pool habitat. All six reaches meet or exceed USFWS guidelines for pool frequency. The ¾ mile stream segment above Black Lake has some of the highest quality pool habitat found on the Methow Valley District. This stream segment exceeds 90% of similar type streams in the North Cascades Eco-Region for numbers of pools and for numbers of large pools (pools with a surface area greater than 215 square feet with a low-flow depth greater than 2.7 feet).

Lake Creek 2003 Pool Survey Comparison with 1994 Survey

- It is difficult to compare pool habitat data between years due to changes in the stream survey protocol. A 1996 protocol change allowed for counting plunge pools where the width of the pool was greater than the length. In 1994, all habitat units had to have a length greater than its width.

- Pools and % pool habitat increased significantly in 2003 from 1994 in all stream segments that were compared. Part of the difference is attributable to the protocol change, but a larger factor is the difference in surveyor judgment (the stream was surveyed by different observers). Surveyor judgment probably accounts for the differences in the average pool residual depth. To be counted, a pool had to have at least one foot of residual depth in the 2003 survey. The 1994 residual depth standard was not stated.

Lake Creek Pool Habitat Comparison – 1994 to 2003

	Pools per Mile	Pool % Habitat	Avg. Residual Depth
Mouth to Farewell Creek (0.7 miles)			
2003 Survey	35.0	22.0%	1.58′
1994 Survey	12.4	7.8%	2.00′
Difference +/-	+22.6	+14.2%	-0.42′
% Increase (Decrease)	182%	182%	(27%)
Farewell Creek to Kidney Creek (4.6 miles)			
2003 Survey	37.3	27.5%	1.88′
1994 Survey	14.9	9.5%	2.30′
Difference +/-	+22.4	+18.0%	-0.42′
% Increase (Decrease)	150%	189%	(22%)
Kidney Creek to Black Lake (1.6 miles)			
2003 Survey	42.6	21.3%	1.90′
1994 Survey	15.0	7.9%	2.20′
Difference +/-	+27.6	+13.4%	-0.30′
% Increase (Decrease)	184%	170%	(16%)
Above Black Lake (3/4 mile in 2003, 1.5 miles in 1994)			
2003 Survey (3/4 mile)	44.6	72.9%	2.22′
1994 Survey (1.5 miles)	18.8	52.9%	2.40′

Lake Creek Off Channel Habitat

The habitat dimensions of all side channels were estimated during the survey (depths were measured). Large woody debris was counted in the same size categories as the main channel. All bank erosion was recorded and Forest Plan "quality" pools were counted in the side channels. Wetland area dimensions were recorded in comments.

Key Findings

- Beavers just above the inlet to Black Lake have created a 950′ long marshland pool with a maximum depth of 5.3′ at low flow. The beaver dams became active around 2000. Numerous juvenile fish were observed in the pool (surveyors could not determine species). Evidence of past beaver activity has been observed just below the outlet in

the past. This area was totally burned in 2003. A wetland pond above the left bank at RM 3.2 was created by beaver. This area was also burned over in 2003. A large wetland pond is found in the valley bottom above the right bank of Lake Creek about a mile below Black Lake (in Cold Creek, a tributary to Lake Creek).

- Side channel habitat was abundant between RM 2.5 and RM 5. Many of the side channels were formed by log jams, including a 1,250' long side channel that exits the main channel at the campground at the end of FS Road 5160-100. The side channel was at one time the main channel. A newly formed main channel along the left side of the floodplain is flowing through the burned forest. Many burned trees will fall into the stream in this area, as the flow of the creek undercuts the soil around the dead trees. This stream segment has excellent spawning substrate for spring Chinook salmon and summer steelhead.

- Side channel habitat in reach 4 (RM 4.3 to RM 5.3) is formed by water flowing through steep talus slopes along both sides of the floodplain. The water forms pools next to the talus slopes and flows alongside the floodplain before joining the creek. Grass forbs and deciduous trees grow in the riparian zone of the springs. These areas did not burn during the Farewell Fire (the conifers growing outside these areas were completely burned). The water temperature of the springs was about 2oC cooler than the main channel.

- Side channel habitat in the ¾ mile segment above Black Lake was abundant (10% of total habitat) and complex, with numerous log jams and deep pool habitat. Bull trout are spawning both in the main channel and in the side channels above Black Lake.

2003 Survey Comparison with 1994 Survey

Side channel habitat data comparison is summarized below.

% Side Channel Habitat Area

Stream Segment	2003 % Side Channel Habitat	1994 % Side Channel Habitat	Difference + or -
Mouth to Farewell Creek (0.7 miles)	1.5%	4.6%	-3.1%
Farewell Creek to Kidney Creek (4.6 miles)	8.2%	6.8%	+1.4%
Kidney Creek to Black Lake (1.6 miles)	2.7%	6.3%	-3.6%
Above Black Lake (3/4 mile in 2003, 1.5 miles in 1994)	10.0%	4.8%	n/a

Summary of Recommended Actions:

Further evaluation is needed and is planned as a component of Forest Plan revision. As funds become available, efforts need to be directed at resources for watershed restoration. Continue to work with federal, state and county governments, and the local communities to modify operations of water diversions. Continue to analyze and monitor roads and recreational sites within riparian areas. Modify or remove roads and/or recreational sites that prevent attainment of Aquatic Conservation Strategy Objectives or Riparian Management Objectives.

Monitoring Item #47:

Riparian Watershed Implementation Monitoring (changed from Water Quality/Best Management Practices in 2003, variable reporting dependent on project implementation)

Objective or Purpose: Determine if project implementation is resulting in expected condition for Riparian and Aquatic Ecosystems.

Type of Monitoring: Implementation ■ Effectiveness ■ Validation ❑

Method of Monitoring: Environmental Assessment (EA) with field review of sample of projects annually.

Unit of Measure: Percentage of Fish/Riparian standards and guidelines successfully identified and applied

Criteria: Forest Plan direction, Standards and Guidelines

Standards: Is there compliance with Forest-wide direction?

Frequency Item is Monitored: Every year

Riparian/watershed implementation monitoring focused on the Respect the River program. The Respect the River program was developed to maintain and restore riparian habitat that is being impacted by recreation use. The program approach combines restoration with public education to improve riparian habitat while providing for recreation use. A monitoring protocol has been developed to both inventory recreation sites adjacent to streams and track changes in habitat condition over time.

On the Methow Ranger District, the 2002 monitoring protocol was continued in the Chewuch watershed and initiated in the Upper Methow watershed. Monitoring in the Methow watershed was halted by the Needles Fire and will be completed in 2004. Respect the River program site maintenance included fence building, interpretive sign installation, boulder placement and vegetation maintenance was completed in the Beaver Creek, Twisp River and Chewuch River. Bank stabilization, revegetation with native plants and hardening of a user built trail to the Chewuch River was completed at Sheep Camp, a popular dispersed group site. The Twisp Horse Camp water pumps were improved to be more efficient and user friendly. Over one mile of a closed road that had been illegally reopened by four wheelers, was scarified and seeded with native plants to close it again. A buck and pole fence was built by Washington Conservation Corps to protect the riparian area of Weiner Lake from vehicles and cows.

Volunteers were used on the Tonasket Ranger District to survey restoration needs at 37 developed and dispersed campsites in riparian settings in three different watersheds. The volunteers made a prioritized list of restoration needs in each watershed. These priorities will be used to plan and implement future restoration projects. The volunteers also made public contact with visitors to interview them about their use of site and solicit ideas for restoration of the sites.

Recommendations

Continue the monitoring of restored sites and inventory of new sites. Monitoring and maintenance of restored sites and continued public contact and education are essential for successful restoration.

Monitoring Item #53:

Road Miles & Operational Status

Type of Monitoring: Implementation ■ Effectiveness ■ Validation ❑

Method of Monitoring: Project reviews and year end reports. Continuous GIS update (as available) with field sampling and Forest Transportation Plan annually.

Unit of Measure: Open road density, based on the miles of open road in a given discrete management area.

Criteria: Forest Plan direction, Standards and Guidelines

Standards: Fails to meet plan objectives by more than ten percent annually.

Frequency Item is Monitored: Every Year

Frequency Item is Reported: Every Year

Evaluation: Approximately half of the forest is allocated to Management Areas that do not have road density standards, but have prohibitions or severe restrictions on road building (e.g., wildlife, semi-primitive, wilderness and special emphasis areas). The other half is allocated to Management Areas that have a specified road density standard.

Approximately 91 percent of the acres in Management Areas with a road density standard meet the standard. Approximately 95 percent of the acres on the forest comply with Forest Plan Standards designed to have limited or no wildlife disturbance from road densities.

Total Forest Acres	Percent Of Acres With No Road Density Standard	Percent Of Acres With Road Density Standard	Percent Of Total Forest Acres Meeting Road Density Standard
1.7 million	52%	48%	95%

68 percent of the discrete Management Areas with road density standards currently meet the standard. 92.9 miles of road have been decommissioned since the Forest began keeping records in 1992. Since that time, efforts have been made to inventory non-system roads that were not included in the earlier inventories. These roads are the "unclassified roads" described in the roads analysis rule. This has resulted in a higher inventoried road mileage in many Management Areas. The majority of these non-system roads existed before the Forest Plan, but had not been inventoried.

22 Management Area road lengths have decreased since 1992 in Management Areas still not currently meeting road density standards (not including minor increases and decreases caused by rounding).

Road construction on the forest continues to decrease. At its highest, fifty-nine miles of road were constructed in 1990, and the low was 0.0 miles in 2000 and 2004.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Total System Road Construction Miles	59	15.2	7	10	1.8	3.9	1.6	4.9	3.1	1.4	0	0.8	0.9	0

The forest actively began obliterating roads in 1992, removing them from the transportation system.

Miles of Road Decommissioned	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
System	4.8	8.0	0.7	3.5	0.0	2.2	12.5	2.6	0	0.0	3.5	3.7
Non-System								4.9	15	4.0	15	12.5

Prior to 1999 no records were kept of non-system road decommissioning

Most timber sale NEPA documents now approve road closures and decommissioning, and the trend is toward increasing closures. The table below displays the amount of road mileage approved in timber sale NEPA documents for closure or decommissioning since 1996. Because timber sales are implemented over a period of many years, these road closures are approved but may not yet be accomplished on the ground or entered into the roads database, and therefore may not yet reflected in current road densities:

Fiscal Year Approved	Miles to be Closed	Miles to be Decommissioned
1996	11.2	6.9
1997	22.8	0.0
1998	56.9	32.9
1999	39.7	0.0
2000	17.0	27.0
2001	16.8	14.3
2002	21.6	17.6
2003	53.3	24.3
Total	239.3	109.1

Trend

Road construction that adds to the forest transportation system is expected to remain low under current direction, and the forest expects to continue road closure and decommissioning as funding is available. The Forest Service has a roads policy that requires roads analysis at several different planning levels to determine the need for existing roads. NEPA documents continue to approve road closures resulting in an upward trend in meeting road density management direction across the Forest.

Recommended Actions: Results Okay; Continue monitoring. Continue to utilize watershed analysis, roads analysis, and project level analysis to identify the need for roads, and to update forest road inventories.

Monitoring Item #55:

Actual Annual Wildfire Occurrence Frequency by Statistical Cause

Objective or Purpose: Assure that fire management direction is being met.

Type of Monitoring: Implementation ■ Effectiveness ■ Validation ❑

Method of Monitoring: Complete individual fire report for each wildfire.

Unit of Measure: Each.

Criteria: Forest Plan direction, Standards and Guidelines.

Standards: Change of +15% in total acres burned from 5-year average.

Frequency Item is Monitored: Every year.

Evaluation: The number of acres burned for all categories of fires except those caused by lightning are within the Forest Plan standard of +/- 15%. Lightning events are not predictable or controllable in terms of the number of wildfires that are caused.

Cause	5-yr fire average 1998-2002	5-yr acre average 1998-2002	No. of fires by cause 2003	Acres 2003
Campfire	7.0	1900.00	1.0	2.0
Children	0.2	0.02	0.0	0.0
Debris Burn	3.0	19.00	1.0	0.1
Equipment	0.8	766.00	1.0	0.6
Incendiary	0.6	0.08	0.0	0.0
Lightning	56.0	5,247.00	45.0	107,724.0
Misc.	5.0	185.00	2.0	0.4
Smoking	2.0	0.60	2.0	0.2

Recommended Action: Results okay, continue monitoring.

Monitoring Item #63:

Minerals Withdrawals

Narrative dropped in 2003 Report, output will continue to be reported.

Mineral Output Table

Outputs and Effects (Unit of Measures)	Estimated Decade (Annual Avg)	FY 90	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01	FY 02	FY 03
Minerals Operating Plans, Notices, Sales, etc.	75	26	57	42	44	45	39	54	35	40	29	37	36	38	48
Minerals Produced (Million $)	0.10	0.004	0.025	0.014	0.035	0.004	0.003	0.004	0.003	0.009	.002*	.001*	.007	.024	.011

*The FY 2000 Monitoring Report displayed these values in Thousand $ rather than Million $. The correct amount is now shown.

Monitoring Item #70:

Heritage Resource Site Protection

Objective or Purpose: Cultural resources that are eligible or potentially eligible for the National Register of Historic Places are being protected as stated in the Forest Plan and in compliance with federal laws and regulations.

Type of Monitoring: Implementation ■ Effectiveness ❑ Validation ❑

Method of Monitoring: Monitor a stratified sample of all unevaluated sites and of all significant sites in active project areas

Unit of Measure: Report percent unevaluated and significant sites sampled and the respective compliance with the Forest Plan.

Criteria: Forest Plan direction, Standards and Guidelines

Frequency Item is Monitored: Every year

Frequency Item is Reported: Every year

Evaluation: The Okanogan National Forest Heritage program is managed by the Wenatchee National Forest. The organization is staffed by a full time, permanent archaeologist who is responsible for overseeing the heritage program on the Methow Valley and the Tonasket Ranger Districts.

For FY 2003, a total of 24 separate consultations occurred in compliance with Section 106 of the National Historic Preservation Act and in accordance with the1997 Programmatic Agreement regarding cultural resource management on National Forests in the State of Washington (PMOA). This slight increase in

the number of consultations over FY 2002 reflects an increase in projects as well as an increase in the Forest's awareness regarding Section 106 consultation in general. Of these consultations, four (4) projects required Section 106 consultation with the Washington State Historic Preservation Officer (SHPO) and 20 project consultations were handled internally per the 1997 PMOA.

Project planning acreage ranged from a high of 19,840 acres for the Mutton Integrated Resource project on the Tonasket Ranger District to less than one acre. Acreage inventoried for cultural resources varied from a high of 2400 acres to less than one acre for culvert replacement. A total of 5300 acres were systematically inventoried and 24 new cultural resource sites were documented. Most of the new sites were located during inventories for fuel reduction and salvage-and timber sales with large planning areas. A total of 28 new or previously documented sites were formally evaluated for nomination to the National Register of Historic Places. This increase in the number of sites evaluated reflects increased emphasis in this area of the heritage program. The Forest Archaeologist and the North Zone archaeologist also met with district personnel to review the Section 106 process. The archaeologist was an active member of several project-planning teams and provided input for NEPA documents and for allotment management plans.

More than half of the projects requiring heritage support had little or no potential to affect cultural resources and included such activities as fence maintenance, permit renewals, and toilet replacement within existing campgrounds. Projects requiring inventory included prescribed burns, timber and salvage sales, burn area emergency rehabilitation for district fires, and recreation and facilities-related projects. The Forest has documented nearly 500 cultural resources of which less than five percent have been evaluated for inclusion on the National Register of Historic Places.

At least five of the 2003 Section 106 project reports specifically recommended site and/or project monitoring to insure avoidance and/or identification of cultural resources. No site discoveries occurred. Each Forest undertaking resulted in a determination of no historic properties affected/no effect.

Two site intrusions resulted in site damage. Both cases occurred during suppression activities for the Needles and Farewell wildfires on the Methow Valley Ranger District. Both sites (Robinson C.C.C. camp and a portion of the Hart's Pass Road) were damaged by dozers during fire line construction. Both sites were documented after the damage had occurred but site rehabilitation has not occurred because mitigation measures may result in more damage.

Recommended Action: Continue monitoring sites inside project areas. Emphasize site evaluation, especially the evaluation of previously documented cultural resource sites. Complete the Forest's GIS heritage layer by 2005.

Monitoring Item No. 71:

Heritage Resource Site Preservation

New Item added in 2003 (Competing and unwanted vegetation management number changed to No. 73)

Objective or Purpose: Management of properties eligible for the National Register of Historic Places includes preservation, rehabilitation, and stabilization of such properties

Criteria: Forest Plan direction, Standards and Guidelines

Type of Monitoring: Implementation ■ Effectiveness ❑ Validation ❑

Method of Monitoring: site preservation projects

Unit of Measure: Number of listed or eligible heritage resources in need of treatment (cumulative) and number of listed or eligible heritage resources treated in the fiscal year.

Frequency Item is Monitored: Every two years

Frequency Item is Reported: Every two years

Evaluation: No rehabilitation or stabilization projects to report. Some maintenance is conducted by the Forest facilities staff but for sites that are exclusively heritage priority assets, the Forest has a backlog of sites in need of rehabilitation, restoration and preservation. Heritage funding does not meet the need.

Recommended Actions: Continue to perform condition assessments on historic properties and treat sites as needed. Look for additional sources of funding.

Monitoring Item No. 72:

American Indian Relations

New Item added in 2003 (Survey and Manage Species moved to No. 74)

Objective or Purpose: The Forest is meeting its trust responsibility to American Indian Tribes

Criteria: Forest Plan direction, Standards and Guidelines

Type of Monitoring: Implementation ■ Effectiveness ❑ Validation ❑

Method of Monitoring: Number of government-to-government consultations

Unit of Measure: Number and types of consultation with appropriate tribal representatives in FY.

Frequency Item is Monitored: - Annually

Frequency Item is Reported: Annually

Evaluation: The Okanogan National Forest is sensitive to American Indian concerns and issues. Government-to-government consultation with the Colville Confederated Tribes, Yakama Nation and

other interested tribes remains a critical element of the program. Consultation with tribes that may have an interest in management activities is initiated at the earliest stage of project planning and is carried through to completion of the project. The heritage program shares project information through distribution of the Schedule of Proposed Actions (SOPA), Passport in Time newsletters, on a case-by-case basis for all projects involving a decision notice or decision memo and via face-to-face meetings with tribal councils. In FY 03 at least 20 separate government-to-government letters were sent to the Confederated Colville Tribes and the Yakama Nation.

Each year contact is made with tribal councils to identify appropriate contacts for various projects. A meeting to discuss government-to-government consultation protocol in 2002 indicated that our current process works well with each Tribal Council but there is clearly a need to establish a better protocol/process with the Colville tribal historic preservation officer (THPO). The process for identifying Traditional Cultural Properties (TCPs) in particular remains problematic with the Colville THPO because of differences in opinion regarding who should provide TCP information and how. Meetings with the Yakama Nation cultural committee and the Colville Confederated Tribes THPO are planned in FY 04-05 to sort out the process.

Fees for special forest products are waived for tribal members. Information that may be sensitive is not shared with or distributed to the public. Privacy is provided for ceremonial activities.

Recommended Actions: Meet with the Colville Confederated Tribes THPO annually to discuss and evaluate the effectiveness of the Forest's consultation protocol. Consider developing a memorandum of understanding for government-to-government consultation, TCP identification and the sharing of sensitive information in general.

Monitoring Item #73:

Management of Competing and Unwanted Vegetation

Objective or Purpose: Reduce the reliance on herbicides and prescribed burning

Type of Monitoring: Implementation ■ Effectiveness ■ Validation ❑

Method of Monitoring: Review attainment reports; review program effectiveness in achieving resource goals

Unit of Measure: Percent of infested acres treated with herbicides; tons of TSP emissions per year

Criteria: Mediated Agreement Requirements

Frequency Item is Monitored: Every year

Frequency Item is Reported: Every year

Evaluation: Noxious weed treatments that included herbicide applications, and other treatment methods (mechanical, manual, bio-control and cultural) were accomplished under contract.

Substantial treatments over the past several years have reduced noxious weed populations in the treated areas. Much of the substantial control has been accomplished with herbicides, but there is emphasis is on reducing chemical use in the control of noxious weeds. Initial treatments on heavily infested sites

generally require chemical treatment to reduce weed populations below damage thresholds. Once these areas have been effectively treated, herbicide use falls because follow-up treatments with herbicides require considerably less herbicide per acre than untreated noxious weed populations (see graphs below for noxious weed levels following initial treatments). In the follow-up work, only noxious weed plants are directly sprayed, and thus less herbicide is used.

Project planning includes an analysis of a prevention strategy to keep noxious weeds from becoming established or substantially increased in project areas. Control work on new invaders or established noxious weeds also helps to create more favorable conditions for natives and desirable non-native plant growth. The use of manual, bio-control and mechanical management methods in recreation areas helps to improve recreational experiences and reduce the likelihood that noxious weeds will be transported out of the area.

Areas Treated

About 2,242 acres were treated using the following methods:

Treatment	Acres
Mechanical	0
Chemical	1525
Manual	596
Bio-control	0
Treated and Seeded	121
Total	2242

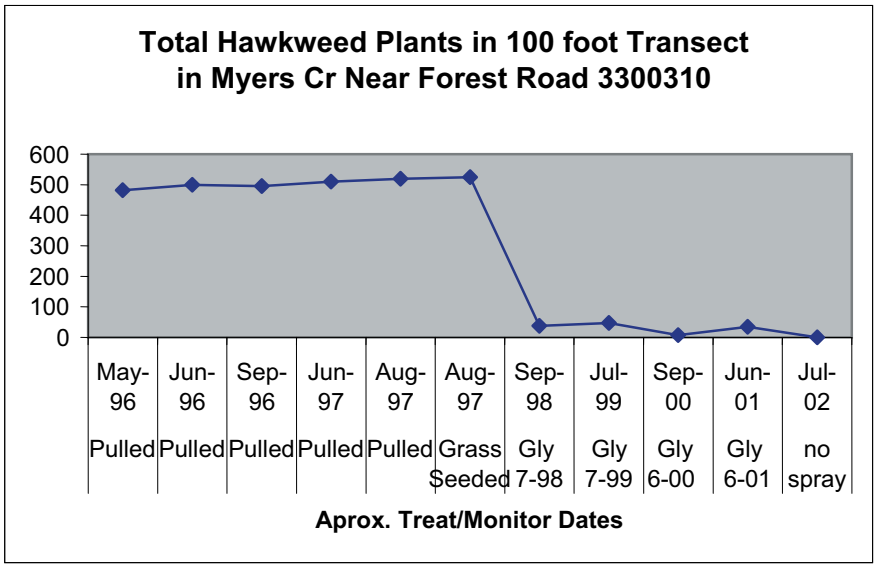
Cultural Treatments

Areas seeded were in Little Bridge Creek (TPR timber sale area) and the Second Creek in Cub Creek, both on the Methow Valley Ranger District. The Farewell Fire (2003) was seeded in late 2003. Germination was excellent, and there is an apparent establishment of grass seeding in Farewell Fire safety zones and batch retardant plant. There was no germination to moderate germination in roadside seeding in late 2003.

Herbicide Use

In 2004 Initial treatment was done in Finley Canyon and on the Benson, Cougar, Bear, Pearrygin, and Ramsey Creeks road systems, which were the last of the areas not previously treated under the 2000 Environmental Assessment for the treatment of noxious weeds on the Methow Valley Ranger District. Diffuse knapweed was treated along with inclusions of sulfur cinquefoil, oxeye daisy, Russian knapweed, whitetop, and Dalmatian toadflax.

Follow-up treatments occurred on sites across the Methow Valley and Tonasket Ranger Districts. Treatments were near the Loup Loup Ski Area oxeye daisy site, Alder Creek horse pasture diffuse knapweed site, and the Twisp View Mine diffuse knapweed site above the horse pasture. The Spokane Gulch tansy site was greatly reduced from previous years. Most of the main stockpiles of road gravel were treated and virtually all gravel pits inventoried. There was emphasis on follow-up treatments in orange and yellow hawkweeds sites on the Tonasket Ranger District.



The amount of herbicide used on a per acre basis continues to decline because the number of individual plants is reduced and treatment of individual plants requires less herbicide than a broadcast application.

Beginning in 1998, the hawkweed treatment site at Myers Creek (below) was treated with RODEO®, the glyphosate formulation for use near water. Since glyphosate enters the plant only through the leaves, it must be re-applied when new plants grow. It was reapplied in 1999, 2000 and 2001, but not on this site in 2002. Monitored levels of plants continue to be low, so fewer plants are found and sprayed.

Manual Treatment

A variety of crews hand pulled diffuse knapweed, mullein and spotted knapweed on the Methow Valley and Tonasket Ranger Districts. A trustee crew, under agreement with the Okanogan County Sheriff's office pulled weeds along roads. Most of the weeds were bagged and removed from the site. The Weed Warriors, under the leadership of Susan Crampton, pulled nearly 80 acres of weeds in campgrounds and along roads and trailheads in the Twisp River watershed. The Methow Natives group pulled a total of 45 acres along the Chewuch River Road. Forest Service crews on the Tonasket and Methow Valley Ranger Districts pulled about 600 acres of weeds.

Biocontrol

The Okanogan and Wenatchee National Forests continues to support the Washington State Bio-control Group and provided some funding for its activities which are listed below. These activities did not occur on National Forest system lands.

The biological control agent Mecinus janthinus was released for Dalmatian toadflax in Antoine Creek and Alta Coulee (lower Methow Valley). Ten more releases of Mecinus janthinus (from the Quad County Bio-agent Project) are planned for spring 2005. These insects inflict significant damage to Dalmatian toadflax and actually kill stems or damage the plant so they fail to flower and set seed.

Prevention Strategy

Continued emphasis on the prevention strategy for noxious weed management is included in the development of new vegetation management projects, recreation site maintenance, gravel pit use, road reconstruction, or site disturbing activities. A prevention strategy is considered in every site disturbing activity.

Noxious weed information is given to Forest Service employees at the new employee and seasonal employee District orientation in June 2004. Employees are given information on plant identification, and the employees are requested to report the location and species to the district noxious weed coordinators.

Cooperation

The US Forest Service through the Okanogan and Wenatchee National Forests is also participating in a cooperative project headed by the Okanogan County Noxious Weed Control Board called "Weeds Across the Borders". The cooperative project includes many cooperators including other County Weed Boards, Colville Tribes, Washington State Department of Transportation, Burlington Northern Railroad Company, University of Montana, and Washington State University. The purpose of the project is to develop partnerships for long term control of noxious weeds along the Washington State and Canadian border.

Monitoring and Inventory

New infestations of invasive species, especially hawkweed, continue to be a concern. District weed staffs look for undiscovered sites and regularly inspect treated sites for isolated plants. Over 1500 acres were inventoried for noxious weeds on the Tonasket and Methow Valley Ranger Districts, including several locations on the Tonasket Ranger District for aquatic noxious weeds. These locations included Sugarloaf Lake, Crawfish Lake, Harbor Lake, Summit Lake, Meadow Lake, Bonaparte Lake, Beth Lake, Beaver Lake, Lost Lake, Turner Lake and Lyman Lake. These surveys were done through a volunteer agreement with the Okanogan County Fly Fishing Club. Other interested parties, such as the Okanogan County Noxious Weed Board staff also provide information on new invader infestations on private lands adjacent to national forest lands and on national forest lands.

Spotted knapweed was increasing in the East Chewuch area. Previously, plants had been observed on lands adjacent to the national forest. Kochia was identified and treated for the first time on national forest lands at 8-mile ranch.

Monitoring in Smith Canyon found some striking population reductions of diffuse knapweed. Dense populations of diffuse knapweed with many old plant skeletons were completely gone - not even one rosette in a thatch of old skeletons. There are still dense populations of diffuse knapweed in this area, but overall it is much reduced. This is a striking reduction from 2002. observations. The reduction in diffuse knapweed appears to be from the bio-agent Larinus minutus. Some adult diffuse knapweed plants were completely defoliated by the insects.

Extensive weed surveys were conducted along roads with some off-road inventories, covering about 1500 acres on the Methow Valley Ranger District. New sites of Dalmatian toadflax, sulfur cinquefoil, houndstongue and whitetop were located. A total of 112 sites were inventoried.

Water monitoring

Two water samples were collected from Little Bridge Creek (tributary to the Twisp River) immediately following an application of picloram and 48 hours following application. Picloram was applied 50-100 feet away from Little Bridge Creek. The samples in Little Bridge Creek were collected just below the treated area. Sample results were no detection of picloram.

Recommended Actions: Results Okay: Continue monitoring new invasive species with high potential for spread in the field. Use tools such as GIS to track treatments and to help interpret the spread of noxious weeds and help set priorities on treatment areas. Continue to use the prevention strategy in the planning of all ground disturbing projects and implement the Okanogan and Wenatchee National Forests Prevention Strategy.

FOREST PLAN AMENDMENTS

At the end of Fiscal Year 2003, thirty-two site-specific amendments had been made to the Okanogan National Forest Land and Resource Management Plan since it was signed in 1989. All have been non-significant amendments and are listed as follows:

NO.	Date	Decision Name	Standard/ Guideline Amended	Amendment
1	5/4/90	Meyers Beetle Timber Sale	MA25-8A MA25-6A	Site-specific amendments for project area only for visual quality and cover because of insect and disease problems.
2	11/19/90	Forest Plan Amendment # 2	Forest-wide 17-6 MA5-8B MA5-20E MA11-20C MA12-20C MA14-20C	Changes to correct errors and to ensure consistency with other Standards and Guidelines.
3	12/14/90	Forest Plan Amendment # 3	Forest-wide 17-8	Temporary amendment to allow both roads 4330 and 4010 to be plowed and open for two weeks to allow logging of two timber sales.
4	5/16/91	Forest Plan Amendment #4	None	Clarify the intent of some of the monitoring items, and correct errors.
5	5/16/91	Lyman Timber Sale	MA5-6A MA11-6B MA14-6 MA14-6B MA26-61	Eliminates total rows for cover requirements and clarifies Standards and Guidelines.
6	8/6/91	Forest Plan Amendment #6	None	Updates schedule of activities in Forest Plan, Appendices A-F.
7	2/7/92	Forest Plan Amendment #7	17-6 17-8	Error in current wording results in allowing a segment of a road to be snowplowed, when intent was that entire route remain unplowed.
8	8/3/92	Forest Plan Amendment #8	None	Updates scheduled of activities in Forest Plan, Amendment A-F.
9	9/23/92	Coyote timber Sale	MA26-6A	Site specific amendment for project area only for Snow Intercept Thermal Cover and Winter Thermal Cover to treat insects and disease and provide long-term cover.
10	2/26/93	Little Bonaparte Timber Sale	Forest-wide 6-1 MA14-6A MA14-6C MA5-17C MA14-17A	Site-specific amendment for project area only to allow cover values below, and road densities above forest plan standards and guidelines. Cover values are reduced to allow treatment of severe insect and disease, and road densities are exceeded to allow management of the area to reduce post sale densities.

NO.	Date	Decision Name	Standard/ Guideline Amended	Amendment
11	5/14/93	Dragon Timber Sale	MA26-17B	Site-specific amendment for project area only, allowing road density above forest plan Standards and Guidelines in discrete MA26-28, because all roads in the management area that can be closed are already closed.
12	6/15/93	Lamb Butte Timber Sale	MA14-17A	Site specific amendment for project area only, allowing road density above forest plan standards and guidelines for discrete MA14-04, because all roads in the management area that can be closed are already closed. Also allows temporary amendment for additional roads to be opened during life of sale.
13	9/3/93	Forest Plan Amendment #13	MA15A-210 MA15B-21P MA15B-21Q MA15A-21U MA15B-21Z	Clarifies wilderness standards and guidelines.
14	9/6/95	Forest Plan Amendment #14		Amends Forest Plan to allow snow plowing and wheeled vehicle use of Road 52, a designated snowmobile route, during the winter of 1995-96, to facilitate quick removal of the fire-killed, deteriorating trees in the Whiteface fire area.
15	4/12/96	Forest Plan Amendment #15	MA15A-19E MA15B-19E	Decisions to declare any lightning fire in the Pasayten Wilderness a prescribed natural fire will follow the direction in the Pasayten Wilderness Prescribed Natural Fire Plan. A prescribed fire plan shall be approved prior to the use of prescribed fire in the Lake Chelan-Sawtooth Wilderness.
16	5/31/96	Cayuse Timber Sale	MA14-6A	Reduce snow intercept/thermal cover for deer in the winter range by an additional 1% to improve forest health and accelerate the growth of healthy future wildlife cover.
17	9/3/96	Doe Timber Sale and Associated Activities Forest Plan Amendment #17	MA25-17C MA17-8	Allows open road density in discrete MA25-03 to exceed Forest Plan standard and guideline MA25-17C during the sale. Portion of groomed snowmobile route along Road 5010 to be relocated to an adjacent planned trail, and approximately 2400 feet of the east half of Road 5100 beyond the sno-park may be plowed.
18	9/30/96	Shady Timber Sale	MA25-17C	Allows open road density in discrete MA25-14 to exceed the Forest Plan standard and guideline during the life of the sale.

NO.	Date	Decision Name	Standard/ Guideline Amended	Amendment
19	2/3/97	Crown Jewel Mine and Forest Plan Amendment #19	MA27	Creates a new minerals management area (MA27) with goals, objectives, Standards and Guidelines.
20	6/9/97	Roger Lake RNA/Forest Plan Amendment #20	MA8	Establishes Roger Lake area as a Research Natural Area.
21	9/12/97	Long Draw Salvage Timber Sale/Forest Plan Amendment #21 Decision withdrawn	PACFISH RHCA widths	Modifies PACFISH interim RHCA widths where necessary to achieve riparian management goals and objectives. Subsequently withdrawn when decision was withdrawn.
22	9/29/97	Beaver Salvage Timber Sale/Forest Plan Amendment #22 Decision withdrawn	PACFISH RHCA widths	Modifies PACFISH interim RHCA widths where necessary to achieve riparian management goals and objectives. Subsequently withdrawn when decision was withdrawn.
23	4/3/98	Beaver Salvage Timber Sale/Forest Plan Amendment #23	PACFISH RHCA widths	Site-specific amendment to PACFISH interim widths for life of this sale to achieve riparian management goals and objectives.
24	5/19/98	South Twentymile Timber Sale/Forest Plan Amendment #24 Old growth amendment withdrawn	MA14-17A	Amends road density in discrete MA14-05 and restores old growth characteristics in three stands of timber; site specific to this sale only. Old growth portion of this amendment was withdrawn.
25	5/27/98	Oakley Timber Sale/Forest Plan Amendment #25	MA14-6A	Amends the Forest Plan to allow management activities to improve long-term winter thermal cover for deer.
26	9/30/98	Bailout Prescribed Fire for Natural Fuels Reduction/ Forest Amendment #26	F/W19-8 MA26-6A	Allows site specific burning of natural fuels within 128 acres of mixed conifer Forest Plan old growth located in discrete MAs 26-33 and 26-34, to move structure towards historic ranges and promote late/old structure, and to protect and to develop snow intercept thermal cover which currently does not meet standards and guidelines.

NO.	Date	Decision Name	Standard/ Guideline Amended	Amendment
27	5/18/99	Redmill Timber Sale, Road Management and Noxious Weed Management and Forest Plan Amendment #27	MA 14-6A	Reduction in snow intercept/thermal cover in MA 14-23 to help reduce disease and move stands toward conditions that maintain deer winter cover and increase long term sustainability of deer winter range.
28	5/15/99	Chewuch RNA and Forest Plan Amendment #28	MA-8	Establishes the Chewuch Research Natural Area.
29	2/11/00	Coco Integrated Resource Projects #29	MA26-17B	Changes road density standard in MA26-31 from 1.0 miles/square mile to 1.3 miles/ square mile to allow main arterials and collectors to remain open
30	2/11/00	Prescribed Fire Projects from the Coco Integrated Resource Projects EA #30	MA19-8	Allows the use of prescribed fire in two old-growth stands to reduce natural fuels and encroachment of small trees.
31	7/18/00	TPR Stand Treatment, Road Management and Prescribed Fire #31	MA-26-20J	Allows winter logging in mule deer winter range for this project only in MA26-05 to mitigate soil impacts and reduce rate of spread of noxious weeds.
32	3/3/03	Bailey Fire Restoration Project #32	MA14-17A	Allows open road density to exceed Forest Plan standard during life of project; public access controlled in most areas.

In addition, the Forest Plan has been amended by four Multi-Regional or Regional amendments. These are:

1. The Record of Decision and Final Supplemental Environmental Impact Statement on Management of Habitat for Late Successional and Old-Growth Forest Related species within the Ranger of the Northern Spotted Owl, signed by Secretary of Agriculture Mike Espy and Secretary of Interior Bruce Babbit on April 13, 1994 and amended on January 12, 2001;

2. The Decision Notice and Environmental Assessment for Revised Continuation of Interim Management Direction Establishing Riparian, Ecosystem and Wildlife Standards for Timber Sales signed by Regional Forester John Lowe on June 25, 1996;

3. The Decision Notice and Environmental Assessment for the Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH) signed by USDA Forest Service Chief Jack Ward Thomas and USDI Bureau of Land Management Director Mike Dombeck on February 24, 1995; and

4. The Decision Notice and Environmental Assessment for Interim Strategies for Managing Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, Western Montana and Portions of Nevada (INFISH) signed by USDA Forest Service Regional Foresters Hal Salwasser (Northern Region), Dale N. Bosworth (Intermountain Region) and John E. Lowe (Pacific Northwest Region) on July 28, 1995.

SCHEDULE OF PROPOSED ACTIONS

The Forest Service published revised policies and procedures for implementing the National Environmental Policy Act (NEPA) on September 18, 1992. One major change in the revised policies and procedures is the requirement that a schedule of proposed actions (SOPA) be published quarterly. The purpose of this schedule is to provide notice of proposals that may undergo environmental analysis and documentation to interested and affected agencies, organizations and individuals. All documents for which the Okanogan National Forest has developed a proposed action are listed on the quarterly schedule, and decisions made during the previous quarter are highlighted.

Projects listed in the schedule disclose the following information: Name of project, description, location, when scoping will begin, status, estimated date of decision, and contact person.

If you have any questions about the schedule, or wish to receive a copy of the schedule, call the Planning and Environment section of the Okanogan and Wenatchee National Forests at (509) 664-9306 or write to: Okanogan and Wenatchee National Forests, Environmental Affairs, 215 Melody Lane, Wenatchee, WA 98801.

LIST OF PREPARERS

Mel Bennett	Hydrologist
Jim Burdick	Assistant Fire Staff
Kathleen Tillman	Transportation Planner
Rod Clausnitzer	Botanist
Jan Flatten	Environmental Coordinator/ Forest Planner
Powys Gadd	Archeologist
Rod Lentz	Mining Geologist
Robert Naney	Wildlife Biologist
Ken MacDonald	Fisheries Biologist
Jacqueline Haskins	Fisheries Biologist