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Colville National Forest Temperature and Bacteria Total Maximum Daily Load

Water Quality Implementation Plan

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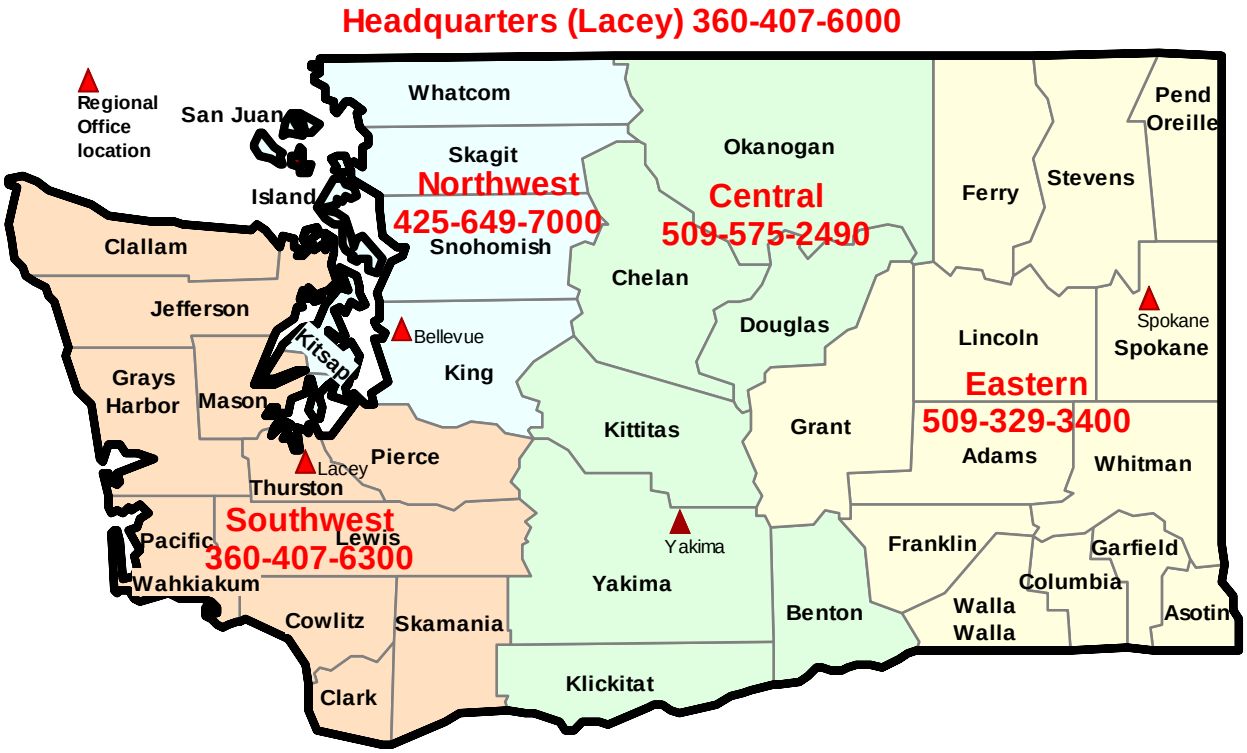

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Executive Summary

Established in 1906 and located in northeast Washington, the Colville National Forest is approximately 2,123 square miles. The forest is situated within Pend Oreille, Stevens, and Ferry counties where the primary economic base is lumber, wood products, and mining. Communities immediately adjacent to the forest include Colville, Chewelah, Kettle Falls, Republic, Newport, Ione, and Metaline Falls (Figure ES-1). Borders to the forest include Canada to the north, Okanogan National Forest to the west, Idaho and the Idaho Panhandle National Forests situated to the east, and Colville Confederated Tribal lands along the south western portion of the forest. Management of the forest is divided into four ranger districts including Three-Rivers (854 mile^2), Republic (382 mile^2), Sullivan Lake, and Newport (886 mile^2 combined).

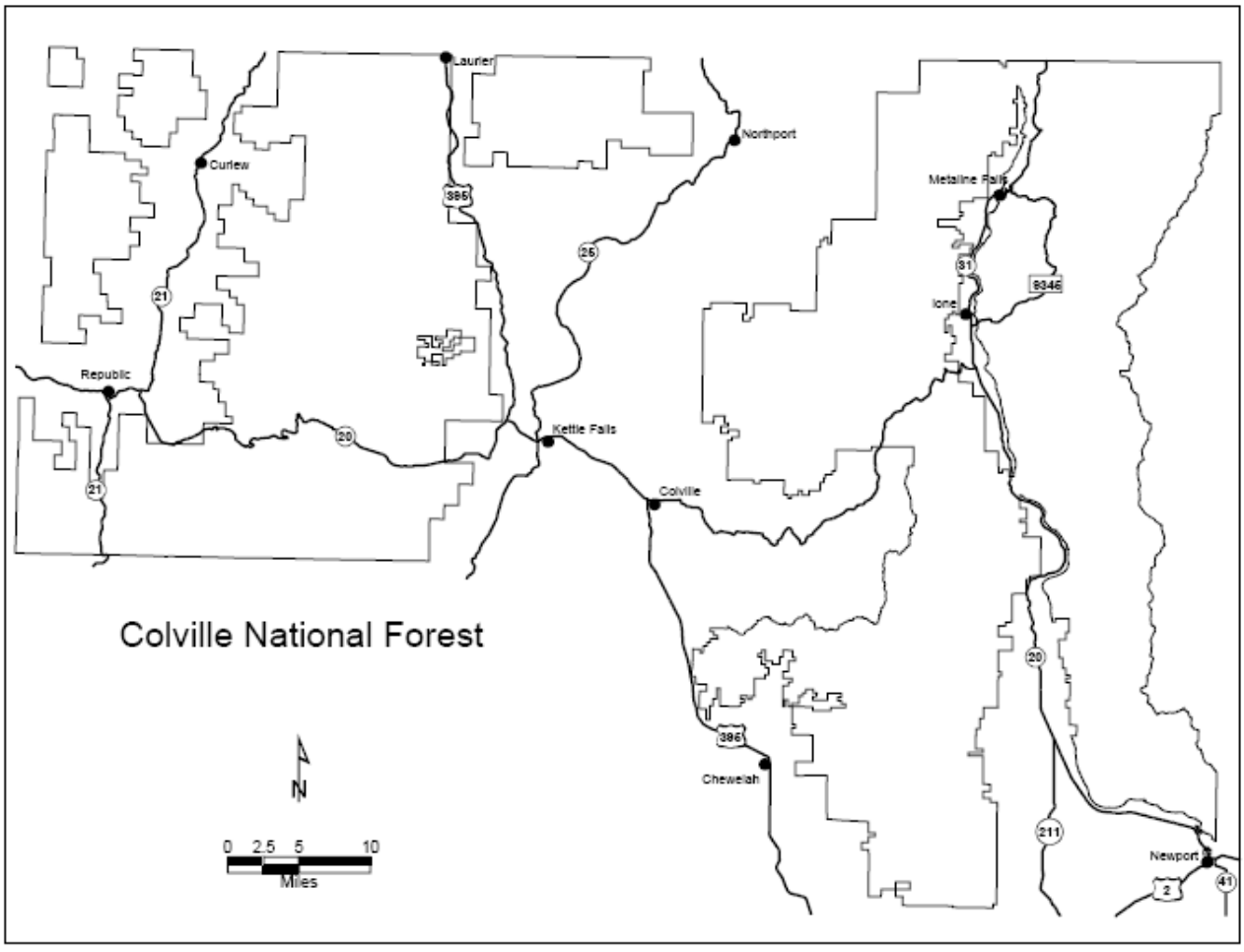

Figure ES-1. Map of the Colville National Forest boundary.

Every two years, states are required to prepare a list of water bodies - lakes, rivers, streams or marine waters - that do not meet water quality standards. This list is called the 303 (d) list. The Clean Water Act requires that a water quality improvement plan or Total Maximum Daily Load (TMDL) be developed for each of the water bodies on the 303 (d) list. A TMDL identifies how much pollution needs to be reduced or eliminated to achieve water quality standards. Then, in the case of the Colville National Forest TMDL, Ecology works with the Forest Service to develop a strategy to control the pollution and a monitoring plan to assess effectiveness of the water quality improvement activities. Once the Environmental Protection Agency (EPA) reviews and approves the water quality improvement plan, the Forest Service and Ecology develop a detailed plan to reduce pollution and measure progress. This detailed plan is called a Water Quality Implementation Plan and it is the final step in the TMDL process.

Ecology established a TMDL for the Colville National Forest because numerous water bodies within the forest are on the 1998 303(d) list of impaired waters. Four streams are on the 1998 303(d) list for temperature, twelve stream segments are included for elevated fecal coliform bacteria levels, and four streams are listed for elevated pH levels (Table ES-1). This TMDL applies solely to surface waters within the Colville National Forest and not private lands within the boundary of the national forest.

In 2002, the Washington Department of Ecology began a TMDL study in cooperation with the Colville National Forest. In the summer months of 2002, 2003, and 2004 Ecology analyzed forest waters for temperature and fecal coliform bacteria. An examination of water temperature data from 62 monitoring stations revealed that in addition to three of the four 303(d) listed creeks, 34 water bodies had maximum water temperatures exceeding the water quality standard. Of the twelve 1998 303(d) listings for fecal coliform bacteria, six of the sites met both parts of the standard, whereas the other six required reductions. In addition, seven other locations had bacteria levels above the standard. All sites found to be impaired were assigned load allocations in this TMDL. Therefore, there are 37 temperature and 13 fecal coliform bacteria load allocations. Appendix C provides tables of the allocations.

Table ES-1. Colville National Forest Creeks on the 1998 303(d) List

Temperature	Fecal Coliform Bacteria	pH	Dissolved Oxygen
Sherman Creek	Cottonwood Creek (Colville)	Pierre Creek	South Fork Chewelah Creek
South Fork Sherman Creek	Cottonwood Creek (Kettle)	South Fork Chewelah Creek	
Lost Creek	East Fork Crown Creek	South Fork O'Brien Creek	
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	Lambert Creek		
	Martin Creek		
	Meadow Creek		
	North Fork Lone Ranch Creek		
	North Fork Trout Creek		
	Smackout Creek		
	South Fork Chewelah Creek		
	South Fork St. Peter Creek		

The *Colville National Forest Temperature, Bacteria, pH and Dissolved Oxygen Total Maximum Daily Load Submittal Report* (Whiley & Baldwin 2005) combined the study results and an overview of strategies to reduce water temperatures and fecal coliform bacteria levels. Site-

specific load allocations to meet water quality standards established in the submittal report can be found in Appendix C.

This document is the Water Quality Implementation Plan (WQIP) for the Colville National Forest. WQIPs include information on activities that will be used to improve water quality, when those activities will occur, who will do them, and how to measure progress. This plan expands upon information in the submittal report. The timeframe to meet the fecal coliform water quality standard is seven years and it is expected to take fifty years to meet the water temperature criteria.

The Colville National Forest has a general approach that will be used to achieve both temperature and fecal coliform bacteria water quality standards. The approach is the same for both parameters since actions to reduce bacteria will also help improve water temperature. For example, buffers help filter bacteria in over land flow and they also help provide shade for the stream. Some approaches may directly benefit one water quality parameter more than the other, but will indirectly improve the other parameter. For instance, road maintenance activities that prevent sediment from entering streams will directly improve water temperature and indirectly improve fecal coliform bacteria levels since the bacteria will not have sediments to live in. The general approach the Colville National Forest will use to achieve water quality standards is:

1. Conduct further monitoring to determine the location of the water quality impairments.
2. Work with grazing permit holders to apply BMPs per allotment management plans.
3. Carry out guidance in INFISH for managing and maintaining riparian vegetation.
4. Supply managed recreation opportunities that protect riparian vegetation and water quality as directed in the Forest Plan.
5. Provide educational material to visitors to increase awareness about water quality.

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Other essential elements necessary to implement this TMDL include:

1. An adaptive management strategy if actions to improve water quality are not achieving the desired results.
2. A list of possible funding sources to finance the activities.
3. An effectiveness monitoring strategy to determine if the implementation activities have achieved the desired water quality improvement.

The Colville National Forest funds restoration activities implemented on lands it administers. Several types of funds have been used to complete this work, including:

1. Appropriated funds
2. Stewardship contracts
3. Wildland-urban interface funds
4. Knutson-Vanderberg funds
5. Title II funds

The Ecology TMDL coordinator will work with the Colville National Forest Fish Biologists to jointly track the progress of this implementation plan in meeting the load allocations. The activities to be tracked appear in Appendix A, which will be updated every two years. Future

water monitoring activities will be essential to the success of this implementation plan. Monitoring for this TMDL can be classified into three categories: 1) routine, 2) source identification, and 3) effectiveness monitoring. Monitoring water quality trends and improvements are necessary to:

- Show where water quality is improving.
- Determine the overall cumulative effect of implementation.
- Assess where management activities and BMPs should be applied.
- Indicate effectiveness of cleanup activities.
- Document achievement of water quality standards.

Several existing plans and activities the Forest Service currently follows or performs provide reasonable assurance that water quality standards will be met on the Colville National Forest. The most notable is the Colville National Forest Plan which was amended by the Inland Native Fish Strategy. These documents provide guidance the Forest Service must follow when managing national forest lands. Term Grazing Permits are contracts with ranchers who run livestock on the national forest. Allotment management plans and annual operating plans provide the terms and conditions for the permits. The Colville National Forest also has an approved Environmental Management System which is a process to identify evaluate, and manage environmental impacts. Finally, the Department of Ecology has a Memorandum of Agreement with the Forest Service which outlines the agencies' responsibilities for meeting Clean Water Act requirements.

The public input to this plan was sought at meetings with grazing allotment permit holders, the Colville National Forest Leadership Team, and county commissioners in all three counties. Draft plans were provided to area tribes and grazing permit holders prior to the public comment period. A 30-day public comment period was held from August 7 until Sept. 8, 2006. The comment period was advertised in newspapers in each county as well as the Colville National Forest and Ecology websites.

What is a Total Maximum Daily Load (TMDL)?

Federal Clean Water Act requirements

The Clean Water Act established a process to identify and clean up polluted waters. Under the Clean Water Act, each state is required to have water quality standards designed to protect, restore and preserve water quality. Water quality standards consist of designated uses for protection, such as cold water biota and drinking water supply. In order to maintain the designated uses, numeric and narrative criteria have been assigned to waters where the uses exist.

Every two years, states are required to prepare a list of water bodies - lakes, rivers, streams or marine waters - that do not meet water quality standards. This list is called the 303 (d) list. To develop the list, Ecology compiles its own water quality data along with data submitted by local state and federal governments, tribes, industries, and citizen monitoring groups. All data are reviewed to ensure that they were collected using appropriate scientific methods before they are used to develop the 303(d) list.

The Clean Water Act requires that a Total Maximum Daily Load or TMDL be developed for each of the water bodies on the 303 (d) list. A TMDL identifies how much pollution needs to be reduced or eliminated to achieve clean water. Then, in the case of the Colville National Forest TMDL, Ecology works with the Forest Service to develop a strategy to control the pollution and a monitoring plan to assess effectiveness of the water quality improvement activities. The Environmental Protection Agency (EPA) then reviews the pollution reduction assessment and strategy to improve water quality. Developing a detailed plan to reduce pollution and measure progress is the final step in the TMDL process.

Elements required in a TMDL

The goal of a TMDL is to ensure the impaired water will attain water quality standards. A TMDL includes a written, quantitative assessment of water quality problems and of the pollutant sources that cause the problem. The TMDL determines the amount of a given pollutant that can be discharged to the water body and still meet standards (the loading capacity) and allocates that load among the various sources.

Determining the loading capacity of a water body is an important step in developing a TMDL. The Environmental Protection Agency (EPA) defines loading capacity as “the greatest amount of loading that a water body can receive without violating water quality standards” (EPA, 2001). The loading capacity provides a reference for calculating the amount of pollution that needs to be reduced to bring a water body into compliance with standards.

The portion of the water body’s loading capacity assigned to a particular source is a load or wasteload allocation. If the pollutant comes from a discrete source (referred to as a point source) such as a municipal or industrial facility’s discharge pipe, that facility’s share of the loading capacity is called a wasteload allocation.

If it comes from a set of diffuse sources (referred to as a nonpoint source) such as general urban, residential, or farm runoff, the cumulative share is called a load allocation. The Colville National Forest does not have any point sources of pollution, so only load allocations were assigned.

The TMDL must also consider seasonal variations and include a margin of safety. These factors take into account any lack of knowledge about the causes of the water quality problem or its loading capacity. A reserve capacity for future loads from growth pressures is sometimes included as well. The sum of the wasteload and load allocations, the margin of safety and any reserve capacity must be equal to or less than the loading capacity. By definition, a TMDL is the sum of the allocations, margin of safety, etc., which must not exceed the loading capacity.

What Part of the TMDL Process Are We In?

This document is the detailed plan to reduce pollution in the Colville National Forest. A 1997 agreement between Ecology and EPA requires the development of a water quality implementation plan (WQIP) for approved TMDLs. WQIPs include information on the activities that will be used to improve water quality, when those activities will occur, who will do them, and how to measure progress.

Why Did Ecology conduct a TMDL study in this watershed?

Overview

Ecology established a TMDL for the Colville National Forest because numerous water bodies within the forest are on the 1998 303(d) list of impaired waters. Four streams are on the 1998 303(d) list for temperature, twelve stream segments are included for elevated fecal coliform bacteria levels, and four streams are listed for elevated pH levels (Table 1). (A discussion about the water quality standards that apply to Colville National Forest waters follows this section.) The analysis and the allocations for achieving each parameter's respective criteria, applies solely to surface waters within the Colville National Forest and not on private lands within the boundary of the national forest.

In 2002, the Washington Department of Ecology began a TMDL study in cooperation with the Colville National Forest. In the summer months of 2002, 2003, and 2004 Ecology analyzed forest waters for temperature and fecal coliform bacteria. An examination of water temperature data from 62 monitoring stations revealed that in addition to three of the four 303(d) listed creeks, 34 water bodies had maximum water temperatures exceeding the water quality standard. Of the twelve 1998 303(d) listings for fecal coliform bacteria, six of the sites met both parts of standard, whereas the other six required reductions. In addition, seven other locations had bacteria levels above the standard. All sites found to be impaired were assigned load allocations in this TMDL. Therefore, there are 37 temperature and 13 fecal coliform bacteria load allocations. Appendix C provides tables of the allocations.

Ecology also analyzed forest streams for pH and the South Fork Chewelah Creek for dissolved oxygen. An assessment of pH data found 32 sites with levels above the pH standard. A comparison of these 32 sites with surface geology revealed that carbonate geology is the likely cause of elevated pH levels at most sites. The South Fork Chewelah Creek site was found to exceed the dissolved oxygen criteria.

Table 1. Colville National Forest Creeks on the 1998 303(d) List

Temperature	Fecal Coliform Bacteria	pH	Dissolved Oxygen
Sherman Creek	Cottonwood Creek (Colville)	Pierre Creek	South Fork Chewelah Creek
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The *Colville National Forest Temperature, Bacteria, pH and Dissolved Oxygen Total Maximum Daily Load Submittal Report* (Whiley & Baldwin 2005), from here on referred to as "submittal report," combined the study results and an overview of strategies to reduce water temperatures and fecal coliform bacteria levels. Site-specific load allocations to meet water quality standards were established in the submittal report and can be found in Appendix C. (For temperature TMDLs, load allocations are typically based on percent effective shade rather than heat. Percent effective shade is defined as the amount of solar, shortwave radiation that is blocked by vegetation and topography.)

The Environmental Protection Agency (EPA) approved the submittal report on August 5, 2005 for temperature and fecal coliform bacteria. In the submittal report, Ecology recommended 303(d) listings for pH be removed from subsequent 303(d) lists. EPA stated in their approval letter that they would "make a final determination regarding proposed removals from the 303(d) list as part of the next 303(d) administrative review process." EPA decided that the submittal report lacked some required components in the dissolved oxygen and pH analysis. Therefore, EPA did not approve the dissolved oxygen and pH portion of the TMDL.

This document is the Water Quality Implementation Plan (WQIP) for the Colville National Forest. WQIPs include information on activities that will be used to improve water quality, when those activities will occur, who will do them, and how to measure progress. This plan expands upon information in the submittal report. The timeframe to meet the fecal coliform water quality standard is seven years and it is expected to take fifty years to meet the water temperature criteria.

Water Quality Standards and Designated Uses

Surface water quality standards for Washington were adopted on July 1, 2003. These standards can be found in Washington Administrative Code (WAC) Chapter 173-201A. The water quality criteria in the standards are based on existing and potential uses of state waters. The designated uses established for national forests, wilderness areas and national parks are:

- Salmon and trout spawning, core rearing, and migration
- Extraordinary primary contact recreation (see definition in the glossary)
- Domestic, industrial and agricultural water supply
- Stock watering
- Wildlife habitat
- Harvesting (fish, shellfish, etc.)
- Commerce and navigation
- Boating
- Aesthetic values

The 2003 edition of Washington State's water quality standards established water quality criteria that protect the designated uses. The 2003 version establishes more protective criteria for streams with Bull Trout and/or Dolly Varden in them. EPA approved the fecal coliform bacteria standards and recently disapproved the temperature and dissolved oxygen criteria.

Therefore, the 1997 version of the state water quality standards were used for the temperature, dissolved oxygen and pH TMDL analysis. The 1997 standards consist of different classes of waters which protect a certain group of designated uses. The 1997 standards designate streams on the Colville National Forest as Class AA. Water quality standards used in the TMDL analysis for the Colville National Forest are listed below:

Temperature

The temperature criteria for Class AA waters state that "temperature shall not exceed 16.0^{o}C…due to human activities. When natural conditions exceed 16.0^{o}C…, no temperature increases will be allowed which will raise the receiving water temperature by greater than 0.3^{o}C." (16^{o}C is approximately 61^{o}F.)

The standard recognizes, however, that not all waters are naturally capable of staying below the temperature criteria. When a water body is naturally warmer than the criteria, an additional allowance is provided for warming due to human activities. In this case, the combined effects of all human activities must not cause more than a 0.3°C (0.54°F) increase above the natural temperature. When water is cooler than the 16°C criteria, the allowable rate of warming up to, but not exceeding, the numeric criteria from nonpoint sources is restricted to 2.8°C.

The criteria applies throughout a water body. It is not intended to apply to areas of unusual natural features such as shallow stagnant eddy pools that are the cause for exceeding the criteria. For this reason, the standards direct that measurements be taken from well mixed portions of rivers and streams. For similar reasons, samples should not be taken from unusually cold areas such as where cold ground water flows into a stream.

Lakes are treated differently for protecting temperature conditions. For all lakes, and for reservoirs with a mean annual detention time of greater than 15 days, human actions considered cumulatively may not measurably increase the temperature [i.e., more than 0.3°C (0.54°F)] above natural conditions.

Temperature affects the physiology and behavior of fish and other aquatic life and can be greatly influenced by human activities. Temperature may be the greatest factor limiting aquatic life health and distribution. Temperature levels fluctuate over the day and night in response to changes in climatic conditions and river flows.

Bacteria

The "Extraordinary Primary Contact" use is intended for waters capable of providing extraordinary protection against waterborne disease or that serve as tributaries to extraordinary quality shellfish harvesting areas. To protect this use category,

- Fecal coliform bacteria levels must not exceed a geometric mean of 50 colonies in 100 mililiters (ml) (approximately a half cup of water).
- No more than ten percent of all samples (or any single sample when less than ten samples exist) obtained for calculating the geometric mean can exceed100 colonies in 100 ml" [WAC 173-201A-200(2)(b), 2003 edition].

Compliance is based on meeting both parts of the criterion, which ensures that bacteria levels in a water body will not cause a great risk to human health. If natural levels of fecal coliform (from wildlife) cause criteria to be exceeded, no allowance exists for human sources to measurably increase bacterial pollution further.

Bacteria criteria are set to protect people from waterborne illnesses as they work and play in or on the water. In the state water quality standards, fecal coliform is used as an "indicator bacteria" for freshwater (e.g., lakes and streams). Fecal coliform in water indicates the presence of waste from humans and other warm-blooded animals. Waste from warm-blooded animals is more likely to contain pathogens that will cause illness in humans than waste from cold blooded animals.

The fecal coliform criteria are set at levels that have been shown to maintain low rates of serious intestinal illness (gastroenteritis) in people. The risk of human illness associated with the criteria is that 7 out of every 1,000 people will experience illnesses. While the specific level of illness rates caused by animal versus human sources has not been quantitatively determined, warm blooded animals (particularly those that are managed by humans and thereby exposed to human derived pathogens as well as those of animal origin) are a common source of serious waterborne illness for humans.

Dissolved Oxygen

The state water quality standards for Class AA waters states that dissolved oxygen shall exceed 9.5 milligrams per liter (mg/l).

The state recognizes that not all waters are naturally capable of staying above the dissolved oxygen standard. When a water body is naturally lower in oxygen than the standard, the combined effects of all human activities must not cause more than a 0.2 mg/l decrease below the naturally lower oxygen condition.

The criterion applies throughout a water body. It is not intended to apply to areas of unusual natural features such as shallow stagnant eddy pools that are the cause for exceeding the criteria. For this reason, the standards direct that measurements be taken from well mixed portions of rivers and streams. For similar reasons, samples should not be taken from unusually oxygen rich areas. For example, in a slow moving stream, sampling on surface areas within a turbulent area would provide data that is not representative of the stream.

Aquatic organisms are very sensitive to low levels of dissolved oxygen in the water. The health of fish and other aquatic species depends upon maintaining an adequate supply of oxygen dissolved in the water. Growth rates, swimming ability, susceptibility to disease, and the ability to endure other environmental stressors and pollutants are all affected by oxygen levels. The state's criteria are designed to maintain conditions that support healthy populations of fish and other aquatic life. Oxygen levels can fluctuate over the day and night in response to changes in climatic conditions as well as the respiratory requirements of aquatic plants and algae.

pH

The Class AA water quality standard for pH directs that pH must be kept within the range of 6.5 to 8.5. Human influences can only result in 0.2 units above the upper pH range, i.e. 8.7.

The pH of natural waters is a measure of the amount of acids and bases that are produced by various dissolved compounds, salts, and gases. pH is an important factor in the chemical and biological systems of natural waters. pH both directly and indirectly affects the ability of waters to have healthy populations of fish and other aquatic species. Changes in pH are important because many compounds naturally occurring in water can become more toxic when pH levels are not with the 6.5 to 8.5 range. For example, while some compounds (e.g., cyanide) increase in toxicity at lower pH, others (e.g., ammonia) increase in toxicity at higher pH. While there is no definite pH range within which aquatic life is unharmed and outside which it is damaged, there is a gradual deterioration as the pH values are further removed from the normal range. However, at extreme pH levels, lethal conditions can develop. For example, extremely low pH values (<5.0) may cause the release of sufficient carbon dioxide (CO_2) from bicarbonate in the water to be directly lethal to fish.

While the pH criteria in the state water quality standards are primarily established to protect aquatic life, they also serve to protect waters as a source for domestic water supply. Water supplies with either extreme pH or that experience significant changes of pH even within otherwise acceptable ranges are more difficult and costly to treat for domestic water purposes. pH also directly affects the longevity of water collection and treatment systems. In addition, low pH waters may cause compounds of human health concern to be released from the metal pipes of the distribution system.

Colville National Forest Description

Founded in 1906 and located in northeast Washington, the Colville National Forest is approximately 2,123 square miles and is the study area for this TMDL. The forest is situated within Pend Oreille, Stevens, and Ferry counties where the primary economic base is lumber, wood products, and mining. Communities immediately adjacent to the forest include Colville, Chewelah, Kettle Falls, Republic, Newport, Ione, and Metaline Falls (Figure 1). Borders to the forest include Canada to the north, Okanogan National Forest to the west, Idaho and the Idaho Panhandle National Forests situated to the east, and Colville Confederated Tribal lands along the south western portion of the forest. Management of the forest is divided into four ranger districts including Three-Rivers (854 mile^2), Republic (382 mile^2), Sullivan Lake, and Newport (886 mile^2 combined).

Distinct zones, each with its own unique climate, topography, and vegetation, are created by the major river drainages that divide the forest. They include the San Poil-Curlew River valleys, the Kettle-Colville-Columbia River valleys, and the Pend Oreille River valley. All of these river systems ultimately drain into the Columbia River. Both the Kettle and Colville River discharge to the Columbia River in close proximity to the town of Kettle Falls. Within the eastern region of the forest, the Pend Oreille River flows north into Canada where it merges with the Columbia River. Along the western section of the forest, the Kettle River flows north into Canada then south to its confluence with the Columbia River. Along this circuitous route, the Kettle River receives surface water runoff from much of the western forest. The Colville River and its tributaries receive drainage from the central forest.

Separating these river valleys are the Selkirk and Kettle ranges located in the northeast and western sections of the forest, respectively. The average elevation within the forest is 3,849 feet with a range between 1,394 and 7,294 feet. Approximately 7,452 miles of streams are located within the Colville Forest with 50 percent situated between 1,394 feet, the lowest elevation within the forest, and 2,953 feet. About seventy-four percent of stream miles are situated below the average elevation of the forest.

The Selkirk and Kettle mountain ranges have a significant effect on the pattern of the annual precipitation. Annual precipitation varies between 10 to 55 inches per year with an overall average of 26 inches. The western-most section of the forest is arid with annual precipitation levels of 10 to 15 inches per year occurring throughout much of the area. In contrast, within the far eastern sections of the forest, precipitation levels occur between 45 to 55 inches per year. The greater precipitation levels are in the Selkirk Mountains where the uplifting of prevailing winds results in significant increases in precipitation.

Differences in the annual precipitation levels are closely reflected in the magnitude of the water yield. The water yield is based on the average stream flow [cubic feet per second (cfs)] observed historically during July and August divided by the upstream drainage area (square miles). The water yield is a reflection of many factors, including storage capacity (geology) and annual precipitation levels.

In general, within the drier western section of the forest, water yields are within the range .01-.15 cubic feet per second per square mile (cfs/mi^2), while in the northeastern section, water yields greater than 1 cfs/mi^2 are found. The variation in annual precipitation is a major influence on the type and density of vegetation found throughout the forest. Within the drier western portion of the forest, Ponderosa pine and Douglas fir are the dominant tree species, while western red cedar and hemlock dominate the east side of the forest.

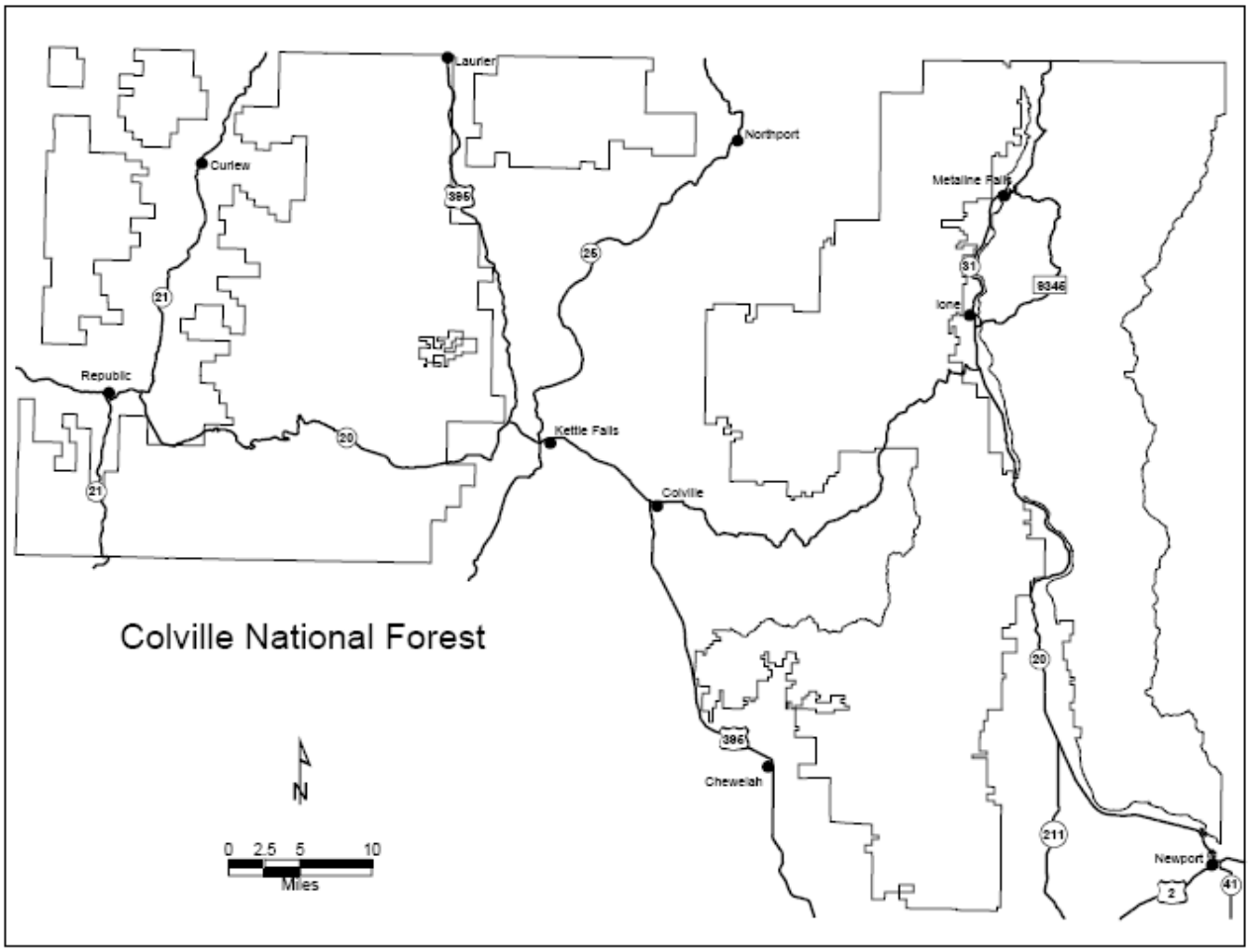

Figure 1. Map of the Colville National Forest boundary.

In addition to forestry, cattle grazing and recreation are additional uses of the forest. Currently, about 5,440 head of cattle graze on the Colville Forest annually within 46 active allotments. Hunting, camping, picnicking, and fishing are popular recreational activities. About two-thirds of all recreational use is outside of the forest's 28 developed campgrounds. Recreational opportunities on the forest also include motorcycle trails, snowmobile trails, lakes with boat launches, interpretive trails, fishing derbies, and scenic drives.

Watershed protection and the maintenance of clean water are important management concerns within the forest for both natural resource and human health protection.

The communities of Orient and Metaline Falls use two forest watersheds for their domestic water supply (East Deer Creek and North Fork Sullivan Creek, respectively). In addition, many surrounding private water systems depend on forest-based water sources, as do wildlife and livestock.

What Will be Done?

Implementation strategy (summary of actions)

To minimize human sources and impacts on natural resources, Forest Service staff have several management guidelines they refer to as they plan activities on the forest. Consulting the management guidelines is included in the strategy to improve water quality.

The Colville National Forest has a general approach that will be used to achieve both temperature and fecal coliform bacteria water quality standards. The approach is the same for both parameters since actions to reduce bacteria will also help improve water temperature. For example, buffers help filter bacteria in over land flow and they also help provide shade for the stream. Some approaches may directly benefit one water quality parameter more than the other, but will indirectly improve the other parameter. For instance, road maintenance activities that prevent sediment from entering streams will directly improve water temperature and indirectly improve fecal coliform bacteria levels since the bacteria will not have sediments to live in. Individual actions making up the general approach to implement this TMDL will be discussed further in the following pages. The general approach the Colville National Forest will use to achieve water quality standards is:

1. Conduct further monitoring to determine the location of the water quality impairments. This involves taking samples in upstream increments to find the highest temperature and fecal coliform levels.
2. Work with grazing permit holders to apply BMPs per allotment management plans. BMPs such as hardened crossings can protect both stream temperature and fecal coliform bacteria levels.
3. Carry out guidance for managing and maintaining riparian vegetation. Guidance for riparian areas is provided in the Inland Native Fish Strategy (INFISH), which is an amendment to the Colville National Forest Plan (Forest Plan).
4. Supply managed recreation opportunities that protect riparian vegetation and water quality as directed in the Forest Plan. Dispersed campsites away from streams, vaulted outhouses and designated trails help maintain water quality.
5. Provide educational material to visitors to increase awareness about water quality. Increasing the public's awareness on how they impact water quality is crucial to the success of TMDLs.

An adaptive management strategy will be used if the general approach to improve water quality is not achieving the desired results. Please see the Adaptive Management section of this document for more information.

Other essential elements necessary to implement this TMDL include obtaining funding to finance the activities and performing effectiveness monitoring. Possible sources of funding are somewhat limited, but will be pursued to carry out the activities in this plan.

Effectiveness monitoring conducted by Ecology will occur to determine if the implementation activities have achieved the desired water quality improvement. Results of effectiveness monitoring are crucial to determine if the TMDL targets have been met and whether the adaptive management strategy should be applied.

The Colville National Forest will work with other agencies, organizations, and individuals concerned with water resources draining from the National Forest. These may include area conservation districts, Natural Resources Conservation Service, city and county officials, watershed planning groups, Ecology, and the Colville, Spokane, and Kalispel Tribes. Such partnerships may be used to assist with monitoring and funding opportunities. Ecology staff will assist Colville National Forest personnel wherever possible to help achieve the targets in this plan. Work achieved under this plan may also be integrated into other basin-wide plans or current and future TMDLs on waters downstream of the Colville National Forest boundary. For example, since the headwaters of many Pend Oreille River tributaries are located within the Colville National Forest, load allocations in this TMDL may help address temperature impairments downstream and help implement the Pend Oreille River Temperature TMDL.

Even though EPA did not approve the TMDLs for dissolved oxygen and pH, strategies used to reduce water temperature and fecal coliform should also help to increase dissolved oxygen. In those areas where carbonate geology does not affect pH levels, implementation of BMPs may help to reduce pH as well. Therefore, future implementation activities may also occur where dissolved oxygen and pH were found to exceed standards.

Load allocations assigned in this TMDL only apply to Colville National Forest lands; however, other entities or individuals may contribute to the success of the TMDL. The Washington State Department of Transportation (WSDOT) is responsible for Highway 20 which follows Sherman Creek in Ferry County. Sherman Creek does not meet the temperature standard; therefore, efforts by WSDOT can help meet the load allocation for this creek. The Washington State Department of Fish and Wildlife is responsible for permitting gold prospecting on forest streams. Permits are required for gold prospecting to ensure that fish habitat and water quality are protected (WDFW 2006). In addition, the actions of people who own property and counties that own roads within the forest boundary may also help improve water quality.

Carrying out actions already underway and those identified in this plan should result in Colville National Forest waters meeting the temperature water quality standard in fifty years, and the bacteria water quality standard in seven years. The following interim targets were established to measure progress in meeting the water quality standards:

- At five to ten year intervals, a decrease in water temperature and an increase in shade will be the shade allocation interim target. The vagueness of this target is due to the length of time required to increase shade (grow vegetation) and the variability in growing conditions.
- Five years after the implementation plan is completed (or 2011), fecal coliform levels in excess of state standards at each site should have dropped by fifty percent.

If forest streams are found to meet water quality standards for temperature and fecal coliform, but do not meet the load allocations, the objectives of this TMDL will have been accomplished.

However, if the load allocations are met but the water quality standards for temperature and/or fecal coliform are not met, the TMDL objective has not been satisfied and adaptive management will be applied.

Pollution sources and organizational actions, goals, and schedules

Several possible sources of high water temperature and bacteria levels exist on the Colville National Forest. Sources include past timber harvest activities, road construction, people camping along streams, livestock grazing, wildlife and natural events such as wildfire. There are some natural conditions such as geologic formations and poor tree growing sites that also affect water temperatures.

The United States Forest Service (USFS) is the principal agency involved with the implementation of this TMDL. The 1988 Colville National Forest Plan (Forest Plan), as amended by the Inland Native Fish Strategy (INFISH), provides direction to the USFS as they manage the forest and implement this TMDL. The Forest Plan includes goals for managing riparian corridors, grazing allotments, recreational activities, and water quality throughout the Colville National Forest. INFISH standards prevent the Forest Service from causing water quality degradation as a result of management activities.

The Forest Service will use several activities to implement the TMDL. Because everything in nature is connected, and what you do to one area will impact another, each activity has the potential to improve both water temperature and fecal coliform bacteria levels. Any activity that reduces the amount of sediment entering the stream improves both temperature and fecal coliform. Also, any activity that increases the amount of vegetation next to streams will reduce fecal coliform and temperature. Specific activities that will primarily be used to implement the TMDL are listed below:

1. Conduct monitoring at sites with load allocations or at the Forest Boundary to monitor improvements and trends. Samples may also be taken in upstream increments to find sources of the bacteria and temperature impairments.
2. Work with grazing permit holders to identify potential BMPs that could be applied. BMPs could include off-stream watering, hardened crossings, water gaps, fencing, pasture rotation, placement of salt, etc.
3. Manage and maintain riparian vegetation during road improvement and/or maintenance, timber harvest activities and managed recreation activities. Some riparian areas may not require active management, but rather time for the trees and vegetation to grow.
4. Restore areas with resource damage, such as road wash-outs, landslides, etc. Possible restoration activities include road decommissioning, riparian plantings, installing bridges or culverts, and relocating dispersed campsites.
5. Provide managed recreation opportunities to protect riparian vegetation and water quality. One example is the Forest Service's efforts to create and designate motorized all terrain vehicle trails.

6. Increase the public's awareness of how they contribute to water quality impairments. Possible education activities include posting signs at established and dispersed camping areas, producing flyers, placing information on the Colville National Forest website, etc.
7. Enforce Colville National Forest rules and regulations upon individuals found practicing prohibited activities in riparian areas and streams.

Activities to improve water quality occurring on each Ranger District have been compiled into an implementation activities table (Appendix A). Due to the uncertainty of funding to complete implementation projects, the table will be updated every two years. Every table will be retained in Appendix A to show the Forest Service's efforts in improving water quality over time. Focusing on projects that will be achieved within the next two years is preferred, since attempting to plan activities beyond this time frame is at best a guess. The Ecology TMDL Coordinator will contact Forest Service staff every two years in April to update Appendix A. The Ecology TMDL coordinator will also periodically check the Colville National Forest website for the schedule of proposed actions (SOPA) for new implementation projects to improve water quality.

All pollution sources that affect water quality may not be listed in the implementation activities table at any one time. However, all pollution sources will be addressed throughout the duration of this plan. The sources listed in the table will be addressed during that particular two-year timeframe, while other sources will be addressed in future years.

Other agencies that may assist in the implementation of this plan are as follows:

- The Washington State Department of Ecology (Ecology) will assist where possible with the implementation of this TMDL. Ecology will conduct effectiveness monitoring in five to ten year increments as resources allow. In addition, Ecology staff will provide technical assistance and jointly coordinate annual meetings to track progress on this TMDL. Ecology and the United States Forest Service Region Six formalized a partnership in 2000 through a Memorandum of Agreement (MOA). The MOA (discussed later) clarified agency responsibilities for federal and state water quality laws, and both agencies are working together as the MOA is put into action. Ecology will also utilize its existing resources and authorities under RCW 90.48 to implement this TMDL.
- The Northeast Washington Forest Coalition is a nonprofit group that can obtain funding to perform work on national forests. Projects funded by the coalition must directly benefit the forest. The Coalition may also apply for Title II money or National Forest Foundation grants.
- National Forest Foundation (NFF) is a nonprofit organization with a mission to involve the public in national forest sustainability programs. The NFF provides grants to non-profit organizations that work to meet Forest Service objectives. Grants are given to projects and programs that address watershed health and restoration, community-based forest stewardship, wildlife habitat, and recreation (National Partnership Guide, 2005).
- Resource Advisory Council consists of 15 people representing a wide array of interests. The council's duties include reviewing annual forest management proposals and making recommendations to the Forest Service on which proposals to fund. Council members work together with other interests for the long-term benefit of the national forests (Nemeth 2006).

Adaptive management

Adaptive management is required when results from water monitoring show that load allocations and/or interim targets in this TMDL are not being met. An adaptive management strategy will also be used if the load allocations and/or targets are met, but the stream(s) still does not meet temperature and fecal coliform water quality standards.

TMDL reductions for fecal coliform should be achieved by 2013 and 2056 for water temperature. As discussed above, fecal coliform levels at each site should decrease by fifty percent by 2011. In addition there should be a measurable decrease in water temperature and an increase in shade along the creeks at five to ten year intervals.

If forest streams are found to meet water quality standards for temperature and fecal coliform, but do not meet the load allocations, the objectives of this TMDL will have been accomplished. However, if the load allocations are met but the water quality standards for temperature and/or fecal coliform are not met, the TMDL objective has not been satisfied and adaptive management will be applied.

An adaptive management strategy will be used if the approach to improve water quality is not achieving the desired results. The adaptive management strategy includes:

- Evaluating monitoring results.
- Researching and applying new management methods.
- Conducting additional monitoring to identify sources;
- Exploring alternatives such as establishing site specific criteria.
- Determining if conditions are due to natural features.

If implementation activities are not producing expected or required results, Ecology and/or the Forest Service may choose to conduct additional studies to identify the significant sources of fecal coliform bacteria or heat input to the creek(s). If the causes can be determined, implementation of additional BMPs, educational efforts, or a combination of these will likely be taken. However, if some unforeseen event affects the landscape, such as a wildfire, the timelines to meet the load allocations for specific streams in this TMDL may need modification. It is ultimately Ecology's responsibility to assure that TMDL implementation is being actively pursued and water standards are achieved.

Funding Opportunities

The Colville National Forest funds restoration activities implemented on lands it administers. Several types of funds have been used to complete this work, including emergency repair for federally-owned roads, supplemental emergency flood, and appropriated funds. In addition, a portion of the fees for grazing allotments is re-invested in BMPs for the allotments. Mitigation funding from highway construction or dam relicensing may occasionally be available. Sources of money the USFS may use to implement the TMDL include the following:

- Stewardship contracts: The Forest Service may enter into stewardship contracts or agreements to achieve land management objectives and meet community needs. The agreements work by allowing the value of harvested timber or other forest products to be used to pay for ecosystem restoration projects. The contracts may also be used to apply excess funding from a timber sale to other stewardship projects. These contracts allow the Forest Service to combine procurement contracts and timber sale contracts to more efficiently accomplish ecosystem restoration. These contracts allow the agency to exchange goods for services.

  Projects funded with stewardship contracts include: watershed restoration and maintenance, road obliteration for sediment control, wildlife habitat improvements, fuel load reductions, timber stand improvements, and insect/disease protection, treatments to improve, maintain, or restore forest or rangeland health; restore or maintain water quality; improve fish and wildlife habitat; and reduce hazardous fuels that pose risks to communities and ecosystem values.

  The Colville National Forest currently has nine stewardship contracts and many more have been signed. Twelve contracts have been completed.

- Wildland-Urban Interface: Funds were allocated by the government to reduce the threat of catastrophic wildfire in wildland-urban interface areas. Wildland-urban interface projects have occurred on the Colville National Forest adjacent to cities and towns. Decreasing the risk of wildfire reduces the chance that riparian vegetation will be destroyed. Therefore, riparian vegetation will continue to thrive and grow to produce the necessary shade to help meet water temperature standards.

- K-V Funds: The Knutson-Vanderberg Act of 1930 enabled the creation of a trust fund that collects a percentage of money from timber sales. Money from the fund can be used for reforestation, timber stand improvements, wildlife habitat work, and other resource improvements. However, the money must be spent within the boundary of the timber sale area. The amount of available money depends on the size of the timber harvest.

- National Forest Foundation (NFF): Grants available from the NFF are required to benefit the national forests as well as contribute to the Forest Service's mission. Community-based non-profit groups are eligible to receive funding. Projects must have the support of the Forest Service in order to qualify. The three available grant programs are:

• Matching Awards Program (MAP): Funding from this program should improve natural resources on national forests. Forestry, watershed health, wildlife habitat, or recreational issues are addressed with these grants. For more information, visit the following website: http://www.natlforests.org/consp_04_map.html .

• Community Assistance Program (CAP): The purpose of this program is to help new organizations become established and obtain non-profit status so that they can apply for MAP grants. Organizations must be collaborative in nature and engage a diverse group of participants. Eligible costs include community outreach, obtaining 501(c)(3) status, program development, and nonprofit management skill-building. Visit the CAP website for more information: http://www.natlforests.org/consp_05_cap.html .

• Wilderness Stewardship Challenge (WSC): This programs offers a maximum of 50,000 dollar grants to implement projects that directly benefit wilderness areas in the national forests. If you would like additional information, visit the WSC website at: http://www.natlforests.org/wilderness_stewardship_info.html .

- Title II Funds: The Secure Rural Schools and Community Self-Determination Act established Title II funding, which is also known as Payments to Counties. This funding was created to compensate counties containing large amounts of federal lands for lost tax income. Projects funded by Title II must benefit national forest lands such as improving forest health and water quality. (Nemeth, 2006) The Act lists the following eligible project categories:

    - Road maintenance & decommissioning
    - Stream & watershed restoration
    - Land health & water quality
    - Forest ecosystem stewardship
    - Control of noxious or exotic weeds
    - Maintaining infrastructure (including trails)
    - Other projects including fish & wildlife habitat and restoring native species

  Project proposals are reviewed by the Resource Advisory Committee (RAC). The RAC then forwards recommendations on which projects should be funded to the Forest Supervisor, who gives final approval. Title II funds have funded multiple projects in the Colville National Forest, such as watershed restoration, stream stabilization, and road maintenance. In 2006, Pend Oreille, Stevens, and Ferry Counties received almost 500,000 dollars for various projects. (Nemeth, 2006)

Measuring Progress toward Goals

Performance measures and targets

The activities mentioned under the "Pollution Sources and Organizational Actions, Goals, and Schedules" section above will be tracked. Tracking the implementation activities (performance measures) is needed to determine:

- what activities were performed and where;
- what practices should be considered for adaptive management, if necessary; and
- whether this implementation plan is adequate to meet water quality standards.

The Ecology TMDL coordinator will work with the Colville National Forest Fish Biologists and Natural Resources Staff person to jointly track the progress of this implementation plan to meet the load allocations. The activities to be tracked appear in Appendix A. As mentioned earlier, Appendix A will be updated every two years beginning in April. Progress on the activities will be recorded annually in the far right column of the table in Appendix A. To assist in this effort, each Ranger District should report their progress to the Ecology TMDL coordinator annually. The Colville National Forest will review implementation progress with Ecology during annual monitoring and tracking meetings held each February. Progress may also be reviewed at annual grazing allotment permit holders meetings.

Water monitoring plans

Future monitoring activities will be essential to the success of this implementation plan. Monitoring water quality trends and improvements are necessary to:

- Show where water quality is improving.
- Determine the overall cumulative effect of implementation.
- Assess where management activities and BMPs should be applied.
- Indicate effectiveness of cleanup activities.
- Document achievement of water quality standards.

Monitoring for this TMDL can be classified into three categories: 1) routine, 2) source identification, and 3) effectiveness monitoring. Each monitoring category and a plan for how to approach the monitoring, is described below.

Routine: Monitoring data are collected on a regular basis by the Forest Service Hydrologist. This type of monitoring should track changes in water quality at established monitoring sites. Most of the established sites are at the Colville National Forest boundary. Routine monitoring efforts will be concentrated on the sites listed in Appendix C that do not meet standards.

Each year the Forest Hydrologist submits a Water Quality Monitoring Plan detailing how water samples will be collected and analyzed. The plan contains the sampling objective, sampling

locations, frequency, and protocols for collecting samples and recording data. A procedure for verifying data is also included. This plan ensures that the data collected is both reliable and credible.

The streams impaired for bacteria should be monitored annually, with samples collected every ten days to two weeks from June through September. (June through September are the months when water quality criteria are exceeded the most.) Sites requiring additional shade will be monitored during the same time frame when possible, but all sites may not be sampled each year. Water temperature and percent shade will be monitored less frequently since results from management activities will not likely be evident until multiple years have passed.

Data from regular monitoring activities on the Colville National Forest is reviewed each February. At any time, area tribes, conservation districts, Ecology and Forest Service staff may gather water quality data on the Colville National Forest. Therefore, each organization has agreed to attend an annual meeting in February to present their data from the previous summer. The purpose of these meetings is to review data and determine trends so the Forest Service can decide what actions (if any) are needed to meet water quality standards. These meetings also ensure that the same sites are not monitored by multiple entities, all data collected is comparable, and the Forest Service is aware of other monitoring efforts. The Ecology TMDL coordinator makes arrangements for the annual meetings and coordinates communication among the organizations.

Routine monitoring could also include tracking visitor use patterns and areas commonly used by wildlife.

Source Identification: Where routine monitoring identifies persistent hot spots, additional sampling to track the source should be conducted. Areas with persistent high bacteria or temperature levels should have additional monitoring designed to shorten the length of the stream segment where there are increases in bacteria or temperature levels (Figure 2).

In the case of fecal coliform bacteria, applying microbial source tracking (MST) methods to identify sources should only be performed if the approach described above does not identify sources that could be reduced through various activities and BMPs. The first approach to source identification of bacteria sources should be to collect fecal coliform water quality samples because:

1) The results would be comparable to the data used for this TMDL.
2) The cost of analyzing samples for fecal coliform is less expensive than MST methods.
3) MST methods can not be repeated with accuracy.
4) MST methods can not determine how much of the bacteria are from a particular species, only that the species may or may not have been a source.
5) Currently, the EPA, the United States Geologic Survey and Ecology do not support or conduct monitoring using MST methods.

Effectiveness Monitoring: The purpose of effectiveness monitoring is to discover if management activities and BMPs are improving water quality. Effectiveness monitoring results are used to

determine if the interim targets and/or water quality standards are being achieved. Ecology usually performs this monitoring five years after the Water Quality Implementation Plan is finished. However, the ability for Ecology to conduct the monitoring in five years depends upon the availability of resources. Ecology should conduct effectiveness monitoring for fecal coliform levels after five years and shade levels should be monitored within a five to ten year interval after the completion of this implementation plan.
If at this time the streams do not meet the interim targets and/or water quality criteria, an adaptive management strategy will be adopted and future effectiveness monitoring will need to be scheduled.

Monitoring may also be conducted to verify if the management activities or BMPs had the desired effect on water quality. Such monitoring may be referred to as implementation monitoring. If Forest Service staff conducts this type of monitoring, there should be data from the streams before the implementation activity was conducted. Monitoring after the project is installed should take place above and downstream of multiple BMPs since it is difficult to see improvements as the result of one BMP. In addition, management activities or BMPs should have at least one year or more to become established before conducting implementation effectiveness monitoring.

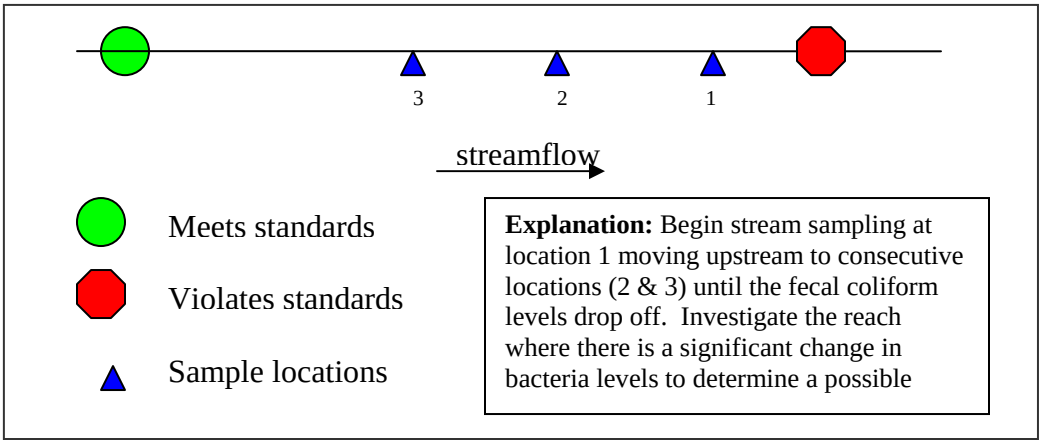

Figure 2. Diagram for how to conduct source identification monitoring.

Reasonable Assurances

When establishing a TMDL, reductions of a particular pollutant are allocated among the pollutant sources (both point and nonpoint sources) in the water body. There are no point sources within the national forest; only nonpoint sources exist. TMDLs (and related implementation plans) must show "reasonable assurance" that these sources will be reduced to their allocated amount. Education, outreach, technical and financial assistance, and enforcement will all be used to ensure that the goals of this water clean up plan are met.

Ecology believes that the following activities are already supporting this TMDL and add to the assurance that temperature and fecal coliform bacteria in the Colville National Forest will meet state water quality standards. This assumes that the activities described below are continued and maintained.

The goal of the Colville National Forest Water Quality Improvement Plan for temperature and fecal coliform bacteria is for the waters in the forest to meet the state's water quality standards. The Forest Service is already engaged in stream restoration and source correction actions that will help resolve the temperature and fecal coliform bacteria problem. The following rationale helps provide reasonable assurance that the Colville National Forest nonpoint source TMDL goals will be met by 2056 for temperature and 2013 for fecal coliform bacteria.

Ecology / USFS Memorandum of Agreement (MOA):
This TMDL analysis is a cooperative effort between Ecology and the USFS. The partnership was formed through a Memorandum of Agreement (MOA) signed in 2000. The initial impetus for the MOA was a joint recognition that inadequately maintained roads on USFS lands were resulting in significant water quality problems throughout the state. For this reason, the agreement established a schedule for planning and implementing road maintenance and abandonment. The MOA also recognized the USFS as the designated management agency for meeting Clean Water Act (CWA) requirements on national forest lands. The USFS agreed to meet or exceed the water quality requirements in state and federal law. To meet this goal, the MOA recognized the necessity that the USFS and Ecology share responsibility for developing TMDLs on national forest lands. Ecology and the USFS meet annually to determine compliance with the MOA. The MOA provides reasonable assurance for TMDL implementation and restoration of water quality for federal lands.

Colville National Forest Land and Resource Management Plan (Forest Plan):
Forest plans are required by the National Forest Management Act (NFMA) of 1976 for each national forest (NFMA 1976). These plans establish goals, objectives, standards, and guidelines that direct how national forest lands are managed. The Act states that forest plans must be compatible with environmental laws and regulations such as the Clean Water Act. The Forest Plan was adopted in 1988. The goal of the Forest Plan is to "provide a management program reflective of a mixture of management activities that allow use and protection of the forest resources; fulfill legislative requirements; and address local, regional, and national issues and concerns" (CNF 1988). Management standards and guidelines were established for all natural resource management activities in the Forest Plan.

An objective of the Forest Plan is to protect Washington State waters through the application and effectiveness monitoring of BMPs. According to the Forest Plan, BMPs will be based on site-specific conditions, as well as technical and economic feasibilities. BMPs should be monitored to determine the effectiveness of these practices in meeting expectations and in attaining water quality standards. In addition, BMPs may be adjusted if designated uses are not protected and water quality standards are not achieved. The Forest Plan also includes a range improvement program that lists annual goals for BMP implementation.

The Forest Plan also directs the creation of range allotment management plans. The allotment management plans provide guidance for grazing domestic livestock and a strategy to manage riparian areas for a variety of resource uses. Allotment management plans are periodically updated. The plans discuss the implementation of BMPs, duration of grazing in the pastures, actions needed to meet riparian objectives, and monitoring requirements. BMPs such as fencing, water developments, and hardened crossings have been installed in various allotments on the forest.

Recreational opportunities provided on the forest include hunting, fishing, gathering forest products, viewing scenery, camping, hiking, and floating down streams. Developed recreation facilities within riparian areas are to be minimized and all sanitary facilities are to meet state and federal standards. Improved dispersed campsites have been relocated further away from the streams and most unsealed outhouses have been replaced. The forest also has an educational campaign encouraging visitors to protect water quality.

One amendment made to the Forest Plan that further guides how riparian areas are managed on the forest is the Inland Native Fish Strategy (INFISH). As stated earlier, INFISH guidelines prohibit water quality degradation as a result of management activities. INFISH also provides direction for establishing riparian protection levels for timber sales and other management activities. This amendment limits the type of activities that may occur within 100 to 300 feet of intermittent and perennial streams as well as wetlands, ponds, and lakes. INFISH does allow specific types of minimum disturbance activity within riparian corridors on the forest. Road construction in riparian zones is limited to stream crossings unless determined necessary by site-specific analysis. The number of stream crossings is minimized and if constructed, they are designed to minimize water quality impacts.

According to the NFMA, forest plans must be revised every ten to fifteen years. As such, the Colville National Forest Plan is in the process of being revised. The revised Forest Plan is anticipated to be released to the public in March 2007. Approval of the revised Forest Plan is planned for August 2007. This implementation plan may be amended once the Forest Plan is finalized. Habitat sustainability will be one of the principals upon which the new Forest Plan will be based. Also guiding the development of the Forest Plan is the information gathered for the Interior Columbia Basin Ecosystem Management Project (ICBEMP). ICBEMP was an uncompleted ecosystem based management strategy for federal lands within the Columbia River Basin and portions of the Klamath and Great basins in Oregon.

Term Grazing Permits:
Term grazing permits are formal contracts with ranchers who run livestock on the national forest. The allotment management plans (discussed earlier) and annual operating plans provide the terms and conditions for the permits. Elements of the allotment management plans and annual operating plans are enforceable through term grazing permits.

Permit holders are updated on current issues and BMPs planned for their allotments at annual grazing permit meetings. The meetings provide an opportunity for the permit holders to cooperatively work with the Forest Service to identify beneficial solutions to resource impairments. During the meetings the previous grazing season is discussed and plans are made for the upcoming grazing season. These plans include rotation schedules, levels of use, structure maintenance and development, and noxious weed treatments. Forest Service staff and grazing permit holders will continue to work together to install a variety of BMPs in allotments to help reduce fecal coliform and temperature levels.

Environmental Management System (EMS):
The Colville National Forest has an approved EMS. EMS is a process to identify, evaluate, and manage environmental impacts. The EMS requires that the Forest Service comply with all applicable federal and state laws, agency policies, Memorandums of Understandings or Agreements, and line officer decisions. EMS ensures that environmental accountability is incorporated into decision making and long-range plans. Monitoring is a required component of EMS and is used to make sure the process is followed and environmental laws are met. The EMS does address satisfying TMDL requirements. The Ecology/USFS Memorandum of Agreement, Forest Plan, are also listed in the Colville National Forest EMS. This Water Quality Implementation Plan will be listed once it is completed. For more information about the EMS, visit http://www.fs.fed.us/r6/colville/forest/news/releases/07212006-ems-audit-augus.html and http://www.fs.fed.us/r6/ems/colville/.

Public Involvement

The following opportunities existed for the public to provide input on this implementation plan:

- The Ecology TMDL Coordinator attended a meeting for the grazing allotment permit holders on the Sullivan Lake and Newport Ranger Districts in January, 2006.
- The Forest Leadership Team was briefed on the plan on May 23, 2006.
- County Commissioners from all three counties were briefed in June 2006.
- Area Tribes were notified about the plan and the upcoming comment period the week of July 24, 2006.
- All of the grazing permit holders received a draft the final week of July 2006 to review prior to the public comment period.
- A thirty day public comment period held from August 7, 2006 until Sept. 8, 2006 was advertised in the Republic News-Miner, Colville Statesman-Examiner, Newport Miner, Chewelah Independent, as well as the Colville National Forest and Ecology websites.

Copies of the draft plan were available at each ranger district and the Supervisor's Office. In addition, copies could be requested from the Ecology TMDL Lead or obtained from the Ecology Web site at *http://www.ecy.wa.gov/programs/wq/tmdl/colville_nf.html*.

Responses to comments received are included in Appendix B. Final copies of this plan are available at each ranger district and the Supervisor's Office. To receive a copy from the Department of Ecology, please see page ii of this document.

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Appendices

Appendix A. Implementation Activities and Tracking Table

Who	Parameter	What	Where		When		Date Completed
			Impaired Stream	Specific Area	2006	2007	
Newport Ranger District	fecal coliform	fence construction & hardened crossings (livestock)	Ruby Creek, Upper Lost Creek, & Calispell Creek,	Calispell, Ruby, & Cusick - Gardiner Allotments	X	X	
Sullivan Lake Ranger District	fecal coliform & temperature	worm fence construction, bank stabilization & installation of fire rings (recreation)		Hanlon Cutoff area in LeClerc basin	X	X	
Republic Ranger District	fecal coliform	fence construction, hardened crossings, & bank stabilization (livestock)	West Fork Trout Creek	Trout Creek Allotment	X		
		fence construction & hardened crossing (livestock)	North Fork Lone Ranch Creek	Lone Ranch & Jasper Allotments		X	
		fence construction (livestock)	Cottonwood Creek	Vulcan Mountain Allotment		X	

Who	Parameter	What	Where		When		Date Completed
			Impaired Stream	Specific Area	2006	2007	
Three Rivers Ranger District	fecal coliform	hardened crossings, water trough developments, fence construction, & bank stabilization (livestock)	South Fork Mill Creek & Smackout Creek	Smackout & Mill Creek Allotments	X		
		fence construction & hardened crossing (livestock)	Deadman Creek	C.C. Mountain Allotment		2008	
		fence construction & water trough development (livestock)		Churchill & Elbow Lake Allotments		X	
		hardened crossing (livestock)		Little Boulder Allotment		X	
	temperature	Growden Dam removal project (dam)	Sherman Creek	historic Growden CCC Camp	downstream fish habitat enhancement	as funding allows	
		obliterate & re-route riparian road (road building)	Boulder Creek & South Fork Boulder Creek	2.5 miles of South Fork Boulder Road		2008	

Who	Parameter	What	Where		When		Date Completed
			Impaired Stream	Specific Area	2006	2007	
all Ranger Districts	all	follow required guidance in INFISH & the Forest Plan	all	n/a	X	X	
		routine monitoring	all fecal coliform impaired streams & selected temperature impaired streams	fecal coliform @ Forest boundary; temperature sites vary each year	X	X	
		source identification	selected fecal coliform impaired streams	varies each year	X	X	
Department of Ecology	all	jointly coordinate annual monitoring/tracking meetings held in February	all	varies each year	X	X	
		provide technical assistance when needed	all	varies each year	X	X	
		implement the Forest Service/Ecology MOA	all	varies each year	X	X	
		update Implementation Activities Table (Appendix A)	n/a	n/a		April 2008	

Appendix B. Response to Comments

Comment 1: **Lincoln Loehr, Heller Ehrman, LLP**

I noticed that in Appendix C "Load Allocations" there are asterisks used for some of the streams indicating that they are lakes or streams that are outlets of lakes, and that "These waters will not meet the temperature criteria....."

Presumably this is because lakes naturally become thermally stratified in the summer and the outlets of lakes will therefore, be warm in response to the natural behavior of lakes.

The temperature standards have several components. Significantly, when any water exceeds the numeric component from natural causes, the water meets the temperature standards as long as human causes do not result in more than a 0.3 degrees C increase. Within the standards, this 0.3 degrees C increase effectively trumps all the other components of the standard.

Therefore, it is incorrect to state that streams that are outlets of lakes will not meet the temperature criteria. No stream should be judged solely based on meeting the numeric criteria, and that is especially true for streams that are outlets of lakes. The outlet streams may very well be meeting the temperature standards, when the entirety of the standards is considered. The footnote needs to be revised.

Similarly, the footnote using the "#" sign in Appendix C needs to be revised as well. If achieving all the site potential effective shade will not allow the criteria to be met, and if there are not other human factors also affecting the temperature, then the temperature feasible with the site potential effective shade will be equal to the natural and will meet the criteria. Again, the numeric component is not the only component of the standard, and to describe a TMDL, or an implementation plan, as if the numeric component is the temperature standard, is inaccurate and misrepresents the standards.

Response 1:

Thank you for your comment. The footnotes for Table C-1: Shade Allocations for Temperature Impaired Sites as of 2005 in Appendix C have been clarified.

Comment 2: Don Comins, Pend Oreille Conservation District

Thanks for the opportunity to review the Colville National Forest TMDL-Water Quality Implementation Plan. We received your hard copy and have reviewed the document. The Plan looks good and we don't have any other comments.

Response 2:

Thank you for your review.

Comment 3: John Gross, Kalispel Tribe

1) Page iv is the only place the additional bacteria and temperature impaired water bodies are mentioned, and only briefly. Then in the appendices the activities and allocations are given. I found this confusing and would suggest further description of the additional water bodies outlined in the appendices. Are the additional water bodies going to be treated the same as the originally listed water bodies or covered in a subsequent TMDL?

2) Page v sets the timeframes for meeting bacteria and temperature criteria. How are these timeframes determined?

3) Page 5 describes the temperature criteria and states that waters cooler than 16°C can receive additional temperature increases of up to 2.8°C. I'd like to confirm that the additional increases due to non-point sources can occur only up to 16°C.

Response 3:

We appreciate your comments.

1) *Additional language has been added to the third paragraph on page iv and the second paragraph on page 3 to clarify the TMDL allocations. The additional 34 temperature and 7 fecal coliform bacteria impaired streams did receive load allocations in this TMDL and are included in the tables in Appendix C. The tables have been updated to distinguish the 1998 listings from the additional impaired sites. Table ES-1 and Table 1 list those creeks that were on the 303(d) list and initiated the need for the Colville National Forest TMDL.*

   The temperature TMDL study was prepared as a landscape TMDL. Therefore, streams determined to exceed temperature standards in the future can receive load allocations without additional assessment. An explanation of how future load allocations will be established is found on pages 64 through 66 of the Colville National Forest Temperature, Bacteria, pH and Dissolved Oxygen TMDL Submittal Report (http://www.ecy.wa.gov/biblio/0510047.html). Streams impaired for reasons other than temperature will need to be assessed on an individual basis. However, if a stream is found to be impaired for fecal coliform upstream of an existing load allocation, that stream segment would be covered by the TMDL.

2) *Ecology determines the timeframes to meet load allocations and water quality standards after results of the technical study are complete. Ecology considers the parameter and percent reductions required when establishing the timeframes. For example, to produce effective shade for a temperature TMDL, trees and riparian vegetation need to grow. Because trees grow slowly, temperature TMDLs often last between 50 and 80 years depending on how much vegetation will need to be grown. Watersheds typically have ten years to achieve fecal coliform bacteria standards. However, Colville National Forest streams do not require large reductions to meet the bacteria standard, and much work has been accomplished to improve water quality. Therefore, Ecology believed the Forest Service could achieve standards in seven years.*

3) *You are correct, additional increases due to nonpoint sources can not exceed 16°C. The 2.8°C allowance would only occur where and when the temperature is 2.8°C or colder than the numeric criteria. For example, if the river is at 13°C then nonpoint sources could warm it to 15.8°C. If the temperature was 15°C and there were no point sources, then nonpoint sources would be limited to a 1°C increase so the 16°C numeric criteria is not exceeded. The statement on page 5 has been clarified.*

Comment 4: Charlie Kessler, Stevens County Conservation District

Page iv - first paragraph; "water quality improvement **plant -** should be plan

Page vi - first paragraph, "Term Grazing Permits are **contractors** - should be contracts

Page 11 - Ecology will conduct the effectiveness monitoring. Is it right for the regulator to conduct such monitoring? I guess it is protocol, but it seems better to have a disinterested third party conduct the monitoring.

Page 13 - The list of BMPs includes off-channel watering, hardened crossings, water gaps, fencing, pasture rotation and placement of salt. On some of our projects, we have been notified that hardened crossings were no longer acceptable and that off-channel watering needed to have some form of exclusion. Perhaps this list needs some modification or clarification.

Page 18 - Water monitoring plans - No mention is made of submitting a Quality Assurance Project Plan (QAPP) to Ecology prior to monitoring.

Page 18 - Last paragraph Routine - It should read Appendix C and **not Appendix D.**

Response 4:
Thank you for submitting comments. The three "typo" errors have been corrected.

As part of a memorandum of agreement (MOA) with EPA, Ecology agreed to perform effectiveness monitoring to determine if progress is being made toward achieving water quality standards. Therefore, Ecology must evaluate progress by performing post-TMDL effectiveness monitoring. Ecology has a separate program dedicated to data collection and assessment. The advantage of Ecology performing the initial TMDL assessment and effectiveness monitoring is that the same protocols, lab, analysis methods, etc. are used so the results are comparable. Ecology takes several measures to ensure that samples are collected in an objective manner. However, other entities, such as the Forest Service can and do collect data to assess the effectiveness of various activities.

The Forest Service must ensure that the waters on their lands meet state water quality standards. It is their responsibility to determine and select the proper and approved best management practices (BMPs) to be used within the Colville National Forest. The BMP restrictions referred to in your comment pertain to requirements of Ecology's financial assistance programs. The Forest Service is not eligible for Ecology's financial assistance and is not bound to follow Ecology's list of fundable BMPs.

The Forest Hydrologist writes a Water Monitoring Plan prior to each year's sampling effort. The plan contains the sampling objective, sampling locations, frequency, and protocols for collecting samples and recording data. A procedure for verifying data is also included. A Quality Assurance Project Plan was written for samples collected in 2004. The water monitoring plan portion has been updated with this information.

Comment 5: Paul Pickett, Dept. of Ecology

1. I think it would be helpful to mention the Pend Oreille River Temperature TMDL, which is likely to link this TMDL to the mainstem Pend Oreille River and also address temperature listings in the tributaries downstream of those addressed in this TMDL. You could cite the QAPP and addendum as well as the interagency workplan. This might fit well in the section "Why did Ecology.../Overview". Some discussion of the linkages would also fit in the Section "Implementation strategy". The message I would like to see would be something along the lines of "as downstream non-USFS temperature impairments are addressed, the work done under this plan can be integrated into basin-wide strategies. There might also be linkages with other TMDLs in the Colville River and Lake Roosevelt watersheds.

2. "Funding Opportunities": there might be opportunities to obtain mitigation funding from highway construction projects, FERC relicensing of dams, or other permitting in the region.

3. "Water Monitoring Plans": There should be some mention of the Credible Data law and policy and to note that all the monitoring will be conducting consistent with the law and policy and in accordance with an approved Quality Assurance Project Plan.

4. Also, along the lines of comment #1, I'd like to see some language in "Water Monitoring Plans" encouraging basin-wide monitoring planning and coordination. There seems to be some issues in the basin with redundancy and consistency of monitoring, and this might be a good place to document the agency's desire for basin-wide solutions and cooperation.

Response 5:

Thank you for commenting. Your suggestions have been considered and incorporated where possible. Language about linkages to other basin-wide plans has been included in the first paragraph on page 12, and the potential sources of funding have been included in the first paragraph of page 16.

The Forest Hydrologist writes a Water Monitoring Plan prior to each year's sampling effort. The plan contains a sampling objective, sampling locations, frequency, and protocols for collecting samples and recording data. A procedure for verifying data is also included. A Quality Assurance Project Plan was written for samples collected in 2004. The water monitoring plan portion has been updated with this information. The Forest Service is not bound by the Credible Data Law since it is not a federal law.

The "Water Monitoring Plan" section (second paragraph on page 20) does note annual monitoring meetings to discuss water quality data that has been collected. Area tribes and conservation districts as well as Forest Service and Ecology staff attend annual meetings in February to coordinate monitoring activities and review data. Implementation progress updates and adaptive management measures will also be discussed at future meetings. Information from these meetings may be taken back to other basin or watershed planning groups.

<u>Comment 6</u>: Mike Petersen, The Lands Council

Temperature Concerns

Loss of riparian zones and vegetation on many of the impaired stream sections seems to be the -primary reason for temperature increases. This can be attributed to current and historic cattle gazing allotments as well as historical farming practices within the stream flood plains. Over use of stream banks for recreation (camping and off-road-vehicles) can also account for a portion of the riparian zone losses. Reductions and/or changes in these uses and reestablishment of riparian zone vegetation would assist in stream temperature reductions.

Shade loss due to historical forestry practices (logging) may also be a cause for stream temperature increases. Reestablishment of riparian zones within these historically logged areas would assist in temperature reductions

Current logging regulations limit logging activity that can occur 100 to 300 feet from stream banks. Increasing these buffer zones in high water yield areas may provide additional cooling to streams.

We also wonder if late summer flows have decreased over the years, in part to loss of forest cover through the watershed, and in part to changes in timing from rain on snow events and warmer winters creating less snowpack. What are the flow regimes past and present?

Bacteria Concerns

Providing off-stream sources of water, either through pumping or gravity feed, would reduce the reliance of cattle directly on streams for a water source. This would remove the cattle as a large direct source of bacteria. Is it possible to track the type of bacteria and its source from domestic livestock, native animals or humans?

Fencing sensitive riparian zones (either permanently or during revegetation projects) would also remove cattle from streams but may also hamper native wildlife that depends on the streams.

Replacing typical campground toilets (no containment measures) with concrete vault toilets would eliminate most future human sources of bacteria. Removal of contaminated soils from historic toilet sites would further reduce possible sources of contamination.

Home sites that are currently within the National Forest boundary should be required to update septic systems to reduce or eliminate possible contamination.

Other Concerns

There are large sections of receiving streams/water bodies (i.e., San Poil River) that are outside the boundaries of this study or are not included because of private in-holdings. However, these receiving waters are also impaired through loss of riparian buffer zones to historic farming and grazing and also to recreational activities. Would these waters be addressed at a later time to meet temperature and bacteria limits? Also, how will these waters be addressed if implementation of the Colville National Forest TMDL does not lead to reduced temperature and bacterial counts in these receiving water bodies?

It would be useful to see photos of the sampling sites to see if there is any visible reason for high temperatures or bacterial contamination.

Thank you for the opportunity to comment, please apprise us of your progress in this important effort.

Response 6:

Thank you for taking time to comment. Your concerns are noted. Several of the strategies you mention to improve stream temperature and fecal coliform bacteria levels are being used by the Forest Service to implement this TMDL.

The Forest Hydrologist has observed flow regimes with some measurements on the Colville National Forest for the past 30 years. The data have not been published. A snowpack-dominated runoff regime appears to dominate rather than a rain-on-snow regime as suggested. Spring runoff is the dominant flow event of the year. Runoff flow regime changes have not been detected due to past loss of forest cover by logging or fires. Less transpiration of water may be associated with loss of forest cover, but this has not been observed or measured. Changes in flow timing have not been detected. There are several environmental factors that affect stream temperature which are difficult to quantify. Ecology has determined through this TMDL that direct solar radiation has the greatest influence on natural stream temperatures and has set load allocations for percent effective shade.

Several methods to identify sources of bacteria are being researched. However, at this time, none of the methods can accurately quantify within a given sample how much of the bacteria come from a certain species. Currently, the methods are only able to tell us what species are contributing bacteria. Land use of a particular area can tell us the same information. There is also a question whether the methods are repeatable and tested for quality. Ecology anticipates that within the next five years, one or several reliable methods will emerge and be put into practice.

Waters outside of the Colville National Forest which are impaired, if they are not currently addressed, will be studied at a later time. Streams and rivers downstream of the national forest boundary fall under less stringent water quality standards. Therefore, the Forest Service is not typically a large contributor of pollution. If the strategies in this TMDL do not improve water quality, an adaptive management strategy will be implemented by the Forest Service. The adaptive management strategy includes additional monitoring to identify sources, applying new management methods, and exploring other alternatives. More information on the adaptive management strategy can be found on page 16.

Every year the Forest Service will write a summary about how they are working to meet legal and other requirements listed in the Colville National Forest Environmental Management System (EMS). Information about the EMS can be found on page 24 of this document. The TMDL is included in the EMS and once this implementation plan (WQIP) is final, it will be included as well. The results of the Forest Service's EMS monitoring will be made public each year. Please continue to monitor the EMS Web site (http://www.fs.fed.us/r6/ems/colville/) each winter to see what is listed under the TMDL and WQIP.

Appendix C. Load Allocations

Table C-1. Shade Allocations for Temperature Impaired Sites as of 2005

Ranger District	Water Body	Current Effective Shade (%)	Effective Shade to Achieve 16°C (%)	Increase in Shade Needed (%)	Site Potential Effective Shade (%)
Newport	Calispell Creek	58	76	18	79
	Cee Cee Ah Creek	84	84	0	92
	Cusick Creek	53	82	29	96
	SF Lost Creek	70	83	13	94
	Tacoma Creek	70	81	11	87
	Winchester Creek	74	81	7	94
Sullivan Lake	Big Muddy Creek	75	82	7	93
	Brown's Lake Outlet	*	*	*	98
	Cedar Creek (Lower)	51	79	28	95
	Cedar Creek (Upper)	74	84	10	95
	EF LeClerc Creek	55	80	25	85
	Jim Creek	75	80	5	96
	Little Muddy Creek	66	76	10	94
	Lime Creek	88	*	*	97
	Lost Creek (Lower)	39	67	28	92
	Lost Creek (Upper)	75	84	9	96
	MF LeClerc Creek	60	84	24	96
	Nile Lake (Inflow)	51	72	21	96
	Nile Lake (Outflow)	*	*	*	94
	Ruby Creek	60	83	23	89
	Sullivan Creek	*	*	*	64
Republic	LaFleur Creek	62	72	10	93
	Lambert Creek	70	85	15	91
	SF O'Brien Creek	69	84	15	93
	Tonata Creek	79	84	5	88
Three Rivers	Addy Creek	67	74	7	95
	Barnaby Creek	66	70	4	92
	Boulder Creek	50	81	31	58 #
	Deadman Creek	70	77	7	81
	Deep Creek	81	81	0	93
	EF Crown	66	80	14	95
	NF Chewelah Creek	52	74	22	89
	Rocky Creek	78	79	1	94
	SF Boulder Creek	55	80	25	75 #
	SF Sherman Creek	32	81	49	87
	SF Mill Creek	62	74	12	89
	Sherman Creek	36	78	42	58 #

1998 303(d) listed site

\# Amount of site potential shade achievable, but site will not be able to meet the numeric temperature criteria target of 16°C.

* Indicates lakes or streams that are outlets of lakes. These waters will not meet the numeric temperature criteria, but will need to reach the site potential effective shade level to cool the waters as much as possible to attain natural conditions.

Table C-2. Required reduction in fecal coliform to achieve State standards as of 2005

Ranger District	Water Body	Geometric Mean (cfu/100 ml)	90th Percentile (cfu/100 ml)	Required Reduction (%)
Newport	Ruby Creek	18	112	10
	South Fork Lost Creek	53	389	74
	Winchester Creek	17	163	39
Sullivan Lake	Lost Creek	38	229	56
Republic	Cottonwood Creek (Kettle)	15	207	52
	North Fork Lone Ranch Creek	72	387	74
	North Fork San Poil River	16	221	55
	Lambert Creek	39	181	45
	West Fork Trout Creek	12	107	6
Three Rivers	Cottonwood Creek	55	305	67
	Smackout Creek	16	115	13
	South Fork Chewelah Creek	36	191	48
	South Fork Mill Creek	24	131	23

1998 303(d) listed site

Appendix D. Glossary and Acronyms

303(d) list: Section 303(d) of the federal Clean Water Act requires Washington State periodically to prepare a list of all surface waters in the state for which beneficial uses of the water – such as for drinking, recreation, aquatic habitat, and industrial use – are impaired by pollutants. These are water quality limited estuaries, lakes, and streams that fall short of state surface water quality standards, and are not expected to improve within the next two years.

Best Management Practices (BMPs): Physical, structural, and/or operational practices that, when used singularly or in combination, prevent or reduce pollutant discharges.

Clean Water Act (CWA): Federal Act passed in 1972 that contains provisions to restore and maintain the quality of the nation's waters. Section 303(d) of the CWA establishes the TMDL program.

Designated Uses: Those uses specified in Chapter 173-201A WAC (Water Quality Standards for Surface Waters of the State of Washington) for each water body or segment, regardless of whether or not the uses are currently attained.

Effective Shade: The fraction of incoming solar shortwave radiation that is blocked from reaching the surface of a stream or other defined area.

Existing Uses: Those uses actually attained in fresh and marine waters on or after November 28, 1975, whether or not they are designated uses. Introduced species that are not native to Washington, and put-and-take fisheries comprised of nonself-replicating introduced native species, do not need to receive full support as an existing use.

Extraordinary primary contact: Waters providing extraordinary protection against waterborne disease or that serve as tributaries to extraordinary quality shellfish harvesting areas.

Fecal coliform bacteria: That portion of the coliform group of bacteria which is present in intestinal tracts and feces of warm-blooded animals as detected by the product of acid or gas from lactose in a suitable culture medium within twenty-four hours at 44.5 plus or minus 0.2 degrees Celsius. FC are "indicator" organisms that suggest the possible presence of disease-causing organisms. Concentrations are measured in colony forming units per 100 milliliters of water (cfu/100ml).

Geometric Mean: A mathematical expression of the central tendency (an average) of multiple sample values. A geometric mean, unlike an arithmetic mean, tends to dampen the effect of very high or low values, which might bias the mean if a straight average (arithmetic mean) were calculated. This is helpful when analyzing bacteria concentrations, because levels may vary anywhere from ten to 10,000 fold over a given period. The calculation is performed by either: 1) taking the nth root of a product of n factors, or 2) taking the antilogarithm of the arithmetic mean of the logarithms of the individual values .

Load Allocation (LA): The portion of a receiving waters' loading capacity attributed to one or more of its existing or future sources of nonpoint pollution or to natural background sources.

Loading Capacity: The greatest amount of a substance that a water body can receive and still meet water quality standards.

Margin of Safety (MOS): Required component of TMDLs that accounts for uncertainty about the relationship between pollutant loads and quality of the receiving water body.

Nonpoint Source: Pollution that enters any waters of the state from any dispersed land-based or water-based activities, including but not limited to atmospheric deposition, surface water runoff from agricultural lands, urban areas, or forest lands, subsurface or underground sources, or discharges from boats or marine vessels not otherwise regulated under the National Pollutant Discharge Elimination System Program. Generally, any unconfined and diffuse source of contamination. Legally, any source of water pollution that does not meet the legal definition of "point source" in section 502(14) of the Clean Water Act.

Pathogen: Disease-causing microorganisms such as bacteria, protozoa, viruses.

Point Source: Sources of pollution that discharge at a specific location from pipes, outfalls, and conveyance channels to a surface water. Examples of point source discharges include municipal wastewater treatment plants, municipal stormwater systems, industrial waste treatment facilities, and construction sites that clear more than five acres of land.

Pollution: Such contamination, or other alteration of the physical, chemical, or biological properties, of any waters of the state, including change in temperature, taste, color, turbidity, or odor of the waters, or such discharge of any liquid, gaseous, solid, radioactive, or other substance into any waters of the state as will or is likely to create a nuisance or render such waters harmful, detrimental, or injurious to the public health, safety, or welfare, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or to livestock, wild animals, birds, fish, or other aquatic life.

Primary contact recreation: Activities where a person would have direct contact with water to the point of complete submergence including, but not limited to, skin diving, swimming, and water skiing.

Stormwater: The portion of precipitation that does not naturally percolate into the ground or evaporate but instead runs off roads, pavement, and roofs during rainfall or snow melt. Stormwater can also come from hard or saturated grass surfaces such as lawns, pastures, playfields, and from gravel roads and parking lots.

Surface waters of the state: Lakes, rivers, ponds, streams, inland waters, saltwaters, wetlands and all other surface waters and water courses within the jurisdiction of the state of Washington.

Total Maximum Daily Load (TMDL): A distribution of a substance in a water body designed to protect it from exceeding water quality standards. A TMDL is equal to the sum of all of the following: 1) individual wasteload allocations (WLAs) for point sources, 2) the load allocations (LAs) for nonpoint sources, 3) the contribution of natural sources, and 4) a Margin of Safety to allow for uncertainty in the wasteload determination. A reserve for future growth is also generally provided.

Wasteload Allocation (WLA): The portion of a receiving water's loading capacity allocated to existing or future point sources of pollution. WLAs constitutes one type of water quality-based effluent limitation.

Watershed: A drainage area or basin in which all land and water areas drain or flow toward a central collector such as a stream, river, or lake at a lower elevation.