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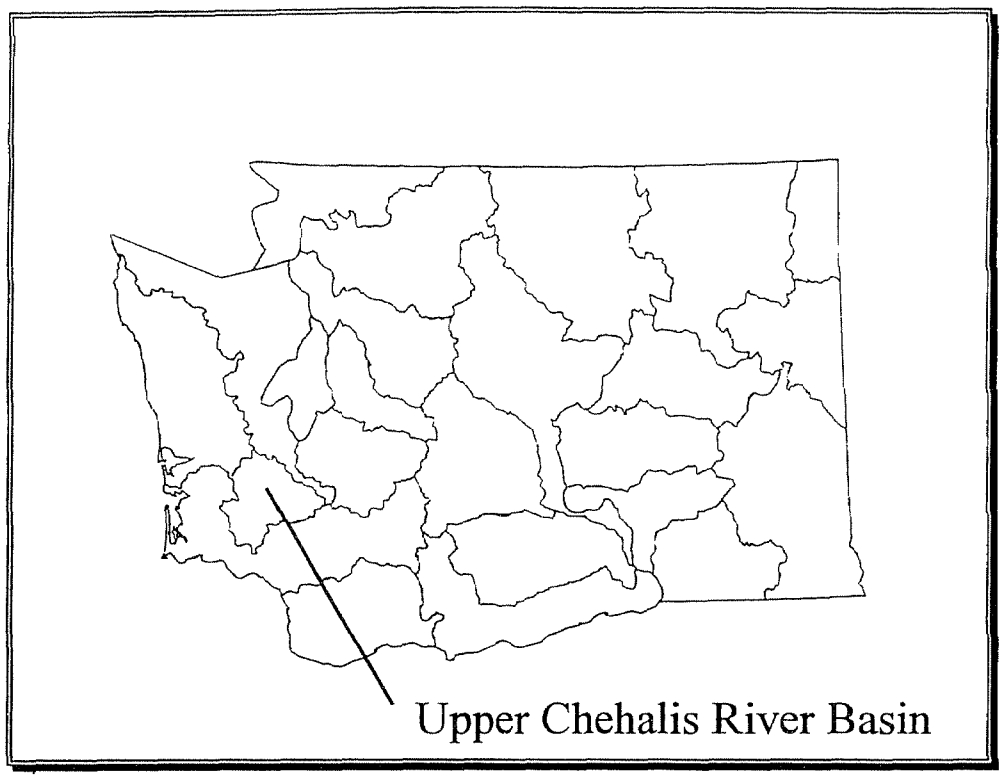

Upper Chehalis River Basin

Evaluation of Total Maximum Daily Loads

Summary Report

Publication Number 94-144
September, 1994

WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

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For information on the content of this summary report, please contact:
General information: Diane Harvester at (206) 407-6269
Upper Chehalis and Black River Dry Season: Paul Pickett at (206) 407-6685, or
Black River Wet Season: Randy Coots at (206) 407-6690.

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Introduction

This summary report highlights findings from the three technical studies and addresses recommendations for restoration and protection of water quality in the Upper Chehalis Basin.

Low dissolved oxygen, high water temperatures, and bacterial contamination caused by a combination of pollution and natural factors have been measured in the Chehalis River Basin. Water supplies, fish and wildlife habitat, and recreational opportunities are threatened as a result.

When the water quality of the waterbody (such as the Chehalis River) is threatened, the Federal Clean Water Act requires states to set limits on the amount of pollutants that the water body receives from all sources. These limits are know as Total Maximum Daily Loads (TMDLs). TMDLs differ from commonly used technology or water quality based numeric limits for discharges because they are based on the total amounts of a pollutant a waterbody can receive from all sources to meet Water Quality Standards.

The Washington State Department of Ecology began the Chehalis Basin TMDL study in 1990. The project evolved into three TMDL studies: 1) May to October "dry season" low oxygen in the Chehalis River upstream from Porter, 2) Black River November to April "wet season" high fecal coliform bacteria, and 3) Black River May to October "dry season" low oxygen.

Ecology's Watershed Approach

In July 1993, Ecology introduced the watershed approach as a new way of protecting water quality. The watershed approach uses a geographic based five-year cycle for scheduling and coordinating the issuance of wastewater discharge permits and other source controls with water quality assessments required by the federal Clean Water Act. The Upper Chehalis Basin is now entering the fifth year of the watershed management cycle, a key element of which is using TMDLs to control pollution.

Managing nonpoint pollution will be more effective using the tools of made available through the watershed approach and TMDL process. Clear priorities for action and funding will be set based on a water body's identified water quality problems.

Reasons for TMDL Studies in the Upper Chehalis River Basin

The Black and mainstem Chehalis Rivers were chosen for TMDL studies for several reasons. First, a large body of historical data indicated that water quality standards were not being met. Past studies had found that low dissolved oxygen was widespread during the dry season, and that high fecal coliform bacteria levels often occurred during the wet season. In

addition, these rivers have been identified as an important fisheries resource, and a major fish kill in 1989 demonstrated the sensitivity of that resource to the water quality of the river.

TMDL studies on the Upper Chehalis were done to assess the water quality of the river systems, identify significant pollutant loading sources, determine loading capacities for oxygen-demanding materials and fecal coliform bacteria, and recommend WLAs and LAs to restore and maintain water quality standards. This was achieved through extensive water quality sampling and computer modeling.

Water quality data were collected from July 1991 to April 1993 from stations on the mainstem Black and Chehalis Rivers, and from tributaries, point sources, and other loading sources. Computer models of the river systems were then developed to simulate pollutant loading under critical environmental conditions. Based on the analysis of data and modeling results, loading capacities were determined and TMDLs proposed. The remainder of this report summarizes the conclusions and recommendations of the three TMDL studies.

Location of Study Area

The Chehalis River Basin drains an area of over 2,000 square miles in Western Washington, discharging to Grays Harbor near the city of Aberdeen (Figure 1). The study area for this report is the upper Chehalis River Basin, which is defined as the river and its tributaries upstream of Porter, corresponding to Water Resource Inventory Area 23. The upper basin lies in northwestern Lewis County, southwestern Thurston County, and eastern Grays Harbor County, with small portions in Pacific and Cowlitz Counties. The city of Olympia is near the northern end of the basin, and the cities of Chehalis and Centralia are in the center of the basin. The Chehalis Confederated Tribes Reservation is at the western end of the basin.

Major tributaries of the Chehalis River in the study area are the South Fork Chehalis, Newaukum, Skookumchuck, and Black Rivers. The headwaters of the mainstem and South Fork Chehalis River lie in the eastern Willapa Hills; the headwaters of the Newaukum and Skookumchuck lie in the Bald Hills, a westward spur of the Cascade Range; and the Black River drains the Black Hills.

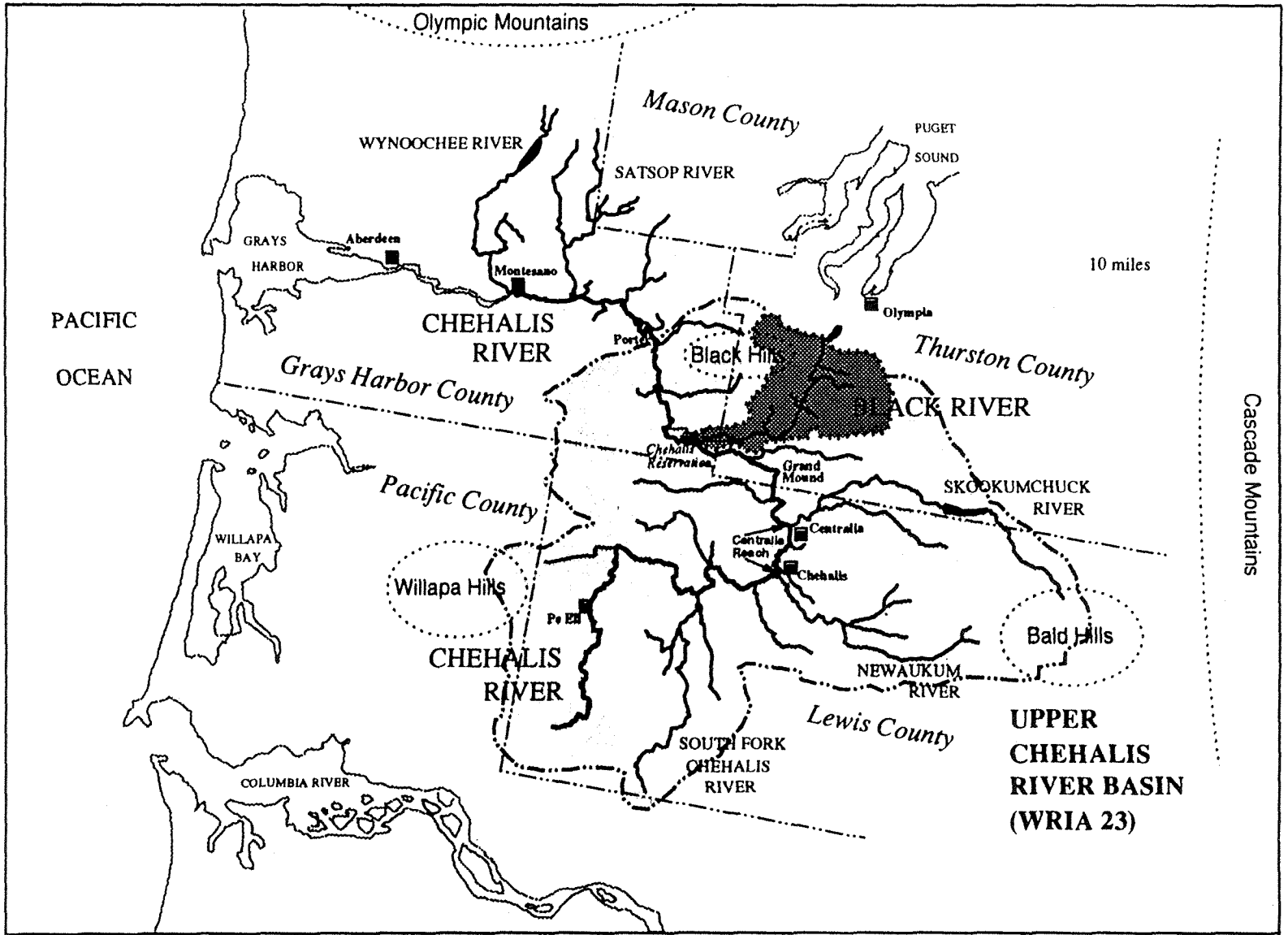

Figure 1 Upper Chehalis River System Location Map

Summary of Findings

This is a brief review of findings. For more detailed information, refer to the back of this document or to the three complete technical reports. To get copies of the complete reports, please call the Ecology Publications office at (206) 407-7472 and ask for publication number 94-104 for the Black River Wet Season Study; 94-106 for the Black River Dry Season Study; and, 94-126 for the Upper Chehalis Dry Season Study.

Upper Chehalis River Dry Season Study:

- The Centralia Reach of the Chehalis River is characterized by high surface water temperatures and virtually no dissolved oxygen in deeper waters. Dissolved oxygen levels would fall below standards even in the absence of human caused pollutants.

- TMDLs are proposed for the Chehalis River between Pe Ell and Porter from May 1 to October 31.

- No loading capacity exists between Chehalis and the mouth of the Skookumchuck River (the Centralia Reach). Two alternatives for Centralia Reach TMDLS are proposed:

  1. Chehalis and Darigold Wastewater Treatment Plants use an alternative disposal method for their discharge during the dry season, such as industrial or agricultural use, and/or;

  2. Centralia, Chehalis, and Darigold Wastewater Treatment Plants use a combined outfall below the Skookumchuck River.

- Nonpoint source Biochemical Oxygen Demand Load Allocations for the Skookumchuck River upstream are to be limited to those that will not cause natural background levels to be exceeded.

- Load Allocations based on current pollutant levels are recommended for nonpoint sources downstream of the Skookumchuck River, subject to all tributaries also meeting water quality standards.

Black River Wet Season Study:

- Waste discharge reductions are needed under critical runoff conditions for multiple Black River segments, Beaver Creek and Little Rock Ditch.

- Beaver Creek has the most serious fecal bacterial pollution problems in the Black River Basin.

- Further investigation is needed to locate and correct the source(s) of fecal bacterial loading to the Black River between the Wildlife Launch and Mima Creek.

- The *Chehalis River Basin Action Plan* should be fully implemented to identify and encourage further watershed improvements specific to sub-basins like the Black River.

Black River Dry Season Study:

- Dissolved Oxygen in the Black River falls below the freshwater quality criterion of 8.0 mg/L throughout most of the mainstem during the summer months. No further degradation of dissolved oxygen can be allowed below these levels.

- TMDLs are required to limit the loading of BOD and ammonia to the mainstem Black River during summer months.

- A limit on total phosphorus is necessary to protect the Black River from excessive algal growth caused by overloading of nutrients.

- A narrative TMDL for temperature is recommended that would protect and replant shade trees along the banks of the lower Black River.

The Future

Valuable BMP projects are being funded in the Upper Chehalis River Basin. Over $1.3 million is being spent on a combination of projects sponsored through the Chehalis Fisheries Restoration Program managed by the United States Department of Fish and Wildlife (Dominguez, 1994) and the new Jobs and Environment Program, managed by the Washington State Departments of Ecology and Natural Resources (Brandow, 1994). Projects include watershed restoration activities such as, channel and pond enhancement, bank stabilization, fencing and water quality surveys in locations from Lucas Creek on the south and to Blooms Ditch in the north. An additional $109,000 of Department of Ecology Centennial Grant funding is being used for Watershed Plan implementation at Dillenbaugh Creek (Palazzi, 1994).

Successful implementation of load limits in the wastewater discharge permits will require understanding and creativity from the permittees and Ecology. Effective implementation of BMPs requires the combined effort of Ecology; other federal, state, tribal and local agencies; and local citizens. The Chehalis River Action Plan is recognized as an key element of this effort, and the Chehalis River Council could play a crucial role in coordinating BMP implementation.

Background Information on Water Quality Protection

Pollution Controls

Ecology uses *technology-based* and *water quality-based* limits to control the discharge of pollutants to surface waters. The most stringent of these controls must be chosen for each pollutant of concern.

The technology-based approach requires that wastes be provided with all known available and reasonable technology (AKART) to prevent and control the pollution of the waters of the state (RCW 90.48.010). "AKART" requires point source discharges (discharges from a distinct location, like wastewater treatment plants) use the best water pollution control treatment that is available and affordable, regardless of the quality of the receiving water. For example, AKART for municipal sewage plants is secondary treatment. The technology-based requirement for nonpoint sources (diffuse discharges like stormwater runoff) consists of the application of best management practices (BMPs) selected for the site. Leaving a buffer strip of undeveloped land between a paved road and a stream to filter pollutants out of surface runoff is a BMP.

Water quality standards (WAC 173-201A) for Washington's surface water bodies are set by beneficial uses and existing water quality. Water quality-based limits that help water bodies meet the standards are based on pollutant concentrations in the effluent and receiving water. Water quality-based limits are determined for the combination of receiving water and waste discharge conditions which has the highest potential to harm aquatic life or existing uses or "critical condition". The water quality based limits contain both numerical criteria (such as a range of pH from 7 to 8.5) and narrative criteria (such as not allowing a discharge of waste that smells bad).

Total Maximum Daily Load (TMDL)

Section 303(d) of the federal Clean Water Act requires states to identify and list waterbodies that are not expected to meet state water quality standards after application of required technology-based controls. Waters on the list must undergo a Total Maximum Daily Load (TMDL) analysis to determine the maximum amount of pollutants which can be discharged without violating water quality standards. Surface waters can assimilate pollutants to some extent through a natural process of self-purification. The amount of a pollutant that a water can assimilate without violating water quality standards is called its loading capacity. Once the loading capacity is calculated, the pollutant loading is allocated to different areas or sources. Part of the loading can be apportioned to background/natural sources and scientific uncertainty. If additional loading capacity remains, waste load allocations (WLAs) may be set for permitted point sources, and load allocations (LAs) set for nonpoint sources. In addition, some loading may be held in reserve for future growth. ***The sum of LAs and WLAs that will stay within the loading capacity, and thus allow water quality standards to be met, is called a TMDL.***

Black River TMDL Study: Wet Season

The Black River arises in wetlands near Black Lake in Olympia, runs south and west through Thurston County along the edge of the Black Hills, and finally enters the Chehalis River near Oakville in eastern Grays Harbor County. The mainstem is about 24 miles long and drains a watershed of about 128 square miles. The Black River can be divided into three stretches with distinct characteristics (Figure 2):

- The upper river, from the headwaters to about River Mile (RM) 15.2 south of Littlerock, drains an area of extensive wetlands. The river is narrow with low flow, sometimes braided and meandering, and displays the dark color that gives the water its name.

- The middle river, or lake reach, begins near the state boat launch at RM 15.2 south of Littlerock, and extends downstream to about RM 9.7 near Rochester. The river here is very slow and wide, with brushy wetlands on both banks. In the summer, the deeper locations in this reach become poorly mixed due to temperature stratification.

- The lower river is the rest of the Black River from the middle lake reach downstream to the mouth. Here the river is relatively swift and flows through an area of mostly agricultural use.

Two separate TMDL studies were conducted on the Black River, one during the wet season and the other during the dry season. The wet season TMDL study addressed fecal coliform bacterial pollution. Fecal coliform bacteria occur in the feces of warm blooded animals. While they do not generally cause disease, they are considered an indicator of other bacteria and viruses which do cause disease. The Class A water quality standard for fecal coliform bacteria is 100 cfu/100 mL, with not more than 10 percent of samples to exceed 200 cfu/100 mL. The study focused on sampling during rain events, when runoff of fecal material into the river is highest.

Findings and Recommendations

- **A concentration-based TMDL for bacteria is recommended for problem Black River segments.** A TMDL of 100 cfu/100 mL is proposed. Half of this allowable load would be set aside as a margin of safety to account for scientific uncertainty, abnormally dry conditions during both survey years, data variability, and future growth. The remaining 50 cfu/100 mL is proposed as a load allocation (LA) for nonpoint sources. To meet this target, load reductions are needed under critical runoff conditions for multiple Black River segments, Beaver Creek, and Littlerock Ditch. The existing loads and reductions needed to meet the proposed LAs are shown in Figure 3.

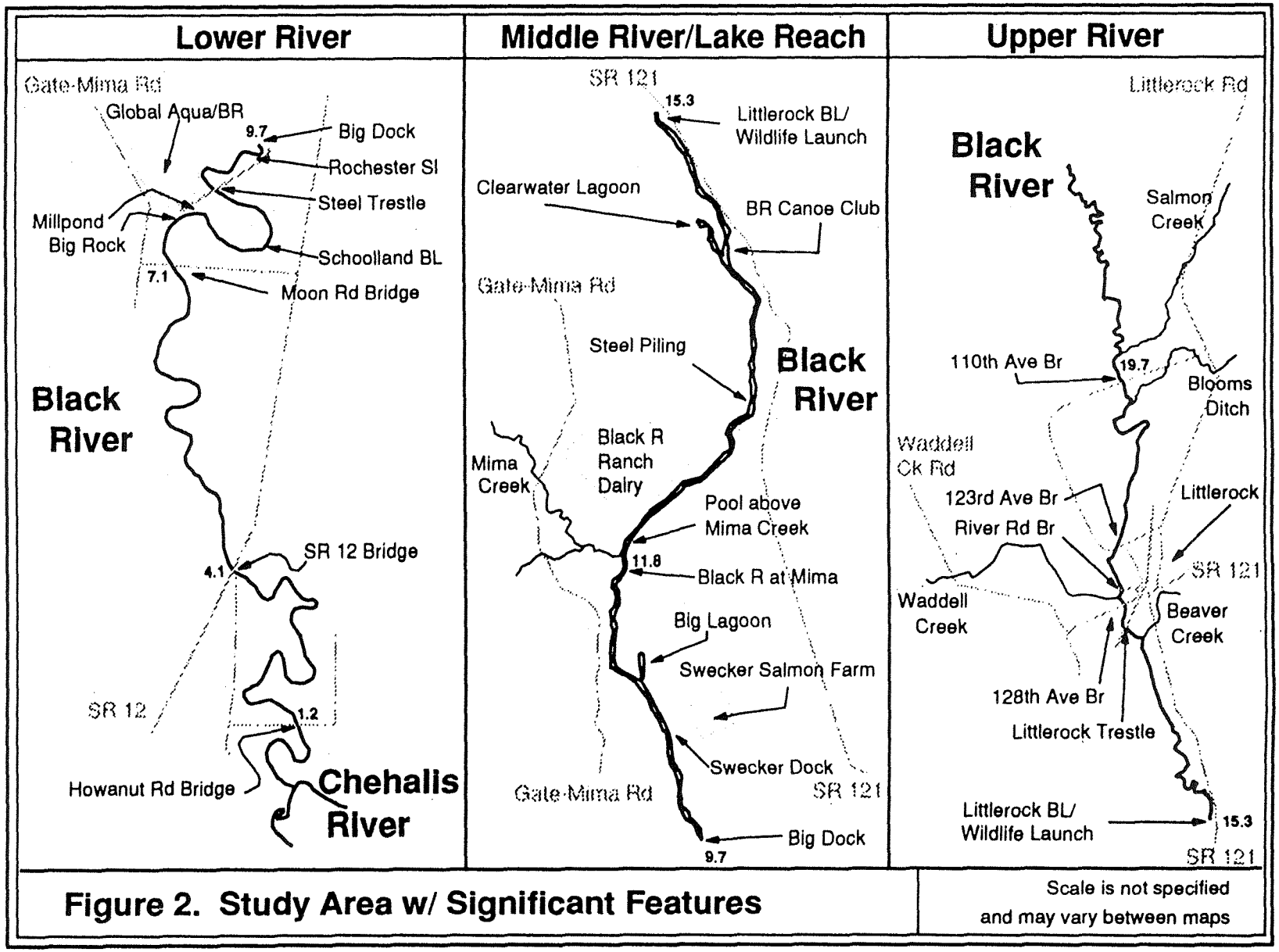

Figure 2. Study Area w/ Significant Features

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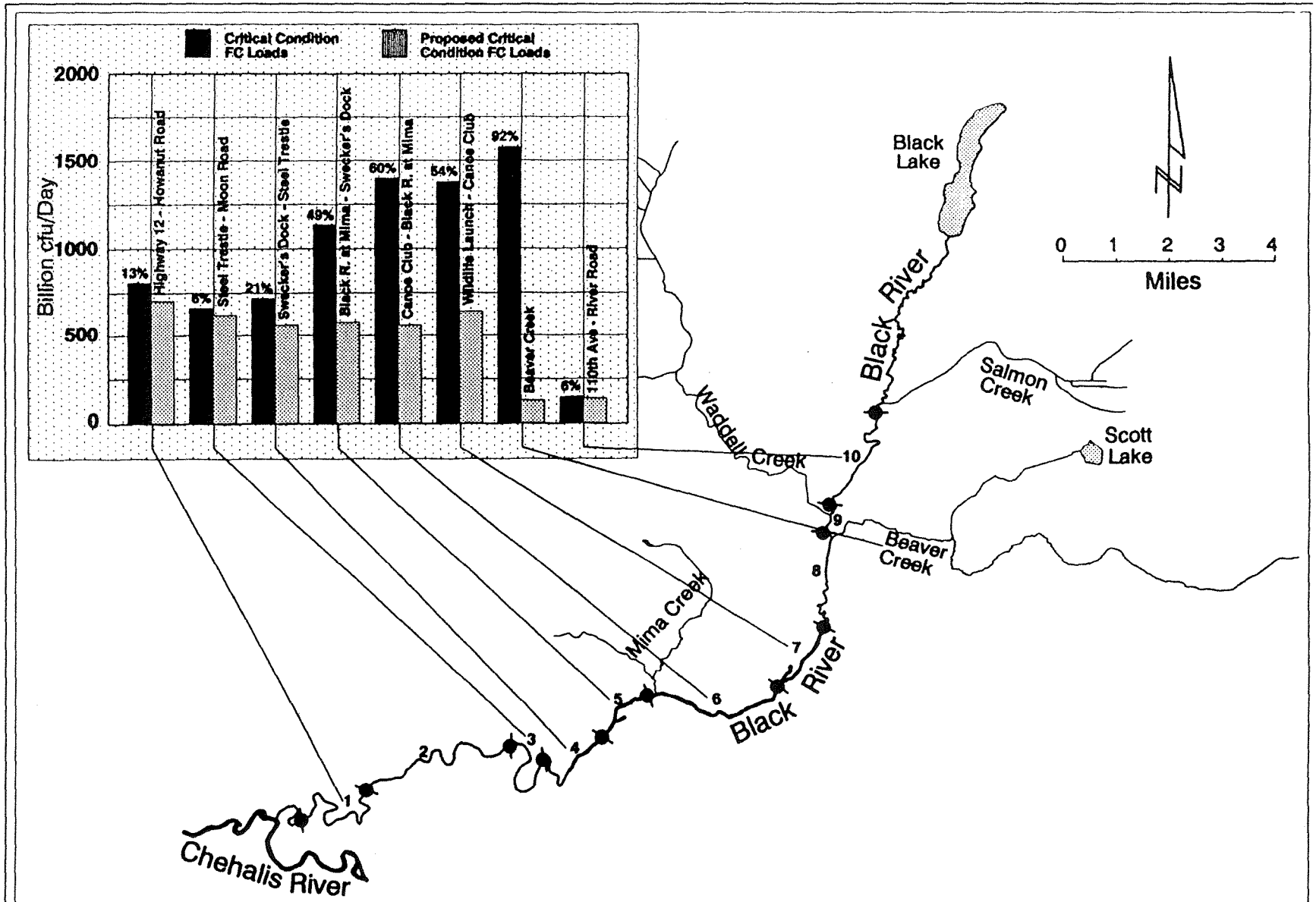

Figure 3. Black River critical condition FC loads and proposed reduction map.

- **Beaver Creek had the most serious bacterial pollution problems in the Black River Basin, and should be considered a top priority for corrective actions.** The load from Beaver Creek dominated the upper basin. A loading reduction of 92 percent will be needed to achieve the TMDL and meet water quality standards. Site-specific evaluations are needed within the Beaver Creek drainage to determine appropriate corrective actions. Locations requiring corrective measures in order of decreasing priority are:

    1) Beaver Creek at Case Road to the Beaver Creek Ranch
    2) Beaver Creek Ranch to Beaver Creek at Highway 121
    3) Lower Allen Creek
    4) The Littlerock Ditch
    5) The unnamed tributary to Beaver Creek crossing 143rd SW

- **Further investigation is needed to locate and correct the source(s) of bacterial loading to the Black River between the Wildlife Launch and Mima Creek.** The Black River between the Wildlife Launch and Canoe Club had higher than expected bacterial counts considering the low number of potential sources in the vicinity. Ecology should coordinate with Thurston County Environmental Health to evaluate if septic systems within the reach are sources of fecal coliform loading. The Black River between the Canoe Club and Mima Creek also merits further investigation, particularly in view of the magnitude of loading to the segment, the 60 percent load reduction required to bring bacterial counts within standards, and the lack of obvious pollutant transport pathways.

- **Thurston County should be encouraged to establish a local watershed management committee fashioned after the "nonpoint rule" (Chapter 400-12 WAC).** Amendments to the *Chehalis River Basin Action Plan* would likely be needed to encourage further development of watershed management plans specific to sub-basins like the Black River.

Black River TMDL Study: Dry Season

The dry season TMDL study investigated low dissolved oxygen levels in the mainstem Black River. Dissolved oxygen is required by fish and other aquatic animals to sustain life. The Class A water quality standard for dissolved oxygen is a minimum concentration of 8.0 mg/L. Pollutants generally reduce oxygen in the water by exerting a biochemical oxygen demand (BOD) as they decay. The study focused on sampling during the summer low flow period, when oxygen levels are naturally depressed and little water is available to dilute oxygen-demanding pollutants.

<u>Findings and Recommendations</u>

- **Dissolved oxygen in the Black River falls below the freshwater quality criterion of 8.0 mg/L throughout most of the mainstem during the summer months.** An

analysis of background conditions indicates that dissolved oxygen falls below this criterion even in the absence of human-caused pollutant loading (Figure 4). Because background conditions are less than the criterion, background conditions define the new water quality standard, and no further degradation of dissolved oxygen can be allowed below these levels.

- **TMDLs are required to limit the loading of BOD and ammonia to the mainstem Black River during summer months.** Table 1 shows the proposed TMDLs strategy. The loading capacity is defined as no significant degradation of dissolved oxygen relative to existing or background conditions in the Black River that is caused by any pollutant load or combination of pollutant loads. WLAs are proposed for existing permitted dischargers based on full application of AKART as currently exists at the facilities. LAs are proposed for existing nonpoint sources, in combination with a narrative LA that requires that nonpoint loading sources be provided BMPs that minimize the discharge of oxygen-demanding materials. The narrative LA recommended for future growth is that any new or expanded pollutant sources to the mainstem or tributaries of the Black River should cause no significant degradation of dissolved oxygen in the Black River.

- **A limit on total phosphorus is necessary to protect the Black River from the deleterious effects of eutrophication.** Existing conditions in the lake-like middle portion of the Black River are approaching eutrophy. Eutrophication of a waterbody is characterized by nuisance algal growth, low dissolved oxygen, high pH, and ultimately depletion of fishery resources. Therefore, a TMDL is proposed to control phosphorus loading to this reach (Table 1). The loading capacity is defined as the load that would result in a daily average concentration of 0.05 mg/L from May 1 through October 31. The loading reduction strategy proposed to achieve this instream concentration includes a WLA of 16 lbs/day for the Swecker Salmon Farm discharge, as well as narrative LA which provides that existing nonpoint sources implement BMPs to reduce or eliminate the discharge of TP during the TMDL period.

- **Temperatures in the Black River exceed the water quality criterion of 18°C during summer months.** Although much of the middle and upper river is bordered by wetlands that likely would not support significant riparian shading, the lower river from about RM 10 downstream does appear to be capable of supporting a riparian shade canopy. However, much of that canopy is absent due to human activities, which has likely resulted in an increase in water temperatures in the Black River. A narrative TMDL for temperature is recommended, specifically that riparian shade trees to be protected and replanted to the fullest extent possible along the lower Black River, from RM 10 to the mouth.

Table 1 Black River Allocations, TMDL, and Loading Capacity for BOD5, Ammonia, and Total Phosphorus

All loading in lbs/day

	BOD5	NH3-N	TP
Wasteload Allocations			
Cedar Creek WTP	25.2	0.26	Included in LA
Black River Ranch	0.0	0.00	0.00
Swecker Salmon Farm	210.3	84.13	16.00
Global Aqua/Black River	421.4	168.54	
Load Allocations			
Background-Ground water	35.7	0.36	2.85
Background-Upstream	167.1	2.22	2.15
Background-Mima Creek	16.2	0.04	0.06
Existing Nonpoint Sources	53.54 Application of BMPs to reduce BOD	7.17 Application of BMPs to reduce NH3N	8.20 Application of BMPs to reduce TP
Reserve for Future Growth	Unspecified load, not to exceed LC	Unspecified load, not to exceed LC	Unspecified load, not to exceed LC
Total Maximum Daily Load (TMDL)	929.4 + Reserve	262.72 + Reserve	29.26 + Reserve
Loading Capacity (LC)	No significant degradation of dissolved oxygen below background or existing conditions.		Shall not exceed a criterion of 0.05 mg/L.
Location	Entire mainstem Black River		Mainstem RM 9.6 to 15.3 Surface waters to 2m depth
Applicable Season	May 1 to October 31		May 1 to October 31

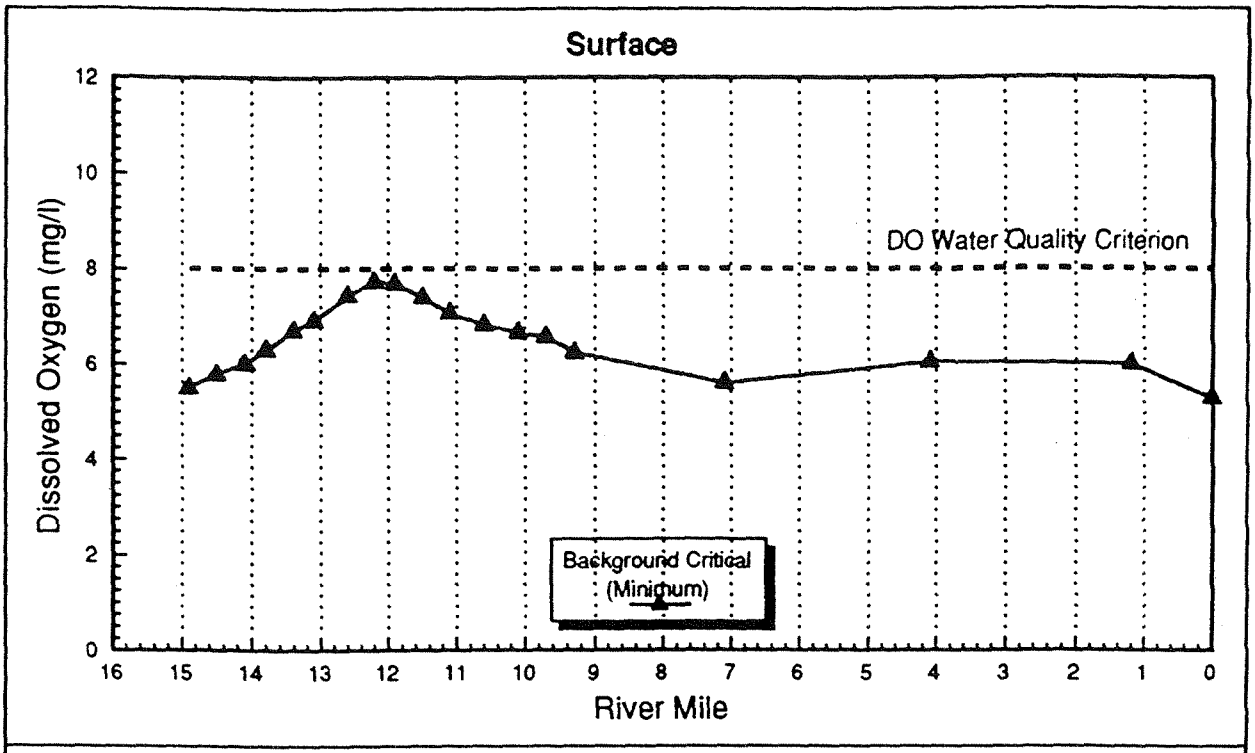

Figure 4 Black River Model Results - Background Critical Conditions

Upper Chehalis River TMDL Study: Dry Season

Like the Black River, the mainstem Chehalis River in the study area can be divided into three reaches that exhibit distinct features. The upper reach of the study area, running from above the town of Pe Ell, past the South Fork and Newaukum Rivers, down to the State Route (SR) 6 bridge near Chehalis (RM 74.9), has mixed features of riffles, swift glides, and occasional deeper pools. The middle reach, from the SR 6 bridge near Chehalis to the Skookumchuck River (RM 67.0), is a stretch of slow, relatively deep water, hereafter referred to as the Centralia Reach. In the lower stretch of the study area, from the Skookumchuck River downstream to Porter (RM 33.8), the river becomes much swifter, again exhibiting a riffle/glide/pool character.

The Chehalis River dry season TMDL study also focused on depressed dissolved oxygen levels. Since the mainstem Chehalis River is rated Class A, the water quality standard for dissolved oxygen is 8.0 mg/L. However, the standards contain a special condition for the reach between the Newaukum River (RM 75.2) and Scammon Creek (RM 65.8), whereby the allowable dissolved oxygen minimum is lowered to 5.0 mg/L from June 1 to September 15.

<u>Findings and Recommendations</u>

- **Sampling of the mainstem Chehalis River and its tributaries revealed that many areas were impaired by dissolved oxygen, temperature, and bacteria levels which violated water quality standards.** Loss of riparian canopy was a likely source of high temperatures, and livestock impacts were the primary suspected source of fecal coliform bacteria. Oxygen depletion was attributed to both nonpoint sources and discharges from wastewater treatment plants (WTPs). However, as in the Black River, an analysis of background conditions indicated that mainstem dissolved oxygen levels would fall below the water quality criteria even in the absence of human-caused pollutant loading (Figure 5).

- **The Centralia Reach of the Chehalis River was characterized by high temperatures near the water surface, and virtually no oxygen in deeper waters.** The Darigold and Chehalis WTPs have a great influence on the quality of this reach due to their discharge location near its upstream boundary. Any discharge accidents at these plants are likely to cause major reductions in dissolved oxygen in the river, as was witnessed in October 1991. During the study, surface waters met the 5.0 mg/L special condition criterion, but DO did not meet the 8.0 mg/L standard in late May and September 16 to early October.

- **TMDLs are proposed for ammonia and carbonaceous BOD for the entire mainstem from May 1 to October 31.** Five points of compliance are recommended for the TMDLs between Pe Ell and Porter (Figure 6). A key

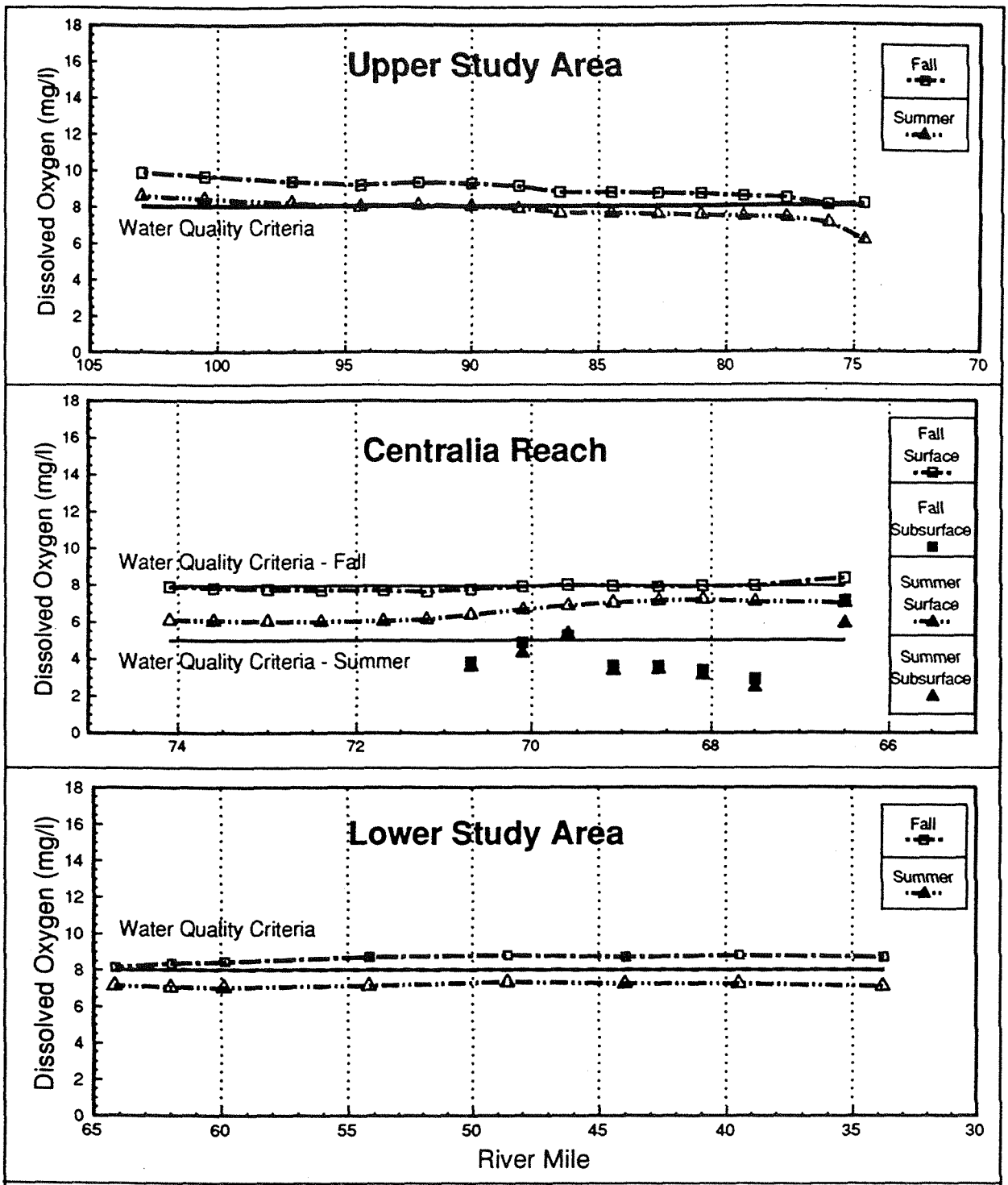

Figure 5 Chehalis River Model Results: Background Critical Conditions

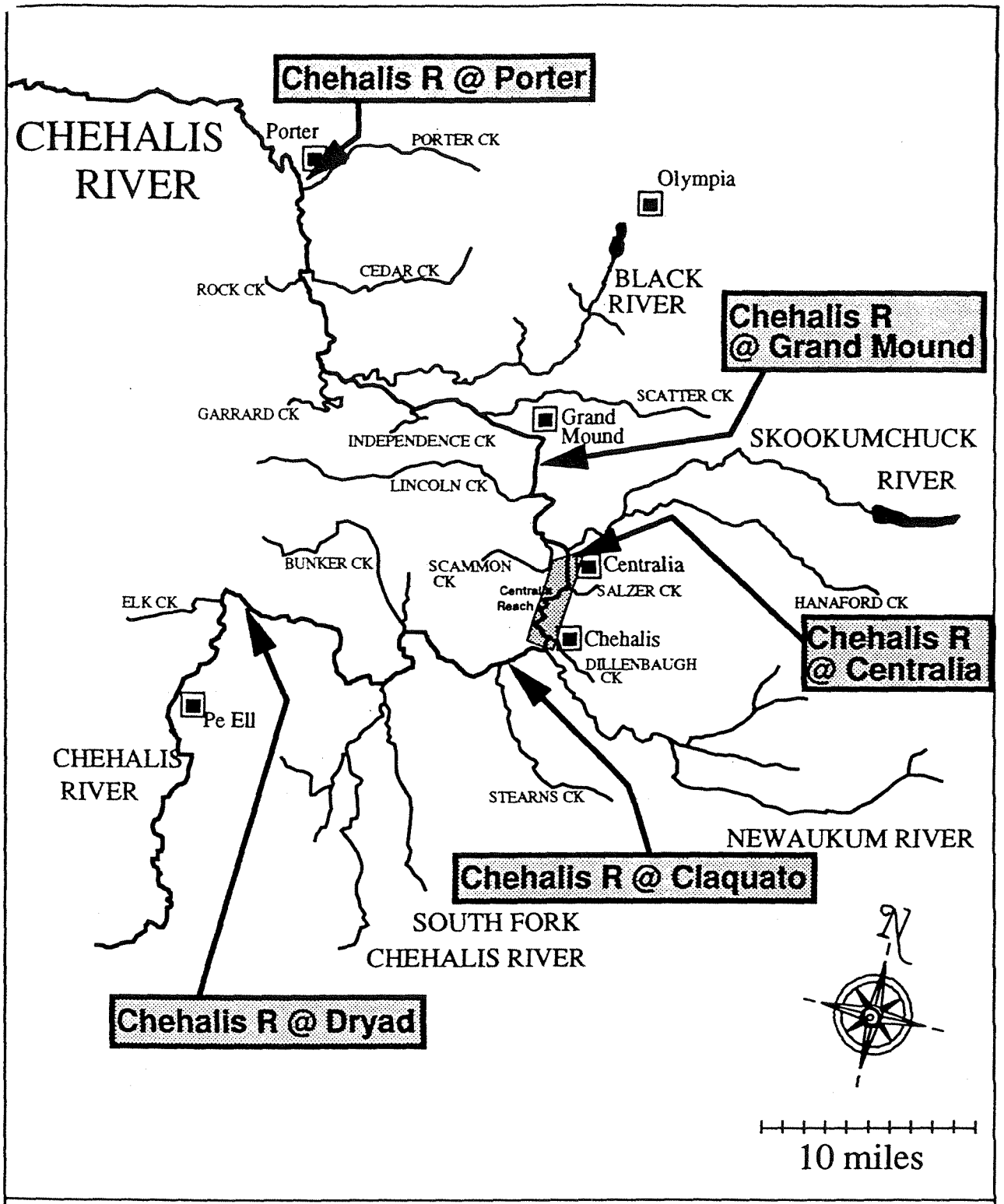

Figure 6 Chehalis River and Major Tributaries, with TMDL Compliance Locations

component of the recommended TMDLs is that no loading capacity exists in the Centralia Reach. Therefore, a WLA of zero is being recommended for this reach, which means the eventual removal of the existing City of Chehalis and Darigold WTP discharges from May 1 to October 31. Loading capacity appears to exist to allow a WLA for the Pe Ell WTP and the proposed Grand Mound WTP.

- **Two alternatives for Centralia Reach WLA/LAs are proposed.** Alternative #1 is based on the Chehalis and Darigold WTPs finding an alternative disposal method for their wastewater during the dry season, such as industrial or agricultural use. Alternative #2 is based on the Centralia, Chehalis, and Darigold WTPs siting a combined outfall below the Skookumchuck River. Pollutant load reductions associated with each alternative are shown in Figure 7. Other options may exist and can be evaluated in the future as they are proposed and reviewed. Implementation of the WLAs will be primarily through permit modifications, administrative order, regional planning, and financial assistance in the form of grants and loans.

- **LAs limited to background levels of ammonia and carbonaceous BOD are recommended for nonpoint sources from the Skookumchuck River upstream. LAs based on current pollutant levels are recommended for nonpoint sources downstream of the Skookumchuck River, subject to all tributaries themselves meeting water quality standards.** Three areas of nonpoint source control are key to improving dry season water quality basin-wide: better livestock management practices, including riparian protection and implementation of farm plans; correction of inadequate or failing septic systems; and implementation of stormwater best management practices in urban areas where summer rainfall is generating runoff.

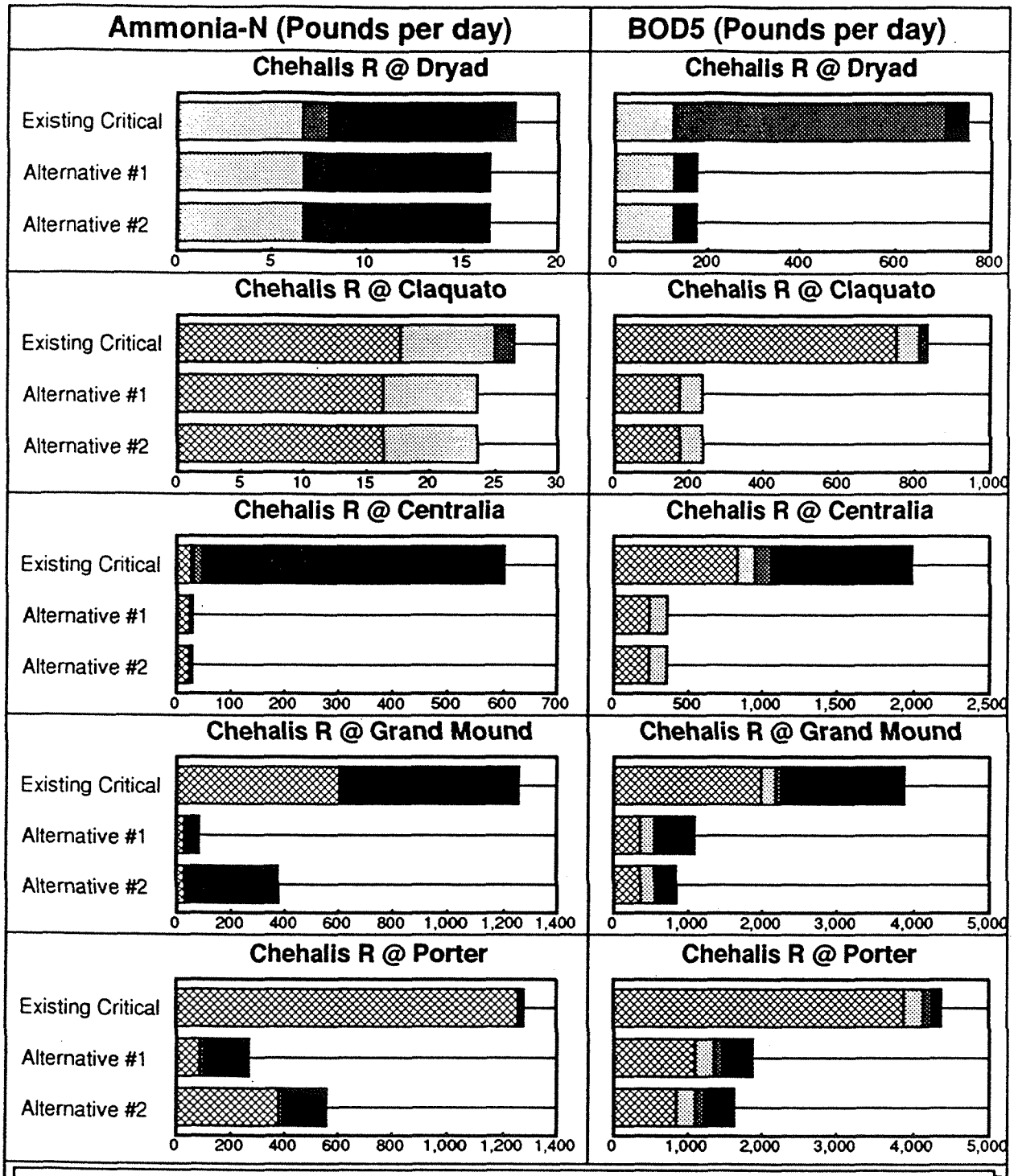

Figure 7 Chehalis River TMDL Alternatives

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Glossary

Algal bloom - Proliferation of living algae in bodies of waters; often stimulated by nutrient (phosphate and/or nitrogen) over-enrichment. Algal blooms can reduce the oxygen available to other aquatic organisms.

Assimilate - The process where a body of water purifies itself of pollutants.

Background - A description of pollutant levels arising from natural sources; and not because of immediate human activities.

Best management practice (BMP) - Physical, structural, and/or managerial practices that, when used singly or in combination, prevent or reduce pollutant discharges.

Biochemical oxygen demand (BOD) - An indirect measure of the amount of nitrogen and carbon compounds present in waste that use oxygen during biological or chemical degradation . A BOD_5 test is made over a five day period. It is expressed in milligrams of oxygen utilized per liter of liquid waste volume (mg/l). Also called biological oxygen demand.

Critical Conditions - When the physical, chemical, and biological characteristics of the receiving water environment interact to produce the greatest potential for pollutants to harm aquatic life and water uses.

Degradation - The lowering of the water quality of a watercourse by an increase in the pollutant loading.

Dissolved Oxygen (DO) - The concentration of free molecular oxygen in the water column.

Eutrophication - Refers to the process where nutrient over-enrichment of water leads to excessive growth of aquatic plants, especially algae.

Existing Critical - Critical conditions that currently could occur under a scenario of maximum permitted pollutant discharges and maximum reasonable nonpoint pollutant loading.

Fecal Coliform bacteria - Microorganisms common in the intestinal tracts of man and other warm-blooded animals. Used as an indicator of pollution by manure or sewage and possible contamination by bacteria and other pathogens.

Load Allocations (LAs) - The portion of a receiving water's TMDL attributed to existing nonpoint sources, scientific uncertainty, future growth and/or natural background.

Loading Capacity (LC) - The maximum pollutant load that can be in a waterbody and still meet water quality standards.

Narrative - When criteria, Load Allocations or TMDLs are provided by description rather than numeric quantity. For example; Requiring planting of trees along river banks to lower stream temperatures.

Nonpoint Source - Pollution from any dispersed activities such as runoff from agriculture, forestry or urban areas.

Numerical Criteria - Numerical targets for chemical, biological or physical parameters for the protection of the water quality.

pH - A measure of the alkalinity or acidity of water which is conducted by measuring the concentration of hydrogen ions. A pH of 7.0 indicates neutral water. A 6.5 reading is slightly acid.

Point Source - An individual identifiable source of pollutants, such as a municipal or industrial wastewater treatment plant, usually required to obtain a permit.

Pollution - An alteration of the physical, biological, chemical, and radiological characteristics of water that renders it unfit or less suited for use.

Reach - A length of river or stream channel with similar characteristics.

Riparian - Pertaining to the banks of streams, wetlands, lakes or tidewater.

Scientific Uncertainty - A required component of the TMDL that accounts for the uncertainty between the environmental processes and conditions being analyzed and the ability of the scientific methods accurately evaluate those processes and conditions. about the relationship between pollutant loads and the quality of the receiving body of water.

Section 303d List - A biennial list of waters not expected to meet Water Quality Standards despite the use of Technology-Based limits.

Stormwater - That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, channels or pipes into a defined surface water channel, or a constructed infiltration facility.

Technology-Based Limits - Effluent quality limits based on minimum required levels of wastewater treatment for individual categories of discharges. These minimum treatment levels are based on national or state standards for available and affordable treatment processes.

Total Maximum Daily Load (TMDL) - The sum of the individual waste load allocations and load allocations that will not exceed the loading capacity of the receiving water.

Waste Load Allocation (WLA) - The portion of a receiving water's TMDL that is allocated to one of its existing or future point sources of pollution.

Water Quality Criterion - A descriptive or numeric factor used as a target for judging the quality of water. Plural - criteria

Water Quality Standards - A law or regulation that consists of the beneficial designated uses of a waterbody, the numeric and narrative water quality criteria that are necessary to protect the uses of that particular water body, and an antidegradation policy.

Acronyms and Abbreviations

AKART - "All Known, Available, and Reasonable methods of prevention, control, and Treatment." The most current means that can be reasonably required for preventing, controlling, or abating pollutants associated with a discharge.

BOD - Biochemical Oxygen Demand

cfu - Colony Forming Units

mL - Millileter

mg - Milligram

RCW - Revised Code of Washington, the Laws of the State

WAC - Washington Administrative Code, State Regulations

WRIA - Water Resource Inventory Area; Washington is divided into 62 WRIAs, which consist of groups or portions of watersheds.

WTP - Wastewater Treatment Plant; facilities designed to reduce pollutants in wastewater prior to discharge to the environment.