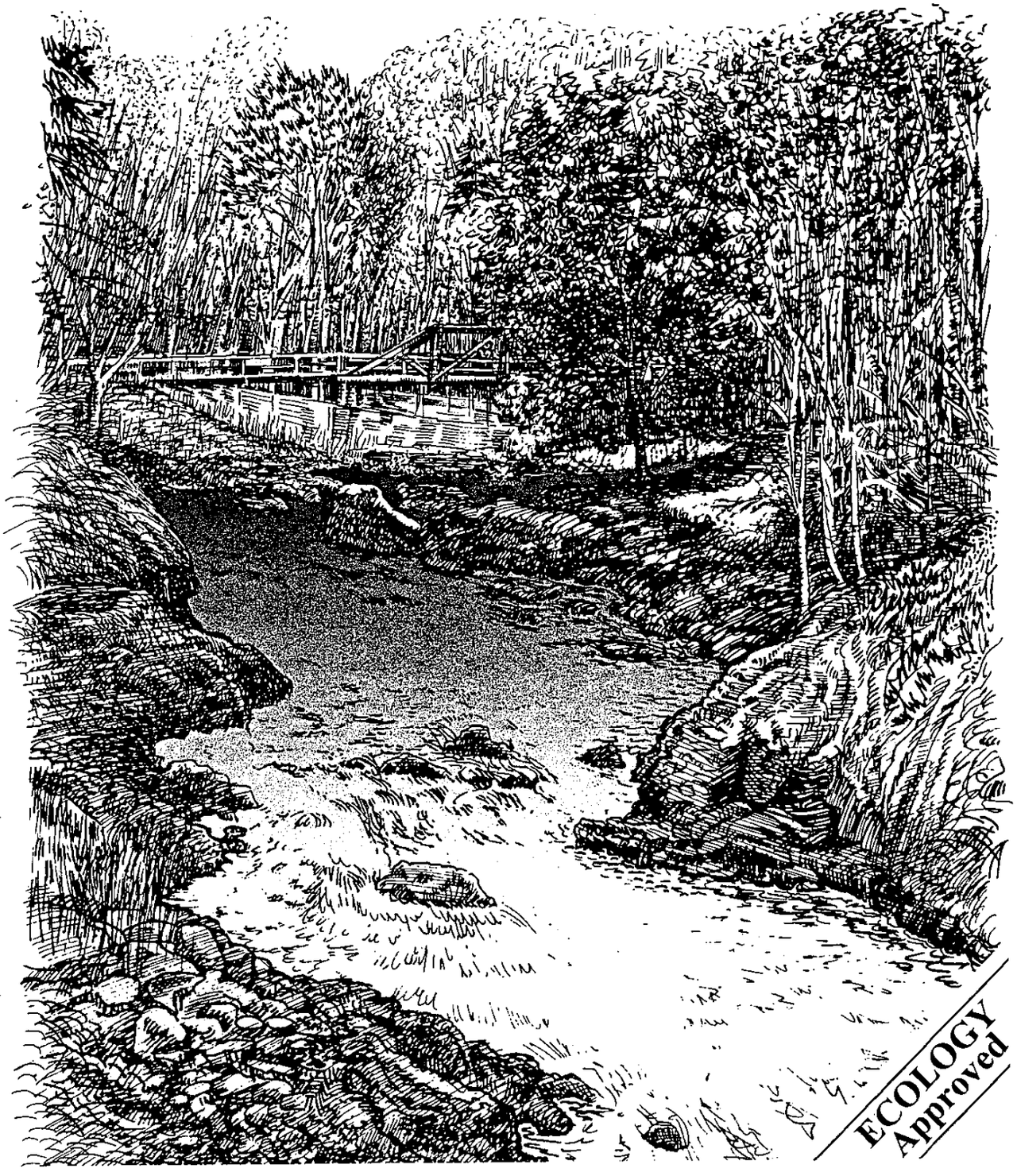
Budd Inlet - Deschutes River



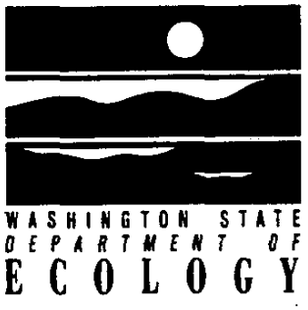
WATERSHED ACTION PLAN

Thurston County, Washington

December 1995

BUDD INLET - DESCHUTES RIVER WATERSHED ACTION PLAN

December 1995



Prepared in accordance with WAC 400-12-515. Funded in Part by Centennial Clean Water Funds through the Washington State Department of Ecology Grant #91004.

Prepared by: Thurston County Advance Planning and Historic Preservation

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Terri Toland	Budd Bay Boaters Association, Past Chair
Kathy Callison	Tumwater Public Works
Rod Culp	Land Development Representative
Jeff Dickison	Squaxin Island Tribe
Roger Dittmar	Citizen Representative (alternate)
Mike Elliott	Town of Rainier
Bruce Fortune	American Littoral Society
William Gill	Citizen Representative
Betty Gosnel	Deschutes River Association
Ingrid Hansen	Sierra Club
Andy Haub	Olympia Public Works (alternate)
Chris Haynes	Boston Harbor Neighborhood Association
Maureen Knutson	Lacey Public Works
Ron Nelson	Agriculture Representative
John Perkins	Citizens Representative (alternate)
Charlene Poste	Squaxin Island Tribe (alternate)
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Jackie Reid	Thurston Conservation District (alternate)
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CHAPTER 1. INTRODUCTION

BACKGROUND

The local watershed planning effort in Puget Sound began with the identification of 12 "early action" watersheds and the development of plans for those watersheds. Thurston County's early action watersheds were Eld, Henderson, and Totten Inlets. These plans are now approved and in various stages of implementation. Continuing the planning process into the remaining Puget Sound watersheds, each county engaged in a public process to determine the order in which plans for these watersheds would be developed. This was known as the "ranking process" and it occurred in 1988. The two remaining watersheds in Thurston County were the Deschutes and Nisqually Rivers.

Factors considered in the ranking process included the best information available about physical conditions in the watershed, the existence or lack thereof of water quality programs, and documentation of the resources intended for protection. The ranking committee, appointed by the Thurston County Board of Commissioners, used this information to determine that the next watershed action plan should be for the Deschutes River and Budd Inlet watershed. The ranking process for Thurston County is documented in the Thurston County Watershed Ranking Committee Final Report (1988).

PRESENT CONDITIONS

In 1990 the Washington State Department of Ecology funded a Centennial Clean Water Fund grant to conduct a watershed planning process within the Budd Inlet-Deschutes River Watershed. This process involved collecting background data on the watershed which was prepared by the USDA Puget Sound Cooperative River Basin Team in Deschutes River-Budd Inlet Watersheds, Thurston County Washington (1990). This was followed by a description of various natural and built environment characteristics by Thurston County. This was called Budd Inlet/Deschutes River Watershed Characterization: Part I Watershed Description (1993). The other essential part of a watershed characterization is the water quality data. This was summarized within the Budd Inlet/Deschutes River Watershed Characterization: Part II Water Quality Study (1993).

To conduct the planning process a Watershed Management Committee was formed comprised of representatives of local and state agencies and the Squaxin Island Tribe, and citizens representing economic, environmental and neighborhood interests. The Committee's charge was to determine which nonpoint source pollutants and sources are of most concern; identify gaps in existing programs and develop strategies for closing the program gaps; and recommend specific actions to implement the strategies including identifying what entities will implement each action. The Watershed Committee addressed various sources of nonpoint pollution provided by the various reports and as outlined in the administrative rule for this process, WAC 400-12. First, the Committee identified "Problems" from a potential source of pollution, they developed a "Goal" statement and then drafted an "Action Recommendations" to address the problem. These then became the framework for the following chapters.

WHAT IS NONPOINT SOURCE POLLUTION?

Essentially, it is all sources of pollution **other than** that discharged through pipes to waterbodies and courses. The types of pollutants are pathogens, sediments and toxicants. Nonpoint pollution can come directly from boats or indirectly from land where runoff from rainfall carries pollutants into streams and ditches and eventually into Puget Sound.

The "Ecology Approved" document is the last step of a mulit-stage Watershed Action Plan approval process. A "Public and Agency Review Draft" was available to the residents of the County and implementing agencies in October of 1994. This started a 60-day comment period during which a public hearing was held on the Plan. The Watershed Management Committee then evaluated the comments and made changes as necessary. The "Final Plan" was submitted to the Washington State Department of Ecology for their review in June of 1995 and approved on June 14, 1995 (see Appendix E).

When Ecology approved the Plan, they requested that Thurston County continue to pursue letters of concurrence with several agencies who commented on the Draft Plan. Ecology felt that formal Letters of Concurrence should be sought from the list of implementors contained in Appendix E. The County contacted the Agencies and sought to resolve issues of non-concurrence, through minor word changes and had the watershed committee review all major changes. Therefore, this document will reflect both the "Approved" Plan and those agreed upon changes subsequent to that date. Thurston County, as the lead agency, would begin to implement the plan as outlined in **CHAPTER 10, PLAN IMPLEMENTATION.**

WHO IS ON THE WATERSHED MANAGEMENT COMMITTEE?

Fred Satter	Thurston Conservation District, Chair
Terri Toland	Budd Bay Boaters Association, Past Chair
Kathy Callison	Tumwater Public Works
Rod Culp	Land Development Representative
Jeff Dickison	Squaxin Island Tribe
Roger Dittmar	Citizen Representative (alternate)
Mike Elliott	Town of Rainier
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Jackie Reid	Thurston Conservation District (alternate)
Joanne Richter	Olympia Public Works
John Stevenson	Agriculture Representative (alternate)
Dan Treat	Weyerhauser Company
Gordon White	Thurston County Community and Environmental Programs

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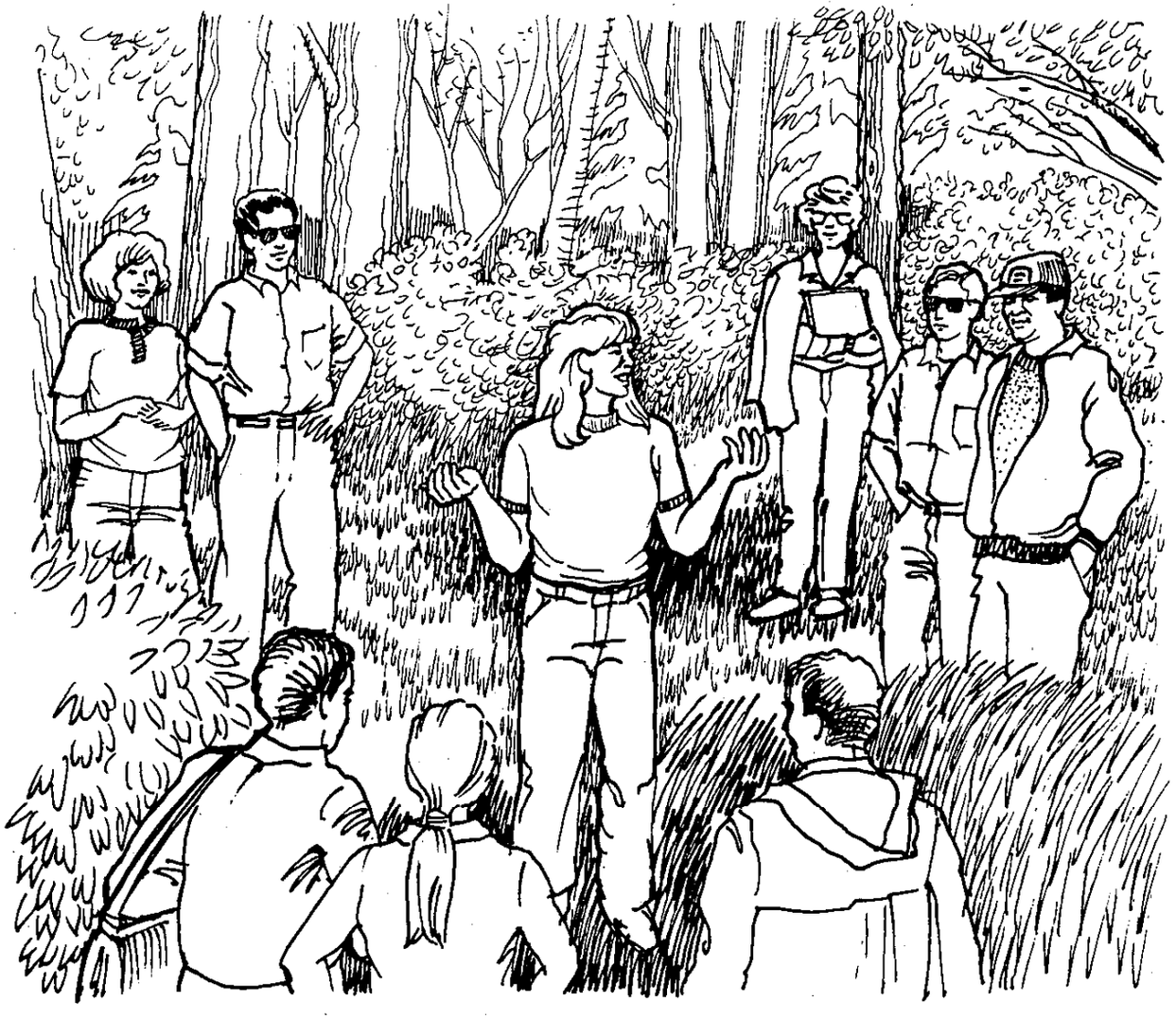
CHAPTER 2. PUBLIC EDUCATION PROGRAMS



BACKGROUND

Pollution prevention requires an ongoing commitment from an informed, involved public. Both education and public involvement are necessary components of a long-term management strategy for the Sound and its resources. Typically, society changes behavior as a result of education and peer pressure, and the majority of us need to change the way we do things. Individuals, families, groups, and neighborhood organizations need better information and technical assistance. Education is necessary to foster public recognition of the Sound as a regional and national resource, and to stimulate public, governmental, and private sector support for the changes in lifestyle and financial commitment necessary to preserve the Sound. Education is also desirable as a supplement and an alternative to enforcement programs.

More and more, education is recognized as the effective resource management tool to address those problems which result from individual actions. An educational survey conducted by the PSWQA in 1986 revealed that most education programs on water quality or the Sound were sporadic and without any sustained funding base. Very few agencies allocated staff or budget to education. There was little coordination among institutions, agencies and programs in the region, resulting in conflicting or poorly targeted messages and inefficient use of educational resources. Although there were numerous curricula related to Puget Sound, there had been limited funds to train teachers in how to use them.

The Authority concluded that educational funding and cooperation was a means to protect and enhance the Sound. Therefore, public involvement in actions to clean up and protect Budd Inlet is also important because they can bring information, expertise, values, funding, and priorities to the decision making process. (PSWQA, 1991)

WHY USE EDUCATION ???

- Education focuses on fixing problems rather than placing blame.
- Education avoids duplicating existing regulations while stressing the need to enforce current laws.
- Education can be fully integrated into ongoing, existing programs. It is not so much a new program as it is a new way of doing ongoing programs.
- Education balances the community demand to act now with the need to develop long-term, realistic, cost-effective alternatives.
- Education has demonstrated that altering behavior is a successful strategy in eliminating the causes of nonpoint pollution.
- Education improves the public's quality and quantity of involvement.
- Education encourages cooperation which results in more community support, thereby increasing the likelihood of long-term implementation.
- Education allows implementing organizations (such as the County, Conservation District, Cooperative Extension, Port, and others) to be active and maintain good working relationships with their constituencies.

PRESENT SITUATION

In Thurston County public education has been a component of water quality programs since the first Early Action Watersheds in the late 1980s (Eld, Henderson, Totten Inlets). While the specific programs are now too numerous to list, there have been three successful efforts reaching a wide cross section of Thurston County residents. The first is the Thurston Conservation District's "Model Farm" program for small farm operators. The second is the regional "Stream Team" which has involved a variety of activities. The third is "Project GREEN" which has involved school aged children.

The Thurston Conservation District began its intensive watershed based "Conservation Plan" program in 1987. This focused on preparing a farm inventory and then preparing plans for the most serious agricultural problems within each of the three early action watersheds. Since then the District has expanded their technical assistance efforts to the point where they should exceed 100 Conservation Plans, in some stage of completion, during 1994. The District also cooperatively manages the Dobbs Creek Model Farm which is a working farm where tours and classes on agricultural Best Management Practices (BMPs) are provided. The Conservation District education message is also carried to the community by means of local access television, TCTV Channel 3. Program topics range from composting to watersheds and are taped every two weeks.

The Stream Team came to Thurston County in 1990 and was modeled after a successful program from the City of Bellevue. Jurisdictions with active Stream Team programs, include Olympia, Lacey, and Thurston County. The Stream Team offers residents an opportunity to improve the quality of our water resources. Workshops, training sessions and action projects prepare volunteers to play an active role in monitoring and enhancing both stream corridors and wetlands. Forms and equipment are available for volunteer use as well as packets on EPA's "Stream Walk". Groups, clubs, businesses and organizations are invited to become involved in monitoring programs or action projects.

Stream Team action projects have included stream clean-ups, storm drain stenciling and stream side revegetation. While improving the environment and minimizing the cost of water quality projects, these hands-on projects allow the volunteers to network with other community members. A recent Stream Team activity included the revegetation of a portion of the Deschutes River floodplain in Tumwater's Pioneer Park. The Stream Team has also conducted summer youth day camps. These mini-programs focus on school age children and provide an overview of how streams, forests, water quality and the marine waters are all connected. To date over 800 persons have been involved in some type of Stream Team program.

Project GREEN is a member of the Global Rivers Environmental Education Network. Project GREEN is a collaborative partnership between government, business, schools, and community organizations which began in 1992. It educates school aged children throughout the watershed and during 1993 involved 27 classes and approximately 1,000 children. The students assist in monitoring water quality, and learning about the history, economy or land use practices within the watershed. This program's contribution to the community was recognized as the recipient of the 1993 Thurston County Public Health Award. Funding for this project comes from businesses, government agencies, civic organizations and foundations.

Thurston County is also unique by having those persons involved in local environmental education programs banded together to form the Educational Technical Advisory Committee (ETAC). This group represents a half dozen governmental programs and several non-governmental entities. These educators focus on preparing a regional calendar of public involvement and education activities, coordinating special events and brochures, and implementing a regional education strategy for storm and surface water. This coordination has avoided the fragmentation and duplication of efforts which often plague similar efforts in other communities. It also provides a lot more education "bang" with limited financial resources.

PROBLEMS IDENTIFIED BY THE WATERSHED MANAGEMENT COMMITTEE

- There is a perception that Public Education Programs are redundant and poorly coordinated.
- There is a lack of understanding of the features and functions of the Budd Inlet-Deschutes River Watershed particularly regarding its geographic boundaries and the hydrologic continuity between the surface and the ground water.
- There is little understanding of water quality problems which are directly due to human use of the shoreline and watershed.
- Many education programs have been funded with project grants and one time fund sources.
- There is a lack of evaluation and follow-up to determine the effectiveness of education programs, and if it occurs, such evaluations are not widely distributed.
- There is a lack of recreation opportunities along the Deschutes River which reduces community motivation to protect it.

GOAL ENSURE A HIGH LEVEL OF WATER QUALITY IN BUDD INLET DESCHUTES RIVER WATERSHED BY WORKING TOGETHER TOWARDS A SUSTAINABLE BALANCE OF ENVIRONMENTAL, ECONOMIC, SOCIAL AND CULTURAL VALUES.

ACTION RECOMMENDATIONS

ED 1 Local jurisdictions should continue to fund, support and coordinate efforts by successful education programs such as the Stream Team and Project Green. High priority public education projects which should be accomplished by these groups include:

a. Developing a series of watershed town hall meetings to discuss watershed issues. Target a meeting for each of the major subdivisions along the shoreline.

b. Developing a series of newspaper articles on Budd Inlet and Deschutes River water quality problems and the results of volunteer monitoring.

c. Developing stream rehabilitation projects focusing on hands-on environmental restoration with a goal of flood and erosion reduction by restoring riparian habitat or offering training to river side landowners.

d. Conducting tours to the bioengineering sites on a regular basis to increase knowledge of watershed problems and to see successful solutions.

e. Creating a TCTV television program on riverbank restoration and erosion control.

f. Developing educational programs focusing on the history and current importance of fisheries in the watershed.

Discussion: Opportunities for specific public education projects can be stand alone programs, but may also fit into other ongoing efforts. While these are important programs, they may be integrated with other watershed activities such as those described in the following recommendation.

This Action Recommendation requires annual funding to support the current programs and personnel. The Stream Team could be funded by the local stormwater utility rates, whereas, Project GREEN could be funded by the Conservation District assessment. Locating stable funding for these programs should be implemented within one to two years.

ED 2 Local jurisdictions and State resource agencies should use signs on public lands to help educate both residents and visitors on the importance of this watershed. Such activities may include the following:

a. Installing stream crossing signs on all public road crossings in the watershed.

b. Designing watershed boundary signs which could be modified with the current location. This could be installed at all public parks, boat ramps and made available to private subdivisions within the basin and watershed.

c. Developing an interpretive display regarding various nonpoint pollution sources. This could be installed at all public parks, boat ramps and made available to private subdivisions within the basin and watershed.

d. Reinstalling interpretative signs on fisheries at Tumwater Falls Park and around at public access sites around Budd Inlet.

Discussion: An example of this type of signage is located along Percival Landing in Olympia. Stream signs are common in northern Thurston County, but are not a part of the local jurisdiction's road signage program. Fisheries signs were a part of the Capitol Lake Interpretive Center but these need to be replaced due to vandalism. These would also be valuable additions at other public fishing areas.

This Action Recommendation would require one time expenditures for each of the various signage projects by the affected local and State agencies. Many signage projects could be incorporated as a part of other education programs. Therefore, the costs could be funded from agency budgets, capital development plan for developing parks or even the County Road Fund for the stream crossing signs. This Action Recommendation should be implemented within the next three to five years.

ED 3 Local jurisdictions should include an education component with any surface, ground, watershed or water quality planning project and adequate financial resources should be provided to complete this task.

Discussion: The value of water quality public education has become more accepted over the past decade. As a result, this policy could be formalized as a part of the Olympia, Lacey, Tumwater, Rainier and Thurston County Comprehensive Plans.

This Action Recommendation would require a one time expenditure. Its cost should be part of the project costs and therefore may be funded from a variety of local, state or federal sources. This Action Recommendation should be implemented within the next one to two years.

ED 4 The Thurston County Parks and Recreation Department should use an environmental education theme in the design of Deschutes Falls Park.

Discussion: Deschutes Falls is an excellent location to focus on the Deschutes River Watershed. Interpretative signs could provide information about the watershed both above and below the park. The site may also accommodate environmental day camp which could focus on the watershed stewardship.

This Action Recommendation would be considered by the Parks and Recreation Department during the design phase of park development. This could be accommodated by existing staff and within existing program budgets. The Parks Department has plans to undertake this during 1995 with construction to follow on a schedule, yet to be determined.

ED 5 The Thurston County Office of Community and Environmental Programs should conduct a survey of knowledge and attitudes to provide a baseline from which to measure the effectiveness of various education programs.

Discussion: A survey of watershed residents and businesses may be a part of a larger county-wide program. While the County public education efforts began in 1987 with the first watershed plans, little has been done to document the overall attitude of its residents. This would be very helpful if a new funding source for water resource protection requires voter approval.

This Action Recommendation would require a one time expenditure for the survey and its analysis. This could be funded from the County General Fund or it may be a part of a Centennial Clean Water Fund Grant or Public Involvement and Education Grant. This Action Recommendation should be implemented within the next three to five years.

ED 6 The local park departments and the Town of Rainier should jointly explore ways of increasing recreational opportunities along the Deschutes River.

Discussion: Public access to the river is currently limited along the middle and upper portions of the watershed. This should change as improvements are made to the Deschutes River Park, Deschutes Falls Park, and the Yelm to Tenino Trail. The task will be to increase recreational uses which will result in better watershed stewardship, without adversely affecting the existing depressed salmon runs.

This Action Recommendation would need to be addressed by the cities of Olympia and Tumwater, Thurston County and the Town of Rainier. This could be accommodated by existing staffs and within program budgets. However, development or improvement to park and recreation facilities along the river would be included in the local Capital Facilities Plan, which are updated on an annual basis.

ED 7 Local governments should continue to use the Educational Technical Advisory Committee (ETAC) to coordinate education efforts within the watershed.

Discussion: The value of using the existing committee eliminates the duplication of efforts, coordinates between various interests and provides more "bang for the buck". It also allows for cooperative projects which might not be undertaken separately due to cost.

This Action Recommendation would not require a specific expenditure of funds. This Action Recommendation should be implemented within the next year.

ED 8 Government agencies should work cooperatively with local land trusts to educate citizens and landowners about voluntary conservation programs.

Discussion: Non-profit conservation groups will include local land trusts. Collaborative activities may include sharing databases, joint mailings, and informational forums.

This Action Recommendation could be incorporated into the existing activities of local and state agencies at little or no cost. This Action Recommendation should be implemented within the next year.

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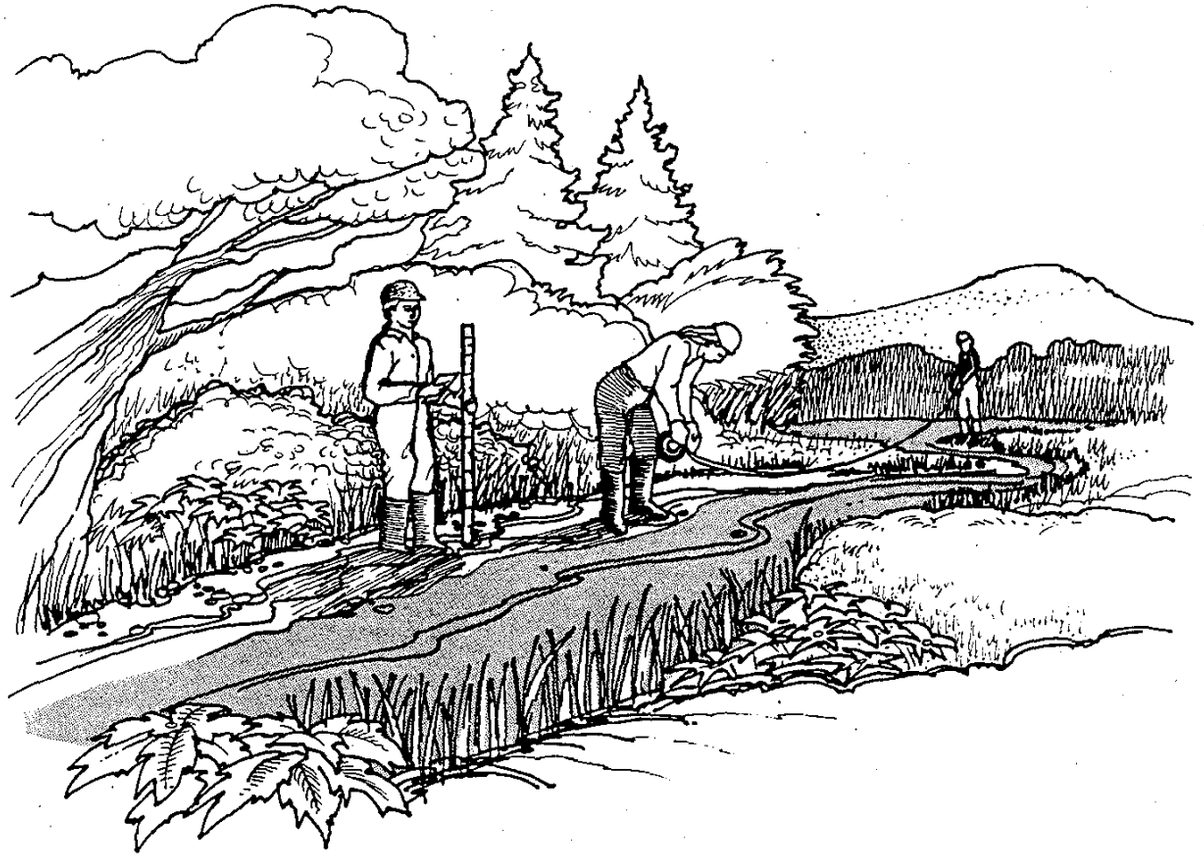
CHAPTER 3. RESEARCH AND MONITORING PROGRAMS



BACKGROUND

Research and Monitoring programs are both essential for understanding the water quality or associated problems of Budd Inlet and the Deschutes River Watershed. They also provide the technical framework for the Action Recommendations of this Watershed Action Plan. Research provides a basic understanding of conditions and processes. Whereas, monitoring established the baseline conditions and helps identify long-term trends. In turn, Research explores and confirms the processes and relationship that underlie the monitoring results. However, it is not feasible to develop management options without long-term, baseline monitoring. So once some degree of monitoring has been established, then through research, it is possible to develop accurate, practical, and cost effective methods of monitoring and sample analysis.

Population growth in Thurston County and within the Budd Deschutes Watershed will place new burdens on water resource managers. Information on various water quality parameters and other habitat features will be vital to accurately determine their status and identify any adverse effects from human activities. Observing changes or trends in the conditions is only possible when baseline data has been collected for a long time. In addition to state and local staffs, community volunteers can also be used to fill in missing data gaps.

WHAT IS RESEARCH?

In the PSWQA Management Plan, *Research* means "the scientific investigation in which a hypothesis, idea or assumption is developed and tested through systematic collection and objective analysis of data."

PRESENT SITUATION

The development of a coordinated water resource program within Thurston County began in the late 1980's with the Early Action Watershed Action Plans for Eld, Henderson and Totten Inlets. Since then other water resource programs have collected data on a variety of surface waters and began an extensive ground water monitoring program. However, water quality data alone has not answered questions related to: the role of water quality in the Washington State Department of Natural Resources' Watershed Analysis process, the effect of canopy coverage on river temperatures by reach, the role of large woody debris in coho salmon habitat, and the source of elevated nitrates in the Chambers Creek Basin. Although the Puget Sound Water Quality Authority (PSWQA) has attempted to coordinate Federal, State and local research efforts related to Puget Sound and the larger urban bays; comparatively little research has been done in Southern Puget Sound and in particular Budd Inlet.

Water quality monitoring in Thurston County has been a collection of State and local sampling efforts. The Washington State Department of Health has monitored waters where shellfish are harvested. The Washington State Department of Ecology has one core monitoring station in Budd Inlet and prior to 1992, two stations on the Deschutes River. The freshwater stations were located near Rainier and the "E" street bridge in Tumwater. The Tumwater sampling station is located up stream of the point discharge from the Olympia Brewery. Data were collected from these freshwater stations on a monthly basis from 1973 to 1991 and 1993, respectively. Ecology has abandoned the Rainier station, but plans to place a rotational station at the "E" street bridge site in 1995 and continue monitoring for an additional five years. Ecology also helps monitor gauging stations for surface flows, such as the Deschutes River near Rainier. (Refer to the Marine Environment Chapter for the discussion of the saltwater station.)

The LOTT (Lacey, Olympia, Tumwater and Thurston County) Sanitary Sewer Treatment Facility in Olympia monitors its outfall into Budd Inlet on a regular basis. There was also a great deal of general water quality monitoring in the mid-1980s within Budd Inlet and the South Sound which was used for modeling in anticipation of the current plant expansion. The Washington State Department of Fish and Wildlife monitors for dissolved oxygen and temperature of Percival Creek at Percival Cove, unfortunately there is no corresponding monitoring of Black Lake, the source of summer time flows to the creek.

Water quality monitoring by the County has also been extensive, but largely grant funded. The Thurston County Environmental Health Division undertook several baseline monitoring programs of Eld, Henderson and Totten Inlets during the 1980s. Previous County work within this watershed was limited to intensive sanitary surveys near Boston Harbor. This data lead to the installation of a small sewage treatment plant to address this problem. There have also been other surface water quality monitoring programs associated with the Percival Creek (1992) and Moxlie-Indian Creek Comprehensive Drainage Basin Plans (1992).

While a large amount of surface water quality data has been collected in the past two decades, much of that data has been printed and forgotten in specific reports or studies. Currently, there is no easy way to link data from various state or local sources within the same geographic area. And poor communication from State departments on data collection efforts or current investigations within targeted areas can lead to agency mistrust and adverse political responses by local elected officials. With so much Research on the biological and physical systems needed, an integrated water quality data collection system based on a Geographic Information System (GIS) could save valuable financial resources in the long run. It would be a major project to collect all this data even for one watershed. However, the Thurston County Environmental Health Division took the first big step by printing a summary of all the County water quality samples for one year in a single document, Water Resources Monitoring Report: 1992-1993 Water Year (1994).

Another fundamental reason for monitoring is to determine if current pollution control programs are adequate. The PSWQA provides a "Report Card" on the health and well being of Puget Sound on a biannual basis. The report card is a condensed version of its State of the Sound Report which is used to help update its Puget Sound Water Quality Management Plan. Such an idea has been proposed in the Draft Thurston County Comprehensive Plan (1994) to help communicate to the citizens about the status of their surface, ground, lake, and marine water resources.

The background information for this chapter is contained in the Budd Inlet - Deschutes River Watershed Characterization: Part II Water Quality Study (1993). This was prepared by the Thurston County Environmental Health Division. It contains an extensive discussion of ambient monitoring, intensive monitoring areas, sediment sampling marina sampling, and other special studies. The conclusions from that document are summarized in Appendix A. Discussion of the priority issues are listed below.

Cooper Point Sanitary Survey

Sanitary surveys conducted in 1987 to 1989 as part of the Eld Inlet Watershed Action Plan (1989) found failure rates of 25 percent and greater along several shoreline sections on the Eld Inlet side of Cooper Point. A beach survey and water sampling was conducted by Thurston County Environmental Health in 1990 as part of the Budd Deschutes planning process. It identified several locations along the shoreline where on-site sewage systems are a likely source of elevated fecal coliform sample results. As a result of this and other information, the Cooper Point Sewerage Options Project began in 1991.

The project focused on conducting on-site sewage system surveys for both the Budd Inlet and Eld Inlet sides of the Cooper Point peninsula. The surveys included dye-tracing of over 700 residence's on-site sewage systems. Approximately 45 percent of the surveys were completed by mid-1994, and it is anticipated that the surveying will be completed by mid-year 1996. While the overall septic system failure rate has not been calculated, the failure rates within particular sub-areas, were less than 20 percent. Repairs are being required on those systems found to be failing. Most of the stormwater discharge pipes on the Budd Inlet side of Cooper Point identified as problems are to be addressed as part of the Sewerage Options work. There has been no on-site sanitary survey activity along the eastern shoreline of Budd Inlet.

The City of Olympia recently found and corrected at least one illegal sewer connection to a storm drain discharging to Budd Inlet. That pipe was identified as a problem pipe during a 1990 beach survey. One broken sewer pipe was also identified in the Boston Harbor area as a result of beach survey work conducted in 1993. (Davis, 1994)

Mission Creek Sanitary Survey

Mission Creek was sampled intensively during storm events as part of the Budd-Deschutes Water Quality Study. The water quality data for the creek and stormwater discharging into the creek violated the water quality standard for fecal coliform by more than an order of magnitude in most cases. As a result, a sanitary survey was conducted in 1993 of all homes served by on-site sewage systems throughout the Mission Creek Basin. Of the 76 homes surveyed, only 3 systems (4 percent) were found to be failing. It is believed that there are other significant sources of nonpoint pollution contributing to the poor water quality. One possible source is leaking sewer lines. However, few problems were found when the sewer lines in this area were evaluated by using in-pipe cameras. In this case, this technique did not find any sources of exfiltration. At this point in time no further activities are planned. (Davis, 1994)

Indian Creek Sanitary Surveys

Indian-Moxlie Creek was identified as having elevated nutrient and fecal coliform concentrations during the Water Quality Study and in the Moxlie-Indian Creek Comprehensive Drainage Basin Plan (1993). As a result, two areas within the Indian Creek watershed were selected for sanitary surveys. The first was an island of unincorporated Thurston County, called "Thurston Hole" lying between Frederick and Chamber Streets in northeast Olympia. The other was along the creek north of Martin Way called "Indian Creek". A total of 41 homes were surveyed, with six systems (15 percent) found to be failing. Four of the six failing systems will be repaired by connecting to the sanitary sewer. (Davis, 1994)

Sanitary Sewer Connection Records

During the Mission, Thurston Hole, and Indian Creek survey work, those conducting the surveys found it very difficult to identify which homes are connected to the sanitary sewer and which still use an on-site systems. Frequently the homeowner does not know and the confusion is increased if they are paying the monthly sewer rate but not be connected to sewer. Another issue is that homes which cannot connect to the sewer via a gravity line are often not connected. Unfortunately, these homes are usually the closest potential source of surface water contamination, which was the case with the homes in the "Thurston Hole". (Davis, 1994)

Elevated Nitrates in Chambers Creek

The average nitrate-nitrite concentration measured in Chamber Creek during the Water Quality Study was 1.3 mg/l, with occasional individual samples reaching as high as 2 mg/l. This was reconfirmed in 1993 with sampling for the Chambers Creek Comprehensive Drainage Basin Plan currently in progress. Surface waters within Thurston County usually have nitrate values less than 1 mg/l. Since the majority of the flow in Chambers Creek is from ground water, these values most likely reflect water quality from a wide area. With a mix of residential, agriculture, commercial land uses within this basin, the sources could be from any combination of on-site sewage systems, agricultural practices, landscaping or fertilizing practices. Since much of this basin lies within the northern Thurston County Urban Growth Boundary, potential nonpoint pollution sources may change over time as this basin transforms from rural to a more urban character. (Davis, 1994)

Elwanger and Reichel Creeks Agriculture Surveys

The Elwanger (Ayer) Creek watershed is dominated by a dairy operation. Fecal coliform samples from the creek showed that the water quality standard was consistently violated, and turbidity, total phosphorus, and ammonia were elevated downstream of the farm. The riparian area consisted almost entirely of pasture grass with little native vegetation remaining. Reichel Creek is influenced by two main land use activities; cattle operations and a logging yard operation. The log yard caused a significant increase in turbidity, however, a large wetland immediately downstream settled out the suspended solids. The cattle operations are located downstream of the wetlands. Like the dairy farm on Elwanger Creek, the native riparian vegetation was removed and the animals were pastured up to the creek's edge and were allowed unrestricted access to the water in most cases. This resulted in the fecal coliform concentrations at all stations along the creek violating water quality standards. (Davis, 1993)

Elwanger and Reichel Creeks illustrated the types of water quality impacts that can occur from use of poor management practices. Spurgeon Creek water quality also showed indications of impacts from poor agricultural practices. However, since the completion of the Water Quality Study, major improvements have been made in the management of the dairy operation on Elwanger Creek and on three cattle operations on Reichel Creek, through the efforts of the landowners and the Thurston Conservation District. The creeks have been fenced to exclude

cattle from the riparian areas and cattle crossing areas have been constructed in some locations. The riparian areas have been planted with native vegetation, and spawning gravel beds have been placed in Reichel Creek to improve Coho salmon habitat. Also a complete farm plan including a manure management strategy was developed for the dairy on Elwanger Creek. (Davis, 1994)

Ground Water Monitoring Within the Deschutes River Basin

Ground water monitoring is carried out for several reasons. Some initial water quality monitoring is necessary to determine the characteristics of the water in the aquifers. This is called aquifer characterization monitoring. The chemical character of the water in the aquifer may change with location in a given aquifer and also be different in the several aquifers that may be present below in a given place. In Thurston County, there are four geologic layers that serve as primary aquifers and three more layers that are sometimes used as aquifers. The quality of water in a particular aquifer at a particular location commonly changes throughout the year in response to seasonal variations in aquifer recharge or contaminant loading.

Monitoring can also be used to detect water quality problems so they can be corrected or avoided. In Thurston County, the most common ground water quality problem is naturally-occurring high levels of iron or manganese. This condition is present in nearly one-third of the wells in the northern part of the county. The best way to deal with this problem is to plan and construct wells so that they avoid the aquifers and areas that have the worst iron and manganese problems. Some other water quality problems are caused by human activities and can be remedied in some cases once detected. Some other types of water quality problems are subtle and may only be detected by long-term monitoring and careful statistical analysis.

Monitoring the quantity of water is becoming more important in Thurston County. This involves measuring water levels in wells, and levels and flows in surface waters. Because ground water and surface water are closely connected, it is important to understand the flow of both types of water. The U.S. Geological Survey recently released a major aquifer characterization study of the ground water of the northern county entitled Hydrology and Quality of Ground Water in Northern Thurston County, Washington: Water Resources Investigation Report 92-4109 (1994). This study examined 1,300 wells and took water quality samples from 359 wells. This included 107 wells within the Deschutes River basin. Thurston County is completing an aquifer characterization study of southern Thurston County that sampled approximately 100 wells. This included approximately 12 wells within the Deschutes River basin.

Water quality and quantity monitoring will be continuing throughout the county in the future. The Ground Water Management Plan for Northern Thurston County (1992) made recommendations for a long-term monitoring plan. The South Thurston County Aquifer Protection Strategy (1993) also planned for an ongoing program of ground water monitoring. Monitoring in northern Thurston County is currently funded by a Centennial Clean Water Fund Grant that expires in 1995 and local matching funds. Monitoring in southern Thurston County is currently funded by a similar combination of grant and local funds that expires in 1994. (Mead, 1994)

PROBLEMS IDENTIFIED BY THE WATERSHED MANAGEMENT COMMITTEE

- Comparatively little research has been done in Southern Puget Sound and in particular Budd Inlet.
- The County has no reliable funding source for comprehensive monitoring programs.
- Minimal monitoring is planned within the watershed after 1994.
- There is no existing effort to link data from various state or local sources within the same geographic area.
- There is a lack of information about the success or failures of local pollution control efforts.
- It is very difficult to identify which homes are connected to the sanitary sewer or those which still use on-site systems.
- Current surface monitoring stations are not able to identify pollutant sources which may be flowing into the streams via ground water.
- Opportunities for citizen monitoring programs in the County are limited and linked to public education programs.
- The State has abandoned one of its core water quality monitoring stations within the watershed.
- Ecology is relying on fewer static monitoring stations and more on rotating stations which are only in place for a short time.

GOAL TO ESTABLISH DATA COLLECTION AND ANALYSIS SYSTEM WHICH TAKES MEASUREMENTS OF SPECIFIC WATER QUALITY PARAMETERS AND HABITAT INDICATORS, AND WHICH PROVIDES AS A COST EFFECTIVE MEANS OF IDENTIFYING SIGNIFICANT CHANGES IN THESE CONDITIONS OVER TIME.

ACTION RECOMMENDATIONS

R&M 1 **Local jurisdictions should agree upon and adequately fund a baseline surface water, ground water and habitat monitoring program for the Budd-Deschutes Watershed.**

Discussion: *A coordinated approach of baseline monitoring would provide the first line of defense for water resources throughout the basin. It determines program effectiveness, establishes trends, identifies potential sources and attempts to minimize the cost of resource restoration. This data should be in addition to that collected by the Washington State Department of Ecology and may include retaining the former Ecology station at Rainier. The only way to address such a large geographic area would be through a cooperative funding agreement. (Thurston County Comprehensive Plan Policy: NE Water Resources B 11.)*

The stormwater utilities have developed a comprehensive surface water monitoring program which includes the northern part of this watershed. The Thurston County Groundwater Program has prepared a similar program for groundwater which will be part of an Aquifer Protection District ballot measure in the fall of 1995. Some habitat monitoring will be done in the surface water program, but most of this data is to be collected and analyzed by the Squaxin Island Tribe. The type of habitat data and the suggested tasks are identified in SED 1, SED 9, SED 11, SED 14, FOR 4 and FOR 7?

This Action Recommendation should be addressed by the Thurston County Environment Health Division in cooperation with the Squaxin Island Tribe. A scope of work should outline the number of sampling stations, location, sampling protocol, level of staff support and costs by jurisdiction. The surface and groundwater monitoring programs are reevaluated on a yearly basis and subject to local funding through stormwater utility rates, County General Fund, or grants from the Centennial Clean Water Fund. Funding for the groundwater monitoring portion may come from the Aquifer Protection District. Funding for the habitat project is described in specific Action Recommendations. The coordination of this Action Recommendation should be implemented within the next one or two years.

R&M 2 **The Thurston County Environmental Health Division should conduct intensive monitoring programs within sub-basins when water quality standards are violated or when there is a perceived threat to public health.**

Discussion: Thurston County currently follows this type of procedure, but actual intensive investigations are often dependant upon the available funding sources.

This Action Recommendation would not affect the existing Environmental Health staffing allocation. Financial resources could project specific or an initial allocation could set up a fund which could be rolled over from year to year if not used. This Action Recommendation should be implemented within the next three to five years.

R&M 3 **The Thurston County Environmental Health Division and the Thurston Conservation District should continue to monitor those creeks where farm plans were written and implemented, such as on Elwanger and Reichel Creeks.**

Discussion: Major emphasis has been placed on development and implementation of farm plans as a means to reduce the water quality impacts from agricultural activities. In order to ensure that the goal of water quality improvement is being accomplished, it is crucial that some sites be monitored over time to track the changes in water quality.

This Action Recommendation should be addressed jointly through the Thurston County Environmental Health Division and the Thurston Conservation District. It would require a one time expenditure to fund this special monitoring effort. Funding could come from the Conservation District assessment alone or in combination with a Centennial Clean Water Fund Grant. This Action Recommendation should be implemented within the next three to five years.

R&M 4 **Local jurisdictions should continue and expand citizen volunteer monitoring opportunities.**

Discussion: Citizen monitoring programs have become a central part of water resource protection programs in several areas of the country. Local examples of these programs are the "Puget Sound Keeper" and the Sequim "Bay Watchers" in Challum County. In addition to coordination, the availability of centralized equipment and expertise for the programs is important.

This Action Recommendation would require an annual expenditure. This could be funded by the City or County General Fund, stormwater utility rate or other utility fees. This Action Recommendation should be implemented within the next three to five years.

R&M 5 **Local and state agencies should jointly establish a watershed based data retrieval system for Budd Inlet and the Deschutes River.**

Discussion: A system for interjurisdictional data management is needed. Thurston County, City of Olympia, Port of Olympia, LOTT, DOH, Ecology, and Department of Fisheries all conduct some monitoring activities within the Budd-Deschutes Watershed. A centralized, coordinated data management system of information from the various agencies would provide an overview of water quality conditions within the watershed. While some of the entities already collaborate on monitoring projects, a Geographic Information System coordinated by the Thurston GeoData Center would provide more opportunities for coordination of monitoring projects and could provide a more complete strategy for evaluating water quality throughout the watershed.

This Action Recommendation would require both a one time expenditure to set up the system and an annual expenditure to input and update the database. A possible source of these funds could be from the Thurston County General Fund, annual LOTT expenditures, or a Centennial Clean Water Fund Grant to set up the database. This Action Recommendation should be implemented within the next one to two years.

R&M 6 **The Thurston County Office of Community and Environmental Programs should distribute a user friendly annual report card on county-wide water quality which includes an evaluation of the data by watershed and the type of water resource.**

Discussion: This type of public communication has been successful in other communities in Western Washington and would be modeled after the PSWQA "State of the Sound" evaluation. This report card could be included as part of an existing publication such as the "County Connection" newsletter. (Thurston County Comprehensive Plan Policy: NE Water Resources B 13.)

This Action Recommendation should be addressed by the Thurston County Office of Community and Environmental Programs. It could be funded from the County General Fund, Stormwater Utility Fees, Health Permit Fees; alone or in combination with a Centennial Clean Water Fund Grant. This Action Recommendation should be implemented within the next five years.

R&M 7 **The Thurston County Environmental Health Division, Assessor's Office and the LOTT local jurisdictions should work together to create a database which will indicate the status of sanitary sewer connections for residential single-family areas.**

Discussion: This was identified as a serious need in the Indian Creek drainage and may apply to other residential areas of similar age and character.

This Action Recommendation should be addressed by the Thurston County Environment Health Division as the lead for this program. Funding could come from the LOTT assessments or a Centennial Clean Water Fund Grant. This Action Recommendation should be implemented within the next six to ten years.

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R&M 8 **The Thurston County Environmental Health Division, Assessor's Office and the LOTT local jurisdictions should work together to create a database which will indicate the status of sanitary sewer connections for residential single-family areas.**

Discussion: This was identified as a serious need in the Indian Creek drainage and may apply to other residential areas of similar age and character.

This Action Recommendation should be addressed by the Thurston County Environment Health Division as the lead for this program. Funding could come from the LOTT assessments or a Centennial Clean Water Fund Grant. This Action Recommendation should be implemented within the next six to ten years.

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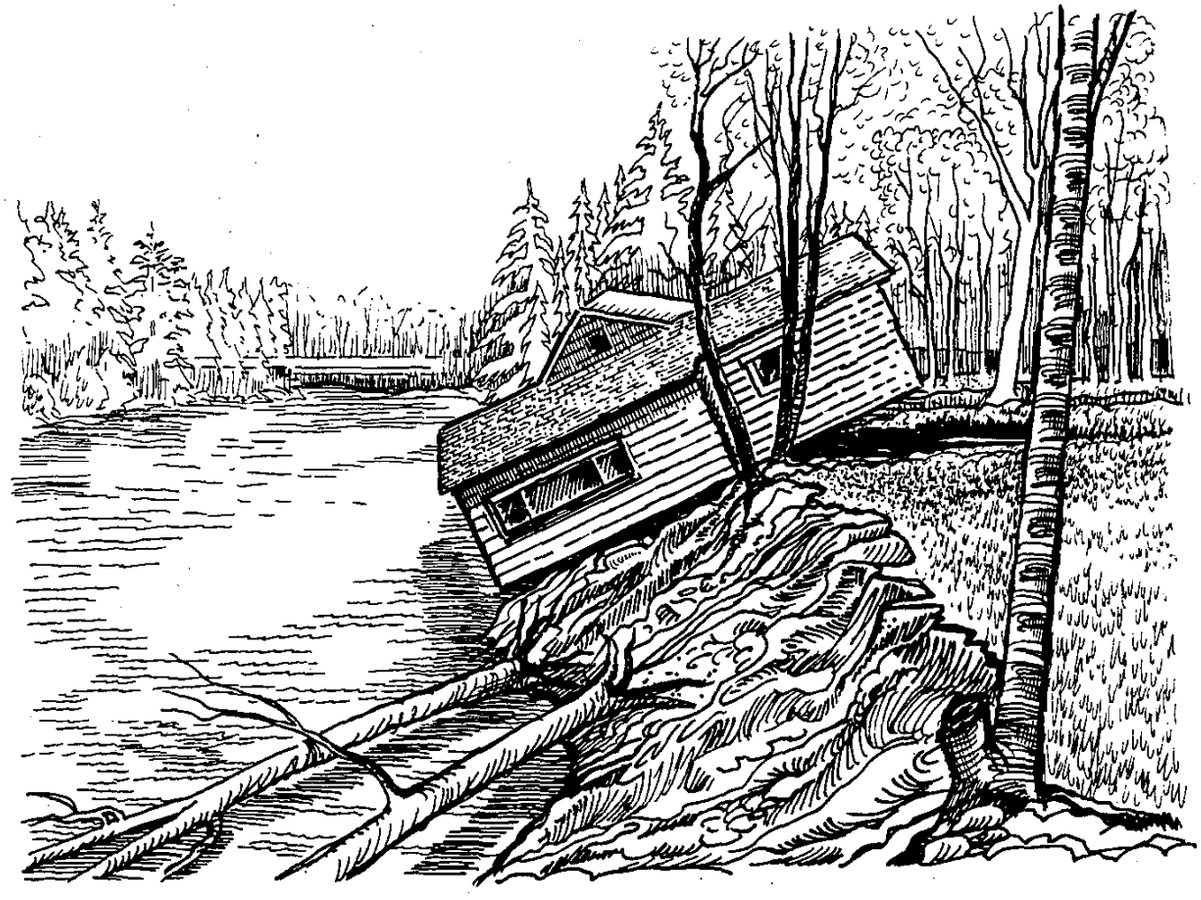
CHAPTER 4. FLOODING, BANK EROSION AND SEDIMENTATION



BACKGROUND

Flooding, bank erosion, and sedimentation are natural processes that occur in any river system. On the Deschutes River it is natural for sediment to be eroded from some sites, moved by water and deposited at other downstream sites. Floods of varying magnitudes are also natural occurrences, which on the Deschutes River are most commonly related to winter storms. This natural process of flooding, bank erosion and sediment movement provides benefits for a variety of human and wildlife activities. Sediment provides the basis for rich alluvial soils that grow farm and forest crops, and erosion of coarse sand and gravel banks provides spawning habitat.

But even though these natural processes help support human and wildlife activities, in certain cases, flooding, bank erosion, and sedimentation can create problems for the very activities they support. If homes and other structures are placed in the path of flood waters or not placed far enough back from an eroding bluff, then eventually these structures will be threatened by the bank erosion which a flood brings. In addition, human activities which cause increased runoff to be directed into the river cause the river to intensify its natural peak flows which leads to additional flooding and bank erosion. One of the most significant contributing factors to flooding and bank erosion is the removal of vegetation along the stream bank or within the riparian corridor. When river banks are cleared of their vegetation, they are much more vulnerable to erosion during storm events.

PRESENT SITUATION

Flooding

Relative to other rivers in western Washington, the Deschutes River is not as prone to frequent large flood events. During the past 40 years the river has peaked only three times at 6000 cubic feet per second as measured at the U.S. Geological Survey gage near Rainier. This volume of water is considered to be a ten-year flood event and floods portions of the floodplain. The January 1990 event was the largest of these and is considered to be a 100-year event. This flood occurred after a near record rain fall and snow melt conditions.

During the larger flood events visibly dramatic erosion and sediment movements occur. In this watershed peak flows which fill the river to the low bank occur just about every year. This "bankfull flow", though often not apparent to a casual observer, moves a significant amount of sediment.

Bank Erosion

A recent study, Channel Erosion Along the Deschutes River, Washington (1994), contains many new insights to bank erosion within this watershed. It noted that the erosion in the Deschutes River is comparable to nearby basins with similar geology and relief. The river has created an alluvial floodplain valley which is bounded by moderate to high glacial outwash terraces. At some bends the river undercuts these glacial terraces, now the valley sides, thereby continuing this process which has been underway since the last glaciation about 17,000 years ago. The study adds that when viewed over a 50 year time frame, the locations of many eroding banks is ephemeral or only periodically active. (Collins, 1994)

In a field comparison of the eroding sites between this and an earlier study (McNicholas, 1984), the highest number of eroding banks (13 percent) were low bank pasture areas. This is significant since that land use only occurs on 4 percent of the shoreline. The lack of forest vegetation appeared to promote the undercutting and caving of low banks. The erosion rate for high banks was not affected by the presence of forest vegetation along the bluff. Trees in streams were observed at 43 percent of the field survey sites and these trees appeared to be mitigating erosion in over 51 percent of the sites which contained wood. (Collins, 1994)

The report also indicates that a majority of the eroding banks (81 percent) were 10 feet high or less and accounted for 60 percent of the total volume of sediment in the river. Downstream of Fall Creek (about 5 miles east of Lake Lawrence) all course sediment produced is from mainstem bank erosion. According to a previous report (McNicholas, 1984) sand or finer material comprises 80 percent of the material eroded from banks. Local riprap use could lead to the need for progressive installations upstream and downstream, aggravating ecosystem effects. Substantially reducing mainstem bank erosion to a level less than the "natural" rate is probably only possible using widespread bank engineering projects which have the potential to affect widespread change to the river. It may be more sound to emphasize the dredging of Capitol Lake rather than a widespread program of bank protection. (Collins, 1994)

Sedimentation

It has been speculated that intense timber harvesting in the upper Deschutes watershed has increased peak flows and the amount of sediment that is transported by the river. This can cause deposition of large quantities of sediment in the slower reaches of the river. As these reaches fill up with sediment the entire river channel tends to widen, eroding into its banks and threaten the structures placed too close to the river channel. Several studies have investigated sediment load quantities, peak flows and fish habitat in the Deschutes watershed. Although the studies are in general agreement that timber harvest activities can have these detrimental effects, none of them have been able to conclusively link timber harvest, road building and management with erosion, flooding and sediment deposition downstream in this watershed (Cramer, 1993).

Watershed Strategy

Studies have shown that the problems of flooding, bank erosion, and sedimentation are intimately connected in the Deschutes River. Each one reacts to other in an interconnecting complex of cause and effect. Bank erosion contributes to sedimentation which fills the floodplain, raising the level of the next flood, which in turn "causes" more bank erosion. In the past, solutions to these problems were developed in isolation, for instance bank erosion structures often restricted channel capacity increasing flooding, water quality, habitat degradation and erosion problems downstream. Or to solve a flooding problem, the floodplain was filled to elevate structures above flood levels, effectively reducing the capacity of the floodplain to carry flood waters. Thus even though an individual erosion or flooding problem might be "solved," in general the problem is intensified.

Local agencies have learned from these experiences, and several recent actions have been taken to reduce the potential for these hazards. The Thurston Conservation District, using funds from the Department of General Administration and Department of Ecology, is installing erosion control measures that protects the river banks while providing both riparian and fish habitat. These projects were in response to the Capitol Lake Restoration Plan (1989) which called for actions to reduce the rate at which sediment is deposited in to the lake. These "bioengineering" sites used various combinations of bank hardening and revegetation techniques to explore the best mixture of bank stabilization, vegetation and fish habitat.

Another preventative measure was the adoption of the Thurston County Critical Areas Ordinance in 1993. It will limit the construction and development in the unincorporated part of the county in the 100-year floodplain to those subdivision lots created before adoption of the ordinance. Also, those persons developing properties would be required to maintain streamside vegetation buffers varying in width from 25 feet up to 100 feet. Vegetative buffers would also be required from the edge of wetlands and the landslide hazard areas which make up the steep bluffs along the river floodplain.

Thurston County is currently undertaking another measure to reduce hazards along the Deschutes River called a Comprehensive Flood Control Management Plan. Typically these plans serve as the lead policy document for how communities will manage flood hazards within a particular watershed. Because of the strong connection between nonpoint source pollution, flooding, bank erosion, and sedimentation in the Deschutes River, a number of flood hazard management policies have been integrated into this Chapter. Another purpose of a Management Plan is to identify specific projects needed to reduce flood hazards. This was outside the scope of this Watershed Action Plan but it is identified in this chapter as an Action Recommendation.

DESCHUTES RIVER REACH SCALE ANALYSIS

Reach scale analysis would divide the river into segments or "reaches" based upon gradient considerations, lateral channel migrations and bank and channel sediment source characteristics. This would identify those segments of the river that are either aggrading (building sediment), degrading (eroding river banks), or transporting (no significant net deposition or erosion).

Within each reach, factors that influence channel behavior would also be inventoried. This should include such factors as large woody debris in the channel, availability of large woody debris on the river bank, shading and off channel rearing areas, bed load distribution through the reach, land use within the floodplain and in-stream habitat conditions.

A reach scale analysis should also identify the most suitable management technique to be applied in that reach. The priority list of objectives listed on Page 4-6 should be used for this.

PROBLEMS IDENTIFIED BY THE WATERSHED MANAGEMENT COMMITTEE

- Excessive sediment traveling in the water column and along the river bottom is accelerating the migration of the river channel across the floodplain.
- The location of the channel, floodway, and 100 year floodplain are changing so that current floodplain mapping is no longer accurate.
- Structures and property located within the floodplain or adjacent to an eroding high bank could be threatened and will be difficult to protect.
- The deposition of very fine sediment within the channel is causing a loss of spawning habitat and is filling in Capitol Lake.
- There is a shortage of money, manpower and equipment to address bank erosion problems in a timely fashion and to ensure implementation of environmental protection requirements.
- Overlapping agency authority and regulation may cause undue confusion, delay and expense which can discourage voluntary actions and the support of local programs.
- There are data gaps in water quality, aquatic habitat and stream flow monitoring.

OBJECTIVES OF THE WATERSHED MANAGEMENT COMMITTEE

Reduction of flood and erosion hazards on the Deschutes River should be achieved through the following approach and order of priority:

1. Development of new structures in the floodplain and meander belt should be avoided and new residential and commercial subdivisions prevented in these same areas.

2. Landowners should be encouraged to preserve and restore riparian vegetation on the Deschutes shoreline.

3. Flood and erosion control structures should only be permitted in reaches of the Deschutes where it has been determined that flooding and erosion is threatening a beneficial use or for limited areas in order to demonstrate new technologies.

4. Erosion control structures should have incorporated into their design and construction, revegetation of the streamside/riparian corridor for a minimum width of 50 feet. This condition is a goal and may not be feasible on some sites where existing structures are within the 50 foot area.

5. Removal of structures and residences within the floodplain or relocation of structures away from eroding bluffs is preferable to dredging, diking, riprapping or other methods which attempt to constrict or alter the river channel. Erosion control structures should only be considered when relocation options are more costly or otherwise impractical such as with bridges or roads.

GOAL TO MAINTAIN A PRODUCTIVE, NATURALLY-FUNCTIONING STREAM CHANNEL AND RIVERINE ECOSYSTEM CAPABLE OF SUSTAINING BENEFICIAL USES SUCH AS WATER MEETING HIGH QUALITY STANDARDS AND FISHERIES PRODUCTION FOR FUTURE GENERATIONS WHILE STILL SUPPORTING COMPATIBLE HUMAN LAND USES.

ACTION RECOMMENDATIONS

SED 1 **The Washington Department of Natural Resources or forest landowners should conduct a Watershed Analysis within the upper Deschutes River system to determine changes in sediment transport and hydrology over time.**

Discussion: A WDNR "Watershed Analysis" would provide an analysis of impacts of forest practices on the stream channel and fish habitat and development of prescriptions to prevent future cumulative effects. It would be important to evaluate data on bedload velocities and the residency time of channel stored materials. The Watershed Analysis template could then be applied to the middle reach of the river. In this Middle Reach the Squaxin Island Tribe and Thurston County would be responsible for data collection and analysis. (Refer to SED 9, SED 11, SED 13, SED 14, SED 18, FOR 4 and FOR 7.)

This Action Recommendation would require a one time expenditure to conduct this analysis. It should be funded by WDNR and forest landowners. This Action Recommendation should be implemented within the next three to five years.

SED 2 **Thurston County should accurately delineate the extent of the floodplain and historic channel meander belt along the Deschutes River to identify areas at risk of hazard due to future channel migration.**

Discussion: The FEMA floodplain maps often do not accurately identify the 100 year floodplain and do not provide other information needed for effective management of areas adjacent to the river. Cross section surveys need to be taken at selected locations along the river and repeated after each ten year flood (6,000 cubic ft/sec. at Rainier). Then appropriate activities for these area could then be identified.

This Action Recommendation would require a one time expenditure for the mapping and baseline cross sections. These could be funded through a Flood Control Assistance Account Program Grant (FCAAP) which could be submitted in 1995. These would be one time project costs for both the mapping and potential revisions to the local Critical Areas ordinances. If a grant is received it could run from mid-1995 to mid-1997.

SED 3 **Local jurisdictions and the Conservation District should secure funding for re-establishing of riparian vegetation removed or damaged by past flooding damage and land use activities.**

Discussion: Riparian vegetation has been removed in some areas due to clearing associated with agriculture, residential and forestry development. The Collins report (1994) indicated that the removal of riparian vegetation increases bank erosion. Natural vegetation within riparian and wetland buffer areas also protects water quality and performs functions such as energy dissipation, fish and wildlife habitat, and large woody debris recruitment.

This Action Recommendation would require ongoing administration and one time costs associated with specific revegetation projects. Where possible, salvaged material could be used along with volunteer assistance when available. This could be funded through local Stormwater Utility rates, the conservation district assessment or watershed restoration grants at the state or Federal level. This Action Recommendation should be implemented within the next three to five years.

SED 4 **Thurston County should conduct a "reach scale analysis" for the Deschutes River before public funds are expended for new flooding, bank erosion, or sedimentation control projects.**

Discussion: The demonstration bioengineering projects of 1992-94 have shown that erosion on specific sites can be reduced or eliminated in the short-term. However, the long-term success of the projects need continued monitoring, and their impact on downstream properties, channel dynamics, and riparian habitat need further assessment.

A Technical Advisory Committee should use the reach scale analysis to evaluate proposals where public funds would be used. The committee would assist private landowners along the river to identify the most feasible and appropriate management measures. County and state permit authorities should also use this evaluation in determining appropriate mitigation measures for flooding, bank erosion, or sedimentation control structures.

This Action Recommendation would require a one time expenditure by Thurston County. This could be funded by a Flood Control Assistance Account Program grant and matched with local funds from the County's General Fund or stormwater utility fees. This Action Recommendation should be implemented within the next one to two years.

SED 5 **Local governments should limit allowable uses and activities within floodplains to reduce potential flood hazard.**

Discussion: It is cheaper to prevent a problem rather than try to solve it once it occurs. Existing Critical Areas or Floodplain ordinances may limit land uses in the floodplain.

This Action Recommendation would require a one time expenditure by Olympia, Tumwater, Thurston County and the Town of Rainier to evaluate and revise their Critical Areas and Floodplain Ordinances. This could be funded from local government General Funds, or a Flood Control Assistance Account Program Grant. This Action Recommendation should be implemented within the next three to five years.

SED 6 **The Thurston Conservation District should secure funding for implementation of the District's program to reduce bank erosion through re-vegetation and bio-engineering as the preferred methodology of stream channel and bank stabilization.**

Discussion: This program is needed to reduce sediment from bank erosion. Where feasible, bio-engineering is the preferred approach.

This Action Recommendation would require ongoing expenditures for program administration which are currently included in the District's annual plan, and may be included within the 1995 Thurston County Capital Facilities Plan which is updated on an annual basis. Funding for these project could come from the County's General Fund, local Stormwater Utility rates, the conservation district assessment or watershed restoration grants at the state or Federal level. This Action Recommendation should be implemented within the next three to five years.

SED 7 **Local jurisdictions should require new developments to preserve and where necessary re-establish a corridor of riparian vegetation on banks where such vegetation has been removed.**

Discussion: These regulations would only apply when new developments are located on parcels which front upon the river. These restored areas could be incorporated within an open space tracts or a conservation easement held by a local land trust. This would require amending local critical area ordinances and should be part of all clustered lot subdivisions.

This Action Recommendation would require a one time expenditure from the General Funds of the cities of Olympia, Tumwater, Thurston County and the Town of Rainier. This Action Recommendation should be implemented within the next six to ten years.

SED 8 **The Thurston Conservation District should make protection and re-establishment of vegetation along stream banks a priority when developing new farm plans.**

Discussion: *Riparian vegetation is absent in some areas where the land has been cleared for agricultural purposes. This adversely affecting fish habitat and water quality, and often increases the rate of bank erosion. Farm plans are a good way to identify areas where action is needed and to identify appropriate practices to improve riparian vegetation.*

This Action Recommendation could be accommodated by the existing District staff and within existing financial resources. This Action Recommendation should be implemented in 1995.

SED 9 **The Squaxin Island Tribe should monitor the status of riparian vegetation in the Deschutes River system and assess related water quality effects such as stream temperature and large woody debris recruitment.**

Discussion: *This would allow for an evaluation of the effectiveness of riparian protection and restoration projects.*

This Action Recommendation would require ongoing administration cost or a one time expenditure after a specific number of years. The funding sources for this could include SCS Watershed Program or the WDNR and WDFW Watershed Partnership Restoration Program. This Action Recommendation should be implemented within the next three to five years.

SED 10 **The City of Tumwater should secure funding to carry out restoration of riparian vegetation along the Deschutes River in Tumwater as identified in Deschutes River Riparian Habitat Plan.**

Discussion: This would go beyond the volunteer approach of the Deschutes River Riparian Habitat Plan by securing funding for all the identified sites. In areas where riparian vegetation has been cleared, restoration of riparian vegetation and functions can be accelerated by mitigation projects.

This Action Recommendation would require ongoing administration and on time costs associated with specific revegetation projects. This could be funded through private donations, local Stormwater Utility rates, the conservation district assessment or watershed restoration grants at the state or Federal level. The overall cost may be considerably reduced if salvaged material and volunteer assistance is available. The restoration sites identified in the Restoration Plan could be included within the Tumwater Capital Facilities Plan which is to be updated on an annual basis. This Action Recommendation should be implemented annually over the next ten years.

SED 11 **The Squaxin Island Tribe should identify and map off-channel salmonoid rearing areas in the floodplain of the Deschutes River and its tributaries. It should also evaluate the effects of nonpoint pollution and related land use activities on these waterbodies.**

Discussion: Coho salmon use habitat in side-channels and spring-fed ponds to escape high winter flows. These habitats are often not identified when projects and activities are planned and have been altered or destroyed in the past due to flood control, drainage, forest practices and development. Lack of these habitats may limit coho production.

This Action Recommendation would require a one time expenditure which could be funded from SCS Watershed Program or the WDNR and WDFW Watershed Partnership Restoration Program. This Action Recommendation should be implemented within the next one to two years.

SED 12 **Thurston County, in cooperation with the Conservation District and other state or Federal resources agencies, should develop wetland and stream restoration guidelines which improve water quality and habitat values while still providing for economic uses of the land.**

Discussion: The County and District staffs receive numerous requests for this type of information from the public and other government agencies. While bits and pieces of this currently exist, a comprehensive wetland and stream restoration guide book does not. (Proposed Thurston County Comprehensive Plan Policy)

This Action Recommendation would require a one time expenditure to prepare and print the guidelines. This could be funded from the County General Fund, local Stormwater Utility rates, the conservation district assessment or a state grant. The possible grant programs include the Flood Control Assistance Account Program, and the Centennial Clean Water Program. This Action Recommendation should be implemented within three to five years.

SED 13 **The Thurston County Stormwater Utility should assess the existing and potential cumulative peak flow augmentation from land use activities, particularly those which are exempt from the provisions of the Drainage Design and Erosion Control Manual.**

Discussion: Existing regulations do not require control of runoff from exempt activities (e.g., structures under 5000 square feet). Concern was expressed that due to intense development, the cumulative effects of many exempt activities could result in increase peak flows and loss of habitat. Some new data will need to be collected for this analysis since, WDNR's Watershed Analysis would only collect data for this calculation in the upper watershed. (See SED 1.)

This Action Recommendation would require a one time expenditure which could be funded from local Stormwater Utility rates or a Flood Control Assistance Account Program Grant. This Action Recommendation should be implemented within the next six to ten years.

SED 14 **Thurston County, in cooperation with the Washington Department of Fish and Wildlife and the Squaxin Island Tribe, should verify WDNR water type classification maps.**

Discussion: WDNR water type designations are used to determine appropriate management practices in the State Forest Practices Rules and the Thurston County Critical Areas Ordinance. Previous studies in other counties have determined that the maps are not always accurate because small streams are often not shown, and fish bearing streams (Type 3 waters) are often miss-typed as non-fish bearing (Type 4 waters). Both these problems result in inadequate buffer strips.

This Action Recommendation would require a one time expenditure to undertake a systematic evaluation of the streams within this watershed. This could be funded from the County General Fund, local Stormwater Utility rates or a Flood Control Assistance Account Program Grant which could be submitted in 1995. If a grant is received it could run from mid-1995 to mid-1997.

SED 15 **Thurston County and Tumwater should review their Critical Areas and Floodplain ordinances to ensure that the design criteria avoid any additional flood hazard or erosion potential.**

Discussion: Some uses or activities; such as the construction of roads and bridges, or the harvesting of trees; could restrict channel or flood flows which may lead to costly protection measures. Therefore, potential problems need to be addressed in the design stage rather than after the fact.

This Action Recommendation applies to all local jurisdictions, but most directly to those that border the river, being Tumwater and the County. It would require a one time expenditure from the County or Tumwater General Funds or a Flood Control Assistance Account Program Grant which could be submitted in 1995. If a grant is received it could run from mid-1995 to mid-1997.

SED 16 **The Washington Department of Natural Resources should continue to evaluate stream bank stability prior to authorizing forest practices within the Deschutes River Watershed.**

Discussion: Cutting trees and clearing vegetation along unstable banks increases likelihood of erosion. Potential effects of forest practices on bank stability, such as riparian management zones (RMZs) and riparian leave tree areas on Type 4 waters, need to be identified during design and permitting stages, so practices can be designed to prevent adverse effects.

This Action Recommendation should have little or no additional cost since it is covered by existing Forest Practices permit fees and existing permit administrators. This Action Recommendation should be implemented during 1995.

SED 17 **The Thurston County Environmental Health Division should develop materials and educational efforts with specific emphasis on preventing hazardous material pollution in the floodplain and during flood events.**

Discussion: This could be accomplished as a part of the county's existing Moderate Risk Waste Program which is staffed by Thurston County Environmental Health. Hazardous materials that are present in the floodplain may be released during floods and contaminate water, homes, land and businesses downstream.

This Action Recommendation would require a one time expenditure to develop the material, which would then be used as a part of ongoing administration. A potential funding source could be Solid Waste tipping fees or state grants. This Action Recommendation should be implemented within the next six to ten years.

SED 18 **Thurston County should convene a group of stakeholders by the year 2000 to evaluate the status of data collection and the effectiveness of restoration efforts within the Deschutes River Watershed.**

Discussion: *This recommendation provides for evaluation, restoration and monitoring of sedimentation and bank erosion, and their effect on beneficial uses such as salmon spawning gravel, rearing areas and Capitol Lake restoration. Better information is needed to effectively manage sedimentation impacts. For example, an evaluation of reach-scale impacts on beneficial uses improves the effectiveness of sediment reduction and resource restoration efforts. Monitoring is essential in order to evaluate the effectiveness of sediment reduction and restoration activities. (To be combined with IMP 5.)*

This Action Recommendation would require a one time expenditure after all the other monitoring and data collection Action recommendations are complete. This could be funded through a Flood Control Assistance Account Program Grant or watershed restoration grants at the state or Federal level. This Action Recommendation should be implemented in the year 2000.

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CHAPTER 5. FOREST PRACTICES

BACKGROUND

Forests cover a significant portion of Budd Inlet Deschutes River Watershed, totalling approximately 94,500 acres or 75 percent. Of this approximately 62,723 acres or 84 percent are privately owned and have one of several property tax designations for commercial timber production. Most of the commercial timber production land is concentrated in the upper third of the watershed. The Weyerhaeuser Company is the predominate forest landowner in the watershed with 49,480 acres (PSCRBT, 1990).

Forest practices can increase the export of sediment from portions of a watershed where harvesting activities are located. Most of the increase in sedimentation associated directly with forest activities is attributed to forest roads. In the Budd Deschutes Watershed debris flows and landslides have occurred because of plugged culverts and side cast for road landfill being de-stabilized. Also, harvesting can alter snow accumulation and melt rates which can increase channel and hillside erosion from greater runoff. Much of the upper Deschutes River Watershed is in the transient snow zone of 1,100 to 3,600 feet elevation. Refer to Appendix B for a brief description of this type of hydrologic cycle.

Until June 1992 the size of timber harvest units on private and state forest lands was unrestricted. Trees in these harvest units were usually clear cut and frequently they were located adjacent to other units where trees had been planted less than five years earlier. This gave the appearance of units several hundred acres in size with very little vegetation. This type of cutting left few trees adjacent to streams, wetlands or for wildlife purposes over large areas.

Forest practices are regulated by the State Forest Practices Act (RCW 76.09 and WAC 222). The Act and Rules were amended in 1988 and then again in 1992 to reflect the Timber-Fish-Wildlife (TFW) agreement. These revisions addressed concerns about erosion, loss of wildlife and fisheries habitat, deterioration in water quality and other issues. These revisions also set limits on the size of harvest units, set requirements for buffer areas adjacent to streams, rivers and wetlands, and established the minimum number of trees that must be retained for wildlife habitat.

WHAT IS TFW?

In 1986 and 1987 representatives of state agencies, tribes, environmental groups and the timber industry negotiated an agreement for timber production practices in Washington. The intent was to balance the production of timber for commercial purposes with the need to retain forest cover for fish and wildlife habitat, protect cultural and archaeological resources, and maintain water quality and quantity. The agreement provides for the use of "adaptive management" with the intent that timber and associated resources are managed using the best information available and with the assumption that rules and field methods can be changed in response to research and monitoring results. Much of the research conducted in the watershed by the Squaxin Island Tribe and the Weyerhaeuser Company is done under the auspices of the TFW agreement.

The Washington State Department of Natural Resources (WDNR) is the implementing agency for the Forest Practices Act and administers a permitting system for this. When land is intended to be converted out of timber production, this must be indicated on the forest practice permit application. This process is called "conversion" and requires a Class IV General permit. With a conversion the local government is notified and is responsible for reviewing the application for its environmental impacts. The County or city can also require mitigation measures that must be followed during the timber harvest.

To discourage illegal land conversions the Forest Practices Act allows local governments to place a six year development moratorium on a cleared property which did not file a conversion declaration. While this would appear to be a significant deterrent, there are also other problems with illegal conversions. First, the local government must be willing to use the moratorium, and no local ordinances exist which require the replanting of trees harvested in buffers areas during the six years. Between the three year period for replanting and the six year moratorium, a decade of damaged water quality may result.

PRESENT SITUATION

Forest Conversions

In 1993 there were 618 Forest Practice Applications in Thurston County. Of these, 190 or 31 percent were for Class IV General permits, which included conversions from timber production. No specific numbers for either are available for the Budd Inlet-Deschutes River watershed.

LEGAL VS. BACK DOOR CONVERSIONS

Conversions through the "back door" occur when a forest practice application is filed for a Class 2 or 3 permit, but no indication of conversion is made. Under the FPA rules this would be defined a Class 4 permit, which can take another two weeks to process and which local government comments have some legal standing. Sometime later, the property owner then applies for large lot subdivision, short plat or other development permit.

The WDNR and the County can enter into an intergovernmental agreement that increases the level of environmental review that all forest practice permits receive within designated areas. The agreement would stipulate that some locations in the County be designated as "lands likely to convert." The agreement could allow the county to conduct environmental review on all forest practice permit applications within the designated areas regardless of whether the applicant indicated an intent to convert. Another possible feature of the agreement is that WDNR could condition all Forest Practice Permit applications by spelling out County regulations, such as the Critical Areas Ordinance.

Water Temperature

Water temperature is a critical factor affecting the survival and growth of salmonoid fishes that reside in freshwater streams during the summer low flow period. Fish are cold-blooded and their internal body temperature must adjust to the temperature of the external environment. The optimal temperature range for most salmon species is approximately 12-14 degrees C. When water temperature is in excess of the preferred range it results in depressed dissolved oxygen and increased stress, mortality, and susceptibility to disease.

The principal source of heat for small mountain streams is the solar radiation that directly strikes the surface of the water. The amount of sunlight reaching the stream depends on the surface area of the stream and the shade provided by vegetation and topography. Reduction in vegetation cover along streams from human or natural causes increased incident solar radiation reaching the stream. This results in higher maximum summer temperatures and larger diurnal fluctuations, especially in small streams (Sullivan et al., 1990).

The effects of logging on stream temperature can be reduced by designing timber harvest units to maintain adequate shade. In Washington state, post-harvest shade requirements necessary to meet water quality standards are estimated with a temperature model which incorporates site specific factors. Shade requirements are measured in terms of canopy closure and increase at lower elevations due to the higher ambient air temperature.

The Squaxin Island Tribe has collected data on canopy closure (a measure of the shade provided to the stream from riparian vegetation) on a number of stream segments on the Deschutes River and its tributaries. Many of the stream segments surveyed failed to meet the shade requirement and maximum temperatures would be predicted to exceed the Class A standard (18.3 degrees C). This appears to be due to the width of the channel (exposing more surface area) which is aggravated in some areas by bank erosion and deposition from the 1990 flood, and disturbance of riparian vegetation from human activities and flooding. Below target canopy closure on some tributary segments was due to timber harvest of riparian stands.

Highest canopy cover values were observed in tributary stream segments in narrow canyons and in areas where solid stands of timber occur along the entire segment. Heaviest shading appeared to be provided by conifer dominated stands of mature second growth, and old growth mixed conifer stands.

TIMBER HARVESTING
HIGHLIGHTS

Harvest Unit Size

The maximum unit size is 240 acres on lands owned or controlled by one landowner. Harvest units shall be designed so that at least 30 percent of the units perimeter is in stands of trees 30 or 30+ years of age from one extreme to 90 percent of the units perimeter being of trees with a minimum of five growing seasons or, if not, have reached a height of 4 feet. (WAC 22-30-025 6/93)

Riparian Zones

The maximum Riparian Management Zone width is 100' on Type 1 and 2 waters 75 feet and over a minimum of 25 feet on Type 3 waters less than 5 feet wide. The zones shall be measured horizontally from the ordinary high water mark. Other restrictions on numbers of trees and types of trees wildlife habitat are included. (WAC 222-30-020(3))

Wetland Zones

The maximum Wetland Management Zone for wetland Type A greater than 5 acres is 200 feet to a minimum of 25 feet for wetland Type B .5 to 5 acres. Other restrictions on harvest equipment and wildlife trees are also included in the WAC for forested wetlands. (Under WAC 222-30-020(7))

Wildlife Habitat

Timber landowners are encouraged to protect wildlife habitats, provided, that such action shall not unreasonably restrict landowners action without compensation. The section on wildlife reserve tree management stipulates the number of trees to be left for each acre to be harvested. (WAC 222-30-20(10) & (11))

Large Woody Debris

The Washington Forest Practices Rules also contains guidelines for the management of Riparian Management Zones (RMZ) on fish-bearing streams. The width of the RMZ varies between 25 and 100 feet. The number of trees that must be retained in RMZ's when a site is logged varies between 25 and 100 trees per 1,000 lineal feet of stream channel.

Data has been collect by the Squaxin Island Tribe regarding the amount and condition of large woody debris in the upper third of the watershed. This includes data from the mainstream of the river and from several of its tributaries. This information is included in two reports: Monitoring of the Upper Deschutes Watershed by Schuett-Hames et al., 1991, and Deschutes River Streambed Characterization by Schuett-Hames and Flores, 1993. The findings and conclusions of from the 1993 report were significant:

> "Many stream reaches have very little large wood. Many of these channels are not likely to receive substantial inputs of large, stable wood in the near future due to the age and species composition of riparian stands. Consequently, the already low levels of LOD (large organic debris) in many of these streams are likely to continue to decline, reducing their suitability for salmon species that rear in freshwater. A strategy to address LOD recruitment in deficient areas should be developed."

WHAT IS LARGE WOODY DEBRIS?

Large woody debris (LWD) (which used to be referred to as large organic debris or LOD) is a crucial component of a healthy aquatic ecosystem (Bisson et al., 1987 and Bilby and Ward, 1991). It plays an integral role in the formation of channel morphology and fish habitat. Pools form in association with large woody debris due to scouring around stable pieces or impoundment of water behind them. This debris often traps and stores sediment, moderating the speed that sediment travels within the stream channel. Pool habitat created by large woody debris is beneficial to a variety of salmonoid species, including within the Deschutes drainage: chinook and coho salmon, and steelhead, rainbow, and cutthroat trout. Large woody debris also functions to maintain an adequate supply of spawning gravel in fast flowing stream channels.

Large woody debris is introduced to channels either by falling in or by human placement. Natural introduction to stream and river channels is largely dependent on the age and types of species within riparian zones and occurs over many years as trees age or are blown down. Land use activities which result in the removal of trees from the riparian area reduce the supply of large woody debris to the channel. Prior to 1989 TFW regulations required that all large woody debris be removed from streams after timber harvest. Upon learning more about the importance of this debris for fisheries habitat and sediment routing, these regulations were changed to retain some debris.

With a deficiency in the present amount of large woody debris in parts of the Deschutes River watershed, there is also a concern potential about future shortages. While the RMZ regulations will cause more trees to be retained in future timber harvest operations, they do not address existing deficits of large woody debris. Given the low absolute levels of large woody debris and the younger age trees in the riparian stands, a restoration strategy appears warranted. Restoration of large woody debris would enable the functions of absorbing hydraulic energy, anchoring stream banks, reducing erosion, storing sediment in the channel and providing fish habitat to be improved from recent conditions.

Road Construction and Maintenance

For several years there has been concern about the relationships between forest practice activities and sediment within the Deschutes River. Several studies and plans have been completed, among them the Capitol Lake Restoration Plan (1989), A Summary Report of the Deschutes River Basin: Sediment, Flow, Temperature and Fish Habitat (1987), and Monitoring of the Upper Deschutes Watershed (1991). While these reports vary in their conclusions as to the effects of forest practice activities, none rule out the possibility that timber harvests are a significant contributing factor in erosion and sedimentation process.

Road construction, placement and maintenance are vital components of present-day timber management. High road density (excessive roading) in a watershed can also contribute to peak flows, flooding, and erosion. Research in western Washington and Oregon has documented that improperly designed and maintained roads can create conditions for slope failures and for rapid delivery of sediment to stream channels (PSCRBT, 1990). In 1989 the Deschutes River watershed had 970 miles of forest roads (PSCRBT, 1990). Of this, 407 miles were located on Weyerhaeuser property in the upper watershed. Many of these roads are located in geologically unstable units, increasing the possibility of failure unless ongoing maintenance occurs. While the existing upper watershed road system presents ongoing challenges to protecting water quality, 98 percent of the planned road system is now constructed. This places an emphasis on establishing road maintenance activities in the upper watershed and looking to coordinate road building and maintenance in the middle watershed.

The winter storm of January 1990 caused extensive damage to Weyerhaeuser's forest road system in the upper Deschutes (Toth, 1991). The company responded with an extensive program to restore damaged roads and upgrade their capacity to withstand storm flows by increasing culvert sizes, replacing cedar puncheon crossings, and other improvements throughout the Weyerhaeuser road system. This effort was documented in a formal road maintenance plan agreement with WDNR. Improvements to the damaged portions of the road system were completed during the fall of 1993. In addition, Weyerhaeuser has begun a road assessment procedure to predict possible problems in their road system. The assessment takes into account the possibility of large slope failures, the delivery of fine sediment over large acreages and other factors to prioritized emergency response to road failures during storm events. This assessment was completed during the fall of 1994.

Downstream of Vail (the Weyerhaeuser tree farm) to the northern county Urban Growth Management boundary forests comprise a significant portion of the land uses, in a mixed ownership pattern of small woodlot owners, Christmas tree farmers and timber companies. The significance of forest road construction and maintenance for water quality in this part of the watershed is currently unknown.

Illegal Dumping and Unauthorized Motorized Vehicle Use

Illegal dumping of solid and moderate risk waste occurs on property owned by the Weyerhaeuser company and by other landowners in rural parts of the watershed. Often these materials are dumped in or close to streams, wetlands, or drainage channels. These materials vary from household garbage and fixtures, to pesticides and fertilizers, septic sludge and dead animals. Both potential hazards to human health and degradation of water quality are associated with these dumping sites. The areas normally affected are remote and difficult for enforcement agencies to respond to. County Solid Waste collection and fee processes directly affect illegal dumping.

Unauthorized use of off-road vehicles and motorcycles on powerline, pipeline right-of-ways and in streams as well as along streams is wide spread in the middle and upper watershed.

The Forest Practices Regulations WAC 222-24-050(3C) states:

> "The landowner shall not be liable for penalties or monetary damages, under the act, for damage occurring from a condition brought about by public use, unless he fails to make repairs as directed by a notice to comply."

This regulation assists landowners concerning liability issues but does not address the adverse water quality impacts.

PROBLEMS IDENTIFIED BY THE WATERSHED MANAGEMENT COMMITTEE

- The County does not have a clearing and vegetation protection ordinance setting the necessary conditions to guide where and how much tree canopy should remain as land is cleared for development purposes.

- Illegal timber harvests with the intent to convert land out of timber production continue. The six-year moratorium on land development does not appear to discourage illegal harvests. Adequate site restoration requirements adopted by local government do not exist.

- The County and DNR lack an agreement that would require DNR to use county standards to protect water quality during timber harvest in areas that are likely to convert out of timber production.

- DNR lacks adequate staff resources to continually patrol the county for violations of forest practice regulations, therefore reliance on preventative measures such as the intergovernmental agreement are necessary to protect water quality.

- The responsibility to prevent water quality degradation resulting from forest practices will be increasingly shared between DNR and the County. Presently, the County lacks adequate personnel trained in forestry and biology to meet this responsibility.

- Lack of adequate shade causes increased water temperatures and therefore stress in salmonoid species of fish in areas of spawning and rearing habitat.

- The lack of large woody debris accelerates the transport of sediment and contributes to increased rates of stream channel erosion, thereby reducing the quality of fish spawning and rearing habitat, as well as increasing the potential for total suspended solids in excess of water quality standards.

- Improper forest road construction and road maintenance significantly increase erosion with resultant increased levels of siltation and suspended sediments.

- Illegal dumping and motorized vehicle use by a small segment of the general public are causing water quality problems.

- Current enforcement and judicial processes are not effectively deterring dumping or unauthorized vehicle use.

OBJECTIVES OF THE WATERSHED MANAGEMENT COMMITTEE

- Improve water quality in the Deschutes River with the intent of removing the river from the 303d "Water Quality Limited List" by 1998.

- Encourage and promote the long-term forest management through dissemination of research findings, use of best management practices and maintenance of land use zoning that provides for commercial timber production activities.

- Provide adequate state and local resources for the ongoing implementation and enforcement of the forest practices rules and regulations.

- Restore the process of sedimentation in the watershed to a dynamic equilibrium the results of which will improve spawning and rearing fisheries habitat, reduce downstream bank erosion and prevent excessive aggradation of the riverbed.

- Encourage and support the goals and objectives of the Timber/Fish/Wildlife adaptive management process.

- Coordinate activities and disseminate findings of the Timber/Fish/Wildlife Agreement process, as well as tribal, private, and public research efforts concerning nonpoint pollution from forest practices in the Budd/Deschutes Watershed.

- Improve and restore aquatic habitat conditions associated with water temperature.

- Provide adequate shade in riparian areas to meet water quality standards for water temperature following timber harvest activities.

- Restore riparian vegetation, where necessary, to meet water quality standards for water temperature.

- Improve and restore fish habitat conditions associated with large woody debris.

- Improve water quality by restoring the natural sediment storage function of large woody debris in tributary systems.

- Implement a program to ensure large woody debris in and near stream channels of adequate quantity and quality for fish habitat prior to establishing Total Maximum Daily Loads for the Deschutes River system.

GOAL TO PROTECT THE WATER QUALITY AND ASSOCIATED BENEFICIAL USES OF THE BUDD INLET-DESCHUTES RIVER WATERSHED BY SIGNIFICANTLY REDUCING NONPOINT POLLUTION FROM FOREST PRACTICES AND TO IMPROVE WATER QUALITY SO THAT THE RIVER COULD BE REMOVED FROM ECOLOGY'S "WATER QUALITY LIMITED LIST" BY 1998.

ACTION RECOMMENDATIONS

FOR 1 **Thurston County should adopt a County Forest Practices Ordinance and develop a written procedures manual with the Washington State Department of Natural Resources to address forest practices and conversions.**

Discussion: There is a very large increase in sediment, nutrients and suspended solids when trees are removed from a site. The Forest Practices Act does not regulate all clearing activities associated with land clearing. All three previous Watershed Action Plans identified this as a major Action Recommendation, which has not yet been accomplished. Any County ordinance should provide for a restoration plan to ensure water quality protection and control erosion when land is converted out of forest land use. An agreement with WDNR is also necessary to clearly identify responsibility, Critical Areas regulations and specify how the designation of lands as "areas likely to convert" (ALTC) will take place.

This Action Recommendation would require a one time expenditure to prepare the draft and take it through the adoption process. It would then require additional staff to implement the new ordinance. Drafting of the ordinance may be funded through the County General Fund or a grant from the Coastal Zone Management or Centennial Clean Water Fund programs. Implementation of the ordinance would require an annual expenditure for the added staff time which could be funded from the General Fund. This Action Recommendation should be implemented within the next one to two years.

FOR 2 **Thurston County should add a staff position to work on the Watershed Analysis and to represent the County in other timber management policy forums.**

Discussion: The staff assigned to these tasks should have a working knowledge of the following: (1) Washington Forest Practices Rules and Regulations, (2) research on effects of timber management on water quality and fish habitat, and (3) on-the-ground knowledge of harvest methods and forest management. (Refer to Appendix C.)

This Action Recommendation would require an annual expenditure to fund this position. It may be funded through the County General Fund or Stormwater utility rates. This Action Recommendation should be implemented within the next three to five years.

FOR 3 **The Washington State Legislature should provide adequate funding to the Washington State Department of Natural Resources to enforce land conversion violations, and to develop interagency agreements with local governments on "lands likely to convert".**

Discussion: With additional demand on State resources it will be difficult to accomplish resource protection without adequate personnel for enforcement. As with local governments, without a cop, the regulations mean very little. The County can encourage the Washington State Association of Counties to support adequate funding levels.

In previous years, from 1/2 to 3/4 FTE has been working with Weyerhaeuser on activities in the upper watershed. Activities in the lower watershed are generally smaller, but require about equal time because of a wider variety in the quality of the timber operations. To provide coverage throughout the Budd-Deschutes Watershed would require 1.5 FTE.

This would be an annual cost and this level needs to be maintained into the future. Funding would be from WDNR Central Region. A possible funding source might be increased permit fees to sustain these staffing levels on an annual basis. This Action Recommendation should be implemented within the next three to five years.

FOR 4 **The Squaxin Island Tribe, in cooperation with the Washington State Department of Natural Resources, Washington State Department of Fish and Wildlife, Weyerhaeuser, and other timberland owners, should develop a restoration strategy for large woody debris within the upper and middle thirds of the watershed.**

Discussion: This plan should examine natural recruitment from riparian management zones and determine whether it is appropriate to place large woody debris within the high water mark of channels identified as being particularly vulnerable to sediment transport problems. Options should specifically address the attainment of water quality standards and the protection of beneficial uses.

This Action Recommendation would require a one time expenditure to conduct the analysis and a subsequent expenditure at a time certain (estimate ten years) to compare the data sets. Drafting of the strategy may be funded through the Small Watershed Grant or other local funding sources. Implementation of the strategy may require additional funds which cannot be estimated at this time. This Action Recommendation should be implemented within the next three to five years.

FOR 5 **The Washington State Departments of Natural Resources and Ecology, in cooperation with other stakeholders, should develop a riparian management strategy which targets canopy closure and stream temperature in affected reaches.**

Discussion: The Departments of Ecology and Natural Resources, Squaxin Island Tribe, Weyerhaeuser, and other forest landowners should be participants in the development and implementation of this strategy. The strategy should address short- and long-term needs for protection of existing riparian vegetation and restoration of those areas which currently have vegetation levels below the requirement. Options should specifically address the attainment of water quality standards and the protection of beneficial uses.

This Action Recommendation would require a one time expenditure to conduct the analysis and a subsequent expenditure at a time to match the WDOE watershed evaluation cycle of every five years. Drafting of the strategy may be funded through the USSCS Small Watershed Grant or other local funding sources. Implementation of the strategy may require additional funds which cannot be estimated at this time. This Action Recommendation should be implemented within the next three to five years.

FOR 6 **The Washington State Departments of Natural Resources and Ecology should reevaluate the current Riparian Management Zone criteria of the Forest Practices Act Rules to determine if it is possible to achieve the State water quality standards using these criteria.**

Discussion: This should be one of Department of Natural Resources and Ecology's research projects and should be funded as such. It needs to include a research team which has representation from other state agencies, the Tribes, environmental groups and the forest industry; since its conclusions could cause further changes to the Forest Practice Act. A number of basins should be analyzed and the Deschutes River should be one of them.

This Action Recommendation should be implemented by Ecology and WDNR as a one time expenditure. It should be funded from monies normally available to Ecology and WDNR. This Action Recommendation should be implemented within the next three to five years.

FOR 7 **The Squaxin Island Tribe should continue to monitor and collect data to document the condition of aquatic habitat within the watershed.**

Discussion: The Tribe should continue to collect data within the watershed on the various habitat indicators. Whereas, the Thurston County Environmental Health Division would continue to monitor and collect for water quality parameters. The County, Tribe and other resource agencies should work together to determine an appropriate protocol for aquatic habitat monitoring.

This Action Recommendation would require an annual expenditure for which there is no current funding. Possible funding sources may include Watershed Restoration Program or other grant programs. This Action Recommendation should be implemented within the next three to five years.

FOR 8 **The Washington State Departments of Natural Resources, and Fish and Wildlife should modify the emphasis of the "Watershed Restoration Partnership Program" from only addressing streams which are listed on the Salmon and Steelhead Stock Inventory, to those streams which could be removed from Ecology's 303d "Water Quality Limited List."**

Discussion: The current program addresses only the fish runs which are the worse off, instead of placing its emphasis on streams which need just a little help. The PSWQA has placed a high priority on recertifying "closed" or "conditionally closed" shellfish beds, but there does not appear to be the same emphasis by Ecology, Natural Resources or Fish and Wildlife to get streams healthy and off the Water Quality Limited List.

This Action Recommendation should be accomplished within these programs at the various state agencies. This should not require additional staff or funding. This Action Recommendation should be implemented by 1995 so that it will be part of the 1996 Watershed Restoration program.

FOR 9 **The Thurston County Roads and Transportation Department should participate in the Weyerhaeuser annual plan review for its forest roads.**

Discussion: Begun in 1987 as a part of the Timber-Fish-Wildlife agreement, this annual process reviews the Company's plans for new road construction, harvesting, fertilization, herbicides application, and road maintenance on units anticipated to be harvested. Involvement is extended to the Tribes, County, and WDNR. The review process should also include road risk assessment and maintenance throughout the watershed.

This Action Recommendation would require an annual expenditure of staff resources and could be accommodated within existing program. This could be accomplished by existing staff and within existing programs. This Action Recommendation should be implemented within the next three to five years.

FOR 10 **The Thurston County Environmental Health Division and the Thurston County Solid Waste Program should work with forest landowners to minimize the potential of illegal dumping.**

Discussion: Programs in the Environmental Health and Solid Waste would place special emphasis on the forest landowners problem and help with ways to minimize illegal dumping. Recognize that one major effective method for landowners to stop or curtail this activity is the use of gates and tank traps.

This Action Recommendation would not require additional resources and could be accommodated by the current staffs. This Action Recommendation should be implemented within the next three to five years.

FOR 11 **The Washington State Department of Natural Resources should require large private forestry property owners to prepare road management plans.**

Discussion: Plans for individual ownerships should be coordinated with one another and with road development on non-timber production lands. Risk assessment of potential road failure should be included in the management plans.

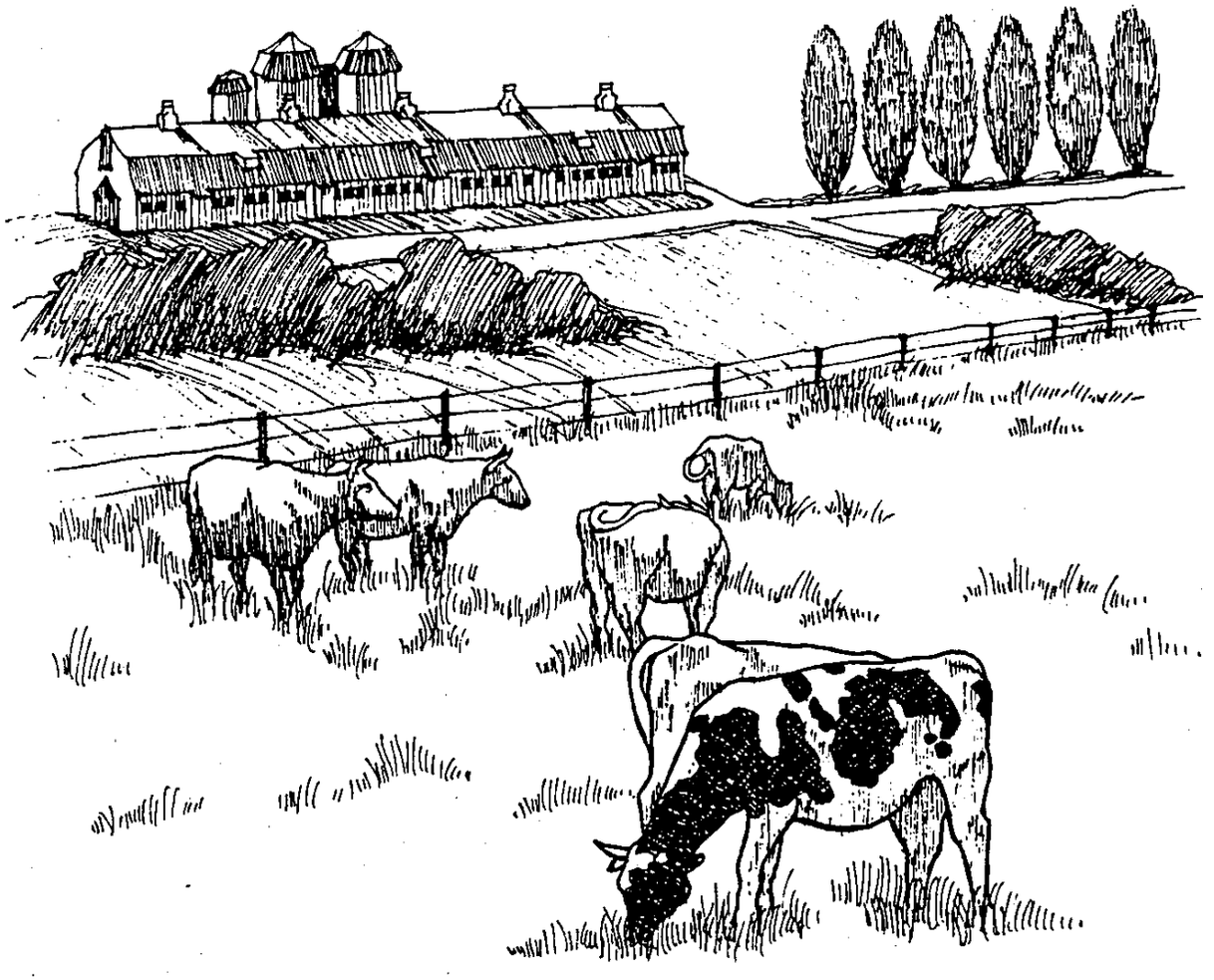
The major forest landowners within the watershed in 1989 were as follows:

Weyerhaeuser Timber Company	*49,480*	*acres*
Ft. Lewis Military Reservation	*5,986*	
Port Blakely Mill Company	*1,100*	
Three Rivers Timber Company	*860*	
Hutson Tree Farm	*540*	
U.S. Forest Land	*533*	
Jess Thompson Inc.	*460*	
Pendleton Miller Land and Timber	*260*	

Source: PSCRBT (1990)

This Action Recommendation should be addressed by WDNR. It could be funded by existing permit fees and should not require any additional staff. This Action Recommendation should be implemented within the next three to five years.

CHAPTER 6. AGRICULTURAL PRACTICES



BACKGROUND

Since the settlement of European immigrants into the watershed, agriculture has been a part of this landscape. Beef, dairy, poultry and hay operations of a commercial nature are now found on the floodplain of the Deschutes River and its tributaries. Also, scattered throughout the watershed are non-commercial farms.

When agricultural operations are managed properly, the opportunities for water quality degradation are minimal. Best management practices such as fencing, pasture management, streamside buffer retention and proper manure management create productive farms that do not adversely effect water quality. The Comprehensive Farm Plan, approved by the U.S. Soil Conservation Service and implemented through the Thurston Conservation District, is a very effective tool in establishing on-the-ground appropriate agricultural practices.

In the judgement of the Budd Inlet-Deschutes River Watershed Management Committee properly managed agricultural operations outside of the northern county Urban Growth Management boundary are an appropriate use to maintain within the watershed. This is because agriculture tends to keep intact the natural functions of the floodplain while still achieving an economic use and maintaining a tax base on the land.

FARMS IN THE WATERSHED

In 1989 the Puget Sound Cooperative River Basin Team found 19 commercial farm operations covering 2,296 acres. Small farms in the watershed covered 8,052 acres, nearly triple the land area of commercial farms.

PRESENT SITUATION

The results of the 1990-92 water quality study for the watershed indicated that three tributaries to the Deschutes River were impacted by agricultural practices. Characterized by agricultural and rural land uses Reichel, Spurgeon and Elwanger Creeks had elevated levels of fecal coliform and total suspended solids. Fortunately, some of the problem areas within all three of these tributary basins are being restored through the farm planning and implementation process. On Reichel Creek for instance, several landowners have established streamside buffers and restricted cattle from the creek on over a half mile section of the creek. This was accomplished through the assistance of the Thurston Conservation District.

Current efforts to address farm-related water quality problems include comprehensive farm planning, and training opportunities at the model farm on Dobbs Creek Model Farm in the Henderson Inlet watershed. Also, two new county regulations, the Nonpoint Source Control and Critical Areas Ordinances, address agricultural practices. The first by discouraging management practices that would allow animal waste to enter the stream. The second requires buffers of native vegetation be retained along streams.

WHAT IS A CONSERVATION DISTRICT?

The Thurston Conservation District (TCD) is not a part of County government. It is a subdivision of State government with its own locally elected board and budget process. TCD adopts an annual work program and receives funding from various federal, state and local sources. Its offices are located in Tumwater in the same complex as the U.S. Soil Conservation Service and the Thurston County Cooperative Extension Office (which is a Thurston County department).

The Thurston Conservation District works with farmers to develop comprehensive farm plans to improve resource management and protect water quality. Because of changes in ownership or in the activities at a farm, farm planning is an ongoing effort. Frequently, costs are shared between farm operator and the public for implementing best management practices identified in comprehensive farm plans. Source of cost-share funds are grants and the Washington State Revolving Loan Fund. As of this writing, three grants are being used for farm planning in the watershed--one is the watershed planning grant, the second a grant from the Washington Department of General Administration and the third is a grant received by the District to protect ground water quality throughout the Northern Thurston County area.

PROBLEMS IDENTIFIED BY THE WATERSHED MANAGEMENT COMMITTEE

- Conversion of agricultural land to more intensely developed uses, increases the possibility of contaminated runoff and more significant peak flood flows.

- There is a lack of local and state resources to assure ongoing implementation of conservation plan program and enforcement mechanism for water quality violations once the plan is initially executed.

- The improper utilization of livestock waste, particularly by small to medium sized operations can lead to bacterial contaminants and high nitrate levels.

- Livestock have caused bacterial contamination and bank erosion at a few sites along the river.

GOAL TO PROTECT THE WATER QUALITY OF THE DESCHUTES RIVER AND ITS TRIBUTARIES BY IMPROVING AGRICULTURAL MANAGEMENT PRACTICES TO REDUCE BACTERIAL, CHEMICAL AND SEDIMENT POLLUTION.

ACTION RECOMMENDATIONS

AG 1 The Thurston Conservation District should continue to prepare and implement comprehensive farm plans for commercial and non-commercial operations within the Budd-Deschutes Watershed.

Discussion: Those operations that are identified as immediately threatening water quality should be engaged in the farm planning process first. Volunteers should be used to the fullest extent possible to maximize water quality education opportunities and to extend the resources of the Conservation District. The District should periodically review implementation of farm plans as needed.

This Action Recommendation should be addressed by the Thurston Conservation District. It is being funded by a variety of sources including The Conservation District assessment. This Action Recommendation should be implemented within the next one to two years.

AG 2 Thurston County Environmental Health Division should continue to provide enforcement of the Nonpoint Pollution Ordinance and the Thurston Conservation District should continue to provide technical assistance as requested by the County and the landowner.

Discussion: An existing Memorandum of Agreement refers all landowners violating agricultural nonpoint pollution standards to the Conservation District for free assistance with corrective measures. Staff of the Conservation District and County Environmental Health discuss violation cases, however, any corrective actions requiring outside financial assistance may depend upon the availability of grant funding. During the watershed planning process the County Health Division efforts within this watershed were grant funded.

This Action Recommendation should be addressed by the County and Conservation District. Additional funds would be needed to support the County Environmental Health effort. This Action Recommendation should be implemented within the next one to two years.

AG 3 Thurston County should encourage farmers within the rural portion of the watershed to keep their land in farm production and to fully utilize the County's agricultural resources.

Discussion: The County provides a number of existing services to residents about agricultural practices. It currently funds both the Cooperative Extension Office and an Agricultural Advisory Committee which provides guidance to the County Commissioners about strategies for support of the local agriculture industry. Funded programs for 1994 include an inventory of farm operations, development and installation of designated agriculture area signage and the annual Farm Tour sponsored by the Agricultural Advisory Committee.

This Action Recommendation should be addressed by the County. It should not require any additional County resources and will be implemented within existing County work programs. This Action Recommendation should be implemented within the next three to five years.

AG 4 The Thurston Conservation District should identify and, where necessary, assist in the corrections of water quality problems before development rights are purchased on agricultural land.

Discussion: The County should consider requiring that farmland owners commit to correcting any water quality problems which their farm may be causing. This commitment should occur prior to the county acquiring the development rights to such farms.

This Action Recommendation would require a one time expenditure. It is, however, dependant upon the County implementing a Purchase of Development Right Program for all long-term agricultural areas. If appropriate scheduling time is available, this would not require any additional staff or District resources. However, if the corrections of all six designated agriculture areas within the watershed need to be corrected at the same time, this may require additional resources. This Action Recommendation should be implemented within the next three to five years.

AG 5 Thurston County should continue the Conservation District tax assessment provided that the District continues to use these funds to leverage grant funds whenever available, and to support technical assistance within this and other watersheds.

Discussion: One example of a grant program that should be considered is the Small Watershed Program Grant (PL 566 program) from the U.S. Soil Conservation Service. These funds can be used for coordinating projects at multiple sites in a watershed. Such a "watershed" restoration strategy may include various recommendations from the Watershed Action Plan.

This Action Recommendation should be addressed by the County and the Conservation District. It would not require any additional County resources and will be implemented within existing County and Conservation District work programs. This Action Recommendation should be implemented within the next three to five years.

AG 6 Thurston County should pursue a Transfer of Development Rights (TDR) and a Purchase of Development Rights (PDR) program for designated agricultural areas within the watershed.

Discussion: There are six long-term agricultural areas within the watershed totalling 2,668 acres. An evaluation of both of these programs is suggested by recent amendments to the County Comprehensive Plan. The TDR program was being pursued by a committee of Thurston Regional Planning Council. The evaluation of the PDR program is funded for 1994 and 1995. It will be necessary to coordinate with the local land trusts to avoid duplication of efforts to protect agricultural land.

This Action Recommendation would contain two parts. The County TDR and PDR programs are both funded work programs for 1995. However, the costs associated with implementing any recommendation are not known and therefore not included. The Action Recommendation should be implemented within the next three to five years. It could run several years and its length may be depend upon the available funding source.

AG 7 The Washington State Legislature should maintain state funding for the Washington Conservation Corps.

Discussion: This group is specifically trained in installing on-the-ground best management practices which are key to proper implementation of farm plans. In other counties these have been called "SWAT" (aka Surface Water Action Teams). Corp teams have been funded by various State and county agencies.

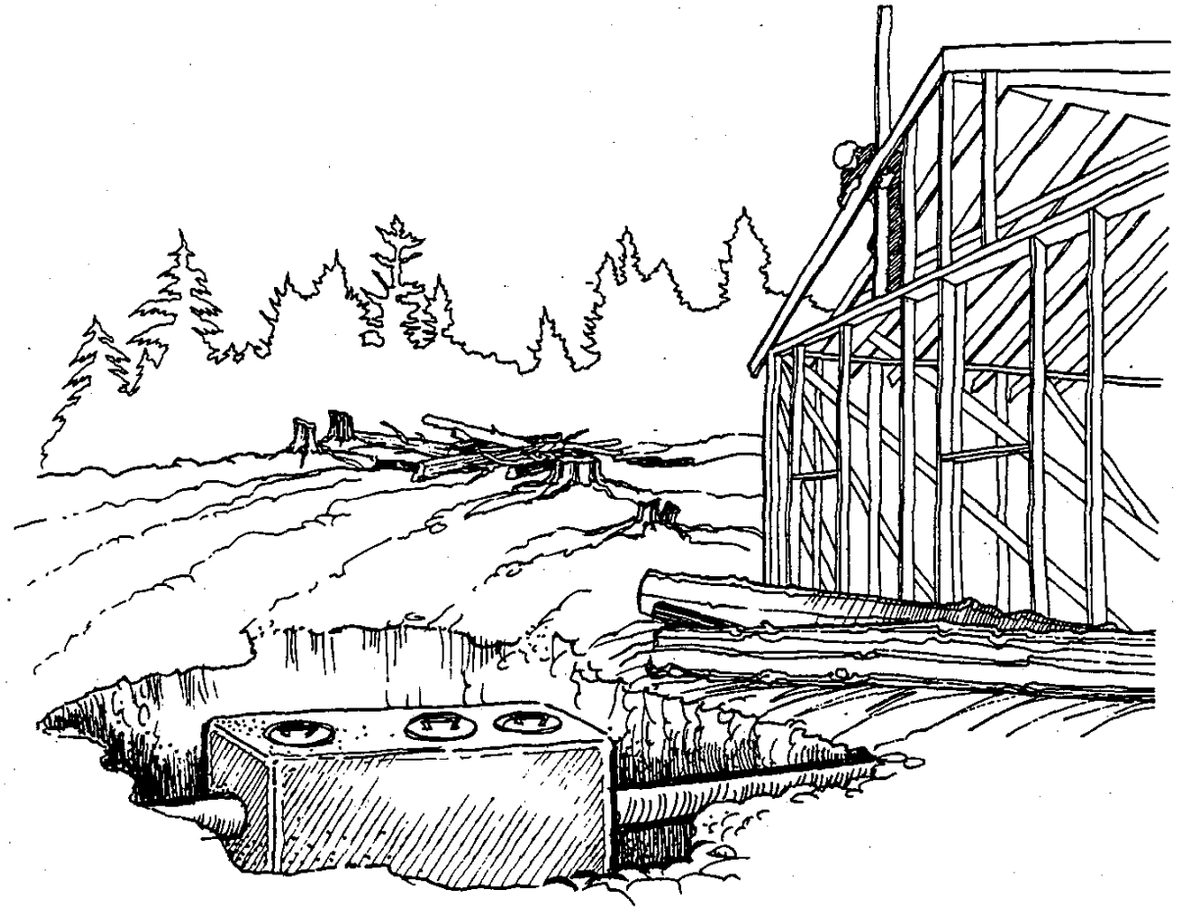
This Action Recommendation would require a biannual support form the state legislature as well as any local "sponsor" who wishes to use the Corps. Local funds would need to be set aside from County, Stormwater Utility, Conservation District or a combination of local sources. This Action Recommendation should be implemented within the next three to five years.

AG 8 Thurston County should evaluate and, if possible, strengthen the Open Space Tax Program for "Surface Water Quality Buffer Areas".

Discussion: Revisions to the Open Space Tax Program will require assistance and coordination with the Assessor's Office. Once a revise program were in place, it would be administered by the Advance Planning and Assessor's Office with the other portions of the program. Currently, landowners not in the open space agriculture tax program may apply for property tax reduction for those portions of property that are fenced to prevent livestock access to surface water. Since this is a relatively small area along a stream or drainage, it carries a low assessed value and even with the 90 percent tax reduction, there can be little change in the property taxes for the entire property. Therefore, use of this incentive has been minimal even though it was added to the Open Space Tax Program at the request of the Conservation District. While changing the criteria for eligibility may result in a stronger landowner incentive, the County needs to evaluate the tax base implications and if there are other more effective incentives to protect water quality.

This Action Recommendation would require a one time expenditure. This could be funded out of the County General Fund. This Action Recommendation should be implemented within the next six to ten years.

CHAPTER 7. WASTEWATER MANAGEMENT



BACKGROUND

Wastewater discharged from residences, businesses, and industries is a significant use of our water resources. These wastes are collected and disposed into the subsoil by on-site sewage systems, or transported to a sewage treatment plant by a system of sewer lines. On-site sewage systems are the means of wastewater disposal in all rural portions of the watershed. As a result, it is important to ensure that they are operating properly. If these on-site sewage systems are not correctly installed or are poorly maintained, the amount of contaminants that reach ground water can increase, as system failures are not always detected or reported. It is important to note that even a well sited and maintained, such systems cannot remove all of the contaminants that enter the system.

On-site sewage systems use soil as the disposal medium for wastewater. The wastewater contains bacteria, viruses, and chemical constituents, many of which threaten public health. However, the systems and soils are generally effective in removing bacteria, viruses, and other pathogens. This is done through flotation, sedimentation, and bacterial decomposition in the septic tank, and by filtration, adsorption, and bacterial and chemical decomposition in the soils around the drainfield. Exceptions occur with poorly designed and sited wells and drainfields, causing local problems with pathogens in water supplies. However, pathogens usually do not reach any but the shallowest aquifers.

Phosphorus in sewage effluent usually does not become a problem unless the on-site sewage systems are sited too close to surface water or have insufficient vertical separation. However, nitrate removal is more problematic for these on-site systems. Nitrate is not easily removed from sewage effluent and is a public health concern at high levels due to its link to a blood disorder in infants called methemoglobinemia. Because of this public health concern, state and federal drinking water standards established a maximum contaminant level of 10 parts per million for nitrates. (Starry, 1990) Nitrates are also important as a general indicator of ground quality because of their association with other sources of contamination, such as stormwater and fertilizers.

Sewering often is proposed as a remedial or preventive action to cope with ground water contamination by on-site sewage systems. Collection, treatment, and discharge of sewage effluent by sewer systems reduces the pollutant loading to ground water resources. However, there are trade-offs associated with sewage systems, including significant capital costs for construction of the plant and sewer lines; financial infrastructure to support construction and ongoing operation and maintenance; water quality impacts of effluent on the receiving waters, and disposal of sludge. (TCEHD, 1992)

PRESENT SITUATION

In 1990 about 42 percent of the entire population of Thurston County resided within the boundaries of the Budd Inlet Deschutes River Watershed. Forecasts from Thurston Regional Planning Council indicate that by the year 2015, the population within the watershed is expected to increase by approximately 50,000 persons. While much of this increase will be located within the northern county Urban Growth Area, this represents a 73 percent increase over the 1990 levels.

Approximately 19,500 dwelling units are located within the Budd Deschutes Watershed, including those connected to the LOTT (Lacey, Olympia, Tumwater and Thurston County) sewer system. The majority of these residential units use on-site sewage systems. There are a number of small sewage treatment plants on Budd Inlet. These include approximately 284 homes in the Boston Harbor community, Beverly Beach Subdivision of 20 homes, Sea Shore Villa mobile subdivision of 120 homes, and the Tamoshan subdivision of 84 homes.

By comparison the current LOTT treatment plant provides service to 25,800 equivalent single family units which includes discharges from industrial, commercial, and residential users. The LOTT service area lies within this watershed as well as the urbanized portion of the Henderson and Nisqually Reach watersheds. The LOTT plants treats upwards of 22 million gallons of wastewater daily during the winter months and receives and treats three million gallons per day of stormwater inflow during wet weather. The plant has been ungraded so that effluent receives secondary treatment and is de-nitrified before it is discharged into Budd Inlet.

The limiting nutrient in Budd Inlet is nitrogen so flows from the Deschutes River and other creeks which are high in nitrogen are a concern. High nitrogen levels have contributed to large algae blooms, which frequently cause low dissolved oxygen levels. These low dissolved oxygen levels have been identified as the cause of several fish kills within the inlet.

A total reliance on individual on-site sewage systems within the rural area has important long-term water quality implications. Each system discharges an average of 45,000 gallons of effluent into the soil each year. (Jaffe and others, 1987) Also, with an increasing number of dwelling units in the rural area there are more residents with little knowledge or experience in maintaining increasing complex on-site sewage systems. Another common occurrence throughout the county is the conversion of cabins, often along the shoreline, into year-round residences, which in some cases, has been done without increasing the size of the previous on-site sewage system.

The U.S. Soil Conservation Service (SCS) soil mapping of Thurston County, indicates a large percentage of the watershed is poorly suited for on-site sewage systems for various reasons. Based upon Thurston County's Aquifer Recharge Area map, approximately 18 percent of the watershed (within Thurston County) lies mountainous soils and are not suitable due to lack of soil depth and excessive slope. Approximately 22 percent of the watershed contains hydric soils which are not suitable due to their proximity to the river, high water table, and periodic flooding. The largest percentage of soils (39 percent) are those classified as Type I, and are excessively drained. Densities within these soils are limited by state health code and concerns with this category relate to the cumulative effects of on-site systems on ground water and eventually stream flow. The last soil category has somewhat slower impeded drainage but it does contain a constricting layer which would provide some protection from the local ground water aquifer. Approximately 19 percent of the watershed contains this category. Approximately 2 percent of the watershed are ponds, lakes, or stream beds. (Refer to **CHAPTER 3, RESEARCH AND MONITORING PROGRAMS**, *Chambers Creek Elevated Nitrate Levels.*)

Thurston County implements the State Board of Health Sewerage Regulations (WAC 246-272) through Article IV of the Thurston County Sanitary Code. This article regulates the siting, design, construction, repair, and replacement of on-site sewage systems and sets standards for subdivisions proposing the use of these systems. It also contains authorization for renewable permits for these systems and contains a means for the requirement of connection to a public sewer.

Thurston County has an operation and maintenance (O & M) program for existing on-site sewage systems. It is currently applied at the time of construction for new permits or with the sale of the residence. About 11,000 of the approximately 40,000 septic systems are currently in the O & M program. The current system is only a certificate program with little inspection occurring beyond managing the pumper reports. Changes to the State Health Code will require the County Environmental Health Division to implement a county-wide system within just a few years. These new state requirements will add additional costs, necessitate new staff which will need to be financed by a new funding program. The Environmental Health Division is evaluating several options for review by the Thurston County Board of Health.

PROBLEMS IDENTIFIED BY THE WATERSHED MANAGEMENT COMMITTEE

- Bacterial levels exceed water quality standards in certain parts of the watershed.
- The cumulative effects of on-site sewage system failing and then impacts of those failures is not well known.
- The County's current operation and maintenance program for on-site sewage systems only applies to about 25 percent of the residences.
- Repairs of on-site sewage systems are difficult when poor soils or under-sized lots limit the financially feasible alternatives.
- High density residential areas with on-site sewage systems may be contributing to high nitrate levels in some sub-basins.
- The source of higher bacteria and nutrients levels in some sub-basins which are hooked up to sanitary sewage system is unknown.
- Obstacles exist to encouraging innovative management and treatment of sewage generated by on-site disposal systems.

GOAL TO PROTECT THE WATER QUALITY OF BUDD INLET, THE DESCHUTES RIVER AND TRIBUTARIES BY REDUCING EXCESSIVE BACTERIAL AND NUTRIENT CONTRIBUTION FROM IMPROPER DISPOSAL OF WASTEWATER.

ACTION RECOMMENDATIONS

WW 1 **The Thurston County Environmental Health Division should conduct an intensive sanitary survey of the eastern shore of Budd Inlet from Olympia to Boston Harbor.**

Discussion: This will complement previous intensive sanitary survey work done on Cooper Point and in the Boston Harbor area. It will complete the shoreline intensive survey of Budd Inlet.

This Action Recommendation would have a one time expenditure for the Environmental Health Division. A possible source of these funds could be the County's General Fund or a Centennial Clean Water Fund Grant. This Action Recommendation should be implemented within the next one to two years.

WW 2 **The cities of Lacey, Olympia and Tumwater should include the criteria of "preventing or correction of water quality degradation" when deciding to locate or extend a sanitary sewer into an existing or partially developed neighborhood where on-site sewage systems are presently used.**

Discussion: In 1992, the cities signed an agreement to implement specific sewer interception construction from the Thurston County Sewerage General Plan (1990). This could be amended during the next update of each City's general sewer plan. These could then be incorporated in to the next Comprehensive Plan revisions for the cities of Lacey, Olympia and Tumwater.

This Action Recommendation would require a one time expenditure. This would be funded out of the City's existing program budgets for their general sewer plans. This Action Recommendation should be implemented within the next three to five years.

WW 3 **The Thurston County Environmental Health Division should provide on-site sewage system owners educational materials and training at all possible opportunities.**

Discussion: Moments of opportunity include but are not limited to; change of ownership, at the time of permitting a system, during maintenance inspections, in neighborhood workshops.

This Action Recommendation would have a one time expenditure for the Environmental Health Division. Distribution of these materials would be included with the normal administration of the on-site sewage system permit program. The possible source of these funds could be through a the County's General Fund or a PSWQA Public Involvement and Education Grant. This Action Recommendation should be implemented within the next six to ten years.

WW 4 **The Thurston County Board of Health should consider the recommendations of the County Health Division's On-Site Sewage Advisory Task Force to modify the operation and maintenance permit system.**

Discussion: Thurston County is currently evaluating several alternatives to deal with new state legislation dealing with operation and maintenance programs. The following components should be included to ensure an efficient permit system that also strives to protect water quality (1) inventory and evaluate all on-site sewage systems in the watershed (2) collect data on system type, location, site condition, soil condition, and performance, and (3) ensure that all systems are inspected at regular intervals, and (4) improve the installer/pumper certification program to better define the responsibilities of both parties.

This Action Recommendation would not directly require the expenditure of any additional staff resources. However, the Advisory Committee's recommendation may have a one time or long-term staffing implication which is not known at this time. This Action Recommendation should be implemented within the next three to five years.

WW 5 **The Thurston County Environmental Health Division and the Olympia Stormwater Utility should continue to investigate storm drainage systems within the Indian, Moxlie, and Mission Creek basins to determine the source of elevated fecal coliform counts.**

Discussion: A number of storm sewer systems have been "scoped" with a small video camera looking for cross connections with little success. However, since these three creeks provide almost all the fresh water flow into East Bay, it will be difficult to improve water quality there without eliminating all possible sources of fecal coliform.

This Action Recommendation would have a one time expenditure for Environmental Health and the Stormwater Utility. Possible sources of these funds could be the County's General Fund, the Olympia Stormwater Utility rates, or a Centennial Clean Water Fund Grant. This Action Recommendation should be implemented within six to ten years.

WW 6 **The Thurston County Environmental Health Division should recommend changes to the zoning densities or land use practices for sub-basins where the monitoring data shows ongoing degradation.**

Discussion: The carrying capacities will likely vary depending on the type of sewage treatment and disposal technology and other best management practices being used or considered for the sub-basin. The results of a carrying capacity analysis may present varying options for land uses and population densities given different scenarios of technology to protect water quality. An example of this type of program will be the Cooper Point Sanitary Survey. Such an analysis may also need to be undertaken in the Chambers Creek Sub-basin.

This Action Recommendation would have a one time expenditure for the Environmental Health Division. A possible source of these funds could be the County's General Fund or a Centennial Clean Water Fund Grant. This Action Recommendation should be implemented within six to ten years.

WW 7 **The Thurston County Board of Health should continue with financial incentives, such as the revolving loan fund, to encourage maintenance and repairs of on-site sewage systems.**

Discussion: A revolving loan fund for these purposes was created in 1991. However, there has been little interest in the program which is believed to be a result of very low interest rates. It is believed that usage will increase as interest rates go up and when more people are required to upgrade their existing systems. Unfortunately, connections to sanitary sewers are not covered under this program.

This Action Recommendation could be accomplished with existing staffing and financial resources. This Action Recommendation should be implemented within the next one to two years.

WW 8 **The Washington State Board of Health should continue to encourage the development of innovations in the technology of sewage treatment and effluent discharge from on-site and community sewerage systems.**

Discussion: These circumstances would address the Town of Rainier, and small, developed lots on marine shorelines. Measures that could be considered include water conservation, composting systems and land disposal of liquid effluent.

This Action Recommendation would have a one time expenditure for the State Agency. A possible source of these funds could be the State's General Fund. This Action Recommendation should be implemented within one to two years.

WW 9 **The Thurston County Environmental Health Division should continue to develop tools and techniques to identify specific pollutant source sites in already identified problem areas.**

Discussion: These should be applied to at least the following areas in the watershed; Mission Creek, Indian Creek, Evergreen Shores along Black Lake.

This Action Recommendation would not require the expenditure of an additional staff resources. This Action Recommendation should be implemented within the next three to five years.

WW 10 **The Thurston County Environmental Health Division should undertake an assessment of the contributing factors to failures of on-site sewage systems.**

Discussion: Factors to be assessed will vary from site to site. In determining sampling protocols for the assessments the following factors should be considered, in addition to the particular engineering and technology of the system that failed--soil type, maintenance history, quantity, quality and proximity of surface water runoff to on-site system and adjoining land uses.

This Action Recommendation would not require a one time expenditure and could be funded by the County General Fund or a grant from the Centennial Clean Water Fund. This Action Recommendation should be implemented within the next three to five years.

WW 11 **The cities of Lacey, Olympia and Tumwater should establish and actively pursue a program for conversion to the sanitary sewer system, within neighborhoods where on-site sewage systems are used, and yet sanitary sewer lines are in place.**

Discussion: Previous decisions for enforcing hook-up to the sanitary sewer system have been based on determinations by the County Health Department that a particular on-site system was failing. This recommendation shifts from a corrective focus to a preventative focus. According to the Thurston County Sewerage General Plan agreement, the cities are to confer with the County Health Division before placing a sewer construction project in its annual sewer capital improvement plan. Also the Thurston County Sanitary Code, Article IV, Sections 1.3.1; G: and 26.2 contain regulatory guidance on the conversion to sanitary sewers which applies within the incorporated and unincorporated areas. Some factors to be considered when establishing the timelines are soil conditions, number of systems on-site systems failing, density of existing and planned development.

This Action Recommendation will require revisions to the cities general sewer plans. This would require a one time expenditures for all three jurisdictions. This could be funded out of the City's General Fund budgets. This Action Recommendation should be implemented within the next three to five years.

CHAPTER 8. STORMWATER MANAGEMENT

BACKGROUND

Rainfall may evaporate, be transpired by plants, infiltrate into the ground, or runoff into drainage courses that discharge into natural waters. Residential, commercial and industrial land uses have a much higher volume of runoff than rural land uses. This is because urban land uses have a much higher percentage of impervious areas. Impervious areas are hard surfaces such as rooftops, driveways, streets, parking lots, and highways; even grass lawns are almost as impervious as some paving. Stormwater is defined as runoff from these land uses and is often called urban runoff.

In developed areas, certain pollutants are more prevalent than in undeveloped areas. Typically, contaminants include suspended solids, nutrients, bacteria, oils and grease, and metals and other toxicants. Many of these contaminants come from motor vehicles; others from applications of fertilizers, pesticides, or herbicides; pet feces; or poor management of various wastes. The atmosphere in an urban area also contains particles and associated contaminants from cars, factories, and wood stoves. So when it rains, these particles--and pollutants--may be deposited on the water, or they may be deposited on the land and be washed into the nearest body of water--stream, lake, or Puget Sound. It can even seep into the local ground water aquifer.

Construction activities contribute to the stormwater pollution problem because of the potential for erosion from construction sites. Stormwater is a significant source of the pollutants that have concentrated in sediments in several urban bays. The primary effect of development on streams has been to increase both the volume and speed of peak flows. The resulting erosion, scouring, and deposition of sediment affect the ecological balance in the stream. Diversity of species decreases and more tolerant (and usually less desirable) species remain.

The potential for significant pollution from stormwater has been increasingly recognized in the past ten years. Metro detected six metals in all 78 samples collected in the Seattle area between 1980 and 1982. In Thurston County, some stormwater may exceed water quality criteria for cadmium, copper, lead, nickel, and zinc (TCEHD, 1989). Further, the concentrations of these metals does not appear to differ among the three basic land use types sampled--residential, commercial, and industrial. Runoff from freeways, however, was consistently higher for most metals.

The 1991 PSWQA Management Plan calculated that the quantity of pollutants contributed to the Sound from stormwater runoff is approximately equal to the contribution from municipal and industrial sources. As urbanization within the Budd Deschutes Watershed continues, the contribution of stormwater to the pollution of surface waters could become more severe, unless effectively managed. (PSWQA, 1991)

PRESENT SITUATION

Storm and surface water programs within the region were initiated in 1983 with a report on Stormwater Management in North Thurston County. Since then there have a number of efforts to address stormwater effects on water quality and other stream resources. These efforts were developed in response to growing concerns over the impacts of urbanization on surface waters in the north county areas. The adoption of the Puget Sound Water Quality Management Plan in 1987, and the emergence of Federal nonpoint pollution programs, caused both state and Federal regulators to place a new emphasis on "cleaning up" urban stormwater. Since stormwater pollution is chronic and largely related to the system of pipes already in the ground, it may take some time to change the historical trends. Another factor in this delay is the necessity to change people's awareness, attitudes and behavior about the proper use and disposal of surface water. The following is a brief summary of key features of stormwater management in northern Thurston County.

Storm and surface water management programs for the Cities of Lacey, Olympia and Tumwater and Thurston County cover the northern third of the Budd Deschutes Watershed. These jurisdictions have agreed to undertake stormwater management on a watershed basis, recognizing that these are not limited by governmental boundaries. Coordination between the programs occurs through regular meetings of the public works directors and their stormwater technical advisory Committee. These result in memorandums of agreement on specific projects determining the sharing of financing the project and who will be lead jurisdiction.

These jurisdictions are also using a common approach to developing stormwater basin plans. These plans follow a uniform format, addressing water quality, habitat and flooding aspects of stormwater. Recommendations from these drainage basin plans generally include both structural (pipes and ponds) as well as nonstructural solutions. Examples of nonstructural solutions may include education, operation and maintenance standards, ambient monitoring, interjurisdictional coordination, and special projects. In the Budd Deschutes Watershed two stormwater basin plans are being implemented for both Percival Creek and Moxlie-Indian Creeks. Another basin planning process is currently being conducted by the County for the Chambers, Ward and Hewitt Lakes drainage basin.

Another important milestone in coordinated management of stormwater is the common Drainage Design and Erosion Control Manual (1993) which has now been adopted by all these jurisdictions. This manual provides the regulatory guidance for constructing publicly and privately-owned stormwater facilities as development occurs. This manual has been updated since its introduction in 1990, and the current version is the first to be adopted by the State Department of Ecology under their stormwater manual certification process. In a related issue, the City of Olympia has undertaken a study of ways to reduce impervious surfaces within urban areas called the Draft Impervious Surface Reduction Study (1994). It reviews a mixture of regulatory, market incentive and physical structure measures to determine those that best fit the north Thurston County human and natural environment.

A stormwater utility rate funds each of the aforementioned stormwater programs. The rates vary from one jurisdiction to another, but they are all related to the size of the property and the percentage of impervious surfaces. The stormwater utilities use these revenues to leverage additional grant monies from state and federal agencies. In addition, Thurston County has allocated some General Funds toward managing stormwater in southern Thurston County outside the boundary of the stormwater utility.

The Budd Inlet Deschutes River Watershed Characterization: Part II Water Quality Study (1993) conducted by the Thurston County Environmental Health Division revealed the following stormwater related water quality problems:

- Levels of fecal coliform violating the water quality standards in Mission, Indian and Moxlie Creeks.

- Moxlie Creek has very high levels of phosphorus along with high levels of nitrogen and total suspended solids.

- Storm drain sediment sampling indicated that Harrison Avenue, Washington Avenue, I-5 storm drain at Historic Park and the West Bay boat yard ditch were contaminated with heavy metals and organic compounds.

- Elevated peak flows in Percival and Schneider Creeks are causing scouring and erosion which reduces the fisheries habitat values of the watercourses.

- Chambers Creek has very high levels of nitrogen.

In 1994, the City of Olympia Stormwater Utility was awarded a Centennial Clean Water Grant to evaluate the performance of stormwater infiltration facilities. In northern Thurston County as many as 50 percent of the stormwater infiltration ponds constructed within the last 20 years are not functioning effectively. As a result, ground water is not sufficiently recharged, failing ponds are overflowing and excess runoff is proceeding too rapidly into receiving waters.

In this study, the City plans to compare the actual performance of existing infiltration facilities with predicted performance, compare the infiltration rates of different types of pond bottom coverings, and compare alternative methods of predicting the infiltration capabilities of the subsurface soil. The results of this grant will be designed to complement another similar project being undertaken by the University of Washington Center for Urban Water Resources Management. The City also plans to include an education component which will involve Stream Team volunteers. Results from this project are anticipated by the fall of 1996.

PROBLEMS IDENTIFIED BY THE WATERSHED MANAGEMENT COMMITTEE

- Storm drainage systems on the peninsulas discharge directly into Budd Inlet or other marine waters.
- Drainage basin plans have not been done for the peninsulas or areas south of Chambers Creek.
- There is a lack of knowledge of effectiveness of stormwater best management practices.
- It is difficult to identify and track sources of nonpoint pollution entering stormwater systems.
- The stormwater generated from small clearing and grading activities causes significant adverse impacts to adjacent properties, stream channels, fish habitat and downstream receiving waters.
- The stormwater utilities have begun to address ways to operate and maintain to private, preexisting stormwater facilities.
- Herbicides sprayed on rights-of-way and in ditches to control vegetation can run-off into water running in ditches thereby entering streams and other water bodies.

GOAL TO PROTECT AND IMPROVE THE WATER QUALITY OF BUDD INLET AND THE DESCHUTES RIVER THROUGH CONTINUING THE REGIONAL APPROACH TO INTEGRATED WATER RESOURCE MANAGEMENT IN NORTHERN THURSTON COUNTY.

ACTION RECOMMENDATIONS

SW 1 All jurisdictions with stormwater utilities should: (a) provide adequate funding to implement projects identified in their capital facility plans; (b) continue to pursue capital facility projects which will benefit more than one jurisdiction; (c) continue efforts to seek joint funding for projects which are of mutual benefit; and (d) continue to pursue the implementation of the nonstructural surface water management program.

Discussion: The jurisdictions with stormwater utilities are already working towards these issues. However, the most important issues facing these jurisdictions will continue to be adequate funding for all their projects. Multi-jurisdictional coordination, planning and funding already occur to a very high level. Therefore, continuing these efforts is a high priority. For comprehensive drainage basin plans to be effective, they need to be fully funded. With limited resources this may become more difficult in the future.

This Action Recommendations will not require any additional staff or financial resources since these are ongoing activities. By itself this recommendation supports the ongoing programs within the various stormwater utilities. Full funding of projects is an ongoing activity. Project funding may be from the Stormwater Utility Rates, grants from the Centennial Clean Water Fund, or local improvement districts. This Action Recommendation should be implemented within the next one to two years.

SW 2 The Thurston County Environmental Health Division should trace the sources of nonpoint pollution from Budd Inlet tributaries and storm drains in areas which have not been monitored.

Discussion: This would help to identify and prioritize tributary stream and private drainage systems which might need corrective measures. It could be conducted as part of the County's Drainage Plan.

This Action Recommendation would require a one time expenditure. A possible source of funds for this expenditure would be a Centennial Clean Water Fund Grant and/or local stormwater utility fees. This Action Recommendation should be implemented within the next three to five years.

SW 3 The Thurston County Stormwater Utility should conduct stormwater drainage studies for either side of Budd Inlet and for the northern county peninsulas which drain directly to Puget Sound.

Discussion: There are some small drainage basins within the watershed which flow directly to Puget Sound. It may be advantageous to do all of these small drainage basins at the same time.

This Action Recommendation would require a one time expenditure to prepare the stormwater basin plans. This could be funded from Stormwater Utility Rates, Centennial Clean Water Grant or a flood control grant. This Action Recommendation should be implemented within the next six to ten years.

SW 4 The Stormwater Utilities should require proper operation and maintenance of stormwater facilities to ensure their proper functioning.

Discussion: Operation and maintenance of existing stormwater facilities is addressed in the current stormwater drainage manual. However, the Stormwater Utility has not yet determined how this will be accomplished for all the existing systems.

This Action Recommendation would not require the expenditure of an additional staff resources since this is to be done under an existing regulation. In Thurston County, it could be funded by a surcharge to the county's stormwater utility rates. This Action Recommendation should be implemented within the next one to two years.

SW 5 Thurston County should pursue non-chemical control of roadside vegetation within the watershed.

Discussion: *Thurston County has been developing non-chemical control methods over the past few years, with varied success. It will be important that the County monitor these efforts to insure that the program is successful and that a return to herbicide use is not needed.*

This Action Recommendation is covered by an annual expenditure in the county road budget for non-chemical control of roadside vegetation. This Action Recommendation should be implemented immediately.

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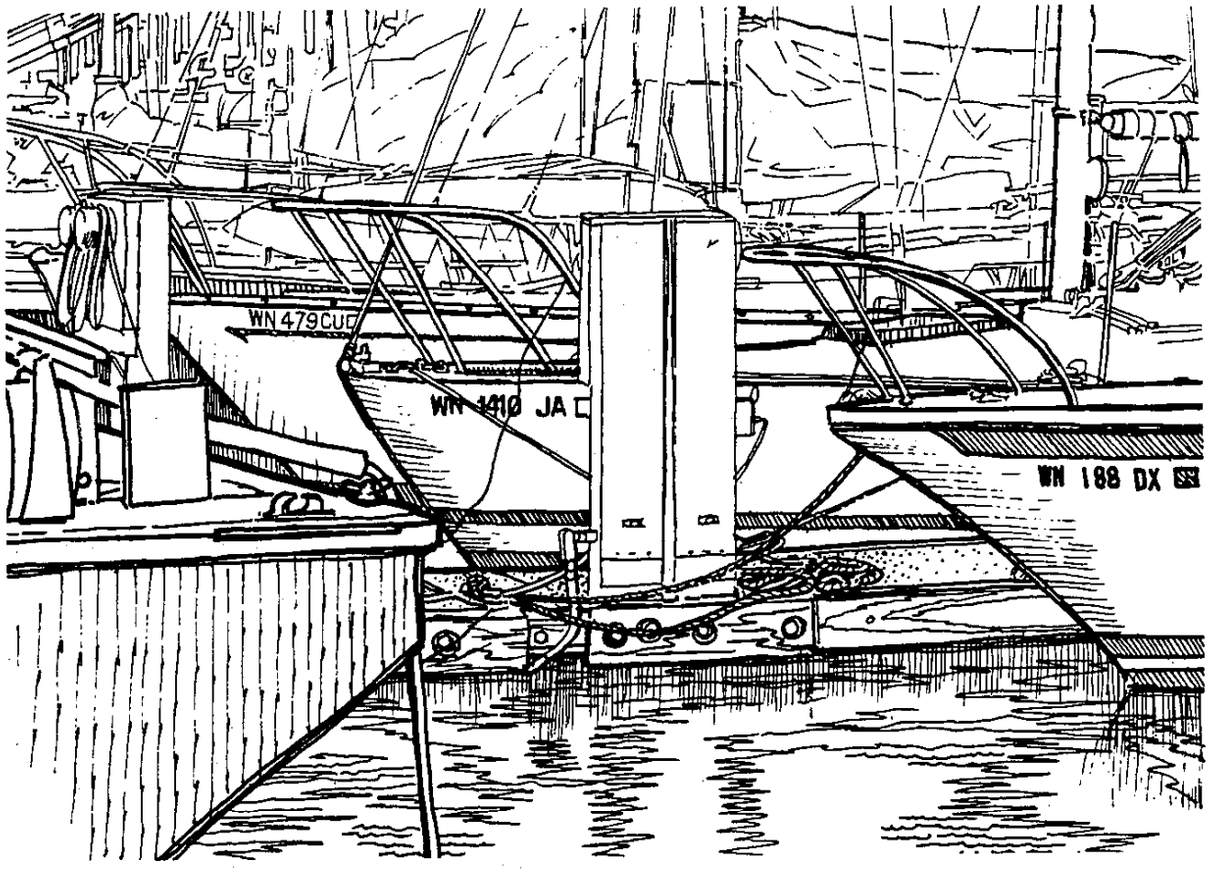
CHAPTER 9. MARINE ENVIRONMENT



BACKGROUND

Budd Inlet is located at the extreme southern end of Puget Sound with the City of Olympia and Port of Olympia situated at the inlet's head. The Cities of Tumwater and Lacey are also located in the lower portion of the Budd Inlet watershed. The lower portion of the inlet is separated into two "bays" by a short peninsula of land; these bays are called West Bay and East Bay. As is typically the case, the land use in this lower portion of the inlet is characterized by urban, port, marina, and industrial-related facilities. Activities include a large marina with significant fueling and hull-cleaning activities, log storage activities, a sawmill, a plywood mill, a bulk fuel and transport facility, and a metal fabricating facility.

Budd Inlet is a shallow, poorly mixing estuary. The inlet is almost 7 miles long and has an average width of 1.15 miles. The average depth is 27 ft. (URS, 1986). A maximum depth of 110 ft. occurs near the mouth of the inlet. The circulation and mixing pattern in the inlet is primarily driven by a two-layer system where the lower water column flows south toward the head of the inlet, and the upper water column flows north (URS, 1986). Other circulation patterns noted were a counter-clockwise gyre off Tykle Cove and the eastward movement of water from West Bay to East Bay.

The Deschutes-Budd Inlet watershed supports important shellfish and anadromous fish populations. Five salmonid species use the Deschutes basin and other drainages into Budd Inlet for spawning and rearing; steelhead trout, searun and resident cutthroat trout, coho, chinook, and chum salmon. The distribution of chum salmon is restricted primarily to small, low gradient streams feeding directly into Budd Inlet.

Species of shellfish known to occur within Budd Inlet important to recreational and commercial harvesters are geoducks, manila, native littleneck and butter clams, cockles, mussels, squid, red rock crabs, and oysters. Shellfish occur throughout Budd Inlet, however the Washington State Department of Health (DOH) prohibits commercial harvest of any species of shellfish south of Gull Harbor. Budd Inlet has several public and private beaches open to recreational harvesting of shellfish. Recently, several bids were received by the Washington State Department of Natural Resources (WDNR) for commercial harvest of geoducks outside the prohibited area in the north end of Budd Inlet.

The Deschutes River and Budd Inlet are important recreational areas among local residents. Recreational activities include boating, fishing, swimming, clamming, scuba diving, picnicking, and scenic enjoyment. Capitol Lake provides a scenic setting for the Washington State Capitol. There are a number of marinas in Budd Inlet. Recreation stimulates additional economic activity through expenditures at local businesses. Annual community events including the Wooden Boat Fair, Lakefair, and Harbor Days take place on the shorelines of Capitol Lake and Budd Inlet.

Recreational boating contributes fuel, sewage, and refuse spillage. Impacts are potentially greatest at popular overnight anchorages and "destination" marinas, particularly in shallow-water bays with poor tidal flushing. With over one thousand total boat slips in use in Budd Inlet, there are many marinas that fit this description.

The Budd Inlet sediment sampling stations were located at the northeast (Boston Harbor) and southern ends of the inlet. Historical and current commercial activities identified in Boston Harbor include vessel fueling activities, a medium-sized marina, and a sewer outfall for the community of Boston Harbor.

PRESENT SITUATION

Land Uses

Within the City of Olympia, a variety of land uses occur along the shoreline. These include undeveloped park shoreline, recreational marinas, residences on small lots, streets, formerly used industrial sites, cargo loading pier and facilities for ocean-going vessels, restaurants, offices, presently used plywood and metal manufacturing plants, raw wood and chip loading facilities, and tugboat operations. The urban shoreline is about one-third of the total shoreline along the inlet. North of the city, land uses simplify and tend to be less intense. Uses include residential lots, large undeveloped lots, county and city parks, and a small but growing village with marina.

Much of the lower watershed is urbanized. In the older, well-established areas, erosion is almost nonexistent. The slopes are nearly flat and very little soil is bare and susceptible to erosion. A few large areas, however, are in some stage of development and/or construction. During land conversion and at construction sites the potential for erosion is significant. Surface drainage in most of these areas is not well developed, so off-site transport of the eroded material is limited. Significant urban erosion is from those few locations where slopes are steeper and surface water is in close proximity to construction activities.

Water Quality

The Budd Inlet-Deschutes River Watershed Characterization: Part II Water Quality Study (1993) was prepared for the purpose of providing information to guide the decisions of a watershed planning committee. Fecal coliform bacterial standards were violated at three of the six Budd Inlet stations measured. The two sampling stations most strongly affected by the LOTT wastewater treatment plant showed the highest nutrient concentrations. Dissolved oxygen measurements at many of the stations showed supersaturated conditions, which is indicative of a highly productive system. It is apparent from the data that there are areas within the watershed where additional investigative monitoring or corrective measures can be taken immediately to improve water quality conditions in specific areas.

Fecal coliform concentrations above water quality standards have been identified in several urban creeks through various water quality monitoring efforts. Indian, Moxlie, Mission, and Percival Creeks are four such creeks. Water quality data and loading calculations indicate that the potential sources for much of the fecal coliform bacteria and nutrient contamination may be sanitary sewer cross connections and/or leaking sewer lines. Numerous pipes discharging stormwater and subsurface water from individual properties along the entire Budd Inlet shoreline are also contributing to bacterial and nutrient contamination of the Inlet. Failures of on-site sewage systems have also been identified as contributors to water quality problems along the marine and freshwater shorelines. Other problem areas for fecal coliform concentrations included Tamoshan and Beverly Beach sewage treatment plant outfalls, Athens Beach, Butler Cove, and the east side of Budd Inlet north of Priest Point Park. The variability inherent in the

bacterial counts at stations sampled more than once, suggests that routine sampling at these stations is essential to better assess the spatial extent and magnitude of the problem areas.

Sediment data collected as part of this project show stormwater in the urban area is contaminated with heavy metals and organic compounds. Many of the contaminants found are attributable to vehicles through oil leaks, fuel and oil spillages, combustion, and vehicle part wear (such as brake linings, etc). Stormwater samples also show stormwater is carrying high levels of bacteria and nutrients.

There are numerous sites throughout the watershed where particular activities have resulted in the contamination of soils, groundwater, and/or surface water. The Cascade Pole site on Port of Olympia property is a site contaminated with wood preservative chemicals. The groundwater under the site as well as the shellfish along the shoreline around the site are contaminated. It is currently under enforcement by Washington State Department of Ecology for clean-up. The shoreline of City of Olympia's Priest Point Park has warning signs posted advising against the harvesting and consumption of shellfish from the area due to the proximity to the LOTT (Lacey, Olympia, Tumwater and Thurston County) sewage treatment plant discharge and other sources of contamination. There have been many other documented sites within the watershed where spills or leaking fuel storage tanks have resulted in contamination, with the majority being located in the urban area.

The Washington State Department of Ecology maintains a core monitoring site at the Olympia sholes. (Refer to Figure 8.) Samples have been taken at the site on a monthly basis since 1973. Ecology also monitors 12 seasonal stations from March to October located within the harbor areas. These are sampled every two weeks. Also included are cross bay transects of the Inlet which occur during the seasonal monitoring period. (Ecology, 1994)

The problem of eutrophication in upper Budd Inlet has been well documented (URS 1986). However, the boundaries of the geographic area impacted by high nutrient levels and low dissolved oxygen have not been delineated. Existing data were collected to monitor specific areas (i.e., Fiddlehead Marina, Capitol Lake outfall, East Bay Marina). The largest problem areas for eutrophication were Ecology Station BUD-002 in West Bay, the Capitol Lake outfall, and the East Bay Marina. Dissolved oxygen levels at these sites were less than 3.0 mg/L during late summer. Secondary priority areas for eutrophication were located at the Fiddlehead Marina, north of the LOTT 30-inch outfall, and in the navigation channel northeast of Cascade Pole site. Additional sampling efforts should be conducted south of Priest Point to generate data that could define the spatial extent of problem areas in southern Budd Inlet. Stations located north of Priest Point would provide reference conditions.

Budd Inlet Urban Bay Action Plan

In 1991 the Washington State Department of Ecology prepared the Budd Inlet Urban Bay Action Plan to address the unique water quality problems within Budd Inlet. Identified in the plan are specific sources of pollution in the inlet, specific locations where pollutant levels require preventative or remedial actions and action recommendations to instigate preventative or remedial activities. The plan was comprehensive and evaluated all pollutants, as well as both point and nonpoint sources known at the time of publication.

A review of the Budd Inlet Urban Bay Action Plan (1991) indicates that the identification of problem areas is limited by the amount of available data for Budd Inlet. According to the Action Plan, large data gaps exist for eutrophication, toxic contamination of water and sediments in Budd Inlet, and understanding the temporal variability of microbial concentrations. The Action Plan also identified that there is very poor spatial representation for a majority of the inlet. Most of the tests have been performed on sediments collected from near the Port of Olympia property. Further, the number of contaminants for which analyses were performed is also limited when compared to studies of other embayments. Consequently, the full extent of contamination problems is not known.

Much of the Urban Bay Action Plan deals with nonpoint pollution and it recommends that watershed planning begin as soon as possible. Since both Plans deal with nonpoint pollution, the Watershed Plan should avoid any unnecessary duplication. Discussions among Thurston County, the Washington State Department of Ecology and the Puget Sound Water Quality Authority have pointed to the possibility of the Budd-Deschutes Watershed Plan as the vehicle for nonpoint pollution action recommendations now found in the Urban Bay Action Plan. The Urban Bay Action Plan would retain its focus on toxic materials, waste, and contaminated sediments. Unfortunately, the Ecology staff support for their active participation in the Urban Bay Action Plan was withdrawn due to budget constraints in 1993.

Local Planning Efforts

The City and Port of Olympia adopted the Urban Waterfront Plan (1993) after four years of work. This joint project evaluated the feasibility of over water development and made recommendations for Olympia's shoreline as part of a Special Area Management Plan. The Plan suggested the formation of a "Habitat Advisory Committee" be formed to prepare a Comprehensive Habitat Plan and thereafter to evaluate any mitigation plans within Budd Inlet. A complete protocol for this new committee was also included.

The City followed this work by completing the Draft East Bay Habitat Enhancement Plan (1994) earlier this year. This focused solely on the eastern side of the Port Peninsula and East Bay which has seen the most recent dredge and fill activities by the Port. The Plan provides a number of recommendations to improve the habitat characteristics of East Bay varying from major reconstruction to education projects. The Enhancement Plan also recommends that the Habitat Commission be formed to help prepare the Comprehensive Habitat Plan.

PROBLEMS IDENTIFIED BY THE WATERSHED MANAGEMENT COMMITTEE

- Failure by Ecology to continue oversight of the Budd Inlet Urban Bay Action Plan.
- Regulators seem unable to enforce current laws pertaining to discharge and holding tanks for marine waters.
- Lack of financial resources to undertake sediment and water quality monitoring in Budd Inlet.
- Budd Inlet has experienced a significant decline and degradation of intertidal and fisheries habitat.
- There is a significant lack of data regarding a number of water quality, sediment and habitat features over a majority of the inlet.

GOAL TO PROTECT THE WATER QUALITY OF BUDD INLET AND ITS WATERSHED BY IDENTIFYING PROBLEMS IN NONPOINT DISCHARGES AND PROVIDE SPECIFIC RECOMMENDATIONS TO REDUCE POLLUTANTS ENTERING BUDD INLET BY IMPROVING PRACTICES IN SEWAGE DISPOSAL PRACTICES OF BOATERS AND ADJACENT UPLAND OWNERS, AS WELL AS REDUCING POLLUTANTS ENTERING BUDD INLET FROM OTHER SOURCES.

ACTION RECOMMENDATIONS

ME 1 The City and Port of Olympia should establish a Habitat Advisory Committee that would initiate a Comprehensive Habitat Plan for Budd Inlet.

Discussion: The formation of this group was suggested in the Olympia Urban Waterfront Plan (1993), which has been incorporated into the Shoreline Master Program for the Thurston Region (1993). A Habitat Advisory Committee would oversee and advise with the development and implementation of shoreline mitigation and restoration projects in Budd Inlet. The Habitat Advisory Committee would guide such projects on a inlet-wide ecosystem basis and would help to implement the East Bay Habitat Enhancement Plan once it is completed.

This Action Recommendation would require some staff support from both the City and Port. Funding and staff could be from existing Public Works Policy and Program Development Division for the City and the Port's General Fund. This Action Recommendation should be implemented within the next one to two years.

ME 2 The Washington State Departments of Fish and Wildlife, and Ecology should continue to collect data within Budd Inlet from english sole, dissolved oxygen, sediment chemicals, and benthic infaunal communities; and should make this data available to relevant management interests.

Discussion: This monitoring protocol should include the following: (1) dissolved oxygen conditions throughout the water column and at the sediment interface; (2) bioassay tests for sediments in East and West bays, north of the Port of Olympia peninsula, near Priest Point, and near Gull Harbor; (3) English sole for bioaccumulation analysis in East and West Bays, near the Port of Olympia

peninsula, near Priest Point near Gull Harbor, and in other areas of Budd Inlet that could provide reference data; and (4) BICs at the same bioaccumulation sites as the above. This will provide information about the geographic extent and seasonal variability of low levels of dissolved oxygen.

Bioassay tests of sediments collected near known and suspected contaminant sources would provide important information about the magnitude of environmental degradation at these locations. An understanding of the composition of the benthic community in Budd Inlet would help determine the effects of sediment contaminants and of low dissolved oxygen on the resident biota. The information collected would enable and identify differences between East and West Bays on the extent of bioaccumulation of the industrialized portions of the inlet. This data should be distributed to the City and Port of Olympia, local environmental groups, the Squaxin Tribe, LOTT and other interested parties as it is available.

This Action Recommendation would require a one time expenditure from all three State Departments. These could be funded by existing agency resources or an EPA Urban Bay Grant. This Action Recommendation should be implemented within the next one to two years.

ME 3 The Washington State Department of Ecology should review the status of the implementation recommendations of the Budd Inlet Urban Bay Action Plan as a part of the proposed "Watershed Forum" scheduled for the year 2000.

Discussion: Many Action Recommendations are in various stages of implementation. Some recommendations had no identifiable funding source. Ecology has eliminated staff support and oversight for plan implementation and would like the County to assume lead agency status. Several recommendations of the Urban Bay Action Plan were implemented by various agencies. This review will determine the status of implementation, explain why some actions have not been undertaken, assess the current need for those actions and recommend the next stage of plan implementation. This review should be distributed to interested stakeholders and the community.

This Action Recommendation would require a one time expenditure for the actual review and an annual expenditure to oversee implementation. This Action Recommendation should be implemented within the next three to five years.

ME 4 The Washington State Parks and Recreation Commission and Washington State Department of Health should continue to print and distribute educational materials on marine sanitation devices and distribute these through marinas and boating clubs.

Discussion: Providing information to boaters is a preventative approach to reducing improper sewage disposal practices.

This Action Recommendation would require a one time expenditure would be needed to reprint this material. A possible source of funds for this would be the Thurston County General Fund or a Centennial Clean Water Fund Grant. This Action Recommendation should be implemented within the next six to ten years.

ME 5 The Washington State Departments of Health and Parks should conduct a review of the status of marine pump out facilities in Budd Inlet to determine the adequacy of facilities, maintenance, and future needs including an ongoing monitoring program.

Discussion: With the number of boats moored in Budd Inlet and this being one of the few pump out locations in Southern Puget Sound, ensuring usable facilities is very important.

This Action Recommendation would require a one time expenditure. A possible source of funds for this would be the Agency Budget or a Centennial Clean Water Fund Grant. This Action Recommendation should be implemented within the next six to ten years.

ME 6 The Thurston County Environmental Health Division should conduct a moderate risk hazardous waste inventory of all marinas in Budd Inlet.

Discussion: The objective would be to identify, if possible, impacts to water quality related to activities at or associated with marinas. Correlation between activities at the marina and water quality can be difficult to determine because the marina is not enclosed or physically separated from the rest of the inlet.

This Action Recommendation would require a one time expenditure and may be funded by the County General Fund or a grant from the Centennial Clean Water Program. This Action Recommendation should be implemented within the next three to five years.

ME 7 The Washington State Department of Natural Resources should conduct a study to determine the effects of log-rafting on habitat and water quality in Budd Inlet.

Discussion: Storage of logs in floating rafts is common along the west shore of Budd Inlet. The same near shore shallow water area where the logs are rafted is very important to migrating juvenile salmon. Water quality can be affected by oxygen depletion caused by decaying bark. In addition, bark that drops to the bottom may impact fauna living in sediments by smothering organisms or degrading habitat. The full extent of this problem in Budd Inlet is not known, but a literature search and summary report would help clarify the degree of possible water quality problems.

This Action Recommendation would require a one time expenditure from WDNR. Possible source of these funds are the Aquatic Lands Enhancement Account. This Action Recommendation should be implemented within the next six to ten years.

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CHAPTER 10. PLAN IMPLEMENTATION

BACKGROUND

This Watershed Action Plan will impose costs on federal and state agencies, local and tribal governments, the private sector and individuals. Historically, potential revenue sources to meet the public sector costs include state and local general funds, the Centennial Clean Water Fund, the state revolving fund for low or no interest loans for clean water projects, state waste water discharge fees, the state superfund account, a variety of fees, federal clean water funds, and the National Estuaries Program. However, revenue constraints have delayed the implementation of many Action Recommendations from previous watershed action plans.

PRESENT SITUATION

Thurston County is the lead agency for the implementation of the Eld, Henderson and Totten-Little Skookum Watershed Action Plans. In the past five years since adoption there have been a number of major successes within these watersheds. First, funds have been found to continue monitoring programs and focus on improvements to agricultural practices within these watersheds. Local jurisdictions adopted new development regulations for stormwater management and critical areas, with the County also adopting a nonpoint ordinance. The County also lowered the zoning densities in the rural portions of these watershed which should help reduce future impacts from on-site septic systems. The County has also begun to implement a individual operation and maintenance program for on-site septic systems. Additional water resource studies have occurred within specific sub-basins and comprehensive drainage basin plans have been or are in the process of begin prepared. Ecology reclassified Totten Inlet as a "AA" waterbody and the State Department of Health is evaluating the permanent and conditional shellfish harvesting closures within Henderson Inlet.

These accomplishments were facilitated by substantial coordination between local jurisdictions and agencies, and secondly by successfully grant writing. During this time, Thurston County has relied heavily on the Centennial Clean Water Fund to fund a majority of the water quality programs, with local fees and revenues providing the matching monies. However, local jurisdictions may not be able to rely upon the Centennial fund to meet all their future needs.

During the 1994 application period, the availability of funds had significantly decreased due to the pass threw of $12 Million to METRO of Seattle, the diversion of $4 Million to the watershed restoration program and finally the lack of any state general fund revenues then needed to balance the state budget. Also, of the projects which were funded in this round, 33 of 72 were related to sanitary sewer design, disposal or treatment. If raids on the Centennial program continue and Ecology continues to primarily fund large "Engineering" projects, such as treatment facilities, the Budd Deschutes Plan should not rely on this funding source.

The implementation items within this Budd Inlet-Deschutes River Watershed Action Plan are similar to those of the previous watershed plans. However, the emphasis of these "Action Recommendations" are significantly more detailed and recommend data collection of some parameters, which have not been associated with water quality by the Centennial program. With more emphasis on the "health" of the riverine environment, future funding opportunities may shift to new grant sources which are focused on watershed analysis, stream restoration, and habitat mitigation.

There are a number of potential grant sources which may assist in the implementing various parts of this Plan. These include:

- U.S. SCS Watershed Restoration Program,
- WDNR/WDFW Watershed Restoration Program*,
- U.S. Army Corps Habitat Mitigation Fund,
- U.S. EPA Urban Bay Program,
- Centennial Clean Water Fund, and
- WDNR Aquatic Lands Enhancement Account.

*(Program not currently available to the Deschutes River.)

STRATEGY FOR PLAN IMPLEMENTATION?

- Rely more heavily on local financial resources,
- Minimize the number of Action Recommendations requiring new funding,
- Locate new grant sources for the restoration and monitoring efforts, and
- Combine related Action Recommendations into a "package" for grant submittal.

PROBLEMS IDENTIFIED BY THE WATERSHED MANAGEMENT COMMITTEE

- There are no comprehensive steps to remove the river from Ecology's "Water Quality Limited List".

- There is no long-term, stable funding source to address water resources programs within the region.

- There are multiple jurisdictions and agencies undertaking planning, monitoring, and implementation efforts within the watershed.

- A number of research or monitoring programs suggested by this Plan have not traditionally been funded by the Centennial Clean Water Fund.

- There is a lack of financial resources to adequately support the State's Centennial Clean Water Fund.

GOAL TO IMPLEMENT THIS ACTION PLAN CONSISTENT WITH THE GUIDANCE FROM THE WATERSHED MANAGEMENT COMMITTEE AND TO REMOVE THE DESCHUTES RIVER FROM THE WATER QUALITY LIMITED LIST.

ACTION RECOMMENDATIONS

IMP 1 **Thurston County should encourage new state legislation which would provide for an unified source of funding for water resource programs.**

Discussion: A change in state law would be needed to correct multiple, piecemeal fees and changes for the County's water protecting efforts. The lack of reliable funding source may be the single most limiting factor for Thurston County's water resource protection programs. This is particularly apparent in the education programs as well as the long-term monitoring efforts. (Thurston County Comprehensive Plan Policy: NE Water Resources B 14.)

This Action Recommendation would require some staff assistance from existing programs. This Action Recommendation should be implemented within the next one to two years.

IMP 2 **Thurston County should create a Watershed Commission to aid in the implementation of adopted Watershed Action Plans.**

Discussion: The Budd-Deschutes Committee felt that adequate implementation requires an oversite committee. This could replace the watershed councils in the Eld and Henderson Inlets. Mason County also has one for its implementation of the Totten-Little Skookum Plan. The Commission would be made up of local residents and affected interest groups.

This Action Recommendation would require an annual funding from the County for staff support. This could be funded from the County's General Fund or Stormwater Utility. This Action Recommendation should be implemented within the next one to two years.

IMP 3 **Implementing departments, agencies or individuals should use the Watershed Action Plan as the framework for future sub-basin ground water, drainage basin, or other water related resource studies.**

Discussion: There will likely be future water related studies within this watershed. The objective for each will be to provide additional clarity for a small part of the watershed. However, these future studies should not be in conflict with the guidance contained within this Watershed Action Plan.

This Action Recommendation should provide guidance to a wide range of stakeholders. Funding could as part of specific program or project. This Action Recommendation should be implemented within the next one to two years.

IMP 4 **The Thurston County Office of Community and Environmental Programs should serve as the lead agency for the implementation of the Budd Inlet-Deschutes River Watershed Action Plan.**

Discussion: The requirements of the lead agency are detailed in WAC 400-12. This will include an annual report to Ecology noting progress toward Plan implementation.

This Action Recommendation would require an annual expenditure from this department. It could be funded through the County's General Fund. This Action Recommendation should be implemented within the next one to two years.

IMP 5 **Thurston County should convene a "Watershed Forum" in the year 2000 to evaluate the implementation of the Budd-Deschutes Watershed Action Plan and Ecology's Budd Inlet Urban Bay Action Plan.**

Discussion: The representation at the Watershed Forum should resemble the watershed management committee. Factors it should evaluate are the funding levels for various programs, amount of habitat restoration, number and type of monitoring projects both in the watershed as well as the inlet, and citizen

perception of problems within the basin. The Forum should involve status reports from implementing agencies and affected parties to be followed by a report to the community.

This Action Recommendation would bring together major stakeholders in the planning and implementation process. It could be funded by a local program such as the stormwater utility fees, and local jurisdiction's general funds. It may also be eligible for a Centennial Clean Water Fund Grant. This Action Recommendation should be implemented within the next three to five years.

LEGEND FOR TABLES

Responsible Party

Ecology = Washington Department of Ecology
LOTT = Lacey, Olympia, Tumwater, Thurston County
Squaxin = Squaxin Island Tribe
TC Stormwater = Thurston County Stormwater Utility Program
TC = Thurston County
TC Roads = Thurston County Roads and Transportation Services Department
TC Solid Waste = Thurston County Solid Waste Program
TCAP = Thurston County Advance Planning and Historic Preservation
TCBOH = Thurston County Board of Health
TCCEP = Thurston County Community and Environmental Programs
TCD = Thurston Conservation District
TCEHD = Thurston County Environmental Health Division
TCPD = Thurston County Parks Department
WA Leg. = Washington State Legislature
WBOH = Washington State Board of Health
WDFW = Washington Department of Fish and Wildlife
WDNR = Washington Department of Natural Resources
WDOH = Washington Department of Health

Recommended Source of Funds

ALEA = Aquatic Lands Enhancement Account
CCWF = Centennial Clean Water Fund
CD Assessment = Thurston Conservation District Assessment
CZM = Coastal Zone Management Grant
EPA = EPA Urban Bay Action Grant
FCAAP = Flood Control Assistance Accounts Program
Federal Watershed = SCS Small Watersheds Program
IAC Grant = Interagency for Outdoor Recreation Grant
PIE = Public Involvement and Education Grant
Port = Port of Olympia
State Watershed = Watershed Partnership Restoration Program
WPRC = Washington Parks and Recreation Commission

TABLE 1: PLAN IMPLEMENTATION -- PUBLIC EDUCATION PROGRAMS

No.	Action Recommendations	Responsible Party	Category	Recommended Source of Funds	Estimated Costs Years 1 & 2	Estimated Costs Years 3, 4 & 5	Estimated Costs Years 6 - 10	Comments
ED 1	Local jurisdictions should continue to fund, support and coordinate efforts by successful education programs such as the Stream Team and Project Green. High priority public education projects which should be accomplished by these groups include: a. Developing a series of watershed town hall meetings to discuss watershed issues. Target a meeting for each of the major subdivisions along the shoreline. b. Developing a series of newspaper articles on Budd Inlet and Deschutes River water quality problems and the results of volunteer monitoring. c. Developing stream rehabilitation projects focusing on hands-on environmental restoration with a goal of flood and erosion reduction by restoring riparian habitat or offering training to river side landowners. d. Conducting tours to the bioengineering sites on a regular basis to increase knowledge watershed problems and to see successful solutions. e. Creating a TCTV television program on riverbank restoration and erosion control. f. Developing educational programs focusing on the history and current importance of fisheries in the watershed.	Local Jurisdiction	Education	Stormwater Fees, CD Assessment	$60,000			Committee Priority

TABLE 1: PLAN IMPLEMENTATION -- PUBLIC EDUCATION PROGRAMS

No.	Action Recommendations	Responsible Party	Category	Recommended Source of Funds	Estimated Costs Years 1 & 2	Estimated Costs Years 3, 4 & 5	Estimated Costs Years 6 - 10	Comments
ED 2	Local jurisdictions and State resource agencies should use signs on public lands to help educate both residents and visitors on the importance of this watershed. Such activities may include the following: a. Installing stream crossing signs on all public road crossing in the watershed. b. Designing watershed boundary signs which could be modified with the current location. This could be installed at all public parks, boat ramps and made available to private subdivisions within the basin and watershed. c. Developing an interpretive display regarding various nonpoint pollution sources. This could be installed at all public parks, boat ramps and made available to private subdivisions within the basin and watershed. d. Reinstalling interpretative signs on fisheries at Tumwater Falls Park and around at public access sites around Budd Inlet.	Local Jurisdiction and State Resource Departments	Education	Various		$30,000		
ED 3	Local jurisdictions should include an education component with any surface, ground, watershed or water quality planning project and adequate financial resources should be provided to complete this task.	Local Jurisdiction	Education	Various	Specific to the Projects			Committee Priority
ED 4	The Thurston County Parks and Recreation Department should use an environmental education theme in the design of Deschutes Falls Park.	TCPD	Education	Conservation Futures IAC Grant	NC			
ED 5	The Thurston County Office of Community and Environmental Programs should conduct a survey of knowledge and attitudes to provide a baseline from which to measure the effectiveness of various education programs.	TCCEP	Education	TC General Fund, CCWF		$20,000		
ED 6	The local park departments and the Town of Rainier should jointly explore ways of increasing recreational opportunities along the Deschutes River.	TC, Olympia, and Lacey Park Departments and Rainier	Education	Existing	NC			
ED 7	Local governments should continue to use the Educational Technical Advisory Committee (ETAC) to coordinate education efforts within the watershed.	Local Jurisdiction	Education	Existing	NC			
ED 8	Government agencies should work cooperatively with local land trusts to educate citizens and landowners about voluntary conservation programs.	TC, Olympia, and Lacey Park Departments and Rainier	Education	Existing	NC			

TABLE 2: PLAN IMPLEMENTATION -- RESEARCH AND MONITORING PROGRAMS

No.	Action Recommendation	Responsible Party	Category	Recommended Source of Funds	Estimated Costs Years 1 & 2	Estimated Costs Years 3, 4 & 5	Estimated Costs Years 6 - 10	Comments
R&M 1	*Local jurisdictions should agree upon and adequately fund a* baseline surface water, ground water and habitat monitoring program for the Budd-Deschutes Watershed.	*Local Jurisdiction*	*Monitoring & Fund* Agreement	*Various*	NC	NC	NC	*Committee* Priority
R&M 2	The Thurston County Environmental Health Division should conduct intensive monitoring programs within sub-basins when water quality standards are violated or when there is a perceived threat to public health.	TCEHD	Monitoring	Stormwater *Assessment*		$25,000	$25,000	
R&M 3	The Thurston County Environmental Health Division and the Thurston Conservation District should continue to monitor those creeks where farm plans were written and implemented, such as on Elwanger and Reichel Creeks.					$20,000		
R&M 4	Local jurisdictions should continue and expand citizen volunteer monitoring opportunities.	Local Jurisdiction	Monitoring	City & TC General Fund or Utility Fees		$45,000 ($15,000/year)	$75,000	
R&M 5	Local and state agencies should jointly establish a watershed based data retrieval system for Budd Inlet and the Deschutes River.	Ecology, TC and LOTT	Data Analysis	TC General Fund, LOTT Assessment, CCWF	$40,000			Committee Priority
R&M 6	The Thurston County Office of Community and *Environmental Programs should distribute a user friendly* annual report card on county-wide water quality which includes an evaluation of the data by watershed and the type of water resource.	TCCEP	Education	TC General *Funds*, Stormwater Fees, Health Fees, CCWF		$20,000		
R&M 7	The Thurston County Environmental Health Division, Assessor's Office and the LOTT local jurisdictions should work together to create a database which will indicate the status of sanitary sewer connections for residential single-family areas.	TCEHD, Assessor, and LOTT	Data Analysis	*LOTT* Assessment, CCWF			*$40,000*	

*Costs only for surface and ground water monitoring, habitat costs listed separately.

TABLE 3: PLAN IMPLEMENTATION – FLOODING, BANK EROSION AND SEDIMENTATION

No.	Action Recommendation	Responsible Party	Category	Recommended Source of Funds	Estimated Costs Years 1 & 2	Estimated Costs Years 3, 4 & 5	Estimated Costs Years 6 - 10	Comments
SED 1	The Washington Department of Natural Resources or forest landowners should conduct a Watershed Analysis within the upper Deschutes River system to determine changes in sediment transport and hydrology over time.	WDNR or Forest Landowners	Program	WDNR or Private		$100,000		Committee Priority
SED 2	Thurston County should accurately delineate the extent of the floodplain and historic channel meander belt along the Deschutes River to identify areas at risk of hazard due to future channel migration.	TCCEP	Data Analysis	FCAAP		$40,000		Committee Priority
SED 3	Local jurisdictions and the Conservation District should secure funding for re-establishing of riparian vegetation removed or damaged by past flooding damage and land use activities.	Local Jurisdiction, TCD	Program	Stormwater Fees, CD Assessment, Federal or State Watershed		$100,000		
SED 4	Thurston County should conduct a "reach scale analysis" for the Deschutes River before public funds are expended for new flooding, bank erosion, or sedimentation control projects.	TCCEP	Data Analysis	FCAAP, General Fund, Stormwater Fees	$40,000	$40,000		Committee Priority
SED 5	Local governments should limit allowable uses and activities within floodplains to reduce potential flood hazard.	Local Jurisdiction	Regulation	City & TC General Funds, FCAAP		$20,000		
SED 6	The Thurston Conservation District should secure funding for implementation of the District's program to reduce bank erosion through re-vegetation and bio-engineering as the preferred methodology of stream channel and bank stabilization.	TCD	Program	TC General Fund, Stormwater Rates, CD Assessment, Federal or State Watershed		$150,000		
SED 7	Local jurisdictions should require new developments to preserve and where necessary re-establish a corridor of riparian vegetation on banks where such vegetation has been removed.	Local Jurisdiction	Regulations	Local General Funds			$20,000	
SED 8	The Thurston Conservation District should make protection and re-establishment of vegetation along stream banks a priority when developing new farm plans.	TCD	Program	Existing	NC			
SED 9	The Squaxin Island Tribe should monitor the status of riparian vegetation in the Deschutes River system and assess related water quality effects such as stream temperature and large woody debris recruitment.	Squaxin	Research and Monitoring	Federal or State Watershed		Included in other		See FOR 8
SED 10	The City of Tumwater should secure funding to carry out restoration of riparian vegetation along the Deschutes River in Tumwater as identified in Deschutes River Riparian Habitat Plan.	Tumwater	Program	Donations, Tumwater Stormwater, CD Assessment, Federal or State Watershed	$15,000	$25,000	$40,000	

NC = No Additional Cost

TABLE 3: PLAN IMPLEMENTATION -- FLOODING, BANK EROSION AND SEDIMENTATION

No.	Action Recommendation	Responsible Party	Category	Recommended Source of Funds	Estimated Costs Years 1 & 2	Estimated Costs Years 3, 4 & 5	Estimated Costs Years 6 - 10	Comments
SED 11	The Squaxin Island Tribe should identify and map off-channel salmonoid rearing areas in the floodplain of the Deschutes River and its tributaries. It should also evaluate the effects of nonpoint pollution and related land use activities on these waterbodies.	Squaxin	Research and Monitoring	Federal or State Watershed	$25,000			Committee Priority
SED 12	Thurston County, in cooperation with the Conservation District and other state or Federal resources agencies, should develop wetland and stream restoration guidelines which improve water quality and habitat values while still providing for economic uses of the land.	TC, TCD, State and Federal Resource Departments	Regulations	TC General Fund, Stormwater Fees, CD Assessment, FCAAP, CCWF		$30,000		
SED 13	The Thurston County Stormwater Utility should assess the existing and potential cumulative peak flow augmentation from land use activities, particularly those which are exempt from the provisions of the Drainage Design and Erosion Control Manual.	TC Stormwater	Research	Stormwater Fees, FCAAP			$150,000	
SED 14	Thurston County, in cooperation with the Washington Department of Fish and Wildlife and the Squaxin Island Tribe, should verify WDNR water type classification maps.	TC, WDFW, Squaxin	Monitoring	TC General Fund, Stormwater Fees, FCAAP		$15,000 ($5,000/each)		
SED 15	Thurston County and Tumwater should review their Critical Areas and Floodplain ordinances to ensure that the design criteria avoid any additional flood hazard or erosion potential.	TC and Tumwater	Regulation	TC, Tumwater General Fund, FCAAP		$20,000		
SED 16	The Washington Department of Natural Resources should continue to evaluate stream bank stability prior to authorizing forest practices within the Deschutes River Watershed.	WDNR	Regulation	WDNR	NC			
SED 17	The Thurston County Environmental Health Division should develop materials and educational efforts with specific emphasis on preventing hazardous material pollution in the floodplain and during flood events.	TCEHD	Education	Tipping Fees, Various Grants			$20,000	
SED 18	Thurston County should convene a group of stakeholders by the year 2000 to evaluate the status of data collection and the effectiveness of restoration efforts within the Deschutes River Watershed.	TC	Review Body	FCAAP, Federal or State Watershed		$30,000		

TABLE 4: PLAN IMPLEMENTATION -- FOREST PRACTICES

No.	Action Recommendation	Responsible Party	Category	Recommended Source of Funds	Estimated Costs Years 1 & 2	Estimated Costs Years 3, 4 & 5	Estimated Costs Years 6 - 10	Comments
FOR 1	Thurston County should adopt a County Forest Practices Ordinance and develop a written precedures manual with the Washington State Department of Natural Resources to address forest practices and conversions.	TC	Regulation	TC General Fund, CZM, CCWF	$40,000			Top Committee Priority; See SW 2
FOR 2	Thurston County should add a staff position to work on the Watershed Analysis and to represent the County in other timber management policy forums.	TC	Technical Assistance	TC General Fund, Stormwater Fees		$80,000 ($40,000/year)	$200,000	
FOR 3	The Washington State Legislature should provide adequate funding to the Washington State Department of Natural Resources to enforce land conversion violations, and to develop interagency agreements with local governments on "lands likely to convert".	WA. Leg.	Program	WDNR		$180,000 ($60,000/year)	$300,000	
FOR 4	The Squaxin Island Tribe, in cooperation with the Washington Department of Natural Resources, Washington Department of Fish and Wildlife, Weyerhaeuser, and other timberland owners, should develop a restoration strategy for large woody debris within the upper and middle thirds of the watershed.	Squaxin	Program	Federal or State Watershed		$40,000		
FOR 5	The Washington State Departments of Natural Resources and Ecology, in cooperation with other stakeholders, should develop a riparian management strategy which targets canopy closure and stream temperature in affected reaches.	WDNR and Ecology	Program	WDNR		Included in others		See FOR 4 and FOR 7
FOR 6	The Washington State Departments of Natural Resources and Ecology should reevaluate the current Riparian Management Zone criteria of the Forest Practices Act Rules to determine if it is possible to achieve the State water quality standards using these criteria.	WDNR and Ecology	Program	WDNR, Ecology			$150,000 ($75,000/each)	
FOR 7	The Squaxin Island Tribe should continue to monitor and collect data to document the condition of aquatic habitat within the watershed.	Squaxin	Monitoring	Federal or State Watershed		$100,000 ($50,000/year)	$250,000	See SED 9
FOR 8	The Washington State Departments of Natural Resources, and Fish and Wildlife should modify the emphasis of the "Watershed Restoration Partnership Program" from only addressing streams which are listed on the Salmon and Steelhead Stock Inventory, to those streams which could be removed from Ecology's 303d "Water Quality Limited List."	WDNR, WDFW	Program	WDNR, WDFW	NC			
FOR 9	The Thurston County Roads and Transportation Department should participate in the Weyerhaeuser annual plan review for its forest roads.	TC Roads	Technical Assistance	Existing		NC		

TABLE 4: PLAN IMPLEMENTATION -- FOREST PRACTICES

No.	Action Recommendation	Responsible Party	Category	Recommended Source of Funds	Estimated Costs Years 1 & 2	Estimated Costs Years 3, 4 & 5	Estimated Costs Years 6 - 10	Comments
FOR 10	The Thurston County Environmental Health Division and the Thurston County Solid Waste Program should work with forest landowners to minimize the potential of illegal dumping.	TCEHD & TC Solid Waste	Technical Assistance	Existing	NC			
FOR 11	The Washington State Department of Natural Resources should require large private forestry property owners to prepare road management plans.	WDNR	Regulation	WDNR		NC		

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TABLE 5: PLAN IMPLEMENTATION -- AGRICULTURAL PRACTICES

No.	Action Recommendation	Responsible Party	Category	Recommended Source of Funds	Estimated Costs Years 1 & 2	Estimated Costs Years 3, 4 & 5	Estimated Costs Years 6 - 10	Comments
AG 1	The Thurston Conservation District should continue to prepare and implement comprehensive farm plans for commercial and non-commercial operations within the Budd-Deschutes Watershed.	TCD	Technical Assistance	CD Assessment	NC	NC	NC	Committee Priority
AG 2	Thurston County Environmental Health Division should continue to provide enforcement of the Nonpoint Pollution Ordinance and the Thurston Conservation District should continue to provide technical assistance as requested by the County and the landowner.	TCEHD, TCD	Technical Assistance	TC General Fund, CD Assessment	$20,000 ($10,000/year)	$30,000	$50,000	Committee Priority
AG 3	Thurston County should encourage farmers within the rural portion of the watershed to keep their land in farm production and to fully utilize the County's agricultural resources.	TC	Technical Assistance	Existing		NC		
AG 4	The Thurston Conservation District should identify and, where necessary, assist in the corrections of water quality problems before development rights are purchased on agricultural land.	TCD	Technical Assistance			$100,000		
AG 5	Thurston County should continue the Conservation District tax assessment provided that the District continues to use these funds to leverage grant funds whenever available, and to support technical assistance within this and other watersheds.	TC, TCD	Program	Existing		NC		
AG 6	Thurston County should pursue a Transfer of Development Rights (TDR) and a Purchase of Development Rights (PDR) program for designated agricultural areas within the watershed.	TC	Program	TRPC, TC General Fund		NC		
AG 7	The Washington State Legislature should maintain state funding for the Washington Conservation Corps.	WA Leg.	Program	State General Fund		NC		
AG 8	Thurston County should evaluate and, if possible, strengthen the Open Space Tax Program for "Surface Water Quality Buffer Areas".	TC	Program	TC General Funds			$20,000	

TABLE 6: PLAN IMPLEMENTATION -- WASTEWATER MANAGEMENT

No.	Action Recommendation	Responsible Party	Category	Recommended Source of Funds	Estimated Costs Years 1 & 2	Estimated Costs Years 3, 4 & 5	Estimated Costs Years 6 - 10	Comments
WW 1	The Thurston County Environmental Health Division should conduct an intensive sanitary survey of the eastern shore of Budd Inlet from Olympia to Boston Harbor.	TCEHD	Monitoring	TC General Fund, CCWF	$100,000			Committee Priority
WW 2	The cities of Lacey, Olympia and Tumwater should include the criteria of "preventing or correction of water quality degradation" when deciding to locate or extend a sanitary sewer into an existing or partially developed neighborhood where on-site sewage systems are presently used.	Lacey, Olympia, Tumwater	Regulation	Local General Funds, Sewer, Utilities Fees		NC		
WW 3	The Thurston County Environmental Health Division should provide on-site sewage system owners educational materials and training at all possible opportunities.	TCEHD	Education	TC General Fund, PIE			$20,000	
WW 4	The Thurston County Board of Health should consider the recommendations of the County Health Division's On-Site Sewage Advisory Task Force to modify the operation and maintenance permit system.	TCBOH, TCEHD	Program	Various		NC		
WW 5	The Thurston County Environmental Health Division and the Olympia Stormwater Utility should continue to investigate storm drainage systems within the Indian, Moxlie, and Mission Creek basins to determine the source of elevated fecal coliform counts.	TCEHD, Olympia Stormwater	Monitoring	TC General Fund, Olympia Stormwater Fees, CCWF			$10,000	
WW 6	The Thurston County Environmental Health Division should recommend changes to the zoning densities or land use practices for sub-basins where the monitoring data shows ongoing degradation.	TCEHD	Program	TC General Fund, CCWF			$15,000	

TABLE 6: PLAN IMPLEMENTATION -- WASTEWATER MANAGEMENT

No.	Action Recommendation	Responsible Party	Category	Recommended Source of Funds	Estimated Costs Years 1 & 2	Estimated Costs Years 3, 4 & 5	Estimated Costs Years 6 - 10	Comments
WW 7	The Thurston County Board of Health should continue with financial incentives, such as the revolving loan fund, to encourage maintenance and repairs of on-site sewage systems.	TCBOH	Financial Assistance	Various	NC	NC	NC	
WW 8	The Washington State Board of Health should continue to encourage the development of innovations in the technology of sewage treatment and effluent discharge from on-site and community sewerage systems.	WBOH, WDOH	Research	WDOH	$100,000			Committee Priority
WW 9	The Thurston County Environmental Health Division should continue to develop tools and techniques to identify specific pollutant source sites in already identified problem areas.	TCEHD	Research	Existing		NC		
WW 10	The Thurston County Environmental Health Division should undertake an assessment of the contributing factors to failures of on-site sewage systems.	TCEHD	Research	TC General Fund, CCWF		$15,000		
WW 11	The cities of Lacey, Olympia and Tumwater should establish and actively pursue a program for conversion to the sanitary sewer system, within neighborhoods where on-site sewage systems are used, and yet sanitary sewer lines are in place.	Lacey, Olympia, Tumwater	Program	Local General Funds, Sewer Utility Fees		$30,000 ($10,000/each)		

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TABLE 7: PLAN IMPLEMENTATION -- STORMWATER MANAGEMENT

No.	Action Recommendation	Responsible Party	Category	Recommended Source of Funds	Estimated Costs Years 1 & 2	Estimated Costs Years 3, 4 & 5	Estimated Costs Years 6 - 10	Comments
SW 1	All jurisdictions with stormwater utilities should: (a) provide adequate funding to implement projects identified in their capital facility plans; (b) continue to pursue capital facility projects which will benefit more than one jurisdiction; (c) continue efforts to seek joint funding for projects which are of mutual benefit; and (d) continue to pursue the implementation of the nonstructural surface water management program.	Lacey, Olympia, Tumwater, TC Stormwater	Program	Stormwater Fees, CCWF	NC	NC	NC	
SW 2	The Thurston County Environmental Health Division should trace the sources of nonpoint pollution from Budd Inlet tributaries and storm drains in areas which have not been monitored.	TCEHD	Monitoring	Stormwater Fees, CCWF			$25,000	
SW 3	The Thurston County Stormwater Utility should conduct stormwater drainage studies for either side of Budd Inlet and for the northern county peninsulas which drain directly to Puget Sound.	TC Stormwater	Data Analysis	TC Stormwater Fees, CCWF			$50,000	
SW 4	The Stormwater Utilities should require proper operation and maintenance of stormwater facilities to ensure their proper functioning.	TC Stormwater	Maintenance	Stormwater Utility Surcharge		N/A		
SW 5	Thurston County should pursue non-chemical control of roadside vegetation within the watershed.	TC Roads	Maintenance	Road	NC	NC	NC	

TABLE 8: PLAN IMPLEMENTATION -- MARINE ENVIRONMENT

No.	Action Recommendation	Responsible Party	Category	Recommended Source of Funds	Estimated Costs Years 1 & 2	Estimated Costs Years 3, 4 & 5	Estimated Costs Years 6 - 10	Comments
ME 1	The City and Port of Olympia should establish a Habitat Advisory Committee that would initiate a Comprehensive Habitat Plan for Budd Inlet.	Olympia, Port	Review Body	Olympia General Fund, Port General Fund	$20,000	$20,000	$30,000	Committee Priority
ME 2	The Washington State Departments of Fish and Wildlife, and Ecology should continue to collect data within Budd Inlet from english sole, dissolved oxygen, sediment chemicals, and benthic infaunal communities; and should make this data available to relevant management interests.	Ecology, WDFW, WDOH	Monitoring	Ecology, WDFW, WDOH, EPA	$200,000			Committee Priority
ME 3	The Washington State Department of Ecology should review the status of the implementation recommendations of the Budd Inlet Urban Bay Action Plan as a part of the proposed "Watershed Forum" scheduled for the year 2000.	Ecology	Program	Ecology		$50,000		
ME 4	The Washington State Parks and Recreation Commission and State Department of Health should continue to print and distribute educational materials on marine sanitation devices and distribute these through marinas and boating clubs.	WPRC, WDOH	Education	WPRC, WDOH			$10,000	
ME 5	The Washington State Departments of Health and Parks should conduct a review of the status of marine pump out facilities in Budd Inlet to determine the adequacy of facilities, maintenance, and future needs including an ongoing monitoring program.	WPRC, WDOH	Monitoring	WPRC, WDOH			$10,000	
ME 6	The Thurston County Environmental Health Division should conduct a moderate risk hazardous waste inventory of all marinas in Budd Inlet.	TCEHD	Monitoring	TC General Fund, CCWF		$15,000		
ME 7	The Washington State Department of Natural Resources should conduct a study to determine the effects of log-rafting on habitat and water quality in Budd Inlet.	WDNR	Research	ALEA			$50,000	

TABLE 9: PLAN IMPLEMENTATION -- PLAN IMPLEMENTATION

No.	Action Recommendation	Responsible Party	Category	Recommended Source of Funds	Estimated Costs Years 1 & 2	Estimated Costs Years 3, 4 & 5	Estimated Costs Years 6 - 10	Comments
IMP 1	Thurston County should encourage new state legislation which would provide for an unified source of funding for water resource programs.	TC	Program	Existing	NC			Committee Priority
IMP 2	Thurston County should create a Watershed Commission to aid in the implementation of adopted Watershed Action Plans.	TC	Review Body	TC General Fund, Stormwater Fees	$20,000	$30,000	$50,000	Committee Priority
IMP 3	Implementing departments, agencies or individuals should use the Watershed Action Plan as the framework for future sub-basin ground water, drainage basin, or other water related resource studies.	Various	Program	Various	NC			
IMP 4	The Thurston County Office of Community and Environmental Programs should serve as the lead agency for the implementation of the Budd Inlet-Deschutes River Watershed Action Plan.	TCCEP	Program	TC General Fund	$20,000	$30,000	$50,000	
IMP 5	Thurston County should convene a "Watershed Forum" in the year 2000 to evaluate the implementation of the Budd-Deschutes Watershed Action Plan and Ecology's Budd Inlet Urban Bay Action Plan.	TC	Review Body	TC General Fund, Stormwater Fees, CCWF		$40,000		

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TABLE 10: PLAN IMPLEMENTATION -- SUMMARY OF ESTIMATED COSTS

Plan Chapters	Years 1 & 2	Years 3, 4, & 5	Years 6 through 10	Total Years 1 through 10
Public Education Programs	$60,000	$50,000		$110,000
Research and Monitoring Programs	$40,000	$110,000	$140,000	$290,000
Flooding, Bank Erosion and Sedimentation	$80,000	$570,000	$230,000	$880,000
Forest Practices	$40,000	$400,000	$900,000	$1,340,000
Agricultural Practices	$20,000	$130,000	$70,000	$220,000
Wastewater Management	$200,000	$45,000	$45,000	$290,000
Stormwater Management			$75,000	$75,000
Marine Environment	$220,000	$85,000	$100,000	$405,000
Plan Implementation	$40,000	$100,000	$100,000	$240,000
Plan Total	$700,000	$1,490,000	$1,660,000	$3,850,000

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TABLE 11: PLAN IMPLEMENTATION -- WATERSHED MANAGEMENT COMMITTEE PRIORITIES

Priority	No.	Action Recommendations	Costs
1	FOR 1	Thurston County should adopt a County Forest Practices Ordinance and develop a written procedures manual with the Washington State Department of Natural Resources to address forest practices and conversions.	*$40,000*
2	AG 1	The Thurston Conservation District should continue to prepare and implement comprehensive farm plans for commercial and non-commercial operations within the Budd-Deschutes Watershed.	
3	ED 1	Local jurisdictions should continue to fund, support and coordinate efforts by successful education programs such as the Stream Team and Project Green. High priority public education projects which should be accomplished by these groups include: a. Developing a series of watershed town hall meetings to discuss watershed issues. Target a meeting for each of the major subdivisions along the shoreline. b. Developing a series of newspaper articles on Budd Inlet and Deschutes River water quality problems and the results of volunteer monitoring. c. Developing stream rehabilitation projects focusing on hands-on environmental restoration with a goal of flood and erosion reduction by restoring riparian habitat or offering training to river side landowners. d. Conducting tours to the bioengineering sites on a regular basis to increase knowledge watershed problems and to see successful solutions. e. Creating a TCTV television program on riverbank restoration and erosion control. f. Developing educational programs focusing on the history and current importance of fisheries in the watershed.	$60,000
4	R&M 1	Local jurisdictions should agree upon and adequately fund a baseline surface water, ground water and habitat monitoring program for the Budd-Deschutes Watershed.	

TABLE 11: PLAN IMPLEMENTATION -- WATERSHED MANAGEMENT COMMITTEE PRIORITIES

Priority	No.	Action Recommendations	Costs
5	ED 3	Local jurisdictions should include an education component with any surface, ground, watershed or water quality planning project and adequate financial resources should be provided to complete this task.	
6	WW 1	The Thurston County Environmental Health Division should conduct an intensive sanitary survey of the eastern shore of Budd Inlet from Olympia to Boston Harbor.	$100,000
7	SED 1	The Washington Department of Natural Resources or forest landowners should conduct a Watershed Analysis within the upper Deschutes River system to determine changes in sediment transport and hydrology over time.	$100,000
8	IMP 1	Thurston County should encourage new state legislation which would provide for a utilitize an unified source of funding for water resource programs. A change in state law would be needed to correct multiple, piecemeal fees and changes for the County's water protecting efforts.	
9	ME 1	The City and Port of Olympia should establish a Habitat Commission to undertake Comprehensive Habitat Management Plan for Budd Inlet.	$70,000
10	ME 2	The Washington State Departments of Ecology, Fish and Wildlife and Health should collect additional data in Budd Inlet to fill existing gaps and fully implement the recommendations of the Budd Inlet Urban Bay Action Plan.	$200,000
11	SED 2	Thurston County should accurately delineate the extent of the floodplain and historic channel meander belt along the Deschutes River to identify areas at risk of hazard due to future channel migration.	$40,000
12	SED 4	Thurston County should conduct a "reach scale analysis" for the Deschutes River before public funds are expended for new flooding, bank erosion, or sedimentation control projects.	$80,000

TABLE 11: PLAN IMPLEMENTATION -- WATERSHED MANAGEMENT COMMITTEE PRIORITIES

Priority	No.	Action Recommendations	Costs
13	SED 11	The Squaxin Island Tribe should identify and map off-channel salmonoid rearing areas in the floodplain of the Deschutes River and its tributaries. It should also evaluate the effects of nonpoint pollution and related land use activities on these waterbodies.	$25,000
14	WW 8	The Washington State Board of Health should establish incentives to encourage the development of innovations in the technology of sewage effluent treatment and discharge from on-site and community sewerage systems.	$100,000
15	R&M 6	Local and state agencies should jointly establish a watershed based data retrieval system for Budd Inlet and the Deschutes River.	$40,000
16	AG 2	Thurston County Environmental Health Division and the Thurston Conservation District should continue to provide coordinated enforcement of the Nonpoint Pollution Ordinance.	$100,000
17	IMP 2	Thurston County should create a Watershed Commission to aid in the implementation of adopted Watershed Action Plans.	$100,000

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APPENDIX A
CONCLUSIONS AND RECOMMENDATIONS

Mainstem of the Deschutes River

- Generally the river meets the water quality standards for dissolved oxygen. Temperature measurements recorded at two stations, near Rainier and near Vail, violated the water quality standard for temperature. Aquatic organisms, especially salmonid fish species, are particularly susceptible to temperature increases.

- Generally, fecal coliform bacteria levels were low in the upper reaches of the river, and increased in the lower reaches. Three of the seven river stations violated one or both parts of the water quality standard for fecal coliform bacteria. The greatest increase in fecal coliform concentrations and fecal coliform loading occurred between the sampling station at river mile 36.5 and river mile 28.5. Another increase in fecal coliform bacteria concentrations and loading occurred in a very short stretch between river mile 2.0, above the brewery, and River Mile 1.75, below the falls.

- Total suspended solids loading at mainstem Deschutes river miles 28.5 and 36.5 during a flood event increased 1070 and 426 times over typical wet weather TSS loads. During non-flood event sampling, the TSS concentration and loading showed a very gradual increase from the upper to lower stations. Estimated TSS loads from the tributaries entering this segment of the river could not account for all of the TSS load in the river, indicating that the source of much of the additional suspended solids may actually be from the river channel.

- Total phosphorus concentrations increase during dry weather and decrease during wet weather in the section of the river below river mile 2.0, but the load is relatively constant. This is characteristic of a point source, and is probably reflecting the permitted discharges from the brewery, which have high concentrations of total phosphorus.

Tributaries

- The three tributaries influenced by urban land uses; Moxlie, Percival, and to some extent Chambers, overall exhibited higher pollutant concentrations and loads than the other seven tributaries monitored. All three creeks had fecal coliform concentrations which violated the standard.

- Percival and Moxlie Creeks, in the urbanized area of the watershed, had dry weather fecal coliform concentrations and loadings greater than the other tributaries and greater than the levels seen during the wet season. This indicates continuous sources of bacteria typical of point sources or sources that are not

related to rainfall and run-off, such as leaking sewers or illicit discharges.

- Moxlie Creek also had higher dry weather TSS and total phosphorus concentrations and loading than wet weather, indicating fairly constant sources and also sources related to activities occurring in the summer.

- Percival Creek contributes the largest load of total phosphorus of the tributaries measured, which is primarily a function of stream size rather than pollutant concentrations.

- Chambers Creek, which has both residential, urban, and agricultural land uses within its watershed, had the highest nitrate concentrations seen in the study. Its average nitrate concentration was 1.33 mg/l. The main source of water for the creek is ground water, and the creek's nitrate concentrations are probably a reflection of nitrate concentrations in the ground water in the area.

- Spurgeon and Reichel Creeks, which have rural residential and agricultural activities within their sub-watersheds, ranked third and second, respectively, in overall fecal coliform loading contribution out of 10 creeks monitored.

- The five tributaries monitored in the upper watershed generally had lower pollutant concentrations and loading contributions than the five tributaries in the lower two-thirds of the watershed. All five creeks had geometric mean fecal coliform concentrations of five organisms per 100 ml or less.

- The tributary in a sub-watershed dominated by a dairy farm showed significantly degraded water quality during storm events at the two stream stations influenced by the farm activities. The water quality standards for fecal coliform bacteria and turbidity were violated at both stations influenced by the dairy, but were easily met at the head water station.

- Reichel Creek had water quality violations of the turbidity standards during storm events. The violations occurred in segments of the creek influenced by a timber company's log sort yard and cattle ranches. The fecal coliform standards were violated at all but the headwater stations on the creek.

- The urban area creeks clearly demonstrated the greatest degree of contamination, both in routine ambient monitoring and in intensive stormwater monitoring. Mission Creek, which is dominated by urban residential land use, had the worst fecal coliform contamination seen in the study, with all of the creek stations violating the water quality standard for bacteria during storm events. Seven storm drains were sampled during storm events and were found to be highly contaminated with fecal coliform bacteria and turbidity.

- Butler Creek, which has rural residential and agriculture, areas of urban densities and commercial/industrial activities, and a golf course, showed definite water quality degradation throughout the stream system. Two of the three tributaries to Butler Creek exceeded the fecal coliform bacteria standard at their headwater and mouth stations. The tributary which had rural residential use and one small cattle farm had the lowest fecal coliform concentrations on the creek and all of its stations met the water quality standard. Nitrate and total phosphorus concentrations were also at levels indicative of contamination.

Capitol Lake Results

- Many miscellaneous discharges located along the perimeter of Capitol Lake are contributing fecal coliform bacteria and nutrient contamination to the lake.

- Phosphorus concentrations and resultant algae productivity in the lake will continue to be a problem because of the large phosphorus load from the river, Percival Creek, and the brewery.

- The data indicates that the lake is a "sink" for bacteria, probably through the settling of suspended solids.

Budd Inlet Results

- Fecal coliform bacteria standards were violated at three of the six Budd Inlet stations measured.

- The two sampling stations most strongly affected by the LOTT wastewater treatment plant showed the highest nutrient concentrations.

- Dissolved oxygen measurements at many of the stations showed supersaturated conditions which is indicative of a highly productive system.

Sediment Sample Results

- Elwanger Creek, Butler/Golf Course Tributary, and Mission Creek sediments had metals concentrations within background levels.

- Olympia Oil and Wood Pond, Reichel Creek, and West Bay Marina Parking Lot sediments had copper concentrations over twice the concentration seen at the upper Deschutes River sediment site and over background levels. Reichel Creek sediment also had a zinc concentration more than twice that measured at the Deschutes site, although it is not above the background level criteria for zinc.

- The I-5 Storm Drain sediment had the highest concentrations of antimony and arsenic. The copper and zinc levels were the second highest levels found, although they are an order of magnitude less than the worst levels. It also had lead levels considerably higher than the upper Deschutes site but less than the state-wide freshwater sediment background level. The copper, lead, arsenic, and zinc levels exceeded the freshwater sediment criteria.

- Washington Avenue storm drain sediment had the greatest number of metals exceeding background levels. Those metals include antimony, cadmium, copper, mercury, lead, and zinc. It is the only sediment sample which exceeded the background level criteria for cadmium, which was undetected at all but two sites.

- Harrison Avenue sediment results were above background level criteria for antimony, nickel, lead, and zinc. It was the only site to exceed background for nickel.

- West Bay Boatyard Ditch site had extremely elevated levels of copper, mercury, lead, and zinc. Antimony was also above background levels.

- No semi-volatile organics were detected in sediment samples from the upper Deschutes River site and four creek sites.

- Polynuclear aromatic hydrocarbons (PAH's) were detected at all five sediment sample sites receiving roadway or parking lot run-off. Thirteen PAH compounds were detected at the Harrison Ave. site. Eight were detected at the I-5 and West Bay Boatyard ditch sites. Seven were detected at the Washington Avenue site, and four were in the West Bay marina parking lot sediment.

- The PAH concentrations in the Washington Avenue sediment were at least an order of magnitude greater than the PAH concentrations in the other samples.

- The second most frequently appearing group of semi-volatile organics were phthalates.

- The pesticide, aldrin, appeared in nine of the eleven sediment sampling sites, and was the most frequently appearing pesticide.

- Heptachlor was the second most frequently appearing pesticide, detected at six of the eleven sampling sites.

- No chlorinated herbicides were detected in any samples.

- The five sediment sampling stations with the greatest number of organic contaminants, in decreasing order; were Harrison Avenue, West Bay Boatyard Ditch, Washington Avenue, I-5 Run-off, and West Bay Marina Parking Lot.

- Washington Avenue and West Bay boatyard ditch both had six contaminants above the marine sediment standards. Harrison Avenue had four above the standard, and West Bay parking lot had only one.

- A total of ten compounds were above the standard at least one sampling site. Of the ten, only one was from the PAH group. The remaining nine compounds were phthalates, phenols, and miscellaneous organics.

- Butylbenzylphthalate and bis(2-ethylhexyl)phthalate were above the standard in three of the four marine sites. The high concentrations of these two phthalate compounds at West Bay boatyard ditch and the Washington Avenue site may be related to plasticizers and resins used for boat repair and auto repair activities, respectively.

- Dimethylphthalate exceeded the standard at the West Bay boatyard ditch. The most likely source at this site is from products used for boat repair.

- 1,2-Dichlorobenzene and 1,4-dichlorobenzene were only detected at the Washington Avenue site, and they were in concentrations an order of magnitude above the standards. 1,2-Dichlorobenzene is used extensively in solvents. There are users of solvents within the drainage area for this site which may be potential sources for this contaminant. The primary use of 1,4-dichlorobenzene is for space deodorants and moth control. Possible sources of this contaminant could be illicit sanitary sewer connections, leaking sewer lines, and janitorial businesses operating in this area.

- Benzyl alcohol was detected only in the West Bay marina parking lot drain and in the West Bay boatyard ditch, and was above the marine standard at both sites.

Because of the wide variety of uses for this chemical, it is not possible to associate any particular activity with its presence.

- Benzoic acid was detected in only two sites in the study, West Bay boatyard and Harrison Avenue. The concentration in the West Bay boatyard sample exceeded the marine standard. Benzoic acid is a common additive in foods, plasticizers, alkyd resins, flavors, perfumes, antifungal agent, and other uses.

- Phenol was detected only at the Harrison Avenue and West Bay boatyard ditch sites. Both concentrations exceeded the standard for phenol. At the boatyard site, a likely source of phenol is the resins used for boat repair. In the drainage area for the Harrison site possible sources for this contaminant may be medical offices in the area which use germicides.

- 4-Methylphenol was detected at levels above the standard at the Harrison Avenue and Washington Avenue sites. Some of the uses are similar to those listed above for phenol. Possible sources at Harrison may be the medical facilities. At Washington Avenue, sources could be cleaning products from janitorial businesses or sanitary sewer connection and resin waste from auto repair shops.

Marina Study Results

- The fecal coliform bacteria samples taken inside the marina met the Class B water quality standard one of the two times sampled. The samples taken outside the marina met the standard both times sampled.

- Dissolved oxygen concentrations met the minimum water quality standards both inside and outside the marina during both sampling runs. The water was supersaturated with oxygen at some locations during both sampling runs, indicating that phytoplankton or algae activity was very high.

- The elevated temperatures at the outside marina stations violated the water quality standard during one of the two sampling runs, but probably were the result of natural weather and tidal conditions.

- pH, turbidity, and biochemical oxygen demand were within acceptable ranges and did not appear to be adversely effected by the marina activities.

- Although the first sampling run appeared to show some difference in nitrogen-compound concentrations between the inside and outside marina stations, the second sampling run was influenced by an unrelated event which did not allow for a repetitive evaluation.

- Five of 15 polynuclear aromatic hydrocarbons (PAH) included in the analysis were detected in samples collected during the study. Phenanthrene was the most frequently occurring of the five PAH compounds detected, and is found in creosote at concentrations of 12 to 14 percent.

- All of the sediment samples both inside and outside the marina met the marine sediment standards for metals. Overall, the average metals concentrations of sediments inside the marina were similar to the average concentrations outside the marina, except lead which was higher outside the marina area. The ranges of results seen from the samples taken inside the marina were greater than the samples from outside the marina.

- The average tributyl tin (TBT) concentration of the inside marina samples were greater by a factor of three than the concentration of the samples outside the marina. And although there are other marinas and many potential sources of tributyl tin in Budd Inlet, it appears that the activities or the presence of large numbers of boats in the marina has influenced the TBT concentrations in the sediment.

- Mussel tissue samples collected from within the marina and at a control site outside of Budd Inlet showed that TBT concentrations were 10 times greater in the marina mussels than in the control mussels. Three PAH compounds were also found in the marina mussels, but none were detected in the control site mussels.

Although this study was conducted for the purpose of providing information to guide the decisions of a watershed planning committee, it is apparent from the data that there are areas within the watershed where additional investigative monitoring or corrective measures can be taken immediately to improve water quality conditions in specific areas. Some of the recommended monitoring and remedial activities are the following:

Recommended Follow-up Action

- Storm drain systems in the urban areas show contamination with conventional and organic contaminants. Cooperative efforts should be undertaken to conduct stormwater investigations and develop facility improvements in areas identified as contributing to water quality degradation in the receiving waters.

- Since many of the contaminants recovered in the sediment samples are the result of everyday practices and lifestyle, such as vehicle generated contaminants, educational efforts both for businesses and individuals on common sense ways to preserve water quality should be continued.

- Some of the water quality monitoring showed results which are indicative of leaking sewer lines or illicit connections. Detailed investigations should be made in those area and corrections made where problems are identified, which would include examining available sewer and storm sewer maps and conducting stream surveys. The specific areas deserving of investigation are Percival and Moxlie Creeks, Fiddlehead sewer and storm sewer outfall, and the Tumwater Falls section of the Deschutes River.

- Areas of primarily residential land use which showed bacterial contamination problems should be targeted for area-wide on-site sewage system surveys and corrective actions initiated where necessary. The specific areas which should be targeted for on-site sewage system surveys are Indian and Mission Creeks. Stream survey and stream segment sampling should also be done on Indian Creek.

- Chambers Creek was found to have nitrate concentrations above typical surface water concentrations and also had somewhat elevated bacteria concentrations. Available information for the area suggests ground water may be the source of the nitrate levels in the creek. A follow-up ground water investigation in the Chambers Creek basin should be conducted to help identify ground water flows and contaminant concentrations and possible sources. Stream survey and stream segment sampling is recommended to identify the possible sources of the bacterial contamination.

- The Deschutes River segment between the uppermost station and Vail Road and Reichel, Spurgeon, and Elwanger Creeks showed bacteria contamination. The primary land uses in these areas are rural residential and agricultural activities. Farm inventories should be conducted in these areas, and owners/operators of farms having management practices resulting in or likely to result in surface water contamination should be referred to the Thurston Conservation District for technical assistance. Additional investigative work in these areas, such as aerial photograph examination, stream surveys and stream segment sampling, may be needed to further identify and correct specific contamination sources. Currently the Thurston Conservation District has dedicated funding to produce five farm plans within the Deschutes watershed, and efforts are being focused on Reichel Creek.

- Data indicates that the river itself, in the section between the Weyerhaeuser stream flow station near the Sorenson Road crossing and the Highway 507 crossing, is contributing large amounts of total suspended solids. This area should be examined by or with the assistance of a hydrologist to determine if or where specific areas where stream bank stabilization or other improvements could

be implemented to reduce the problem. The Conservation District has dedicated funding to design and construct three to five stream bank stabilization projects on the Deschutes River in 1993-94, however, continued efforts in this area should be expanded. Cooperation and coordination with Weyerhaeuser, as primary land holder in the upper watershed, is also needed to address the issues of peak flow stream flows and sediment reduction.

- The water quality monitoring showed that Reichel Creek and an associated wetland near the headwaters is being impacted by the activities at the Weyerhaeuser log-sort yard. Stormwater run-off improvements are needed to treat the stormwater before it flows into the creek and wetland. Field observations during monitoring also indicate that stormwater improvements at the Weyerhaeuser operations yard should be made to minimize run-off of contaminated stormwater to the creek.

- Shoreline sampling along Budd Inlet identified areas where possible non-point pollution is occurring. Follow-up sampling and corrective action where appropriate should be done.

- Efforts to investigate and correct pollution sources to the storm drain outfalls into Capitol Lake should be continued with the City of Olympia, Washington State Department of General Administration, and Thurston County Health Department.

- A cooperative inventory and sampling effort of all storm drain discharges to Budd Inlet in the inner inlet area should be conducted during low tide conditions to identify and prioritize drainage areas and piping systems which might need corrective measures.

Some of the activities listed above will be initiated as part of a Centennial Clean Water grant awarded to Thurston County to prepare a non-point pollution plan for the Budd Inlet/Deschutes River watershed.

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APPENDIX B
TRANSIENT SNOW ZONE

The transient snow zone is a zone where rain-on-snow precipitation events are relatively common. The rain-on-snow events presents a "wild card" to hydrologists in the estimation of runoff and infiltration on watershed within the transient zone. Although our knowledge of snow hydrology in the transient snow zone is far from complete, we recognize that certain changes int he snow hydrologic system can occur. The physical basis for increased rate of snow melt after logging does exist in the components of snow melt that are dependent on wind speed and turbulence. Increased melt results in increased rate of water delivery to soil, and roads and ditches can route surface and subsurface water to streams faster than in undisturbed watersheds. Increased rate of delivery of water to soil can lead to more or larger landslides in areas susceptible to mass erosion (Christner and Harr, 1982).

In addition, surface erosion on disturbed soil can increase during periods of high runoff. Faster delivery of more water to streams can cause higher flows and stream velocities that erode banks and channels and move large organic debris. And, because the flow changes have been detected in streams draining relatively large areas, there is reason to believe that changes in peak flows in some smaller basins within the large watersheds could have been much greater. Smaller watersheds tend to have greater proportions of their areas in an altered condition, and harvesting tends to be concentrated in a shorter period of time. Increased size of peak flows appears related to cumulative effects of timber harvested activities, primarily clearcut logging in the transient snow zone. More rapid delivery of water to soil and to streams increases the probability of landslides and stream channel erosion in headwater areas as well as channel erosion processes downstream. Timber harvest scheduling should take into account both the possibility for changes in snow accumulation and melt resulting from logging in the transient snow zone and the time required for hydrologic recovery (Christner and Harr, 1982).

Snowpacks in large openings are known to develop more ice lenses due to lower nighttime temperatures than do packs under forest cover. During some melt conditions, meltwater may flow over ice lenses to watercourses without entering the soil and may contribute to higher rates of stream flow. The frequency of occurrence of ice lenses and their extent within the transient snow zone are not known (Smith, 1974).

The transient snow zone in Washington and Oregon appear to be similar in that they occur at about the same elevation. Most of the research has been done in Oregon although new research by Harr is now being done in both states.

Harr's summary from his review of "Effects of Clearcutting on Rain-on-Snow Runoff in Western Oregon. A New Look at Old Studies" suggests that clearcut logging has altered snow accumulation and melt sufficiently to have affected size of peak flows resulting from snow melt during rainfall. Another updating suggests although less conclusively (Harr and McCorison, 1979), that snow accumulation and melt both may have been altered by clearcut logging.

In a discussion of unit size, harvest timing, and spatial location of units as tied to rain-on-snow events Harr felt that while they are not far enough along to specifically tie unit size and spatial location, it would be appropriate to err on the conservation side (Harr, 1989).

As was pointed out by Moore and Anderson (DOE, 1979) the majority of the sedimentation in the Deschutes River appears to be coming from the streambanks of the mainstem from near the 1000 line bridge on down the river to the lower sections. There is a strong possibility that the increased stream flow from the transient snow zone and large clearcut units can increase the amount of water in the mainstem. As a result, the rate of bankcutting is increased, hence greater sedimentation at a faster rate into Capitol Lake.

In the area of the upper watershed where landslide activity occurred, special care in harvesting, unit size, and location needs to be considered in the future. Intensified road maintenance including storm patrol during rain-on-snow events in the transient snow zone (where possible) is helpful as rain-on-snow can, for example, load up the road shoulders, fill slopes, and increase the probability of landslides.

Further monitoring and research may tie together the transient snow zone and cumulative effects (PSCRBT, 1990).

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APPENDIX C
WATERSHED ANALYSIS

Watershed Analysis is a system for identifying cumulative effects from forest practices on state and private lands in Washington State. It is a recent addition to the regulations developed by the State Forest Practices Board to protect public resources such as water quality, fish, wildlife, bridges, etc. as required by the State Forest Practices Act. This regulation is also intended to satisfy a requirement in the State Environmental Policy Act (SEPA) to evaluate potential cumulative effects. The Washington Department of Natural Resources (WDNR) is responsible for implementing Watershed Analysis.

Watershed Analysis is designed for watersheds approximately 10,000 - 50,000 acres in size. WDNR has identified about 250 hydrologic units (known as "Watershed Administrative Units" (WAUs) in the forested portions of Washington State. The State of Washington will fund teams to perform Watershed Analysis using priority lists developed by each WDNR region. Watershed Analysis can also be independently initiated by forest landowners.

Watershed Analysis attempts to determine the effect of forest practice activities on the natural processes that determine sediment input, hydrology and riparian function. Changes in these "hill-slope processes" are linked to existing or potential responses in the stream channel that result in changes to fish habitat and water quality.

The process begins with a series of resource condition assessments performed by WDNR certified analysts. Assessments are done of mass wasting, surface erosion, hydrology, riparian function, stream channel condition, fish habitat and public works. After each of the individual assessments have been completed, the team members work together to prepare a resource condition report that will: (a) determine current conditions in the watershed; (b) assess the likelihood that watershed processes (sediment delivery, hydrology or large woody debris (LWD) recruitment) have or will be adversely changed by one or more forest practices; (c) assess the vulnerability of resources potentially affected by alterations in watershed processes; (d) identify areas of resource sensitivity requiring a management response; (e) determine the appropriate level of management response (minimize, or prevent and avoid); and (f) summarize this information in a series of causal mechanism reports developed for each area of resource sensitivity.

After reviewing the resource assessment report, WDNR assembles a team of qualified field managers to develop prescriptions (appropriate management practices) for each of the areas of resource sensitivity identified in the resource assessment report. Prescriptions must be reasonably designed to minimize, or to prevent or avoid, the likelihood of adverse change to processes with a potential to cause material adverse effects to public resources. Following completion of the prescriptions, the entire Watershed Analysis goes through a public review and comment process. It can then be approved, revised or disapproved by WDNR.

The Puget Sound Water Quality Plan endorses the Timber-Fish and Wildlife (TFW) forest management system and suggests that local watershed management plans coordinate with provisions of the TFW agreement and the forest practices management system. Watershed Analysis is a tool in the forest practices management system that can assist in accomplishing objectives related the forest practices component of the local plans. Watershed Analysis also provides opportunities for participation, review and comment by local governments and landowners. Finally, it will help to assess impacts from other nonpoint activities and identify voluntary corrective action or restoration possibilities suitable for interagency cooperation.

The Watershed Analysis process will produce a number of products, which can include the following:

- Scientific Analysis
  Watershed Analysis produces a technically sound analysis that provides a framework for understanding and addressing cumulative effects on a watershed scale. The analysis is based on an understanding of watershed processes, how they are potentially altered by forest practices, and the resulting channel, fish habitat and water quality impacts. This information is essential to prevent future impacts and to restore damaged resources.

- Prescriptions for Forest Practices
  Specific prescriptions for forest practices will be developed for each watershed process and area of resource sensitivity in the watershed. These prescriptions will be tailored to manage for localized conditions, providing better resource protection than statewide regulations.

- Monitoring and Evaluation
  Voluntary cooperative monitoring is encouraged. A watershed specific monitoring plan is developed by watershed "stakeholders" following the resource assessment. WDNR is required to evaluate the effectiveness of prescriptions to determine if they are providing protection and allowing recovery of resource characteristics. If WDNR finds that the prescriptions are not providing for such protection and recovery over a period of three years, Watershed Analysis will be repeated to determine why protection and recovery are not occurring.

- Impacts Not Associated with Forest Practices
  The resource assessment teams are required to identify and report on any non-forest practice related impacts to public resources identified during Watershed Analysis. WDNR passes this information along to the appropriate agency with jurisdiction over these activities (this may be local governments in some cases).

- Voluntary Corrective Action
  The resource assessment team is directed to identify voluntary corrective actions (includes non-mandatory activities such as restoration) that would significantly reduce the likelihood of material adverse effects to public resources. WDNR conveys this information to the appropriate landowner.

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APPENDIX D
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APPENDIX E
APPROVAL LETTER
AND
LETTERS OF CONCURRENCE

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
P.O. Box 47600 • Olympia, Washington 98504-7600
(360) 407-6000 • TDD Only (Hearing Impaired) (360) 407-6006

June 14, 1995

Budd Inlet/Deschutes River Watershed Management Committee
c/o Steve Morrison, Senior Planner
Thurston County Advance Planning and Historic Preservation 2404 B Heritage Court SW
Olympia, WA 98502-6031

Dear Committee Members and Staff:

Please accept my compliments on the completion of the Budd Inlet - Deschutes River Watershed Action Plan. Much hard work has gone into the preparation of this Plan. I sincerely appreciate the commitment and efforts that have gone into protection of the waters in the Budd Inlet - Deschutes River Watershed.

Your Plan has been reviewed by a staff committee from Ecology's Division of Water and Shorelands. A copy of the committee's report is enclosed. I have reviewed your Plan and the committee's report and hereby approve the Plan. Please review the committee's report and make any needed changes prior to final printing of your Plan.

We look forward to annual reports on how implementation of your Plan is proceeding. We recognize that most implementation efforts will occur at the local level and we will assist you with your efforts in any way we can.

We look forward to the successful implementation of your Plan and its water quality benefits to the Budd Inlet - Deschutes River Watershed.

Sincerely,

Linda G. Crerar
Assistant Director
Water and Shorelands

LC:BD:lb
Enclosure

cc: Kathy Minsch, PSWQA

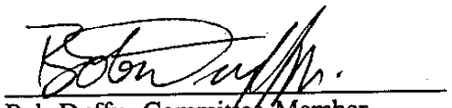
A REPORT OF THE ECOLOGY REVIEW COMMITTEE ON THE FINAL JUNE 1995 VERSION OF THE BUDD INLET - DESCHUTES RIVER WATERSHED ACTION PLAN SUBMITTED MAY 15, 1995 AS THE FINAL VERSION FOR ECOLOGY APPROVAL

An Ecology review committee, consisting of Bob Duffy and Toni Canova was formed to review the Final June 1995 version of the Budd Inlet - Deschutes River Watershed Action Plan submitted in May 15, 1995, as the final version of the Plan for Ecology approval. The committee members reviewed and evaluated the Plan during May 1995. Overall, the committee was very impressed with the excellent quality and detail in the plan.

The Plan was read by Ecology reviewers, comments on the preliminary draft were examined, plan revisions were analyzed, statements of concurrence were evaluated, and the plan was compared with the requirements of the 1991 version of Chapter 400-12 WAC, Local Planning and Management of Nonpoint Source Pollution (the Nonpoint Rule) (which is the version of the rule that this Plan was developed under).

Ecology's review committee report consists of two sections: "Determinations Pursuant to the Process for Final Approval of Watershed Action Plans, November 1989," and "Detailed Comments." (The Process for Approval provides procedural guidance to Ecology staff regarding the review of watershed management committee approved plans.)

Because the Ecology review committee feels the Plan is consistent with the Nonpoint Rule and meets the criteria in the Ecology Process for Final Approval of Watershed Action Plans, we recommend that the Plan be approved. There are a few items, detailed below under "Detailed Comments," that should be considered prior to final printing of the plan.

FOR THE COMMITTEE: 

Bob Duffy, Committee Member

ECOLOGY PLAN REVIEW DETERMINATIONS PURSUANT TO ECOLOGY PROCESS FOR FINAL APPROVAL OF WATERSHED ACTION PLANS (NOVEMBER 1989)

RE: THE FINAL JUNE 1995 VERSION OF THE BUDD INLET - DESCHUTES RIVER WATERSHED ACTION PLAN SUBMITTED MAY 15, 1995, AS THE FINAL VERSION FOR ECOLOGY APPROVAL

The committee has reviewed the Plan as provided in section 400-12-545(4) of the 11-6-91 version of Chapter 400-12 WAC, Local Planning and Management of Nonpoint Source Pollution. We used the 1991 version of the Rule because the Plan was developed under this version of the Rule.

1. The Plan is consistent with the goals and requirements of the Puget Sound Water Quality Management Plan (PSWQMP).

2. The Plan has been developed in accordance with the process described in Chapter 400-12 WAC, the Nonpoint Rule.

3. The Plan contains a summary of the water quality characterization, the problem definition, and a statement of goals and objectives.

4. The Plan specifies a set of actions to be carried out by implementing entities to address the priority nonpoint pollution problems in the watershed and to meet the goals and objectives of the PSWQMP.

5. The Plan includes statements of concurrence from entities responsible for implementing recommendations of the action plan.

6. The Plan includes a budget and implementation schedule.

7. Adequate public involvement and participation has occurred in development of the Plan and a process for adequate public involvement in implementation of the plan is provided for in the Plan.

DETAILED DEPARTMENT OF ECOLOGY COMMENTS ON THE PLAN

RE: THE FINAL JUNE 1995 VERSION OF THE BUDD INLET - DESCHUTES RIVER WATERSHED ACTION PLAN SUBMITTED MAY 15, 1995 AS THE FINAL VERSION FOR ECOLOGY APPROVAL

This is an excellent plan. Overall, the review committee was impressed with the dedication and commitment of the Watershed Management Committee. The plan effectively addresses the subject of prevention and control of nonpoint sources of water pollution. The plan also addresses all provisions of the revised Nonpoint Rule adopted in 1991.

Problem statements were clearly presented in the Plan. Goals and objectives were also clearly and succinctly stated and were well linked to the problems identified. Recommendations followed that provided full continuity with goals, objectives and problem statements.

No major problems were noted with the plan. The following items should be considered prior to final printing of the plan.

1. The final printing of the Plan should indicate "Ecology Approved" and the date of approval on the front cover of the plan.

2. The contact information described in 400-12-550(1) should be included in the title page.

3. Statements of concurrence are missing from the plan. Statements of concurrence should be collected and included in the plan before printing the final plan.

The following specific comments are provided by our regional office staff:

4. The plan's implementation strategy looks feasible and I think the committee has formulated action items which will begin to address the water quality problems that have been identified. However, I do not think the plan adequately provides an implantation {sic} strategy for current water quality problems that have been identified. For example, adopting the forest practices ordinance as stated in the priorities outlined in Table 11 (p. 10-23) would address potential (future) temperature excursions in the Deschutes. However, this action does not provide a plan to address current restoration needs. The same is true for priority #2. Continuing to prepare and implement comprehensive farm plans is necessary to prevent additional loads of pollution from entering the river, but a plan for correcting the coliform problems that have been identified at RM 36.5, 28.5, etc., on the Deschutes is still needed. Specific loading sources (or problems) should be identified, monitored, corrected and followed-up with more monitoring to ensure the problem has been corrected. (Some problems are clearly identified in Appendix A, but they {are} not included in the implementation plan outline in Table 11.

5. The plan does not provide the actions necessary to control nonpoint sources of pollution for all the water quality problems that have been identified. For example,

total phosphorous is a problem identified in the section of the Deschutes River below RM 2.0, but none of the action items addresses this problem.

6. The players with the authority to implement the plan have been involved in this action plan's development. However, their continual use of the word "should" indicates that implementation is conditional. What is conditional upon is not addressed.

7. The end notes citing "Davis" and "Mead" as references in Chapter 3 are not listed in the Bibliography.

8. A monitoring program must be planned and funded, particularly where WQ violations have been identified.

9. An oversight committee should be initiated as indicated in Imp 2 (p. 10-5), but it is not clear why this committee would replace existing watershed councils for Eld and Henderson Inlets.

City of
OLYMPIA

900 Plum Street, P.O. Box 1967, Olympia, WA 98507-1967

November 23, 1994

Board of Thurston County Commissioners
2000 Lakeridge Drive
Olympia, WA 98502

Dear County Commissioners:

SUBJECT: Letter of Concurrence regarding the Budd Inlet-Deschutes River Watershed Action Plan

The City of Olympia would like to commend your staff and members of the Budd-Deschutes Watershed Management Committee for their efforts in producing the Budd Inlet-Deschutes River Watershed Action Plan. We understand that many long hours have gone into developing this comprehensive watershed management plan that establishes short- and long-term solutions to nonpoint pollution problems in the Budd-Deschutes Watershed.

While a relatively small percentage of this watershed falls within the City of Olympia, we are very supportive of the comprehensive approach to watershed management that the plan's 85 Action Recommendations promote. We also appreciate very much the efforts of the Watershed Management Committee to recommend 19 of the highest priority Action Recommendations that should be implemented in the next two years. The City of Olympia would be directly involved in implementing four of these priority recommendations, three of which we have already begun to implement with our existing programs.

City staff have reviewed the draft Watershed Action Plan and would like you and the Watershed Management Committee to consider the specific comments detailed on the following pages. In general we concur with the majority of Action Recommendations contained in this important plan and will implement those that we are partially responsible for to the extent feasible and practical given our constraints of available funding.

We urge the Board of County Commissioners to adopt this comprehensive Watershed Action Plan and hope that the highest priority recommendations may soon begin to be implemented. The comprehensive watershed planning process undertaken in the Budd Inlet-Deschutes River Watershed is an important first step in understanding, controlling, and eliminating sources of nonpoint pollution throughout this rich and diverse watershed.

Sincerely,

BOB JACOBS, Mayor
City of Olympia

cc: Emmett Dobey
Joanne Richter
Liz Hoenig

CITY COUNCIL
JON W. HALVORSON
Mayor
EARLYSE A. SWIFT
Deputy Mayor
ANN BURGMAN
WILLIAM A. BUSH
HERB JONES
NANCY J. PETERSON
JAMES J. WEBER

CITY MANAGER
GREG J. CUOIO

Shaping our community together

CITY OF LACEY
POST OFFICE BOX "B" / 420 COLLEGE ST. SE
LACEY, WASHINGTON 98503-0507

23 November 1994

Fred Satter, Chair
Budd/Deschutes Watershed Management Committee
2000 Lakeridge Drive SW
Olympia, Washington 98502-6045

Subject: Budd Inlet - Deschutes River Watershed Action Plan

Dear Mr. Satter:

Thank you for the opportunity to review and comment on the recently completed Draft Action Plan that your committee has developed for the Budd Inlet - Deschutes River Watershed.

The City of Lacey is pleased to forward this Letter of Concurrence to you. We agree with the problem statements, goals, objectives and philosophy of the Plan and actions specified for Lacey subject to the following:

Action Plan implementation is subject to availability of adequate funding. With regard to funding, the City will make every effort to pursue grant and local funding for implementation. Funding availability may affect the City's ability to implement some of the recommendations within the desired time frame as outlined in the Plan.

R&M 1 - Lacey together with Thurston County and the Cities of Olympia and Tumwater are already funding regional monitoring programs for ground and surface waters. Similarly, habitat monitoring is covered by interjurisdictional basin planning processes. In order to support this recommendation, we need to know how the proposed monitoring effort relates to existing monitoring efforts and that it does not create a duplication of effort.

R& M 2 - Lacey supports this recommendation but feels it is too vague. Water quality standards are violated on a regular basis. Specific criteria should be established and used to determine when intensive monitoring programs should be conducted.

R&M 6 - The Thurston Geodata Center (formerly the Thurston Geographic Information Facility) was jointly established by Thurston County, the Cities of Lacey, Olympia (the LOT Partners) and provides GIS coverage of the entire county. In order to support this recommendation, we need to understand the need for a separate GIS for Budd Inlet and the Deschutes River.

OS 11 - Lacey feels that this recommendation is unnecessary. We feel that the County Health Code allows for conversions as necessary should problems arise with on-site sewerage systems and that required conversions are an unwarranted burden for those with properly functioning systems.

We share your commitment to protect and improve the water quality in Thurston County. As you may be aware, the City is focusing a good deal of effort on non-point source pollution prevention and reduction programs. You will be pleased to know that we are already making progress in a number of areas as part of our Comprehensive Water Resources Management Program.

Again, thank you for the opportunity to be part of the solution to the non-point pollution problem. We appreciate the immense amount of time and energy your committee has devoted to the development of this plan and look forward to working with you toward the goal of protecting our local water resources.

Sincerely,

Brian F. Barnett
Director of Public Works

Cory J. Crebbin
Water Resource Division Manager

cc: Lacey City Council
Greg J. Cuoio, City Manager

555 ISRAEL ROAD S.W.
TUMWATER, WA 98501

206/754-5855
INFORMATION

206/754-4126
FACSIMILE

206/754-4120
MAYOR
COUNCIL
CITY ADMINISTRATOR

206/754-4121
CITY ATTORNEY
HUMAN RESOURCES

206/754-4130
FINANCE DEPARTMENT
BUSINESS LICENSES

206/754-4133
UTILITIES

CITY OF TUMWATER
Washington's First Community.

206/754-4140
ENGINEERING

206/754-4150
PUBLIC WORKS
OPERATIONS
MAINTENANCE

206/754-4160
COMMUNITY DEVELOPMENT
PLANNING
PARKS & RECREATION
BUILDING & GROUNDS

206/754-4180
DEVELOPMENT SERVICES
ZONING
INSPECTIONS
DEVELOPMENT ENGINEERING

206/754-4170
FIRE DEPARTMENT

206/754-4190
MUNICIPAL COURT

206/754-4200
POLICE DEPARTMENT

January 19, 1995

JAN 25 1995
THURSTON REGIONAL
PLANNING COUNCIL

Mr. Fred Satter, Chair
Budd-Deschutes Watershed Management Committee
2404 Heritage Court S.W., Suite B
Olympia, WA 98502-6031

Dear Mr. Satter:

This is a letter of concurrence by the city of Tumwater with the Budd-Deschutes Watershed Management Plan, subject to inclusion in the plan, as appropriate, of the specific attached comments, and subject to funding availability.

The city supports the goal of prevention of nonpoint pollution in the Budd-Deschutes Watershed. We are proud to be an active participant in regional storm water programs, implementation of the Percival Creek Plan, and implementation of the Deschutes River Riparian Habitat Plan. These programs encompass many of the implementation recommendations of the Budd-Deschutes Watershed Management Plan.

We are committed to programs ensuring the long-term protection of our surface and ground waters. Because of funding and staffing constraints, the city is taking a phased approach to these projects. The implementation of the recommendations proposed in the Budd-Deschutes Plan is subject to these constraints.

We congratulate the Watershed Management Committee on their hard work and dedication to the protection of the water resources of the Budd-Deschutes Basin.

Sincerely,

Ralph Osgood

RALPH OSGOOD
Mayor

RO:KC:djr
b:calison95\corresp\cncurenc.ltr

THURSTON COUNTY
WASHINGTON
SINCE 1852

COUNTY COMMISSIONERS
Judy Wilson
District One
Diane Oberquell
District Two
Dick Nichols
District Three

BOARD OF COUNTY COMMISSIONERS
COMMUNITY AND ENVIRONMENTAL PROGRAMS

June 8, 1995

Fred Satter
Chairman
Budd/Deschutes Watershed Committee
c/o Thurston County Advance Planning
2404 Heritage Court SW "B"
Olympia, Wa. 98502-6031

Dear Mr. Satter:

SUBJECT: Letter of Concurrence regarding the Budd Inlet/Deschutes River Watershed Plan

The Board of Thurston County Commissioners would like to commend the Budd/Deschutes Watershed Committee for their efforts in producing the Budd/Deschutes Watershed Action Plan. We also appreciate your efforts in making appropriate changes to the plan as per our comment letter in December 1994. We are pleased that you were able to reduce the implementation budget by several hundred thousand dollars.

We concur with the plan, and are committed to implementing the action recommendations that require our involvement within the budget constraints facing the county.

We wish to thank you and your committee for the long hours you have put into developing this plan.

Sincerely

Judy Wilson, Chairman

Dick Nichols, Commissioner

Diane Oberquell, Commissioner

Mailing Address: 2000 Lakeridge Dr. SW, Olympia, WA 98502-6045
Location: 921 Lakeridge Dr. SW, Rm. 113, Olympia, WA 98502-6045 (360) 754-4111

CLIVE PINNIX
Director

STATE OF WASHINGTON
WASHINGTON STATE PARKS AND RECREATION COMMISSION
7150 Cleanwater Lane • P.O. Box 42650 • Olympia, Washington 98504-2650 • (360) 902-8500

June 14, 1995

Fred Satter, Chairman
Budd-Deschutes Watershed Management Committee
c/o Thurston County Advance Planning and Historic Preservation
2404 Heritage Court SW #B
Olympia, WA 98502-6031

Dear Mr. Satter:

Subject: **Letter of Concurrence for the Budd Inlet-Deschutes River Watershed Action Plan.**

The Washington State Parks and Recreation Commission would like to commend the Budd Inlet-Deschutes River Watershed Management Committee for their efforts to address nonpoint pollution concerns within this watershed. We recognize that the preparation of such a Plan requires hundreds of volunteer hours of the Watershed Management Committee. We appreciate the Committee's efforts to address our comment letter of May 21, 1994.

We concur with the Watershed Action Plan and are committed to implementing the Action Recommendations that require our involvement.

Thank you and the Committee for the long hours you have put into developing this Action Plan for Budd Inlet and the Deschutes River Watershed.

Sincerely,

Doug Strong

Douglas K. Strong
Clean Vessel Project Manager

cc Jim French, Boating Programs Manager

h:\pswqa\ltrbdwter.shd

Thurston
Conservation District

Local solutions to local problems

Conservation Planning • Habitat Restoration • Bio-engineering • Soils Analysis • Conservation Education • Project GREEN • Nutrient Management

JUNE 19, 1995

Fred Satter, Chairman
Budd-Deschutes Watershed Management Committee
c/o Thurston County Advance Planning and Historic Preservation
2404 Heritage Court SW #B
Olympia, WA 98502-6031

SUBJECT: **Budd Inlet-Deschutes River Watershed Action Plan**

Dear Mr. Satter:

The Thurston Conservation District hereby concurs with the Budd Inlet-Deschutes River Watershed Action Plan with minor changes in wording as discussed earlier with Steve Morrison.

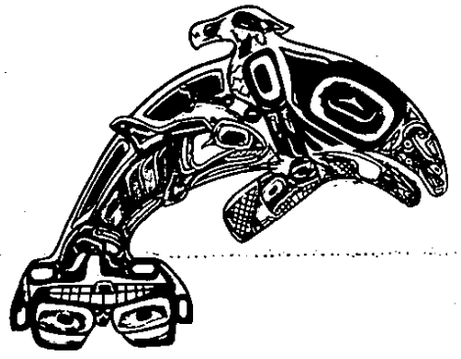
Thank you and your hard working Watershed Management Committee for all of the tremendous effort that went into this document. This gives everyone a clear vision of what is needed, the players, and everyone's role for protecting and enhancing this key watershed.

Sincerely,

Jaclyn Reid

Jaclyn Reid, Chair
Thurston Conservation District
Board of Supervisors

6128 Capitol Blvd. • Olympia, WA • 98501-5271 • Fax (360) 753-8085 • (360) 754-3588



SQUAXIN ISLAND TRIBE

June 22, 1995

Fred Satter, Chairman
Budd-Deschutes Watershed Management Committee
c/o Thurston County Advance Planning
2404 Heritage Court SW #B
Olympia, WA 98502

Re: **Letter of Concurrence for the Budd Inlet-Deschutes River Watershed Action Plan**

Dear Mr. Satter:

The Squaxin Island Tribe would like to commend your efforts as chair, and the contributions of the entire Budd-Deschutes Watershed Management Committee in addressing the concerns of nonpoint pollution within the watershed and its associated marine waters. We recognize that the preparation of such a plan requires literally hundreds of hours of devoted community effort.

We also wish to express our concurrence with the Watershed Action Plan's Goals and Implementation Recommendations. We are committed to seeking funding and deploying our resources toward implementing the Action Recommendations identified in the plan, particularly those specifically assigned to the Tribe.

Thank you and the committee for the long hours you have devoted toward improving water quality for this and future generations. Our staff has enjoyed working with you in this endeavor.

Sincerely,

David Lopeman, Tribal Chairman

SQUAXIN ISLAND TRIBE / S.E. 70 Squaxin Lane / Shelton, WA 98584 / Phone (206) 426-9781
Tribal Council (206) 426-9783 Natural Resources (206) 426-9783 Health Clinic (206) 427-9006

Thurston
Conservation District

Local solutions to local problems

Conservation Planning • Habitat Restoration • Bio-engineering • Soils Analysis • Conservation Education • Project GREEN • Nutrient Management

DATE: June 16, 1995

TO: Steve Morrison

FROM: Bill Melton

SUBJECT: Budd Inlet-Deschutes River Watershed Action Plan

Attached is our letter of concurrence for the above plan. As I discussed with you, we need a change in the emphasis in wording on Item AG 2 page 6-4, since we are not an "enforcement" agency. I suggest the following wording or something similar, that conveys our role as being "friend of the Landowner" and available to assist them in conservation efforts:

> AG 2 Thurston County Environmental Health Division should continue to provide enforcement of the Nonpoint Pollution Ordinance and the Thurston Conservation District should provide technical assistance as requested by County Environmental Health and the Landowner.

Discussion: *An existing Memorandum of Agreement refers all landowners violating agricultural nonpoint pollution to call the Conservation District for free assistance to help them with corrective measures. Staff of the Conservation District and County Environmental Health discuss violation cases, however, any corrective actions requiring outside financial assistance may depend on the availability of grant funding.*

This Action Recommendation should be addressed by the County and/or Conservation District at the earliest time funding can be secured, hopefully within one to two years.

The other issue concerns wording that commits the Conservation District to use the assessment funds for "on-the-ground" kinds of activities. The assessment is used to leverage large state and federal grants to do "on-the-ground" work. Please reword the Discussions for SED 3, SED 6, SED 12, and AG 1. AG 5 on page 10-16 states it correctly.

Thanks.

6128 Capitol Blvd. • Olympia, WA • 98501-5271 • Fax (360) 753-8085 • (360) 754-3588

AG 2: **Committee Response: Text change made.**

Good suggestion. Helps to clarify the dual roles.

AG 2 Discussion: **Committee Response: Text change made.**

Combined text of second paragraph with existing text. Neither the earlier text or suggestion were totally complete.

Other Discussions: **Committee Response: No text change**

The staff and committee have the same understanding about the use of these funds. Like any local funding source, if federal or state grants are not available, the assessment resources could be used for these tasks, subject to review and approval of the TCD budget.

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

AUG 1995

July 28, 1995

Fred Satter, Chairman
Budd-Deschutes Watershed Management Committee
c/o Thurston County Advance Planning and Historic Preservation
2404 Heritage Court SW #B
Olympia, WA 98502-6031

Dear Mr. Satter:

SUBJECT: CONCURRENCE LETTER FOR THE BUDD INLET-DESCHUTES RIVER WATERSHED ACTION PLAN.

Washington Department of Fish and Wildlife (WDFW) appreciates the opportunity to provide a letter of concurrence for this plan. WDFW is directly concerned with the quality of fish and wildlife habitat in the Budd-Deschutes watershed. We feel that this plan represents an important step forward in identifying related nonpoint water pollution concerns in the watershed. We also wish to express our appreciation for the many hundreds of hours which the Watershed Management Committee and Thurston County staff have devoted to the development of this plan.

WDFW believes that the plan identifies and addresses well the major sources of water quality problems in the watershed. We recognize the difficulty of the issues addressed and with adequate implementation and enforcement the proposed Action Recommendations (ARs) will result in significant improvements in water quality. Contingent on staff and funding priorities we also concur with the ARs identified for WDFW implementation or assistance with the following comments:

SED 12 - The discussion for SED 14 references printing costs for guidelines. This appears to belong with SED 12.

SED 14 - There is a formal process for submitting individual stream type changes through WDNR. We have also had success with programs directed at retyping specific watersheds or areas. Current opportunities for this may include Watershed Restoration Partnership Program funding.

FOR 8 - The authorizing legislation for restoration projects specifically included depressed and critical salmon and steelhead stocks as a priority; however, that prioritization does not exclude water quality issues. Projects in watersheds on the 303d list and which also include SASSI critical or depressed stocks have an increased probability for funding. Projects which

SED 12: **Committee Response: Text change made.**

SED 14: No response necessary.

FOR 8: No response necessary.

emphasize ecosystem restoration will also rate higher.

ME 2 - Expansion of existing programs (e.g. Puget Sound Ambient Monitoring Program) is necessarily contingent on funding and staff priorities.

Again, thanks for a job well done. We appreciate the quality of the results and the many volunteer hours which we know went into the Watershed Management Committee's work. Please feel free to contact me (902-2563) if I may be of further assistance.

Sincerely,

Carl E. Samuelson

Carl E. Samuelson
Water Quality Issues
Habitat Management Program

cc. Steve Keller, WDFW
Rocky Beach, WDFW
Steven Morrison, Thurston County Planning

ME 2: No response necessary.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • (206) 407-6300

August 22, 1995

Mr. Fred Slatter, Chairman
Budd-Deschutes Watershed Management Committee
c/o Thurston County Advance Planning and Historic Preservation
2404 Heritage Court SW #B
Olympia, WA 98502-6031

Dear Mr. Slatter:

Congratulations on completing the Budd Inlet-Deschutes River Watershed Action Plan. Ecology appreciates the Watershed Management Committee's commitment and hard work that have gone into preparation of this plan for addressing nonpoint pollution.

Ecology agrees with the overall goals and objectives of the plan. Jeannette Barreca of Ecology's Water Quality Program, negotiated deletions and wording changes for certain recommendations involving Ecology with Steven Morrison, who represented the committee. Ecology concurs with the amended recommendations, as discussed in the enclosure.

Ecology looks forward to working with the various cooperators on implementing this plan to protect water quality.

Sincerely,

Sue Mauermann
Southwest Regional Director

SM:JB:lmc

Enclosure

cc: Steven Morrison, Thurston County
Jeannette Barreca, Ecology
David Jansen, Toxics Cleanup Program, Ecology
Keith Phillips, Environmental Investigations and Laboratory Services, Ecology

Committee Comment:

Staff had three detailed meetings with Ecology regarding this letter. Since Ecology approved the Plan, a letter of concurrence from them was desirable. Negotiations were difficult, but the following changes met the Committee's interest. Unfortunately, these were the type of comments which should have been raised during the DRAFT Plan, and were not.

Research and Monitoring Programs

R&M 3: [To be deleted]

R&M 6: *Local and state agencies should jointly establish a watershed based data retrieval system for Budd Inlet and the Deschutes River.*

Ecology concurs with this recommendation and will contribute water quality data for the system.

Flooding, Bank Erosion and Sedimentation

SED 12: *Thurston County, in cooperation with the Conservation District and other state or Federal resources agencies, should develop wetland and stream restoration guidelines which improve water quality and habitat values while still providing for economic uses of the land.*

Ecology concurs with this recommendation and is willing to review the guidelines as they are developed.

Forest Practices

FOR 5: *The Washington State Departments of Natural Resources and Ecology, in cooperation with other stakeholders, should develop a riparian management strategy which targets canopy closure and stream temperature in affected reaches.*

Ecology concurs with this recommendation and is willing to participate with timberland owners, the Squaxin Tribe, the Department of Natural Resources, and other interested parties to develop a riparian management strategy.

FOR 6: *The Washington State Departments of Natural Resources and Ecology should reevaluate the current Riparian Management Zone criteria of the Forest Practices Act Rules to determine if it is possible to achieve the State water quality standards using these criteria.*

Ecology concurs that the Riparian Management Zone criteria should be periodically reviewed, especially when there are changes to state water quality standards. The reference in the discussion section to a diversion of funds from the Centennial Clean Water Fund should be deleted.

R&M 3: **Committee Response: Text change made.**

Specific research projects have been called out as separate recommendations.

R&M 6: No response necessary.

SED 12: No response necessary.

FOR 5: No response necessary.

FOR 6: **Committee Response: Text change made.**

New sentence added about the funding which suggests using normal funding sources for both Ecology and DNR.

Marine Environment

Page 9-5: [The last two sentences of the fourth paragraph under Budd Inlet Urban Bay Action Plan should be deleted.]

ME 2: [New language]

The Washington State Departments of Fish and Wildlife, and Ecology should continue to collect data within Budd Inlet from english sole, dissolved oxygen, sediment chemicals, and benthic infaunal communities; and should make this data available to relevant management interests.

It is Ecology's understanding that the discussion text will be revised and will note particular entities which should be sent the 1995/1996 reports on dissolved oxygen and benthic infauna. Ecology concurs with the recommendation as amended, and the Environmental Investigations and Laboratory Services Program will continue to collect ambient monitoring data in Budd Inlet.

ME 3: [New language]

The Washington State Department of Ecology should review the status of implementation recommendations of the Budd Inlet Urban Bay Action Plan as part of the proposed "Watershed Forum" in the Year 2000.

The discussion should be revised to reference IMP 5 (Thurston County should convene a "Watershed Forum" in the year 2000 to evaluate the implementation of the Budd-Deschutes Watershed Action Plan.) and to delete reference to EPA's Urban Bay Program as a possible source of funding. Ecology concurs with the recommendation as amended. Ecology's Toxics Cleanup Program led the effort to develop the Budd Inlet Urban Bay Action Plan (1991).

ME 8: [To be deleted]

Page 9-5: **Committee Response: Text change made.**

ME 2: **Committee Response: Text change made.**

This incorporated parts of the discussion into the recommendation, thus making it clearer and more measurable.

ME 3: **Committee Response: Text change made.**

This retains the basic thrust of the recommendation and makes the reevaluation meaningful for all the parties involved.

ME 8: **Committee Response: Text change made.**

WASHINGTON STATE DEPARTMENT OF
Natural Resources

JENNIFER M. BELCHER
Commissioner of Public Lands
KALEEN COTTINGHAM
Supervisor

August 25, 1995

Mr. Fred Satter, Chairman
Budd-Deschutes Watershed Management Committee
c/o Thurston County Advance Planning and
Historic Preservation
2404 Heritage Court S.W., #B
Olympia, WA 98502-6031

SUBJECT: LETTER OF CONCURRENCE FOR THE BUDD INLET-DESCHUTES RIVER WATERSHED ACTION PLAN

Dear Mr. Satter:

Thank you for the opportunity to comment on the final draft Budd Inlet-Deschutes River Watershed Action Plan. This response is to your request for a statement of concurrence or nonconcurrence from the Department of Natural Resources (DNR).

DNR commends the Budd Inlet-Deschutes River Watershed Management Committee for their efforts to address nonpoint pollution concerns within this watershed. We recognize and support the effort that Thurston County and the committee invested in the plan. DNR appreciates the hard work, coordination and public involvement it takes to put together such a plan.

The enclosed response is arranged by individual action items where the DNR is involved as a potential implementing agency. Each action item is followed by our statement of concurrence or nonconcurrence, a brief explanation, and a suggested rewrite if appropriate.

DNR is committed to working with local government and the community and looks forward to working with Thurston County and the Budd Inlet-Deschutes River Watershed Management Committee. The Forest Practices Regulations, the Timber/Fish/Wildlife process and other Department land management programs can work to address water quality issues as they relate to forest practices.

Committee Comment:

Staff discussed these concerns over the phone with DNR Central Region management. These comments are more detailed than those provided for the DRAFT Plan.

Please do not hesitate to contact Garry Gideon, assistant Central Region manager, at (360) 740-6802 if you have concerns or questions regarding the enclosed comments.

Sincerely,

Kaleen Cottingham
Department Supervisor

Enclosure

ENCLOSURE

Flooding, Bank Erosion and Sedimentation

SED 1 The Washington Department of Natural Resources or forest landowners should conduct a Watershed Analysis within the upper Deschutes River system to determine changes in sediment transport and hydrology over time.

We do not concur with the language as written. The department agrees that a watershed analysis would be very beneficial. However, the long term objective of a watershed analysis initiated under the state s forest practice laws, is to protect and restore the public resources of fish, water, and capital improvements of the state or its political subdivisions. Determining changes in sediment transport and hydrology over time could be assisted by data that may result from a watershed analysis. We recommend the wording change to The Washington Department of Natural Resources or forest landowners should conduct a watershed analysis within the upper Deschutes River system.

With the wording change, the department would conditionally concur. As stated in an earlier DNR comment letter, funding and timing of watershed analyses are somewhat unpredictable. The Upper Deschutes watershed administrative unit is currently the number seven priority for analysis within the department s Central Region. Hopefully, it will be done within the next three to five years.

SED 12 Thurston County, in cooperation with the Conservation District and other state or Federal resources agencies, should develop wetland and stream restoration guidelines which improve water quality and habitat values while still providing for economic uses of the land.

Conditionally concur. This is a worthwhile proposal. The department s ability to contribute to this action item will depend upon available staff and program priorities. The department currently would not have staff available to work directly on this action item. We will certainly contribute information that is readily available.

SED 16 The Washington Department of Natural Resources should continue to evaluate stream bank stability prior to authorizing forest practices within the Deschutes River Watershed.

Concur. The department will continue stream bank stability evaluation through our current forest practice application risk assessment and field review process.

SED 1: **Committee Response: No text change**

The deletion of these words makes the recommendation less clear with less measurable outcomes.
(Opposite of Ecology's ME 2 comment)

SED 12: **Committee Response: No response necessary**

SED 16: **Committee Response: No response necessary**

Forest Practices

FOR 1 Thurston County should adopt a County Forest Practices Ordinance and sign an interagency agreement with the Washington State Department of Natural Resources for lands which are converting out of timber production.

We do not concur with the language as written. Previous attempts to sign formal interagency agreements in other areas of the state have not been successful. A written procedural guide, developed in consultation with Thurston County, would be a more effective alternative. This would accomplish the objectives of an interagency agreement, with much less effort, and would be easier to amend.

We recommend the wording change to Thurston County should adopt a Clearing and/or Grading Ordinance and develop a written procedural guide with the Washington State Department of Natural Resources for dealing with forest practices.

FOR 4 The Squaxin Island Tribe, in cooperation with the Washington State Department of Natural Resources, Washington State Department of Fish and Wildlife, Weyerhaeuser, and other timberland owners, should develop a restoration strategy for large woody debris within the upper and middle thirds of the watershed.

Nonconcurrence. Since this action item requires no regulatory action by the department and the state owns very little land in the Deschutes drainage, our priorities direct our efforts away from such a task. However, one of the benefits of the forest practices watershed analysis process are prescriptions that address large woody debris issues in the riparian areas. When watershed analysis is conducted in the Deschutes watershed, the best science available will be applied to address large woody debris/riparian issues. That information would be available to all landowners upon completion.

FOR 5 The Washington State Departments of Natural Resources and Ecology, in cooperation with other stakeholders, should develop a riparian management strategy which targets canopy closure and stream temperature in affected reaches.

Nonconcurrence. Since the department manages very little land in the Deschutes drainage, staff is not available for this action item. Current forest practice rules are designed to provide adequate shading and riparian leave areas where vegetation is present. Further, watershed analysis applies the best available science to address site specific shade and riparian issues. The department s involvement in this type of effort would be through regulatory watershed analysis, which we suggest is the best way to accomplish this action item.

FOR 1: **Committee Response: Text change made.**

This provides additional focus to this recommendation.

FOR 4: **Committee Response: No text change**

This is a major issue to the watershed committee.

FOR 5: **Committee Response: No text change**

This is a major issue to the watershed committee.

FOR_6 The Washington State Departments of Natural Resources and Ecology should reevaluate the current Riparian Management Zone criteria of the Forest Practices Act Rules to determine if it is possible to achieve the State water quality standard using these criteria.

We do not concur with the language as written. The Forest Practices Board, a separate state agency, is the rule-making authority for the Forest Practices Act rules. The Departments of Natural Resources and Ecology often work with the Board in an advisory capacity. In this instance, however, the Forest Practices Board would be the implementing agency. This action item is currently not on the Board s agenda.

FOR_8 The Washington State Departments of Natural Resources, and Fish and Wildlife should modify the emphasis of the Watershed Restoration Partnership Program from only addressing streams which are listed on the Salmon and Steelhead Stock Inventory, to those streams which could be removed from Ecology s 303d Water Quality Limited List.

Conditionally concur. The department will consider grant proposals for the Watershed Restoration Partnership Program on 303d listed waters. However, the emphasis of the program is directed towards fish habitat. If a grant proposal is submitted for the Deschutes drainage, it would be more competitive with other projects if it contained a fish habitat component.

FOR_11 The Washington State Department of Natural Resources should require large private forestry property owners to prepare road management plans.

Conditionally concur. The Weyerhaeuser Co. is the only large private forest landowner in the Deschutes drainage. The department has required a formal road maintenance and abandonment plan from Weyerhaeuser in the past. Effective cooperation and road maintenance activity no longer requires submission of a formal plan in the Deschutes drainage. However, we do meet annually to review their road management plans to insure that public resources will continue to receive adequate protection.

If the department finds significant, chronic road maintenance problems on forest land ownership, we would require a road maintenance and abandonment plan. As stated above for other action items, watershed analysis would be the best way, based on science and not speculation, to identify specific road management needs.

FOR 6: **Committee Response: No text change**

This is a major issue to the watershed committee.

FOR 8: **Committee Response: No text change**

The watershed committee believes that this program has the wrong focus.

FOR 11: **Committee Response: Text changes made**

There are other private forestry property owners within the basin. A list of these owners from the Watershed Reconnaissance Report was added to the discussion.

Marine Environment

ME 7 The Washington State Department of Natural Resources should conduct a study to determine the effects of log-rafting on habitat and water quality in Budd Inlet.

Nonconcurrence. The Department of Natural Resources is not the proper agency to conduct such a study. The Department of Ecology should address water quality and The Department of Fish and Wildlife should address habitat. The department has no plans for such a study.

Aquatic Lands Enhancement Account funds are not available for such a study. The primary purpose for ALEA funds is to develop access to state-owned aquatic lands.

ME 7: **Committee Response: No text change**

Neither DNR or Ecology wants to claim this issue. Since some of the ALEA existing leases are for tidelands where log booms occur, this is reasonable recommendation as written. However, within Budd Inlet, current log raft operations are significantly less than those of previous decades.

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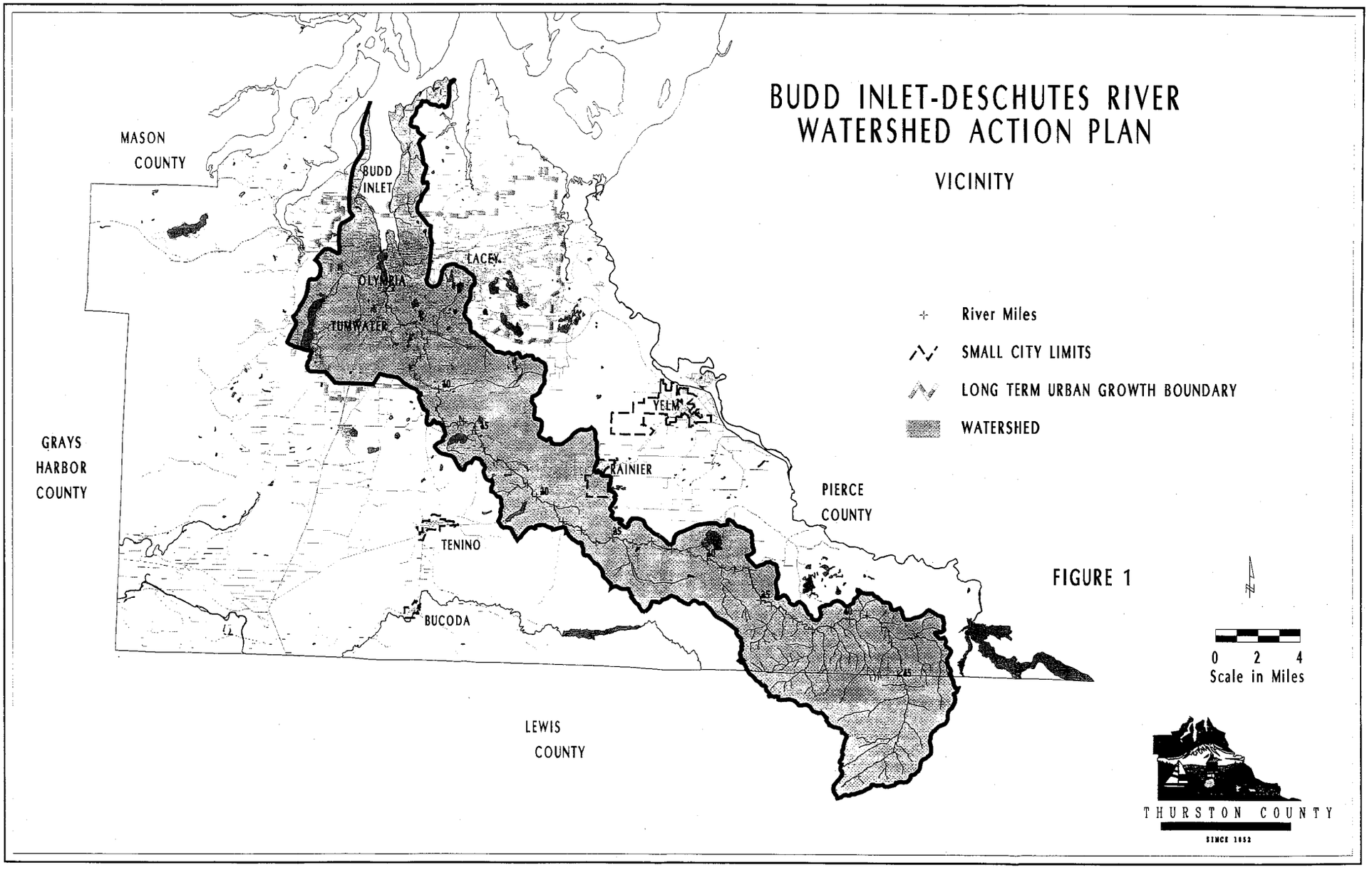
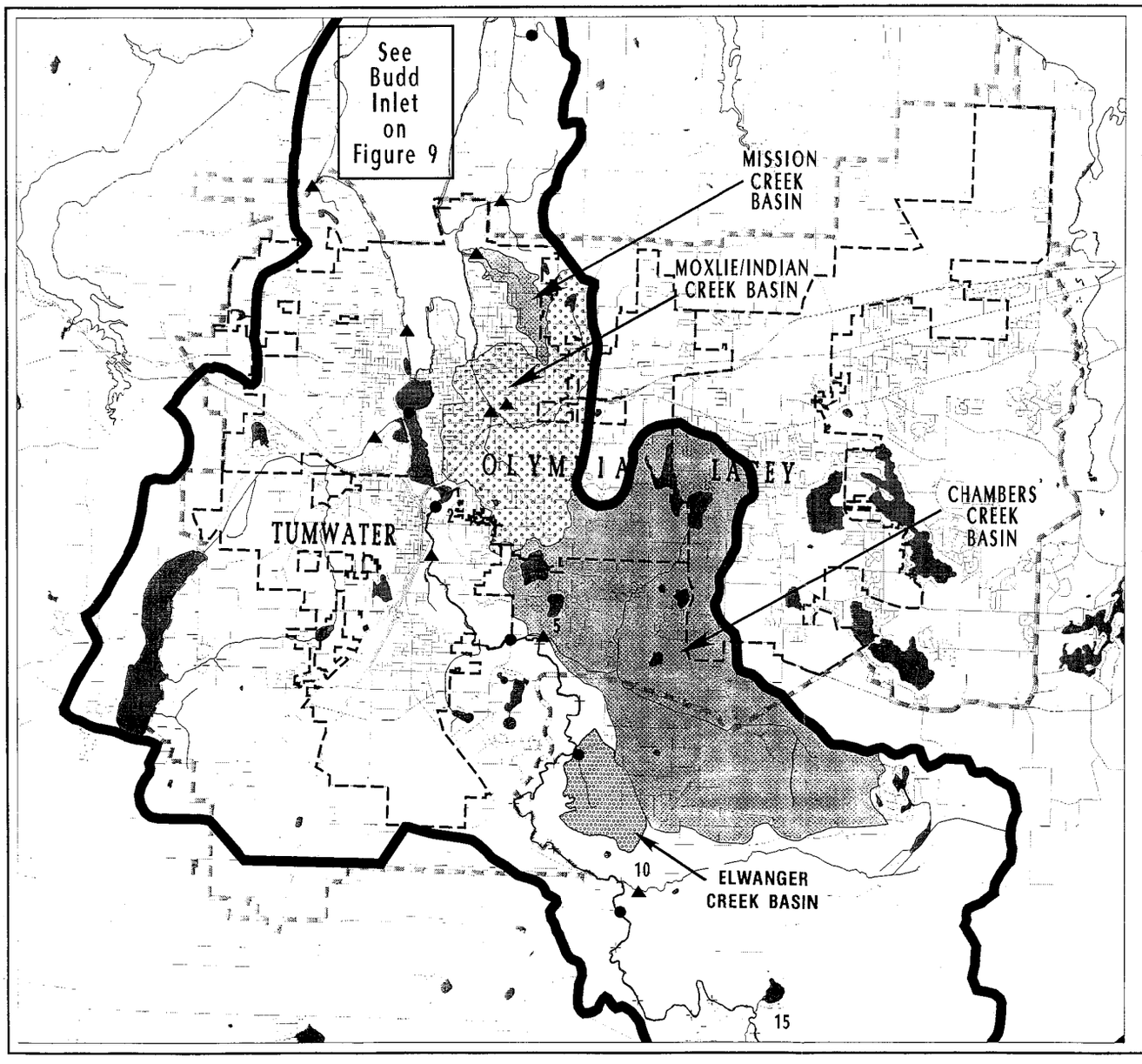

BUDD INLET-DESCHUTES RIVER
WATERSHED ACTION PLAN
VICINITY
MASON COUNTY
BUDD INLET
LACEY
OLYMPIA
TUMWATER
YELM
RAINIER
TENINO
BUCODA
GRAYS HARBOR COUNTY
PIERCE COUNTY
LEWIS COUNTY
River Miles
SMALL CITY LIMITS
LONG TERM URBAN GROWTH BOUNDARY
WATERSHED
FIGURE 1
0 2 4
Scale in Miles
THURSTON COUNTY
SINCE 1852



BUDD INLET-DESCHUTES RIVER WATERSHED ACTION PLAN

MONITORING STATIONS

URBAN AREA

- River Miles
- Long-Term Monitoring Sites (Funded By Stormwater Utility)
- Short-Term Monitoring Sites (Sampling Ceases End Of 1994)
- City Limits
- Long-Term Urban Growth Area Boundary
- Watershed Boundary

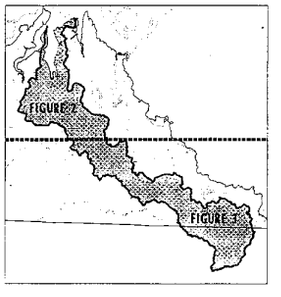
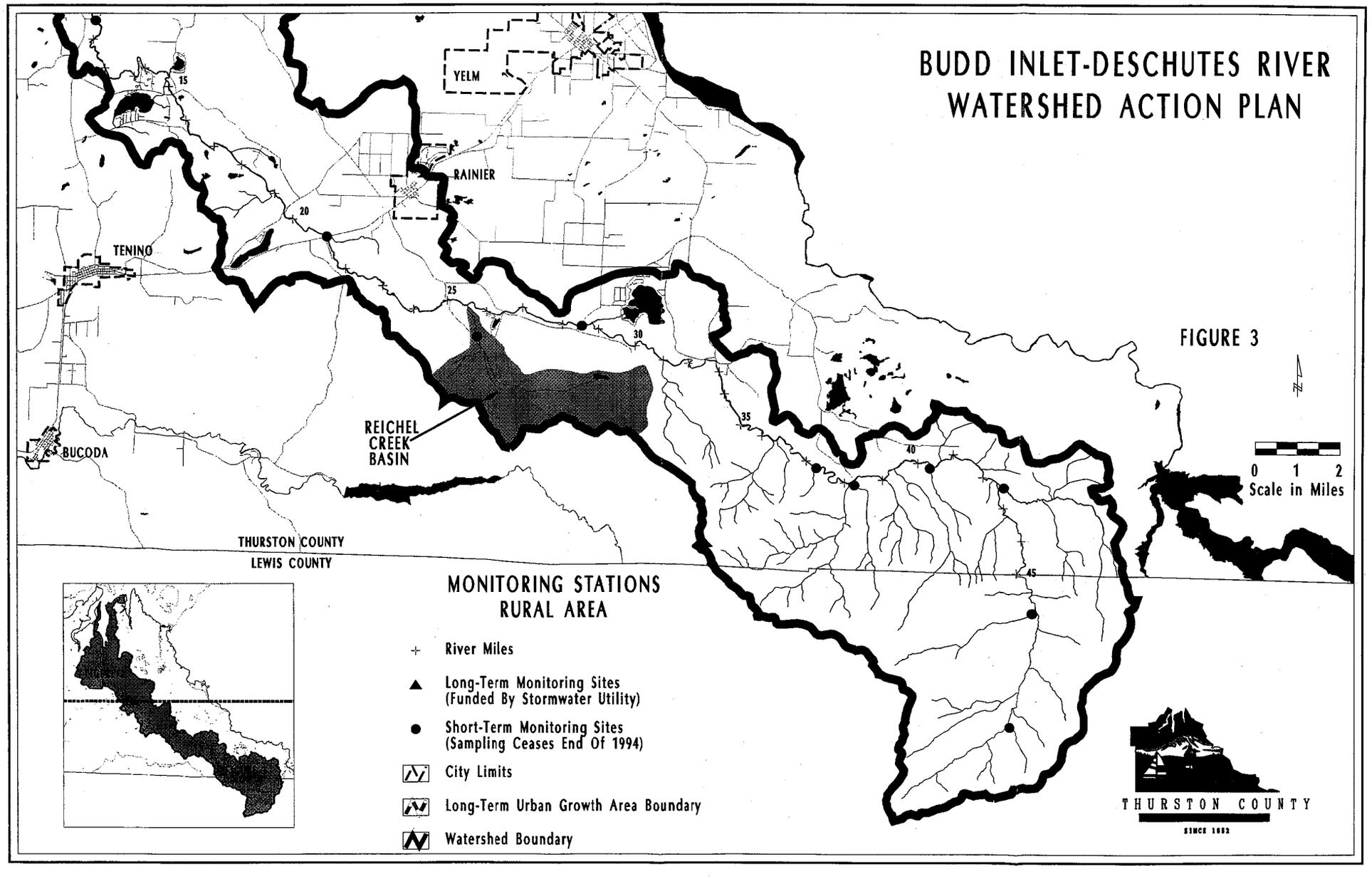
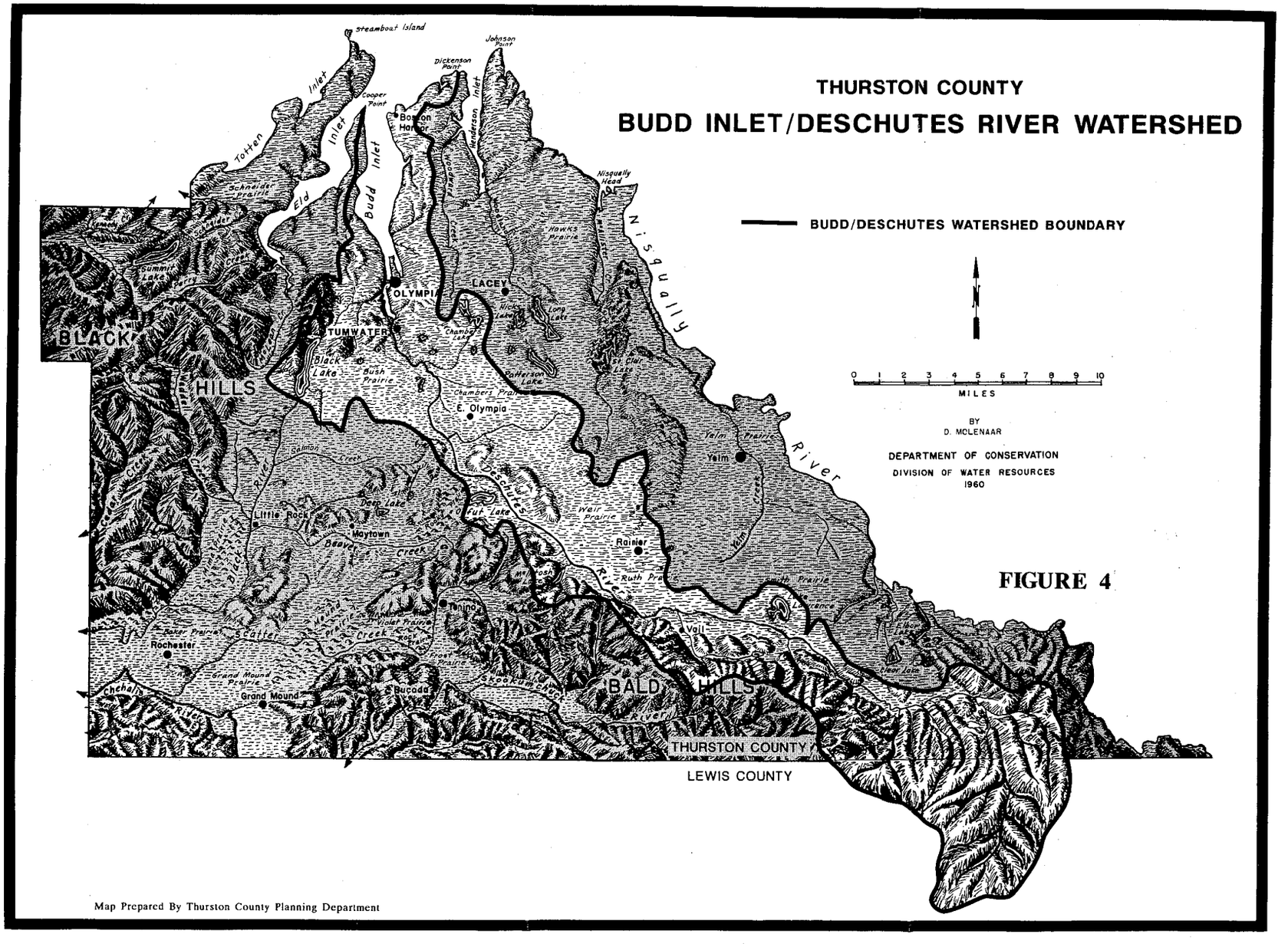


FIGURE 2

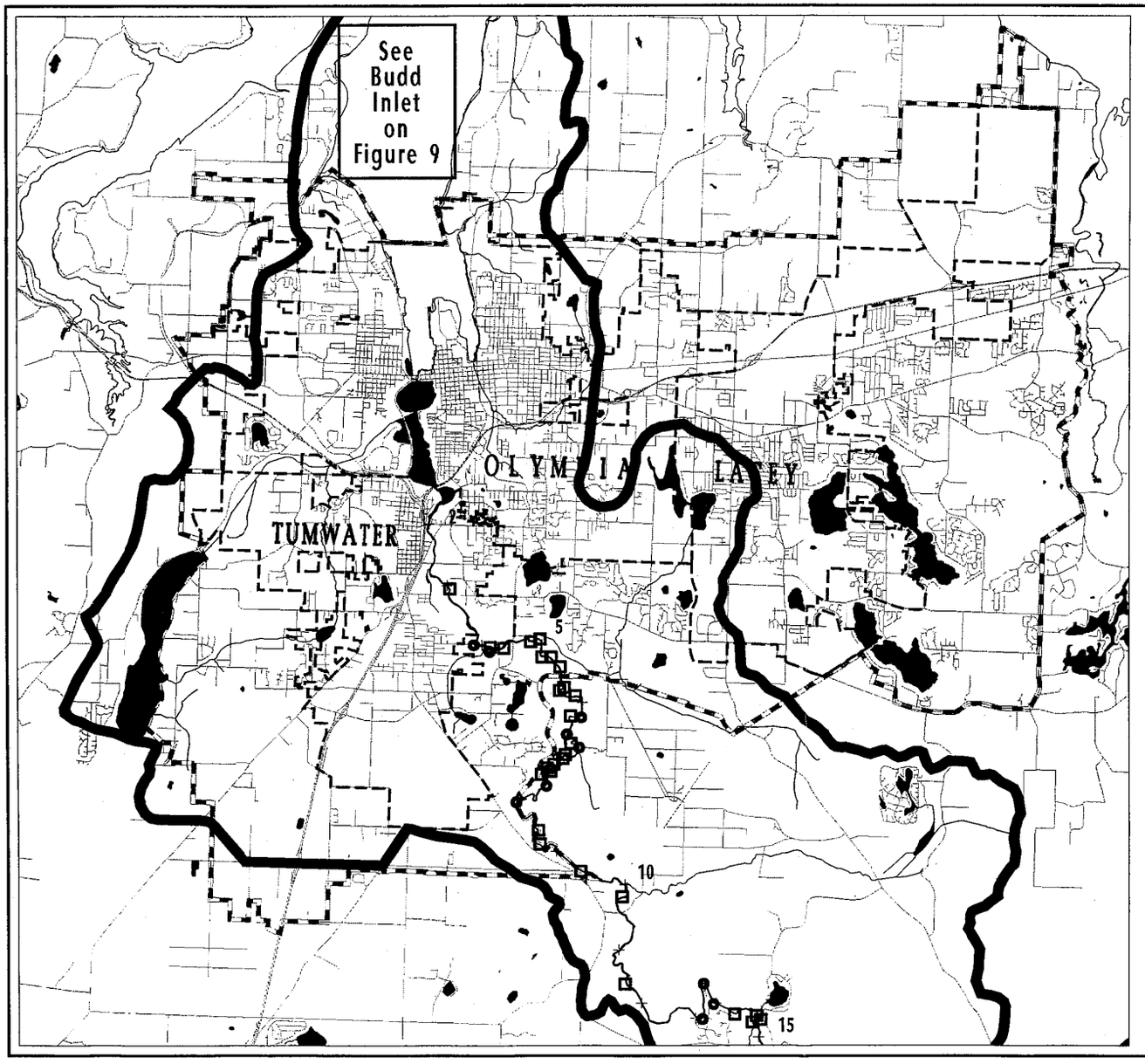
0 7000 14000
Scale in Feet

THURSTON COUNTY
SINCE 1852


BUDD INLET-DESCHUTES RIVER
WATERSHED ACTION PLAN
FIGURE 3
YELM
RAINIER
TENINO
BUCODA
REICHEL
CREEK
BASIN
15
20
25
30
35
40
45
THURSTON COUNTY
LEWIS COUNTY
0 1 2
Scale in Miles
MONITORING STATIONS
RURAL AREA
River Miles
Long-Term Monitoring Sites
(Funded By Stormwater Utility)
Short-Term Monitoring Sites
(Sampling Ceases End Of 1994)
City Limits
Long-Term Urban Growth Area Boundary
Watershed Boundary
THURSTON COUNTY
SINCE 1852



Map Prepared By Thurston County Planning Department



BUDD INLET-DESCHUTES RIVER WATERSHED ACTION PLAN

SIGNIFICANT ERODING BANKS

URBAN AREA

- River Miles
- Eroding between 3,162 and 10,000 cubic yards/year
- Eroding more than 10,000 cubic yards/year
- City Limits
- Long-Term Urban Growth Area Boundary
- Watershed Boundary

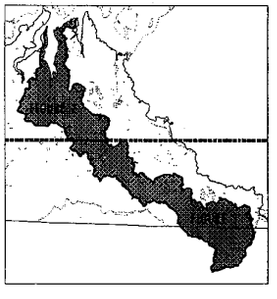
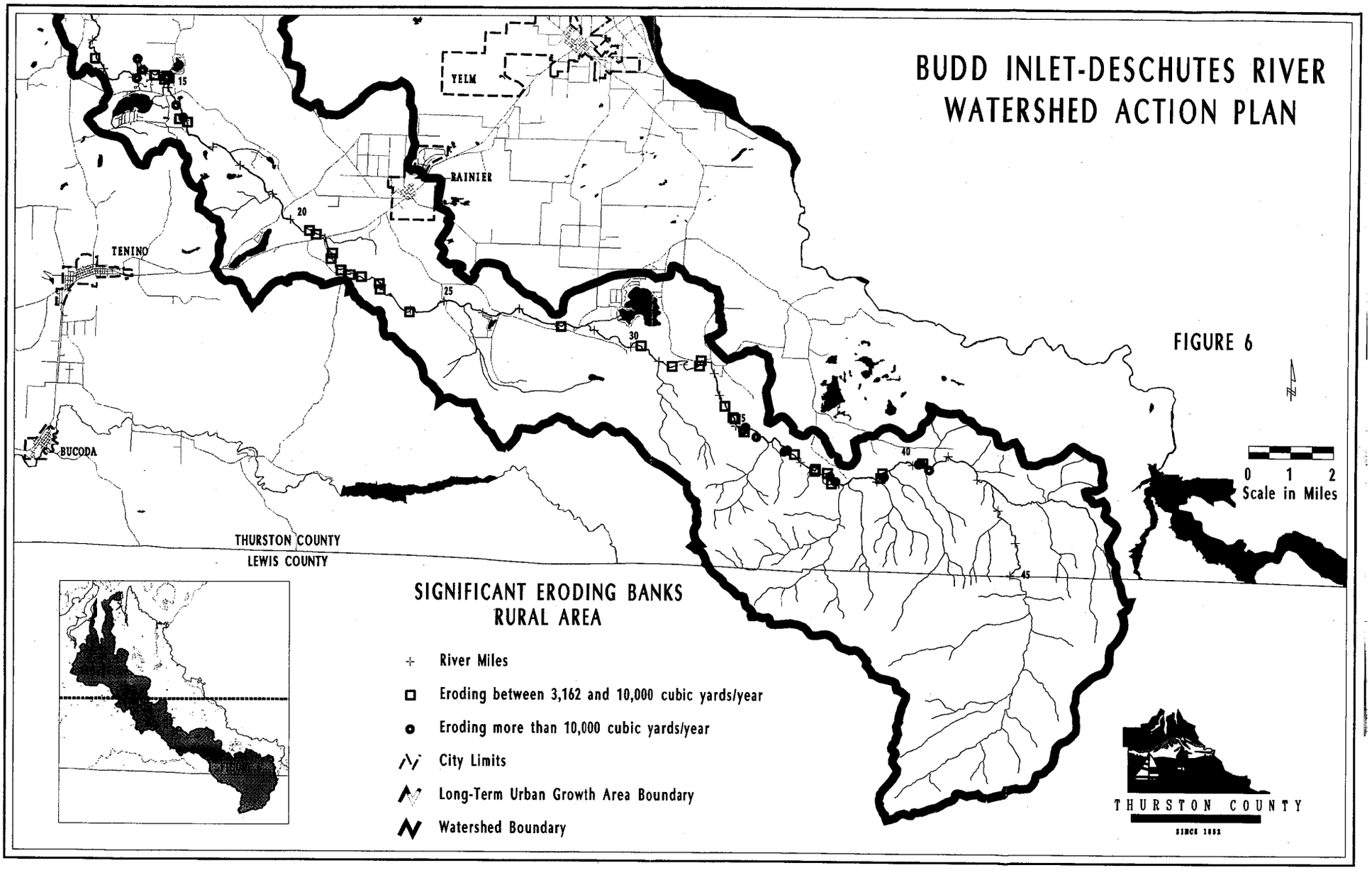


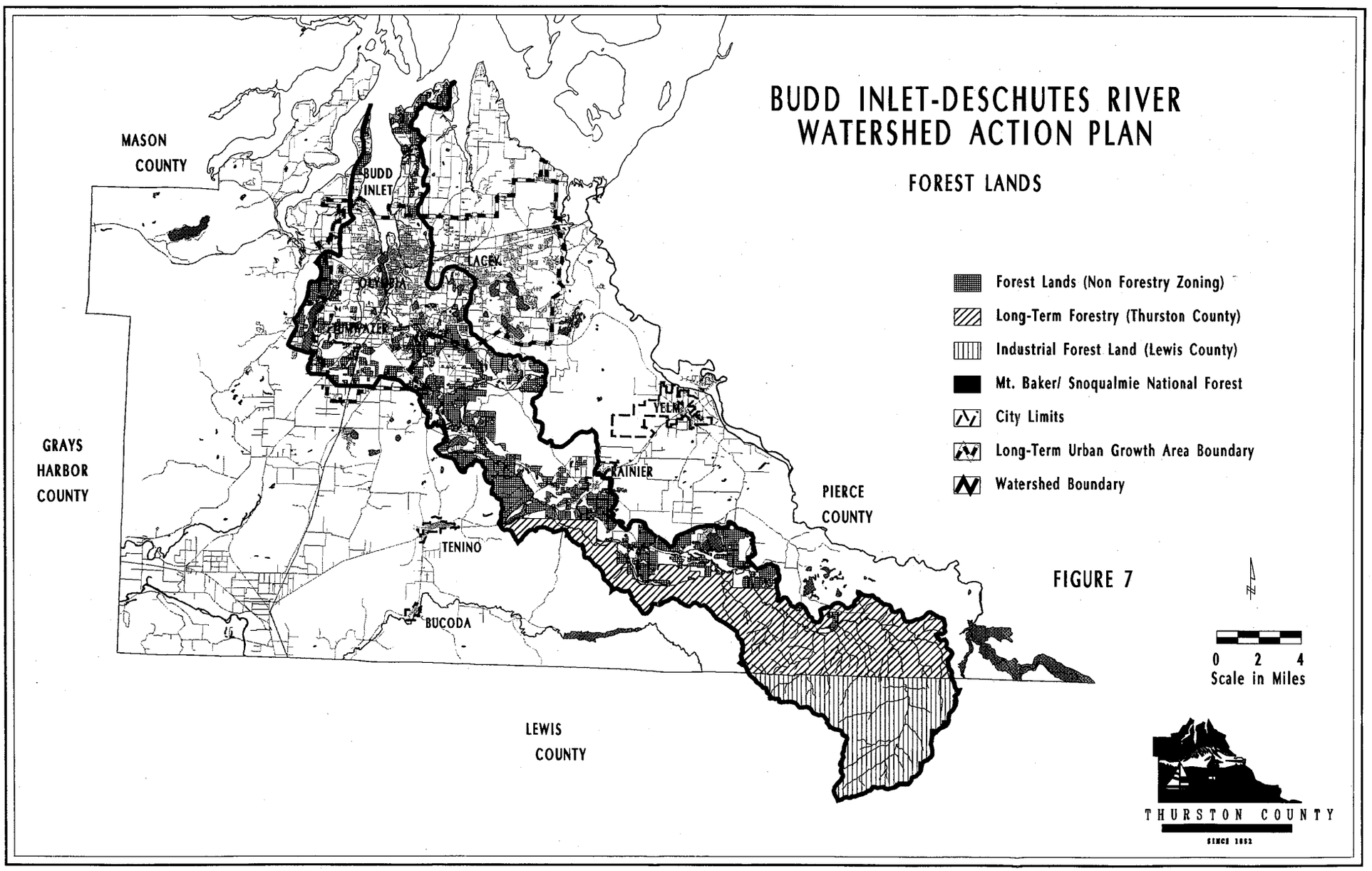
FIGURE 5

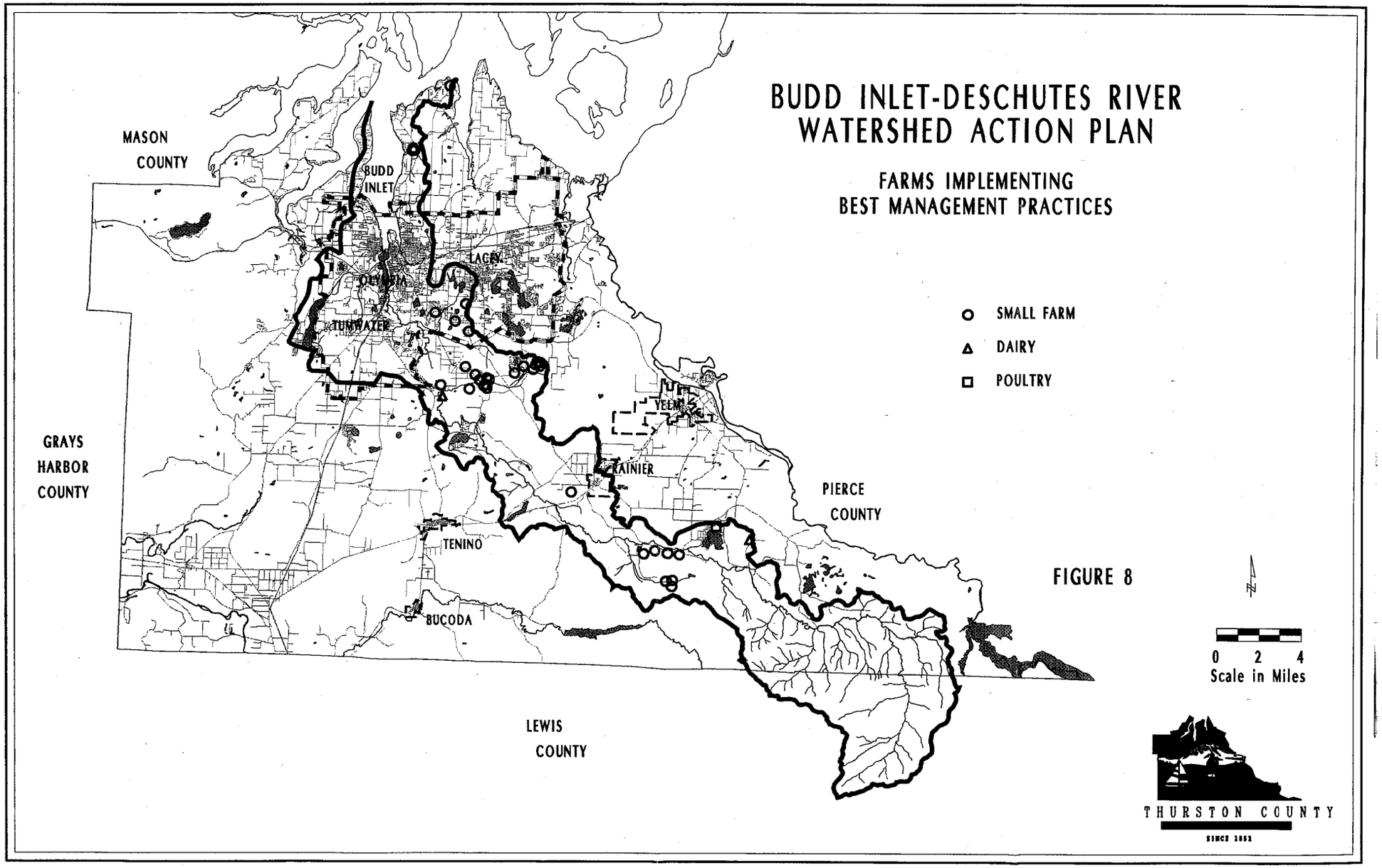
N

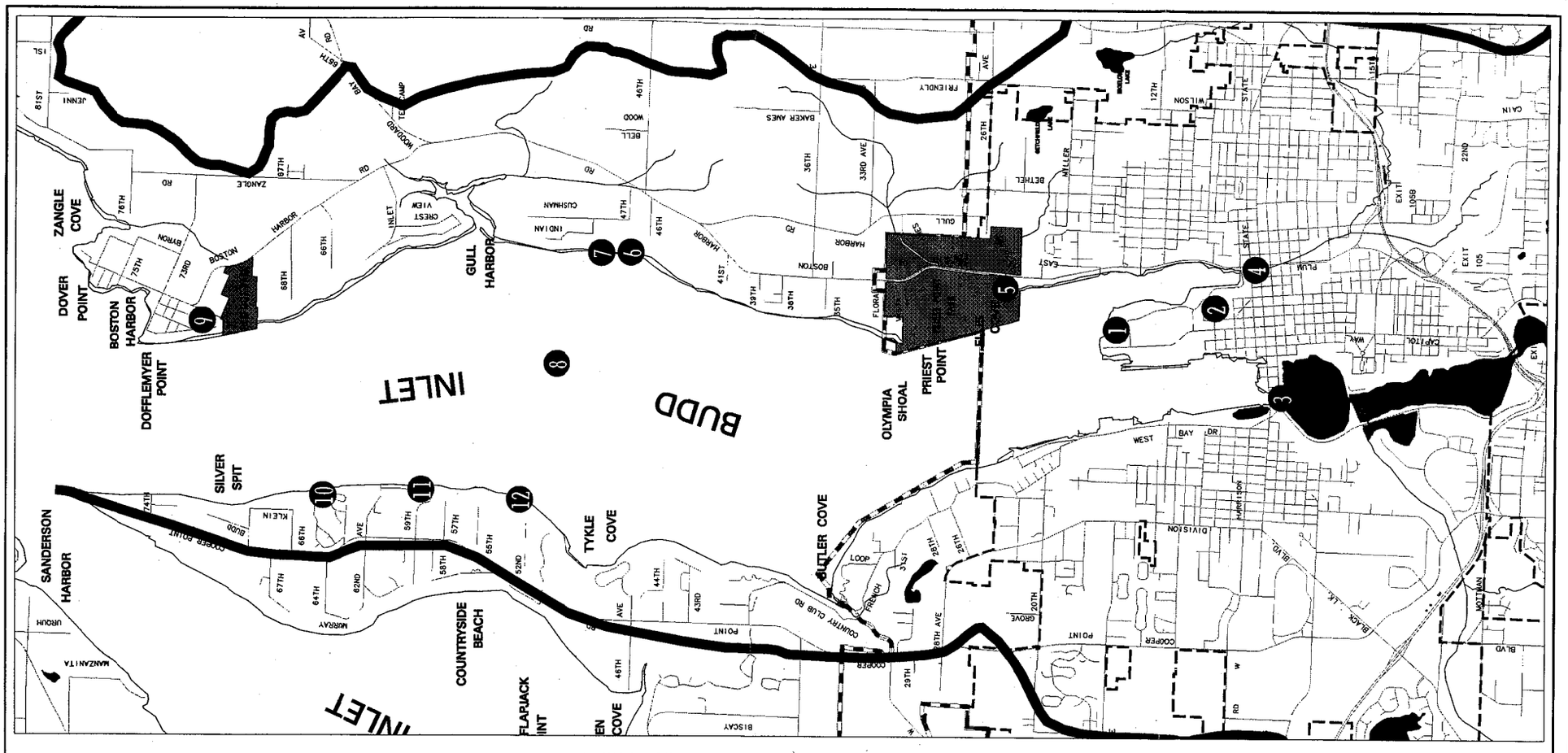
0 7000 14000
Scale in Feet

THURSTON COUNTY
SINCE 1852


BUDD INLET-DESCHUTES RIVER
WATERSHED ACTION PLAN
FIGURE 6
YELM
RAINIER
TENINO
BUCODA
15
20
25
30
35
40
45
THURSTON COUNTY
LEWIS COUNTY
0 1 2
Scale in Miles
SIGNIFICANT ERODING BANKS
RURAL AREA
River Miles
Eroding between 3,162 and 10,000 cubic yards/year
Eroding more than 10,000 cubic yards/year
City Limits
Long-Term Urban Growth Area Boundary
Watershed Boundary
THURSTON COUNTY
SINCE 1852


BUDD INLET-DESCHUTES RIVER
WATERSHED ACTION PLAN
FOREST LANDS
MASON COUNTY
BUDD INLET
LACEY
OLYMPIA
TUMWATER
YELM
RAINIER
GRAYS HARBOR COUNTY
PIERCE COUNTY
TENINO
BUCODA
LEWIS COUNTY
Forest Lands (Non Forestry Zoning)
Long-Term Forestry (Thurston County)
Industrial Forest Land (Lewis County)
Mt. Baker/ Snoqualmie National Forest
City Limits
Long-Term Urban Growth Area Boundary
Watershed Boundary
FIGURE 7
0 2 4
Scale in Miles
THURSTON COUNTY
SINCE 1852


BUDD INLET-DESCHUTES RIVER
WATERSHED ACTION PLAN
FARMS IMPLEMENTING
BEST MANAGEMENT PRACTICES
SMALL FARM
DAIRY
POULTRY
MASON COUNTY
BUDD INLET
LACEY
OLYMPIA
TUMWATER
YELM
RAINIER
PIERCE COUNTY
GRAYS HARBOR COUNTY
TENINO
BUCODA
LEWIS COUNTY
FIGURE 8
0 2 4
Scale in Miles
THURSTON COUNTY
SINCE 1852



THURSTON COUNTY
SINCE 1852

0 1500 3000
Scale in Feet

BUDD INLET-DESCHUTES RIVER WATERSHED ACTION PLAN MARINE ENVIRONMENT

FIGURE 9