



BUDD INLET/DESCHUTES RIVER WATERSHED CHARACTERIZATION

Part I
Watershed Description
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PROJECT BACKGROUND



This report provides information about water quality factors that influence the condition of waters in the Budd Inlet/Deschutes River watershed. It also provides information about existing efforts to address water quality and some background about agencies who have responsibility to protect water quality. It is particularly intended to give the reader information to understand nonpoint source water pollution in the watershed. This information can then be used to formulate a watershed action plan for improving the watershed's water quality with the long-term goal of controlling the sources of nonpoint pollution so they do not significantly degrade the quality of the waters.

Water Quality Planning in Puget Sound

This report and the planning process for the upcoming Budd Inlet/Deschutes River Watershed Action Plan are part of a Puget Sound-wide effort to improve water quality in the Sound. In 1985, the Washington State Legislature responded to concerns that the quality of the Sound's waters was declining rapidly. The Puget Sound Water Quality Authority was established and charged with formulating a water quality management plan for the Sound and also charged with identifying which state and local entities would be responsible for implementing elements of the plan. The first Puget Sound Water Quality Management Plan was adopted in 1986 and is updated every two years.

To address nonpoint source pollution in the Puget Sound Basin, the Plan sets forth a strategy requiring the development of local management plans to address water quality situations at the individual watershed level. This approach is in contrast to another possible strategy relying on uniform, state-wide regulations to control nonpoint pollution. The intent was to foster local solutions to water quality problems and over time, to create a sense of stewardship in the community for the watersheds where the community was located.

To ensure that watershed plans are thorough in analyzing pollutant sources and strategies for improvement, the Puget Sound Plan authorized an administrative rule, WAC 400-12, to guide the planning process. This report and the upcoming watershed action plan are being formulated using the WAC for guidance. The text of WAC 400-12 is contained in Appendix A of Part I of this report.

What is Nonpoint Source Water 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.

A Brief History of Watershed Planning in Thurston County

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 early action watersheds were Henderson, Eld 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 what 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, November, 1988.

This two-part report is one of the results of a Centennial Clean Water Fund grant awarded to Thurston County in 1990. Part One of the report, the part which you are presently reading, characterizes the watershed to give the reader a "mental picture" of the human and natural environment. Part Two reports the results of a sampling program undertaken to assess water quality conditions throughout the watershed.

The Budd Inlet/Deschutes River Watershed Planning Process

To conduct the planning process a watershed management committee is formed comprised of representatives of local and state agencies and the Squaxin Island Tribe, and citizens representing economic, environmental and neighborhood interests. The management committee's charge is 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. Funding for the planning process is from another grant through the Centennial Clean Water Fund.

Ultimately, the plan is reviewed by the Washington State Department of Ecology for approval. However, each implementing entity is required to review the plan, and provide a

statement to the watershed management committee of the actions with which it concurs. In cases where the implementing entity does not concur with plan recommendations, the committee is authorized to attempt to resolve the disagreement. If necessary, the county may also conduct conflict resolution actions before the plan is forwarded to the Washington State Department of Ecology.

NATURAL ENVIRONMENT

Location & Size

Located in the southernmost portion of the Puget Sound Basin, the Budd Inlet/Deschutes River watershed originates in the Bald Hills of Lewis County. Map 1 is a vicinity map of the watershed within the state of Washington. Map 2 is a map of the physiography of the watershed. The Deschutes River flows north northwest 57 miles from the headwaters to Capitol Lake in Olympia. At this point, discharge from Capitol Lake to Budd Inlet is controlled by a dam effectively separating the freshwaters from the saltwaters at the river's mouth. Budd Inlet is on a mostly north axis. It is bounded by Cooper Point to the west and to the east Dickerson Point. The land area drained by the River and Inlet is 126,609 acres.

Hydrology: Flows, Floods and Erosion

Understanding the hydrology of the watershed means understanding how fast, how much, and where the water flows in the watershed. These factors and the dramatic flooding and erosion processes we have come to associate with the Deschutes River are directly influenced by the weather cycles, geology, soils, topography, land use activities and vegetative cover of the watershed. Understanding the hydrology of the watershed is also useful for determining concentration and timing of pollutants. Map 3 illustrates the subwatershed boundaries in the overall watershed.

The annual weather pattern in this watershed is similar to that of the greater Western Washington region; most of the rain and snow occurs from October through May. Most of the precipitation falls in small-sized storms throughout this period. However, it is not unusual for at least one significant storm to occur each rainy season. The average annual amount of rain that falls each year, as measured at the Olympia Airport is 52 inches. In the upper watershed it is over 90 inches.

Topography in the upper watershed is characterized by ridgetop elevations well over 2,000' with quite steep hillsides of 30-65 percent. The highest point in the watershed is over 3,800'. At these elevations, it is typical for some snow to accumulate, to be later melted during rainfall events. This may occur several times during the rainy season. Depending on the intensity of the rainfall, sudden flushes of surface water runoff occur carrying large volumes of sediment and debris. Flooding of the lower reaches of the river is associated with such events. (PSCRBT, 1990)

Landform in the mid-watershed is characterized by less steep topography with 5-30 percent slopes and an alluvial floodplain. Here there are fewer tributaries contributing

surface water to the mainstem of the river as compared to the upper watershed. (PSCRBT, 1990)

In the lower portion of the watershed and Budd Inlet, land is gently rolling at nearly sea-level elevation. One human engineering action that changed the hydrology of the watershed is the construction of the Black Lake Drainage Ditch. Now Black Lake drains into this ditch which feeds into Percival Creek, and eventually into Percival Cove of Capitol Lake.

In the Deschutes Watershed, the combination of weather, topography, land cover and soils all make a difference in how fast, how much, and how far the water flows or floods. In the upper watershed, rain or snow combined with steep topography, unstable soil conditions and minimal vegetative cover produce run-off. There are differing schools of thought on precisely how these processes work and the degree to which land use activities such as forestry in the upper watershed affect or accelerate the process.

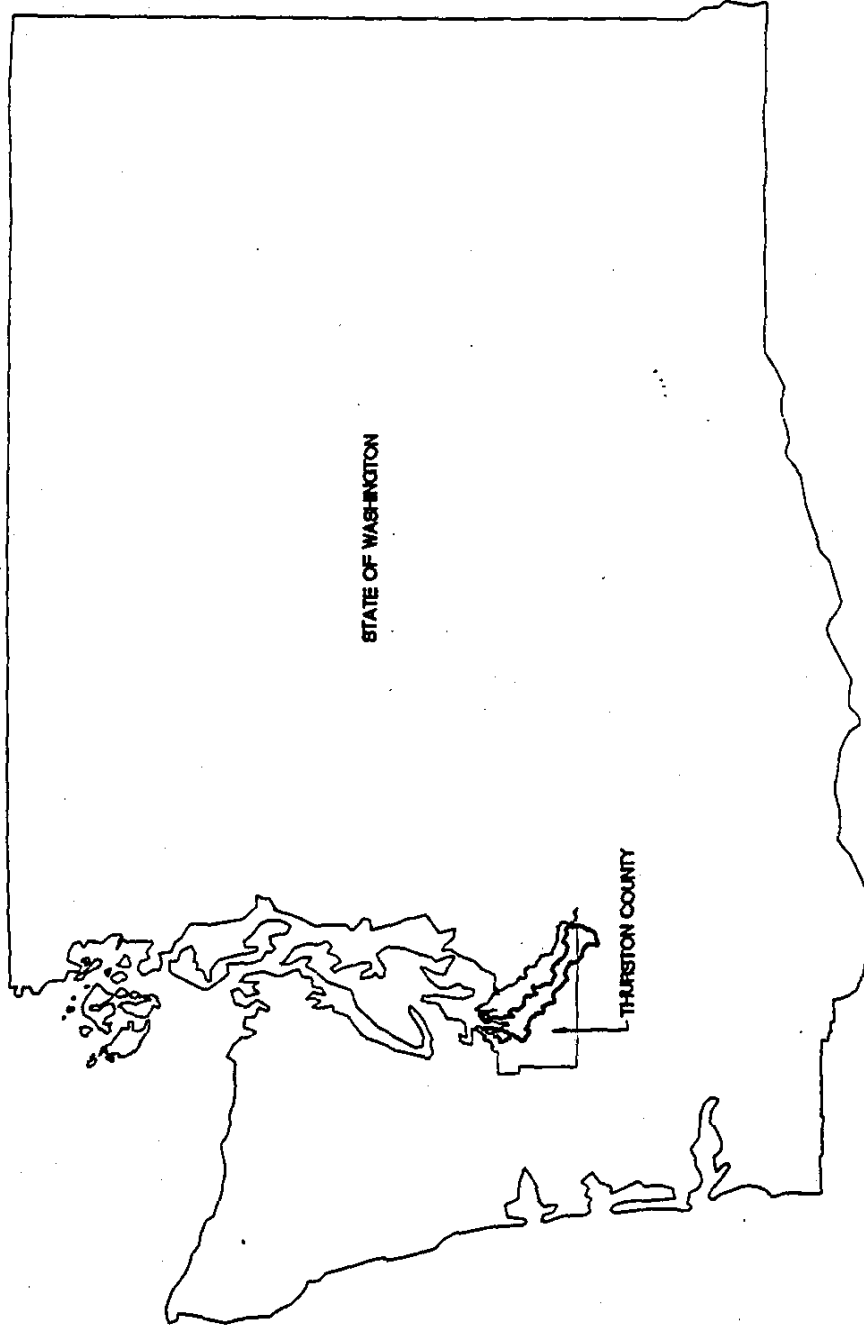
Sedimentation

Another factor to consider in understanding hydrology of the watershed is the role of sedimentation. Sediment is produced by rain and flood events and can also influence flood intensity.

Sedimentation is a naturally occurring phenomenon in most river systems. Sediment of varying sizes, from silt to boulders, is eroded and then deposited downstream. Rivers that are in equilibrium can move a volume of sediment without harming other uses of the river. Sedimentation is considered to be excessive when other uses of the river, for example fish spawning and rearing habitat are significantly negatively affected by erosion and deposition downstream of sediment material. While we understand the general phenomenon of sedimentation, the on-the-ground process is very complex.

Excessive sedimentation in the Deschutes River system and of Capitol Lake has long been a concern among local citizens and agencies. However, there is not agreement among all parties that sedimentation is occurring at levels detrimental to other uses of the river and lake. Nor is there agreement about the mechanisms causing erosion and deposition. The rate at which sediment is arriving into the lake is faster than anticipated when the Fifth Street dam was installed in 1951. The river was considered by the Cooperative River Basin Team to not be in long-term equilibrium with the surrounding watershed, as evidenced in some reaches by channel braiding, and bank erosion and channel scouring in other reaches. Studies have been conducted to better understand the mechanisms for sedimentation in the watershed and to determine the sources of sediment. Among these studies are research

BUDD INLET/DESCHUTES RIVER WATERSHED
VICINITY MAP
THURSTON COUNTY
WASHINGTON
☐ BUDD/DESCHUTES BASIN BOUNDARY



STATE OF WASHINGTON

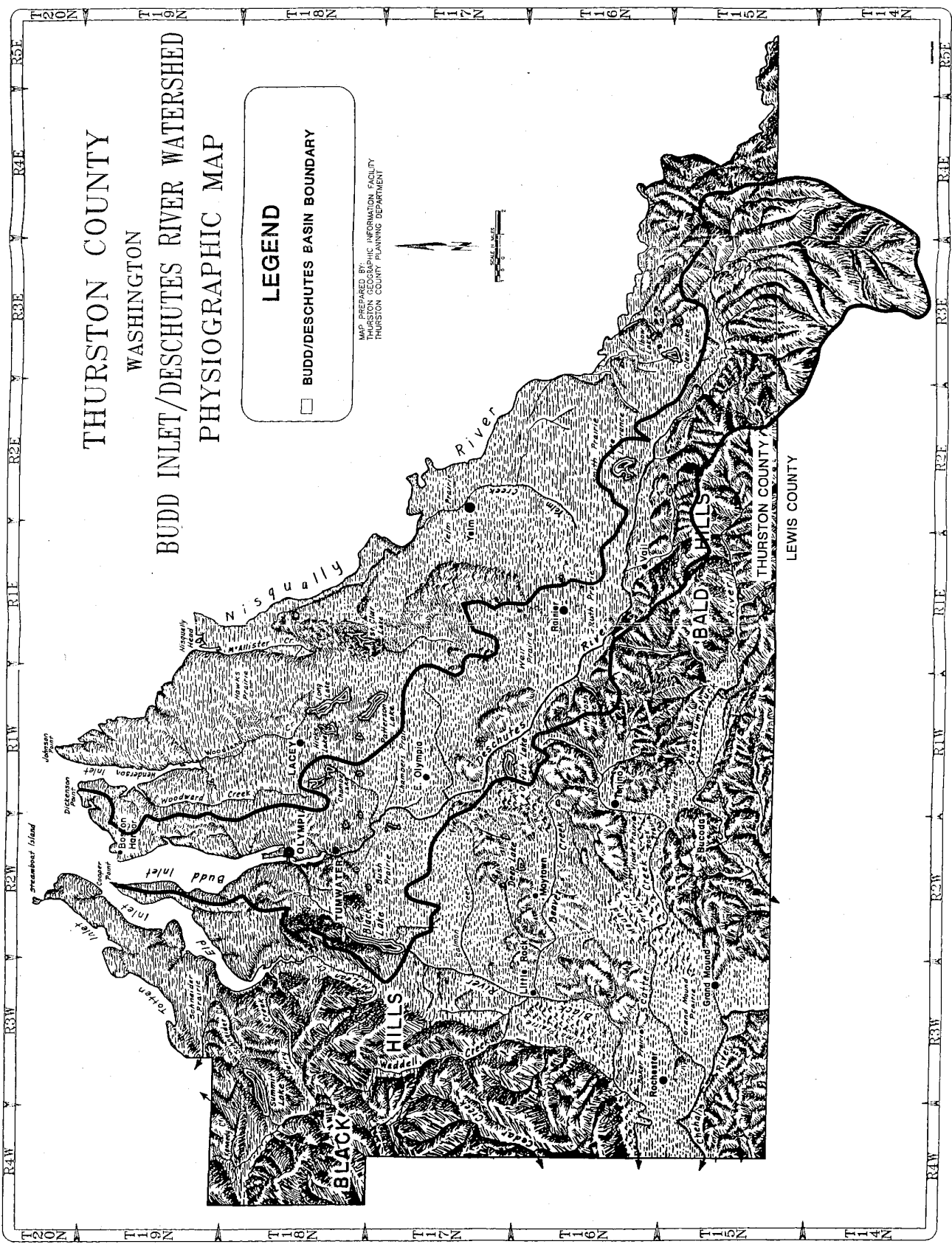
THURSTON COUNTY



NOT TO SCALE




MAP PREPARED BY:
WASHINGTON STATE DEPARTMENT OF
SEPTUMBER 1992

MAP #1

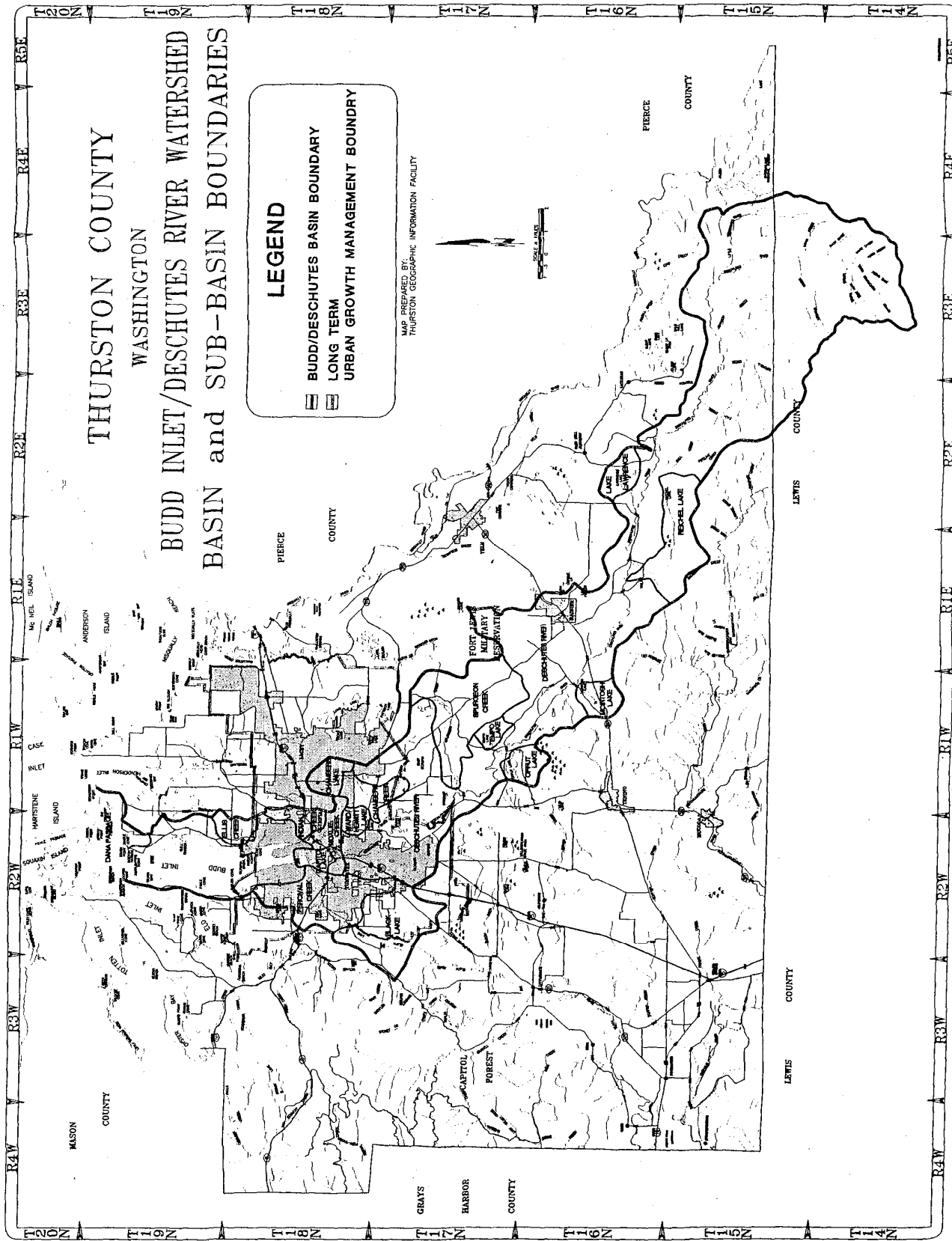


THURSTON COUNTY WASHINGTON BUDD INLET/DESCHUTES RIVER WATERSHED BASIN and SUB-BASIN BOUNDARIES

LEGEND

-  BUDD/DESCHUTES BASIN BOUNDARY
-  LONG TERM
-  URBAN GROWTH MANAGEMENT BOUNDARY

MAP PREPARED BY:
THURSTON GEOGRAPHIC INFORMATION FACILITY



conducted by the Weyerhaeuser Co. (Sullivan), by the Squaxin Island Tribe (Appendix J of Part II of this report) and by Thurston Conservation District (Thurston Conservation District, 1984). Some of the probable sources of sedimentation, particularly expansion of the forest road network and intensive timber harvesting over a large area are now past a cyclical peak. This implies that sources of sedimentation related to forest management will not further accentuate the situation. However, the delivery of sediment to stream channels will continue to occur. While there is a more full understanding now of what may be the sources of sedimentation than 10 years ago, much more work remains to be done on the specific processes at work in specific reaches.

Geology

The Deschutes River flows through two distinctly different geologic areas: the volcanic rocks of the Bald Hills and the glacially formed Puget lowland.

About 50 million years ago, the western shore of North America ran from somewhere near Bellingham to near Morton. This area was drained by a major river system that deposited large quantities of deltaic sediments off the coast of the continent, partly in the area of present day Thurston County. Offshore the ocean floor was being subducted causing volcanic activity along the edge of the continent. (A similar process is forming the Cascades today.) One center of volcanic activity was the Northcraft Center located near the present day headwaters of the Deschutes river.

Andesitic and basaltic lavas from the Northcraft Center interfingered with the deltaic sediments and were eventually covered by sediments. Then these once buried rocks were lifted above sea level, folded, and are now exposed as a northwest trending flank of the Cascade Mountains that extends from the Cascade crest northwest towards Tenino and forms the Bald Hills.

Exposed bedrock in the Bald Hills is largely andesitic. In the Deschutes headwaters, which once held two small cirque glaciers, the exposed andesite is relatively unweathered. This area is characterized by steep slopes, crested ridges, and thin soils. Despite the steepness of this area slopes are fairly stable because of the solid rock.

Moving west, away from the volcanic center, there is an increase in the amount of platy and jointed andesite and volcanic breccia (rock made of volcanic fragments that are cemented together). This area is generally characterized by deep, fine-textured soils and deeply weathered bedrock. Slopes vary from gentle to steep. There are a number of ancient slump-flows in this area, none of which have been active during recent history, probably because the soil texture is well developed and allows good infiltration of water. The more recent debris flows are generally found where ground water may be creating critical

saturation conditions. The lower and middle sections of Lincoln and Lewis creeks are examples of areas more prone to land slide activity due the weathered bedrock and fine-textured soils.

The major event that shaped the geology of the lower Deschutes Basin is one that is familiar to many area residents: the ice age. During the ice age, the earth's climate was cooler than it is now, causing glaciers now found in high mountainous areas to grow and move downward. These valley glaciers joined into huge continental glaciers that were thousands of feet thick.

As the glaciers moved southward from British Columbia they gouged and scoured the land beneath them and picked up large amounts of sediment ranging from boulders to silt. The friction of movement caused melting of the ice at the glaciers' base, resulting in some of the sediment load being deposited as a compressed layer directly below the glacier. This formed the dense mixture of sand, gravel, and boulders in a matrix of silt and clay called glacial till.

The most recent advance of the glaciers extended as far south as the Bald Hills. Meltwater from the ice was contained between the glacier and the hills forming a channel along the edge of the hills. This meltwater carried large amounts of silt, sand, and gravel. Coarser materials were deposited close to the glacier's edge, while sands were carried farther and deposited on the flood plains. It is this remanent channel from the ice age that the Deschutes follows along the northern edge of the Bald Hills.

Near Vail the Deschutes leaves the old meltwater channel and flows northwestward across the low gently rolling terrain formed by the Vashon advance. Here the river flows through both till and outwash materials. Since these materials are loosely packed, contain a mixture of sand, silt, clay, and gravel, and are easily eroded, they contribute a significant sediment load to the Deschutes River.

Ground Water

Ground water is water stored underground that fills the spaces between soil particles or fractures in the rock. When a rock unit will yield a useable amount of water it is commonly called an aquifer.

In the lower part of the Deschutes Basin, the area formed by glaciers, there are a number of important aquifers. These aquifers are primarily recharged by rainfall. The United States Geological Survey (USGS) estimates recharge in the northern part of the county averages approximately 25 inches per year (Dion and others, 1991).

Ground water flows downward through the geologic units and towards the marine shorelines and major streams. It discharges to Puget Sound, the lower parts of the principal rivers in Thurston County and other surface water bodies. Ground water sustains the late-summer flow of many streams, especially small streams not fed by glacial meltwater. The Critical Aquifer Recharge Areas map, Map #4, shows the areas of the county where soils and geologic conditions result in replenishment of ground water supplies.

Ground water is a very important source of water for the Deschutes River. Based on work done by the U.S. Geological Survey in August 1988, it was found that the Deschutes River between Rainier and Tumwater gained over 44 percent of its total flow from ground water seepage into the river. The river segment near Bush and Chambers Prairies showed the most gain from groundwater. Above Rainier, ground water also probably supplies significant flow to the Deschutes as it flows through the glacial materials along the edge of the Bald Hills. However, data was not available for this section. In the headwaters of the Deschutes, the ground water contribution is less significant to the total flow than the surface water contribution.

Soils

The soils of the Deschutes/Budd Watershed can be discussed in three general categories which are based on origin and location in the landscape. Those three categories include: Soils on Floodplains, Soils on Glacial Uplands, and Soils Dominantly on Plains, Uplands, and Mountains. The USDA Puget Sound Cooperative River Basin Team prepared a description of these soil categories which is published in "Deschutes River/Budd Inlet Watersheds", Thurston County, Washington, dated June 1990. The following description of the soil categories is taken directly from the document referenced above.

The Soils on Floodplains group makes up a relatively small portion, only 5 percent (6,300 acres), but a very important portion of the watershed. The soils are well to very poorly drained. Elevation ranges from 50 to 500 feet. Slopes are nearly level. The average annual precipitation is 45 to 55 inches.

The soils formed in very deep loamy or clayey alluvium. Some of the soils are artificially drained by ditches or tile. In places there are remnants of the native hardwoods and conifers not replaced by agriculture or homesites.

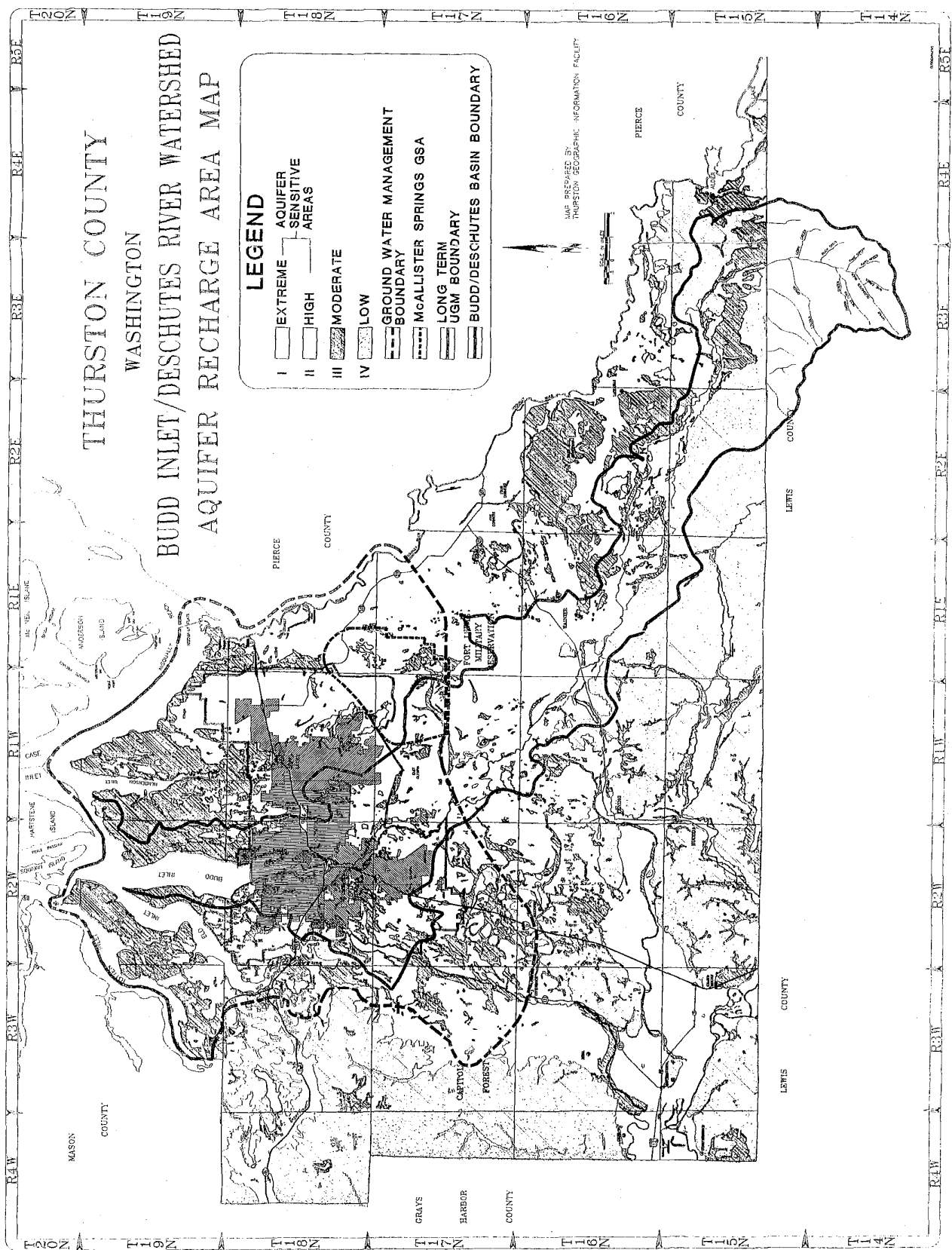
Soils in this group are subject to periodic flooding by the Deschutes River and its major tributaries. They are well suited for agricultural crops due to their high natural fertility and moisture holding capacity and poorly suited for homesites due to flooding and/or a seasonal high water table. A major soil and water management consideration is the land application of animal waste and the animal access to stream and/or ditches.

The Soil on Glacial Uplands the prominent group, makes up about 54 percent (68,400 acres) of the watershed. The soils are on glacial terraces, till plains, and terminal moraines. Drainage is somewhat excessive to poor. Elevation ranges from 100 to 980 feet. Slopes range from nearly level to very steep. The average annual precipitation is 45 to 60 inches.

The soils are formed in very deep to moderately deep, gravelly to extremely gravelly loams and sands, many of which are underlain by compact glacial till. Soils in this group are used for agriculture and rural homesites, and as sources for sand and gravel. Much of the area is under forest management. The main limitation in areas of agriculture use is low natural fertility and droughtiness during the growing season. The main limitation for many of the soils in this group for homesites is wetness. A major water quality management consideration is that almost one-third of the soils in this group present a severe potential for polluting groundwater when the conventional septic system is the principal waste disposal method.

The Soils Dominantly on Plains, Uplands, and Mountains group makes up about 41 percent (51,900 acres) of the watershed. The soils are on terminal moraines, glaciated uplands, and mountainsides. These soils are very deep to moderately deep and well to moderately well drained. Elevation ranges from 700 to 3400 feet. Slopes range from nearly level to very steep. Vegetation is dominantly conifers. The average annual precipitation is 45 to more than 90 inches.

The soils formed in stony glacial till and, in residuum and colluvium derived from basalt and andesite or andesitic volcanic breccia. Soils in this group are used for agriculture, principally forestry, and for recreation, homesites, and wildlife habitat. Soils of steep slopes have contributed sediment to the Deschutes River. The main limitation for many of these soils when managed for forest products is steepness of slope. There is a continual high potential for mass wasting and other forms of erosion. The limitation of soils on flatter slopes is seasonal wetness. Year-round logging roads require suitable surfacing to permit use and to reduce surface erosion.



THURSTON COUNTY
 WASHINGTON
BUDD INLET/DESCHUTES RIVER WATERSHED
AQUIFER RECHARGE AREA MAP

LEGEND

I	EXTREME	AQUIFER	SENSITIVE	AREAS
II	HIGH			
III	MODERATE			
IV	LOW			
GROUND WATER MANAGEMENT				
BOUNDARY				
MCGALLISTER SPRINGS GSA				
LONG TERM				
UGM BOUNDARY				
BUDD/DESCHUTES BASIN BOUNDARY				

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Lakes & Wetlands in the Watershed

Lakes

In the Budd Inlet/Deschutes River watershed are 40 lakes occupying 2,048 surface acres or approximately 2 percent of the watershed (PSCRBT, 1990). Depending on the underlying geology some of these lakes are fed primarily by springs and may or may not have outlets to streams. Others receive incoming waters from streams and drain into tributaries of the Deschutes River or Budd Inlet.

Frequently, residential development is located around lakes, sometimes occupying the entire shoreline. This development is sometimes for year-round occupancy and sometimes for seasonal use. With development come nonpoint pollution problems described below in the "Land Use" section.

This section will briefly describe some of the larger lakes in the watershed and water quality protection efforts that are taking place focusing on those lakes.

Black Lake

Black Lake and its subdrainage area are located in the westernmost portion of the Deschutes River watershed as defined for this project. In fact, natural drainage from Black Lake was geographically separate from the Deschutes River, going instead to the Black River. However, with the construction of the Black Lake drainage ditch, the Lake now also drains to Percival Creek and on into Capitol Lake.

Most of the eastern shoreline is occupied by residential and developed recreational properties. The western shore is bounded by Black Lake Boulevard and residential properties. There are two undeveloped public access sites to the lake. During summer months the lake is heavily used for fishing and water contact sports. In 1993, the county Environmental Health Department will conclude a water quality study of the lake and will recommend specific remedial actions be undertaken to improve water quality.

Capitol Lake

Capitol Lake, the terminus of the Deschutes River, was artificially created by fill used to construct downtown Olympia and the installation of the dam in 1951 over which Fifth Avenue lies. Prior to the fill and dam construction, this area was the estuary for Budd Inlet. The lake is used for boating and fishing and serves as reflecting pool for the Capitol Campus. A chinook salmon rearing operation is conducted by the Department of Fisheries in

Percival Cove on the west side of the Deschutes River Parkway.

Numerous studies have been undertaken to understand the water quality and rate of sedimentation of Capitol Lake. At the time of construction of the dam, it was anticipated that sedimentation of the lake would occur. However, the rate of sediments settling into the upper and mid-lake basins is considerably faster than anticipated.

The Capitol Lake Restoration Plan, described in the "Present Activities and Plans" chapter of this report, proposes management actions for the lake several of which are now being implemented. Additionally, Part II of this report presents findings of the most recent water quality analysis of the lake conducted in 1991.

Chambers Lake

This two basin lake straddles the city limits of Lacey and Olympia, and provides public access for fishing while being located in one of the fastest growing areas in the Urban Growth Management Area. The lake drains to the Deschutes River by two means; a natural outlet channel and a two part drainage ditch.

The Thurston County Stormwater Utility is preparing a comprehensive drainage plan for the Chambers Lake basin (including Ward and Hewitt Lakes as well). This drainage plan will present estimated flood flows once full development in the basin occurs. Also it will address, at the site specific level, flood control measures and water quality and habitat improvement actions.

Lawrence Lake

Lake Lawrence, located in the upper Deschutes River watershed, is the site of residential development, agricultural uses and public access for fishing and swimming. It is spring fed and drains to the Deschutes River via a regulated tributary. At one time, the lake was dammed and a portion of the flow of the Deschutes River was diverted to the lake for purposes of generating hydroelectricity. Over the years a large quantity of very fine sediment accumulated on the lake bottom. The Thurston County Department of Public Works, in 1993, will evaluate the feasibility of dredging to improve water quality.

Wetlands

Wetlands occur frequently throughout the Budd/Deschutes watershed. These are upland areas where the soils become regularly saturated and the vegetation is typically adapted for life in saturated soil conditions. Examples of wetland areas include but are not

limited to, swamps, fresh and salt water marshes, and bogs. Map 5 illustrates the approximate location of wetlands using data from the National Wetlands Inventory and hydric soils from the Soil Survey of Thurston County, 1990 (U.S. Soil Conservation Service, 1990). Generally speaking, fresh water wetlands are found in areas underlain by glacial till, a substrate less likely to allow rapid percolation of surface water runoff to ground water. When viewed from the air wetlands are often found in depressions, low-lying areas and small drainages and in riparian areas abutting streams and lakes.

What is the significance of wetlands to surface water quality? Research the Thurston Regional Planning Council conducted revealed that wetlands perform many functions some of which are quite important to good water quality. (Thurston Regional Planning Council, 1986, 1987) These are:

- Moderation of high flows during floods
- Filtration of pollutants as water runs off or absorbs into the soil
- *Short-term storage for release back into surface water systems during seasonal lower water flows*

In short, wetlands essentially act as hydrologic buffers. Because wetland soils are so sponge-like, large volumes of water are retained in these areas. By retaining water, wetlands shave off the peak of the flood flow, so that less energy is available in rivers or streams to scour the bed and banks of channels. This translates into less sediment being transported during a specific storm event by the river to be deposited somewhere downstream and possibly negatively affecting instream habitat. Retaining water in wetlands creates the time for certain mechanisms to occur (sedimentation, adsorption to soil particles, decomposition by microbes) that remove pollutants from the water. And lastly, over a period of time, the soils usually will release the excess water back into a surface water channel. This benefits in-stream habitat by maintaining flows during the dry season and keeping water temperature relatively low.

Because of the importance of wetlands to water quality and wildlife habitat, efforts are being undertaken by the jurisdictions in Thurston County to identify, and where feasible, to protect those areas. Through the Thurston Regional Planning Council, a project to more accurately map wetlands in the cities and unincorporated county is underway. Prior mapping efforts resulted in error of mapping, when checked in the field, of up to 59 percent. This project uses the most recent and accurate aerial photo technology available. Results for the northern part of the county should be available in summer, 1993. Funding is being sought to continue the mapping effort throughout the southern part of the county.

All the jurisdictions in the county are preparing or have adopted Critical Area ordinance, to protect environmentally sensitive areas including wetlands. These actions implement requirements of the Growth Management Act as well as attempt to protect water quality. The regulations, are quite similar in structure throughout the county. They require rating the significance of wetlands based on site factors. Buffer areas around wetlands are established, the width of which varies depending on the rating of the wetland. Also, land uses in the wetland and in the buffer area are restricted or subject to more scrutiny. The intensity of these restrictions and scrutiny again vary depending on the rating of the wetland. This approach is somewhat complicated to administer, yet it in essence tailors the regulation to the site.

Of special note, there are a few sites of sphagnum bogs, a particular classification of wetland, within the watershed. These are located north of Olympia, towards Gull Harbor and south of the urban area near Elwanger Creek. While the peat soils are nutrient poor, the shrubby vegetation found in bogs serves as useful perching habitat and protective cover for birds. This type of wetland is infrequent when compared to other types of wetland.

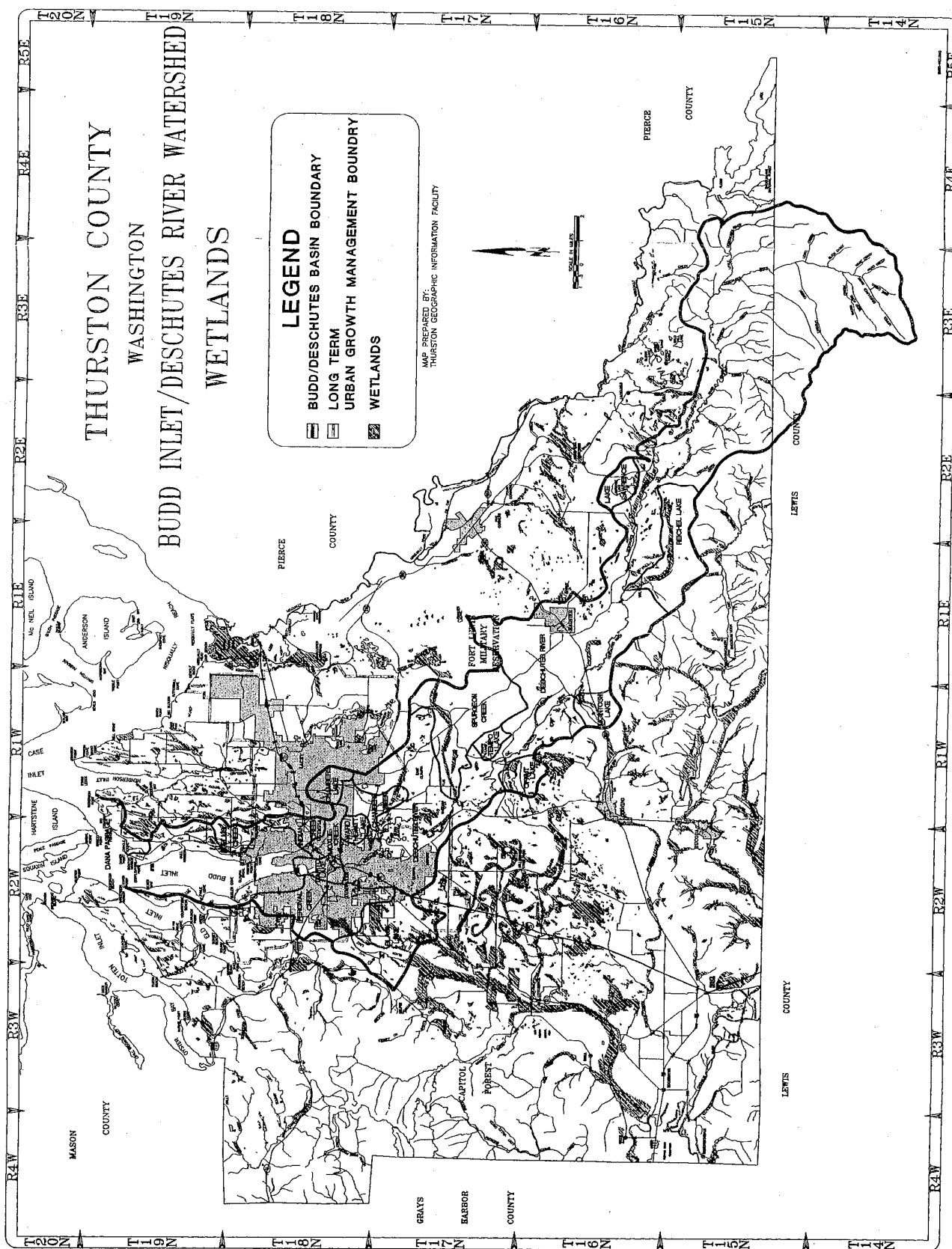
Habitat

Under Washington law, wildlife, broadly defined, are legally recognized as "beneficiaries" of good water quality. This means that water quality programs should aim to contribute to high quality wildlife habitat. This section will discuss some of the linkages between water quality and wildlife.

For wildlife, home is where the habitat is. And habitat varies depending on the species. Habitat for a particular species occurs when there is shelter, food and water available to meet that species requirements. These requirements can vary depending on the lifestage and seasonal activity of the species. To aid in managing the landscape to meet the varying habitat requirements of species, land managers will often classify vegetation into habitat types. However, in Thurston County no one classification of habitat types is officially recognized. So, an alternative approach to discerning the linkages between water quality and wildlife, is to review the needs of individual species.




The species discussed here were chosen because they are covered by the Washington Department of Wildlife's Priority Habitats and Species program (WDW, 1991). Further, these species:

- have habitat requirements directly linked to good water quality and;
- because they are candidates for listing as threatened or endangered or;



THURSTON COUNTY
 WASHINGTON
BUDD INLET/DESCHUTES RIVER WATERSHED
WETLANDS

LEGEND

-  BUDD/DESCHUTES BASIN BOUNDARY
-  LONG TERM URBAN GROWTH MANAGEMENT BOUNDARY
-  WETLANDS

MAP PREPARED BY
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- are either being monitored because of changes to their habitat which may negatively affect their populations.

Wildlife

Bald Eagle

The diet of bald eagles consists of a large variety of vertebrates, preferably dead or weakened. These include salmon and waterfowl, both species dependent on good water quality. It is important that the eagles' food supply be of sufficient quantity and that it not be chemically or bacterially contaminated.

An indirect link between bald eagles and water quality is the amount of forest cover desired by the species. Research indicates that somewhat older, more contiguous forest with relatively low human disturbance will result in higher chances of successful nesting and reproduction. However, some removal of forest cover appears to be tolerable to the species. This forest cover also performs a variety of water quality functions, including reducing the rate of delivery of sediment to stream channels, and decreasing the quantity and rate of delivery of surface water to channels, thereby reducing flood peaks.

Great Blue Heron

These birds also rely on vertebrates for their diet and are most interested in fresh and saltwater species, less so in terrestrial animals. Distance is an important factor as these birds strongly prefer to hunt relatively close (within 3 miles) to nesting areas.

Great blue herons nest in colonies in fairly high trees (50'). They prefer relatively low human disturbance and buffer areas of a minimum of 820' are recommended around nesting colonies which can be as large as 10 or more acres. The forested cover can provide similar water quality benefits as mentioned with bald eagles.

Olympic Mudminnow

This small fish is found in lakes, ponds and marshes with relatively low velocity currents, but also dense aquatic vegetation and deep, soft mud bottoms. It is quite sensitive to habitat changes, including changes to wetland hydrology such as draining, paving or changing the flows of tributaries to wetlands. Although these fish prefer silty substrates, it must have a high organic content, such as from decomposing plant material, not from recently deposited silt.

Osprey

Osprey feed almost exclusively on live fish. They nest in snags and live trees in areas relatively close to their feeding source. The Department of Wildlife management recommendations strongly recommend against the use of certain pesticides in watersheds that are home to osprey to avoid contamination of their food sources.

Purple Martin

These swallows feed on flying insects while the bird itself is in flight. Favorable habitat for feeding include open areas, near moist and wet sites, such as wetlands, where flying insects are abundant. To maintain the insect population necessary for the purple martins, it is recommended that pesticides not be used within a 7.5 mile radius of nesting colonies.

Special Areas

There are some locations in the Budd/Deschutes watershed that will be specifically noted in this report because of their unique character. Maintaining and improving water quality in the watershed will serve to enhance these sites.

Tumwater Falls in Tumwater and Deschutes Falls near Vail on the Deschutes River are striking breaks in the river's gradient. Both sites have very important recreation and aesthetic value. Tumwater Falls is the main feature in a trail corridor that follows the Deschutes River from the upper basin of Capitol Lake to a fish spawning facility immediately south of the Olympia Brewery. This site is heavily used by urban recreationists throughout the year. Deschutes Falls is in a much more isolated location and was recently acquired by the Thurston County Parks Department. Eventually picnic facilities and trails will be open for public use.

A site of a different kind is Gull Harbor on the east shore of Budd Inlet. This coastal embayment is documented in Puget Trough Coastal Wetlands: A Summary Report of Biologically Significant Sites, published by the Department of Natural Resources (1984). It is a very biologically productive site. The small freshwater streams draining into the embayment are spawning grounds for chum, coho, sea-run cutthroat trout. Surf smelt spawn in the gravels closer to the mouth. Also chum and coho juveniles feed in the embayment before leaving the estuarine environment. Both the juvenile salmon and surf smelt are prey for a number of other species. Additionally, a sensitive plant species, chain-fern, is found at the site. While there are other embayments similar in structure in Puget Sound, this one is noteworthy because it is relatively undeveloped and undisturbed.

Water Quality Standards

The Washington State water quality standards for all surface water bodies are found in Chapter 173-201 W.A.C. Within the WAC, every surface water body in the state is classified in one of five water body classifications, which are based on the present or potential characteristic uses of that water body. Specific water quality standards are established for each classification in order to protect the characteristic uses of water bodies within those classifications. The standards for conventional parameters are shown in Table 1. Refer to WAC 173-201 for a complete description of the standards.

The Deschutes River from the mouth to the Snoqualmie National Forest boundary (river mile 48.2) is classified as Class A (excellent). All tributaries to the river in this section are also Class A. The Deschutes River from the national forest boundary to the headwaters and its tributaries in this section is classified as Class AA (extraordinary). Budd Inlet is a Class A waterbody north of Priest Point Park (latitude 47 degrees 04 minutes N). The Inlet is listed as Class B (Good) south of Priest Point Park. All lakes in the watershed are in the Lake Class, except Capitol Lake which is a Class A waterbody.

Table 1. WATER QUALITY STANDARDS FOR SURFACE WATERS

Parameter	Waterbody Classification				
	AA	A	B	C	LAKE
FECAL COLIFORM (org./100ml)					
Freshwater (geo. mean)	50	100	200	N/A	50
Marine (geo. mean)	14	14	100	200	N/A
DISSOLVED OXYGEN (mg/l)					
Freshwater (Min.)	9.5	8.0	6.5	N/A	*
Marine (Min.)	7.0	6.0	5.0	4.0	N/A
TEMPERATURE (degrees C)					
Freshwater (Max.)	16	18	21	N/A	*
Marine (Max.)	13	16	19	22	N/A
pH (within range shown)					
Freshwater	6.5-8.5	6.5-8.5	6.5-8.5	N/A	*
Marine	7.0-8.5	7.0-8.5	7.0-8.5	6.5-9.0	N/A
TURBIDITY (no more than xx NTU over bkgd if bkgd < 50 NTU <u>OR</u> no more than xx percent increase over bckgrd if bckgrd > 50 NTU)	5; 10%	5; 10%	10; 20%	10; 20%	5
TOXICITY **	**	**	**	**	**

* No measurable change over background.

** Refer to WAC 173-201A-040 for toxic substances standards.

Beneficial Uses

Table 2 shows the characteristic uses for each waterbody classification established in WAC 173-201. The characteristic uses listed for Class AA, A, and Lake are the same, and provide the widest variety of beneficial uses for humans and wildlife. The only water body within the Budd/Deschutes watershed which does not fall in one of those classifications in Southern Budd Inlet, which is designed as Class B. The uses not specified in the WAC for Class B waters are domestic water supply and stock watering, salmon spawning and clam, oyster, and mussel harvesting, and primary recreational contact.

Table 2. CHARACTERISTIC USES OF SURFACE WATERBODY CLASSIFICATIONS (Ref. WAC 173-201)

Characteristic Uses	Waterbody Classification				
	AA	A	B	C	LAKE
WATER SUPPLY					
Domestic	X	X	-	-	X
Industrial	X	X	X	X	X
Agriculture	X	X	X	-	X
Stock Watering	X	X	-	-	X
FISH AND SHELLFISH					
Salmonids					
Migration	X	X	X	X	X
Rearing	X	X	X	-	X
Spawning	X	X	-	-	X
Harvesting	X	X	X	-	X
Other Fish					
Migration	X	X	X	X	X
Rearing	X	X	X	-	X
Spawning	X	X	X	-	X
Harvesting	X	X	X	-	X
Clam, Oysters, & Mussels					
Rearing	X	X	X	-	X
Spawning	X	X	X	-	X
Harvesting	X	X	-	-	X
Crustaceans & Other Shellfish					
Rearing	X	X	X	-	X
Spawning	X	X	X	-	X
Harvesting	X	X	X	-	X
WILDLIFE HABITAT	X	X	X	-	X
RECREATION					
Primary contact	X	X	-	-	X
Secondary Contact	X	X	X	X	X
Sport fishing	X	X	X	X	X
Boating	X	X	X	X	X
Aesthetic enjoyment	X	X	X	X	X
Commerce and Navigation	X	X	X	X	X

Overall there is a wide variety of existing uses of the Budd/Deschutes water resources. The primary source of domestic and industrial water in Thurston County is groundwater, and many of the groundwater withdrawals are from aquifers associated with the Deschutes River. For example, the Pabst Brewing Company and the City of Tumwater have large well fields in very close proximity to the river. Wells within the watershed also provide water for irrigation and stock watering. Groundwater is very important resource for the Deschutes River because a large percentage of the base flow of the river is from groundwater.

There are existing water appropriations for surface water withdrawals from the river and its tributaries, primarily for irrigation and stock watering. In 1980, the river above Deschutes Falls and all tributaries to the river were closed year-round to further out-of-stream consumptive uses. The river below the Deschutes Falls was closed to further consumptive appropriations between April 15 to November 1. These restrictions were established in WAC 173-513 in order to maintain low flows adequate to sustain the fisheries resources.






Historically, anadromous fish were prevented from migrating up the Deschutes River by the height of the Tumwater Falls. An anadromous fish run in the Deschutes River was established after construction of fish ladders at the falls and at the Capitol Lake dam. The Washington Department of Fisheries operates a capture and artificial spawning facility for chinook and coho salmon at Tumwater Falls. Eggs are incubated offsite and juveniles are reared in net pens in Percival Cove and pens near Squaxin Island. Eventually the fish are released into Capitol Lake or Puget Sound. The Washington Department of Wildlife also plants steelhead smolts and cutthroat trout in the river, and manage a sport trout fishery in several of the lakes within the watershed. The Squaxin Island tribe plants chum salmon in Deschutes tributaries. Some of the lakes also support a substantial warm-water fishery. Map #6 on the following page shows the known fish-bearing streams in the watershed.

In addition to the fisheries mentioned above, the Deschutes is also home to the rare Olympic mudminnow, which is restricted to a small geographic area in southwestern Washington. Another fish of special concern is the shorthead sculpin, which inhabits the upper reaches of the watershed.

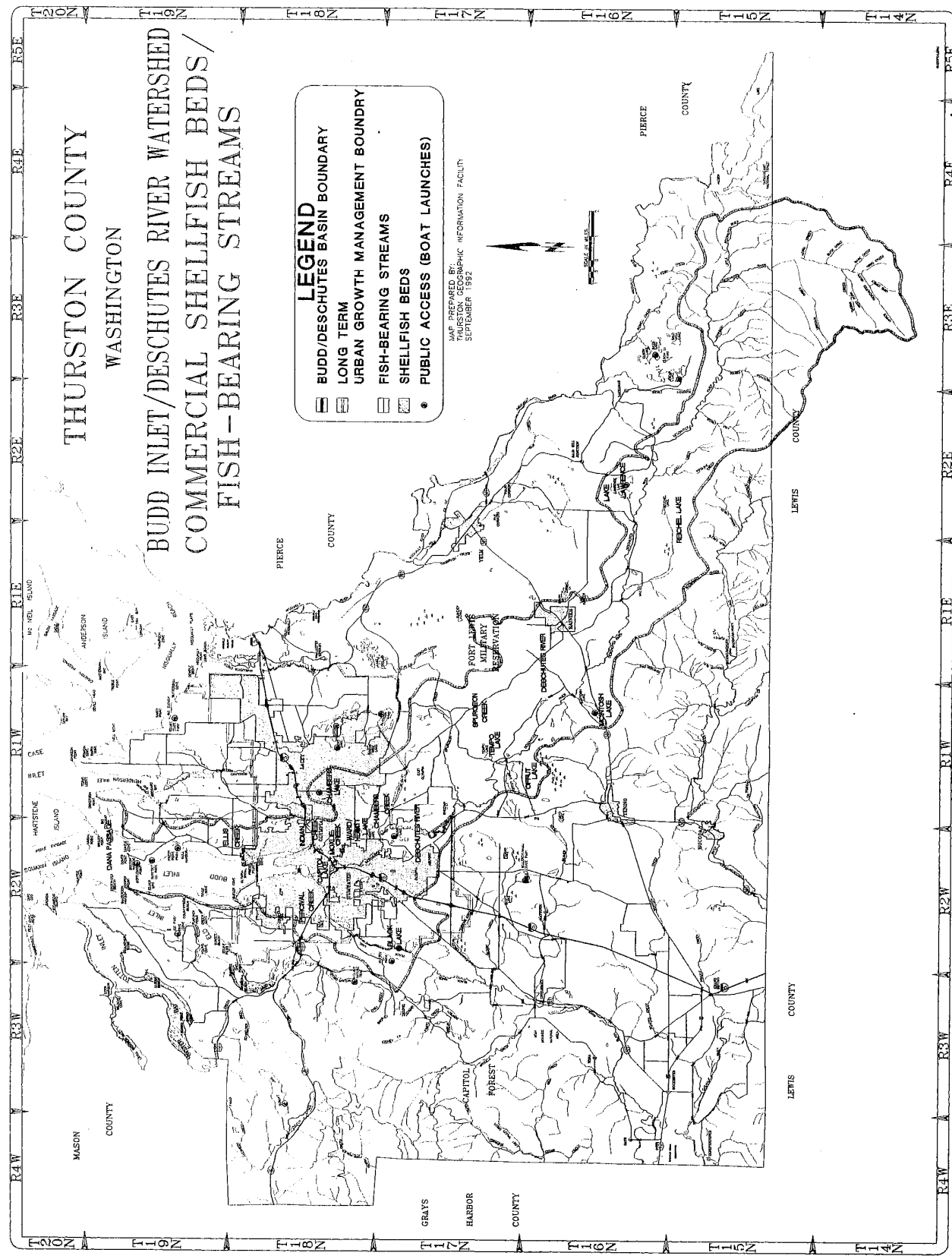
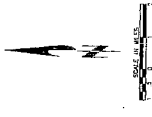
Budd Inlet is decertified for commercial shellfish harvesting by Washington Department of Health due to water quality limitations from numerous point discharges. However, the Inlet does support populations of native and introduced species of shellfish. These shellfish are harvested by some Budd Inlet shoreline property owners for personal use. Two public shorelines where shellfish harvesting is currently not prohibited are Burfoot County Park and an undeveloped County shoreline property on the east side of the Inlet.

THURSTON COUNTY
WASHINGTON

BUDD INLET/DESCHUTES RIVER WATERSHED
COMMERCIAL SHELLFISH BEDS/
FISH-BEARING STREAMS

- LEGEND**
-  BUDD/DESCHUTES BASIN BOUNDARY
 -  LONG TERM URBAN GROWTH MANAGEMENT BOUNDARY
 -  FISH-BEARING STREAMS
 -  SHELLFISH BEDS
 -  PUBLIC ACCESS (BOAT LAUNCHES)

MAP PREPARED BY:
THURSTON GEOGRAPHIC INFORMATION FACILITY
SEPTEMBER 1992



There are a wide range of recreational opportunities within the watershed. Developed facilities along the marine water include the Boston Harbor public boat launch, Burfoot County Park, City of Olympia Priest Point Park, Port of Olympia East Bay marina and public boat launch, and Percival Landing waterfront and public boat moorage. The Inlet also has four private marinas. Budd Inlet and Percival Landing are the focus of community events such as the Wooden Boat Festival and Harbor Days.

Recreational facilities open to the public on Capitol Lake include Capitol Lake Park, Marathon Park, Capitol Lake Interpretive Center, and Tumwater Historical Park. Facilities include boat access for fishing, walking and jogging trails which lead to habitat observation areas, fishing docks, and picnic areas and restrooms. The lake is also the focus of a community event called Lake Fair. The Washington Department of General Administration manages Capitol Lake and several of the public facilities. The Cities of Olympia and Tumwater also operate parks on the Lake.

On the lower portion of the Deschutes River, the Pabst Brewing Company owns and maintains the Tumwater Falls Park. There are paths along both sides of the river as well as the fish ladder system and fish trapping area operated by the Department of Fisheries. Picnic facilities and play equipment are also available at that site. The Tumwater Valley Golf Course and athletic facility along the lower reach of the river is also available to the public. The lower and middle sections of the river are used for river rafting and swimming, with access at several undeveloped locations, primarily road crossings. The County also acquired a unique parcel of land in the upper watershed which includes the Deschutes Falls. This property will eventually be developed for day use and opened to the public.

There are also seven other lakes which have public boat access provided by the Washington Department of Wildlife. These lakes are used for boating, swimming, and fishing. Black Lake, which drains into Percival Creek, is the most heavily used recreational lake in the County. The County owns two waterfront properties on Black Lake, one of which is being developed as a day use park for swimming and picnicking. It is scheduled to open in 1994.

Another beneficial use within the watershed is navigation and commerce. The Port of Olympia operates a shipping and export facility in inner Budd Inlet.

Problem Identification and Impaired Beneficial Uses

The waterbody classification and the existing water quality in inner Budd Inlet is lower than water quality throughout the rest of the basin. One of the biggest water quality problems identified in the Inlet is eutrophication, or excess nutrients which result in major algae blooms and low dissolved oxygen. A mechanical aeration system has been placed in

inner East Bay to aerate the water column during the summer periods when anoxic conditions occur. A major source of the excess nitrogen in the Inlet has been attributed to the LOTT sewage treatment plant discharge in the inner Inlet, as well as several other smaller sewage treatment plant discharges. 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 sewage treatment plant discharge and other sources of contamination.

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 illicit sewer 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.

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. Warning signs have been posted advising against harvesting and consumption of shellfish from the area. The site is under enforcement by Washington Department of Ecology for clean-up. 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.

Water quality problems in Capitol Lake are primarily major algae blooms from excess nutrients and sediment deposition from the Deschutes River. Poor water quality in the lake (poor water clarity and elevated fecal coliform bacteria) resulted in closure of the public swimming beach at the City of Olympia managed park in the north basin of the lake. The Washington State Department of General Administration has an on-going dredging program to deal with the high sediment deposition rate in the lake.

Much of the sediment being deposited in the lake is from actively eroding banks along the Deschutes River. Between the river mouth and river mile 41, 140 eroding banks were identified during a study conducted by the Thurston County Conservation District in 1984. Percival Creek also has actively eroding banks which are resulting in sediment deposition in Percival Cove. Higher stream flows are commonly the cause of increased stream bank erosion. In Percival Creek, higher stream flows have been attributed to increased urban development in the watershed and resulting increased stormwater volumes. This problem is being addressed through a stormwater basin plan which is described later in this document. In the Deschutes River, it is suspected that increased stream flows may be an effect of the intensive timber harvesting activities in the upper watershed. The Puget Sound Cooperative River Basin Team stated in their June 1990 report that the sediment in the channel has caused the river to change from a meandering channel to a braided channel, which is accelerating stream bank erosion.

The Pabst Brewing Company, located along the lower section of the Deschutes River, has several permitted discharges to the river. Some of the wastewater being discharged have high concentrations of phosphorus, and some have high concentrations of fecal coliform bacteria. These point discharges are contributing to the water quality problems in Capitol Lake. At this time, the brewery's discharge permit is being rewritten by the Washington State Department of Ecology and the draft permit addresses the phosphorus and fecal coliform bacteria issues.

The Washington State Department of Fisheries has had to severely curtail their chinook salmon rearing operation in Percival Cove due to declining water quality and lack of control over how many fish are being released into Puget Sound. The two main water quality issues are: 1) increased incidents of blue-green algae blooms and 2) low dissolved oxygen levels. It is suspected that degrading water quality in the cove maybe associated with declining water quality in Black Lake and increased stormwater inputs.

In the mid-reaches of the river and the tributaries in the mid-watershed, monitoring has shown water quality impacts from agriculture operations. The data reported in Part II of this document shows that fecal coliform bacteria, nutrients, and suspended solids can increase as a result of inappropriate animal-keeping and animal waste management practices. Aquatic habitat can also be seriously affected in areas where animals have unrestricted access to streams.

In the upper Deschutes watershed, one of the major water quality concerns is related to debris flows caused by road construction or maintenance problems, timber harvest activities, and/or natural conditions. Large clearcuts increase the water availability which can overload the road drainage systems causing road failures and debris slides. Actively used logging roads also generate suspended sediment in run-off. Considerable efforts to

minimize water quality impacts from timber-related activities are being implemented through the Timber, Fish and Wildlife Agreement which is discussed on page 66. Weyerhaeuser, who is the principle property owner in the upper watershed, is actively improving culverts and drainage facilities in the road system to reduce the occurrences of road-related debris "torrents" and slides.

HUMAN ENVIRONMENT

Population

By using a computerized "geographic information system," (GIS), population data from the 1990 U.S. Census can be extracted for the area lying within the boundaries of the Budd Inlet/Deschutes River watershed. The population of the watershed in 1990 was 68,386 persons. This was 42.4 percent of the total population of the county, which was 161,238 persons. The City of Tumwater, the Town of Rainier, nearly all of the City of Olympia and a very small area of the City of Lacey lie within the watershed. This tilts the balance of the population in the watershed towards incorporated areas. During recent years about 70 percent of the population growth in the county has occurred in the north county Urban Growth Management Area. If this is applied to the Budd/Deschutes watershed, then about 47,000 people lived within the Urban Growth Management Area portion of the watershed. (TRPC, 1992)

During 1992, the Thurston Regional Planning Council prepared forecasts for population growth for Thurston County up to the year 2015, combining both incorporated and unincorporated areas. Six scenarios were developed, grouped into two categories. "Full density" scenarios assume that development in the Urban Growth Management Area between now and 2015 will be to the maximum densities allowed by existing zoning. In contrast, the assumption underlying "current trends" scenarios is that the Urban Growth Management Area will develop only to the typical densities now occurring, which are sometimes only half of what the zoning allows. Factors such as increased military personnel due to the expansion of Fort Lewis, possible growth in industrial economic sectors and possible expansion in employment in state government were varied between the scenarios. Results for the medium growth scenario are in Table 3. Both versions of the medium scenario estimate that in the 25 years between 1990 and 2015 the total county population will expand about 42 percent.

**TABLE 3
POPULATION ESTIMATES, Year 2015
MEDIUM GROWTH SCENARIO**

	<u>Full Density</u>	<u>Current Trends</u>
Countywide population	279,208	279,208
Budd/Deschutes Watershed ¹	118,384	118,384
Watershed Portion of Urban Growth Management Area	90,435	78,616

¹ Assumes the percentage of county population residing in the watershed remains at 42 percent as in 1990.

Of particular note are the implications of continuing to develop the Urban Growth Management Area at the densities of current trends as compared to what is allowed under existing zoning (full density). The same number of total persons will reside in the watershed, but more than 11,000 persons will reside outside the UGMA. This implies that the water quality impacts of residential development in the rural area would be accentuated affecting the quality of life for all residents of the watershed, both human and otherwise. Development at full density would certainly accentuate water quality impacts in the urban area. However, it is likely that infrastructure for managing surface water runoff could more readily be supplied to mitigate those impacts.

Land Use in the Budd Inlet/Deschutes River Watershed

Land uses in the watershed are relatively diverse when compared to other watersheds in South Puget Sound. A map of land use can be found in Map 7. Map 8 illustrates the existing water and sewer service areas in the watershed. These are areas that are or soon will be serviced with infrastructure at a level to serve urban densities

In the upper watershed, land is under intensive management to produce commercial timber. Commercial and non-commercial agricultural enterprises are scattered throughout the upper two-thirds of the watershed. Rural residences are found throughout the mid-watershed and outer peninsulas. Land use at the mouth of the Deschutes River and inner Budd Inlet is urban in character.

This section will open by discussing some of the factors in land uses that affect water quality. Then, the land uses found in the watershed will be described and quantified. Table 4 lists land uses and associated acreage. Also, there will be descriptions of the general pollutant characteristics typically associated with those land uses. The section will close with a discussion of proposed zoning changes being considered by the Board of County Commissioners early in 1993, that, if approved, would influence land uses for the foreseeable future. Material on existing land uses is based on an inventory conducted in 1988-89 by the Puget Sound Cooperative River Basin Team and through field observations. In the "Present Activities and Plans" chapter of this report, results from intensive study sites are reported, providing detailed analyses of the water quality effects of certain types of land uses.



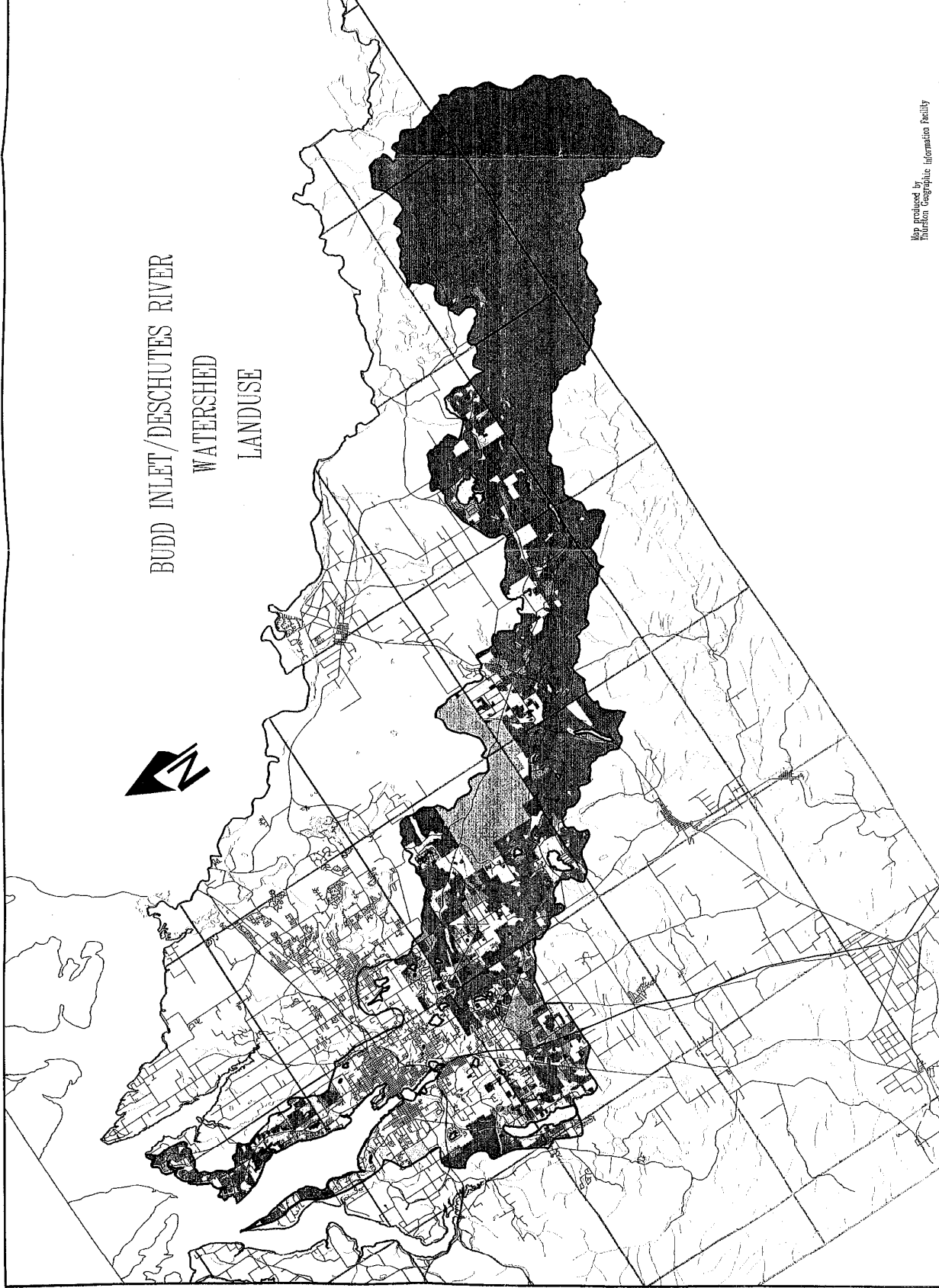
- Forestry
- Agriculture
- Rural Residential 1
- Rural Residential 2
- Urban Residential
- Commercial
- Industrial
- Mines, Gravel Pits
- Recreational Land
- School
- Utilities
- Military Land
- Fresh Water
- Other

- Roads
- River
- Townships
- Watershed



Map 7—Land use
September 1992





BUDD INLET/DESCHUTES RIVER WATERSHED LANDUSE



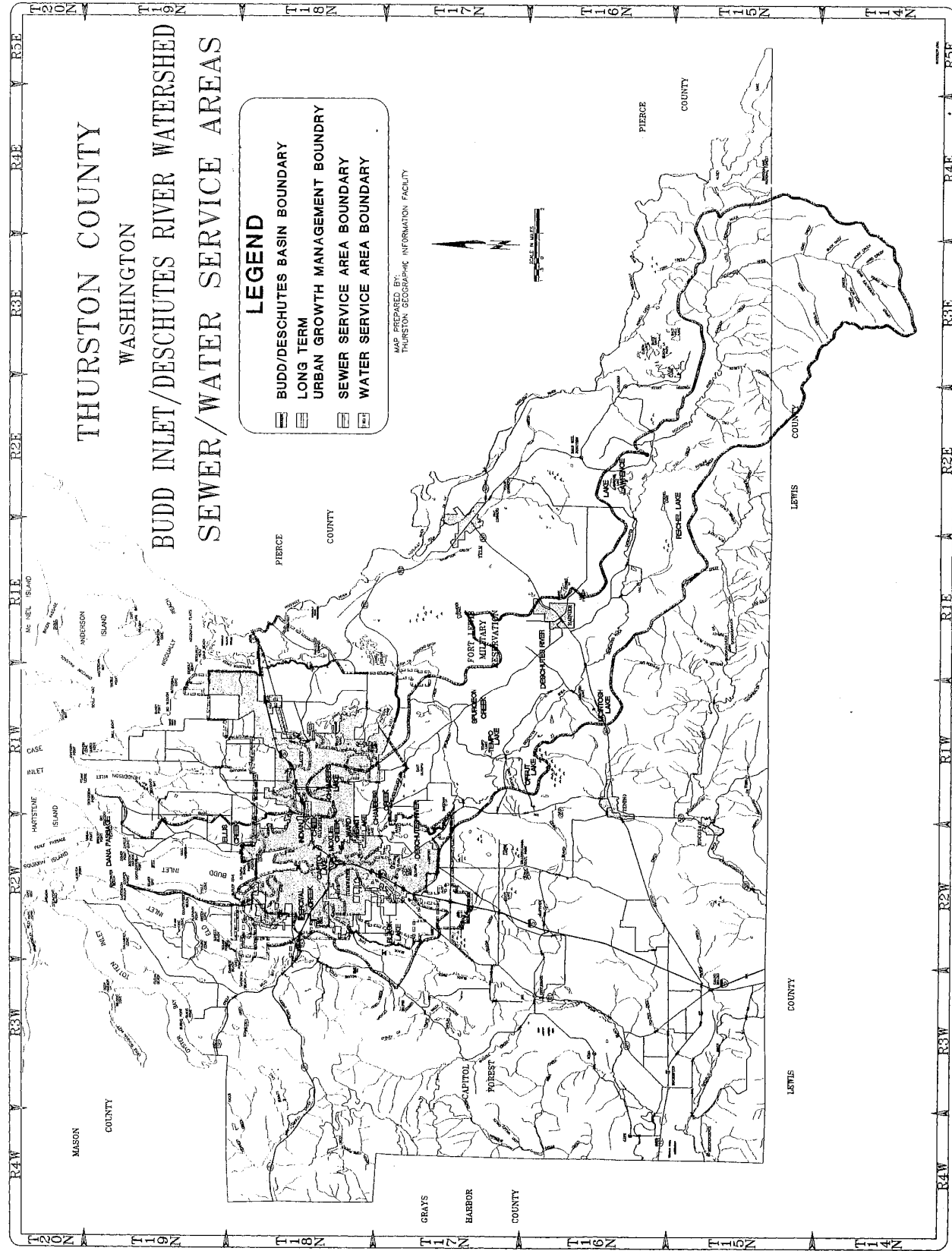
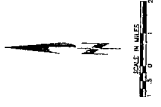
Map produced by
Thorston Geographic Information Facility

THURSTON COUNTY
 WASHINGTON
 BUDD INLET/DESCHUTES RIVER WATERSHED
 SEWER/WATER SERVICE AREAS

LEGEND

-  BUDD/DESCHUTES BASIN BOUNDARY
-  LONG TERM URBAN GROWTH MANAGEMENT BOUNDARY
-  SEWER SERVICE AREA BOUNDARY
-  WATER SERVICE AREA BOUNDARY

MAP PREPARED BY:
 THURSTON GEOGRAPHIC INFORMATION FACILITY



**TABLE 4
LAND USE IN THE BUDD INLET/DESCHUTES RIVER WATERSHED**

<u>Land Use Category</u>	<u>Acreage¹</u>	<u>Percent of Total</u>
Forest Cover ²	74,654	58.9
Primarily in Urban Growth Management Area	13,862	10.9
Rural Residential 1 (5-20 acres/unit)	7,520	5.9
Agriculture	10,348	8.2
Urban Residential ³ (up to 1.5 acres/unit)	4,463	3.5
Military	5,986	4.7
Rural Residential 2 (1.5-5 acres/unit)	3,824	3.0
Freshwater Bodies	2,048	1.6
Other ⁴	1,895	1.5
Industrial ⁵	1,280	1.0
Utilities	399	0.31
Mines, Gravel Pits	132	less than 0.1% of total land area
Recreational Land	128	less than 0.1% of total land area
Commercial	46	less than 0.1% of total land area
School	24	less than 0.1% of total land area

¹ Quantities have been rounded up to nearest whole number when necessary.

² Includes commercial forestland as well as woodlots and Christmas tree farms and wooded residential lots greater than 20 acres.

³ Urban residential density found outside of the Urban Growth Management Area.

⁴ Includes certain wetlands and cemeteries.

⁵ Includes Olympia Airport.

Factors in Land Use that Affect Water Quality

As human-initiated land uses change the landscape from its natural condition, the inputs that create water quality conditions also change. Also, when the landscape is altered from its natural condition, the mechanisms that control the quantity and intensity of water delivered to stream channels changes. These, in turn, can cause flooding and erosion of channels, creating water quality problems from excess sedimentation. Under more extreme conditions, changes in the water regime delivered to a stream can cause the stream to jump course altogether to create a new channel. Of major concern in addressing nonpoint pollution, are the cumulative effects of many seemingly small changes in the landscape (or over the water, as in boating). When considered together, the rate and intensity of these small changes usually do not coincide and often exceed the ecological and geological rates and intensities through which the landscape was formed. Here is an example. A single residence with an on-site sewage system may contribute only small amounts of bacterial pollution to a stream. However, if many single family residences within an area all have failing or inadequate on-site systems the result may be a contribution of bacterial pollution from residences that is far greater than ability of stream system to dilute. This in turn may cause disruption to the aquatic ecosystem depending on the climate conditions.

We know some of the factors of human land uses that affect the quality and quantity of water delivered to rivers and streams. A brief discussion of those factors follows. We also know that if we use best management practices when altering the land from its more natural condition, we can mitigate some of the inputs that change water quality and quantity, thereby reducing the chances of creating nonpoint water pollution. And finally, we know that over the long term, one of the least expensive ways to prevent water pollution, is to leave relatively large areas intact, to undergo change at ecologically and geologically defined rates rather than human defined rates. This is especially true for those areas that are environmentally sensitive or geologically predisposed to amplifying water quality problems.

Impervious Surfaces

Any land use which increases the amount of impervious surfaces affects water resources by changing the rate and timing of high and low flows in streams and rivers. The result is higher flows during the storm events and lower baseflows in dry periods than occurred prior to the establishment of the impervious surface. In a natural system, the soils within the drainage area of a stream are generally absorbent. Trees and other vegetation take up and transpire water, and their roots provide channels for water to infiltrate slowly into the soils to be used by the vegetation or seep into a nearby stream. This process regulates the rate at which water enters the stream. In heavy rainfall, each tributary to a larger river will have a different rate at which this absorption and seeping process will occur so that it is unlikely that all streams are at high flow at the same time. This helps to protect the main

channel from flooding. Also, pollutants are often removed as water moves through the soil returning to surface water channels or percolating into ground water.

Where impervious surfaces have replaced the natural soils, or a certain type of use has compacted the soils, the drainage area of the stream can no longer function in the same way as natural conditions once did. Rainfall that would normally soak into the ground instead drains more rapidly into the stream, conveying pollutants with it. The filtering process has been altered and the stream may now have flash flood potential. If many of the streams within the watershed of the river have taken on these characteristics, the main river channel may also be threatened with high flood waters and increased pollutant loads.

In dry season, the soil in the natural drainage system stores water that continues to seep into the stream during dry weather periods. When impervious surfaces cover those soils, there are no reserves and dry weather flows become even lower. Also, a much higher percentage of the water flowing to the stream comes from stormwater runoff and usually contains higher concentrations of pollutants.

The existence of an impervious surface directly implies the removal of vegetation, which is discussed below. Land uses which create impervious surfaces include paving for parking and road systems, roofs, sidewalks, and lawns. While not as impervious as hard surfaces such as concrete, lawns often result in compacted soils that are nearly impermeable. Mitigation measures include retention/detention facilities that retain peak flows to moderate the quantity, rate and timing of impacts created by impervious surfaces. Oil/water separators and biofiltration are other means to mitigate for some of the water quality impacts of impervious surfaces.

Vegetation Removal

Vegetation, especially trees, benefits water quality by holding soils in place and preventing erosion, reducing water runoff by increasing percolation, transpiring water, and providing shade keeping stream temperatures low. Vegetation is also a key component of habitat. When vegetation is completely removed from an area runoff from the site increases, carrying suspended soil particles, so both the volume of water to a water channel increases and the quality of water to that channel is degraded. Best management practices are necessary for the following activities to decrease the probability of increased runoff and soil erosion--row and field crops, livestock overgrazing, roads and buildings construction, timber harvest, surface mining and off-road vehicular recreation.

Pollutants

A pollutant is a contaminant that adversely alters the physical, chemical or biological

properties of the environment. For some chemical pollutants such as heavy metals, only small quantities are necessary to damage aquatic life or be harmful to humans. Sediment in excess is a physical pollutant. It can suffocate the eggs of fish and insects, damage the gills of fish and inhibit the growth of normal aquatic vegetation. Nutrients, normally considered beneficial to aquatic life, in excessive amounts can create the conditions for algal blooms requiring excessive demands for oxygen, thereby reducing the amount available for fish and other forms of aquatic life. Fertilizers are a source of nutrients.

Types of Land Uses in the Watershed

Forest Cover

Forest cover includes commercial forest lands, smaller woodlots and Christmas trees and lots over 20 acres in size that are wooded. In this land use are 74,654 acres or 58.9 percent of the total acreage in the watershed. The Cooperative River Basin Team concluded that 57,984 acres of forest cover were in industrial forestry use. By far the greatest concentration of forest cover is the upper third of the watershed southeast of Vail. However, significant forest cover acreage is found throughout the watershed.

Depending on the practices used in timber harvest, small and/or large areas can have the vegetative cover removed, thus exposing the soil to rainfall. Additionally, the road network to access timber harvest sites, while often dirt, is usually compacted and can be an impervious surface. Herbicides are used in commercial forestry to control plant growth that is competitive with establishing new timber stands after harvest. How well the road network is maintained and the objectives of the timber management system, as well as the predisposition of certain geologic formations to mass wasting under certain rainfall and snowmelt conditions are a few of several factors that shape the severity of water quality problems from timber harvest practices.

In addition to the potential effects that timber harvest has on sedimentation (discussed earlier), the log sort yard near Reichel Lake southeast of Vail contributes suspended sediment to nearby surface water. During storm events this has been in excess of water quality standards. The "Present Activities and Plans" chapter of this report presents results from intensive site sampling. Installation of on-site stormwater management systems could greatly improve water quality coming from the sort yard.

Residential

Residential land use in the watershed was divided into three subcategories. The largest subcategory was rural residential of 5-20 acres/unit. This occurred over 7,520 acres or 5.9 percent of the watershed. The highest concentration of this land use type is in the

middle third of the watershed. Following in land area is residential development of urban density (1.5 acres or less) outside of the Urban Growth Management Area. A total of 4,463 acres are in this land type or 3.5 percent of the watershed. Of the residential subcategories, last is rural residential of 1.5-5 acres per unit. This occupied 3,824 acres which is 3.0 percent of the watershed.

Residential uses have impervious surfaces as well as the potential for nonpoint pollution from pet wastes, on-site sewage system failure, and inappropriate use of fertilizers and pesticides. Generally, lower density residential uses have lower amounts of impervious surfaces than high density but have a greater potential for pollution from pet wastes, on-site system failure, pesticides and fertilizers. Residential use also generates household hazardous waste from materials like cleaning agents or used motor oil. If not disposed of properly, these too are probable nonpoint source pollutants.

The Cooperative River Basin Team conducted a survey of a sample of residents on rural and agricultural parcels to determine practices that may contribute to nonpoint source pollution. The findings from the survey can be found in the River Basin Team's report on the watershed, Deschutes River/Budd Inlet Watersheds, Thurston County Washington. Briefly, it was found that most on-site sewage systems have not undergone regular maintenance and pump-out as recommended by the Thurston County Health Department. As for the use of household pesticides and fertilizers, it was found that only a small number of persons use these products and only for a very limited time during the year.

Agriculture

There are approximately 10,348 acres (8.2 percent of the land area) in agricultural use in the watershed. Most of this land is used in dairy and beef cattle production. Herd sizes range from 30 to 200 head of cattle. Both commercial and non-commercial operations are included in this category.

Physical and bacterial pollutants are associated with agricultural operations. Degraded pasture conditions can act similarly to impervious surfaces by delivering higher levels of runoff and also accentuate bacterial pollution through the transport of manure to receiving waters. Manure is particularly problematic because, in addition to being a source of pathogens, it rapidly uses up available dissolved oxygen in surface water making it unavailable for aquatic organisms. Additionally, when livestock is allowed unrestricted access to stream and river channels, significant bank erosion often results. Finally, overstocking livestock in seasonal wetlands or riparian areas can compact the soil, limiting the ability of those areas to serve as "sponges" for high flows. A combination of implementing a package of best management practices for a particular farm and using the appropriate animal stocking density can mitigate potential pollution sources from a particular

farm. Some of the best management practices include developing and maintaining manure storage, only applying manure to pasture during the time of high plant uptake, rotation and rest of pastures, limiting access to streams and wetlands and providing alternative watering sites.

Non-commercial Agricultural Operations

Conditions that influence water pollution vary with farm size. Generally, the very small farms, 1.5 acres or less, had livestock densities exceeding the recommended 1 animal unit/acre as reported by the River Basin Team. Pastures were overgrazed and in poor condition. Manure was concentrated into confined areas with little or no best management practices to contain the waste. This category of farm occupied 53 acres in the watershed. Farms greater than 1.5 acres had livestock densities at or below 1 animal unit/acre. However access to riparian areas and to streams significantly increased. Of the farms in the size class 5-20 acres, 27 of those operations allowed direct access to streams. And in the size class 20 acres and above, 22 operations allowed access to streams by livestock. Data on the number of lineal feet of streambank affected were not available.

Commercial Agricultural Operations

The possibility of bacterial pollution from manure is greatly magnified with larger commercial operations. At the time of the River Basin Team inventory there were 4 commercial dairy and 15 commercial beef operations in the watershed. Average herd size of dairy cattle in the watershed was 200 head, while for beef cattle it was 75. One operation was a combined dairy/poultry farm. Inadequate limitations on access to waterways and inadequate facilities for long-term manure storage were identified as contributing factors to water quality degradation. Farm plans tailored to the individual operations, when implemented, will significantly reduce the probability of water quality threats. The Thurston Conservation District has recently contacted most of the operators in the watershed to inform them of farm planning services. Under the watershed planning Centennial Clean Water Fund grant, the District will be able to work with 4 or 5 operations to draft and finalize farm plans and begin implementation.

Military

Fort Lewis army base is the second largest landowner the watershed (Weyerhaeuser Co. is the largest), occupying 5,986 acres or 4.7 percent of the land area. The fort extends to the east for a total size of 84,000 acres. About seventy percent of the fort in the watershed is forested and is managed for timber harvest in addition to use for military maneuvers. Little is known about nonpoint pollution from land uses at the fort. However, the terrain is very flat, less than 5 percent slope, minimizing the physical conditions for

sedimentation that can be associated with forest harvest practices.

Industrial

Land classified as industrial occupies 1,280 acres which is about 1 percent of the watershed. The Olympia Airport is grouped into this classification. Due to the flat terrain and sandy soils the delivery of pollutants to surface waterbodies is negligible.

Utilities

About 400 acres in the watershed are utility right-of-ways and transfer stations. Often, to allow unimpeded access to facilities for maintenance and emergency repair, utilities use herbicides to control vegetation in the right-of-ways. At this time, no data exists that suggests that herbicide by-products from these activities are reaching waterways. Leakages and accidental spills of insulating chemicals are also a possible source of pollution. There are no known incidents of such in the watershed.

Mines & Gravel Pits

In the watershed 133 acres are devoted to sand and gravel mining. This is less than 0.1 percent of the total land area. There are five operations permitted by the Washington State Department of Natural Resources.

When nonpoint pollution associated with sand and gravel mining occurs, it results from the combination of the removal of vegetation and the disruption of natural surface water drainage patterns creating the conditions for excess sedimentation. Also chemical spills from machinery can occur. While it is likely that the pollution impacts from this level of mining activity will not be widespread throughout the watershed, site specific conditions may be of concern. No surface water quality problems associated with sand and gravel mining in this watershed are known at this time.

Proposed Changes in Zoning for Unincorporated Thurston County

During the winter of 1993, the Thurston County Board of Commissioners will consider a package of amendments to the 1988 Comprehensive Plan and the Thurston County Zoning Code. The package was developed in response to two actions that occurred in 1990. One action was adoption by the Board of a two-phase program to bring the county's rural residential zoning into consistency with the Comprehensive Plan. The other was the enactment of the Growth Management Act which required certain jurisdictions to consider designating natural resource lands that met criteria as long-term commercially significant. These include agricultural, mineral and forest lands. The intent of such a

designation is that the natural resource use would be preferred over other uses in the designated areas and that regulations should foster the ongoing use of those lands for producing natural resource products.

Rural Residential Zoning

In summer, 1990 the Board of County Commissioners temporarily rezoned much of the unincorporated area outside of the Urban Growth Management Area to one unit per five acres. The Board directed the Thurston County Planning Department to conduct a detailed review of the rural area to determine what properties met the Comprehensive Plan's criteria for densities higher than one residence per five acres. Also studied were incentives to encourage the clustering of parcels within developments in the rural residential zone. The Thurston County Planning Commission then deliberated on staff research.

After staff research and Planning Commission consideration, the proposal before the Board of County Commissioners is to continue the density of one unit per five acres in the rezoned area. The Planning Commission was not able to identify areas that met the criteria in the Comprehensive Plan for higher densities. An underlying assumption is that existing lots 5 acres or smaller can be developed once environmental health regulations for drinking water and on-site sewage disposal are met. While considering this proposal, the Board will also discuss other options, including higher densities next to certain existing parcels.

Part of the proposal before the Board includes establishing incentives for clustering residential structures when a property is developed. The basic incentive is an increase in residential unit density of up to 35 percent at the site. The number of bonus density units varies with decreases in size of the area subject to development.

Agricultural Lands of Long-term Commercial Significance

The proposal before the Board of County Commissioners to designate agricultural lands of long-term commercial significance includes criteria for determining what lands may be considered commercially significant over the long term. When the criteria are applied to existing conditions, 14,000 acres are technically eligible for designation in Thurston County. These areas would be zoned "Long-Term Agricultural District." The primary uses in the district would be for agriculture and related activities as well as a certain amount of residential presence, both related and not related to agriculture. Residential density in this district would be one unit per 20 acres, with no bonus densities allowed for clustering development. The proposal also recommends that the county undertake transfer and purchase of development rights programs in the district. The densities proposed for these programs would be one unit per five acres. The proposal also includes a Right-To-Farm ordinance, notification procedures for neighboring properties and recommendations for a "community

support" program.

Forest Lands of Long-term Commercial Significance

As with agriculture, criteria for forest lands of long-term commercial significance were developed and then applied to lands in the county. Approximately 140,000 acres meet the criteria and are therefore proposed for long-term commercial designation. If the Board approves, a "Long-Term Forestry District" would be established. Primary uses include forest management and harvest activities, certain mining activities, agriculture and nurseries and limited residential construction. The proposed residential density is one unit per 80 acres with some exceptions in the district. A Right-To-Practice Forestry ordinance is proposed along with notification to neighboring property owners of the long-term commercial significance of the lands in the district.

Mineral Lands of Long-term Commercial Significance

This proposal recommends designating 5,000 acres in the county as commercially significant (these are existing operations) and states procedures for possible future designation as well as removal of the designation. Designation allows limited protection from nuisance claims of adjacent property owners. The proposal also requires that adjacent property owners receive notice of mining activities.

Implications of Zoning Changes for the Budd/Deschutes Watershed

In the Budd/Deschutes watershed are lands affected by all four parts of the proposed zoning changes package. Map 9 is a map of zoning in the watershed. The map shows the proposed zoning outside of the Urban Growth Management Area. Inside the Urban Growth Management Area is existing zoning available in the Thurston Geographic Information Facility computer database.

The bulk of the watershed outside the Urban Growth Management Area is proposed for rural residential zoning of one unit per five acres. There are three gravel and sand operations that are proposed for designation in the watershed. Forest lands in the upper third of the watershed, from State Route 507 on south, are submitted for long-term commercial designation. Possible locations for the "Long-Term Agriculture District" are:

- Smith Prairie Rd.;
- south side of Lake Lawrence;
- Mulqueen Rd. to the intersection with Vail Loop Rd.;
- southwest side of Waldrick Rd. at the intersection with Military Rd.;
- near the intersection of State Route 99 and Waldrick Rd. north and west of Offut Lake.

When considering possible patterns of future development, it is important to note that proposed density would not apply to existing undeveloped parcels. These parcels are "grandfathered" by any amendment to the zoning ordinance. It is possible such parcels could be developed at higher densities than the proposed zoning, if regulations for on-site sewage systems and drinking water wells were met.

The Governmental Entities in the Watershed--Who are They and What Do They Do?

Many governmental entities undertake numerous programs that occur in, as well as beyond the watershed. Some of these programs have an affect on water quality, while many other do not. The following section describes in general terms the water quality-related role of a particular entity. Map 10 illustrates the boundaries of several of the governmental entities in the watershed.

The Incorporated Areas and Unincorporated County

In the watershed are three cities, Olympia, Lacey and Tumwater and one town, Rainier. The remainder of the watershed is within unincorporated Thurston County. These are known as "general purpose" local governments. This type of government entity undertakes the day-to-day functions to protect the general health, safety and welfare of the local population. Some of these functions are specifically mandated by the state legislature.

A number of the functions these jurisdictions undertake affect nonpoint source water pollution, either by controlling or preventing pollution or serving as part of a source of pollution. In general terms, these functions include:

- Regulation of land development (Olympia, Lacey, Tumwater, Rainier, Thurston County)
- Regulation and provision of sanitary sewage disposal services (for on-site sewage systems and certain small treatment plants-Thurston County; for large secondary sewage treatment plant-Lacey, Olympia, Tumwater, Thurston County Agreement, known as LOTT)
- Control and treatment of stormwater runoff (Olympia, Lacey, Tumwater, Thurston County stormwater management programs)
- Vegetation management along public rights-of-way (Thurston County, Olympia)
- Disposal of solid waste including hazardous materials (Thurston County, Lacey, Olympia)

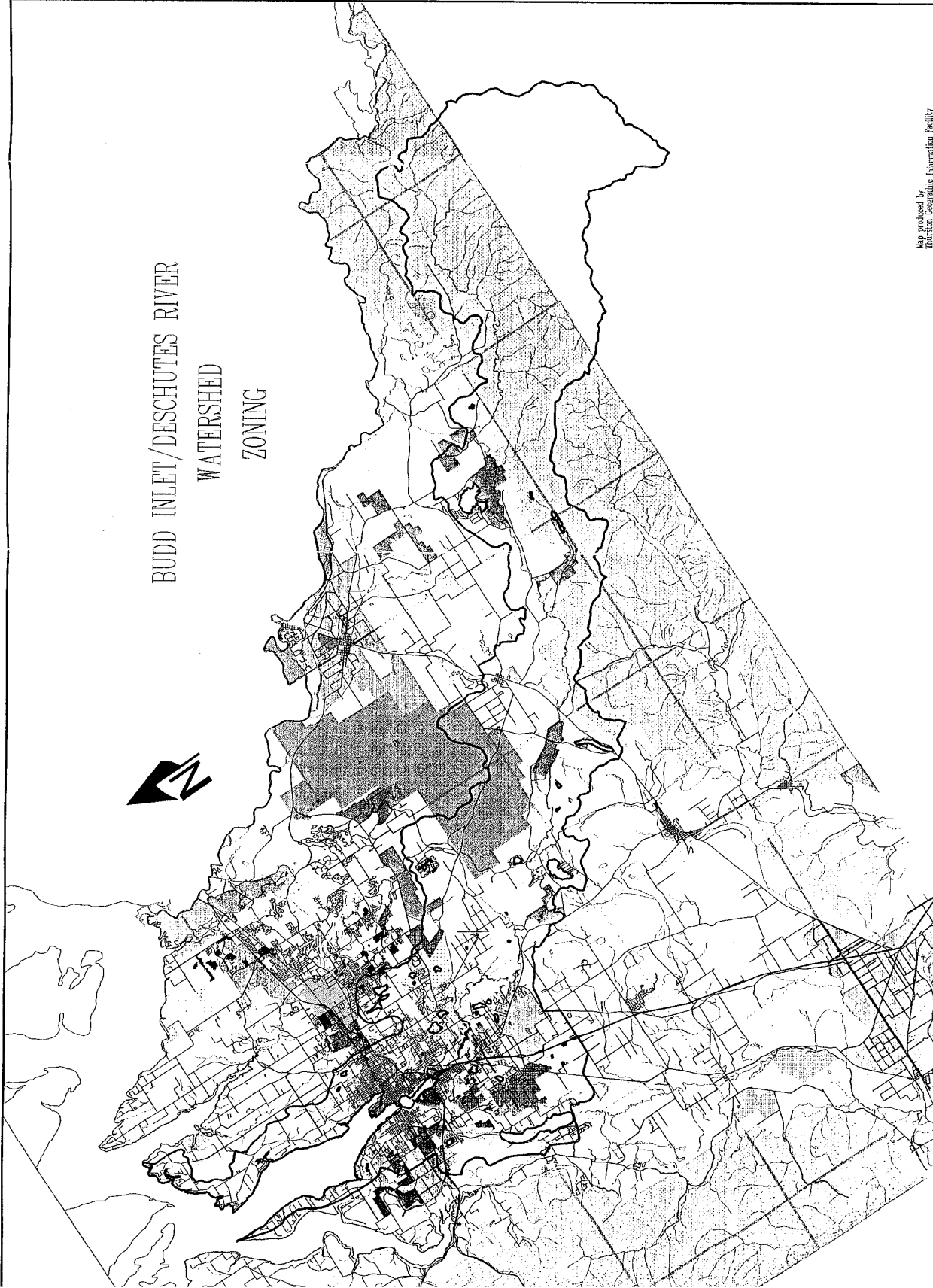


- Rural Res 1/5
- Rural Res 2/1
- Rural Res 1/1
- Residential 1
- Rural Res 1/2
- Rural Res 4/1
- Med Density Res 1-6/1
- Med Density Res 2-8/1
- Med Density Res 4-8/1
- Suburban Res 4/1
- High Density Res 4-16/1
- Density 2
- Density 4
- Density 12
- Density 18
- Neighborhood Commercial
- Arterial Commercial
- Highway Commercial
- Light Industrial
- Planned Industrial
- Agriculture
- Forestry
- Public Preserve
- Urban Zoning
- Military Reservation
- McAllister Geo Seas Area
- Beach
- River
- Township
- Watershed

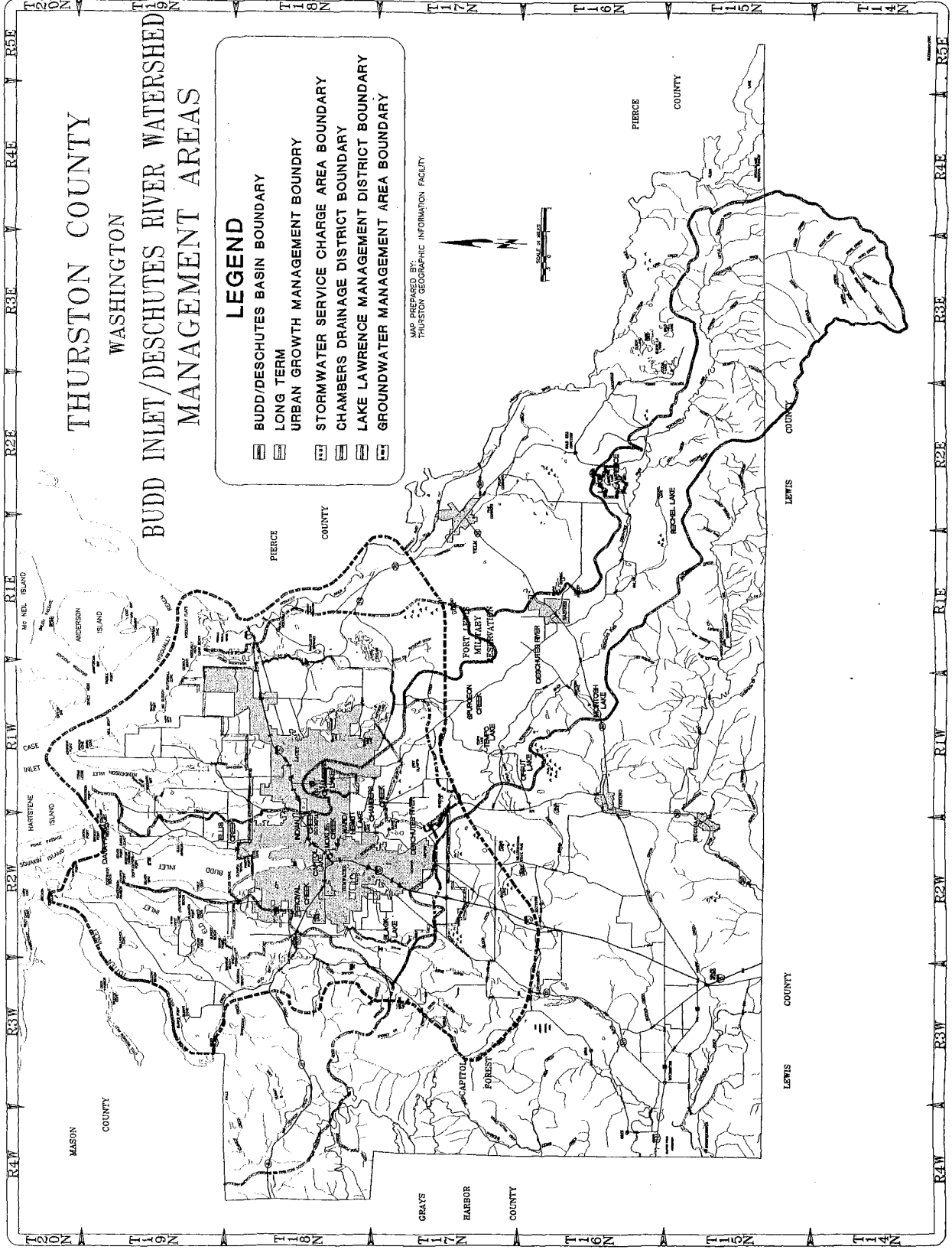


Map 9-Zoning
September 1992

BUDD INLET/DESCHUTES RIVER WATERSHED ZONING



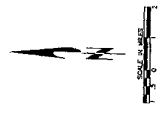
Map produced by
Thurston Geographic Information Facility



THURSTON COUNTY
 WASHINGTON
BUDD INLET/DESCHUTES RIVER WATERSHED
MANAGEMENT AREAS

- LEGEND**
- BUDD/DESCHUTES BASIN BOUNDARY
 - LONG TERM URBAN GROWTH MANAGEMENT BOUNDARY
 - STORMWATER SERVICE CHARGE AREA BOUNDARY
 - CHAMBERS DRAINAGE DISTRICT BOUNDARY
 - LAKE LAWRENCE MANAGEMENT DISTRICT BOUNDARY
 - GROUNDWATER MANAGEMENT AREA BOUNDARY

MAP PREPARED BY:
 THURSTON GEOGRAPHIC INFORMATION FACILITY



- Regulation to protect environmentally sensitive areas (Olympia, Lacey, Tumwater, Rainier, Thurston County)
- Development and maintenance of infrastructure-particularly roads (Olympia, Lacey, Tumwater, Rainier, Thurston County)
- Public outreach and education

In the "Present Activities and Plans" chapter of this report are a number of specific plans and activities that are being undertaken by the jurisdictions to maintain and improve water quality.

The Squaxin Island Tribe

In 1989 the state of Washington and certain Indian tribes signed the Centennial Accord, formalizing government-to-government relations between the state and those tribes. The Squaxin Island Tribe was among those tribes. Through the Tribe's historical claim to Budd Inlet as usual and accustomed fishing grounds, it is active in policy and on-the-ground efforts that affect natural resources, especially salmon, in the watershed. The Tribe participated with the County in the water quality assessment reported in Part II of this document, specifically by gathering baseline data on fish habitat in the upper watershed. The next step in continuing the study of upper watershed fish habitat will begin to discern cause and effect relationships of changes in salmonid habitat where the habitat is degraded. A new research program for the Tribe in 1993 will be to investigate river channel erosion in the reach of the river between Vail and the river mouth.

In addition to research efforts, the Tribe takes part in administrative actions, such as providing comment on Forest Practice Applications, and the permit upgrade for the LOTT sewage treatment plant.

Thurston Conservation District

The Thurston Conservation District is a form of local government known as a "special district." The purpose of a special district is to supply very specific services to a targeted public.

The Conservation District provides technical assistance to landowners for the on-site management of natural resources. The intent is to maintain the long-term productivity of the soil and vegetation for both economic (such as farming) and non-economic (such as water quality) purposes. While Conservation District staff are trained to provide technical assistance for a number of natural resource management activities, a major portion of their effort in the watershed is directed towards conservation plans for farm operations, especially livestock management. The Conservation District is also undertaking pilot projects to control

bank erosion along the Deschutes River using bioengineering methods as opposed to standard civil engineering methods.

Port of Olympia

The Port of Olympia is another special district. Its purpose is to provide economic development opportunities for the area in its jurisdiction. In Thurston County, the Port provides marine facilities for shipping, primarily for log export, and vessel repair. Additionally, the Port owns and manages air transport facilities for small aircraft located at the Olympia airport. Proper management of both air and marine facilities can contribute to an overall increase in the watershed's water quality.

Lacey, Olympia, Tumwater, Thurston County Agreement

This agreement among the four jurisdictions describes the joint and separate responsibilities for the management of the sanitary sewage treatment system that services the Urban Growth Management Area. The sewage treatment plant is located at the Port peninsula in Olympia.

Chambers Drainage District

Providing facilities to drain off areas of standing water or high water table is the purpose of a drainage district which is another special district. In doing so, land that may otherwise be unsuitable for development or agriculture is made more suitable.

The area in the Chambers Drainage District includes the upper and lower Chambers Lakes and extends approximately half-way along Chambers Creek to the Deschutes River. The district is responsible for the maintenance of Chambers Ditch which drains from Chambers Lake to the Deschutes River. The Thurston County Stormwater Utility is presently preparing a drainage basin plan for stormwater management for the Chambers/Ward/Hewitt Lakes basin. The utility found that the Chambers Ditch provides both some flood control for adjoining properties and reduces silt and water pollution of the waters entering the Deschutes from the ditch. The filtration that the ditch provides is important for nearby salmon spawning areas in the Deschutes River.

Lake Lawrence - Lake Management District

The Lake Lawrence - Lake Management District (LMD) is a special purpose district formed by a vote of the property owners within the district boundaries and managed by Thurston County Public Works. The existing LMD was formed in 1992 and is effective through 1994. The purpose of the LMD is to provide funding for several recommendations

in the lake restoration plan completed in December 1991. Extremely eutrophic conditions in the lake are threatening the value of the lake for both human activities such as recreation and wildlife habitat. Activities being done through the current LMD include watershed management controls to reduce external nutrient loading, aquatic weed harvesting, and final design and environmental review for a lake sediment dredging project.

Washington State Department of General Administration

This agency of the state of Washington has several responsibilities, of which a major one is property management for state facilities. One of the state facilities managed by the Department of General Administration is Capitol Lake. The Department is responsible for the implementation of the Capitol Lake Restoration Plan which is summarized in the "Present Activities and Plans" chapter of this report. The Department of General Administration will oversee dredging operations and eroding bank repair in all three of the lake's basins. Also, the Department of General Administration will be responsible for oversight of the construction of Heritage Park on the lower basin's east shore. The proposed park design will be considered during the 1993 legislative session.

Washington State Department of Natural Resources

The Department of Natural Resources has three responsibilities that bear on water quality; 1) to manage state trust lands, both aquatic and forest lands, 2) to regulate forest practices on private lands and, 3) to provide geological information about the state and regulate mining operations. The responsibility of regulating private forest lands is the most significant in the Deschutes watershed because of the extensive commercial forest lands in the upper watershed. It should be noted however, that the state leases aquatic land to the Port of Olympia for part of their marine shipping facilities.

In regulating forest practices, the Department of Natural Resources has new responsibilities as analyses of cumulative environmental effects from forest practices on a watershed basis are now required. A summary of the analysis procedure can be found in the "Present Activities and Plans" chapter in this report.

**PRESENT ACTIVITIES & PLANS IN
THE WATERSHED**

Increasing attention to water quality and related environmental concerns during recent years has led to the formulation of several plans that deal with certain sources of water pollution or certain parts of the watershed. Several plans have been adopted or are in the final stages of revision. They provide a jumping off place for creating the Budd/Deschutes Watershed Action Plan. In fact, some of these plans are now being implemented. Examples of plans that are being implemented are the Northern Thurston County Ground Water Management Plan, the Moderate Risk Waste Plan For Thurston County, the Budd Inlet Urban Bay Action Plan and stormwater basin plans. Additionally, recent state laws and regulations will have consequences for future water quality programs. This section reviews these plans, implementing activities and laws.

Northern Thurston County Ground Water Management Plan

Who developed the plan--This plan was developed by a Ground Water Advisory Committee (GWAC) consisting of citizens, affected interests, and government agency staff and elected officials. The planning process began in 1987.

Who adopted the plan--The elected bodies of Thurston County, Olympia, Lacey and Tumwater must review and concur with the plan. By state law, the plan also must be certified by the Washington State Department of Ecology before it becomes effective.

Summary of the plan--The boundary of the ground water management area encompasses the lower portion of the Deschutes River watershed and all of Budd Inlet. Its objective is to provide long-term ground water management that will protect the quality and manage the quantity of ground water for all uses in the present and future. To accomplish this, the plan relies on a mix on programs including education, technical assistance, research, formal agreements, and regulation. The plan covers the ground water implications of wellhead areas, aquifer sensitive areas, water availability, waste water, hazardous materials, pesticides and fertilizers, stormwater, well construction and abandonment, solid waste, and aquaculture.

Status--The County and Cities reviewed and concurred with the Groundwater Management Plan in Spring, 1992. The Department of Ecology certified the plan in July, 1992.

Several implementation actions are already occurring. Many of the necessary policy decisions during plan implementation will be made by the Wellhead Protection and Financial Policy Committee, consisting of an elected official from each participating jurisdiction. Plan implementation will be overseen by a citizen-based Implementation/Oversight Committee. These committees will be formed during the second half of 1992. During the first two years of plan implementation, part of the funding will come from a Centennial Clean Water Fund

grant from the Department of Ecology. For long-term funding, the Ground Water Management Plan proposes that an Aquifer Protection Area (APA) be established for northern Thurston County. The APA would require approval by every incorporated city within its boundaries and by a majority of the citizens within the area.

Linkage between the Budd/Deschutes Watershed Action Plan and the Northern Thurston County Groundwater Management Plan--Many of the measures adopted in the ground water plan will significantly contribute to surface water protection. Two examples of these are an educational program for business owners for managing hazardous materials to avoid spills and upgrading the maintenance of stormwater facilities. As recommendations are formulated for the Budd/Deschutes Watershed Plan, cross-referencing with this and other plans can reduce duplication between the plans.

Moderate Risk Waste Plan For Thurston County

Who developed the plan--The local hazardous waste plan was written by a citizens' committee and Thurston County Health Department staff.

Who adopted the plan--The Thurston County Board of Commissioners adopts the plan.

Summary of the plan--The plan proposes a county-wide moderate risk waste program. The purpose of the moderate risk waste program is to offer education and collection programs for safe handling of household hazardous waste, and to offer technical assistance, education, collection, and compliance programs for businesses that produce small amounts of hazardous waste. Primary activities include waste reduction education, household hazardous waste collection events, free waste reduction audits for businesses, teacher activity guides, workshops, business recognition programs, and development of a local ordinance to require proper disposal of all moderate risk waste and provide management standards for commercial small quantity waste generators.

The Thurston County Board of Health is the designated lead implementing agency. The Thurston County Solid Waste Advisory Committee, made up of public, private, and citizen representatives, reviews the moderate risk waste program's annual work plan and budget. Funding sources for the program include solid waste tipping fees and state grants. In addition, a permit and fee system for small businesses that generate hazardous waste will be under consideration to provide long-term funding.

Status--A five-year plan to reduce and control improper disposal of small amounts of hazardous waste throughout Thurston County was adopted in early 1991.

Linkage between the Budd/Deschutes Watershed Action Plan and the Moderate Risk Waste Plan--Hazardous wastes generated in households and small businesses can be found throughout the county. Examples are used auto oil and antifreeze, paint, solvents, pesticides and garden fertilizers, and cleaning products used in the kitchen and bathroom. If disposed of improperly, such as dumping on the ground, these wastes can be transported by runoff and enter surface waters. As with the Northern Thurston County Ground Water Management Plan, the Moderate Risk Waste Plan contains many measures that will directly contribute to decreasing nonpoint pollution.

An Introduction to Stormwater Basin Planning

Thurston County, along with the Cities of Olympia, Lacey and Tumwater, have been actively engaged in preparing basin plans to direct the management of urban stormwater runoff. Political boundaries are generally not congruent with the boundaries of most basins, so a series of interlocal agreements establish cooperative relationships and identify which jurisdictions shall take lead responsibility for stormwater planning in which basin. Within the Deschutes River and Budd Inlet watershed there are three drainage basins that have or are in the process of basin planning. They are Percival Creek, Indian and Moxlie Creeks, and Chambers/Ward/Hewitt Lakes basins.

Percival Creek Comprehensive Drainage Basin Plan

Who developed the plan--For Percival Creek, the City of Olympia is the lead jurisdiction. The Water Resources Program staff for the city prepared the initial draft. Both Thurston County and the City of Tumwater are also participating.

Who adopted the plan--The plan was adopted by all three participating jurisdictions. It is now forwarded to the Department of Ecology for final approval.

Summary of the plan--The Percival Creek basin includes much of southwest Olympia and most of west Tumwater as well as a small portion of unincorporated Thurston County. After characterizing the basin, the plan analyzes three categories of problems--flooding, fisheries habitat and water quality. While it is necessary to categorize the problems to write the plan, the physical reality is that the factors that create the problems are interconnected. To address these problem areas a multi-faceted approach is being proposed including:

- New capital facilities and upgrades for stormwater management at several locations in the basin, including the Mottman Road area, north of Grass Lake, Cooper Point Road and Black Lake Boulevard
- Habitat enhancement programs and on-the-ground improvements

- Land development controls to reduce the volume and improve the quality of stormwater runoff in developed areas, especially by clustering development in the southern portion of the basin
- Expansion of the sanitary sewer system in the basin
- Long-term monitoring program to assess conditions and trends in water quality, sediment volume, in-stream and riparian habitat

Status--The Percival Creek Comprehensive Drainage Basin Plan was adopted by Olympia, Tumwater and Thurston County in 1992. The Olympia City Council approved a stormwater utility rate increase to fund plan implementation.

Indian/Moxlie Creeks Comprehensive Drainage Basin Plan

Who developed the plan--For Indian/Moxlie Creeks, the City of Olympia is the lead jurisdiction. Thurston County is also participating in the development of this plan.

Who adopted the plan--For the plan to take full effect both the Olympia City Council and the Board of County Commissioners must adopt the plan. The plan will be forwarded to the Washington Department of Ecology for final approval.

Summary of the plan--The Indian/Moxlie Creek basin is located on the east side of Olympia. It encompasses a large portion of the highly urbanized downtown Olympia core, numerous residential areas, and a small portion of unincorporated Thurston County, that is mostly undeveloped. The basin lies within the Urban Growth Management Area. Land use policies within this area are designed to encourage high density housing and commercial development. Similar to the Percival Creek plan, the plan characterizes the basin and then analyzes problems categorized into flooding, habitat degradation and water quality. The multi-faceted approach proposed for this basin, which is significantly more urbanized than Percival Creek includes:

- Capital facilities to address flooding problems at Log Cabin and Cain Roads, as well as re-routing Indian Creek in the Plum St./Union Av. area
- Separating stormwater discharges from the sanitary sewer system
- Upgrading stormwater catchbasins in downtown Olympia
- Habitat enhancement by removing unnecessary piping and land acquisition
- Maintain zoning north of Bigelow Lake at one unit/five acres to decrease probability of downstream flooding
- Several pollution control measures including sanitary surveys, expansion of the sanitary sewer system and intensive sampling of the pipe system conveying Moxlie Creek under downtown Olympia to determine source points of bacterial contamination

Status--The Indian/Moxlie Comprehensive Drainage Basin Plan was adopted by Olympia and Thurston County in 1992. The Olympia City Council approved a stormwater utility rate increase to fund plan implementation.

Chambers/Ward/Hewitt Lakes Comprehensive Drainage Basin Plan

Who develops the plan--For this basin, Thurston County is the lead jurisdiction. The cities of Lacey and Olympia are also participating. The north Thurston County stormwater utility is the project staff.

Who adopts the plan--As with the other basin plans, the elected bodies of the jurisdictions must adopt the plan with final approval from the Department of Ecology.

Summary of the plan--This basin encompasses southeast Olympia and southwest Lacey as well as an arm of unincorporated county. All of the basin is within the Urban Growth Management Area. It is one of the fastest growing areas both in the City of Olympia and in the unincorporated county. Most of the development is single family residential in character. The plan will address many of the same topics as the Percival and Indian/Moxlie plans.

Status--Modeling to estimate stormwater runoff is being undertaken during 1993. Public education activities including water quality sampling are also happening. A draft of the plan is expected in 1994.

Drainage Design & Erosion Control Manual for Thurston Region, Washington

Who developed the manual--The north Thurston County stormwater utility was the lead staff. All jurisdictions in the north county area participated.

Who adopted the manual--Thurston County and the three north county cities adopted the manual by ordinance in 1991.

Summary of the manual--The manual contains the detailed technical specifications for stormwater drainage as well as erosion control at construction sites. It applies to land that is being developed or significantly re-developed. In addition to facilities, the manual specifies the rate at which treated stormwater runoff can be discharged to stream channels.

Status--The jurisdictions are now requiring that developers use the manual when designing and submitting development plans. It should be noted that the Department of Ecology prepared a model drainage manual after the local manual was adopted. The Department of

Ecology manual suggests significantly more stringent controls on discharge to streams.

Linkage between the Budd/Deschutes Watershed Action Plan and the Drainage Design & Erosion Control Manual for Thurston Region, Washington--Along with capital facilities called for in the comprehensive drainage basin plans, this is the "hardware" for protecting water quality in areas with significant stormwater runoff problems. The requirements in the manual are the on-the-ground measures to cleanse stormwater runoff and to moderate the peak volumes of runoff during storms.

Regional Stormwater Management Program

Some actions to manage stormwater will be more effective if they are conducted on a regional basis. These are certain actions that do not require capital facilities, but instead are programs. Each basin plan incorporates the Regional Program.

Who develops the program--The four jurisdictions have cooperatively formulated the proposed regional management program.

Who adopts the program--The elected bodies of Olympia, Lacey, Tumwater and Thurston County adopt the program as part of each basin plan.

Summary of the program--Like the individual stormwater basin plans, the regional management program uses a multi-faceted approach to address the interconnected problems associated with stormwater runoff in urban and urbanizing areas. The recommendations are again grouped into categories. For the sake of brevity only some of the recommendations are summarized here.

Stormwater Facilities

- Maintain public and private stormwater management facilities on scheduled basis.
- Identify facilities that can be upgraded and improve them as an alternative to building new facilities.

Habitat Enhancement

- Provide technical and financial assistance to private parties pursuing the establishment of conservation easements for environmentally sensitive areas.

Land Development Controls

- Amend the Drainage Design and Erosion Control Manual for the Thurston Region to require double the current

stormwater storage rate and to decrease by half the release rate of stormwater in new development.

- Require all new home and remodel construction to install stormwater management systems such as french drains or swales.
- Establish uniform standards for land clearing and grading within the Urban Growth Management Area.

Pollution Source Control Programs

- Support the adoption of the nonpoint source pollution control ordinance.

System Monitoring

- Establish a long-term regional water quality, stream gaging, and stream assessment program for key streams throughout the north Thurston region.

Public Involvement and Education

- Establish a regional community grants program to support volunteer action projects, school projects, and community education.

Public Information and Outreach

- Restructure stormwater utility rates to offer rate reductions to schools that incorporate water resources curriculum and meet established criteria.
- Create a citizen stream patrol program.

Regional Program Management

- Establish a five-year implementation strategy aimed at regionalization of stormwater management within the Urban Growth Management Area.

The regional management program proposes two different administrative strategies for implementing the program. As part of the decision process to adopt or not adopt the regional program, the jurisdictions will need to decide which administrative strategy to pursue. One alternative is to coordinate and implement the program using one lead agency throughout the north Thurston Region. The other alternative is to agree regionwide on the program elements (the recommendations described above), but continue the existing institutional structure (that is, coordination through interlocal agreements) to implement those program elements.

Status--The jurisdictions have adopted the regional stormwater management program in concept. A portion of the utility rate increase in Olympia will fund regional program activities. The Thurston County Storm & Surface Water Advisory Board will discuss proposals to fund the unincorporated county's portion of the regional program in 1993 and will forward a recommendation to the Board of County Commissioners.

Linkage between the Budd/Deschutes Watershed Action Plan and Stormwater Planning

Urban stormwater will likely be identified as a source of nonpoint water pollution in the Budd/Deschutes watershed. The watershed action plan could incorporate by reference the proposed basin plans. Additionally, the watershed management committee will work with the jurisdictions to identify future programs and planning activities. Non-urban stormwater runoff is another topic likely to be considered by the committee. In those areas adjacent to the basins undergoing stormwater planning, it will be important to integrate any proposed recommendations in the watershed plan with approved basin plan actions.

Thurston County Nonpoint Source Pollution Control Ordinance

Who developed the ordinance--Thurston County Environmental Health Department staff developed the ordinance and worked with several citizen organizations.

Who adopted the ordinance--The Thurston County Board of Health adopted the ordinance in 1992.

Summary of the ordinance--The ordinance aims to protect water quality by stipulating proper methods for the disposal of moderate risk waste and agricultural livestock waste. It also establishes the violator as the responsible party for clean-up and restoration. The violator is also subject to civil penalties including fines.

For moderate risk waste, the ordinance says that waste should be disposed only through recycling through a hazardous waste management facility. Animal waste is prohibited from disposal into surface water, storm drains or man-made drainage systems. However, certain exceptions are made, most notably for accidental spills due to excessive rainfall (as defined in the ordinance) or for manure systems that are managed according to approved farm conservation plans.

Status--The ordinance applies county-wide, both incorporated and unincorporated areas. Eighteen months from adoption the ordinance will be reviewed by a committee appointed by the Board of Health and recommendations for changes will be made at that time.

Linkage between the Budd/Deschutes Watershed Action Plan and the Nonpoint Source Ordinance--Adoption of this ordinance was recommended in the early action watershed plans. It was considered to be a key regulatory component of the strategy to protect water quality in those watersheds. It enables local government staff to inspect sites suspected of significant contribution to water quality degradation. Equally as important, it provides an avenue to bring suspected violators into a loop of education and technical assistance, both necessary for successful implementation of land management practices to protect water quality. Because it was adopted county-wide, it is applicable to the Budd/Deschutes watershed. The watershed committee may wish to review how implementation of the ordinance is proceeding to make suggestions for the formal review in eighteen months.

An Introduction to the Growth Management Act

House Bill 2929, otherwise known as the Growth Management Act, was signed into law in 1990. The Act amended and added sections to several existing laws oriented towards land use planning and economic development. Among other purposes, the act is intended to encourage orderly development of land; to protect areas of significant environmental concern; and to require jurisdictions to anticipate future capital facilities needs and the ability to finance those facilities. Three broad efforts required by the Act that have direct linkage with watershed planning are:

- 1) Adoption of ordinances to protect environmentally critical areas;
- 2) Revision of Comprehensive Plans and;
- 3) Formulation of six-year capital facilities plans including a financing section.

The Act also requires that ordinances which implement the Comprehensive Plans be revised to conform with the Plans. Examples of these include the zoning ordinance and the subdivision ordinance. A timetable is set out in the Act requiring jurisdictions to complete their Comprehensive Plans and implementing ordinances by June, 1994.

Also, the Act requires that jurisdictions with common borders or related regional issues coordinate with each other in developing their Comprehensive Plans and that the Plans, where necessary, are consistent with each other.

Comprehensive Plans

Who develops the plan--Counties, and the incorporated cities and towns in them, which meet certain criteria set forth in the Growth Management Act are required to develop new, or revise existing, Comprehensive Plans. The jurisdictions in the Budd/Deschutes watershed planning under the Growth Management Act are Thurston County, the Cities of Olympia,

Lacey, Tumwater and the Town of Rainier. The criteria are based on population growth; counties of population 50,000 or more that experienced an increased population of more than 10 percent between 1980 and 1990 are subject to the requirements of the Growth Management Act.

Thurston County, Olympia, Lacey, and Tumwater have previously adopted Comprehensive Plans. Planning Department staff are preparing revisions to comply with the Act. The Town of Rainier is contracting with a consultant to develop its Comprehensive Plan.

Who adopts the plan--The elected bodies of the jurisdictions adopt the Comprehensive Plans after review and public hearings by the Planning Commissions of the jurisdictions.

Comprehensive Plans and the population projections on which they are based, can be appealed to a western Washington Growth Planning Hearings Board that is appointed by the Governor. If the Hearings Board finds that the Plan is not in compliance with the Growth Management Act, the Board is required to remand the Plan back to the local jurisdiction to bring the plan into compliance within 180 days of the decision.

Summary of the plan--Every Comprehensive Plan will have certain mandatory elements, in essence chapters. They are:

Land use

- This element has a direct link with protection of water quality as it addresses the desired distribution, location and intensities of land uses and development in the jurisdiction. Land uses that should be addressed, if appropriate, include agriculture, timber production, housing, commerce, industry, recreation, open space, public utilities and public facilities. It should set target population and building densities, as well as estimated future population growth. It also should address water quantity and, if applicable, stormwater management.
- A land use map that illustrates the land uses of the jurisdiction must accompany the text.

Housing

- An inventory and analysis of existing and projected housing needs is part of this element.
- Identification of land for future housing needs.

Capital Facilities

- This element documents capital facilities needs and puts forth a six year financing plan to achieve those identified facilities. This will be described in more detail in a subsection below.

Utilities

- These are generally thought to be electrical, telecommunication and natural gas lines.
- A description of existing and proposed utility facilities that includes present and future locations and estimation of capacity of those facilities.

Transportation

- This element should be consistent with the land use element and should establish a level of service for transportation movement, and should include techniques to avoid overburdening the transportation system. Additionally, the element should specify a financing plan.

Rural

- Those lands that are not addressed in the Urban Growth Area, or by natural resource production land policies are addressed in this element. Land uses in rural parts of counties shall maintain the rural character of these lands.

Status--The deadline established by the Growth Management Act for Plan development or revisions is June, 1993. All the jurisdictions are proceeding with Plan updates.

About two-thirds of the watershed lie in unincorporated Thurston County outside of the Urban Growth Management Area. During winter, 1993 the Board of County Commissioners is deliberating on a proposal for rural zoning and for the designation of natural resource lands of long-term commercial significance. This was discussed in the "Human Environment" chapter of this report.

The City of Olympia is updating its land use, housing and transportation elements. Among other activities the City of Tumwater and Thurston County are preparing a joint plan for the unincorporated areas in the Urban Growth Management Area that eventually will be annexed to Tumwater.

Linkage between the Budd/Deschutes Watershed Action Plan and Comprehensive Planning

Comprehensive Plans describe existing human uses of the land and present desired goals for land uses and infrastructure. Often modern land uses are associated with degraded water quality. Comprehensive Plans bring together into one document several items that effect water quality and provide broad policy guidance for the jurisdiction as a whole. The geographical area covered by a Comprehensive Plan is based on political boundaries. As well, Comprehensive Plans give policy guidance for certain mitigation measures such as land banking, environmentally sensitive area protection, stormwater and sanitary sewer capital facilities for intensely developed areas, and encouraging compact urban areas which encourage less auto usage all of which contribute to water quality protection. A watershed plan can cover some similar topics and applies to an area bounded by physical geography.

The implementation of Comprehensive Plans is done through the administration of land development ordinances, capital facilities programs and transportation plans. The implementation activities influence, and to some extent, mandate the effects and intensity of development, thereby influencing the rate of delivery of water to channels and the quality of the water as it is conveyed over the land.

Capital Facilities Plans

Background--What are capital facilities? For the purposes of the Growth Management Act, capital facilities include structures for stormwater control, road and transportation facilities, parks and public open space, public office buildings, correctional facilities, solid waste management and infrastructure for water supply and sanitary sewers. School facilities may also be included depending on the financing options that are selected. For water quality purposes, these facilities can be grouped into three categories:

- Those facilities whose function is to improve water quality. An example is a stormwater biofiltration pond.
- Those facilities whose function either directly or indirectly contributes to water quality degradation. An example is increased impervious surface due to building construction necessary to house expanding county offices, which are indirectly driven by population growth.
- Those facilities whose function has the potential to both improve and degrade water quality. Infrastructure that supports land development is a significant example. Roads and leaky sanitary sewers are significant contributors to water quality degradation. However, if well-sited and maintained, infrastructure can

greatly influence where urbanization occurs thereby limiting the area subject to water quality degradation associated with urbanization.

Who develops the plan--For unincorporated Thurston County, the Board of County Commissioners appointed a citizen task force to develop the plan. The task force began meeting in October, 1992. Staff from the Thurston County Community & Environmental Programs office provide support to the task force. In Olympia, the Administrative Services Department is the plan coordinator, while in Lacey and Tumwater, capital facilities plans are the responsibility of the City Manager's office.

Who adopts the plan--The elected bodies of the jurisdictions adopt the capital facilities plans. Because the plans are elements of the Comprehensive Plan, Planning Commissions also review and provide comment.

Summary of what the plans are to address--To comply with the Growth Management Act, capital facilities plans must:

- Include an inventory of existing public facilities that indicates location and capacities.
- Present a forecast for future needs.
- Identify proposed locations and capacities of expanded or new facilities.
- Present a realistic financing plan including identification of specific sources of money to fund changes in capital facilities.

If financing plans for capital facilities do not meet the forecasted needs, jurisdictions must reconsider the level of service they can provide and/or the mix and intensities of proposed land uses.

Status--The jurisdictions have begun the process of developing capital facilities plans. These will be incorporated into the Comprehensive Plans, which are under a deadline of June, 1993 for completion.

Linkage between the Budd/Deschutes Watershed Action Plan and Capital Facilities Planning

Capital facilities are part of the "hardware" of water quality protection. They are on-the-ground structures and improvements that can determine the rate and intensity that water enters surface water channels and waterbodies. They also influence the chemical constituents carried in the water. Much of the capital facilities necessary to protect water quality are described in detail in stormwater basin plans. An aggressive strategy to protect water quality will weave together both capital facilities and non-structural measures. To the extent that the

watershed action plan strategy to protect water quality depends on publicly owned capital facilities, the level of service embodied in the capital facilities plans directly influences the public sector's capability to protect water quality.

There are trade-offs when trying to decide about the level of service to be provided by public capital facilities. If a jurisdiction or region determines that it can not finance the improvements necessary to maintain or improve the present water quality, then what are the consequences? Some questions that need to be considered are; does the region adopt regulations requiring private landowners and developers to bear an increasing share of providing facilities? Does the region accept steadily decreasing water quality as population and impervious surface increases? What role do both the private and public sectors have in creating innovative approaches to protecting water quality?

Environmentally Critical Areas

Who develops the ordinances--Planning Departments for the jurisdictions in the watershed have developed proposed ordinances.

Who adopts the ordinances--The elected bodies of the jurisdictions adopt the ordinances after the Planning Commissions review, hold public hearings and provide input on drafts that are first developed by staff.

Summary of the ordinances--To work towards one of the goals of the Growth Management Act, protecting environmental quality, the Act requires jurisdictions to designate areas that are critical to environmental quality and adopt regulations to protect those areas. These areas include wetlands, aquifer recharge areas, fish and wildlife habitat conservation areas, frequently flooded areas, and geologically hazardous areas.

The early action watershed action plans for Totten, Eld and Henderson watersheds also recommended protecting certain types of environmentally critical areas, specifically riparian areas along streams and wetlands. Varying techniques were recommended including establishing regulations requiring buffer areas next to streams and wetlands, encouraging the use of conservation easements, and encouraging the use of open space taxation by private property owners to reduce property taxes on parcels actively engaged in protecting stream and wetland buffers. The adoption by the jurisdictions of critical areas ordinances is a big step in implementing the early action plans.

In Thurston County, the jurisdictions are taking similar approaches to protecting critical areas. The ordinances more specifically define critical areas and limits land uses to those which generate very low environmental impacts. The ordinances also establish buffer areas between the critical areas and land that can be developed. These buffer areas vary in size

and land uses are somewhat restrictive. The intent of the buffer areas is to separate land uses that may be environmentally damaging from critical areas so that the critical areas can continue to perform environmental services for which the entire population benefits, such as absorbing flood flows, filtering out pollutants and providing wildlife habitat.

Status--The cities of Olympia, Tumwater and Lacey and the Town of Rainier have already adopted critical area ordinances. The Thurston County Planning Commission will hold public hearings this fall on a draft ordinance.

Linkage between the Budd/Deschutes Watershed Action Plan and Environmentally Critical Areas

Minimizing disturbance of land reduces the risk of water pollution from human-related causes, such as livestock entering streams or building construction too close to surface waters. Ordinances establishing buffers and limiting land uses in critical areas and associated buffers, aims to keep land disturbance to a minimum in key locations most vulnerable to disruption. Additionally, buffer areas are filters that partially cleanse surface water runoff. In essence, critical area ordinances are mechanisms existing now that will further the goals and objectives of the watershed action.

Timber/Fish/Wildlife Agreement & Forest Practices Watershed Analysis

Background--Private sector timber management and harvest activities are regulated by the Forest Practices Act of 1974. Counties participate in forest practices regulation by commenting on applications for timber harvest. Those applications that have been of particular interest to the county are for converting land from forest management to other land uses, usually some sort of development.

In 1986 and 1987 representatives of state agencies, tribes, environmental groups and the timber industry negotiated an agreement for on-going forest resources management in Washington. It is called the Timber/Fish/Wildlife Agreement. The Forest Practices Board, in early summer of 1992, adopted a wide-ranging and significant package of amendments to the regulations that implement the Forest Practices Act. Of particular interest to protecting water quality are the rules requiring analysis of the potential cumulative effects of timber harvesting within a watershed. This is known as "watershed analysis. And "cumulative effects," what are they? They are changes to the environment that result when two or more forest management activities interact with natural ecosystems. Examples of these effects are the substantial removal of wildlife habitat or a sustained increase in stream temperature. Building haul roads or clear-cutting large tracts of land are examples of forest management

activities that can cause cumulative effects.

Who conducts the watershed analysis--The Washington Department of Natural Resources is responsible for convening teams on a watershed-by-watershed basis. The department is required to seek team members from state and federal agencies, local government, tribes, forest landowners and the general public. As a group, the team must include expertise in forestry, forest hydrology, soil science or geology, fisheries and geomorphology. The regulations also allow forest landowners, under certain conditions, to initiate watershed analysis and form a team.

Who approves the watershed analysis--After an analysis is conducted and, if necessary, prescriptions recommended, the Department of Natural Resources circulates these results to state agencies, tribes, local governments and forest landowners for comment. The general public is also invited to provide comment. Within thirty days, the department must finalize the prescriptions and approve or disapprove the analysis.

Summary of the process for watershed analysis--The objectives of the watershed analysis are to: 1) determine if cumulative effects are likely; 2) if they are significantly adverse to the environment and; 3) to prescribe if and how timber harvesting and related activities shall occur to avoid cumulative effects. A watershed analysis is broken into three parts, level one, level two and prescription recommendations. The techniques that are employed in the analysis are described in the Forest Practices Board Manual.

Level One

- A broadbrush look at the watershed. The intent is to determine how likely it is that forest practices will adversely affect fish, water or capital improvements and how vulnerable fish, water and capital improvements, such as roads and bridges, are to degradation. Out of level one, a report that describes the causes for significant adverse impacts is produced.

Level Two

- Provides a finer detail of analysis. In some cases, where level one was not able to determine if adverse impacts to the environment are likely to occur, the level two analysis is intended to ascertain those causes. In other cases, the level one result may call for a level two analysis to provide the information necessary to develop recommendations for prescriptions.

Prescriptions

- A somewhat different team is convened for developing prescriptions. The expertise on this team includes forest resource management, harvest and road systems engineering, hydrology and fisheries science or management. The prescriptions can include (but are not limited to) abandonment of roads and road maintenance and use plans.

Once an analysis is complete for a watershed, individual forest practice applications must use the prescriptions. In reviewing forest practice applications, the Department of Natural Resources must confirm that the prescriptions that the applicant is indicating will be used are, in fact, in compliance with the watershed analysis. Prescriptions called for by the watershed analysis are subject to periodic review and revision.

Status--In 1993 the Department of Natural Resources is determining the order in which watersheds will undergo analysis. Each region of the Department of Natural Resources is preparing such a list. While not finalized as of this writing, it appears that the Deschutes River watershed, south of Vail is likely to be among the first 10 watersheds to undergo analysis in the central region. Analysis in the first round of watersheds is to begin as soon as possible.

Linkage between the Budd/Deschutes Watershed Action Plan and Forest Practices Watershed Analysis--Conducting a watershed analysis will determine if significantly adverse cumulative effects are present in the upper Deschutes watershed. Cumulative effects from forest practices can negatively affect the same beneficial uses, such as fisheries, that efforts to control nonpoint pollution are trying to protect. For example, increased loads of sediment delivered to stream channels due in part to siting forest haul roads in geologically unstable sub-watersheds can be deleterious to successful survival of salmon eggs.

Anadromous Fish Habitat Monitoring in the Upper Watershed

Background--Anadromous fish runs in the Deschutes were introduced in 1954 when a fish ladder was constructed at Tumwater Falls, formerly a barrier to migration. The river now supports runs of coho, chinook, sea-run cutthroat and steelhead. Another outgrowth of the Timber/Fish/Wildlife agreement is habitat monitoring to collect data on anadromous fish habitat. The intent of collecting this data is to determine existing conditions and factors that contribute to degradation of fish habitat. The fish habitat monitoring that has occurred in the upper Deschutes could be used in the watershed analysis described above and may influence

how timber harvesting and management occurs.

Who conducts the fish habitat monitoring--Funded by the same Centennial Clean Water Fund grants that have supported the county's work in the Budd/Deschutes watershed, the Squaxin Island Tribe is conducting the monitoring project. A full report of the first year's data collection titled "Monitoring of the Upper Deschutes Watershed", is included in Part II, Appendix J of this report.

Summary from first year of fish habitat monitoring--The conclusions should be read bearing in mind that the first year of this project was designed to provide baseline data on current stream channel and salmonid habitat conditions. This information was used to design the monitoring program for the second year which will be oriented more towards determining cause/effect relationships of changes in salmonid habitat. Results of the 1992 field work including the spawning gravel fine sediment analysis will be available by June 1993.

The conclusions from year one of the monitoring are:

- Streambank erosion and mass wasting are significant at certain sites in the upper watershed. Efforts to stabilize and restore these sites should be designed in the context of the whole upper watershed ensuring that activities further upstream will not minimize the opportunity for success on the sites somewhat lower in the watershed.
- A strategy for replenishing large woody debris (downed trees and large branches) in stream channels is necessary. Woody debris is essential in creating pools which are used by resting adults and rearing juveniles. Many streams have very low levels of both woody debris and pool habitat.
- Debris flows have occurred in the upper watershed and can have significant negative consequences for salmon habitat. Existing efforts to reduce the risk of debris flows should be continued and restoration of disturbed channel reaches should be encouraged.
- The data suggests that landuse activities as a whole are having cumulative effects on salmonid production throughout the freshwater life history stages of the fish.

Conducting the watershed analysis described above is important in developing forestland management prescriptions that will create environmental conditions favoring increased salmonid production.

Linkage between the Budd/Deschutes Watershed Action Plan and Fish Habitat Monitoring--

Among the uses of water that depend upon good water quality are anadromous fish. The Puget Sound Water Quality Management Plan, 1989, in addition to addressing nonpoint pollution, speaks to protecting and restoring fish and wildlife habitat. While the watershed planning process is charged with correcting nonpoint pollution, often the actions that improve water quality also improve salmonid habitat and vice versa. An example is stabilizing streambanks thereby reducing turbidity and at the same time creating cover for fish. The Watershed Action Plan can highlight those action recommendations that achieve multiple objectives of the Puget Sound Plan.

Capitol Lake Restoration Plan

Who developed the plan--The plan was developed by a committee of chief administrative officers of the jurisdictions abutting Capitol Lake, as well as the Washington State Department of General Administration and the Governor's Office with staff assistance from Thurston Regional Planning Council.

Summary of what the plan addresses--The Plan gives a brief introduction to the history of Capitol Lake. It notes that the lake is actually an estuary of the Deschutes River that was dammed in 1951 to serve as a reflecting pond for the Capitol Campus, part of the Capitol Campus design created 1911. The Plan reviews the previous technical reports which document the problems with Capitol Lake and summarizes presentations the committee received for addressing these problems. The problems include:

- Filling of the lake basins due to sediment deposition from the river. Of particular concern is the rate at which the filling is occurring.
- Algae blooms that rendered the large salmon rearing operation in Percival Cove inoperable. A significantly smaller operation now exists.
- High fecal coliform bacteria counts throughout the lake basins.

The Plan contains recommendations for actions divided into three categories--management of lake waters and shore, point source pollution control and nonpoint source pollution control. To ensure that the recommendations were implemented the plan called for an on-going Capitol Lake Action Committee representing the same parties who developed the plan and further including the Squaxin Island Tribe.

Status--The Plan was finalized in February, 1989 and is now being implemented. The Capitol Lake Action Committee was formalized through a memorandum of understanding signed by the participants. The Committee successfully lobbied for funds for partial plan implementation in 1992-93. One effort is a pilot slope stabilization project using bio-engineering techniques in the mid-Deschutes watershed. The other is a study to identify the sources of sediments of the mid and lower Deschutes river channel to determine sources of small and large sediment that contribute to flooding and erosion on the river. This is being undertaken by the Squaxin Island Tribe.

The Department of General Administration is responsible for the management of Capitol Lake. Currently the Department is attempting to replace a gabion which has significantly deteriorated in the upper lake basin. Dredging of Capitol Lake is expected to happen on a four-year cycle, but is delayed in starting because of the necessary gabion work. Additionally, in the lower basin Heritage Park, now known as Capitol Green, will be designed and constructed during the next four years. This will replace the existing Capitol Lake Park and will require some cutting and filling of the east shoreline of the lower basin.

Linkage between the Budd/Deschutes Watershed Action Plan and the Capitol Lake Restoration Plan--The Capitol Lake Restoration Plan specifically recognized that efforts to clean up Capitol Lake depended, in part, on efforts to address problems in the mid and upper sections of the Deschutes River watershed and called for watershed planning to control nonpoint pollution. Additionally, a number of recommendations in the Capitol Lake Plan provide guidance for controlling nonpoint pollution within the Capitol Lake basin. These include actions such as water quality monitoring and stormwater basin plans. The Budd/Deschutes Watershed Action Plan and the Capitol Lake Restoration Plan could be mutually reinforcing. The Budd/Deschutes Plan could incorporate the Restoration Plan by reference and therefore focus on problems outside of the immediate Capitol Lake Basin.

Budd Inlet Urban Bay Action Plan, 1991

Background--The Urban Bay Action program, of which this plan is part, is a component of the Puget Sound Estuary Program, a nationwide program headed by the federal Environmental Protection Agency (EPA) and begun in 1985. In this state, it is implemented as a partnership between the EPA and Washington Department of Ecology and the Puget Sound Water Quality Authority. The original focus of the program was pollution in urban bays due to toxic materials and waste as well as contaminated sediments. While this remains the main group of pollutants, the Budd Inlet plan scope was expanded to include contamination due to eutrophication and bacteria as well. In addition to Budd Inlet, urban bay action plans have been developed for Elliott Bay, Commencement Bay, Sinclair/Dyes Inlet, Everett Harbor and Bellingham Bay.

Who Developed the Plan--This plan was prepared by consultants on contract to the EPA.

Who Coordinates Plan Implementation--The Department of Ecology is responsible for implementation. This is done by a variety of methods including interagency briefings. Additionally, the department conducts enforcement inspections, and where necessary cites violations.

Summary of the Plan--The plan identified and described problems and their locations in Budd Inlet. It also describes the actions that 21 agencies and a tribe are conducting that address these problems, in some cases only peripherally. The plan also describes the purview of those agencies. For locations that are categorized as primary problem areas, the plan strongly recommends technical evaluation to determine specific actions to remediate the problem(s).

Primary Problem Areas and Probable Sources of Pollutants

Eutrophication

- The plan identifies inner Budd Inlet around the Port Peninsula as the primary problem area. The combination of the outfall for the waste water treatment plant (LOTT), the marinas, and surface runoff carry nutrients that lead to very low levels of oxygen in the water in late summer.

Chemical

- The Cascade Pole site and the storm drain at the western end of the port peninsula contained levels of metals and organic chemical concentrations high enough to be considered primary problem areas. The probable sources are wide-ranging and include former industrial production, marinas, stormwater runoff, accidental spills, and seeps into the Inlet from contaminated groundwater.

Bacteria

- Primary Problem Areas for fecal coliform contamination were the mouth of Moxlie Creek, Boston Harbor, the mouth of Ellis Creek and south of Tykle Cove. Probable sources include outfalls from waste water treatment plants, combined storm and sanitary sewage overflows, and failing on-site sewage systems.

In the plan is a detailed table that documents the actions being conducted to, at the minimum, partially address these specific problem areas, including target dates for the actions. The plan also aims to provide a general framework for preventing further pollution and guiding overall cleanup of the Inlet. It lists actions for 1) planning and program development, 2) contaminant control actions, 3) clean-up investigations, 4) on-going monitoring, 5) resource protection actions and 6) environmental education for the public.

Status--Coordination of plan implementation is provided by the Southwest Regional Office of the Department of Ecology. The Department of Ecology and many of the other identified agencies are implementing actions recommended in the plan. In 1993, the Department of Ecology will conduct a survey to determine the status of implementation of individual recommendations.

Linkage between the Budd/Deschutes Watershed Action Plan and the Budd Inlet Urban Bay Action Plan--Much of the Urban Bay Action Plan deals with nonpoint pollution. In fact, the plan recommends that watershed planning begin as soon as possible. Since both plans deal with nonpoint pollution, it is important to avoid unnecessary duplication. Discussions among Thurston County, the 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 Plan would retain its focus on toxic materials, waste and contaminated sediments.

Deschutes River Special Area Management Plan for the Tumwater Valley

Who developed the Plan--The City of Tumwater Planning Department prepared the Plan.

Who adopted the Plan--The Plan was adopted by the Tumwater City Council.

Summary of the Plan--This plan is a supplement to the Shoreline Master Program for the Thurston Region, which is the local implementing plan and set of regulations for the Shoreline Management Act. As such, the special area management plan has the force of regulation inside the geographic area of jurisdiction by the Shoreline Management Act. However, this plan provides a vision for the valley floor including those areas outside of the jurisdiction of the Shoreline Master Program.

The plan divides the planning area into four sections--north, middle and south reaches (from I-5) to Henderson Blvd) and a riverine corridor ranging in width from 50-500 feet. The

vision for the valley is one where ". . . the Deschutes River Corridor will continue to be the centerpiece of the City of Tumwater. In general, the valley will remain an area of open space, with very few intensive landuses being added, and with substantial opportunities for the public to enjoy this community resource. The upriver portion of the valley will be conserved, with most of the area in recreational open space combined with natural lands. In contrast, the central reach of the river near the brewery will be bordered by intensive urban uses, including industry, with human activity in evidence everywhere. The shorelines of the falls and Capitol Lake will provide direct access to the river and some respite from this urban environment." The plan anticipates that the south basin of Capitol Lake will eventually fill with silt. Also, other than the existing Palermo neighborhood, no new large residential developments are expected. Some historic structure reconstructions are envisioned.

With respect to actions that directly affect nonpoint pollution, the plan recommends that a "Deschutes Riparian Habitat Plan" be developed that will provide specific guidance for the restoration and enhancement of fish and wildlife habitat for this planning area.

Status--The special area management plan was adopted by the City Council of Tumwater. In 1993, planning department staff will finalize the recommended riparian habitat plan, with river corridor restoration projects to follow.

Linkage between the Budd/Deschutes Watershed Action Plan and the Deschutes River Special Area Management Plan for the Tumwater Valley --The Special Area Management Plan links with the Budd/Deschutes Plan by proposing measures to both reduce pollutant sources and cleanse runoff into the river. The Management Plan provides for mostly low intensity land uses along the Deschutes River within the city limits of Tumwater. This contributes to reducing the probability of water pollution from nonpoint sources. Additionally, protection and enhancement of the riparian corridor along the river will improve the capacity of the land area adjoining the river to act as a pollutant filter.

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The Budd/Deschutes Watershed Management Committee was formed in December, 1992. One of the first tasks undertaken by the Budd/Deschutes Watershed Management Committee was to compile a comprehensive bibliography of documents that pertain to water quality issues in the watershed. Presented in this chapter are the result of the Committee's efforts. From these efforts, as well as the assessment of water quality reported in Part II of this document and briefings on existing programs, the Committee will determine what information would be desirable but presently is unavailable.

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**APPENDIX A--WAC 400-12 LOCAL
PLANNING & MANAGEMENT OF
NONPOINT SOURCE POLLUTION**

Chapter 400-12 WAC

LOCAL PLANNING AND MANAGEMENT OF NONPOINT SOURCE POLLUTION

WAC

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		SEPA review. [Statutory Authority: RCW 90.70.055 and 90.70.060. 88-06-053 (Order 88-01), § 400-12-540, filed 3/2/88.] Repealed by 91-22-096, filed 11/6/91, effective 12/7/91. Statutory Authority: Chapter 90.70 RCW.
		Action plan contents. [Statutory Authority: RCW 90.70.055 and 90.70.060. 88-06-053 (Order 88-01), § 400-12-550, filed 3/2/88.] Repealed by 91-22-096, filed 11/6/91, effective 12/7/91. Statutory Authority: Chapter 90.70 RCW.
		Phase 3—Action plan review and approval. [Statutory Authority: RCW 90.70.055 and 90.70.060. 88-06-053 (Order 88-01), § 400-12-560, filed 3/2/88.] Repealed by 91-22-096, filed 11/6/91, effective 12/7/91. Statutory Authority: Chapter 90.70 RCW.
		Action plan implementation. [Statutory Authority: RCW 90.70.055 and 90.70.060. 88-06-053 (Order 88-01), § 400-12-570, filed 3/2/88.] Repealed by 91-22-096, filed 11/6/91, effective 12/7/91. Statutory Authority: Chapter 90.70 RCW.
		General provisions. [Statutory Authority: RCW 90.70.055 and 90.70.060. 88-06-053 (Order 88-01), § 400-12-600, filed 3/2/88.] Repealed by 91-22-096, filed 11/6/91, effective 12/7/91. Statutory Authority: Chapter 90.70 RCW.
		Agricultural practices. [Statutory Authority: RCW 90.70.055 and 90.70.060. 88-06-053 (Order 88-01), § 400-12-610, filed 3/2/88.] Repealed by 91-22-096, filed 11/6/91, effective 12/7/91. Statutory Authority: Chapter 90.70 RCW.
		On-site sewage disposal. [Statutory Authority: RCW 90.70.055 and 90.70.060. 88-06-053 (Order 88-01), § 400-12-620, filed 3/2/88.] Repealed by 91-22-096, filed 11/6/91, effective 12/7/91. Statutory Authority: Chapter 90.70 RCW.
		Stormwater and erosion. [Statutory Authority: RCW 90.70.055 and 90.70.060. 88-06-053 (Order 88-01), § 400-12-630, filed 3/2/88.] Repealed by 91-22-096, filed 11/6/91, effective 12/7/91. Statutory Authority: Chapter 90.70 RCW.
		Forest practices. [Statutory Authority: RCW 90.70.055 and 90.70.060. 88-06-053 (Order 88-01), § 400-12-640, filed 3/2/88.] Repealed by 91-22-096, filed 11/6/91, effective 12/7/91. Statutory Authority: Chapter 90.70 RCW.
		Marinas and boats. [Statutory Authority: RCW 90.70.055 and 90.70.060. 88-06-053 (Order 88-01), § 400-12-650, filed 3/2/88.] Repealed by 91-22-096, filed 11/6/91, effective 12/7/91. Statutory Authority: Chapter 90.70 RCW.

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400-12-660 Other nonpoint sources. [Statutory Authority: RCW 90.70.055 and 90.70.060, 88-06-053 (Order 88-01), § 400-12-660, filed 3/2/88.] Repealed by 91-22-096, filed 11/6/91, effective 12/7/91. Statutory Authority: Chapter 90.70 RCW.

PART ONE AUTHORITY/PURPOSE

WAC 400-12-100 Authority. This chapter is promulgated by the Puget Sound water quality authority pursuant to chapter 90.70 RCW.

(1) It is the intent of this chapter that the department of ecology coordinate all aspects of this program, including interpreting this chapter for local entities, state agencies, tribes, and affected parties as they carry out their responsibilities under this chapter, and that the department shall consult with the authority as needed regarding the interpretation of this chapter.

(2) As required by RCW 90.70.070, the authority shall review the progress of state agencies and local governments regarding timely implementation of programs established pursuant to this chapter.

(3) Pursuant to RCW 90.70.080, local governments and state agencies are authorized to adopt ordinances, rules, and/or regulations to implement action plans. [Statutory Authority: RCW 90.70.055 and 90.70.060, 88-06-053 (Order 88-01), § 400-12-100, filed 3/2/88.]

WAC 400-12-110 Purpose. This chapter establishes criteria and procedures for ranking watersheds and for developing and implementing action plans for watersheds in need of corrective and/or preventive actions. The purpose is to reduce pollutant loading from nonpoint sources, prevent new sources from being created, enhance water quality and protect beneficial uses.

This planning process encourages collaborative problem solving among a diversity of local, state, tribal, and federal interests, recognizing that political constituency-building is necessary for implementation. [Statutory Authority: Chapter 90.70 RCW, 91-22-096, § 400-12-110, filed 11/6/91, effective 12/7/91. Statutory Authority: RCW 90.70.055 and 90.70.060, 88-06-053 (Order 88-01), § 400-12-110, filed 3/2/88.]

WAC 400-12-120 Applicability. This chapter applies to the Puget Sound basin as identified by RCW 90.70.060 and does not apply outside of the Puget Sound basin. [Statutory Authority: Chapter 90.70 RCW, 91-22-096, § 400-12-120, filed 11/6/91, effective 12/7/91. Statutory Authority: RCW 90.70.055 and 90.70.060, 88-06-053 (Order 88-01), § 400-12-120, filed 3/2/88.]

PART TWO GENERAL REQUIREMENTS

WAC 400-12-200 Definitions. For the purposes of this chapter, the following definitions shall apply:

(1) "Action plan" means a locally developed and department-approved plan which is implemented to prevent and control nonpoint pollution in a priority watershed or an early action watershed.

(2) "Affected parties" means both those whose beneficial use of water is being impaired, or potentially impaired, by nonpoint pollution and those groups associated with the nonpoint sources of pollution identified in WAC 400-12-515(2).

(3) "Authority" means the Puget Sound water quality authority.

(4) "Beneficial uses" means uses identified by Water quality standards for waters of the state of Washington (chapter 173-201 WAC) as desirable uses for given classes of waters. Examples are water supplies for domestic, industrial, or agricultural purposes; fish, shellfish, and wildlife habitat; recreation; and navigation.

(5) "Best management practices" means agricultural, structural, and/or managerial practices that, when used singly or in combination as part of an approved site development plan or farm plan, provide minimum essential action or treatment needed to solve, prevent, or reduce site-specific water quality problems.

(6) "Comprehensive land use plan" means a generalized coordinated land use policy statement of the governing body of a county or city that is adopted pursuant to Title 35 RCW, Title 35A RCW, chapter 36.70, or 36.70A RCW.

(7) "Consensus" means achievement of general agreement on an issue by the watershed management committee during the planning process.

(8) "Department" means the Washington state department of ecology.

(9) "Document review" means solicitation of comment from interested and affected parties on reports, proposals, or plans during various stages of development of action plans.

(10) "Early action watersheds" means those watersheds selected by the department for development of action plans prior to promulgation of this chapter.

(11) "Failed," "failing," or "failure" of an on-site sewage disposal system means failure as defined by chapter 70.118 RCW (On-site sewage disposal systems) and chapter 246-272 WAC (On-site sewage system).

(12) "Farm" means a property where domestic animals are kept to provide primary or supplemental income, for personal consumption, or for recreational use, or where crops are grown for resale.

(13) "Farm plan" also known as "farm water quality management plan" means a site-specific plan developed by a farm operator in cooperation with a resource agency (such as those developed under the "208" water quality management program with assistance of a conservation district or the soil conservation service) and approved by the conservation district board of supervisors, for managing resources to protect water quality.

(14) "Federal agencies" means units of the federal government having major facilities or substantial land holdings in the watershed, such as the Departments of Defense, Interior, Agriculture, or Transportation.

(15) "Ground water management areas" means areas designated and defined in chapter 173-100 WAC and administered by the department.

(16) "Implementing entity" means a federal or state agency, Indian tribe, local government, organization, or special purpose district responsible for carrying out the day-to-day activities of the applicable provisions of an action plan once it is approved by the department and, where applicable, adopted by the legislative body of the entity.

(17) "Lead agency" means any entity selected in accordance with WAC 400-12-400 with responsibility for coordinating the development and implementation of a watershed action plan. The lead agency must possess the financial and staff resources in order to fulfill its responsibilities under this chapter. The lead agency must be a governmental agency or division thereof with power to pass resolutions, enact ordinances, and appropriate funds for expenditure; an Indian tribe recognized as such by the federal government with territory or usual and accustomed fishing grounds within waters in or adjacent to the county; a conservation district; a metropolitan municipal corporation; or a council of governments.

(18) "Local government" means the city or town council, board of county commissioners, county council, special purpose district commission, metropolitan municipal corporation, council of governments, or that body assigned legislative duties by a city, county, or district charter.

(19) "Nonpoint pollution" means pollution, as defined by chapter 90.48 RCW, (Water pollution control) that enters any waters of the state within Puget Sound basin from any dispersed land-based or water-based activities or sources, including farm practices, storm water and erosion, on-site sewage disposal, forest practices, marinas and boats, atmospheric deposition, garbage, and other residential, commercial, and industrial sources.

(20) "Nonpoint pollution control programs" or "nonpoint pollution control strategy" means programs using education, technical and financial assistance, regulation, incentives or disincentives, monitoring, and/or enforcement to control, prevent, and mitigate pollution from nonpoint sources.

(21) "On-site sewage disposal system" means a septic tank and drainfield or alternative treatment and disposal system as defined in chapter 246-272 WAC (On-site sewage system).

(22) "Pesticides" means those substances intended to control pests and unwanted plants as defined in chapter 15.58 RCW, the Washington Pesticide Control Act.

(23) "Plan" means the 1991 Puget Sound water quality management plan, which has been approved as the comprehensive conservation management plan for Puget Sound, and subsequent revisions.

(24) "Planning entity" means a governmental or non-governmental body that prepares reports, makes recommendations, and participates in developing an action

plan. An agency may serve both as a planning entity and implementing entity.

(25) "Prevention" means application of laws, ordinances, administrative procedures, and/or land management practices or education and public involvement programs which reduce or eliminate the potential for nonpoint pollution.

(26) "Priority" means highest or higher in importance or rank.

(27) "Public hearing" means a formal public meeting to take testimony on a pending action.

(28) "Public meeting" means an informal public proceeding, including a workshop, that informs the public and provides an opportunity for the public to ask questions and voice opinions.

(29) "Public notification" means use of public information techniques to ensure that:

(a) Information on decisions to be made or actions to be taken is complete and understandable;

(b) A full explanation is provided on the effects of decisions or actions on the public, especially the effects on specific groups or geographic areas; and

(c) The ways in which the public may influence the decision-maker and appeal the decision are explained.

(30) "Puget Sound" means all waters of Puget Sound south of the Admiralty Inlet including Hood Canal and Saratoga Passage; the waters north to the Canadian border, including portions of the Strait of Juan de Fuca south of the Canadian border; and all land draining into these waters as mapped by WAC 173-500-040, water resource inventory areas, number 1 through 19.

(31) "Regional watershed" means a large geographic region draining into a major river or body of water as identified and numbered by the state of Washington water resource inventory areas as defined in chapter 173-500 WAC.

(32) "Regulation" means laws, rules, or ordinances to establish legal standards or administrative procedures to control nonpoint pollution.

(33) Section 313 of the Clean Water Act specifies that the federal government shall be subject to and comply with all federal, state, interstate and local requirements, administrative authority and process and sanctions respecting the control and abatement of water pollution.

(34) Section 319 of the Clean Water Act requires states to assess and rank their waters for impacts to beneficial uses from nonpoint source pollution and to develop and implement management programs to address the ranked waters.

(35) "Special purpose district" means a district established pursuant to statute or ordinance in a specific geographic area to carry out specific responsibilities which affect water quality. Examples are soil and water conservation districts, port districts or on-site sewage disposal system maintenance districts.

(36) "Special surveys" means intensive assessments of land use and water quality designed to obtain information on specific sources or pollutants not available through routine water sampling.

(37) "State-wide forest practices program" means chapter 76.09 RCW, the Washington state Forest Practices Act; forest practices regulations as adopted by the state forest practices board and the department of ecology; administration of the Forest Practices Act and regulations; and implementation of the Timber, Fish, and Wildlife Agreement.

(38) "Subwatershed" means a geographic and hydrologic subunit of a watershed or regional watershed.

(39) "Technical assistance" means service provided by state, tribal, or federal agencies to assist local entities in watershed ranking and/or action plan development and implementation.

(40) "Timber, fish, and wildlife agreement" means a voluntary agreement which was drawn up by resource agencies, tribes, industry, and environmental groups to address forest practices on state and private lands within the state of Washington.

(41) "208 water quality management plans" means nonpoint source control plans prepared in accordance with Section 208 of the Federal Clean Water Act.

(42) "Watershed" means a geographic region within which water drains into a particular river, stream, or body of water as identified and numbered by the state of Washington water resource inventory areas as defined in chapter 173-500 WAC, or as defined and delineated by a watershed ranking committee through the watershed ranking process.

(43) "Watershed management committee" means a local committee formed to develop an action plan in accordance with criteria set forth in this chapter and in the plan.

(44) "Watershed ranking committee" means a committee convened to identify and rank all of the watersheds within a county in accordance with criteria set forth in this chapter and as generally described in the plan.

(45) "Watershed rating criteria for nonpoint sources of pollution" means criteria developed by the United States Department of Agriculture Puget Sound Cooperative River Basin Study team to rank watersheds.

(46) "Water quality violation" means a violation of local, state, and/or federal water quality laws or regulations.

(47) "Wetlands" means areas as determined in accordance with element W 4.1.1 of the plan. [Statutory Authority: Chapter 90.70 RCW. 91-22-096, § 400-12-200, filed 11/6/91, effective 12/7/91. Statutory Authority: RCW 90.70.055 and 90.70.060. 88-06-053 (Order 88-01), § 400-12-200, filed 3/2/88.]

WAC 400-12-210 Overview. (1) This chapter establishes a process to review the ranking of watersheds in the Puget Sound basin and to develop and implement action plans to prevent nonpoint pollution, enhance water quality, and protect beneficial uses.

(2) Each county will convene a committee to review and/or rerank the watersheds wholly or partly within the county boundaries, using criteria set forth in this chapter. Local watershed management committees will be

formed to develop action plans for the ranked watersheds. Lead agencies will submit completed action plans to the department for approval. Each action plan may be implemented, as coordinated by the lead agency, through voluntary actions, local ordinances, or a combination thereof; and/or local, state, and federal laws, regulations, and programs.

(3) Technical assistance from state agencies will be available to committees and implementing entities. Substantial involvement by both the general public and affected parties shall be sought in all phases of watershed ranking and action plan development. If action plans are ineffective, a revision process can be initiated by either local governments or the department according to procedures outlined in the watershed action planning process. [Statutory Authority: Chapter 90.70 RCW. 91-22-096, § 400-12-210, filed 11/6/91, effective 12/7/91. Statutory Authority: RCW 90.70.055 and 90.70.060. 88-06-053 (Order 88-01), § 400-12-210, filed 3/2/88.]

WAC 400-12-220 Public involvement. (1) In addition to the provisions of this chapter, public involvement shall be conducted in accordance with public involvement policies of the plan and with chapter 42.30 RCW, the Open Public Meetings Act.

(2) Except where otherwise specified in this chapter, meaningful and substantive participation by the general public and affected parties shall be provided as follows:

(a) All interested and affected local governments, special purpose districts, state and federal agencies, Indian tribes, the general public, and other interested parties shall be informed of progress in planning and implementation and educated and involved in decision-making through such activities as public meetings and hearings, watershed events, citizen workshops, open houses, and newsletters.

(b) The watershed ranking committee and the watershed management committee shall provide:

(i) Adequate opportunities for public comment both early in the watershed reranking and action planning process; and

(ii) Public notification sufficiently in advance of public meetings and public hearings to allow the general public and affected parties adequate time to consider the decision in question. [Statutory Authority: Chapter 90.70 RCW. 91-22-096, § 400-12-220, filed 11/6/91, effective 12/7/91. Statutory Authority: RCW 90.70.055 and 90.70.060. 88-06-053 (Order 88-01), § 400-12-220, filed 3/2/88.]

PART THREE WATERSHED RANKING PROCESS

WAC 400-12-305 Initial watershed ranking. Each of the twelve Puget Sound counties has completed the initial watershed ranking. The initial watershed ranking process required each county to convene a committee of representatives from cities, special purpose districts,

tribal governments, and other appropriate entities. Information on the water quality, habitat, biological conditions, and land use of each watershed was gathered. The committees then ranked the watersheds in order of need for preventive and/or corrective actions. The committees considered such factors as beneficial uses, likelihood of intensified land use, environmental factors, such as soil, slope, or precipitation, and contamination problems. Each county submitted a report on their ranking process and final ranked list to the department by January 1989. [Statutory Authority: Chapter 90.70 RCW, 91-22-096, § 400-12-305, filed 11/6/91, effective 12/7/91.]

WAC 400-12-320 Five-year review. (1) The county is assumed to be the lead agency for the watershed reranking process. The lead agency shall reconvene a watershed ranking committee at least every five years to evaluate the need to rerank based on the results of the implementation of action plans and/or new information. The lead agency must explain that conditions in its watersheds have not changed enough to warrant going through the reranking process. This review shall be conducted more frequently than every five years if a significant change occurs, such as intensified land use within the watershed, if there is an emergency situation which poses a hazard to public health or the health of an ecosystem within the watershed, or if a jurisdiction is ready to proceed with planning.

(2) Process.

(a) **Watershed ranking committee.** The lead agency shall invite representatives from interested and affected parties, including but not limited to, local government legislative authorities, special purpose districts, tribal governments, and the general public. In counties with numerous incorporated communities, committees shall include at least one representative from each population category of a city or town as identified in chapter 35.01 RCW (Municipal corporations classified).

(b) **Information gathering.** The lead agency shall provide any new information on water quality, habitat, biological conditions, and land use for all watersheds in the county, as well as information on the results of action plan implementation.

(c) **Review and reranking.** Using this information, the watershed ranking committee shall evaluate the initial ranking based on criteria in plan element NP-1 or on alternative methods consistent with the plan upon approval from the department. The use of consensus in the reranking process is encouraged.

(d) **Public involvement.** The watershed ranking committee shall conduct its public involvement program in accordance with the provisions of WAC 400-12-220. In addition, the committee shall conduct at least one public hearing in the county on the proposed re-ranking.

(3) If changes are made to the previous watershed ranking, a description and a brief rationale shall be prepared and submitted to the department. [Statutory Authority: Chapter 90.70 RCW, 91-22-096, § 400-12-

320, filed 11/6/91, effective 12/7/91. Statutory Authority: RCW 90.70.055 and 90.70.060. 88-06-053 (Order 88-01), § 400-12-320, filed 3/2/88.]

PART FOUR PREPARATION FOR WATERSHED ACTION PLANNING

WAC 400-12-400 Lead agency for watershed planning. (1) Designation.

(a) The county is assumed to be the lead agency for each watershed management committee. However, another entity may serve as the lead agency if it has geographic jurisdiction and/or responsibilities that wholly or mostly encompass the watershed and can demonstrate that it has the ability to perform the duties of a lead agency as per WAC 400-12-200(17), either directly or through a memorandum of agreement with the county. Additionally, the entity shall demonstrate coordination with the county. If the county does not act as the lead agency, it shall serve on the committee and shall participate in local review of the action plan as described in Part Five of this chapter.

(b) In multicounty watersheds, the counties may jointly convene the committee, provided there is demonstrated coordination, or may choose one entity to carry out lead agency responsibilities. In these situations there shall be a single public involvement process which ensures that interested and affected parties throughout the watershed are involved.

(c) Where a joint ground water and watershed management program is established, a city may be designated as the lead agency if both the ground water and watershed management plan areas are wholly or mostly within the city.

(2) Responsibilities. The lead agency shall be responsible for:

(a) Initiating the planning process and developing the work plan and schedule;

(b) Setting up the watershed management committee and convening additional advisory committees as necessary;

(c) Convening meetings and coordinating the activities necessary to develop the action plan;

(d) Coordinating the activities of the watershed management committee with other existing land and water planning and management programs (e.g., ground water, local comprehensive planning);

(e) Working with planning and implementing agencies throughout preparation of the action plan, including:

(i) Informing federal agencies with jurisdiction in the watershed of action plan requirements to ensure compliance with the Clean Water Act Section 313 and to assist federal agencies in the review of their activities pursuant to Section 319 of the Clean Water Act, 33 U.S.C. 1251 et seq., if applicable; and

(ii) Informing local and state agencies that either have jurisdiction over any property or facility, or are engaged in any activity resulting in nonpoint pollution in

the watershed, of their role or responsibility in the implementation of the action plan;

(f) Coordinating the SEPA review;

(g) Performing other such duties as necessary to ensure the action planning process is carried out;

(h) Reviewing the action plan to determine whether it is consistent with the requirements of this chapter and reporting its findings to the committee; and

(i) Submitting the action plan on behalf of the watershed management committee to the department for approval. [Statutory Authority: Chapter 90.70 RCW. 91-22-096, § 400-12-400, filed 11/6/91, effective 12/7/91. Statutory Authority: RCW 90.70.055 and 90.70.060. 88-06-053 (Order 88-01), § 400-12-400, filed 3/2/88.]

WAC 400-12-410 Watershed management committees. (1) Membership. The watershed management committee shall include all entities that have a legitimate role in the development and implementation of a watershed action plan. This includes affected local and tribal governments, special purpose districts, affected parties, watershed residents, and appropriate state and federal agencies (if the watershed includes significant state or federal lands or if these agencies have regulatory roles within the watershed). Additional advisory committees may be established as necessary and agreed upon by the committee members. Membership on watershed management committees in multicounty watersheds shall include the same interests as those in single county watersheds.

(2) Responsibilities. In addition to the responsibilities identified in Parts Five, Six, and Seven of this chapter, the watershed management committee shall be responsible for:

(a) Approving rules for conducting meetings, decision-making and dispute resolution. Use of consensus in making decisions is encouraged;

(b) Reviewing and approving the work plan and schedule for the development of the action plan;

(c) Providing input to develop a strategy for public participation consistent with this chapter;

(d) Informing representative interests about the action planning process; and

(e) Developing and approving the watershed action plan. [Statutory Authority: Chapter 90.70 RCW. 91-22-096, § 400-12-410, filed 11/6/91, effective 12/7/91. Statutory Authority: RCW 90.70.055 and 90.70.060. 88-06-053 (Order 88-01), § 400-12-410, filed 3/2/88.]

WAC 400-12-415 Planning and implementing entities. Planning and implementing entities shall evaluate the applicability of the watershed action planning process to their jurisdiction and/or responsibilities early on and provide technical assistance and coordination as appropriate during the development of the plan. Planning and implementing entities shall also be responsible for reviewing the action plan. Each implementing entity shall be responsible for providing a statement of concurrence. [Statutory Authority: Chapter 90.70 RCW. 91-

22-096, § 400-12-415, filed 11/6/91, effective 12/7/91.]

WAC 400-12-420 Schedule for preparation and review of action plan. Draft action plans shall be prepared and presented to the department within eighteen months after the watershed management committee approves the schedule and work plan. The department may allow a planning process of up to twenty-four months at the request of the watershed management committee. [Statutory Authority: Chapter 90.70 RCW. 91-22-096, § 400-12-420, filed 11/6/91, effective 12/7/91. Statutory Authority: RCW 90.70.055 and 90.70.060. 88-06-053 (Order 88-01), § 400-12-420, filed 3/2/88.]

PART FIVE WATERSHED ACTION PLANNING PROCESS

WAC 400-12-500 Overview. (1) Nonpoint pollution comes from a large number of sources that vary in size and impact on water quality. Degradation of a waterbody results from the cumulative effect of pollutants from these sources. High risk and sensitive areas are particularly vulnerable to nonpoint pollution. The watershed action plan shall describe a coordinated program of effective actions to be implemented to prevent and abate nonpoint pollution within the watershed. This is to be accomplished through local watershed programs that define priority nonpoint pollution problems and identify appropriate means to maintain or improve water quality and protect beneficial uses.

(2) Action plans shall be developed in four phases:

(a) In phase 1, current conditions are assessed, risks and threats to beneficial uses are identified, priority problems are defined and goals and objectives are developed;

(b) In phase 2, the nonpoint pollution control strategy is prepared, consisting of a combination of voluntary, educational, and regulatory approaches to controlling the identified sources of the problem pollutants, and based on feasibility, likelihood of success and cost;

(c) In phase 3, the implementation strategy is developed, including milestones, financing, and monitoring; and

(d) In phase 4, the public hearing is held, statements of concurrence are solicited and submitted, and the action plan, including materials developed in phases 1, 2 and 3, is reviewed and submitted to the department for its approval.

(3) Each phase requires public involvement and consultation with implementing entities and agencies. Watershed management committees may obtain technical assistance during all four phases. Action plans may vary in content depending on water quality problems identified in the watershed, and on the feasibility and likelihood of success of various control strategies. Implementing entities are strongly encouraged to become involved early in the action planning process, and

to continue and augment their ongoing efforts during plan development to prevent and correct nonpoint pollution. [Statutory Authority: Chapter 90.70 RCW. 91-22-096, § 400-12-500, filed 11/6/91, effective 12/7/91. Statutory Authority: RCW 90.70.055 and 90.70.060. 88-06-053 (Order 88-01), § 400-12-500, filed 3/2/88.]

WAC 400-12-515 Phase 1—Watershed characterization and goals and objectives development. (1) Purpose. This section establishes requirements for gathering and evaluating water quality information to define priority nonpoint pollution problems and for developing goals and objectives for the action plan.

(2) Watershed characterization.

(a) Intent. The purpose of the watershed characterization is to provide the lead agency and the watershed management committee, other decision-making bodies, and the public with the most accurate current information on the types and levels of pollutants from nonpoint sources, and the relative impacts on water quality and beneficial uses of the water resource. This is to include those areas or resources which are particularly sensitive to those pollutants. This information is to be used in developing and implementing action plan nonpoint pollution control strategies and in evaluating the effectiveness of these strategies. The characterization shall summarize current information and identify information needed to adequately define nonpoint pollution problems which need to be addressed.

(b) Preparation. Preparation of the watershed characterization shall be at the direction of the lead agency, and the watershed management committee as appropriate. The watershed management committee and the lead agency shall have the opportunity to evaluate the completeness and adequacy of the characterization. Other appropriate implementing agencies shall be involved in the preparation and review of the characterization.

(c) Minimum requirements. The watershed characterization shall include, at a minimum:

(i) A description of the biological conditions and physical characteristics of the environment;

(ii) Information on land use and population, including existing and potential trends;

(iii) A description of habitats;

(iv) An assessment of existing water quality and anticipated trends;

(v) A map showing the action plan boundaries. Where a plan is being jointly prepared with a ground water management program, the boundaries of the ground water management planning area shall be included;

(vi) A map showing jurisdictional boundaries of the local, state, federal, and tribal governments, participating special purpose districts and implementing entities in the watershed;

(vii) A map showing all waterways, water bodies, and known wetlands;

(viii) A discussion of existing federal, state, local, and other water quality programs ongoing in the watershed; and

(ix) A description of information that is desirable but unavailable.

(3) Problem definition. Using information from the watershed characterization prepared in accordance with subsection (2) of this section, the committee shall prepare a description of the extent of the water quality problems resulting from nonpoint pollution in the planning area including, but not limited to:

(a) Beneficial uses of the water bodies and/or stream segments impaired or threatened by nonpoint pollution and the extent of the impairment or threat;

(b) The extent that water quality standards in the various water bodies, as specified in chapter 173-201 WAC (Water quality standards for surface waters of the state of Washington), are not being met;

(c) Impacts or potential impacts of nonpoint pollution on ground water and surface water;

(d) Wetlands affected or threatened by nonpoint pollution;

(e) Existing or potential nonpoint pollutants and their sources that threaten or impair beneficial uses or contribute to water quality degradation in each water resource identified in (a), (b), (c), and (d) of this subsection. All potential pollutants and their sources must be evaluated and ranked according to the extent of impairment of beneficial uses or contribution to water quality degradation. Evaluated pollutants shall include nutrients, pathogens, toxic chemicals, sediments, and other potential pollutants. Sources shall include farm practices, storm water, on-site septic systems, forest practices, boating and marinas, and any other source or potential source in the watershed. The evaluation shall include the best available estimates of the number and general location of sources and volume of pollutant loadings; and

(f) An analysis of the adequacy of existing water quality programs to prevent and correct nonpoint pollution.

(4) Goals and objectives. The committee shall prepare a statement of water quality goals and objectives. At a minimum, the goals and objectives statement shall provide for:

(a) Identifying the desired extent of protective measures and corrective actions that must be enacted to achieve the intended level of restoration and maintenance of beneficial uses;

(b) Achieving enhancement of water quality pursuant to chapter 173-201 WAC and chapter 90.48 RCW (Water pollution control); and

(c) Achieving consistency with the intent of this chapter, the programs resulting from Section 319 of the Federal Clean Water Act, and the plan. [Statutory Authority: Chapter 90.70 RCW. 91-22-096, § 400-12-515, filed 11/6/91, effective 12/7/91.]

WAC 400-12-525 Phase 2—Action plan nonpoint pollution control strategy. (1) Purpose. This section guides the development of control strategies to prevent and minimize nonpoint pollution, protect beneficial uses, and achieve enhancement of water quality. Nonpoint pollution control strategies shall address the existing or potential nonpoint pollutants and sources identified by the watershed management committee as priorities.

Control strategies for pollutants or sources which are not identified as priorities may be included in the action plan, but are not required.

(2) Approach. Watershed management committees may select voluntary, educational, and/or regulatory approaches for addressing nonpoint pollution in the watershed. Educational programs must involve agencies and/or individuals with expertise in education in program development and implementation, while regulatory programs must provide adequate enforcement.

(3) Minimum requirements. The watershed management committee shall prepare a description and analysis of nonpoint pollution control strategies for each pollutant or source category which has been designated a priority. A source control strategy would address the pollutants from each source category which has been designated as a priority. A pollutant-by-pollutant strategy still entails control of sources in order to reduce or prevent pollutant loadings, but would be across the range of sources for that pollutant. The committee shall not be limited to the approaches described in subsection (4) of this section. The rationale for choosing or not choosing the approaches described in subsection (4) of this section for each source or pollutant control strategy shall be discussed, including the feasibility, cost, likelihood of success, and likelihood of achieving the stated goals and objectives. In addition, the committee shall describe the ways in which the nonpoint pollution control strategies will achieve enhancement of water quality and protection of beneficial uses in the watershed.

(4) Nonpoint pollution source categories. When addressing pollutants from farm practices, storm water and erosion, on-site septic systems, forest practices, marinas and boating, or other sources as applicable, the committee shall consider including the following in developing the nonpoint pollution control strategies:

(a) Farm practices. The intent of this strategy is to control nonpoint pollution that results from farm practices, and to emphasize education and incentives to obtain voluntary action for prevention and correction, the use of best management practices implemented as part of farm water quality management plans, and special considerations for noncommercial farms. Implementation of farm plans, including best management practices that meet USDA Soil Conservation Service technical standards, is the recommended control tool for action plans. The committee shall consider including a compliance and enforcement element for those cases where voluntary action is not obtained, and shall consider including the following:

(i) A farm inventory element that identifies all farms in the watershed, and includes information on the status of existing farm plans;

(ii) A prevention and corrective action element which includes: Provisions for encouraging farm operators without farm plans to develop and implement farm plans and to update existing farm plans; provisions for the local conservation district and lead implementing agency to evaluate on an ongoing basis the effectiveness of farm plan implementation; and special provisions to address nonpoint pollution from noncommercial farms;

(iii) An education element, coordinated with the conservation district and/or cooperative extension service, informing the agricultural community about nonpoint pollution from farm activities and the financial and technical assistance available to implement farm plans;

(iv) A compliance and enforcement element which includes: Incorporation of the Agriculture Compliance Memorandum of Agreement between the department, the Conservation Commission and conservation districts; additional enforcement provisions of the § 208 water quality management plans, such as the requirement for a National Pollutant Discharge Elimination system permit when applicable; and compliance with other applicable state and local laws and rules, such as the state water quality standards, and the federal Clean Water Act; and

(v) An exceptions element stating that any farm implementing an approved farm plan, as agreed upon by the operator and the conservation district, shall be exempt from further water quality regulation under this chapter unless there is a water quality violation pursuant to chapter 90.48 RCW (Water pollution control), chapter 90.52 RCW (Pollution Disclosure Act of 1971), or chapter 90.54 RCW (Water Resources Act of 1971) and/or degradation of water quality. In cases where a violation cannot be attributed to a specific farm or farms, the committee shall consider surveying and evaluating all pollution sources potentially contributing to the violation.

(b) Storm water and erosion. The intent of this strategy is to correct and prevent pollution from storm water and erosion originating in urban, suburban, and urbanizing areas of the watershed through focusing on a combination of problem evaluation, public education, use of best management practices, and management of the quality and quantity of storm water runoff. This strategy does not apply to drainage and erosion control activities of farm operations or forest practices addressed pursuant to (a) and (d) of this subsection. The committee shall consider including the following:

(i) An evaluation of existing drainage and erosion control ordinances, policies, and programs to determine their effectiveness in controlling erosion and managing storm water to enhance water quality and protect beneficial uses;

(ii) A ranked list of the most significant storm water and erosion problems in the watershed as determined by the severity of their threat to or impacts on beneficial uses, an explanation of the criteria used to complete the ranking, and identification of needed monitoring information when existing information is not adequate to fully rank the problems;

(iii) A prevention and corrective action element that includes applicable requirements of the Plan elements SW-1 through SW-4. If a watershed includes jurisdictions that encompass both urbanized areas as well as those not considered urbanized, as defined by the Plan, the watershed management committee, together with local government entities responsible for stormwater management, shall propose an appropriate boundary for SW-2 application based on the following criteria: Urban growth areas defined in chapter 36.70A RCW (Growth

Management Act), land use designations, and other special purpose district boundaries under the urbanized designation. A watershed management committee may choose storm water management and erosion control requirements that are more stringent than those in the Plan;

(iv) Coordination with local hazardous waste plans pursuant to chapter 70.105 RCW (Hazardous waste management); and

(v) Compliance with the provisions of the National Flood Insurance Program, 44 C.F.R. Parts 59 and 60, and chapter 86.16 RCW, Flood plain management; consideration of and coordination with NPDES Permit Application Regulations for Stormwater Discharges 40 C.F.R. Parts 122, 123, and 124, where appropriate.

(c) **On-site sewage disposal.** The intent of this strategy is to control nonpoint pollution that results from on-site sewage disposal systems and to emphasize prevention and remediation of water quality problems through education, regulation, correction of failing systems, and system maintenance. The committee shall consider including the following:

(i) Identification of geographic areas within the watershed with potential and existing risk of system failure, divided into categories of high, moderate, and low risk of failure, with an explanation of the criteria used. High risk areas are considered to be areas where systems are failing, where soils have severe limitations for sewage treatment, where development is occurring at high densities, or where other site conditions create a potential for surface or ground water contamination when on-site systems are used;

(ii) A prevention and corrective action element that includes: Provisions requiring adherence to chapter 246-272 WAC (On-site sewage system), particularly that failing systems be repaired or replaced; required use of alternative on-site sewage disposal systems in high risk areas, if site conditions permit the use of on-site sewage disposal; consideration of whether high risk areas would be better served, and water quality better protected, by a community or municipal sewage treatment system; provisions for an ongoing operation and maintenance program in high risk areas for existing and new systems utilizing a maintenance district or other mechanism that ensures proper functioning of systems; and in low and moderate risk areas, provisions for periodically informing users of on-site systems of the need for regular system maintenance; and

(iii) An education element directed at owners and those who install and service on-site systems, informing them about basic principles of system siting, design, installation, operation, and maintenance; local and state health requirements; available alternative systems; and financial assistance for remedial actions.

(d) **Forest practices.** The intent of this strategy is to control nonpoint pollution that results from forest practices and to emphasize coordination with forest practices and forest management programs. The committee shall consider including the following:

(i) Identification and ranking, with an explanation of criteria used, of water quality impacts in the watershed

resulting from forest practices, using in part the watershed analysis tools available from the department of natural resources, and/or the cooperative evaluation, monitoring and research steering committee with the timber/fish/wildlife agreement, categorized by type of forest practice, geographic area of impact, and land ownership, and ranked according to the severity of threat to beneficial uses and public resources;

(ii) A coordination element that specifies how the water quality impact will be addressed, including the forest practices rule and regulations and timber/fish/wildlife agreement for state and private forest lands, and the national forest planning process for federal forest lands. Proposals for correcting water quality or fish habitat problems should be coordinated with the department of fisheries or department of wildlife;

(iii) Provisions to ensure that the requirements of the Forest Practices Act and rules and regulations for land use conversions are implemented consistently to their fullest extent by all jurisdictions in the watershed;

(iv) Provisions for ensuring consistency among local jurisdictions in the watershed in carrying out the forest practices provisions in WAC 222-50-020(3) relating to the Shoreline Management Act; review of proposed regulations, and proposal of new regulations, pursuant to RCW 76.09.040 and review of forest practice applications pursuant to RCW 76.09.050;

(v) An education element coordinated with the department of natural resources that informs private landowners, especially small landowners, about the availability of technical assistance on water quality best management practices and compliance with forest practices rules and regulations, and informs watershed residents about opportunities for information and comment on forest practices in the watershed; and

(vi) Procedures for coordinating water quality monitoring on forest lands in the watershed with state, federal and timber/fish/wildlife monitoring programs.

(e) **Marinas and boats.** The intent of this strategy is to control nonpoint pollution from marinas and boats, focusing on coordinated education efforts for the boating public and marina operators to reduce pollutants from improper sewage disposal and boat maintenance. The committee shall consider including:

(i) Provisions for coordinating with the state parks and recreation commission, the department of health, and the state agency task force and advisory committees under MB-1 of the plan; and

(ii) An education program in coordination with element MB-4 of the plan to inform marina operators and the boating public about nonpoint pollution from boating activities, as well as the available methods to control such pollution and applicable federal, state, and local programs, including: On-board sanitation; near-shore and on-shore sewage disposal facilities; use of paints and solvents; solid waste disposal; and other practices related to the use, repair, or maintenance of boats that may contribute to water quality degradation. The boating public shall also be informed of the importance of preventing discharges in sensitive areas particularly shellfish beds and swimming areas; and

(iii) Measures may be developed for shoreside sewage disposal facilities at marinas, regulation of waste discharges from recreational boats and liveaboards, and for the storage, use, and disposal of hazardous materials such as fuels, paints, and solvents.

(f) **Other nonpoint sources.** The intent is to control other priority or potential priority sources of nonpoint pollution in the watershed, including but not limited to pesticides, landfills, mines, sand and gravel pits, septage disposal practices, and contaminated sites, as needed. The committee shall consider including the following:

(i) A pesticides management strategy, emphasizing an education program coordinated with the cooperative extension service, conservation district, forest and farm practices strategies pursuant to this chapter, and the state department of agriculture. This will include informing users of pesticides in the watershed about the potential water quality problems associated with the improper use, storage, and disposal of pesticides, and the less toxic alternatives, including integrated pest management practices and nonpesticide substances and techniques that do not degrade water quality. The education program shall consider utilizing the Puget Sound Pest Management Information Program developed under element NP-17 of the plan, and other appropriate actions, including possible use of the Pesticide Usage Survey developed under element NP-16 of the plan. The strategy shall also consider including provisions which recognize the state preemption to regulate pesticides pursuant to chapter 16-228 WAC (Pesticide regulations), chapter 17.21 RCW (Washington Pesticide Application Act) and chapter 15.58 RCW (Washington Pesticide Control Act).

(ii) A management strategy for addressing nonpoint pollution from landfills, mines, and sand and gravel pits shall consider including measures that local governments can incorporate into their permitting processes to minimize sedimentation, turbidity, particulates, and leachates from closed, active, and proposed landfills, mining, and excavation activities; an education program to inform those engaged in landfill and resource excavation activities about the potential water quality problems associated with these operations, existing applicable regulations, and effective methods to reduce erosion and leachates from these activities; and other appropriate actions.

(iii) A management strategy for septage disposal practices, including coordination with the local agency administering the regulations pursuant to chapter 173-304 WAC, Minimal functional standards for solid waste handling.

(iv) A management strategy for contaminated sites, including coordination with the plan, related federal superfund plans, and any relevant state cleanup plans.

(v) When addressing nonpoint pollution from other nonpoint sources, strategies shall be developed by the watershed management committee. [Statutory Authority: Chapter 90.70 RCW. 91-22-096, § 400-12-525, filed 11/6/91, effective 12/7/91.]

WAC 400-12-535 Phase 3--Action plan implementation strategy. The watershed management committee shall prepare a strategy for implementing the action plan, including the following:

(1) A description of the specific actions required of each implementing agency and local government, including federal compliance requirements pursuant to Section 313 of the Federal Clean Water Act, and a means of coordinating these actions within and among control strategies. Where possible, the implementation strategy shall include, but is not limited to, specifically worded statements, such as model ordinances, recommended government policy statements, interagency agreements, proposed legislative changes, and proposed amendments to local comprehensive plans;

(2) A schedule that includes annual milestones for implementing nonpoint pollution control strategies and a specified time frame for achieving action plan objectives;

(3) Estimated implementation costs and budget, including a financing element that identifies existing and potential local, state, and federal funding sources to fully implement the action plan. Optional federal and state funding sources include Sections 319 and 205(j) of the Clean Water Act, as well as the state revolving loan program and the Centennial Clean Water Fund. The financing element shall include local long-term funding sources, such as utility districts, that are capable of generating revenues needed to sustain nonpoint pollution control programs;

(4) Identification of a lead agency which must be willing and able to assume a leadership role in coordinating the implementation of the action plan and the public involvement process;

(5) A dispute resolution process to resolve disputes between the lead implementing agency and other implementing entities;

(6) A process and strategy for coordination and integration with ongoing planning and management programs within the watershed which impact water quality, including local, state, federal, and tribal plans and programs. Such plans and programs shall include comprehensive land use plans under the Growth Management Act, storm water and highway runoff plans, drainage basin plans, ground water management programs, flood control plans, wetlands management and protection programs, Coastal Zone Management Act Section 6217 coastal nonpoint pollution control programs, the Shoreline Master Program (chapter 173-19 WAC), shellfish and fisheries management programs, and others as appropriate;

(7) Provisions for public involvement in the preparation and adoption of implementation plans, policies, and/or ordinances. Such public involvement may include the designation of a watershed management council or similar body to advise and assist the lead implementing agency with overseeing implementation of the action plan; and

(8) A method of evaluating the overall effectiveness of the action plan in preventing and correcting ground and surface water quality impacts from nonpoint pollution and protecting beneficial uses, including:

(a) A long-term monitoring program. The long-term monitoring program shall provide information on trends related to water quality, habitat, biological conditions, and land use to determine whether the nonpoint pollution control strategies in the approved action plan are effective; and

(b) A process for annual review. The lead implementing agency shall annually evaluate the effectiveness of the action plan and report the results of the evaluation to the department and affected parties. Every other year, this report shall include the results from the long-term monitoring program, as applicable, and shall coincide with the departmental biennial audit. [Statutory Authority: Chapter 90.70 RCW, 91-22-096, § 400-12-535, filed 11/6/91, effective 12/7/91.]

WAC 400-12-545 Phase 4—Action plan review and approval. (1) Departmental review. The watershed management committee and lead agency shall periodically consult with the department for technical assistance in the preparation of the draft plan to be submitted for the public and agency review in subsection (2) of this section. The watershed management committee and lead agency shall submit draft portions of the plan, as each phase is completed, to the department for review.

(2) Public and agency review.

(a) As soon as the watershed management committee completes the draft action plan, the lead agency shall:

(i) Forward this draft action plan to the department for review;

(ii) Forward this draft action plan to the planning and implementing entities identified in the action plan for review and to initiate the process for obtaining concurrence;

(iii) Distribute this draft action plan to the public; and

(iv) Initiate the SEPA review process.

(b) Within thirty days after distribution of the draft action plan, the watershed management committee and implementing entities shall conduct a joint public hearing to take public testimony on the draft action plan.

(c) Each planning and implementing entity shall evaluate those provisions of the draft action plan which require the entity's involvement.

(d) The department, planning and implementing agencies, and the public shall provide comments to the lead agency within sixty days of the distribution of the draft action plan.

(e) The lead agency shall collect the comments and present them to the watershed management committee.

(f) The committee shall prepare final revisions to the action plan and a summary of responses to the comments and forward these, preferably within sixty days, to the lead agency and planning and implementing agencies for statements of concurrence.

(3) Statements of concurrence.

(a) Within sixty days of publication of the final proposed action plan, each implementing entity shall submit a statement of its concurrence to the watershed management committee, indicating its intent to adopt implementing policies, ordinances, and programs as required,

or a statement of nonconcurrence with the final proposed action plan which recommends specific revisions to those sections requiring its involvement. The lead agency need only concur with those provisions of the final proposed action plan which require its involvement.

(b) The committee shall attempt to resolve statements of nonconcurrence utilizing their dispute resolution process, prepare final revisions to the action plan, and approve it, preferably within sixty days.

(4) Action plan submittal. The final revised action plan shall be forwarded to the lead agency for submittal to the department. If there are unresolved issues or if there are statements of nonconcurrence which could not be resolved by the watershed management committee, these shall be described and included with the final revised action plan for submittal to the department. The lead agency shall propose solutions to any remaining statements of nonconcurrence and submit them to the department as part of the final action plan.

(5) Ecology approval process. Not more than thirty days from receipt of the final action plan, the department shall notify the lead agency, in writing, of its decision to approve or reject all or any portion of the final action plan. The lead agency shall promptly notify the watershed management committee of the decision of the department. Implementation of approved portions may proceed while approval of other portions is pending. To approve all or part of an action plan, the department must conclude that:

(a) The action plan is consistent with the goals and requirements of the plan;

(b) The action plan has been developed in accordance with the process described in this chapter;

(c) The plan contains a summary of the water quality characterization, the problem definition, and a statement of goals and objectives;

(d) 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 plan;

(e) The plan includes statements of concurrence from entities responsible for implementing recommendations of the action plan; in making a determination, the department shall consider the impact of any statements of nonconcurrence submitted with the action plan;

(f) The action plan includes a budget and implementation schedule;

(g) Adequate public involvement and participation has occurred in development of the action plan and a process for adequate public involvement in implementation of the plan is provided for in the action plan; and

(h) The plan complies with applicable state and federal laws.

(6) Authority review. If the department disapproves all or part of the action plan and the lead agency cannot reach agreement with the department on approval within sixty days, either the lead agency, the watershed management committee, or the department may request review by the authority. The authority will review the decision for consistency with the plan and forward its

determination to the department, lead agency, and watershed management committee. [Statutory Authority: Chapter 90.70 RCW. 91-22-096, § 400-12-545, filed 11/6/91, effective 12/7/91.]

WAC 400-12-555 SEPA review. The action plan, subsequent revisions, and implementation actions of the action plan shall be subject to review pursuant to the State Environmental Policy Act, chapter 43.21C RCW, as required under the applicable state and local implementing regulations. [Statutory Authority: Chapter 90.70 RCW. 91-22-096, § 400-12-555, filed 11/6/91, effective 12/7/91.]

WAC 400-12-565 Revisions. The lead agency or the department may initiate a process for making revisions to the action plan if either determines through annual evaluations or biennial audits that the nonpoint pollution control strategies or implementation provisions of the action plan are not effective. Upon determining that an action plan needs revision, the lead agency or the department shall provide written notice to the other, identifying the provisions of the action plan to be modified, the reason for the revision, and a reasonable time frame in which the revision is to be made.

All revisions to action plans shall be processed in accordance with the requirements of WAC 400-12-525, 400-12-535, 400-12-545, and 400-12-220. [Statutory Authority: Chapter 90.70 RCW. 91-22-096, § 400-12-565, filed 11/6/91, effective 12/7/91.]

PART SIX ACTION PLAN IMPLEMENTATION

WAC 400-12-605 Decision of department. Within thirty days of approval or disapproval of all or part of the action plan by the department, the lead agency shall notify in writing all appropriate federal and state agencies, relevant local planning and implementing entities, and affected parties of the department's decision. [Statutory Authority: Chapter 90.70 RCW. 91-22-096, § 400-12-605, filed 11/6/91, effective 12/7/91.]

WAC 400-12-615 Responsibilities of implementing entities. (1) Implementing entities are encouraged to adopt action plans, or applicable parts thereof, once approved by the department. Each local and state implementing entity identified in the action plan approved by the department shall be responsible for carrying out its portion of the action plan within the prescribed schedule, using the approaches described in the action plan, pursuant to RCW 90.70.070.

(2) In addition, affected local governments and state agencies with jurisdiction in the watershed shall be guided by the action plan in developing and approving all studies, plans, permits, and facilities in the watershed. The lead implementing agency shall seek to ensure consistency of federal agency actions pursuant to Section 313 and Section 319 of the Clean Water Act, 33 U.S.C.

1251 et seq., as amended, if applicable. [Statutory Authority: Chapter 90.70 RCW. 91-22-096, § 400-12-615, filed 11/6/91, effective 12/7/91.]

WAC 400-12-625 Lead agency responsibilities. (1) The lead implementing agency, identified in the implementation strategy developed in accordance with WAC 400-12-535, shall be responsible for coordinating among implementing entities and establishing a public involvement process.

(2) Pursuant to chapter 39.34 RCW (Interlocal Cooperation Act), cooperative agreements may be used to facilitate coordination among implementing entities and between the lead agency and implementing entities.

(3) The lead agency shall also be responsible for providing annual progress reports according to the requirements under WAC 400-12-535. [Statutory Authority: Chapter 90.70 RCW. 91-22-096, § 400-12-625, filed 11/6/91, effective 12/7/91.]

WAC 400-12-635 Department responsibilities. The department shall provide ongoing oversight of watershed action plans. In addition, the department shall audit each watershed action plan every two years to ensure consistent and adequate implementation. [Statutory Authority: Chapter 90.70 RCW. 91-22-096, § 400-12-635, filed 11/6/91, effective 12/7/91.]

PART SEVEN PLAN COMPLIANCE

WAC 400-12-700 Default procedure. If a planning or implementing entity does not carry out its responsibilities pursuant to this chapter, such as develop action plans, and/or carry out its responsibilities under the approved action plan, and has not been granted an exception under WAC 400-12-710, the department shall work directly with that entity to identify reasons why and to develop an appropriate strategy for addressing nonpoint pollution concerns. If the planning or implementing entity fails to prepare and/or implement a watershed action plan, or portions thereof, the authority shall follow procedures in chapter 90.70 RCW and in element EM-8 of the plan to seek action. In addition, the department shall use its regulatory authority under chapter 90.48 RCW (Water pollution control) to require that water quality problems are corrected and, as a last resort, prepare action plans, and/or implement portions thereof. [Statutory Authority: Chapter 90.70 RCW. 91-22-096, § 400-12-700, filed 11/6/91, effective 12/7/91. Statutory Authority: RCW 90.70.055 and 90.70.060. 88-06-053 (Order 88-01), § 400-12-700, filed 3/2/88.]

WAC 400-12-710 Exceptions. The lead agency may request approval of an alternative to the procedures or action plan content provisions of this chapter when there are special circumstances unique to that lead agency or watershed. Such requests shall be made in

writing to the department and describe how the alternative is consistent with the intent of this chapter and the plan. If the department approves such an alternative, it shall specify in writing agreed-upon schedules and milestones for achieving objectives with adequate opportunities for public involvement, and shall clearly state that the exception may be revoked if the schedules and milestones are not achieved. [Statutory Authority: RCW 90.70.055 and 90.70.060. 88-06-053 (Order 88-01), § 400-12-710, filed 3/2/88.]

WAC 400-12-720 Severability. If any provision of this chapter or its application to any person, entity, or circumstance is held invalid, the remainder of this chapter or the application of the provision to other persons, entities, or circumstances shall not be affected. [Statutory Authority: RCW 90.70.055 and 90.70.060. 88-06-053 (Order 88-01), § 400-12-720, filed 3/2/88.]

