

June 2009

Final Proposed Shoreline Master Program

Shoreline Inventory for the Cities of Lacey, Olympia, and Tumwater and their Urban Growth Areas



Part 1: Shoreline Inventory

Part 2: Inventory Appendix

Part 3: Shoreline Analysis and
Characterization Report

Thurston Regional Planning Council

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THURSTON REGIONAL PLANNING COUNCIL (TRPC) is a 22-member intergovernmental board made up of local governmental jurisdictions within Thurston County, plus the Confederated Tribes of the Chehalis Reservation and the Nisqually Indian Tribe. The Council was established in 1967 under RCW 36.70.060, which authorized creation of regional planning councils.

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About This Report

Consistent with Governor Gregoire's Plain Talk Executive Order 05-03 (2005), this report is written in a manner that is brief and to-the-point, uses non-bureaucratic language and features a clean design that promotes fast scanning and reading.

Scientific and legal references are kept to a minimum, replaced by a full list of sources in the report appendix.

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I. Introduction

A. Background and Purpose

This report is a draft inventory of the shoreline characteristics for the cities of Lacey, Olympia, Tumwater and their urban growth areas. The report has been created as part of the Shoreline Master Program for the cities and is part of Phase 1 of the overall update. The report will be used to analyze and characterize shoreline conditions and functions (Phase 2).

B. Timeline

A timeline for the complete shoreline master program update (a multi-year program) is below:

TABLE 1: TIMELINE FOR THE SHORELINE MASTER PROGRAM UPDATE FOR THE CITIES OF LACEY, OLYMPIA, AND TUMWATER

Phase	Update Schedule	Timeline
1	<ul style="list-style-type: none">• Determine what shorelines are regulated under the act• Conduct an inventory of all existing and available data for shorelines• Public Open Houses	Winter 2008
2	<ul style="list-style-type: none">• Analyze and characterize shoreline conditions	Spring 2008
3	<ul style="list-style-type: none">• Categorize each shoreline segment into a designation such as urban, suburban, or rural. Each will have a different set of rules.• Develop draft rules and policies• Public meetings	Fall 2008 Winter-Spring 2009
4	<ul style="list-style-type: none">• Analyze the cumulative impacts of expected shoreline development or redevelopment• Develop a restoration (and preservation) plan, including public access	Winter-Spring 2009
5	<ul style="list-style-type: none">• Public hearings• Planning Commission recommendations• City Council approval• State approval	Late 2009-2011

II. Methods

A. Overview

This inventory was created by reviewing available and existing data and reports. Due to the extensive work by the jurisdictions (Tribes, Cities, County, Regional, State, Conservation District, Non-Profits among others) much data was already available within the study area. This work was compiled for review by a Scientific and Technical Advisory Team, and with input from a consulting team that will utilize the inventory in the analysis and characterization of the shorelines.

At this time jurisdiction is still being determined for several of the water bodies in the study area. This is expected to be completed before a final inventory report is issued.

Working with the Scientific and Technical Advisory Group and the Consulting Team, some of the larger shorelines will be broken down into smaller reaches. At that time the inventory will also be refined if necessary.

B. Mapping

A series of similar maps has been prepared for each of the three cities – Lacey, Olympia, and Tumwater, along with their associated urban growth area as part of the inventory.

MAP 1: PROPOSED SMA SHORELINE JURISDICTION WITH REACHES

MAP 2: 2006 AERIAL PHOTOS

MAP 3: BASIN, WATERSHED, AND WRIA BOUNDARIES

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III. Shoreline Jurisdiction

A. Minimum Shoreline Jurisdiction

At a minimum, the Shoreline Management Act (SMA) applies to all Shorelines of the State. Shorelines of the State, as defined under the SMA, include:

- All marine waters, as well as tidelands
- Lakes that are 20 acres or greater in size (at ordinary high water mark – may include vegetated shorelines)
- Streams and rivers with a mean annual flow of greater than 20 cubic feet per second
- The following areas when they are associated with one of the above:
 - Wetlands and river deltas
 - Floodways
- Upland areas extending 200 feet from the shoreline's edge
- Portions of the 100-year floodplain within 200 feet of an associated floodway

One of the first tasks in completing a shoreline inventory is determining the specific water bodies and associated areas that qualify under minimum shoreline jurisdiction. For the cities of Lacey, Olympia, and Tumwater and their urban growth areas this was a three step process:

1. Determine the water features (and their designations) currently being regulated under the Shoreline Master Program.
2. Determine if any additional water bodies meet the criteria of shorelines.
3. Determine the extent of any associated wetlands or floodways meeting the criteria.

B. Optional Jurisdiction

Once minimum jurisdiction is determined, the cities may also choose to apply SMA regulations to additional areas. These areas are:

- Buffers around critical areas associated with a shoreline
- Critical areas such as steep slopes or channel migration zones
- 100 year floodplain (the 100 year floodplain is currently being regulated under the SMA in the cities of Lacey, Olympia, and Tumwater.)

IV. Growth Management Act and Shoreline Management Act

A. Regulatory Framework

Both the Growth Management Act (GMA) and the Shoreline Management Act (SMA) provide a regulatory framework for certain critical areas.

When critical areas are located within SMA Jurisdiction, the Shoreline Management Act requires the following:

- Critical areas occurring within a shoreline of the state are regulated through the Shoreline Master Program (and not the Critical Areas Ordinance adopted under GMA.)
- The level of protection of critical areas which occur within a shoreline of the state shall be at least equal to the level of protection provided by the local government's Critical Areas Ordinance regulations.
- Local jurisdictions, at their option, may choose to have Critical Areas Ordinance buffers be a part of SMA jurisdiction. This is also referred to "optional SMA jurisdiction".

B. Critical Area Ordinances

Critical area ordinances can be found under the goals and policies of local Comprehensive Plans, and in adopted Critical Areas Ordinances (CAO) development regulations, as required by the Growth Management Act. The last updates were adopted in the following years:

- City of Tumwater - 2004
- City of Olympia - 2005 and 2006
- City of Lacey - 2003 and 2007

The updated ordinances address the required issues of Best Available Science and protection of salmonid fisheries. All CAO updates have been accepted by the State Department of Community Trade and Economic Development (CTED).

Thurston County is in the process of updating its CAO to address GMA requirements.

V. Existing Shoreline Inventory

A. Previous Shoreline Master Programs

The first inventory of shorelines in the Thurston Regional regulated under the SMA was completed in 1975 (O’Neil, 1975). In the 1980s there were several additions to the shorelines regulated under the SMA. Most notably, Barnes Lake and Black Lake Drainage Ditch were added to the inventory, and the area of Woodland Creek regulated under the SMA was extended to south of Interstate 5. In 1990, the Cities of Lacey, Olympia, and Tumwater adopted the most recent update of a Regional Shoreline Master Plan (Aaland, 1990). There have been several text amendments since that time.

In the current inventory, shorelines regulated under the SMA were designated as one of the following shoreline environments:

- Natural
- Conservancy
- Rural
- Urban

B. Anticipated Changes

It is anticipated that in the update of the Shoreline Master Plan (which is expected to be adopted by 2011), additional areas will fall under minimum shoreline jurisdiction. For instance, a recent study has shown that at the statewide level, many lakes were not included in the original inventory because their area of standing water was less than 20 acres. The true measurement of a lake’s area is at the “ordinary high water mark,” which may include wetlands beyond the edge of open water. Shoreline environmental designations are also expected to change with the shoreline update.

C. Existing SMA Shorelines and Potential Changes to SMA Jurisdiction

The following is a list of existing shorelines under SMA jurisdiction, and potential changes for the Cities of Lacey, Olympia, and Tumwater and their associated urban growth areas:

TABLE 2: EXISTING SMA SHORELINES AND POTENTIAL CHANGES TO SMA JURISDICTION FOR LACEY, OLYMPIA, TUMWATER AND THEIR UGAS.

Type	City/ Urban Growth Areas	Existing (In Current Inventory)	Potential Changes	Justification	Significant Associated Wetlands/Floodplain
Marine Waters					
Budd Inlet	Olympia & UGA	Yes	No change	Marine	Some
Nisqually Reach	Lacey & UGA	Yes	No change	Marine	Some
Rivers/Streams					
Black Lake Drainage Ditch	Olympia Tumwater & UGA	Yes	No change	Flow	Yes – field verified by TRPC
Chambers Creek	Olympia UGA Tumwater UGA	No	Add to inventory	Flow identified as meeting criteria in 1998 USGS report	Yes
Deschutes River	Olympia & UGA Tumwater & UGA	Yes	No change	Flow	Yes
Percival Creek	Olympia Tumwater	Yes	No change	Flow	Yes
Woodland Creek	Lacey & UGA	Yes	Change to start point (now at USGS gauge at Interstate 5)	Flow identified as meeting criteria in 1998 USGS report	Some

TABLE 2 (CONTINUED): EXISTING SMA SHORELINES AND POTENTIAL CHANGES TO SMA JURISDICTION FOR LACEY, OLYMPIA, TUMWATER AND THEIR UGAS.

Type	City/ Urban Growth Areas	Existing (In Current Inventory)	Proposed	Justification	Significant Associated Wetlands/Floodplain
Lakes					
Barnes Lake	Tumwater	No	Add to inventory	The open water of this lake is well over 20 acres. This lake was in the original 1975 inventory – field verified 2008	No
Bigelow Lake	Olympia UGA	No	Add to inventory	Field verified 2008 – new OHWM	Yes – within the OHWM for the most part.
Black Lake	Tumwater UGA	Yes	No change	Over 20 acres	Yes
Capitol Lake	Olympia Tumwater	Yes	No change	Over 20 acres	No
Chambers Lake	Lacey Olympia	Yes	No change	Over 20 acres	Yes- extent of southern wetlands was field verified in 2008
Grass Lake (Lake Louise)	Olympia	Yes	No change	Lake plus associated wetlands at ordinary high water mark are over 20 acres – memo from Dept. of Ecology establishes field verified OHWM	Yes – and wetlands within OHWM for the most part

TABLE 2 (CONTINUED): EXISTING SMA SHORELINES AND POTENTIAL CHANGES TO SMA JURISDICTION FOR LACEY, OLYMPIA, TUMWATER AND THEIR UGAS.

Type	City/ Urban Growth Areas	Existing (In Current Inventory)	Proposed	Justification	Significant Associated Wetlands/Floodplain
Hewitt Lake	Olympia UGA	Yes	No change	Over 20 acres	No
Hicks Lake	Lacey	Yes	No change	Over 20 acres	Yes
Ken Lake	Olympia	Yes	No change	Over 20 acres	No
Lake Susan	Tumwater & UGA	Yes	No change	Over 20 acres with Munn Lake	Yes
Long Lake	Lacey & UGA	Yes	No change	Over 20 acres	Yes- field verified 2008 (Longs pond not included as it is over 6.6 feet in depth and therefore not a wetland)
Munn Lake	Tumwater UGA	Yes	No change	Over 20 acres with Lake Susan	Yes - field verified 2008 (Trails End Lake not included as it is over 6.6 feet in depth and therefore not a wetland)
Pattison Lake	Lacey & UGA	Yes	No change	Over 20 acres	Yes
Southwick Lake	Lacey & UGA	Yes	No change	Over 20 acres	No
Trosper Lake	Tumwater & UGA	Yes	No change	Lake and wetlands at ordinary high ground water mark over 20 acres	Yes
Ward Lake	Olympia & UGA	Yes	No change	Over 20 acres	No

VI. Regional Profile

A. History

Salish Indian groups from the tribes now known as Nisqually, Squaxin, and Chehalis gathered shellfish and frequented the inlets and prairies of Puget Sound for centuries before Euro-American exploration and settlement. The rivers of the County were long-established for salmon harvesting, the prairies were popular hunting and plant harvesting sites, and the beaches were replete with shellfish, harvested by native peoples.

Tumwater was the site of the first non-native permanent American settlement on Puget Sound. In 1845, a party of 30 men and women established a settlement when the area was still part of British Territory. The settlement developed around the Tumwater Falls. A flood of settlers followed, and Olympia was settled shortly after. Washington Territory was separated from Oregon Territory in 1853, and Olympia was designated as the temporary capital. Olympia became the permanent capitol in 1855. In 1891 Woodland officially became known as Lacey and in 1893 construction began on the first buildings of St. Martin's College. Lacey officially incorporated as a city in 1966.

As early as 1853, settlers began appreciating the qualities of the oyster. Native Americans often sold oysters to settlers and by 1868 a brisk trade with San Francisco in Olympia oysters was under way. Beginning about 1890 the native population of oysters was augmented through oyster cultivation, and oyster boats and rafts for harvesting and washing became common. In 1900 oystermen began damming the natural tidelands to create more, extensive beds for oyster cultures. The high point of oyster production occurred in the 1920s. Eventually, native stocks were depleted by pollution from nearby pulp mills and Japanese Pacific oysters were later introduced.

The inlets of the Puget Sound had long been popular summer camping sites, but new roads and automobile travel opened up areas to permanent homes. At Butler Cove, just north of Olympia, prestigious homes were built in the 1920s in conjunction with a golf course and country club. The 1910 and 1920s were also a period of expansion around the lakes of the County as automobile travel increased mobility and brought residents to local resorts. The heyday for lake resorts was the 1920s. Hicks, Long, Pattison, and Southwick Lakes all had resorts – Hicks Lake alone had seven resorts in 1926, including one that is currently the site of Christian summer youth camps.

B. Land Use

Today, Thurston County is one of the fastest growing counties in Washington. The 2007 population estimate for the urban areas of Lacey, Olympia, and Tumwater is approximately 147,000 people. The population is expected to increase to 231,000 people by 2030. The expected increase in jobs is also significant. In 2003 it was estimated that there were approximately 96,000 jobs in the three-city urban area; this is expected to increase to 149,000 by the year 2030.

The land use is typical of an urban-suburban environment. In the cities is a mix of commercial, industrial, and moderate to high density urban uses, intermingled with parks. Moving out from the core are moderate density residential areas. Typically of American cities, lower-density residential neighborhoods were built in much of the surrounding areas during the 1960s and 1970s, including around many suburban lakes such as Hicks, Ken, Long, and Pattison Lakes. By the early 1990s the state passed the Growth Management Act, requiring that urban development occur at urban densities and that areas for urban growth be designated around existing cities.

In the future it is expected that residential growth in the urban areas of Lacey, Olympia, and Tumwater will take place at moderate to high densities, infilling vacant lands within the existing urban growth area. Lands around critical areas, lakes, and other shorelines will be set aside in riparian buffers as upland areas are developed.

In the residential areas there is limited potential for redevelopment – but along the marine shoreline and in downtown Olympia redevelopment is already occurring, providing opportunities for restoration and increased enjoyment of shorelines.

C. Land Cover, Forest Cover, and Impervious Surfaces

Land cover, forest cover, and impervious surfaces are important indicators of the health of a basin. Many of the basins in the urban areas of Lacey, Olympia, and Tumwater have a total impervious surface area of greater than 10 percent (Capitol Lake, Chambers, Indian Creek, Mission Creek, Moxlie Creek, Percival Creek, Schneider, West Bay, Green Cove Creek, Woodard, and Woodland), however efforts have been made to retain a forested riparian corridor even in these urban basins.

Thurston Regional Planning Council (TRPC) has worked with the Stormwater Utilities of Lacey, Olympia, Tumwater, and Thurston County to develop estimates of future impervious surfaces given current land use patterns, zoning, and the population and employment forecast. These estimates are for the year 2030 and at a theoretical capacity. The estimates are useful for planning purposes only as a general indication of impervious surface conditions.

D. Wetlands

Thurston Regional Planning Council (TRPC) has mapped wetlands from color infrared aerial photography for most of Thurston County. As this data layer has not been completely field verified, it is referred to as Wetland Indicators, and provides a planning level data set at the County-wide level. It has been supplemented with wetlands mapped by the National Wetlands Inventory (NWI). Wetlands associated with shorelines were either field verified (see Appendix) or refined using LiDAR-derived topography and recent aerial photos.

TABLE 3: 2000 LAND COVER FOR SELECT BASINS WITHIN THURSTON COUNTY (ACRES).

Watershed	Basin	Forest				Urban			Other				Total
		Coniferous	Mixed	Hardwoods	Young Trees	High Density	Moderate Density	Low Density	Non-Forest Vegetation - Shrubs, grasses	Non-irrigated pasturelands, dry grasses, soils	Mines, Quarries, Gravel Pits	Water	
Budd/ Deschutes	Black Lake	345	259	683	157	112	334	64	1,955	1,073	5	540	5,526
	Capitol Lake	74	26	68	22	191	270	22	305	167	-	252	1,399
	Chambers	1,073	310	805	232	229	1,139	100	2,622	1,706	16	184	8,416
	Deschutes River	17,935	6,932	5,407	2,955	733	1,396	239	10,759	9,759	92	78	56,284
	East Bay	285	295	496	121	33	213	29	941	342	-	6	2,761
	Ellis Creek	160	128	301	84	5	62	13	541	174	-	6	1,473
	Indian Creek	90	23	157	37	110	299	32	535	206	-	13	1,500
	Mission Creek	23	24	47	12	4	81	7	125	35	-	-	359
	Moxlie Creek	117	45	70	12	239	428	28	323	200		1	1,463
	Percival Creek	376	226	561	168	851	387	64	1,299	685	54	42	4,712
	Schneider	38	31	47	11	63	167	11	221	91	-	-	680
West Bay	152	148	324	110	41	206	28	684	214	5	6	1,918	
Eld Inlet	Green Cove Creek	353	284	484	123	59	130	28	750	258	12	2	2,483
Henderson Inlet	Woodard	496	255	705	174	331	402	49	1,422	641	-	3	4,479
	Woodland	3,247	650	1,334	370	1,033	2,741	186	4,106	4,372	131	703	18,872
Nisqually River	McAllister Creek	7,246	886	1,321	567	297	994	91	4,435	3,570	125	286	19,818
	Nisqually Reach	1,561	410	651	194	24	174	34	1,189	420	-	6	4,662
Total		33,571	10,931	13,462	5,350	4,355	9,422	1,026	32,212	23,911	440	2,128	136,807

Source: TRPC GIS data; Tabbutt, 2001

TABLE 4: 2000 LAND COVER FOR SELECT BASINS WITHIN THURSTON COUNTY (PERCENT).

Watershed	Basin	Forest				Urban			Other				Total
		Coniferous	Mixed	Hardwoods	Young Trees	High Density	Moderate Density	Low Density	Non-Forest Vegetation - Shrubs, grasses	Non-irrigated pasturelands, dry grasses, soils	Mines, Quarries, Gravel Pits	Water	
Budd/ Deschutes	Black Lake	6%	5%	12%	3%	2%	6%	1%	35%	19%	0%	10%	100%
	Capitol Lake	5%	2%	5%	2%	14%	19%	2%	22%	12%	0%	18%	100%
	Chambers	13%	4%	10%	3%	3%	14%	1%	31%	20%	0%	2%	100%
	Deschutes River	32%	12%	10%	5%	1%	2%	0%	19%	17%	0%	0%	100%
	East Bay	10%	11%	18%	4%	1%	8%	1%	34%	12%	0%	0%	100%
	Ellis Creek	11%	9%	20%	6%	0%	4%	1%	37%	12%	0%	0%	100%
	Indian Creek	6%	2%	10%	2%	7%	20%	2%	36%	14%	0%	1%	100%
	Mission Creek	7%	7%	13%	3%	1%	23%	2%	35%	10%	0%	0%	100%
	Moxlie Creek	8%	3%	5%	1%	16%	29%	2%	22%	14%	0%	0%	100%
	Percival Creek	8%	5%	12%	4%	18%	8%	1%	28%	15%	1%	1%	100%
	Schneider	6%	5%	7%	2%	9%	24%	2%	32%	13%	0%	0%	100%
	West Bay	8%	8%	17%	6%	2%	11%	1%	36%	11%	0%	0%	100%
Eld Inlet	Green Cove Creek	14%	11%	20%	5%	2%	5%	1%	30%	10%	0%	0%	100%
Henderson Inlet	Woodard	11%	6%	16%	4%	7%	9%	1%	32%	14%	0%	0%	100%
	Woodland	17%	3%	7%	2%	5%	15%	1%	22%	23%	1%	4%	100%
Nisqually River	McAllister Creek	37%	4%	7%	3%	2%	5%	0%	22%	18%	1%	1%	100%
	Nisqually Reach	33%	9%	14%	4%	1%	4%	1%	26%	9%	0%	0%	100%
Total		25%	8%	10%	4%	3%	7%	1%	24%	17%	0%	2%	100%

Source: TRPC GIS data; Tabbutt, 2001

TABLE 5: 2000 GENERALIZED LAND COVER FOR SELECT BASINS AND RIPARIAN AREAS WITHIN THURSTON COUNTY

Watershed	Basin	Urban (acres)	Forest (acres)	Other (acres)	Water (acres)	Total (acres)	% Urban	% Forest	% Forested in 150 ft. Riparian Areas
Budd/ Deschutes	Black Lake	510	1,443	3,032	540	5,526	9.2%	26.1%	43%
	Capitol Lake	683	191	534	255	1,663	41.1%	11.5%	27%
	Chambers	1,468	2,420	4,344	184	8,416	17.4%	28.8%	39%
	Deschutes River	2,368	33,229	20,610	78	56,284	4.2%	59.0%	75%
	East Bay	275	1,197	1,283	6	2,761	9.9%	43.4%	52%
	Ellis Creek	79	673	714	6	1,472	5.4%	45.7%	60%
	Indian Creek	440	306	741	13	1,500	29.3%	20.4%	47%
	Mission Creek	92	107	160	-	359	25.7%	29.8%	63%
	Moxlie Creek	695	244	523	1	1,463	47.5%	16.7%	60%
	Percival Creek	1,302	1,330	2,037	42	4,712	27.6%	28.2%	44%
	Schneider	241	128	312	-	680	35.4%	18.8%	66%
West Bay	275	735	902	6	1,918	14.4%	38.3%	38%	
Eld Inlet	Green Cove Creek	260	1,284	1,090	2	2,636	9.9%	48.7%	71%
Henderson Inlet	Woodard	782	1,630	2,064	3	4,479	17.5%	36.4%	62%
	Woodland	3,960	5,601	8,609	703	18,873	21.0%	29.7%	54%
Nisqually River	McAllister Creek	1,383	10,020	8,129	286	19,818	7.0%	50.6%	47%
	Nisqually Reach	232	2,816	1,609	6	4,662	5.0%	60.4%	69%

Source: TRPC GIS data; Tabbutt, 2001

TABLE 6: ESTIMATES OF TOTAL AND EFFECTIVE IMPERVIOUS AREA, 2000, 2030 AND CAPACITY FOR SELECT BASINS IN THURSTON COUNTY.

Watershed	Basin	Total (acres)	Total Impervious Area Estimates						Effective Impervious Area Estimates					
			2000		2030 Estimate		Capacity Estimate		2000		2030 Estimate		Capacity Estimate	
			Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Budd/ Deschutes	Black Lake	5,526	515	9.3%	794	14.4%	1,202	21.8%	380	6.9%	591	10.7%	907	16.4%
	Capitol Lake	1,663	683	41.1%	723	43.5%	748	44.9%	549	33.0%	579	34.8%	599	36.0%
	Chambers	8,416	1,484	17.6%	2,087	24.8%	2,399	28.5%	1,103	13.1%	1,561	18.5%	1,807	21.5%
	Deschutes River	56,284	2,460	4.4%	3,616	6.4%	4,699	8.3%	1,806	3.2%	2,681	4.8%	3,531	6.3%
	East Bay	2,761	275	9.9%	355	12.9%	395	14.3%	202	7.3%	262	9.5%	292	10.6%
	Ellis Creek	1,472	79	5.4%	129	8.8%	155	10.5%	57	3.9%	94	6.4%	113	7.7%
	Indian Creek	1,500	440	29.3%	523	34.9%	569	38.0%	334	22.3%	398	26.6%	433	28.9%
	Mission Creek	359	92	25.7%	114	31.8%	130	36.4%	68	18.9%	84	23.5%	97	27.1%
	Moxlie Creek	1,463	695	47.5%	728	49.8%	738	50.4%	540	36.9%	567	38.7%	574	39.3%
	Percival Creek	4,712	1,356	28.8%	1,671	35.5%	2,032	43.1%	1,060	22.5%	1,306	27.7%	1,594	33.8%
	Schneider	680	241	35.4%	282	41.5%	298	43.8%	185	27.2%	216	31.8%	228	33.5%
West Bay	1,918	280	14.6%	349	18.2%	390	20.3%	204	10.7%	256	13.4%	287	15.0%	
Eld Inlet	Green Cove Creek	2,636	272	10.3%	390	14.8%	426	16.2%	197	7.5%	286	10.8%	313	11.9%
Henderson Inlet	Woodard	4,479	782	17.5%	1,008	22.5%	1,130	25.2%	611	13.6%	786	17.6%	881	19.7%
	Woodland	18,873	4,091	21.7%	5,340	28.3%	6,921	36.7%	3,050	16.2%	4,018	21.3%	5,317	28.2%
Nisqually River	McAllister Creek	19,818	1,507	7.6%	2,124	10.7%	2,489	12.6%	1,059	5.3%	1,524	7.7%	1,804	9.1%
	Nisqually Reach	4,662	232	5.0%	480	10.3%	608	13.0%	168	3.6%	354	7.6%	452	9.7%

Source: (Tabbutt, 2003; 2007)

TABLE 7: ESTIMATE OF WETLANDS BY BASIN.

Watershed	Basin	Total (acres)	Wetland Indicators				Acidic Organic Wetlands		Hydric Soils – Possible Historic Wetlands			
			Open Water		Other Wetlands				All		Hydric Soils with Flat Slopes	
			Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Budd/ Deschutes	Black Lake	5,532	569	10%	554	10%	27	0.49%	916	17%	813	15%
	Capitol Lake	678	246	36%	7	1%	0	0.00%	2	0%	0	0%
	Chambers	8,443	204	2%	742	9%	41	0.49%	856	10%	852	10%
	Deschutes River	56,713	532	1%	2,312	4%	53	0.09%	3,151	6%	2,609	5%
	East Bay	2,427	0	0%	314	13%	0	0.00%	245	10%	189	8%
	Ellis Creek	1,449	0	0%	424	29%	34	2.32%	353	24%	345	24%
	Indian Creek	1,338	0	0%	165	12%	18	1.33%	144	11%	144	11%
	Mission Creek	407	0	0%	30	7%	0	0.00%	27	7%	27	7%
	Moxlie Creek	2,127	0	0%	55	3%	0	0.02%	21	1%	21	1%
	Percival Creek	4,856	55	1%	327	7%	1	0.02%	603	12%	452	9%
	Schneider	635	0	0%	2	0%	0	0.00%	41	6%	0	0%
West Bay	1,995	0	0%	44	2%	0	0.00%	150	8%	97	5%	
Eld Inlet	Green Cove Creek	2,518	0	0%	295	12%	7	0.28%	467	19%	299	12%
Henderson Inlet	Woodard	4,739	0	0%	694	15%	39	0.83%	769	16%	705	15%
	Woodland	9,089	800	4%	814	4%	180	0.95%	865	5%	772	4%
Nisqually River	McAllister Creek	19,762	334	2%	1,472	7%	5	0.02%	1,953	10%	1,910	10%
	Nisqually Reach	4,604	0	0%	292	6%	1	0.03%	352	8%	352	8%

Source: TRPC GIS Inventory of Wetlands; United States Department of Agriculture, 1990.

E. Geology

The topography, hydrology, and soils found in northern Thurston County are a result of a series of glacial advances that occurred in the Pleistocene period, the most recent being the Vashon Stage of the Fraser Glaciation. The advance and retreat of the Puget Lobe during this glacial event was responsible for most of the landforms that are exposed today. The ice sheet advanced as far south as the Tenino region and probably reached its peak around 15,000 years before present.

As glaciers advanced southward into the Puget Sound Lowland, coarse sediment carried by the glacier was deposited at its leading edge and transported southward by meltwater to form a layer of sand and gravel. These deposits are referred to as the Vashon advance outwash. They overlay the interglacial fine-grained sediments (Kitsap formation). As the glaciers continued to advance southward, they overrode these outwash deposits and compressed them. The glaciers also deposited till on top of the advance outwash. This material is typically a highly compacted, unsorted mixture of silt, sand, and pebble-to-boulder debris. Later, as glaciers receded, meltwater carried additional sediment to form recessional outwash. These sands and gravels were deposited on top of the till.

As the Puget Lobe retreated glacial lakes formed because the northern drainage was blocked by ice. In northern Thurston County a large lake formed in front of the glacier, fed by glacial melt and the rivers. Eventually this lake breached and flowed west into the Chehalis valley. This flow carved deep troughs out of the fill, and formed an extensive system of terraces and braided channels (Logan et al., 2003). Eventually, when drainage resumed out the Straits of Juan de Fuca, river systems cut through the glacial deposits. As the glaciers melted worldwide sea level increased about 100 meters and flooded these drainage systems. These flooded valleys are the inlets of Puget Sound today.

There were two general types of glacial sediments left behind – outwash (moderate to well-sorted sands and gravels) and till (unsorted sand, gravel, and boulders in a silt or clay matrix). Glacial end moraine tends to have formed hummocky terrain where kettle lakes (closed depressions) are common – examples of this are Hewitt and Ward Lakes (Drost et al., 1998).

Isolated outcrops of Tertiary basalt form local hills including the Black Hills north of Black Lake and west of Ken Lake, Tumwater Hill – north of Barnes Lake, and Bush Mountain – west of Barnes Lake (Walsh et al., 2003).

F. Topography

In general, northern Thurston County is a low-lying fairly flat glacial plain that ranges in elevation from 200 to 400 feet. There are many distinct north-south oriented valleys as a result of the last phase of glaciation. Areas of steep slopes are found along the marine bluffs, and around the basalt outcrops.

G. Hydrology

The glacial plain is dissected by numerous rivers and streams. The Deschutes River is the only river in the study area, draining 165 square miles and measuring 57 miles in length. The river originates in Lewis County in the Snoqualmie National Forest. The Deschutes River drains into Capitol Lake, and then enters the Puget Sound at Budd Inlet, in downtown Olympia. It was given its name by French fur traders, who called it Rivière des Chutes, or "River of the Falls." The main falls are located in Tumwater, and formed a natural barrier to fish passage until a fish ladder was constructed in 1954.

Many closed depressions are also found on the end moraine deposits of the glacial plain, many of which are occupied by lakes, ponds, and wetlands. Examples of this are the many kettle lakes found in northern Thurston County such as Ward, Hewitt, Susan and Munn Lakes.

The Lacey, Olympia, and Tumwater area has been urbanized for over a century and a half, and much of the original hydrology has been altered by dikes and drainage ditches. A drainage ditch has significantly altered the hydrology of Black Lake, resulting in it now draining to the north rather than south into the Black River. The area around Chambers Lake has been heavily ditched to drain this very flat area, and the Chambers Ditch provides an output for the lake into Chambers Creek.

Both surface water and groundwater play an important role in the hydrology of the region. The groundwater flow system of the region was evaluated extensively in 1988-89 (Drost et al., 1998). The study suggests that groundwater generally moves from upland recharge areas in the interior of Thurston County, to points of discharge along the Deschutes River, streams, and the Puget Sound. Groundwater flow diagrams were developed for the Quaternary Vashon Drift Advance outwash (Qva) and Quaternary Salmon Springs Drift (Qc) geohydrologic units (Drost et al., 1998) and are in Figures 1 and 2. It is likely that groundwater discharge sustains summer baseflows in the Deschutes River, Percival Creek, and other streams in the study area (Sinclair and Bilhimer, 2007).

H. Soils

The two types of general soil associations found in the Lacey, Olympia, Tumwater region are both related to glacial material. Most of the area is covered with soils from the Alderwood-Everett association, which are moderately deep and very deep well drained soils on glacial till. The Lake Susan, Munn and Trails End systems, Chambers Creek, and the area to the west of Long Lake and Pattison Lake are covered with soils from the Spanaway-Nisqually association, which are very deep, excessively drained soils on glacial outwash terraces (USDA, 1990). More detailed soil associations are described by hydrologic feature further in this text.

Source: **DROST ET AL., 1998.**

Table 8 shows an estimate of soils with higher permeability (aquifers) by basin.

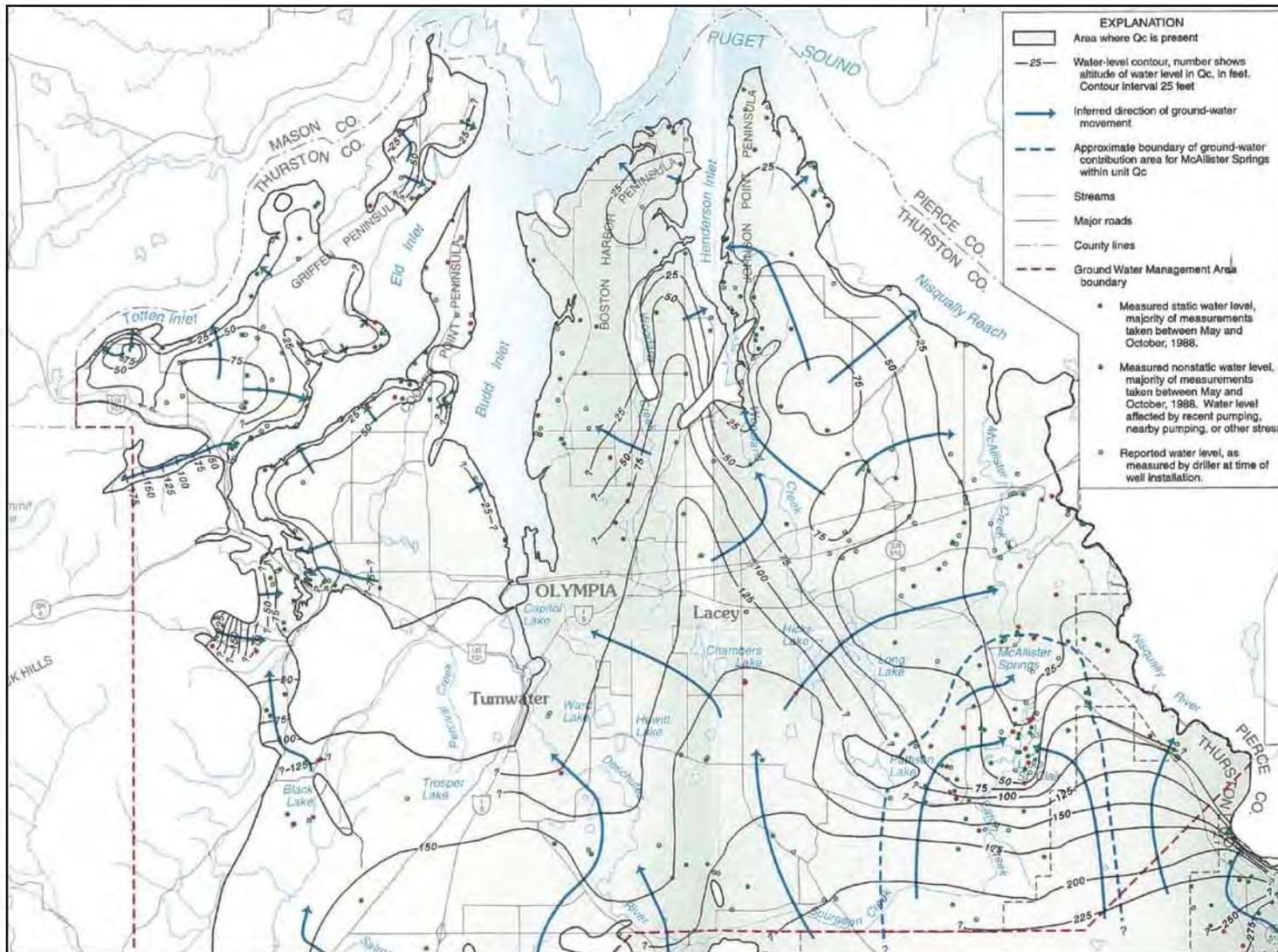


FIGURE 1: WATER LEVELS AND FLOW DIRECTIONS IN GEOHYDROLOGIC UNIT QVA, 1988.
Source: Drost et al., 1998.

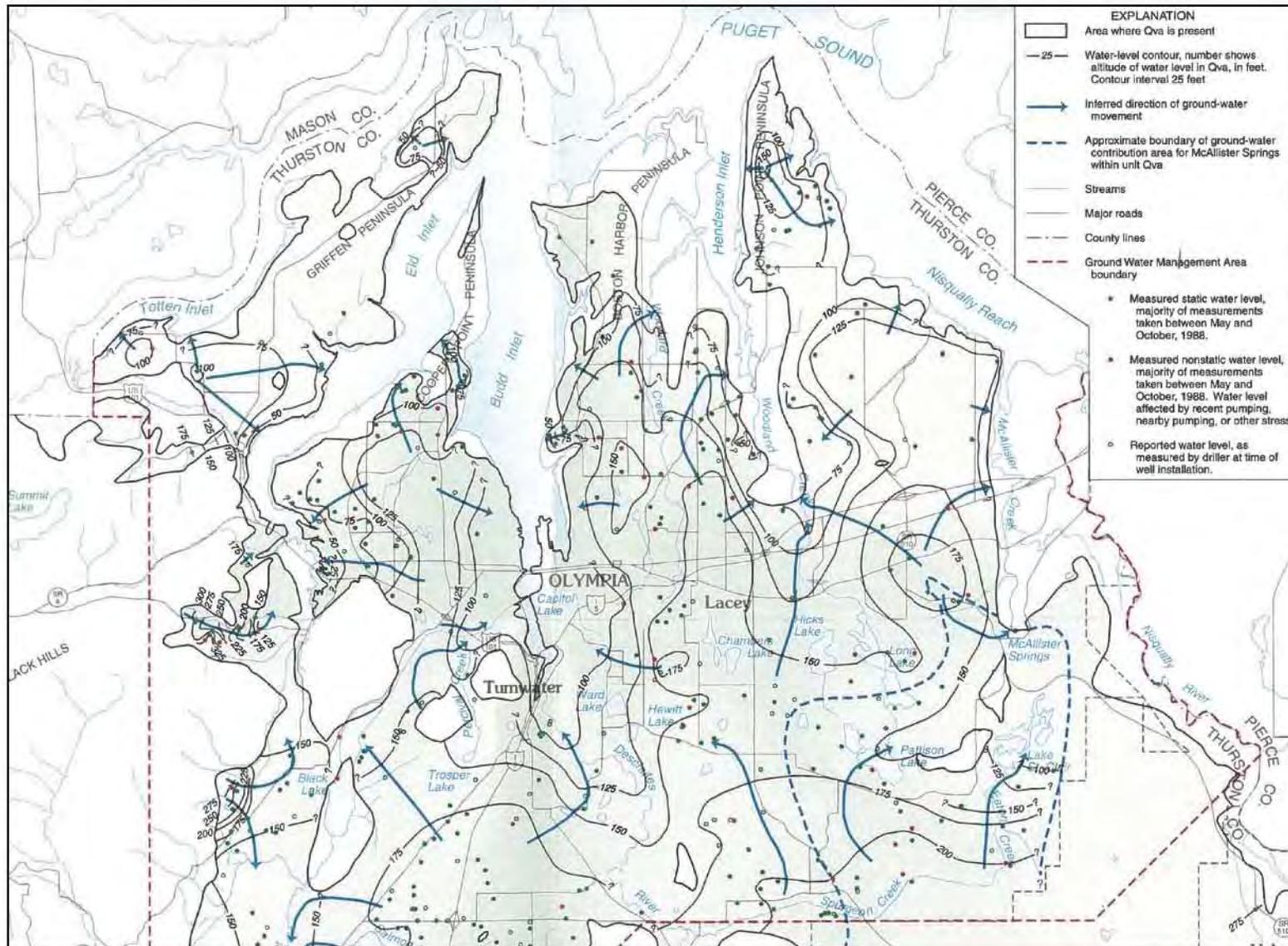


FIGURE 2: WATER LEVELS AND FLOW DIRECTIONS IN GEOHYDROLOGIC UNIT QC, 1988.
Source: Drost et al., 1998.

TABLE 8: ESTIMATE OF SOILS OF HIGH AND EXTREME PERMEABILITY BY BASIN.

Watershed	Basin	Total (acres)	Permeable Soils			
			Extreme Permeability		High Permeability	
			Acres	%	Acres	%
Budd/ Deschutes	Black Lake	5,532	2,286	20%	1,099	20%
	Capitol Lake	678	68	10%	137	20%
	Chambers	8,443	3,366	76%	3,766	45%
	Deschutes River	56,713	24,286	37%	5,697	10%
	East Bay	2,427	53	68%	330	14%
	Ellis Creek	1,449	110	15%	439	30%
	Indian Creek	1,338	153	20%	1,024	76%
	Mission Creek	407	10	10%	298	73%
	Moxlie Creek	2,127	309	76%	1,197	56%
	Percival Creek	4,856	1,248	37%	1,784	37%
	Schneider	635	0	68%	406	64%
	West Bay	1,995	13	15%	923	46%
Eld Inlet	Green Cove Creek	2,518	63	20%	1,702	68%
Henderson Inlet	Woodard	4,739	720	10%	1,845	39%
	Woodland	9,089	11,137	76%	4,346	23%
Nisqually River	McAllister Creek	19,762	13,226	37%	2,926	15%
	Nisqually Reach	4,604	1,213	68%	986	21%

List of Soils: Soils with extreme permeability with the study area are the following: Baldhill, Cagey, Everett, Grove, Indianola, Newberg, Nisqually, Pilchuck, Pits gravel, Puyallup, Spanaway, Sutan, and Tenino sands or loams. Soils with high permeability within the study area are: Alderwood, Chehalis, Delphi, Eld, Giles, Mayton, Spana, and Yelm loams.

Source: United States Department of Agriculture, 1990; Thurston Geodata Center.

I. Climate

Thurston County has a marine type climate with mild temperatures year-round. In the warmest months, the average high temperature ranges between 75 and 80 degrees Fahrenheit. In the winter months, high temperatures usually hover around 45 degrees Fahrenheit. The weather is characterized by sunny summers and wet winters. Olympia receives around 51 inches of average annual rainfall, typically spread out over a large period of time, with only 52 clear days out of every year.

J. Watershed Resource Inventory Areas (WRIAs) and Watersheds

Portions of three Watershed Resource Inventory Areas (WRIAs) are found in the urban areas of Lacey, Olympia, and Tumwater: WRIA 11; WRIA 13; and WRIA 23.

Only a very small portion of WRIA 11 is found in eastern Lacey, surrounding the Little McAllister Creek, which drains into the McAllister Creek, part of the Nisqually River Watershed. No shorelines of WRIA 11 are found in Lacey or the unincorporated growth area.

Most of the Lacey, Olympia, and Tumwater urban area is found in WRIA 13, which includes parts of four watersheds: Henderson Inlet to the east, Budd/Deschutes in the center, and Eld Inlet to the west, as well as the Nisqually Reach in the Nisqually River Watershed.

A small portion of WRIA 23 is found in southwest Tumwater. Black Lake is found in this WRIA, even though Black Lake currently drains to the north and into Budd Inlet through Black Lake Drainage Ditch and Percival Creek, and is part of the Budd/Deschutes Watershed.

K. Water Quality

The water quality of the lakes, rivers, and shorelines of northern Thurston County has been heavily influenced by the urban environment. Numerous studies have shown that stream health correlates strongly with land uses and human activities in the adjacent basin or watershed. As development increases, stream health tends to decline.

Retaining forest cover, minimizing and disconnecting impervious surfaces, as well as preserving mature, native vegetation in corridors adjacent to streams, shorelines, and other water bodies can help retain stream health.

Many of the streams and lakes in northern Thurston County appear on the Washington Department of Ecology's most recent list of impaired water bodies. In the Budd/Deschutes Watershed the violations include fecal coliform bacteria, dissolved oxygen, fine sediments, temperature, and pH. In Henderson Inlet and along the Nisqually Reach the studies and cleanup efforts are focusing mainly on fecal coliform bacteria, dissolved oxygen, temperature, and pH.

Local streams are monitored by local governments and organizations, including stream team programs. Thurston County's Environmental Health Department produces a water quality report summarizing monitoring results.

L. Shellfish Water Quality

Note: Parts of this section have been taken from the South Sound Forum Indicators Report, produced by TRPC and the Water Quality Action Team.

The south Puget Sound contains four marine inlets with rivers or streams draining the urban areas of Lacey, Olympia or Tumwater. These are, from west to east, Eld Inlet, Budd Inlet, Henderson Inlet, and Nisqually Reach.

The Washington Department of Health (DOH) monitors levels of fecal coliform bacteria in the marine waters to determine suitability for shellfish harvesting. The department also periodically surveys shorelines and drainages to look for pollution problems that might affect the growing areas. Three of the four South Sound inlets listed above are classified for commercial shellfish harvesting, and the classification of these areas tends to correlate with population and development levels in the adjacent watersheds.

Budd Inlet is the most developed of the South Sound Inlets, and has been closed to shellfish harvesting for decades. The LOTT Alliance municipal sewer plant and outfall are located at the southern end of Budd Inlet.

DOH closed a portion of Eld Inlet in the early 1980s because of fecal pollution, then reopened much of the area in 1998 following successful control of the pollution sources and improvements in water quality.

The work in Henderson Inlet has been more challenging due largely to the scale and complexity of the pollution problems and continued population growth and urbanization in the watershed.

In Nisqually Reach, the story has been more mixed, with both downgrades and upgrades over the past 15 years, but with some notable successes in recent years due to targeted cleanup efforts. DOH also oversees an early warning system to help identify and respond to declining conditions in shellfish growing areas.

Since the system was first instituted in 1997, a portion of Eld Inlet has been listed four times, Nisqually Reach four times, and Henderson Inlet nine times through 2005.

M. Priority Habitats and Species of Concern

The Washington State Department of Fish and Wildlife (WDFW) maintain a habitat database with the most current locations of "Priority Habitats and Species" and "Species of Concern." In addition, local governments adopt regulation to protect priority habitats and species of concern. In local jurisdictions these areas are referred to as:

- Important Habitats and Species - City of Olympia and Thurston County

- Fish and Wildlife Habitat Protection areas - City of Tumwater
- Habitat Conservation Areas - City of Lacey

Priority species include those with the concerns of extinction. These may be listed by the state or Federal government as “endangered” or “threatened.” Examples might include the Bald Eagle or the Peregrine Falcon, both found along the shores of Budd Inlet and Capitol Lake. The habitat database also includes species which are considered to be “sensitive” or “monitored”, such as the Olympic Mudminnow in the Green Cove Creek Drainage.

Priority habitats include habitats in sharp decline in Western Washington. Examples of priority habitats within the three cities include large woodland areas, such as Priest Point Park; Quaking Aspen groves of over two acres, such as near Grass Lake; estuaries, such as Ellis Cove; and rare or sensitive plant species, such as some found in Chambers Lake.

Table 9 lists species of concern likely to be found in Thurston County.

TABLE 9: SPECIES OF CONCERN FOUND IN THURSTON COUNTY.

Mammals	State	Federal
California wolverine (<i>Gulo gulo luteus</i>)	Candidate	Species of Concern
Long-eared myotis (<i>Myotis evotis</i>)	Monitored	Species of Concern
Long-legged myotis (<i>Myotis volans</i>)	Monitored	Species of Concern
Pacific fisher (<i>Martes pennanti pacifica</i>)	Endangered	
Pacific Townsend’s big-eared bat (<i>Corynorhinus townsendii townsendii</i>)	Candidate	Species of Concern
Western gray squirrel (<i>Sciurus griseus griseus</i>)	Threatened	Species of Concern
Birds		
Bald eagle (<i>Haliaeetus leucocephalus</i>)	Threatened	Species of Concern
Great blue heron (<i>Ardea herodias</i>)	Monitored	
Marbled murrelet (<i>Brachyramphus marmoratus</i>)	Threatened	Threatened
Northern goshawk (<i>Accipiter gentiles</i>)	Candidate	Species of Concern
Oregon vesper sparrow (<i>Pooecetes gramineus affinis</i>)	Candidate	Species of Concern
Osprey (<i>Pandion haliaetus</i>)	Monitored	
Pileated woodpecker (<i>Dryocopus</i>)	Candidate	
Slender-billed white-breasted nuthatch (<i>Sitta carolinesis aculeate</i>)	Candidate	Species of Concern
Northern spotted owl (<i>Strix occidentalis caurina</i>)	Endangered	Threatened

Reptiles/Amphibians	State	Federal
Cascades frog (<i>Rana cascadae</i>)	Monitored	Species of Concern
Larch Mountain salamander (<i>Plethodon larselli</i>)	Sensitive	Species of Concern
Northwestern pondturtle (<i>Clemmys marmorata marmorata</i>)	Endangered	Species of Concern
Tailed frog (<i>Ascaphus truei</i>)	Candidate	Species of Concern
Van Dykes salamander (<i>Plethodon vandykei</i>)	Candidate	Species of Concern
Western toad (<i>Bufo boreas</i>)	Candidate	Species of Concern
Insects		
Mardon skipper (<i>Polites mardon</i>)	Endangered	Candidate
Valley silverspot (<i>Speyeria zerene breneri</i>)	Candidate	Species of Concern
Puget Blue (<i>Icaricia icarioides</i> spp. <i>Blackmorei</i>)	Candidate	
Fish		
Chinook salmon (<i>Oncorhynchus keta</i>)	Candidate	Threatened
Steelhead (<i>Oncorhynchus mykiss</i>)		Threatened
Bull trout (<i>Salvelinus confluentus</i>)	Candidate	Threatened
Pacific cod (<i>Gadus macrocephalus</i>)	Candidate	Species of Concern
Walleye Pollock (<i>Theragra chalcogramma</i>)	Candidate	Species of Concern
Mollusks		
Olympia oyster (<i>Ostrea lurida</i>)	Candidate	
Plants		
Alaska Alkaligrass (<i>Puccinellia nutkaensis</i>)	Sensitive	
Bog Clubmoss (<i>Lycopodiella inundata</i>)	Sensitive	
Bristly Sedge (<i>Carex comosa</i>)	Sensitive	
Bulb-bearing Water Hemlock (<i>Cicuta bulbifera</i>)	Sensitive	
California Compassplant (<i>Wyethia angustifolia</i>)	Sensitive	
California Swordfern (<i>Polystichum californicum</i>)	Threatened	
Canadian St. John'swort (<i>Hypericum majus</i>)	Sensitive	
Chain fern (<i>Woodwardia fimbriata</i>)	Sensitive	
Common Bluecup (<i>Githopsis specularioides</i>)	Sensitive	
Golden Paintbrush (<i>Castilleja levisecta</i>)	Endangered	Threatened
Hall's Aster (<i>Symphyotrichum hallii</i>)	Threatened	
Howellia (<i>Howellia aquatilis</i>)	Threatened	Threatened
Nuttall's Quillwort (<i>Isoetes nuttallii</i>)	Sensitive	
Pacific Pea (<i>Lathyrus vestitus</i> ssp. <i>Bolanderi</i>)	Endangered	
Pine-foot (<i>Pityopus californica</i>)	Threatened	
Pink Fawnlily (<i>Erythronium revolutum</i>)	Sensitive	
Rose Checkermallow (<i>Sidalcea malviflora</i> ssp. <i>Virgata</i>)	Endangered	Species of Concern
Small-flowered Trillium (<i>Trillium parviflorum</i>)	Sensitive	
Tall Agoseris (<i>Agoseris elata</i>)	Sensitive	
Tall Bugbane (<i>Cimicifuga elata</i> var. <i>elata</i>)	Sensitive	Species of Concern
Western Wahoo (<i>Euonymus occidentalis</i>)	Threatened	
White-top Aster (<i>Sericocarpus rigidus</i>)	Sensitive	Species of Concern

Sources: Preliminary Environmental Assessment for the Nisqually Transmission Line Relocation Project and Washington Natural Heritage Information System.

N. Critical Saltwater Habitat

In addition to the priority habitats listed above, six types of critical saltwater habitat have been identified as priority areas for achieving habitat protection and restoration objectives for juvenile salmonid survival in the South Puget Sound (Kliem et al., 2006).

This work was based upon the four essential nearshore eco-system functions beneficial to juvenile salmonids described by Simenstad (1982) and William and Thom (2001). The following descriptions of the importance of each habitat are taken from Kliem et al., 2006.

Known Forage Fish Spawning Beaches

Because adult and juvenile Chinook in particular rely on forage fish for a significant portion of their diet, protecting or restoring this asset is critical for foraging and growth. Forage fish spawn in sand and small gravel substrates in upper intertidal zones easily disrupted by nearshore energy, interrupted sediment supply, and shoreline armoring placed below the ordinary high water line.

Feeder Bluffs

Feeder bluffs contribute sediment supply for sustaining beaches, organic matter, invertebrate prey, and groundwater supply to the nearshore.

Pocket Estuaries

Pocket estuaries are small scale estuaries located at the mouths of streams and small rivers and other semi-enclosed embayments within Puget Sound that have a tidal channel structure, intertidal marsh and/or mudflats, eelgrass beds and other features typical of larger estuaries. Pocket estuaries provide juvenile Chinook with a low wave energy refuge and a physiological transition zone with lower salinity levels. The rich macro invertebrate community within pocket estuaries is also critical for foraging and growth.

Salmonid Bearing Streams

Chinook favor salmonid bearing freshwater tributaries habitats for feeding opportunities, refuge, and physiological transition for juveniles.

Eelgrass Beds

Juvenile salmonids favor eelgrass beds for foraging, as a refuge from predators, and as a migratory corridor. Despite its relative scarcity in South Puget Sound, eelgrass is important to the nearshore food web for supporting salmonids.

Salt Marshes

Juvenile salmonids are frequent users of salt marsh habitats. Salt marsh supports a food web critical to juvenile salmonids. Juveniles tend to migrate along the edges of marsh areas as well, which provide shelter from predators and wave energy.

O. Historic Preservation

Cultural Resource inventories were performed for Olympia, Tumwater, and Thurston County in the mid-1980s. Those buildings, structures, sites, and objects which would be suitable for placement on a local, state, and national register were inventoried. Additions have been made to this “inventory” since these reports were prepared.

There are three categories of Historic Registers: “Local,” “State,” and “National” register properties. Nominations for the State or National Register of Historic Places, requires review by the Department of Archaeology and Historic Preservation (DAHP) and placement by a statewide Historic Advisory Committee. Nominations for all the local historic registers are reviewed by a local historic commission. Each register has its own criteria, with the National Register being the most selective. A Local Register can enroll properties that have an importance to local history, whereas the State Register requires a threshold of statewide or regional importance.

Historic districts comprise the city's significant historic and architectural resources. A National Historic District is established by the community and is adopted by the DAHP. Inclusion in a historic district signifies that a property contributes to an ensemble that is worth protecting by virtue of its historic importance or architectural quality. There are five National Historic Districts that lie adjacent to Shorelines in Olympia or Tumwater:

1. Tumwater Historic District
2. State Capitol Historic District
3. South Capitol Historic District
4. Downtown Historic District
5. Olympia Avenue Historic District

1. Tumwater Historic District

Bounded by Interstate 5, the Schmidt House, the falls of the Deschutes River and Tumwater Falls Park, the district was occupied in prehistoric and historic times by Salish Indians, known as the *Stehchas*, or *st tcas bc* people.

The Hudson’s Bay Company called the falls “the Chutes” or “Puget Sound Falls”. The falls were a rendezvous point and in 1833, they considered moving Ft. Nisqually to the site. The Bush-Simmons Party, who crossed the Oregon Trail in 1844, over-wintered at Fort Vancouver and probably heard of the falls from the Hudson’s Bay Company.

In 1845, their party of 30 including the Simmons, Bush, McAllister, Kindred, and Jones families, along with Jesse Ferguson and Samuel B. Crockett, established the first permanent American settlement on Puget Sound at the falls, called “New Market”.

In 1863, the settlement became known as Tumwater, a Chinook jargon word meaning “falling water.” During the 1860s and 1870s many small factories grew up along its banks, including a tannery, lumber and flour mills, a water pipe factory, a prune drying company, a blacksmith shop and a box factory. General stores, hotels, a literary society, a school and a church followed. Through the early to mid-1900s the area continued as a small business and residential district. However, many historic homes and businesses were razed when Interstate 5 was built in 1957-1958.

Tumwater Falls Park was established in 1962 by the Olympia Tumwater Foundation and is privately owned, and Tumwater Historical Park was built by the City of Tumwater in 1980. Both are open to the public.



2. State Capitol Historic District

“Located in Olympia, the state capitol, the district’s main building is the most prominent architectural feature of the city and is visible for several miles. The elevation of the district is about 120 feet above sea level, and its topography is fairly flat. ... To the west of the district boundary is the edge of a cliff, below which is Capitol Lake. ... Because of the district’s location atop of a hill, the prominence of its buildings is enhanced, particularly when viewed from the west and northwest. From these perspectives, one sees a huge dome rising above a wooded hillside, which falls away abruptly to a sizeable lake.” (*National Historic District Nomination Application, DAHP*).

The historic district was adopted in 1974. It included six historic buildings surrounded by the landscaped grounds of the 51-acre West Capitol Campus designed by the Olmsted Brothers, a nationally-recognized landscape architectural firm. Today the State of Washington recognizes eight historic buildings within the original 1974 State Capitol Historic District, and an additional six historic, state-owned structures immediately adjacent to it as contributing elements to the district. The State Capitol Historic District and the historic structures are not located within 200 feet of Capitol Lake, but are an adjacent upland use.

	
<p><i>The 1911 Wilder and White Concept for the Capitol of the State of Washington</i> Washington State Archives</p>	<p><i>The 1911 Vision as it appeared in 2006</i> Department of Transportation</p>

3. South Capitol Neighborhood Historic District

The South Capitol Neighborhood is located to the south the Washington State Capitol Campus on both sides of Capitol Way in Olympia, Washington. The Historic District was adopted in 1999, is 267 acres in size, and includes 65 properties which are on the nation, state or local historic registers or have been inventoried.

The centerpiece of the historic district is the C.J. & Elizabeth Lord House which was built in 1923 by noted Olympia architect Joseph Wohleb. The property was donated to the state in 1939. The house now serves as the State Capitol Museum, and as part of the Washington State Historical Society.



Lord Mansion - State Capitol Museum
Thurston Regional Planning Council

The boundaries of the Historic District extend along the Capitol Lake shoreline. However, average horizontal distance from the shoreline to these residential structures is from 500 to 700 feet. Therefore, no structures within the historic district are located within 200 feet of the water's edge.

4. Downtown Historic District

The Downtown Olympia Historic District was listed on the Washington Heritage Register and National Register of Historic Places in 2004. It contains construction periods of the buildings and sites in the district dating from 1850, just after the town's earliest American settlement through the early 1950s after a devastating earthquake in 1949 destroyed many of

its 19th century structures. The downtown historic district is a showcase of the architecture of Joseph Wohleb, whose designs predominate in the district.

The district represents an important collection of architectural styles related to the development of the city. The district is especially significant as a concentration of early 20th century commercial architecture representing important styles of the era—Art Moderne, Mission Revival, Beaux Arts, Georgian Revival, Sullivanese, Modern, and Romanesque.

The major themes of the city's history related to government, entertainment/recreation, transportation, community planning and development, commerce, landscape architecture and architecture are illustrated in the district. The district includes almost 27 acres and 66 inventoried buildings and sites including the territorial and state capitals.

5. Olympia Avenue Historic District

The Olympia Avenue Historic District is located in east Olympia just north and east of downtown area. The district is linear in shape and extends five blocks from Plum Street to Tullis Street along Olympia Avenue. The district includes 12.2 acres and contains three properties listed on the National Register of Historic Places and nine properties listed on the Olympia Heritage Register.

The district encompasses the major styles of Olympia in its history. These include the saltbox as the earliest architectural style, with four Pioneer style houses from the 1890-1910 era. The district also includes five Queen Anne houses, two Colonial/Dutch Colonial Revival houses, with multiple Arts and Crafts, Tudor Cottage, and Craftsman style homes.

The western end of the historic district lies with 200 feet of the current Budd Inlet shoreline.

P. Public Access

One of the stated goals of the Shoreline Management Act is to promote public access to the shorelines within of Lacey, Olympia and Tumwater. Several opportunities already exist for recreational access to local waterbodies. Supported activities include wildlife viewing, fishing, swimming, and boating among others. Different waterbodies support varying uses, which are shown on accompanying maps.

1. Notes for Fishing

Unless otherwise noted, fishing is permitted in any public water body in Washington State. In general, fishing and shellfishing licenses are required for any person 15 years of age or older. Fishing seasons vary by water body and organism; the entire set of regulations for fishing in Washington is available from the Washington State Department of Fish and Wildlife. Though few waterbodies have designated shoreline fishing access, there is potential access at many locations, including piers, docks, and boat launches.

2. Notes for Swimming

Swimming at publically-owned shoreline in Lacey, Olympia, and Tumwater is limited to certain sites. There are no restrictions on any public water body, however the public is permitted to swim in any water body to which they can legally gain access. However,

outside of designated swimming beaches there is no guarantee that safety issues and water quality are monitored.

Q. Toxics

Information was gathered on sites of known contamination, the location of landfills and dumps, areas of elevated nitrate and chloride levels as well as pesticide contamination. The Department of Ecology maintains a database of known and suspected contamination sites. The data includes site name and address, contaminant group and media, and remediation status.

Contaminants may belong to any of several groups, as listed below:

- Base/Neutral/Acid Organics
- Halogenated Organics
- Metals, Priority Pollutants
- Metals, Other
- Polychlorinated Bi-phenyls
- Pesticides
- Petroleum Products
- Phenolic Compounds
- Non-Halogenated Solvents
- Dioxins
- Polynuclear Aromatic Hydrocarbons
- Reactive Wastes
- Corrosive Wastes
- Radioactive Wastes
- Conventionals, Organic
- Conventionals, Inorganic
- Asbestos
- Arsenic
- Methyl Tertiary-Butyl Ether
- Unexploded Ordinance
- Tibutyl Tin
- Bioassay/Benthic Failures
- Wood Debris
- Other Deleterious Substances

More detail on individual sites can be found in the feature/reach scale analysis section of the report.

VII. Feature/Reach Scale Inventory

A. Overview

Delineation of individual reaches will occur in conjunction with the analysis and characterization of features.

The feature scale inventory is organized in the following way:

1. Feature type (marine water; rivers and streams; lakes)
2. General information in a standardized format

Unless otherwise noted, the sources for the feature scale inventory are as indicated on the following pages in the feature-scale template.

Feature Name
Location (useful to locate appropriate map series)

2006 Aerial Photography
(Thurston Geodata Center, Thurston County)

Urban Growth Areas line is shown in dashed black and white

Minimum Jurisdiction is shown in transparent yellow.

Reaches are mapped on Ordinary High Water Mark.

The photo is located on the left side of the page, indicating the start of section on the feature.

WRIA (MAP 3)	Watershed (MAP 3)	Basin (MAP 3)	Size/Length
WRIAs, Watersheds, Basins – Thurston Geodata Center			TRPC LIDAR-corrected Hydro GIS Layer

Bathymetry/Topography (MAP 4)	Surface Hydrology (MAP 4)	Other Hydrologic Features
Bathymetry - Reconnaissance Data on Lakes in Washington, USGS, 1976. Topography – LIDAR – Puget Sound LIDAR Consortium (2002)	TRPC LIDAR-corrected Hydro GIS Layer and Various Basin Studies (listed below)	Basin Studies (listed below)

Existing Shoreline Designations (MAP 5)	General Land Cover (MAP 6)	Riparian Land Cover (MAP 6)
1990 Shoreline Master Program and Thurston Geodata Center	TRPC 2000 Land Cover Analysis and 2006 Aerial Photography	TRPC 2000 Land Cover Analysis and 2006 Aerial Photography

Current Land Use (MAP 7)	Future Land Use (Zoning) (MAP 8)	Water Dependent/Oriented Uses (MAP 9)
(2006) TRPC Buildable Lands Inventory	TRPC Buildable Lands Inventory and planning departments from Thurston County, Lacey, Olympia, and Tumwater.	TRPC Buildable Lands Inventory, and research by TRPC staff

Roads	Railroads, Utilities	Shoreline Modifications
Roads – Street Atlas of Thurston County; Thurston Geodata Center Roads Data Layer	TRPC Buildable Lands Inventory	Basin studies and TRPC observations

Known sites with Toxic or Hazardous Material (MAP 10)
<ul style="list-style-type: none"> • Elevated Nitrate Areas – Thurston Geodata Center • Elevated Chloride Levels – Thurston Geodata Center • Areas of Pesticide Contamination – Thurston Geodata Center • Landfills and Dumps – Thurston Geodata Center • Contamination Sites – Washington State Department of Ecology • Leaking Underground Storage Tanks – Washington State Department of Ecology

Historic Properties
(MAP 11)

TRPC Historic Properties database

Public Waterfront Land Owners
(MAP 12)

TRPC Buildable Lands Inventory

Public Access
(MAP 12)

- Regional Trails Plan
- 2007 Profile (TRPC)
- Thurston County Water Resources Monitoring Report—2003-2004 Water Year, 2004-2005 Water Year
- 1991 Shoreline Public Access Inventory (TRPC)
- Cities of Lacey, Olympia & Tumwater
- Recreational swimming beaches data for Thurston County
- Fishing in Washington: 2007/2008 pamphlet edition

Soils

Both general and detailed soil descriptions are from the Soil Survey of Thurston County Washington, USDA, 1990. The following is a list of soils, detailed description, and native vegetation for soils found within minimum jurisdiction in the urban areas of Lacey, Olympia, and Tumwater:

Soil Name	Description	Native Vegetation
Alderwood gravelly sandy loam	Moderately deep, moderately well drained soil on glacial till plains	Mainly conifers and hardwoods
Bellingham silty clay loam	Very deep, poorly drained soil in depressions	Mainly hardwoods and conifers
Cagey loamy sand	Very deep, moderately well drained soil on terraces	Mainly conifers and hardwoods
Dystric Xerochrepts	Moderately deep to very deep, well drained soil on escarpments	Mainly conifers and hardwoods
Everett very gravelly sandy loam	Very deep, somewhat excessively drained soil on terraces and outwash plains	Mainly conifers
Giles silt loam	Deep, well drained soil on terraces	Mainly conifers and hardwoods
Godfrey silty clay loam	Deep, poorly drained soil in depressions on flood plains	Mainly hardwoods

Soil Name	Description	Native Vegetation
Hoogdal silt loam	Moderately deep, moderately well drained soil on terrace escarpments	Mainly conifers and hardwoods
Indianola loamy sand	Very deep, somewhat excessively drained soil on terraces, eskers and kames	Mainly conifers
Kapowsin silt loam	Moderately deep, moderately well drained soil on till plains	Mainly conifers and hardwoods
McKenna gravelly silt loam	Moderately deep, poorly drained soil in depressions and drainageways	Mainly hardwoods
Mukilteo muck	Very deep, very poorly drained soil in upland depressions	Mainly sedges and rushes
Nisqually loamy fine sand	Very deep, somewhat excessively drained soil on terraces	Mainly prairie grasses, ferns and mosses
Norma silt loam	Very deep, poorly drained soil in depressions on till plains	Mainly sedges, rushes and hardwoods
Pilchuck loamy sand	Very deep, somewhat excessively drained soil on flood plains	Mainly conifers and hardwoods
Puget silt loam	Very deep, poorly drained soil in depressions on flood plains	Mainly grasses and sedges
Puyallup silt loam	Deep, well drained soil on flood plains	Mainly conifers and deciduous trees
Schneider very gravelly loam	Deep, well drained soil on foothills and mountains	Mainly conifers
Semiahmoo muck	Very deep, very poorly drained soil on floodplains	Mainly sedges and rushes
Shalcar Variant muck	Deep, very poorly drained soil on floodplains	Mainly sedges and rushes
Skipopa silt loam	Moderately deep, somewhat poorly drained soil on terraces	Mainly conifers and hardwoods
Spana gravelly loam	Very deep, somewhat poorly drained soil in elongated drainageways on outwash plains	Mainly conifers, hardwoods and grasses
Spanaway gravelly sandy loam	Very deep, somewhat excessively drained soil on terraces	Mainly grasses, ferns and a few conifers
Sultan silt loam	Very deep, moderately well drained soil on flood plains	Mainly conifers and hardwoods
Tisch silt loam	Deep, very poorly drained soil is in upland depressions and drainageways	Mainly hardwoods, spirea, grasses, and sedges
Xerorthents	Deep, moderately well drained to somewhat excessively drained soils on uplands and tidelands	Scotch-broom and various weeds and grasses
Yelm fine sandy loam	Deep, moderately well drained soil on terraces	Mainly conifers and hardwoods

Critical Areas (MAP 13)
<p>Wetlands</p> <ul style="list-style-type: none"> • Wetland Indicators, TRPC
<p>Habitat Conservation Areas</p> <ul style="list-style-type: none"> • Based on adopted Critical Areas Ordinances (buffers of streams)
<p>Priority Habitats & Species</p> <ul style="list-style-type: none"> • Washington Department of Fish and Wildlife – not mapped due confidentiality per data sharing agreement

Critical Areas (Continued) (MAP 13)
<p>Floodplains & Floodways</p> <ul style="list-style-type: none"> • 100-year Floodplains – FEMA, Thurston Geodata Center • Floodways - FEMA, Thurston Geodata Center • Deschutes River Meander Belt – digitized by TRPC staff from historic aerial photographs
<p>Landslide Hazard Areas Landslide Hazard Areas –</p> <ul style="list-style-type: none"> • Based on adopted Critical Area Ordinances
Critical Saltwater Habitat (MAP 14)
<ul style="list-style-type: none"> • Forage Fish Spawning Beaches – based on Washington Department of Fish and Wildlife Survey Points – digitized by TRPC • Feeder Bluffs – Squaxin Island Tribe • Pocket Estuaries – Squaxin Island Tribe • Salmonid Bearing Streams – Washington State Department of Natural Resources Streams • Eelgrass Beds – Squaxin Island Tribe • Emergent Marsh – TRPC Wetlands Indicators

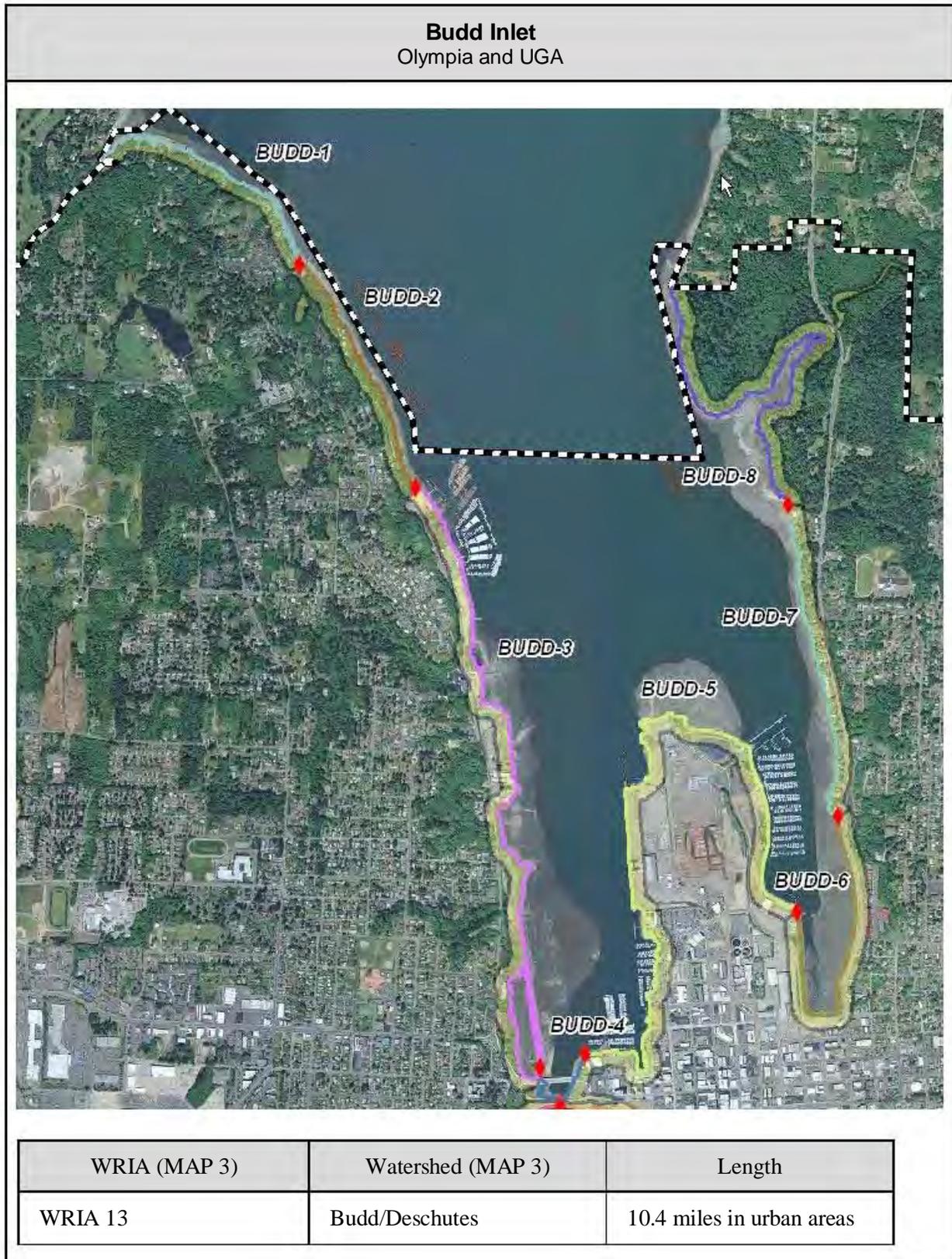
Water Quality
State Listings
<p>Washington State Department of Ecology—Surface Water Quality Standards, Water Quality Listings by Category, 2004 Integrated Water Quality Assessments—Surface Water and Sediments</p> <p>United States Environmental Protection Agency—Total Maximum Daily Loads Program</p>
Local Information
<p>Thurston County Water Resources Monitoring Report—2003-2004 Water Year, 2004-2005 Water Year</p>
Additional Information
<p>Thurston County Water Resources Monitoring Report—2003-2004 Water Year, 2004-2005 Water Year</p>

Fisheries
<p>Streams</p> <ul style="list-style-type: none"> • Thurston County Water Resources Monitoring Report—2003-2004 Water Year, 2004-2005 Water Year • Salmon Habitat Limiting Factors Final Report WRIA 13– Washington State Conservation, Commission, 1999 • Salmon Habitat Protection and Restoration Plan – WRIA 13 Deschutes, Thurston Conservation District, 2004 <p>Shellfish</p> <p>2006 Annual Inventory of Commercial and Recreational Shellfish Areas in Washington State Washington State Department of Health—Annual Growing Area Review of Nisqually Reach</p> <p>Puget Sound</p> <p>Puget Sound Fish Species: Fishes of Puget Sound website – hosted by the University of Washington - http://artedi.fish.washington.edu/FishKey/</p> <p>Lakes</p> <p>Washington Lakes - http://www.washingtonlakes.com/FeaturedLakes.aspx</p>

Bird Watching Areas
South Puget Sound's Best Places for Bird Watching - http://blackhillsaudubon.com/bestplaces/index.html

Basin Studies Used in the Feature/Reach Scale Analysis or Lakes and Streams	
Water Bodies	Plan/Study
Chambers Creek, Chamber Lake, Hewitt Lake, Ward Lake	Chambers, Ward, Hewitt Comprehensive Drainage Basin Plan, 1995
Barnes Lake	Barnes Lake Integrated Aquatic Vegetation Management Plan, 2007
Black Lake Drainage Ditch, Percival Creek, Trospen Lake, Ken Lake	Percival Creek Comprehensive Drainage Plan, 1993
Grass Lake	Green Cove Creek Comprehensive Drainage Plan, 1998
Hicks Lake, Long Lake, Pattison Lake, Southwick Lake Woodland Creek	Woodland and Woodard Creek Comprehensive Drainage Plan, 1995
Bigelow Lake	Indian and Moxlie Creek Comprehensive Drainage Plan, 1993

B. Marine Waters



Topography (MAP 4)	Surface Hydrology (MAP 4)	Other Hydrologic Features
<ul style="list-style-type: none"> • Shorelines range from flat in downtown Olympia to steep bluffs to the north on both sides of Budd Inlet. 	<p>Major River</p> <ul style="list-style-type: none"> • Deschutes River into Capitol Lake <p>Streams</p> <ul style="list-style-type: none"> • Black Lake Drainage Ditch and Percival Creek into Capitol Lake • Butler Creek • Schneider Creek • Garfield Creek • Indian Creek • Moxlie Creek • Ellis Creek 	<p>Hydrology in the urban area of downtown Olympia is highly altered. The most significant alterations are:</p> <ul style="list-style-type: none"> • Capitol Lake is an artificial lake • Indian and Moxlie Creek are combined and piped under the business district of Olympia into East Bay • Black Lake Drainage Ditch drains Black Lake to the north into Percival Creek

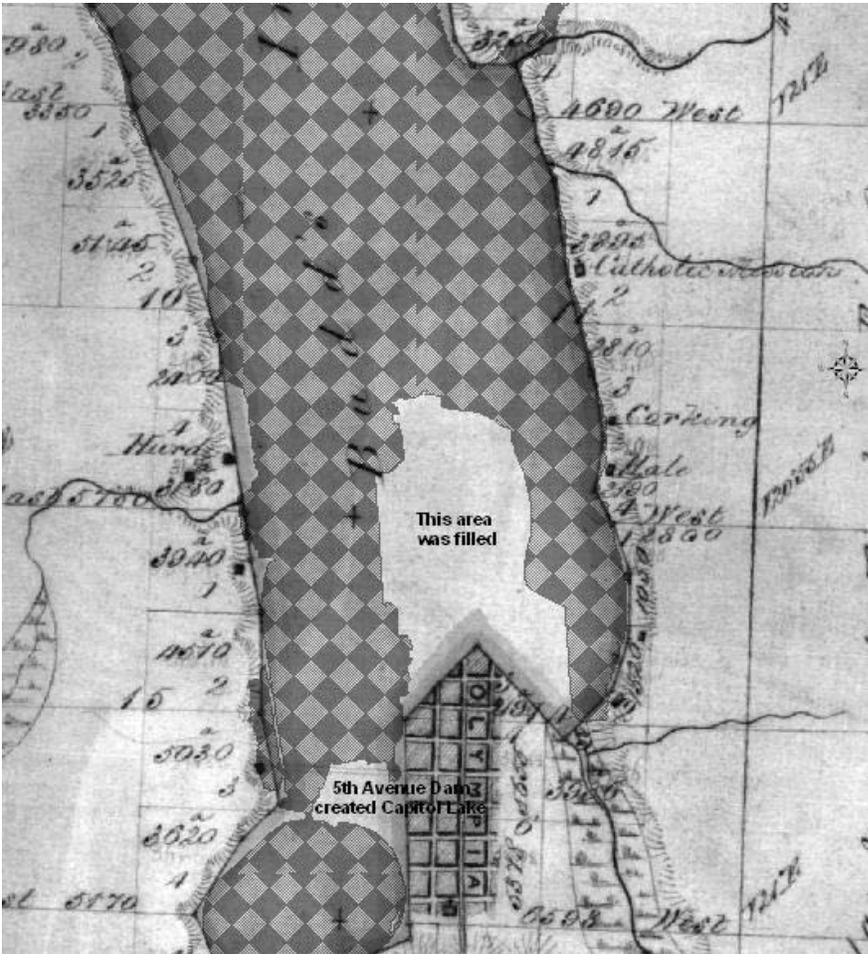
Existing Shoreline Designations (MAP 5)	General Land Cover (MAP 6)	Riparian Land Cover (MAP 6)
<ul style="list-style-type: none"> • Urban along Olympia’s downtown, the Port Peninsula, East Bay Drive up to Priest Point Park, and West Bay Drive up to West Bay Marina • Conservancy along Priest Point Park • Rural from West Bay Marina to Butler Cove 	<ul style="list-style-type: none"> • High density urban • Moderate density urban • Mixed forest • Non-forest vegetation (shrubs, wetlands, lawns) • Coniferous forests 	<ul style="list-style-type: none"> • High density urban • Moderate density urban • Mixed forest • Non-forest vegetation (shrubs, wetlands, lawns) • Coniferous forests

Current Land Use (MAP 7)	Future Land Use (Zoning) (MAP 8)
<ul style="list-style-type: none"> • Moderate density single-family residential • Multifamily residential • Commercial • Government (Port of Olympia) • Parks • Industrial 	<ul style="list-style-type: none"> • Redevelopment from industrial to mixed residential and commercial uses is likely to occur along West Bay drive and the eastern portion of the Port Peninsula • New City Park is planned for West Bay Drive • Redevelopment in Olympia’s downtown is likely to occur

Water Dependent/Oriented Uses – Reaches noted after Feature) (MAP 9)		
West Bay	Downtown Olympia	East Bay
<p>Water Dependent</p> <ul style="list-style-type: none"> • Log Booming (BUDD-2) • West Bay Marina (BUDD-3) • Evergreen State College Boathouse @ West Bay Marina (BUDD-3) • Log Yard (BUDD-3) • Dunlap Towing – harbor tugs and barge services - chip reloads (BUDD-3) 	<p>Water Dependent (BUDD-5)</p> <ul style="list-style-type: none"> • Martin Marina • One Tree Island Marina • Fiddlehead Marina • Swantown/East Bay Marina • Evergreen State College Boathouse @ Swantown Marina • Olympia Yacht Club LOTT Sewer Outfall Port of Olympia Terminal • Budd Bay Charters (boat tours) 	<p>Water Dependent</p> <ul style="list-style-type: none"> • None noted
<p>Water Related (BUDD-3)</p> <ul style="list-style-type: none"> • West Bay Marina – boat repair services (BUDD-3) • Private kayak rentals (BUDD-3) • Brown-Minneapolis Tanks (formerly Reliable Steel) – tank manufacturer, currently not using the water for transportation of tanks (BUDD-3) 	<p>Water Related (BUDD-3)</p> <ul style="list-style-type: none"> • Yacht sales (Yacht club) • Outboard motor sales • Boat sales (Fiddlehead Marina) 	<p>Water Related</p> <ul style="list-style-type: none"> • None noted
<p>Water Enjoyment</p> <ul style="list-style-type: none"> • Community access at Old Port Beach (BUDD-1) • Restaurants (Tug Boat Annies) (BUDD-3) • Shared-use trails: Trail planned for West Bay Drive (BUDD-3) • Small private park – 1801 West Bay Drive (BUDD-3) • City Park (BUDD-3) • Viewpoint: 234 West Bay Drive viewing platform (BUDD-3) • Viewpoints 4th Avenue Bridge (BUDD-4) 	<p>Water Enjoyment</p> <ul style="list-style-type: none"> • Restaurants: Bayview Deli – Budd-4/5) • Budd Bay Café; 2 Anthony’s; Dockside Deli (BUDD-5) • Boardwalk – Percival Landing (BUDD- 4/5) • Port Plaza (BUDD-5) • Walking Trails – East Bay Marina (BUDD-5) • Viewpoint: 4th Avenue Bridge (BUDD-4) • Viewing Tower – Port Plaza (BUDD-5) 	<p>Water Enjoyment</p> <ul style="list-style-type: none"> • Walking Trails – Priest Point Park (BUDD-8) • Viewpoint: East Bay Waterfront Park (BUDD-6)

Roads	Railroads, Utilities	Shoreline Modifications
<ul style="list-style-type: none"> • West Bay Drive • East Bay Drive • Numerous roads in downtown Olympia 	<ul style="list-style-type: none"> • West Bay Drive has an abandoned railroad right of way, and railroad trestle 	<ul style="list-style-type: none"> • Olympia downtown shoreline is fill and highly modified • Percival Landing Boardwalk is over the water • West Bay is modified up to the West Bay Marina • East Bay Drive Residences are armored • There are ten small docks and several marinas in Budd Inlet • About 73% of the shoreline is modified

Historic Shoreline
 General Land Office Map (1850s) With Current Water Overlain in Hatch Marks



**Known sites with Toxic or Hazardous Material
(MAP 10)**

West Bay

Confirmed and Suspected Contamination Sites

- Hardel Mutual Plywood, 1210 West Bay Drive NW, Olympia. Located on west shore of Budd Inlet. Contaminants from Petroleum Products groups and Polynuclear Aromatic Hydrocarbons are confirmed in groundwater, surface water, soil, and sediment, and suspected in air. Remedial action is underway.
- Reliable Steel, 1218 West Bay Drive NW, Olympia. Located on west shore of Budd Inlet. Contaminants from Metals & Priority Pollutants are confirmed in sediment and groundwater, and suspected in soil. Petroleum Products are confirmed in sediment and groundwater, and suspected in soil. Arsenic is suspected in soil, sediment, and groundwater. Remedial action is underway.
- Industrial Petroleum Distributers, 1117 West Bay Drive NW, Olympia. Located on the west shore of Budd Inlet. Contaminants from Metals & Priority Pollutants are confirmed in soils, and Petroleum Products are confirmed in soils and groundwater, and suspected in sediments. Remedial action is underway.
- Solid Wood, Inc., 700 West Bay Drive NW, Olympia. Located on the west shore of Budd Inlet. Contaminants from Metals & Priority Pollutants are confirmed in groundwater. Contaminants from Petroleum Products groups and Polynuclear Aromatic Hydrocarbons are confirmed in groundwater, and soil and suspected in sediments. Remedial action is underway.

No Further Action Needed

- West Bay Marina, 2100 West Bay Dr. NW, Olympia. Located on west shore of Budd Inlet. Contaminants from the Metals & Priority Pollutants, Metals & Other Contaminant, and Petroleum Products groups were suspected in the soil. Petroleum Products were also suspected in groundwater, and contaminants from the Tributyl Tin group were found in sediments. Remedial action is currently underway.
- Delson Lumber Olympia, 1820 West Bay Dr. NW, Olympia. Located adjacent to the west shore of Budd Inlet. Contaminants from the Petroleum Products group were found in the groundwater. Remedial action was completed in 1997.
- Woodard Building Site, 1433 West Bay Dr. NW, Olympia. Located adjacent to the west shore of Budd Inlet. Contaminants from the Petroleum Products group were found in the soil and groundwater. Remedial action was completed in 2003.

Downtown Olympia

Leaking Underground Storage Tanks

- Numerous sites

Confirmed and Suspected Contamination Sites

- Pho Olympia Restaurant Utility Pole, 301 4th Avenue W, Olympia. Contaminants from Metals & Priority Pollutants and the Petroleum Products group are confirmed in soil and groundwater. Polynuclear Aromatic Hydrocarbons are suspected in soil and groundwater. This site is ranked and awaiting remedial action.
- Olympia City Sewer Pump Station, 220 Water Street NW, Olympia. Contaminants from the Petroleum Products group are confirmed in soil and groundwater samples. This site is ranked and

awaiting remedial action.

- Phoenix Inn, 415 Capitol Way N, Olympia. Contaminants from the Petroleum Products group and Non-Halogenated Solvents are confirmed in soil and groundwater. Metals & Priority Pollutants, and Polynuclear Aromatic Hydrocarbons are suspected in groundwater. This site is undergoing remedial action.
- Warehouse One Port, N Washington and B Ave, Port Peninsula, Olympia. Contaminants from the Petroleum Products group are suspected in soil and groundwater. This site is ranked and awaiting remedial action.
- Budd Inlet Sediment, Budd Inlet. Dioxin is confirmed in sediment samples. This site is undergoing remedial action.
- Cascade Pole Inc. McFarland. 1110 Washington Street, Olympia. This superfund cleanup site has had construction completed, and is in the operations and maintenance phase. Contaminants from many groups were found in soil and groundwater.
- LOTT Wastewater Treatment Plant Expansion, 500 N Adams NE, Olympia. Contaminants from the Metals & Priority Pollutants, Other Metals, and Petroleum Products groups and Arsenic were confirmed in groundwater samples. Other Metals are also confirmed in soil. This site is undergoing remedial action.
- East Bay Redevelopment, 315 Jefferson St. NE, Olympia. Contaminants from the Metal & Priority Pollutants, and Other Metals groups are confirmed in soil samples. Polychlorinated Bi-Phenyls are confirmed in groundwater, and suspected in soil and sediments. Contaminants from the Petroleum Products group are suspected in sediment, and confirmed in soil and groundwater. Phenolic Compounds are suspected in sediment and groundwater. Contaminants from the Polynuclear Aromatic Hydrocarbons are suspected in sediment, and confirmed in soil and groundwater. This site is undergoing remedial action.
- WA State Vacant Property, 318 State Avenue NE, Olympia. Contaminants from the Halogenated Organics group confirmed in soil and groundwater. Contaminants from the Other Metals group and Polynuclear Aromatic Hydrocarbons group confirmed in soil and suspected in groundwater. This site is awaiting a site hazard assessment.

No Further Action Needed

- 503 N Capitol Way, Olympia. Located east of Budd Inlet's West Bay. Contaminants from the Petroleum Products group were found in the groundwater and soil. Remedial action was completed in 2002.
- Port of Olympia, 724 E State St, Olympia. Located to the south of Budd Inlet. Contaminants from the Petroleum Products group were found in soil and groundwater. Contaminants from the Metals, Priority Pollutants group were also found in groundwater. Remedial action was completed in 2007.
- East Bay Marina Drum, 1022 Marine Dr. NE, Olympia. Located west of Budd Inlet's East Bay. Contaminants from the Non-Halogenated Solvents and Polynuclear Aromatic Hydrocarbons group were suspected in the soil and groundwater. Contaminants from the Petroleum Products group were suspected in groundwater and located below the cleanup level in the soil. Contaminants from the Metals, Priority Pollutants group were also suspected in the soil. This site is currently awaiting site hazard assessment.
- Intercity Transit Key Shop, Capitol & State Streets. Located east of Budd Inlet's West Bay. Contaminants from the Petroleum Products group were found in the soil and groundwater. Remedial action was completed in 2002.

Indian/Moxlie Creek Area – Downtown Olympia

Leaking Underground Storage Tanks

- Numerous sites

Confirmed and Suspected Contamination Sites

- Downtown Safeway, 601-609 4th Ave E, Olympia. Contaminants from the Petroleum Products and Non-Halogenated Solvent groups were confirmed in soil and groundwater. Remedial action is in progress for this site.
- Stop ‘n Go, 600 4th Ave E, Olympia. Contaminants from the Petroleum Products group have been confirmed in groundwater, and remediated in soil. This site is ranked and awaiting remedial action.
- Former Darigold Site, 706 7th Ave E, Olympia. Contaminants from the Petroleum Products group have been confirmed in soil and groundwater. They are below cleanup level in groundwater. This site is undergoing remedial action.
- Olympia City Public Works, 8377th Ave SE, Olympia. Contaminants from the Petroleum Products and Polynuclear Aromatic Hydrocarbons groups are confirmed in soil and groundwater. This site is ranked and awaiting remedial action.
- Chevron 95311, 1018 Plum Street SE, Olympia. Contaminants from the Petroleum Products group were confirmed in soil and groundwater. Metals & Priority Pollutants were found in soil but at levels below the cleanup threshold. This site is ranked and awaiting remedial action.
- Olympia Dry Cleaners Former, 606 Union Avenue SE, Olympia. Contaminants from the Halogenated Organics and Petroleum Pollutants groups were confirmed in soil and groundwater. Remediation is in progress for this site.

No Further Action Needed

- Supervalu Inc., 620 Legion Way SE, Olympia. Contaminants from the Petroleum Products group were found in the soil and groundwater. Remedial action was completed in 2006.
- ANR Freight, 701 Legion Way, Olympia. Contaminants from the Petroleum Products group were found in the soil. Remedial action was completed in 1995.
- McDonald’s Restaurant, 715 Plum St, Olympia. Contaminants from the Petroleum Products group were found in the soil and groundwater. Remedial action was completed in 1999.
- City of Olympia, Department of Public Works Maintenance Center, 1401 Eastside St. SE, Olympia. Located southwest of Indian Creek. Contaminants from the Petroleum Products group were found in the soil. Remedial action was completed in 2000.

Historic Properties
(MAP 11)

- There are two National Historic Districts located adjacent to Budd Inlet in downtown Olympia.
- There are numerous properties in the historic inventory, or on local, state, or federal registers adjacent to Budd Inlet. They are listed below.

Historic Name	Location Address	Inventory or Register	Construction Date
The Firs	1816 27 th St NW Olympia	Inventory	1908
Iverson House	208 West Bay Dr NW, Olympia	Inventory	1908
George B. Lane House	1205 West Bay Dr NW Olympia	State Register	1891
Wright Building	218 4th W Olympia	Inventory	1908
Overland Lunch/ Eads Transfer	105 Columbia St NW, Olympia	Inventory	ca. 1929
Olympia Oyster House	320 4th Avenue W Olympia	Inventory	1923
Olympia Yacht Club	201 Simmons NW Olympia	Inventory	1930
Olympia Sand & Gravel	401 Columbia Street NW Olympia	Inventory	1928
Mullins House	516 East Bay Dr Olympia	Inventory	1920
Raymond House	1130 North East Bay Dr NE Olympia	Inventory	1922
Meyer House	1136 East Bay Dr NE Olympia	Local, State and National Registers	1910
Parker House	1919 East Bay Dr NE Olympia	Inventory	1917
Chandler House	2053 East Bay Dr NE Olympia	Local Register	1920
George Mills House	2061 East Bay Dr NE Olympia	Local Register	1920
Jeffers House	2109 East Bay Dr NE Olympia	Inventory	1922
Stanton House	2139 East Bay Dr NE Olympia	Inventory	1928
Earl & Adele Kent House	2155 & 2155 1/2 East Bay Dr NE Olympia	Inventory	1905
Sylvester House	2221 East Bay Dr NE Olympia	Inventory	ca. 1945
Priest Point Park	2600 North East Bay Dr NE Olympia	Inventory	1905

Public Waterfront Land Owners (MAP 12)
<ul style="list-style-type: none"> • Port of Olympia (BUDD-5) • City of Olympia • LOTT Wastewater Treatment Plant (BUDD-5)

Public Access (MAP 12)			
	Swimming	Fishing	Boat Access
Overall	Yes	Yes	Yes
Parks, Trails, and other Access Points			
Fiddlehead Marina (BUDD-5)	No	No	Yes
One Tree Island Marina (BUDD-5)	No	No	Yes
Martin Marina (BUDD-5)	No	No	Yes
Olympia Yacht Club (BUDD-5)	No	No	Yes
Swantown Marina/East Bay (BUDD-5)	No	Yes	Yes
Port Plaza (BUDD-5)	No	No	No
4 th Avenue Bridge (BUDD-4)	No	No	No
5 th Avenue Dam (BUDD-4)	No	No	No
West Bay Marina (BUDD-3)	No	No	Yes
West Bay Drive – 234 West Bay Drive Public viewing platform (BUDD-3)	No	No	No
West Bay – 1801 West Bay Drive - Small park (private ownership with public access) (BUDD-3)	No	No	No
Seven Oars Art Site (pocket park) (BUDD-3)	No	No	No
Percival Landing (Downtown Olympia) Waterfront Boardwalk (BUDD-4/5)	No	Yes	Yes
East Bay Waterfront Park (BUDD-6)	No	No	No
Priest Point Park (East Bay Drive) (BUDD-8)	Yes	Yes	No
West Bay Park (undeveloped) Plans for non-motorized boat access and waterfront trail (BUDD-3)	No	No	No
Public Trail proposed for West Bay waterfront (BUDD-3)	No	No	No

Soils			
General	Alderwood-Everett Association – Glacial uplands		
Reach	Name	Acres	Percent
BUDD-1	Dystric Xerochrepts, 60 to 90% slopes	10.1	54%
BUDD-1	Skipopa silt loam, 3 to 15% slopes	5.1	27%
BUDD-1	Alderwood gravelly sandy loam, 15 to 30% slopes	3.6	19%
BUDD-2	Dystric Xerochrepts, 60 to 90% slopes	16.0	92%
BUDD-2	Alderwood gravelly sandy loam, 0 to 3% slopes	1.3	8%
BUDD-3	Xerorthents, 0 to 5% slopes	35.8	79%
BUDD-3	Alderwood gravelly sandy loam, 15 to 30% slopes	6.8	15%
BUDD-3	Dystric Xerochrepts, 60 to 90% slopes	1.9	4%
BUDD-3	Hoogdal silt loam, 15 to 30% slopes	0.5	1%
BUDD-4	Xerorthents, 0 to 5% slopes	5.0	100%
BUDD-5	Xerorthents, 0 to 5% slopes	53.3	100%
BUDD-6	Xerorthents, 0 to 5% slopes	10.6	46%
BUDD-6	Hoogdal silt loam, 15 to 30% slopes	8.7	38%
BUDD-6	Hoogdal silt loam, 30 to 50% slopes	2.2	10%
BUDD-6	Yelm fine sandy loam, 3 to 15% slopes	1.4	6%
BUDD-7	Hoogdal silt loam, 15 to 30% slopes	11.1	58%
BUDD-7	Kapowsin silt loam, 0 to 3% slopes	7.5	39%
BUDD-7	Hoogdal silt loam, 30 to 50% slopes	0.6	3%
BUDD-8	Dystric Xerochrepts, 60 to 90% slopes	30.7	85%
BUDD-8	Hoogdal silt loam, 15 to 30% slopes	4.2	12%
BUDD-8	Skipopa silt loam, 0 to 3% slopes	1.4	4%

Critical Areas (MAP 13)
<p>Wetlands</p> <ul style="list-style-type: none"> • Small patch of salt marsh along beach south of Ellis Cove in Priest Point Park. • Mitigation site for the new 4th Avenue Bridge at the north end of the Port Lagoon (along West Bay Drive & north of 4th Avenue Bridge). • The northern beach of the Port Peninsula (adjacent to Cascade Poll) has been remediated.
<p>Habitat Conservation Areas</p> <ul style="list-style-type: none"> • Three qualities of riparian habitat can be found in lower Budd Inlet: high quality riparian shorelines along Priest Point Park; medium quality riparian along the west shore of the Port Lagoon; and low quality riparian on the west shore north of the fills (Dunlop Towing parcel) along West Bay Drive. In Olympia these areas are designated as '<i>Important Riparian Areas</i>'.
<p>Priority Habitats & Species</p> <ul style="list-style-type: none"> • The species in lower Budd Inlet include a collection of birds of prey and shorebirds. • Osprey and purple martin nest within the basin and a Great Egret is also present. • There are shorebird concentrations along the original shorelines of both East and West Bay. • Ellis Cove is noted as a relatively intact estuary. • The log rafts north of the West Bay Marina Harbor are seal haul out areas.
<p>Floodplains</p> <ul style="list-style-type: none"> • Shoreline properties may be affected by tidal flooding
<p>Landslide Hazard Areas</p> <ul style="list-style-type: none"> • Existing steep slopes along Priest Point Park • Steep slopes to the east of East Bay Drive • Existing steep slope along the west shore of the Port Lagoon, and west of West Bay Drive north of Schneider Creek • Steep slopes adjacent to shoreline north of the fills along the west shore of West Bay
Critical Saltwater Habitat (MAP 14)
<ul style="list-style-type: none"> • Priest Point Park supplies multiple overlapping habitats. The steep slopes of the park provide beach sediment for forage fish, there is a remnant salt marsh south of the creek, and the Ellis Cove estuary is relatively intact with a salmon bearing stream. • Other salmon bearing streams along East Bay are Mission and Moxlie Creeks. • Capitol Lake is a significant source of Chinook, Coho, and Steelhead salmon. • Schneider Creek is the only salmon bearing stream along West Bay. • Forage fish spawning extends south from Priest Point Park along East Bay for approximately ½ mile. • Along the west shore of Budd Inlet forage fish spawning is intermittent from Butler Cove Creek south approximately ¾ of a mile. • The west shore of the Port Lagoon has patchy salt marsh.

Water Quality for Budd Inlet		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d) Water	Dissolved oxygen	Found in water samples, detected at several locations
Category 5 303(d) Tissue	Benzo(a)anthracene, Benzo(b)fluorene, Benzo(k)fluorine, Chrysene, Total PCBs	Found in tissue samples from East Bay
Category 4(C)	None	
Category 4(B) Sediment	Hexachlorobenzene; 1,2,4- Trichlorobenzene; Pentachlorophenol; Butylbenzyl phthalate; 2,4-Dimethylphenol; Bis(2- ethylhexyl)phthalate; 4-Methylphenol; Benzyl alcohol; 1,2- Dichlorobenzene; Sediment Bioassay; 2- Methylphenol; Cadmium	Found in sediment samples, some detected at multiple locations
Category 2 Water	Dissolved oxygen, pH, Temperature	Found in water samples, all detected at several locations
Category 2 Sediment	Benzyl alcohol; 2,4- Dimethylphenol; Hexachlorobenzene; 1,2,4-Trichlorobenzene	Found in sediment samples, all but 1,2,4- Trichlorobenzene detected at two locations
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Closed to shellfish because of LOTT sewer outfall		

Water Quality for Budd Inlet Tributaries

Water Quality for Ellis Creek		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	None	
Category 4(C)	None	
Category 2	None	
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Good	Failed Part II of the fecal coliform water quality standards.	
Additional Information		
<p>Major Issues</p> <ul style="list-style-type: none"> • Because of its proximity to the city limits, new development is occurring in the watershed. Full development of the basin could have an appreciable impact on flood volumes. • Water quality is threatened by erosion from high stream flows and nonpoint source pollution in the watershed. • Stream bed appears to be changing from predominantly gravel to fine sand. 		

Water Quality for Indian Creek		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	Fecal coliform	
Category 4(C)	None	
Category 2	None	
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Poor	Creek in consistent violation of both parts of the fecal coliform standards.	Past studies have detected elevated metals and organics.
Additional Information		
<p>Major Issues</p> <ul style="list-style-type: none"> • Fecal coliform bacteria contamination continues to be a problem in this urban stream. • Stormwater runoff from local roadways and Interstate Highway 5 discharges into the creek and contributes to water quality problems. 		

Water Quality for Mission Creek		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	None	
Category 4(C)	None	
Category 2	None	
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Fair	Failed both parts of the fecal coliform standard.	Nutrients are elevated, particularly nitrate.
Additional Information		
<p>Major Issues</p> <ul style="list-style-type: none"> • High levels of bacterial contamination throughout the creek system, including stormwater discharges. • The watershed has potential for future development which may further impact water quality. 		

Water Quality for Moxlie Creek		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	Fecal coliform	
Category 4(C)	None	
Category 2	pH	
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Poor	Failed both parts of the fecal coliform standard	Total phosphorus and ammonia levels are moderately high; the creek is heavily impacted by urban land uses.
Additional Information		
<p>Major Issues</p> <ul style="list-style-type: none"> • Stormwater discharges to the creek threaten the integrity of the natural creek channel in the upper watershed and degrades water quality throughout its length. • The lower portion of the creek is confined in a 72" culvert under the city, which provides little habitat value. • Illicit connections of sewer lines to the culverted portion of the creek is an on-going problem. 		

Water Quality for Schneider Creek		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	None	
Category 4(C)	None	
Category 2	None	
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Good	Failed Part II of the fecal coliform standard.	Stream channel is severely impacted by peak stormwater flows.
Additional Information		
<p>Major Issues</p> <ul style="list-style-type: none"> • High volumes of stormwater discharging directly to the creek are causing bank failures, streambank erosion, flooding, stream channel scour, and water quality degradation. • City of Olympia constructed a stormwater treatment facility at the headwaters of the creek to improve the quality of urban stormwater discharging to the creek. 		

Fisheries for Budd Inlet

Budd Inlet

- The following fish species have been identified in Puget Sound: sturgeons, poachers, lancetfishes, thresher sharks, sand lances, wolffishes, sablefishes, tubesnouts, ronquils, toadfishes, lefteye flounders, pomfrets, livebearing brotulas, jacks, requiem sharks, basking shark, shortnose chimaeras, herrings, sculpins, wrymouths, lumpfishes, tonguefishes, carps and minnows, killifishes, sleeper sharks, surfperches, anchovies, cods, sticklebacks, clingfishes, gobies, greenlings, cow sharks, ragfish, mackerel sharks, opahs, snailfishes, merluccid hakes, molas, temperate basses, lanternfishes, snipe eels, smelts, barracudinas, lampreys, gunnels, righteye flounders, fathead sculpins, quillfish, skates, grunt sculpin, salmon and trouts, drums, sauries, mackerels and tunas, scorpionfishes/rockfishes, cat sharks, graveldiver, barracudas, dogfish sharks, angel sharks, pricklebacks, butterfishes, pipefishes, lizardfishes, electric rays, ribbonfishes, cutlassfishes, sandfishes, combfishes, eelpouts.

The following fisheries resources have been identified for fresh water tributaries of Budd Inlet:

Ellis Creek

- Coho and chum.

Indian Creek

- Chinook, coho, (chum unknown)
- Washington Department of Fish and Wildlife plants coho in Indian Creek near the Boulevard Street bridge. NED (Northwest Environmental Database) indicates resident fish are found in the entire length of Indian Creek. Species include coastal cutthroat, cottids, and three-spined stickleback. Cutthroat may also possibly inhabit Indian Creek.

Mission Creek

- Coho and chum.

Moxlie Creek

- Olympia Stream Team has sighted cutthroat trout, Chinook and coho in Moxlie Creek. There were some limited numbers of coho juveniles planted in the creek in Watershed Park. Cutthroat may also possibly inhabit Moxlie Creek.

Schneider Creek

- Coho and cutthroat.

Bird Watching Areas

Priest Point Park

- Woods: Northern Flicker, Downy and Pileated Woodpeckers, Black-capped and Chestnut-backed Chickadees, Red-breasted nuthatch, and both kinglets can be found in these woods.
- Mudflats and rocky beach: Greater Yellowlegs, Western and Least Sandpipers, and Dunlin (especially in winter).
- Other species: The Cormorants, Mallard, Glaucous-winged Gull, Great Blue Heron, and Kingfisher, Bald Eagle, Pigeon Guillemot and Band-tailed Pigeon
- Nests: Brown Creeper, Osprey.

Downtown Olympia

- Remnant pilings: Double-crested or Pelagic cormorants, Ring-billed, Mew, Glaucous-winged, and hybrid gulls, or a kingfisher. A Willet was seen here regularly for two winters and a Snowy Egret perched on the pipe during its May 1996 visit. In summer, the piling-mounted nest boxes hold several Purple Martin pairs.
- Shallow waters at the head of the bay: Horned Grebe, Mallard, Hooded Merganser, Bufflehead, and goldeneyes (both Barrow's and Common), Greater Yellowlegs, Dunlin (winter), other peeps during migration.
- Swantown/East Bay: grebes, ducks, or an occasional Rhinoceros Auklet.
- Radio tower - tip of the Port Peninsula: Almost any "typical" waterbird is possible here. Yellow-billed Loon, Eared Grebe, and Oldsquaw are infrequent treats. Bonaparte's Gull and Caspian Tern are regular seasonally and shorebirds use the mud flats.
- Lower West Bay: Scan for grebes, sea ducks, and surprises.
- West Bay Lagoon: Greater Scaup, Barrow's Goldeneye, and Great Blue Heron. Band-tailed Pigeons and kingfishers use the big-leaf maples along the shoreline, shorebirds roost on the cobbles, and Green Herons occasionally patrol the channels.
- The dam at Fifth Avenue: Pelagic Cormorants, Barrow's Goldeneyes, Great Blue Herons, Bonaparte's Gulls, and Belted Kingfishers.

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Nisqually Reach (DeWolf Bight from Butterball Cove to Beachcrest)
Lacey & Lacey UGA



WRIA (MAP 3)	Watershed (MAP 3)	Length
WRIA 13	Nisqually River	1.8 miles in urban areas

Topography (MAP 4)	Surface Hydrology (MAP 4)	Other Hydrologic Features
<ul style="list-style-type: none"> • Bluffs along the marine shoreline. 	<ul style="list-style-type: none"> • Small unnamed streams drain into Butterball Cove and Mallard Cove 	<ul style="list-style-type: none"> • None noted

Existing Shoreline Designations (MAP 5)	General Land Cover (MAP 6)	Riparian Land Cover (MAP 6)
<ul style="list-style-type: none"> • Rural 	<ul style="list-style-type: none"> • Mixed forests • Moderate density urban • Non-forest vegetation (shrubs, lawns) 	<ul style="list-style-type: none"> • Mixed forests • Moderate density urban • Non-forest vegetation (shrubs, lawns)

Current Land Use (MAP 7)	Future Land Use (Zoning) (MAP 8)	Water Dependent/Oriented Uses (MAP 9)
<ul style="list-style-type: none"> • Vacant land • Low density residential 	<ul style="list-style-type: none"> • Master Planned Community of moderate density residential development planned for vacant land 	<p>Water Dependent</p> <ul style="list-style-type: none"> • Small private marina in Mallard Cove (NIS-2) <p>Water Related</p> <ul style="list-style-type: none"> • None noted <p>Water Enjoyment</p> <ul style="list-style-type: none"> • Community trails to beach access for two communities (NIS1/2)

Roads	Railroads, Utilities	Shoreline Modifications
<ul style="list-style-type: none"> • Local road access 	<ul style="list-style-type: none"> • None noted 	<ul style="list-style-type: none"> • One old pier (NIS-1) • Private marina (NIS-2) • Beachcrest shoreline is modified by road and armoring at base of bluff (NIS-2)

Known sites with Toxic or Hazardous Material (MAP 10)
<ul style="list-style-type: none"> • None noted

Historic Properties (MAP 11)
<ul style="list-style-type: none"> • None noted

Public Waterfront Land Owners (MAP 12)
<ul style="list-style-type: none"> • None noted

Public Access (MAP 12)			
	Swimming	Fishing	Boat Access
Overall	No	No	No
Parks, Trails, and other Access Points			
None noted			

Soils			
General	Alderwood-Everett Association – Glacial uplands		
Reach	Name	Acres	Percent
NIS-1	Dystric Xerochrepts, 60 to 90% slopes	21.0	75%
NIS-1	Skipopa silt loam, 0 to 3% slopes	7.1	25%
NIS-2	Dystric Xerochrepts, 60 to 90% slopes	17.8	100%

Critical Areas (MAP 13)
<p>Wetlands</p> <ul style="list-style-type: none"> • See <i>Critical Saltwater Habitat</i> below
<p>Habitat Conservation Areas</p> <ul style="list-style-type: none"> • DeWolf Bight (that portion of the Nisqually Reach between Butterball Cove to the west and Mallard Cove to the east) is the longest segment of high quality riparian habitat along the Nisqually Reach.
<p>Priority Habitats & Species</p> <ul style="list-style-type: none"> • Bald Eagles are located along the reach

<p>Floodplains</p> <ul style="list-style-type: none"> • Shoreline properties may be affected by tidal flooding
<p>Landslide Hazard Areas</p> <ul style="list-style-type: none"> • None noted. <i>[Note: may be due to large pixel size of DEM mapping]</i>
<p>Critical Saltwater Habitat (MAP 14)</p>
<ul style="list-style-type: none"> • A commercial shellfish growing area exists along this segment of the Nisqually Reach. • The shorelines on either side of Butterball Cove are sediment sources for forage fish spawning which also occurs within the cove. • Butterball Cove is designated as a pocket estuary with patchy salt marsh, but its stream is not noted as having salmon. • Mallard Cove is an undesignated but degraded pocket estuary, as it serves as a marina for the Beachcrest subdivision. • The stream which flows around the boat basin is also noted as not supporting salmon, however it lies within a half mile of the Hogum Bay salmon stream. • Forage fish spawning occurs within Mallard Cove. • Partial restoration of the stream to Beachcrest Pond is planned

Water Quality		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	Fecal coliform	
Category 4(C)	None	
Category 2	Dissolved oxygen, fecal coliform	
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Unlisted		
Additional Information		
<p>Major Issues</p> <ul style="list-style-type: none"> • There are several known potential sources of bacteria along Nisqually Reach, including Luhr Beach—a commercial area—and several residential areas (James 2007). 		

Shellfish

- In 2006, the Washington State Department of Health’s Office of Shellfish and Water Protection issued a report on the state of shellfish beds in Nisqually Reach (the entire Reach, not just the area within the City and Urban Growth Area.) Overall, water quality standards were met, but with some concerns. Of 33 test sites, 27 were approved for shellfish growing, four were restricted, one was prohibited and one was unclassified. That same year, 37 acres of restricted area were upgraded to approved due to improvements in on-site sewage systems, although 118 acres were downgraded from approved to prohibited due to excess fecal coliform levels.

Fisheries

- The following fish species have been identified in Puget Sound: sturgeons, poachers, lancetfishes, thresher sharks, sand lances, wolffishes, sablefishes, tubesnouts, ronquils, toadfishes, lefteye flounders, pomfrets, livebearing brotulas, jacks, requiem sharks, basking shark, shortnose chimaeras, herrings, sculpins, wrymouths, lumpfishes, tonguefishes, carps and minnows, killifishes, sleeper sharks, surfperches, anchovies, cods, sticklebacks, clingfishes, gobies, greenlings, cow sharks, ragfish, mackerel sharks, opahs, snailfishes, merluccid hakes, molas, temperate basses, lanternfishes, snipe eels, smelts, barracudinas, lampreys, gunnels, righteye flounders, fathead sculpins, quillfish, skates, grunt sculpin, salmon and trouts, drums, sauries, mackerels and tunas, scorpionfishes/rockfishes, cat sharks, graveldiver, barracudas, dogfish sharks, angel sharks, pricklebacks, butterfishes, pipefishes, lizardfishes, electric rays, ribbonfishes, cutlassfishes, sandfishes, combfishes, eelpouts.

C. Rivers and Streams

Black Lake Drainage Ditch
Olympia, Tumwater and UGA



WRIA (MAP 3)	Watershed (MAP 3)	Basin (MAP 3)	Length
WRIA 13	Budd/Deschutes	Percival Creek	2.2 miles

Topography (MAP 4)	Surface Hydrology (MAP 4)	Other Hydrologic Features
<ul style="list-style-type: none"> • Flat topography surrounding Black Lake Drainage Ditch. 	<ul style="list-style-type: none"> • Black Lake drains into Black Lake Drainage Ditch • Black Lake Drainage Ditch drains into Percival Creek and eventually Capitol Lake and Budd Inlet • Ken Lake also discharges into Black Lake Drainage Ditch 	<ul style="list-style-type: none"> • This is a drainage ditch that alters the hydrology of Black Lake. The ditch was constructed in 1922 to drain potential agricultural land north of Black Lake. • Black Lake Drainage Ditch also captures the stormwater discharge from many of the commercial districts of West Olympia, through Yauger Park stormwater pond (constructed in 1981), and a regional stormwater detention facility off Mottman Road, constructed in the mid-1990s.

Existing Shoreline Designations (MAP 5)	General Land Cover (MAP 6)	Riparian Land Cover (MAP 6)
<ul style="list-style-type: none"> • Percival Shoreline Management Area 	<ul style="list-style-type: none"> • Mixed forest • Non-forest vegetation (shrubs) • High density urban • Mining 	<ul style="list-style-type: none"> • Mixed forests • Non-forest vegetation (shrubs)

Current Land Use (MAP 7)	Future Land Use (Zoning) (MAP 8)	Water Dependent/Oriented Uses (MAP 9)
<ul style="list-style-type: none"> • Open Space – City stormwater pond • Industrial • Mining 	<ul style="list-style-type: none"> • Developed area, unlikely to change 	<p>Water Dependent</p> <ul style="list-style-type: none"> • None noted <p>Water Related</p> <ul style="list-style-type: none"> • None noted <p>Water Enjoyment</p> <ul style="list-style-type: none"> • None noted

Roads	Railroads, Utilities	Shoreline Modifications
<ul style="list-style-type: none"> • Black Lake Blvd. to the north • Black Lake – Beltmore Road cross adjacent to Black Lake • Other private road crossings • Future wetland/ditch crossing at 34th Ave SW (Jones Bridge) 	<ul style="list-style-type: none"> • Railroad runs adjacent to Black Lake Drainage Ditch in the eastern section 	<ul style="list-style-type: none"> • This is an artificial drainage ditch

Known sites with Toxic or Hazardous Material (MAP 10)
<p>Leaking Underground Storage Tanks</p> <ul style="list-style-type: none"> • Four noted along Black Lake Drainage Ditch <p>Confirmed or Suspected Contaminated Sites</p> <ul style="list-style-type: none"> • Shop Fast, 2020 Black Lake Blvd., Olympia. Contamination from Petroleum Products and Non-Halogenated Solvents groups confirmed in soils and groundwater. Metals & Priority Pollutants also confirmed in groundwater. The site is undergoing remedial action. (Also near Ken Lake) • 2040 Mottman Road, Olympia. Contaminants from the Petroleum Products group are confirmed in groundwater. This site is awaiting a site hazard assessment.

Historic Properties (MAP 11)
<ul style="list-style-type: none"> • None noted

Public Waterfront Land Owners (MAP 12)
<ul style="list-style-type: none"> • City of Olympia stormwater pond

Public Access (MAP 12)			
	Swimming	Fishing	Boat Access
Overall	No	No	No
Parks, Trails, and other Access Points			
None noted			

Soils			
General	Alderwood-Everett Association – Glacial uplands		
Reach	Name	Acres	Percent
BLDD-1	Semiahmoo muck	120.7	63%
BLDD-1	Shalcar Variant muck	29.1	15%
BLDD-1	Everett very gravelly sandy loam, 0 to 3% slopes	9.4	5%
BLDD-1	Tisch silt loam	8.1	4%
BLDD-1	McKenna gravelly silt loam, 0 to 5% slopes	8.0	4%
BLDD-1	Everett very gravelly sandy loam, 3 to 15% slopes	3.6	2%
BLDD-1	Indianola loamy sand, 0 to 3% slopes	3.2	2%
BLDD-1	Alderwood gravelly sandy loam, 3 to 15% slopes	3.1	2%
BLDD-1	Alderwood gravelly sandy loam, 0 to 3% slopes	2.4	1%
BLDD-1	Giles silt loam, 15 to 30% slopes	1.8	1%
BLDD-1	Kapowsin silt loam, 15 to 30% slopes	1.5	1%
BLDD-1	Everett very gravelly sandy loam, 30 to 50% slopes	0.5	0%
BLDD-2	Everett very gravelly sandy loam, 30 to 50% slopes	10.4	65%
BLDD-2	Pits, gravel	3.6	23%
BLDD-2	Everett very gravelly sandy loam, 3 to 15% slopes	1.2	8%
BLDD-2	Schneider very gravelly loam, 40 to 65% slopes	0.8	5%

Critical Areas (MAP 13)
<p>Wetlands</p> <ul style="list-style-type: none"> • Associated wetland of over 160 acres adjacent to the ditch • Wetland changing up gradient from emergent to scrub shrub with some small forested patches • Personal knowledge (Morrison) that this wetland supports pine tree - site involved with special mapping in 1987 • Olympia stormwater facility constructed adjacent to the ditch in previously dewatered wetlands in the mid-1990s
<p>Habitat Conservation Areas</p> <ul style="list-style-type: none"> • Mapped on site - part of a riparian area which links Capitol and Black Lakes
<p>Priority Habitats & Species</p> <ul style="list-style-type: none"> • Mink located within the basin

<p>Floodplains</p> <ul style="list-style-type: none"> • Floodplains are associated with this feature
<p>Landslide Hazard Areas</p> <ul style="list-style-type: none"> • Minor slopes of filled land east of Black Lake Boulevard, and within the canyon from Mottman Road downstream to the confluence with Percival Creek

Water Quality

State Listings

Listing	Parameter	Remarks/Notes
Category 5 303(d)	Temperature	
Category 4(C)	None	
Category 2	None	

Local Information

General Water Quality	Met/Failed Standards	Remarks/Notes
Fair	Failed Part II of the fecal coliform standard; violated temperature and dissolved oxygen standards in July and August of 2005.	

Additional Information

<p>Major Issues</p> <ul style="list-style-type: none"> • The basin is within the urban growth boundary and is rapidly developing. The City of Olympia has a major regional stormwater facility along Black Lake Drainage Ditch that treats and detains storm water that comes from commercial development on the west side of Olympia. • Black Lake Drainage Ditch is included in a total maximum daily load study (TMDL) begun in 2003 by the Washington Department of Ecology to identify pollution sources and develop a plan to correct them. Because Black Lake is the origin of the Black Lake Drainage Ditch, high summer temperatures and low dissolved oxygen are a common condition. • Homeless encampments within the riparian corridor are a common occurrence and could be contributing to water quality problems.
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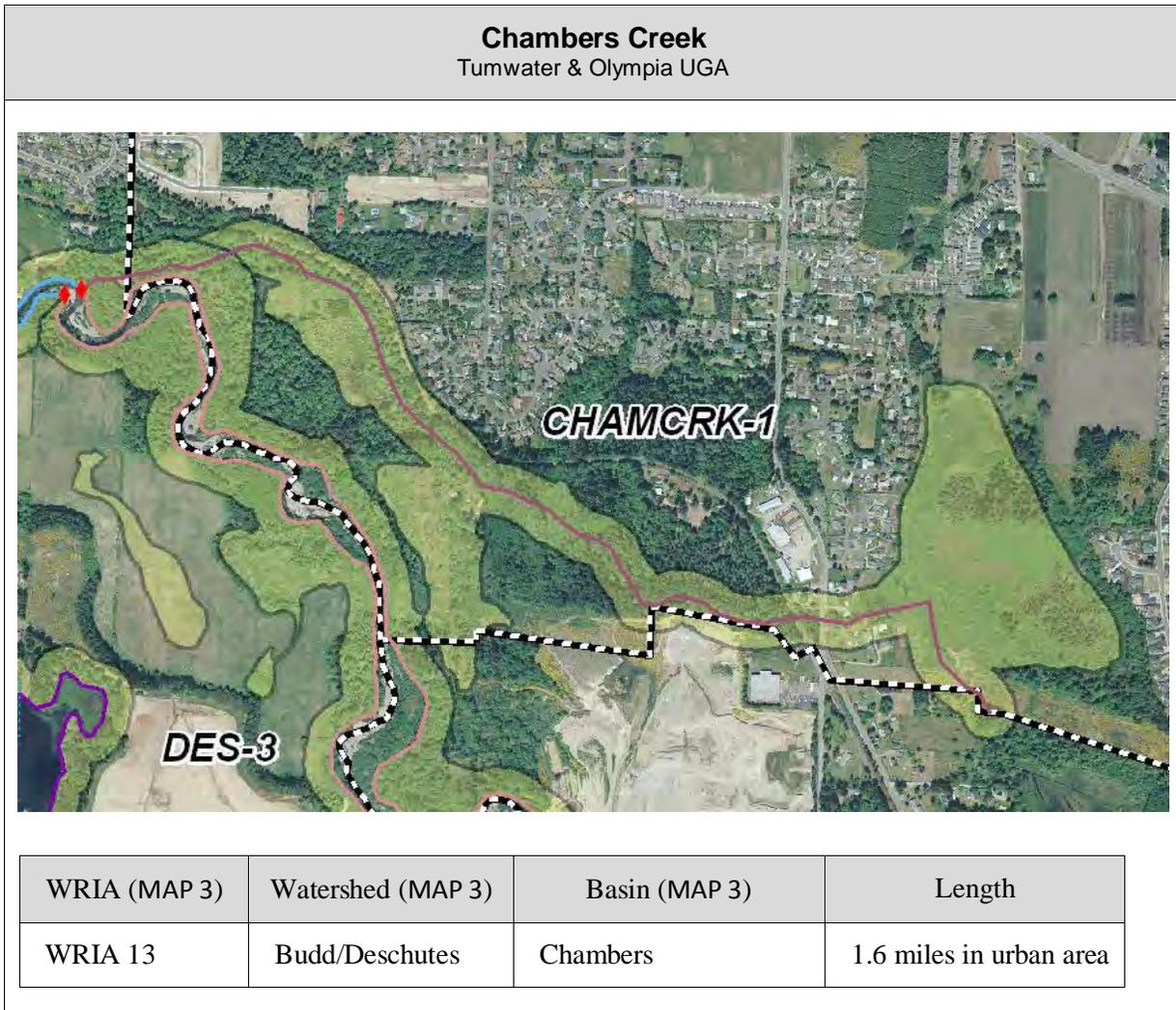
Fisheries

<ul style="list-style-type: none"> • Chinook, coho, chum. Occasional sockeye sightings.
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Bird Watching Areas

Black Lake Meadows

- Ponds: Solitary Sandpiper in early May, Killdeer, Greater and Lesser Yellowlegs, Western and Least Sandpipers, Short-billed Dowitcher, Red-necked Phalarope, Spotted Sandpiper, and Common Snipe.
- Nesting: Spotted Sandpipers and Killdeer.
- Woods and Fields: Bewick's Wren, Steller's Jay, Song and Fox Sparrows, chickadees, kinglets, Winter Wren, Dark-eyed Junco, and Spotted Towhee, passerines in spring migration.
- April and May: a good variety of warblers, but also tanagers, grosbeaks, flycatchers, and vireos, Bullocks Oriole and Dusky Flycatchers, Goldfinches, and nuthatches.
- Tree and Violet-green Swallows inhabit the nest boxes. California Quail sometimes call from the nearby fields. House Finch nest in the blackberry thickets
- Also: Northern Flicker, Red-breasted Sapsucker, Red-tailed Hawk, Bushtit, White and Golden-crowned sparrows, Wood Duck, Spotted Sandpiper, Willow Flycatcher, Cedar Waxwing, and Swainson's Thrush.
- Winter: a variety of ducks including Mallard, Pintail, Gadwall, American Wigeon, Northern Shoveler, Bufflehead, Green-winged Teal, Lesser Scaup, and Bufflehead.
- This site is also good for dragonflies, with a reported sighting of the Pacific Clubtail, *Gomphus Kurilis*, only the second State record, and the most sought species in Washington.



Topography (MAP 4)	Surface Hydrology (MAP 4)	Other Hydrologic Features
<ul style="list-style-type: none"> Fairly flat topography surrounding creek. 	<ul style="list-style-type: none"> Chambers Creek consists of the mainstem and the South Tributary. Chambers Lake drains into Chambers Creek via Chambers Ditch Numerous other drainage ditches drain Chambers Basin into Chambers Ditch The South Tributary originates in a wetlands system and has intermittent flow. It flows into Chambers Ditch at Rich Road, which then feeds into the mainstem. Chambers Creek drains into the Deschutes River During wet periods groundwater rises to the level of Chambers Lake and Chambers Ditch, feeding both systems. 	<ul style="list-style-type: none"> The hydrology of Chambers basin is highly altered. This very flat area is heavily ditched to drain surface water into Chambers Ditch and eventually the Deschutes River. Chambers Creek is in an active Drainage Ditch District

Existing Shoreline Designations (MAP 5)	General Land Cover (MAP 6)	Riparian Land Cover (MAP 6)
<ul style="list-style-type: none"> Not currently designated 	<ul style="list-style-type: none"> Coniferous forest Mixed forest Non-forest vegetation (shrubs) Moderate density residential 	<ul style="list-style-type: none"> Coniferous forest Mixed forest Non-forest vegetation (shrubs) Moderate density residential

Historic Hydrology of Chambers Creek and Chambers Lake
General Land Office Map (1850s)



Current Land Use (MAP 7)	Future Land Use (Zoning) (MAP 8)	Water Dependent/Oriented Uses (MAP 9)
<ul style="list-style-type: none"> • Vacant Land • Park • Open Space 	<ul style="list-style-type: none"> • Moderate density residential development may occur around the vicinity of the creek, although access is limited 	<p>Water Dependent</p> <ul style="list-style-type: none"> • None noted <p>Water Related</p> <ul style="list-style-type: none"> • None noted <p>Water Enjoyment</p> <ul style="list-style-type: none"> • None noted

Roads	Railroads, Utilities	Shoreline Modifications
<ul style="list-style-type: none"> • Local road access 	<ul style="list-style-type: none"> • Railroad runs to the north of the creek 	<ul style="list-style-type: none"> • None noted

Known sites with Toxic or Hazardous Material (MAP 10)
<p>No Further Action Needed</p> <ul style="list-style-type: none"> • Keegan Residence, 6143 Rich Rd. SE, Olympia. Located northeast of Chambers Creek. Contaminants from the PCB group were found in the soil and groundwater. Contaminants from the Petroleum Products group were found in the soil and suspected in the groundwater. Remedial action was complete as of 2004.

Historic Properties (MAP 11)
<ul style="list-style-type: none"> • None noted

Public Waterfront Land Owners (MAP 12)
<ul style="list-style-type: none"> • None noted

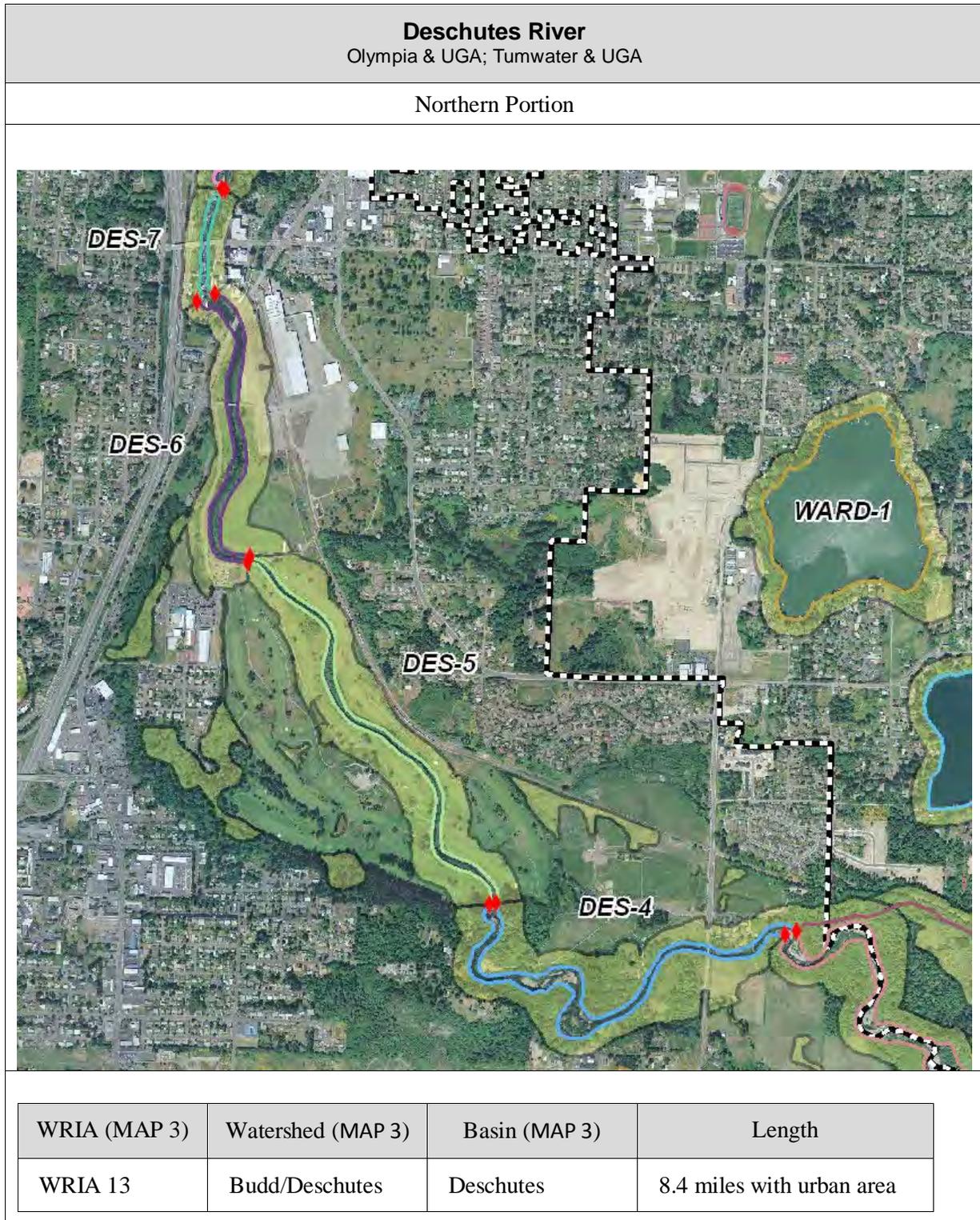
Public Access (MAP 12)			
	Swimming	Fishing	Boat Access
Overall	No	No	No
Parks, Trails, and other Access Points			
None noted			

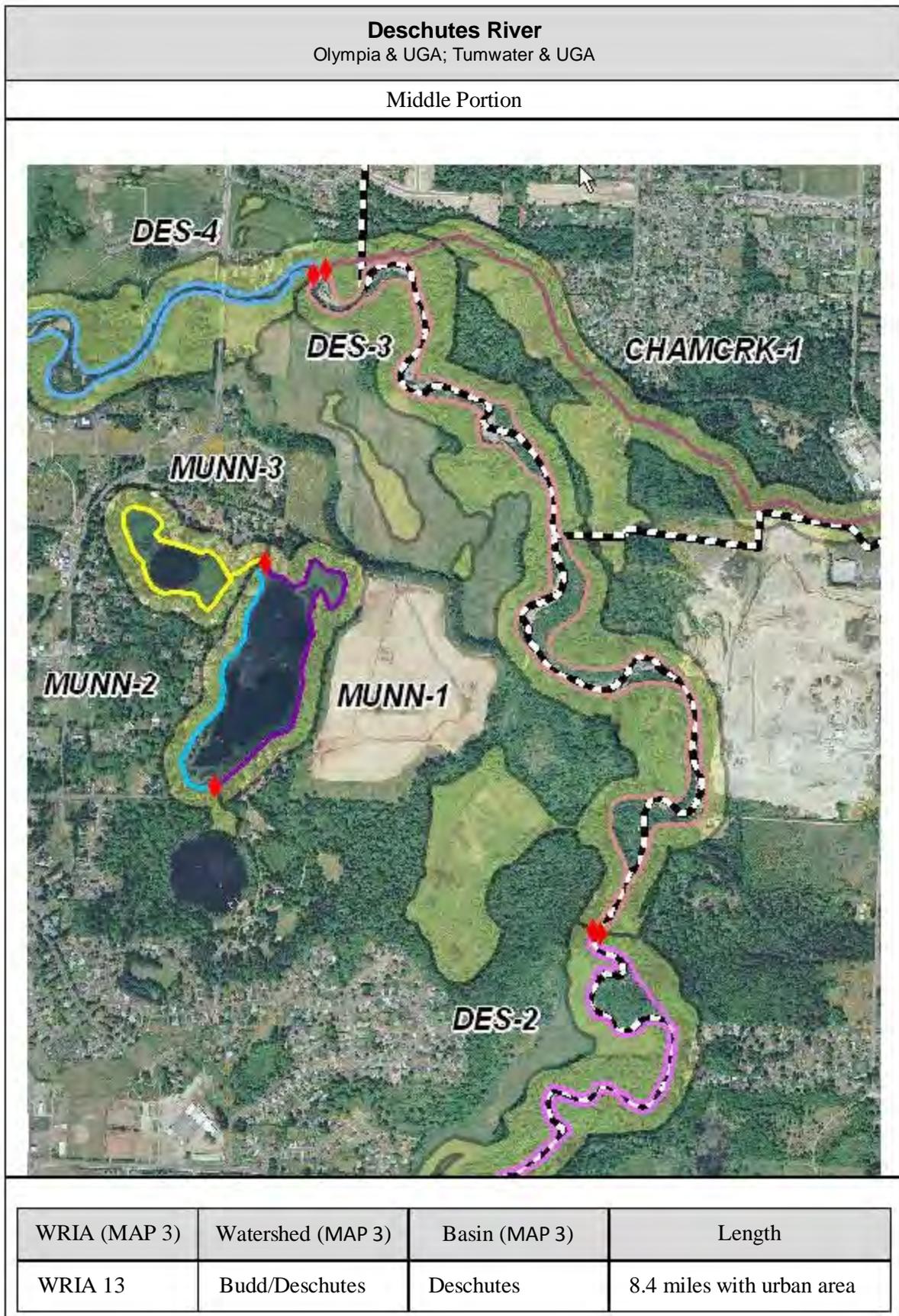
Soils			
General	Alderwood-Everett Association – Glacial uplands, Spanaway-Nisqually Association – Glacial outwash terraces		
Reach	Name	Acres	Percent
CHAMCRK-1	Mukilteo muck, drained	49.4	38%
CHAMCRK-1	Puget silt loam	37.4	29%
CHAMCRK-1	Cagey loamy sand	12.3	9%
CHAMCRK-1	Indianola loamy sand, 15 to 30% slopes	7.0	5%
CHAMCRK-1	Everett very gravelly sandy loam, 0 to 3% slopes	6.4	5%
CHAMCRK-1	Indianola loamy sand, 0 to 3% slopes	5.5	4%
CHAMCRK-1	Everett very gravelly sandy loam, 15 to 30% slopes	5.5	4%
CHAMCRK-1	Norma silt loam	4.6	4%
CHAMCRK-1	Indianola loamy sand, 3 to 15% slopes	1.4	1%

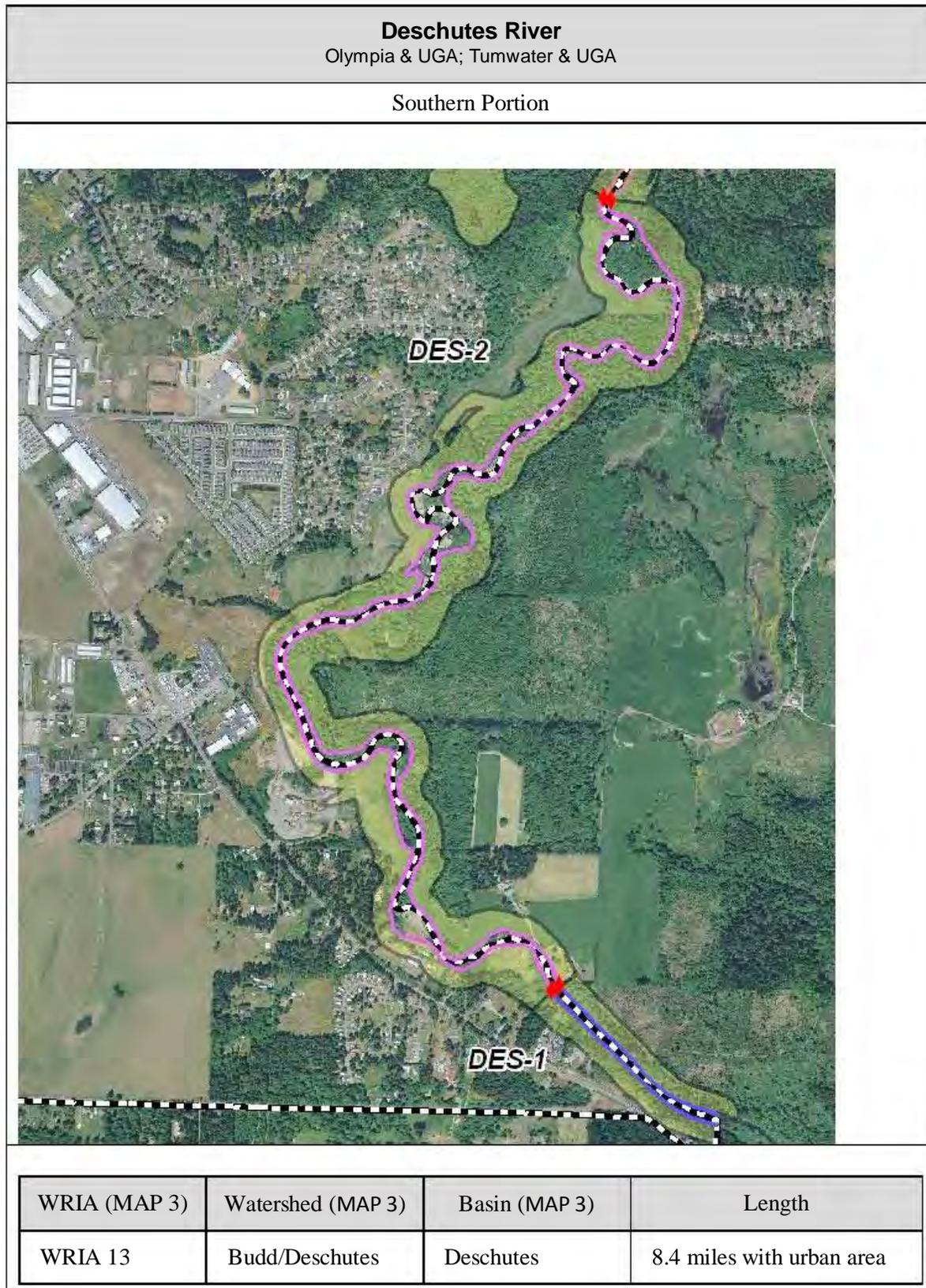
Critical Areas (MAP 13)
<p>Wetlands</p> <ul style="list-style-type: none"> • Extensive wetlands exist along the creek east of the confluence with Chambers Ditch. This continuous wetland is comprised of large patches ranging from emergent to scrub shrub to forested and those of mixed habitats. • Large wetland unit near the confluence of Chambers Creek with Chambers Ditch. It includes mostly scrub shrub and mixed scrub shrub habitat with a small patch of mixed forested and scrub shrub with acidic organic soils.
<p>Habitat Conservation Areas</p> <ul style="list-style-type: none"> • Part of the riparian connection from the wetlands from Rainier Road and the Deschutes River
<p>Priority Habitats & Species</p> <ul style="list-style-type: none"> • None noted
<p>Floodplains</p> <ul style="list-style-type: none"> • Floodplains are associated with this feature
<p>Landslide Hazard Areas</p> <ul style="list-style-type: none"> • None noted

Water Quality		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	None	
Category 4(C)	None	
Category 2	None	
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Fair to Good	Failed Part II of the fecal coliform standard in water years 03/04 and 04/05.	Nitrate concentration is elevated above background conditions.
Additional Information		
<p>Major Issues</p> <ul style="list-style-type: none"> • High nitrate concentrations at the mouth. • Development in the basin, which is expected to occur at a rapid rate since most of the basin is within the urban growth boundary, may impact stream quality. • Chambers/Ward/Hewitt Comprehensive Drainage Basin Plan was completed July 1995, which included recommendations to address flooding and water quality issues. 		
Fisheries		
<ul style="list-style-type: none"> • Coho and cutthroat. 		

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Topography (MAP 4)	Surface Hydrology (MAP 4)	Other Hydrologic Features
<ul style="list-style-type: none"> • The Deschutes River flows through a gently sloping glacial plain. • Tumwater Canyon is located just south of Capitol Lake near the mouth of the river. 	<ul style="list-style-type: none"> • The Deschutes River has headwaters in Lewis County in the Snoqualmie National Forest. • It drains approximately 166 square miles. • The lower part of the reach flows through Tumwater then Olympia into Capitol Lake and Budd Inlet. 	<ul style="list-style-type: none"> • The 5th Avenue Dam in downtown Olympia forms Capitol Lake. • There is a dam at the top of Tumwater Falls

Existing Shoreline Designations (MAP 5)	General Land Cover (MAP 6)	Riparian Land Cover (MAP 6)
<p>North</p> <ul style="list-style-type: none"> • Deschutes Shoreline Management Area • Rural <p>South</p> <ul style="list-style-type: none"> • Conservancy 	<p>North</p> <ul style="list-style-type: none"> • High density urban • Grasses (golf course) • Mixed forest <p>South</p> <ul style="list-style-type: none"> • Mixed and hardwood forest • Non-forest vegetation (shrubs and grasses) • Moderate density residential 	<p>North</p> <ul style="list-style-type: none"> • High density urban • Grasses (golf course) • Mixed forest <p>South</p> <ul style="list-style-type: none"> • Mixed and hardwood forest • Non-forest vegetation (shrubs and grasses)

Current Land Use (MAP 7)	Future Land Use (Zoning) (MAP 8)	Water Dependent/Oriented Uses (MAP 9)
<p>North</p> <ul style="list-style-type: none"> • Golf Course (DES-5) • Industrial (Former Brewery) (DES-6/7) • Moderate density residential • Low density residential <p>South</p> <ul style="list-style-type: none"> • Vacant Land • Moderate density residential 	<p>North</p> <ul style="list-style-type: none"> • Brewery site expected to redevelop (DES 6/7) • Briggs urban village will be located to the east (DES-5) <p>South</p> <ul style="list-style-type: none"> • Moderate density residential subdivision development 	<p>Water Dependent</p> <ul style="list-style-type: none"> • Fish Hatchery at Tumwater Falls (DES-6/7) • Future fish hatchery at Pioneer Park (DES-4) <p>Water Related</p> <ul style="list-style-type: none"> • The Brewery/water bottling plant in Tumwater is now closed. Future uses of the building/site might be water-related. (DES-6/7) <p>Water Enjoyment</p> <ul style="list-style-type: none"> • Tumwater Golf Course (recreation, restaurant) (DES-5) • Walking Trails/Nature Trails: Pioneer Park (DES-4) • Viewpoints: Tumwater Golf Course (DES-5); Tumwater Falls Park (DES-7)

Roads	Railroads, Utilities	Shoreline Modifications
<p>North</p> <ul style="list-style-type: none"> • Two pedestrian bridges in Tumwater Canyon (DES-6/7) • Custer Way Bridge (DES-7) • “E” Street Bridge to Brewery (DES-6) • Capitol Blvd. Bridge (DES-6) • Henderson Rd. Bridge (DES-4) • Interstate 5 runs west of the river (DES-7) • Future road crossing of valley at “E” Street (DES-6) • Future regional trail crossing near Pioneer Park (DES-4) <p>South</p> <ul style="list-style-type: none"> • No road crossings 	<p>North</p> <ul style="list-style-type: none"> • Railroad to the east of the river 	<p>North</p> <ul style="list-style-type: none"> • Modified shoreline in an urban environment (DES-6/7) • Riparian restoration along the golf course (DES-5) <p>South</p> <ul style="list-style-type: none"> • Generally unaltered shoreline

Known sites with Toxic or Hazardous Material
(MAP 10)

Confirmed and Suspected Contamination Sites

- All American Bottled Water Corp., 100 Custer Way SW, Tumwater. Located adjacent to the Deschutes River. Pollutants from the Petroleum Products Contaminants group were found in soil below the cleanup level. This site is awaiting site hazard assessment.

No Further Action Needed

- Old Brewhouse Former Paint Shop, 3245 Boston St. SW, Tumwater. Located adjacent to the Deschutes River. Pollutants from the Metals, Priority Pollutants and Arsenic Contaminants groups were found in soil and groundwater. Remedial action was completed in 2003.

Historic Properties
(MAP 11)

- The Tumwater National Historic District is adjacent to the Deschutes River. It contains many properties of historic significance, including some located adjacent to the Deschutes River.



Upper photo old Brewhouse; Left Boston Street Bridge.

Historic Name	Location Address	Inventory or Register	Construction Date
Not named	204 Custer Way SE	Inventory	1911
Old Brewhouse	Capitol Lake, Tumwater	National, State, and Local Register	1906
Leopold Schmidt House	330 Schmidt Place SW	Local Register	1904
Crosby House	650 Deschutes Way	National, State, and Local Register	1860
Henderson House	602 Deschutes Way	National, State, and Local Register	1905
Boston Street Bridge (Lower Custer Way)	Spans Deschutes River	State Register	1915
Upper Custer Way Bridge	Custer Way	National Registry	1956

Public Waterfront Land Owners (MAP 12)
<ul style="list-style-type: none"> • City of Tumwater Golf Course

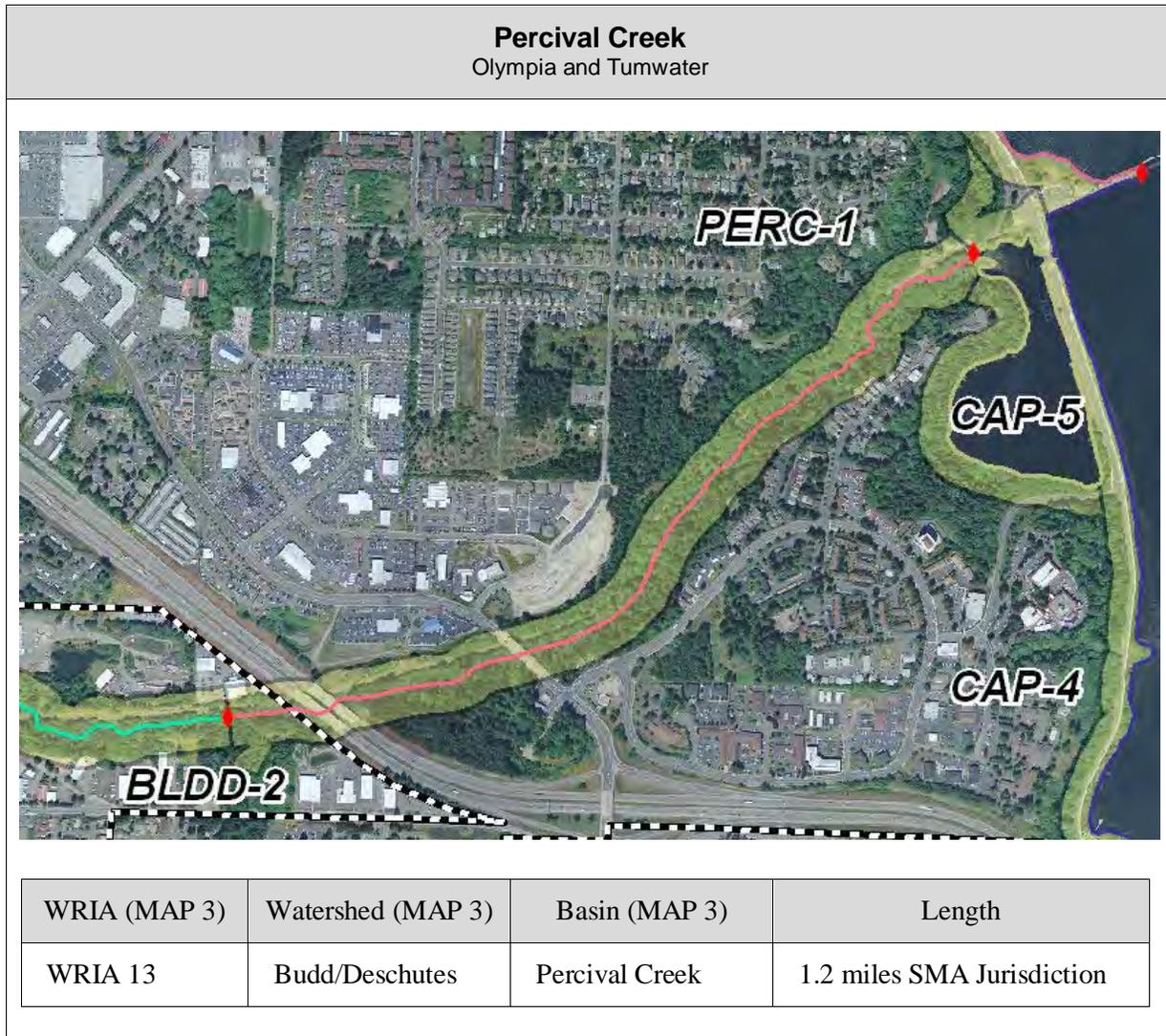
Public Access (MAP 12)			
	Swimming	Fishing	Boat Access
Overall	No	No	Yes
Parks, Trails, and other Access Points			
Pioneer Park (Tumwater) (DES-4)	No	No	Yes (handcarried boats)
Tumwater Falls Park (Private) (DES-7) Trail and Overlook Areas	No	No	No

Soils			
General	Alderwood-Everett Association – Glacial uplands, Spanaway-Nisqually Association – Glacial outwash terraces		
Reach	Name	Acres	Percent
DES-1	Everett very gravelly sandy loam, 30 to 50% slopes	3.2	33%
DES-1	Puyallup silt loam	2.3	23%
DES-1	Everett very gravelly sandy loam, 0 to 3% slopes	2.2	22%
DES-1	Indianola loamy sand, 15 to 30% slopes	2.1	22%
DES-2	Sultan silt loam	32.1	43%
DES-2	Indianola loamy sand, 15 to 30% slopes	13.8	19%
DES-2	Puget silt loam	12.8	17%
DES-2	Pilchuck loam sandy	6.7	9%
DES-2	Everett very gravelly sandy loam, 0 to 3% slopes	3.2	4%
DES-2	Pits, gravel	3.1	4%
DES-2	Indianola loamy sand, 0 to 3% slopes	2.2	3%
DES-2	Everett very gravelly sandy loam, 15 to 30% slopes	0.7	1%
DES-3	Puyallup silt loam	32.6	25%
DES-3	Sultan silt loam	30.8	23%
DES-3	Semiahmoo muck	22.8	17%
DES-3	Puget silt loam	19.0	14%
DES-3	Pilchuck loam sandy	13.1	10%
DES-3	Tisch silt loam	6.6	5%
DES-3	Indianola loamy sand, 15 to 30% slopes	4.4	3%
DES-3	Everett very gravelly sandy loam, 15 to 30% slopes	2.8	2%
DES-5	Puyallup silt loam	62.83	67%
DES-5	Norma silt loam	17.86	19%
DES-5	Godfrey silty clay loam	7.89	8%
DES-5	Sultan silt loam	2.1	2%
DES-5	Indianola loamy sand, 15 to 30% slopes	1.86	2%
DES-5	Xerorthents, 0 to 5% slopes	1.09	1%
DES-6	Puyallup silt loam	27.8	59%
DES-6	Indianola loamy sand, 15 to 30% slopes	8.06	17%
DES-6	Norma silt loam	8.01	17%
DES-6	Indianola loamy sand, 0 to 3% slopes	3.38	7%
DES-7	Indianola loamy sand, 0 to 3% slopes	6.4	58%
DES-7	Indianola loamy sand, 15 to 30% slopes	3.2	29%
DES-7	Puyallup silt loam	1.5	14%

Critical Areas (MAP 13)
<p>Wetlands</p> <ul style="list-style-type: none"> • The existing TRPC wetland mapping within the river floodplain may not reflect all the wetland units, particularly forested wetlands located on outwash soils. • Riparian forests are the most extensive wetland units, but are discontinuous. • Scrub shrub units are likely immature forests. • Locations of some units change over time. • There are some forested and emergent habitats within Pioneer Park and to the south of the river.
<p>Habitat Conservation Areas</p> <ul style="list-style-type: none"> • None noted
<p>Priority Habitats & Species</p> <ul style="list-style-type: none"> • None noted
<p>Floodplains, Floodways and Channel Migration:</p> <ul style="list-style-type: none"> • Floodplains and floodways are associated with this feature. A channel migration zone has been identified from historic aerial photographs.
<p>Landslide Hazard Areas</p> <ul style="list-style-type: none"> • Steep slopes existing within the Tumwater Canyon, but they consist of basalt and are not considered to be unstable. • Bluffs that are significant sediment sources to the river have been mapped (McNicholas, 1984 & Collins, 1995). • Personal knowledge (Morrison) of steep slopes and feeder bluffs at approximately 79th Ave SE.

Water Quality		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	Temperature, Fecal coliform	
Category 4(C)	Instream Flow	
Category 2	4,4'-DDE, Bis(2-ethylhexyl) phthalate, Total PCBs	Recorded in tissue samples only
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Good	Both parts of fecal coliform standard met for water years 03/04 and 04/05. Failed temperature in August 2005 and pH in October 2004.	In past studies, there have been temperature and bacteria violations documented upstream, as well as in-stream flow and habitat deficiencies.
Fisheries		
<ul style="list-style-type: none"> • Coho, Chinook, steelhead and chum. Chinook are of hatchery origin. 		

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Topography (MAP 4)	Surface Hydrology (MAP 4)	Other Hydrologic Features
<ul style="list-style-type: none"> • Percival Creek flows between two basalt outcrops before entering a canyon. • At the confluence of Black Lake Drainage Ditch the canyon deepens and becomes very steep. 	<ul style="list-style-type: none"> • Percival Creek is fed by two branches, a south branch originating in Trosper Lake, and the Black Lake Drainage Ditch (draining Black Lake) to the west. • Numerous year-round and seasonal tributaries, springs and seeps feed the creek. • These two branches join near Mottman Road and enter the Percival Creek Canyon flowing under Highway 101 and into Capitol Lake and eventually Budd Inlet. 	<ul style="list-style-type: none"> • The hydrology of this Creek is altered by Black Lake Drainage Ditch. The ditch was constructed in 1922 to drain potential agricultural land north of Black Lake. Before the construction of the ditch, flows from Black Lake to Percival Creek were minimal. • Percival Creek discharged directly into Budd Inlet prior to the development of Capitol Lake in 1951. The estuary located at the mouth of the creek was lost. • The hydrology of the Percival Creek drainage basin is highly altered by urban development, and a system of stormwater ponds and pipes convey surface water throughout the basin.

Existing Shoreline Designations (MAP 5)	General Land Cover (MAP 6)	Riparian Land Cover (MAP 6)
<ul style="list-style-type: none"> • Percival Creek Shoreline Management Area 	<ul style="list-style-type: none"> • Coniferous forest • Mixed forest • High density urban • Moderate density urban • Non-forest vegetation (shrubs) 	<ul style="list-style-type: none"> • Mixed forest • Non-forest vegetation (shrubs) • Coniferous forest

Historic Hydrology of Percival Creek
General Land Office Map (1850s)



Current Land Use (MAP 7)	Future Land Use (Zoning) (MAP 8)	Water Dependent/Oriented Uses (MAP 9)
<ul style="list-style-type: none"> • Industrial • Commercial • High density residential • Open Space 	<ul style="list-style-type: none"> • The area around Percival Creek is developed 	<p>Water Dependent</p> <ul style="list-style-type: none"> • None noted <p>Water Related</p> <ul style="list-style-type: none"> • None noted <p>Water Enjoyment</p> <ul style="list-style-type: none"> • None noted

Roads	Railroads, Utilities	Shoreline Modifications
<ul style="list-style-type: none"> • Highway 101 and Cooper Point Rd. cross over Percival Creek on high bridges • Pedestrian Bridge approximately 1 mile from Percival Cove 	<ul style="list-style-type: none"> • The Burlington Northern Santa Fe Railroad line runs along the north edge of the creek from Percival Cove to Mottman Road. 	<ul style="list-style-type: none"> • Construction of the Burlington Northern Santa Fe Railroad in the 1890s was the first major alteration of the stream channel. The railroad defines the northern edge of the creek.

Known sites with Toxic or Hazardous Material (MAP 10)
<ul style="list-style-type: none"> • Several identified leaking underground storage tanks.

Historic Properties (MAP 11)
<ul style="list-style-type: none"> • None noted

Public Waterfront Land Owners (MAP 12)
<ul style="list-style-type: none"> • None noted

Public Access (MAP 12)			
	Swimming	Fishing	Boat Access
Overall	No	No	No
Parks, Trails, and other Access Points			
Marathon Park	No	No	No
The City of Olympia owns property within Percival Canyon and has proposed development of a shared-use trail within the canyon.	No	No	No

Soils			
General	Alderwood-Everett Association – Glacial uplands		
Reach	Name	Acres	Percent
PERC-1	Schneider very gravelly loam, 40 to 65% slopes	36.7	65%
PERC-1	Dystric Xerochrepts, 60 to 90% slopes	13.6	24%
PERC-1	Alderwood gravelly sandy loam, 3 to 15% slopes	2.9	5%
PERC-1	Pits, gravel	2.3	4%
PERC-1	Xerorthents, 0 to 5% slopes	1.1	2%

Critical Areas (MAP 13)
<p>Wetlands</p> <ul style="list-style-type: none"> • Riparian forest within the canyon walls downstream of the pedestrian bridge to Percival Cove • Emergent wetlands colonizing new fill at the mouth of the creek
<p>Habitat Conservation Areas</p> <ul style="list-style-type: none"> • Riparian corridor linking Capitol Lake with Black and Trosper Lakes.
<p>Priority Habitats & Species</p> <ul style="list-style-type: none"> • Mink located within the basin
<p>Floodplains</p> <ul style="list-style-type: none"> • Floodplains are associated with this feature
<p>Landslide Hazard Areas</p> <ul style="list-style-type: none"> • Significant steep slopes on south side of the creek. • The steep slopes north of the BNSF railroad are at more moderate slopes and include a wider canyon.

Water Quality		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	None	
Category 4(C)	None	
Category 2	None	
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Good	Met all standards	
Additional Information		
<p>Major Issues</p> <ul style="list-style-type: none"> • The basin is within the urban growth boundary and is rapidly developing. Increases in stormwater runoff could impact the stream through degraded water quality, stream bank erosion, hill slope failures, and channel scour. • Concerns have been raised regarding the effect of Black Lake water quality on Percival Creek and Percival Cove. • In 1996, a fish passage blockage at the Mottman Road crossing was corrected, and salmon were observed spawning in the creek above the road crossing. • Percival Creek is included in a total maximum daily load study (TMDL) begun in 2003 by the Washington Department of Ecology to identify pollution sources and develop a plan to correct them. • Homeless people often establish camps within the riparian corridor. 		
Fisheries		
<ul style="list-style-type: none"> • Chinook, coho, cutthroat and chum. Chinook are of hatchery origin. Occasional sockeye sightings. 		



Topography (MAP 4)	Surface Hydrology (MAP 4)	Other Hydrologic Features
<ul style="list-style-type: none"> • Woodland Creek flows through gently sloping terrain until almost the edge of the urban area. • Towards Henderson Inlet the terrain becomes moderately steep. 	<ul style="list-style-type: none"> • Woodland Creek flows out of a large wetland and lakes complex that includes Hicks, Pattison Lake and Long Lake. • The Nisqually Trout farm discharges into Woodland Creek north of Martin Way. • Woodland Creek drains into the Henderson Inlet. 	<ul style="list-style-type: none"> • Stormwater flow that used to discharge into the creek below Lake Lois was diverted into a large stormwater treatment facility beginning in 1991. This facility doesn't drain directly into the creek except during peak events. • Downstream from Martin Way, several large stormwater systems drain directly into Woodland Creek, resulting in high peak water flows. • Much of the basin that drains into Woodland Creek is highly altered by urban activities, such as the crossing of Interstate 5.

Existing Shoreline Designations (MAP 5)	General Land Cover (MAP 6)	Riparian Land Cover (MAP 6)
<ul style="list-style-type: none"> • Conservancy 	<ul style="list-style-type: none"> • Coniferous forest • Mixed forest • Non-forest vegetation (shrubs) • Moderate density residential 	<ul style="list-style-type: none"> • Coniferous forest • Mixed forest • Non-forest vegetation (shrubs)

Current Land Use (MAP 7)	Future Land Use (Zoning) (MAP 8)	Water Dependent/Oriented Uses (MAP 9)
<ul style="list-style-type: none"> • University (St. Martins) • Vacant land • Moderate density residential 	<ul style="list-style-type: none"> • Moderate density residential development in the northern most areas 	<p>Water Dependent</p> <ul style="list-style-type: none"> • Nisqually Trout Farm (WOOD-1) <p>Water Related</p> <ul style="list-style-type: none"> • None noted <p>Water Enjoyment</p> <ul style="list-style-type: none"> • None noted

Roads	Railroads, Utilities	Shoreline Modifications
<ul style="list-style-type: none"> Interstate 5 crosses over the creek (WOOD-1) 	<ul style="list-style-type: none"> None noted 	<ul style="list-style-type: none"> None noted

Known sites with Toxic or Hazardous Material (MAP 10)
<p>Confirmed or Suspected Contamination Sites</p> <ul style="list-style-type: none"> German Car Service, 6215 Martin Way E, Lacey. Located east of Woodard Creek. Contaminants from the Halogenated Organics and Petroleum Products groups were found in the soil. The site is currently awaiting site hazard assessment. <p>Elevated Nitrate Areas</p> <ul style="list-style-type: none"> Elevated nitrate areas have been identified in the Tanglewilde area, to the east of Woodland Creek.

Historic Properties (MAP 11)
<ul style="list-style-type: none"> There is one home located at 1834 NE Draham Street Lacey that is in the Thurston County historic inventory. This home was built in 1920, and exhibits building fabric and architectural features commonly utilized throughout the region during the late nineteenth and early twentieth centuries. Adjacent to the home is a large garage/workshop structure. The site may be associated with agriculturally activity and/or early suburban growth.

Public Waterfront Land Owners (MAP 12)
<ul style="list-style-type: none"> None noted

Public Access (MAP 12)			
	Swimming	Fishing	Boat Access
Overall	No	Yes	No
Parks, Trails, and other Access Points			
Pleasant Glade Park (undeveloped) (WOOD-2)	No	No	No

Soils			
General	Alderwood-Everett Association – Glacial uplands		
Reach	Name	Acres	Percent
WOOD-1	Bellingham silty clay loam	63.9	53%
WOOD-1	Hoogdal silt loam, 15 to 30% slopes	19.5	16%
WOOD-1	Skipopa silt loam, 3 to 15% slopes	11.1	9%
WOOD-1	Skipopa silt loam, 0 to 3% slopes	9.7	8%
WOOD-1	Schneider very gravelly loam, 40 to 65% slopes	9.2	8%
WOOD-1	Giles silt loam, 3 to 15% slopes	5.5	5%
WOOD-1	Kapowsin silt loam, 3 to 15% slopes	1.6	1%
WOOD-2	Giles silt loam, 15 to 30% slopes	26.9	78%
WOOD-2	Hoogdal silt loam, 15 to 30% slopes	4.0	12%
WOOD-2	Skipopa silt loam, 3 to 15% slopes	3.6	10%

Critical Areas (MAP 13)
<p>Wetlands</p> <ul style="list-style-type: none"> • Wetlands along the creek are limited to the area between I-5 and Martin Way. • The Nisqually Trout Farm has discharge for a one acre pond that is a significant source of flow to the creek. • The deciduous wetland forest unit is over 50 acres in size and surrounds a small patch of emergent and mixed emergent habitat. • The boundary of the mapped wetland extends south to Martin Way.
<p>Habitat Conservation Areas</p> <ul style="list-style-type: none"> • Riparian connection from wetland adjacent to the Nisqually Trout Farm and its discharge downstream to Henderson Inlet • Intermittent stream channel upstream to Lake Louise
<p>Priority Habitats & Species</p> <ul style="list-style-type: none"> • Wood Duck located within the riparian corridor
<p>Floodplains</p> <ul style="list-style-type: none"> • Floodplains are associated with this feature
<p>Landslide Hazard Areas</p> <ul style="list-style-type: none"> • None noted

Water Quality		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	Dissolved oxygen, Temperature, Fecal coliform	
Category 4(C)	Instream flow	
Category 2	Temperature	
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Fair	Failed both parts of fecal coliform standard.	
Additional Information		
<p>Major Issues</p> <ul style="list-style-type: none"> • Urban stormwater discharges are contributing to water quality problems. • Nonpoint pollution from failing on-site septic systems and livestock in the watershed is occurring. • Shellfish harvest downgrades in Henderson Inlet occurred in 2000, 2001, and 2005 due to bacteria pollution from Woodland Creek and other tributaries. • The Tanglewood stormwater outfall is contributing to water quality problems in Woodland Creek. • On-site septic systems and other urban activities are contributing to the contamination of the shallow ground water in the area, which is infiltrating into the stormwater system. 		
Fisheries		
<ul style="list-style-type: none"> • Coho, chum, steelhead, and cutthroat trout. Occasional sockeye sightings. 		

D. Lakes

Barnes Lake
Tumwater



WRIA (MAP 3)	Watershed (MAP 3)	Basin (MAP 3)	Size
WRIA 13	Budd/Deschutes	Deschutes River	35 acres

Bathymetry/Topography (MAP 4)	Surface Hydrology (MAP 4)	Other Hydrologic Features
<ul style="list-style-type: none"> • Mean Depth: Data gap • Maximum Depth: Data gap • Elevation: 159 ft. • Flat terrain 	<ul style="list-style-type: none"> • There are no obvious tributaries to Barnes Lake other than overland stormwater flow. • Barnes Lake discharges through the southeast corner into the Deschutes River. 	<ul style="list-style-type: none"> • A constructed berm restricts outflow from the lake during summer months, and meters flow during wetter periods.

Existing Shoreline Designations (MAP 5)	General Land Cover (MAP 6)	Riparian Land Cover (MAP 6)
<ul style="list-style-type: none"> • Not currently designated under the shoreline master program 	<ul style="list-style-type: none"> • Moderate density urban • High density urban • Mixed forest • Non-forest vegetation (shrubs, wetlands, lawns) 	<ul style="list-style-type: none"> • Mixed forest • Shrubs (wetlands)

Current Land Use (MAP 7)	Future Land Use (Zoning) (MAP 8)	Water Dependent/Oriented Uses (MAP 9)
<ul style="list-style-type: none"> • Moderate density single-family residential • Elementary school • WSDOT roads and photo lab and Puget Sound Energy substation on southern shore 	<ul style="list-style-type: none"> • No significant changes expected from current land use immediately around lake • Tumwater Hill to the north is developing rapidly with moderate family residential development 	<p>Water Dependent</p> <ul style="list-style-type: none"> • None noted <p>Water Related</p> <ul style="list-style-type: none"> • None noted <p>Water Enjoyment</p> <ul style="list-style-type: none"> • Bike rental site

Roads	Railroads, Utilities	Shoreline Modifications
<ul style="list-style-type: none"> • Lake Park Drive to west • Troser Road to south • Linwood Ave. to north • Limited local road access 	<p>Water Dependent</p> <ul style="list-style-type: none"> • None noted <p>Water Related</p> <ul style="list-style-type: none"> • None noted <p>Water Enjoyment</p> <ul style="list-style-type: none"> • None noted 	<ul style="list-style-type: none"> • Very little modification of open water shoreline • Single-family homes and condos with landscaped yards, four small docks

**Known sites with Toxic or Hazardous Material
(MAP 10)**

- None noted adjacent to the lake, but several sites are found at the Interstate 5 interchange to the southwest of Barnes Lake.

**Historic Properties
(MAP 11)**

- There are 10 homes listed in Thurston County’s historic inventory along the Barnes Lake waterfront. These homes were constructed between 1925 and 1940. They are not on any local, state, or federal historic registers.
- These homes are examples of Tumwater's historic vernacular housing. The homes form a part of Tumwater's visual link to the past.

**Public Waterfront Land Owners
(MAP 12)**

- Michael T. Simmons Elementary School
- Washington State Department of Transportation

**Public Access
(MAP 12)**

	Swimming	Fishing	Boat Access
Overall	No	No	No
Parks, Trails, and other Access Points			
None noted			

Soils

General	Alderwood-Everett Association – Glacial uplands, Spanaway-Nisqually Association – Glacial outwash terraces
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Reach	Name	Acres	Percent
BAR-1	Indianola loamy sand, 0 to 3% slopes	24.4	45%
BAR-1	Mukilteo muck	23.4	43%
BAR-1	Nisqually loamy fine sand, 0 to 3 % slopes	6.8	12%

Critical Areas (MAP 13)
<p>Wetlands</p> <ul style="list-style-type: none"> • Open water with some remnant, thin fringing wetlands of emergent, scrub shrub, and mixed scrub shrub and forested habitat
<p>Habitat Conservation Areas</p> <ul style="list-style-type: none"> • None noted
<p>Priority Habitats & Species</p> <ul style="list-style-type: none"> • None noted
<p>Floodplains</p> <ul style="list-style-type: none"> • None noted
<p>Landslide Hazard Areas</p> <ul style="list-style-type: none"> • None noted

Water Quality		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	None	
Category 4(C)	None	
Category 2	None	
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Unclassified		

Fisheries
<ul style="list-style-type: none"> • Unknown

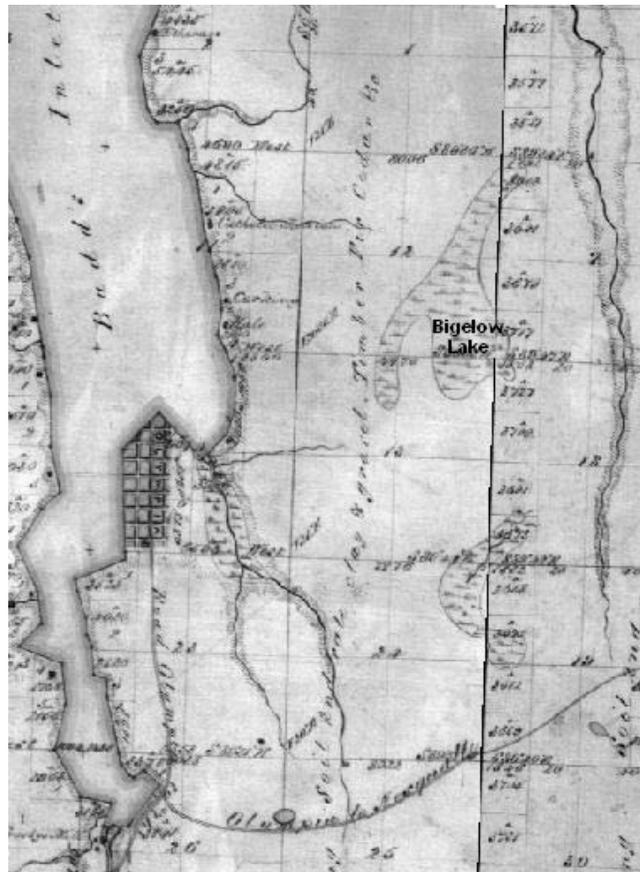
Bigelow Lake
Olympia UGA



WRIA (MAP 3)	Watershed (MAP 3)	Basin (MAP 3)	Size
WRIA 13	Budd/Deschutes	Indian Creek	78 acres OHWM

Bathymetry/Topography (MAP 4)	Surface Hydrology (MAP 4)	Other Hydrologic Features
<ul style="list-style-type: none"> • Mean Depth: Data gap • Maximum Depth: Data gap • Elevation: 165 ft. • Flat terrain 	<ul style="list-style-type: none"> • There are no obvious tributaries to Bigelow Lake other than overland stormwater flow. • Bigelow Lake flows into Indian Creek, which eventually discharges into Budd Inlet. • The wetlands surrounding Bigelow Lake are a 140 acre peat bog with excellent hydrologic storage capabilities. 	<ul style="list-style-type: none"> • The natural hydrology of this urban area has been altered for many years. The area directly around Bigelow Lake is natural wetlands. • The hydrology of Indian Creek has been highly altered for many years.

Historic Hydrology of East Olympia
General Land Office Map (1850s)



Existing Shoreline Designations (MAP 5)	General Land Cover (MAP 6)	Riparian Land Cover (MAP 6)
<ul style="list-style-type: none"> • Not currently designated under the shoreline master program 	<ul style="list-style-type: none"> • Forest - mixed • Non-forest vegetation – wetland shrub/scrub 	<ul style="list-style-type: none"> • Shrubs (wetlands)

Current Land Use (MAP 7)	Future Land Use (Zoning) (MAP 8)	Water Dependent/Oriented Uses (MAP 9)
<ul style="list-style-type: none"> • Open space • Low density residential 	<ul style="list-style-type: none"> • No significant changes expected from current land use immediately around lake 	<p>Water Dependent</p> <ul style="list-style-type: none"> • None noted <p>Water Related</p> <ul style="list-style-type: none"> • None noted <p>Water Enjoyment</p> <ul style="list-style-type: none"> • None noted

Roads	Railroads, Utilities	Shoreline Modifications
<ul style="list-style-type: none"> • South Bay road to the east • 12th Avenue to the south • Limited local road access 	<ul style="list-style-type: none"> • None noted 	<ul style="list-style-type: none"> • Very little modification of lake shoreline • Some trails to lake’s edge • Four small docks

Known sites with Toxic or Hazardous Material (MAP 10)
<ul style="list-style-type: none"> • Bigelow Lake Is located in an area identified as having elevated nitrate levels

Historic Properties (MAP 11)
<ul style="list-style-type: none"> • None noted

Public Waterfront Land Owners (MAP 12)
<ul style="list-style-type: none"> • None noted

Public Access (MAP 12)			
	Swimming	Fishing	Boat Access
Overall	No	No	No
Parks, Trails, and other Access Points			
None noted			

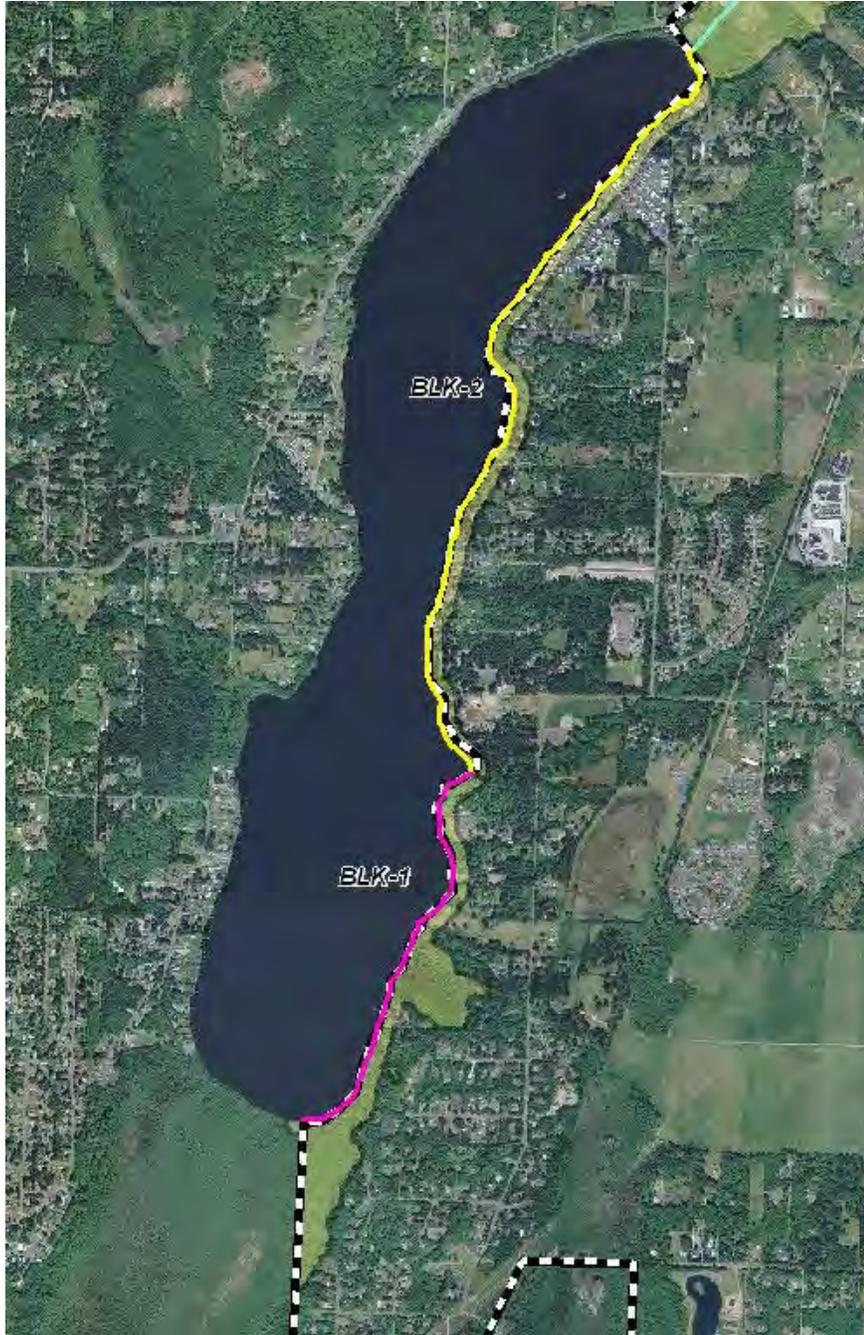
Soils			
General	Alderwood-Everett Association – Glacial uplands		
Reach	Name	Acres	Percent
BIG-1	Mukilteo muck, drained	83.6	57%
BIG-1	Yelm fine sandy loam, 3 to 15% slopes	29.6	20%
BIG-1	Norma silt loam	23.6	16%
BIG-1	Yelm fine sandy loam, 0 to 3% slopes	5.0	3%
BIG-1	Giles silt loam, 0 to 3% slopes	4.4	3%

Critical Areas (MAP 13)
<p>Wetlands</p> <ul style="list-style-type: none"> Extensively drained bog wetland system. Units range from forested and scrub shrub or mixed scrub shrub habitats to emergent areas. A forested unit north of the lake is on acid organic soils. Personal knowledge (Morrison) that this wetland supports pine trees.
<p>Habitat Conservation Areas</p> <ul style="list-style-type: none"> Headwaters of the Indian Creek riparian corridor which extends to Pacific Avenue
<p>Priority Habitats & Species</p> <ul style="list-style-type: none"> Wood Duck located within the basin
<p>Floodplains</p> <ul style="list-style-type: none"> Floodplains are associated with this feature.
<p>Landslide Hazard Areas</p> <ul style="list-style-type: none"> None noted

Water Quality		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	None	
Category 4(C)	None	
Category 2	None	
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Unclassified		
Fisheries		
<ul style="list-style-type: none"> • Unknown 		

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Black Lake
Tumwater UGA



WRIA (MAP 3)	Watershed (MAP 3)	Basin (MAP 3)	Size
WRIA 23	Budd/Deschutes	Black Lake	566 acres

Bathymetry/Topography (MAP 4)	Surface Hydrology (MAP 4)	Other Hydrologic Features
<ul style="list-style-type: none"> • Mean Depth: 19 ft. • Maximum Depth: 29 ft. • Elevation: 130 ft. • Flat terrain on east and south west. Steep hills to the northwest. 	<ul style="list-style-type: none"> • Black Lake has two tributaries to the west. • Black River has been observed flowing into Black Lake on occasion • Black Lake drains into north into Black Lake Drainage Ditch and then Percival Creek, and eventually Capitol Lake and Budd Inlet. 	<ul style="list-style-type: none"> • Black Lake used to drain south into the Black River, but the hydrology was altered when Black Lake Drainage Ditch was constructed in 1922. • Beaver dams now restrict water flow to the south.

Existing Shoreline Designations (MAP 5)	General Land Cover (MAP 6)	Riparian Land Cover (MAP 6)
<ul style="list-style-type: none"> • Rural in the north reaches • Conservancy in the southern reaches • Natural for the associated wetlands to the south • Percival Shoreline Management Area to the north 	<ul style="list-style-type: none"> • Moderate density urban • Coniferous, mixed, and deciduous forest • Non-forest vegetation 	<ul style="list-style-type: none"> • Non-forest vegetation (shrubs, and grass) • Moderate density urban • High density urban

Current Land Use (MAP 7)	Future Land Use (Zoning) (MAP 8)	Water Dependent/Oriented Uses (MAP 9)
<ul style="list-style-type: none"> • Low and moderate density residential with some higher density pockets – mobile home parks • Rock quarry • Parks • Light Commercial 	<p>Westside</p> <ul style="list-style-type: none"> • Rural residential and suburban residential <p>Eastside</p> <ul style="list-style-type: none"> • Several large moderate density subdivision expected to the east • General area has a lot of residential redevelopment potential as urban services become available 	<p>Water Dependent</p> <ul style="list-style-type: none"> • None noted <p>Water Related</p> <ul style="list-style-type: none"> • None noted <p>Water Enjoyment</p> <ul style="list-style-type: none"> • Camps (BLK-1) • Beach Club (RURAL) • Waterfront Community Areas (BLK-1/2) • Parks, boat ramps and Public Areas (BLK-1)

Historic Hydrology of Black Lake
General Land Office Map (1850s)



Roads	Railroads, Utilities	Shoreline Modifications
<ul style="list-style-type: none"> • Black Lake Boulevard runs along northwest portion • Numerous local roads provide access 	<ul style="list-style-type: none"> • Powerlines run just north of the lake 	<ul style="list-style-type: none"> • 138 docks for single-family residential homes • Eight community docks

Known sites with Toxic or Hazardous Material (MAP 10)
<p>Elevated Nitrate Areas</p> <ul style="list-style-type: none"> • Elevated nitrate levels are found to the east of the lake. <p>Elevated Chloride Areas</p> <ul style="list-style-type: none"> • Elevated Chloride levels are found to the northwest of the lake <p>Confirmed and Suspected Contaminated Sites</p> <ul style="list-style-type: none"> • Black Lake Grocery, 4409 Black Lake Blvd., Tumwater. Contaminants from the Petroleum Products group are confirmed in soil and groundwater samples. This site is undergoing remediation.

Historic Properties (MAP 11)
<ul style="list-style-type: none"> • None noted

Public Waterfront Land Owners (MAP 12)
<ul style="list-style-type: none"> • None noted

Public Access (Urban side only) (MAP 12)			
	Swimming	Fishing	Boat Access
Overall	Yes	No	Yes
Parks, Trails, and other Access Points			
Kenneydell Park (BLK-1)	Yes	No	No
Two WDFW Boat Launches (BLK-1 & Rural County)	No	Yes	Yes

Soils			
General	Alderwood-Everett Association – Glacial uplands		
Reach	Name	Acres	Percent
BLK-1	Semiahmoo muck	34.6	60%
BLK-1	Cagey loamy sand	8.5	15%
BLK-1	Kapowsin silt loam, 3 to 15% slopes	7.7	13%
BLK-1	McKenna gravelly silt loam, 0 to 5% slopes	5.9	10%
BLK-1	Indianola loamy sand, 15 to 30% slopes	0.8	1%
BLK-2	Everett very gravelly sandy loam, 0 to 3% slopes	15.6	31%
BLK-2	Cagey loamy sand	10.2	20%
BLK-2	Norma silt loam	8.5	17%
BLK-2	Alderwood gravelly sandy loam, 0 to 3% slopes	6.4	13%
BLK-2	Indianola loamy sand, 15 to 30% slopes	5.8	12%
BLK-2	Semiahmoo muck	2.5	5%
BLK-2	Indianola loamy sand, 0 to 3% slopes	0.7	1%
BLK-2	McKenna gravelly silt loam, 0 to 5% slopes	0.5	1%

Critical Areas (MAP 13)
<p>Wetlands</p> <ul style="list-style-type: none"> • Extensive associated wetland to south of the lake • Those wetlands to north are along the Black Lake Drainage Ditch and are separated from the lake by Black Lake Beltmore Road • The only notable wetland habitat along the eastern shore is a two acre forested wetland at about 76th Ave SW • The western shore is outside the urban growth area and not included in the inventory
<p>Habitat Conservation Areas</p> <ul style="list-style-type: none"> • Associated wetlands to north and south of lake • Limited riparian habitat along non-wetland shorelines
<p>Priority Habitats & Species</p> <ul style="list-style-type: none"> • Bald Eagles located adjacent to the basin • Although not mapped, use of the lake by waterfowl would likely be Bald Eagle habitat • Associated wetlands to the south have waterfowl concentrations, Green Heron use and mink usage
<p>Floodplains</p> <ul style="list-style-type: none"> • Floodplains are associated with this feature

Landslide Hazard Areas

- None noted

Water Quality

State Listings

Listing	Parameter	Remarks/Notes
Category 5 303(d)	Total phosphorus	
Category 4(C)	None	
Category 2	None	

Local Information

General Water Quality	Met/Failed Standards	Remarks/Notes
Fair		Nuisance algal growth during summer, affects recreational uses of lake. In 2004, an algal bloom closed the swimming area at the County Park.

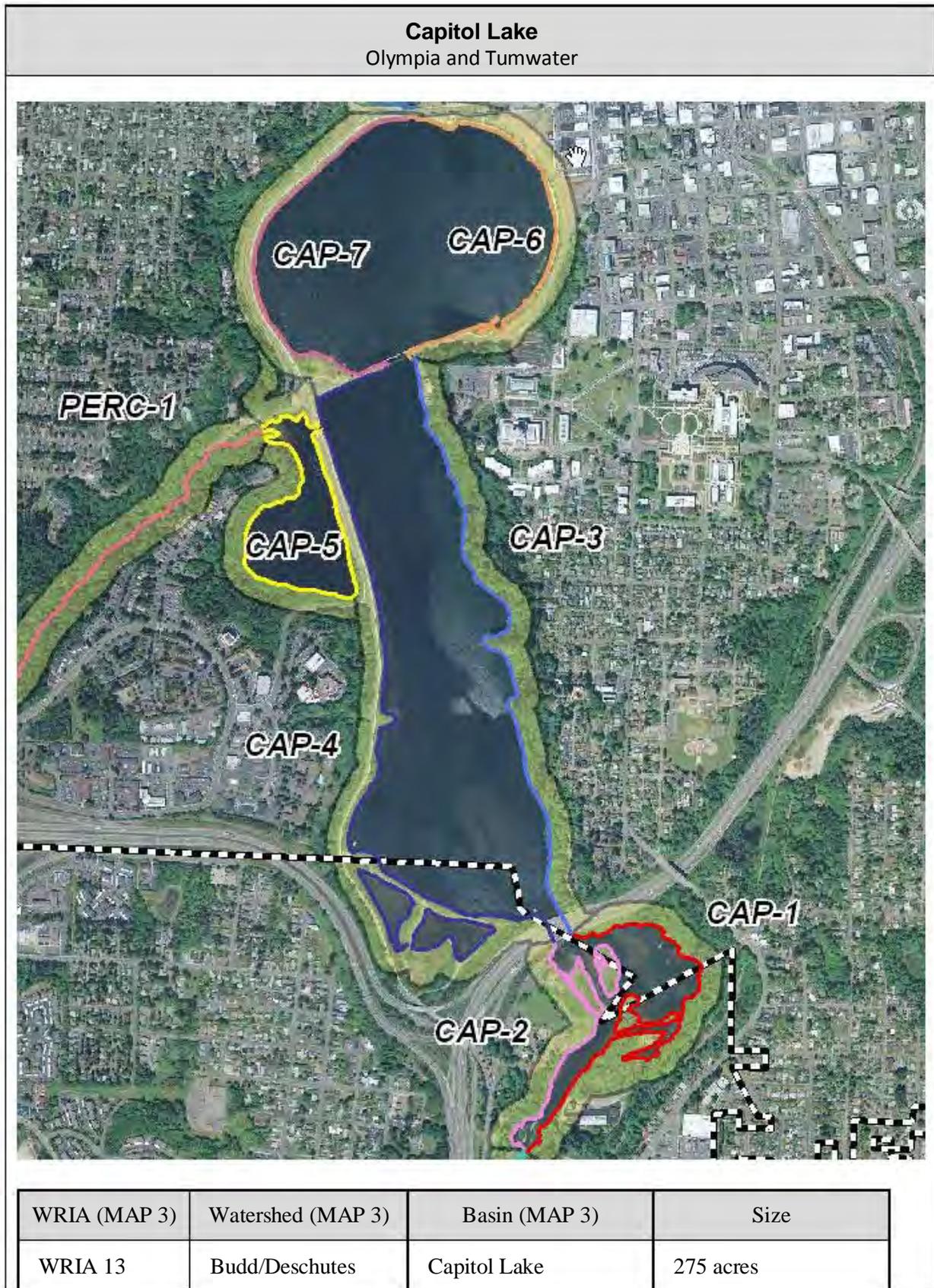
Additional Information

Major Issues

- Major blue-green algae blooms that occur during late summer and fall interfere with the recreational uses of the lake.
- Occasional beaver activity in the lake outlet ditch to the north (Black Lake Drainage Ditch) causes lake levels to rise resulting in flooding of yards and docks.
- Swimmer's itch is reported to be a regular summer problem in this lake, so preventative measures should always be taken by bathers.

Fisheries

- The following game fish are found in Black Lake: rainbow and cutthroat trout, largemouth, smallmouth and rock bass, perch, crappies, brown bullhead catfish, bluegill and sunfish.

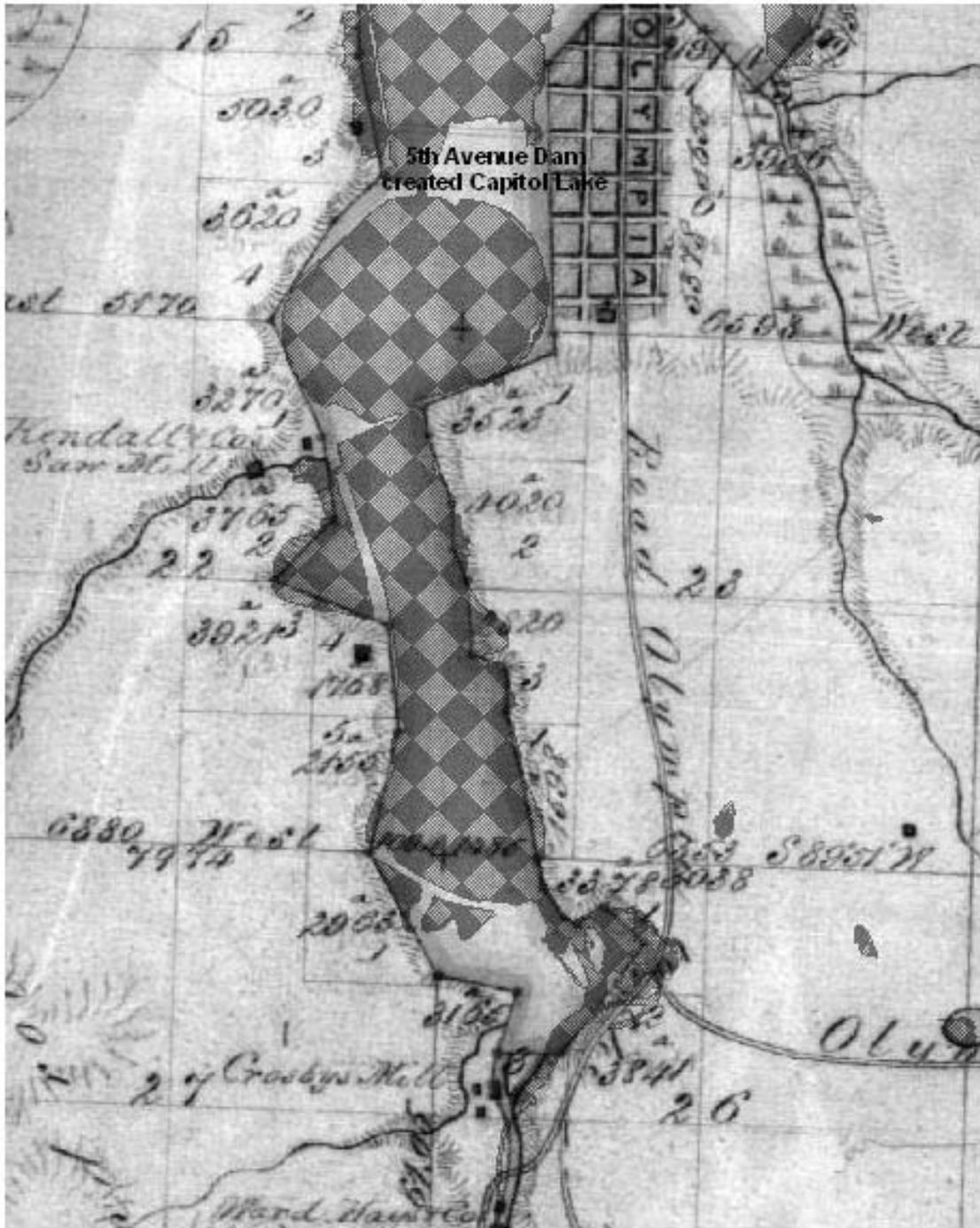


Bathymetry/Topography (MAP 4)	Surface Hydrology (MAP 4)	Other Hydrologic Features
<ul style="list-style-type: none"> • Mean Depth: 9 ft. • Maximum Depth: 20 ft. • Elevation: 9 ft. • Steep slopes on either side of the middle basin and south basin • Flatter topography around the north basin except in the southeast corner where slopes are steep 	<ul style="list-style-type: none"> • Capitol Lake was constructed with the 5th Avenue Dam controlling flow into Budd Inlet. • The Deschutes River drains into Capitol Lake. • Percival Creek enters Capitol Lake in Percival Cove (Percival Lake). • Numerous stormwater outlets also drain into the lake. 	<ul style="list-style-type: none"> • The State is currently studying alternatives for the lake's future.

Existing Shoreline Designations (MAP 5)	General Land Cover (MAP 6)	Riparian Land Cover (MAP 6)
<ul style="list-style-type: none"> • Urban within Heritage Park • Conservancy in remainder of lake 	<ul style="list-style-type: none"> • Moderate and high density urban • Mixed forest 	<ul style="list-style-type: none"> • Mixed forest • Grasses • Non-forest vegetation (shrubs)

Current Land Use (MAP 7)	Future Land Use (Zoning) (MAP 8)
<ul style="list-style-type: none"> • Commercial and Mixed Use • Government (Capitol Campus) • Parks • Moderate to High Density Residential 	<p>Currently fully developed</p> <p>Redevelopable Potential:</p> <ul style="list-style-type: none"> • Increase expected in commercial and residential densities in downtown core • Redevelopment of Old Brewhouse (Tumwater) is expected

Historic Hydrology of the Deschutes River Estuary
General Land Office Map (1850s) with Current Boundaries of Capitol Lake Overlain in Crosshatch



Water Dependent/Oriented Uses (MAP 9)
<p>Water Dependent</p> <ul style="list-style-type: none"> • None noted <p>Water Related</p> <ul style="list-style-type: none"> • None noted <p>Water Enjoyment</p> <ul style="list-style-type: none"> • Historic Tumwater Brewery is likely to have some water enjoyment element when restored (CAP-1). • Shared-use trails: Capitol Lake Interpretive Center (CAP-4); Arc of Statehood Trail – Heritage Park (CAP-2); Deschutes Parkway (CAP-7); Marathon Park (CAP-7); Tumwater Historical Park (future site of endpoints for Deschutes Valley & Woodland Trails) (CAP-2) • Walking Trails/Nature Trails: Capitol Lake Interpretive Center (CAP-2); Sidewalk/jogging path on 5th & Deschutes (CAP-7), pedestrian trail to Capitol Campus (CAP-6); Heritage Park (CAP-6) • Viewpoints: Benches & viewing dock - Capitol Lake Interpretive Center (CAP-4); Benches, waterviews, beach access - Heritage Park (CAP-6); 5th Avenue Dam public overlook (CAP-6/7); benches along Deschutes Parkway (CAP-7); Water views; Tumwater Historical Park (CAP-2)

Roads	Railroads, Utilities	Shoreline Modifications
<ul style="list-style-type: none"> • Deschutes Parkway to the west of North and Middle Basins (CAP-2, CAP-4, CAP-5, & CAP-7) • Interstate 5 between Middle and South Basins (CAP-2/4 & CAP1/3) • Highway 101 to the south (CAP-4) • Numerous local roads 	<ul style="list-style-type: none"> • Burlington Northern Santa Fe railroad track and trail on fill separates the North and Middle Basins (CAP-4/7 & CAP-3/6). • A railroad track lies to the west of Deschutes Parkway (CAP-7). 	<ul style="list-style-type: none"> • Interstate 5 crosses the lake on bridge and fill (CAP-2/4 & CAP1/3) • Deschutes Parkway lies on fill on the west edge of the lake, with a rip-rapped shoreline (CAP-2, CAP-4, CAP-5, & CAP-7) • The shoreline of Heritage Park is a concrete bulkhead (CAP-6) • Railroad on till crosses lake (CAP-4/7 & CAP-3/6). • Three small docks (CAP4 (2) & CAP-7) • Public piers at the Interpretive Center near Interstate 5 (CAP-4) • Trails in Tumwater Historic Park (CAP-2) • Tumwater Historic Brewhouse in South Basin (CAP-1) • Pedestrian bridge between North and Middle Basins

Known sites with Toxic or Hazardous Material
(MAP 10)

Leaking Underground Storage Tanks

- Eight tanks are identified near the lake's edge

Confirmed and Suspected Contamination Sites

- Premier Auto Detail, 722 Capitol Way S, Olympia. Contaminants from the Petroleum Products group are confirmed in soil and groundwater. Metals & Priority Pollutants are suspected in soil and groundwater. This site is awaiting a site hazard assessment.
- 8th & Capitol Investigation, 8th Avenue and Capitol Way S, Olympia. Contaminants from the Petroleum Products group have been confirmed in soil samples, and are suspected in groundwater. This site has been ranked and is awaiting remedial action.
- Unocal Service Station 0266, 924 Capitol Way S, Olympia. Contaminants from the Petroleum Products group have been confirmed in soil and groundwater. This site has been ranked and is awaiting remedial action.
- Shell Oil Co 2466146 0150, 1018 Capitol Way S, Olympia. Contaminants from the Petroleum Products and Non-Halogenated Solvents groups have been confirmed in groundwater. Metals & Priority Pollutants and Polynuclear Aromatic Hydrocarbons are suspected in groundwater. This site is undergoing remedial action.
- WA GA Olympia, 1058 Capitol Way S, Olympia. Contaminants from the Petroleum Products group are suspected in groundwater and confirmed in soil. This site has been ranked and is awaiting remedial action.

No Further Action Needed

- Heritage Park, 5th Avenue and Water St., Olympia Located northeast of Capitol Lake. Contaminants from the Petroleum Products group were found in the soil, and contaminants from the Polynuclear Aromatic Hydrocarbons group were found in sediment. Remedial action was completed in 1999.
- Previous JC Penney's site. 601 Columbia St. SW, Olympia. Located east of Capitol Lake. Contaminants from the Petroleum Products group were found in the soil and groundwater. Remedial action was completed in 1999.

**Historic Properties
(MAP 11)**

- There are two National Historic Districts located along or adjacent to the shoreline of Capitol Lake.
- There are numerous properties in the historic inventory, or on local, state, or federal registers in this district. Some of them are located adjacent to Capitol Lake.

Historic Name	Location Address	Inventory or Register	Construction Date
Old Brewhouse	Capitol Lake, Tumwater	National, State, and Local Register	1906
Titus House	1601 Sylvester St. SW, Olympia	Inventory	1923
McCully House	1625 Sylvester St. SW, Olympia	Local Register	1921
Eugley House	1825 Water Street SW, Olympia	Local Register	1908
Bridges House	301 21st Ave SW, Olympia	Inventory	1923
W.B. McDonald House	2215 Water St. S, Olympia, Thurston	Inventory	1939
Ewald House	2227 Water Street St. SW, Olympia	Inventory	1939
Karl Anderson House	2319 Water Street St. SW, Olympia	Inventory	1940
Chambers Packing/Brodie House	1821 Water Street SW Olympia	Inventory	1910
Naumann House	602 Deschutes Way, Tumwater	Local, State, and Federal Register	1905
Leopold Schmidt House	330 Schmidt Place SW, Tumwater	Inventory	1920

**Public Waterfront Land Owners
(MAP 12)**

- Washington State (approximately 67 percent of the Lake shoreline)

Public Access (MAP 12)			
	Swimming	Fishing	Boat Access
Overall	No	Yes	Yes
Parks, Trails, and other Access Points			
Capitol Lake Interpretive Center (State) (CAP-4)	No	Yes (dock)	Yes (handcarried boats)
Heritage Park (State) (CAP-6)	No	No	No
Marathon Park (State) (CAP-7)	No	Yes (dock)	Yes (handcarried boats)
Tumwater Historical Park (Tumwater) (CAP-4)	No	No	Yes
5 th Avenue Dam (State) (CAP -6/7) Provides overlooks to the lake	No	No	No

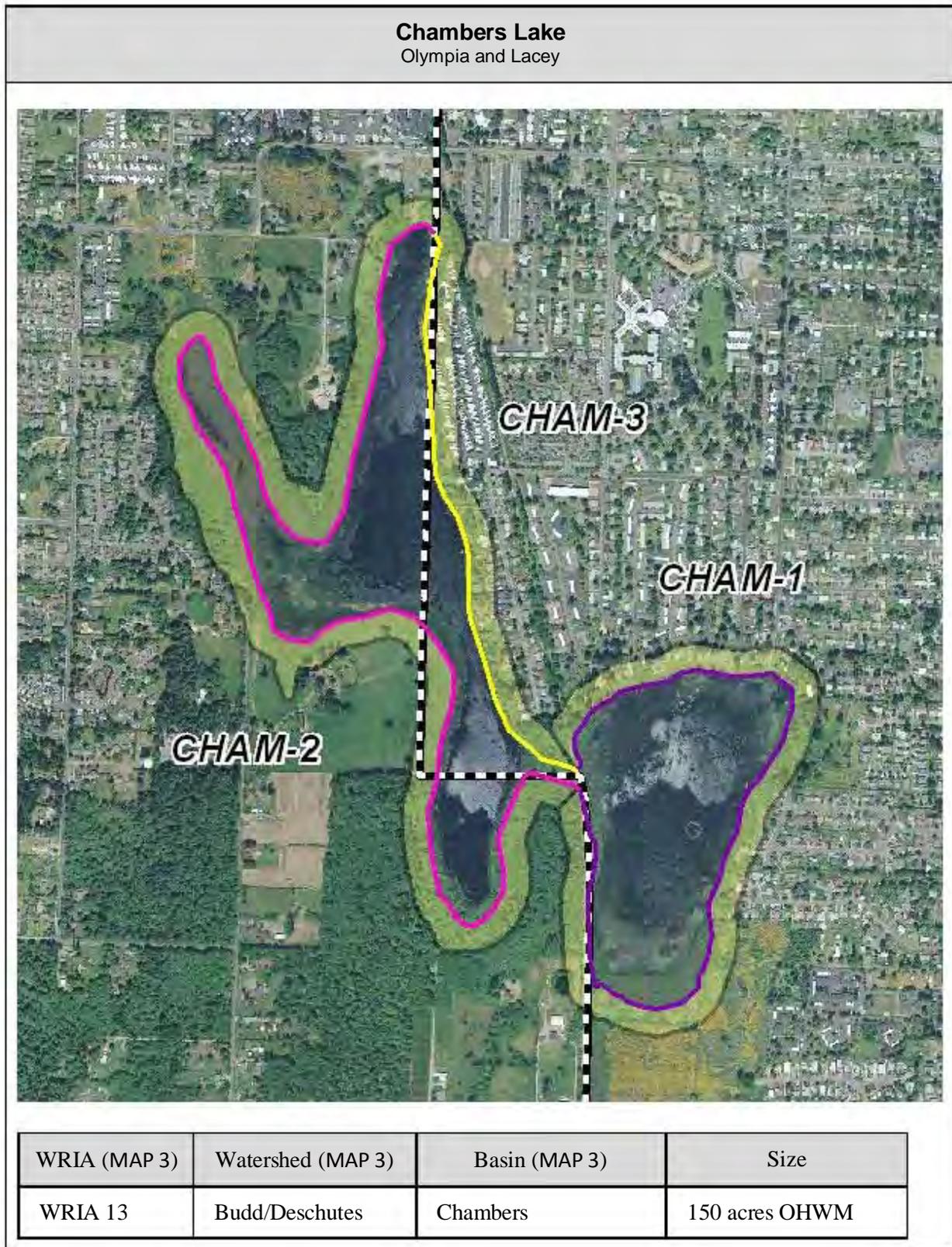
Soils			
General	Alderwood-Everett Association – Glacial uplands		
Reach	Name	Acres	Percent
CAP-1	Dystric Xerochrepts, 60 to 90% slopes	11.7	74%
CAP-1	Puyallup silt loam	2.0	13%
CAP-1	Indianola loamy sand, 15 to 30% slopes	1.4	9%
CAP-1	Indianola loamy sand, 0 to 3% slopes	0.8	5%
CAP-2	Everett very gravelly sandy loam, 3 to 15% slopes	8.2	69%
CAP-2	Indianola loamy sand, 0 to 3% slopes	2.0	17%
CAP-2	Everett very gravelly sandy loam, 30 to 50% slopes	1.7	14%
CAP-3	Dystric Xerochrepts, 60 to 90% slopes	25.1	100%
CAP-4	Everett very gravelly sandy loam, 30 to 50% slopes	20.7	100%
CAP-5	Dystric Xerochrepts, 60 to 90% slopes	10.4	61%
CAP-5	Xerorthents, 0 to 5% slopes	5.2	31%
CAP-5	Everett very gravelly sandy loam, 30 to 50% slopes	0.8	4%
CAP-5	Alderwood gravelly sandy loam, 3 to 15% slopes	0.7	4%
CAP-6	Xerorthents, 0 to 5% slopes	10.4	73%
CAP-6	Dystric Xerochrepts, 60 to 90% slopes	3.9	27%
CAP-7	Xerorthents, 0 to 5% slopes	15.7	100%

Critical Areas (MAP 13)
<p>Wetlands</p> <ul style="list-style-type: none"> • Extensive riparian and emergent wetlands in the South Basin and adjacent to the Tumwater Historical Park • Wetland mitigation site in the SW corner of the Middle Basin • Thin fringe estuarine wetlands along Deschutes Parkway
<p>Habitat Conservation Areas</p> <ul style="list-style-type: none"> • High quality riparian shoreline exists along the east shore of the Middle Basin, east and south shore of the South Basin, and the west shore of Percival Cove. In Olympia these areas are designated as <i>'Important Riparian Areas'</i>. • Wooded hillside of Capitol Lake is the largest connected habitat unit within Olympia or Tumwater
<p>Priority Habitats & Species</p> <ul style="list-style-type: none"> • Bald Eagles located within the basin • Other mapped species include riffle sculpin and mink • Although not mapped, use of the lake by waterfowl would likely be Bald Eagle habitat
<p>Floodplains</p> <ul style="list-style-type: none"> • New floodplain elevation and FEMA map as of 2003 • Heritage Park landscaped to provide flood protection to downtown Olympia
<p>Landslide Hazard Areas</p> <ul style="list-style-type: none"> • Steep slopes surround the basin, except to the north • Steep slopes along the shoreline in the eastern shore of the Middle Basin, east and south shore of the South Basin, and the west shore of Percival Cove • Steep slopes to the west of Deschutes Parkway in the Middle and North Basins • Steep slopes also to the southeast and south of the Heritage Park in the North Basin

Water Quality		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	Fecal Coliform; Phosphorus	
Category 4(C)	Invasive Exotic Species	
Category 2	Temperature	

Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Fair to poor	Failed total phosphorus and fecal coliform	Sediment deposition, shoreline erosion, landslides, and noxious aquatic plant infestations (Eurasian water milfoil) have been issues at Capitol Lake. Swimming area closed in 1985.
Additional Information		
<p>Major Issues</p> <ul style="list-style-type: none"> • A 10-year plan for adaptively managing Capitol Lake was developed by the Washington Department of General Administration and a multi-agency steering committee. The goal of the plan is to achieve measurable improvements in flood control, water quality, salmon enhancement, sediment management and infrastructure improvements. The plan identifies fourteen management objectives, which have been adopted by the State Capitol Committee and are being implemented by the Washington State Department of General Administration and the other participating agencies. • A study to examine the feasibility of returning the lake to an estuary is being evaluated. The study is projected to be completed in 2009. • Some of the past and present Capitol Lake management issues include: <ul style="list-style-type: none"> Sediment deposition and dredging Poor water quality Controlling the population of resident Canada and domestic geese Accidental sewage and chemical spills Control of aquatic plant and algae growth by saltwater flushing Invasion of noxious weeds such as purple loosestrife and Eurasian water milfoil Flooding and lake shoreline erosion Chinook salmon hatching and rearing operation Stormwater discharges • In mid 2003, the brewery operation just upstream of the lake closed and ceased discharge to the Deschutes River. • In 2001 Eurasian water milfoil, an exotic aquatic plant, was discovered in the lake. In summer 2004, the herbicide triclopyr was applied to the lake to control the milfoil infestation. In 2005, some surviving milfoil plants were discovered in the south basin and in the wetland near the Interpretive Center. 		
Fisheries		
<ul style="list-style-type: none"> • Chinook, coho, steelhead and cutthroat. Also Stihel barb and Olympic mud minnow. 		

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Bathymetry/Topography (MAP 4)	Surface Hydrology (MAP 4)	Other Hydrologic Features
<ul style="list-style-type: none"> • Mean Depth: 5 ft. • Maximum Depth: 8 ft. • Elevation: 197 ft. • Flat topography surrounding the lake; slightly steeper to the southeast. 	<ul style="list-style-type: none"> • Chambers Lake is made up of East and West Basins connected by a ditch • The West Basin flows into the East basin • Chamber Lake drains through Chambers Ditch to Chambers Creek and the Deschutes River. • There are no obvious tributaries to Chambers Lake other than overland stormwater flow. 	<ul style="list-style-type: none"> • The hydrology of this lake is highly altered by the surrounding urban environment. Numerous ditches control surface flow in the surrounding basin. • This area is within the Chambers Ditch District (see Chambers Creek for Historic Hydrology map)

Existing Shoreline Designations (MAP 5)	General Land Cover (MAP 6)	Riparian Land Cover (MAP 6)
<ul style="list-style-type: none"> • Conservancy in West Basin and along the southern lake edge in the East Basin • Urban in remainder of the East Basin 	<ul style="list-style-type: none"> • Moderate and high density urban • Mixed and hardwood forests • Non-forest vegetation (shrubs and grasses) 	<ul style="list-style-type: none"> • Non-forest vegetation (shrubs and wetlands vegetation) • Mixed forests

Current Land Use (MAP 7)	Future Land Use (Zoning) (MAP 8)	Water Dependent/Oriented Uses (MAP 9)
<ul style="list-style-type: none"> • Low, Moderate and High density residential • Agriculture • Parks, preserves and open space 	<ul style="list-style-type: none"> • Parts of this area (in the City of Olympia) are currently under moratorium as moderate density urban zoning is reexamined 	<p>Water Dependent</p> <ul style="list-style-type: none"> • None noted <p>Water Related</p> <ul style="list-style-type: none"> • None noted <p>Water Enjoyment</p> <ul style="list-style-type: none"> • Community area – mobile home park (CHAM-3) • Shared-use trail – Chehalis Western Trail (ALL REACHES)

Roads	Railroads, Utilities	Shoreline Modifications
<ul style="list-style-type: none"> • 14th Ave. to the north • College Street to the east • On east side of the lake are numerous local roads • Very limited access on the West Basin of the lake 	<ul style="list-style-type: none"> • The Chehalis-Western Trail (former railroad right of way) divides the West and East Basins. The railroad has been converted to a trail. 	<ul style="list-style-type: none"> • Very little modification of lake shoreline except along the railroad right-of-way (regional trail)

Known sites with Toxic or Hazardous Material (MAP 10)
<ul style="list-style-type: none"> • Elevated nitrate levels are found to the west of Chambers Lake

Historic Properties (MAP 11)
<ul style="list-style-type: none"> • None noted

Public Waterfront Land Owners (MAP 12)
<ul style="list-style-type: none"> • None noted

Public Access (MAP 12)			
	Swimming	Fishing	Boat Access
Overall	No	Yes	Yes
Parks, Trails, and other Access Points			
WDFW Boat Launch (CHAM-3)	No	Yes	Yes
Undeveloped Park Property (City of Olympia) (CHAM-1 & 2)	No	No	No

Soils			
General	Alderwood-Everett Association – Glacial uplands		
Reach	Name	Acres	Percent
CHAM-1	Mukilteo muck	11.2	37%
CHAM-1	Nisqually loamy fine sand, 0 to 3 % slopes	8.8	29%
CHAM-1	Yelm fine sandy loam, 0 to 3% slopes	8.8	29%
CHAM-1	Norma silt loam	1.2	4%
CHAM-2	Mukilteo muck	24.8	45%
CHAM-2	Skipopa silt loam, 0 to 3% slopes	9.4	17%
CHAM-2	Yelm fine sandy loam, 0 to 3% slopes	9.0	16%
CHAM-2	Skipopa silt loam, 3 to 15% slopes	7.6	14%
CHAM-2	Norma silt loam	3.2	6%
CHAM-2	Mukilteo muck, drained	1.0	2%
CHAM-3	Mukilteo muck	9.1	51%
CHAM-3	Nisqually loamy fine sand, 0 to 3 % slopes	8.8	49%

Critical Areas (MAP 13)
<p>Wetlands</p> <ul style="list-style-type: none"> • The variety of wetland habitats surrounding the lake is extensive • Modified emergent or scrub shrub wetlands can be found along the east and south shore of the East Basin (east of the Chehalis Western Trail) • Emergent wetlands surround the south isthmus between the basins and the south and east shore of the West Basin • Much of the west shore of the West Basin is surrounded by scrub shrub wetland • The northwest arm of the West Basin supports a unique wetland with acidic organic soils
<p>Habitat Conservation Areas</p> <ul style="list-style-type: none"> • Limited riparian habitat along non wetland shorelines
<p>Priority Habitats & Species</p> <ul style="list-style-type: none"> • Wood Duck located within the basin
<p>Floodplains</p> <ul style="list-style-type: none"> • Floodplains are associated with this feature
<p>Landslide Hazard Areas</p> <ul style="list-style-type: none"> • None noted

Water Quality		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	None	
Category 4(C)	None	
Category 2	Total phosphorus	
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Unclassified		

Fisheries
<ul style="list-style-type: none"> • The following game fish are found in Chambers Lake: cutthroat and spiny rays.

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Grass Lake and Lake Louise
Olympia



WRIA (MAP 3)	Watershed (MAP 3)	Basin (MAP 3)	Size
WRIA 13	Eld Inlet	Green Cove Creek	64 acres OHWM

Bathymetry/Topography (MAP 4)	Surface Hydrology (MAP 4)	Other Hydrologic Features
<ul style="list-style-type: none"> • Mean Depth: Data gap • Maximum Depth: Data gap • Elevation (Lake Louise): 141 ft. • Flat to moderately flat topography 	<ul style="list-style-type: none"> • Grass Lake is part of a large wetland system that drains through Green Cove Creek into Eld Inlet. • There are no obvious tributaries to Grass Lake other than overland stormwater flow. 	<ul style="list-style-type: none"> • Historically Grass Lake was part of an extensive wetland system. Roads and culverts now break it up into a series of smaller systems. • The Grass Lake system is in an urban environment that has been highly altered. The City of Olympia owns much of the wetlands, and they have been placed into a refuge.

Existing Shoreline Designations (MAP 5)	General Land Cover (MAP 6)	Riparian Land Cover (MAP 6)
<ul style="list-style-type: none"> • Rural 	<ul style="list-style-type: none"> • Coniferous, mixed and hardwood forests • Non-forest vegetation – shrubs and grasses • Moderate and high density urban 	<ul style="list-style-type: none"> • Coniferous, mixed and hardwood forests • Non-forest vegetation – shrubs and grasses

Current Land Use (MAP 7)	Future Land Use (Zoning) (MAP 8)	Water Dependent/Oriented Uses (MAP 9)
<ul style="list-style-type: none"> • Rural, Moderate and High density residential • Grass Lake Refuge • Commercial to southeast 	<ul style="list-style-type: none"> • Much of this area is in the Grass Lake Refuge • Residential development is allowed to occur under low impact development regulations on the uplands surrounding the lakes • Significant moderate residential development is expected in general vicinity 	<p>Water Dependent</p> <ul style="list-style-type: none"> • None noted <p>Water Related</p> <ul style="list-style-type: none"> • None noted <p>Water Enjoyment</p> <ul style="list-style-type: none"> • Planned Shared-use trail – Grass Lake Refuge • Walking Trail and Viewpoint – Grass Lake Refuge

Historic Hydrology of West Olympia
General Land Office Map (1850s)



Roads	Railroads, Utilities	Shoreline Modifications
<ul style="list-style-type: none"> • Cooper Point Drive to the east • Kaiser Road to the west • Harrison Avenue to the south • 14th Avenue to the north • Limited direct lake access by roads 	<ul style="list-style-type: none"> • None noted 	<ul style="list-style-type: none"> • Little modification of lake shoreline

Known sites with Toxic or Hazardous Material (MAP 10)
<p>Confirmed and Suspected Contamination Sites</p> <ul style="list-style-type: none"> • Puget Power Eld Inlet Substation, 14th Ave. NW, Olympia. Contaminants from the Petroleum Products group are confirmed in groundwater and soil, and suspected in drinking water. Polychlorinated Bi-phenyls are suspected in groundwater, soil and drinking water. This site has been ranked and is awaiting remedial action.

Historic Properties (MAP 11)
<ul style="list-style-type: none"> • None noted

Public Waterfront Land Owners (MAP 12)
<ul style="list-style-type: none"> • Capital High School is located across the street from the Refuge

Public Access (MAP 12)			
	Swimming	Fishing	Boat Access
Overall	No	No	No
Parks, Trails, and other Access Points			
Grass Lake Refuge	No	No	No

Soils			
General	Alderwood-Everett Association – Glacial uplands		
Reach	Name	Acres	Percent
GRASS-1	Alderwood gravelly sandy loam, 3 to 15% slopes	47.4	30%
GRASS-1	McKenna gravelly silt loam, 0 to 5% slopes	36.0	23%
GRASS-1	Alderwood gravelly sandy loam, 0 to 3% slopes	35.9	23%
GRASS-1	Mukilteo muck	18.7	12%
GRASS-1	Yelm fine sandy loam, 0 to 3% slopes	5.3	3%
GRASS-1	Shalcar Variant muck	3.8	2%
GRASS-1	Yelm fine sandy loam, 3 to 15% slopes	3.6	2%
GRASS-1	Indianola loamy sand, 3 to 15% slopes	2.1	1%
GRASS-1	Norma silt loam	1.8	1%
GRASS-1	Xerorthents, 0 to 5% slopes	1.7	1%
GRASS-1	Giles silt loam, 3 to 15% slopes	1.3	1%

Critical Areas (MAP 13)
<p>Wetlands</p> <ul style="list-style-type: none"> • Extensive scrub shrub wetland interspersed with forested, smaller patches of emergent and open water habitats. Involved special mapping with WDOE in the mid-1990s.
<p>Habitat Conservation Areas</p> <ul style="list-style-type: none"> • Grass Lake Refuge is one of the largest intact habitat units within Olympia.
<p>Priority Habitats & Species</p> <ul style="list-style-type: none"> • Wood Ducks are within the basin. Olympic mud minnow present in Green Cove Creek downstream of the lake. Personal knowledge (Morrison) of use by Green Heron, and a two acre stand of Quaking Aspen in the western leg north of Harrison Avenue
<p>Floodplains</p> <ul style="list-style-type: none"> • Floodplains are associated with this feature
<p>Landslide Hazard Areas</p> <ul style="list-style-type: none"> • None noted

Water Quality		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	None	
Category 4(C)	None	
Category 2	None	
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Unclassified		

Fisheries
<ul style="list-style-type: none"> Unknown

Bird Watching Areas
<p>Grass Lake</p> <ul style="list-style-type: none"> Lake Louise - Summer and early fall: shorebirds and waterfowl such as Common Snipe, Hooded Merganser, Great Blue Heron, Red-tailed Hawk, Killdeer, Green-winged Teal, and Greater Yellowlegs Lake Louise – Winter: Pied-billed Grebes, Bufflehead, and American Coots, Purple and House Finches in the brambles along the path to the lake. Forest: many Spotted Towhees, Winter Wrens, Downy and Hairy Woodpeckers, Kinglet sp., and the occasional Bewick's Wrens. Grass Lake Refuge is an excellent Neotropical birding site: Black-throated Greys, Wilson's Warblers, Common Yellowthroats, Orange-crowned Warblers, Solitary Vireos, Yellow Warblers, Yellow-rumped Warblers, Swainson's Thrushes, Barn Swallows, Violet-green Swallows, Tree Swallows, Western Tanagers and Black-headed Grosbeaks.

Hewitt Lake
Olympia UGA



WRIA (MAP 3)	Watershed (MAP 3)	Basin (MAP 3)	Size
WRIA 13	Budd/Deschutes	Chambers	29 acres

Bathymetry/Topography (MAP 4)	Surface Hydrology (MAP 4)	Other Hydrologic Features
<ul style="list-style-type: none"> • Mean Depth: 28 ft. • Maximum Depth: 56 ft. • Elevation: 126 ft. • Moderate slopes around lake; surrounded by flat topography 	<ul style="list-style-type: none"> • Hewitt Lake is a spring-fed kettle lake with no surface feeder streams and no outlet. 	<ul style="list-style-type: none"> • The lake level fluctuates with rainfall, but more slowly than nearby Ward Lake.

Existing Shoreline Designations (MAP 5)	General Land Cover (MAP 6)	Riparian Land Cover (MAP 6)
<ul style="list-style-type: none"> • Rural 	<ul style="list-style-type: none"> • Moderate density urban • Mixed and hardwood forests • Non-forest vegetation (shrubs and lawns) 	<ul style="list-style-type: none"> • Mixed and hardwood forests • Non-forest vegetation (shrubs and lawns)

Current Land Use (MAP 7)	Future Land Use (Zoning) (MAP 8)	Water Dependent/Oriented Uses (MAP 9)
<ul style="list-style-type: none"> • Low density residential 	<ul style="list-style-type: none"> • Along shoreline residential redevelopment may occur but density is unlikely to change significantly • Plans for moderate density residential development to the south 	<p>Water Dependent</p> <ul style="list-style-type: none"> • None noted <p>Water Related</p> <ul style="list-style-type: none"> • None noted <p>Water Enjoyment</p> <ul style="list-style-type: none"> • None noted

Roads	Railroads, Utilities	Shoreline Modifications
<ul style="list-style-type: none"> • Yelm Highway to north • Other local residential roads 	<ul style="list-style-type: none"> • None noted 	<ul style="list-style-type: none"> • Residential uses including 23 private docks

Known sites with Toxic or Hazardous Material (MAP 10)
<p>No Further Action Needed</p> <ul style="list-style-type: none"> Swaney Chevron, 2601 Yelm Hwy SE, Olympia. Located east of Hewitt Lake. Contaminants from the Petroleum Products group were found in the soil. Remedial action was completed in 1998.

Historic Properties (MAP 11)
<ul style="list-style-type: none"> None noted

Public Waterfront Land Owners (MAP 12)
<ul style="list-style-type: none"> None noted

Public Access (MAP 12)			
	Swimming	Fishing	Boat Access
Overall	No	No	No
Parks, Trails, and other Access Points			
None noted			

Soils			
General	Alderwood-Everett Association – Glacial uplands		
Reach	Name	Acres	Percent
HEWITT-1	Indianola loamy sand, 15 to 30% slopes	21.4	87%
HEWITT-1	Indianola loamy sand, 3 to 15% slopes	1.7	7%
HEWITT-1	Indianola loamy sand, 0 to 3% slopes	0.7	3%
HEWITT-1	Yelm fine sandy loam, 0 to 3% slopes	0.6	3%

Critical Areas (MAP 13)
Wetlands <ul style="list-style-type: none"> • None noted
Habitat Conservation Areas <ul style="list-style-type: none"> • Limited riparian habitat along non-wetland shorelines
Priority Habitats & Species <ul style="list-style-type: none"> • None noted
Floodplains <ul style="list-style-type: none"> • None noted
Landslide Hazard Areas <ul style="list-style-type: none"> • None noted <i>[Note: may be due to large pixel size of DEM mapping]</i>

Water Quality		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	None	
Category 4(C)	None	
Category 2	None	
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Unclassified		

Fisheries
<ul style="list-style-type: none"> • Unknown

Hicks Lake
Lacey



WRIA (MAP 3)	Watershed (MAP 3)	Basin (MAP 3)	Size
WRIA 13	Henderson Inlet	Woodland	170 acres

Bathymetry/Topography (MAP 4)	Surface Hydrology (MAP 4)	Other Hydrologic Features
<ul style="list-style-type: none"> • Mean Depth: 18 ft. • Maximum Depth: 35 ft. • Elevation: 161 ft. • Fairly flat, some moderately sloping elevation on the east of the lake. 	<ul style="list-style-type: none"> • Water enters Hicks Lake mainly as groundwater seepage and surface flow. The lake discharges through a large wetland to the south. • Hicks Lake is part of a four lake system connected by extensive wetlands, forming a horseshoe-shaped chain at the head of Woodland Creek. • Hicks Lake flows into Pattison Lake, and then Long Lake, all at relatively the same elevation. • Long Lake empties into Lake Lois, which lies at a slightly lower elevation. • Lois Lake discharges into Woodland Creek, which then flows into Henderson Inlet. 	<ul style="list-style-type: none"> • Hicks Lake is in an urban environment, and much of the surrounding area has been altered, although the wetlands to the south are intact. • The area between Pattison and Hicks Lake is a 162 acre palustrine wetland. At one time it was drained and used for agriculture, but native vegetation has been restored, and no distinct stream channels remain.

Existing Shoreline Designations (MAP 5)	General Land Cover (MAP 6)	Riparian Land Cover (MAP 6)
<ul style="list-style-type: none"> • Urban • Conservancy along associated wetlands 	<ul style="list-style-type: none"> • Moderate density urban • Coniferous, mixed, and deciduous forests • Non-forest vegetation – shrubs and lawns 	<ul style="list-style-type: none"> • Moderate density urban • Non-forest vegetation – wetland shrubs and lawns • Mixed forests

Current Land Use (MAP 7)	Future Land Use (Zoning) (MAP 8)	Water Dependent/Oriented Uses (MAP 9)
<ul style="list-style-type: none"> • Low to moderate density residential • Parks and open space • Church 	<ul style="list-style-type: none"> • Residential redevelopment may occur along lake but density is unlikely to change significantly • Some moderate density residential development planned to the south 	<p>Water Dependent</p> <ul style="list-style-type: none"> • None noted <p>Water Related</p> <ul style="list-style-type: none"> • None noted <p>Water Enjoyment</p> <ul style="list-style-type: none"> • Church camp (HICKS-1) • Wanschers Park (HICKS-1)

Roads	Railroads, Utilities	Shoreline Modifications
<ul style="list-style-type: none"> • Carpenter Road to east • Local road access to the north and west • Limited access from the south 	<ul style="list-style-type: none"> • None noted 	<ul style="list-style-type: none"> • Boat ramp, residential uses including 89 private docks (HICKS-2) • Southern portion of lake is unaltered (HICKS-1)

Known sites with Toxic or Hazardous Material (MAP 10)
<p>Elevated Nitrate Areas</p> <ul style="list-style-type: none"> • Elevated nitrate areas are found to the northeast of Hicks Lake. <p>No Further Action Needed</p> <ul style="list-style-type: none"> • Thurston County Fairgrounds, 3054 Carpenter Rd., Lacey. Located between Hicks and Long Lakes. Contaminants from the Petroleum Products group were found in the soil. Remedial action was completed in 2001.

Historic Properties (MAP 11)
<ul style="list-style-type: none"> • There are 11 residential homes located on the Hicks Lake waterfront that are in Thurston County’s historic inventory. These homes were constructed between 1912 and 1935. They are not on any local, state or national registers.

Public Waterfront Land Owners (MAP 12)
<ul style="list-style-type: none"> Thurston County Fairgrounds are located between Hicks Lake and Long Lake – the property does not extend to the waterfront of either lake.

Public Access (MAP 12)			
	Swimming	Fishing	Boat Access
Overall	Yes	Yes	Yes
Parks, Trails, and other Access Points			
Wanschers Park (City of Lacey) (HICKS-2) *lily pads discourage swimmers	No*	Yes	Yes
WDFW Boat Launch (HICKS-2)	Yes	Yes	Yes

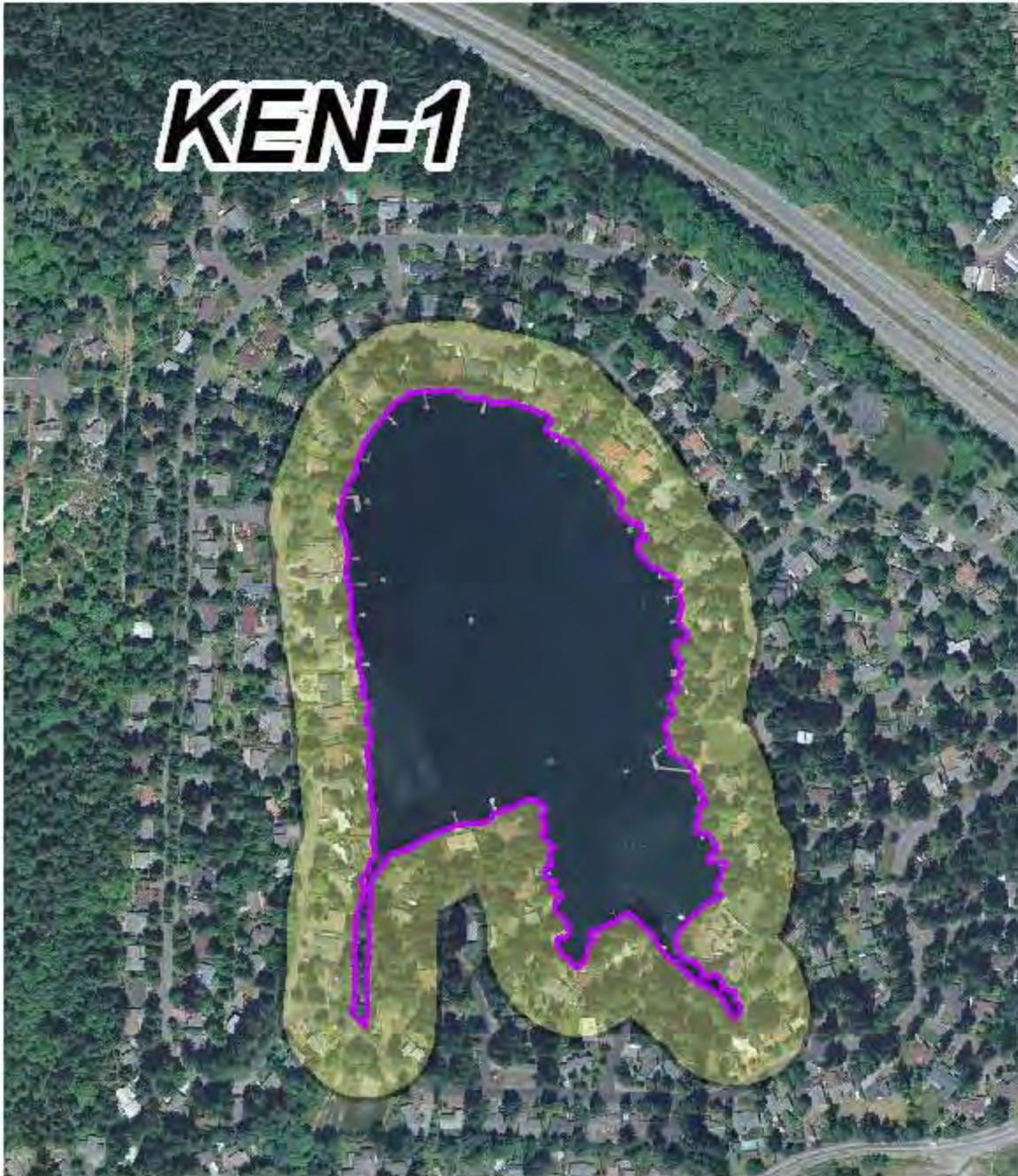
Soils			
General	Alderwood-Everett Association – Glacial uplands		
Reach	Name	Acres	Percent
HICKS-1	Mukilteo muck	139.8	89%
HICKS-1	Everett very gravelly sandy loam, 15 to 30% slopes	6.6	4%
HICKS-1	Indianola loamy sand, 3 to 15% slopes	4.8	3%
HICKS-1	Everett very gravelly sandy loam, 3 to 15% slopes	4.4	3%
HICKS-1	Indianola loamy sand, 15 to 30% slopes	1.2	1%
HICKS-2	Indianola loamy sand, 3 to 15% slopes	31.6	60%
HICKS-2	Everett very gravelly sandy loam, 3 to 15% slopes	18.4	35%
HICKS-2	Norma silt loam	1.9	4%
HICKS-2	Mukilteo muck	1.1	2%

Critical Areas (MAP 13)
<p>Wetlands</p> <ul style="list-style-type: none">• Associated wetland arm to the southwest is a mixture of modified and native scrub shrub, forested, emergent wetland units with scrub shrub wetland• The associated wetland to the south of the lake is the largest wetland unit in Lacey. It is comprised of intermixed units of modified and native scrub shrub and forested wetlands with acidic organic soils.• Some small emergent wetlands are located adjacent to Timberline High School• The wetlands stops north of Mullen Road
<p>Habitat Conservation Areas</p> <ul style="list-style-type: none">• Upper most part of the <i>Lacey Lakes</i> watershed.• Riparian connection to Pattison Lake via the associated wetland and a ditch across Mullen Road• Limited riparian habitat along non wetland shorelines
<p>Priority Habitats & Species</p> <ul style="list-style-type: none">• Wood Duck located within the associated wetlands to the south
<p>Floodplains</p> <ul style="list-style-type: none">• Floodplains are associated with this feature
<p>Landslide Hazard Areas</p> <ul style="list-style-type: none">• None noted

Water Quality		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	None	
Category 4(C)	Invasive exotic species	
Category 2	None	
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Good		Water quality is generally good and supports recreational uses.
Additional Information		
<p>Major Issues</p> <ul style="list-style-type: none"> • Low water levels occur during summer months, especially during periods of drought such as in 2001. High lake levels can also occur during higher than normal winter rainfall conditions. Extreme high lake levels cause flooding of some lakeshore structures. The outlet channel is on private property, is not maintained, and restricts the flow of water out of the lake. • High density residential land use, storm water discharges, and other non-point pollution in this urban setting could degrade water quality if measures are not taken to prevent it. 		

Fisheries
<ul style="list-style-type: none"> • The following game fish are found in Hicks Lake: rainbow trout (planted), brown trout, crappies, largemouth, rock and warmouth bass, perch, sunfish, and bullhead catfish.

Ken Lake (was known as Simmons Lake)
Olympia



WRIA (MAP 3)	Watershed (MAP 3)	Basin (MAP 3)	Size
WRIA 13	Budd/Deschutes	Percival Creek	26 acres

Bathymetry/Topography (MAP 4)	Surface Hydrology (MAP 4)	Other Hydrologic Features
<ul style="list-style-type: none"> • Mean Depth: 7 ft. • Maximum Depth: 11 ft. • Elevation: 138 ft. • Steep hills to the west of Ken Lake; Moderately flat topography surrounding the lake. 	<ul style="list-style-type: none"> • Ken Lake is spring fed, with no obvious tributaries. Overland stormwater flow also contributes to the lake. • The lake discharges into Black Lake Drainage Ditch. 	<ul style="list-style-type: none"> • Ken Lake was dredged when the surrounding subdivision was built to enhance recreational enjoyment, which has led to decreased water storage capacity in the lake during rain events. • This, combined with increased stormwater runoff, has led to flooding.

Existing Shoreline Designations (MAP 5)	General Land Cover (MAP 6)	Riparian Land Cover (MAP 6)
<ul style="list-style-type: none"> • Urban 	<ul style="list-style-type: none"> • Moderate density residential • Non-forest vegetation (lawns and shrubs) • Mixed forests 	<ul style="list-style-type: none"> • Moderate density residential • Non-forest vegetation (lawns and shrubs) • Mixed forests

Current Land Use (MAP 7)	Future Land Use (Zoning) (MAP 8)	Water Dependent/Oriented Uses (MAP 9)
<ul style="list-style-type: none"> • Low to moderate density residential 	<ul style="list-style-type: none"> • This immediate area around the lake is unlikely to change in the future • A large development is planned to the west of the lake 	<p>Water Dependent</p> <ul style="list-style-type: none"> • None noted <p>Water Related</p> <ul style="list-style-type: none"> • None noted <p>Water Enjoyment</p> <ul style="list-style-type: none"> • Two community beaches

Roads	Railroads, Utilities	Shoreline Modifications
<ul style="list-style-type: none"> • Highway 101 to the north • Black Lake Boulevard to the east • Lake access is through local roads 	<ul style="list-style-type: none"> • None noted 	<ul style="list-style-type: none"> • The majority of Ken Lake’s shoreline is residential back yards. • 32 private residential docks

Known sites with Toxic or Hazardous Material (MAP 10)
<p>Leaking Underground Storage Tanks</p> <ul style="list-style-type: none"> • One noted along Black Lake Blvd. in general vicinity of Ken Lake <p>Confirmed or Suspected Contaminated Sites</p> <ul style="list-style-type: none"> • Shop Fast, 2020 Black Lake Blvd., Olympia. Contamination from Petroleum Products and Non-Halogenated Solvents groups confirmed in soils and groundwater. Metals & Priority Pollutants also confirmed in groundwater. The site is undergoing remedial action. (Also near Black Lake Drainage Ditch) <p>Elevated Chloride Levels</p> <ul style="list-style-type: none"> • Elevated chloride levels are found to the west of Ken Lake, although some distance away.

Historic Properties (MAP 11)
<ul style="list-style-type: none"> • None noted

Public Waterfront Land Owners (MAP 12)
<ul style="list-style-type: none"> • None noted

Public Access (MAP 12)			
	Swimming	Fishing	Boat Access
Overall	No	No	No
Parks, Trails, and other Access Points			
None noted			

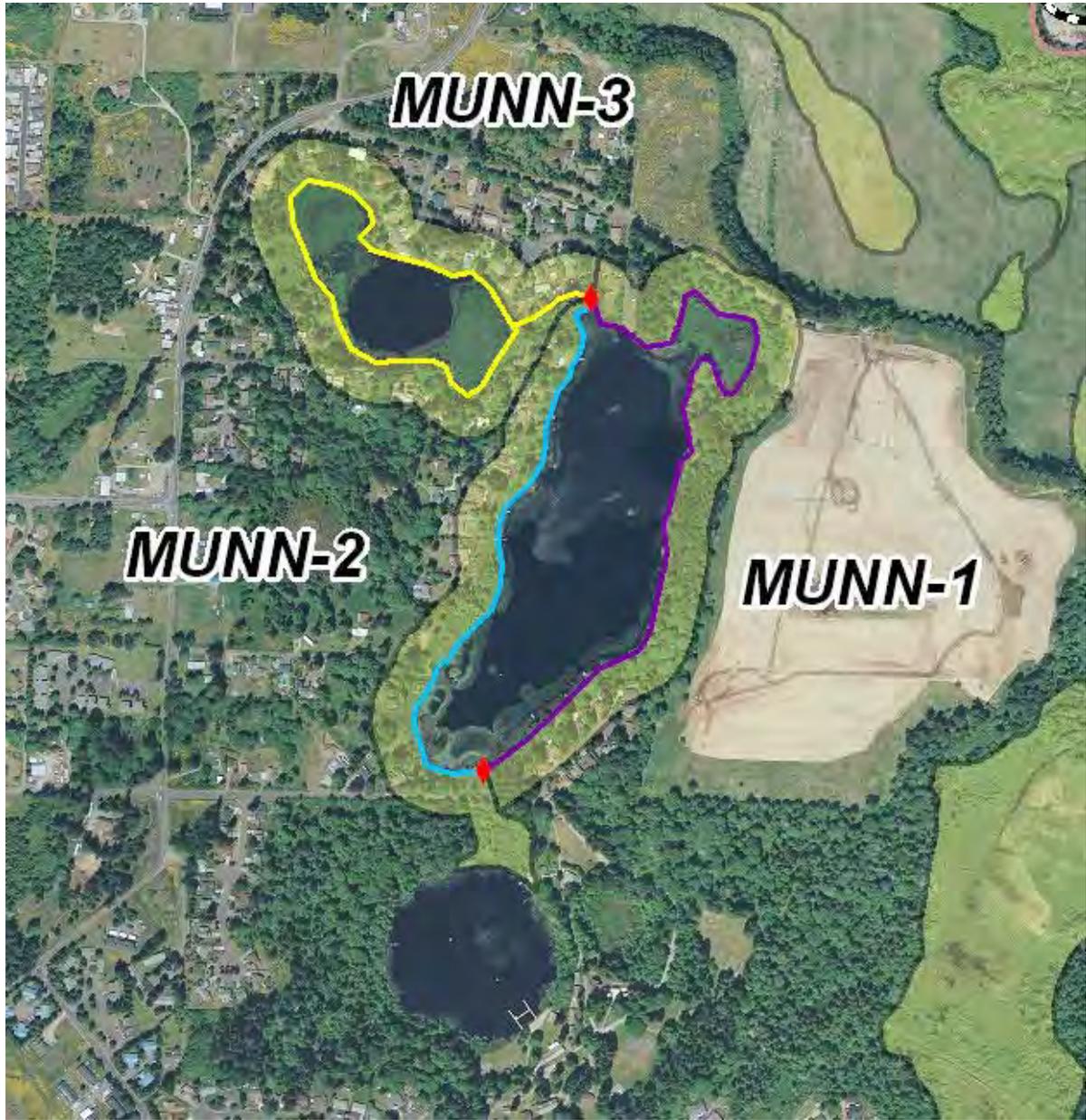
Soils			
General	Alderwood-Everett Association – Glacial uplands		
Reach	Name	Acres	Percent
KEN-1	Alderwood gravelly sandy loam, 3 to 15% slopes	36.7	92%
KEN-1	McKenna gravelly silt loam, 0 to 5% slopes	2.4	6%
KEN-1	Schneider very gravelly loam, 20 to 40% slopes	0.6	1%

Critical Areas (MAP 13)
Wetlands <ul style="list-style-type: none"> • None noted
Habitat Conservation Areas <ul style="list-style-type: none"> • None noted
Priority Habitats & Species <ul style="list-style-type: none"> • None noted
Floodplains <ul style="list-style-type: none"> • Floodplains are associated with this feature • Experienced flooding problems in 2007
Landslide Hazard Areas <ul style="list-style-type: none"> • None noted

Water Quality		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	None	
Category 4(C)	None	
Category 2	None	
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Unclassified		

Fisheries
<ul style="list-style-type: none"> • Unknown

Lake Susan and Munn Lake
Tumwater & UGA



WRIA (MAP 3)	Watershed (MAP 3)	Basin (MAP 3)	Size
WRIA 13	Budd/Deschutes	Deschutes River	44 acres OHWM

Bathymetry/Topography (MAP 4)	Surface Hydrology (MAP 4)	Other Hydrologic Features
<p>Munn Lake</p> <ul style="list-style-type: none"> • Mean Depth: 10 ft. • Maximum Depth: 19 ft. • Elevation: 145 ft. • Moderate slopes around the lakes. 	<ul style="list-style-type: none"> • Susan and Munn Lakes are connected with a small wetland area. • The lakes are kettle lakes with no surface tributaries. They are fed by seeps and rainfall. • There are no surface outlets for Susan and Munn Lakes. 	<ul style="list-style-type: none"> • Trails End Lake flows into Munn Lake (field observation March 2008) and therefore is not likely under SMA jurisdiction.

Existing Shoreline Designations (MAP 5)	General Land Cover (MAP 6)	Riparian Land Cover (MAP 6)
<ul style="list-style-type: none"> • Conservancy 	<ul style="list-style-type: none"> • Deciduous and mixed forest • Non-forest vegetation – shrubs • Moderate density urban • Soils and grasses – cleared area for subdivision development 	<ul style="list-style-type: none"> • Deciduous and mixed forest • Non-forest vegetation – shrubs • Forested wetlands

Current Land Use (MAP 7)	Future Land Use (Zoning) (MAP 8)	Water Dependent/Oriented Uses (MAP 9)
<ul style="list-style-type: none"> • Low to moderate density single-family residential • Open space 	<ul style="list-style-type: none"> • Large moderate density residential developments planned to the east and west of the lakes • The general area is expected to urbanize 	<p>Water Dependent</p> <ul style="list-style-type: none"> • None noted <p>Water Related</p> <ul style="list-style-type: none"> • None noted <p>Water Enjoyment</p> <ul style="list-style-type: none"> • Church camp on Trails End Lake (not within jurisdiction)

Roads	Railroads, Utilities	Shoreline Modifications
<ul style="list-style-type: none"> • Limited road access • Henderson Boulevard is to the west 	<ul style="list-style-type: none"> • Powerlines cross to the north of Lake Susan 	<ul style="list-style-type: none"> • Very little modification of shorelines, 3 private docks (MUNN-1); 4 in (MUNN-2)

Known sites with Toxic or Hazardous Material (MAP 10)
<ul style="list-style-type: none"> • None noted

Historic Properties (MAP 11)
<ul style="list-style-type: none"> • None noted

Public Waterfront Land Owners (MAP 12)
<ul style="list-style-type: none"> • None noted

Public Access (MAP 12)			
	Swimming	Fishing	Boat Access
Overall	No	No	Yes
Parks, Trails, and other Access Points			
WDFW Boat Launch (MUNN-1)	No	No	Yes

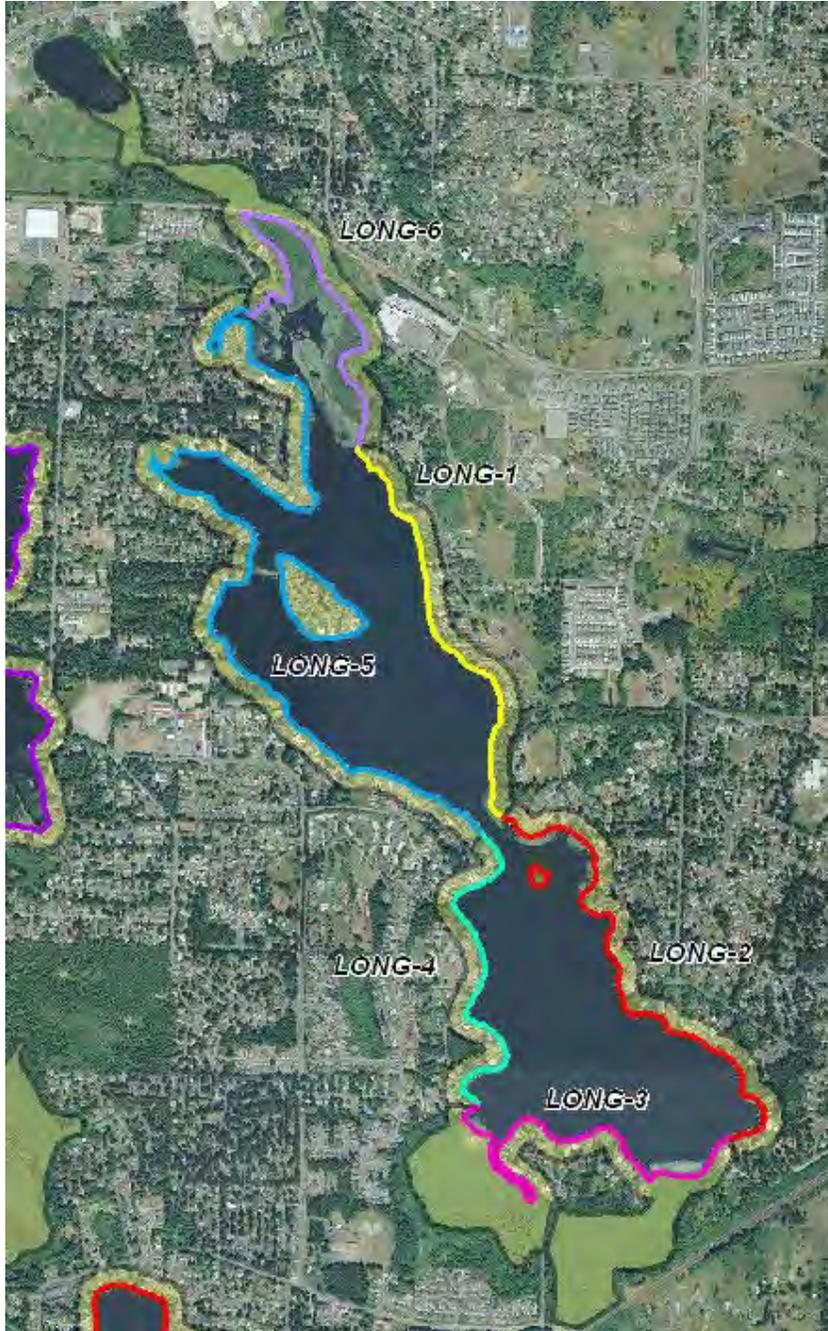
Soils			
General	Spanaway-Nisqually Association – Glacial outwash terraces		
Reach	Name	Acres	Percent
MUNN-1	Indianola loamy sand, 15 to 30% slopes	15.2	85%
MUNN-1	Indianola loamy sand, 0 to 3% slopes	1.6	9%
MUNN-1	Nisqually loamy fine sand, 0 to 3 % slopes	1.1	6%
MUNN-2	Indianola loamy sand, 15 to 30% slopes	7.9	58%
MUNN-2	Indianola loamy sand, 3 to 15% slopes	3.8	28%
MUNN-2	Mukilteo muck, drained	1.9	14%
MUNN-3	Indianola loamy sand, 15 to 30% slopes	13.9	75%
MUNN-3	Indianola loamy sand, 3 to 15% slopes	3.3	18%
MUNN-3	Indianola loamy sand, 0 to 3% slopes	1.2	6%

Critical Areas (MAP 13)
<p>Wetlands</p> <ul style="list-style-type: none"> • At the south shore of Munn Lake are small forested and scrub shrub habitats • Munn Lake has scattered small fringing habitats of emergent or scrub shrub wetlands • The shoreline of Lake Susan is similar to Munn Lake
<p>Habitat Conservation Areas</p> <ul style="list-style-type: none"> • Limited riparian habitat along non-wetland shorelines • A hydraulic connection between Lake Susan and Munn Lake is clearly apparent • The connection between Munn Lake and Trails End Lake is a ditch through a connected wetland system
<p>Priority Habitats & Species</p> <ul style="list-style-type: none"> • Wood Duck usage along the eastern shore of Munn Lake
<p>Floodplains</p> <ul style="list-style-type: none"> • Floodplains are associated with this feature
<p>Landslide Hazard Areas</p> <ul style="list-style-type: none"> • None noted <i>[Note: may be due to large pixel size of DEM mapping]</i>

Water Quality		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	None	
Category 4(C)	Invasive Exotic Species	Documented in Munn Lake
Category 2	Total phosphorus	Measured in Munn and Trails End Lakes
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Unclassified		

Fisheries
<ul style="list-style-type: none"> • The following game fish are found in Munn Lake: rainbow trout, largemouth bass and bluegill.

Long Lake
Lacey & UGA



WRIA (MAP 3)	Watershed (MAP 3)	Basin (MAP 3)	Size
WRIA 13	Henderson Inlet	Woodland	330 acres

Bathymetry/Topography (MAP 4)	Surface Hydrology (MAP 4)	Other Hydrologic Features
<ul style="list-style-type: none"> • Mean Depth: 12 ft. • Maximum: 21 ft. • Elevation: 156 ft. • Moderately flat topography around the lake 	<ul style="list-style-type: none"> • Long Lake is part of a four lake system connected by extensive wetlands, forming a horseshoe-shaped chain at the head of Woodland Creek. • Hicks Lake flows into Pattison Lake, and then Long Lake, all at relatively the same elevation. • Long Lake empties into Lake Lois, which lies at a slightly lower elevation. • Lois Lake discharges into Woodland Creek, which then flows into Henderson Inlet. 	<ul style="list-style-type: none"> • There is a ditch between Pattison and Long Lakes that was constructed many years ago to float logs to Long Lake. It still connects the two lakes.

Existing Shoreline Designations (MAP 5)	General Land Cover (MAP 6)	Riparian Land Cover (MAP 6)
<ul style="list-style-type: none"> • Rural • Conservancy along associated wetlands to the south of the lake 	<ul style="list-style-type: none"> • Moderate density residential • Mixed forest and hardwood (oak) forests • Non-forest vegetation (shrubs and grasses) 	<ul style="list-style-type: none"> • Moderate density residential • Mixed forest • Non-forest vegetation (shrubs and grasses) • Wetlands to the south

Current Land Use (MAP 7)	Future Land Use (Zoning) (MAP 8)	Water Dependent/Oriented Uses (MAP 9)
<ul style="list-style-type: none"> • Low to moderate density residential • Parks • Industrial uses along Union Mills Road 	<ul style="list-style-type: none"> • Residential redevelopment may occur along lake but density is unlikely to change significantly • Moderate density residential development anticipated to occur in general vicinity, especially to the east where vacant land is available 	<p>Water Dependent</p> <ul style="list-style-type: none"> • None noted <p>Water Related</p> <ul style="list-style-type: none"> • None noted <p>Water Enjoyment</p> <ul style="list-style-type: none"> • Walking trails • Lacey Community Center on Longs Pond • Docks on Longs Pond • Float at Long Lake Park

Roads	Railroads, Utilities	Shoreline Modifications
<ul style="list-style-type: none"> • Union Mills Road to northeast • Carpenter Road to west • Other local roads 	<ul style="list-style-type: none"> • Railroad to southeast 	<ul style="list-style-type: none"> • Residential uses 245 including private docks – ALL REACHES EXCEPT LONG-6) • Five larger docks and boat ramp (LONG-5)

Known sites with Toxic or Hazardous Material (MAP 10)
<ul style="list-style-type: none"> • Elevated nitrate levels are found to the north and south of Long Lake.

Historic Properties (MAP 11)
<ul style="list-style-type: none"> • There are two properties on Long Lake that are on the Local Historic Register. <ul style="list-style-type: none"> ○ The Falkner/Kolze House is significant as a good example of housing that was constructed in the Lacey area between World War I and World War II. It was built in 1938. ○ The Holmes Island Water Tower was built in 1938/39. Emil and Anna Johnson bought property on Holmes Island in the mid 1920s. They moved there in 1933 and built the house which is near the water tower. It was one of the first permanent homes on the island.

Public Waterfront Land Owners (MAP 12)
<ul style="list-style-type: none"> • Thurston County Fairgrounds are located between Hicks Lake and Long Lake – the property does not extend to the waterfront of either lake.

Public Access (MAP 12)			
	Swimming	Fishing	Boat Access
Overall	Yes	No	Yes
Parks, Trails, and other Access Points			
Long Lake Park (City of Lacey) (LONG-5)	Yes	No	No
Lacey Community Center (Longs Pond) (LONG-6)	No	Yes (youth)	No
WDFW Boat Launch (LONG-5)	No	No	Yes

Soils			
General	Alderwood-Everett Association – Glacial uplands, Spanaway-Nisqually Association – Glacial outwash terraces		
Reach	Name	Acres	Percent
LONG-1	Indianola loamy sand, 15 to 30% slopes	8.4	47%
LONG-1	Spana gravelly loam	5.8	32%
LONG-1	Nisqually loamy fine sand, 3 to 15 % slopes	2.1	12%
LONG-1	Spanaway gravelly sandy loam, 0 to 3% slopes	1.6	9%
LONG-2	Everett very gravelly sandy loam, 3 to 15% slopes	20.9	77%
LONG-2	Indianola loamy sand, 15 to 30% slopes	2.9	11%
LONG-2	Everett very gravelly sandy loam, 15 to 30% slopes	1.6	6%
LONG-2	Mukilteo muck, drained	1.0	4%
LONG-2	Spanaway gravelly sandy loam, 0 to 3% slopes	0.8	3%
LONG-3	Mukilteo muck	57.8	79%
LONG-3	Everett very gravelly sandy loam, 3 to 15% slopes	8.8	12%
LONG-3	Everett very gravelly sandy loam, 15 to 30% slopes	6.3	9%
LONG-4	Everett very gravelly sandy loam, 15 to 30% slopes	10.8	63%
LONG-4	Everett very gravelly sandy loam, 3 to 15% slopes	4.9	29%
LONG-4	Indianola loamy sand, 3 to 15% slopes	1.3	8%
LONG-5	Everett very gravelly sandy loam, 3 to 15% slopes	50.9	80%
LONG-5	Mukilteo muck	5.5	9%
LONG-5	Nisqually loamy fine sand, 3 to 15 % slopes	3.7	6%
LONG-5	Indianola loamy sand, 3 to 15% slopes	2.6	4%
LONG-5	Xerorthents, 0 to 5% slopes	0.7	1%
LONG-5	Alderwood gravelly sandy loam, 0 to 3% slopes	0.6	1%
LONG-6	Mukilteo muck	10.5	31%
LONG-6	Alderwood gravelly sandy loam, 0 to 3% slopes	7.0	21%
LONG-6	Spanaway gravelly sandy loam, 0 to 3% slopes	5.5	16%
LONG-6	Bellingham silty clay loam	5.3	15%
LONG-6	Indianola loamy sand, 3 to 15% slopes	4.3	13%
LONG-6	Alderwood gravelly sandy loam, 3 to 15% slopes	0.9	2%

Critical Areas (MAP 13)
<p>Wetlands</p> <ul style="list-style-type: none"> • The wetlands between Pattison and Long Lakes are the second largest wetland system in Lacey. • From Pattison Lake to Mullen Road is a large forested wetland • Scrub shrub dominates north of Mullen Road and the BMSF railroad surrounding patches of emergent and native forested wetlands • A small patch of aquatic bed is located in the southwest corner of the lake • Only a few small, isolated patches of scrub shrub or mixed scrub shrub/emergent wetlands are along the east or west shores • There is a 20 plus acre aquatic bed wetland in the northern neck of the lake • The associated wetlands to the north of the lake are dominated by scrub shrub with some patches of forested and emergent wetlands along the edges
<p>Habitat Conservation Areas</p> <ul style="list-style-type: none"> • Part of the <i>Lacey Lakes</i> watershed • Riparian connection to Lake Louise and Woodland Creek via associated wetlands north of the lake and a ditch • Limited riparian habitat along non-wetland shorelines
<p>Priority Habitats & Species</p> <ul style="list-style-type: none"> • Bald Eagle habitat, likely due to waterfowl use of the lake • Wood Duck located within the associated wetlands to Long Lake
<p>Floodplains</p> <ul style="list-style-type: none"> • Floodplains are associated with this feature
<p>Landslide Hazard Areas</p> <ul style="list-style-type: none"> • None noted

Water Quality		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	Total phosphorus	
Category 4(C)	Invasive exotic species	
Category 2	None	
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Fair		North basin has better water quality than south basin. Lake experiences nuisance algal blooms.
Additional Information		
<p>Major Issues</p> <ul style="list-style-type: none"> • The Long Lake Steering Committee is implementing the Long Lake Integrated Management Plan. Activities include the following: <ul style="list-style-type: none"> ○ Monitor and manage any recurrence of milfoil or emergence of other aquatic plant to meet recreational and aesthetic needs, fishery and wildlife habitat requirements, and watershed concerns. ○ Conduct water quality monitoring. ○ Investigate and promote best management practices and shoreline enhancement to decrease phosphorus loading. ○ Implement the Long Lake Management Plan to be adopted in 2006. ○ Investigate, advise, and report upon impacts caused by the increased population and popular use of Long Lake, while maintaining quality of life on and around the lake. • In 2002, zooplankton sampling and alkalinity analysis were discontinued from the monitoring program. • In 2003 and 2004 the water quality sampling frequency was changed by the steering committee from six monthly sampling events to three (July, August, and September). • In 2005, six monthly samples were again collected to support a partial lake alum treatment feasibility assessment. 		

Fisheries
<ul style="list-style-type: none"> • The following game fish are found in Long Lake: all types of trout and spiny rays, largemouth, rock and warmouth bass.

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Pattison Lake
Lacey & UGA



WRIA (MAP 3)	Watershed (MAP 3)	Basin (MAP 3)	Size
WRIA 13	Henderson Inlet	Woodland	272 acres

Bathymetry/Topography (MAP 4)	Surface Hydrology (MAP 4)	Other Hydrologic Features
<p>South Basin</p> <ul style="list-style-type: none"> • Mean Depth: 13 ft. • Maximum Depth: 19 ft. <p>North Basin</p> <ul style="list-style-type: none"> • Mean Depth: 14 ft. • Maximum Depth: 22 ft. • Elevation: 157 ft. <p>Moderately sloping terrain around lake</p>	<ul style="list-style-type: none"> • Pattison Lake is part of a four lake system connected by extensive wetlands, forming a horseshoe-shaped chain at the head of Woodland Creek. • Hicks Lake flows into Pattison Lake, and then Long Lake, all at relatively the same elevation. • Long Lake empties into Lake Lois, which lies at a slightly lower elevation. • Lois Lake discharges into Woodland Creek, which then flows into Henderson Inlet. 	<ul style="list-style-type: none"> • The area between Pattison and Hicks Lake is a large palustrine wetland. At one time it was drained and used for agriculture, but native vegetation has been restored, and no distinct stream channels remain. • There is a ditch between Pattison and Long Lakes that was constructed many years ago to float logs to Long Lake. It still connects the two lakes.

Existing Shoreline Designations (MAP 5)	General Land Cover (MAP 6)	Riparian Land Cover (MAP 6)
<ul style="list-style-type: none"> • Rural • Conservancy along associated wetlands 	<ul style="list-style-type: none"> • Moderate density residential • Coniferous and mixed forests • Non-forest vegetation (shrubs and lawns) 	<ul style="list-style-type: none"> • Moderate density residential • Coniferous and mixed forests • Non-forest vegetation (shrubs and lawns)

Current Land Use (MAP 7)	Future Land Use (Zoning) (MAP 8)	Water Dependent/Oriented Uses (MAP 9)
<ul style="list-style-type: none"> • Low to moderate density residential • Parks • Open space 	<ul style="list-style-type: none"> • Residential redevelopment may occur along lake but density is unlikely to change significantly • Some moderate density residential development planned to the north • Moderate density residential development is expected to occur to the east where vacant land is available 	<p>Water Dependent</p> <ul style="list-style-type: none"> • None noted <p>Water Related</p> <ul style="list-style-type: none"> • None noted <p>Water Enjoyment</p> <ul style="list-style-type: none"> • None noted

Roads	Railroads, Utilities	Shoreline Modifications
<p>Major Roads:</p> <ul style="list-style-type: none"> • Mullen Road to the north • Yelm Hwy. to the south • Other access is through local roads 	<ul style="list-style-type: none"> • Burlington Northern Santa Fe Railroad divides the lake into two basins 	<ul style="list-style-type: none"> • Residential uses including 143 private docks • Railroad on dike crosses lake • Boat ramp

Known sites with Toxic or Hazardous Material (MAP 10)
<p>Confirmed and Suspected Contamination Sites</p> <ul style="list-style-type: none"> • Pattison Lake EDB, Fair Oaks Rumac and Kelly Beach Rd., Lacey. Pesticides are confirmed in soil, groundwater and surface water. This site has undergone remediation however residual contamination remains and is monitored. <p>Areas of Pesticide Contamination</p> <ul style="list-style-type: none"> • There is an area of pesticide contamination located immediately to the south of Pattison Lake. <p>Elevated Nitrate Areas</p> <ul style="list-style-type: none"> • Pattison Lake is fully contained within an area of elevated nitrate levels. <p>No Further Action Needed</p> <ul style="list-style-type: none"> • Interlake Grocery, 7446 Mullen Rd. SE, Lacey. Located northeast of Pattison Lake. Contaminants from the Petroleum Products group were found in the soil. Remedial action was completed in 1996. • Uncle Dan’s Country Store, 8031 Yelm Highway, Olympia. Contaminants from the Petroleum Products group were found in the soil. Remedial action was completed in 1999.

Historic Properties (MAP 11)
<ul style="list-style-type: none"> • None noted

Public Waterfront Land Owners (MAP 12)
<ul style="list-style-type: none"> • None noted

Public Access (MAP 12)			
	Swimming	Fishing	Boat Access
Overall	No	No	Yes
Parks, Trails, and other Access Points			
WDFW Boat Launch (PAT-3)	No	No	Yes

Soils			
General	Alderwood-Everett Association – Glacial uplands		
Reach	Name	Acres	Percent
PAT-1	Everett very gravelly sandy loam, 3 to 15% slopes	19.2	55%
PAT-1	Everett very gravelly sandy loam, 15 to 30% slopes	9.8	28%
PAT-1	Spanaway gravelly sandy loam, 0 to 3% slopes	1.9	5%
PAT-1	McKenna gravelly silt loam, 0 to 5% slopes	1.8	5%
PAT-2	Indianola loamy sand, 0 to 3% slopes	17.8	61%
PAT-2	Indianola loamy sand, 15 to 30% slopes	11.4	39%
PAT-3	Mukilteo muck, drained	28.3	68%
PAT-3	Indianola loamy sand, 15 to 30% slopes	10.1	24%
PAT-3	Norma silt loam	2.9	7%
PAT-3	Indianola loamy sand, 0 to 3% slopes	0.6	1%
PAT-4	Mukilteo muck	43.9	67%
PAT-4	Everett very gravelly sandy loam, 3 to 15% slopes	11.3	17%
PAT-4	Indianola loamy sand, 3 to 15% slopes	7.9	12%
PAT-4	Everett very gravelly sandy loam, 15 to 30% slopes	1.3	2%
PAT-4	Indianola loamy sand, 15 to 30% slopes	0.9	1%

Critical Areas (MAP 13)
<p>Wetlands</p> <ul style="list-style-type: none">• Small emergent and scrub shrub wetland fringe the BNSF railroad crossing between the north and south basins.• In the southwest corner of the south basin is an intermixed forest and scrub shrub wetland surrounding a native forest with acidic organic soils• The associated wetlands between Pattison and Long Lakes are described with Long Lake
<p>Habitat Conservation Areas</p> <ul style="list-style-type: none">• Part of the <i>Lacey Lakes</i> watershed• Riparian connection to Long Lake via the associated wetland and channel• Limited riparian habitat along non wetland shorelines
<p>Priority Habitats & Species</p> <ul style="list-style-type: none">• Bald Eagles are located within the basin.• The south basin is Bald Eagle habitat, likely due to waterfowl use of the lake.• Wood Duck located within the associated wetlands to the north
<p>Floodplains</p> <ul style="list-style-type: none">• Floodplains are associated with this feature
<p>Landslide Hazard Areas</p> <ul style="list-style-type: none">• None noted

Water Quality		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	Total phosphorus	
Category 4(C)	None	
Category 2	Total phosphorus	
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Good to Fair		Algae and aquatic plant growth have impaired water clarity and recreational uses at times.
Additional Information		
<p>Major Issues</p> <ul style="list-style-type: none"> • Blockages in the outlet channel in past years have caused the lake level to rise, flooding docks and yards. • Abundant nutrients often create algae blooms, which reduce water clarity. Nutrients also stimulate filamentous algae growth, especially in the south basin, which form floating mats on the surface that impair recreational uses. 		

Fisheries
<ul style="list-style-type: none"> • The following game fish are found in Pattison Lake: brown trout, rainbow trout (planted), largemouth and rock bass, perch and crappies.



Bathymetry/Topography (MAP 4)	Surface Hydrology (MAP 4)	Other Hydrologic Features
<ul style="list-style-type: none"> • Mean Depth: 7 ft. • Maximum Depth: 17 ft. • Elevation: 172 ft. • Moderately flat terrain 	<ul style="list-style-type: none"> • Southwick Lake is a small kettle lake with no obvious surface tributaries or outlets. 	<ul style="list-style-type: none"> • None noted

Existing Shoreline Designations (MAP 5)	General Land Cover (MAP 6)	Riparian Land Cover (MAP 6)
<ul style="list-style-type: none"> • Conservancy 	<ul style="list-style-type: none"> • Moderate to high density urban • Mixed forests • Non-forest vegetation (shrubs and lawns) 	<ul style="list-style-type: none"> • Mixed forests • Non-forest vegetation

Current Land Use (MAP 7)	Future Land Use (Zoning) (MAP 8)	Water Dependent/Oriented Uses (MAP 9)
<ul style="list-style-type: none"> • Moderate density residential • Parks • Schools 	<ul style="list-style-type: none"> • The immediate area around the lake is unlikely to change in the future • Moderate density residential development is likely in the vicinity 	<p>Water Dependent</p> <ul style="list-style-type: none"> • None noted <p>Water Related</p> <ul style="list-style-type: none"> • None noted <p>Water Enjoyment</p> <ul style="list-style-type: none"> • Community access (mobile home park)

Roads	Railroads, Utilities	Shoreline Modifications
<ul style="list-style-type: none"> • Ruddell Road to west • Mullen Road to north 	<ul style="list-style-type: none"> • None noted 	<ul style="list-style-type: none"> • Little apparent modification to natural shoreline • One dock noted • Road to the west forms a portion of the shoreline

**Known sites with Toxic or Hazardous Material
(MAP 10)**

- None noted

**Historic Properties
(MAP 11)**

- None noted

**Public Waterfront Land Owners
(MAP 12)**

- Lakes Elementary School
- Puget Sound High School
- Rainier Vista Park to west across Ruddell Road

**Public Access
(MAP 12)**

	Swimming	Fishing	Boat Access
Overall	No	No	No
Parks, Trails, and other Access Points			
None noted			

Soils

General	Alderwood-Everett Association – Glacial uplands, Spanaway-Nisqually Association – Glacial outwash terraces
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Reach	Name	Acres	Percent
SOUTH-1	Indianola loamy sand, 3 to 15% slopes	15.8	57%
SOUTH-1	Nisqually loamy fine sand, 3 to 15 % slopes	6.2	22%
SOUTH-1	Nisqually loamy fine sand, 0 to 3 % slopes	3.7	13%
SOUTH-1	Everett very gravelly sandy loam, 0 to 3% slopes	2.3	8%

Critical Areas (MAP 13)
<p>Wetlands</p> <ul style="list-style-type: none"> • The largest emergent wetland lies along Ruddle Road with some fringe habitat along the west and north shorelines
<p>Habitat Conservation Areas</p> <ul style="list-style-type: none"> • Limited riparian habitat along non-wetland shorelines
<p>Priority Habitats & Species</p> <ul style="list-style-type: none"> • Wood Duck located within the basin
<p>Floodplains</p> <ul style="list-style-type: none"> • Floodplains are associated with this feature
<p>Landslide Hazard Areas</p> <ul style="list-style-type: none"> • None noted

Water Quality		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	None	
Category 4(C)	None	
Category 2	Total phosphorus	
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Unclassified		

Fisheries
<ul style="list-style-type: none"> • Unknown

Trosper Lake
Tumwater & UGA



WRIA (MAP 3)	Watershed (MAP 3)	Basin (MAP 3)	Size
WRIA 13	Budd/Deschutes	Percival Creek	43 acres Field delineation of OHWM not yet obtained from Wild Fish Conservancy

Bathymetry/Topography (MAP 4)	Surface Hydrology (MAP 4)	Other Hydrologic Features
<ul style="list-style-type: none"> • Mean Depth: Data gap • Maximum Depth: Data gap • Elevation: 160 ft. • Flat terrain 	<ul style="list-style-type: none"> • Trosper Lake forms the headwaters of Percival Creek. • There are no obvious surface tributaries feeding Trosper Lake. 	<ul style="list-style-type: none"> • None noted

Existing Shoreline Designations (MAP 5)	General Land Cover (MAP 6)	Riparian Land Cover (MAP 6)
<ul style="list-style-type: none"> • Conservancy 	<ul style="list-style-type: none"> • Moderate density urban • Deciduous and mixed forest • Non-forest vegetation – shrubs and lawns 	<ul style="list-style-type: none"> • Deciduous forest • Shrubs and lawns

Current Land Use (MAP 7)	Future Land Use (Zoning) (MAP 8)	Water Dependent/Oriented Uses (MAP 9)
<ul style="list-style-type: none"> • Moderate density single-family residential • Vacant lands • Park • Open space 	<ul style="list-style-type: none"> • Moderate density subdivision planned to the northwest of the lake • No other significant changes are expected in land use 	<p>Water Dependent</p> <ul style="list-style-type: none"> • None noted <p>Water Related</p> <ul style="list-style-type: none"> • None noted <p>Water Enjoyment</p> <ul style="list-style-type: none"> • None noted

Roads	Railroads, Utilities	Shoreline Modifications
<ul style="list-style-type: none"> Limited road access 	<ul style="list-style-type: none"> Major powerlines cross over lake 	<ul style="list-style-type: none"> Very little modification of lake shoreline to the north Some single-family homes to the south with landscaped yards and 11 docks

Known sites with Toxic or Hazardous Material (MAP 10)
<ul style="list-style-type: none"> An area of elevated nitrates lies to the south of Trosper Lake

Historic Properties (MAP 11)
<ul style="list-style-type: none"> None noted

Public Waterfront Land Owners (MAP 12)
<ul style="list-style-type: none"> None noted

Public Access (MAP 12)			
	Swimming	Fishing	Boat Access
Overall	No	No	No
Parks, Trails, and other Access Points			
Future Trosper Lake Park	No	No	No

Soils			
General	Alderwood-Everett Association - Glacial uplands, Spanaway-Nisqually Association – Glacial outwash terraces		
Reach	Name	Acres	Percent
TROS-1	Mukilteo muck, drained	32.5	46%
TROS-1	Indianola loamy sand, 0 to 3% slopes	22.5	32%
TROS-1	Cagey loamy sand	15.3	22%
TROS-1	Norma silt loam	0.5	1%

Critical Areas (MAP 13)
<p>Wetlands</p> <ul style="list-style-type: none"> • Open water surrounded by a sizable emergent and scrub shrub habitats to the west and north • Extends into a scrub shrub and forested wetland to the northeast
<p>Habitat Conservation Areas</p> <ul style="list-style-type: none"> • The headwater of Percival Creek and the riparian corridor to Capitol Lake
<p>Priority Habitats & Species</p> <ul style="list-style-type: none"> • Wood Duck habitat with an Osprey located within the basin
<p>Floodplains</p> <ul style="list-style-type: none"> • Floodplains are associated with this feature
<p>Landslide Hazard Areas</p> <ul style="list-style-type: none"> • None noted

Water Quality		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	None	
Category 4(C)	None	
Category 2	Total phosphorus	
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Unclassified		

Fisheries
<ul style="list-style-type: none"> • Unknown

Ward Lake
Olympia & UGA



WRIA (MAP 3)	Watershed (MAP 3)	Basin (MAP 3)	Size
WRIA 13	Budd/Deschutes	Chambers	66 acres

Bathymetry/Topography (MAP 4)	Surface Hydrology (MAP 4)	Other Hydrologic Features
<ul style="list-style-type: none"> • Mean Depth: 33 ft. • Maximum Depth: 67 ft. • Elevation: 126 ft. • Moderatly steep terrain around lake 	<ul style="list-style-type: none"> • Ward Lake is a kettle lake. • This spring-fed lake occupies a closed pothole with no surface feeder streams, and no surface outlet. 	<ul style="list-style-type: none"> • Lake level corresponds with rainfall

Existing Shoreline Designations (MAP 5)	General Land Cover (MAP 6)	Riparian Land Cover (MAP 6)
<ul style="list-style-type: none"> • Rural 	<ul style="list-style-type: none"> • Moderate to high density urban • Coniferous, deciduous and mixed forest • Shrubs and lawns 	<ul style="list-style-type: none"> • Deciduous and mixed forest • Shrubs and lawns

Current Land Use (MAP 7)	Future Land Use (Zoning) (MAP 8)	Water Dependent/Oriented Uses (MAP 9)
<ul style="list-style-type: none"> • Low to moderate density single-family residential • Vacant Land/Agricultural land • Park 	<ul style="list-style-type: none"> • Urban village being developed on west side of lake • Vacant land around lake is expected to develop to moderate density residential over time • City park will be developed on southern end of lake 	<p>Water Dependent</p> <ul style="list-style-type: none"> • None noted <p>Water Related</p> <ul style="list-style-type: none"> • None noted <p>Water Enjoyment</p> <ul style="list-style-type: none"> • Future city park southern end of lake • Homeowners association park and beach along northshore

Roads	Railroads, Utilities	Shoreline Modifications
<ul style="list-style-type: none"> • Henderson Blvd. to the west • Yelm Hwy. to the south • Local access roads to the north and east 	<ul style="list-style-type: none"> • None noted 	<ul style="list-style-type: none"> • Single-family homes with landscaped yards and 48 docks • Boat ramp

**Known sites with Toxic or Hazardous Material
(MAP 10)**

Confirmed and Suspected Contaminated Sites

- Briggs Nursery Debris Field, 4407 Henderson Blvd., Olympia. Located to the west of Ward Lake. Contaminants from the Pesticides group and dioxins were confirmed in the soil. Contaminants from the Pesticides group were also suspected in groundwater, and air, and have been remediated in sediment. Other contaminants that are suspected on this site are Metals & Priority Pollutants, Polychlorinated Bi-Phenyls, and Petroleum Products. This site is still undergoing remediation.

**Historic Properties
(MAP 11)**

- None noted

**Public Waterfront Land Owners
(MAP 12)**

- None noted

**Public Access
(MAP 12)**

	Swimming	Fishing	Boat Access
Overall	Yes	No	Yes
Parks, Trails, and other Access Points			
Ward Lake Park (not yet constructed)	Yes	No	No
WDFW Boat Launch	No	No	Yes

Soils

General	Alderwood-Everett Association – Glacial uplands		
Reach	Name	Acres	Percent
WARD-1	Yelm fine sandy loam, 15 to 30% slopes	38.0	87%
WARD-1	Yelm fine sandy loam, 0 to 3% slopes	3.1	7%
WARD-1	Yelm fine sandy loam, 3 to 15% slopes	2.6	6%

Critical Areas (MAP 13)
<p>Wetlands</p> <ul style="list-style-type: none"> • Over a half acre forested wetland in the southeast corner of the lake
<p>Habitat Conservation Areas</p> <ul style="list-style-type: none"> • None noted
<p>Priority Habitats & Species</p> <ul style="list-style-type: none"> • None noted
<p>Floodplains</p> <ul style="list-style-type: none"> • Floodplains are associated with this feature
<p>Landslide Hazard Areas</p> <ul style="list-style-type: none"> • Steep slopes to the west, north and eastern shores of the lake

Water Quality		
State Listings		
Listing	Parameter	Remarks/Notes
Category 5 303(d)	Total PCBs	Recorded only in tissue samples
Category 4(c)	None	
Category 2	Total Phosphorus	
Local Information		
General Water Quality	Met/Failed Standards	Remarks/Notes
Excellent to Good		Lake has low levels of nutrients. Uses are not generally impeded by aquatic weeds or algal growth.
Additional Information		
<p>Major Issues</p> <ul style="list-style-type: none"> • The lake is located in a basin that is developing rapidly. Stormwater flows directly into Ward Lake in at least three locations from high density residential areas. Currently, a planned urban village is under construction on the west side of the lake on a site that had formerly been a landscape plant nursery. Spills and storm-related sewage spills have occurred into Ward Lake in the past. • Conflict between lake users at the Department of Fish and Wildlife public access have been a controversial issue. 		
Fisheries		
<ul style="list-style-type: none"> • The following game fish are found in Ward Lake: rainbow trout, Kokanee, largemouth bass and bluegill. 		

VIII. Maps

Map 1: SMA Minimum Shoreline Jurisdiction with Reach Breaks

- Lacey
- Olympia
- Tumwater

Map 2: 2006 Aerial Photos

- Lacey
- Olympia
- Tumwater

Map 3: Basin, Watershed and WRIA Boundaries

- Lacey
- Olympia
- Tumwater

Map 4: Surface Topography

- Lacey
- Olympia
- Tumwater

Map 5: Existing SMA Shoreline Jurisdiction

- Lacey
- Olympia
- Tumwater

Map 6: Year 2000 Land Cover

- Lacey
- Olympia
- Tumwater

Map 7: Current Land Use (2006)

- Lacey
- Olympia
- Tumwater

Map 8: Future Land Use

- Lacey
- Olympia
- Tumwater

Map 9: Shoreline Uses

- Lacey
- Olympia
- Tumwater

Map 10: Known Sites with Hazardous or Toxic Materials

- Lacey
- Olympia
- Olympia – Budd Inlet
- Tumwater

Map 11: Historic Districts and Properties

- Lacey
- Olympia
- Tumwater

Map 12: Public Access and Public Lands

- Lacey
- Olympia
- Tumwater

Map 13: Critical Areas

- Lacey
- Olympia
- Tumwater

Map 14: Critical Salt Water Habitats

- Lacey – Nisqually Reach
- Olympia – Budd Inlet

Map 15: Channel Migration Zone

- Tumwater and Olympia – Deschutes River

Map 16: Permeable Soils

- Lacey
- Olympia
- Tumwater

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