

Appendix A

Individual Lake Assessments

ALICE

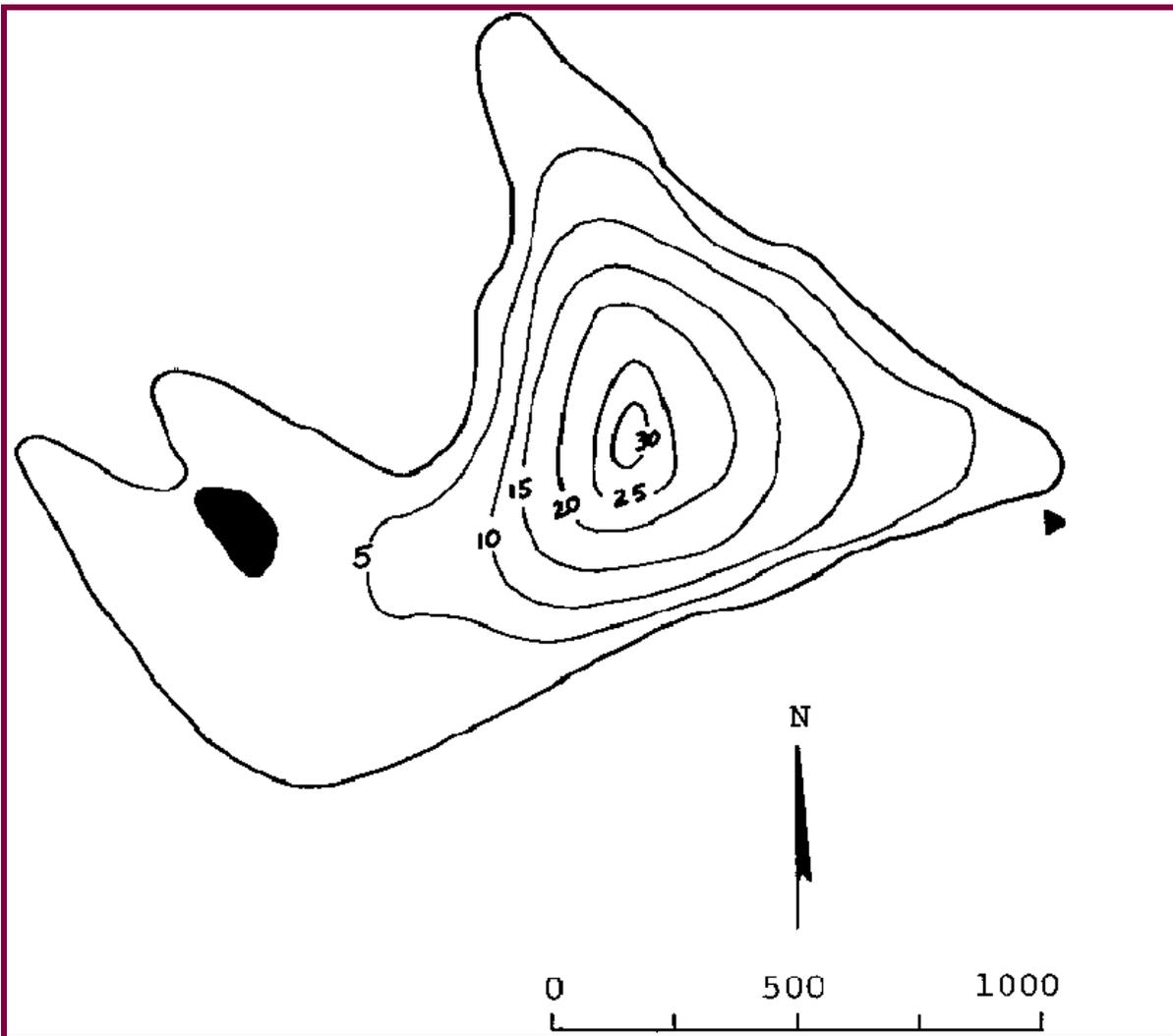
KING County

Lake ID: ALIK11

Ecoregion: 2

Lake Alice is located 2.5 miles south of Fall City. It has no surface inlets, and drains intermittently via Icy Creek to the Raging River.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
32	30	8	0.24	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
260	1.34	875	47 31 52.	121 53 24.



Station Information

ALIKI1

Primary Station Station # 1 latitude: 47 31 56.9 longitude: 121 53 19.3
Description: Deep spot of the lake.

Trophic State Assessment for 1998

ALICE

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 39 J
TSI_Phos:
TSI_Ch1:
Narrative TSI: ^b OM

Summary Comments:

The general water clarity of Lake Alice was good for 1998. The Secchi depth readings ranged from 3.3 meters (10.8 feet) to 4.7 meters (15.5 feet) with a mean Secchi depth of 4.2 meters (13.9 feet). For comparison, in 1997 the mean Secchi depth was 4.2 meters (13.6 feet). In 1998, the volunteer monitor noted the lake being unusually clear; no algal blooms were seen during the months of May through September. The lake level in 1998 was lower than in years past.

No chemistry data was collected for Lake Alice in 1998.

Historically this lake has low conductivity readings - much lower than what is typically seen in western Washington lakes.

A total of three (3) geese were counted by the volunteer monitor between the months of May through the middle of October.

Only one site visit by Ecology staff was done in 1998. Thermal stratification was noted during this visit (9/9/1998). Also observed were low dissolved oxygen levels in the hypolimnion.

The only problem noted on the lake were large patches of the non-native *Nymphaea odorata* (fragrant waterlily). The sheer mass of these plants can cause impairment to boating and swimming.

Based on Secchi depth data and the low dissolved oxygen levels in the hypolimnion, Lake Alice is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

ALICE

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/1/1998		20.8	16.6		0	2	1			0	0	0	0
	Sampler:	JOHNSON		Remarks:	WATER IS UNUSUALLY CLEAR								
5/14/1998		15	16.2	6	100	2	3	4	3	2	0	0	0
	Sampler:	JOHNSON		Remarks:	AIR TEMP = 50 DEGREES F								
5/28/1998		13.9	15.5	6	0	3	5	4	4	0	2	0	0
	Sampler:	JOHNSON		Remarks:	NONE								
6/11/1998		20	12.8	2	100	2	4	4	4	1	0	0	0
	Sampler:	JOHNSON		Remarks:	NONE								
6/25/1998		17.2	11.4	2	100	2	3	4	4	0	0	0	0
	Sampler:	JOHNSON		Remarks:	NONE								
7/9/1998		21.1	14.5	7	0	2	1	4	4	0	0	0	0
	Sampler:	JOHNSON		Remarks:									
7/23/1998		26.1	15.5	2	100	1	1	4	4	0	2	0	0
	Sampler:	JOHNSON		Remarks:	WATER IS UNUSUALLY WARM AND CLEAR								
8/6/1998		25.6	15.1	7	0	2	1	4	4	0	0	0	0
	Sampler:	JOHNSON		Remarks:									
8/20/1998		21.1	14.7	6	0	2	1	4	4	0	0	0	0
	Sampler:	JOHNSON		Remarks:									

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
9/3/1998		23.9	14.2	7	0	2	1	4	4	0	1	0	0
	Sampler:	JOHNSON		Remarks:	FEW GEESE THIS YEAR. WATER MUCH CLEARER								
9/9/1998			15.3		0					0	0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									
9/17/1998		21.1	13.5	6	0	2	1	4	4	0	47	0	0
	Sampler:	JOHNSON		Remarks:	USED FIELD GLASSES TO SPOT WATERFOWL								
10/1/1998		16.7	10.8	2	75	3	1	4	4	0	0	0	0
	Sampler:	JOHNSON		Remarks:	LAKE HEIGHT IS THREE INCHES LOWER THAN IT HAS EVER BEEN.								
10/16/1998		13.3	8.8	6	75	2	5	4	4	0	3	0	0
	Sampler:	JOHNSON		Remarks:									

Profile Report

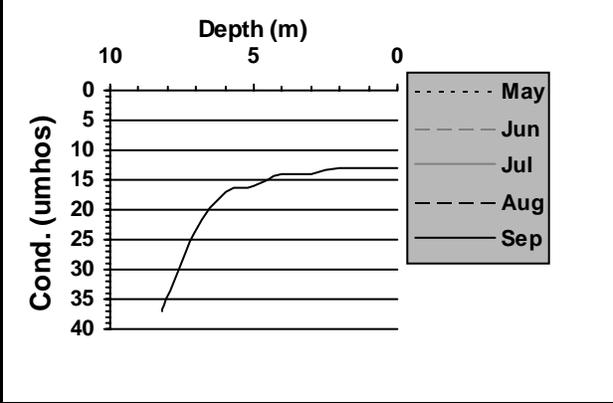
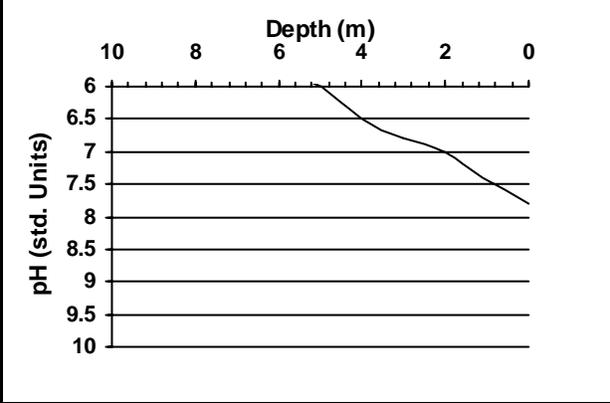
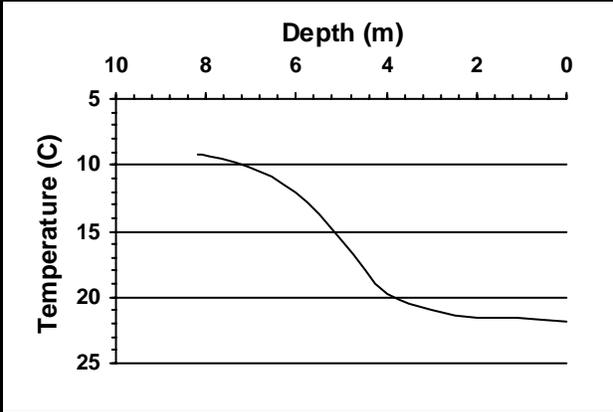
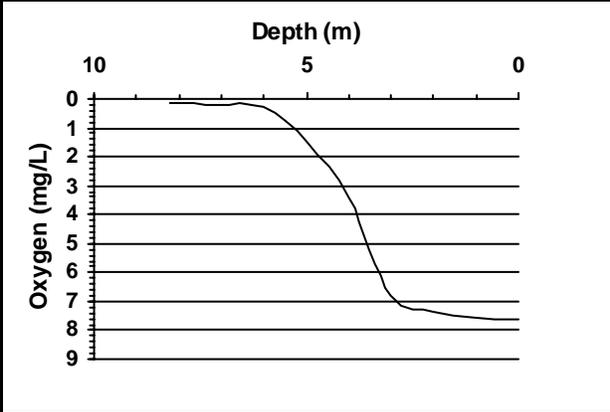
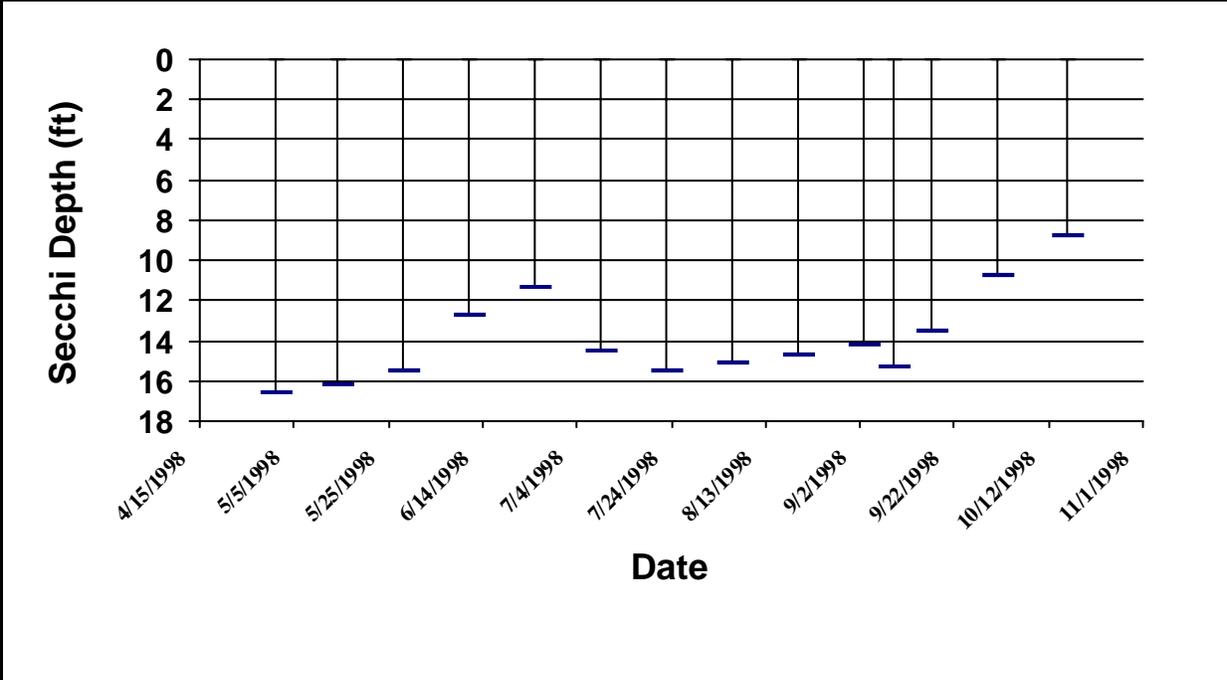
ALICE

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
9/9/1998						
		0	13	7.65	7.8	21.8
		1.1	13	7.55	7.4	21.6
		2	13	7.32	7	21.5
		3	14	6.81	6.8	21
		4	14	3.41	6.5	19.7
		5	16	1.54	6	15.7
		6	17	.25	5.8	12.1
		7.1	24	.19	5.6	10.1
		8.1	36	.17	5.6	9.2
		8.2	37	.15	5.6	9.2

Secchi Depth and Profile Graphics

Station: 1

ALIKI1



Station Information

ALIKI1

Primary Station Station # 1 latitude: 47 31 56.9 longitude: 121 53 19.3
Description: Deep spot of the lake.

Trophic State Assessment for 1999

ALICE

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 39	J
TSI_Phos:	41	J
TSI_Ch1:		
Narrative TSI:	^b OM	

Summary Comments:

The general water clarity of Lake Alice was very good for 1999. The Secchi depth readings ranged from 2.5 meters (8.3 feet) to 5.4 meters (17.8 feet) with a mean Secchi depth of 4.3 meters (14.3 feet). For comparison, in 1998 the mean Secchi depth was 4.2 meters (13.9 feet). In 1999 the volunteer monitor noted the lake being higher than in the previous year - reaching a maximum height of 12 inches above last year's lake level in August.

Few geese and/or other waterfowl were counted by the volunteer monitor between the months of May through the middle of October.

The chemistry data collected for Lake Alice showed low to moderate phosphorus levels. Combined with the Secchi clarity data, this indicates a lower level of productivity in the lake.

Ecology staff made two site visits in 1999. Thermal stratification was noted during both visits (6/11/1999 and 8/30/1999). Also observed during both site visits were low dissolved oxygen levels in the hypolimnion.

An aquatic plant survey was done by Ecology staff on 8/12/1999. Three non-native plants were observed: *Lysimachia vulgaris* (garden loosestrife) in one patch on the north shore, *Lythrum salicaria* (purple loosestrife) in one patch on the east shore and *Nymphaea odorata* (fragrant waterlily) which occurred along with the native plant *Brasenia schreberi* (watershield) along the shoreline in large patches.

Based on the Secchi depth data, the low nutrient levels and the low dissolved oxygen levels in the hypolimnion, Lake Alice is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

ALICE

8/30/1999 1030 E 9.28

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

ALICE

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/12/1999		54	9.6	7	100	1	3	4	4	0	0	0	0
	Sampler: JOHNSON		Remarks:										
5/26/1999		66	11.1	2	0	2	3	3	4	0	0	1	0
	Sampler: JOHNSON		Remarks: Used a view tube; lake height highest ever for this date.										
6/9/1999		60	14.2	6	100	2	5	4	4	1	5	1	0
	Sampler: JOHNSON		Remarks: Lake is 7 inches higher than 1998.										
6/11/1999			16.5										
	Sampler: JOHNSON		Remarks:										
6/23/1999		62	16.7	6	100	3	4	4	4	1	0	0	0
	Sampler: JOHNSON		Remarks: Used a view tube; lake height 6 inches higher than 1998.										
7/7/1999		65	17.8	6	100	2	2	4	4	0	0	0	0
	Sampler: JOHNSON		Remarks: Used a view tube.										
7/21/1999		71	16.3	6	100	2	2	4	4	2	0	0	0
	Sampler: JOHNSON		Remarks: Used view tube; heavy infestation of lilies.										
8/4/1999		74	16	6	25	2	2	4	4	2	0	1	0
	Sampler: JOHNSON		Remarks: Used a view tube.										
8/18/1999		68	8.3	6	0	2	3	4	4	0	0	0	0
	Sampler: JOHNSON		Remarks: Used a view tube; lake is 11.8 inches higher than last year.										
8/30/1999			14.7										
	Sampler: JOHNSON		Remarks:										
9/1/1999		62	12.4	6	0	2	4	4	3	0	2	0	0
	Sampler: JOHNSON		Remarks:										
9/15/1999		67	12.7	6	0	2	1	4	3	0	0	0	0
	Sampler: JOHNSON		Remarks: Used a view tube.										

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
9/29/1999		61	13.3	7	0	2	1	4	3	0	0	0	0
		Sampler: JOHNSON		Remarks: Used a view tube.									

Profile Report

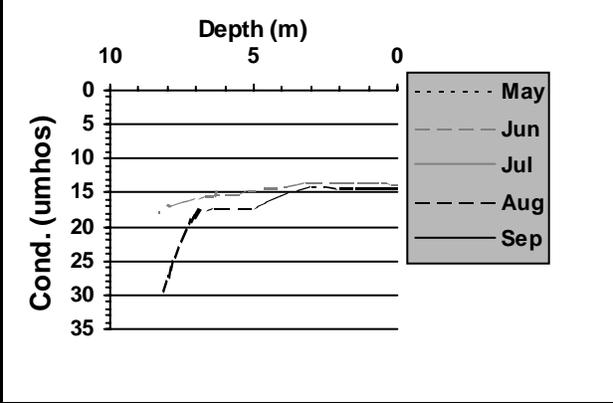
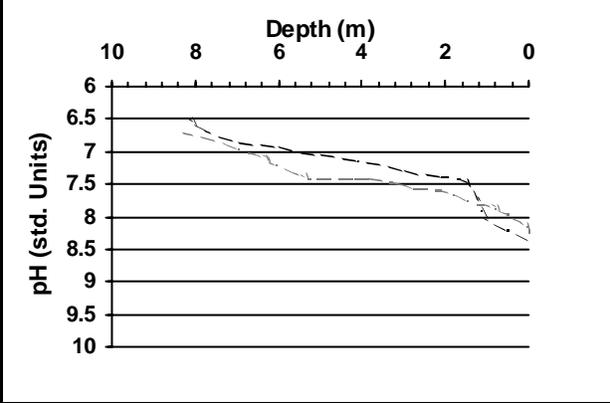
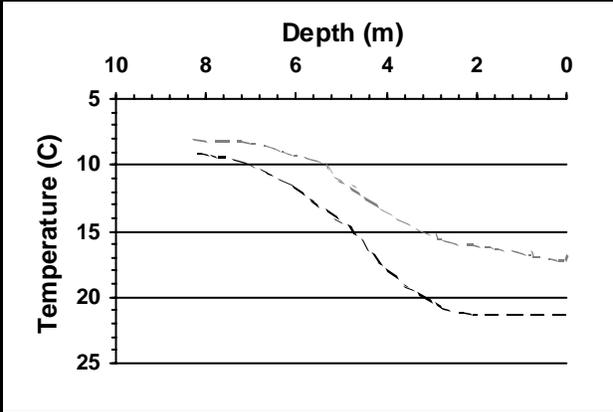
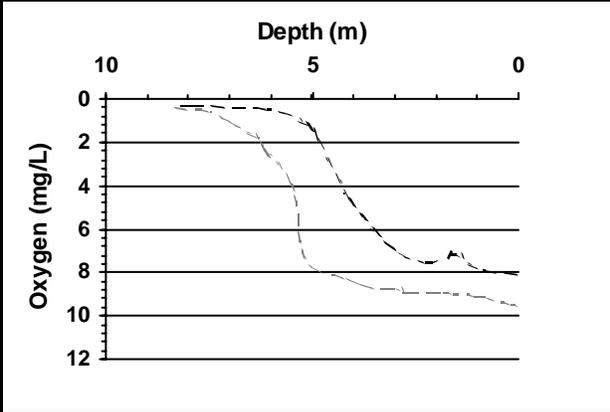
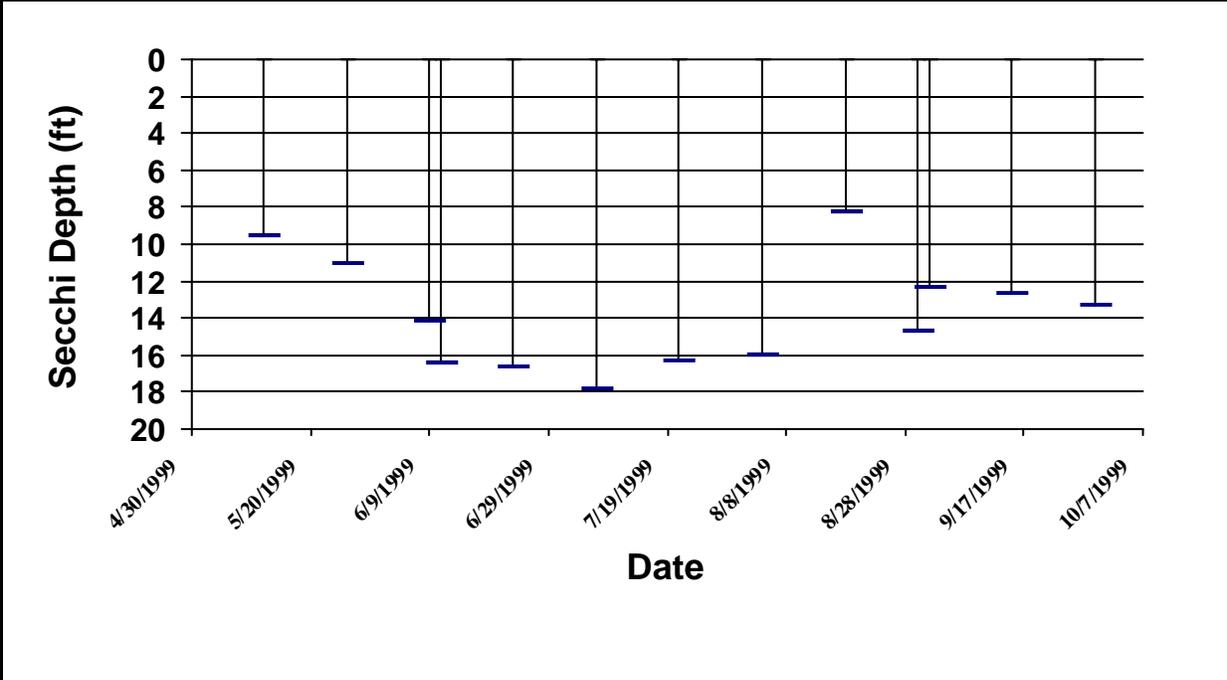
ALICE

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/11/1999						
		0	13.6	9.53	8.26	17.1
		0.1	13.6	9.39	8.12	17.24
		0.6	13.5	9.22	7.92	16.84
		0.9	13.5	9.03	7.82	16.71
		1.5	13.5	8.95	7.73	16.35
		1.9	13.4	8.92	7.62	16.06
		2.7	13.4	8.93	7.55	15.69
		3	13.4	8.74	7.51	15.28
		3.5	13.7	8.72	7.44	14.51
		4.2	14.2	8.22	7.39	13.15
		5.2	14.6	7.3	7.4	10.59
		5.5	15.1	4.04	7.35	9.7
		6.2	15.2	2.35	7.16	9.04
		6.4	15.4	1.72	7.06	8.7
		7	15.7	1.02	6.95	8.37
		7.5	16.4	.55	6.83	8.12
		8.3	17.9	.38	6.69	8
8/30/1999						
		0	14.2	8.1	8.34	21.28
		1	14.2	7.78	8.03	21.3
		1.5	14.2	7.15	7.46	21.3
		2.1	14.2	7.52	7.36	21.29
		3	14	6.97	7.28	20.27
		4.1	15.6	4.63	7.12	17.55
		5.1	17.1	1.22	7.04	13.97
		6.1	17.1	.44	6.92	11.4
		7.1	18.6	.35	6.81	9.87
		7.9	26.3	.31	6.62	9.2
		8.2	29.4	.26	6.47	9.1

Secchi Depth and Profile Graphics

Station: 1

ALIKI1



BIG MEADOW

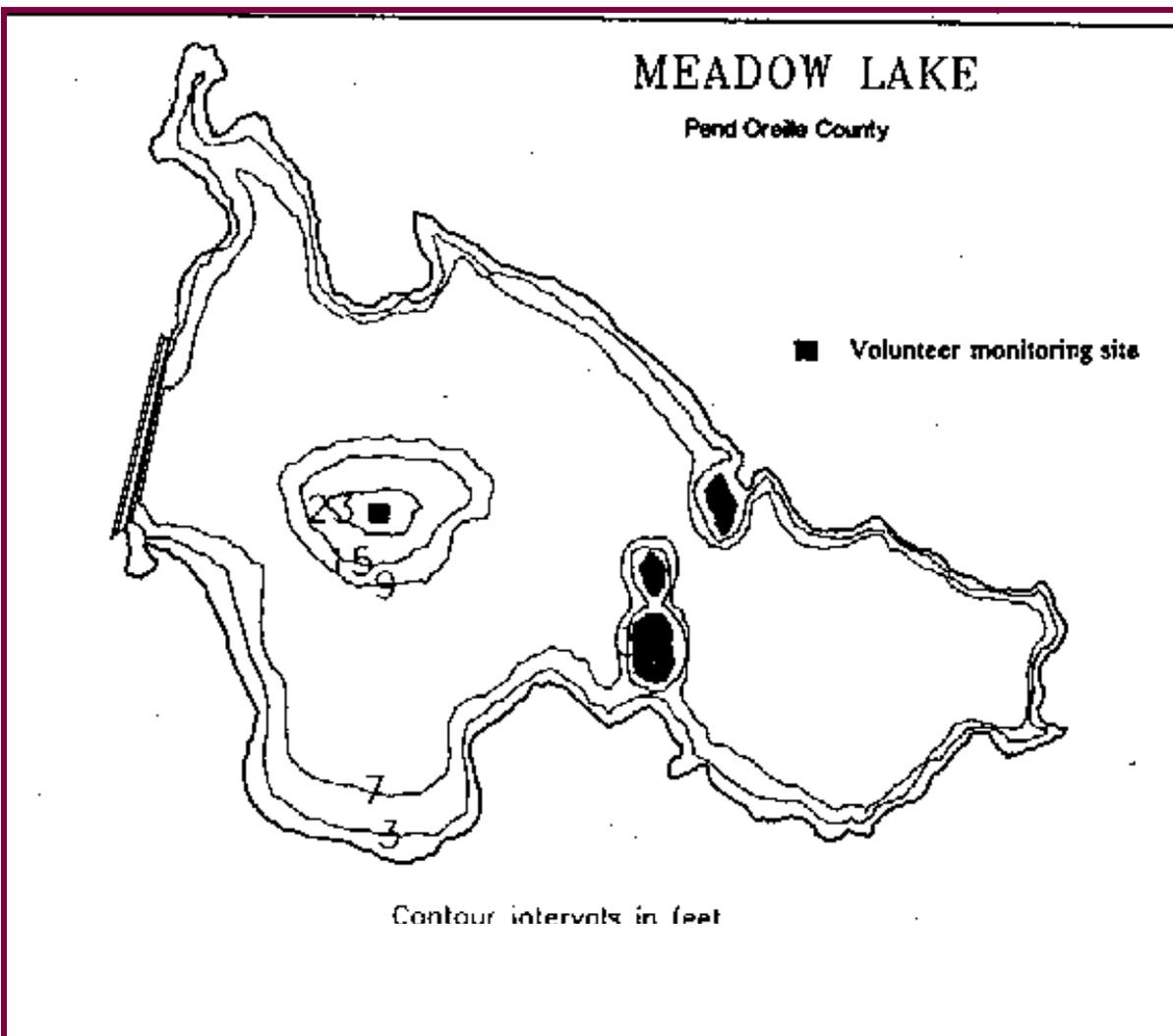
PEND OREILLE County

Lake ID: BIGPE1

Ecoregion: 8

Big Meadow Lake lies in a peat area about 20 miles northeast of Colville at the head of Meadow Creek. It drains westerly to the south fork of Deep Creek and ultimately to the Columbia River. Big Meadow Creek was dammed in the mid-seventies, which enlarged the lake from its original size of about four acres to its present size of about 72 acres.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
72	23	7	1	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
512		3450	48 43 42.	117 33 23.



Station Information

BIGPE1

Primary Station Station # 1 latitude: 48 43 49.7 longitude: 117 33 30.5
Description: Deep spot of the lake.

Trophic State Assessment for 1998

BIG MEADOW

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 42	J
TSI_Phos:		
TSI_Ch1:		
Narrative TSI:	^b	M

Summary Comments:

The general water clarity was good for Big Meadow Lake in 1998. The Secchi depth readings ranged from 2.4 meters (8.0 feet) to 4.5 meters (14.7 feet) with a mean Secchi depth of 3.4 meters (11.2 feet). For comparison, the mean Secchi depth in 1997 was 3.2 meters (10.3 feet). The volunteer monitor did not report any algae blooms in the lake between May and October. He did report a large amount of Potamogeton sp. (pondweed) appearing in the lake at the end of June and which continued to grow in mass through the middle of October. The amount of pondweed present in the lake hampered the boating ability of some lake users.

No site visit was made by Ecology staff in 1998; subsequently no chemistry data or profile data was collected.

Only one goose was counted by the volunteer monitor this year but he noted the presence of numbers of other waterfowl throughout the summer.

Based on Secchi depth data, Big Meadow Lake is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

BIG MEADOW

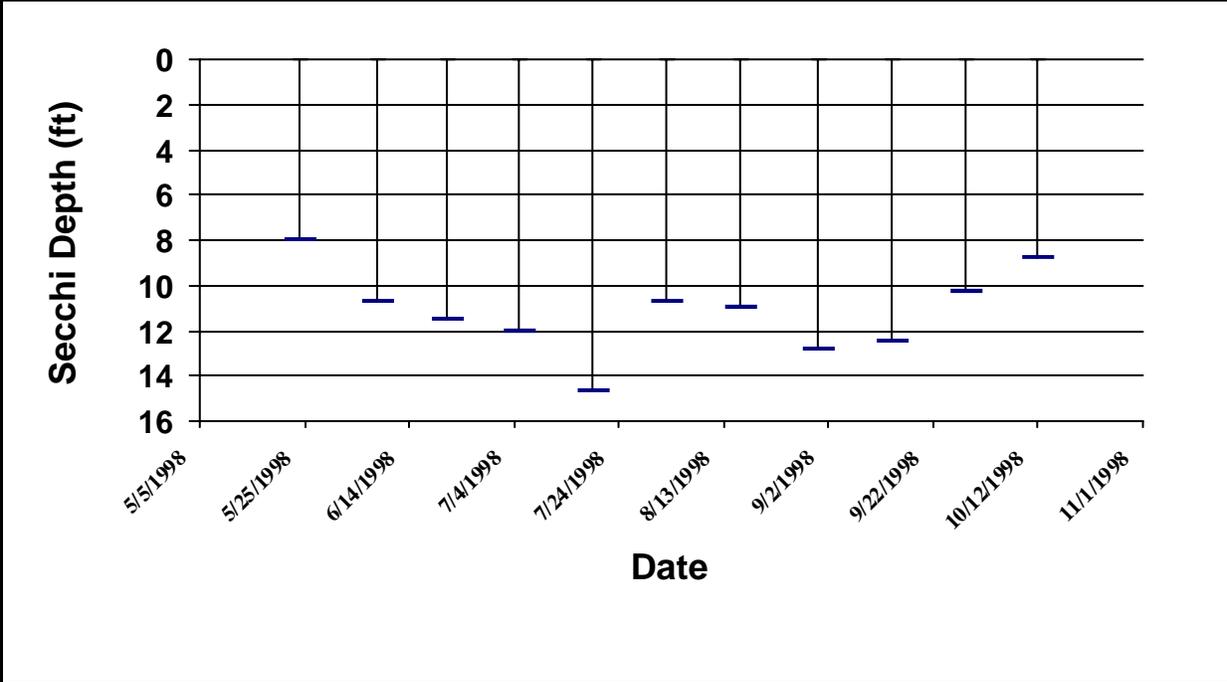
Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/24/1998		14	8	8	100	2	4	5	3	0	0	2	0
	Sampler:	WILLIAMS		Remarks:									
6/8/1998		18	10.75	7	50	3	4	5	3	0	0	0	0
	Sampler:	WILLIAMS		Remarks:									
6/21/1998		18	11.5	7	50	2	4	5	3	0	2	2	0
	Sampler:	WILLIAMS		Remarks: LOTS OF PONDWEED HAS GROWN IN LAST TWO WEEKS									
7/5/1998		20	12	6	75	2	5	4	3	1	0	0	0
	Sampler:	WILLIAMS		Remarks: MORE PONDWEED									
7/19/1998		23.5	14.67	6	0	4	1	4	2	0	14	1	0
	Sampler:	WILLIAMS		Remarks: EVEN MORE WEEDS									
8/2/1998		25.5	10.75	7	50	2	4	3	2	0	4	1	0
	Sampler:	WILLIAMS		Remarks: MORE WEEDS									
8/16/1998		23	11	7	75	2	1	3	3	0	1	0	0
	Sampler:	WILLIAMS		Remarks: CAMPGROUND HOST HAS TAKEN HIS BOAT OUT DUE TO WEEDS									
8/31/1998		22.5	12.83	6	0	1	1	4	3	0	7	1	0
	Sampler:	WILLIAMS		Remarks: ALOT OF PONDWEES, "ISLAND" HAS SUNK									
9/14/1998		19	12.5	7	0	3	1	4	3	0	3	0	0
	Sampler:	WILLIAMS		Remarks: LOTS OF LARGE PATCHES OF PONDWEED; SURFACE WEEDS ARE 90% PONDWEED AND 10% LILY									

Date	Time	Temperature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Brightness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5-good)	Swimming (1-poor, 5-good)	Geese (#)	Waterfowl (besides geese #)	Boats-Fishing (#)	Boats-Skiing (#)
9/28/1998		15.5	10.25	7	0	2	2	4	3	0	3	0	0
	Sampler: WILLIAMS			Remarks:									
10/12/1998		9.5	8.75	7	75	4	3	4	2	0	15	0	0
	Sampler: WILLIAMS			Remarks:	WEED CONTINUE TO BE MAJOR PROBLEM; LAST CARD THIS YEAR.								

Secchi Depth and Profile Graphics

Station: 1

BIGPE1



--	--

--	--

Station Information

BIGPE1

Primary Station Station # 1 latitude: 48 43 49.7 longitude: 117 33 30.5
Description: Deep spot of the lake.

Trophic State Assessment for 1999

BIG MEADOW

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	42
TSI_Phos:		49
TSI_Ch1:		
Narrative TSI:	^b	ME

Summary Comments:

The general water clarity of Big Meadow Lake was good to fair in 1999. The Secchi depth readings ranged from 2.4 meters (8.0 feet) to 4.8 meters (15.8 feet) with a mean Secchi depth of 3.5 meters (11.6 feet). For comparison, in 1998 the mean Secchi depth was 3.4 meters (11.2 feet).

Only waterfowl other than geese were seen on the lake and counted by the volunteer monitor between the months of May through the middle of September.

The chemistry data collected for Big Meadow Lake showed moderately high phosphorus levels in the epilimnion indicating an elevated degree of productivity. At these phosphorus levels, algae may become a nuisance though not usually for a very long period of time. The volunteer monitor reported an algae bloom occurring in mid-August and heavy aquatic plant growth, primarily Potamogeton sp., beginning in mid-July.

Ecology staff made two site visits in 1999. Thermal stratification of the lake and low dissolved oxygen levels in the hypolimnion were observed during both visits (6/23/1999 and 9/15/1999).

Based on the Secchi depth data and the phosphorus levels, Big Meadow Lake is classified as mesoeutrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

BIG MEADOW

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
------	------	--------	-----------------	-----------------	-------	----------------------------	-------------------------------------	--------------------	-------------------	--------------------

Station 1

6/23/1999 1300 E 18.1

Secchi Data and Field Observations

BIG MEADOW

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/23/1999		10.5	8	6	0	2	1	4	3	0	2	7	0
	Sampler:	WILLIAMS		Remarks:	Used a view tube; very few weeds at surface.								
6/14/1999		13.5	11	6	0	2	2	5	4	0	0	2	0
	Sampler:	WILLIAMS		Remarks:	Used a view tube. Weed problem very low.								
6/23/1999		15	13	6	50	3	4	5	4	0		1	0
	Sampler:	WILLIAMS		Remarks:									
7/5/1999		14.5	15.75	6	0	3	4	5	4	0	2	0	0
	Sampler:	WILLIAMS		Remarks:	Used a view tube. Pondweed now growing, lots of water grass.								
7/22/1999		17	13.5	6	0	3	3	3	2			2	0
	Sampler:	WILLIAMS		Remarks:	Used a view tube. Heavy weed coverage, mostly pondweed.								
8/2/1999		21	13.75	6	0	2	2	4	3	0	14	1	0
	Sampler:	WILLIAMS		Remarks:	Used a view tube. More weed.								
8/18/1999		18	9.5	6	25	2	2	4	3	0	1	0	0
	Sampler:	WILLIAMS		Remarks:	Used a view tube. Lots of weed, mostly pondweed. Looks like algae bloom.								
9/2/1999		15	8.67	6	25	3	3	4	3	0	5	1	0
	Sampler:	WILLIAMS		Remarks:	Used a view tube.								
9/15/1999		16.5	10.25	7	0	2	1	4	3	0	8	0	0
	Sampler:	WILLIAMS		Remarks:	Heavy weed growth. Very distinct disappearance of disk - like a wall of algae; water seemed clear down to this "wall". Algae bloom about a month ago. Sampling day was sunny, slight breeze.								

Profile Report

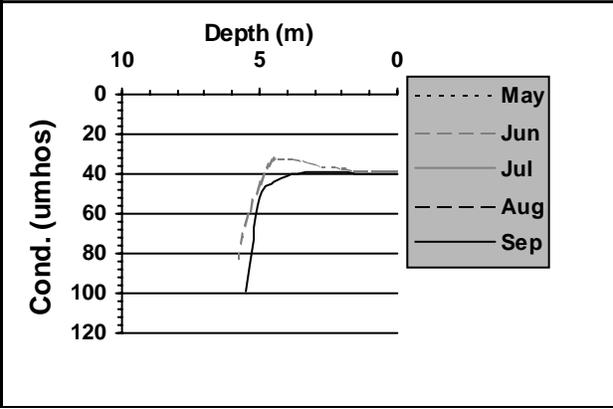
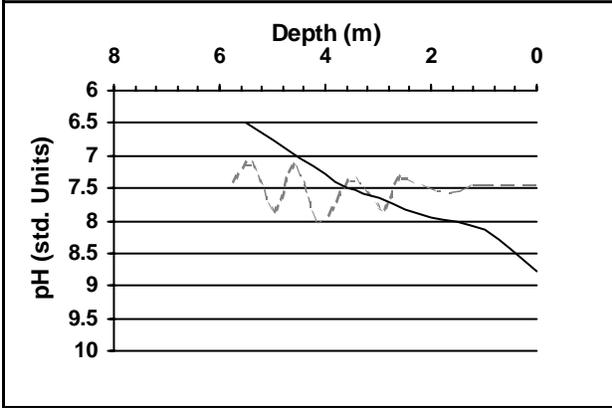
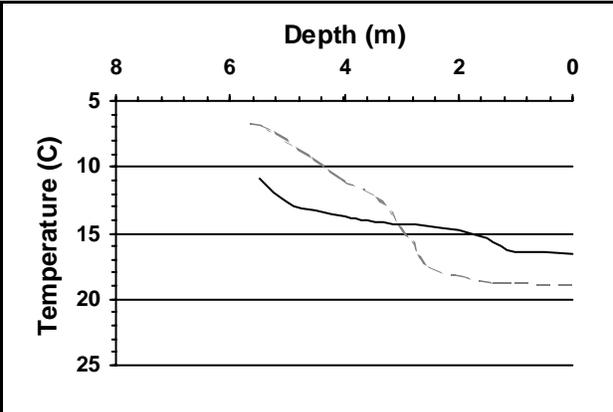
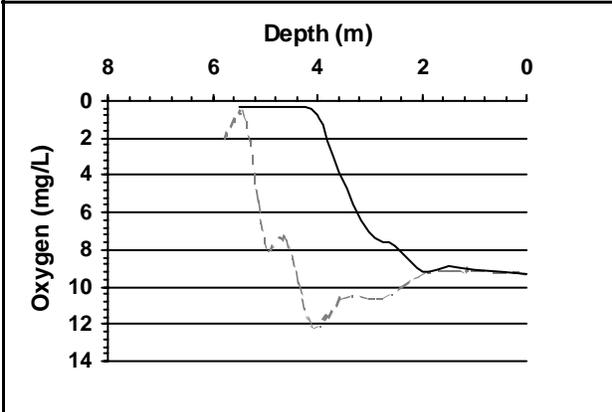
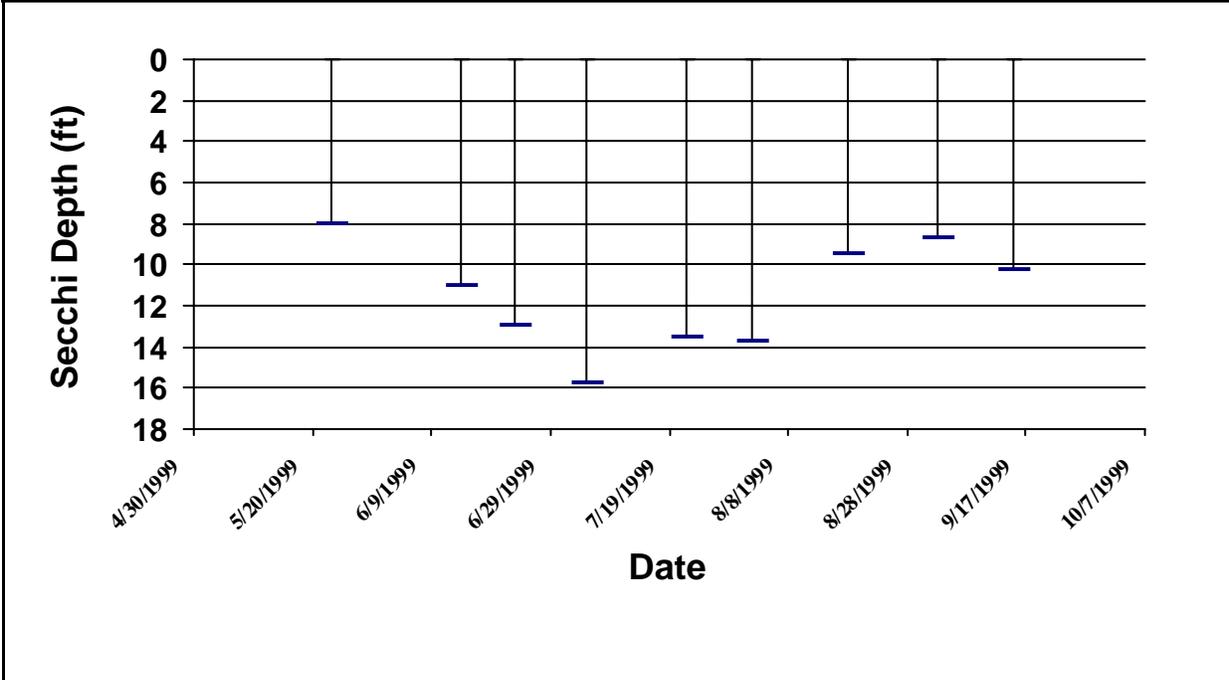
BIG MEADOW

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/23/1999						
		0	37.6	9.26	7.45	18.81
		0.4	37.5	9.2	7.44	18.76
		1.1	37.5	9.1	7.45	18.75
		1.2	37.5	9.14	7.45	18.75
		1.4	37.5	9.13	7.52	18.68
		1.9	37	9.22	7.54	18.18
		2.6	36.1	10.35	7.33	17.31
		2.9	34.7	10.57	7.82	15.28
		3.5	33.1	10.62	7.37	12.03
		4.1	31.8	12.11	8.02	10.8
		4.6	34.1	7.48	7.15	9.21
		5	45	7.96	7.87	7.95
		5.4	60.5	.81	7.12	6.82
		5.8	82.1	2.03	7.42	6.49
9/15/1999						
		0	39.9	9.34	8.79	16.54
		0.5	39.7	9.16	8.45	16.45
		1	39.6	9.08	8.14	16.37
		1.5	39.5	8.89	8	15.32
		2	39.3	9.22	7.94	14.71
		2.5	39.1	7.77	7.84	14.42
		3	39.3	7.04	7.65	14.28
		3.6	39.7	3.82	7.49	14.07
		4	40.6	.74	7.29	13.73
		4.5	43.6	.34	7.05	13.32
		5	51.7	.3	6.75	12.64
		5.5	98.6	.3	6.49	10.92

Secchi Depth and Profile Graphics

Station: 1

BIGPE1



BLACK

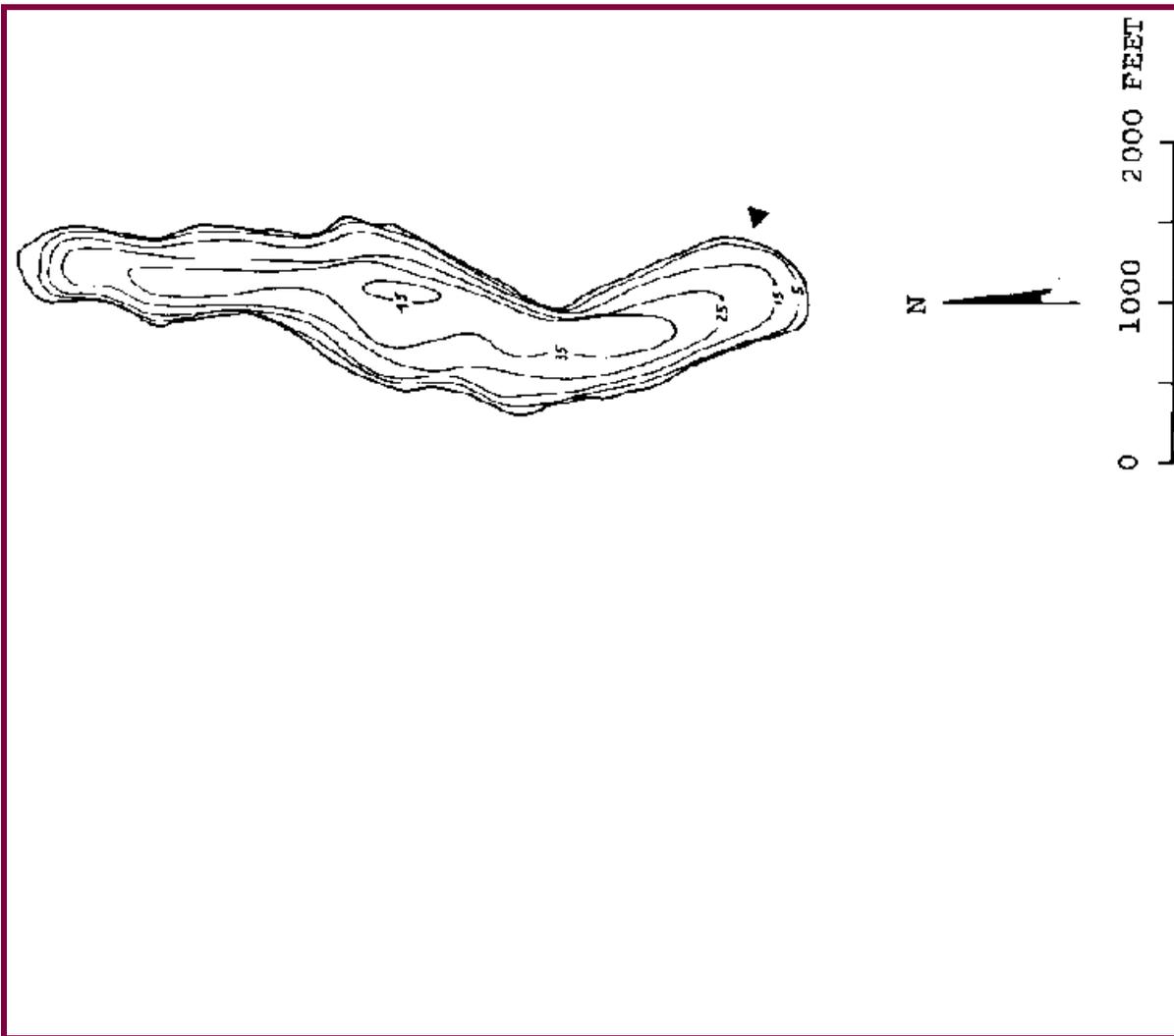
STEVENS County

Lake ID: BLAST1

Ecoregion: 8

Black Lake is located about 12.5 miles east of Colville. It is 4,800 feet long. The main inflow is intermittent into the north end of the lake, and there is a smaller inlet on the east side of the lake. Black Lake drains southeast via Gap Creek to the Little Pend Oreille River.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
70	45	27	1	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
1863	2.03	3701	48 33 23.	117 37 23.



Station Information

BLAST1

Primary Station	Station # 1	latitude: 48 33 31.9	longitude: 117 37 32.8
	Description: Deep spot of the lake.		
Secondary Statio	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

BLACK

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 41	N, J
TSI_Phos:	
TSI_Ch1:	
Narrative TSI: ^b	M

Summary Comments:

The general water clarity for Black Lake was good in 1998. The Secchi depth readings ranged from 2.7 meters (9.0 feet) to 4.3 meters (14.0 feet) with a mean Secchi depth of 3.5 meters (11.6 feet). No algae blooms were recorded by the volunteer monitor during the months of May through September.

No chemistry data was collected for Black Lake in 1998.

No geese were counted by the volunteer monitor and only a few other waterfowl were noted during the volunteer's sampling visits.

Only one site visit by Ecology staff was done in 1998. Thermal stratification was noted during this visit (8/9/98) and the hypolimnion showed an oxygen depletion. The lake water color was observed to be a clear orange-brown.

Unfortunately, the volunteer monitor only collected four Secchi disk readings; not enough for an accurate trophic state analysis. However, based on the Secchi data collected and best professional judgment, Black Lake is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

BLACK

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/11/1998		19.4	9	7	0	2	2	5	4	0	3	0	0
	Sampler:	LAVIGNE		Remarks:	ONE BEAR IN GARBAGE, ONE MOOSE LAST WEEK								
7/8/1998		23.3	11	8	0	2	2	5	5	0	0	0	0
	Sampler:	LAVIGNE		Remarks:									
7/24/1998		25	12	7	0	2	1	5	5	0	0	1	
	Sampler:	LAVIGNE		Remarks:									
8/19/1998		21.1	14	7	0	2	1	5	5	0	0	0	0
	Sampler:	LAVIGNE		Remarks:									
8/19/1998			14		0					0	0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									

Profile Report

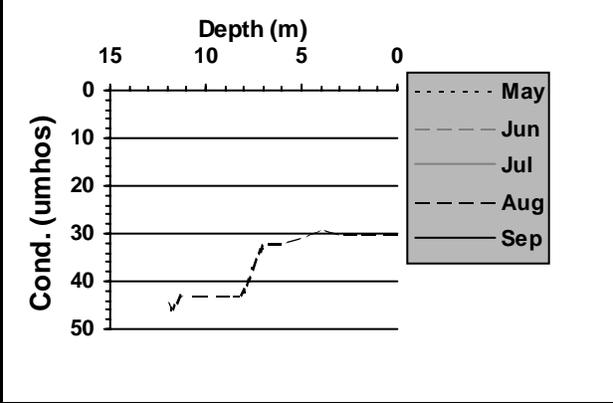
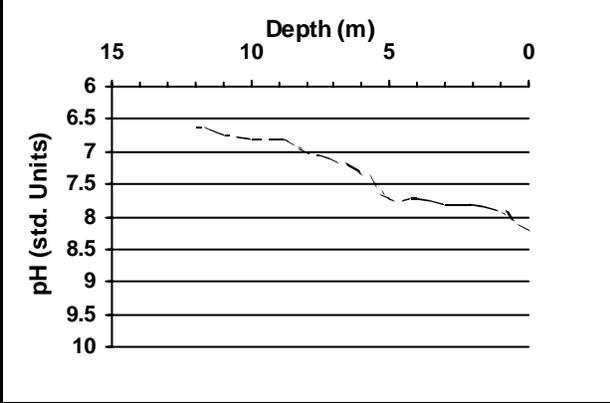
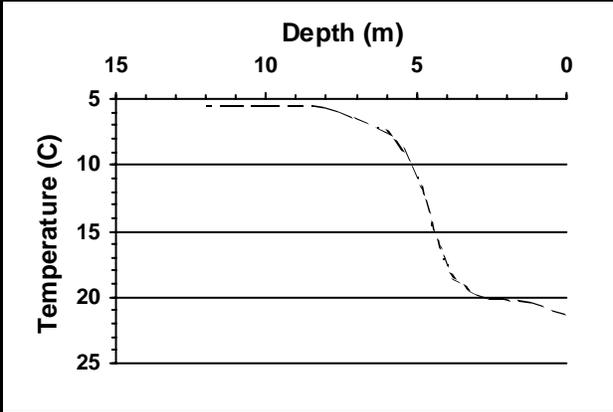
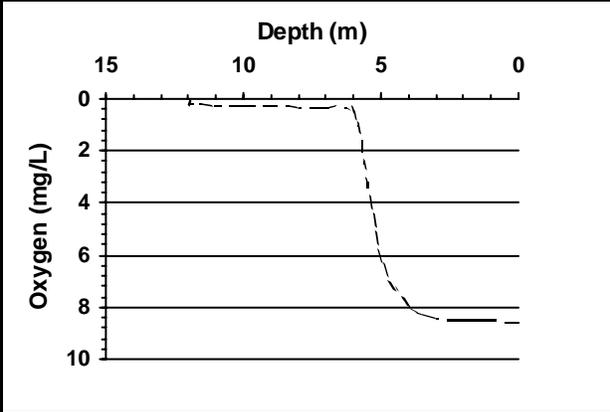
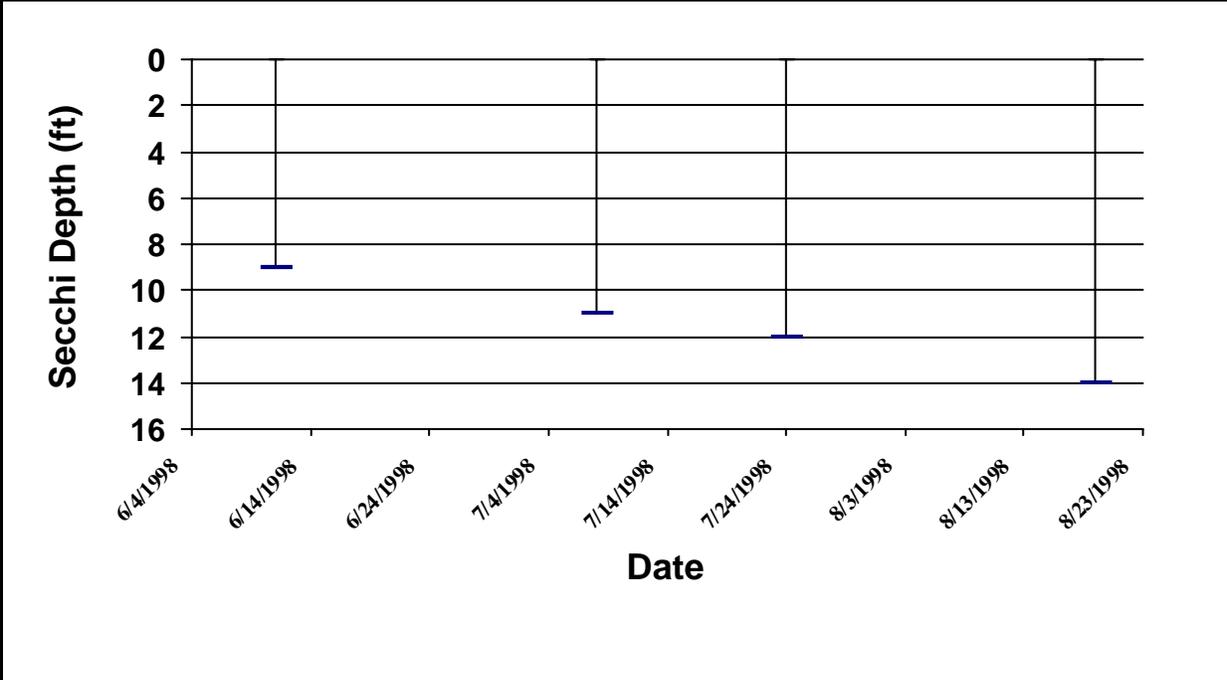
BLACK

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
8/19/1998						
		0	30	8.58	8.2	21.2
		1.1	30	8.5	7.9	20.3
		2.1	30	8.46	7.8	20.1
		3	30	8.38	7.8	19.7
		4	29	7.95	7.7	17.7
		5	31	6.23	7.7	11
		6	32	.52	7.3	7.6
		7.1	33	.32	7.1	6.3
		8	42	.28	7	5.6
		8.8	43	.24	6.8	5.5
		10	43	.21	6.8	5.4
		11.1	43	.23	6.7	5.4
		11.8	46	.17	6.6	5.4
		12	45	.21	6.6	5.4

Secchi Depth and Profile Graphics

Station: 1

BLAST1



Station Information

BLAST1

Primary Station	Station # 1	latitude: 48 33 31.9	longitude: 117 37 32.8
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

BLACK

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	37
TSI_Phos:		49
TSI_Ch1:		
Narrative TSI:	^b	M

Summary Comments:

The general water clarity of Black Lake was excellent for 1999. The Secchi depth readings ranged from 4.3 meters (14.0 feet) to 5.5 meters (18.0 feet) with a mean Secchi depth of 4.9 meters (16.1 feet). For comparison, in 1998 the mean Secchi depth was 3.5 meters (11.6 feet).

No geese and only a small number of other waterfowl were observed on the lake and counted by the volunteer monitor between the months of May through the middle of September.

The chemistry data collected for Black Lake showed moderately high phosphorus levels in the epilimnion indicating an elevated degree of productivity. At these phosphorus levels, algae may become a nuisance though not usually for a very long period of time. Even at this nutrient level, no algae blooms were recorded by the volunteer monitor during the summer months.

Ecology staff made two site visits in 1999. Thermal stratification and low dissolved oxygen levels in the hypolimnion were observed during both visits (6/22/1999 and 9/14/1999).

Based on the Secchi depth data, Black Lake should be classified as oligotrophic. However, because of the high phosphorus levels and the low dissolved oxygen levels in the hypolimnion, Black Lake is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

BLACK

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/11/1999		46	9	8	0	2	2	5	5	0	2	1	0
	Sampler:	LAVIGNE		Remarks: Did not use a view tube; ice of of lake on 4-26-99									
6/4/1999		58	16	7	25	2	2	5	5	0		0	0
	Sampler:	LAVIGNE		Remarks: Did not use a view tube. Saw ducks on water - didn't count. Water cleared since ice out.									
6/22/1999		65	14	6	25	2	5	5	5	0	0	0	0
	Sampler:	LAVIGNE		Remarks:									
7/11/1999		68	16	7	0	3	1	5	5	0	4	1	0
	Sampler:	LAVIGNE		Remarks: Did not use a view tube. Shiners loaded with tapeworms and another parasite and passing them to the trout. Lake needs Rotenone!									
8/28/1999		73	16	7	0	2	1	5	5	0	6	0	0
	Sampler:	LAVIGNE		Remarks: Did not use a view tube. Fish have tapeworms and another parasite - bad. Can't get Fish & Wildlife to move.									
9/14/1999		64	18	7	0	1	1	5	5	0	4	0	0
	Sampler:	LAVIGNE		Remarks: Did not use a view tube. Maggie's fall visit. No algae blooms. Sampling day was sunny and calm.									

Profile Report

BLACK

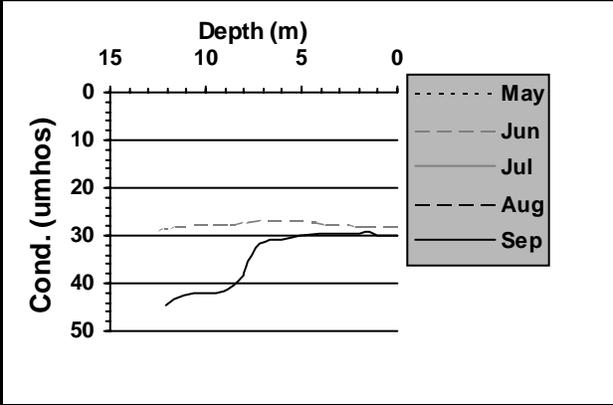
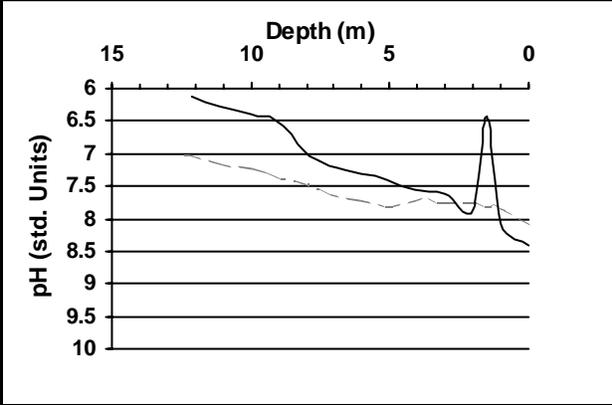
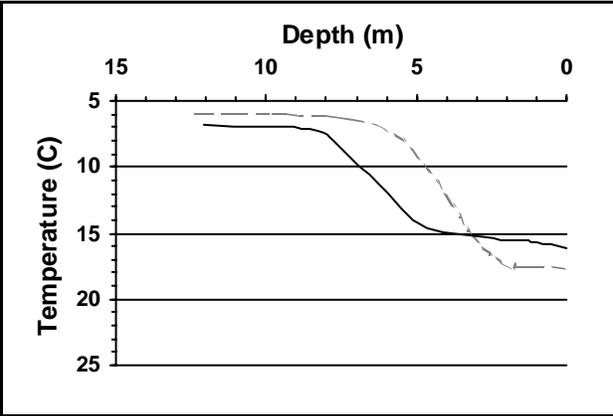
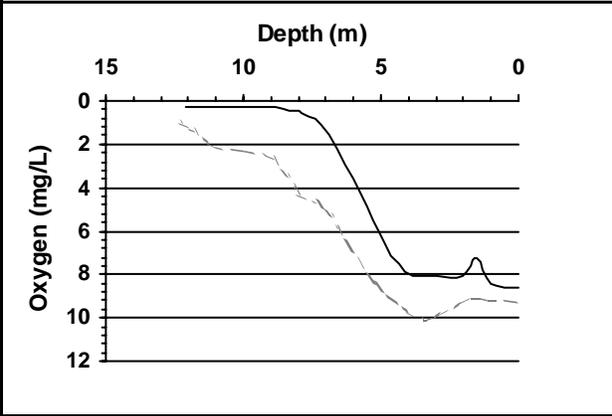
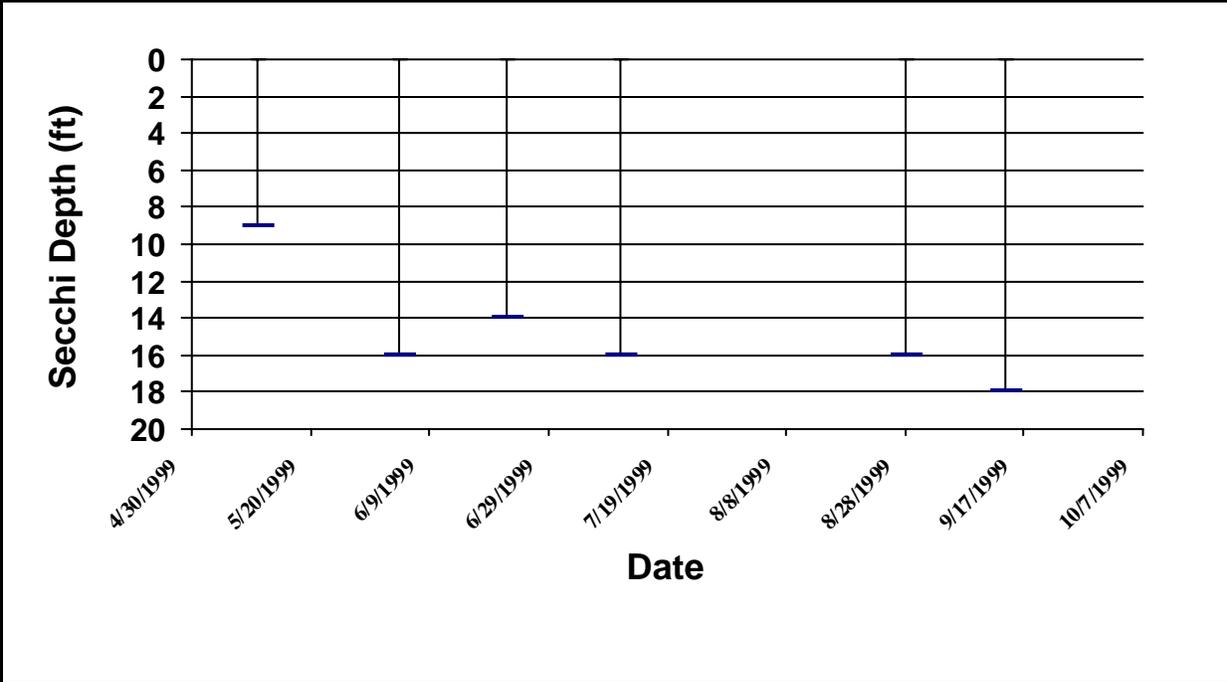
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/22/1999						
		0	28.1	9.29	8.09	17.58
		1.1	28	9.12	7.79	17.54
		1.6	28	9.11	7.79	17.46
		1.9	28	9.12	7.74	17.42
		3.1	27.4	9.96	7.74	15.44
		3.8	27.3	9.9	7.68	12.94
		4.9	26.5	8.78	7.81	9.4
		6	26.6	6.92	7.7	7.17
		7.1	26.8	4.96	7.61	6.39
		8	27.2	4.27	7.48	6.09
		8.9	27.4	2.63	7.37	6
		9.9	27.5	2.29	7.23	5.97
		11	28	2.15	7.15	5.88
		12	28.4	1.2	7.05	5.86
		12.4	28.7	.84	7.02	5.84

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
9/14/1999						
		0	29.9	8.64	8.41	16.18
		1	29.8	8.41	8.07	15.74
		1.5	29.3	7.21	6.43	15.51
		2	29.7	8.1	7.86	15.6
		3	29.7	8.03	7.62	15.25
		4.1	29.7	7.88	7.57	14.91
		5.1	29.9	6.02	7.4	14.07
		6	30.8	3.57	7.32	11.94
		7.2	31.7	1.13	7.19	9.38
		7.9	36.7	.57	7.05	7.64
		8.1	38.6	.5	6.96	7.38
		9.1	41.6	.32	6.48	7.02
		10	42	.3	6.41	6.95
		11.1	42.3	.28	6.27	6.9
		12.1	44.6	.25	6.12	6.81

Secchi Depth and Profile Graphics

Station: 1

BLAST1



BLACK

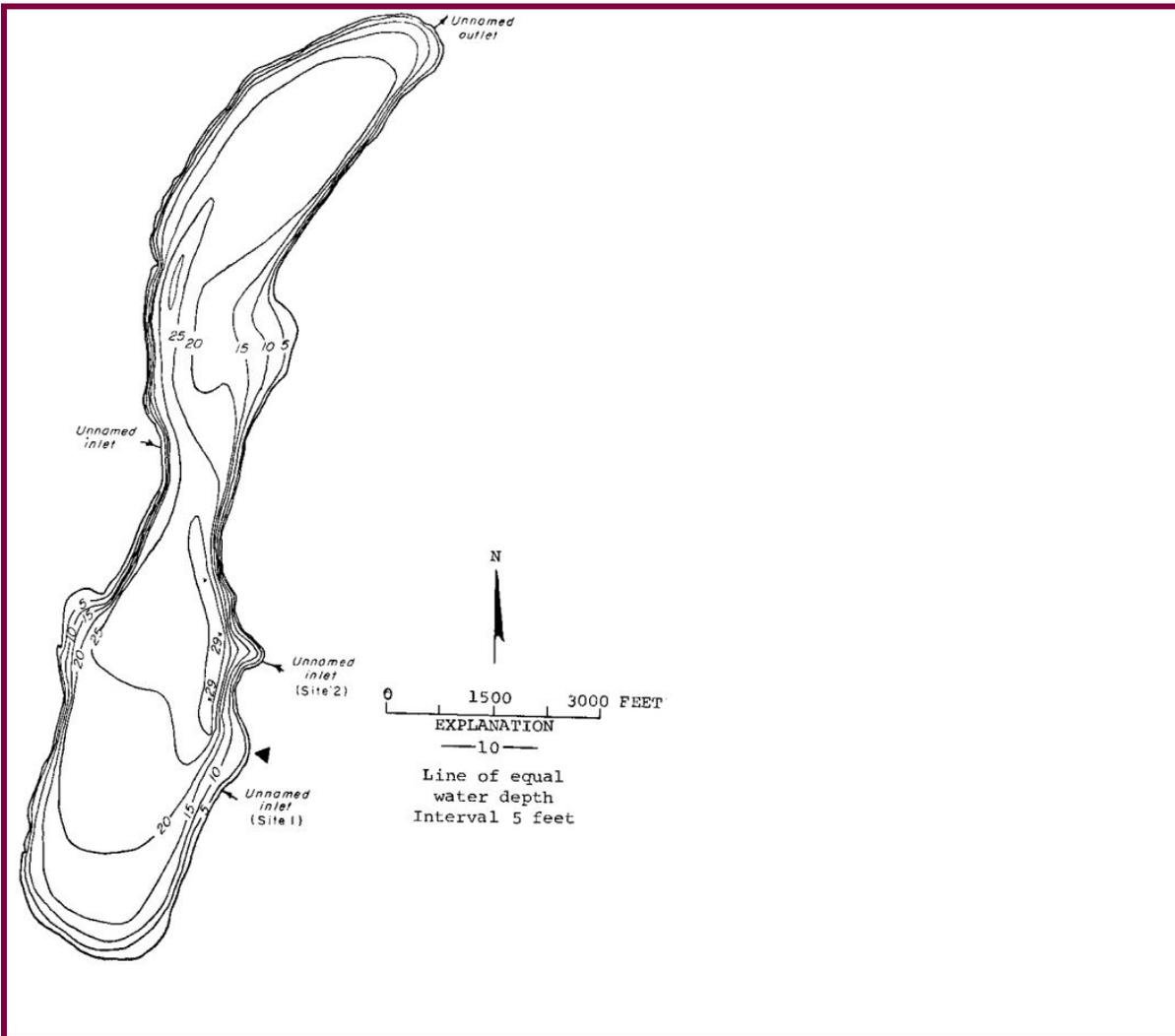
THURSTON County

Lake ID: BLATH1

Ecoregion: 2

Black Lake is located four miles southwest of Olympia. It is 2.5 miles long. The lake is fed by two unnamed perennial tributaries, and drains via Percival Creek to Budd Inlet.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
570	29	19	10	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
11000	5.98	131	47 00 36.	122 57 50.



Station Information

BLATH1

Primary Station	Station # 1	latitude: 46 59 11.0	longitude: 122 58 26.2
	Description:	Deep spot of the lake.	
Secondary Statio	Station # 2	latitude:	longitude:
	Description:		
Secondary Statio	Station # 3	latitude:	longitude:
	Description:		
Secondary Statio	Station # 4	latitude:	longitude:
	Description:		
Secondary Statio	Station # 5	latitude:	longitude:
	Description:		
Secondary Statio	Station # 6	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

BLACK

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 50 J
TSI_Phos:
TSI_Ch1:
Narrative TSI: ^b M

Summary Comments:

The general water clarity for Black Lake was fair in 1998. The Secchi depth readings ranged from 1.8 meters (6.0 feet) to 2.7 meters (8.8 feet) with a mean Secchi depth of 2.0 meters (6.7 feet) in 1998. For comparison, the previous volunteer monitor collected Secchi data in 1993 which showed a mean Secchi depth of 1.5 meters (5.0 feet).

No chemistry data was collected for Black Lake in 1998.

Numerous waterfowl and/or geese were noted by the volunteer monitor during each of his 10 sampling visits made between May through September; most of the geese counted were on the lake in the month of June.

Two site visits were made by Ecology staff in 1998. Thermal stratification was observed at both of these visits with a higher amount of oxygen depletion in the hypolimnion seen during the fall site visit (9/30/98).

Based on Secchi depth data, Black Lake is classified as mesotrophic.

Secchi Data and Field Observations

BLACK

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/2/1998		17	8.75		75	2	1	5	5		4	1	0
	Sampler:	SWAN		Remarks:									
6/2/1998			8.75		0					0	0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									
6/15/1998		20	7	6	25	2	1	5	4	34	5	3	
	Sampler:	SWAN		Remarks:	LAKE HEIGHT SHOWS NO CHANGE FROM FIRST READING - ZERO POINT OF 6/2/98.								
6/30/1998		20	6		25	3	1	4	5	15	4	2	1
	Sampler:	SWAN		Remarks:	LAKE HEIGHT 0.5 INCHES FROM BASELINE								
7/8/1998		22	7	6	75	1	1	4	3	0	2	1	0
	Sampler:	SWAN		Remarks:	RELATIVELY QUIET. NO CHANGE IN LAKE HEIGHT FROM BASELINE.								
7/22/1998		22	7	6	25	2	1	5	5	0	6	1	0
	Sampler:	SWAN		Remarks:	LAKE HEIGHT DOWN ONE INCH FROM BASELINE.								
8/11/1998		23	6	6	0	1	1	4	5	0	4	0	2
	Sampler:	SWAN		Remarks:	LAKE HEIGHT DOWN 1.5 INCHES.								
8/26/1998		22	6.5	6	0	3	1	5	4	0	1	1	2
	Sampler:	SWAN		Remarks:	LAKE HEIGHT DOWN TWO INCHES FROM BASELINE.								
9/8/1998		21	6	6	0	1	1	4	4	1	8	3	4
	Sampler:	SWAN		Remarks:	LAKE HEIGHT DOWN 2.5 INCHES FROM BASELINE.								

Profile Report

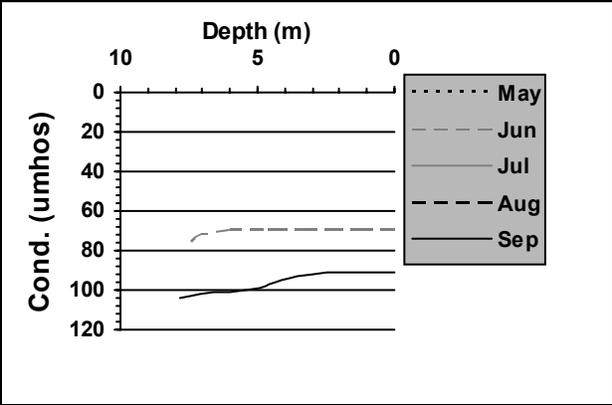
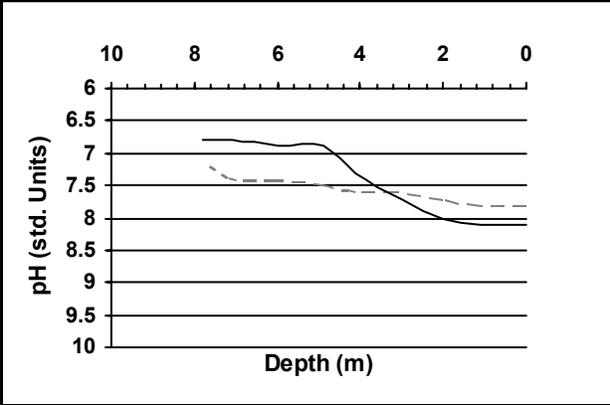
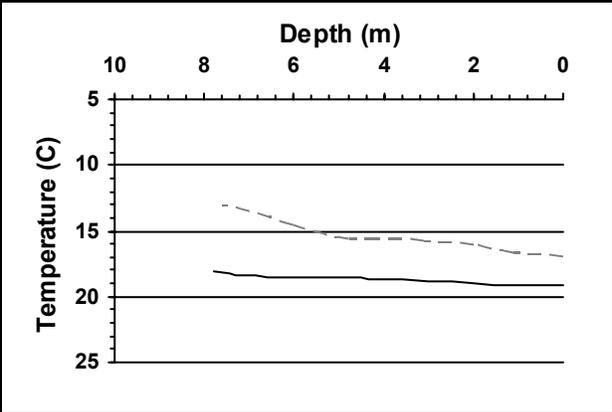
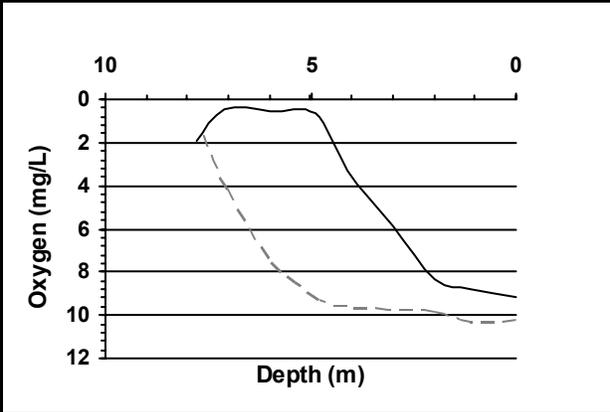
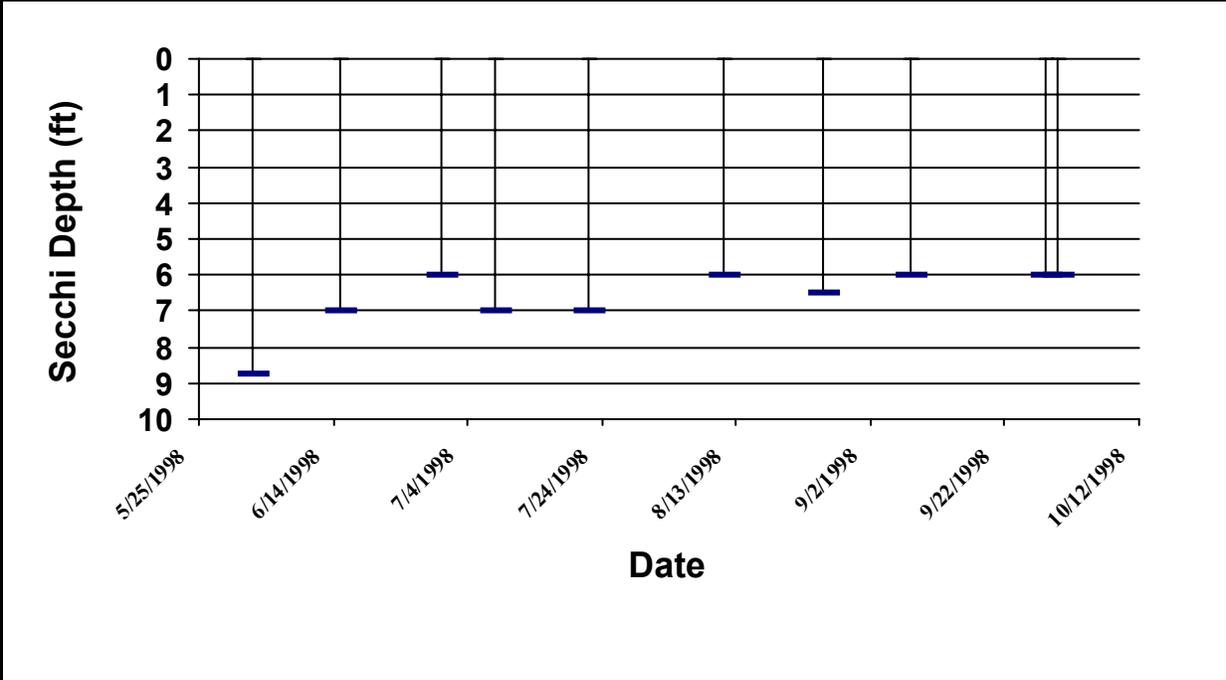
BLACK

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/2/1998						
		0	69	10.19	7.8	16.9
		1.1	69	10.26	7.8	16.6
		2	69	9.79	7.7	16
		3.1	69	9.73	7.6	15.7
		4.1	69	9.54	7.6	15.6
		4.8	69	9.29	7.5	15.6
		6	69	7.29	7.4	14.4
		7	71	4.13	7.4	13.4
		7.6	76	1.65	7.2	13
9/30/1998						
		0	91	9.17	8.1	19.2
		1.1	91	8.79	8.1	19.1
		2	91	8.36	8	19
		3	92	5.83	7.7	18.8
		4.1	95	3.27	7.3	18.7
		4.9	99	.62	6.9	18.6
		6	101	.58	6.9	18.5
		7.1	102	.44	6.8	18.4
		7.8	104	1.89	6.8	18.1

Secchi Depth and Profile Graphics

Station: 1

BLATH1



BOSWORTH

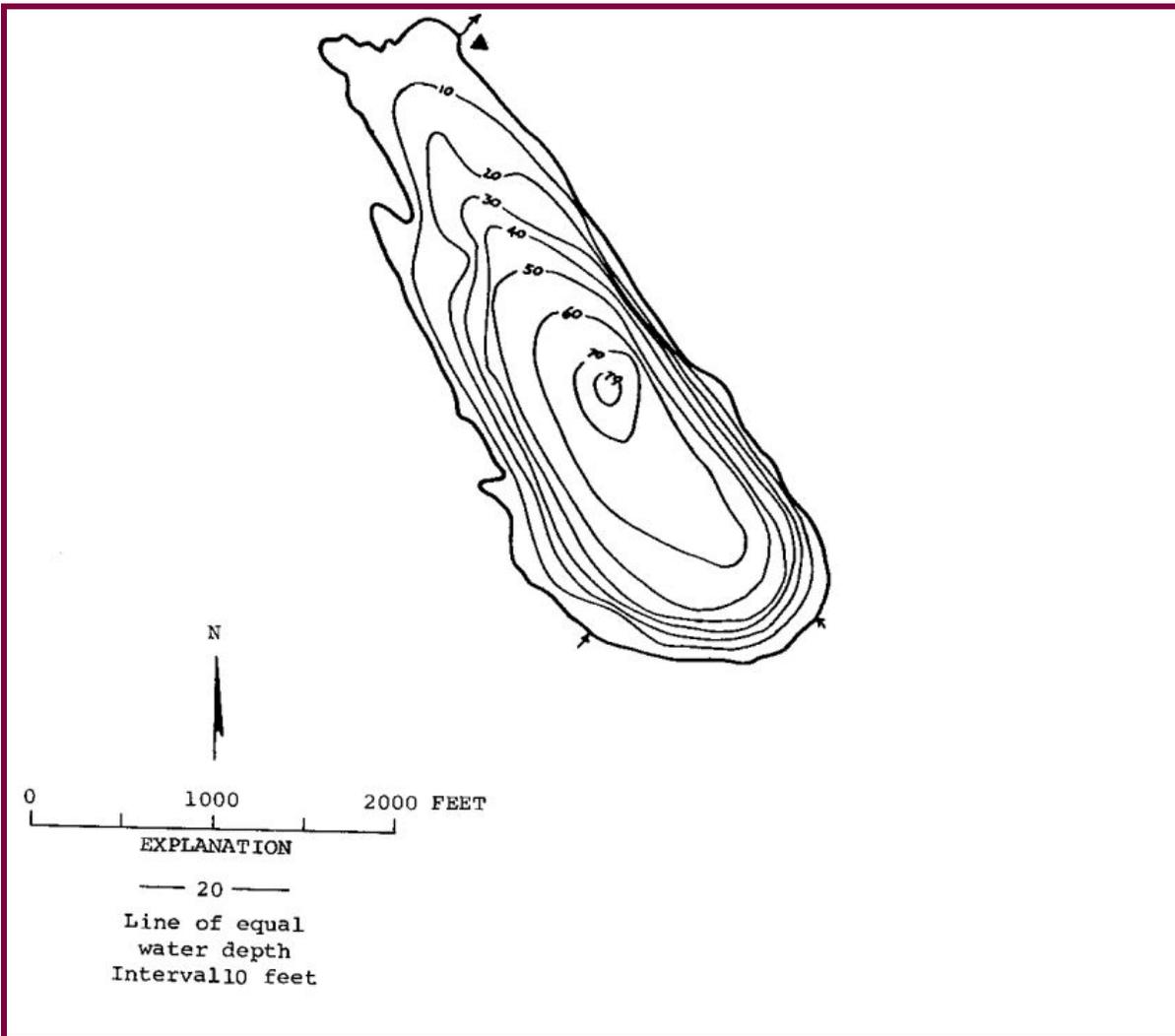
SNOHOMISH County

Lake ID: BOSSN1

Ecoregion: 2

Lake Bosworth is located 2.3 miles south of Granite Falls. It is fed by two unnamed inlets, and drains northeast to the Pilchuck River.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
105	79	35	1	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
3671	1.99	563	48 02 55.	121 58 21.



Station Information

BOSSN1

Primary Station	Station # 1	latitude: 48 02 38.8	longitude: 121 58 16.4
	Description: Deep spot of the lake.		
Secondary Statio	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

BOSWORTH

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 38 J
TSI_Phos:
TSI_Ch1:
Narrative TSI: ^b OM

Summary Comments:

The general water clarity for Lake Bosworth was good in 1998. The Secchi depth readings ranged from 3.7 meters (12.0 feet) to 5.8 meters (19.0 feet) with a mean Secchi depth of 4.7 meters (15.5 feet). For comparison, in 1997 the mean Secchi depth was 4.6 meters (15.2 feet). No algal blooms were reported by the volunteer monitor.

No chemistry data was collected for Lake Bosworth in 1998.

A total of 16 geese and numerous other waterfowl were counted by the volunteer monitor between the months of May through September.

Only one site visit by Ecology staff was made in 1998. Thermal stratification was noted during this visit (9/29/1998) and low dissolved oxygen levels were observed in the hypolimnion.

Based on Secchi depth data and the low dissolved oxygen levels in the hypolimnion, Lake Bosworth is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

BOSWORTH

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/16/1998		14.4	19	3	50	3	4	4	4	2		3	0
	Sampler: MCFADDEN		Remarks: ONE BALD EAGLE AND TWO OSPREY										
6/1/1998		16.7	15	3	100	1	3	4	4	14	3	1	0
	Sampler: MCFADDEN		Remarks:										
6/16/1998		17.8	19	2	75	1	4	4	4	0	2	1	0
	Sampler: MCFADDEN		Remarks:										
7/2/1998		20	16	2	100	1	1	4	4			2	0
	Sampler: MCFADDEN		Remarks:										
7/15/1998		20	17	2	100	1	3	4	4	0	0	0	0
	Sampler: MCFADDEN		Remarks:										
8/2/1998		23.3	16	2	50	1	2	4	4	0	10	5	0
	Sampler: MCFADDEN		Remarks:										
8/15/1998		23.3	14	2	75	3	2	4	4	0	5	2	0
	Sampler: MCFADDEN		Remarks:										
9/1/1998		23.3	15		0	1	1	4	4	0	8	0	0
	Sampler: MCFADDEN		Remarks:										
9/16/1998		21.1	12	2	0	1	1	4	4	0	10	0	0
	Sampler: MCFADDEN		Remarks:										
9/29/1998		18.3	12	2	0	1	1	4	4	0	0	0	0
	Sampler: MCFADDEN		Remarks: VOLUNTEER LIKES THE NEW COLOR STRIPS FOR DETERMINING WATER COLOR.										
9/29/1998			12		0					0	0	0	0
	Sampler: BELL-MCKINNON		Remarks:										

Profile Report

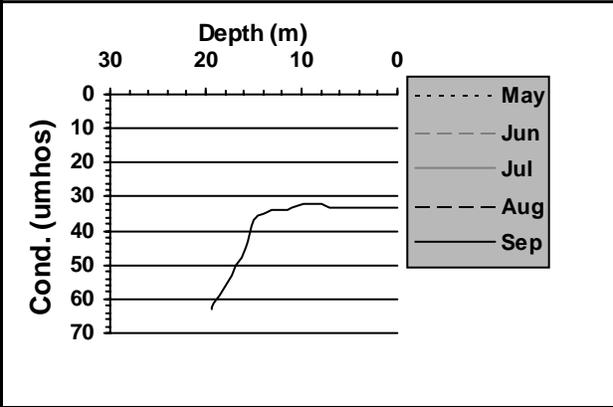
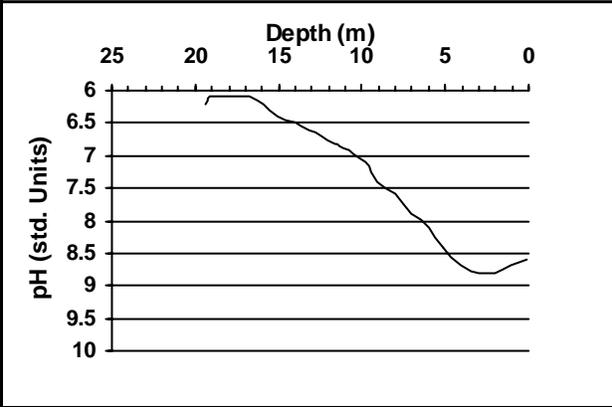
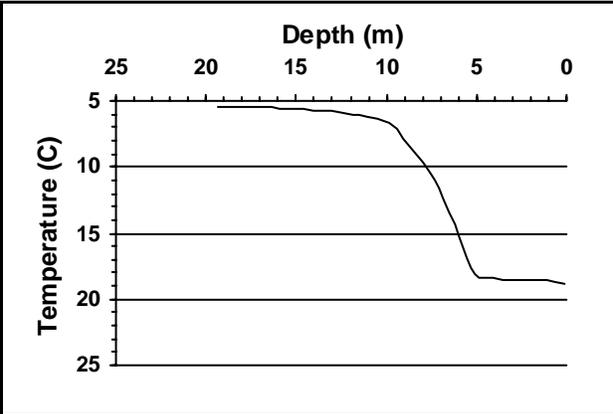
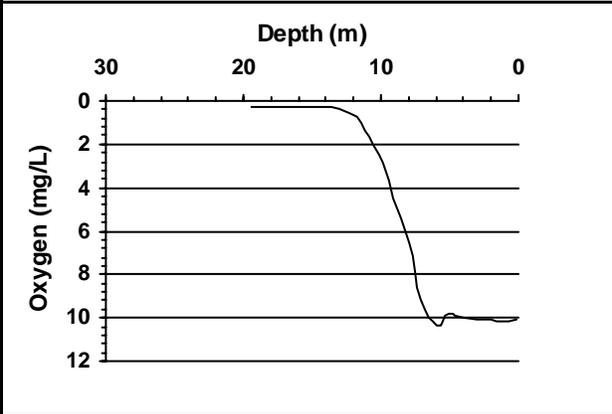
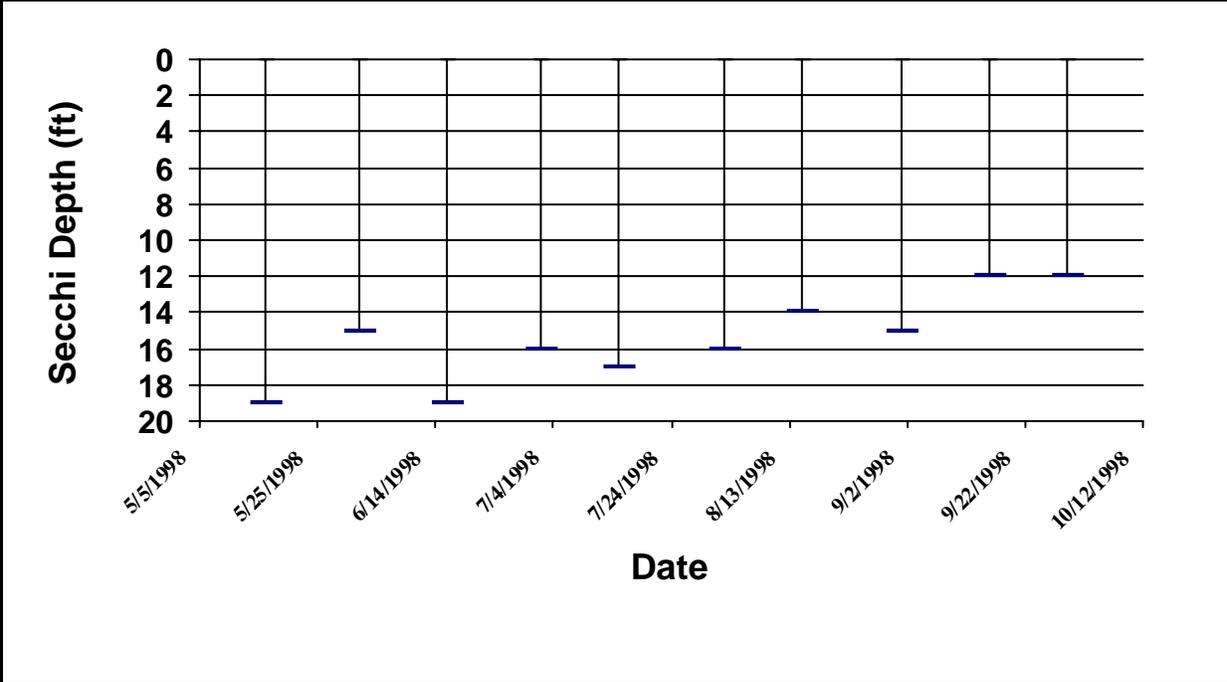
BOSWORTH

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
9/29/1998						
		0.1	33	10.09	8.6	18.9
		1.1	33	10.13	8.7	18.6
		2	33	10.11	8.8	18.5
		3	33	10.09	8.8	18.5
		4.1	33	9.95	8.7	18.4
		5.1	33	9.83	8.4	18.1
		6	33	10.32	8.1	15.2
		7.1	33	9.2	7.9	11.6
		8	32	6.51	7.6	9.6
		9.1	32	4.52	7.4	7.9
		9.8	32	2.84	7.1	6.7
		11.1	33	1.34	6.9	6.2
		11.8	34	.7	6.8	6
		13.1	34	.39	6.6	5.8
		14	35	.29	6.5	5.7
		15.1	37	.29	6.4	5.6
		15.9	45	.28	6.2	5.6
		16.8	50	.26	6.1	5.5
		18	56	.23	6.1	5.5
		19.1	61	.25	6.1	5.5
		19.4	63	.23	6.2	5.5

Secchi Depth and Profile Graphics

Station: 1

BOSSN1



Station Information

BOSSN1

Primary Station	Station # 1	latitude: 48 02 38.8	longitude: 121 58 16.4
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

BOSWORTH

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 37	B, J
TSI_Phos:	38	
TSI_Ch1:		
Narrative TSI:	^b OM	

Summary Comments:

The general water clarity of Lake Bosworth was excellent in 1999. The Secchi depth readings ranged from 4.0 meters (13.0 feet) to 6.1 meters (20.0 feet) with a mean Secchi depth of 5.1 meters (16.7 feet). For comparison, in 1998 the mean Secchi depth was 4.7 meters (15.5 feet).

Only a few geese and/or other waterfowl were observed on the lake and counted by the volunteer monitor between the months of May through the middle of September.

The chemistry data collected for Lake Bosworth showed low phosphorus levels in the epilimnion. Combined with the Secchi clarity data, this indicates a low level of productivity in this lake.

Ecology staff made two site visits in 1999. Thermal stratification was observed during both visits (5/25/1999 and 8/10/1999); however low dissolved oxygen levels in the hypolimnion were observed only during the August visit.

Based on the Secchi depth data, Lake Bosworth should be classified as oligotrophic. However, because of the low dissolved oxygen levels in the hypolimnion during August, Lake Bosworth is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

BOSWORTH

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L) TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
------	------	--------	-----------------	--------------------------	----------------------------	-------------------------------------	--------------------	-------------------	--------------------

Station 1

5/25/1999 1000 E 6.74

Secchi Data and Field Observations

BOSWORTH

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/15/1999		52	19	2	100	1	3	4		0	2	5	0
	Sampler:	MCFADDEN		Remarks: Used a view tube.									
5/25/1999		62	15.5	2	100	3	1	4	4	0	0	2	0
	Sampler:	MCFADDEN		Remarks:									
6/15/1999		68	17	2	75	1	1		4	0	7	3	0
	Sampler:	MCFADDEN		Remarks: Used a view tube.									
7/4/1999		62	16	2	100	1	5	4	4	0	0	3	0
	Sampler:	MCFADDEN		Remarks: Used a view tube.									
7/17/1999		65	16	2	100	2	3	4	4	0	0	1	0
	Sampler:	MCFADDEN		Remarks: Used a view tube.									
8/1/1999		65	20 B	2		1	2	5	5	1	3	0	0
	Sampler:	WOOLMAN		Remarks: Used a view tube.									
8/10/1999			16										
	Sampler:	MCFADDEN		Remarks: No unusual odors. No boaters or fishers; only 2 swimmers. Sampling day was sunny and calm. No algae blooms since last visit.									
9/3/1999		71	13	2	75	2	1	4	4	0	4	0	0
	Sampler:	WOOLMAN		Remarks: Used a view tube.									
9/17/1999		69	17	2	0	1	1	4	4	0	3	0	0
	Sampler:	WOOLMAN		Remarks: Used a view tube.									

Profile Report

BOSWORTH

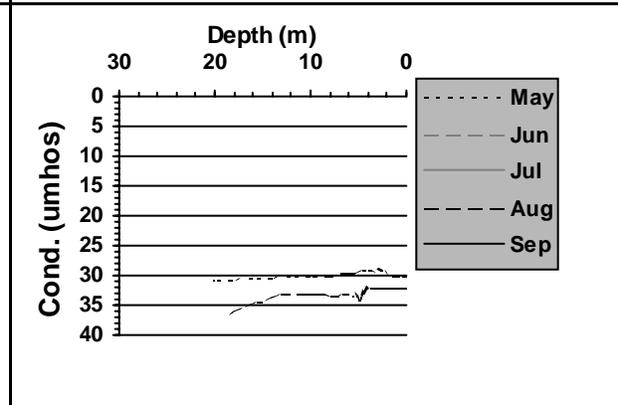
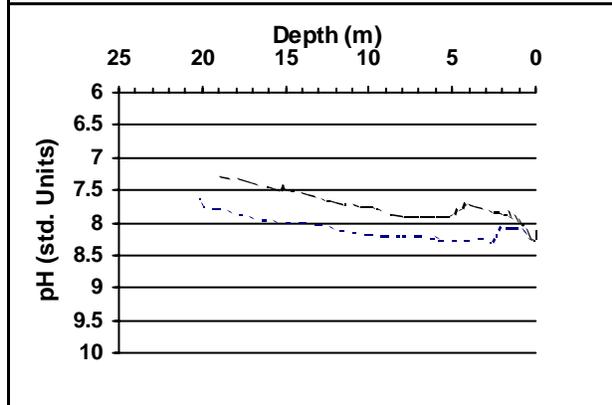
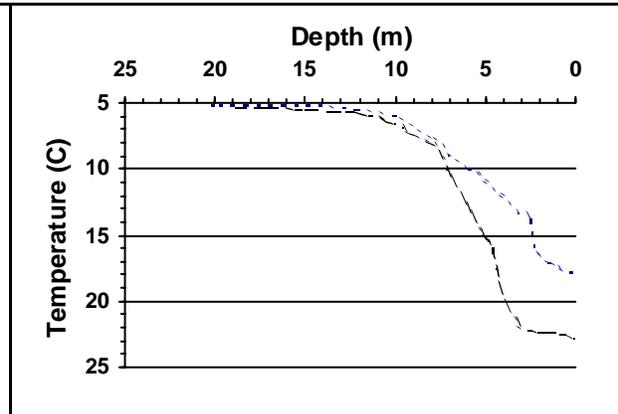
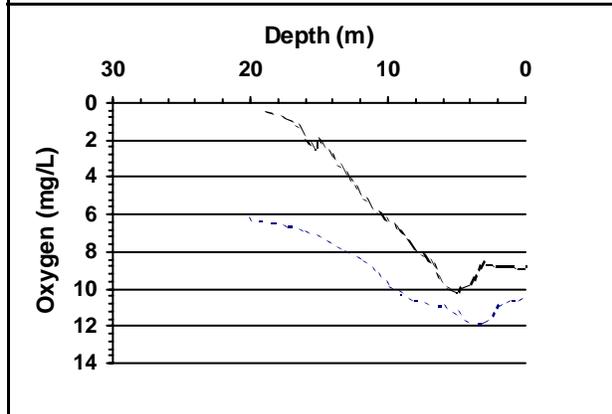
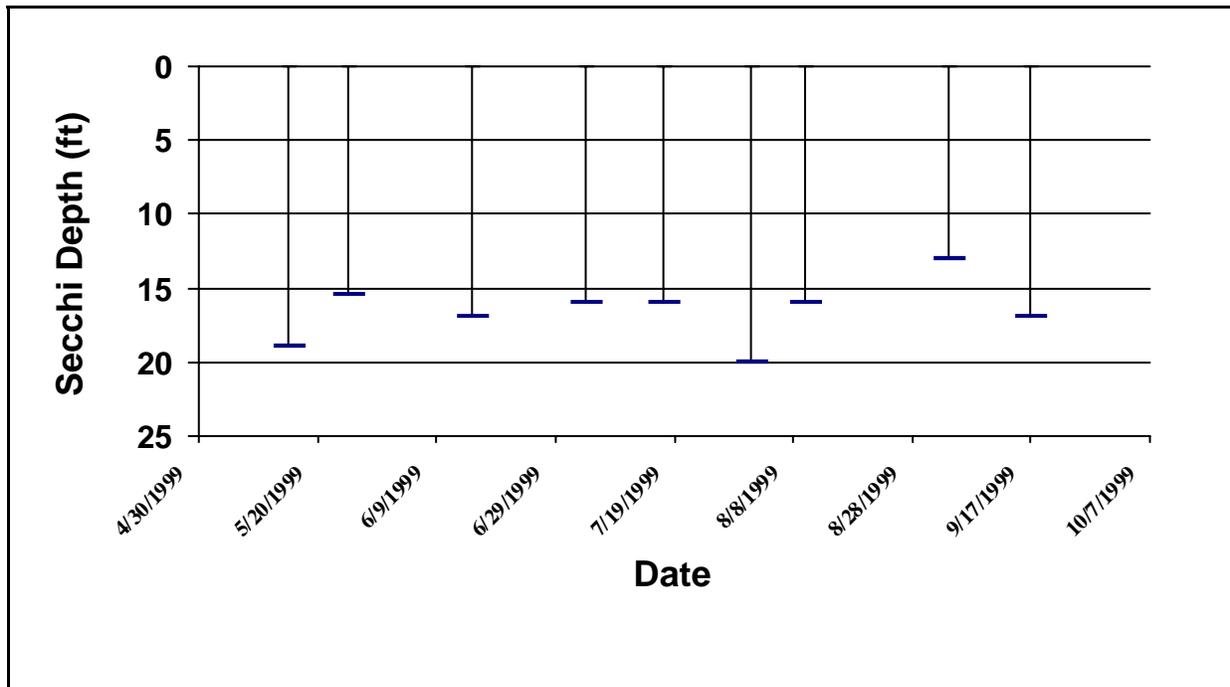
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
5/25/1999						
		0.1	30	10.48	8.27	17.77
		0.7	29.9	10.57	8.15	17.62
		1.1	29.9	10.63	8.08	17.11
		2.1	29.7	11.06	8.1	16.44
		2.6	29.1	11.64	8.29	13.47
		3.2	29.2	11.89	8.22	13.2
		4.1	29	11.8	8.25	12.01
		5.8	29.8	11.06	8.27	9.96
		6.1	29.8	10.9	8.24	9.92
		8.1	30	10.58	8.2	7.58
		10	30	9.77	8.18	5.91
		12.1	30	8.29	8.07	5.38
		14	30.2	7.5	7.99	5.21
		16.1	30.4	6.87	7.95	5.17
		18.2	30.7	6.42	7.83	5.16
		20	30.6	6.26	7.75	5.15
		20.2	30.6	6.12	7.65	5.16

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
8/10/1999						
		0	32	8.8	8.1	22.73
		0.1	32.1	8.84	8.26	22.72
		1.1	32.1	8.81	7.97	22.34
		1.6	32	8.79	7.89	22.25
		1.9	32	8.8	7.85	22.22
		3.1	32	8.68	7.76	21.87
		4.1	32.4	9.68	7.72	19.47
		4.8	33.5	10.01	7.83	15.69
		5.1	33.9	10.17	7.88	15.09
		6.1	32.9	9.62	7.9	12.73
		7	33.4	8.54	7.89	10.58
		7.9	33.2	7.93	7.88	8.09
		9.2	33	6.92	7.81	7.27
		10.1	33.1	6.31	7.75	6.51
		12	32.9	4.87	7.68	5.76
		13.1	33.1	3.88	7.6	5.58
		15.1	34.2	1.99	7.46	5.39
		15.3	34.3	2.43	7.49	5.38
		17	35.4	.96	7.36	5.32
		18.9	36.9	.38	7.27	5.3

Secchi Depth and Profile Graphics

Station: 1

BOSSN1



CHAMBERS

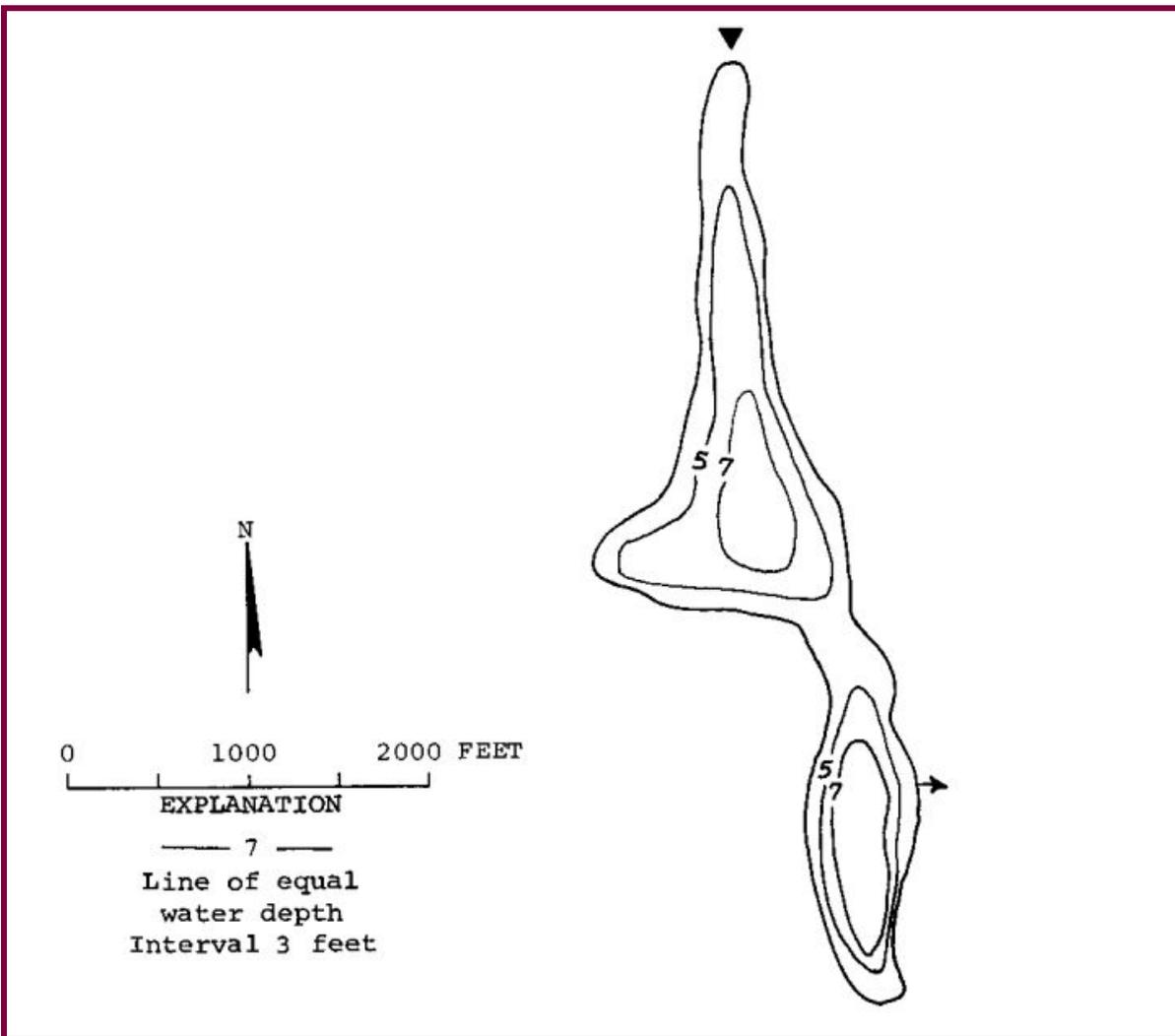
THURSTON County

Lake ID: CHATH1

Ecoregion: 2

Chambers Lake is located three miles southeast of Olympia. It is also known as Big Chambers Lake, and was originally known as Russell Lake. Chambers Lake has no surface inlets, but is fed by stormwater and surface runoff. As a result, it varies in size. Chambers Lake drains via Little Chambers Lake to the Deschutes River.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
60	8	5	1	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
273	2.2	194	47 01 21.	122 50 04.



Trophic State Assessment for 1998

CHAMBERS

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 67	J
TSI_Phos:		
TSI_Ch1:		
Narrative TSI:	^b	E

Summary Comments:

The general water clarity for Chambers Lake was poor for 1998, worse than even in year's past. Chambers Lake is very shallow lake and has a large amount of aquatic plants growing within it. The Secchi depth readings ranged from 0.3 meters (less than 1 foot) to 1.0 meters (3.5 feet) with a mean Secchi depth of 0.6 meters (2.0 feet). In 1994, the mean Secchi depth was 1.1 meters (3.5 feet).

No chemistry data was collected for Chambers Lake in 1998.

Numerous geese and other waterfowl were sighted by the volunteer monitor on the lake between May and September.

Two site visits were made by Ecology staff in 1998. A weak degree of thermal stratification was observed during the 8/25/98 visit with a corresponding depletion of dissolved oxygen near the bottom of the lake.

Based on Secchi depth data, Chambers Lake is classified as eutrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

CHAMBERS

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/14/1998		11	2	6	100	4	4	4	3	100	0	0	0
	Sampler: MCNEIL			Remarks:									
5/14/1998			2		0						0	0	0
	Sampler: BELL-MCKINNON			Remarks:									
5/29/1998		18.9	3	6	50	1	3	4	2	20		0	0
	Sampler: MCNEIL			Remarks:									
6/12/1998		18.9	2.5	6	75	3	1	4	1	40	1	2	0
	Sampler: MCNEIL			Remarks: (THIS IS THE FIRST LAKE HEIGHT MEASUREMENT)									
6/28/1998		20	3.5	6	0	2	1	4	2	100		2	0
	Sampler: MCNEIL			Remarks:									
7/10/1998		23.9	3	6	25	2	1	4	2	50	1	1	0
	Sampler: MCNEIL			Remarks: PURPLE LILIES OUT - BEAUTIFUL									
7/25/1998		24.4	1.5	7	0	2	1	4	2	50	0	2	0
	Sampler: MCNEIL			Remarks:									
8/16/1998		25	2	7	50	2	1	4	2	70	0	2	0
	Sampler: MCNEIL			Remarks:									
8/25/1998		22.2	.83	2	0	2	1	3	1	0	0	0	0
	Sampler: MCNEIL			Remarks:									
8/25/1998			.83		0						0	0	0
	Sampler: BELL-MCKINNON			Remarks:									
9/6/1998		22.8	1	2	0	2	1	3	1	30	1	0	0
	Sampler: MCNEIL			Remarks:									

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
9/22/1998		20	1		0	2	1	1	1	0	2	0	0
		Sampler: MCNEIL		Remarks:									

Profile Report

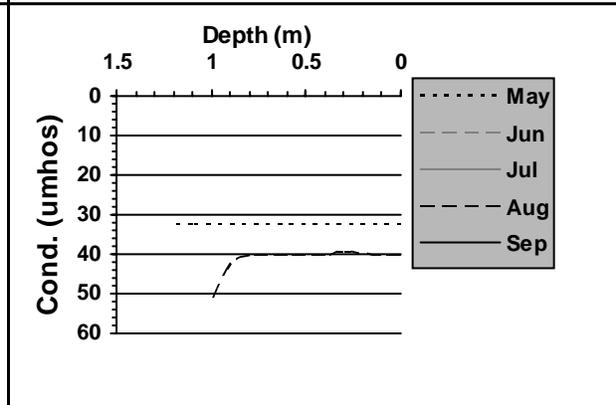
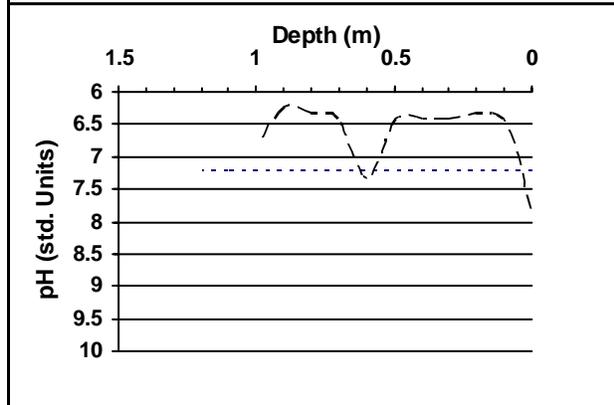
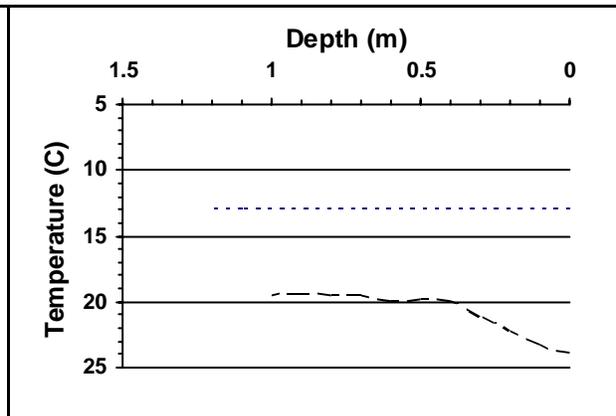
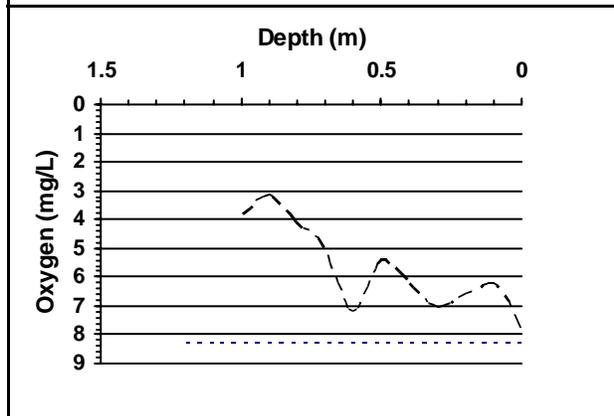
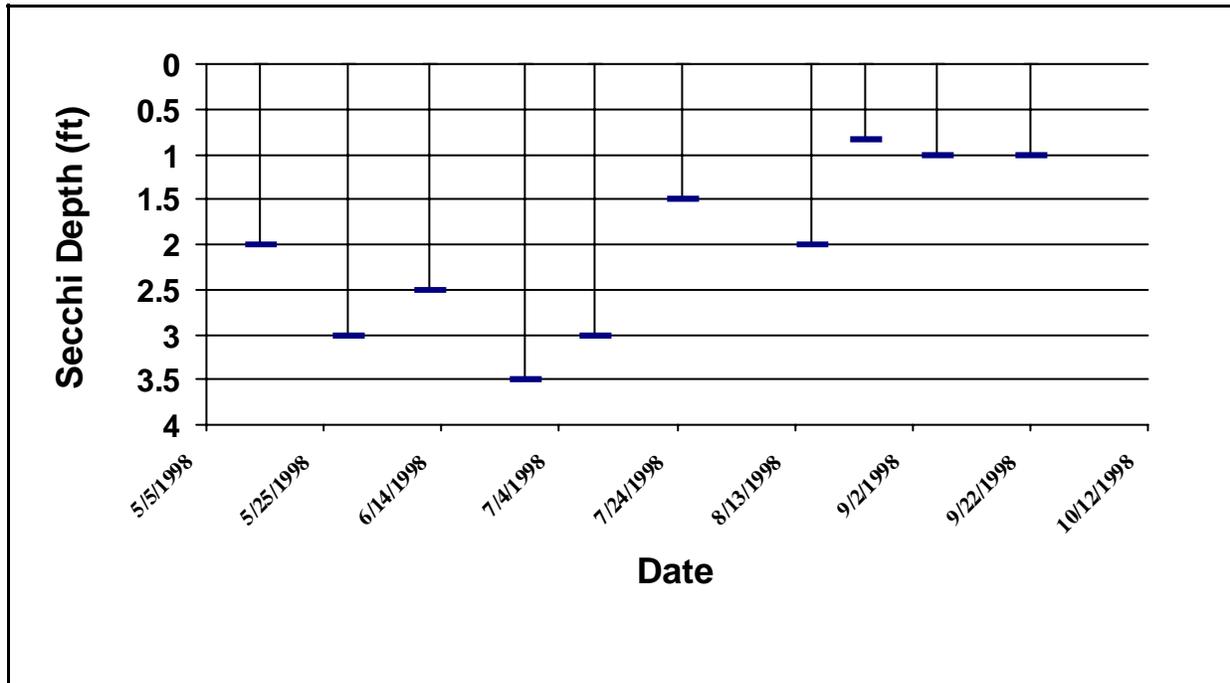
CHAMBERS

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
5/14/1998						
		0	32	8.23	7.2	12.8
		1.1	32	8.23	7.2	12.8
		1.2	32	8.22	7.2	12.8
8/25/1998						
		0	40	7.74	7.8	23.8
		0.1	40	6.16	6.4	23.2
		0.3	39	7.04	6.4	21.1
		0.4	40	6.03	6.4	19.9
		0.5	40	5.38	6.4	19.7
		0.6	40	7.12	7.3	19.9
		0.7	40	4.97	6.4	19.5
		0.8	40	4.04	6.3	19.5
		0.9	42	3.1	6.2	19.3
		1	51	3.76	6.8	19.4

Secchi Depth and Profile Graphics

Station: 1

CHATH1



- May
- Jun
- Jul
- Aug
- Sep

CLEAR

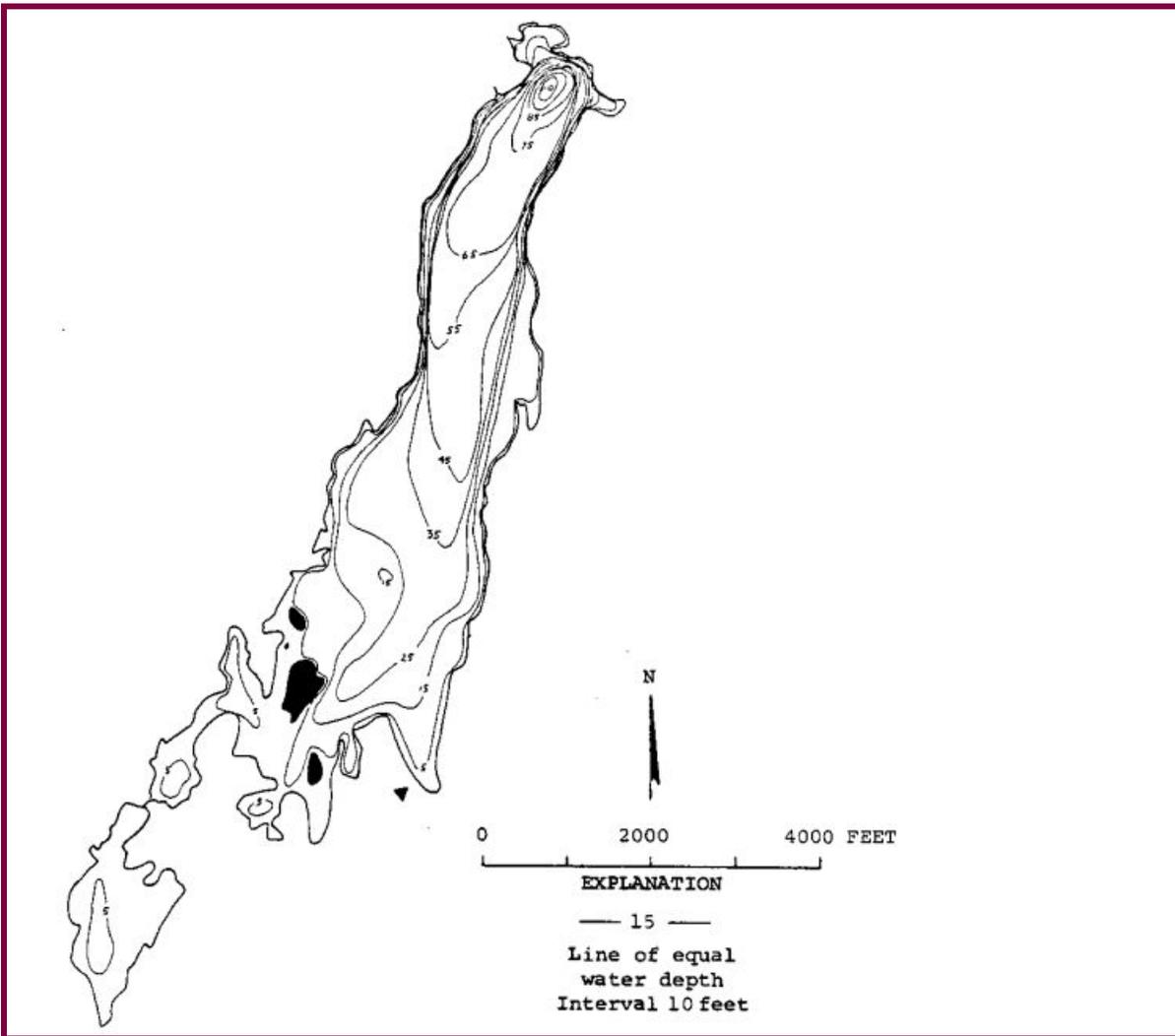
SPOKANE County

Lake ID: CLESP1

Ecoregion: 7

Clear Lake is located 2.1 miles south of the Town of Medical Lake. It has no surface inlets or outlets, and is within the Crab Creek drainage.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
410	110	26	10	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
11000	9.09	2342	47 30 58.	117 42 22.



Station Information

CLESP1

Primary Station	Station # 1	latitude: 47 33 15.6	longitude: 117 41 50.8
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

CLEAR

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 43 J
TSI_Phos:
TSI_Ch1:
Narrative TSI: ^b M

Summary Comments:

The general water clarity for Clear Lake was good in 1998. The Secchi depth readings remained relatively constant throughout the sampling season. They ranged from 2.4 meters (8.0 feet) to 4.3 meters (14.0 feet) with a mean of 3.4 meters (11.1 feet). For comparison, in 1997 the mean Secchi depth reading was 3.3 meters (11.0 feet).

No chemistry data was collected for Clear Lake in 1998.

Only one site visit was made by Ecology staff in 1998. Thermal stratification was observed during this visit (6/16/1998) and low dissolved oxygen levels were noted in the hypolimnion.

Geese were observed by the volunteer monitor on only one of his sampling visits between May and October. However various numbers of waterfowl were observed and recorded by the volunteer monitor on every one of his sampling visits except one.

An aquatic plant survey was done by Ecology staff in 1994 which showed no non-native plants. In a shallow bay at the far north end of the lake there was a large expanse of aquatic plants which impacted the users of the resort located in the bay.

Based on Secchi depth data, Clear Lake is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

CLEAR

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/7/1998		14.4	17.5	6	0	3	1	3	4	6	10	5	0
	Sampler:	JOHNSON		Remarks:									
5/20/1998		12.2	12.5	6	50	2	2	3	3	0	3	4	0
	Sampler:	JOHNSON		Remarks: DON'T HAVE WATER HEIGHT GAGE.									
6/3/1998		12.2	11.5	6	0	3	1	3	3	0	4	3	0
	Sampler:	JOHNSON		Remarks:									
6/16/1998		14.4	9.5	6	75	1	2	2	3	0	1	1	1
	Sampler:	JOHNSON		Remarks:									
6/16/1998			9.5		0					0	0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									
7/1/1998		19.4	10.5	6				2	3	0	4	2	0
	Sampler:	JOHNSON		Remarks:									
7/15/1998		20	8	6	25	1	1	2	2			3	0
	Sampler:	JOHNSON		Remarks: LAKE HEIGHT IS GOOD.									
7/28/1998		24.4	14	6	50	1	1	3	3	0	12	3	1
	Sampler:	JOHNSON		Remarks: LAKE HEIGHT IS GOOD.									
8/12/1998		21.1	13.5	6	0	1	1	3	3	0	8	4	0
	Sampler:	JOHNSON		Remarks: LAKE HEIGHT IS DROPPING BUT STILL OK.									

Date	Time	Temperature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Brightness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5-good)	Swimming (1-poor, 5-good)	Geese (#)	Waterfowl (besides geese #)	Boats-Fishing (#)	Boats-Skiing (#)
8/26/1998		18.9	12.5	6	25	3	1	3	3	0	11	2	0
	Sampler:	JOHNSON		Remarks:	LAKE HEIGHT IS OK.								
9/16/1998		17.8	8.5	2	25		2	3	3	0	5	4	0
	Sampler:	JOHNSON		Remarks:	LAKE HEIGHT IS DOWN SOME.								
10/21/1998		8.9	9.6	2	25	3	1	3	3	0	7	2	0
	Sampler:	JOHNSON		Remarks:	LAKE HEIGHT IS DOWN MORE.								

Profile Report

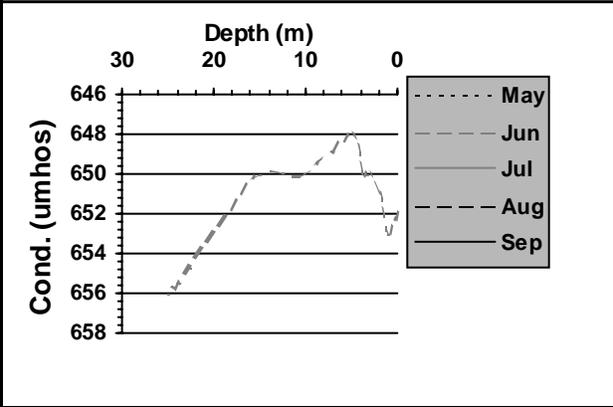
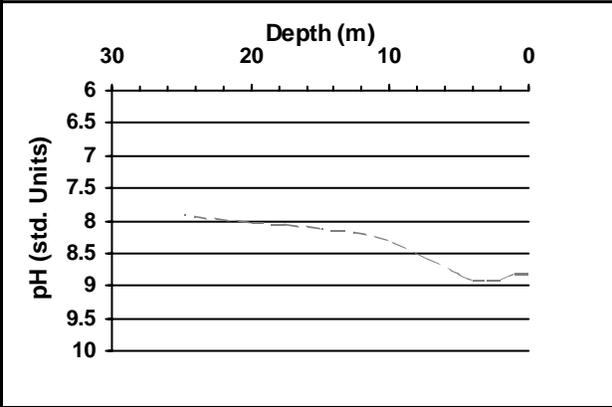
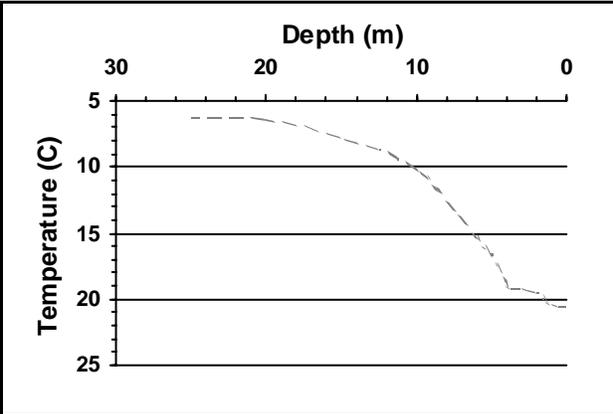
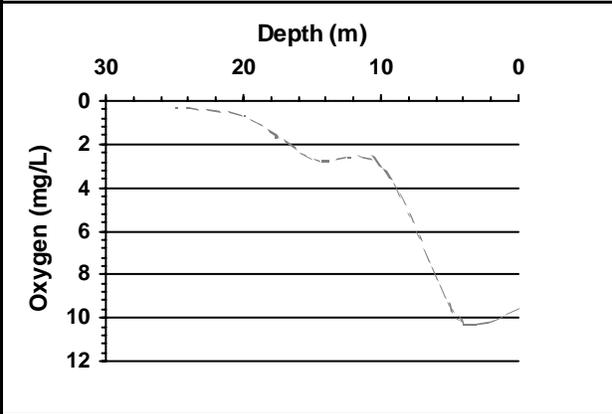
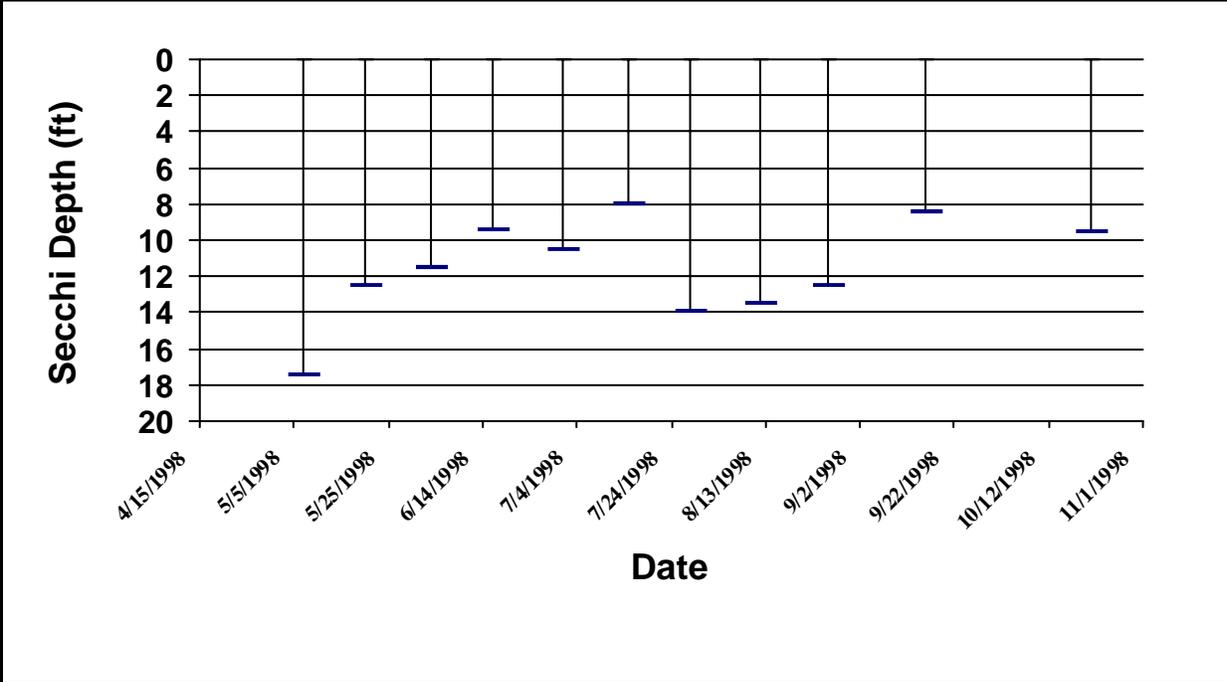
CLEAR

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/16/1998						
		0	652	9.49	8.8	20.5
		1	653	9.89	8.8	20.3
		2	651	10.21	8.9	19.4
		3.1	650	10.27	8.9	19.1
		4	650	10.28	8.9	19
		5	648	9.75	8.8	16.7
		10	650	3	8.3	10.2
		15	650	2.64	8.1	7.7
		20	653	.64	8	6.4
		24.8	656	.27	7.9	6.2
		24.9	656	.26	7.9	6.2

Secchi Depth and Profile Graphics

Station: 1

CLESP1



Station Information

CLESP1

Primary Station	Station # 1	latitude: 47 33 15.6	longitude: 117 41 50.8
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

CLEAR

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	41
TSI_Phos:		46
TSI_Ch1:		
Narrative TSI:	^b	M

Summary Comments:

The general water clarity of Clear Lake was good in 1999. The Secchi depth readings ranged from 2.6 meters (8.5 feet) to 6.1 meters (20.0 feet) with a mean Secchi depth of 3.9 meters (12.9 feet). For comparison, in 1998 the mean Secchi depth was 3.4 meters (11.1 feet).

No geese and between 4-20 other waterfowl were observed on the lake during each sampling visit made by the volunteer monitor between the months of May through the middle of September.

The chemistry data collected for Clear Lake showed a moderately high phosphorus level in the epilimnion indicating an elevated degree of productivity. This level of phosphorus indicates algae could become a nuisance, though usually not for long periods of time.

Ecology staff made only one site visit in 1999. Thermal stratification was observed during this visit (7/28/1999) and low dissolved oxygen levels in the hypolimnion were noted.

A complete aquatic plant survey was not done on Clear Lake in 1999. However, Ecology staff noted large amounts of native aquatic plants: *Elodea canadensis* (common elodea), *Myriophyllum sibiricum* (northern milfoil), *Potamogeton robbinsii* (fernleaf pondweed) and *Ceratophyllum demersum* (hornwort) in a bay at the north end of the lake. The owner of the resort near this bay complained that the aquatic plants restricted boat use in that part of the lake. The resort owner also commented on the occurrence of a filamentous green algae widespread in the lake beginning in May.

Based on the Secchi depth data and the phosphorus levels, Clear Lake is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

CLEAR

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
------	------	--------	-----------------	-----------------	-------	----------------------------	-------------------------------------	--------------------	-------------------	--------------------

Station 1

7/28/1999 1610 E 18.5

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

CLEAR

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/6/1999		44	15	6	0	2	2	4	4	0	4	4	0
	Sampler:	JOHNSON											Remarks: Used a view tube.
5/26/1999		60	20	6	0	1	1	3	3	0	7	5	0
	Sampler:	JOHNSON											Remarks: Used a view tube; beautiful day.
6/11/1999		58	15	6	25	2	2	3	3	0	3	8	0
	Sampler:	JOHNSON											Remarks: Used a view tube.
7/1/1999		62	12	6	50	3	2	4	4	0	9	6	0
	Sampler:	JOHNSON											Remarks: Used a view tube.
7/15/1999		65	12		50		2	4	4	0	9	9	0
	Sampler:	JOHNSON											Remarks: Used a view tube.
7/28/1999			12										
	Sampler:	JOHNSON											Remarks: Beginning of may - green filamentous algae everywhere - water still cold then! Lake didn't stay frozen all winter. 6-8 underwater springs in the lake. Plants: Elodea, milfoil, Potamogeton robbinsii and coontail. Lots of plants in the cove area.
8/19/1999		68	10	2	0			3	3	0		2	1
	Sampler:	JOHNSON											Remarks: Used a view tube. Lake lower but still good.
9/8/1999		60	8.5	2				3	3	0	20	3	0
	Sampler:	JOHNSON											Remarks: Used a view tube.

Profile Report

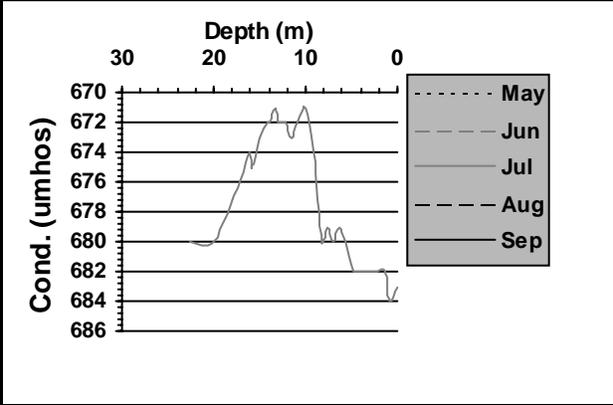
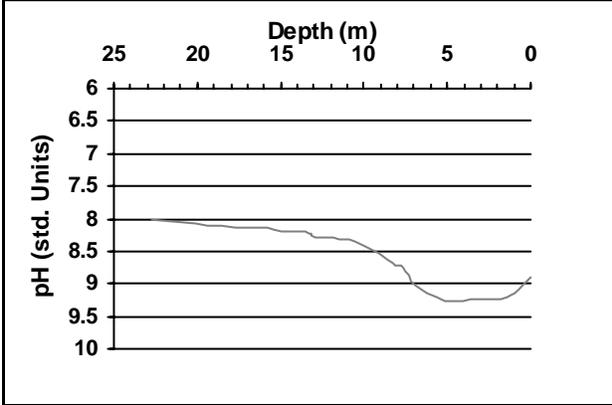
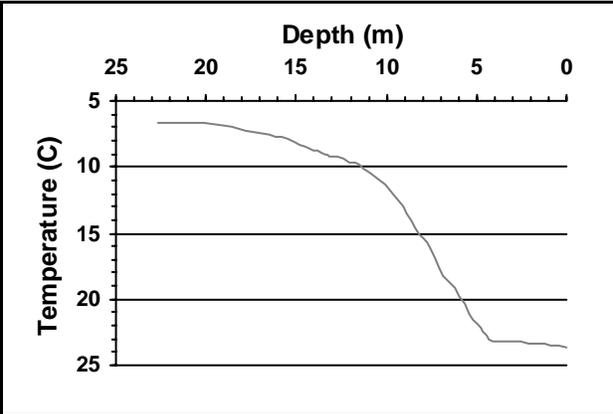
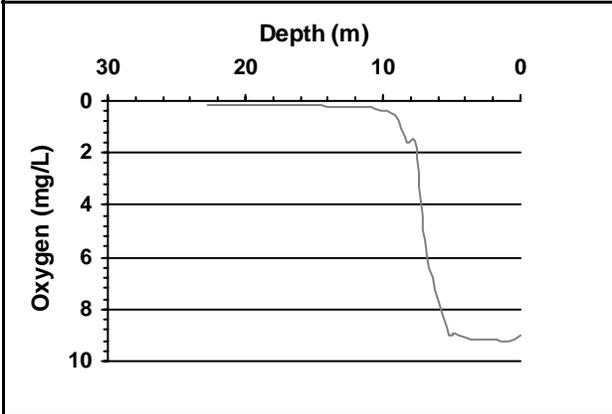
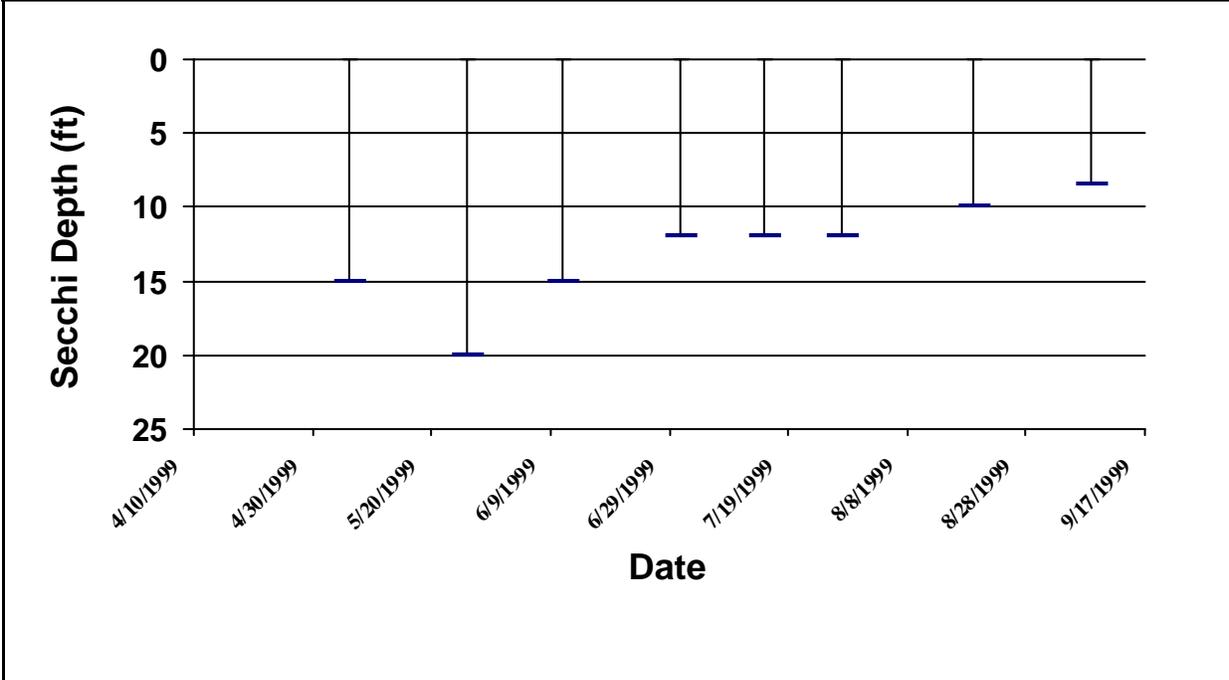
CLEAR

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
7/28/1999						
		0	683	9	8.91	23.61
		0.9	684	9.21	9.16	23.54
		1.4	682	9.22	9.21	23.41
		2.1	682	9.19	9.23	23.32
		3	682	9.16	9.25	23.22
		4.1	682	9.09	9.27	23.17
		4.8	682	8.93	9.27	22.15
		5.2	681	8.98	9.26	21.59
		6.2	679	7.24	9.15	19.2
		6.9	680	5.33	9.01	18.22
		7.7	679	1.5	8.74	15.72
		8.2	680	1.6	8.69	15.1
		9.1	674	.55	8.52	13
		10.1	671	.37	8.42	11.3
		10.9	672	.26	8.33	10.39
		11.5	673	.24	8.31	9.86
		12.1	672	.26	8.3	9.73
		12.7	672	.24	8.28	9.25
		13.1	672	.24	8.27	9.15
		13.3	671	.22	8.22	9.06
		13.9	672	.22	8.21	8.73
		14.1	672	.22	8.19	8.69
		15	673	.19	8.19	8.11
		15.8	675	.18	8.14	7.74
		16.1	674	.19	8.14	7.73
		17.1	676	.18	8.13	7.47
		20.1	680	.18	8.07	6.69
		22.7	680	.18	8.03	6.6

Secchi Depth and Profile Graphics

Station: 1

CLESP1



CONCONULLY (SALMON)

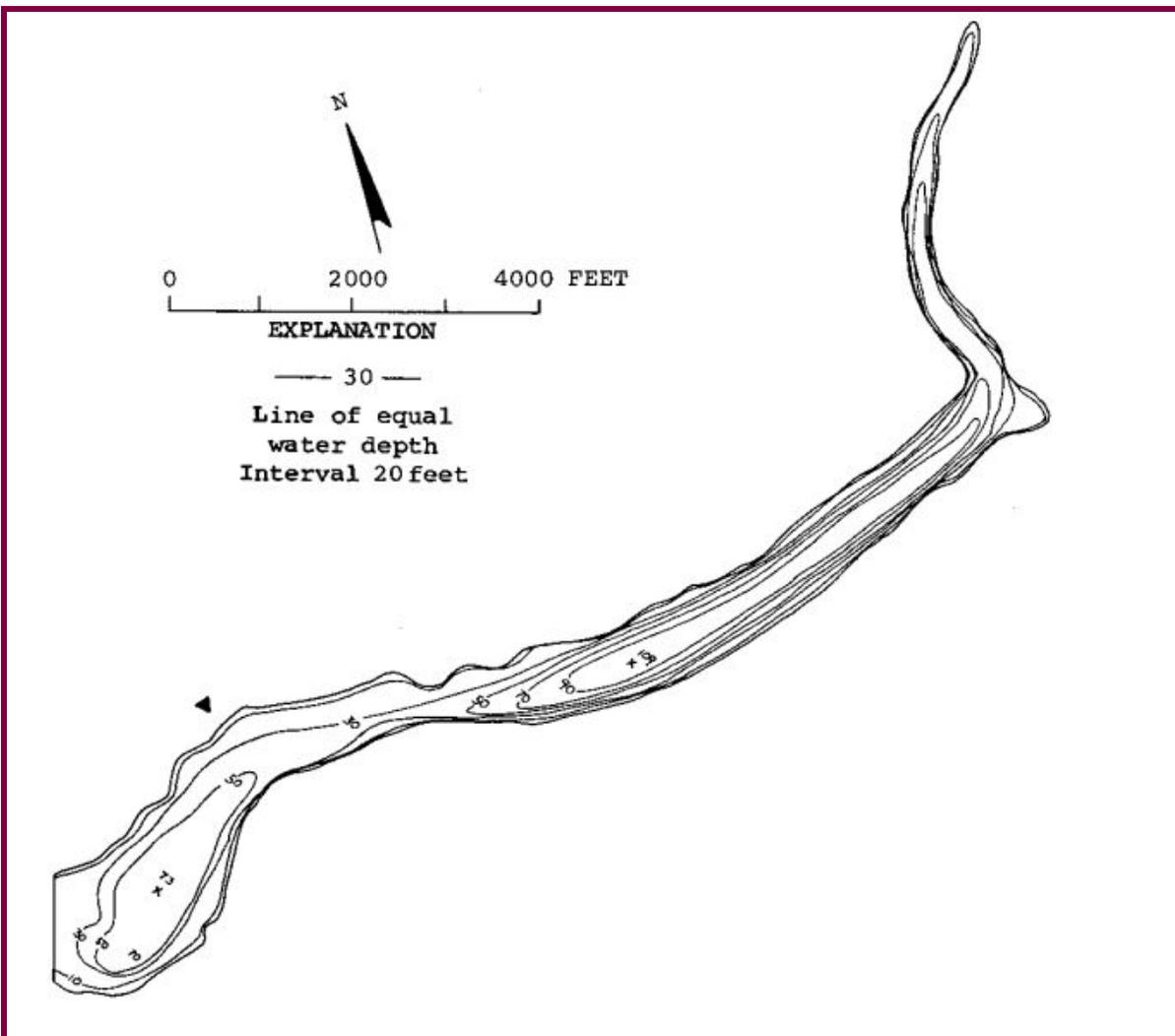
OKANOGAN County

Lake ID: CONOK1

Ecoregion: 4

The south end of Conconully Lake is located at Conconully. It is an artificial reservoir created in 1919-1921 by damming Salmon Creek. It is fed by the North Fork of Salmon Creek, which enters Conconully Lake just above the dam. The lake drains south via Salmon Creek to Conconully Reservoir. Before Salmon Creek was dammed, the lake was known as Salmon Lake.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
273	109	47	50	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
12907	6.82	2287	48 33 29.	119 44 40.



Station Information

CONOK1

Primary Station	Station # 1	latitude: 48 33 39.8	longitude: 119 44 22.7
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

CONCONULLY (SALMON)

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 37 J
TSI_Phos:
TSI_Ch1:
Narrative TSI: ^b OM

Summary Comments:

The general water clarity for Lake Osoyoos was good in 1998. The Secchi depth readings ranged from 2.7 meters (9.0 feet) to 6.7 meters (22.0 feet) with a mean Secchi depth reading of 4.1 meters (13.5 feet). For comparison, the mean Secchi depth in 1997 was 4.6 meters (15.1 feet).

No chemistry data was collected for Lake Conconully in 1998.

Only one site visit was made by Ecology staff in 1998. Thermal stratification was noted during this visit (8/18/1998) and low dissolved oxygen occurred in the hypolimnion.

Even though the Secchi Trophic State Index (TSI) number indicates an oligotrophic lake, Lake Conconully is classified as oligomesotrophic. This assessment is based on the large amount of suspended algae found in the lake by both the volunteer monitor throughout the summer and by Ecology staff during their site visit and the low dissolved oxygen levels in the hypolimnion.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Profile Report

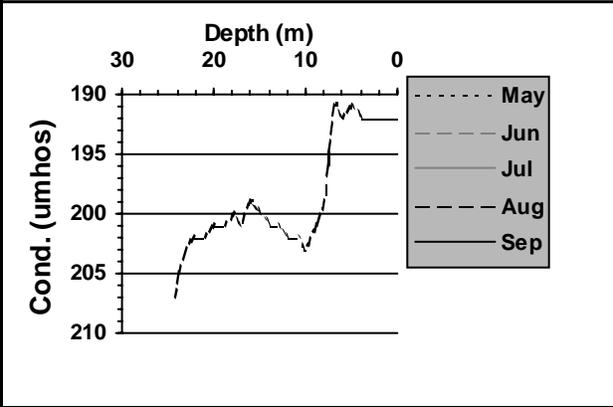
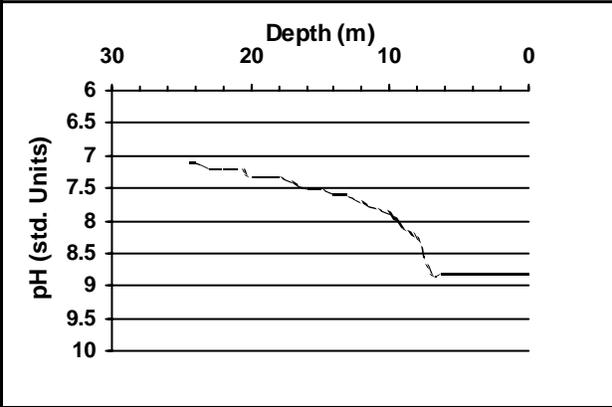
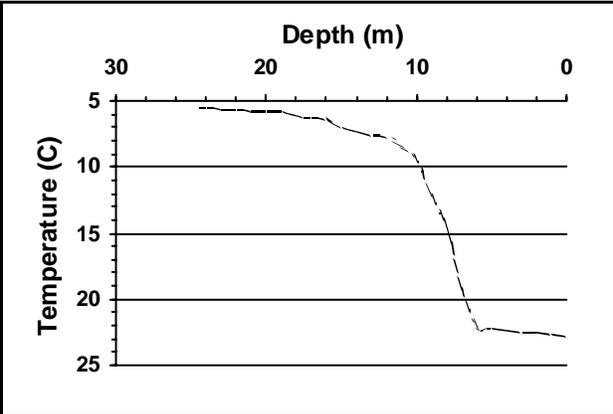
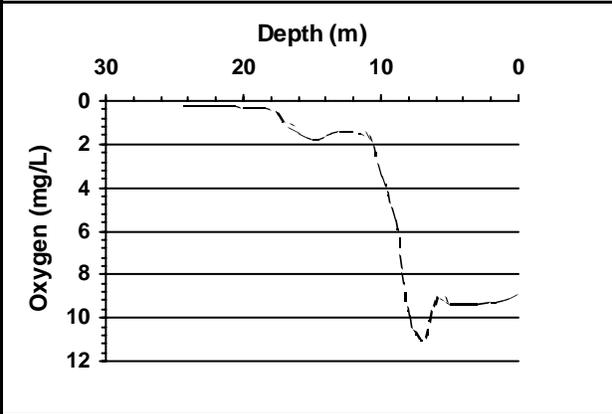
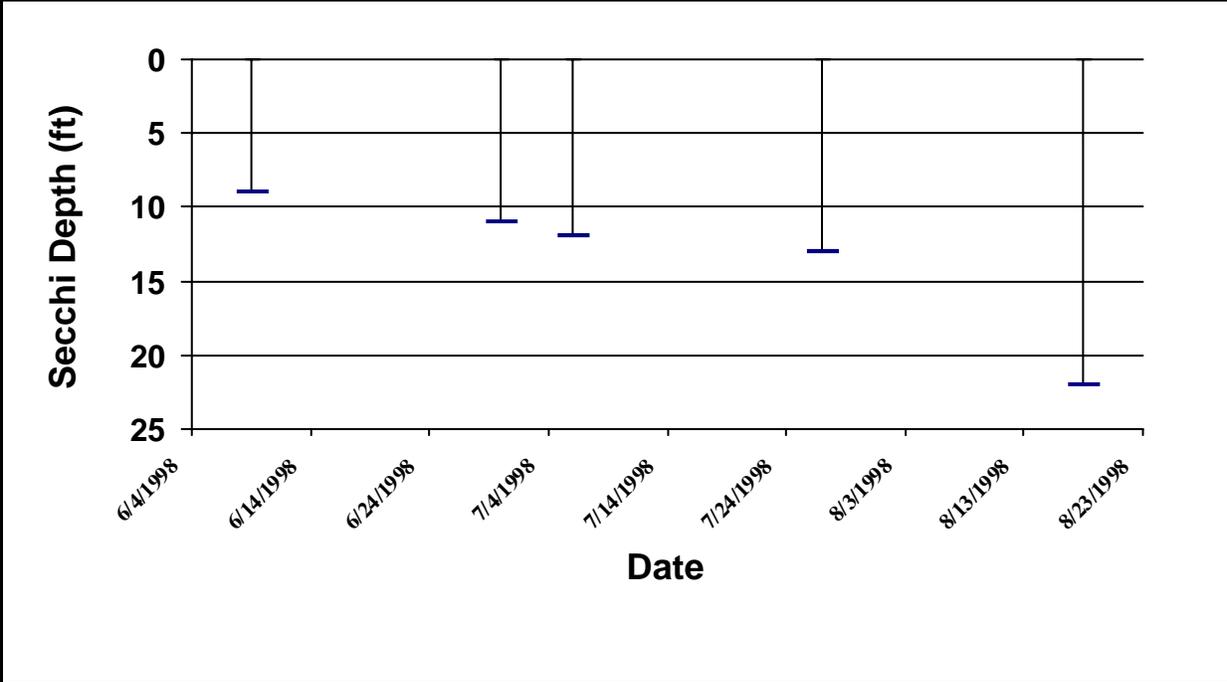
ONCONULLY (SALMON)

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
8/18/1998						
		0	192	8.92	8.8	22.8
		1	192	9.18	8.8	22.6
		2	192	9.29	8.8	22.5
		3	192	9.35	8.8	22.4
		4	192	9.37	8.8	22.3
		5	191	9.3	8.8	22.2
		6	192	9.17	8.8	22.2
		7	191	11.03	8.8	19.3
		8	199	9.98	8.3	14.8
		9	201	5.46	8.1	12.2
		10	203	3.48	7.9	9.6
		10.9	202	1.77	7.8	8.4
		12	202	1.4	7.7	7.7
		13	201	1.38	7.6	7.5
		14	201	1.61	7.6	7.2
		15	200	1.77	7.5	6.9
		16	199	1.49	7.5	6.4
		17.1	201	.94	7.4	6.2
		17.9	200	.35	7.3	6
		19	201	.26	7.3	5.8
		20.1	201	.24	7.3	5.7
		21	202	.21	7.2	5.7
		22.1	202	.2	7.2	5.6
		23	203	.2	7.2	5.6
		24	205	.18	7.1	5.5
		24.4	207	.16	7.1	5.5

Secchi Depth and Profile Graphics

Station: 1

CONOK1



Station Information

CONOK1

Primary Station	Station # 1	latitude: 48 33 39.8	longitude: 119 44 22.7
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

CONCONULLY (SALMON)

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a	J, N
TSI_Phos: 45	
TSI_Ch1:	
Narrative TSI: ^b	

Summary Comments:

Only two Secchi readings were made in 1999. This is not enough data to calculate a Trophic State Index.

The chemistry data collected for Lake Conconully showed a moderately high phosphorus level in the epilimnion indicating an elevated degree of productivity. At this level of phosphorus algae could become a nuisance, though usually not for long periods of time.

Ecology staff made only one site visit in 1999. Thermal stratification was observed during this visit (7/27/1999) and low dissolved oxygen levels in the hypolimnion were noted.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

CONCONULLY (SALMON)

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
------	------	--------	-----------------	-----------------	-------	----------------------------	-------------------------------------	--------------------	-------------------	--------------------

Station 1

7/27/1999 0915 E 17.2

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

ONCONULLY (SALMON)

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
7/20/1999		60	11	3	0	1	3	4	3		20	9	0
	Sampler: MOORE		Remarks: Did not use a view tube.										
7/27/1999		23	11	2	0	1	1	4	4	8		12	0
	Sampler: MOORE		Remarks:										

Profile Report

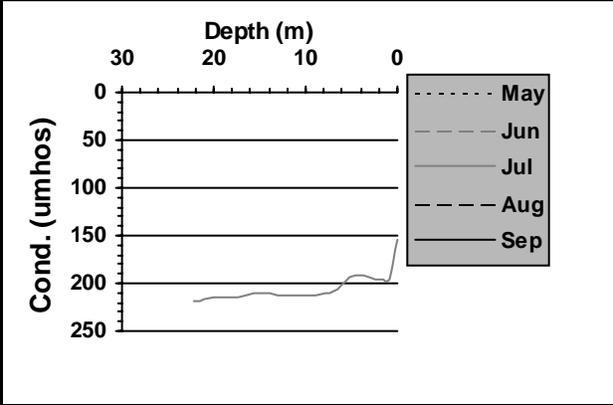
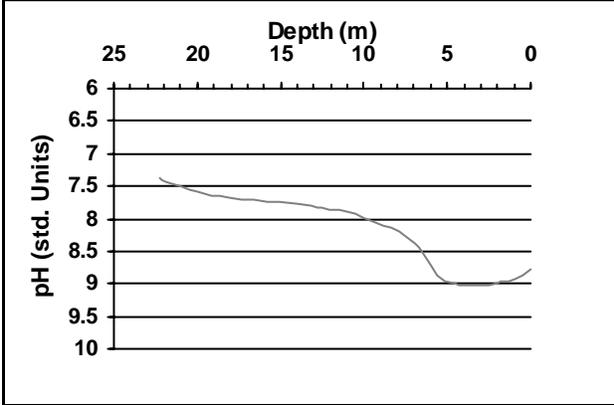
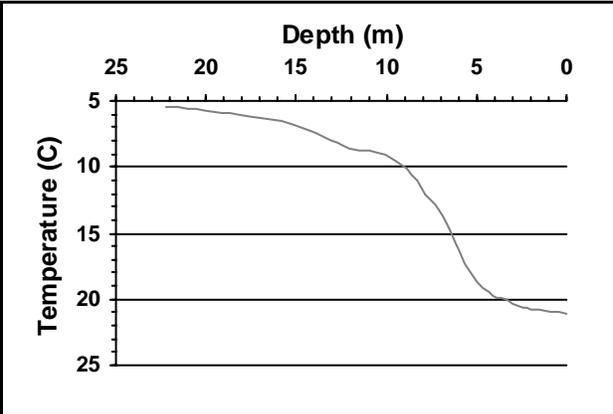
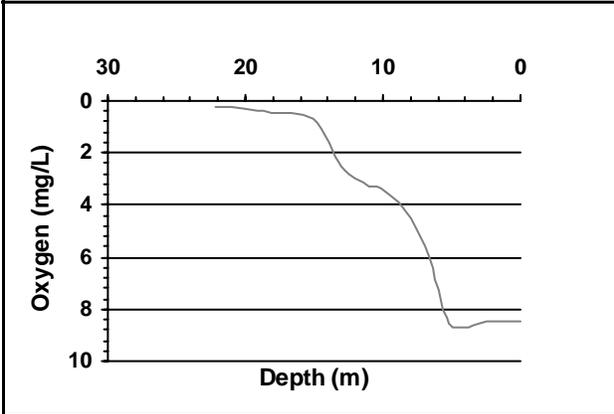
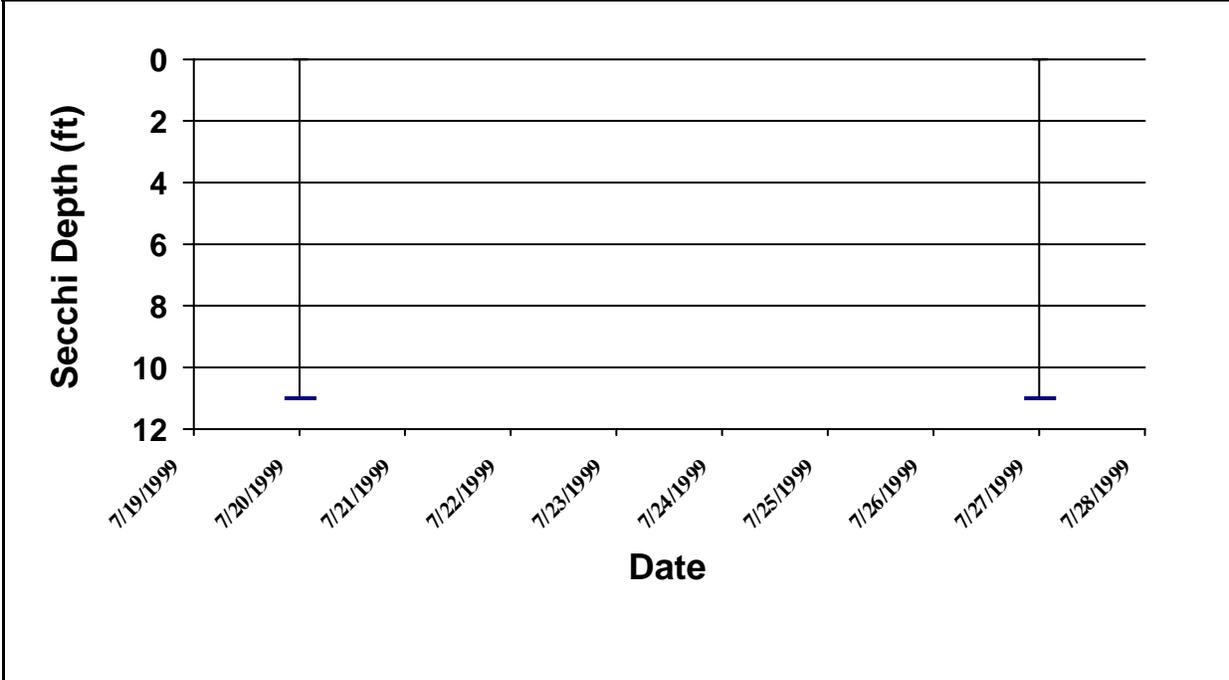
ONCONULLY (SALMON)

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
7/27/1999						
		0	154	8.49	8.79	21.12
		0.9	195	8.5	8.94	20.91
		1.5	195	8.49	8.97	20.83
		2	195	8.45	8.99	20.75
		3	193	8.54	9.01	20.32
		3.7	192	8.68	9.01	19.85
		4.1	192	8.72	9.02	19.68
		5.2	193	8.57	8.96	18.25
		6	203	7.27	8.71	16.23
		6.9	209	5.6	8.39	13.69
		7.9	211	4.48	8.19	12.05
		8.9	212	3.93	8.12	10.17
		10.1	212	3.38	7.99	9.05
		11	212	3.31	7.9	8.81
		12.1	212	3	7.85	8.6
		13.1	212	2.54	7.81	7.97
		15.1	211	.7	7.73	6.74
		18.1	214	.42	7.67	6
		20	215	.32	7.58	5.68
		21.9	218	.25	7.42	5.42
		22.2	218	.24	7.37	5.42

Secchi Depth and Profile Graphics

Station: 1

CONOK1



CRAWFISH

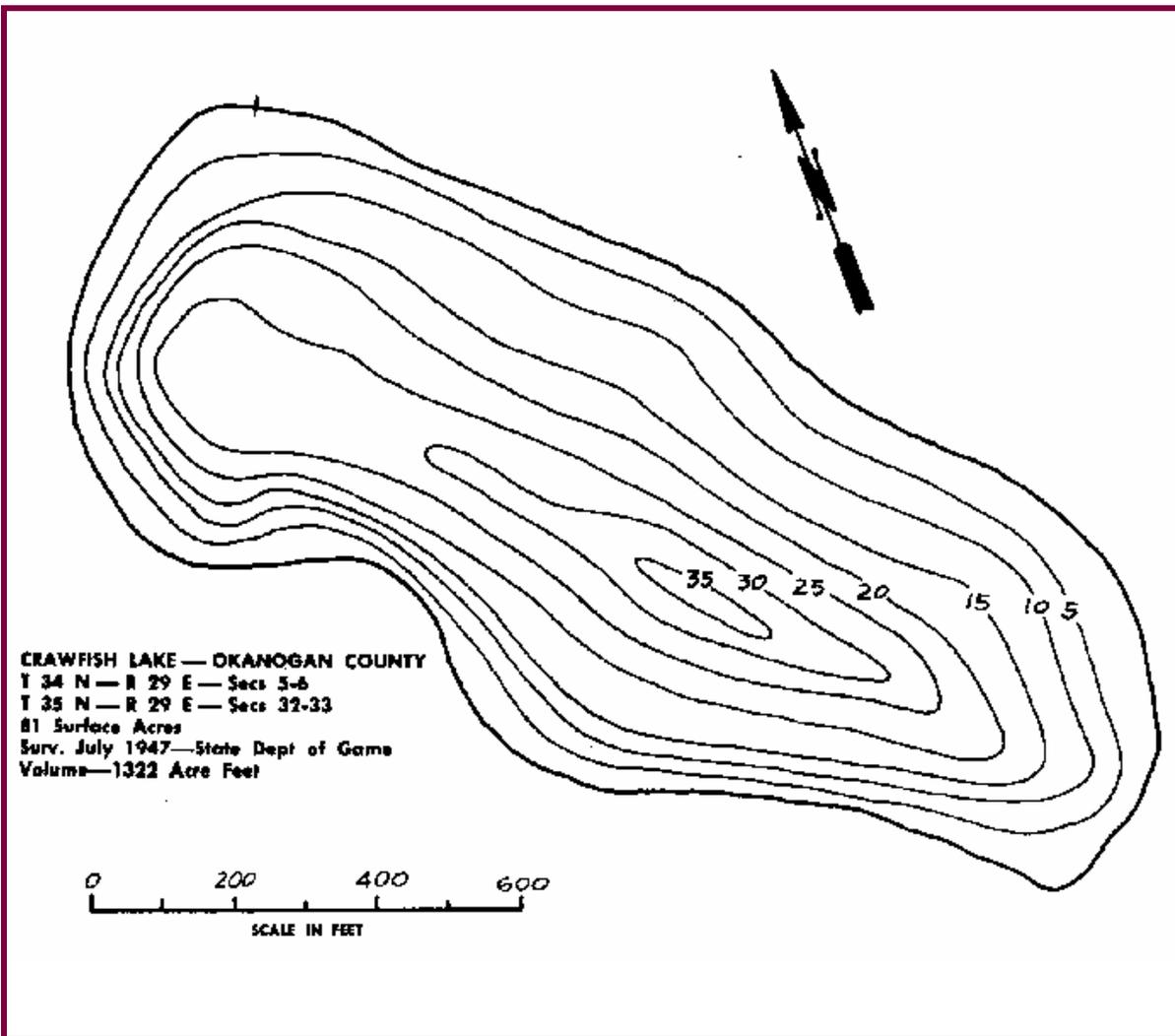
OKANOGAN County

Lake ID: CRAOK1

Ecoregion: 8

Crawfish Lake is located 15 miles northeast of Omak, and 8.5 miles north of Disautel. It drains intermittently to the east to Lost Creek and the West Fork of the Sanpoil River. The north half of the lake is on USFS land, and the south half is on the Colville Indian Reservation.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
80	36			
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
		4475	48 28 08.	119 12 54.



Station Information

CRAOK1

Primary Station	Station # 1	latitude: 48 29 28.7	longitude: 119 13 25.0
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

CRAWFISH

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 39 J
TSI_Phos:
TSI_Ch1:
Narrative TSI: ^b O

Summary Comments:

The general water clarity for Crawfish Lake was good in 1998. The Secchi depth readings ranged from 3.3 meters (10.7 feet) to 5.4 meters (17.8 feet) with a mean Secchi depth of 4.5 meters (14.7 feet). For comparison, in 1997 the mean Secchi depth was 4.4 meters (14.4 feet).

No chemistry data was collected for Crawfish Lake in 1998.

There were no sightings of geese or waterfowl on the lake by the volunteer monitor during his sampling visits.

No site visits were made by Ecology staff in 1998.

Based on Secchi depth data, Crawfish Lake is classified as oligotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

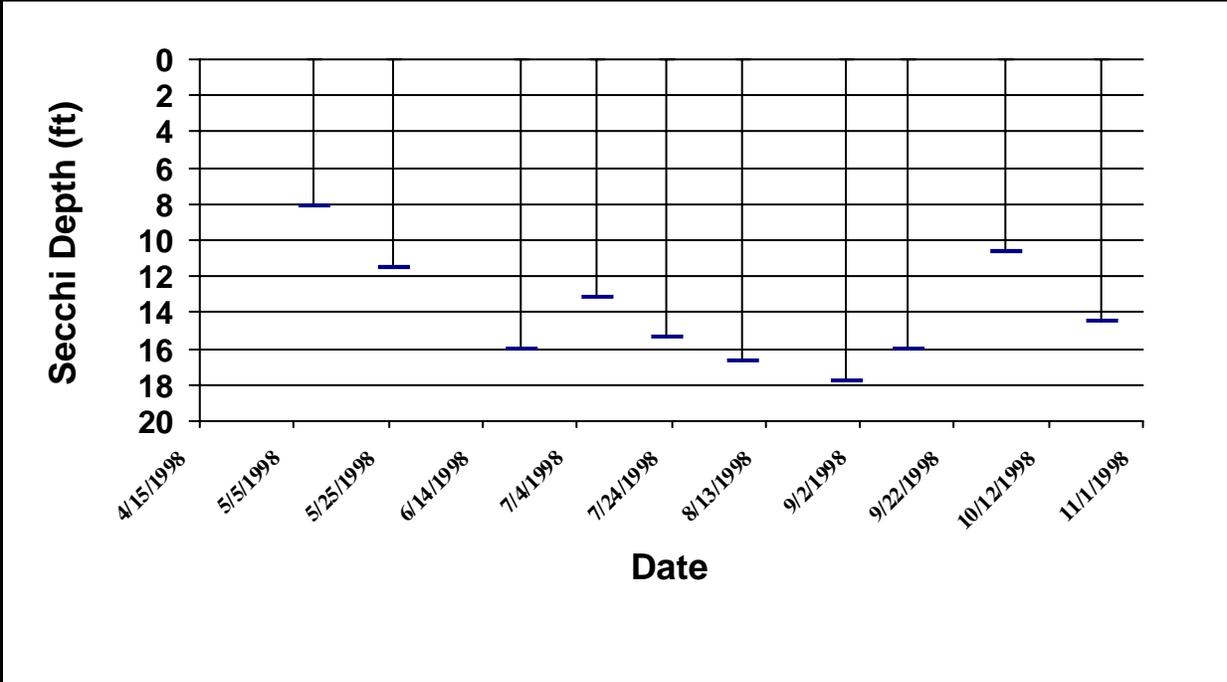
CRAWFISH

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/9/1998		12.2	8.17	3	75	3	1	5	5	0	8	1	0
	Sampler:	PETERSON		Remarks:	ICE FREE 5/7/98.								
5/26/1998		12.2	11.5	3	100	1	4	5	5	0	8	0	0
	Sampler:	PETERSON		Remarks:									
6/22/1998		16.7	16	2	75	2	5	4	4	0	29	1	0
	Sampler:	PETERSON		Remarks:									
7/8/1998		21.1	13.17	2	25	2	4	5	5	0	12	7	0
	Sampler:	PETERSON		Remarks:									
7/23/1998		23.3	15.33	2	25	2	1	5	5	0	49	0	0
	Sampler:	PETERSON		Remarks:									
8/8/1998		24.4	16.67	2	0	3	1	5	5	0	39	3	0
	Sampler:	PETERSON		Remarks:									
8/30/1998		20	17.83	2	0	2	1	5	3	0	21	3	0
	Sampler:	PETERSON		Remarks:									
9/12/1998		17.8	16	6	0	1	1	5	5	0	20	3	0
	Sampler:	PETERSON		Remarks:									
10/3/1998		14.4	10.67	7	100	2	4	5	1	0	8	0	0
	Sampler:	PETERSON		Remarks:									
10/23/1998		7.8	14.5	6	0	1	1	5	5	0	25	1	0
	Sampler:	PETERSON		Remarks:									

Secchi Depth and Profile Graphics

Station: 1

CRAOK1



--	--

--	--

Station Information

CRAOK1

Primary Station	Station # 1	latitude: 48 29 28.7	longitude: 119 13 25.0
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

CRAWFISH

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	41
TSI_Phos:		48
TSI_Ch1:		
Narrative TSI:	^b	M

Summary Comments:

Crawfish Lake, located at approximately 1500 meters in elevation (4,923 feet), is a spring fed lake with an outlet - Lost Creek. There are no year round residents living at the lake.

The general water clarity of Crawfish Lake was good in 1999. The Secchi depth readings ranged from 3.1 meters (10.3 feet) to 5.4 meters (17.8 feet) with a mean Secchi depth of 3.9 meters (12.7 feet). For comparison, in 1998 the mean Secchi depth was 4.5 meters (14.7 feet).

No geese and between 7-28 other waterfowl were observed on the lake during each sampling visit made by the volunteer monitor between the months of May through the end of October.

The volunteer monitor noted the presence of algae blooms in the spring.

The chemistry data collected for Crawfish Lake showed moderately high phosphorus levels in the epilimnion. This level of phosphorus indicates algae could become a nuisance, though usually not for long periods of time.

Ecology staff made only one site visit in 1999. Thermal stratification was observed during this visit (7/27/1999) and low dissolved oxygen levels in the hypolimnion were noted.

The lake sediment is comprised of mostly fine silts with a spotty distribution of aquatic plants occurring in the lake.

Based on the Secchi depth data and the phosphorus levels, Crawfish Lake is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

CRAWFISH

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
------	------	--------	-----------------	-----------------	-------	----------------------------	-------------------------------------	--------------------	-------------------	--------------------

Station 1

7/27/1999 1600 E 21.4

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

CRAWFISH

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/31/1999		58	10.29	6	0		1	5	5	0	8	5	0
	Sampler:	PETERSON		Remarks: Used a view tube.									
6/12/1999		60	11.17	6	0	2	1	5	5	0	28	2	0
	Sampler:	PETERSON		Remarks: Used a view tube. Two osprey seen.									
7/9/1999		64	17.83	6	0	2	1	5	5	0	25	3	0
	Sampler:	PETERSON		Remarks: Saw two loons and two osprey.									
7/27/1999		70	16	6	0		3	5	5	0	28	3	0
	Sampler:	PETERSON		Remarks:									
8/15/1999		63	10.67	6	100	1	4	5	5	0	11	9	0
	Sampler:	PETERSON		Remarks: Used a view tube.									
9/1/1999		60	11.33	6	100	3	4	4	4	0	20	3	0
	Sampler:	PETERSON		Remarks: Used a view tube.									
9/13/1999		60	13.17	6	0	3	1	5	4	0	10	0	0
	Sampler:	PETERSON		Remarks: Used a view tube.									
9/27/1999		54	10.67	5	50	4	2	5	4	1	8	0	0
	Sampler:	PETERSON		Remarks: Used a view tube.									
10/23/1999		44	13.17	3	0	3	1	5	4	0	14	0	0
	Sampler:	PETERSON		Remarks: Used a view tube.									

Profile Report

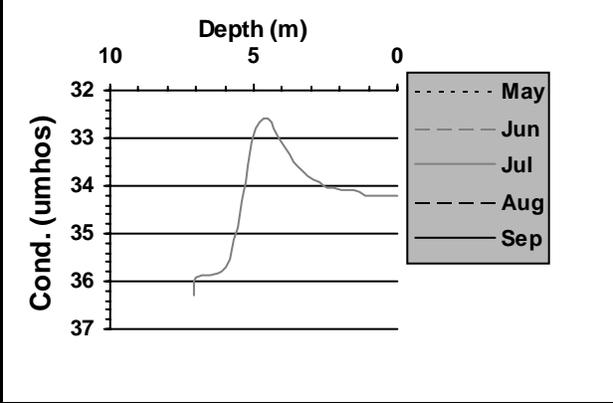
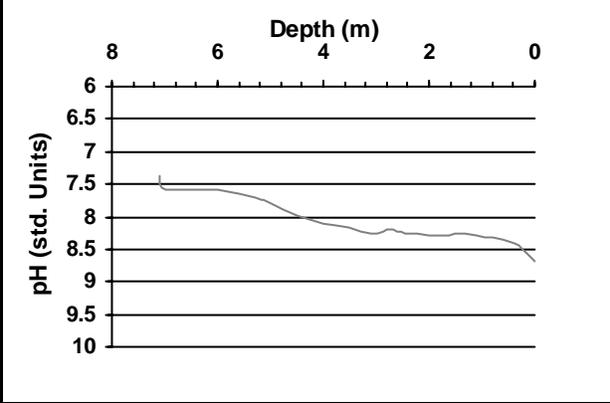
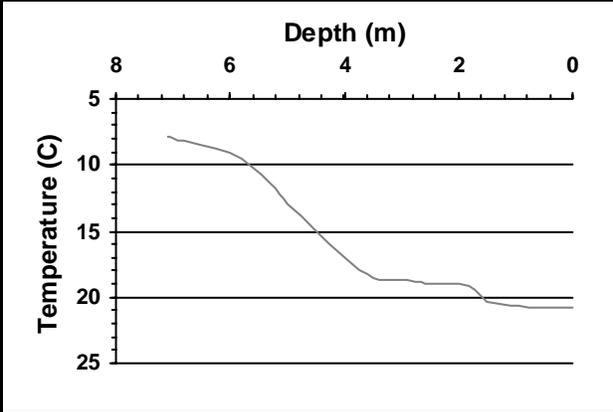
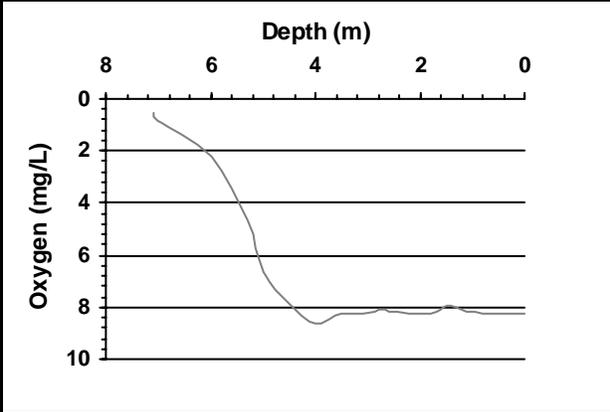
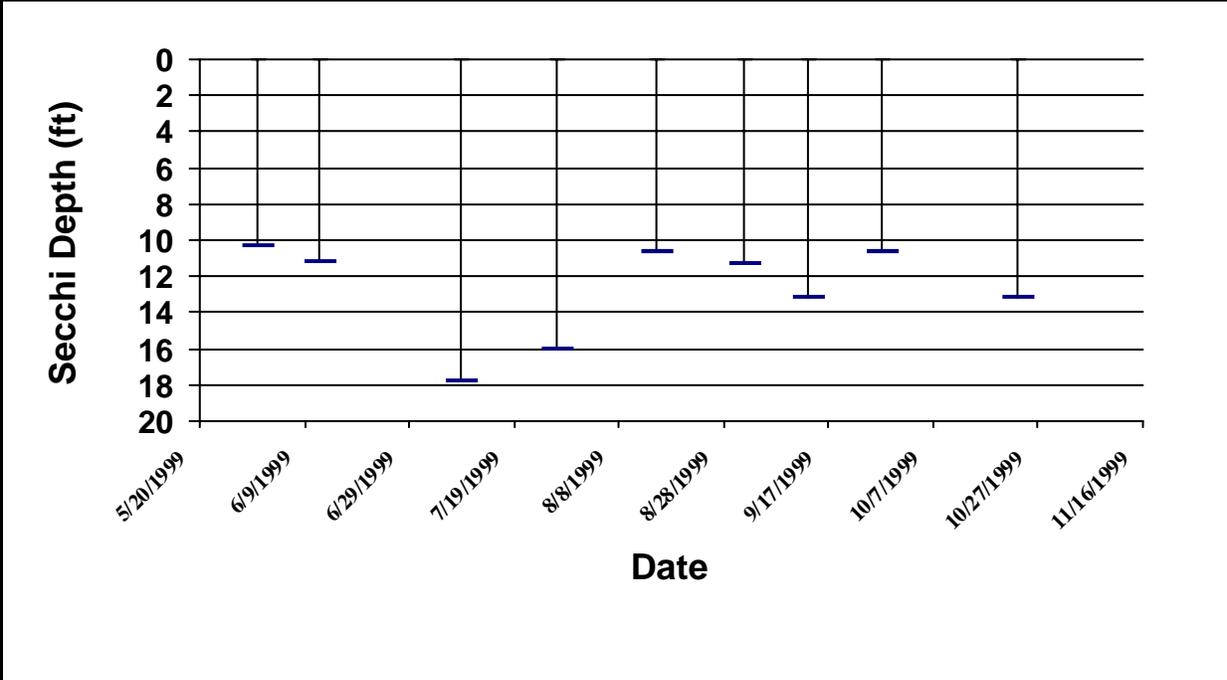
CRAWFISH

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
7/27/1999						
		0	34.2	8.28	8.69	20.86
		0.3	34.2	8.28	8.43	20.79
		0.5	34.2	8.24	8.39	20.79
		1.1	34.2	8.13	8.29	20.63
		1.5	34.1	7.97	8.27	20.34
		1.8	34.1	8.23	8.3	19.21
		2.6	34	8.17	8.24	19.05
		2.7	33.9	8.12	8.21	18.87
		3.1	33.8	8.25	8.25	18.71
		3.5	33.6	8.28	8.17	18.53
		4	33.1	8.66	8.12	17.1
		4.5	32.6	7.84	7.99	14.94
		5	32.9	6.61	7.81	13.04
		5.3	33.9	4.67	7.71	11.27
		6	35.7	2.22	7.6	9.13
		7	35.9	.82	7.58	7.94
		7.1	36.3	.56	7.36	7.85

Secchi Depth and Profile Graphics

Station: 1

CRAOK1



CURLEW

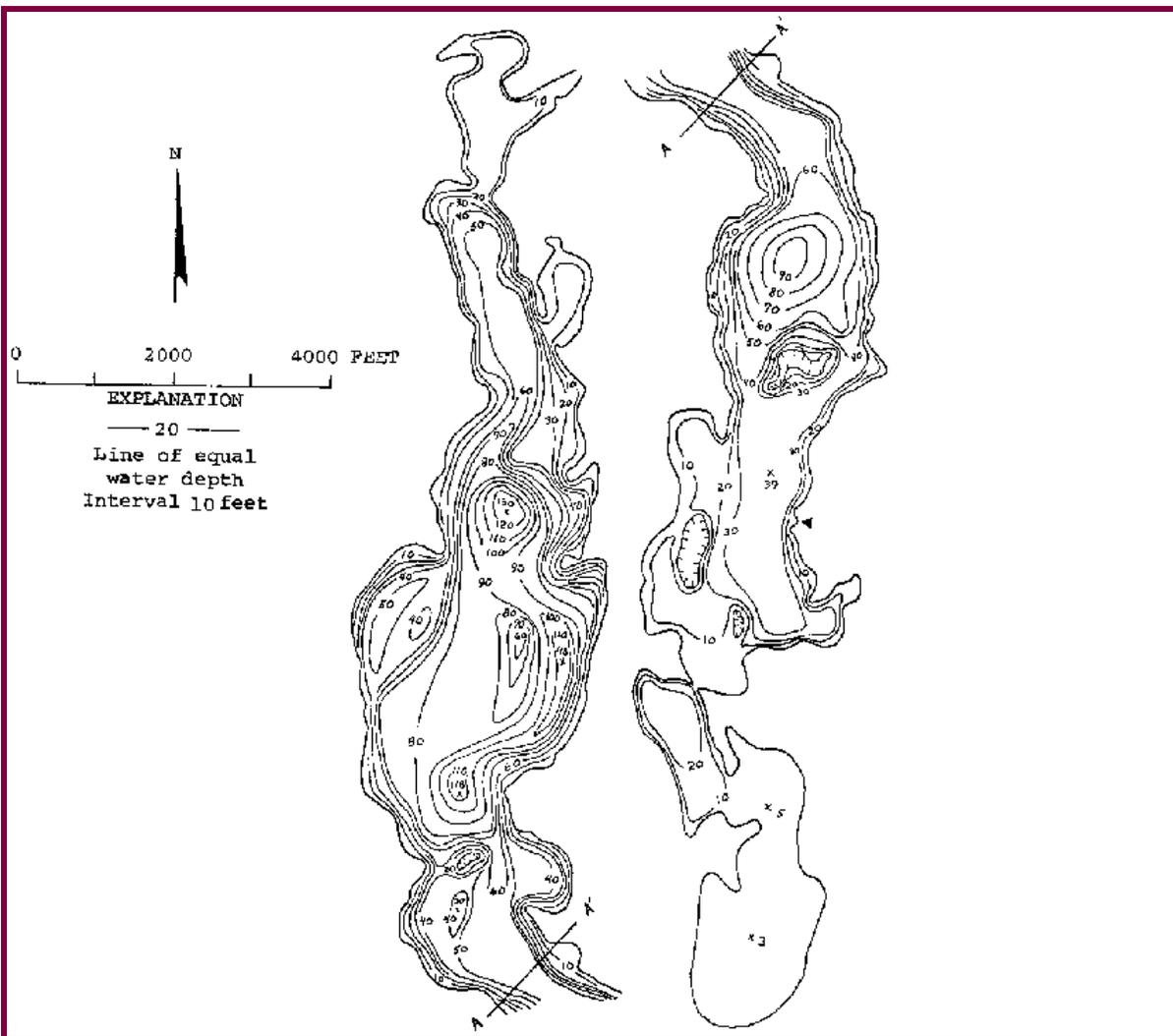
FERRY County

Lake ID: CURFE1

Ecoregion: 8

Curlew Lake is located 4.8 miles northeast of Republic. It is a natural lake, and water level fluctuations are stabilized by a three foot dam built in 1926. The lake extends northerly 4.8 miles to the outlet. There are four islands, totaling 20 acres, that are not included in the reported acreage. Inlets include Herron, Mires, Barrett, and Trout Creeks.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
921	130	43	65	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
39519	15.78	2333	48 46 03.	118 39 23.



Station Information

CURFE1

Primary Station	Station # 1	latitude: 48 44 52.0	longitude: 118 39 48.0
Description: Deep site: Center of basin north of Fisherman's Cove and Tiffany's Resorts.			

Secondary Station	Station # 2	latitude: 48 44 47.0	longitude: 118 40 05.0
Description: Deep spot just north of the first island south of site 1.			

Trophic State Assessment for 1998

CURLEW

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 42 J
TSI_Phos:
TSI_Ch1:
Narrative TSI: ^b M

Summary Comments:

The general water clarity for Curlew Lake was good in 1998. The Secchi depth readings ranged from 2.4 meters (8.0 feet) to 4.6 meters (15.0 feet) with a mean Secchi depth of 3.5 meters (11.5 feet). For comparison, in 1997 the mean Secchi depth was 4.5 meters (14.8 feet).

No chemistry data was collected or site visit made by Ecology staff to Curlew lake in 1998.

Except for two sampling occasions, very few geese and/or other waterfowl were counted by the volunteer monitor during her sampling visits conducted between May and October. The volunteer monitor commented that evening (instead of her normal morning sampling time) was a better time to see the maximum number of waterfowl.

The volunteer monitor noted exceptionally heavy rainfall during the month of June. In addition, a blue-green algae bloom, as well as other algal species, were observed by the volunteer monitor starting in early July and lasting through the first part of August. Another algae bloom occurred in early September.

An aquatic plant survey was done by Ecology staff in 1998; no non-native plant species were observed.

Based on Secchi depth data, Curlew Lake is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

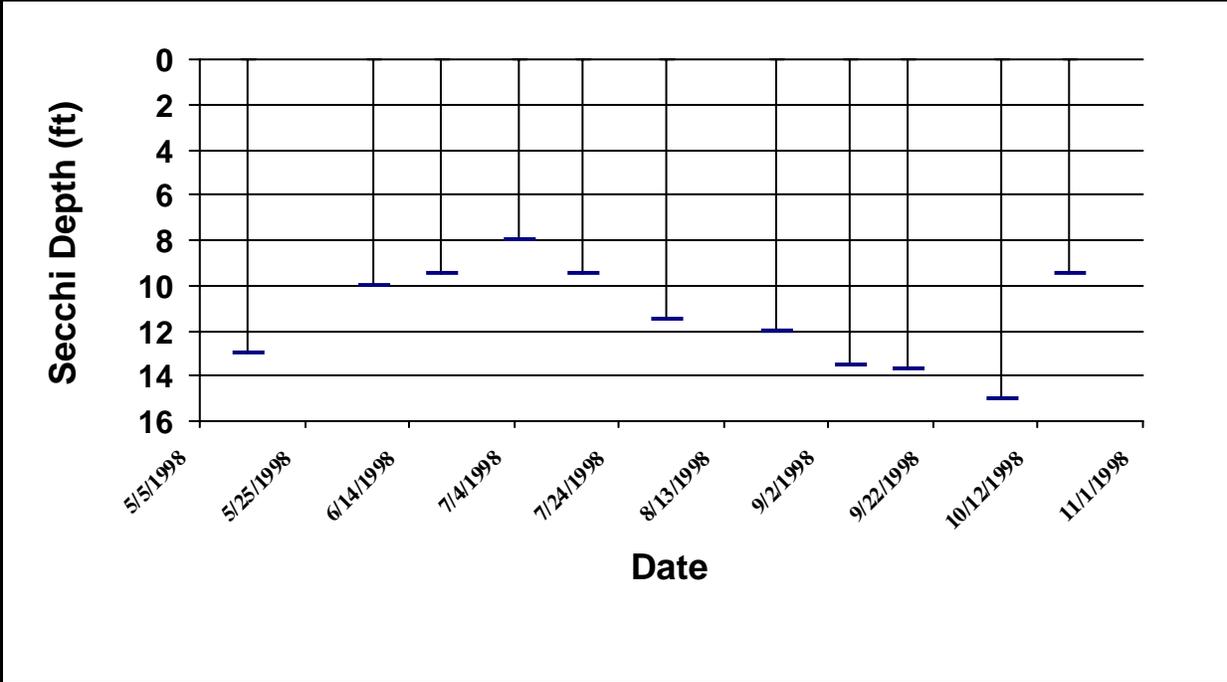
CURLEW

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/14/1998		6.7	13	3	100	2	4	2	3	2	2	8	0
	Sampler:	PERRY		Remarks:	LAKE HEIGHT READING IS VERY APPROXIMATE - GAGE CORRODED AND CRUSTED OVER. DIFFICULT TO TELL WHAT THE BOATS ARE DOING (I.E. FISHING, OTHER, ETC.)								
6/7/1998		7.8	10	5	100	3	4	4	3	0	0	3	0
	Sampler:	PERRY		Remarks:	HAVE HAD UNUSUALLY HEAVY RAIN SINCE LAST READINGS INCLUDING A 100-YR FLOOD EVENT								
6/20/1998		9.4	9.5	3	75	1	5	4	3	0	0	6	0
	Sampler:	PERRY		Remarks:	UNUSUALLY HEAVY RAIN LAST MONTH. ON 5/26, STREAMS FLOODED BUT LAKE DIDNT.								
7/5/1998		12.2	8	6	75		4	3	2	0	2	8	0
	Sampler:	PERRY		Remarks:	MUCH FLOATING DEBRIS INCLUDING SPENT FIREWOOD & CANS. MASSES OF BRIGHT AQUA PAINT-LIKE ALGAE <3CM PLENTIFUL; ALSO GREEN GLOBS <1CM AND FILAMENTS <1CM								
7/17/1998		15	9.5	8	0	1	1	2	1	0	6	2	0
	Sampler:	PERRY		Remarks:	CHUNKS OF CURD-LIKE GREENISH WHITE MATERIAL FLOATING ON SURFACE IN WIDE (~20 FEET) SWATHS.								
8/2/1998		15.6	11.5	6	100	3	3	3	3	0	9	7	1
	Sampler:	PERRY		Remarks:	STILL SMALL (<3CM) CHUNKS OF WHITE & AQUA CURD-LIKE STUFF FLOATING. WATER FULL OF SPINDLE-SHAPED GREEN OBJECTS ~1CM LONG.								
8/23/1998		12.2	12	3	100	3	4	3	2	0	11	0	0
	Sampler:	PERRY		Remarks:	HEAVY SHOWERS & LIGHTNING YESTERDAY; DENSE FOG TODAY.								
9/6/1998		11.1	13.5	6		1	1	4	3	0	3	8	0
	Sampler:	PERRY		Remarks:	GREENISH PARTICLES SAME AS LAST TIME; MUCH PINE NEEDLES AND SMALL DEBRIS FLOATING.								
9/17/1998		10.6	13.75	6	25	1	1	5	4	0	16	0	0
	Sampler:	PERRY		Remarks:	HEIGHT GAGE ILLEGIBLE.								

Secchi Depth and Profile Graphics

Station: 1

CURFE1



--	--

--	--

Station Information

CURFE1

Primary Station	Station # 1	latitude: 48 44 52.0	longitude: 118 39 48.0
	Description:	Deep site: Center of basin north of Fisherman's Cove and Tiffany's Resorts.	

Secondary Station	Station # 2	latitude: 48 44 47.0	longitude: 118 40 05.0
	Description:	Deep spot just north of the first island south of site 1.	

Trophic State Assessment for 1999

CURLEW

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 37	J
TSI_Phos:	47	
TSI_Ch1:	41	
Narrative TSI:	^b M	

Summary Comments:

The general water clarity of Curlew Lake was good in 1999. The Secchi depth readings ranged from 3.7 meters (12.0 feet) to 5.8 meters (19.0 feet) with a mean Secchi depth of 5.1 meters (16.7 feet). For comparison, in 1998 the mean Secchi depth was 3.5 meters (11.5 feet).

Numerous geese and/or other waterfowl were observed on the lake by the volunteer monitor during her sampling visits made between May and October.

The chemistry data collected for Curlew Lake showed moderate to high phosphorus levels throughout the summer: 10.5 ug/L to 23.7 ug/L in the epilimnion and hypolimnetic readings of 116 ug/L to 228 ug/L. The chlorophyll levels showed low to moderate density of algae growing in the lake. These data indicate an elevated level of productivity in Curlew Lake.

Ecology staff made four site visits in 1999. Thermal stratification and low dissolved oxygen levels in the hypolimnion were noted during each of these visits.

Ecology staff conducted an aquatic plant survey on 7/28/1999. A wide variety of aquatic plants occur in the lake. Dominant species include Chara sp. (muskwort) and Potamogeton crispus (curly leaf pondweed). A number of other Potamogeton species were also observed as well as Myriophyllum sibiricum (northern watermilfoil), Ceratophyllum demersum (hornwort) and Elodea canadensis (common elodea).

Based on the Secchi depth data, and the phosphorus and chlorophyll levels, Curlew Lake is classified as mesotrophic.

The following is an assessment written by Ecology staff, Sarah O'Neal, to determine

the phosphorus criterion for
Curlew Lake:

Curlew Lake is a large, deep lake with a steep shoreline. Its location in a sizeable watershed increases its susceptibility to anthropogenic eutrophication. In fact, practices throughout the watershed appear to have led to a decline in the water quality of the lake. While clarity remained exceptionally high, excessive nutrients led to dense plant and algae growth which occasionally interfered with the lake's uses. Frequent algae blooms occurred throughout the summer. The relatively large body size of algae species may explain good transparency in spite of high chlorophyll and phosphorus levels. Plants grew densely, which is unusual in lakes with steep sides and a consequently reduced littoral zone. Dense macrophytes led to herbicide applications in 1988 and 1989 to control particularly weedy species. By 1999, however, those species again dominated the lake. Washington State University studied nutrient sources in Curlew Lake. The study implicated faulty septic tanks, livestock grazing in the watershed, fertilizer application, excessive plants, waterfowl, precipitation, groundwater, surface runoff, and past timber practices in the problem. Findings from the watershed survey agreed with these results. High total phosphorus levels in the hypolimnion also indicated internal loading, in which phosphorus is released from sediments into the water column. This often occurs when dissolved oxygen is absent near the lake bottom, as clearly indicated by the Hydrolab profile data. Anoxia also often leads to hydrogen sulfide near the bottom of the lake, causing an offensive, "rotten-egg" smell about which residents complained.

The lake supported a wide variety of uses. Survey respondents indicated fishing as the primary activity, with relaxing and canoeing/kayaking as other important interests. However, site visits to the lake and surveys also revealed water-skiing, swimming, picnicking, hunting, and bird watching as popular activities. Survey respondents indicated a desire for clearer water, as well as boat speed limits. Coldwater fish composed the majority of Curlew's fishery. WDFW primarily managed the lake for rainbow trout. About 200,000 rainbow trout were released each year. Sixty-thousand of those were released annually from a cooperative net pen on the lake. Approximately 40% of tagged rainbow trout released from the net pen returned, indicating an unusually good utilization of most fish. Trout prefer at least 4.5mg/L dissolved oxygen and water temperatures below 20 degrees Celsius, which limits their range in Curlew Lake to depths of six to sixteen feet during the summer. The dominance of smaller zooplankton suggested an ineffective amount of predators to suppress planktivore density. Tiger muskies were additionally stocked in the lake in an attempt to control an oversized northern pike minnow population. Known warmwater game species in the lake consisted only of largemouth bass.

While uses were supported for most of the year, there were two to three weeks annually during which quality was impaired enough to affect many lake activities. This generally resulted from particularly dense algae blooms. Consequently, we suggest implementation of appropriate best management practices throughout the watershed. We recommend a total phosphorus criterion of 20 ug/L, the action value

for Northern Rockies lower mesotrophic lakes. This criterion will likely be exceeded during some years. Ferry County may want to consider adopting boat speed limits in certain areas or during certain times of day.

Mean Secchi = 4.9m; Mean TP = 19.3 ug/L; Mean Chl = 2.8 ug/L

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

CURLEW

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 1										
6/17/1999		E	23.7	.35	15	3.5		116	32400	.6 J
		H	116	.535	5					
7/15/1999	0900	E	10.5	.369	35	1.93				.8
		H	135	.624	5					
8/12/1999	0900	E	16.3	.392	24	2.5				.6
		H	190	.634	3					
9/16/1999		E	22.2	.358	16	2.9				.6
		H	228	.691	3					
Station 2										
6/17/1999		E	22.9	.326	14	3.7				
7/15/1999	1000	E	13	.375	29	2.13				
8/12/1999	1015	E	14.4	.372	26	2.5				
9/16/1999		E	22	.397	18	3.1				

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

CURLEW

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/16/1999		39	16	2	100	2	5	5	5	25	3	7	0
	Sampler:	PERRY			Remarks:	Used a view tube on the second Secchi reading but not on the first. Cloudburst and hail yesterday. Showers most of the week, sprinkling off and on today.							
5/29/1999		44	16	6	0	1	1	4	4	4	8	7	0
	Sampler:	PERRY			Remarks:	Used a view tube on the second Secchi reading but not the first. Lake has floating algae mats. Saw two live "Anadonta californicus" clams today!							
6/13/1999		48	10	6	100	3	1	4	3	6	10	3	0
	Sampler:	PERRY			Remarks:	Used a view tube on the second Secchi reading but not the first Secchi reading. Aesthetic enjoyment affected by floating algae mats. Thermometer not functioning - fluid has separated. Distrust at least the last two readings.							
6/17/1999		68	14.5	6	5	1	1	3	2	15	5	7	
	Sampler:	PERRY			Remarks:								
7/10/1999		69	14	6	0		1	4	3	0	5	12	0
	Sampler:	PERRY			Remarks:	First Secchi reading taken without a view tube, second Secchi reading is with a view tube. Weed mats in shallows. Geese feed here in afternoon - I sample in the morning.							
7/15/1999			17.4	6	60	2	1	4	4	2	20	8	2
	Sampler:	HALLOCK			Remarks:	Bottom: 31.8M. P. crispus appears to be getting worse. Oxygen < 5 @ 8M, ~0 @ 25M. Some zoopl. and no H2S smell, even at 25M							
7/25/1999		68	15.75	6	50	1	2	4	4	0	2	2	0
	Sampler:	PERRY			Remarks:	First Secchi reading without a view tube, second Secchi reading with view tube.							
7/28/1999			16.73										
	Sampler:	Parsons			Remarks:								
8/8/1999		72	17.5	6	100	3	5	3	4	0	2	1	0
	Sampler:	PERRY			Remarks:	First Secchi reading without a view tube, second Secchi reading with a view tube.							
8/12/1999			19	6	90	1	1	4	3	8		6	3
	Sampler:	PERRY			Remarks:	Bottom: 34.5M. Algae specks clearly visible throughout water column. According to volunteer, there didn't used to be nesting geese on the lake, but now are about 50 goslings/year and people are beginning to perceive them as a problem.							
8/22/1999		68	18	6	0	1	1	4	4	0	0	3	0
	Sampler:	PERRY			Remarks:	First Secchi reading without a view tube, second Secchi reading with a view tube.							

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
9/5/1999		64	18.5	6	75	2	1	4	4	0	2	4	0
	Sampler:	PERRY		Remarks: First Secchi reading without a view tube, second Secchi reading is with a view tube.									
9/16/1999			16.4	3	50	1	1	2	2	12	30	6	
	Sampler:	PERRY		Remarks: Bottom: 37.6M. Aphanizomenon bloom moderate to severe. Took zebra mussel veliger sample from state park pier.									
9/26/1999		60	16	6	50	1	1	4	4	4	11	5	0
	Sampler:	PERRY		Remarks: First Secchi reading taken without a view tube, second Secchi reading is taken with a view tube. Fewer clumps than last time. Lake height taken one week later than rest of data. One brief rain shower in week. The Conductivity result is qualified as an estimate due to postcalibration failing QA/QC requirements.									
Station 2													
6/17/1999			14										
	Sampler:	PERRY		Remarks:									
7/15/1999			17.1	6	35	2	1						
	Sampler:	HALLOCK		Remarks: Bottom: 32.5M. Site 2 is just north of Dammann's (now Perry's) island.									
8/12/1999			20.34	6									
	Sampler:	PERRY		Remarks: Bottom: 28.2M									
9/16/1999			15.1	3									
	Sampler:	PERRY		Remarks: Bottom: 32.2M.									

Profile Report

CURLEW

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/17/1999						
	0755	0	236	9.99	8.67	20.75
	0756	1	236	9.99	8.73	20.54
	0756	2	236	9.97	8.74	20.38
	0757	3	236	10.59	8.75	17
	0757	4	237	10.19	8.67	15.53
	0759	5	238	8.91	8.44	13.95
	0800	6	240	8.48	8.3	12.77
	0801	7	246	7.02	7.98	9.97
	0802	8.1	250	6.66	7.86	8.46
	0803	10	253	6.25	7.79	7.51
	0805	12	254	5.29	7.68	6.83
	0807	14	256	5.07	7.63	6.49
	0808	16	257	4.7	7.59	6.23
	0809	18	257	4.61	7.57	6.16
	0810	20	258	4.63	7.55	6.03
	0811	25	260	3.17	7.48	5.63
	0813	30	263	.84	7.38	5.45
	0815	35	264	.37	7.34	5.37
	0815	35.9	265	.3	7.33	5.38

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
7/15/1999						
	0744	0	225	8.87	8.83	20.72
	0744	1	226	8.8	8.87	20.63
	0746	2	226	8.79	8.87	20.58
	0747	3	226	8.7	8.87	20.46
	0748	4	228	8.82	8.8	18.1
	0749	5	228	8.48	8.71	17.35
	0750	6	239	6.88	8.19	13.34
	0752	8	244	4.83	7.79	8.84
	0755	10	248	3.76	7.63	7.39
	0756	12	248	3.26	7.56	7.01
	0757	14	249	3.02	7.51	6.7
	0758	16	250	2.41	7.47	6.55
	0759	18	250	2.6	7.45	6.42
	0801	20	250	3.12	7.45	6.24
	0803	25	254	.26	7.35	5.84
	0803	30	258	.15	7.32	5.63
	0804	31.8	261	.13	7.32	5.58

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
8/12/1999						
	0849	0		7.76	8.84	22.64
	0853	1		8.23	8.84	22.69
	0854	2		8.21	8.84	22.69
	0855	3		8.15	8.84	22.69
	0856	4		8.1	8.84	22.66
	0857	5		8.34	8.72	20.33
	0858	6		8.4	8.61	16.35
	0901	8		4.25	8.15	9.88
	0902	10		2.75	8.03	7.85
	0903	12		1.56	7.9	7.14
	0904	14		1.37	7.86	6.95
	0905	15.1		.98	7.8	6.87
	0906	20		.71	7.75	6.54
	0907	25		.19	7.66	5.86
	0908	29.9		.12	7.6	5.71
	0909	34.5		.13	7.57	5.63
9/16/1999						
	0853	0	222	9.28	8.87	17.25
	0854	1	222	9.25	8.91	17.26
	0855	2	222	9.22	8.92	17.26
	0856	4	222	9.21	8.92	17.23
	0857	5	222	9.2	8.92	17.18
	0859	6	223	8.58	8.85	16.37
	0900	7	233	5.11	8.38	15.11
	0901	8	245	1.44	7.85	10.72
	0903	10	245	.25	7.64	8.11
	0904	15	246	.15	7.54	7
	0905	20	244	.12	7.47	6.74
	0907	25	250	.11	7.41	6.11
	0908	30	256	.11	7.33	5.76
	0909	37.4	258	.11	7.3	5.67

Station 2

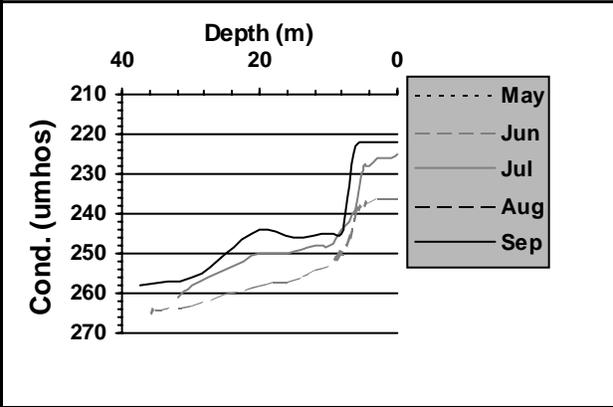
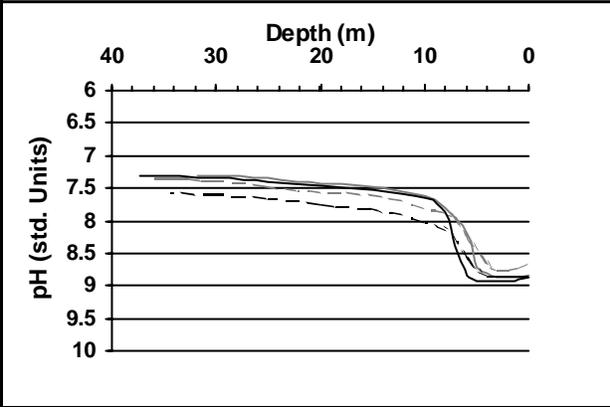
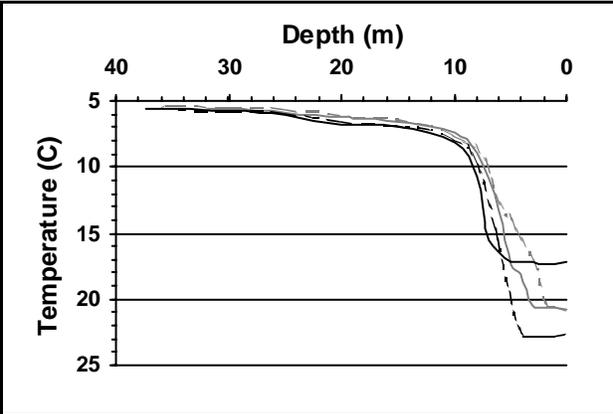
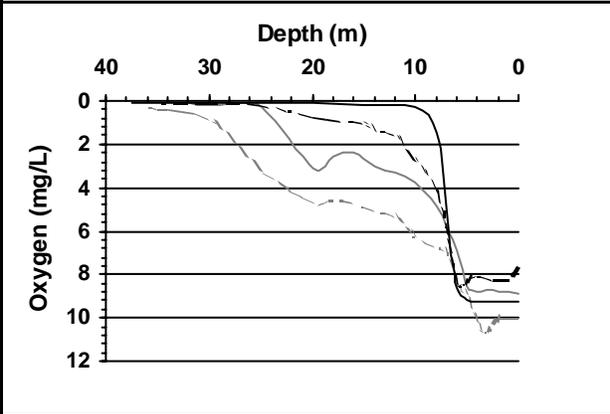
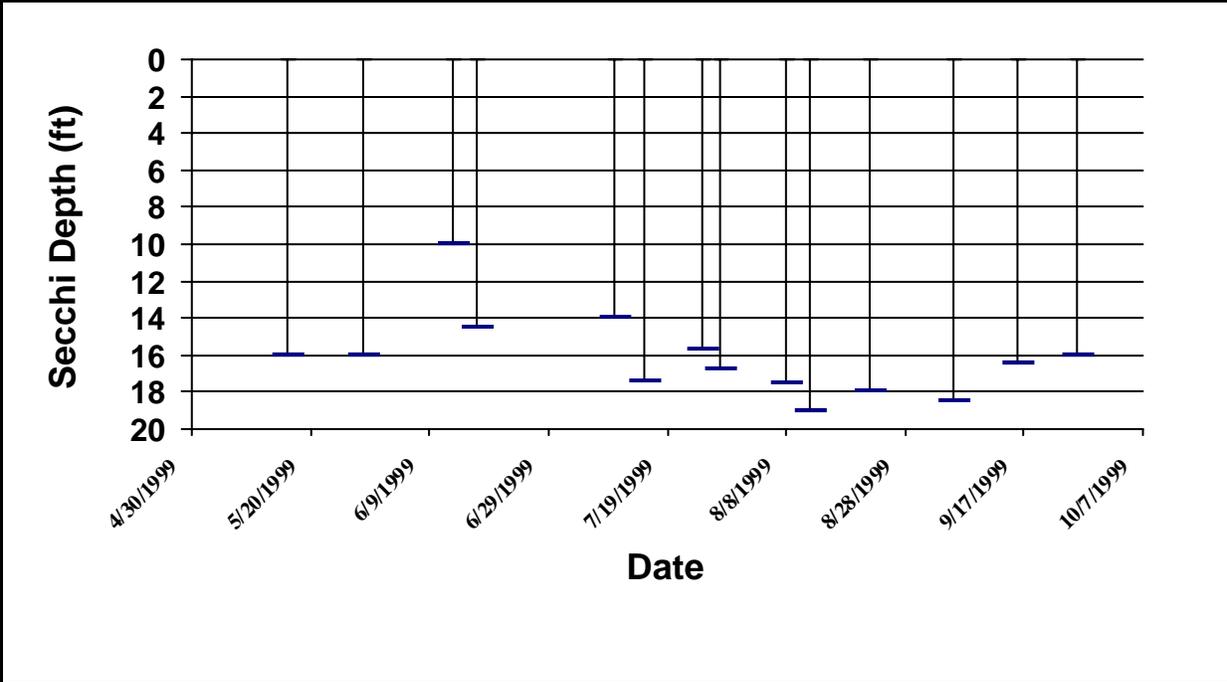
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
6/17/1999						
	0905	0	236	10.01	8.65	21.05
	0907	0	236	9.81	8.75	21.08
	0909	1	234	10.06	8.81	20.28
	0910	2	234	10.09	8.8	20.19
	0911	3	235	10.92	8.81	17.07
	0911	4	235	10.47	8.75	15.89
	0912	6.1	241	8.29	8.29	11.84
	0913	8	250	6.79	7.99	8.32
	0914	9.9	253	5.76	7.82	7.26
	0915	12	256	5.07	7.7	6.57
	0916	14	256	4.84	7.64	6.41
	0917	16.1	256	4.57	7.59	6.24
	0918	18	257	4.57	7.56	6.16
	0919	20	259	4.15	7.54	6.03
	0921	24.9	260	2.17	7.45	5.65
	0923	30	264	1.02	7.39	5.58
7/15/1999						
	0834	0	225	8.77	8.84	20.76
	0835	1	225	8.7	8.87	20.76
	0836	2	225	8.73	8.87	20.6
	0837	3	225	8.73	8.88	20.49
	0838	4	226	8.9	8.85	18.93
	0839	6	240	7.04	8.33	13.04
	0841	8	246	4.68	7.86	8.9
	0842	10	247	3.75	7.7	7.49
	0844	15	251	2.53	7.55	6.59
	0845	20	250	2.69	7.51	6.34
	0847	25	253	.29	7.39	5.96
	0847	30	264	.16	7.36	5.76
	0848	32.5	269	.15	7.37	5.75

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
8/12/1999						
	0952	0		7.85	8.82	22.69
	0954	1		8.01	8.85	22.61
	0957	2		8.05	8.87	22.56
	0958	3		7.79	8.87	22.51
	0959	4		7.82	8.87	22.49
	1001	5		7.49	8.82	22.01
	1002	6		6.55	8.47	13.8
	1004	8		3.59	8.1	10.08
	1004	10		2.19	7.98	7.99
	1006	15.1		1.08	7.85	6.74
	1006	20		.69	7.79	6.44
	1008	25.1		.17	7.68	6.23
	1008	28.2		.17	7.62	6.01
9/16/1999						
	0944	0	221	9.38	8.81	16.99
	0946	1	221	9.21	8.91	16.98
	0947	2	221	9.23	8.92	16.97
	0949	4	221	9.17	8.91	16.94
	0950	6	221	8.83	8.89	16.63
	0951	8	247	.7	8.01	10.74
	0952	10	247	.23	7.75	8.3
	0954	16	246	.17	7.61	7.05
	0954	20	246	.15	7.53	6.8
	0955	25	251	.13	7.46	6.26
	0956	30	255	.13	7.37	6.09
	0957	32.3	259	.13	7.29	6.06

Secchi Depth and Profile Graphics

Station: 1

CURFE1



DEEP

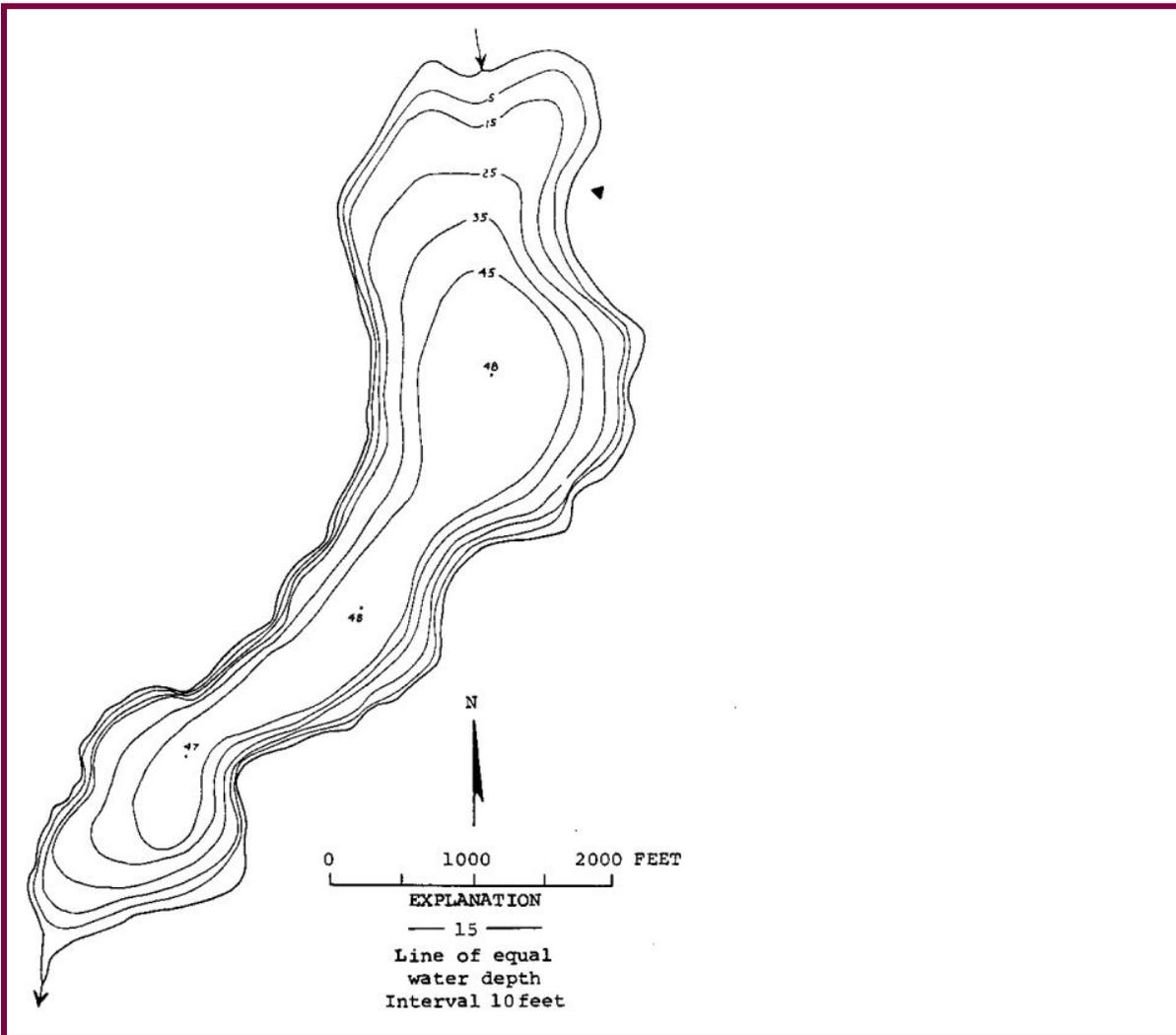
STEVENS County

Lake ID: DEEST1

Ecoregion: 8

Deep Lake is located nine miles south of Northport, and 25 miles northeast of Colville. The lake is 1.4 miles long and the shoreline is steep. The lake is fed by the north fork of Deep Creek, and drains via Deep Creek to the Columbia River (Lake Roosevelt).

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
210	49	34	48	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
7203	3.5	2025	48 51 01.	117 36 54.



Trophic State Assessment for 1998

DEEP

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 40 J
TSI_Phos:
TSI_Ch1:
Narrative TSI: ^b OM

Summary Comments:

The general water clarity for Deep Lake was good in 1998. The Secchi depth readings ranged from 3.2 meters (10.5 feet) to 5.5 meters (18.0 feet) with a mean Secchi depth of 4.2 meters (13.9 feet). For comparison, in 1997 the mean Secchi depth reading was 3.0 meters (9.7 feet).

No chemistry data was collected or site visit made by Ecology staff to Deep Lake in 1998.

Only a few geese and/ or other waterfowl were observed by the volunteer monitor during each of his sampling visits made between May and October.

The volunteer monitor also noted an exceptional amount of heavy rain beginning in early June and lasting till the end of July.

An aquatic plant survey was done by Ecology staff in 1997. The only nonnative plant observed during this survey was *Phalaris arundinacia* (reed canarygrass) along the shoreline.

Based on the Secchi depth data, Deep Lake is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

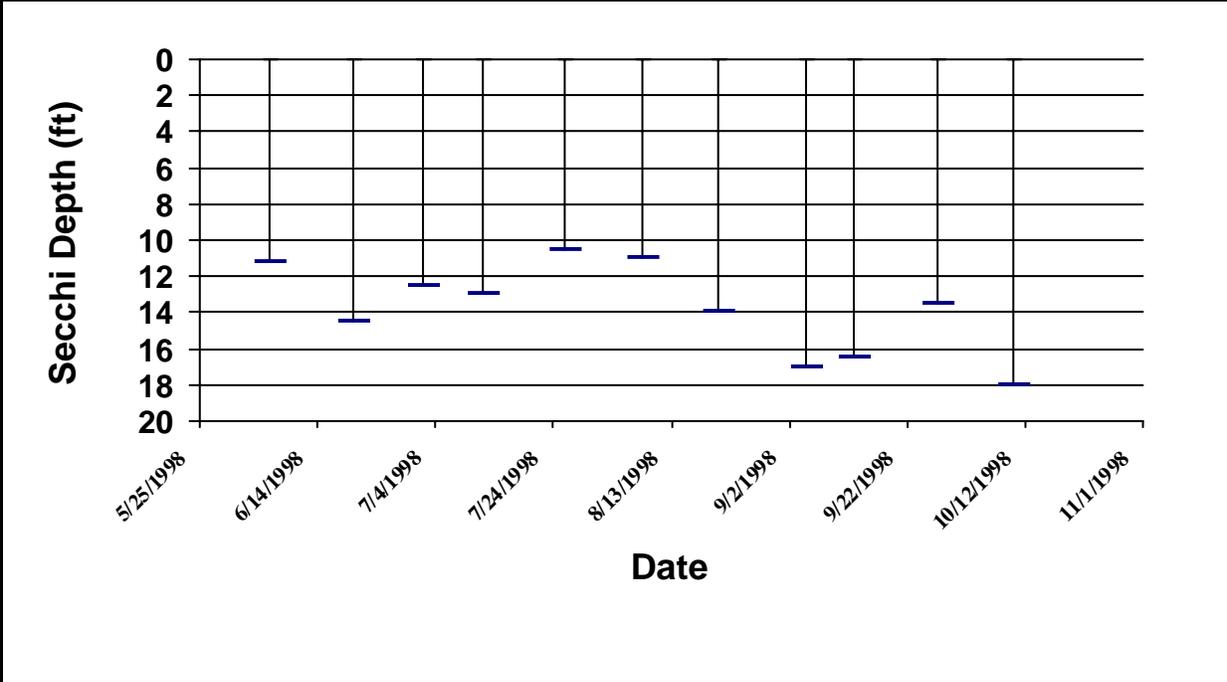
DEEP

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/6/1998		14	11.2	5	25	2	5						
	Sampler:	HILL			Remarks:	WATER LEVEL WENT UP TWO FEET AND DOWN TWO FEET IN ONE WEEK DUE TO HEAVY RAINS.							
6/20/1998		17	14.5	5	25	2	5	4	4	0	1	3	0
	Sampler:	HILL			Remarks:	RAIN HAS BEEN EXCEPTIONAL THIS SPRING.							
7/2/1998		20.5	12.5	5	50	2	4	4	4	5	0	1	0
	Sampler:	HILL			Remarks:	STILL LOTS OF RAIN; 7-8 WEEKS IN A ROW!							
7/12/1998		20	13	5	25	3	4	4	4	5	6	2	0
	Sampler:	HILL			Remarks:	AGAIN LOTS OF RAIN IN LAST 48 HRS.							
7/26/1998		29.5	10.5	3	0	2	1	3	4	0	8	2	2
	Sampler:	HILL			Remarks:	VERY HOT LAST FEW DAYS; 100 DEGREES PLUS. LOTS OF BOATS!							
8/8/1998		22.5	11	5	0	1	1	4	4	0	2	2	1
	Sampler:	HILL			Remarks:	AIR TEMPERATURE DROPPED 40 DEGREES FROM LAST WEEK TO 60 DEGREES.							
8/21/1998		21	14	5	75	1	1	4	4	0	6	0	0
	Sampler:	HILL			Remarks:	COOLER WEATHER LAST WEEK.							
9/5/1998		20.5	17	3	0	1	1	4	4	0	4	4	0
	Sampler:	HILL			Remarks:								
9/13/1998		19	16.5	4	0	1	2	4	4			5	0
	Sampler:	HILL			Remarks:	SUMMER OVER - LAKE USE WAY DOWN! NICE AND QUIET.							

Secchi Depth and Profile Graphics

Station: 1

DEEST1



--	--

--	--

Trophic State Assessment for 1999

DEEP

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	40
TSI_Phos:		48
TSI_ChI:		
Narrative TSI:	^b	M

Summary Comments:

The general water clarity of Deep Lake was good in 1999. The Secchi depth readings ranged from 2.1 meters (7.0 feet) to 6.3 meters (20.5 feet) with a mean Secchi depth of 4.2 meters (13.9 feet). For comparison, in 1998 the mean Secchi depth was also 4.2 meters (13.9 feet).

Geese were sighted by the volunteer monitor only during his last sampling visit on 10/23/1999. During each of the his sampling visits between April and the end of October, the volunteer monitor saw between 2-20+ other waterfowl on the lake.

Up until the beginning of August, the volunteer monitor commented on the high degree of clarity in the lake. After this date the Secchi readings decreased.

The chemistry data collected for Deep Lake showed moderately high phosphorus levels in the epilimnion. This level of phosphorus indicates algae could become a nuisance, though probably not for long periods of time.

Ecology staff made only one site visit in 1999. Thermal stratification was observed during this visit (6/21/1999) and low dissolved oxygen levels in the hypolimnion were noted.

Based on the Secchi depth data and the phosphorus levels, Deep Lake is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

DEEP

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
------	------	--------	-----------------	-----------------	-------	----------------------------	-------------------------------------	--------------------	-------------------	--------------------

Station 1

6/21/1999 1400 E 20.4

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

DEEP

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
4/18/1999		9	8.5	5	75	2	2	4	4	0	2	0	0
	Sampler:	HILL			Remarks:	Used a view tube.							
5/22/1999		13	9	5	0	2	3	4	4	0	4	1	0
	Sampler:	HILL			Remarks:	Used a view tube; lake is in great shape.							
6/20/1999		16	12.5		75	2	2	4	4	0	2	1	0
	Sampler:	HILL			Remarks:	Used a view tube. No real hot weather yet! Main concerns: cows in lake, dumping septics into lake and swimmers itch. Previous sampling showed no trace of heavy metals in water or fish flesh.							
6/21/1999			14.5										
	Sampler:	HILL			Remarks:								
7/1/1999		16	18.5	2	25	1	5	4	4	0	12	1	0
	Sampler:	HILL			Remarks:	Used a view tube. Very heavy rain last night.							
7/17/1999		17.5	19	2	50	1	2	4	4	0	20	2	2
	Sampler:	HILL			Remarks:	Used a view tube. Lake is very clear this year.							
8/2/1999		21.5	20.5	2	0	1	1	4	4	0	20	1	0
	Sampler:	HILL			Remarks:	Used a view tube. Lots of boat use this week.							
8/21/1999		21	11.5	6	0	3	2	4	4	0	6	0	1
	Sampler:	HILL			Remarks:	Used a view tube. The lake has inverted!							
9/4/1999		18	7	6	100	1	2	4	4	0	6	1	1
	Sampler:	HILL			Remarks:	Used a view tube. Temperature has dropped recently.							
10/3/1999		13	12	2	0	3	1	4	4	0	2	3	0
	Sampler:	HILL			Remarks:	Used a view tube. Temperature is dropping.							
10/28/1999		10	15.5	2	0	2	1	4	4	12	2	3	0
	Sampler:	HILL			Remarks:	Used a view tube.							

Profile Report

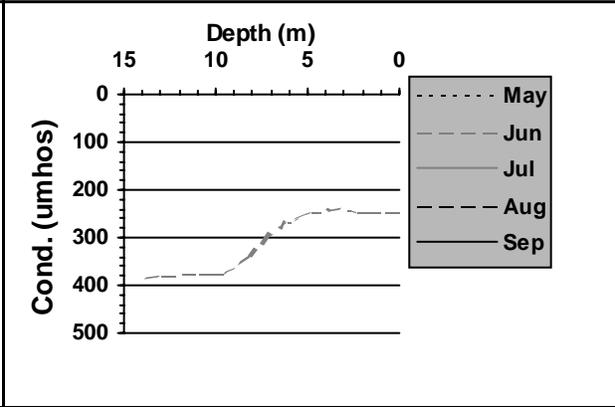
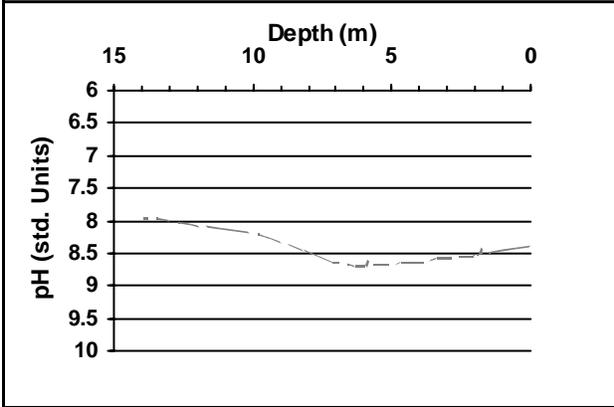
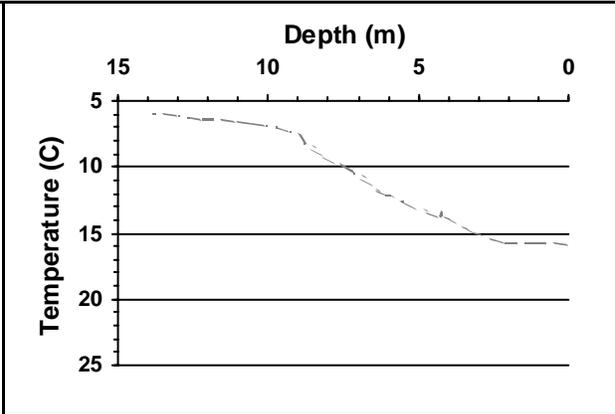
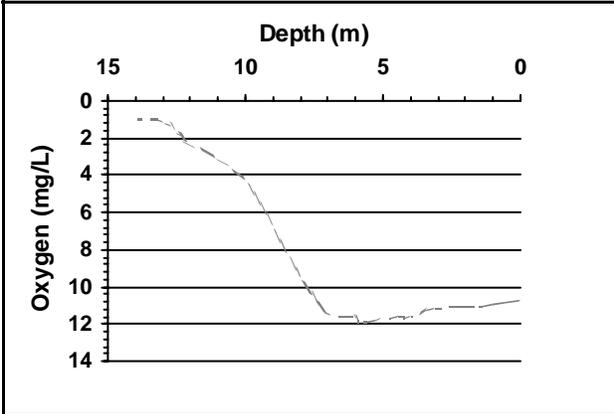
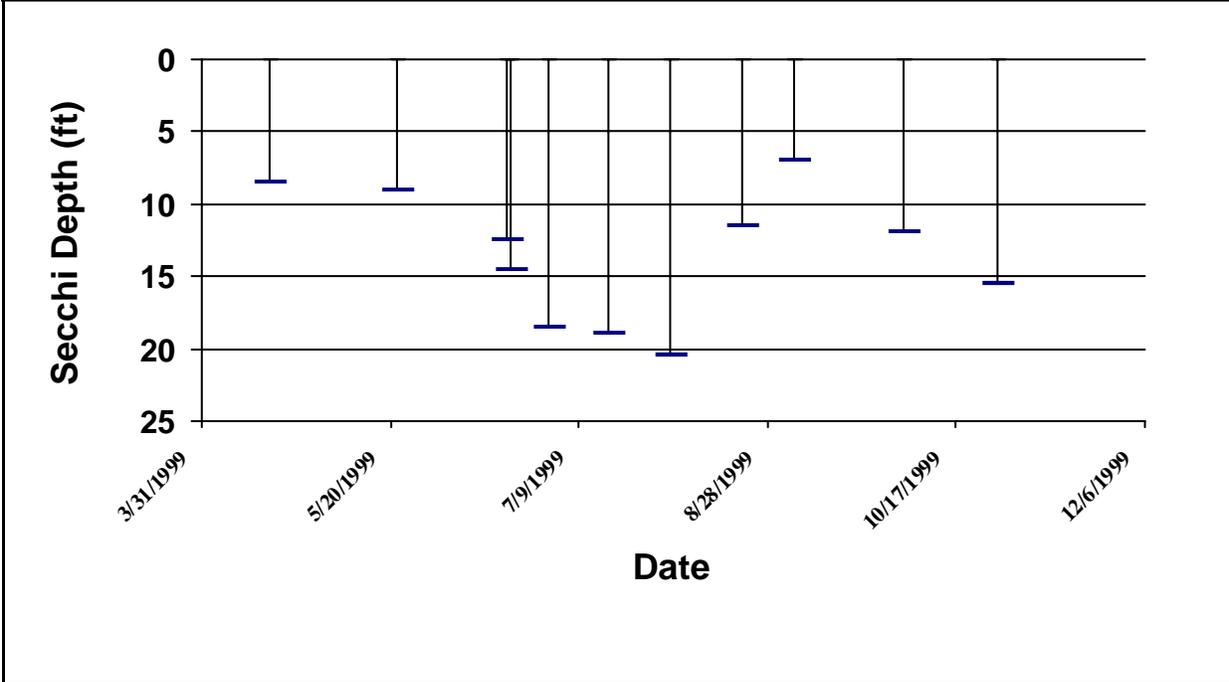
DEEP

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/21/1999						
		0	245	10.67	8.37	15.76
		1	244	10.88	8.44	15.71
		1.7	244	10.99	8.46	15.68
		1.9	244	11.04	8.49	15.66
		2.1	244	11.02	8.52	15.66
		3.1	237	11.15	8.55	14.92
		4.2	246	11.63	8.64	13.61
		4.3	245	11.54	8.62	13.68
		5.2	252	11.78	8.66	13
		5.9	267	11.86	8.67	12.03
		6.1	268	11.56	8.68	12.07
		7.1	295	11.3	8.63	10.48
		8.2	338	9.05	8.44	9.09
		9.3	369	6.05	8.27	7.33
		10.1	374	4.14	8.16	6.82
		11.1	376	2.95	8.1	6.52
		12.2	378	2.1	8.04	6.3
		13	379	1.1	7.99	6.09
		13.9	382	.93	7.96	5.95

Secchi Depth and Profile Graphics

Station: 1

DEEST1



DEER

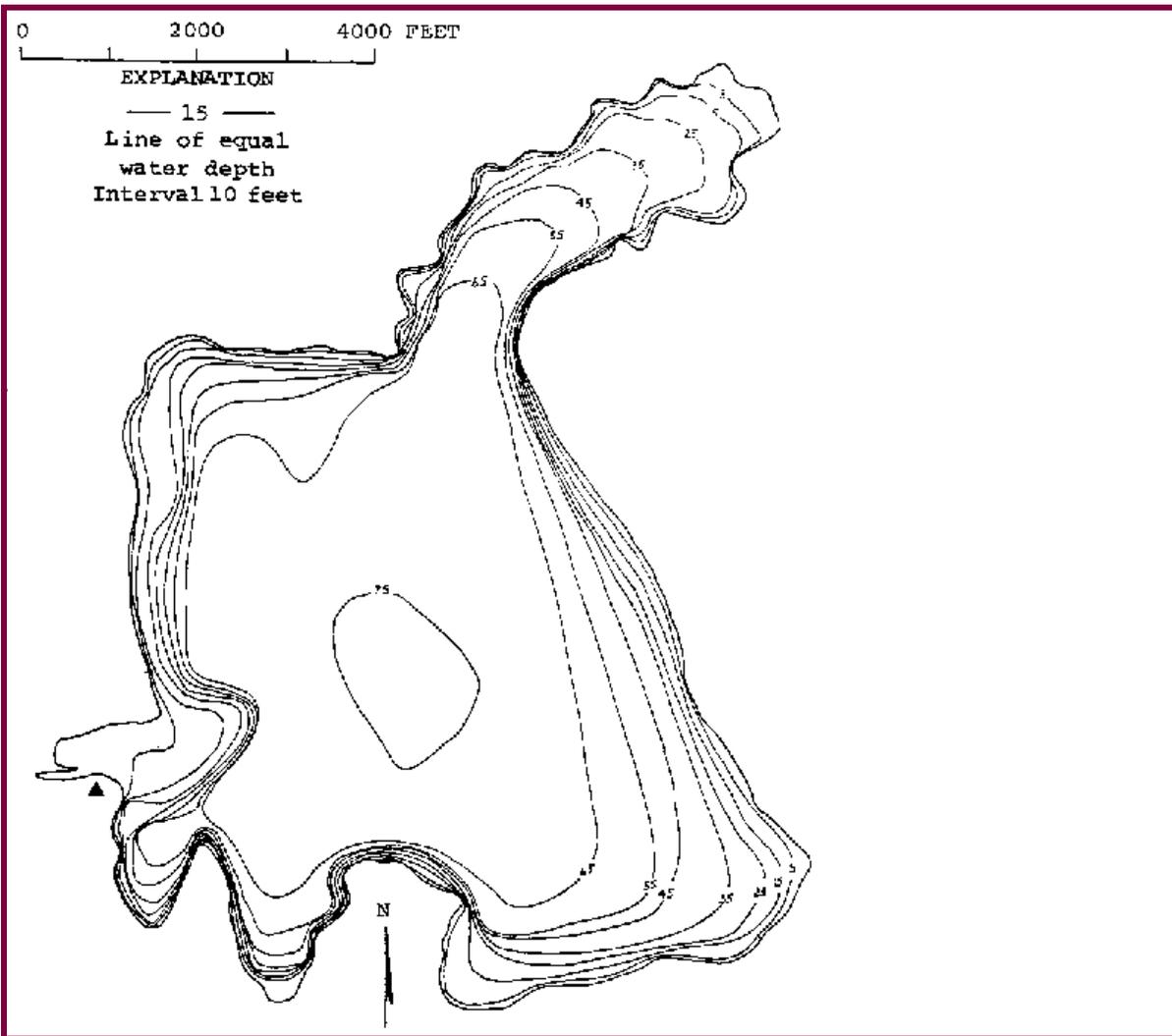
STEVENS County

Lake ID: DEEST2

Ecoregion: 8

Deer Lake is located approximately 25 miles northwest of Spokane, just east of Highway 395.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
1110	75	52	18	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
57000	8.62	2474	48 06 28.	117 36 18.



Station Information

DEEST2

Primary Station	Station # 1	latitude: 48 06 25.0	longitude: 117 35 24.0
	Description: At the deep spot.		

Secondary Station	Station # 2	latitude:	longitude:
	Description: Near the end of the arm at the north end of the lake.		

Trophic State Assessment for 1999

DEER

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	29
TSI_Phos:		48
TSI_ChI:		32
Narrative TSI:	^b	OM

Summary Comments:

The general water clarity of Deer Lake was excellent in 1999. The Secchi depth readings ranged from 7.2 meters (23.6 feet) to 9.9 meters (32.4 feet) with a mean Secchi depth of 8.7 meters (28.7 feet). For comparison, in 1992 (the most recent year Secchi data was collected) the mean Secchi depth was 6.9 meters (22.6 feet).

No geese but numerous other waterfowl were observed on the lake by the volunteer monitor during his sampling visits made between June and September.

The chemistry data collected for Deer Lake showed low phosphorus levels in July but high levels the rest of the summer. Values ranged from 7.8 ug/L to 26.3 ug/L in the epilimnion and hypolimnetic readings of 21.3 ug/L to 34.8 ug/L. The chlorophyll levels showed low algae densities in the lake. However the phosphorus data indicate a level of productivity where the potential exists for algae growth to be heavy and long lasting.

Ecology staff made four site visits in 1999. Thermal stratification and low dissolved oxygen levels in the hypolimnion were noted during each of these visits.

Ecology staff conducted an aquatic plant survey on 7/27/1999. A wide variety of aquatic plants occur in the lake with the dominant species being Potamogeton amplifolius (large-leaf pondweed). The only nonnative species observed was Phalaris arundinacia (reed canarygrass).

Based on the Secchi depth data, and the phosphorus and chlorophyll levels, Deer Lake is classified as oligomesotrophic.

The following is an assessment written by Ecology staff, Sarah O'Neal, to determine the phosphorus criterion for

Deer Lake:

Deer Lake is a large, deep lake which displayed many oligotrophic characteristics. Exceptional water clarity in the lake and low chlorophyll-a concentrations indicated little photosynthetic activity. Plants, mostly submerged, grew at moderate densities. No noxious weeds occur in the lake, though milfoil was present in nearby Loon Lake. Algal blooms occurred occasionally, but were not excessive. However, surprisingly high total phosphorus concentrations indicated a high mesotrophic state. Nitrogen limitation may explain why the mean Secchi depth and chlorophyll concentrations were lower than mean total phosphorus concentrations would indicate. Several potential nutrient sources existed in and around the lake. Approximately 600 homes, 450 of which were occupied year round, densely surround the shoreline. These homes were all on individual septic tanks until a sewer was built in 1992. Sparse vegetation around the shoreline resulted largely from development, with either buildings or lawns often extending up to the water's edge. This allowed runoff from the surrounding watershed to more easily enter the lake, including fertilizers used for lawn maintenance. Furthermore, cattle grazed up to and in the inlet to Deer Lake. Fencing cattle out of the lake, which occurred for the first time in 1999, may improve nutrient levels over time. Finally, logging occurred within the surrounding watershed. As well as high total phosphorus levels, one sample taken in August near the boat launch indicated a high fecal coliform concentration. The source of contamination is unknown, but possible sources include stormwater runoff, goose and animal access, and swimmers.

Questionnaire respondents indicated relaxing as their primary activity on the lake. Other uses included fishing, swimming, skiing, and boating. Questionnaire respondents indicated water quality, scenic views, fishing quality, and swimming opportunities added to the enjoyment of the lake and facilitated relaxing. WDFW managed the lake for eastern brook trout, rainbow trout, mackinaw (lake trout), and kokanee. They planted approximately 20,000 rainbow trout annually at a catchable size. Two-hundred-fifty-thousand small kokanee fry were planted between 1998 and 1999. Generally, kokanee exhibited little positive return. Kokanee that survived grew to a healthy size despite high mortality. In addition to the hatchery fish, there were two net pens on the lake. One contained rainbow trout and the other contained eastern brook trout. They each raised and released about 15,000 fish annually. Other species in the lake included yellow perch, sunfish, bullhead, large- and smallmouth bass, black crappie, and pumpkinseed. Zooplankton were exceptionally small considering the diversity of the fishery, which may indicate an ineffective amount of piscivores to control planktivore density.

Three of four earlier Ecology water quality surveys of the lake, from 1989-1992, indicated an oligotrophic state, with low total phosphorous levels ranging from 7 to 17 ug/L. Due to this, the dense development around the lake, and watershed uses, the oligomesotrophic state of the lake may not be natural. Consequently, we recommend an interim total phosphorus criterion of 20 ug/L, the action value for Northern Rockies lower mesotrophic lakes, pending a more thorough study, including a nutrient budget

analysis. Phosphorus concentrations exceeded this criterion in 1999. Future studies will likely recommend lowering this criterion. Due to the limitations of the sampling conducted during this study, it is difficult to determine whether nitrogen is also limiting to the system. Future studies may propose a nitrogen criterion.

Mean Secchi = 8.7m; Mean TP = 21.4 ug/L; Mean Chl = 1.2 ug/L

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

DEER

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 0										
6/14/1999		L					1 U			
		L					1			
7/12/1999		L					1 U			
		L					33			
8/9/1999		L					5			
		L					160			
9/13/1999		L					3			
		L					1 U			
Station 1										
6/14/1999		E	23.5	.25	11	.97		32.5	8920	.5
		H	26.7	.237	9					
7/12/1999		E	7.77	.301	39	1.71				.5
		H	21.3	.28	13					
8/9/1999		E	22.8	.288	13	1.1				.6
		H	21.7	.261	12					
9/13/1999		E	26.3	.253	10	1.2				.5 U
		H	34.8	.231	7					

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Profile Report

DEER

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/14/1999						
	0738	0	78.5	9.47 J	7.83	16.16
	0739	1	78.5	9.51 J	7.85	15.93
	0740	2	78.5	9.54 J	7.86	15.83
	0740	3	78.4	9.56 J	7.86	15.64
	0741	4	78.2	9.55 J	7.87	15.29
	0742	5	78.2	9.72 J	7.9	14.43
	0743	6	78.2	9.84 J	7.91	13.86
	0744	7	77.2	10.69 J	7.9	12
	0745	8	76.4	11.19 J	7.86	9.62
	0746	10	76.3	10.54 J	7.73	7.93
	0747	12	75.8	10.35 J	7.67	6.95
	0748	14	75.8	10.05 J	7.59	6.31
	0749	16	75.5	9.51 J	7.52	5.61
	0750	18	75.3	8.8 J	7.42	5.17
	0751	20	75.4	8.17 J	7.38	4.87
	0751	22	76.2	6.67 J	7.3	4.62
	0752	22.9	77.7	5.7 J	7.25	4.53

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
7/12/1999						
	0738	0	77.7	8.97 J	7.92	19.95
	0739	1	77.6	8.99 J	8.03	19.71
	0740	2	77.3	9.4 J	8.14	18.71
	0741	3	77.1	9.4 J	8.15	18.6
	0742	4	77	9.59 J	8.22	17.6
	0743	5	76.9	9.59 J	8.22	17.04
	0744	6	76.6	9.57 J	8.21	17
	0745	8	75.5	9.94 J	8.02	13.75
	0746	10	75.2	10.21 J	7.85	8.89
	0747	12	74.2	8.92 J	7.62	6.82
	0748	14	73.9	8.7 J	7.54	6.26
	0749	16	73.6	8.16 J	7.42	5.63
	0750	18	73.8	7.6 J	7.36	5.2
	0750	20	74	6.22 J	7.28	4.84
	0752	22.6	81.5	1.53 J	7.05	4.57

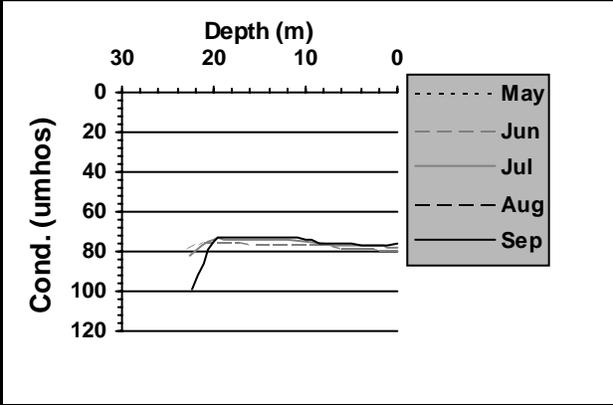
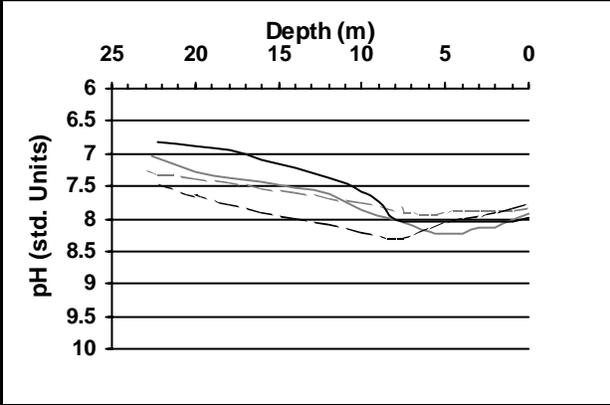
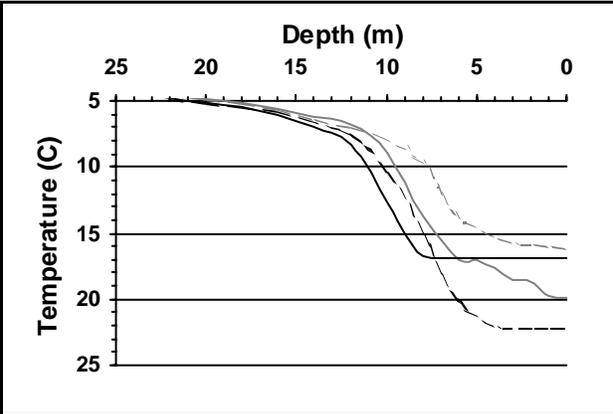
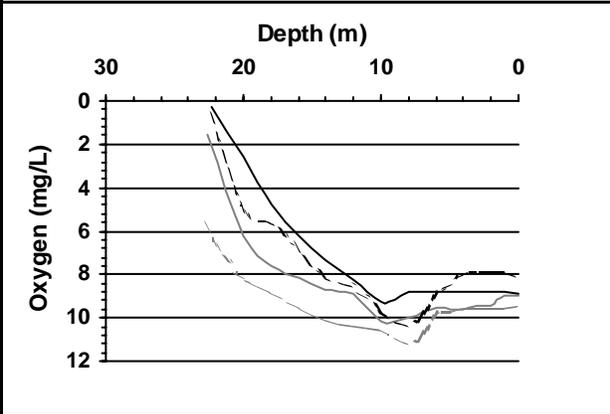
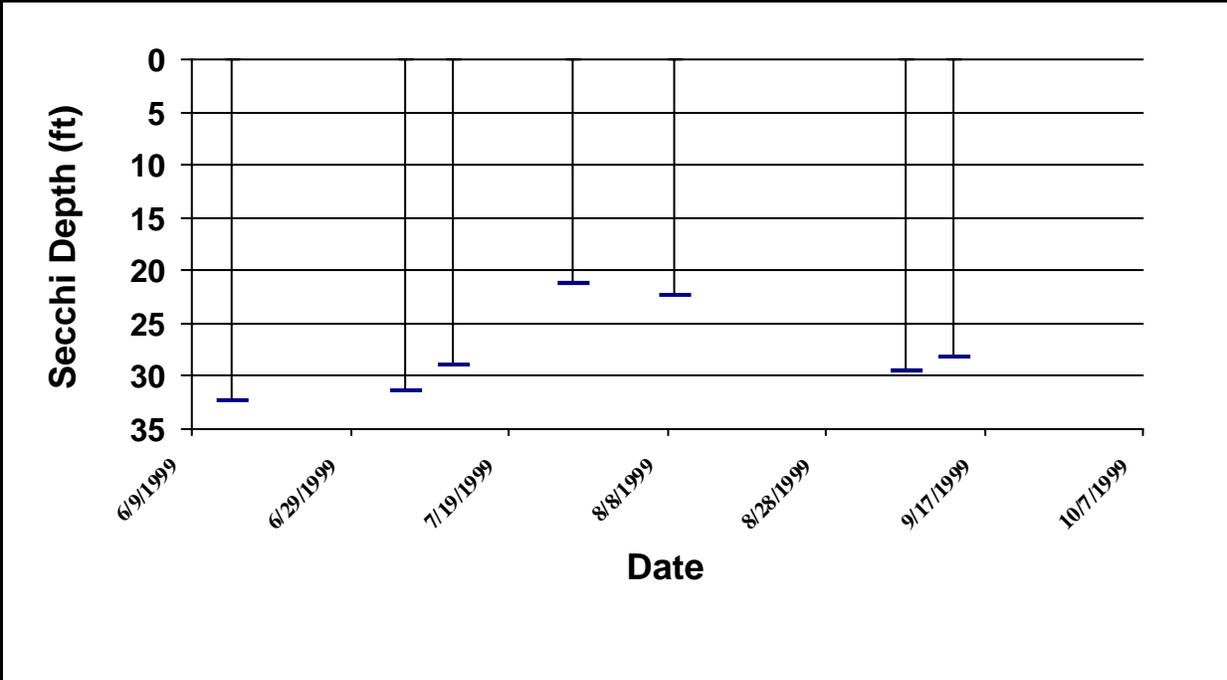
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
8/9/1999						
	0844	0.1		8.02 J	7.77	22.19
	0845	1		7.9 J	7.84	22.15
	0846	1.9		7.91 J	7.89	22.11
	0847	3		7.9 J	7.96	22.09
	0848	4		8 J	7.98	21.93
	0849	5		8.41 J	8.05	21.25
	0850	6		8.89 J	8.15	20.15
	0851	7		9.81 J	8.27	18.12
	0852	8		10.32 J	8.3	15.01
	0854	10		9.72 J	8.19	10.41
	0855	12		8.55 J	8.08	7.62
	0856	14		8.15 J	7.99	6.53
	0857	16		7 J	7.88	5.75
	0858	18		5.59 J	7.76	5.42
	0859	20		5.17 J	7.66	5.1
	0900	20		5.16 J	7.62	5.08
	0901	22.4		.67 J	7.44	4.75

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
9/13/1999						
	0717	0	76.4	8.85	7.98	16.92
	0719	1	76.6	8.81	8.05	16.91
	0719	2	76.5	8.77	8.06	16.92
	0720	4	76.5	8.76	8.06	16.92
	0722	6	76.4	8.77	8.05	16.89
	0722	8	76.3	8.75	8.02	16.66
	0724	9	75.1	9.16	7.75	15.1
	0725	10	74	9.28	7.59	12.64
	0727	12	72.6	8.28	7.37	8.34
	0728	14	72.9	7.34	7.23	6.95
	0730	16	72.8	6.19	7.09	6.06
	0732	18	72.8	4.72	6.96	5.45
	0733	20	74.6	2.52	6.88	5.18
	0735	22.3	98.7	.31	6.82	4.77

Secchi Depth and Profile Graphics

Station: 1

DEEST2



DUCK

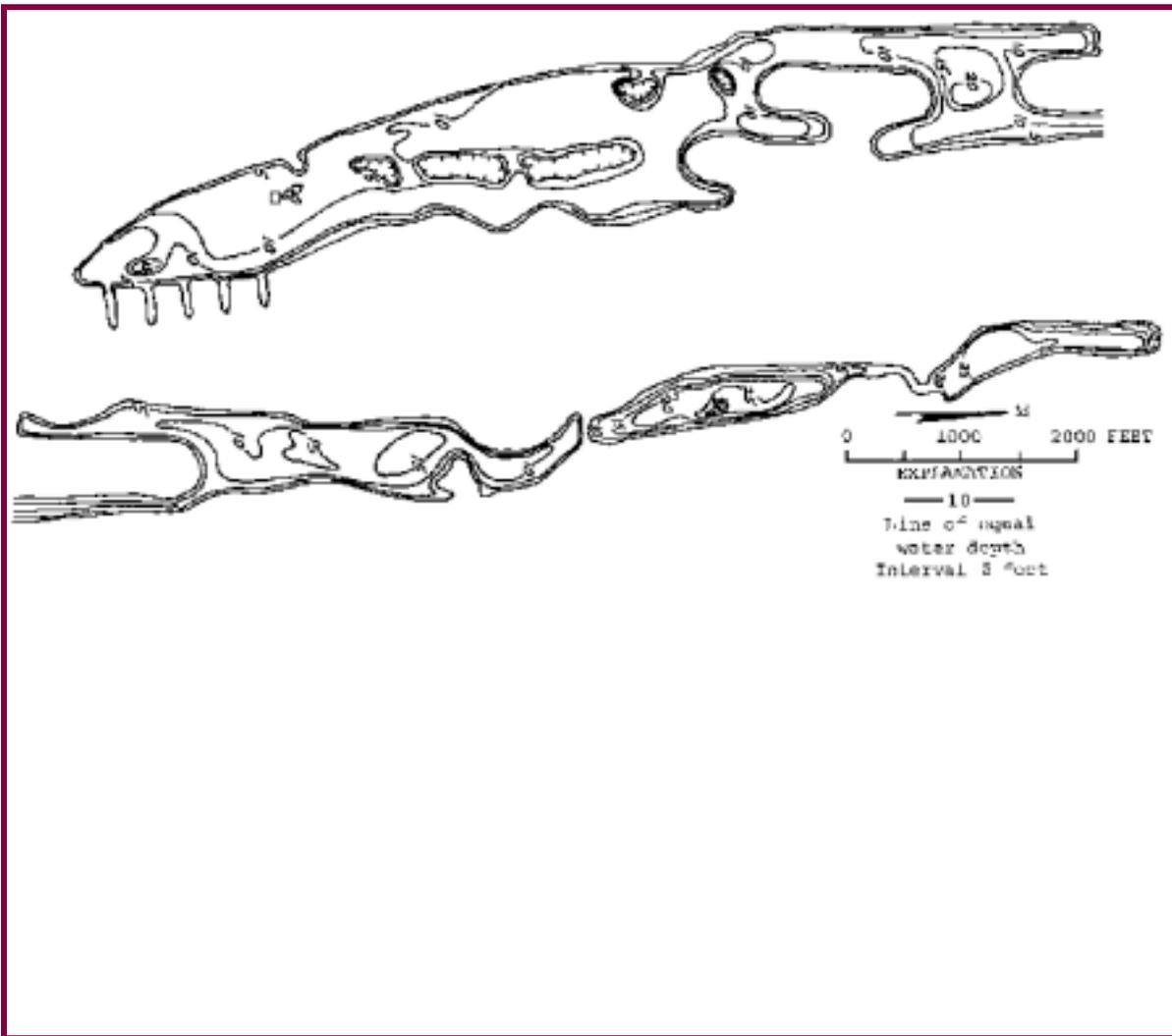
GRAYS HARBOR County

Lake ID: DUCGR1

Ecoregion: 1

Duck Lake is a reservoir just east of the resort city of Ocean Shores. It consists of a series of canals lined with residential homes. At nearly sea level and so close to the ocean, Duck Lake provides a protected haven for many shore birds and other waterfowl.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
278	30	11	1	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
3000	11.3	10	46 57 33.	124 08 12.



Station Information

DUCGR1

Primary Station	Station # 1	latitude: 46 59 42.5	longitude: 124 08 43.2
	Description:	Deep site. One 'basin' south of northernmost basin of lake. Approximately 1500 feet south of bridge, near east shore.	

Secondary Station	Station # 3	latitude: 46 57 48.4	longitude: 124 08 20.0
	Description:	In southernmost portion of lake, about 2000 feet north of southern tip, and about 400 feet southeast of a major point jutting out into water on west shore.	

Trophic State Assessment for 1998

DUCK

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 48 J
TSI_Phos:
TSI_Ch1:
Narrative TSI: ^b ME

Summary Comments:

The general water clarity for Duck Lake was fair to poor in 1998. The Secchi depth readings ranged from 2.1 (7.0 feet) to 2.9 meters (9.5 feet) with a mean Secchi depth of 2.4 meters (8.1 feet). For comparison, in 1997 the mean Secchi depth was 1.9 meters (6.3 feet).

No chemistry data was collected or site visit made by Ecology staff in 1998.

A large number of geese (50+) were observed by the volunteer monitor during one sampling visit (9/27/1998). The volunteer monitor also commented on the low lake level he observed during the month of September.

An aquatic plant survey was done by Ecology staff in 1998. The non-native plant *Egeria densa* (Brazilian elodea) was observed growing very densely in the north part of the lake. In addition, *Myriophyllum spicatum* (Eurasian milfoil) was also observed in the lake.

Based on Secchi depth data, Duck Lake is classified as mesoeutrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

DUCK

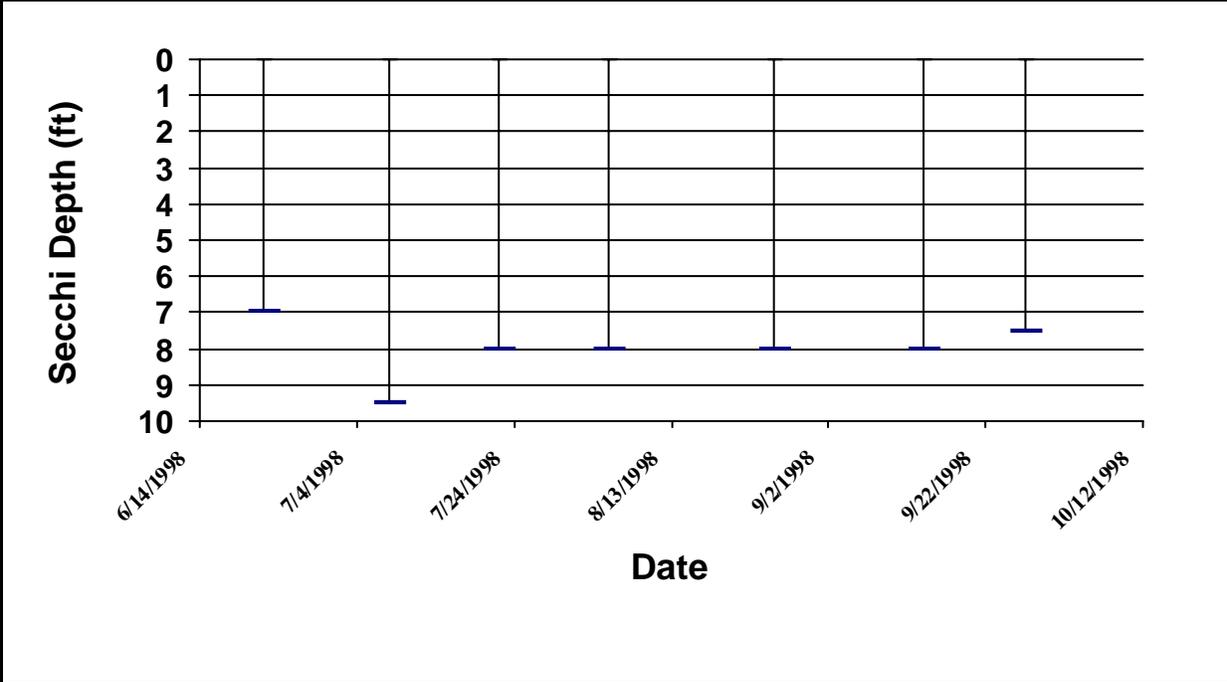
Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/22/1998		17.8	7	7	100	2	2	2	2	0	2	0	0
	Sampler: MARCHBANK		Remarks:										
7/8/1998		18.3	9.5	7				3	3	0	1	3	0
	Sampler: MARCHBANK		Remarks:										
7/22/1998		17.8	8	8	50	2	1	3	3	0	0	3	0
	Sampler: MARCHBANK		Remarks:										
8/5/1998		20	8	8	25	2	1	3	3	7	0	0	0
	Sampler: MARCHBANK		Remarks:										
8/26/1998		21.1	8	7	0	3	1	3	3	0		1	0
	Sampler: MARCHBANK		Remarks:										
9/14/1998		18.3	8	7	0	2	1	3	3	0	0	1	0
	Sampler: MARCHBANK		Remarks: LOW WATER LEVEL										
9/27/1998		17.8	7.5	7	0	1	1	3	3	50		1	0
	Sampler: MARCHBANK		Remarks:										
Station 2													
6/22/1998		17.8	2.5	7	100	2	2	2	1	0	0	0	0
	Sampler: MARCHBANK		Remarks:										
7/8/1998		20	1.5	6	75	2	1	1	1	0	0	0	0
	Sampler: MARCHBANK		Remarks:										
7/22/1998		18.3	1.5	6	50	2	1	2	1	0	5	0	1
	Sampler: MARCHBANK		Remarks:										
8/5/1998		21.1	4	8	25	1	1	3	2	0	0	0	0
	Sampler: MARCHBANK		Remarks:										

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
8/26/1998		21.1	5	7	0	3	1	3	3	0		1	0
	Sampler:	MARCHBANK		Remarks:									
9/14/1998		18.9	7 W	6	0	2	1	3	3	0	0	0	0
	Sampler:	MARCHBANK		Remarks: LAKE IS LOW									
9/27/1998		17.8	6.5 B	6	0	1	1	3	3	0		0	0
	Sampler:	MARCHBANK		Remarks:									
Station 3													
6/22/1998		17.8	5	8	100	2	2	3	2	0	0	0	0
	Sampler:	MARCHBANK		Remarks:									
7/8/1998		18.3	4	8	75	2	1	3	3	0	0	1	0
	Sampler:	MARCHBANK		Remarks:									
7/22/1998		18.3	3	7	50	2	1	3	2			5	0
	Sampler:	MARCHBANK		Remarks:									
8/5/1998		21.1	7	7	25	1	1	3	3	0	0		
	Sampler:	MARCHBANK		Remarks:									
8/26/1998		21.1	7	7	0	3	1	4	4	0		0	0
	Sampler:	MARCHBANK		Remarks:									
9/14/1998		18.3	6	7	0	2	1	3	3	25		2	0
	Sampler:	MARCHBANK		Remarks: LOW WATER LEVEL.									
9/27/1998		17.8	6.5	7	0	1	1	3	3	0		0	0
	Sampler:	MARCHBANK		Remarks:									

Secchi Depth and Profile Graphics

Station: 1

DUCGR1



--	--

--	--

Station Information

DUCGR1

Primary Station	Station # 1	latitude: 46 59 42.5	longitude: 124 08 43.2
	Description:	Deep site. One 'basin' south of northernmost basin of lake. Approximately 1500 feet south of bridge, near east shore.	

Secondary Station	Station # 3	latitude: 46 57 48.4	longitude: 124 08 20.0
	Description:	In southernmost portion of lake, about 2000 feet north of southern tip, and about 400 feet southeast of a major point jutting out into water on west shore.	

Trophic State Assessment for 1999

DUCK

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 61	J
TSI_Phos:	57	
TSI_Ch1:	61	
Narrative TSI:	^b E	

Summary Comments:

The general water clarity of Duck Lake was poor in 1999. The Secchi depth readings ranged from 0.8 meters (2.5 feet) to 1.2 meters (4.0 feet) with a mean Secchi depth of 0.9 meters (3.0 feet). For comparison, in 1998 the mean Secchi depth was 2.4 meters (8.1 feet).

Numerous geese and/or other waterfowl were observed on the lake by the volunteer monitor during his sampling visits made between June and September.

The volunteer monitor commented the water color of Duck Lake being a very dark green-brown to dark brown.

The chemistry data collected for Duck Lake showed high phosphorus levels. Values ranged from 32.5 ug/L to 66.5 ug/L in the epilimnion and hypolimnetic readings of 37.0 ug/L to 74.5 ug/L. The chlorophyll levels showed extremely high algae densities in the lake. The phosphorus data indicates a level of productivity where the potential exists for long term algae problems.

Ecology staff made four site visits in 1999. Thermal stratification and low dissolved oxygen levels in the hypolimnion were noted during each of these visits.

Ecology staff conducted an aquatic plant survey on 9/21/1999. The nonnative plant *Egeria densa* (Brazilian elodea) showed thick growth to the exclusion of other species in the lake. Another nonnative species that occurred was *Myriophyllum spicatum* (Eurasian watermilfoil). It had a small and patchy distribution in the lake. Also noted was the large amount of algae growing on the submerged macrophytes.

Based on the Secchi depth data, and the phosphorus and chlorophyll levels, Duck

Lake is classified as eutrophic.

The following is an assessment written by Ecology staff, Sarah O'Neal, to determine the phosphorus criterion for Duck Lake:

Duck Lake is a shallow, densely developed lake in Ocean Shores. Dredging and filling expanded the lake in the early 1960s to create land suitable for development. This led to a disproportionate amount of shoreline relative to a small lake area. It additionally allowed for an overwhelming amount of development on the lakeshore. This development likely led to high nutrient levels, typical of an eutrophic system. The lake did not exhibit increasing nutrient loading in 1999. In fact, nutrients were much lower than in a 1990 Ecology study, perhaps due to the creation of a municipal sewer system in the City of Ocean Shores, though most survey respondents reported a decline in water quality. At the time of sampling, the most significant problems in the lake resulted from dense plant and algae growth. Two non-native noxious weeds, Brazilian elodea (*Egeria densa*), and Eurasian watermilfoil (*Myriophyllum spicatum*) grew in the lake. The Brazilian elodea, in particular, dominated the plant community to the exclusion of other submerged species in many areas of the lake. Algae also grew densely throughout the summer. Both Diquat and copper sulfate were used to control plant and algae growth in the late 1980s, and an Aquatic Plant Management Plan was developed in 1994 which involved mechanical harvesting, grass carp planting, and hand removal of plants. Unfortunately, these methods appear to us to have had little affect. Dense vegetation surrounds the shoreline. Fortunately, native reeds dominated the shoreline plant community, providing some buffer between lawns and lake water, as well as a barrier to boat wakes.

Twenty-one visitors and residents completed the questionnaire. They indicated types of watercraft, water quality, plants, and swimming opportunities all impaired enjoyment of the lake. Two respondents specifically mentioned a desire to restrict personal watercraft. Primary uses among respondents included fishing, canoeing, kayaking, and watching wildlife. Respondent comments, site visits, and other studies clearly revealed that water skiing, jetskiing, swimming, and irrigation were among other uses. Fish habitat in the lake consisted mainly of plants, as well as some overhanging vegetation and human structures. Anoxia in the lake bottom, particularly later in the summer, created poor habitat for coldwater fish such as trout, though surface waters were not excessively warm. The zooplankton community, however, decreased in average size over the course of the summer, indicating utilization by planktivores and possibly inadequate numbers of piscivores. According to WDFW, poor water quality in Duck Lake limited its fishery to primarily warmwater species including largemouth bass, black crappie, bluegill, and pumpkinseed. Prior to sampling, the lake had not been stocked with trout due to a higher angler demand for bass.

Nutrient levels in the lake were within reasonable ranges considering the lake's wetland origin. In addition, the lake's eutrophic state somewhat supported its primary

uses. However, dense plant and algae growth clearly impacted the majority of those uses. Consequently, we recommend a total phosphorus criterion for the lake of 47.2 ug/L (mean 39.3 ug/L plus standard deviation of 7.9 ug/L) as well as continued, perhaps more aggressive, efforts to manage the lake vegetation. Due to the limitations of the sampling conducted during this study, it is difficult to determine whether nitrogen is also limiting to the system. Future studies should investigate the possibility of nitrogen limitation and propose a nitrogen criterion if appropriate.

Mean Secchi = 0.91m; Mean TP = 39.3 ug/L; Mean Chl = 22.0 ug/L; The Secchi TSI is qualified due to duplicate Secchi readings failing to meet quality assurance requirements.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

DUCK

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 1										
6/5/1999		E	66.5	.505	8	15.7				
		H	74.5	.257	3					
7/5/1999		E	45.6	.507	11	45.3				
		H	44.1	.291	7					
8/3/1999		E	35.9	.497	14	18				
		H	37.3	.509	14					
9/15/1999		E	32.5	.439	14	15.7				
		H	37	.612	17					
Station 2										
6/5/1999		E	47.2	.611	13	19.9				
7/5/1999		E	35	.6	17	27.8				
9/15/1999		E	41.7			9.6				

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

DUCK

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/5/1999			2.62	7	50	2	1	4	2	24	1	0	0
	Sampler:	SMITH		Remarks:	Lots of brownish growth in the water--could be some type of iron bacteria. Dissolved oxygen measurement qualified as an estimate due to calibration failing QA/QC requirements.								
6/22/1999		66	3	5	25	2	3	2	1	0	5	0	0
	Sampler:	MARCHBANK		Remarks:	Did not use a view tube.								
7/5/1999			3.61	7	0	4	1	4	2	0	0	5	5
	Sampler:	SMITH		Remarks:	Lots of Brazilian elodea fragments in water. Was so thick that the motor started over-heating.								
7/16/1999		64	2.5	5	75	2	1	2	1		4	3	0
	Sampler:	MARCHBANK		Remarks:	Did not use a view tube. Water color is close to "11", it is very green-brown.								
8/3/1999			3.3	7	0	3	1	5	4	0	1	0	0
	Sampler:	SMITH		Remarks:	Water very clear compared to the murky iron color seen earlier in the year. Less Brazilian elodea floating around. H2S at 9 meters.								
8/23/1999		67	2.5	5	25	3	1	2	1	0	0	2	0
	Sampler:	MARCHBANK		Remarks:	Did not use a view tube. Brown water.								
9/15/1999			4	6	100	1	2	5	2	65	8	2	0
	Sampler:	MARCHBANK		Remarks:									
9/21/1999			2.95										
	Sampler:	Parsons		Remarks:									
Station 2													
6/5/1999			3.3	6									
	Sampler:	SMITH		Remarks:	Water more green than brown. Bottom covered with Brazilian elodea.								
9/15/1999		65	7	6	100	1	1						
	Sampler:	MARCHBANK		Remarks:									
Station 3													
6/22/1999		69	3.5	5	25	2	3	2	1	0	4	1	0
	Sampler:	MARCHBANK		Remarks:	Did not use a view tube.								

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
7/16/1999		64	4	5	75	2	1	3	2	14		0	0
	Sampler:	MARCHBANK		Remarks: Did not use a view tube.									
8/23/1999		70	7	5	25	3	1	3	3	0		1	0
	Sampler:	MARCHBANK		Remarks: Did not use a view tube.									

Profile Report

DUCK

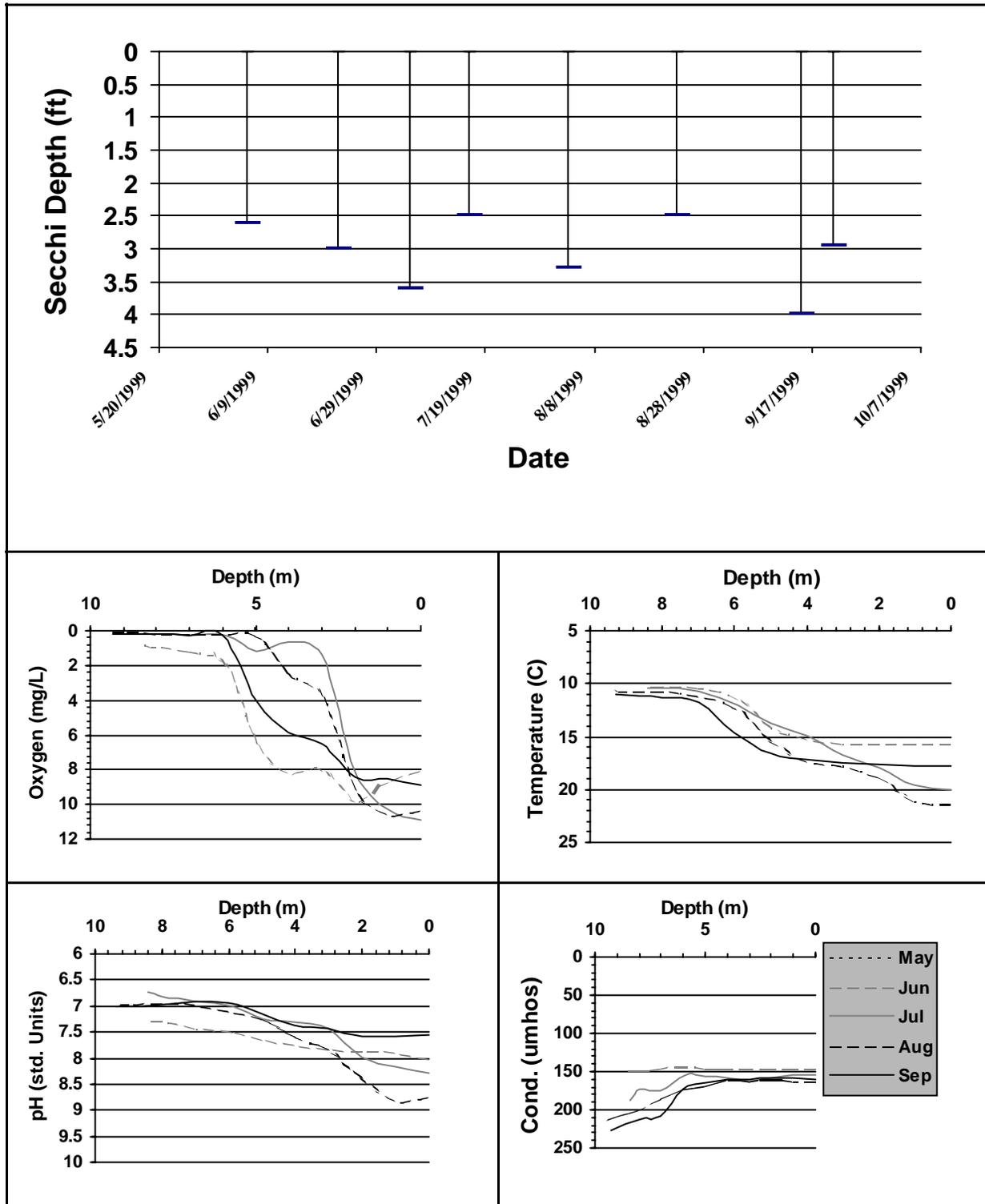
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/5/1999						
	0727	0	145.8	8.04 J	8	15.72
	0728	1	145.7	8.68 J	7.9	15.65
	0728	2	145.8	9.78 J	7.86	15.66
	0729	3	146.1	7.96 J	7.82	15.61
	0729	4	146.1	8.19 J	7.74	15.18
	0730	5	145.1	6.5 J	7.66	14.12
	0731	5.9	144.4	1.99 J	7.51	11.41
	0731	7	146.4	1.19 J	7.42	10.45
	0732	8	148.9	.96 J	7.29	10.28
	0733	8.5	148.3	.84 J	7.27	10.26
7/5/1999						
	0939	0	155	10.92	8.28	19.98
	0940	1	155	10.23	8.16	19.65
	0940	2	158	8.14	7.98	17.98
	0942	3	163	1.33	7.45	16.67
	0943	4	159	.68	7.31	14.95
	0943	5	156	1.17	7.26	13.78
	0945	5.9	155	.25	7	12.12
	0945	7	174	.23	6.92	10.72
	0946	8	172	.22	6.81	10.47
	0946	8.4	187	.21	6.74	10.4

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
8/3/1999						
	1143	0	162	10.33	8.74	21.39
	1143	1	162	10.52	8.82	21.05
	1144	2	161	9.16	8.38	18.88
	1145	3	162	3.8	7.83	17.82
	1145	4	161	2.44	7.6	17.38
	1146	5	169	.23	7.24	15.38
	1147	6	172	.18	7.1	12.24
	1147	7	185	.16	6.99	11.13
	1147	8	199	.14	6.96	10.77
	1148	9	209	.13	6.98	10.64
	1148	9.4	212	.13	7	10.59
9/15/1999						
	1341	0	160	8.91	7.57	17.85
	1342	1	159	8.53	7.6	17.8
	1342	2	159	8.46	7.59	17.68
	1343	3	160	6.5	7.45	17.44
	1344	4	160	5.85	7.36	17.15
	1346	5	164	4.01	7.16	16.56
	1347	6	172	.26	6.96	14.6
	1348	7	208	.23	6.93	11.75
	1348	8	212	.2	6.98	11.27
	1349	9.3	227	.17	7.02	11.04
Station 2						
6/5/1999						
	0830	0	133.2	9 J	8.81	16.69
	0831	0.9	133.1	12.05 J	8.8	16.55
	0832	1.8	133.1	9.08 J	8.78	16.22
	0832	1.9	133.3	12.12 J	8.81	16.25

Secchi Depth and Profile Graphics

Station: 1

DUCGR1



GILLETTE

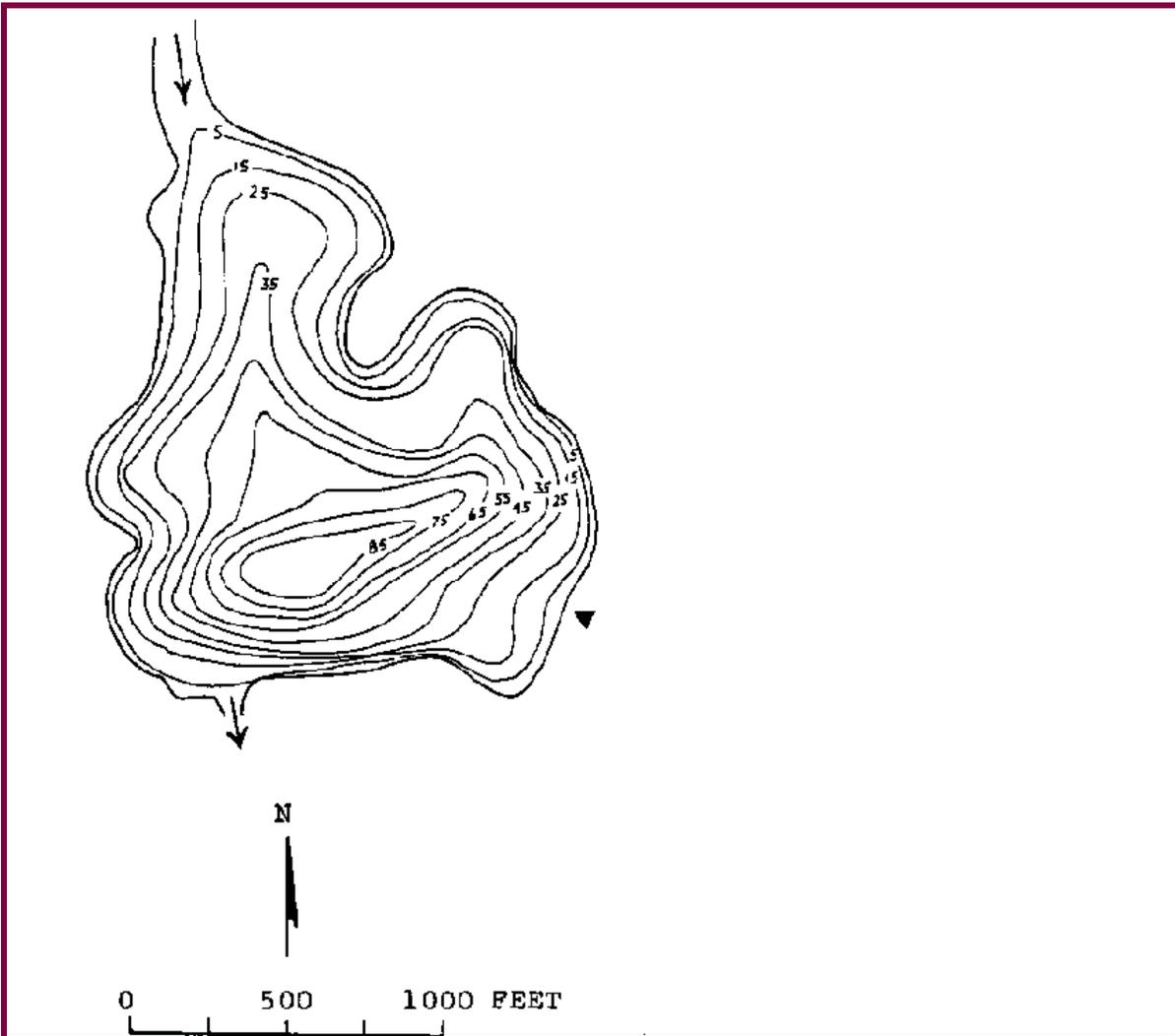
STEVENS County

Lake ID: GILST1

Ecoregion: 8

Lake Gillette is the fourth lake in the Little Pend Oreille chain of lakes. It is located approximately 20 miles northeast of Colville just south of the Pend Oreille County line.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
47	85	34	15	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
1600	1.27	3160	48 36 43.	117 32 35.



Station Information

GILST1

Primary Station	Station # 1	latitude: 48 36 42.0	longitude: 117 32 24.0
	Description: Deep site: North and slightly east of outlet to Sherry.		
Secondary Station	Station # 2	latitude: 48 36 50.0	longitude: 117 32 20.0
	Description: Mid-lake on a line between the USFS access and the tip of the peninsula at the north end.		

Trophic State Assessment for 1998

GILLETTE

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 41	J
TSI_Phos:		
TSI_Ch1:		
Narrative TSI:	^b M	

Summary Comments:

The general water clarity for Lake Gillette was good for 1998. The Secchi depth readings ranged from 3.0 meters (9.8 feet) to 4.6 meters (15.0 feet) with a mean Secchi depth reading of 3.9 meters (12.9 feet). For comparison, in 1997 the mean Secchi depth reading was 3.7 meters (12.1 feet). The water clarity remained fairly constant throughout the summer.

No chemistry data was collected from Lake Gillette in 1998.

Only one site visit was done by Ecology staff in 1998. Thermal stratification was noted during this visit (8/19/1998) as well as a depletion of dissolved oxygen in the hypolimnion.

Based on the Secchi depth data and the low dissolved oxygen levels in the hypolimnion, Lake Gillette is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

GILLETTE

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/22/1998		21.1	10	2	50	2	5	4	3			2	0
	Sampler:	HAWK			Remarks:	ESTABLISHED LAKE LEVEL BASE TODAY. BOAT MOTOR BAD - JUST GOT RUNNING.							
7/9/1998		24.4	9.75	2	25	1	1						
	Sampler:	HAWK			Remarks:								
7/29/1998		26.7	12.5	2	0	2	2	4	5			0	0
	Sampler:	HAWK			Remarks:								
8/19/1998		21.1	15	6	75	3	1	5	5		6	1	1
	Sampler:	HAWK			Remarks:								
8/19/1998			15		0					0	0	0	0
	Sampler:	BELL-MCKINNON			Remarks:								
9/5/1998		22.2	14.5	6	0	3	1	5	5			2	
	Sampler:	HAWK			Remarks:	BECAUSE OF MY SCHEDULE, I HAD TO DO THIS ON SATURDAY.							

Profile Report

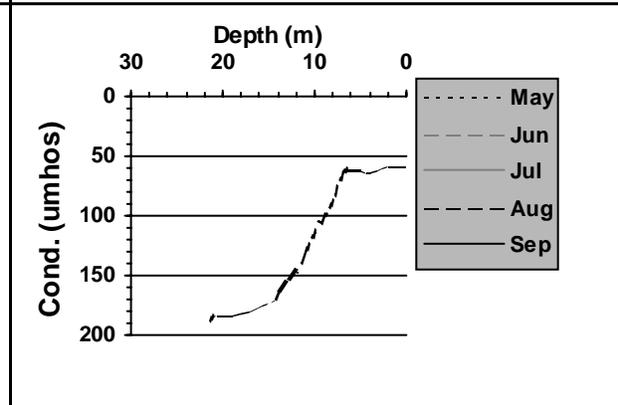
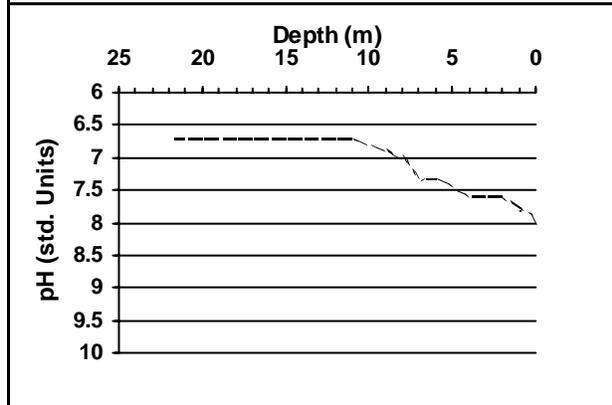
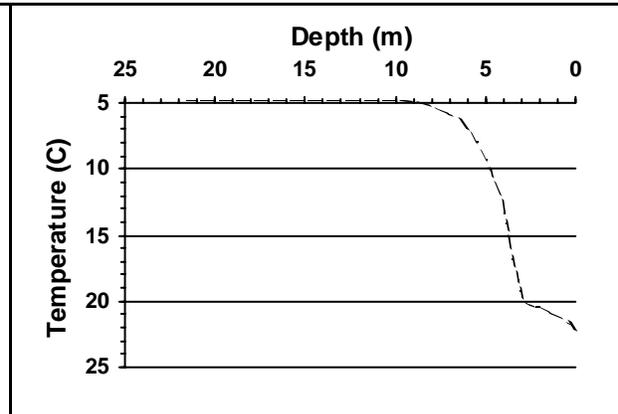
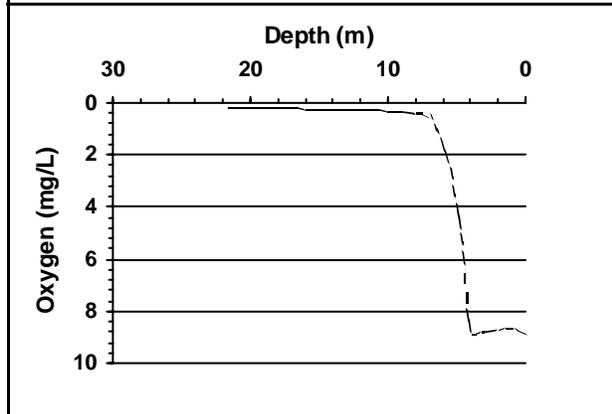
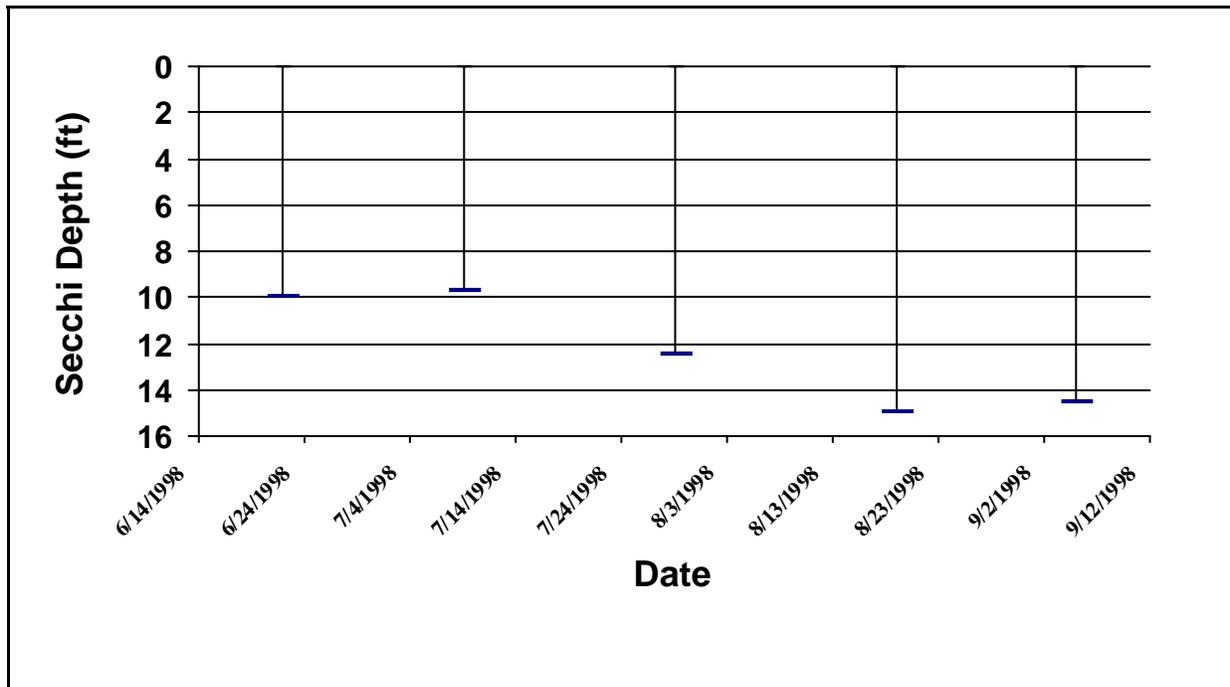
GILLETTE

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
8/19/1998						
		0	59	8.82	8	22.2
		0.8	59	8.61	7.8	21.3
		2	59	8.68	7.6	20.4
		3	61	8.79	7.6	19.8
		4	63	8.8	7.6	13.3
		5	62	4.38	7.4	9.3
		6	62	1.8	7.3	7
		7	65	.55	7.3	5.7
		8	89	.39	7	5.1
		9	100	.3	6.9	4.8
		10	114	.29	6.8	4.7
		11	133	.25	6.7	4.7
		12	147	.23	6.7	4.7
		13	156	.23	6.7	4.7
		14	165	.2	6.7	4.7
		15	173	.2	6.7	4.7
		16	176	.2	6.7	4.7
		17	180	.18	6.7	4.7
		18	181	.18	6.7	4.7
		19	183	.18	6.7	4.7
		20	184	.18	6.7	4.7
		21	185	.18	6.7	4.7
		21.6	188	.18	6.7	4.7

Secchi Depth and Profile Graphics

Station: 1

GILST1



Station Information

GILST1

Primary Station	Station # 1	latitude: 48 36 42.0	longitude: 117 32 24.0
	Description: Deep site: North and slightly east of outlet to Sherry.		
Secondary Station	Station # 2	latitude: 48 36 50.0	longitude: 117 32 20.0
	Description: Mid-lake on a line between the USFS access and the tip of the peninsula at the north end.		

Trophic State Assessment for 1999

GILLETTE

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 38	J
TSI_Phos:	50	
TSI_Chlor:	35	
Narrative TSI:	^b M	

Summary Comments:

The general water clarity of Lake Gillette was good in 1999. The Secchi depth readings ranged from 3.9 meters (12.8 feet) to 4.7 meters (15.3 feet) with a mean Secchi depth of 4.3 meters (14.3 feet). For comparison, in 1998 the mean Secchi depth was 3.9 meters (12.9 feet).

No geese and only a few other waterfowl were observed on the lake by the volunteer monitor during his sampling visits made between June and September.

The chemistry data collected for Lake Gillette showed high phosphorus levels. Values ranged from 22.4 ug/L to 26.3 ug/L in the epilimnion and hypolimnetic readings of 269.0 ug/L to 722.0 ug/L. The chlorophyll levels showed low algae densities in the lake. The phosphorus data indicates a level of productivity where algae growth could be heavy, last long and potentially interfere with the beneficial uses of the lake.

Ecology staff made six site visits in 1999. Thermal stratification and low dissolved oxygen levels in the hypolimnion were noted during each of these visits.

Ecology staff conducted an aquatic plant survey on 7/27/1999. The nonnative plant *Nymphaea odorata* (fragrant waterlily) grew in large patches and codominantly with other native plants like *Brasenia schreberi* (watershield). The nonnative plant *Iris pseudacorus* (yellow flag) also occurred in a few locations around the lake. Lake Gillette was treated with 2,4-D (Sonar) on 7/21/1999. During Ecology's plant survey of 7/27/1999 staff commented the submersed plant growth seemed reduced (perhaps because of the Sonar treatment) with macroalgae and floating leaved plants the most prevalent vegetation in the lake.

Based on the Secchi depth data, and the phosphorus and chlorophyll levels, Lake

Gillette is classified as mesoeutrophic.

The following is an assessment written by Ecology staff, Sarah O'Neal, to determine the phosphorus criterion for Lake Gillette:

Lake Gillette is a small, deep lake located in a relatively large drainage. A USFS campground bordered about half of the lake, and the rest was residential. The lake displayed both oligotrophic and mesoeutrophic characteristics. Secchi readings and chlorophyll levels indicated oligotrophy. Good clarity in the lake remained fairly constant throughout the summer. Total phosphorus levels, however, were notably high, at mesoeutrophic levels. TN:TP ratios may be caused by nitrogen limitation, which would explain why the mean Secchi and chlorophyll concentrations were so much lower than mean total phosphorus concentrations would indicate. Chemistry data revealed particularly high phosphorus in the hypolimnion, indicating internal nutrient loading in which nutrients are released from the sediment into the water column. This often occurs with low dissolved oxygen concentrations near the lake bottom, as clearly indicated by the Hydrolab profile data. Low dissolved oxygen also often leads to hydrogen sulfide near the bottom of the lake, causing an offensive, "rotten-egg" smell, and yellow-colored hypolimnetic water, documented throughout the summer. Watershed condition possibly caused the high phosphorus levels in the lake, considering the large size of the watershed relative to the small lake. The primarily residential watershed also contained agricultural, park, forest, and natural land, and a main highway. Several best management practices observed in the watershed included cattle gates and protection from erosion. However, some homeowners around the lake appeared to use fertilizers, which may contribute to higher nutrient levels in the lake. Macrophytes grew fairly densely in the lake, without causing particular problems, however. A 1997 Sonar treatment to control the aggressive, non-native plant, Eurasian watermilfoil (*Myriophyllum spicatum*) in addition to a 1999 2,4-D treatment possibly reduced plant densities below normal levels. The milfoil subsided since treatment.

No questionnaires were distributed for the lake. During site visits, uses included fishing and water-skiing. The lake appeared both aesthetically pleasing, as well as inviting to swimmers. WDFW managed the fishery for cutthroat trout. They rehabilitated the lake with Rotenone in 1997 in an attempt to curb continued growth of exploding populations of pumpkinseed, sunfish, and yellow perch. Pumpkinseed returned to the lake since the treatment. Five thousand cutthroat yearlings were planted annually in the lake since the treatments.

Despite elevated phosphorus levels, Lake Gillette supported a variety of beneficial uses. Therefore, we recommend a total phosphorus criterion of 27.8 ug/L (mean 23.4 ug/L plus standard deviation of 4.4 ug/L). Due to limitations of the sampling conducted during this study, it is difficult to determine whether nitrogen is also limiting to the system, though this appears likely. Future studies may propose a nitrogen criterion. Consequently, nitrogen applications in the watershed, for example forest

fertilization, should be carefully managed.

Mean Secchi = 4.6m; Mean TP = 23.4 ug/L; Mean Chl = 1.6 ug/L

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

GILLETTE

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 0										
6/16/1999		L					4			
		L					3			
7/14/1999		L					5			
		L					5			
8/11/1999		L					2			
		L					6			
9/15/1999		L					1 U			
		L					3			
Station 1										
6/16/1999		E	25.5	.168	7	1.5		19.1	5690	.5
		H	691	3.4	5					
6/22/1999		E	26.3							
7/14/1999		E	23.1	.216	9	1.81				1
		H	269	1.27	5					
8/11/1999		E	22.4	.206	9	1.4				.6
		H	722	3.05	4					
9/15/1999		E	22.1	.193	9	1.7				.5
		H	668	3.9	6					
Station 2										
6/16/1999		E	23.2	.182	8	1.2				
7/14/1999		E	22.3	.209	9	1.57				
8/11/1999		E	23.5	.208	9	1.4				
9/15/1999		E	22.8	.192	8	1.8				

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

GILLETTE

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/11/1999		62	15	2	25		3	5	5	0	2	3	
	Sampler:	HAWK			Remarks:	Used a view tube.							
6/16/1999			15.7	7	75	1	1	5	4	0	6	2	
	Sampler:	HALLOCK			Remarks:	H2S smell at all hypo depths. Hypo samples yellow. Oxygen dropped to 0.8 @ 6M. Took zooplankton tow from there. About 1/2 of shoreline is USFS campground, remainder is developed.							
6/22/1999		66	14	2	75	2	3	5	5	0	0	2	0
	Sampler:	HAWK			Remarks:	Used a view tube. No algae problems this spring. Only plant problem is Eurasian milfoil. Today's sampling weather was somewhat windy and threatening to rain.							
7/14/1999			15.7	7	5	2	1	5	4	0	9	2	
	Sampler:	HALLOCK			Remarks:	Bottom: 25.6M. Oxygen < 1 below 5M. H2S @ 10 and 15M. Waterfowl mostly grebes and ducks							
7/27/1999			11.48										
	Sampler:	Parsons			Remarks:								
7/30/1999		73	12.83	2	75	1	1	5	5	0	0	0	1
	Sampler:	STRAUSS			Remarks:	Used a view tube.							
8/11/1999			14.4	6.5	50	1	1	4	4	0	4	2	
	Sampler:	HALLOCK			Remarks:	Bottom: 25.6M. USFS placed boulders along eroding bank to west of swimming beach. H2S at all hypo depths. Dissolved oxygen measurement qualified as an estimate due to calibration failing QA/QC requirements.							
8/13/1999		73	13	2	25	2	1	5	5	0	0	0	0
	Sampler:	STRAUSS			Remarks:	Used a view tube.							
8/28/1999		73	14.5	2	0	2	1	5	5	0	0	2	0
	Sampler:	STRAUSS			Remarks:	Used a view tube.							
9/10/1999		64	15.25	2	25	3	1	5	5	0	5	2	0
	Sampler:	STRAUSS			Remarks:	Used a view tube.							
9/14/1999			15										
	Sampler:	STRAUSS			Remarks:	No suspended algae or unusual water color. Fish were jumping - hatch was on! Sampling day was sunny and calm.							

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
9/15/1999			18	7	0	1	1	5	5	0	6	1	
	Sampler:	HALLOCK		Remarks: Bottom: 25.6M. Hypo samples yellowish with H2S in all. Light mist on the water.									
Station 2													
6/16/1999			16.1	7	20	1	1						
	Sampler:	HALLOCK		Remarks: Dissolved oxygen measurement qualified as an estimate due to calibration failing QA/QC requirements.									
7/14/1999			16.1	7	15	2	1						
	Sampler:	HALLOCK		Remarks: Bottom: 21.8M.									
8/11/1999			15.7	6.5									
	Sampler:	HALLOCK		Remarks: Bottom: 20.2M.									
9/15/1999			17.7	7									
	Sampler:	HALLOCK		Remarks: Bottom: 18.8 M									

Profile Report

GILLETTE

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/16/1999						
	0730	0	27.5	10.61 J	7.35	19.31
	0730	1	44.5	10.62 J	7.37	19.25
	0731	2	45.5	11.75 J	7.41	16.2
	0732	3	46.5	13.56 J	7.47	12.76
	0734	4	52.1	11.76 J	7.2	8.62
	0735	5	56.3	7.15 J	6.91	7
	0738	6	60.8	.78 J	6.52	5.6
	0738	8	72.7	.6 J	6.46	4.89
	0739	10	93.8	.47 J	6.42	4.6
	0740	12	142.9	.31 J	6.41	4.59
	0741	14	165	.29 J	6.45	4.62
	0742	16	173	.29 J	6.48	4.65
	0742	18	179	.25	6.51	4.7
	0743	20	184	.23 J	6.54	4.7
	0744	25	188	.23 J	6.55	4.73
	0744	25.5	190	.21 J	6.55	4.75

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
6/22/1999						
		0	43.7	9.87	8.16	18.23
		1.1	43.7	9.75	7.79	18.01
		1.5	45.9	10.19	7.73	17.68
		2.1	43.8	10.77	7.7	16.91
		3.1	46.1	12.71	7.79	12.96
		4	50.3	13.13	7.78	9.63
		5.1	53.5	8	7.9	7.07
		6	57.2	4.63	7.78	5.93
		7.1	59.8	1.41	7.64	5.2
		8	66.4	1	7.56	4.98
		9.2	79.3	.69	7.28	4.69
		9.9	91.7	.59	7.08	4.6
		11	108	.49	6.85	4.55
		12	133.5	.47	6.74	4.57
		12.9	148.3	.4	6.62	4.59
		13.7	152	.39	6.58	4.6
		14	153	.36	6.58	4.6
		15	159	.34	6.58	4.64
		16	164	.31	6.56	4.64
		17	166	.31	6.57	4.65
		17.6	168	.28	6.59	4.66

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
7/14/1999						
	0712	0	47.5	8.34 J	7.48	21.07
	0713	1	47.6	8.3 J	7.49	21.09
	0715	2	47.5	9.37 J	7.6	19.28
	0716	3	53.7	12.14 J	7.74	15.43
	0718	4	54	13.47 J	7.79	12.12
	0719	5	57.3	4.37 J	7.24	8.21
	0721	6	59.5	.49 J	6.69	6.64
	0722	8	68.9	.16 J	6.54	5.22
	0723	10	107.3	.15 J	6.43	4.72
	0724	15	164	.13 J	6.49	4.67
	0725	20	177	.13 J	6.52	4.7
	0726	25	182	.12 J	6.55	4.72
	0726	25.6	207	.12 J	6.56	4.73
8/11/1999						
	0853	0		7.99 J	7.53	22.26
	0943	0		8.2 J	7.67	22.38
	0854	1		7.99 J	7.48	22.27
	0855	2		7.96 J	7.44	22.29
	0856	3		12.22 J	7.51	20.05
	0858	4		14.77 J	7.88	14.37
	0900	5		12.21 J	7.89	10.72
	0902	6		.8 J	7.24	7.81
	0903	8		.43 J	7.03	5.58
	0904	10		.33 J	6.77	4.87
	0905	15		.35 J	6.6	4.72
	0906	20		.28 J	6.61	4.77
	0907	25		.22 J	6.64	4.77
	0908	25.6		.26 J	6.68	4.78

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
9/14/1999						
		0.1	58	8.63	8.24	17.01
		1.1	57.8	8.7	7.96	15.93
		1.6	57.7	8.61	7.75	15.84
		2	57.6	8.56	7.66	15.74
		3.1	58.2	8.53	7.59	15.62
		4	57.4	8.42	7.52	15.39
		5	61.2	5.76	7.44	11.68
		5.1	60.6	8.23	7.58	12.49
		6.1	63	2.94	7.35	9.06
		7.1	63	.95	7.25	7.16
		7.8	73	.46	7.02	5.92
		9.2	91.1	.35	6.68	5.36
		9.8	103.2	.3	6.54	5.03
		10.7	128.4	.26	6.41	4.79
		12.1	147.5	.25	6.41	4.72
		13.2	153	.22	6.42	4.68
		15.1	167	.21	6.45	4.67
		17.1	172	.2	6.46	4.66
		20.1	178	.2	6.49	4.68

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
9/15/1999						
	0809	0	55.7	9.25	7.64	15.88
	0810	1	55.8	9.23	7.66	15.88
	0811	2	55.8	9.21	7.69	15.88
	0812	4	55.8	9.32	7.62	15.2
	0813	5	58.2	10.25	7.37	13.29
	0815	6	61.4	1.12	6.83	8.95
	0816	7	61.6	.25	6.57	7
	0817	8	67.6	.21	6.48	5.98
	0818	10	95.6	.17	6.39	5.12
	0819	15	159	.15	6.49	4.67
	0820	20	172	.14	6.53	4.7
	0820	25	177	.14	6.55	4.72
	0821	25.6	179	.12	6.56	4.72

Station 2

6/16/1999

	0836	0	45	10.63 J	7.47	19.5
	0837	1.1	45.9	10.37 J	7.4	18.69
	0839	2	45.4	11.64 J	7.45	15.68
	0840	3	48.3	13.82 J	7.44	12.38
	0840	4	51.2	12.03 J	7.26	8.79
	0842	5	55.5	7.01 J	6.9	7
	0844	6	60.6	.098 J	6.55	5.66
	0845	7.9	77.7	.56 J	6.47	4.8
	0845	10	99.8	.49 J	6.42	4.6
	0846	12	137.9	.43 J	6.42	4.62
	0846	14	157	.39 J	6.46	4.63
	0847	16	177	.33 J	6.5	4.68
	0847	18	182	.31 J	6.53	4.69
	0848	20	186	.27 J	6.54	4.72
	0848	21.8	186	.29 J	6.57	4.72

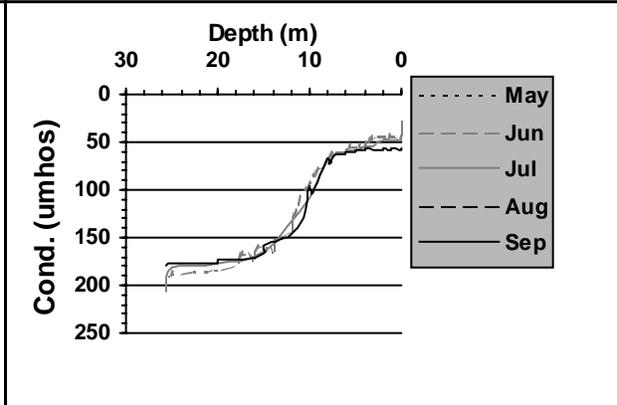
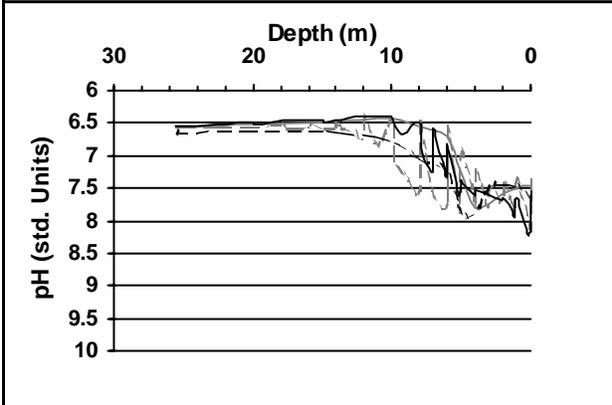
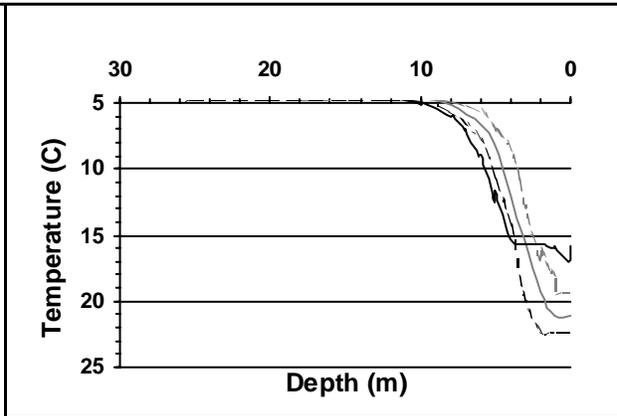
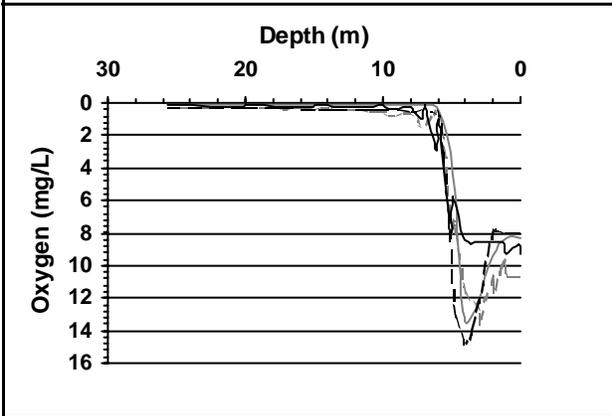
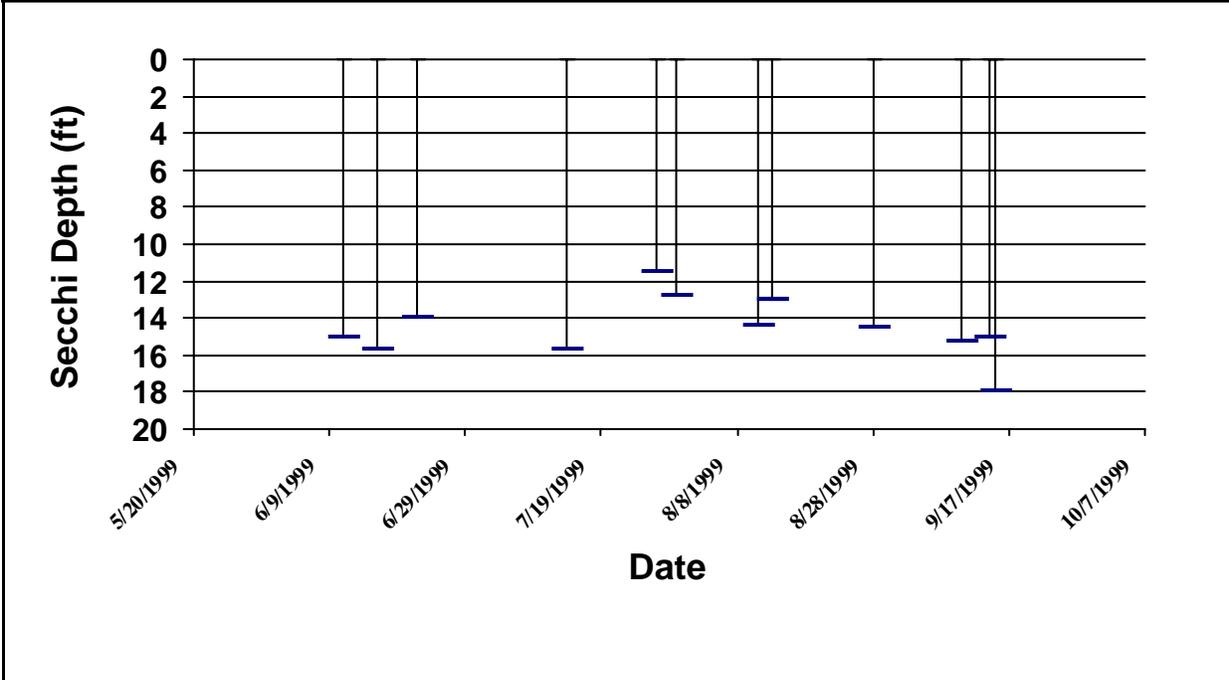
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
7/14/1999						
	0759	0	47.6	8.13 J	7.57	20.98
	0801	1	47.7	8.15 J	7.53	20.98
	0802	2	47.6	9.35 J	7.67	19.04
	0803	3.1	55.1	11.96 J	7.75	15.39
	0805	4	54	13.67 J	7.79	12.12
	0807	4.9	56.9	5.17 J	7.03	8.61
	0808	6	60.3	.49 J	6.73	6.62
	0809	8.1	78.7	.23 J	6.57	5.13
	0810	10	95.6	.17 J	6.5	4.78
	0811	15.1	167	.15 J	6.56	4.67
	0812	20	177	.13 J	6.57	4.7
	0812	21.8	178	.12 J	6.6	4.7
8/11/1999						
	0945	0		7.8 J	7.55	22.38
	0844	0.3		7.95 J	8.69	22.69
	0947	0.9		7.75 J	7.53	22.36
	0948	2		7.84 J	7.49	22.2
	0948	3		11.6 J	7.55	19.86
	0950	4.1		13.7 J	7.75	14.4
	0951	5		12.55 J	7.83	10.6
	0953	6		1.08 J	7.28	7.86
	0954	7		.59 J	7.07	6.1
	0955	8		.41 J	6.91	5.58
	0955	10		.31 J	6.64	4.9
	0956	15		.26 J	6.52	4.72
	0956	20		.24 J	6.56	4.75
	0957	20.2		.52 J	6.62	4.8

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
9/15/1999						
	0848	0	55.8	9.24	7.69	15.93
	0849	0.9	55.8	9.22	7.69	15.9
	0850	2	55.8	9.16	7.69	15.88
	0850	4	56.5	9.22	7.65	15.23
	0852	5	58.5	9.55	7.23	12.77
	0854	6	60.4	.96	6.67	9.66
	0855	8	80.1	.21	6.49	5.75
	0856	10	94.5	.2	6.45	5.25
	0857	15	157	.15	6.48	4.69
	0858	18.9	167	.14	6.52	4.72

Secchi Depth and Profile Graphics

Station: 1

GILST1



HAVEN

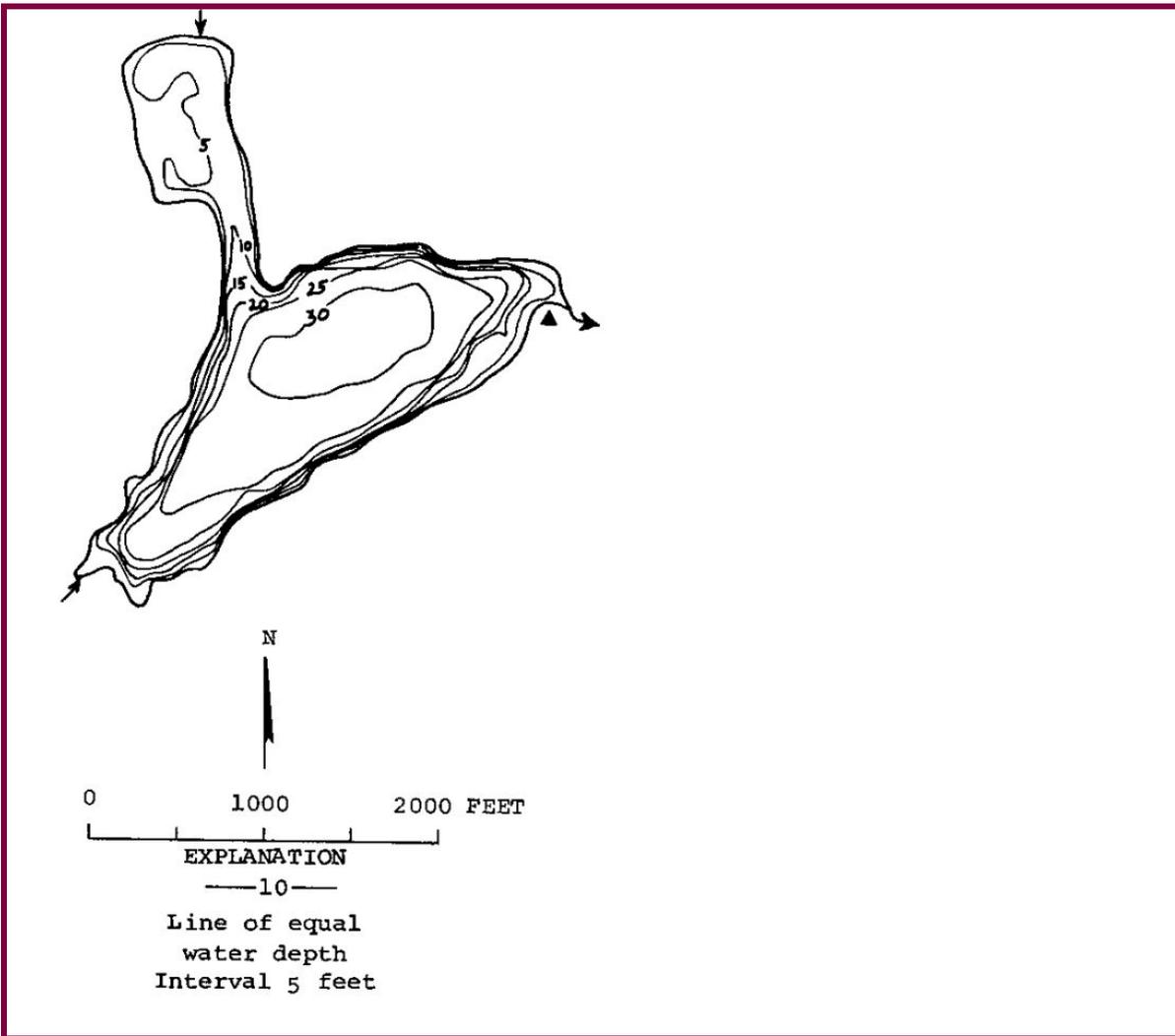
MASON County

Lake ID: HAVMA1

Ecoregion: 2

Haven Lake is just across the street from Lake Wooten in Mason County. It receives the outfall from Lake Wooten. Most of the cottages that line the shores of the lake are occupied during the summer months only.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
69	31	18	1	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
1270	2.16	366	47 27 28.	122 58 33.



Station Information

HAVMA1

Primary Station	Station # 1	latitude: 47 27 23.2	longitude: 122 59 05.0
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

HAVEN

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 34 J
TSI_Phos:
TSI_Ch1:
Narrative TSI: ^b OM

Summary Comments:

The general water clarity for Haven Lake was good to excellent in 1998. The Secchi depth readings ranged from 5.6 meters (18.5 feet) to 6.6 meters (21.5 feet) with a mean Secchi depth of 6.1 meters (20.2 feet). For comparison, in 1997 the mean Secchi depth was 6.3 meters (20.7 feet).

No chemistry data was collected for Haven Lake in 1998.

Only one site visit was made by Ecology staff in 1998. Thermal stratification was observed during this visit (5/14/1998) and low dissolved oxygen levels were noted in the hypolimnion.

Geese and/ or other waterfowl were observed on the lake by the volunteer monitor during five of his ten sampling visits between May and October. Algae was also seen by the volunteer in some areas of the lake during the month of June.

An aquatic plant survey of Haven Lake was done by Ecology staff in 1998. Only native plants were observed during this visit (6/8/1998) as well as big "pillows" of algae on the bottom at the south end of the lake.

Based on Secchi depth data and the low dissolved oxygen levels in the hypolimnion, Haven Lake is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Profile Report

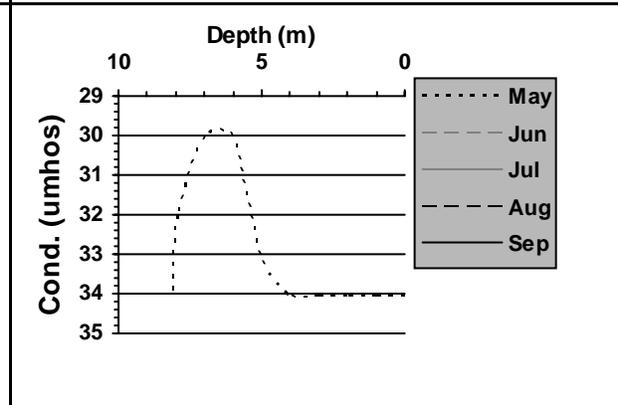
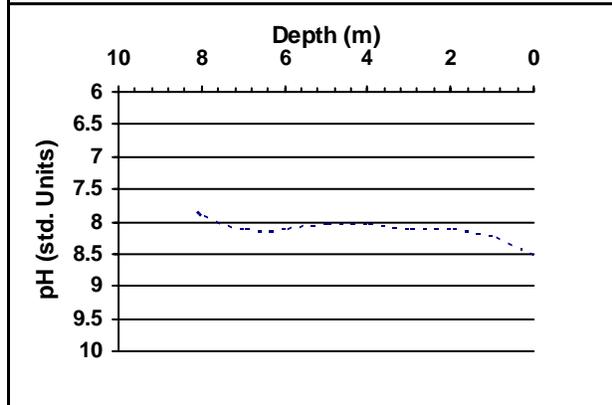
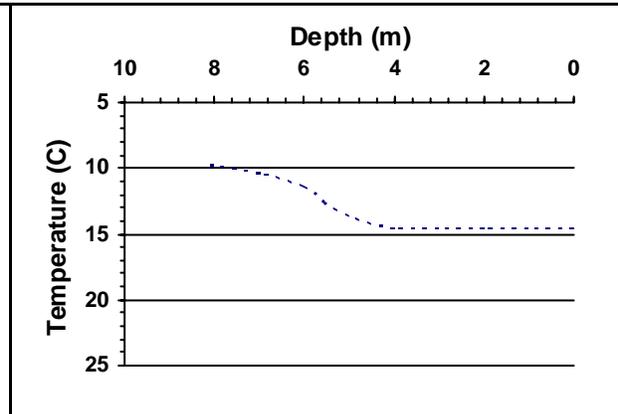
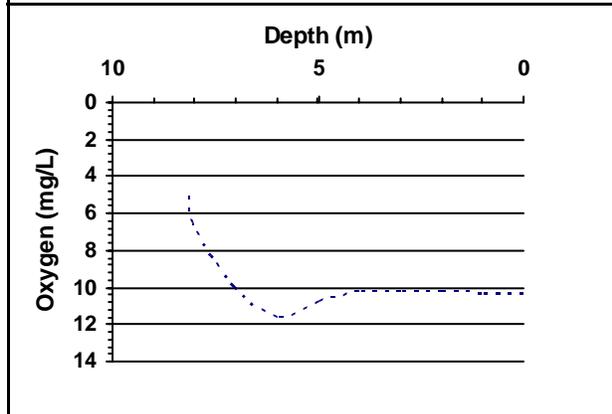
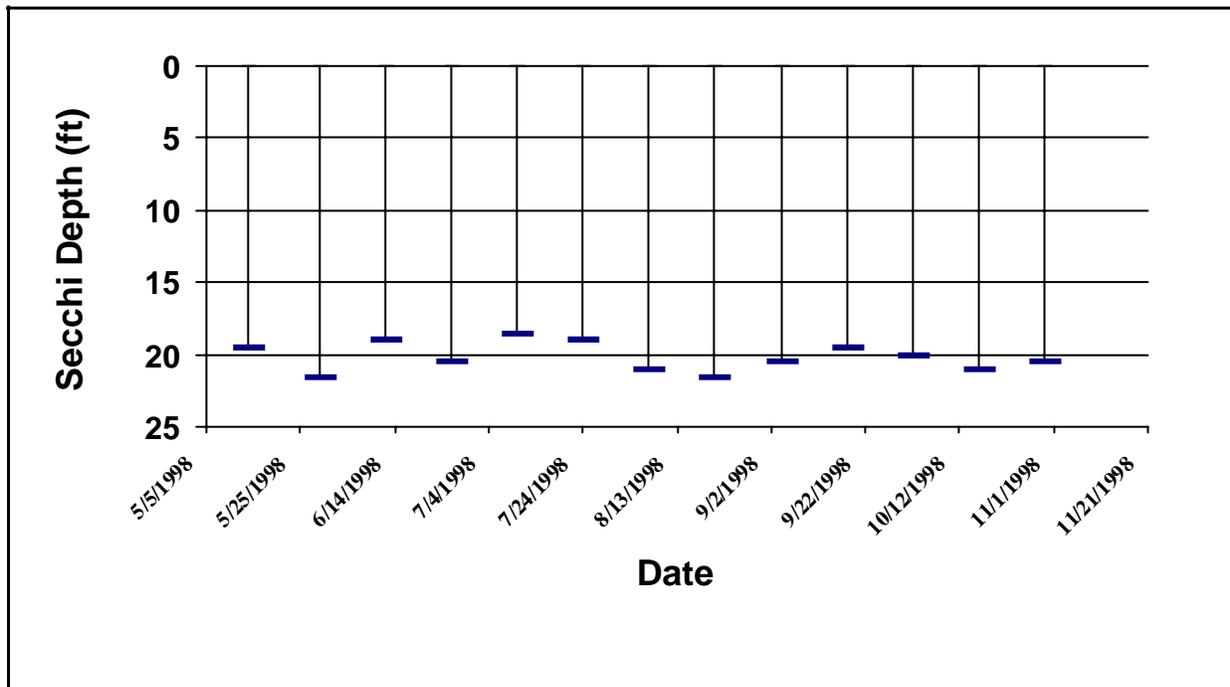
HAVEN

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
5/14/1998						
		0	34	10.31	8.5	14.4
		1	34	10.26	8.2	14.4
		2	34	10.16	8.1	14.4
		3	34	10.1	8.1	14.4
		4	34	10.17	8	14.4
		5	33	10.73	8	13.6
		6	30	11.58	8.1	11.3
		7	30	9.93	8.1	10.2
		8	32	6.56	7.9	9.7
		8.1	34	4.73	7.7	9.6

Secchi Depth and Profile Graphics

Station: 1

HAVMA1



Station Information

HAVMA1

Primary Station	Station # 1	latitude: 47 27 23.2	longitude: 122 59 05.0
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

HAVEN

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 35	J
TSI_Phos:	38	
TSI_Ch1:		
Narrative TSI:	^b OM	

Summary Comments:

The general water clarity of Haven Lake was very good in 1999. The Secchi depth readings ranged from 4.6 meters (15.0 feet) to 6.6 meters (21.5 feet) with a mean Secchi depth of 5.6 meters (18.5 feet). For comparison, in 1998 the mean Secchi depth was 6.1 meters (20.2 feet).

No geese were sighted by the volunteer monitor during any of his sampling visits between May and September; other waterfowl were seen on the lake only during the month of August.

The chemistry data collected for Haven Lake showed low phosphorus levels in the epilimnion.

Ecology staff made two site visits in 1999. A very slight degree of thermal stratification was observed during both of these visits (5/19/1999 and 8/11/1999) and low dissolved oxygen levels in the hypolimnion were noted during the site visit in August.

Based on the Secchi depth data, the low dissolved oxygen levels and the phosphorus levels, Haven Lake is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

HAVEN

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
------	------	--------	-----------------	-----------------	-------	----------------------------	-------------------------------------	--------------------	-------------------	--------------------

Station 1

5/19/1999		E	8.2							
-----------	--	---	-----	--	--	--	--	--	--	--

Profile Report

HAVEN

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
5/19/1999						
		0.1	28.2	11.29	8.23	13.5
		0.9	27.9	11.04	8.12	13.5
		1.2	27.8	11	7.99	13.49
		1.9	27.6	10.8	7.94	13.43
		3	27.5	10.72	7.99	13.4
		4.1	27.5	10.69	7.93	13.37
		4.8	27.6	10.75	7.91	13.16
		5.1	27.5	10.74	7.83	13.09
		5.7	27.6	10.76	7.87	12.98
		6	27.6	10.71	7.89	12.93
		7.1	27.5	9.77	7.8	11.83
		8	28.2	4.84	7.44	11.09
		8.2	28.2	7.13	7.67	11.08
8/11/1999						
		0	36.6	8.74	8.11	23.08
		0.9	36.7	8.66	7.93	23.09
		1.2	36.7	8.64	7.9	23.09
		1.5	36.6	8.64	7.81	23.09
		2	36.6	8.62	7.78	23.09
		3	36.7	8.59	7.74	23.08
		4	36.7	8.58	7.67	23.08
		5	36.7	8.55	7.61	23.07
		6.1	35.6	9.26	7.61	21.78
		7.1	34.8	6.03	7.5	20.05
		7.8	36.7	2.98	7.28	18.7

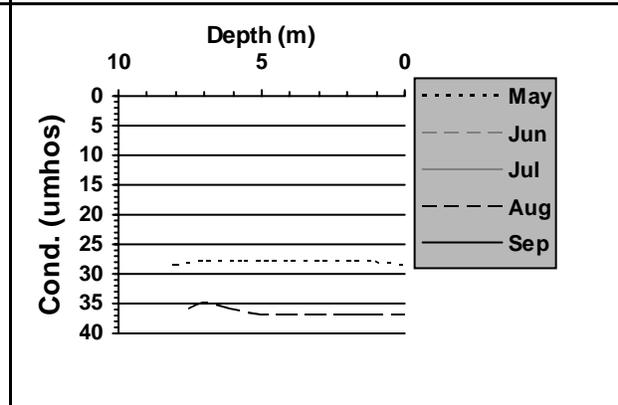
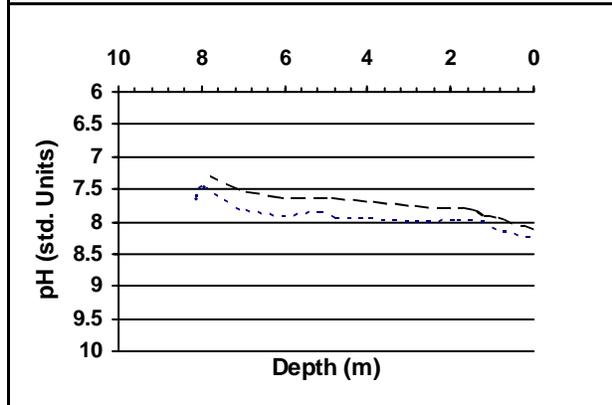
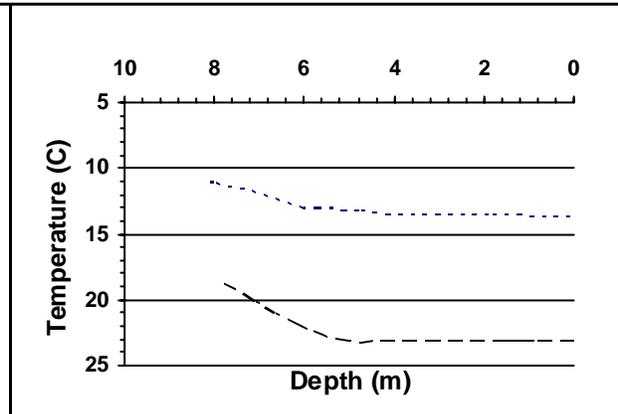
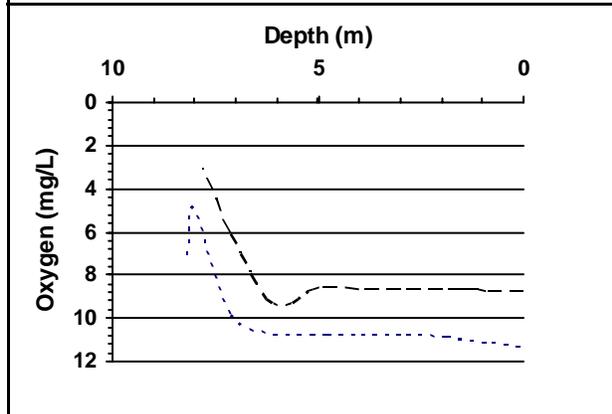
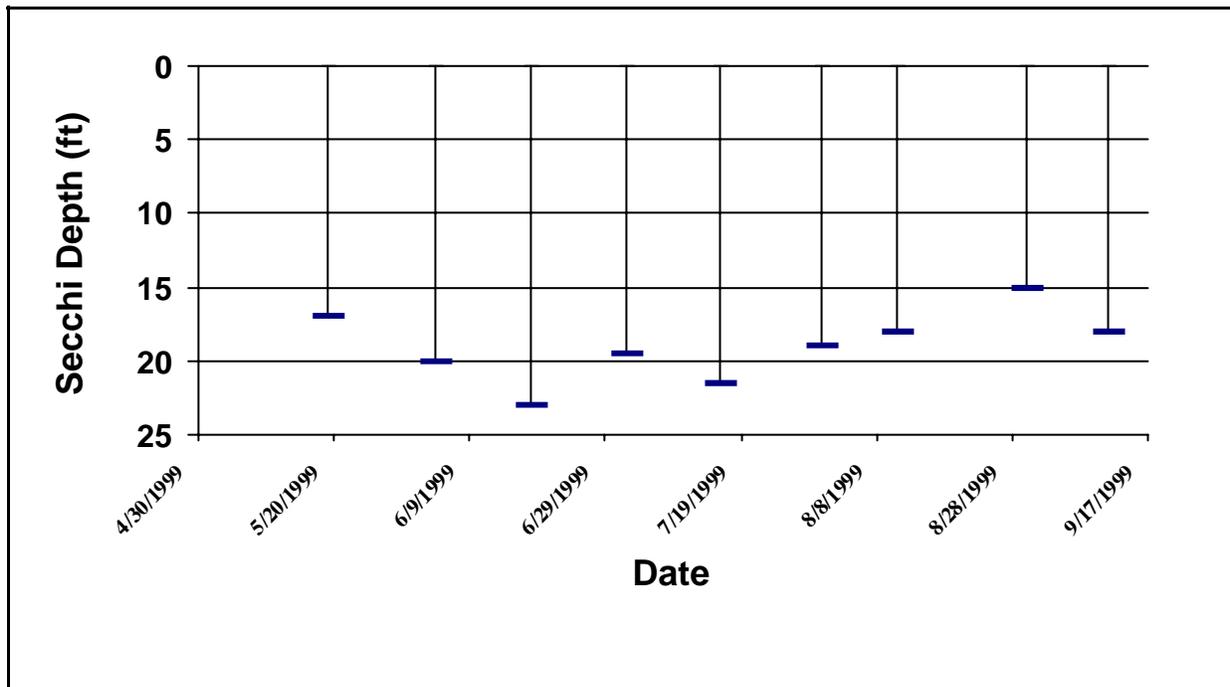
Station 2

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
5/19/1999						
		0	28.2	10.61	8.38	13.4
		1.1	27.7	10.88	8.25	13.43
		2	27.7	11.16	8.16	13.41
		3	27.6	11.41	8.2	13.4
		4.1	27.7	11.69	8.14	13.4
		5.1	27.7	11.13	8.09	13.38
		5.9	27.6	11.22	8.04	13.09
		7.2	28.3	10.3	7.98	12.25

Secchi Depth and Profile Graphics

Station: 1

HAVMA1



HICKS

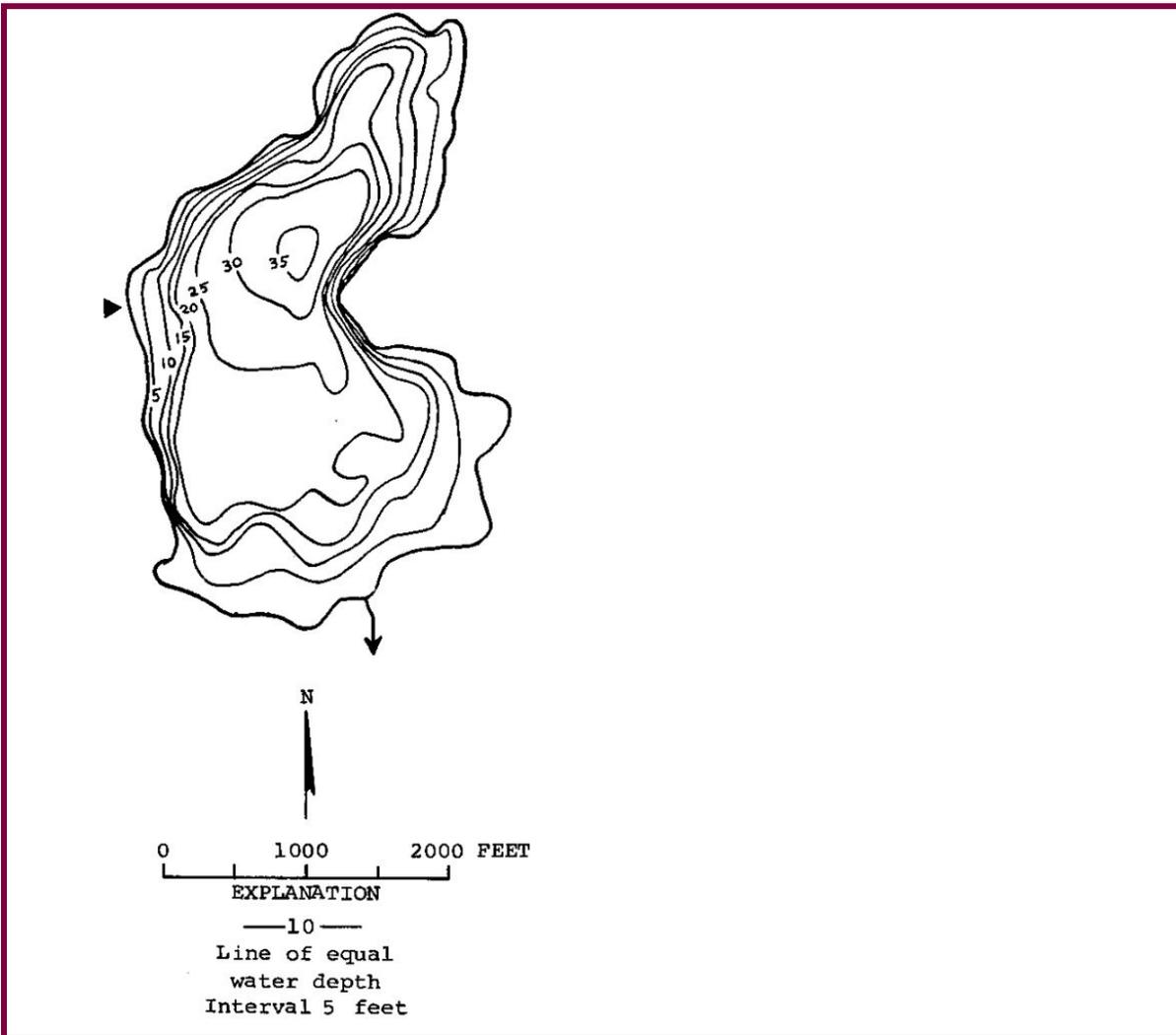
THURSTON County

Lake ID: HICTH1

Ecoregion: 2

Hicks Lake is the only lake within the Lacey City limits that allows motorized boats. There are no inlet waters but the lake is the receiving water for much stormwater runoff. As a result, Hicks Lake suffers from high water levels during times of excessive rainfall and extreme low water levels during drought.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
160	35	18	2	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
2700	2.44	162	47 01 02.	122 47 42.



Station Information

HICTH1

Primary Station Station # 1 latitude: 47 01 31.0 longitude: 122 47 42.2
Description: Deep spot of the lake.

Trophic State Assessment for 1998

HICKS

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 46 J
TSI_Phos:
TSI_Ch1:
Narrative TSI: ^b M

Summary Comments:

The general water clarity for Hicks Lake was good in 1998. The Secchi depth readings ranged from 2.1 meters (7.0 feet) to 3.1 meters (10.0 feet) with a mean Secchi depth of 2.6 meters (8.7 feet). For comparison, in 1997 the mean Secchi depth was 2.1 meters (6.8 feet).

No chemistry data was collected for Hicks Lake in 1998.

Only one site visit was made by Ecology staff in 1998. Thermal stratification was observed during this visit (9/14/1998) and oxygen depletion was noted in the hypolimnion.

The volunteer monitor noted an algae bloom occurring in the lake in April with another bloom appearing in September.

Hicks Lake has a large amount of the non-native *Nymphaea odorata* (fragrant waterlily) in the south end of the lake but this does not seem to interfere with the beneficial uses of the lake.

Based on Secchi depth data and the low dissolved oxygen in the hypolimnion, Hicks Lake is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

HICKS

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
4/20/1998		14.4	10		0	1	2						
	Sampler:	YATES			Remarks:	LOTS OF POLLEN ON AND IN THE WATER.							
5/28/1998		15.6	7	6	0	3	4	4	3		2	1	0
	Sampler:	YATES			Remarks:	LOTS OF COTTONWOOD COTTON NEAR SHORE.							
6/16/1998		18.9	9	6	50	2	3	4	4	0	4	1	1
	Sampler:	YATES			Remarks:	TWO JET SKIS. EARLIER TODAY THERE WERE TWELVE OR MORE GEESE IN FRONT OF OUR HOUSE.							
7/1/1998		21.1	8.5	6	50	2	1	4	4	0	24	3	0
	Sampler:	YATES			Remarks:	SAW NO GEESE AT TIME OF SAMPLING BUT 20 OR MORE GEESE NORMALLY FREQUENT THE LAKE.							
7/20/1998		23.3	9.5	6	0	2	1	4	4	0	12	0	0
	Sampler:	YATES			Remarks:								
8/13/1998		24.4	8	6	0	3	1	4	4	0	30	0	0
	Sampler:	YATES			Remarks:								
9/8/1998		23.3	8.5	6	100	1	1	4	3	0	2	1	0
	Sampler:	YATES			Remarks:	THICK ALGAE "SOUP" ALONG LAKESHORE.							
9/14/1998			9		0					0	0	0	0
	Sampler:	BELL-MCKINNON			Remarks:								
9/28/1998		18.9	10	6	0	2	1	4	3	0	12	1	0
	Sampler:	YATES			Remarks:	CLUMPS OF ALGAE NEAR SHORE.							

Date	Time	Temperature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Brightness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5-good)	Swimming (1-poor, 5-good)	Geese (#)	Waterfowl (besides geese #)	Boats-Fishing (#)	Boats-Skiing (#)
10/26/1998		15.6	9	6	0	1	3	4	4	0	84	1	0
	Sampler: YATES			Remarks: A PERFECTLY BEAUTIFUL FALL DAY!									

Profile Report

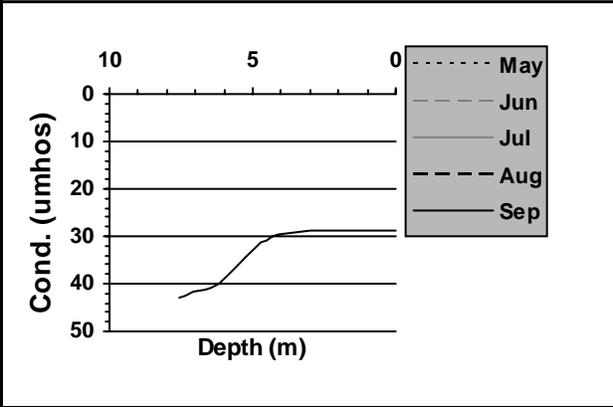
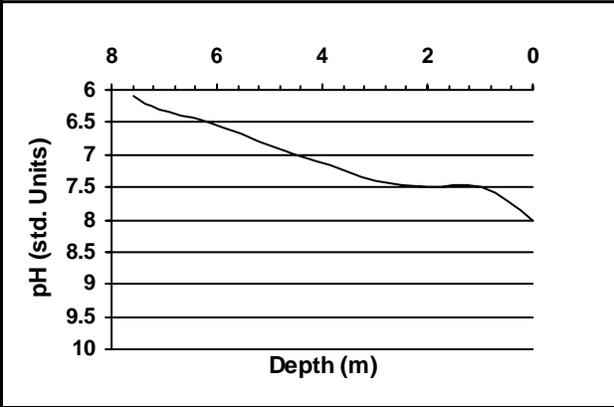
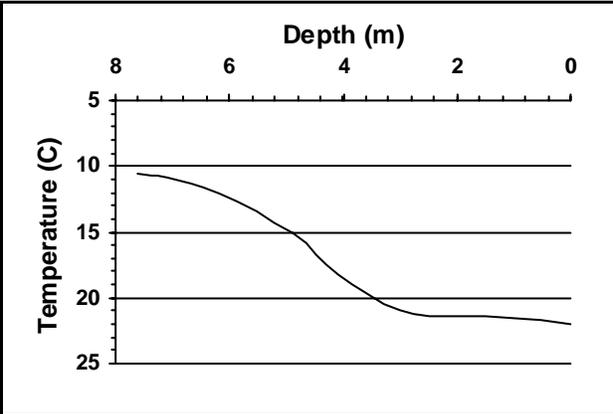
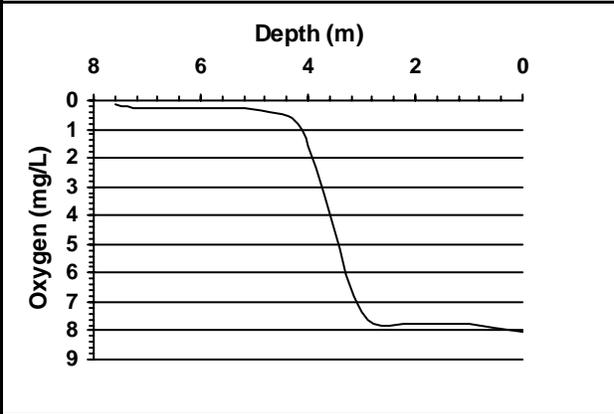
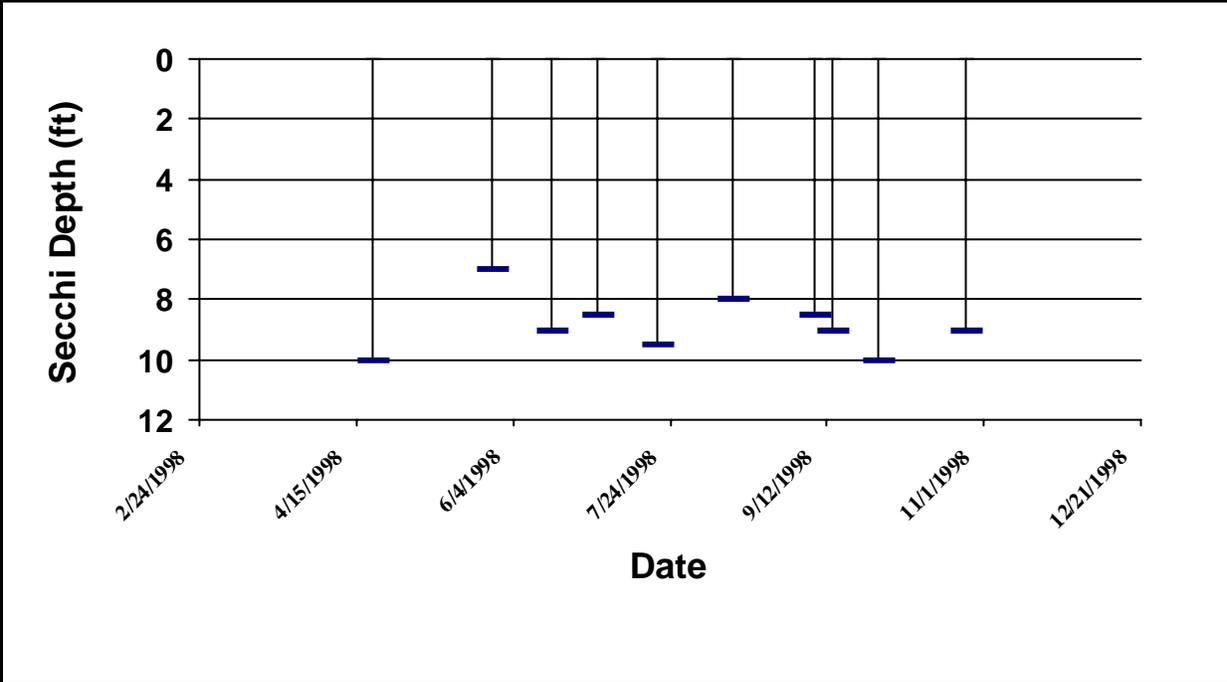
HICKS

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
9/14/1998						
		0	28.6	8.01	8	22
		1	28.7	7.76	7.5	21.5
		2	28.6	7.74	7.5	21.4
		3	28.9	7.38	7.4	20.9
		4.1	29.7	1.01	7.1	18.3
		4.9	32.7	.34	6.9	15.1
		6.2	40.1	.27	6.5	12
		7.1	41.5	.25	6.3	10.9
		7.6	43	.17	6.1	10.5

Secchi Depth and Profile Graphics

Station: 1

HICTH1



Station Information

HICTH1

Primary Station Station # 1 latitude: 47 01 31.0 longitude: 122 47 42.2
Description: Deep spot of the lake.

Trophic State Assessment for 1999

HICKS

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	49
TSI_Phos:		43
TSI_Ch1:		
Narrative TSI:	^b	ME

Summary Comments:

The general water clarity of Hicks Lake was fair in 1999. The Secchi depth readings ranged from 1.5 meters (5.0 feet) to 2.7 meters (9.0 feet) with a mean Secchi depth of 2.2 meters (7.3 feet). For comparison, in 1998 the mean Secchi depth was 2.6 meters (8.7 feet).

Numerous geese and/or other waterfowl were sighted by the volunteer monitor during six of her seven sampling visits between May and October.

The volunteer monitor for Hicks Lake commented on the presence of algae in the water throughout the summer. At the end of September, she commented on something in the lake that looked like green paint - this suggests a blue-green algae bloom.

The lake height for Hicks Lake was at a record high this year - the highest since 1935. Many lakeside homes were flooded.

The chemistry data collected for Hicks Lake showed moderate phosphorus levels in the epilimnion.

Ecology staff made two site visits in 1999. Thermal stratification was observed during both of these visits (6/10/1999 and 8/31/1999); low dissolved oxygen levels in the hypolimnion were also noted during both visits. Ecology staff noted during the August site visit that the lake was strongly brown in color with a lot of suspended algae in the water column. Also noted was the continuing spread of the nonnative plant *Nymphaea odorata* (fragrant waterlily) around the shoreline and extending out towards the center of the lake.

Based on the Secchi depth data and the phosphorus levels, Hicks Lake is classified as mesoeutrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

HICKS

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 1										
6/10/1999	0900	E	15.8							
8/31/1999	1130	E	13							

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

HICKS

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/27/1999		68	8	6	0	2	1	4	4	11	13	1	0
	Sampler:	YATES		Remarks: Used a view tube. Algae in the water; pollen on the water near eastern shore.									
6/10/1999		60	9	7	0	1	2	4	4	0	0	2	0
	Sampler:	YATES		Remarks: Used a view tube.									
7/5/1999		66	8	7	0	2	3	4	4	32	12		
	Sampler:	YATES		Remarks: Used a view tube. Quite a bit of algae in the water. Pollen on surface near shore.									
8/3/1999		78	8.5	7	0	1	1	4	4	17	3		1
	Sampler:	YATES		Remarks: Used a view tube.									
8/31/1999		67	7	7	100	3	3	4	4	4	8	0	0
	Sampler:	YATES		Remarks: Lot of suspended algae in water. Water color seemed brown. Waterlilies spreading quickly over the lake. Water level dropping per "normal". Sampling day was cloudy and breezy.									
9/21/1999		68	6	7	0	1	1	4	3	0	7	2	
	Sampler:	YATES		Remarks: Used a view tube. Lots of algae, especially near shore - looks like green paint.									
10/19/1999		58	8	7	0	1	1	4	4	0	14	0	0
	Sampler:	YATES		Remarks: Used a view tube. Lots of algae in the water.									

Profile Report

HICKS

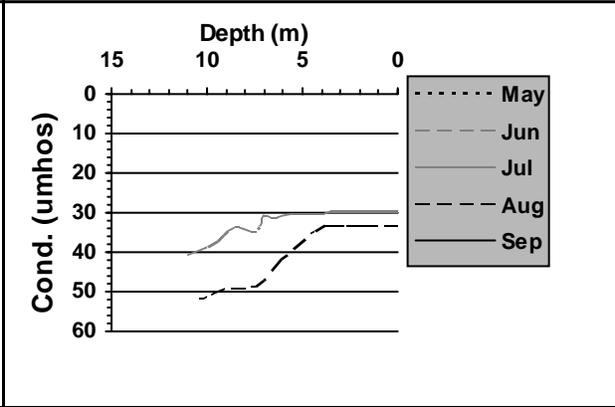
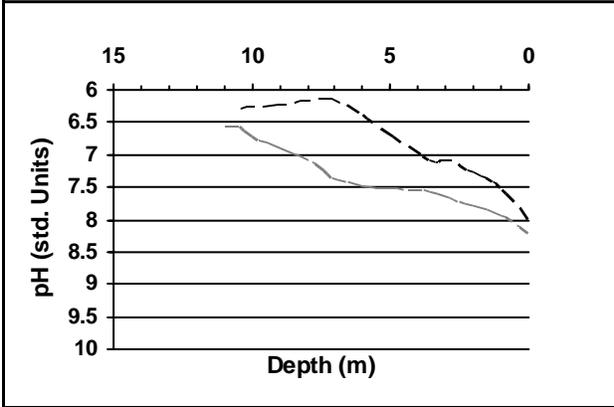
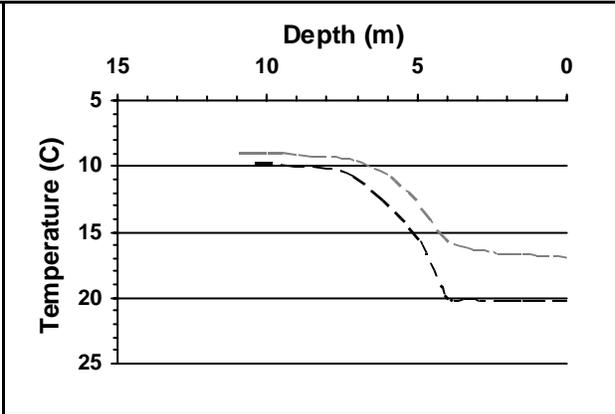
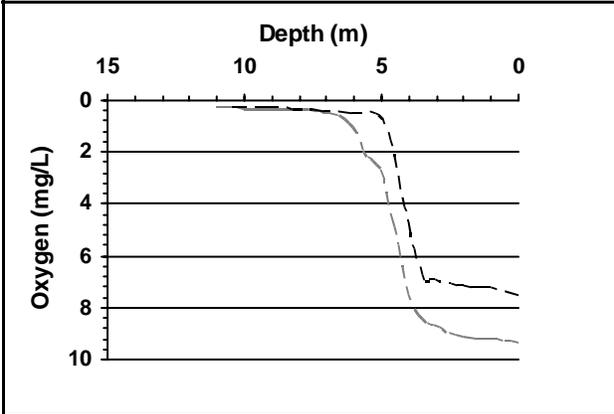
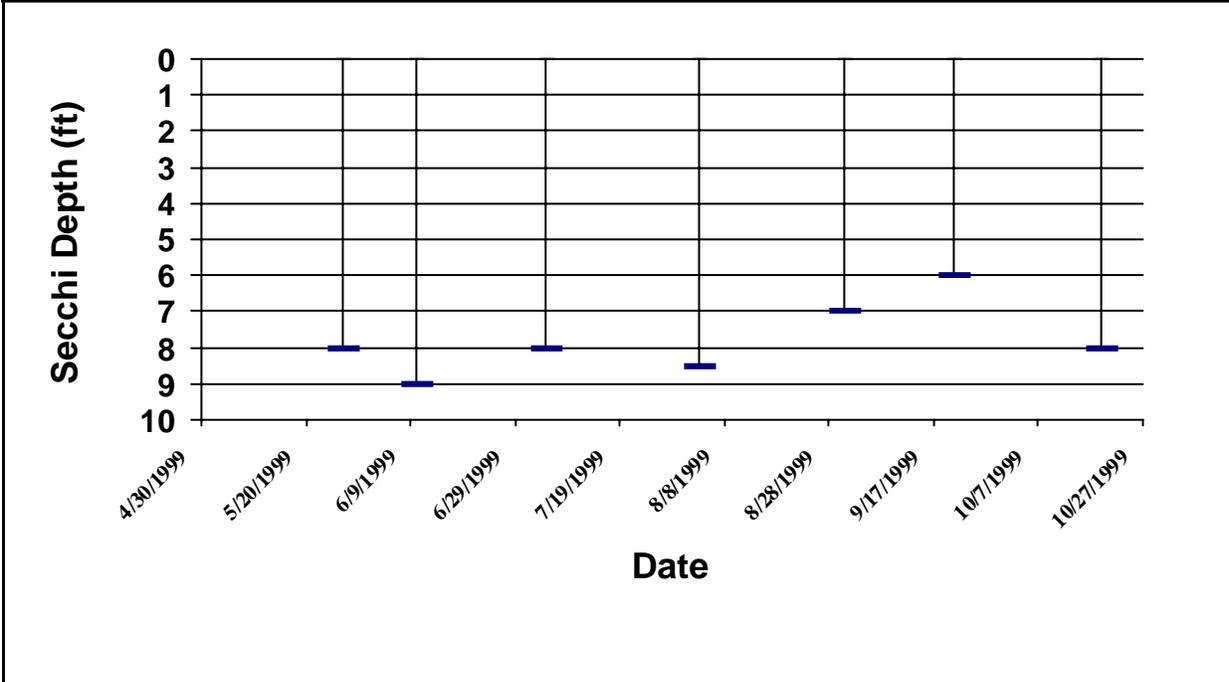
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/10/1999						
		0	29.5	9.31	8.21	16.87
		0.6	29.6	9.2	8.03	16.79
		1	29.5	9.18	7.92	16.73
		1.5	29.5	9.13	7.82	16.62
		2	29.5	9.08	7.76	16.58
		2.6	29.5	8.91	7.71	16.47
		2.9	29.6	8.71	7.65	16.26
		3.3	29.5	8.52	7.59	16.13
		3.9	29.8	7.74	7.54	15.65
		4.5	30.1	4.9	7.52	14.02
		5	29.9	2.59	7.51	12.47
		5.5	30.2	2.12	7.5	11.48
		6	30.3	1	7.46	10.51
		6.6	30.8	.56	7.39	9.91
		7.1	30.7	.47	7.35	9.49
		7.4	34.3	.4	7.21	9.32
		8	34.2	.34	7.07	9.17
		8.5	33.7	.33	6.98	9.16
		9	34.7	.31	6.88	9
		9.5	36.8	.29	6.8	8.93
		10	38.6	.28	6.69	8.92
		10.5	39.6	.26	6.55	8.87
		11	40.6	.25	6.55	8.86

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
8/31/1999						
		0	32.9	7.47	7.98	20.17
		1	32.9	7.21	7.51	20.16
		1.5	32.9	7.15	7.35	20.14
		2	32.9	7.08	7.25	20.16
		2.8	32.9	6.93	7.06	20.16
		2.9	32.9	6.98	7.06	20.14
		3.2	33	6.88	7.08	20.11
		3.4	33	6.91	7.11	20.11
		3.9	32.9	5.14	6.98	20.04
		4.9	36.3	.66	6.7	15.54
		6.1	41.5	.46	6.35	12.51
		7.1	47.2	.35	6.13	10.73
		8	49	.28	6.14	10.17
		9.1	49.2	.25	6.21	9.92
		10	50.9	.25	6.25	9.66
		10.2	51.3	.22	6.24	9.64
		10.4	51.7	.21	6.27	9.63

Secchi Depth and Profile Graphics

Station: 1

HICTH1



HORSESHOE

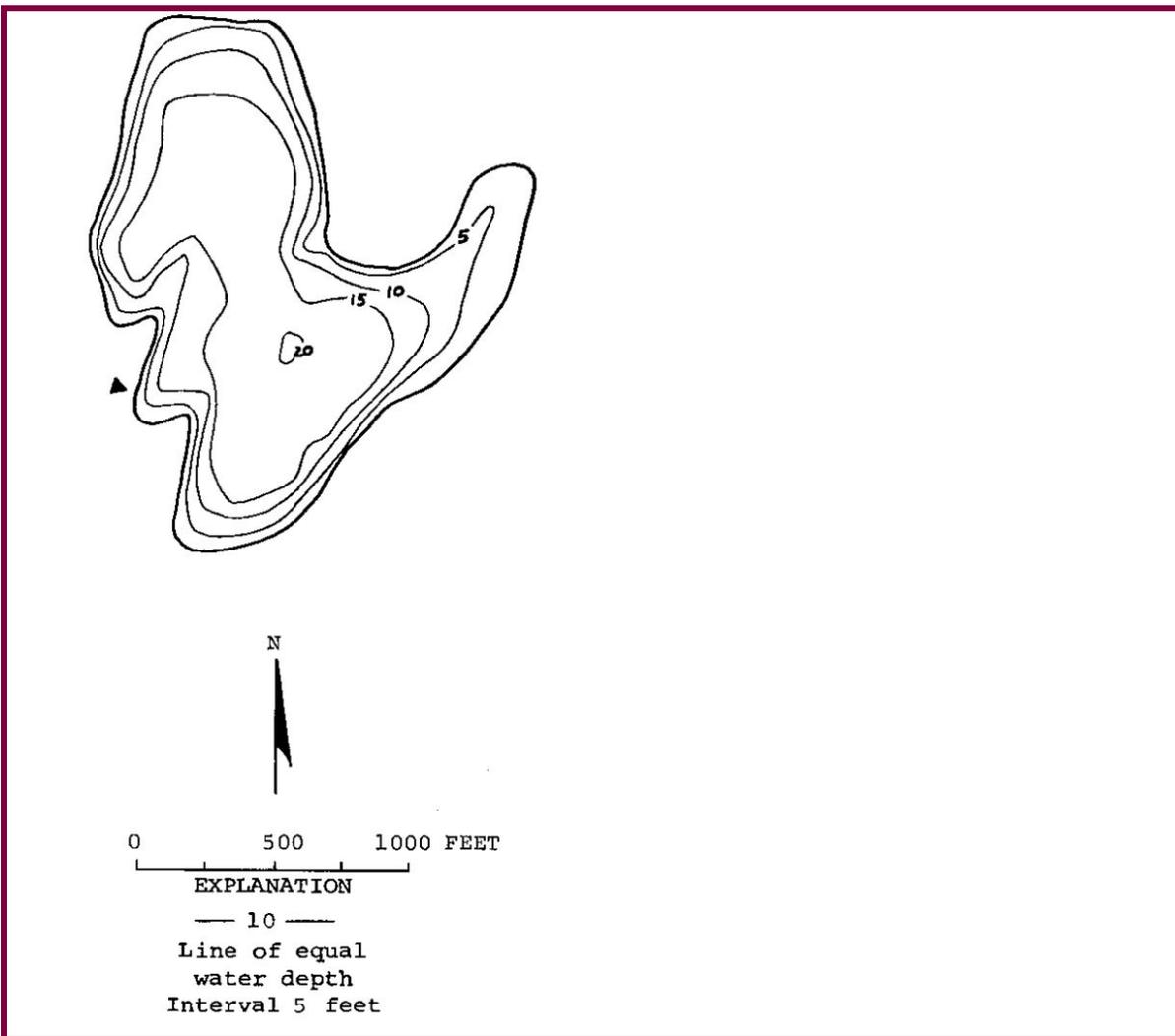
KITSAP County

Lake ID: HORK11

Ecoregion: 2

Horseshoe Lake is a small lake in Kitsap County. About a third of the lakeshore is occupied by a church camp adjacent to a county park. The lake is located near the end of Henderson Bay just a few hundred feet north of the Pierce County line.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
40	20	12		
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
470	1.29	270	47 24 20.	122 39 48.



Station Information

HORKI1

Primary Station	Station # 1	latitude: 47 24 15.9	longitude: 122 39 42.2
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

HORSESHOE

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 40 J
TSI_Phos:
TSI_Ch1:
Narrative TSI: ^b M

Summary Comments:

The water clarity in Horseshoe Lake was fair to good in 1998. The Secchi depth readings ranged from 2.4 meters (8.0 feet) to 4.9 meters (16.0 feet) with a mean Secchi depth reading of 4.0 meters (13.3 feet). For comparison, in 1997 the mean Secchi depth reading was 3.5 meters (11.5 feet).

There was no Ecology staff visit made to Horseshoe Lake in 1998 and no chemistry data was collected.

The volunteer monitor noted an algae bloom in May that lasted until June; another algae bloom occurred in July. The County park in the southeast portion of the lake was closed down by the Kitsap County Health Department from 7/24/98 to 8/7/98 because of high E. coli counts in the swimming area.

There is a large amount of aquatic plants, including the non-native *Nymphaea odorata* (fragrant waterlily), on the east side of the lake.

Based on the Secchi depth data, the excessive plant growth and algae blooms, Horseshoe Lake is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

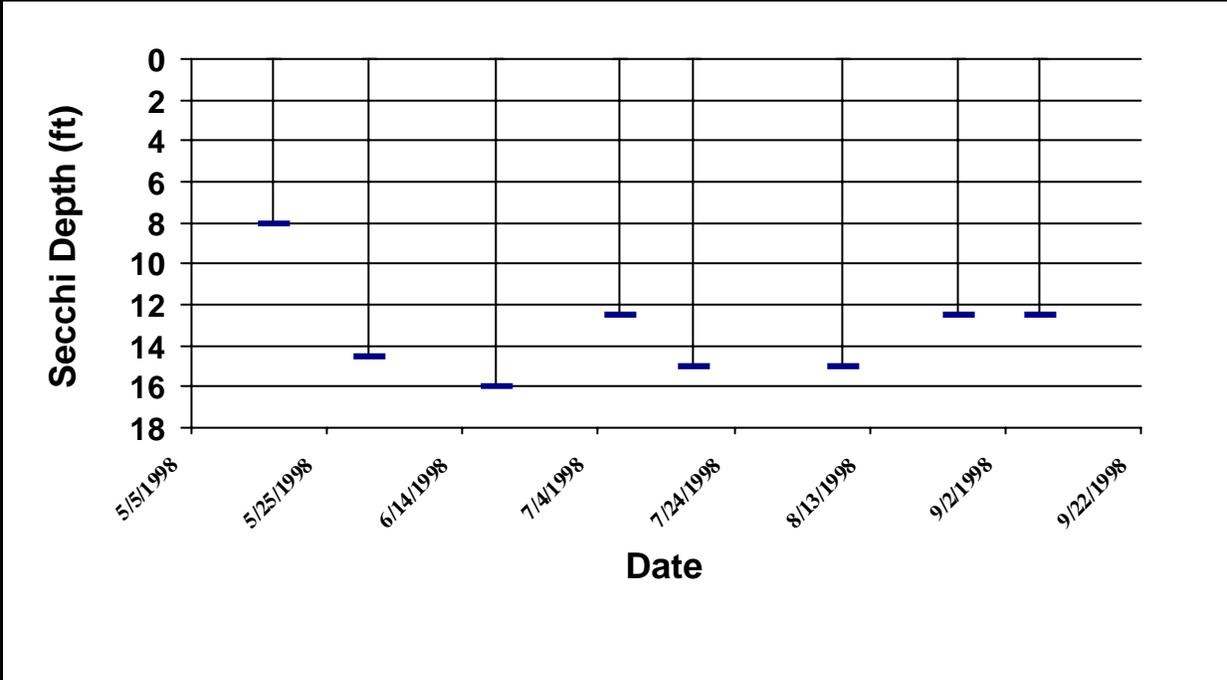
HORSESHOE

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/17/1998		16	8	4	75	3	4		2	17	3	0	0
	Sampler:	CARLSEN			Remarks:	ALGAE-ASSUME SAME TYPE AS LAST YEAR. COUNTY HAS TAKEN SAMPLE. MUCH BIGGER "CLOUD" - ALMOST THE LENGTH OF OUR BULKHEAD (50 FEET?)SHALLOW END OF LAKE HAS POOR SWIMMING AND AESTHETICS DUE TO ALGAE AND WEEDS.							
5/31/1998		17	14.5	6	25	1	1		2	22		0	0
	Sampler:	CARLSEN			Remarks:	ONE BLOOMING BLADDERWORT. ALGAE BY OUR HOUSE STILL BAD.							
6/19/1998		21	16	6	0	2	1			23	8	0	0
	Sampler:	CARLSEN			Remarks:	ALGAE BLOOM BEGINNING TO SETTLE.							
7/7/1998		23	12.5	6	75	1	1	3	3	31	2	0	0
	Sampler:	CARLSEN			Remarks:								
7/18/1998		25	15	6	0	1	1			40	0	0	0
	Sampler:	CARLSEN			Remarks:	DARK ALGAE BLOOM - SHALLOW END OF LAKE. KITSAP COUNTY HEALTH IDENTIFIED.							
8/9/1998		25	15	6	0	1	1	3	3	42	22	0	0
	Sampler:	CARLSEN			Remarks:	COUNTY PARK CLOSED 7/24-8/7 DUE TO HIGH E.COLI COUNTS.							
8/26/1998		24	12.5	6	0	1	1			51	14	0	0
	Sampler:	CARLSEN			Remarks:	SWIMMING AND AESTHETIC ENJOYMENT RATINGS DEPEND ON WHERE YOU ARE IN THE LAKE.							
9/7/1998		23	12.5	6	0	2	1			0	0	0	0
	Sampler:	CARLSEN			Remarks:								

Secchi Depth and Profile Graphics

Station: 1

HORKI1



--	--

--	--

Station Information

HORKI1

Primary Station	Station # 1	latitude: 47 24 15.9	longitude: 122 39 42.2
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

HORSESHOE

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 41	J
TSI_Phos:	42	
TSI_Ch1:		
Narrative TSI:	^b M	

Summary Comments:

The general water clarity of Horseshoe Lake was good in 1999. The Secchi depth readings ranged from 2.4 meters (8.0 feet) to 5.2 meters (17.0 feet) with a mean Secchi depth of 3.7 meters (12.2 feet). For comparison, in 1998 the mean Secchi depth was 4.0 meters (13.3 feet).

Beginning in July through September, numerous geese and/or other waterfowl were sighted by the Horseshoe Lake volunteer monitor during her sampling visits. During the third week of August, the volunteer monitor counted 120+ geese.

During the first week of July, Horseshoe Lake was sprayed with Rodeo and Aquathol K for *Potamogeton pectinatus* (Sago pondweed). On 8/10/1999, the lake was sprayed again with Rodeo for eradication of *Nymphaea odorata* (fragrant waterlily). No algae blooms were reported by the volunteer monitor during her sampling visits between May and October.

The volunteer monitor noted the large amount of new construction occurring around the lake within the last two years. She observed some sedimentation of the lake near these construction sites.

The chemistry data collected for Horseshoe Lake showed moderate phosphorus levels in the epilimnion.

Ecology staff made two site visits in 1999. A very slight degree of thermal stratification was observed during both of these visits (5/17/1999 and 8/4/1999); low dissolved oxygen levels in the hypolimnion were also noted during both visits.

Based on the Secchi depth data and the phosphorus levels, Horseshoe Lake is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

HORSESHOE

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
------	------	--------	-----------------	-----------------	-------	----------------------------	-------------------------------------	--------------------	-------------------	--------------------

Station 1

5/17/1999 E 13.4

8/4/1999 1245 E 13.8

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

HORSESHOE

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/17/1999		13.5	17	6	75	1	5	4	4	0	2	0	0
	Sampler:	CARLSEN		Remarks:									
6/13/1999		21	15	6	0	1	2	4	4	0	0	1	0
	Sampler:	CARLSEN		Remarks: Used a view tube. Sago pondweed getting stronger.									
7/5/1999		21	11	6	0	3	1	4	4	43	10	1	0
	Sampler:	CARLSEN		Remarks: Did not use a view tube. Sprayed Rodeo, Aquathol K on 6/18/99. Can see bottom of the lake along the shoreline!! Looks great.									
7/25/1999		23	12.5	6	0	2	2			18	12	0	0
	Sampler:	CARLSEN		Remarks: Used a view tube.									
8/4/1999		25	13	6	0	1	1			36	0	0	0
	Sampler:	CARLSEN		Remarks: No algae blooms this year. Lake treated for waterlilies. Lots of geese.									
8/22/1999		23	11	6	0	2	1	4	4	18	8	0	0
	Sampler:	CARLSEN		Remarks: Did not use a view tube. Rodeo applied to lilies on 8/10/99. Last week counted 120+ geese.									
9/18/1999		20	9.5	6	0	1	1	3	3	0	8	0	0
	Sampler:	CARLSEN		Remarks: Did not use a view tube.									
10/3/1999		17	8		0	1	1	3	3	0	11	0	0
	Sampler:	CARLSEN		Remarks: Did not use a view tube. Maggie - thanks for cleared lot update -- amazing!									

Profile Report

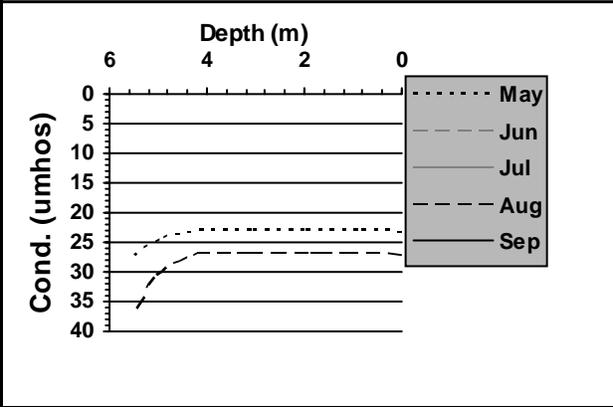
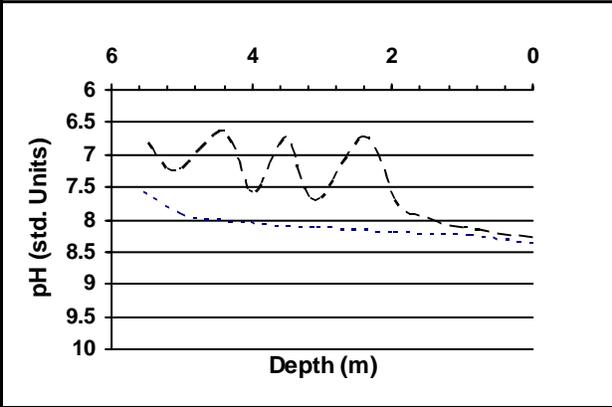
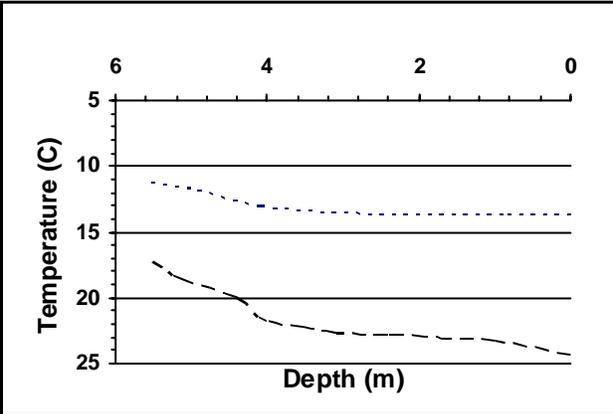
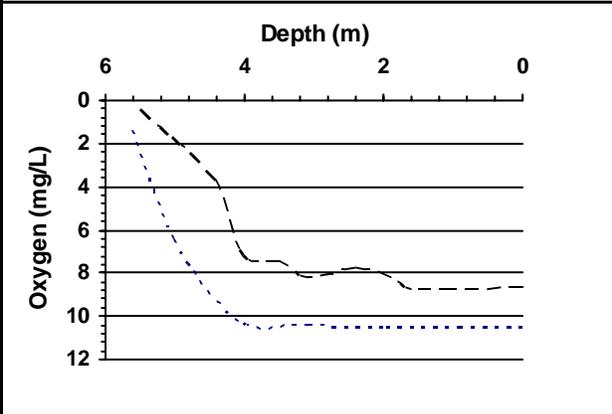
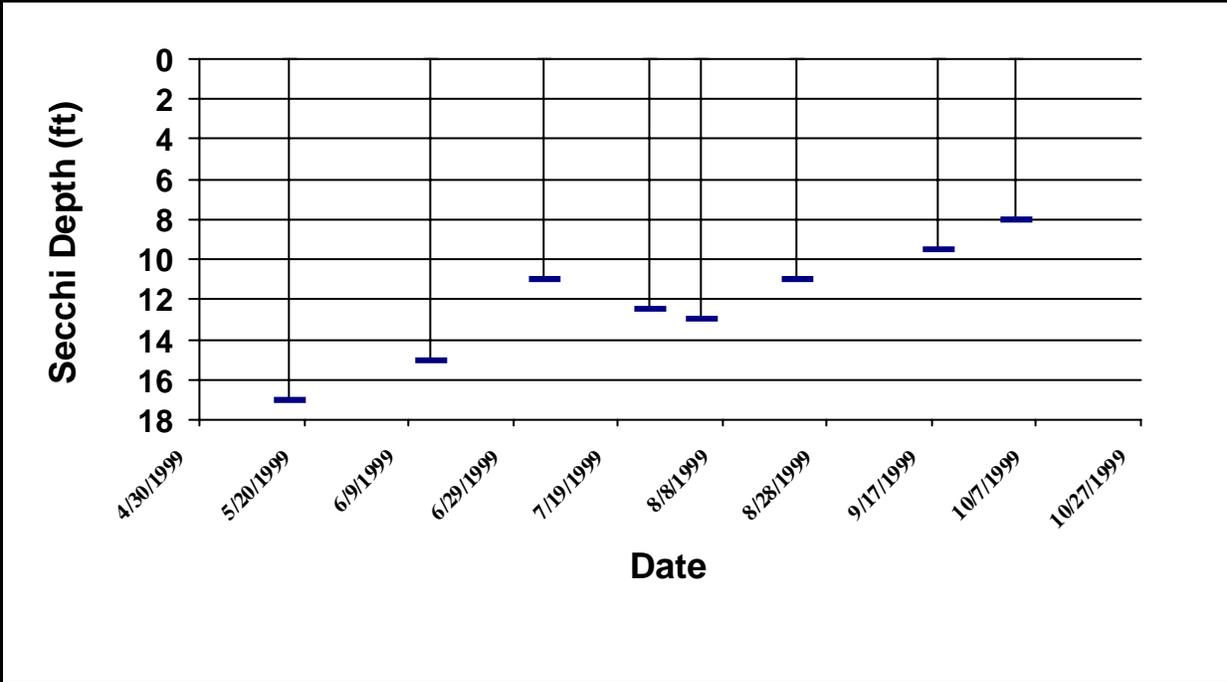
HORSESHOE

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
5/17/1999						
		0	23	10.45	8.36	13.52
		0.9	22.8	10.42	8.24	13.51
		2	22.8	10.45	8.18	13.51
		3.1	22.8	10.36	8.11	13.4
		4.1	22.7	10.15	8.01	12.93
		5	24.3	6.37	7.89	11.65
		5.6	27.2	1.41	7.49	11.08
8/4/1999						
		0	27	8.61	8.27	24.24
		1	26.8	8.66	8.11	23.22
		1.6	26.7	8.67	7.93	23.07
		1.9	26.7	8.13	7.77	22.93
		2.4	26.7	7.73	6.7	22.72
		3.1	26.7	8.16	7.68	22.52
		3.5	26.6	7.46	6.7	22.21
		4	26.7	7.15	7.57	21.63
		4.4	27.3	3.68	6.62	19.96
		5.1	30.6	1.58	7.23	18.47
		5.5	36.9	.38	6.72	17.22

Secchi Depth and Profile Graphics

Station: 1

HORKI1



ISABELLA

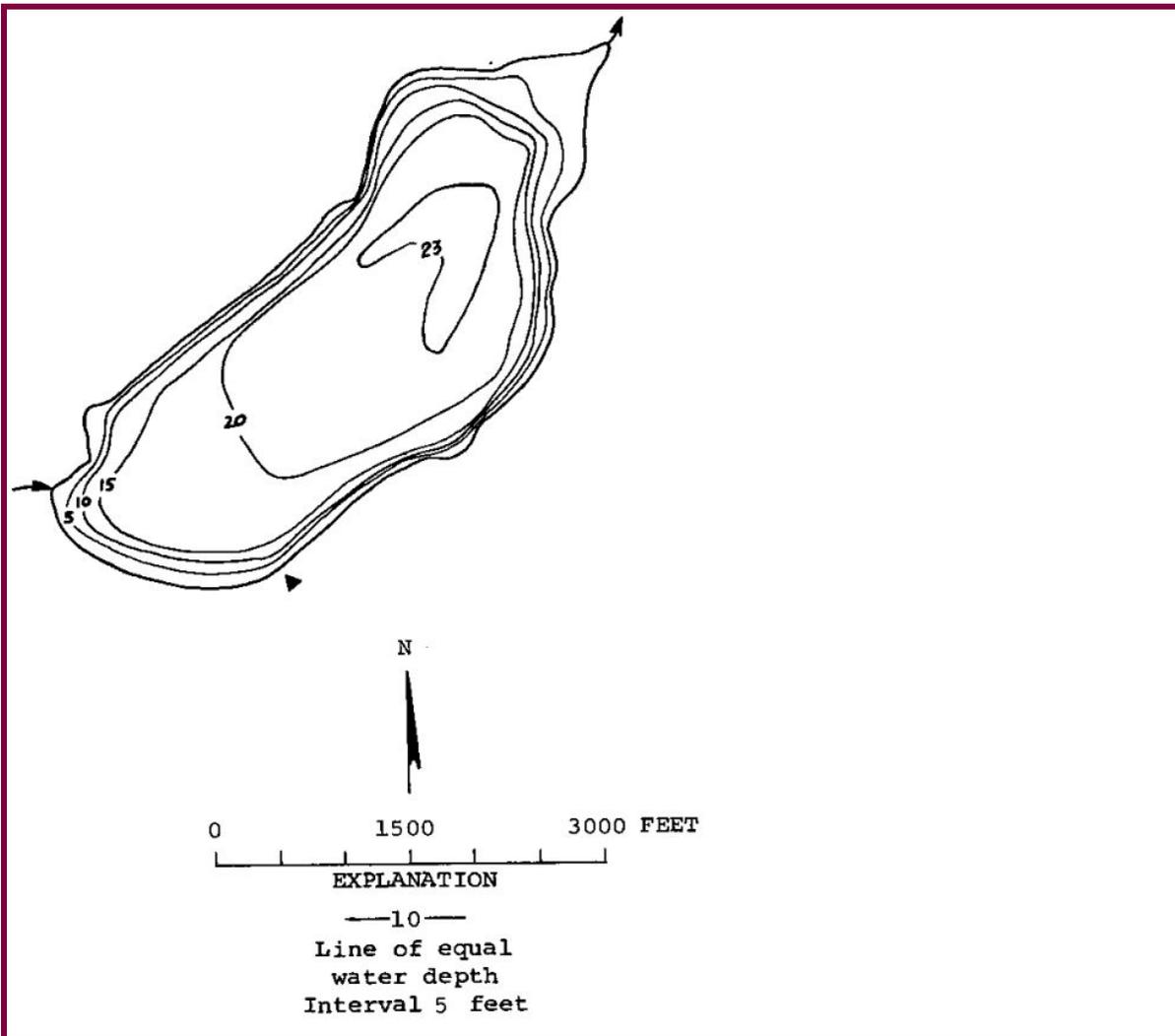
MASON County

Lake ID: ISAMA1

Ecoregion: 2

Isabella Lake is located 2 miles south of Shelton in Mason County just west of highway 101.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
200	23	16	18	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
3200	2.46	150	47 10 36.	123 06 17.



Station Information

ISAMA1

Primary Station Station # 1 latitude: 47 10 27.9 longitude: 123 06 41.9
Description: Deep spot of the lake.

Trophic State Assessment for 1998

ISABELLA

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 41 J
TSI_Phos:
TSI_Ch1:
Narrative TSI: ^b M

Summary Comments:

The water clarity in Lake Isabella in 1998 was good. The Secchi depth readings ranged from 3.1 meters (10.0 feet) to 4.9 meters (16.0 feet) with a mean Secchi reading of 3.9 meters (12.8 feet). For comparison, the mean Secchi depth reading in 1997 was 3.4 meters (11.3 feet).

Only a few geese were counted by the volunteer monitor between May and September. She also noted an algae bloom in the lake during the month of June.

No chemistry data was collected for Lake Isabella in 1998.

Only one site visit was made by Ecology staff. A weak thermal stratification was noted and low dissolved oxygen levels were observed in the hypolimnion during this visit (9/1/1998).

Based on Secchi depth data and a decrease in hypolimnetic dissolved oxygen levels, Lake Isabella is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Profile Report

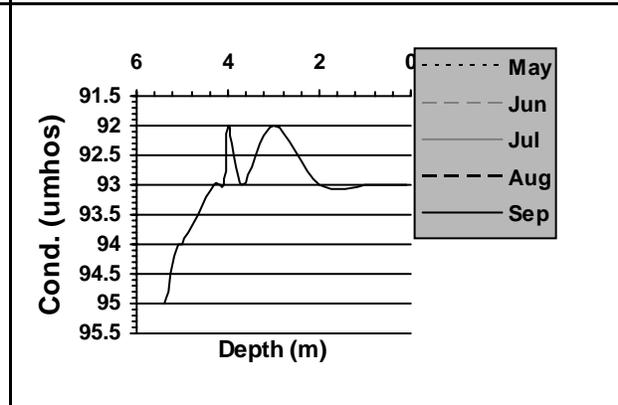
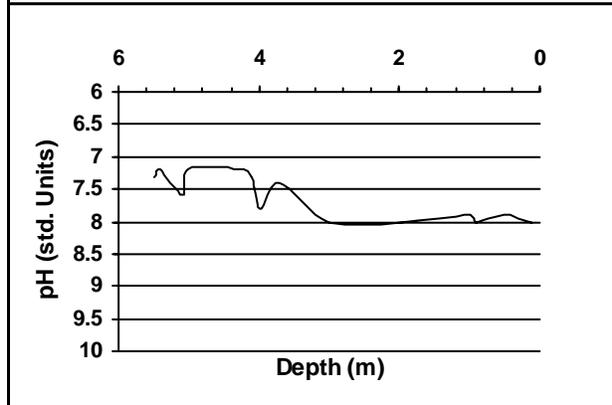
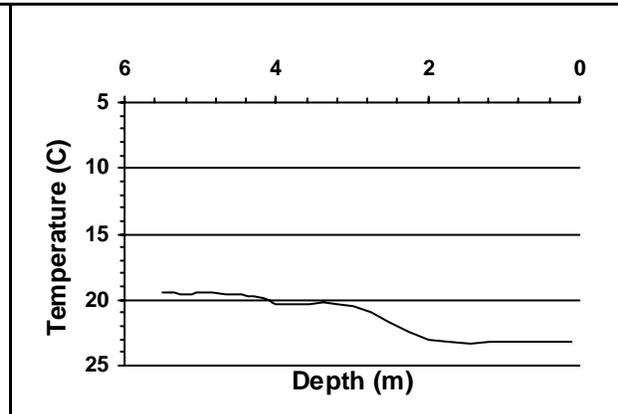
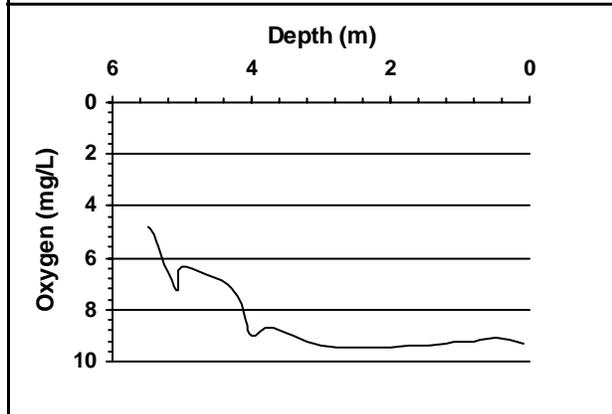
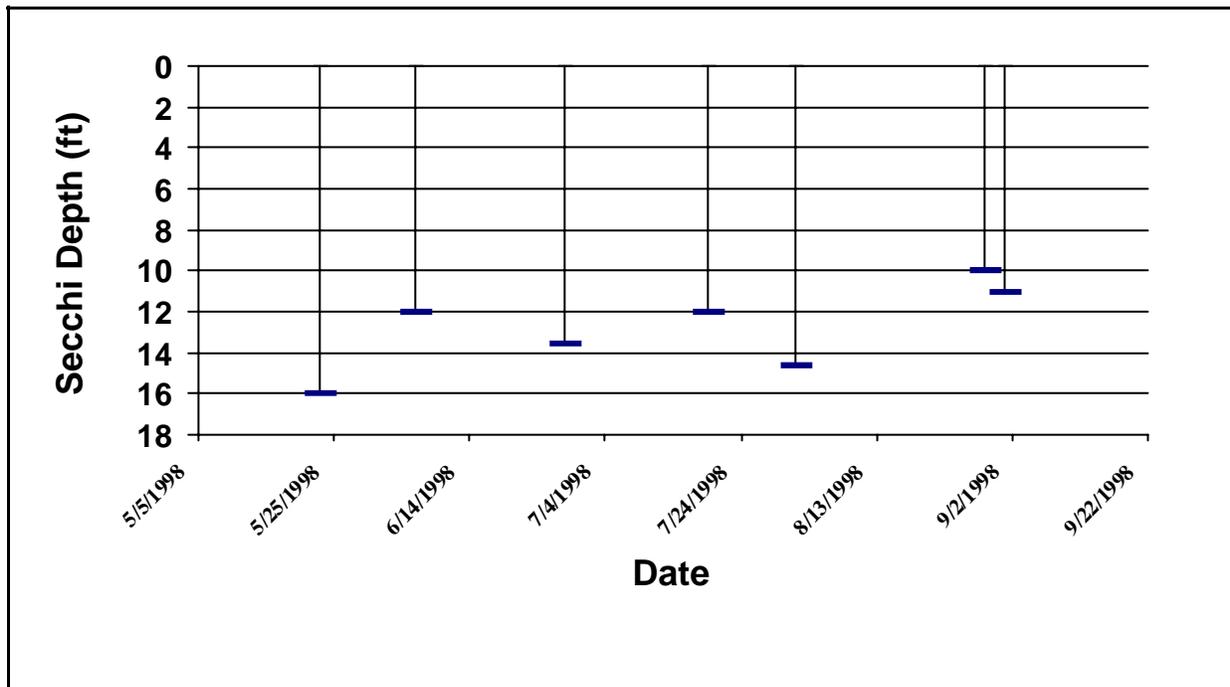
ISABELLA

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
9/1/1998						
		0.1	93	9.3	8	23.2
		0.5	93	9.09	7.9	23.2
		0.9	93	9.27	8	23.2
		1	93	9.22	7.9	23.2
		2	93	9.44	8	23
		3	92	9.37	8	20.5
		3.7	93	8.67	7.4	20.3
		4	92	8.99	7.8	20.3
		4.1	93	8.36	7.3	20.1
		4.3	93	7.14	7.2	19.8
		5	94	6.3	7.2	19.5
		5.1	94	7.28	7.6	19.6
		5.4	95	5.15	7.2	19.4
		5.5	95	4.83	7.3	19.4

Secchi Depth and Profile Graphics

Station: 1

ISAMA1



Station Information

ISAMA1

Primary Station Station # 1 latitude: 47 10 27.9 longitude: 123 06 41.9
Description: Deep spot of the lake.

Trophic State Assessment for 1999

ISABELLA

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 42	BW
TSI_Phos:	52	
TSI_Ch1:		
Narrative TSI:	^b ME	

Summary Comments:

The general water clarity of Lake Isabella was good in 1999. The Secchi depth readings ranged from 3.0 meters (10.0 feet) to 4.9 meters (16.2 feet) with a mean Secchi depth of 3.7 meters (12.2 feet). For comparison, in 1998 the mean Secchi depth was 3.9 meters (12.9 feet).

The volunteer monitor for Lake Isabella reported seeing 32 geese during her sampling visit of 6/15/1999. During the rest of the summer, she observed no geese and/or other waterfowl on the lake.

Only one small algae bloom was observed this summer by the volunteer monitor. Normally more than one bloom occurs in the lake during the summer months.

The chemistry data collected for Lake Isabella showed high phosphorus levels in the epilimnion.

Ecology staff made two site visits in 1999. A very slight degree of thermal stratification was observed during the first visit of 6/15/1999; no thermal stratification was observed during the 9/1/1999 site visit. Consistently high dissolved oxygen levels were noted throughout the water column.

Ecology staff also observed very luxuriant plant growth around the lake. Native species included *Potamogeton amplifolius* (large leaved pondweed), *Potamogeton robbinsii* (Robbins pondweed), *Elodea canadensis* (common elodea), *Nuphar polysepalum* (spatterdock). A dense community of the nonnative plant *Nymphaea odorata* (fragrant waterlily) was also noted.

Based on the Secchi depth data and the phosphorus levels, Lake Isabella is classified as mesoeutrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

ISABELLA

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 1										
6/15/1999	1000	E	22.4							
9/1/1999	1330	E	31.8							

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

ISABELLA

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/15/1999		64.5	10 B	2	100	2	2	5	5	32	0	0	0
	Sampler: WEBB												Remarks: Pretty breezy during the sampling. Nothing unusual about the lake this year. No algae blooms this spring.
7/18/1999		66.2	11.5 B	2		1	3	3	3	0	0	2	0
	Sampler: WEBB												Remarks: Did not use a view tube.
8/8/1999		69.8	16 W	2	75	1	4	5	5	0	0	1	0
	Sampler: WEBB												Remarks: Did not use a view tube.
8/21/1999		68	12.75 W		50	3	1	5	5	0	0	2	0
	Sampler: WEBB												Remarks: Did not use a view tube.
9/1/1999		66.2	10 B	3	0	1	5	5	5	0	0	0	1
	Sampler: WEBB												Remarks: Only 1 algae bloom this year - usually more during the year. Water seemed very clear. Lake not stratified. Plant growth very luxuriant: P. amplifolius, P. robbinsii, Elodea canadensis, Nuphar, lots of Nymphaea. Sampling day was sunny.

Profile Report

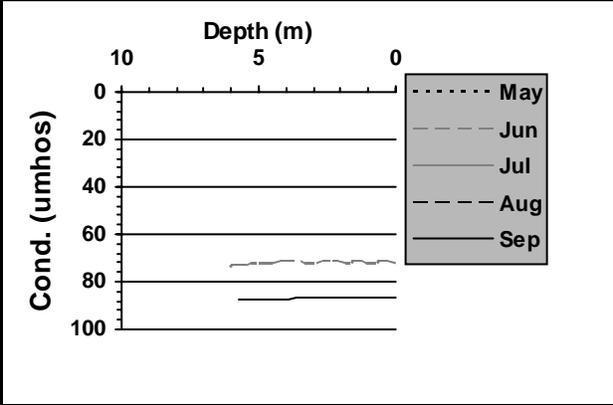
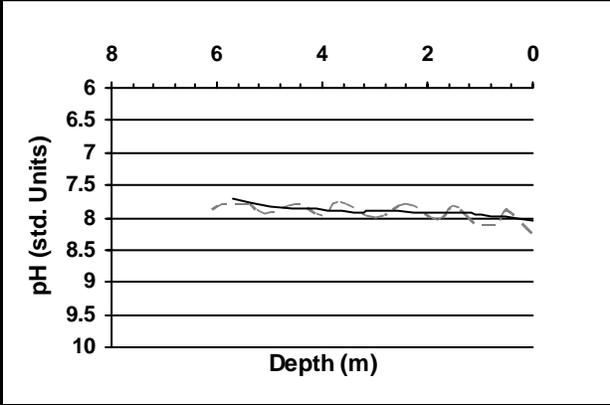
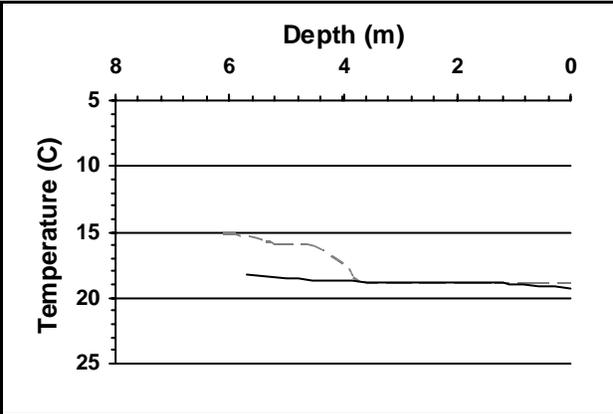
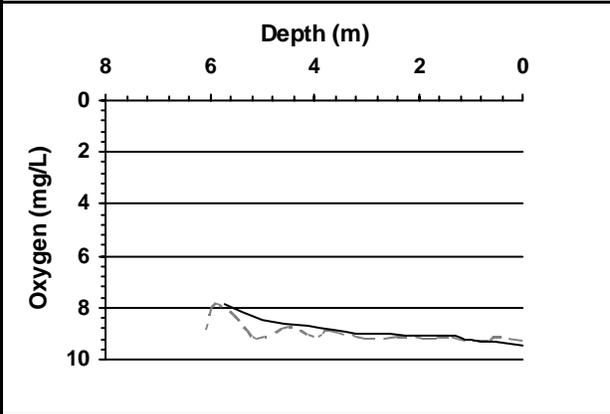
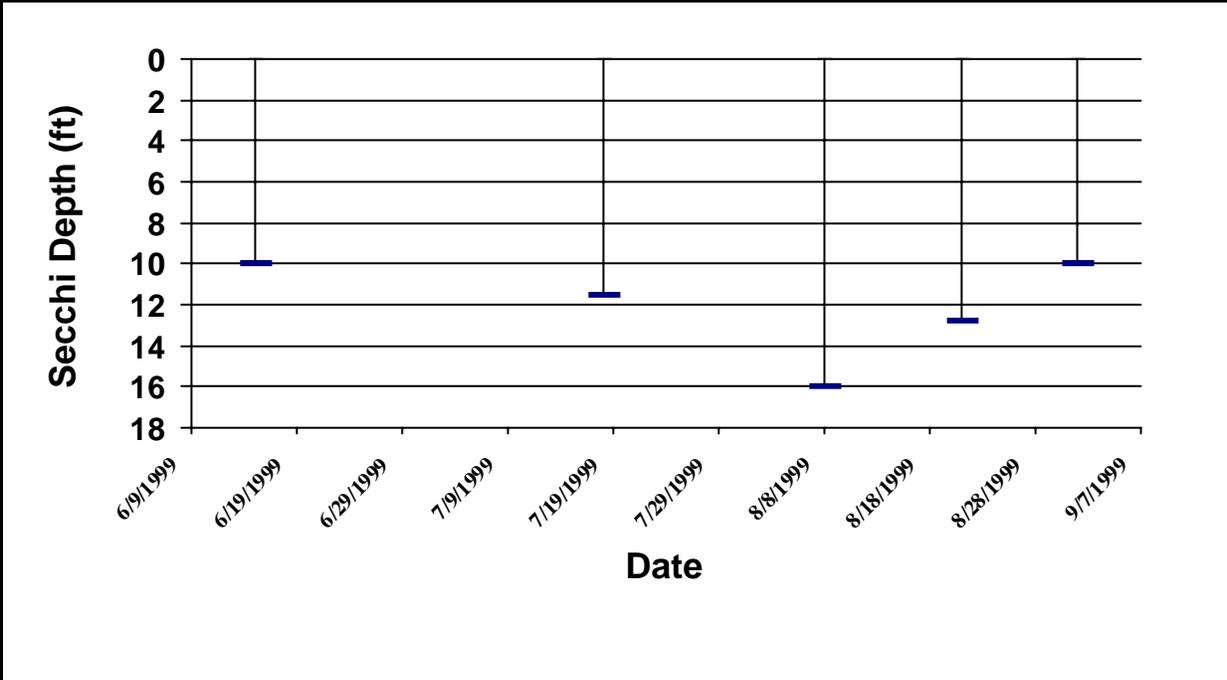
ISABELLA

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/15/1999						
		0	71.4	9.27	8.23	18.81
		0.5	71.2	9.1	7.87	18.81
		0.7	71.3	9.23	8.1	18.83
		1.1	71.3	9.21	8.09	18.83
		1.4	71.2	9.12	7.83	18.81
		1.6	71.2	9.12	7.84	18.83
		1.8	71.3	9.17	8.03	18.81
		2.4	71.2	9.09	7.78	18.8
		3	71.3	9.18	7.98	18.8
		3.7	71.1	8.83	7.75	18.62
		4	70.7	9.05	7.96	17.38
		4.5	72	8.72	7.76	16.04
		5.1	72	9.13	7.91	15.87
		5.4	72.7	8.51	7.77	15.46
		5.9	72.9	7.82	7.77	15.11
		6.1	73.1	8.86	7.87	15.1
9/1/1999						
		0	87	9.48	8.04	19.35
		1	86.9	9.22	7.95	18.94
		1.1	86.9	9.25	7.96	18.95
		1.3	86.9	9.08	7.92	18.89
		1.6	86.9	9.12	7.93	18.87
		2	87	9.1	7.91	18.85
		3.1	86.9	9	7.9	18.78
		3.2	86.8	9.02	7.91	18.77
		4.1	87.1	8.72	7.85	18.64
		5	87.3	8.48	7.83	18.48
		5.7	87.7	7.87	7.71	18.22

Secchi Depth and Profile Graphics

Station: 1

ISAMA1



ISLAND

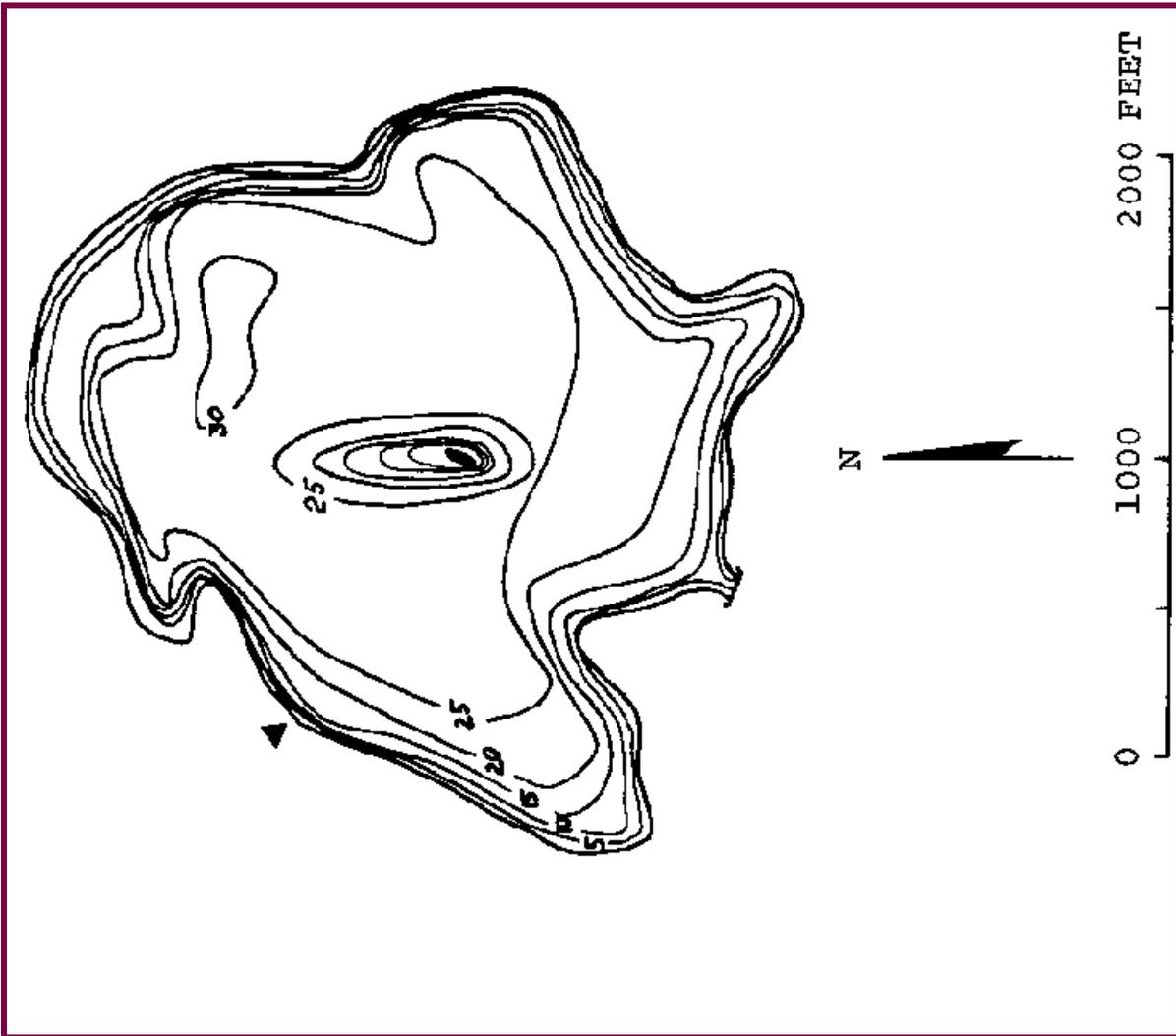
MASON County

Lake ID: ISLMA1

Ecoregion: 2

Island Lake is located 2.5 miles north of Shelton. It drains via a swamp to Goldsborough Creek and Oakland Bay.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
108	31	21		
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
2246	1.74	230	47 14 44.	123 06 40.



Station Information

ISLMA 1

Primary Station	Station # 1	latitude: 47 14 51.7	longitude: 123 06 45.2
	Description:	Deep part of lake, directly east of first cove north of boat launch, approximately 500 feet west of eastern shore	

Secondary Station	Station # 2	latitude: 47 14 55.3	longitude: 123 06 59.8
	Description:	Approximately midway between boat launch and first major point south of boat launch (point between large cove to the west and culvert leading to swamp to the east)	

Trophic State Assessment for 1998

ISLAND

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a	36
TSI_Phos:	35
TSI_Chlor:	43
Narrative TSI: ^b	OM

Summary Comments:

The general water clarity for Island Lake was very good to excellent in 1998. The Secchi depth readings ranged from 4.1 meters (13.5 feet) to 6.7 meters (22.0 feet) with a mean Secchi depth reading of 5.4 meters (18.0 feet). For comparison, in 1997 the mean Secchi reading was 5.0 meters (16.6 feet).

The chemistry data collected for Island Lake showed low phosphorus levels (5.2 to 9.6 ug/L) and low chlorophyll levels (2.5 to 4.2 ug/L). These data indicate a low level of productivity in the lake.

Ecology staff made five site visits in 1998. Thermal stratification was noted only during the first site visit (6/1/98). Low dissolved oxygen levels were noted during the first three site visits (6/1, 7/25 and 8/17/98) with consistently high dissolved oxygen levels throughout the water column during the month of September.

Between 25-30 geese were counted by the volunteer monitor during two of his sampling visits in late June and early July. After that date, there were few to no geese and/or other waterfowl observed by the volunteer monitor on the lake.

Approximately 70% of the shoreline of Island Lake is residentially developed. In spite of this high level of development, the lake shoreline has retained 60 % of its natural vegetation.

Ecology staff conducted an aquatic plant survey on 7/9/1998. Two non-native plants were observed during this survey: *Myriophyllum spicatum* (Eurasian milfoil) and *Nymphaea odorata* (fragrant waterlily). The *Myriophyllum spicatum* was very dense in many areas of the lake, mostly near the boat launch and at the northern end of the lake. The *Nymphaea odorata* occurred in only one or two patches on the eastern

shore. Island Lake was treated with Sonar on 6/24/1998; Ecology staff noted the aquatic vegetation was showing some bleaching effect two weeks after the Sonar treatment. During his sampling visit of 9/10/1998, the volunteer monitor on Island Lake commented that the *Myriophyllum spicatum* seemed diminished in abundance.

Based on the Secchi depth data and the low levels of nutrients, Island Lake should be classified as oligotrophic. However, because of the low dissolved oxygen levels observed in the hypolimnion during most of the summer months, Island Lake is classified as oligomesotrophic.

The following is an assessment written by Ecology staff, Kirk Smith, to determine the phosphorus criterion for Island Lake:

Island Lake is an oligomesotrophic lake in a suburban setting. The shoreline is about 60% natural vegetation, though about 70% of the shoreline is developed residential. There was a Sonar application for *Myriophyllum spicatum* (Eurasian water-milfoil) on 14 August 98. The excellent water quality and water clarity in the lake is surprising considering how developed the shoreline is. *Myriophyllum spicatum* (Eurasian water-milfoil) was the dominant aquatic plant in 1998, growing in nearly monospecific patches. It remains the biggest threat to the beneficial uses on the lake.

We recommend that a nutrient criterion be set at 10 ug/L total phosphorus, the action value for Puget Lowland oligotrophic lakes.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

ISLAND

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 1										
6/2/1998		E	8.7	.216	25	3.7		18.5	4460	.8
7/25/1998		E	5.2	.199	38	3.4				.7 J
8/17/1998		E	9.6	.199	21	4.2				.9
9/17/1998		E	8.7	.193	22	2.5				.8
Station 2										
6/2/1998		E	9.6	.191	20	2.6				
7/25/1998		E	10.1	.178	18	3				
8/17/1998		E	9.2	.18	20	4.4				
Station 3										
6/2/1998		L					1			
		L					1			

9/17/1998

L

3

L

1

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

ISLAND

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/2/1998			14.5	2	100		2	4	1	3	0	0	0
	Sampler:	SMITH			Remarks:	AQUATIC HERBICIDE ADDED							
6/24/1998		18	13.5	2	75	3	3	5	5	30	0	1	0
	Sampler:	YOUNG			Remarks:	LAKE WAS RECEIVING A HERBICIDE (SONAR) TREATMENT.							
7/10/1998		20.5	18	2	0	3	1	4	4	25	0	0	0
	Sampler:	YOUNG			Remarks:								
7/22/1998		23	17.5	2	0	1	1	5	5	8	0	2	1
	Sampler:	YOUNG			Remarks:	WARM DAY - MANY SHORE SWIMMERS (EST. 25).							
7/25/1998			19.8	2	0			5	5	0	2	0	1
	Sampler:	SMITH			Remarks:	70% OF THE SHORELINE DEVELOPED. CONSTRUCTION ALONG SHORELINE NEAR SITE #2 WITH NO SILT SCREENS. SLIGHT BLUE-GREEN BLOOM. 5 SWIMMERS.							
8/8/1998		23	19	2	0	2	1	5	5	0	0	2	0
	Sampler:	YOUNG			Remarks:								
8/17/1998			14.2	3	90	1		4	2	1	0	0	2
	Sampler:	SMITH			Remarks:	8-14-98 SONAR TREATMENT FOR MILFOIL. SLIGHT BLUE-GREEN BLOOM.							
8/21/1998		22	16	2	50	2	1	5	5	3	0	1	0
	Sampler:	YOUNG			Remarks:								
9/10/1998		22	17	2	0	1	1	5	5	0		0	0
	Sampler:	YOUNG			Remarks:	MILFOIL DEPRESSED.							

Profile Report

ISLAND

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/1/1998						
		0	41	9.75	7.8	17.2
		1	41	9.73	7.8	17.1
		2	41	9.79	7.8	17
		3	41	9.87	7.8	17
		4	41	10.02	7.8	16.9
		5	40	9.98	7.7	16.2
		7	48	2.5	6.5	14.4
7/25/1998						
		0	42	8.39	7.5	23
		1	42	8.47	7.5	22.8
		2	42	8.63	7.5	22.6
		3	42	8.48	7.5	22.6
		4	42	8.5	7.5	22.5
		5	42	8.88	7.5	21.5
		6	45	4.55	7	20.4
		6.7	47	1.29	6.5	19.7
8/17/1998						
		0	45	7.79	7.4	22.6
		1	45	7.75	7.4	22.7
		2	45	7.74	7.4	22.6
		3	45	7.73	7.4	22.6
		4	45	7.71	7.3	22.6
		5	45	7.78	7.3	22.6
		6	45	7.58	7.3	22.5
		6.5	45	4.1	7.2	22.5

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
9/17/1998						
		1.3	42 J	7.68	7.8	21.5
		2.2	42 J	7.67	7.7	21.5
		2.8	42 J	7.73	7.7	21.4
		3	42 J	7.84	7.7	21.4
		5	42 J	7.91	7.7	21.4
		5.1	42 J	7.82	7.7	21.4
		6.7	49 J	5.43	7.2	21.3
		6.8	42 J	7.95	7.6	21.3
9/24/1998						
		0	46	8.34	8.2	20.1
		0.6	46	8.01	6.9	20.1
		1	46	8.13	7.9	20.1
		1.6	46	8.01	7	20.1
		2	46	8.13	7.9	20.1
		2.4	46	8.05	7	20.1
		2.9	46	8.13	7.7	20.1
		3.5	46	8.01	7	20.1
		4.1	46	8.11	7.6	20.1
		4.5	46	8.04	7	20.1
		5	46	8.11	7.6	20.1
		5.5	46	8.04	7.1	20.1
		5.9	46	8.09	7.6	20.1
		6.7	46	6.22	6.9	20.1

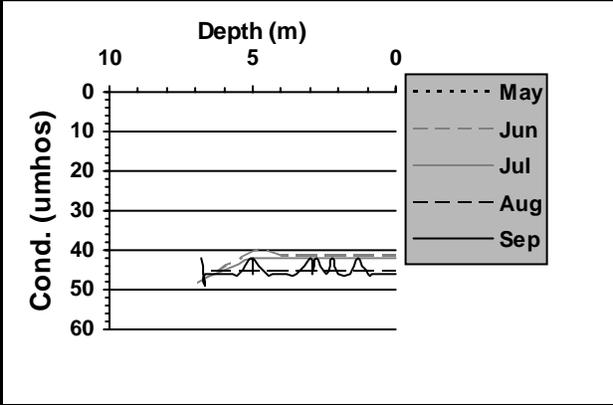
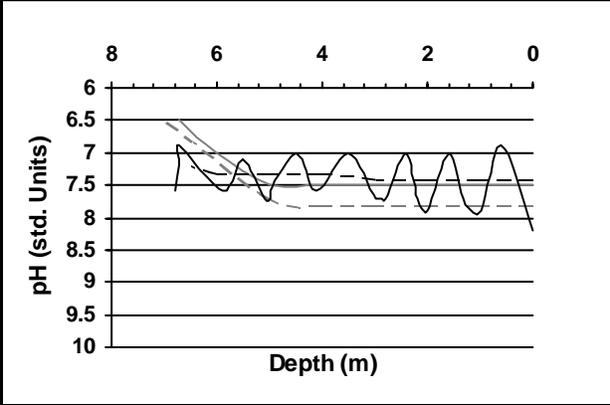
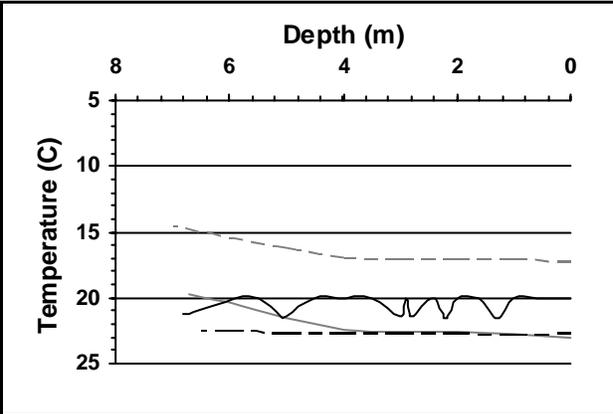
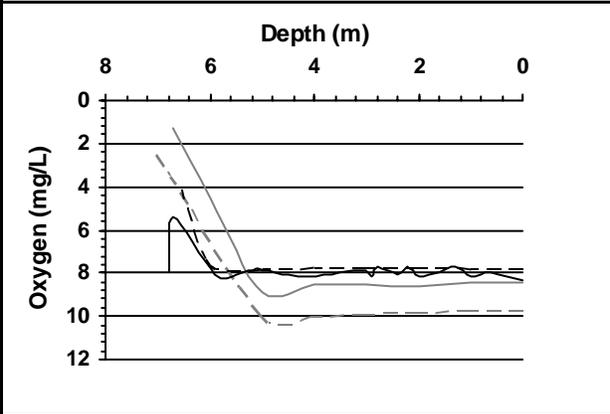
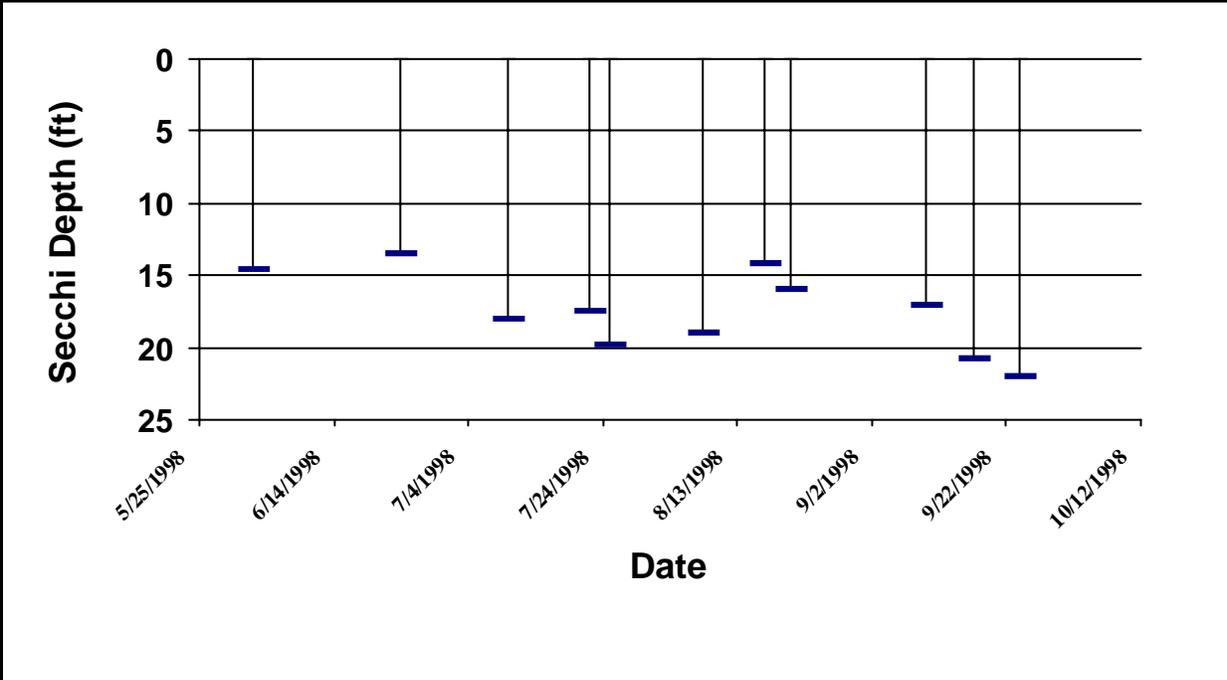
Station 2

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
6/2/1998						
		0	41	10.11	7.8	17.3
		1	41	9.88	7.8	17
		2	41	9.96	7.8	17
		3	41	10.02	7.8	16.9
		4	41	10.14	7.7	16.8
		5.1	41	10.22	7.6	16
		6	41	8.86	7.4	15.4
		6.7	45	3.3	6.6	14.8
7/25/1998						
		0		8.81	7.4	23.5
		1	42	8.41	7.5	22.9
		2	42	8.37	7.5	22.8
		3	42	8.4	7.5	22.6
		4	42	8.52	7.5	22.5
		5	42	8.98	7.7	21.9
		6.1	45	4.63	7	20.8
		6.3	47	3.39	6.6	20.2
8/17/1998						
		0	45	8.06	7.1	22.6
		1	45	7.96	7.1	22.6
		2	45	7.94	7.1	22.6
		3	45	7.85	7.1	22.5
		4	45	7.83	7.1	22.5
		5	45	7.75	7.1	22.5
		5.9	45	6.11	7	22.4

Secchi Depth and Profile Graphics

Station: 1

ISLMA1



KITSAP

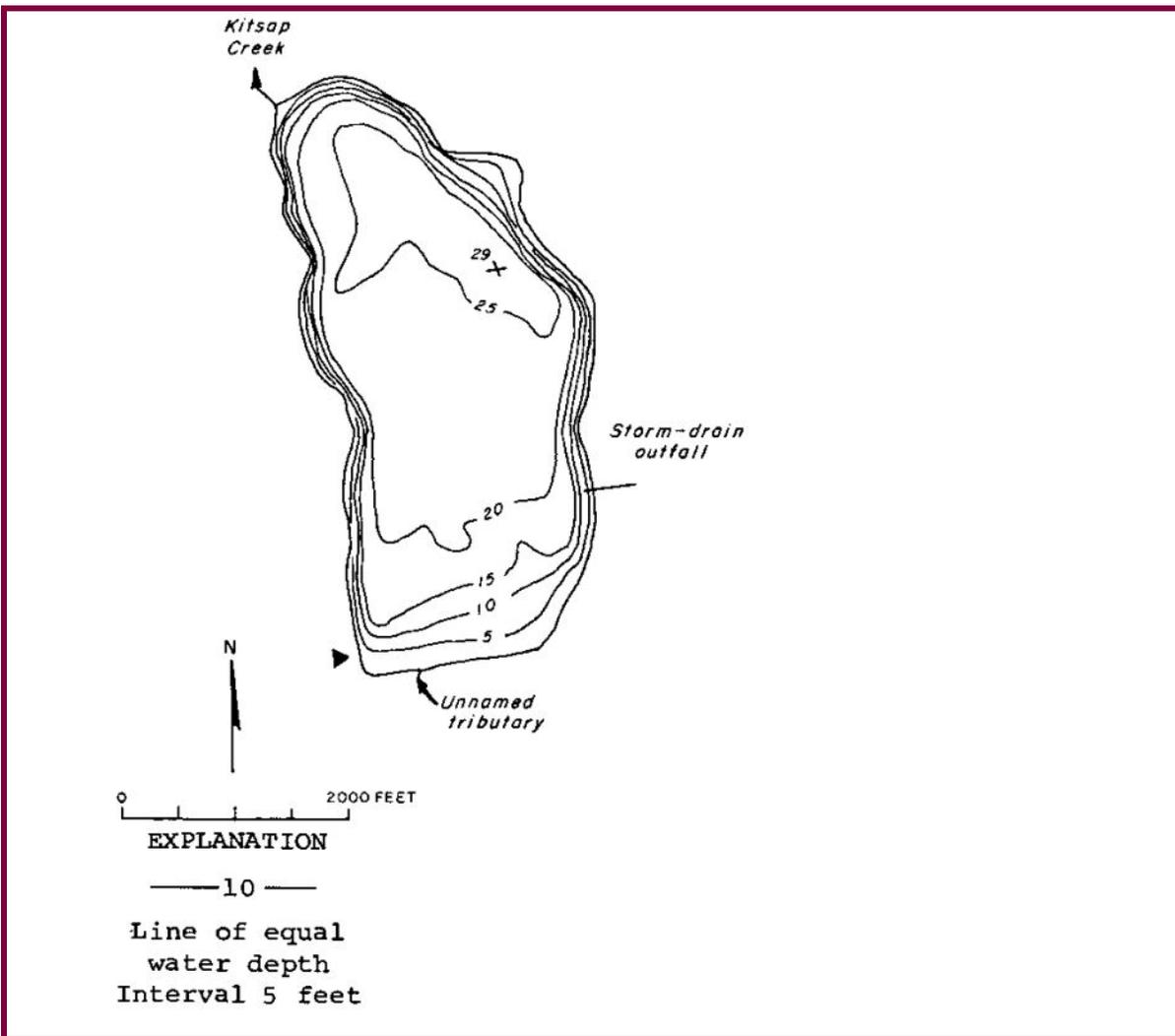
KITSAP County

Lake ID: KITK11

Ecoregion: 2

Kitsap Lake is located in an urban area, 3 miles west of Bremerton. It is fed by an intermittent unnamed tributary and drains via Kitsap Creek to Dyes Inlet. The lake level is stabilized by a dam.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
250	29	18	3	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
4500	2.69	156	47 34 47.	122 42 34.



Station Information

KITKI1

Primary Station	Station # 1	latitude: 47 34 32.3	longitude: 122 42 05.3
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

KITSAP

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 38 J
TSI_Phos:
TSI_Ch1:
Narrative TSI: ^b M

Summary Comments:

The water clarity in 1998 started out very good but deteriorated at the end of the sampling season. The Secchi depth readings ranged from 1.7 meters (5.5 feet) to 6.4 meters (21.0 feet). The mean Secchi depth reading was 4.5 meters (14.7 feet). For comparison, the previous volunteer monitor on Kitsap Lake sampled in 1993 and recorded a mean Secchi depth reading of 4.7 meters (15.5 feet).

No chemistry data was collected for Kitsap lake in 1998.

Geese were sighted by the volunteer monitor on only two sampling occasions; the highest number counted was 18 on 9/11/1998.

Three site visits were made by Ecology staff in 1998 to collect profile information. Weak thermal stratification was noted at all three visits and a depletion of dissolved oxygen occurred near the bottom of the hypolimnion.

Numerous aquatic plants sighted in the shallow southern end of the lake included: *Potamogeton amplifolius* (large-leaf pondweed), *Iris pseudacorus* (yellow flag iris), *Nuphar polysepala* (yellow waterlily), and *Elodea canadensis*.

The Secchi depth data indicate Kitsap Lake as an oligomesotrophic lake. However, because of the low dissolved oxygen levels in the hypolimnion and the algae blooms noted during site visits, Kitsap Lake is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

KITSAP

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/25/1998		15	21	3	50	3	5	4	2	0		13	0
	Sampler: SONNABEND		Remarks:										
6/7/1998		17.5	21	3	0	1	3	3	2	0	18	12	0
	Sampler: SONNABEND		Remarks:										
6/22/1998		17.5	21	3	75		3	3	3	8	25	5	0
	Sampler: SONNABEND		Remarks:										
7/5/1998		19.5	16	3	25	2	4	3	2	0	0	0	0
	Sampler: SONNABEND		Remarks:										
7/19/1998		23	15	6	50	1	1	3	2	0	0	4	3
	Sampler: SONNABEND		Remarks:										
8/2/1998		24	16.5	6	0	2	1	4	1	0	0	2	0
	Sampler: SONNABEND		Remarks:										
8/22/1998		23	14.75	6	50	2	1	4	1	0	0	0	3
	Sampler: SONNABEND		Remarks:										
8/27/1998			16.5		0					0	0	0	0
	Sampler: BELL-MCKINNON		Remarks:										
9/11/1998		23	7	8	0	1	1	3	1	18	7	1	1
	Sampler: SONNABEND		Remarks:										
9/27/1998		20	5.5	7	0	1	1						
	Sampler: SONNABEND		Remarks:										
10/13/1998		15.5	7	7	100	2	4						
	Sampler: SONNABEND		Remarks:										
10/23/1998		15	7	6	75	2	1						
	Sampler: SONNABEND		Remarks:										

Profile Report

KITSAP

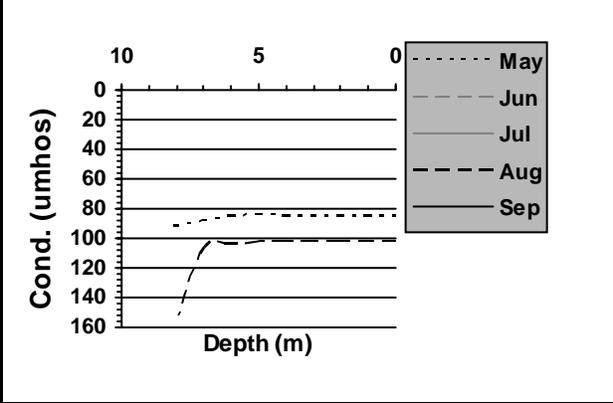
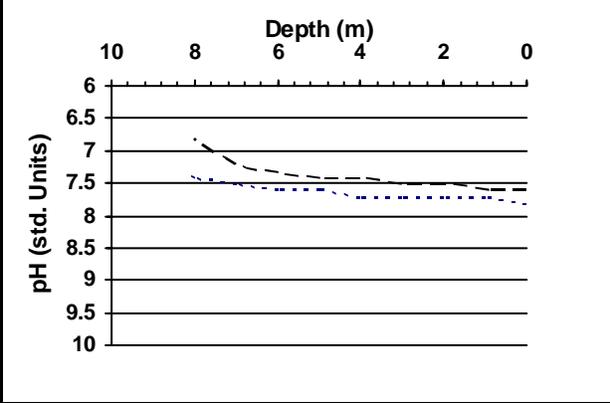
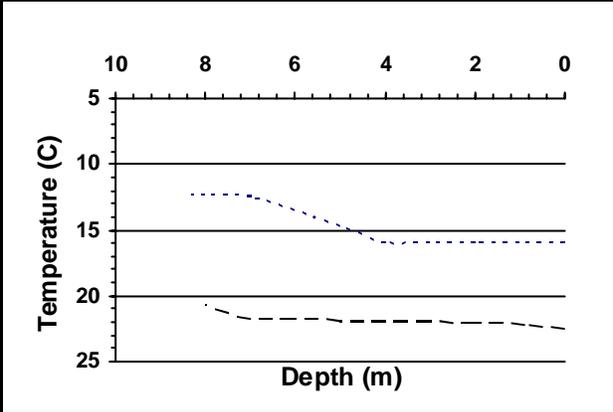
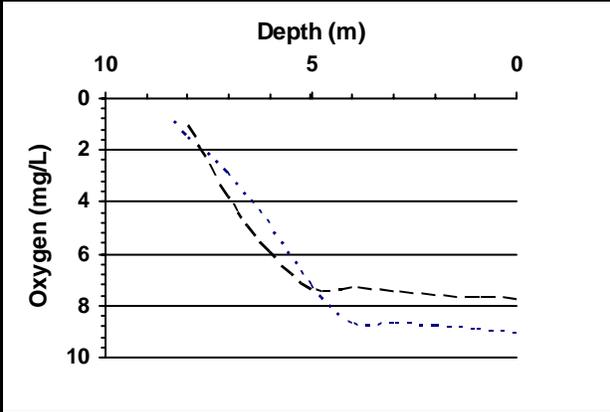
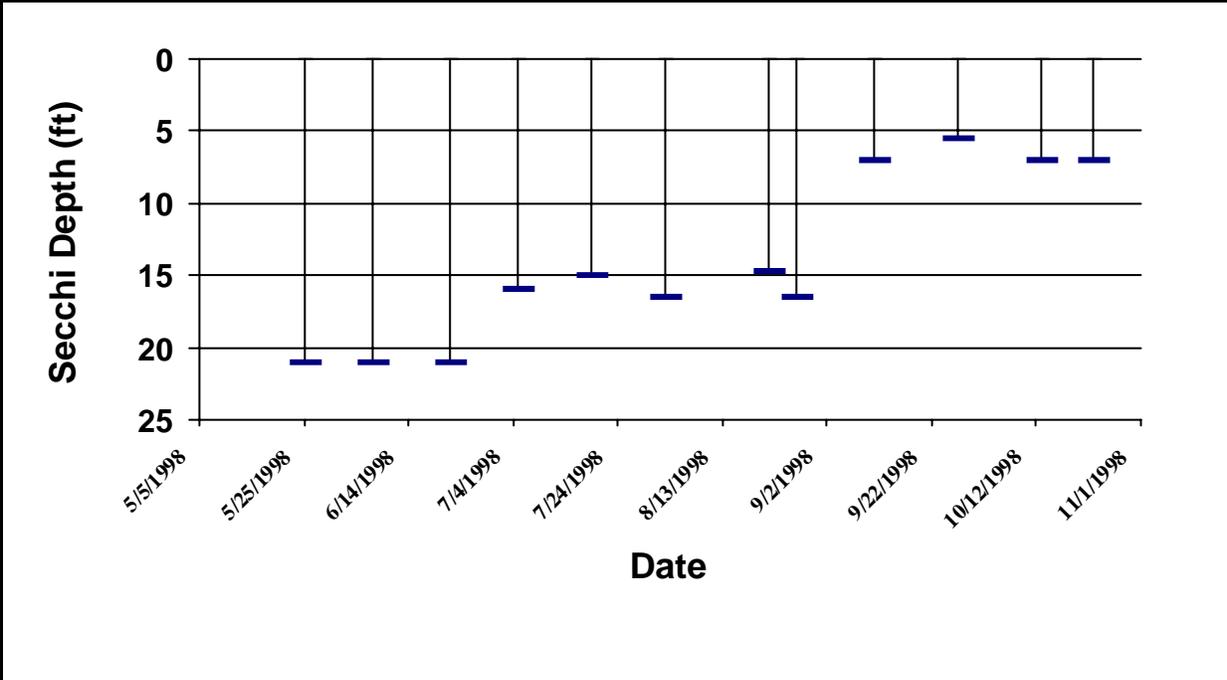
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
5/5/1998						
		0	83.7	9.01	7.8	15.8
		1	83.7	8.85	7.7	15.8
		2	83.6	8.72	7.7	15.8
		3	83.8	8.59	7.7	15.8
		4	83.5	8.59	7.7	15.8
		5	83.1	7.18	7.6	14.6
		6	84.3	4.81	7.6	13.4
		7	86.6	2.84	7.5	12.4
		8	90.4	1.34	7.4	12.2
		8.3	91.2	.87	7.3	12.2
5/11/1998						
		0	83.7	9.01	7.8	15.8
		1	83.7	8.85	7.7	15.8
		2	83.6	8.72	7.7	15.8
		3	83.8	8.59	7.7	15.8
		4	83.5	8.59	7.7	15.8
		5	83.1	7.18	7.6	14.6
		6	84.3	4.81	7.6	13.4
		7	86.6	2.84	7.5	12.4
		8	90.4	1.34	7.4	12.2
		8.3	91.2	.87	7.3	12.2

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
8/27/1998						
		0	101	7.69	7.6	22.4
		0.9	101	7.66	7.6	22.2
		2	101	7.52	7.5	22
		3	101	7.44	7.5	21.9
		4	101	7.24	7.4	21.9
		5	101	7.33	7.4	21.8
		6	103	5.84	7.3	21.7
		7	105	3.73	7.2	21.7
		8	152	.77	6.8	20.6

Secchi Depth and Profile Graphics

Station: 1

KITKI1



Station Information

KITKI1

Primary Station	Station # 1	latitude: 47 34 32.3	longitude: 122 42 05.3
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

KITSAP

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	38
TSI_Phos:		50
TSI_Ch1:		
Narrative TSI:	^b	M

Summary Comments:

The general water clarity of Kitsap Lake was very good in 1999, especially through August. The Secchi depth readings ranged from 3.1 meters (10.0 feet) to 6.3 meters (20.5 feet) with a mean Secchi depth of 5.0 meters (16.4 feet). For comparison, in 1998 the mean Secchi depth was 4.5 meters (14.7 feet).

The volunteer monitor for Kitsap Lake reported seeing geese and/or other waterfowl on the lake during four of his seven sampling visits between May and October. He also commented that fishing on the lake in 1999 was the best in years.

The chemistry data collected for Kitsap Lake showed low phosphorus levels in the epilimnion on 5/18/1999. By 9/8/1999, the phosphorus levels had more than tripled to 33.8 ug/L. This high level of productivity is reflected in the decrease in Secchi depth readings.

Ecology staff made two site visits in 1999. Thermal stratification was not observed during either visit (5/18/1999 and 9/8/1999) and consistently high dissolved oxygen levels were noted throughout the water column.

Ecology staff also observed very luxuriant plant growth of *Potamogeton amplifolius* (large-leaf pondweed) near the boat ramp. At the south end of the lake were dense masses of *Nuphar polysepala* (spatterdock) and the nonnative plant *Nymphaea odorata* (fragrant waterlily).

Based on the Secchi depth data, Kitsap Lake should be classified as oligomesotrophic. But considering the high phosphorus levels, Kitsap Lake is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

KITSAP

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 1										
5/18/1999		E	10.5							
9/8/1999	1100	E	33.8							

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

KITSAP

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/18/1999		13.5	20.5	2	75	3	4	4	4	0	0	2	0
	Sampler: SONNABEND		Remarks:										
5/31/1999		17	18	2	100	3	1	4	4	12	0	3	0
	Sampler: SONNABEND		Remarks:										
6/14/1999		19.5	18	6	100	2	1	4	4	0	0	3	1
	Sampler: SONNABEND		Remarks:										
6/28/1999		19.5	17.5	6	100	3	5	4	4	7	0	4	0
	Sampler: SONNABEND		Remarks:										
8/13/1999		21.5	17	6	100	2	1	4	4	0	2	1	0
	Sampler: SONNABEND		Remarks: Used a view tube.										
8/28/1999		23	13	7	0		1	3	2	0	0	1	3
	Sampler: SONNABEND		Remarks: Used a view tube.										
9/8/1999		20	10	6	0		1	2	1	0	1	1	0
	Sampler: SONNABEND		Remarks: Water changed color from last week. Huge amount of suspended algae in the water. Lake wasn't stratified. Fishing was great this year. Sampling day was sunny and calm.										

Profile Report

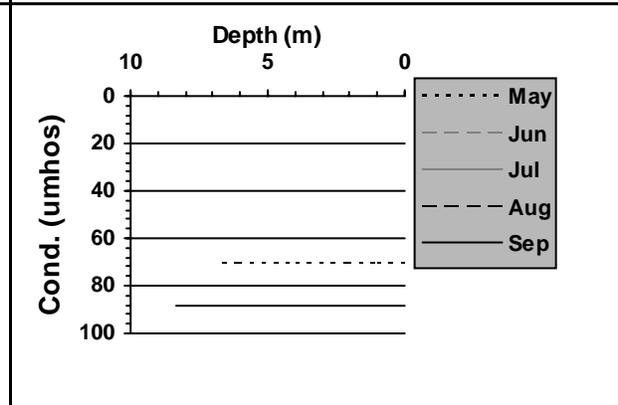
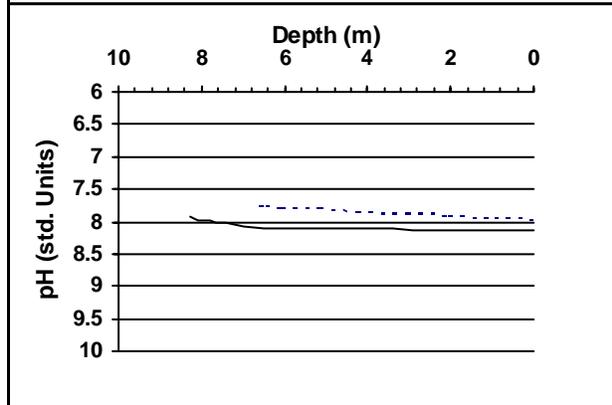
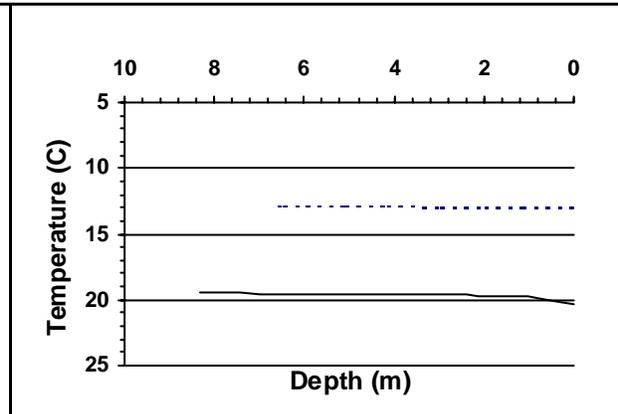
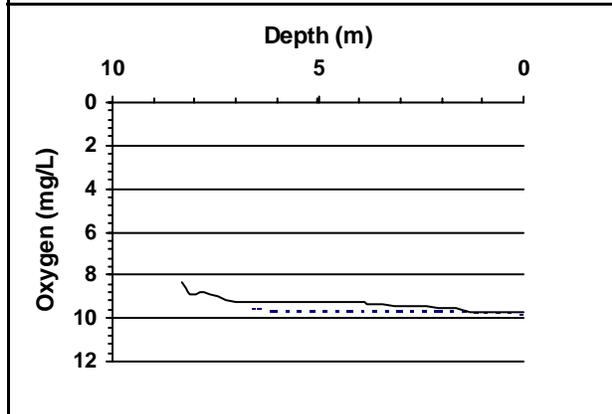
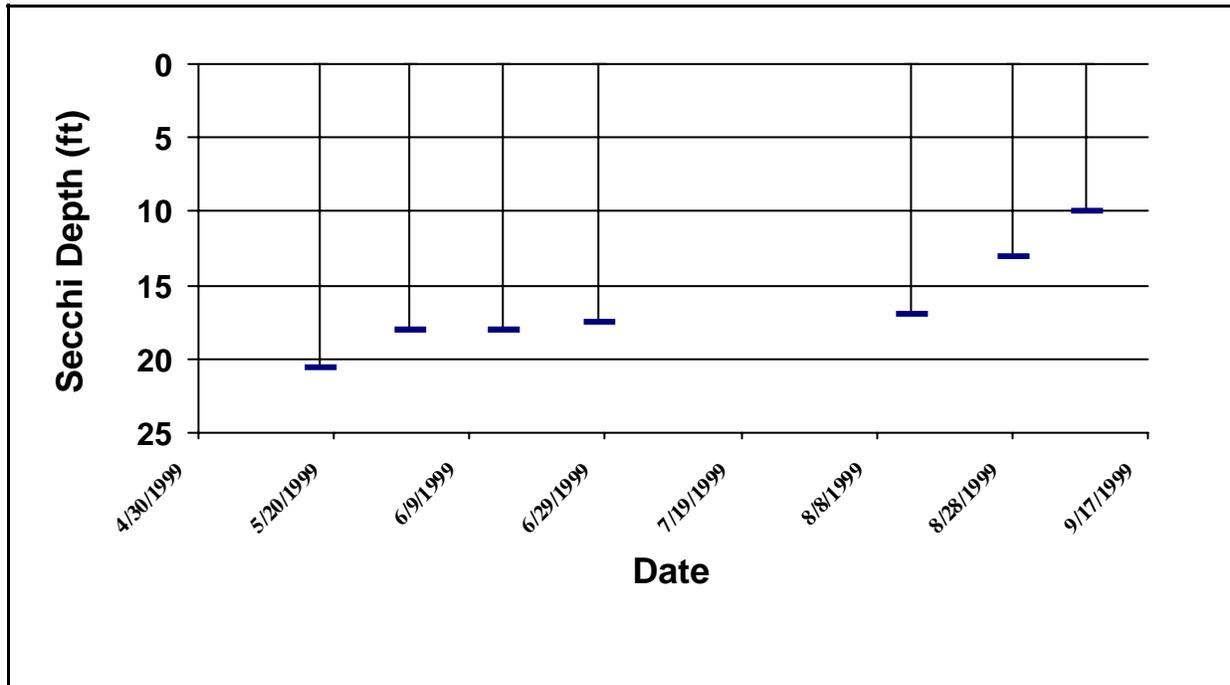
KITSAP

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
5/18/1999						
		0	70	9.8	7.96	12.91
		1.1	70.1	9.67	7.91	12.91
		2.1	70.1	9.64	7.88	12.91
		3	70	9.61	7.86	12.9
		4.2	70	9.6	7.83	12.89
		5.1	70	9.6	7.78	12.89
		6.1	70	9.64	7.76	12.87
		6.5	70	9.55	7.73	12.87
		6.7	70	9.62	7.76	12.87
9/8/1999						
		0	88.6	9.72	8.15	20.36
		1	88.2	9.68	8.15	19.76
		1.5	88.2	9.6	8.15	19.69
		1.9	88.2	9.53	8.15	19.67
		2.9	88.2	9.41	8.14	19.62
		3.8	88.2	9.33	8.11	19.6
		3.9	88.2	9.28	8.11	19.6
		5	88.2	9.27	8.11	19.6
		6	88.3	9.22	8.1	19.58
		7	88.3	9.22	8.08	19.56
		7.8	88.3	8.83	7.99	19.47
		8.1	88.4	8.85	7.98	19.46
		8.3	88.4	8.35	7.91	19.45

Secchi Depth and Profile Graphics

Station: 1

KITKI1



LACAMAS

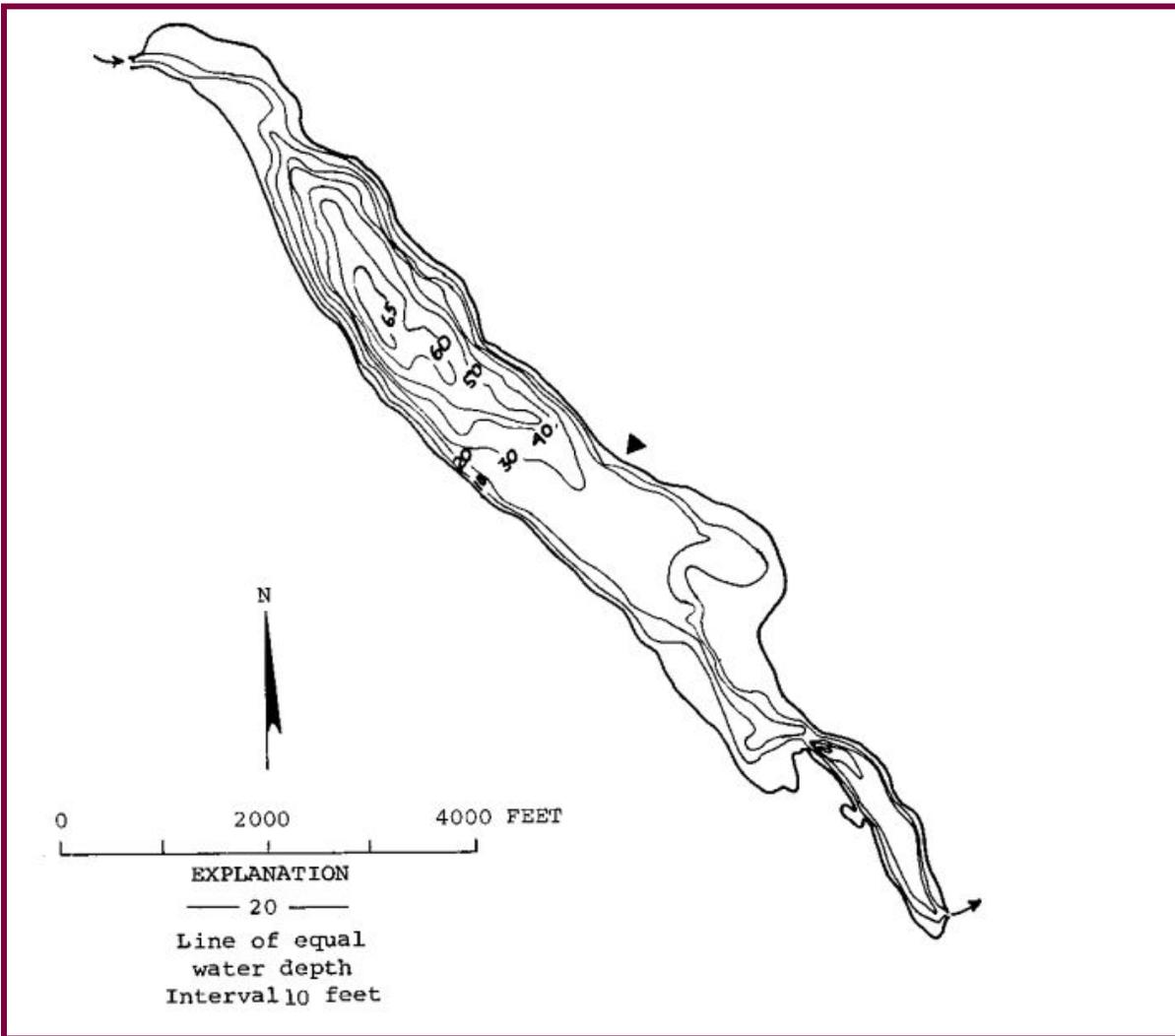
CLARK County

Lake ID: LACCL1

Ecoregion: 3

Lacamas Lake is located one mile north of Camas. It is formed by two dams in Lacamas Creek. Lacamas Lake is fed by Lacamas Creek, and drains via Round Lake to Lacamas Creek and the Washougal River.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
315	65	24	64	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
7489	5.34	179	45 36 16.	122 24 22.



Trophic State Assessment for 1998

LACAMAS

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 51	J
TSI_Phos:		
TSI_Ch1:		
Narrative TSI:	^b	E

Summary Comments:

The water clarity of Lacamas Lake was poor for 1998. The Secchi depth readings ranged from 1.4 meters (4.7 feet) to 2.3 meters (7.7 feet) with a mean Secchi depth reading of 2.0 meters (6.6 feet). For comparison, in 1997 the mean Secchi depth reading was also 2.0 meters (6.6 feet).

No chemistry data was collected for Lacamas Lake in 1998.

Only one site visit by Ecology staff was made in 1998. Thermal stratification was noted during this visit (9/8/1998). In addition, the bottom 75% of the lake at its deepest spot (four meters from the surface to the bottom) showed extreme dissolved oxygen depletion.

The non-native aquatic plant *Egeria densa* (Brazilian elodea) was very dense around most of the lake shoreline.

Based on the Secchi depth data, the dense macrophyte growth and the low levels of dissolved oxygen in the hypolimnion, Lacamas Lake is classified as eutrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Profile Report

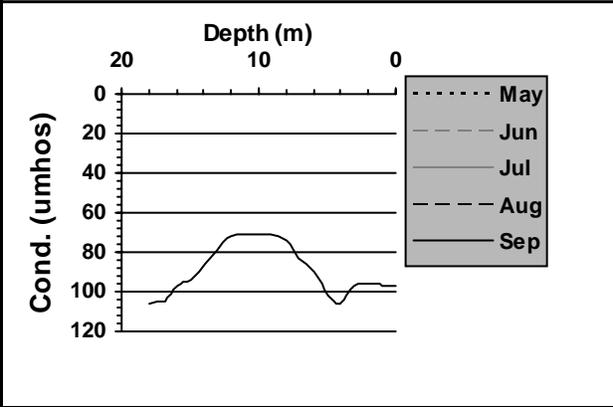
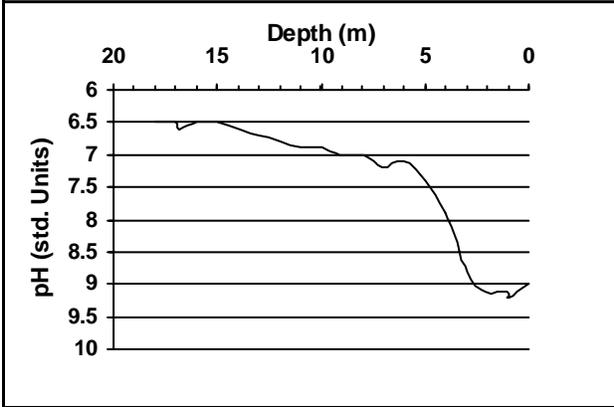
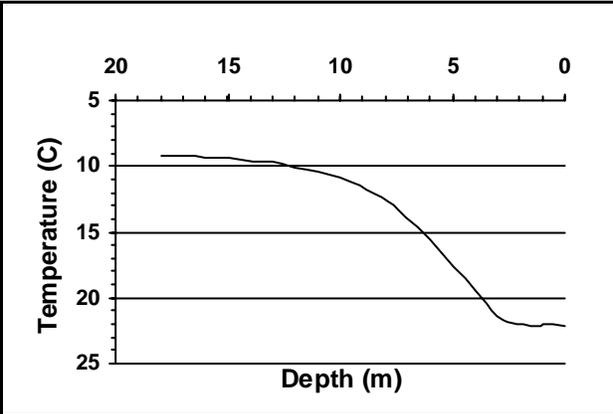
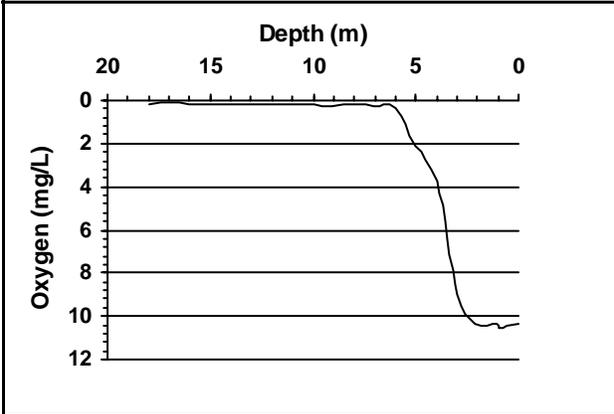
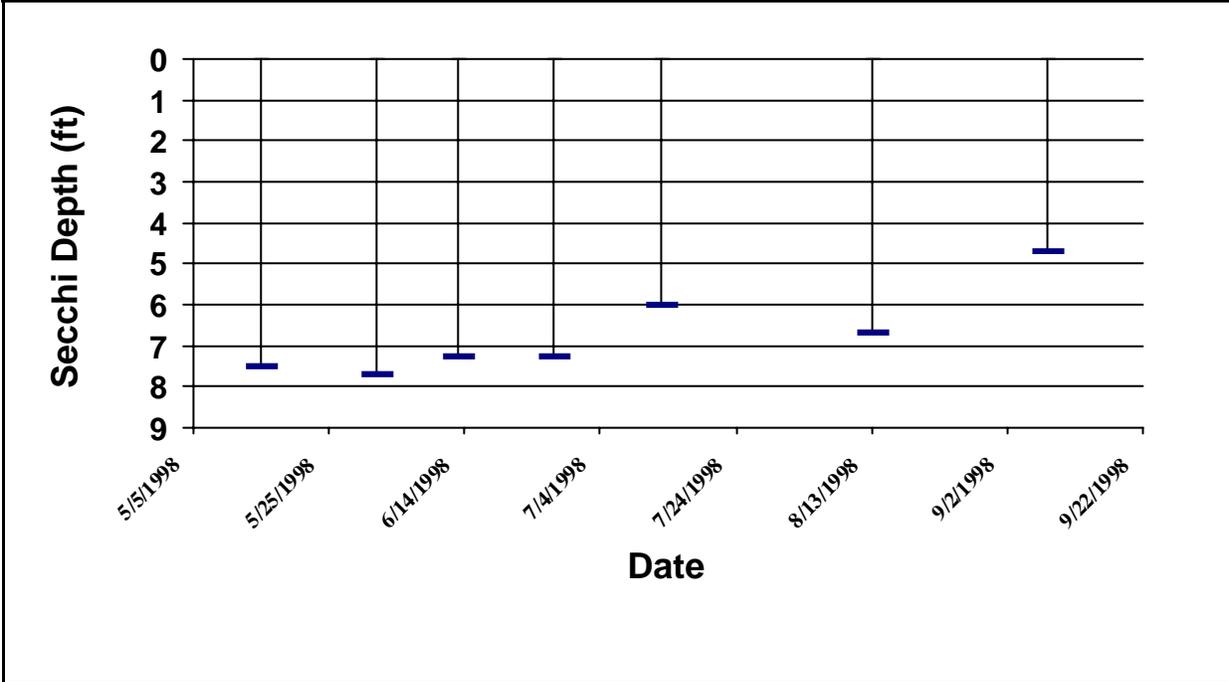
LACAMAS

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
9/8/1998						
		0	97	10.35	9	22.1
		1	97	10.56	9.2	22
		1.1	96	10.35	9.1	22.1
		2.1	96	10.33	9.1	22
		3	97	8.94	8.8	21.4
		4	106	3.73	7.9	19.4
		5	102	2.11	7.4	17.6
		6	90	.4	7.1	15.6
		7.1	83	.28	7.2	13.8
		7.9	74	.21	7	12.7
		9.1	71	.23	7	11.4
		10	71	.21	6.9	10.8
		11	71	.17	6.9	10.4
		12	72	.17	6.8	10.1
		13	79	.15	6.7	9.7
		13.9	86	.15	6.6	9.6
		15	94	.15	6.5	9.4
		16	97	.14	6.5	9.4
		16.8	105	.12	6.6	9.2
		17	105	.12	6.5	9.2
		18	106	.14	6.5	9.2

Secchi Depth and Profile Graphics

Station: 1

LACCL1



Trophic State Assessment for 1999

LACAMAS

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	54
TSI_Phos:		59
TSI_Ch1:		
Narrative TSI:	^b	E

Summary Comments:

The general water clarity of Lacamas Lake was very poor in 1999. The Secchi depth readings ranged from 1.1 meters (3.5 feet) to 2.6 meters (8.5 feet) with a mean Secchi depth of 1.6 meters (5.3 feet). For comparison, in 1998 the mean Secchi depth was 2.0 meters (6.6 feet).

The volunteer monitor for Lacamas Lake reported seeing geese and/or other waterfowl on the lake during five of his six sampling visits between June and September. The volunteer monitor also reported an algae bloom in the lake on 7/19/1999; this bloom continued for the rest of the summer getting larger and denser over time.

The chemistry data collected for Lacamas Lake showed high phosphorus levels in the epilimnion. This high level of phosphorus indicates a high degree of productivity and is reflected in the low Secchi depth readings.

Ecology staff made two site visits in 1999. Low dissolved oxygen levels in the hypolimnion and thermal stratification was observed during both site visits (6/7/1999 and 9/2/1999).

Ecology staff conducted an aquatic plant survey on 6/17/1999. The nonnative plant *Egeria densa* (Brazilian elodea) was found to be dominant or co-dominant throughout most of the lake shoreline and growing densely out to a lake depth of three (3) meters. The only other nonnative plant found was *Phalaris arundinacia* (reed canarygrass); it occurred in a dense mass at the north end of the lake.

Based on the Secchi depth data and the phosphorus levels, Lacamas Lake is classified as eutrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

LACAMAS

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
------	------	--------	-----------------	-----------------	-------	----------------------------	-------------------------------------	--------------------	-------------------	--------------------

Station 1

6/7/1999	1400	E	41.2							
----------	------	---	------	--	--	--	--	--	--	--

9/2/1999 1430 E 47.6

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

LACAMAS

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/7/1999		15	5.33	3	75	1	3	1	1	2	20	1	1
	Sampler:	BALDWIN		Remarks:	Did not use a view tube. Saw osprey & eagle. Less algae noted this spring than in years past. Elodea has gotten significantly worse over the years. There is a potential development being planned on 86 acres (approx. 20 houses) near Lacamas Creek.								
6/28/1999		18	8.5	3	75	3	3	1	1	0	10	2	1
	Sampler:	BALDWIN		Remarks:	Did not use a view tube. Osprey.								
7/19/1999		22.5	5.5	3	0	3	1	1	1			1	2
	Sampler:	BALDWIN		Remarks:	Small algae starting to form.								
8/2/1999		23	4.5	4	50	2	1	1	1	0	10	2	1
	Sampler:	BALDWIN		Remarks:	Did not use a view tube. Algae mass getting denser.								
8/17/1999		24.5	4.5	4	25	3	1	1	1	2	6	2	4
	Sampler:	BALDWIN		Remarks:	Did not use a view tube. Algae very thick.								
9/2/1999		21	3.5	4	25	2	3	1	1		3	0	2
	Sampler:	BALDWIN		Remarks:	Heavy algae growth. Water very cloudy. Sampling day was sunny and slight breeze.								

Profile Report

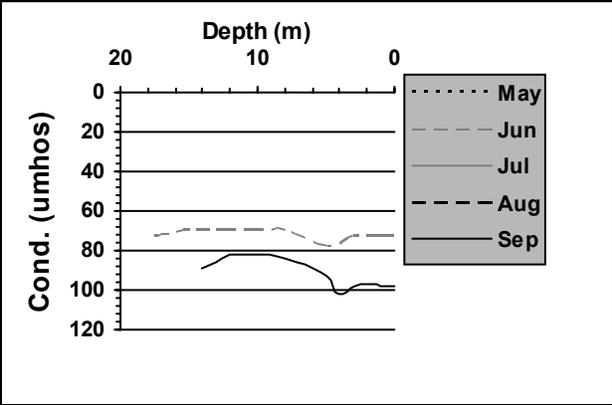
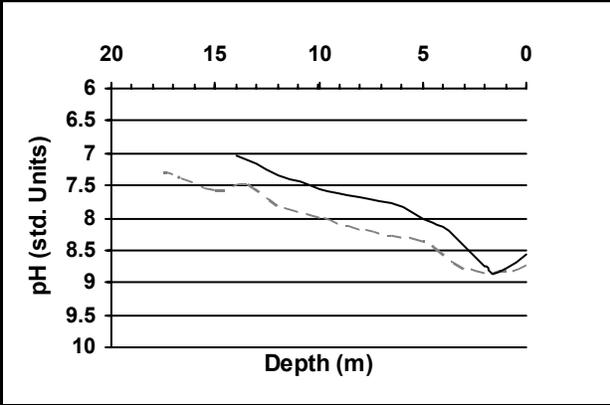
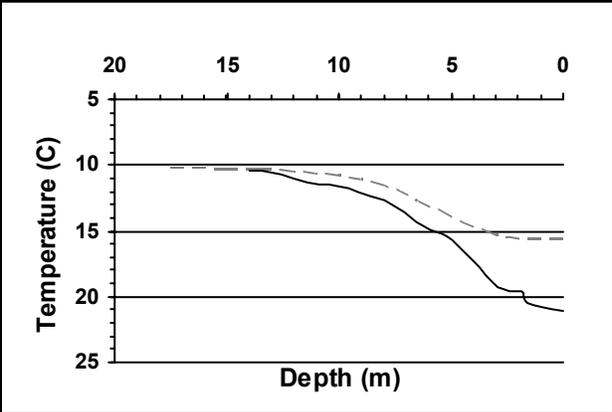
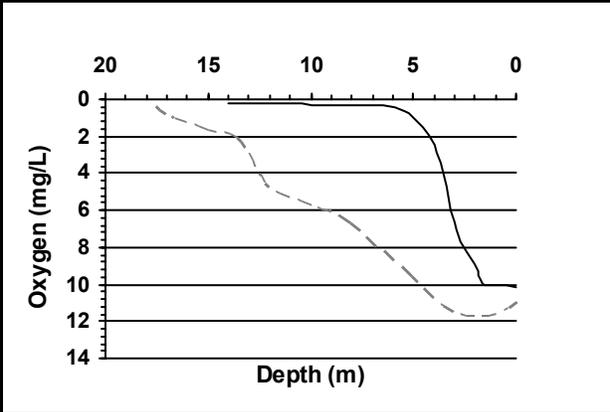
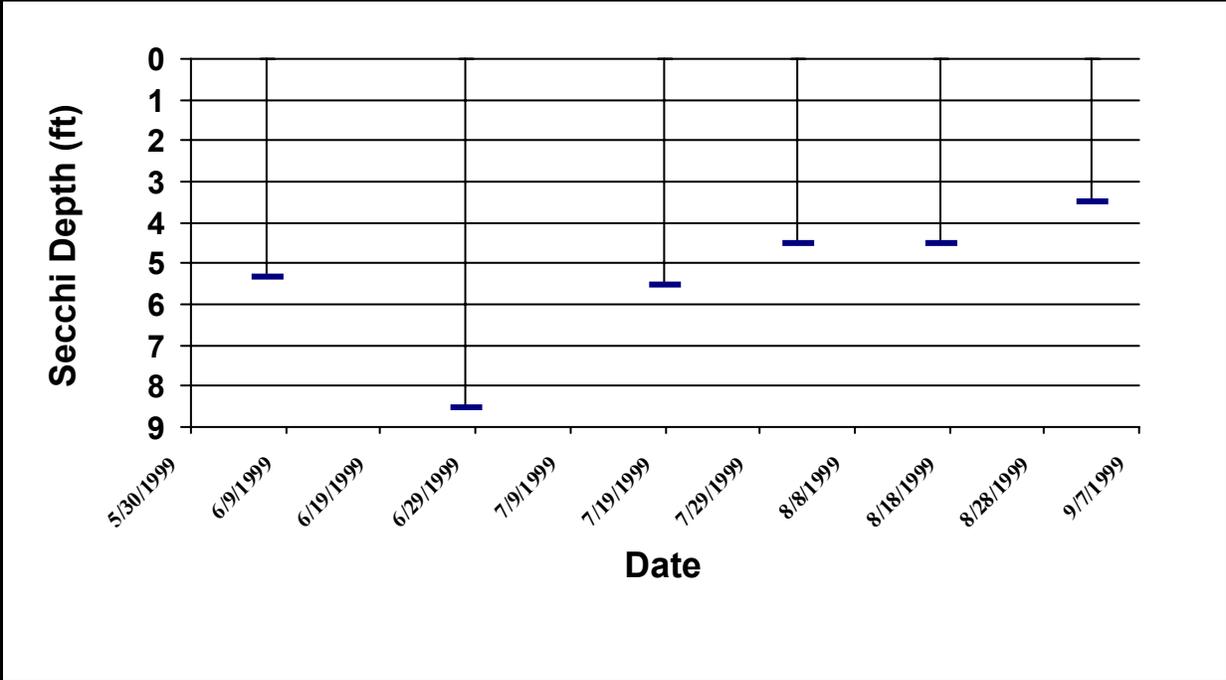
LACAMAS

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/7/1999						
		0	72	10.87	8.72	15.5
		1	72.1	11.5	8.8	15.59
		3	72.1	11.43	8.79	15.25
		5	76.9	9.53	8.34	13.88
		8	69.2	6.67	8.17	11.41
		10	68.7	5.7	7.97	10.77
		12	68.5	4.66	7.79	10.46
		13.5	69	2.08	7.48	10.29
		15	68.6	1.61	7.55	10.22
		17	70.9	.73	7.32	10.15
		17.5	71.9	.33	7.29	10.08
9/2/1999						
		0	97.9	10.15	8.56	21.13
		1	97.7	10.07	8.78	20.79
		1.6	97.4	9.92	8.86	20.48
		1.9	97.2	9.04	8.76	19.59
		2	97	8.82	8.75	19.56
		2.9	98.4	7.06	8.48	19.23
		4	102.4	2.43	8.14	17.34
		5	92.9	.93	8.01	15.65
		5.9	89.1	.43	7.82	14.9
		7.1	85.5	.36	7.73	13.59
		8	83.5	.35	7.69	12.65
		9.1	82.2	.32	7.61	12.08
		10	81.7	.29	7.55	11.59
		10.9	82.1	.26	7.45	11.4
		12	82	.25	7.34	11
		13	86.1	.23	7.17	10.54
		14	88.9	.22	7.03	10.46

Secchi Depth and Profile Graphics

Station: 1

LACCL1



LAWRENCE

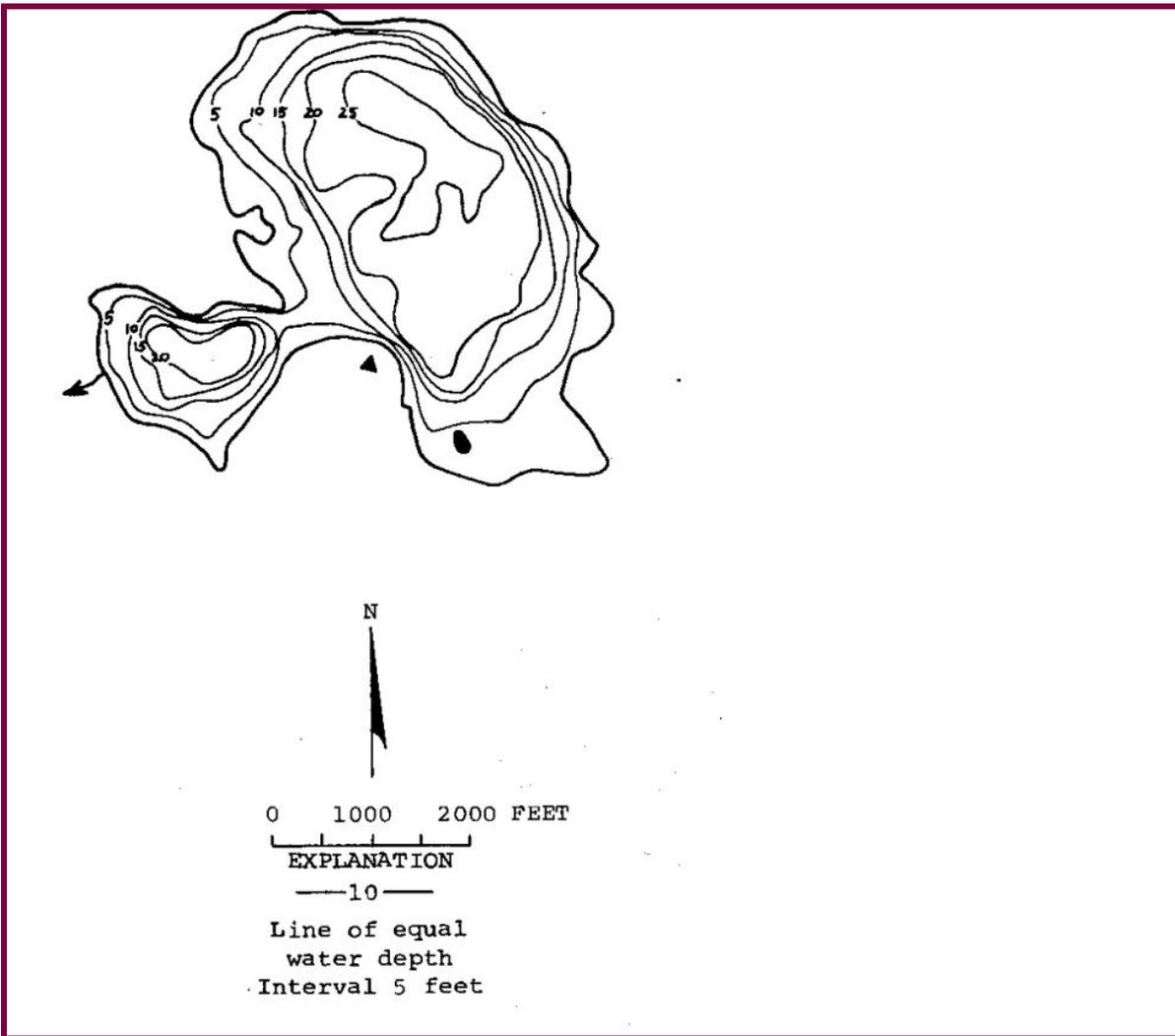
THURSTON County

Lake ID: LAWTH1

Ecoregion: 2

Lake Lawrence is located six miles south of Yelm, and six miles southeast of Rainier. It is fed by springs, and drains to the Deschutes River.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
330	26	13	3	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
4379	3.96	421	46 50 57.	122 34 51.



Station Information

LAWTH1

Primary Station	Station # 1	latitude: 46 51 14.9	longitude: 122 34 17.4
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

LAWRENCE

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 42 J
TSI_Phos:
TSI_Ch1:
Narrative TSI: ^b M

Summary Comments:

The water clarity for Lake Lawrence was fair to good in 1998. The Secchi depth readings ranged from 2.4 meters (8.0 feet) to 4.7 meters (15.5 feet). The mean Secchi depth reading was 3.6 meters (11.8 feet). There are no previous year's data from Lawrence Lake for comparison.

No chemistry data was collected from Lawrence Lake in 1998.

Two site visits were made by Ecology staff to Lawrence Lake in 1998. A weak thermal stratification was noted during the first visit (6/10/1998); no thermal stratification was noted during the second Ecology site visit (8/26/1998). Depletion of dissolved oxygen was seen in the bottom third of the water column at the lake's deepest location during both site visits.

The west side of the lake has an area densely covered by *Nymphaea odorata* (fragrant waterlily).

Based on the Secchi depth data and the low levels of dissolved oxygen in the hypolimnion, Lake Lawrence is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

LAWRENCE

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/10/1998		19	10.5	6	100	2	4	4	3	0	1	1	0
	Sampler:	HANNON		Remarks:									
6/10/1998			10.5		0						0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									
6/26/1998		20	15	6	25	2	4	4	4	0	2	2	0
	Sampler:	HANNON		Remarks:									
7/9/1998		23.5	15	6	25	2	1	4	4	0	0	1	0
	Sampler:	HANNON		Remarks:									
7/22/1998		24	15.5	6	0		1	4	4	0	0		
	Sampler:	HANNON		Remarks:									
8/12/1998		21.5	10	2	0		1	4	4	4	0	2	0
	Sampler:	HANNON		Remarks: WE DO HAVE RESIDENT GEESE.									
8/26/1998		21.5	10.33	6	75	3	1	4	4	50	0	1	0
	Sampler:	HANNON		Remarks: TOTAL WATER LEVEL DROP 14.5 INCHES.									
8/26/1998			10.33		0						0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									
9/10/1998		22	8	6	0	1	1	4	4	0	0	2	0
	Sampler:	HANNON		Remarks:									

Profile Report

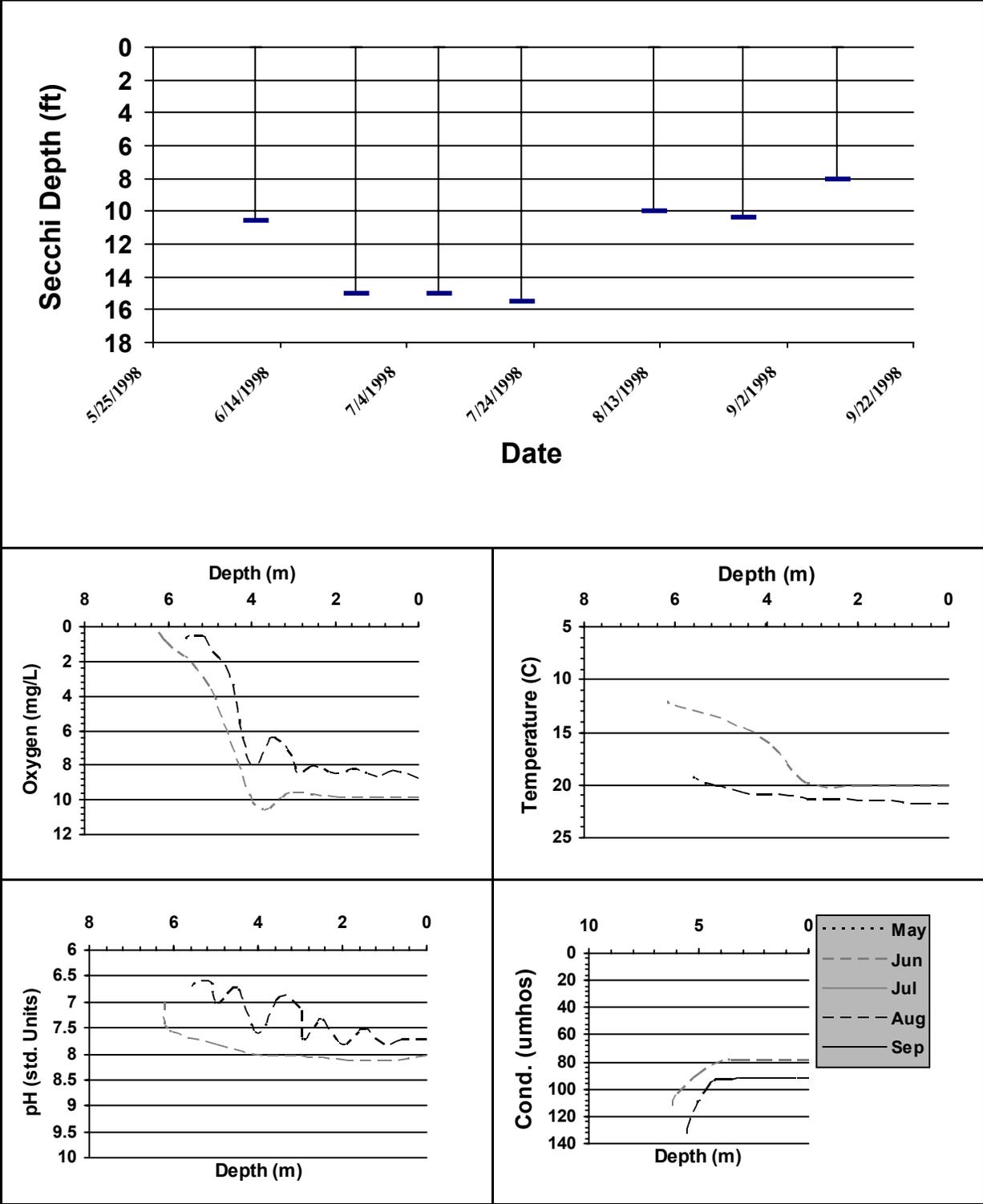
LAWRENCE

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/10/1998						
		0	78	9.81	8	20
		0.9	78	9.76	8.1	20
		1.9	78	9.79	8.1	20
		3.1	78	9.49	8	19.8
		3.9	78	10.23	8	16
		5	87	3.37	7.8	13.5
		6.1	104	.61	7.5	12.2
		6.2	112	.29	7	12.1
8/26/1998						
		0	91	8.66	7.7	21.7
		0.6	91	8.27	7.7	21.7
		1	91	8.6	7.8	21.6
		1.5	91	8.13	7.5	21.4
		2	91	8.43	7.8	21.4
		2.5	91	7.94	7.3	21.3
		2.9	91	8.44	7.7	21.3
		3	91	7.46	7.1	21.3
		3.5	92	6.3	6.9	20.9
		4	92	7.99	7.6	20.8
		4.5	95	2.81	6.7	20.7
		5	108	1.12	7	20.1
		5.1	108	.51	6.6	20.1
		5.5	126	.48	6.6	19.4
		5.6	133	.61	6.7	19.1

Secchi Depth and Profile Graphics

Station: 1

LAWTH1



Station Information

LAWTH1

Primary Station	Station # 1	latitude: 46 51 14.9	longitude: 122 34 17.4
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

LAWRENCE

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 42	
TSI_Phos:	49	J
TSI_Ch1:		
Narrative TSI:	^b ME	

Summary Comments:

The general water clarity of Lake Lawrence was good in 1999. The Secchi depth readings ranged from 1.5 meters (5.0 feet) to 4.7 meters (15.5 feet) with a mean Secchi depth of 3.5 meters (11.6 feet). For comparison, in 1998 the mean Secchi depth was 3.6 meters (11.9 feet).

No geese were seen on the lake by the Lake Lawrence volunteer monitor between June and October; he observed only a few other waterfowl on 9/28/1999.

A lake plant harvester worked on Lake Lawrence the first week of August. *Nymphaea odorata* (fragrant waterlily) has been seen as a detriment to lake use in the past.

The chemistry data collected for Lake Lawrence showed moderately high phosphorus levels in the epilimnion. This level of phosphorus indicates a higher level of productivity and the potential for algae growth to be heavy and last for a period of time.

Ecology staff made two site visits in 1999. Low dissolved oxygen levels in the hypolimnion and thermal stratification was observed during both site visits (6/9/1999 and 8/17/1999).

Based on the Secchi depth data and the phosphorus levels Lake Lawrence is classified as mesoeutrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

LAWRENCE

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/9/1999		16	13	4	75	1	4	4	4	0	0	0	0
	Sampler:	HANNON		Remarks: Used a view tube. Algae less than usual this year. Lake height high for last couple of years.									
6/29/1999		18	14	2	75	1	3	4	4	0	0	2	0
	Sampler:	HANNON		Remarks: Did not use a view tube.									
7/21/1999		21	15.5	2	75	1	1	5	5	0	0	2	0
	Sampler:	HANNON		Remarks: Did not use a view tube. Saw about 15 geese earlier.									
8/4/1999		25	15	2	0	1	1	5	5	0	0	2	1
	Sampler:	HANNON		Remarks: Did not use a view tube. Aquatic weed harvester present.									
8/17/1999		21	10.5	2	100	2	4	5	5	0	0	3	0
	Sampler:	HANNON		Remarks: Did not use a view tube. Lot of suspended algae in water. Weed harvester was working on the lake 2 weeks ago. Lots of plants in shallower water. Sampling day was overcast and calm.									
9/4/1999		20	5	6	75	2	1	4	4	0	0	4	0
	Sampler:	HANNON		Remarks: Did not use a view tube.									
9/28/1999		17	8	3	0	1	1	5	4	0	6	1	0
	Sampler:	HANNON		Remarks: Did not use a view tube.									

Profile Report

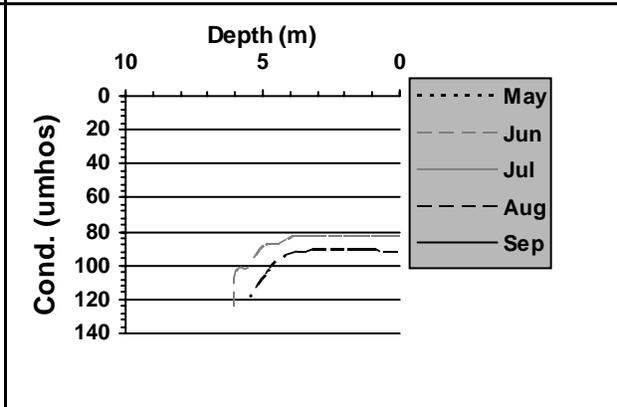
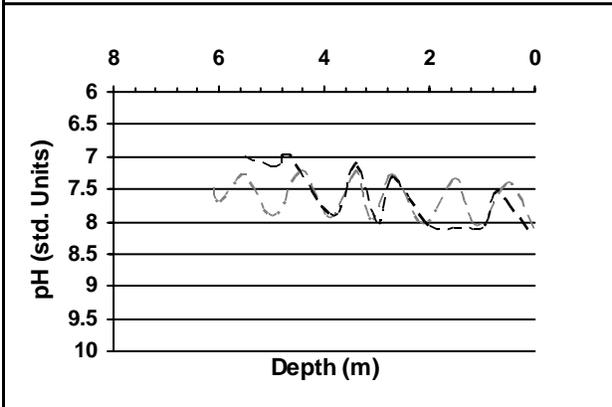
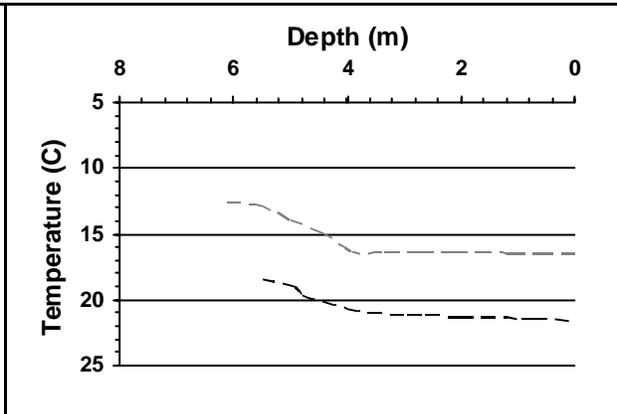
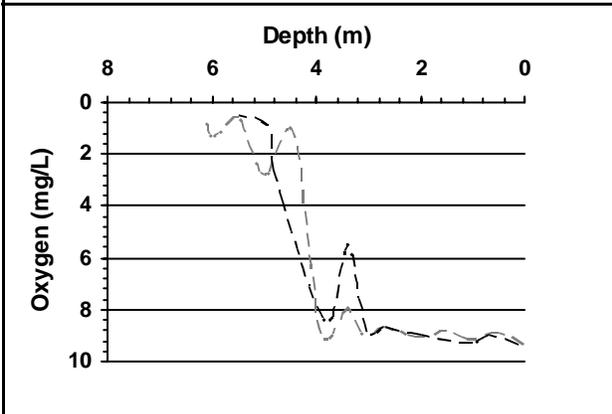
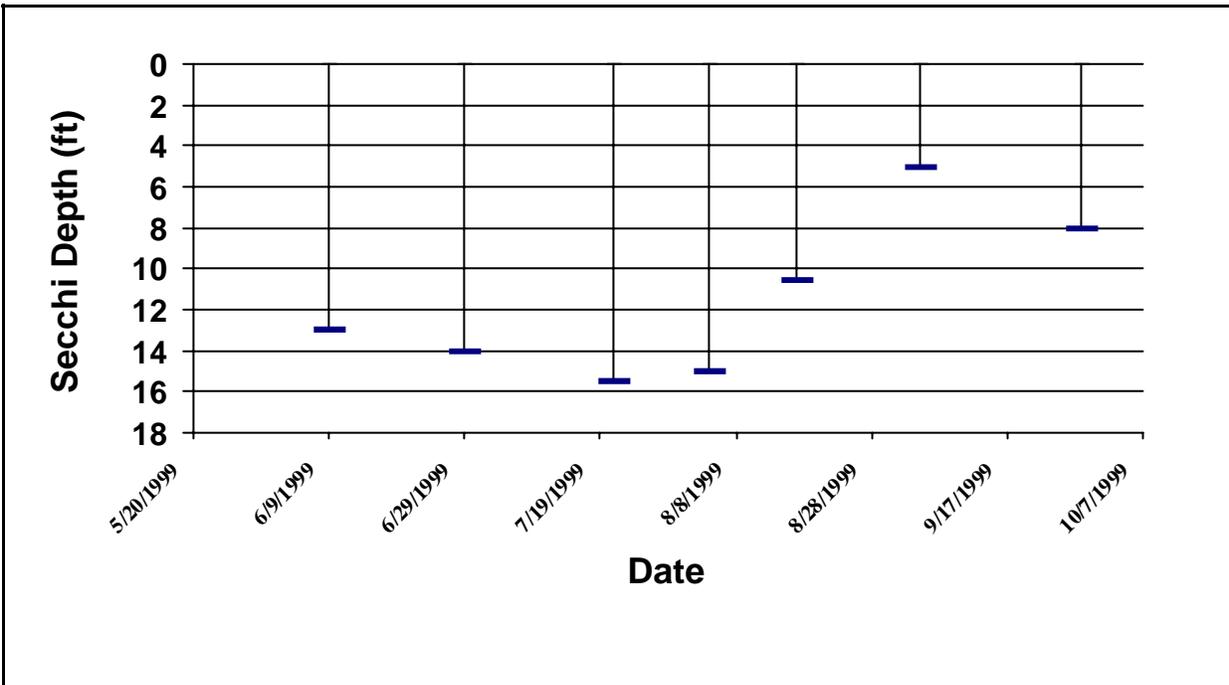
LAWRENCE

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/9/1999						
		0	81.5	9.28	8.12	16.43
		0.5	81.4	8.87	7.36	16.4
		1.1	81.4	9.08	8.05	16.41
		1.5	81.3	8.8	7.32	16.31
		2.1	81.3	9.04	8	16.33
		2.7	81.2	8.59	7.26	16.28
		3.1	81.2	8.96	7.94	16.3
		3.4	81.1	7.88	7.19	16.25
		3.9	81.3	8.95	7.91	16.26
		4.4	85.8	1.16	7.19	14.9
		5	87.3	2.74	7.88	13.91
		5.5	100.1	.52	7.24	12.81
		6	103.1	1.31	7.68	12.56
		6.1	127.5	.67	7.39	12.5
8/17/1999						
		0.1	90.6	9.31	8.11	21.52
		0.7	90.5	8.92	7.49	21.42
		1	90.4	9.25	8.09	21.41
		1.4	90.3	9.18	8.09	21.3
		2	90.2	8.93	8.04	21.24
		2.7	90.1	8.62	7.27	21.1
		3	90.1	8.88	8.01	21.03
		3.4	90.5	5.45	7.07	20.88
		3.8	90.8	8.38	7.9	20.86
		4.6	96.3	3.86	6.98	19.96
		4.8	101.4	2.58	6.95	19.59
		4.9	104.9	.86	7.14	19.05
		5.5	117.9	.48	6.98	18.36

Secchi Depth and Profile Graphics

Station: 1

LAWTH1



LELAND

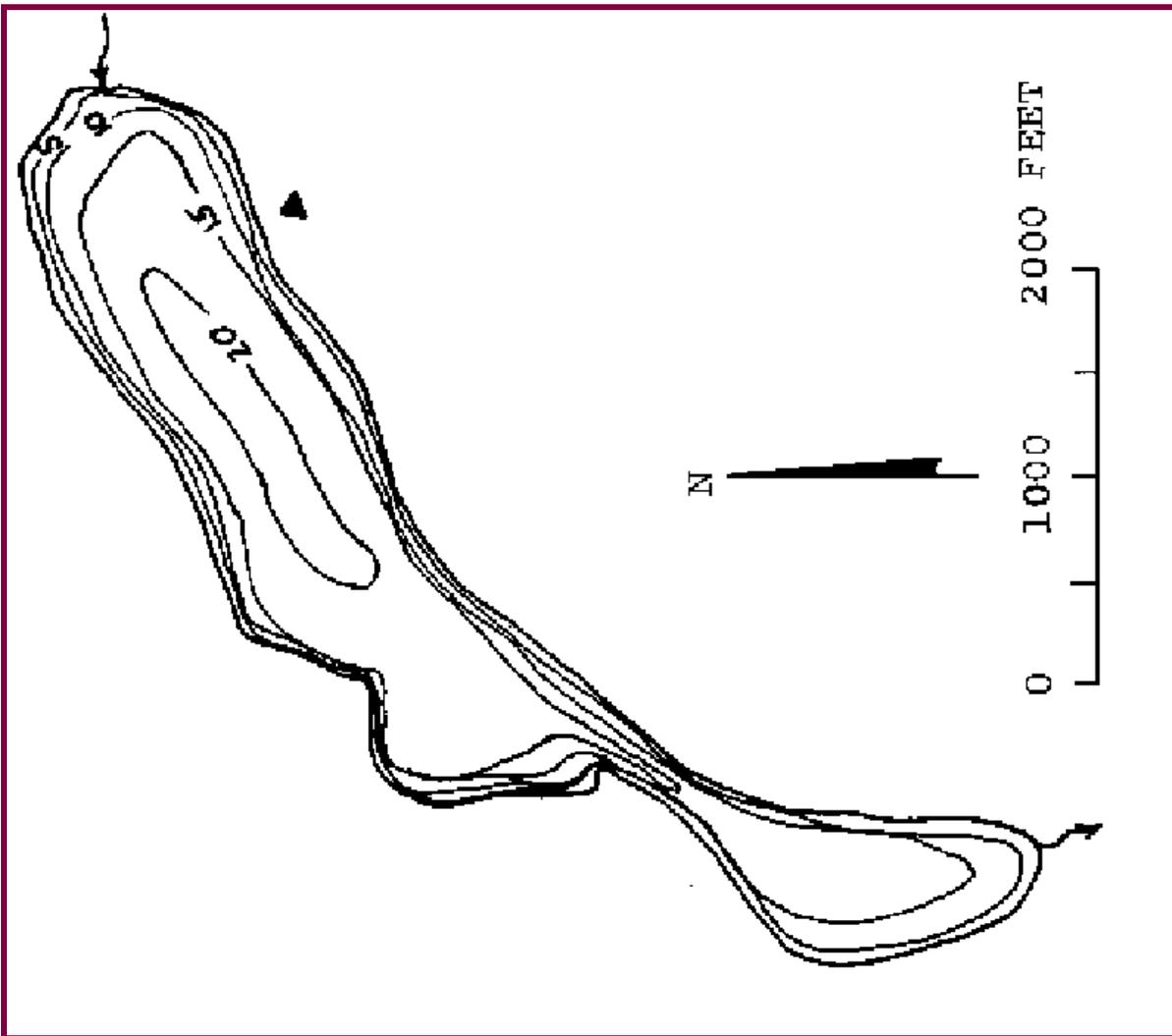
JEFFERSON County

Lake ID: LELJE1

Ecoregion: 2

Leland Lake is a prime fishing lake nestled on the eastern slopes of the Olympics. The lake is located approximately 5 miles north of Quilcene, just west of Highway 101. Leland Lake's outlet is Leland Creek which flows into the Little Quilcene River

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
107	20	13	6	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
1415	2.75	190	47 53 12.	122 53 05.



Station Information

LELJE1

Primary Station	Station # 1	latitude: 47 56 47.3	longitude: 122 52 50.5
	Description: Deep part of lake, directly west from boat launch		

Secondary Station	Station # 2	latitude: 47 53 16.8	longitude: 122 53 18.4
	Description: Approximate center of southernmost arm of lake		

Trophic State Assessment for 1998

LELAND

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	47	
TSI_Phos:		48	
TSI_ChI:		51	J
Narrative TSI:	^b	ME	

Summary Comments:

The general water clarity for Leland Lake was good to fair in 1998. The Secchi depth readings ranged from 1.5 meters (5.0 feet) to 3.2 meters (10.6 feet) with a mean Secchi depth of 2.4 meters (8.0 feet). For comparison, in 1997 the mean Secchi depth was 1.8 meters (6.0 feet).

The chemistry data collected for Leland Lake showed moderately high levels of phosphorus in the epilimnion (15.7 to 22.1 ug/L) and very high levels in the hypolimnion (32.6 to 330 ug/L). All water samples except one showed total nitrogen levels below 1.0 mg/L. In general, a total nitrogen level over 1.0 mg/L is considered high for lakes. These low nitrogen levels tell us that plant growth (including algae) is not limited by nitrogen. There were two very high chlorophyll readings (over 15 ug/L) in September. These readings were qualified by the lab as estimates. The rest of the chlorophyll levels in Leland Lake were moderately high; ranging from 4.3-6.8 ug/L. A chlorophyll reading over 6.0 ug/L indicates high algal densities in the water column.

Ecology staff made four site visits in 1998. Thermal stratification was observed in the water column and low dissolved oxygen levels were noted in the hypolimnion during all of the site visits.

Results from a survey distributed to lake residents indicate they feel that swimming in the lake may be impaired due to the water clarity.

An aquatic plant survey was done by Ecology staff on 9/3/1998. Three non-native plants were observed during the survey: *Egeria densa* (Brazilian elodea), *Nymphaea odorata*, (fragrant waterlily) and *Phalaris arundinacia* (reed canarygrass). The *Egeria densa* was growing densely at the west end of the lake and in patches in the main part of the lake. One area of *Nymphaea odorata* was seen on the south shore. There were only a few places around the lake with *Phalaris arundinacia*.

Based on the trophic state index, Leland Lake is classified as mesoeutrophic.

The following is an assessment written by Ecology staff, Kirk Smith, to determine the phosphorus criterion for Leland Lake:

Lake Leland is a productive shallow lake which has been infested with the non-native aquatic plant, *Egeria densa* (Brazilian elodea). Questionnaire results from residents indicate the primary use on the lake is most likely swimming/wading and the secondary use appears to be enjoyment of the view/watching wildlife. Survey respondents indicated a desire for more restrictive motorboat regulations. The survey suggests that water clarity may be impairing the water quality for swimming. Historic data suggests that there may be even fewer nutrients now than before and swimming conditions may be as good as could reasonably be expected. The lake supports a good bass fishery and water quality parameters suggests the lake could be very productive for a warmwater fishery but somewhat limiting for a coldwater fishery due to the substantial decrease in hypolimnetic oxygen in the summer.

Our mean measured total phosphorus concentration was 18.3 ug/L. We recommend the nutrient criterion for Lake Leland be set at 20ug/L total phosphorus, the action value for Puget Lowlands lower mesotrophic lakes.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

LELAND

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 0										
8/12/1998		L					54			
Station 1										
6/5/1998		E	17.2	.416	24	4.3		25	5590	1 J
		H	32.6	.784	24					
7/30/1998		E	15.7	.371	24	4.6				
		H	330	1.07	3					
8/12/1998		E	18.2	.384	21	4.8				1.3
		H	254	.813	3					
9/14/1998		E	22.1	.56	25	17.5 J				2.1 J
		H	273	.725	3					
Station 2										
6/5/1998		E	14.8	.415	28					1.1 J
7/30/1998		E	22	.437	20	4.4				
8/12/1998		E	20.1	.386	19	6.8				1.3

9/14/1998

E

28.8

.57

20

19.4 J

2.1 J

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

LELAND

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/17/1998		15.6	7.5	7	100	1	2	5	5	4		3	0
	Sampler:	CASE			Remarks:	NEW STAFF GAUGE - NEW = 2.25, OLD =14.00.							
5/31/1998		20	5.5	9	50	1	2	5	5	0	0	6	0
	Sampler:	CASE			Remarks:								
6/5/1998			7	9	100			4	2	0	0	2	0
	Sampler:	SMITH			Remarks:	RESIDENT SUSPECTS LOGGING IN AREA HAS CONTRIBUTED TO HIGH WATER LEVELS OVER THE LAS FEW YEARS.							
6/15/1998		19.4	8.5	8	50	2	2	5	5	0	0	1	0
	Sampler:	CASE			Remarks:								
6/29/1998		22.8	8	8	0	2	1	5	5	0	0	2	0
	Sampler:	CASE			Remarks:								
7/13/1998		21.1	9.5	8	50	2	3	5	5	0	0	0	0
	Sampler:	CASE			Remarks:								
7/26/1998		24.4	10.5	7	0	1	1	5	5	0	0	4	0
	Sampler:	CASE			Remarks:								
7/30/1998			10.56	9	100	1				0	0	0	0
	Sampler:	SMITH			Remarks:	MUCH LESS BLUE-GREEN ALGAE THAN USE TO SEEING IN THE LAKE. VERY DARK WATER! 2 OSPREY							
8/10/1998		22.2	8	8	25	1	1	5	5	0	0	0	0
	Sampler:	CASE			Remarks:								
8/12/1998			9.57		0	1		4	3	0	3	1	0
	Sampler:	SMITH			Remarks:	STRONG H2S IN HYPOLIMNION							
8/24/1998		22.2	9.5	7	0	2	1	5	5	0	0	1	0
	Sampler:	CASE			Remarks:								

Profile Report

LELAND

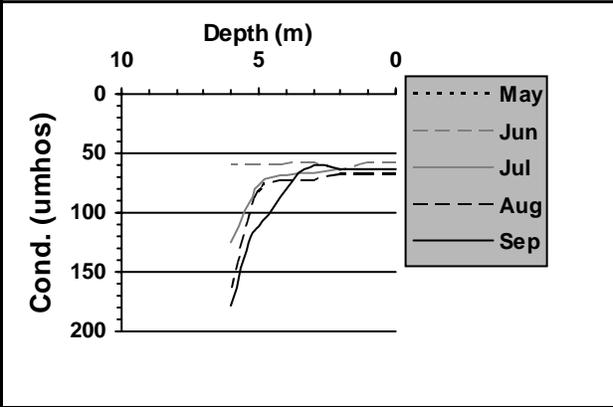
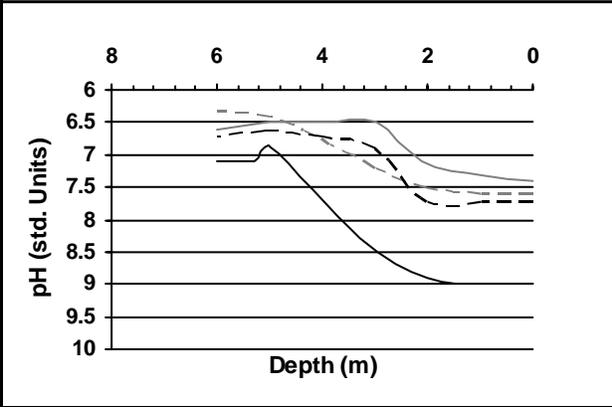
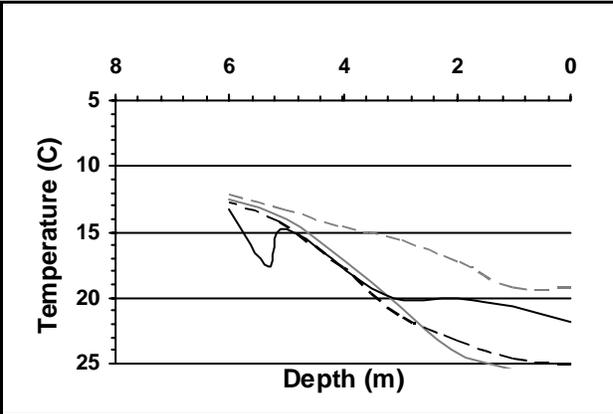
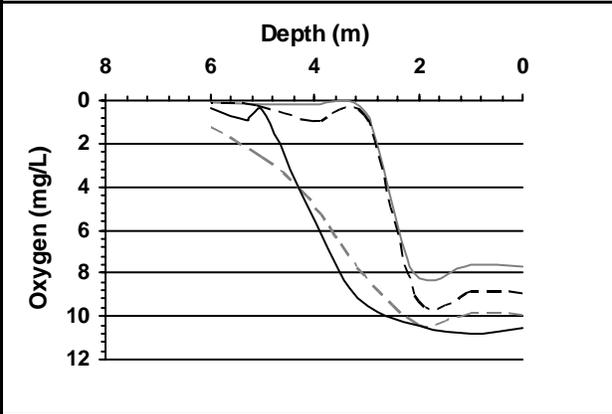
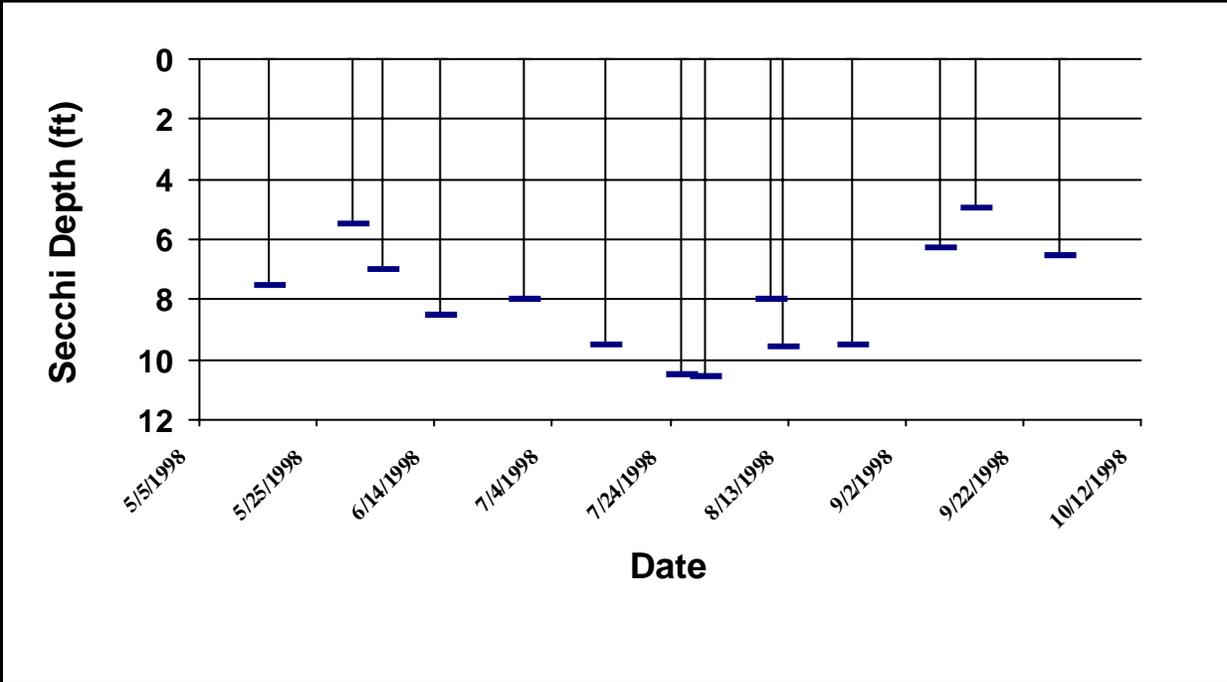
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/5/1998						
		0	56	9.87	7.6	19.1
		1	56	9.77	7.6	19.1
		2	64	10.36	7.5	17.2
		3	57	8.04	7.2	15.5
		4.1	58	4.42	6.7	14.4
		5	58	2.54	6.4	13.2
		6	58	1.16	6.3	12.1
7/30/1998						
		0	64	7.67	7.4	25.4
		1	64	7.64	7.3	25.4
		2.1	64	8.01	7.1	24
		3	66	.57	6.5	20.7
		4	68	.19	6.5	17.2
		5	77	.15	6.5	14
		6	125	.13	6.6	12.5
8/12/1998						
		0	67	8.84	7.7	25
		1	67	8.83	7.7	24.5
		2	67	9.24	7.7	23.2
		3	71	.66	6.9	21.2
		4	71	.88	6.7	17.7
		5.1	81	.16	6.6	14.2
		6	164	.12	6.7	12.6

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
9/14/1998						
		0	64 J	10.52 J	9	21.9
		1	63 J	10.77 J	9	20.6
		2	63 J	10.48 J	8.9	20
		3.3	63 J	8.72 J	8.3	19.7
		5	112 J	.5 J	6.9	14.7
		5.3	120 J	.91 J	7.1	17.6
		6	179 J	.4 J	7.1	13.2
Station 2						
7/30/1998						
		0.1	64	7.99	7.5	26.1
		1	64	7.9	7.5	26
		2	63	9.01	7.4	24.2
		3	71	3.24	6.7	21.2
		4.1	72	.24	6.6	17.5

Secchi Depth and Profile Graphics

Station: 1

LELJE1



Station Information

LELJE1

Primary Station	Station # 1	latitude: 47 56 47.3	longitude: 122 52 50.5
	Description: Deep part of lake, directly west from boat launch		

Secondary Station	Station # 2	latitude: 47 53 16.8	longitude: 122 53 18.4
	Description: Approximate center of southernmost arm of lake		

Trophic State Assessment for 1999

LELAND

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 47
TSI_Phos:	55
TSI_ChI:	
Narrative TSI: ^b	ME

Summary Comments:

The general water clarity of Leland Lake was fair in 1999. The Secchi depth readings ranged from 1.8 meters (6.0 feet) to 3.4 meters (11.0 feet) with a mean Secchi depth of 2.5 meters (8.1 feet). For comparison, in 1998 the mean Secchi depth was 2.4 meters (8.0 feet).

Geese and/or other waterfowl were seen by the Leland Lake volunteer monitor on only three of his nine sampling visits between May and September. He also commented there were less algae blooms this year than in years past.

The chemistry data collected for Leland Lake showed high phosphorus levels in the epilimnion. This level of phosphorus indicates a higher level of productivity and the potential for algae growth to be heavy and last for a period of time.

Ecology staff made two site visits in 1999. Low dissolved oxygen levels in the hypolimnion and thermal stratification were observed during both site visits (6/8/1999 and 9/7/1999). The lake water seemed lighter in color on the second visit although it was still very brownish - probably from dissolved tannins in the water.

Ecology staff conducted an aquatic plant survey on 10/7/1999. The nonnative plant *Egeria densa* (Brazilian elodea) occurred in dense patches along most of the shoreline except at the public boat ramp. The only other nonnative plant was *Iris pseudocorus* (yellow flag iris) which appeared dense along the shore and dominant when it occurred.

Based on the Secchi depth data and the phosphorus levels, Leland Lake is classified as mesoeutrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

LELAND

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 1										
6/8/1999	1200	E	32.9							
9/7/1999	1130	E	35.1							

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

LELAND

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/10/1999		57	6.5	7	50		4	5	4	0	2	0	0
	Sampler:	CASE			Remarks:	Used a view tube.							
5/24/1999		64	6	7	0	1	1	5	5	24	0	1	0
	Sampler:	CASE			Remarks:	Used a view tube.							
6/8/1999		60	6	7	100	1	4	5	5	0	0	1	0
	Sampler:	CASE			Remarks:	Used a view tube.							
6/20/1999		67	11	9	50	1	3	5	5		1	2	0
	Sampler:	CASE			Remarks:	Used a view tube.							
7/4/1999		63	7.5	7	75	1	4	4	4	0	0	1	0
	Sampler:	CASE			Remarks:	Used a view tube. Oily substance on surface.							
7/19/1999		73	10	8	0	2	3	5	5	0	0	0	0
	Sampler:	CASE			Remarks:	Used a view tube.							
8/7/1999		74	7	8	75	2	3	5	5	0	0	2	0
	Sampler:	CASE			Remarks:	Used a view tube.							
8/23/1999		70	8	8	0	1	1	5	5	0	0	0	0
	Sampler:	CASE			Remarks:	Used a view tube.							
9/7/1999		66	9	7	0	4	2	5	5	0	0	0	0
	Sampler:	CASE			Remarks:	Used a view tube. Less algae blooms this year than normal. Volunteer caught fewer fish this year-noticed more comorants. Water seems clearer this visit than earlier in the year. Color still browish-due to tannin from fallen trees? Lots of bad elodea							

Profile Report

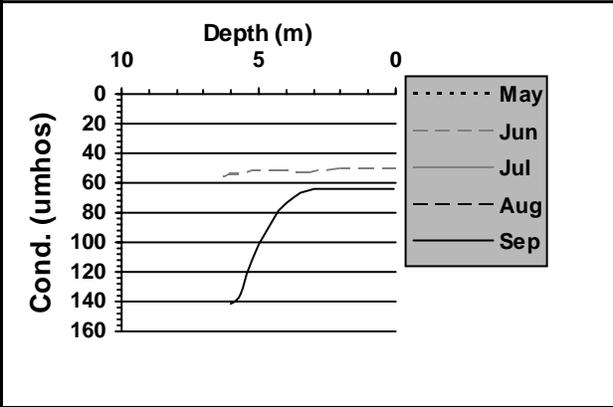
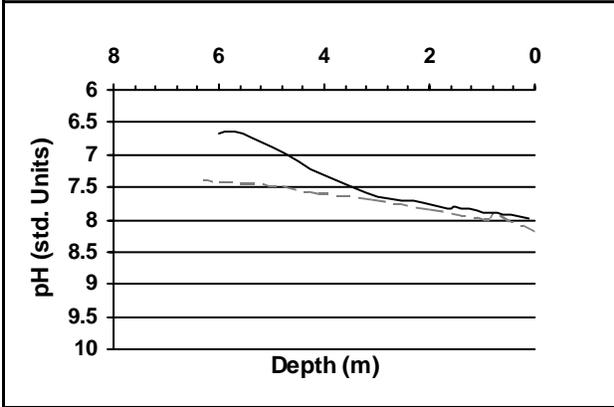
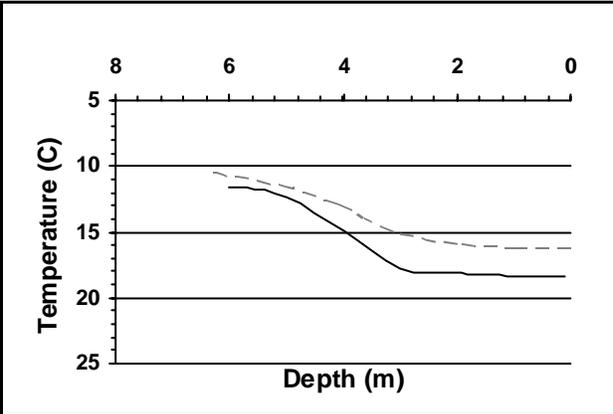
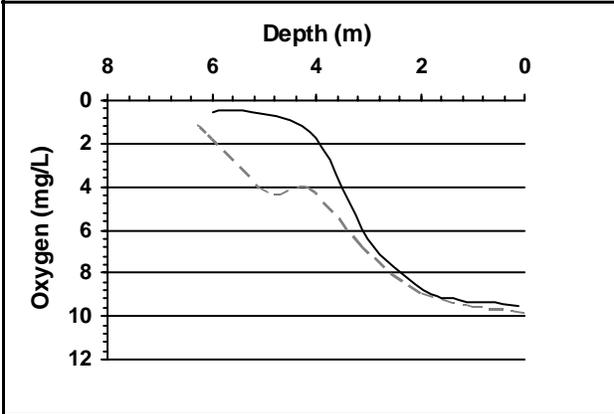
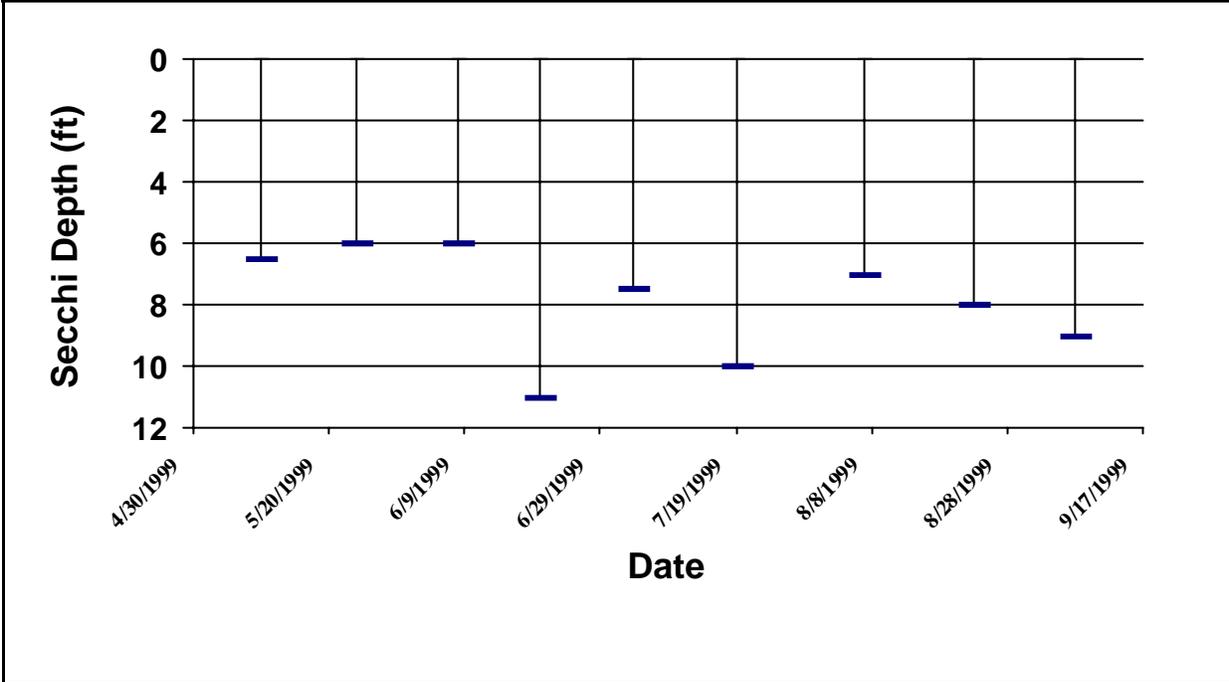
LELAND

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/8/1999						
		0	48.7	9.76	8.18	16.13
		0.8	48.8	9.5	7.88	16.12
		0.9	48.7	9.56	7.97	16.13
		2	49	8.86	7.82	15.9
		3.1	52.1	6.82	7.68	14.92
		4.1	50.7	3.99	7.59	12.77
		4.9	50.5	4.24	7.46	11.61
		6.1	53	1.5	7.39	10.58
		6.3	55.2	1.1	7.36	10.36
9/7/1999						
		0.1	63.8	9.55	7.97	18.39
		0.7	63.9	9.36	7.89	18.33
		1	63.8	9.33	7.88	18.32
		1.5	63.8	9.12	7.8	18.18
		1.6	63.8	9.2	7.83	18.19
		2.1	63.8	8.53	7.75	18.06
		3	64.6	6.38	7.65	17.85
		4	73	1.72	7.32	14.91
		5	101.4	.66	6.89	12.41
		5.7	137.4	.43	6.63	11.67
		6	141.5	.51	6.66	11.58

Secchi Depth and Profile Graphics

Station: 1

LELJE1



LIBERTY

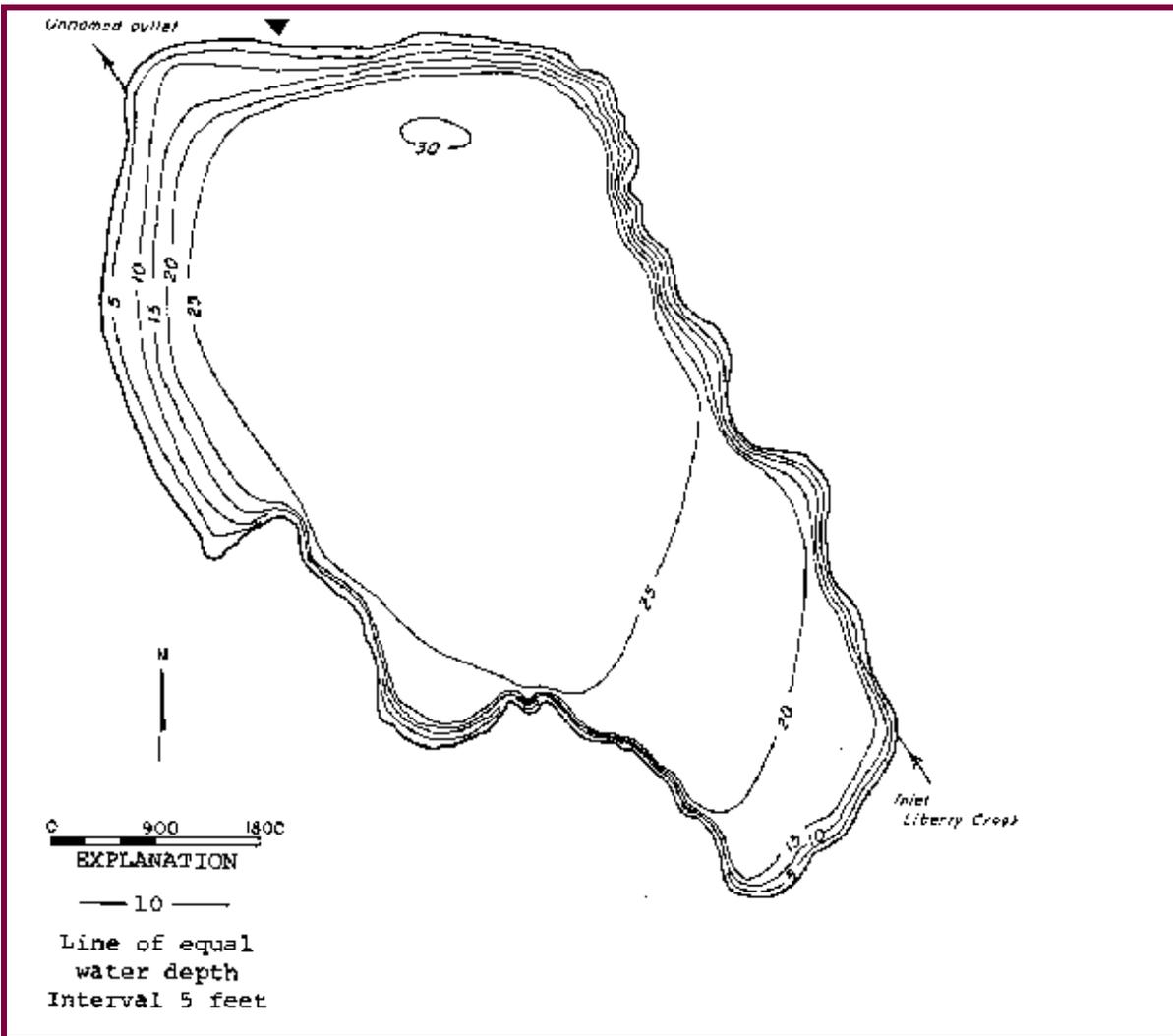
SPOKANE County

Lake ID: LIBSP1

Ecoregion: 7

Liberty Lake is a popular lake just outside the Spokane city limits to the west. Its shores are only a mile from the Idaho border. The inlet for Liberty Lake is Liberty Creek and the outlet is an unnamed creek.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
710	30	23	13	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
16000	4.77	2053	47 39 09.	117 05 20.



Station Information

LIBSP1

Primary Station Station # 1 latitude: 47 39 01.0 longitude: 117 04 33.0
Description: Lake's deep site, several hundred meters from shore, SW of public access.

Trophic State Assessment for 1998

LIBERTY

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a	38
TSI_Phos:	42
TSI_Ch1:	39
Narrative TSI: ^b	OM

Summary Comments:

The general water clarity for Liberty Lake was very good to excellent in 1998. The Secchi depth readings ranged from 3.4 meters (11.1 feet) to 6.5 meters (21.2 feet) with a mean Secchi reading of 5.0 meters (16.6 feet). For comparison, in 1990 (the most recent previous data) the mean Secchi reading was 4.4 meters (14.5 feet).

The chemistry data collected for Liberty Lake show low phosphorus levels in both the epilimnion and the hypolimnion, ranging from 11.0 ug/L to 25.9 ug/L. Chlorophyll concentrations indicate low algal densities. The low concentrations of both of these parameters suggest a low level of productivity in Liberty Lake. Fecal coliform numbers were also very low.

Ecology staff made four site visits in 1998. A very slight degree of thermal stratification was observed during the first two site visits (6/15/1998 and 7/13/1998). Low dissolved oxygen levels were noted during the site visits of 7/13/1998 and 8/10/1998.

The volunteer monitor counted no geese and only a few other waterfowl during her sampling visits this year.

Ecology staff conducted an aquatic plant survey on 7/13/1998. Two non-native plants were observed: *Myriophyllum spicatum* (Eurasian water-milfoil) and *Phalaris arundinacia* (reed canarygrass). A few plants of the *Myriophyllum spicatum* and some patches of the *Phalaris arundinacia* were seen near the wetlands at the south end of the lake. Overall the lake had a nice plant community.

Based on the Secchi depth data, Liberty Lake should be classified as oligotrophic. However, because of the low dissolved oxygen levels in the hypolimnion, Liberty Lake is classified as oligomesotrophic.

The following is an assessment written by Ecology staff, Kirk Smith, to determine the phosphorus criterion for Liberty Lake:

Liberty Lake has a well developed shoreline but the watershed appears to be mostly undeveloped with abundant timber and some timber harvest. The residential area around the lake is partially curbed; however, many roads run perpendicular to the lake so runoff could enter directly into the lake. The lake has undergone recent restoration efforts and is currently being monitored by both residents and by the Liberty Lake Sewer District. Dr. William Funk of Washington State University has been actively monitoring the lake for many years in conjunction with the sewer district. Dr. Funk considers nutrient deposition from wild fowl to be a threat to the water quality of the lake. He also recommends the repair of the dike separating the marsh from the lake (Funk, W. H. 2000. Water quality annual report for Liberty Lake, Washington. Submitted to Liberty Lake Sewer District).

Some lakeside landscaping appeared to include the use of lawn chemicals. Zooplankton samples collected in the spring suggest a healthy zooplankton population with large daphnia to support a sport fishery. Water quality measurements suggest the lake is oligomesotrophic; our seasonal mean TP was 13.3 ug/L. The vast majority of the user surveys were answered by lakeside residents who were primarily interested in maintaining water clarity. Several respondents reported seagulls to be a nuisance.

The total phosphorus action value for Liberty Lake is 20 ug/L; however, we recommend a criterion be set at current TP levels (plus an adjustment to account for inter-annual variation) in order to protect present uses. Therefore, the recommended nutrient criterion for Liberty Lake is (13.3 + 4.1=) 17.4 ug/L total phosphorus.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

LIBERTY

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 0										
7/13/1998		L					1 U			
		L					3 J			
8/10/1998		L					1			
		L					2			
9/14/1998		L					8			
		L					9			
Station 1										
6/15/1998		E	11	.225	20	1.5		14.7		.6 J
		H	21.5	.225	10					
7/13/1998		E	12.9	.236	18	2.5				.8

	H	14	.236	17		
8/10/1998	E	12.9	.251	19	2.3	.6
	H	25.9	.289	11		
9/14/1998	E	16.3	.25	15	4.8	1

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

LIBERTY

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/14/1998		19.5	21.2	6	50	3	3	5	5	0	0	2	3
	Sampler:	KLAPP		Remarks:									
6/14/1998		19.5	21.2	6	100	1		5	5	0	0	0	0
	Sampler:	HALLOCK		Remarks:	2 PARTIES BANK FISHING AT ACCESS. MOSTLY TIMBER IN WSHED. SHORELINE DEVELOPED HEAVILY IN SOME AREAS. ALL SEWERED.								
7/2/1998		22.2	15.83	6	0	3	2	5	5	0	0	0	1
	Sampler:	KLAPP		Remarks:	FORGOT THE VIEW TUBE THIS TIME BUT EXPECT TO USE IT REGULARLY.								
7/13/1998			16.8	6	20	3		5	5	0	25	3	1
	Sampler:	HALLOCK		Remarks:	ONE TRAILER AT ACCESS. TWO OTHERS FISHING AT ACCESS								
7/16/1998		25	15.7	6	0	1	1	5	5	0	1	2	2
	Sampler:	KLAPP		Remarks:									
8/3/1998		27	17.6	6	0	2	2	5	5	0	3	1	2
	Sampler:	KLAPP		Remarks:									
8/10/1998			20.46	6	0					0	9	2	2
	Sampler:	HALLOCK		Remarks:	VOL HASN'T SEEN GEESE ON THE LAKE SINCE GOLF COURSE OPENED. GLEOTRICHIA IN WATER COLUMN.								
8/19/1998		23.8	13	6	0	2	1	5	5	0	5	0	2
	Sampler:	KLAPP		Remarks:									
9/12/1998		23	15.7	6	0	1	2	5	5	0	4	0	2
	Sampler:	KLAPP		Remarks:									
9/14/1998			17.16	6	0			4	4	2	0	1	0
	Sampler:	HALLOCK		Remarks:	GLEOTRICHIA PRESENT IN WATER COLUMN. COUNTY PARK IS ACCESSIBLE BY ROAD.								

Date	Time	Temperature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Brightness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5-good)	Swimming (1-poor, 5-good)	Geese (#)	Waterfowl (besides geese #)	Boats-Fishing (#)	Boats-Skiing (#)
10/4/1998		16.2	11.1	6	50	2	1	5	5	0	5	0	0
	Sampler: KLAPP			Remarks: "PECTINATELLA" NOTED 9/12/98.									
10/18/1998		12.3	9.1	6	0	1	3	5	3	0	2	0	0
	Sampler: KLAPP			Remarks:									

Profile Report

LIBERTY

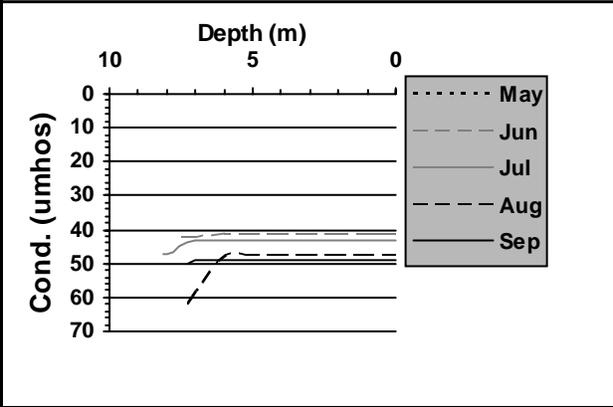
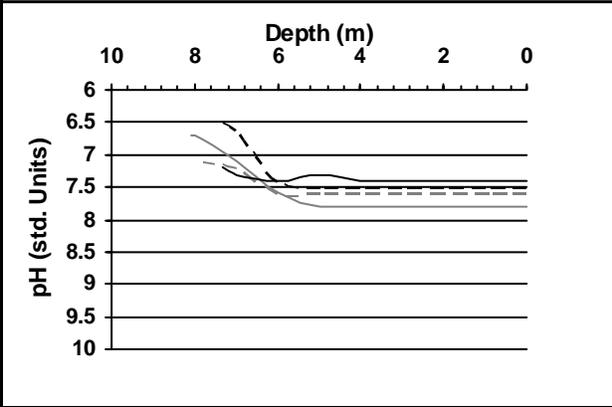
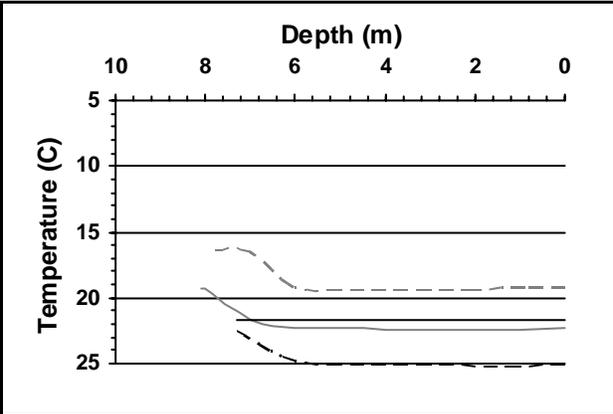
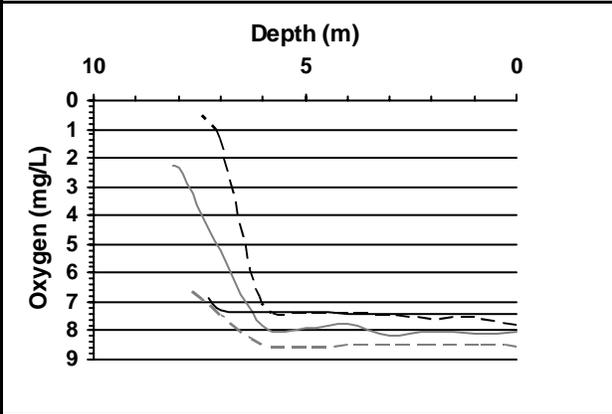
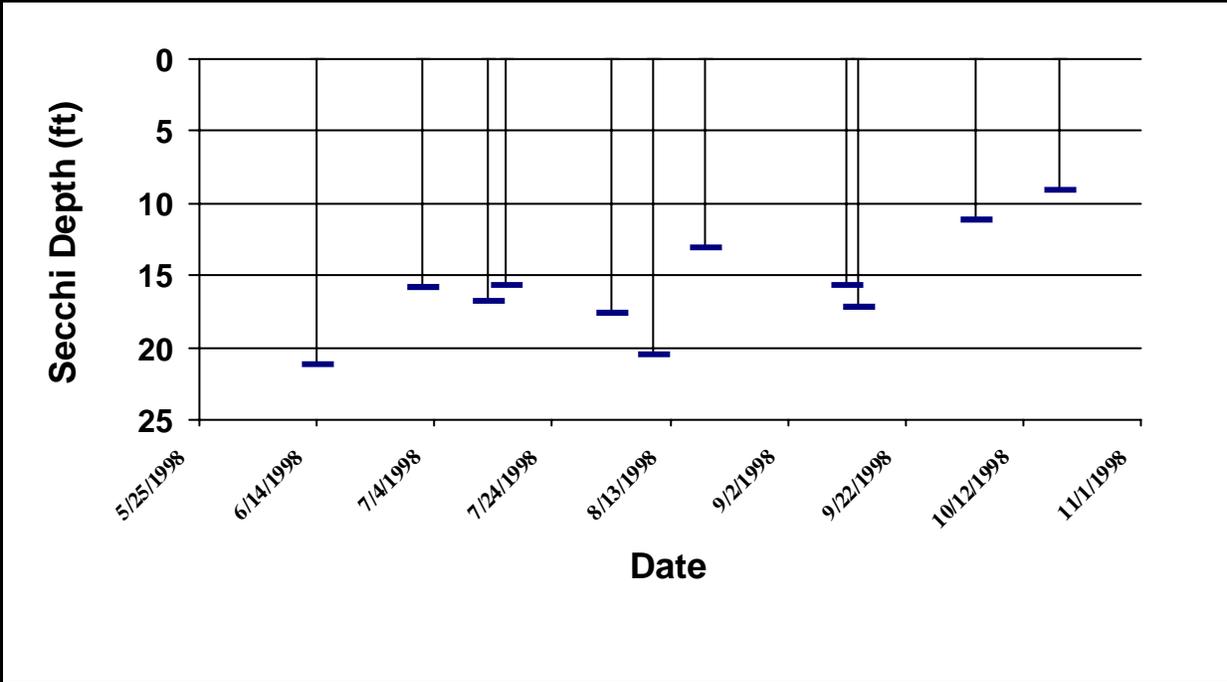
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/15/1998						
		0	41	8.51	7.6	19.2
		0.5	41	8.47	7.6	19.2
		0.9	41	8.48	7.6	19.2
		2	41	8.46	7.6	19.3
		3	41	8.43	7.6	19.3
		4	41	8.47	7.6	19.3
		5	41	8.51	7.6	19.3
		6	41	8.48	7.6	19.2
		7	42	7.39	7.2	16.4
		7.8	42	6.37	7.1	16.3
7/13/1998						
	0845	0	43	8.02	7.8	22.3
	0845	1	43	8.14	7.8	22.4
	0845	2	43	8.05	7.8	22.4
	0845	3	43	8.16	7.8	22.4
	0845	4	43	7.79	7.8	22.4
	0845	5	43	7.91	7.8	22.3
	0845	6	43	7.8	7.6	22.3
	0845	7	43	5.23	7.1	21.7
	0845	8	47	2.31	6.7	19.3
	0845	8.1	47	2.24	6.7	19.3

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
8/10/1998						
	0840	0	47	7.76	7.5	25
	0840	1	47	7.47	7.5	25.1
	0840	2	47	7.57	7.5	25.1
	0840	3	47	7.41	7.5	25
	0840	4	47	7.32	7.5	25
	0840	5	47	7.32	7.5	25
	0840	6	47	7.04	7.4	24.7
	0840	7	58	1.31	6.6	23
	0840	7.4	64	.46	6.5	22.2
9/14/1998						
	0835	0	49	7.43	7.4	21.7
	0835	1	49	7.4	7.4	21.7
	0835	2	49	7.41	7.4	21.7
	0835	3	49	7.42	7.4	21.7
	0835	4	49	7.39	7.4	21.7
	0835	5	49	7.35	7.3	21.7
	0835	6	49	7.35	7.4	21.7
	0835	7	49	7.26	7.3	21.7
	0835	7.3	50	6.86	7.2	21.7

Secchi Depth and Profile Graphics

Station: 1

LIBSP1



Station Information

LIBSP1

Primary Station Station # 1 latitude: 47 39 01.0 longitude: 117 04 33.0
Description: Lake's deep site, several hundred meters from shore, SW of public access.

Trophic State Assessment for 1999

LIBERTY

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	47
TSI_Phos:		51
TSI_Ch1:		
Narrative TSI:	^b	ME

Summary Comments:

The general water clarity of Liberty Lake was good to fair in 1999. The Secchi depth readings ranged from 1.5 meters (5.0 feet) to 3.6 meters (11.7 feet) with a mean Secchi depth of 2.6 meters (8.5 feet). For comparison, in 1998 the mean Secchi depth was 5.0 meters (16.6 feet).

No geese were seen by the volunteer monitor on Liberty Lake; however other waterfowl were observed during seven of the eight sampling visits made by the volunteer monitor between May and October. Other comments by the volunteer monitor included the presence of an algae bloom on 9/18/1999 that had cleared up by 10/16/1999.

The chemistry data collected for Liberty Lake showed moderately high phosphorus levels in the epilimnion. This level of phosphorus indicates a higher level of productivity and the potential for algae growth to be heavy and last for a period of time.

Ecology staff made one site visit in 1999. Dissolved oxygen levels remained constant throughout the water column and only a very slight degree of thermal stratification was observed during this site visit (7/28/1999).

Based on the Secchi depth data and the phosphorus levels, Liberty Lake is classified as mesoeutrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

LIBERTY

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
------	------	--------	-----------------	-----------------	-------	----------------------------	-------------------------------------	--------------------	-------------------	--------------------

Station 1

7/28/1999 1823 E 26.1

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Profile Report

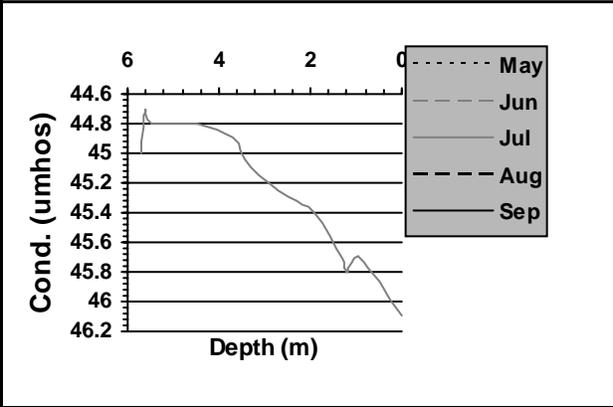
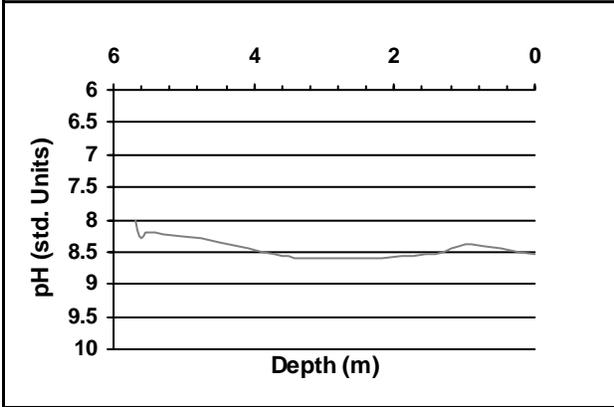
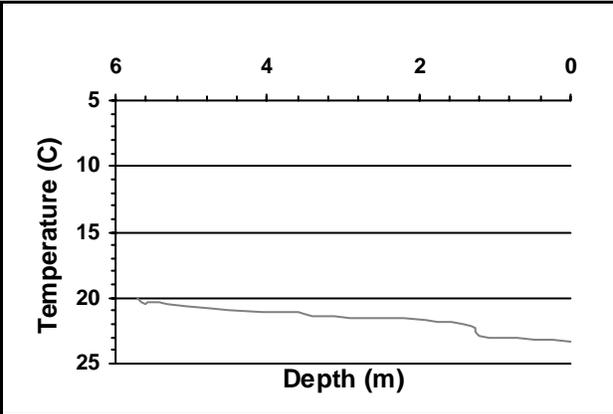
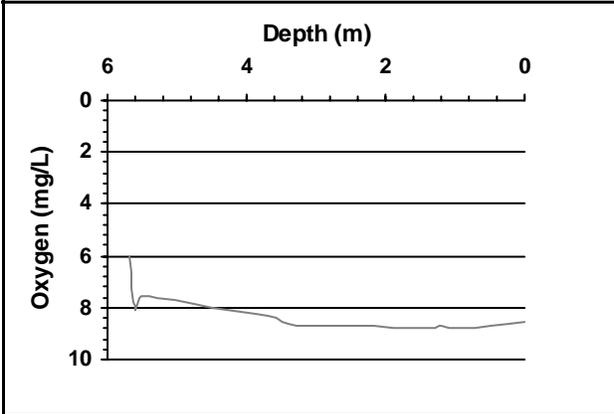
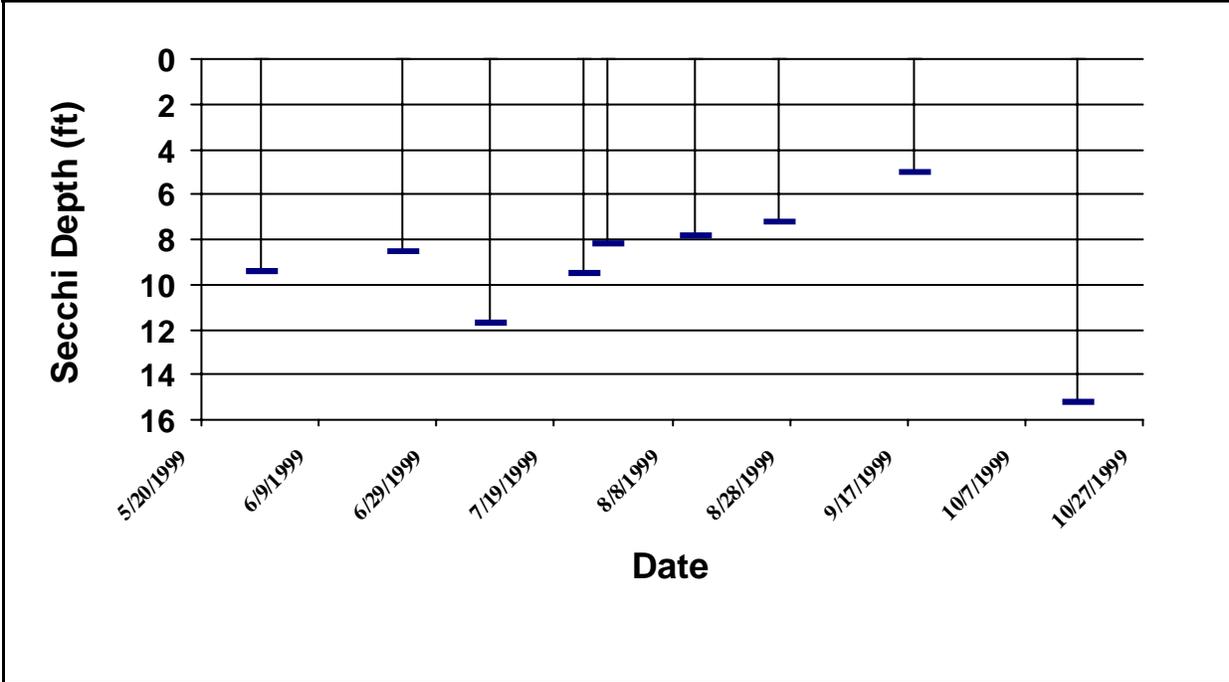
LIBERTY

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
7/28/1999						
		0	46.1	8.57	8.52	23.32
		0.9	45.7	8.76	8.38	23.11
		1.2	45.8	8.72	8.43	22.83
		1.3	45.7	8.75	8.49	22.12
		1.9	45.4	8.77	8.56	21.72
		2.5	45.3	8.72	8.6	21.52
		3.3	45.1	8.68	8.61	21.36
		3.7	44.9	8.35	8.54	21.06
		4.5	44.8	8.05	8.36	20.91
		5.5	44.8	7.52	8.21	20.37
		5.6	44.7	8.11	8.29	20.53
		5.7	45	6	8.01	19.99

Secchi Depth and Profile Graphics

Station: 1

LIBSP1



LIMERICK

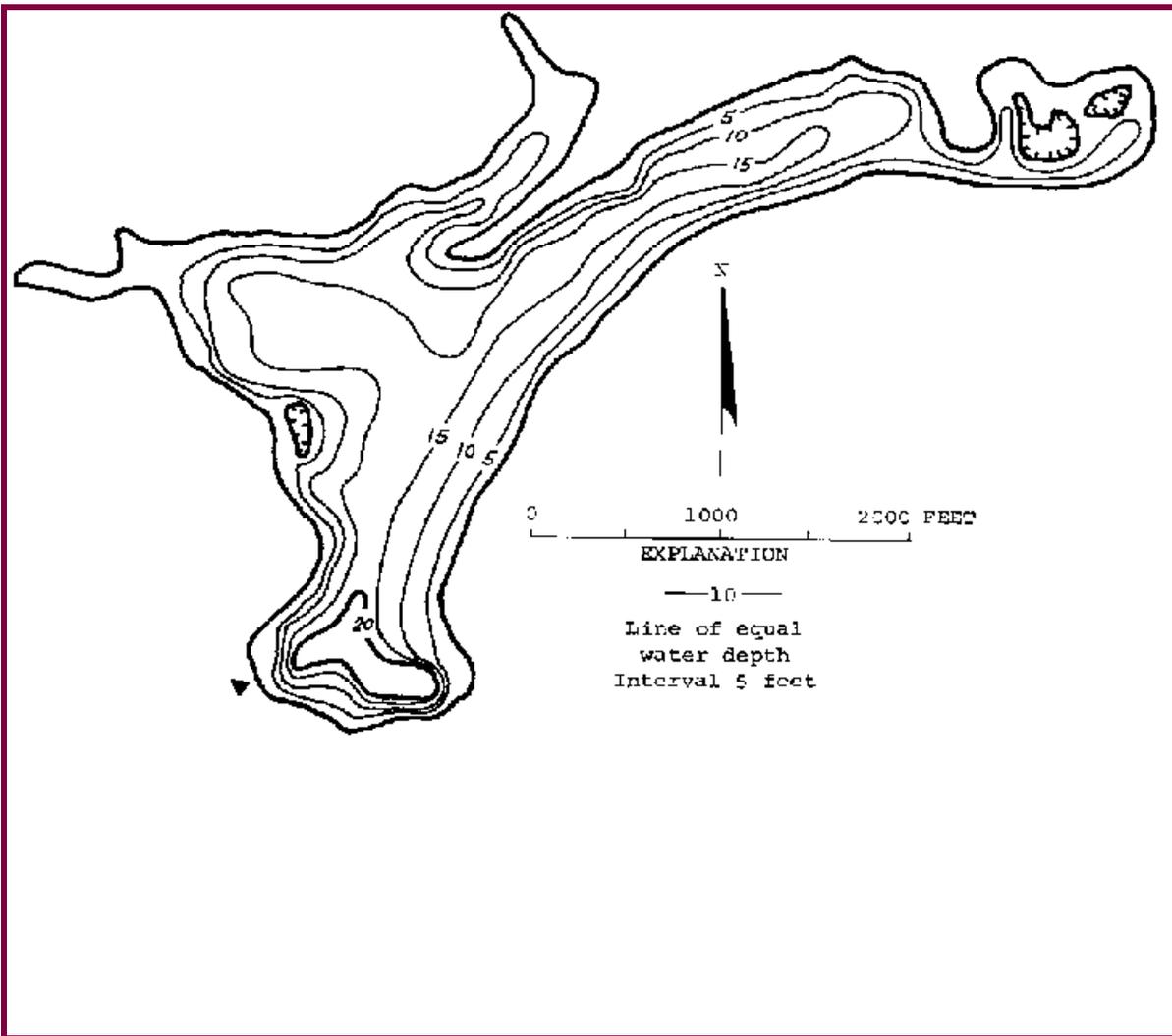
MASON County

Lake ID: LIMMA1

Ecoregion: 2

Lake Limerick is located about five miles northeast of Shelton. It was formed in 1966 by the impoundment of Cranberry Creek. Lake Limerick is fed mainly by Cranberry Creek, as well as three other minor inlets. The lake level is stabilized by a control weir at its outlet to Cranberry Creek.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
129	24	9	13	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
1210	4.39	220	47 16 59.	123 02 51.



Station Information

LIMMA 1

Primary Station Station # 1 latitude: 47 16 48.8 longitude: 123 02 45.7
Description: Deep part of lake in approximate center of southernmost cove

Trophic State Assessment for 1998

LIMERICK

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a	43
TSI_Phos:	36
TSI_Ch1:	42
Narrative TSI: ^b	M

Summary Comments:

The general water clarity for Lake Limerick was good in 1998. The Secchi depth readings ranged from 2.5 meters (8.3 feet) to 3.8 meters (12.5 feet) with a mean Secchi depth of 3.2 meters (10.6 feet). For comparison, in 1997 the mean Secchi reading was 2.8 meters (9.2 feet).

The chemistry data collected for Lake Limerick showed moderately low phosphorus levels throughout the summer: 7.4 ug/L to 10.4 ug/L in the epilimnion and a hypolimnetic reading of 16.3 ug/L. The chlorophyll levels showed a moderate density of algae growing in the lake. These data indicate a fair amount of productivity in Limerick Lake.

Ecology staff made five site visits in 1998. A very slight degree of thermal stratification was noted during each of these visits. Low dissolved oxygen levels were also observed in the bottom meter of the water column.

Geese and/ or other waterfowl were counted by the volunteer monitor at Lake Limerick on four of his eight sampling visits. On 10/20/1998, 102 ducks were observed on the lake.

The lake level dropped dramatically during the month of October due to the removal of boards in a dam located at the outlet of Lake Limerick. The reason for increasing the outlet flow was to assist outmigrating salmon.

Ecology staff conducted an aquatic plant survey in 1998. A few plants of the non-native *Egeria densa* (Brazilian elodea) were observed around the islands in the lake with denser growth occurring in deeper water near the public boat launch. Large patches of *Utricularia inflata* were seen which could lead to impairment of beneficial uses of the lake. Overall Lake Limerick supports a varied amount of aquatic plant vegetation.

Based on the Secchi depth data and the moderate levels of nutrients, Lake Limerick is classified as mesotrophic.

The following is an assessment written by Ecology staff, Kirk Smith, to determine the phosphorus criterion for Lake Limerick:

Lake Limerick is relatively low in nutrients (mean total phosphorus was 9.0 ug/L) but rich in aquatic macrophytes. It is surprising more nutrients are not showing up in the water column considering Cranberry Lake (a bog-like wetland with considerably higher nutrient concentrations) drains into Lake Limerick. It is possible that much of the total phosphorus is bound to sediment particles or accumulated in macrophyte biomass. The abundant aquatic plants appear to impair the beneficial uses of the lake more than the nutrient concentrations. Limiting the nutrients, however, will not necessarily reduce the aquatic macrophyte biomass because those nutrients typically come from sediment and not from the water column.

We recommend the ecoregional action value for oligotrophic Puget Lowland lakes (10 ug/L) be set as a total phosphorus criterion for Lake Limerick.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

LIMERICK

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 0										
7/27/1998		L					6			
		L					7			
8/18/1998		L					5			
		L					30			
Station 1										
6/4/1998		E	8.8	.186	21	2.8		21.4	4890	.9
7/27/1998		E	7.4	.247	33	2.4				1.3
		H	16.3	.269	17					
8/18/1998		E	9.6	.335	35	3.8				2
9/18/1998		E	10.4	.283	27	4.3				.8 J

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

LIMERICK

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/4/1998		16.6667	10.25	7	100	1	1	5	5	30	16	0	0
	Sampler: SMITH			Remarks: FIRST TIME VOL HAS SEEN GOSLINGS ON LAKE. BLADDERWORT NOTICED, GREEN ALGAL MATS. MOSTLY TIMBER LAND IN WSHED. The Oxygen result is qualified as an estimate due to postcalibration failing QA/QC requirements.									
6/26/1998		17.8	11	7	75	2	4	5	5	0	0	2	0
	Sampler: WESTON			Remarks:									
7/8/1998		20.6	11	6	100	2	1	5	5	0	6	1	0
	Sampler: WESTON			Remarks:									
7/22/1998		24.4	12	6	0	1	1	5	5	0	0	1	0
	Sampler: WESTON			Remarks:									
7/27/1998			11.55		0			3	2	15	5	0	2
	Sampler: SMITH			Remarks: WATER UNUSUALLY CLEAR FOR LIMERICK. DEAD PLANTS IN WATER FROM HERB TREATMENT--MAKES FOR BORDERLINE SWIMMING CONDITIONS									
8/4/1998		23.3	12.5	6	0	1	1	5	5	15	6	0	0
	Sampler: WESTON			Remarks:									
8/18/1998			8.58	6	100			4	3	5	0	0	0
	Sampler: SMITH			Remarks: FEC#1 AT OUTFALL NEAR BOAT LAUNCH. FEC#2 AT COMMUNITY CENTER DOCK. The pH results are qualified as estimates due to postcalibration failing QA/QC requirements.									
8/20/1998		22.2	11	6	25	1	1	5	5	0		1	0
	Sampler: WESTON			Remarks:									
9/18/1998			8.25	6	90	1		4	3	2	1	0	0
	Sampler: SMITH			Remarks: The conductivity result is qualified as an estimate due to postcalibration failing QA/QC requirements.									
9/24/1998		18.9	8.66	8	100	3	1	5	5			0	0
	Sampler: WESTON			Remarks:									
9/24/1998			8.66		0					0	0	0	0
	Sampler: BELL-MCKINNON			Remarks:									

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
10/6/1998		15.6	10.66	6	25	1	1	5	5		8	0	0
	Sampler: WESTON			Remarks:									
10/20/1998		13.9	10	7	0	1	1	5	3	0	102	0	0
	Sampler: WESTON			Remarks:	LAKE HEIGHT AT THIS TIME YEAR DUE TO REMOVAL OF BOARDS IN THE DAM TO HELP THE SALMON RUN. I COUNTED AT LEAST THREE SALMON IN BEAVER CREEK.								

Profile Report

LIMERICK

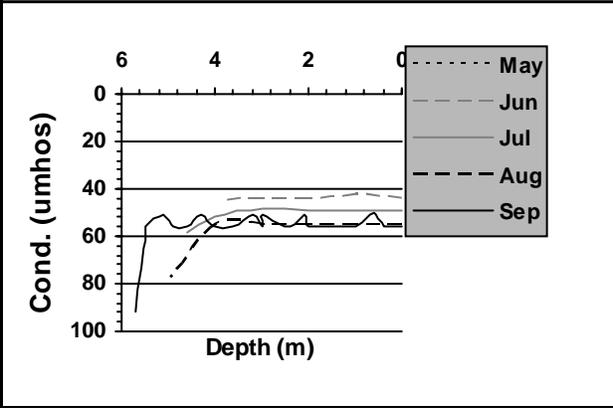
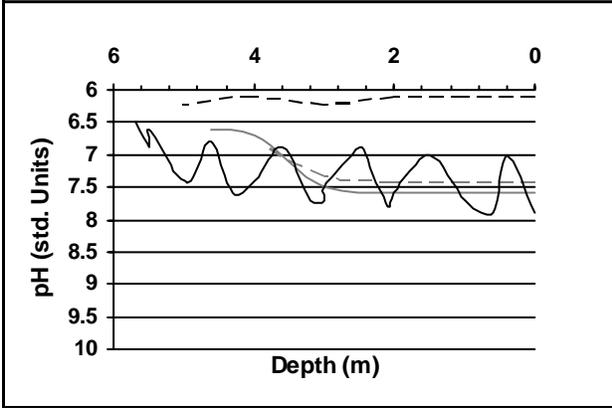
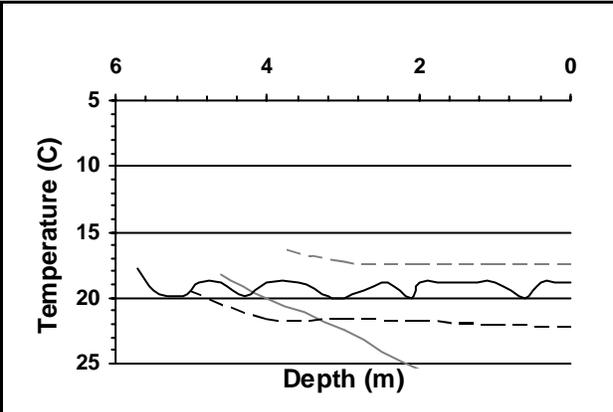
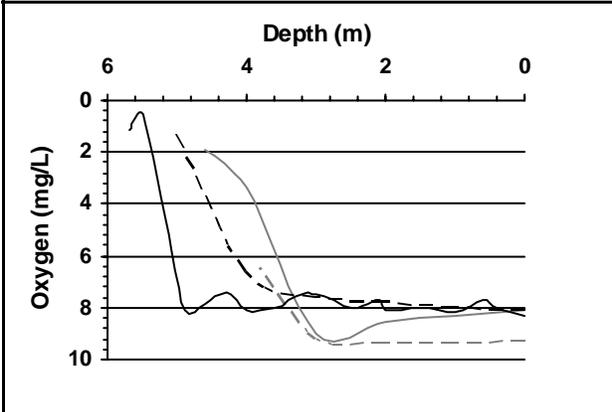
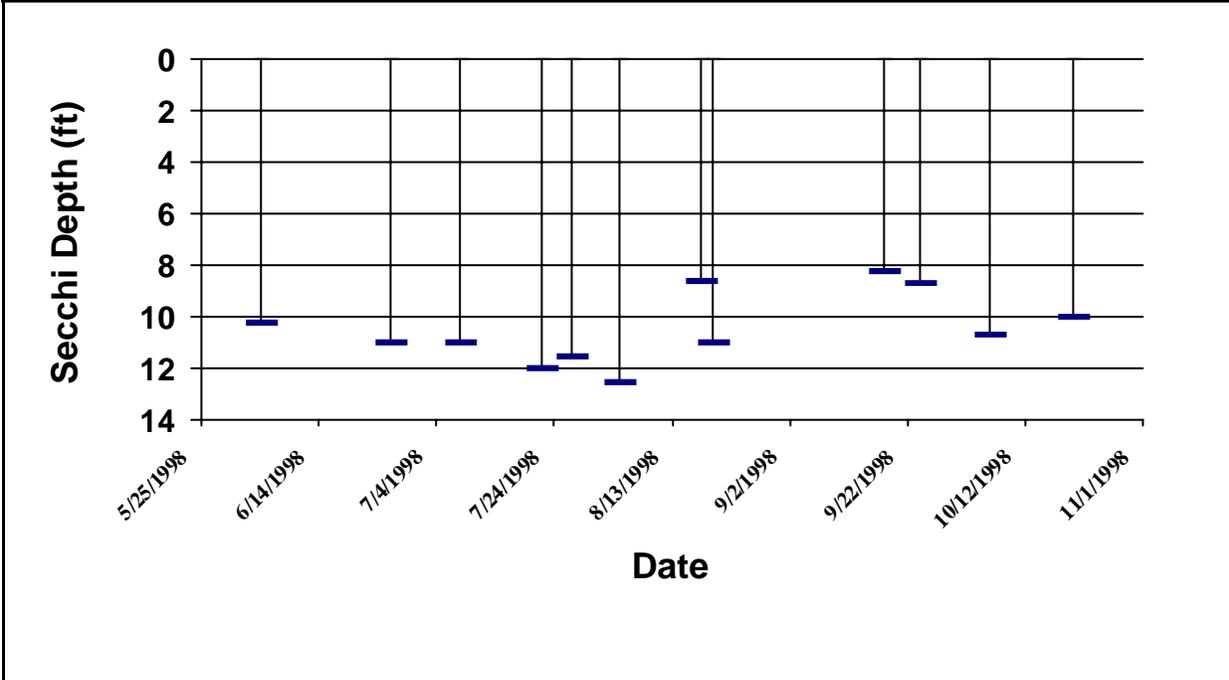
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/4/1998						
		0	43	9.22 J	7.4	17.4
		1	42	9.28 J	7.4	17.4
		2	43	9.32 J	7.4	17.4
		3	43	9.17 J	7.3	17.2
		3.8	44	6.41 J	6.9	16.3
7/27/1998						
		0	49	8.06	7.6	26.4
		1	49	8.32	7.6	25.5
		2	49	8.54	7.6	25.4
		3	48	9	7.5	22.5
		4	52	3.39	6.7	20
		4.6	58	1.89	6.6	18.2
8/18/1998						
		0	54	8.02	6.1 J	22.1
		1	54	7.91	6.1 J	22
		2	54	7.7	6.1 J	21.7
		3	54	7.56	6.2 J	21.6
		4	54	6.58	6.1 J	21.5
		5	77	1.23	6.2 J	19.4
9/18/1998						
		0.6	50 J	7.72	7.9	20.1
		2.1	51 J	7.68	7.8	20
		3	51 J	7.51	7.7	20
		3.2	51 J	7.5	7.7	19.9
		4.3	51 J	7.4	7.6	19.9
		5.1	51 J	5.75	7.3	19.9
		5.5	59 J	.57	6.9	19.4

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
9/24/1998						
		0	56	8.29	7.9	18.8
		0.4	56	8.02	7	18.8
		1	56	8.2	7.7	18.8
		1.5	56	8.04	7	18.8
		2	56	8.12	7.6	18.8
		2.4	56	8.04	7	18.8
		2.5	56	8.01	6.9	18.8
		3	56	8.11	7.5	18.8
		3.6	56	8	6.9	18.8
		4	56	8.07	7.4	18.8
		4.6	56	7.87	6.8	18.8
		4.9	56	8.08	7.4	18.8
		5.5	56	4.69	6.6	18.7
		5.7	92	1.16	6.5	17.8

Secchi Depth and Profile Graphics

Station: 1

LIMMA1



Station Information

LIMMA 1

Primary Station Station # 1 latitude: 47 16 48.8 longitude: 123 02 45.7
Description: Deep part of lake in approximate center of southernmost cove

Trophic State Assessment for 1999

LIMERICK

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	42
TSI_Phos:		42
TSI_Ch1:		
Narrative TSI:	^b	M

Summary Comments:

The general water clarity of Lake Limerick was good in 1999. The Secchi depth readings ranged from 2.7 meters (9.0 feet) to 4.2 meters (14.0 feet) with a mean Secchi depth of 3.5 meters (11.4 feet). For comparison, in 1998 the mean Secchi depth was 3.2 meters (10.6 feet).

During four of his ten sampling visits between May and October, only a few geese and/or other waterfowl were observed on the lake by the volunteer monitor. Other comments by the volunteer monitor included noting the spraying of the lake with Endothal for control of the non-native aquatic plant *Egeria densa* (Brazilian elodea); another non-native plant that can become quite dense in the lake is *Utricularia inflata* (big floating bladderwort). Also noted by the volunteer monitor was the presence of algae throughout most of the summer.

Lake Limerick's height is regulated by a board dam at the south end of the lake. No jetskis are allowed on the lake.

The chemistry data collected for Liberty Lake showed low to moderate levels of phosphorus levels in the epilimnion. This level of phosphorus indicates a level of productivity where algae may become a nuisance but not for long periods of time.

Ecology staff made two site visits in 1999. Low dissolved oxygen levels in the hypolimnion were observed as well as thermal stratification during both site visits (5/12/1999 and 8/23/1999).

Based on the Secchi depth data and the phosphorus levels, Lake Limerick is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

LIMERICK

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 1										
5/12/1999		E	9.5							
8/23/1999	1030	E	16.4							

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Profile Report

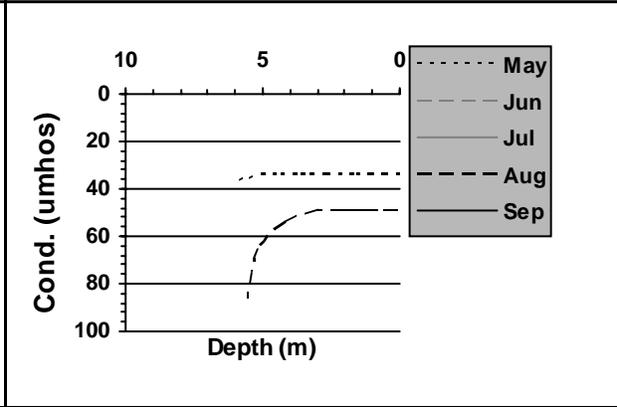
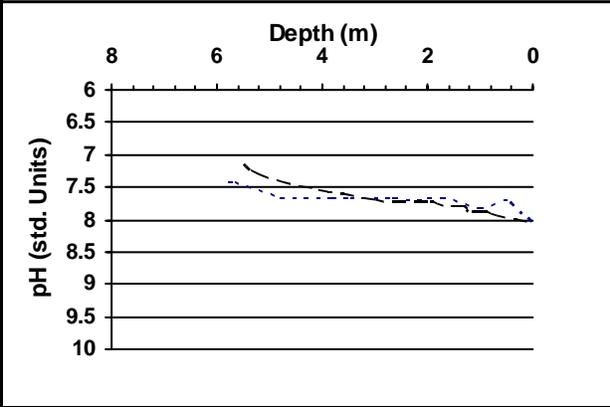
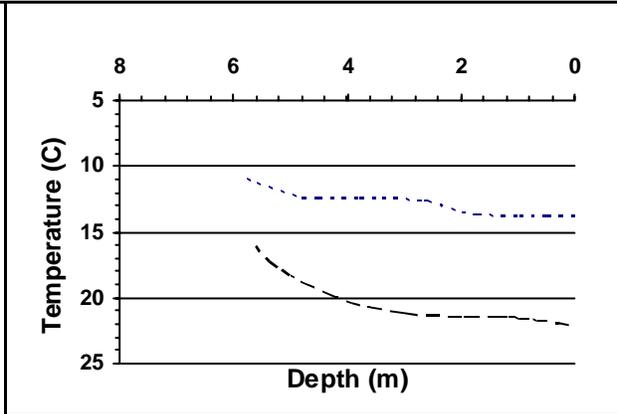
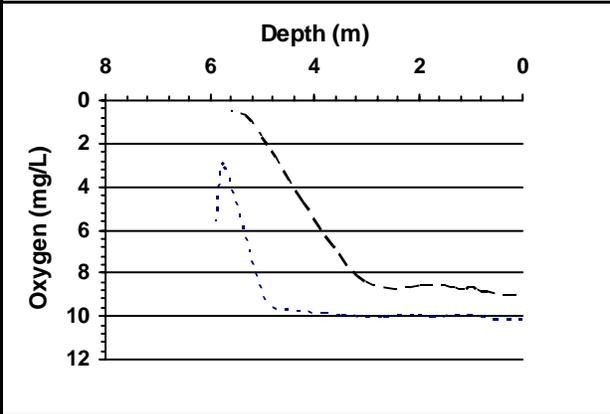
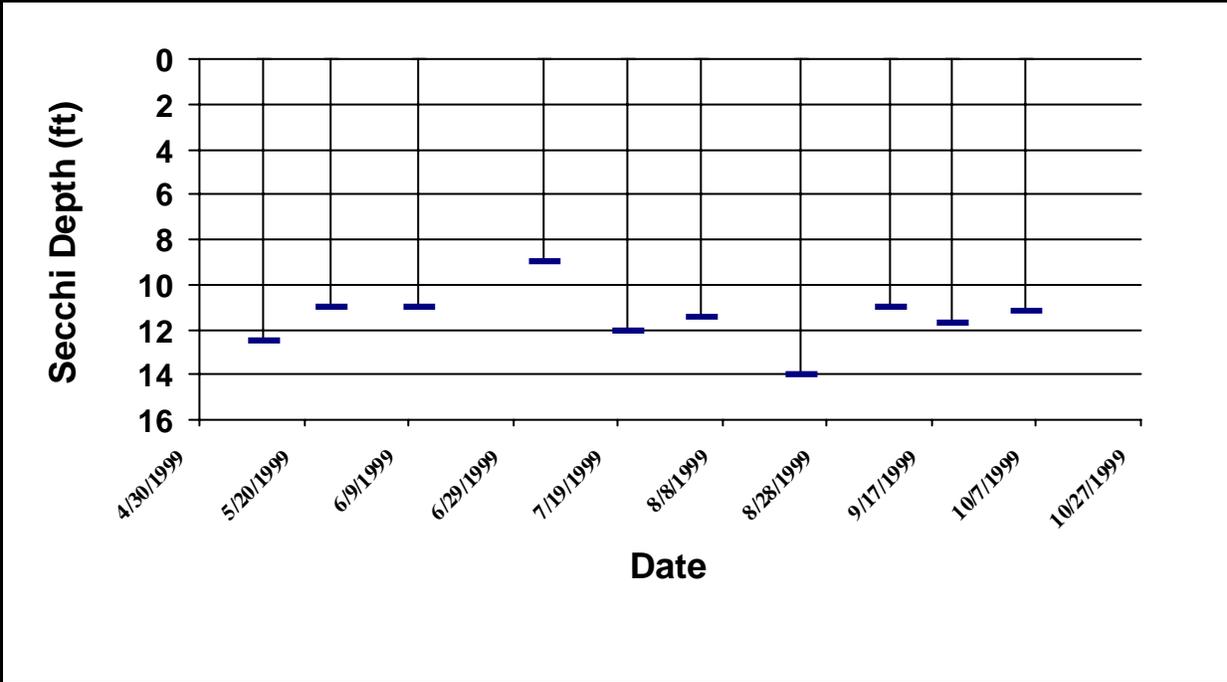
LIMERICK

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
5/12/1999						
		0	33.3	10.11	8.02	13.65
		0.5	33.4	10.04	7.67	13.74
		1	33.3	9.88	7.81	13.69
		1.7	33.3	10.01	7.66	13.59
		2.1	33.1	9.93	7.68	13.22
		2.6	33.1	9.98	7.65	12.51
		2.7	33.2	9.95	7.66	12.46
		3.5	33.2	9.89	7.66	12.4
		3.8	33.2	9.79	7.64	12.36
		4.5	33.2	9.66	7.64	12.32
		4.9	33.3	9.29	7.63	12.19
		5.7	34.8	2.94	7.41	11.08
		5.9	35.7	5.57	7.5	10.91
8/23/1999						
		0.1	48.6	8.95	8	21.92
		0.8	48.5	8.81	7.9	21.58
		0.9	48.5	8.63	7.86	21.54
		1.2	48.6	8.68	7.85	21.46
		1.3	48.5	8.59	7.76	21.39
		1.7	48.6	8.56	7.76	21.38
		2	48.5	8.52	7.72	21.32
		3	48.4	8.35	7.68	21.15
		4.2	53.6	4.66	7.51	19.82
		5.2	64.8	.95	7.28	17.64
		5.6	85.7	.49	7.02	16.02

Secchi Depth and Profile Graphics

Station: 1

LIMMA1



LOON

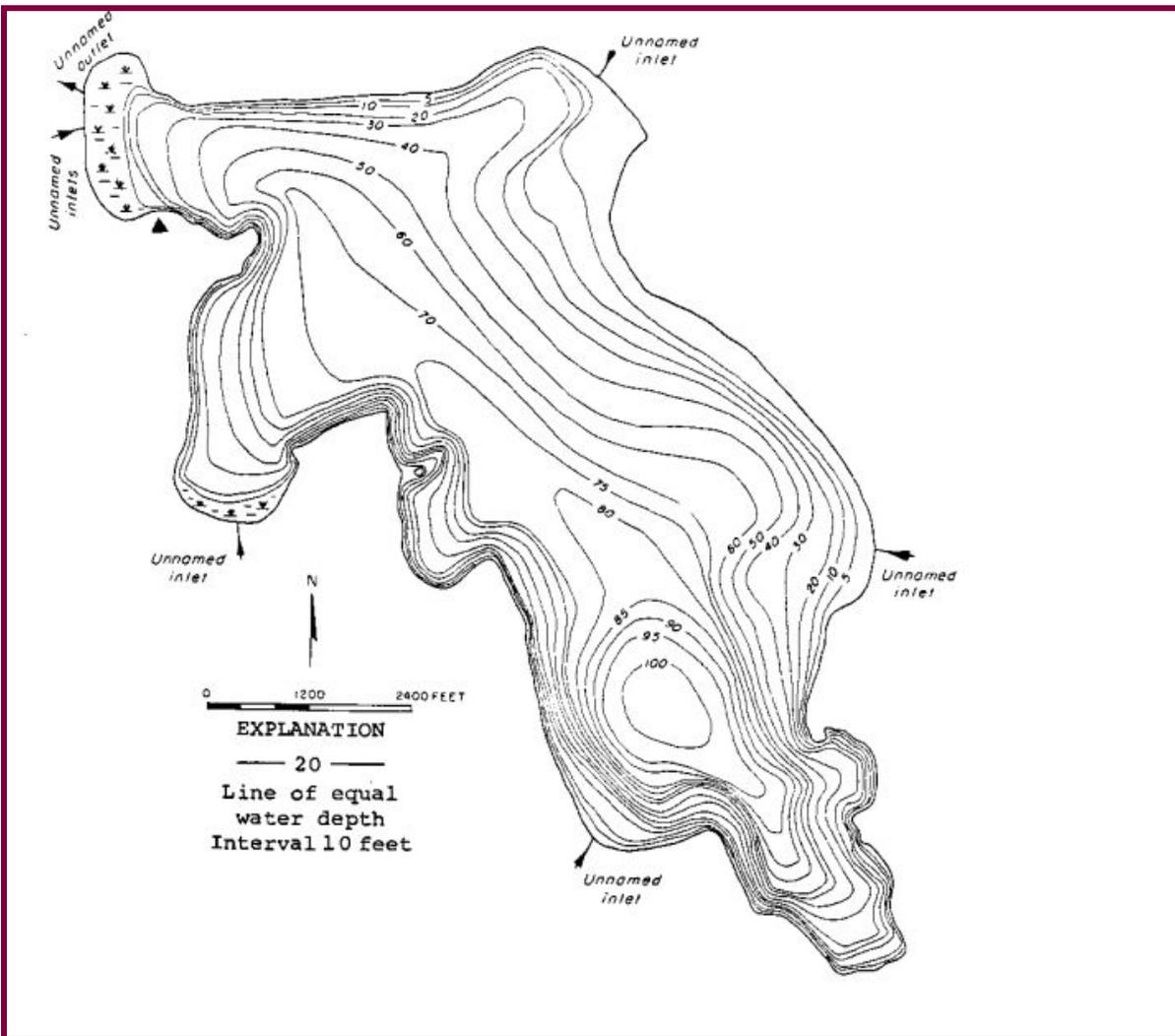
STEVENS County

Lake ID: LOOST1

Ecoregion: 8

Loon Lake is located approximately 20 miles northwest of Spokane just west of highway 395. The lake is fed by a number of unnamed inlets and flows out through a wetland via an unnamed outlet which feeds into Sheep Creek.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
1100	100	46	14	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
52000	7.92	2381	48 03 20.	117 38 30.



Trophic State Assessment for 1998

LOON

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 31	J
TSI_Phos:		
TSI_Ch1:		
Narrative TSI:	^b	OM

Summary Comments:

The general water quality for Loon Lake was very good. The mean Secchi depth was 7.7 meters (25.4 feet) in 1998. For comparison, in 1997 the mean Secchi depth was 6.8 meters (22.4 feet).

No chemistry data was collected for Loon Lake in 1998.

Only twelve (12) geese were counted by the volunteer monitor between May and October; however 172 other waterfowl were counted on the lake during this same time period.

Only one site visit was made by Ecology staff to Loon Lake in 1998. Thermal stratification was observed during this visit (6/16/98) with oxygen depletion noted in the hypolimnion.

The volunteer monitor commented on the presence of *Myriophyllum spicatum* (Eurasian milfoil). This appears to be the problem of note in the lake. Applications of aquatic herbicide have been done in an attempt to control this non-native invasive plant.

Even though the Secchi depth data call for a trophic state classification of oligotrophic, Loon Lake is classified as oligomesotrophic based on the oxygen depletion in the hypolimnion.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

LOON

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/24/1998		14.4	28	4	25	3	3	5	5	12	50	6	0
	Sampler:	FEYK		Remarks:	WE DO HAVE MILFOIL.								
6/16/1998		17.8	28	4	75	1	4	5	5	0	200	0	0
	Sampler:	FEYK		Remarks:									
6/16/1998			28		0					0	0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									
6/28/1998		18.3	28	4	0	2	4	5	5	0	60	1	0
	Sampler:	FEYK		Remarks:									
7/16/1998		22.2	26	4	0	1	1	5	5	4	30	0	0
	Sampler:	FEYK		Remarks:									
7/30/1998		26.1	23	4	25	2	2	5	5	0	0	2	1
	Sampler:	FEYK		Remarks:									
8/16/1998		23.3	23	4	25	3	1	5	5	0	4	0	2
	Sampler:	FEYK		Remarks:	STILL HAVE MILFOIL!								
8/28/1998		23.9	24	4	0	1	1	5	5	0	0	0	0
	Sampler:	FEYK		Remarks:									
9/13/1998		21.1	25	4	0	2	1	5	5	0	5	1	4
	Sampler:	FEYK		Remarks:									
10/3/1998		16.7	21	4	75	2	3	5	5	0	3	0	0
	Sampler:	FEYK		Remarks:	LAST SAMPLE OF THE SEASON.								

Profile Report

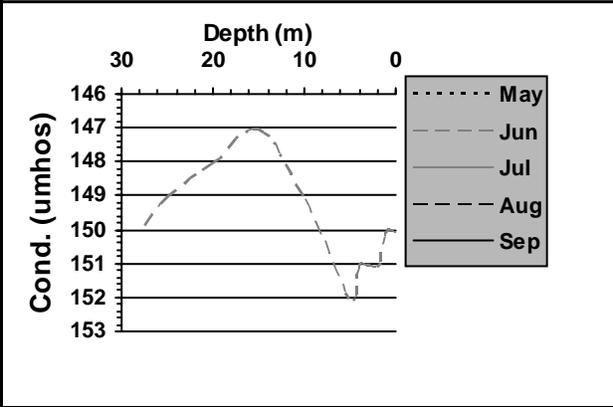
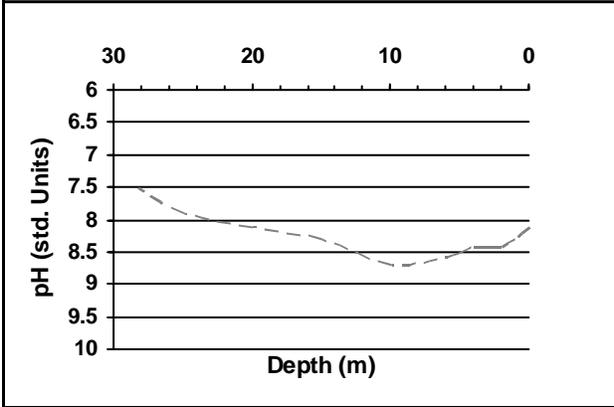
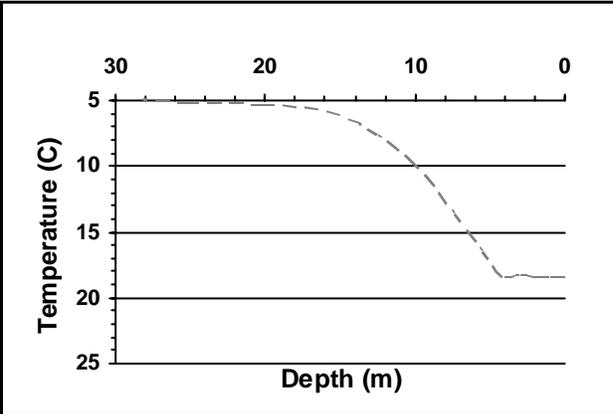
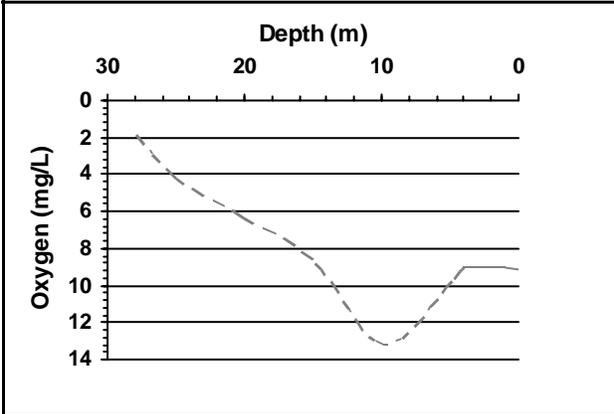
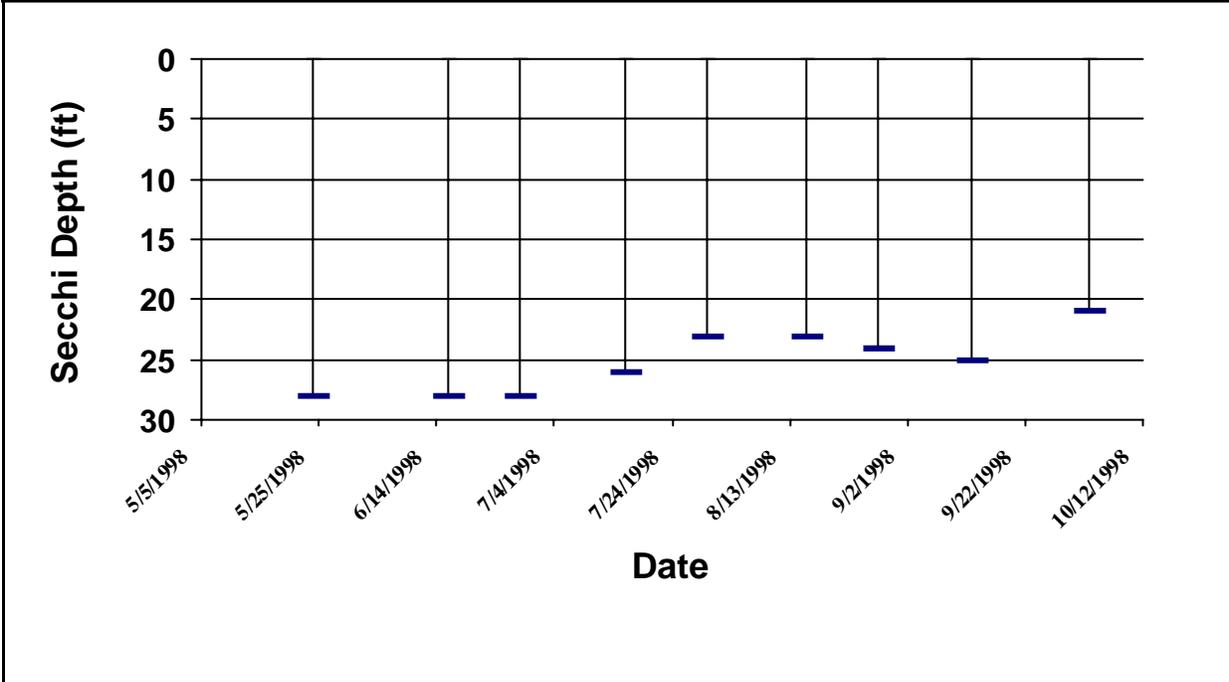
LOON

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/16/1998						
		0	150	9.12	8.1	18.4
		1	150	9.01	8.3	18.4
		2	151	8.96	8.4	18.4
		3	151	8.98	8.4	18.3
		4.1	151	8.94	8.4	18.4
		5	152	9.76	8.5	17
		9.9	149	13.17	8.7	9.8
		15	147	8.54	8.3	6
		20	148	6.31	8.1	5.3
		24.9	149	4.18	7.9	5.1
		28.2	150	1.48	7.5	4.9

Secchi Depth and Profile Graphics

Station: 1

LOOST1



Trophic State Assessment for 1999

LOON

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	34
TSI_Phos:		37
TSI_ChI:		
Narrative TSI:	^b	OM

Summary Comments:

The general water clarity of Loon Lake was excellent in 1999. The Secchi depth readings ranged from 4.9 meters (16.0 feet) to 7.3 meters (24.0 feet) with a mean Secchi depth of 6.4 meters (21.0 feet). For comparison, in 1998 the mean Secchi depth was 7.7 meters (25.4 feet).

No geese were seen by the volunteer monitor on Loon Lake; other waterfowl were observed on the lake during two of his ten sampling visits made between May and October. The volunteer monitor also commented that it snowed during his first sampling visit of 5/9/1999. The air temperature in June was quite cool - around 10 degrees Centigrade (50 degrees Fahrenheit) and the rest of the summer was unseasonably cool and wet.

The chemistry data collected for Loon Lake showed low phosphorus levels in the epilimnion. This level of phosphorus indicates a low level of productivity where algae growth doesn't usually become a problem.

Ecology staff made one site visit in 1999. Low dissolved oxygen levels in the hypolimnion were observed as well as thermal stratification during this site visit (7/28/1999).

Ecology staff conducted an aquatic plant survey on 6/28/1999. The main purpose of this survey was a one year post treatment data collection for a 2,4-D study. *Myriophyllum spicatum* (Eurasian milfoil) showed a spotty distribution in the lake, mostly in the shallows. *Nymphahaea odorata* (fragrant waterlily) was just starting to grow and *Phalaris arundinacia* (reed canarygrass) was also observed.

Based on the Secchi depth data, the phosphorus levels and the low dissolved oxygen in the hypolimnion, Loon Lake is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

LOON

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
------	------	--------	-----------------	-----------------	-------	----------------------------	-------------------------------------	--------------------	-------------------	--------------------

Station 1

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

LOON

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/9/1999		50	13	4	0	1	3	5	5	0	12	1	0
	Sampler: FEYK												Remarks: Used a view tube. We had snow today!
5/22/1999		58.5	16	4	0	2	1	5	5	0	0	3	1
	Sampler: FEYK												Remarks: Best fishing in five years!
6/6/1999		60	21	4	50	3	3	5	5	0	0	3	0
	Sampler: FEYK												Remarks: Used a view tube. Cool air temperature for June - 50 degrees.
6/20/1999		66	22	4	50	2	2	5	5	0	0	4	0
	Sampler: FEYK												Remarks: Used a view tube.
7/3/1999		62	23	4	75	4	4	5	5	0	0	1	0
	Sampler: FEYK												Remarks: Used a view tube. Unseasonable cool and wet!
7/18/1999		67	24	4	50	2	5	5	5	0	0	0	4
	Sampler: FEYK												Remarks:
7/28/1999		72	24	4	0	3	1	5	5	0	0	0	1
	Sampler: FEYK												Remarks: Used a view tube. No algae problems. Sprayed with 2,4-D for milfoil on 7/21/99. Not as many people using lake this year because of cooler weather. Earlier this day, volunteer counted 50 geese. Sampling day was hot, slightly breezy.
8/17/1999		72	20	4	0	1	1	5	5	0	3	2	2
	Sampler: FEYK												Remarks: Used a view tube.
9/5/1999		68	19	4	50	3	2	5	5	0	0	1	0
	Sampler: FEYK												Remarks: Used a view tube.
9/20/1999		64	19	4	0	1	1	5	5	0	0	0	0
	Sampler: FEYK												Remarks: Used a view tube. Last sample for the year.

Profile Report

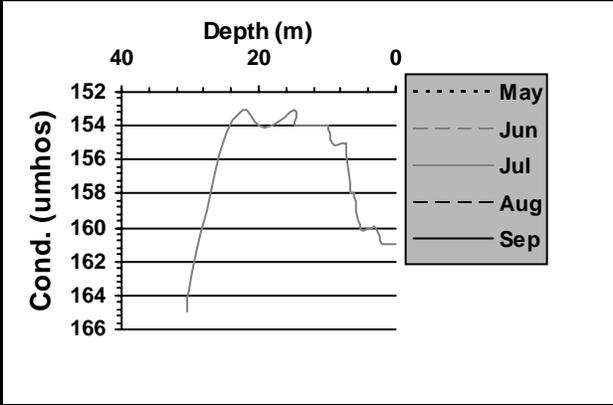
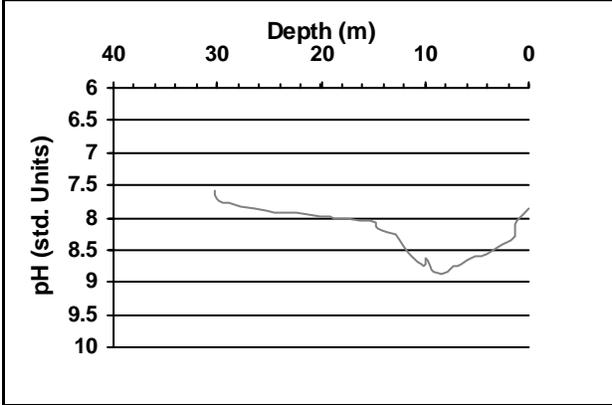
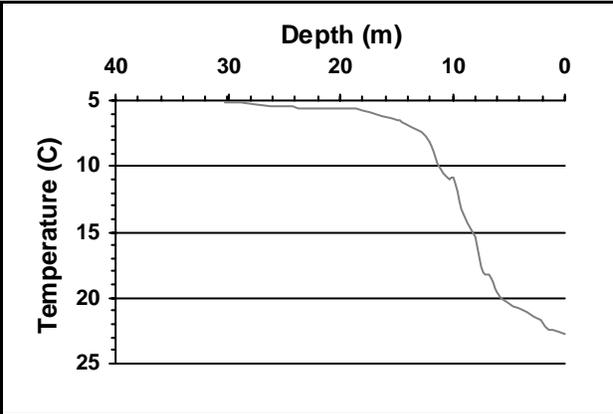
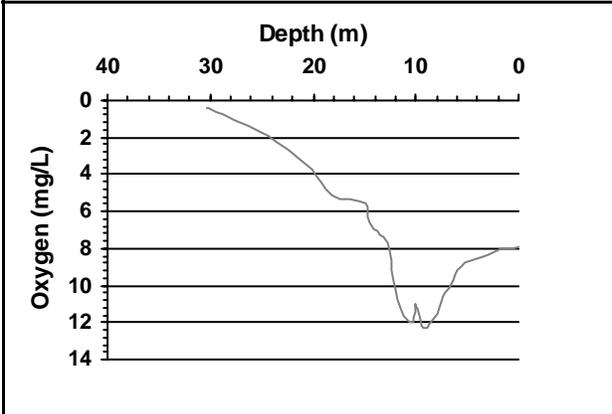
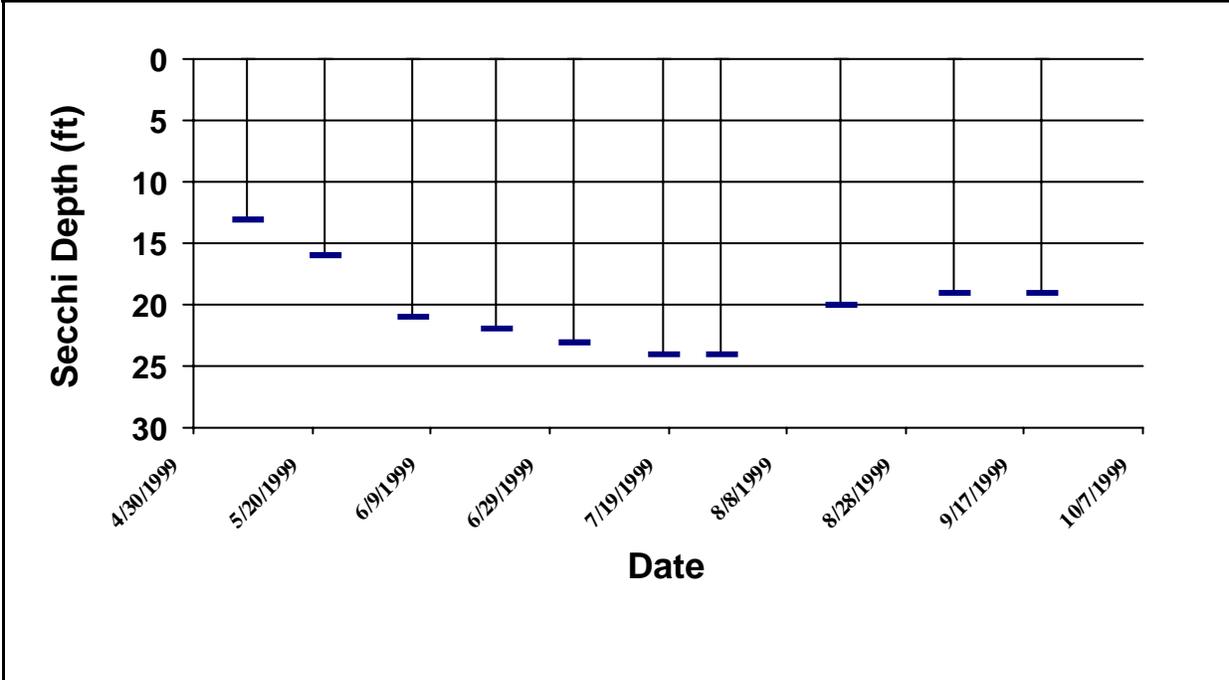
LOON

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
7/28/1999						
		0	161	7.92	7.86	22.71
		1.1	161	7.98	8.05	22.5
		1.4	161	8.02	8.28	22.42
		2.1	161	8.16	8.38	21.65
		2.9	160	8.36	8.45	21.32
		4.1	160	8.56	8.56	20.84
		5.2	160	8.74	8.59	20.36
		6	158	9.2	8.66	19.58
		6.8	158	10.17	8.74	18.28
		7.2	155	10.32	8.75	18.04
		7.9	155	11.55	8.83	15.43
		9.2	155	12.24	8.84	13.24
		10	154	11.06	8.64	10.9
		10.2	154	11.94	8.76	11.09
		11.3	154	11.68	8.61	9.74
		12.1	154	9.72	8.43	8.19
		12.8	154	7.73	8.27	7.43
		14.1	154	6.99	8.2	6.83
		14.7	154	6.28	8.14	6.48
		14.8	153	5.54	8.09	6.45
		18.1	154	5.08	8.03	5.8
		20.1	154	3.71	7.98	5.67
		22.4	153	2.72	7.92	5.53
		25.2	155	1.71	7.88	5.38
		29.8	163	.53	7.74	5.22
		30.3	165	.38	7.59	5.21

Secchi Depth and Profile Graphics

Station: 1

LOOST1



MARTHA (27N-04E-01)

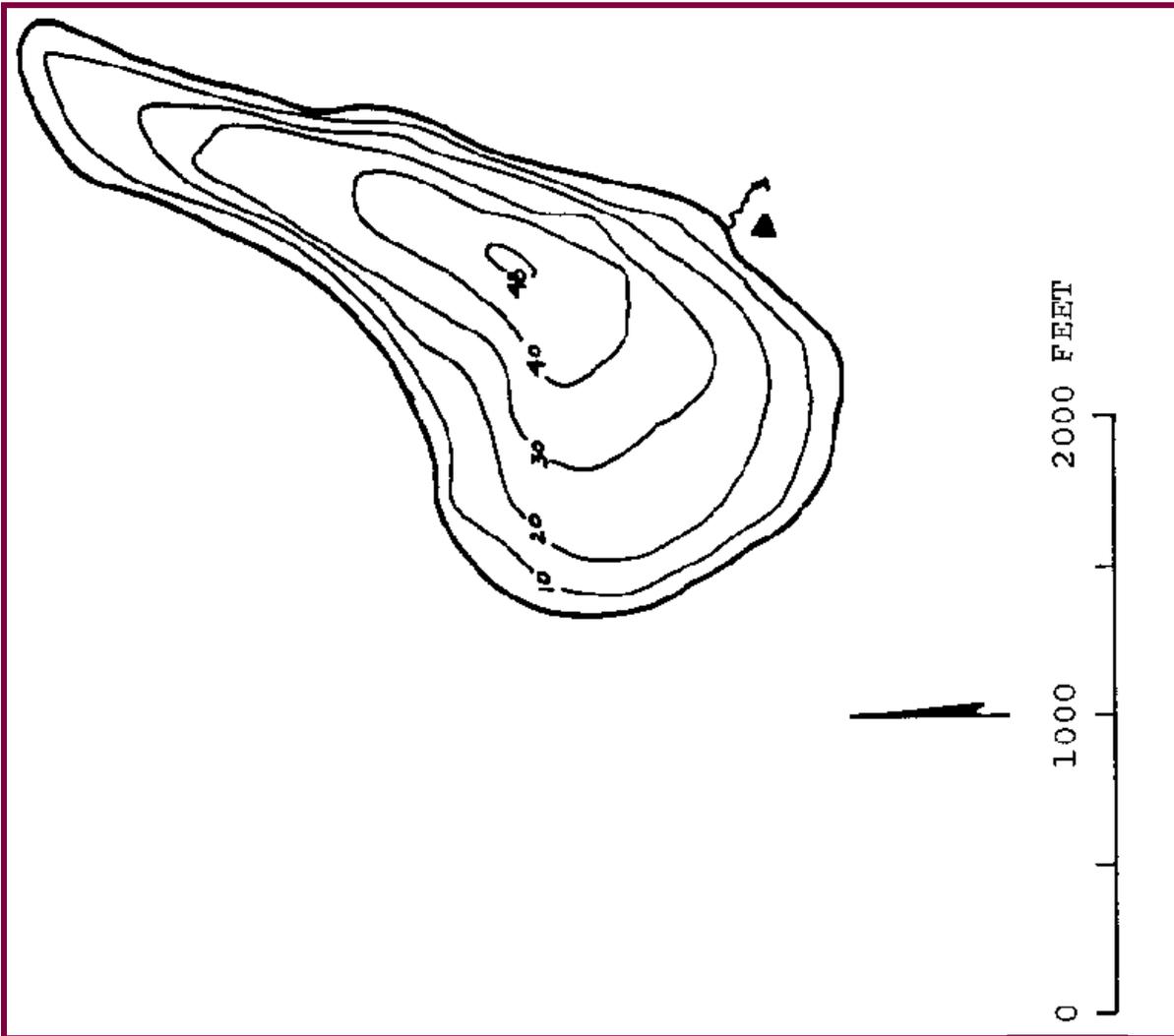
SNOHOMISH County

Lake ID: MARSN2

Ecoregion: 2

Martha Lake is located 2.5 miles northeast of Alderwood Manor. It was originally called Manor Lake. It has an intermittent inlet, and drains via a marsh to Swamp Creek and the Sammamish River. (There is another Martha Lake, called Lake Martha, located near Stanwood.)

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
57	48	24	1	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
1346	1.41	450	47 51 02.	122 14 37.



Trophic State Assessment for 1998

MARTHA (27N-04E-01)

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 37	J
TSI_Phos:		
TSI_Ch1:		
Narrative TSI:	^b	OM

Summary Comments:

The general water quality for Martha Lake was fair to good for 1998. The Secchi depth readings ranged from 3.9 meters (12.9 feet) to a high of 6.0 meters (19.8 feet) with a mean of 4.8 meters (15.8 feet). For comparison, in 1997 the mean Secchi depth reading was 4.4 meters (14.6 feet).

No chemistry data was collected from Martha Lake in 1998.

Only one site visit was made by Ecology staff in 1998. The lake showed a very weak thermal stratification; the water temperature dropped only in the bottom meter of the water column. A corresponding low level of dissolved oxygen also occurred at this depth.

Between May and October, the volunteer monitor counted numerous geese and/or other waterfowl on the lake during each of his eight (8) sampling visits.

The volunteer monitor also noted a heavy algae bloom that lasted most of the month of July. In addition, he commented on the substantial increase in the growth of aquatic plants in the lake. An aquatic plant survey was done by Ecology staff in 1998 which showed a dense growth of the non-native *Nymphaea odorata* (fragrant waterlily) in the lake.

Based on the Secchi depth data and the low level of dissolved oxygen in the hypolimnion, Martha Lake is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

MARTHA (27N-04E-01)

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/5/1998		19.5	19.8		100	2	1			67	33		
	Sampler:	GUENTZ		Remarks:	WEED GROWTH AROUND LAKE HAS SUBSTANTIALLY INCREASED.								
6/19/1998		18.5	13.9	2	100	2	3	3	2	43	8	0	0
	Sampler:	GUENTZ		Remarks:	WEEDS AND SEDIMENT IN LAKE.								
7/17/1998		23.5	15.8	3	0	2	1	3	1	60	20	0	0
	Sampler:	GUENTZ		Remarks:	HEAVY ALGAE BLOOM 2-3 M.								
7/31/1998		24.7	14.5	3	100	3	2	3	3			0	0
	Sampler:	GUENTZ		Remarks:	HEAVY ALGAE BLOOM APPROXIMATELY 4 METERS.								
8/14/1998		24.7	16.8	3	0	2	1	3	2			1	0
	Sampler:	GUENTZ		Remarks:	ONE REPORT OF MILFOIL ADJACENT TO BOAT LAUNCH.								
9/11/1998		21	12.87	2	25	2	1	3	2	12	18	0	0
	Sampler:	GUENTZ		Remarks:									
9/30/1998		22.5	18.5	3	0	1	1	3	2		23	1	0
	Sampler:	GUENTZ		Remarks:									
10/12/1998		15.2	14.1	4	75	1	4	4	3	0	17	0	0
	Sampler:	GUENTZ		Remarks:									
10/12/1998			14.1		0					0	0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									

Profile Report

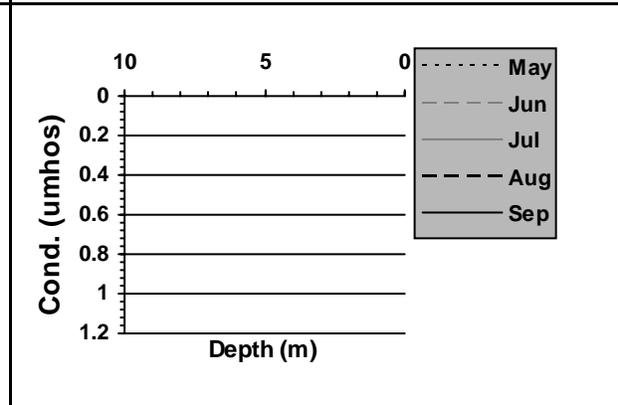
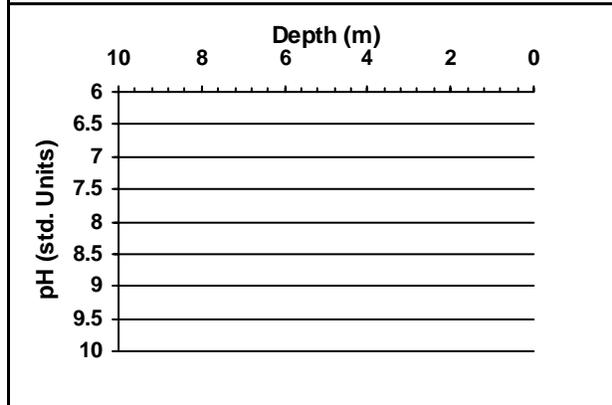
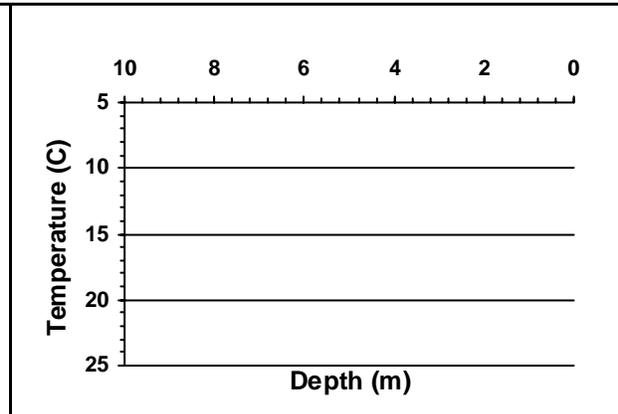
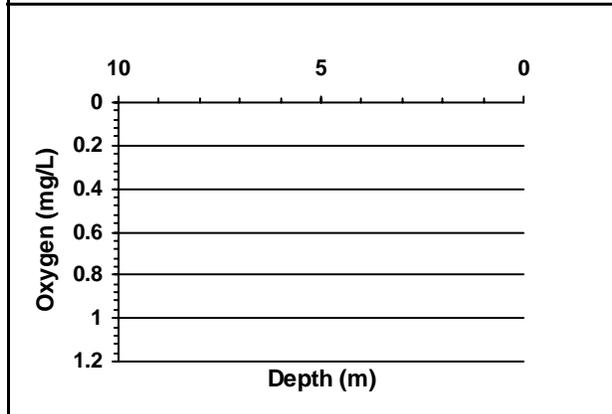
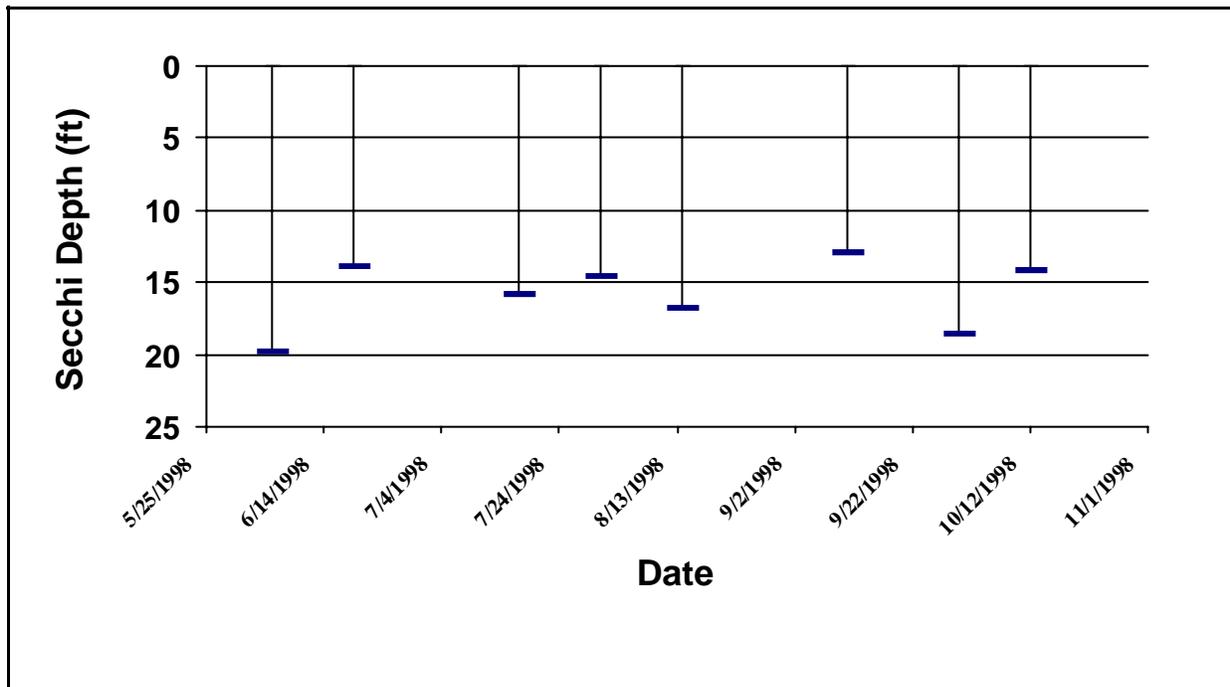
MARTHA (27N-04E-01)

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
10/12/1998						
		0	95	8.73	7.9	15.3
		0.5	95	8.24	7.7	15.3
		1	95	8.19	7.7	15.3
		1.5	95	8.18	7.6	15.3
		2	95	8.15	7.6	15.3
		2.9	95	8.13	7.6	15.3
		4	95	8.08	7.5	15.3
		5	95	8.05	7.5	15.3
		6	95	8.04	7.5	15.3
		7	95	7.81	7.4	15.2
		8.1	102	3.75	7.3	12.5
		9.3	113	.51	6.8	9.3

Secchi Depth and Profile Graphics

Station: 1

MARSN2



MARTHA (31N-04E-18)

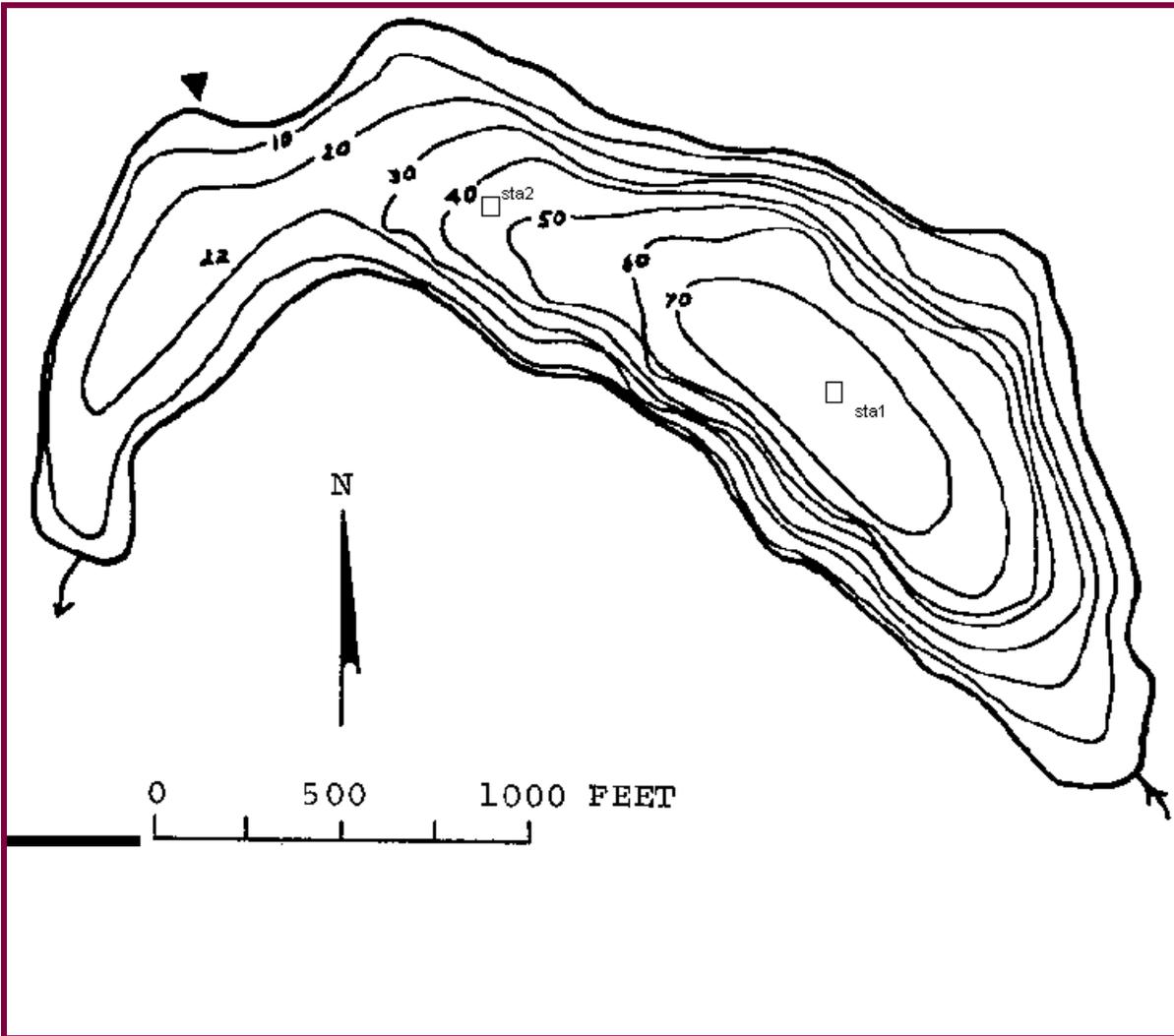
SNOHOMISH County

Lake ID: MARSN1

Ecoregion: 2

Lake Martha is located 10.5 miles northwest of Marysville, and one mile east of Warm Beach. It is fed by Lake Howard and drains to Port Susan. (Lake Martha is not the same lake as Martha Lake, which is located near Alderwood Manor.)

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
62	70	33	2	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
2034	1.76	186	48 10 03.	122 20 46.



Station Information

MARSN1

Primary Station	Station # 1	latitude: 48 10 06.7	longitude: 122 20 12.7
	Description:	Deep site. In middle of lake approximate 1250 feet northwest of inflow at southeast corner.	

Secondary Station	Station # 2	latitude: 48 10 10.6	longitude: 122 20 27.5
	Description:	Located in middle of lake, about 750 feet east of boat launch (and about 250 feet south of boat launch in to the lake's middle).	

Trophic State Assessment for 1998

MARTHA (31N-04E-18)

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 40	J
TSI_Phos:		
TSI_Ch1:		
Narrative TSI:	^b	OM

Summary Comments:

The general water quality of Lake Martha was good for 1998. The mean Secchi depth reading was 4.0 meters (13.1 feet). For comparison, in 1997 the mean Secchi depth reading was 4.5 meters (14.8 feet).

No chemistry data was collected from Lake Martha in 1998.

The volunteer monitor notes a permanent lake population of 23 Canada geese.

Only one site visit was made by Ecology staff in 1998. During this visit (9/28/1998), thermal stratification was observed and a depletion of dissolved oxygen in the hypolimnion was noted.

Based on Secchi depth data and the low dissolved oxygen levels in the hypolimnion, Lake Martha is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

MARTHA (31N-04E-18)

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/18/1998		15	11.25	7		1	2	4	4	3	3	0	0
	Sampler:	DEAN			Remarks:	DENSE SMALL PARTICULATE.							
6/4/1998		20	12	8	75	3	1	4	4		0	1	0
	Sampler:	DEAN			Remarks:	LOON HAS BEEN AROUND FOR A WEEK.							
6/20/1998		19	13	8	0	3	1	5	4	0	0	0	0
	Sampler:	DEAN			Remarks:								
7/7/1998		21	11.5	7	50	3	1	5	4	0	0	0	0
	Sampler:	DEAN			Remarks:	23 GEESE PERMENANTLY ON LAKE. FOUR LOONS ON 7/4/98. FORGOT VIEW TUBE; USUALLY GAIN ONE FOOT IN SECCHI READING WITH THE TUBE.							
7/27/1998		26	13	7	0	1	1	4	4	0	0	0	0
	Sampler:	DEAN			Remarks:								
8/17/1998		22	13.5	7	100	1	4	4	4	0	3	0	0
	Sampler:	DEAN			Remarks:	COUNTY LAKE MONITOR ON LAKE WITH GAS POWERED ENGINE!							
9/7/1998		22	13.5	7	75	2	1	4	4	0	0	1	0
	Sampler:	DEAN			Remarks:								
9/28/1998		16	15.25	6	0	2	1	4	4	15	2	2	0
	Sampler:	DEAN			Remarks:								
9/28/1998			15.25		0					0	0	0	0
	Sampler:	BELL-MCKINNON			Remarks:								

Profile Report

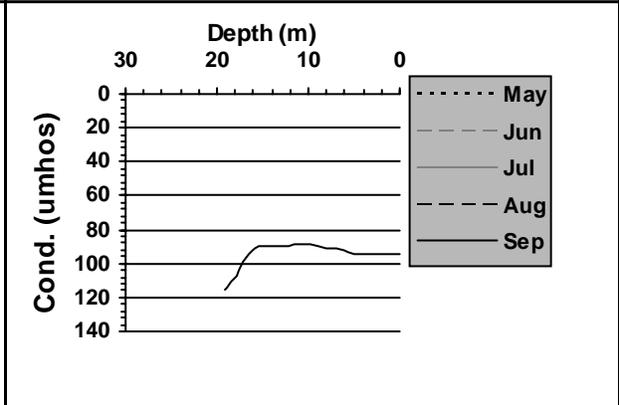
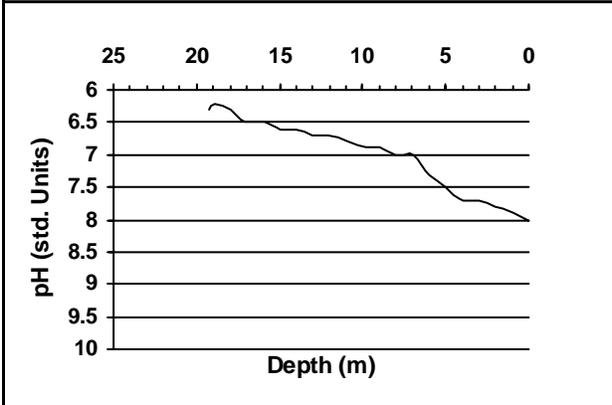
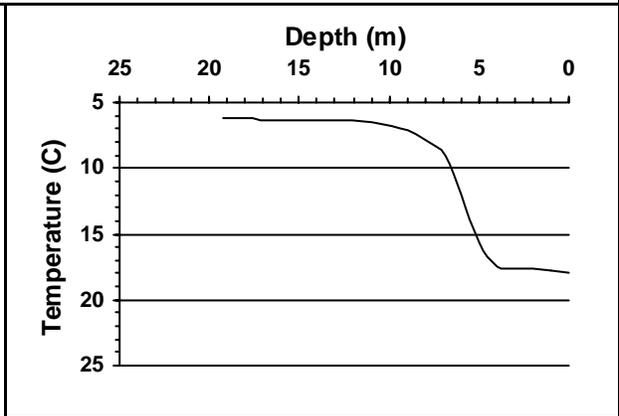
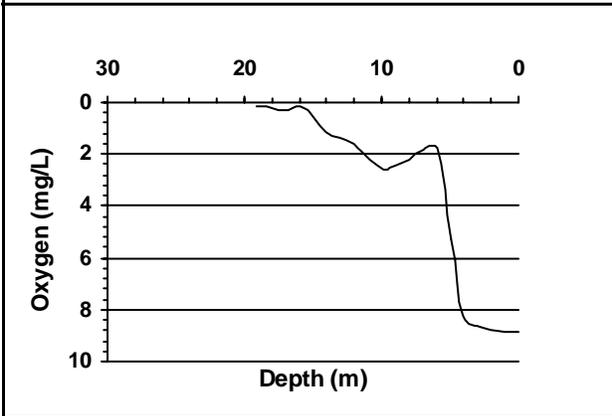
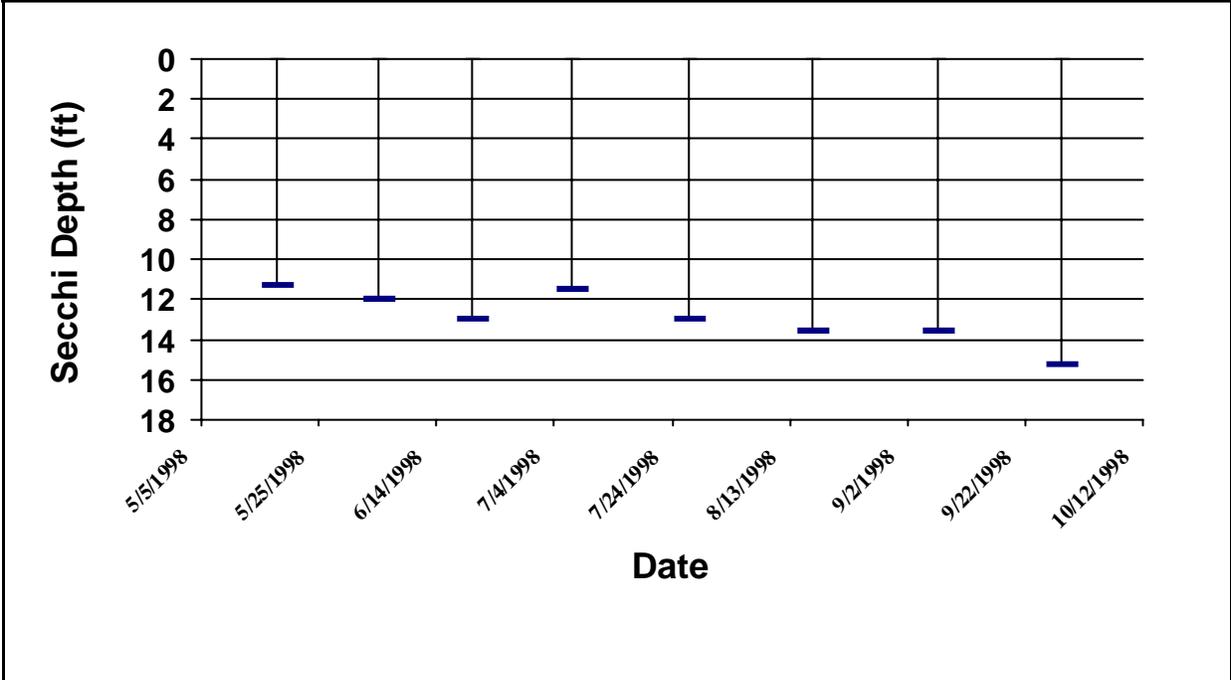
MARTHA (31N-04E-18)

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
9/28/1998						
		0	95	8.83	8	17.9
		1	95	8.83	7.9	17.8
		2	95	8.76	7.8	17.7
		3	95	8.6	7.7	17.6
		4	95	8.25	7.7	17.5
		5	94	5.24	7.5	15.7
		6	92	1.77	7.3	12
		6.9	91	1.81	7	9.1
		8	91	2.19	7	7.8
		9	90	2.43	6.9	7.1
		9.8	89	2.63	6.9	6.8
		10.9	89	2.21	6.8	6.5
		12.1	90	1.61	6.7	6.4
		13	90	1.36	6.7	6.4
		14	90	1.12	6.6	6.4
		15	90	.6	6.6	6.4
		15.9	91	.14	6.5	6.3
		17.1	99	.27	6.5	6.3
		17.9	107	.22	6.3	6.2
		18.9	114	.19	6.2	6.2
		19.2	115	.16	6.3	6.2

Secchi Depth and Profile Graphics

Station: 1

MARSN1



Station Information

MARSN1

Primary Station	Station # 1	latitude: 48 10 06.7	longitude: 122 20 12.7
	Description:	Deep site. In middle of lake approximate 1250 feet northwest of inflow at southeast corner.	

Secondary Station	Station # 2	latitude: 48 10 10.6	longitude: 122 20 27.5
	Description:	Located in middle of lake, about 750 feet east of boat launch (and about 250 feet south of boat launch in to the lake's middle).	

Trophic State Assessment for 1999

MARTHA (31N-04E-18)

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	43
TSI_Phos:		41
TSI_Ch1:		50
Narrative TSI:	^b	M

Summary Comments:

The general water clarity of Lake Martha was good to fair in 1999. The Secchi depth readings ranged from 2.4 meters (8.0 feet) to 5.0 meters (16.3 feet) with a mean Secchi depth of 3.4 meters (11.2 feet). For comparison, in 1998 the mean Secchi depth was 4.0 meters (13.1 feet).

Numerous geese and/or other waterfowl were observed on the lake by the volunteer monitor during six of her ten sampling visits made between May and September.

The chemistry data collected for Lake Martha showed moderate phosphorus levels.

Values ranged from 11.1 ug/L to 15.1ug/L in the epilimnion and hypolimnetic readings of 26.1ug/L to 75.5 ug/L. The chlorophyll levels showed high algae densities in the lake. The phosphorus data indicates a level of productivity where algae growth could become a problem but usually not for long periods of time. The volunteer monitor reported an large amounts of suspended algae in the lake beginning in late May and lasting until the end of August.

Ecology staff made four site visits in 1999. Thermal stratification and low dissolved oxygen levels in the hypolimnion were noted during each of these visits.

Ecology staff conducted an aquatic plant survey on 7/20/1999. The non-native plant *Nymphaea odorata* (fragrant waterlily) grew in one patch in the lake. Another non-native plant *Iris pseudacorus* (yellow flag) also occurred in a few locations around the lake. Only a few submersed plants were observed, mostly occurring at the mouth of an unnamed intermittent inflow stream located at the southeast corner of the lake.

Based on the Secchi depth data, and the phosphorus and chlorophyll levels, Lake

Martha is classified as mesotrophic.

The following is an assessment written by Ecology staff, Sarah O'Neal to determine the phosphorus criterion for Lake Martha:

Lake Martha is a small, deep lake. While nutrient levels and Secchi depths were consistent with a mesotrophic lake, chlorophyll-a levels were elevated. In fact, we noted that 1999 brought the worst algal conditions observed in many years on the usually clear lake. Slightly elevated hypolimnetic total phosphorus concentrations indicated slight internal nutrient loading. Additionally, dissolved oxygen dropped off in the hypolimnion, particularly in September, another indication of the potential for internal nutrient loading. A number of activities in the watershed may have been responsible for the productivity of the lake. In particular, there was an apparent increase in resident geese, which often add nutrients to a lake system. Homes with manicured lawns, many running down to the shoreline, surrounded the majority of the lake (an estimated two-thirds). Fertilizers, a common nutrient source, were clearly used on many of the lawns. Lawns are known to attract and sustain geese year round. Finally, agriculture was the primary land use within the watershed; farm runoff is another potential source of nutrients. Fortunately, plants were not a problem in the lake. Submerged plants grew only sparsely, and no problem species grew in or around the lake.

Nineteen residents and two visitors completed the questionnaire. They indicated a wide variety of uses including swimming, relaxing, watching wildlife, canoeing, kayaking, and using personal watercraft. All but one respondent answering the question about water quality agreed that water quality had worsened in the past decade or two. The respondents especially desired less algae, clearer water, good swimming, and fewer Canada geese on the lake. The lake and its surroundings provided habitat for eagles, hawks, grebes, and other waterfowl. Fish habitat was somewhat sparse on the lake, and consisted largely of human structures and aquatic plants. However, WDFW managed the lake primarily for rainbow trout. Between 1000 and 2000 catchable fish were planted each spring before opening day. Four inch brown trout were also planted in the fall. The fishery effectively utilized zooplankton, as indicated by a decrease in their average size over the summer. However, smaller forms dominated the zooplankton community, particularly later in the summer, indicating a possible overabundance of prey to predator species. Anadromous fish do not use Martha Lake. Warmwater fish species in the lake included largemouth bass, yellow perch, and brown bullhead. The lake received only about 50 anglers on opening day of its year-round season.

Despite increasingly dense algal growth, uses of the lake appeared to be largely supported. In order to maintain water quality of the lake and prevent increased nutrient loading, we recommend a total phosphorus criterion of 15.8 ug/L (mean 12.5 ug/L plus standard deviation of 3.3 ug/L).

Mean Secchi = 3.2m; Mean TP = 12.5 ug/L; Mean Chl = 7.6 ug/L

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

MARTHA (31N-04E-18)

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 0										
6/10/1999		L					3			
		L					4			
8/11/1999		L					13			
		L					9			
Station 1										
6/10/1999		E	15.1	.455	30	8.1		30.5	5760	.8
		H	57.5	.635	11					
7/16/1999		E	12.4	.584	47	10.5				
		H	75.5	.729	10					
8/11/1999		E	11.2	.637	57	11.2				1.2
		H	26.1	.728	28					
9/10/1999		E	11.1	.416	37	3.2				
		H	33.8	.811	24					
Station 2										
6/10/1999		E	11.9	.448	38	8.2				
7/16/1999		E	11.1	.571	51	11.6				
8/11/1999		E	11.1	.652	59	11.6				
9/10/1999		E	8.45	.415	49	3				

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Profile Report

MARTHA (31N-04E-18)

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/10/1999						
	1248	0	89.4	10.4	8.19	18
	1249	0.9	89.2	10.47	8.14	17.85
	1250	2	88.9	10.47	8.08	17.21
	1251	3	88.4	10.37	7.98	16.23
	1254	4	89.4	7.81	7.5	13.37
	1257	5	89.9	5.96	7.25	10.59
	1259	6	89.5	6.69	7.15	9.48
	1301	8	88.8	8.02	7.12	8.05
	1302	10	89	7.32	7.04	6.78
	1304	13	88.9	6.63	6.99	6.32
	1306	15	88.8	6.27	6.94	6.24
	1311	18	89.8	3.78	6.76	6.13
	1314	20	93.4	1.02	6.65	6.11
	1317	20.2	94.4	.67	6.62	6.09
7/16/1999						
	0709	0	89.2	9.52	8.42	21.08
	0710	1	89.2	9.48	8.43	21.07
	0711	2	89.4	9.44	8.44	21.01
	0713	3	87.5	9.77	8.18	19.69
	0715	4	88.2	6.7	7.7	14.92
	0718	5	88.8	3.08	7.33	11.62
	0719	6	88.2	4.08	7.28	9.95
	0721	7	88.2	3.82	7.2	9.07
	0722	10	87.2	5.57	7.21	6.98
	0724	15	87.5	4.37	7.14	6.26
	0726	20	93	.47	7.04	6.11
	0727	20.1	93.3	.32	6.96	6.11

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
8/11/1999						
	1037	0	91.1	9.95	8.94	22.74
	1037	2	91.2	9.9	8.96	22.79
	1038	4	88.1	7.22	8.06	16.52
	1040	6	89.4	1.93	7.49	10.76
	1040	8	87.7	4.44	7.37	8.25
	1041	10	87.3	4.49	7.27	6.95
	1042	15	87.6	3.3	7.15	6.31
	1043	18.1	90	.26	6.97	6.19
9/10/1999						
	1011	0.1	87.3	9.13	8.86	18.69
	1012	1	87.2	9.13	8.66	18.69
	1012	2	87.4	9.05	8.46	18.69
	1013	3.1	87.1	9.05	8.36	18.63
	1014	4	87.2	8.13	8.18	18.29
	1015	5	88.1	.69	7.78	14.2
	1016	6	86.7	1.16	7.7	11.34
	1017	7.1	85.4	3.08	7.6	9.4
	1018	7.9	85.2	3.35	7.53	8.44
	1019	9	84.9	3.4	7.45	7.65
	1019	10	84.6	3.75	7.42	7
	1021	11	84.5	3.02	7.31	6.67
	1022	12	85.2	2.19	7.2	6.49
	1023	13	85.3	2.02	7.16	6.44
	1024	15.1	85.5	1.21	7.07	6.36
	1025	16.1	86	.17	7.02	6.31
	1026	18	94.3	.13	6.87	6.24
	1027	19	99.4	.13	6.76	6.23

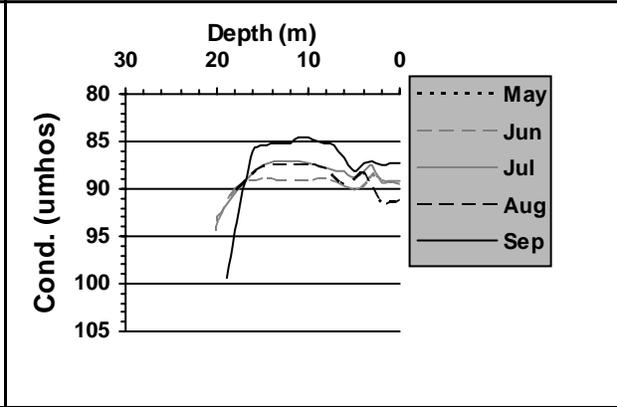
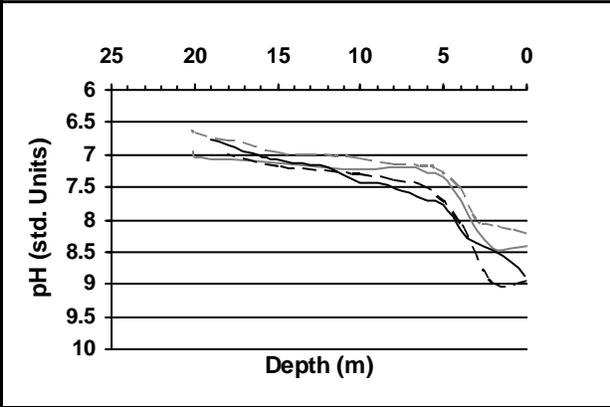
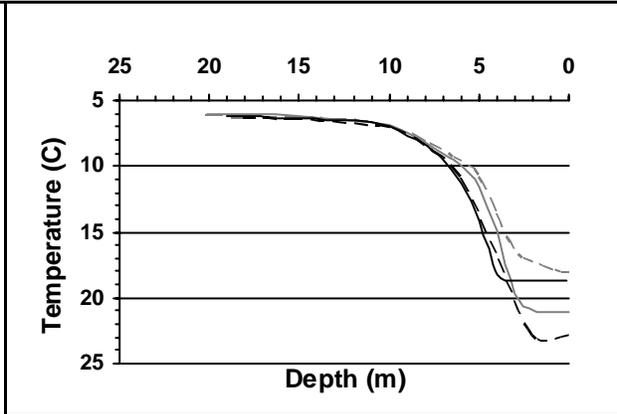
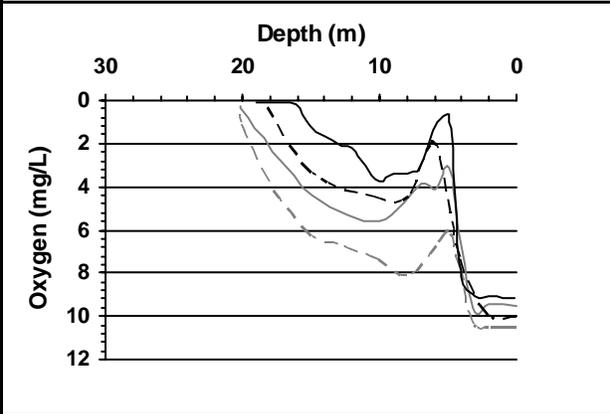
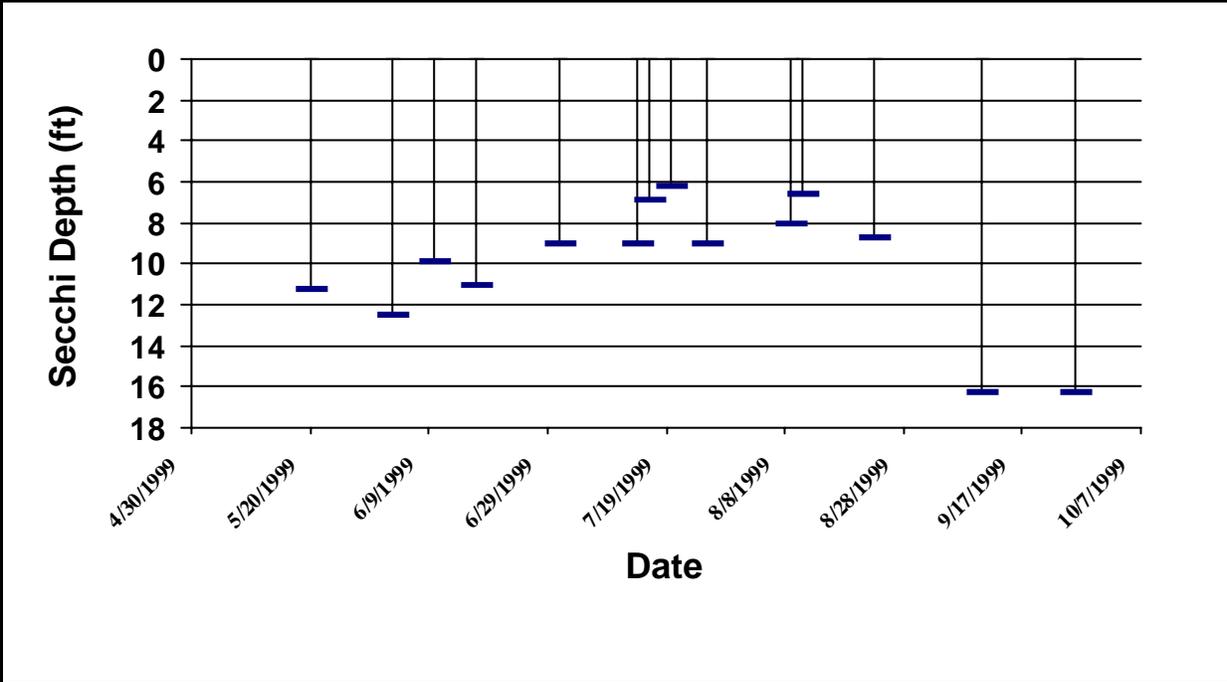
Station 2

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
6/10/1999						
	1349	0.1	89.2	10.43	8.31	18.26
	1350	1	89.1	10.5	8.22	17.8
	1351	2	88.6	10.7	8.17	16.78
	1354	3	88.5	10.07	7.81	15.66
	1357	4	89.5	7.36	7.3	12.72
	1359	4.9	89.7	6.2	7.09	10.38
	1401	6	89.5	6.26	7.01	9.56
	1411	8	88.7	8.21	7.3	7.75
	1414	10	88.7	7.21	7.07	6.57
	1417	11.8	88.9	5.99	6.9	6.34
9/10/1999						
	1056	0	87.2	9.13	7.58	18.77
	1056	1	87.2	9.1	7.61	18.76
	1057	2	87	9.01	7.61	18.67
	1057	3	87.2	8.95	7.63	18.57
	1058	4	87.2	7.84	7.53	18.19
	1059	6	86.7	1.52	7.42	11.29
	1100	7	86.4	2.24	7.11	10.09
	1103	8	85.4	4.11	6.85	8.19
	1111	10	84.5	3.6	7.14	6.92
	1104	10	84.9	3.31	6.77	6.99
	1111	11.1	85.9	3.1	7.05	6.61

Secchi Depth and Profile Graphics

Station: 1

MARSN1



MASON

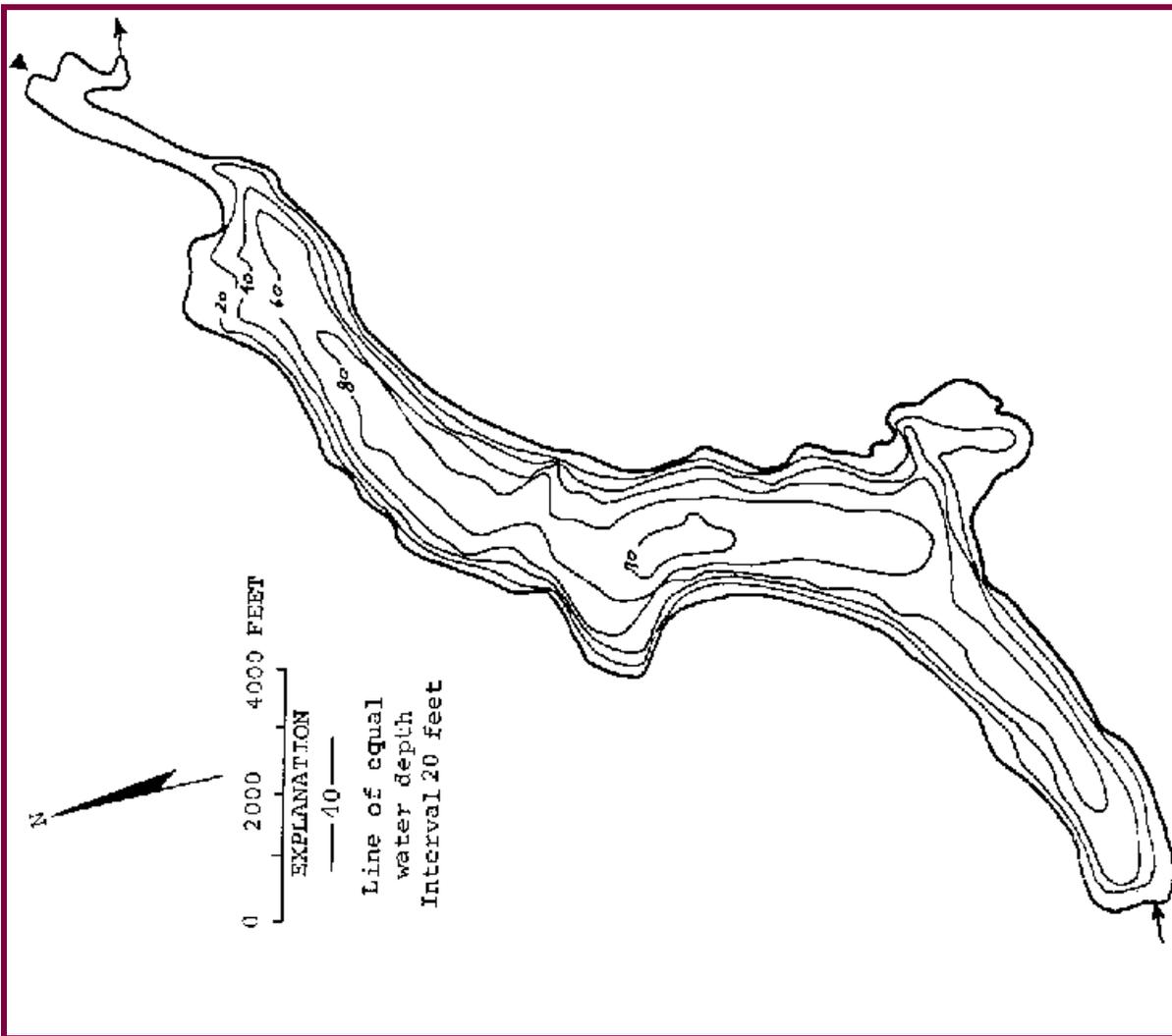
MASON County

Lake ID: MASMA1

Ecoregion: 2

Mason Lake is located eight miles southwest of Belfair. It is four miles long and is fed by Shumocher Creek. Mason Lake drains via Sherwood Creek to North Bay and Case Inlet. It is the largest and deepest lake in Mason County.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
1000	90	48	20	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
49000	10.9	194	47 21 14.	122 55 17.



Station Information

MASMA1

Secondary Station	Station # 1	latitude:	longitude:
	Description:	Located approximately 3500 feet up from the inlet at the southern end of the lake. The station is midway between the east and west shorelines at a spot where the water is about 60 feet in depth.	

Secondary Station	Station # 2	latitude:	longitude:
	Description:	Located at the far southern end of the 80 foot contour line (see bathymetric map) midway between both shorelines. Station is directly across from a concrete boathouse on the western shore and a brown house on the eastern shore.	

Secondary Station	Station # 3	latitude: 47 19 38.7	longitude: 122 56 17.0
	Description:	Located at the northern end of the 60 foot contour line, midway between both shorelines (see bathymetric map). The station is directly across from a red boathouse on the western shore and a yellow boathouse on the eastern shore.	

Primary Station	Station # 4	latitude: 47 20 16.0	longitude: 122 57 18.1
	Description:	Located in the deepest part of the lake in the middle of the 90 foot contour line (see the bathymetric map). The station is in the approximate center of a line extending from the southern edge of a large cove on the western shore to a smaller cove on the east shore.	

Secondary Station	Station # 5	latitude:	longitude:
	Description:	Located approximately 2 miles south of the boat launch. The station is midway between the east and west shorelines and where the water depth is about 80 feet.	

Trophic State Assessment for 1998

MASON

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a	32
TSI_Phos:	24
TSI_ChI:	31
Narrative TSI: ^b	OM

Summary Comments:

The general water clarity for Mason Lake was excellent in 1998. The Secchi depth readings ranged from 5.5 meters (18.0 feet) to 9.8 meters (32.0 feet) with a mean Secchi depth of 7.2 meters (23.8 feet). For comparison, in 1997 the mean Secchi reading was 6.7 meters (22.0 feet).

The chemistry data collected for Mason Lake showed very low phosphorus (3.1 ug/L to 5.3 ug/L) and algal densities (0.5 ug/L to 1.2 ug/L) in the epilimnion. These data indicate a very low level of productivity in the lake. Ecology staff made five site visits in 1998. Thermal stratification was observed and low dissolved oxygen levels in the hypolimnion were noted during each of these visits.

No geese or other waterfowl were counted by the volunteer monitor between May and October.

Ecology staff conducted an aquatic plant survey in 1998. The first recorded observation of the non-native *Myriophyllum spicatum* (Eurasian water-milfoil) was confirmed during this survey. This was the only non-native plant observed in Mason Lake. The rest of the aquatic vegetation was patchy in distribution with many areas of bare sediment.

Based on the Secchi depth data and the low levels of nutrients, Mason Lake should be classified as oligotrophic. However, because of the low dissolved oxygen levels observed in the hypolimnion throughout the summer, Mason Lake is classified as oligomesotrophic.

The following is an assessment written by Ecology staff, Kirk Smith, to determine the phosphorus criterion for Mason Lake:

Mason Lake is an oligomesotrophic lake in the Puget Lowlands ecoregion. Mason Lake remains relatively clear despite the densely developed shoreline. The watershed is mostly timber and some of it has been clear-cut within the last decade. This disturbance in the watershed has not shown any apparent impact on lake nutrient concentrations; Ecology records do not indicate an increase in total phosphorus concentrations throughout the decade. Although water clarity is very good, blooms of *Gleotrichia* sp. (blue-green algae) are apparent in mid and late summer. The first invasion of *Myriophyllum spicatum* (Eurasian water-milfoil) on Mason Lake was observed in 1998 along the east shore, midlake. Although the watershed appeared fairly stable (even in the clear-cut areas), it was rare to see any natural habitat along the shoreline. The habitat survey revealed considerable human disturbance in the riparian and littoral zones. These disturbances could adversely impact fish populations. The results of the user survey suggests the water clarity is sufficient to support primary contact uses--although only 3 surveys were returned. Our 1998 sampling found a mean total phosphorus concentration of 4.3 ug/L. Although there may be reason to suspect impairment to habitat from human disturbance and there is a potential for increased phosphorus loading from the recent milfoil introduction, there is not enough information to conclude that there is currently any impairment to the uses of the lake. Milfoil most likely offers the biggest threat to beneficial uses in the near future.

The phosphorus criterion for Mason Lake could be set at 10 ug/L, the action value in the water quality regulations for Puget Lowlands oligotrophic lakes; however, to protect this valuable resource from degradation, we recommend a criterion be set at 7.3 ug/L, the current total phosphorus concentration plus an adjustment for inter-annual variability.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

MASON

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 0										
7/26/1998		L					4			
		L					1 U			
8/18/1998		L					22			
		L					1			
Station 3										
6/4/1998		E	5.8	.104	18					
7/26/1998		E	3.8	.081	21	.73				
9/18/1998		E	4.3							
Station 4										
6/4/1998		E	5.3	.121	23	1.2		19.8	4560	.5 U
		H	6.1 J	.081	13					
7/26/1998		E	3.1	.09	29	.5 U				.5 U
		H	5	.068	14					
8/18/1998		E	3.7	.087	24	1.1				.5 U
		H	8.5	.066	8					
9/18/1998		E	5.2	.066	13	1.2				.5 U
		H	14	.04	3					

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

MASON

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 2													
5/30/1998		14.4	22	2	75	2	1	5	5	0	0	0	0
	Sampler:	HOLM		Remarks:									
6/13/1998		17.8	19	2	100	2	3	5	5	2	0	1	1
	Sampler:	HOLM		Remarks:									
6/30/1998		20	17	2	75	2	1	5	4	0	0	0	0
	Sampler:	HOLM		Remarks:									
7/16/1998		21.1	22	2	0		4	5	5	0	0	0	1
	Sampler:	HOLM		Remarks:									
7/31/1998		24.4	21	2	100	1	3	5	4	0	0	0	1
	Sampler:	HOLM		Remarks:									
8/13/1998		25	26	2	0	1	1	5	5	0	0	1	3
	Sampler:	HOLM		Remarks: BEAUTIFUL DAY.									
8/27/1998		23	25	2	0			5	5	0	0	0	1
	Sampler:	HOLM		Remarks:									
9/11/1998		23	27	2	0	1	1	5	5	0	0	0	0
	Sampler:	HOLM		Remarks:									
9/27/1998		20	29	2	0	1	3	5	5	0	0	0	1
	Sampler:	HOLM		Remarks:									
10/13/1998		17	23	2	100	3	5	1	1	0	0	0	0
	Sampler:	HOLM		Remarks:									
Station 3													
5/28/1998		15	22	2	0	3	2	5	5	0	0	0	0
	Sampler:	SCOTT		Remarks: LATE WITH TESTING DUE TO WEATHER.									

Date	Time	Temperature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Brightness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5-good)	Swimming (1-poor, 5-good)	Geese (#)	Waterfowl (besides geese #)	Boats-Fishing (#)	Boats-Skiing (#)
6/10/1998		20	19	2	75	1	4	4	4	0	0	0	0
	Sampler:	SCOTT		Remarks:									
6/22/1998		19	17	2	25	3	1	4	4	0	0	0	0
	Sampler:	SCOTT		Remarks:									
7/9/1998		22	17	2	75	1	1	4	4	0	0	0	2
	Sampler:	SCOTT		Remarks:									
7/24/1998		28	20	2	100	1	1	5	5	0	0	0	1
	Sampler:	SCOTT		Remarks:									
8/8/1998		24	25	2	0	1	1	5	5	0	0	0	2
	Sampler:	SCOTT		Remarks: SATURDAY.									
8/24/1998		22	21	2	100	1	1	4	4	2	0	0	2
	Sampler:	SCOTT		Remarks:									
9/8/1998		23	25		100	1	1	4	4	0	0	0	0
	Sampler:	SCOTT		Remarks:									
9/20/1998		23	27	2	0	1	2	3	3	0	0	0	0
	Sampler:	SCOTT		Remarks: SUNDAY.									
Station 4													
5/28/1998		15	22	2	0	3	2	5	5	0	0	0	0
	Sampler:	NELSON		Remarks: LATE GETTING STARTED DUE TO BAD WEATHER.									
6/3/1998		17	23.5	2	100	2	1	5	5	0	0	0	0
	Sampler:	NELSON		Remarks:									
6/4/1998			22	2	100	4	1	5	4	0	1	0	0
	Sampler:	SMITH		Remarks: VERY WINDY DAY. EXTREMELY DIFFICULT FOR SAMPLING. DRIFTING TOO MUCH FOR ZOO TOW. WSHED 100% TIMBER, SHORELINE ALL RESIDENTIAL (~400 HOMES). NO RESTRICTED USES. The Oxygen result is qualified as an estimate due to postcalibration failing QA/QC requirements.									

Profile Report

MASON

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/4/1998						
		0	39	10.44 J	7.6	15.9
		1	39	10.24 J	7.7	15.9
		2	39	10.2 J	7.7	15.9
		4.1	39	10.17 J	7.7	15.8
		5.9	39	10.27 J	7.7	15.4
		8	39	10.21 J	7.5	14.4
		10.2	38	10.16 J	7.4	13.2
		12.1	38	9.63 J	7.3	11.8
		16	37	8.55 J	7.1	9.2
		19	36	7.73 J	6.9	8.9
		21.9	35	7.19 J	6.8	8.6
		24.2	35	6.55 J	6.7	8.6
		24.8	36	6.41 J	6.7	8.6
Station 2						
10/13/1998						
		0	44 J	9.78	8.2	16.6
		5.3	44 J	9.42	7.9	16.5
		10.3	44 J	9.3	7.8	16.5
		14.6	40 J	4.2	7.6	10.6
		19.6	40 J	.53	6.9	9.4
		19.9	40 J	1.97	7.4	9.5
Station 4						

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
7/26/1998						
		0	42	8.3	7.3	23.8
		2	42	8.41	7.4	23.1
		4.1	42	8.7	7.4	22.3
		6	42	9.47	7.6	19.8
		8	41	9.81	7.7	17.8
		10	40	9.18	7.5	15.1
		12	38	7.72	7.3	12.6
		15	36	5.37	7.1	10
		19.9	37	4.29	6.9	9.1
		23.2	37	2.11	6.7	8.9

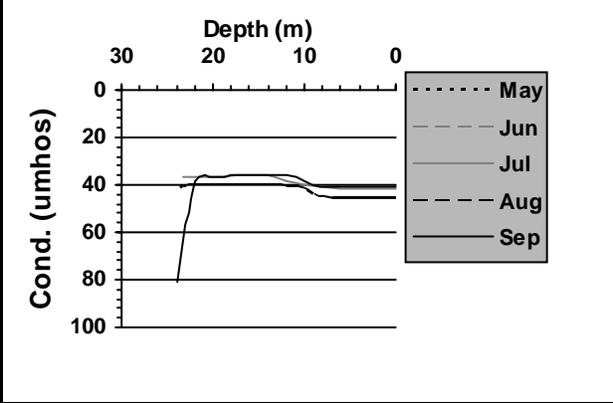
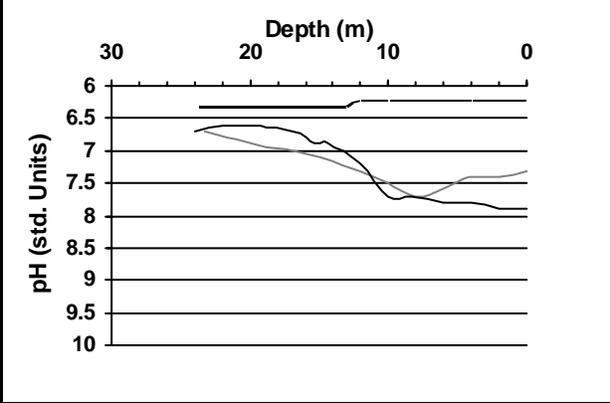
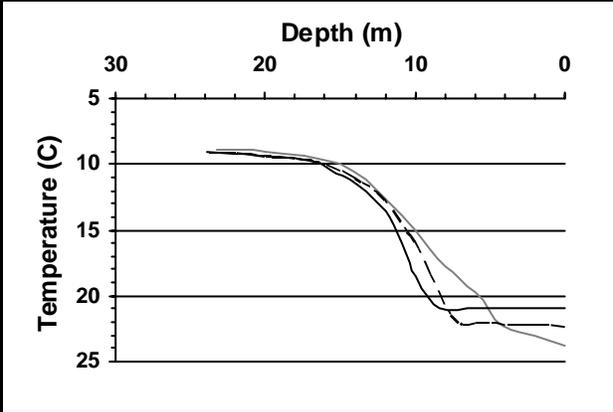
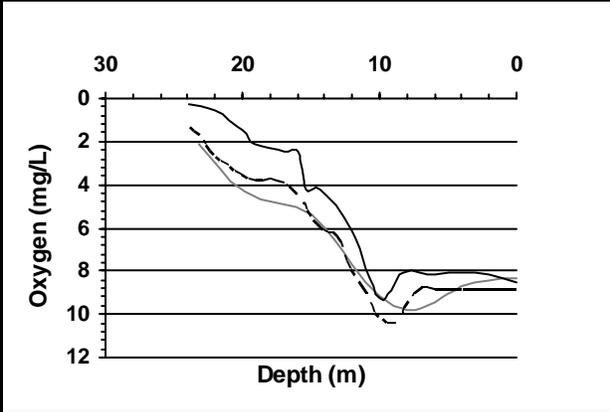
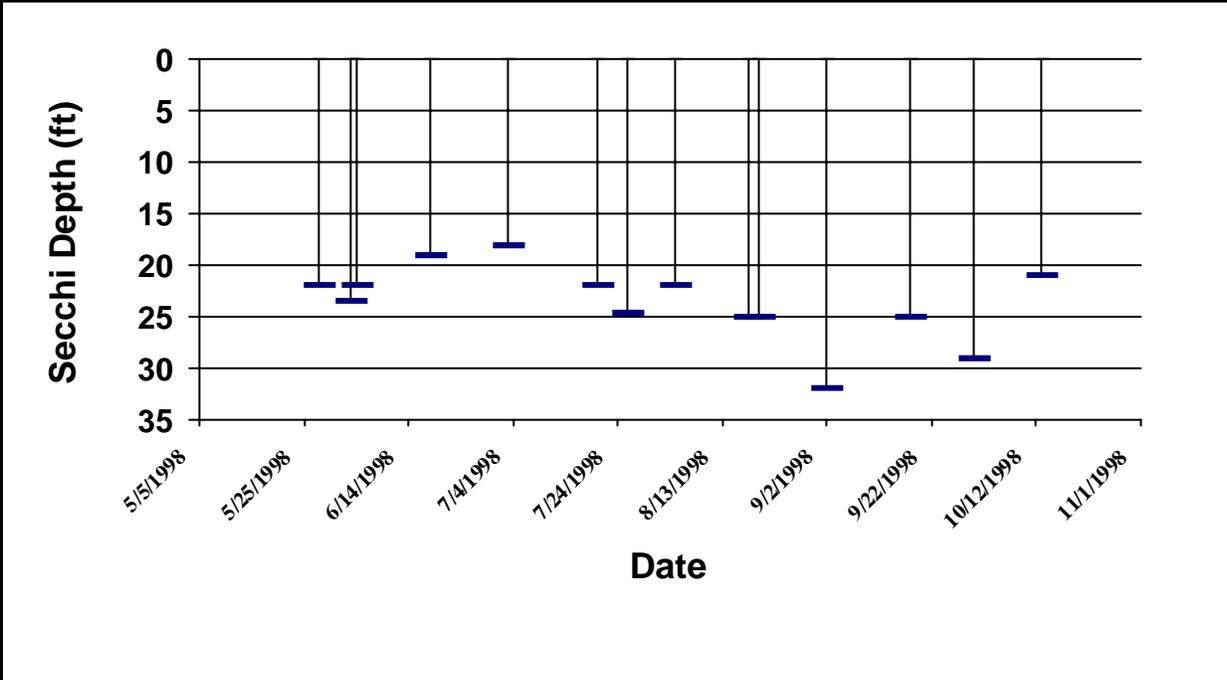
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
8/18/1998						
		0	45	8.82	6.2 J	22.3
		1	45	8.79	6.2 J	22.2
		2	45	8.79	6.2 J	22.2
		2.9	45	8.76	6.2 J	22.2
		4	45	8.77	6.2 J	22.1
		5	45	8.78	6.2 J	22
		6	45	8.75	6.2 J	22
		7	45	8.72	6.2 J	22
		8	44	9.37	6.2 J	20.6
		8.9	43	10.34	6.2 J	18.4
		10	41	10.06	6.2 J	15.9
		10.9	40	8.98	6.2 J	14.3
		12	40	7.87	6.2 J	12.7
		13	39	6.34	6.3 J	11.6
		14	39	6.09	6.3 J	11
		15	39	5.44	6.3 J	10.4
		16	39	4.36	6.3 J	9.9
		17	39	3.88	6.3 J	9.7
		18	39	3.7	6.3 J	9.5
		19	39	3.71	6.3 J	9.3
		20	39	3.46	6.3 J	9.3
		21	39	3.01	6.3 J	9.2
		22	39	2.6	6.3 J	9.1
		23	40	1.63	6.3 J	9
		23.7	41	1.27	6.3 J	9

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
9/18/1998						
		0	41 J	8.48	7.9	21
		2	41 J	8.12	7.9	21
		4	41 J	8.05	7.8	20.9
		6	41 J	8.16	7.8	20.9
		8.3	41 J	8.1	7.7	20.9
		10	38 J	9.26	7.7	18.5
		12	36 J	6.15	7.2	13.5
		14.3	36 J	4.2	6.9	11.1
		15.3	36 J	4.18	6.9	10.7
		16	36 J	2.47	6.8	10.1
		17	36 J	2.47	6.7	9.7
		19.2	37 J	2.1	6.6	9.5
		20	37 J	1.5	6.6	9.3
		22	38 J	.51	6.6	9.2
		23.9	81 J	.24	6.7	9.1
10/13/1998						
		0.1	44 J	9.56	8	16.6
		5	44 J	9.43	7.8	16.6
		8	44 J	9.34	7.8	16.5
		10.1	44 J	9.3	7.7	16.5
		15	39 J	5.08	7.6	10.7
		20	40 J	1.59	6.9	9.5
		20.5	40 J	1.2	6.7	9.4
		22.2	42 J	.83	6.6	9.2

Secchi Depth and Profile Graphics

Station: 4

MASMA1



Station Information

MASMA1

Secondary Station	Station # 1	latitude:	longitude:
	Description:	Located approximately 3500 feet up from the inlet at the southern end of the lake. The station is midway between the east and west shorelines at a spot where the water is about 60 feet in depth.	
Secondary Station	Station # 2	latitude:	longitude:
	Description:	Located at the far southern end of the 80 foot contour line (see bathymetric map) midway between both shorelines. Station is directly across from a concrete boathouse on the western shore and a brown house on the eastern shore.	
Secondary Station	Station # 3	latitude: 47 19 38.7	longitude: 122 56 17.0
	Description:	Located at the northern end of the 60 foot contour line, midway between both shorelines (see bathymetric map). The station is directly across from a red boathouse on the western shore and a yellow boathouse on the eastern shore.	
Primary Station	Station # 4	latitude: 47 20 16.0	longitude: 122 57 18.1
	Description:	Located in the deepest part of the lake in the middle of the 90 foot contour line (see the bathymetric map). The station is in the approximate center of a line extending from the southern edge of a large cove on the western shore to a smaller cove on the east shore.	
Secondary Station	Station # 5	latitude:	longitude:
	Description:	Located approximately 2 miles south of the boat launch. The station is midway between the east and west shorelines and where the water depth is about 80 feet.	

Trophic State Assessment for 1999

MASON

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 33
TSI_Phos:	41
TSI_ChI:	
Narrative TSI:	^b OM

Summary Comments:

The general water clarity of Mason Lake was excellent in 1999. The Secchi depth readings ranged from 5.5 meters (18.0 feet) to 8.5 meters (28.0 feet) with a mean Secchi depth of 6.5 meters (21.4 feet). For comparison, in 1998 the mean Secchi depth was 7.2 meters (23.8 feet).

No geese and/or other waterfowl were seen on Mason Lake by the volunteer monitor during any of his sampling visits made between May and October.

The chemistry data collected for Mason Lake showed low phosphorus levels in the epilimnion. This level of phosphorus indicates a low level of productivity where algae

growth doesn't usually become a problem.

Ecology staff made two site visits in 1999. Dissolved oxygen levels remained constant throughout the water column and no thermal stratification was observed during the first site visit (5/11/1999). During the second site visit (8/3/1999), low dissolved oxygen levels in the hypolimnion and thermal stratification were observed.

On 9/9/1999 Mason Lake was treated with an aquatic herbicide. Ecology staff conducted an aquatic plant survey on 9/22/1999. The only non-native plant observed consisted of two floating fragments of *Myriophyllum spicatum* (Eurasian milfoil). A rare aquatic plant, *Lobelia dortmanna* (water lobelia) was observed as being bleached out in one of the herbicide treated areas.

Based on the Secchi depth data, the phosphorus levels and the low dissolved oxygen in the hypolimnion, Mason Lake is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

MASON

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 4										
5/11/1999		E	6.6							
8/3/1999	1030	E	14.8							

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

MASON

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 2													
5/27/1999		16	20	2	25	1	2	5	4			0	0
	Sampler:	HOLM		Remarks: Used a view tube.									
6/15/1999		18	19	2	100		3	1	1	0	0	0	0
	Sampler:	HOLM		Remarks: Used a view tube.									
6/30/1999		18	20	2	100	1	2	5	5	0	0	0	0
	Sampler:	HOLM		Remarks: Used a view tube.									
7/15/1999		68	21	2	100	1	1	5	5	0	0	0	0
	Sampler:	HOLM		Remarks: Used a view tube.									
7/27/1999		22	20	2	0	1	1	5	5	0	0	0	0
	Sampler:	HOLM		Remarks: Used a view tube.									
8/3/1999			21										
	Sampler:	HOLM		Remarks: Used a view tube.									
8/13/1999		21	17	2	100	1	3	4	4	0	0	0	1
	Sampler:	HOLM		Remarks: Used a view tube.									
8/26/1999		22	23	2	0	1	2	5	5	0	0	0	1
	Sampler:	HOLM		Remarks: Used a view tube.									
9/11/1999		20	22	2	0	1	1	5	5	0	0	0	0
	Sampler:	HOLM		Remarks: Used a view tube.									
9/27/1999		19	21	2		1	1	5	5	0	0	0	0
	Sampler:	HOLM		Remarks: Used a view tube.									
Station 3													
5/11/1999		14	23.5	2	75	2	4	3	1	0	0	0	0
	Sampler:	PATRICELLI		Remarks: Used a view tube. Rain, no wind.									
6/8/1999		16	19	2	75	1	4	2	2	0	0	1	0
	Sampler:	SCOTT		Remarks:									

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
7/6/1999			19		0	1	1	4	4	0	0	0	1
	Sampler:	SCOTT			Remarks: Used a view tube.								
7/23/1999			23	2	0	1	1	4	4	24		0	0
	Sampler:	SCOTT			Remarks: Used a view tube.								
8/3/1999			20										
	Sampler:	SCOTT			Remarks: Used a view tube.								
8/8/1999		22	21	2	75	1	3	3	3			0	6
	Sampler:	SCOTT			Remarks: Used a view tube.								
8/24/1999		23	22		0	2	1	4	4	13	2	1	0
	Sampler:	SCOTT			Remarks: Used a view tube.								
9/4/1999		22	22	2	0	1	1	5	4		3	0	2
	Sampler:	SCOTT			Remarks:								
9/19/1999		20	20		0	1	1	5	4	0	0	0	0
	Sampler:	PATRICELLI			Remarks:								
Station 4													
5/11/1999		55	22	4		1	4	2	1	0	0	0	0
	Sampler:	NELSON			Remarks: Used a view tube. Rain no wind.								
6/4/1999		60	19	2	100	2	1	5	5	0	0	0	0
	Sampler:	NELSON			Remarks: Used a view tube.								
7/6/1999		67	28	2	0	1	1	5	5	0	0	0	3
	Sampler:	NELSON			Remarks: Used a view tube.								
7/20/1999		69	22	2	0	3	1	5	5	0	0	0	0
	Sampler:	NELSON			Remarks: Used a view tube.								
8/3/1999		71	20	6	0	1	1	5	5	0	1	0	0
	Sampler:	NELSON			Remarks: Used a view tube. 2-3 algae blooms/year-usually spring and early August. Today water was clear of algae. Media reported swimmer's itch in Mason Lake this year. Lake was sprayed for milfoil in July/1999. Not many boats on lake today.								
8/18/1999		69	22	2	100	1	1	5	5	0	1	0	0
	Sampler:	NELSON			Remarks: Used a view tube.								

Date	Time	Temperature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Brightness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5-good)	Swimming (1-poor, 5-good)	Geese (#)	Waterfowl (besides geese #)	Boats-Fishing (#)	Boats-Skiing (#)
9/1/1999		68	18	2	0	2	2	5	5	0	0	0	0
	Sampler: NELSON			Remarks: Used a view tube.									
9/13/1999		67	22	2	0	2	1	5	5	0	0	0	1
	Sampler: NELSON			Remarks: Used a view tube.									
9/30/1999		66	20	2	50	1	1	5	5	0	0	0	0
	Sampler: NELSON			Remarks: Used a view tube.									

Profile Report

MASON

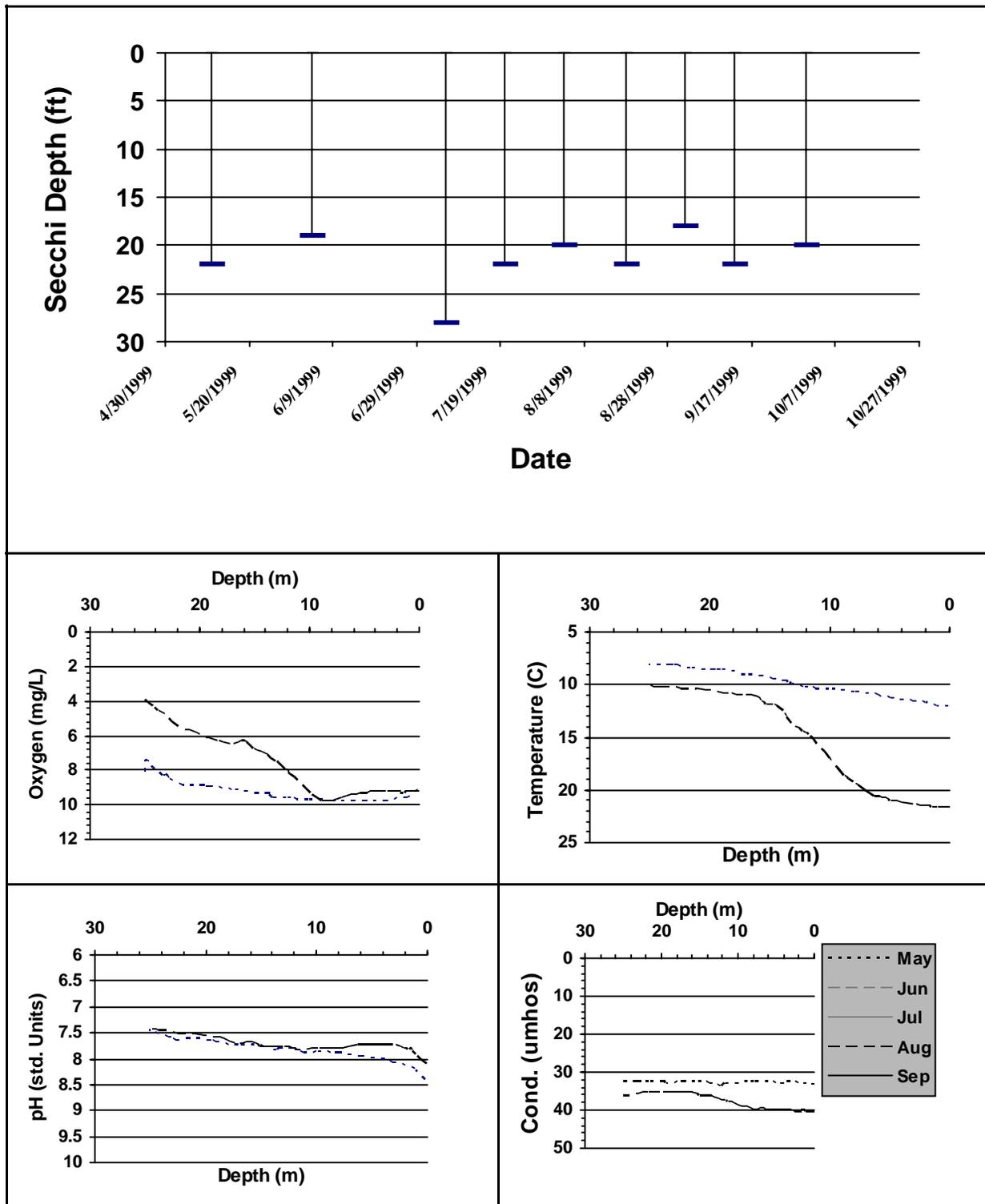
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 4						
5/11/1999						
		0.1	32.8	9.05	8.37	11.96
		1.1	32.4	9.49	8.18	11.87
		2	32.3	9.56	8.11	11.63
		3.1	32.2	9.67	8.04	11.47
		3.9	32.3	9.72	7.97	11.3
		4.9	32.3	9.74	7.95	11.12
		6	32.1	9.73	7.93	10.83
		8	32.2	9.69	7.87	10.53
		8.8	32.2	9.65	7.87	10.37
		10.1	32.4	9.6	7.84	10.29
		11.2	32.4	9.61	7.85	10.21
		11.8	32.7	9.55	7.81	10.04
		12.2	33.5	9.5	7.77	10.05
		13.4	32.7	9.52	7.76	9.71
		13.6	32.4	9.38	7.8	9.49
		13.7	32.4	9.27	7.79	9.49
		14.8	32.2	9.23	7.75	9.37
		15.7	32.1	9.17	7.71	9.06
		17.1	32.1	9.04	7.71	8.86
		17.9	32.2	8.96	7.71	8.6
		19.1	32.4	8.89	7.66	8.51
		19.5	32	8.85	7.63	8.48
		19.7	32.1	8.8	7.61	8.41
		21.6	32.1	8.77	7.6	8.24
		22.7	32.1	8.43	7.61	8.07
		23.1	32.1	8.19	7.57	8.04
		23.4	32.1	8.23	7.57	8.04
		25	32.2	7.36	7.44	8.02
		25.1	32.3	8.02	7.55	8.02

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
8/3/1999						
		0	39.8	9.15	8.08	21.59
		1	39.8	9.2	7.88	21.53
		1.5	39.7	9.21	7.78	21.47
		1.7	39.7	9.25	7.81	21.42
		1.9	39.8	9.19	7.76	21.34
		3.1	39.7	9.15	7.72	21.22
		4	39.7	9.2	7.71	21.07
		4.8	39.7	9.27	7.7	20.94
		4.9	39.7	9.27	7.71	20.93
		5.8	39.6	9.38	7.71	20.54
		6.3	39.6	9.37	7.71	20.55
		7.1	39	9.51	7.73	19.87
		8	39.4	9.74	7.76	19.13
		8.8	38.9	9.71	7.76	18.51
		9.9	38.2	9.23	7.76	16.93
		11.7	37.2	8.13	7.79	14.56
		11.9	37.1	7.93	7.77	14.48
		13.1	36.1	7.46	7.75	13.52
		13.8	36	7.09	7.75	12.43
		14.8	35.8	6.81	7.73	11.75
		15.2	35.4	6.64	7.71	11.79
		16	35.2	6.24	7.66	11.02
		17.3	35.2	6.42	7.69	10.93
		18.4	35.1	6.23	7.6	10.76
		20.3	35	5.81	7.54	10.48
		21.9	35.2	5.44	7.5	10.24
		24.2	35.7	4.22	7.43	10.05
		24.9	35.7	3.84	7.39	10.03

Secchi Depth and Profile Graphics

Station: 4

MASMA1



MCINTOSH

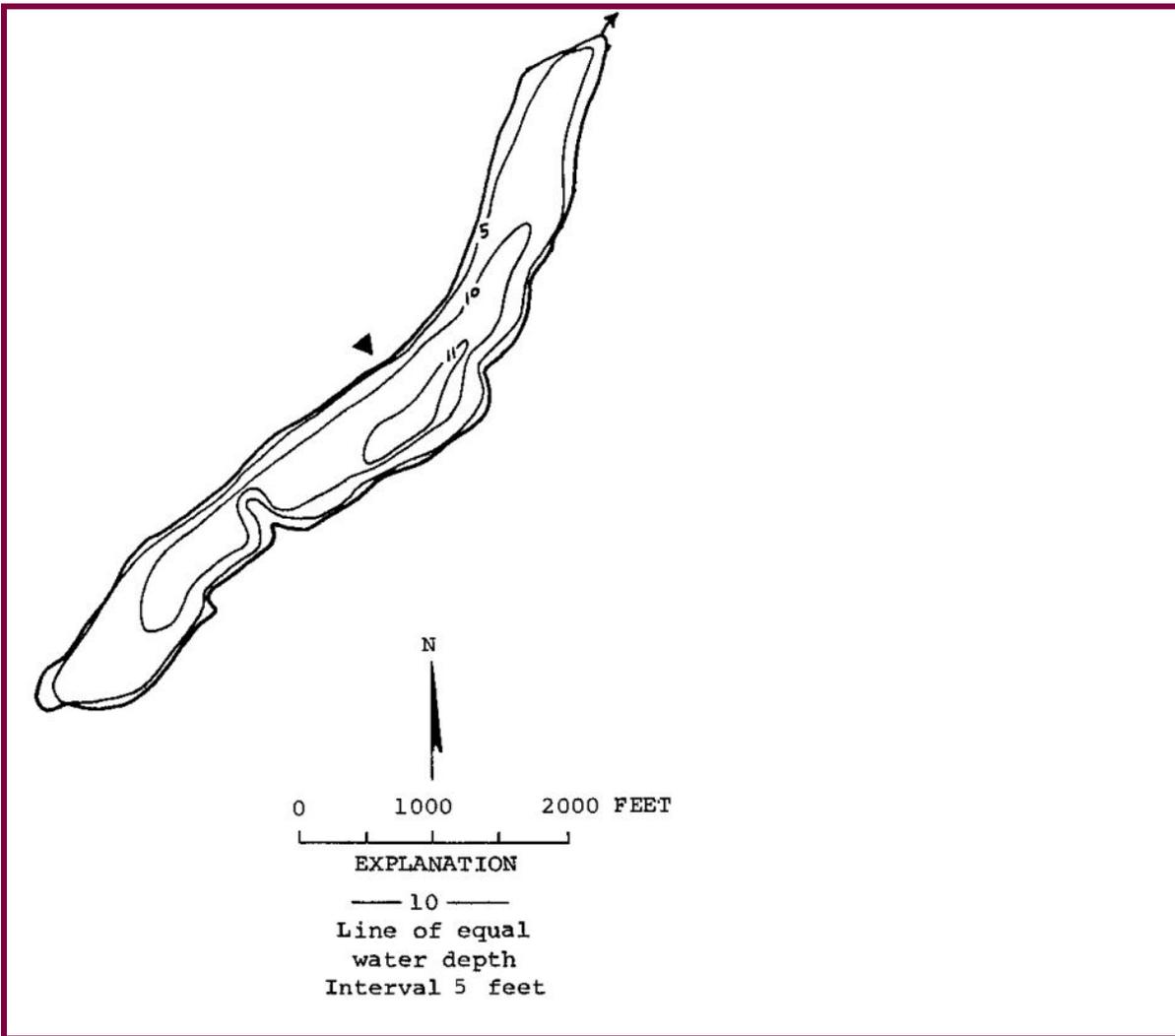
THURSTON County

Lake ID: MCITH1

Ecoregion: 2

Lake McIntosh is located four miles east of Tenino. It has no surface inlets, and drains via an unnamed outlet to the Deschutes River.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
93	11	8	2	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
700	2.65	336	46 51 41.	122 46 29.



Station Information

MCITH1

Primary Station	Station # 1	latitude: 46 51 29.5	longitude: 122 45 39.5
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

MCINTOSH

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 52	B, J
TSI_Phos:	
TSI_Ch1:	
Narrative TSI: ^b	E

Summary Comments:

The general water quality for McIntosh Lake was poor in 1998. The Secchi depth readings ranged from 0.6 meters (2.0 feet) to 2.7 meters (8.8 feet) with a mean of 1.7 meters (5.5 feet). For comparison, Secchi data collected in 1996 showed a mean of 1.6 meters (5.3 feet).

No chemistry data was collected for McIntosh Lake in 1998.

Very few geese or other waterfowl were counted on the lake by the volunteer monitor between May and October.

Algae blooms occurred during the last part of June and again at the beginning of September. Also the volunteer monitor noted in August that *Elodea canadensis* (waterweed) was visible growing all the way to the surface of the lake.

Only one site visit was made by Ecology staff in 1998. No thermal stratification was observed during this site visit. In addition, no oxygen depletion was noted in the water column in spite of the large number of plants occurring in the lake. The most likely reason for this lack of low dissolved oxygen is the very shallow nature of the lake allowing for easy mixing of the entire water column. The maximum depth of the lake is 3.3 meters (11.0 feet) with a mean depth of 2.4 meters (8.0 feet).

Based on Secchi depth data and the large mass of aquatic plants, McIntosh Lake is classified as eutrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

MCINTOSH

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/10/1998		19	8.83 B	2	75	2	3	4	3	0	2	0	0
	Sampler:	KELLOGG		Remarks:									
6/10/1998			8.83		0						0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									
6/29/1998		25	7.5 B	2	0	1	1	4	4	0	1	1	0
	Sampler:	KELLOGG		Remarks: WATER HAS GRAINY APPEARANCE.									
7/26/1998		30	5.5	2	0	2	1	4	4	0	3	3	0
	Sampler:	KELLOGG		Remarks:									
8/17/1998		23	3	5	75	1	3	4	3	6	4	2	0
	Sampler:	KELLOGG		Remarks: ELODEA VISIBLE AT SURFACE (SPARSE). LESS WEEDS AND ALGAE THAN USUAL; LAKE LOOKS GOOD FOR THIS TIME OF YEAR.									
9/1/1998		26	2	3	0	2	1	2	2	0	2	0	0
	Sampler:	KELLOGG		Remarks: WATER VERY MURKY, ALGAE BLOOM. FILM PRESENT AT SHORELAINE.									
9/27/1998		18	6	4	25	1	1	4	3	0	0	0	0
	Sampler:	KELLOGG		Remarks:									

Profile Report

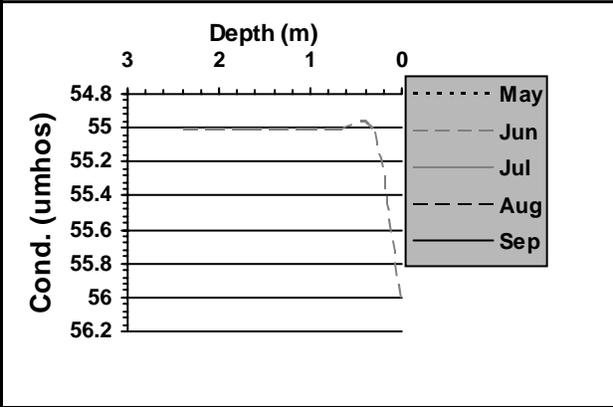
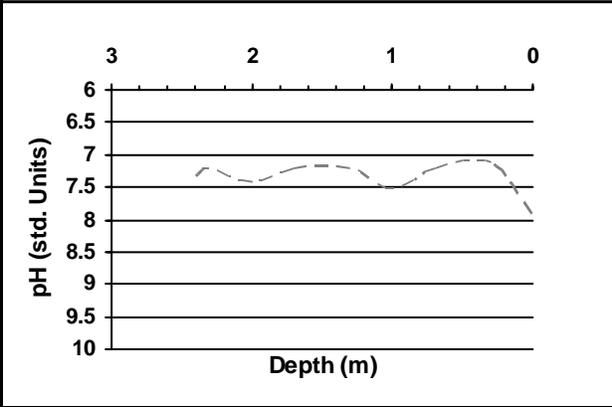
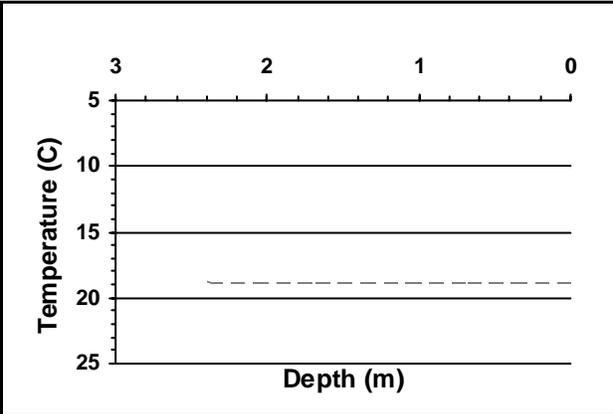
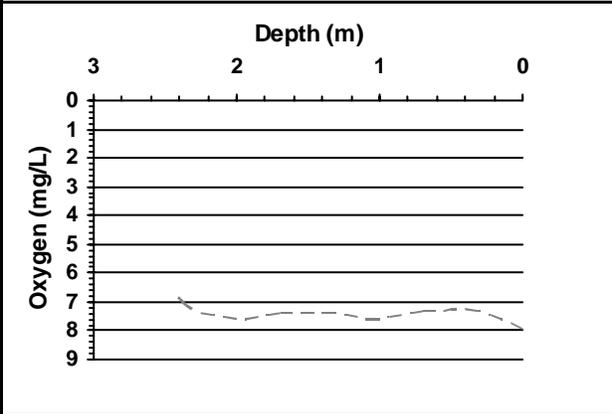
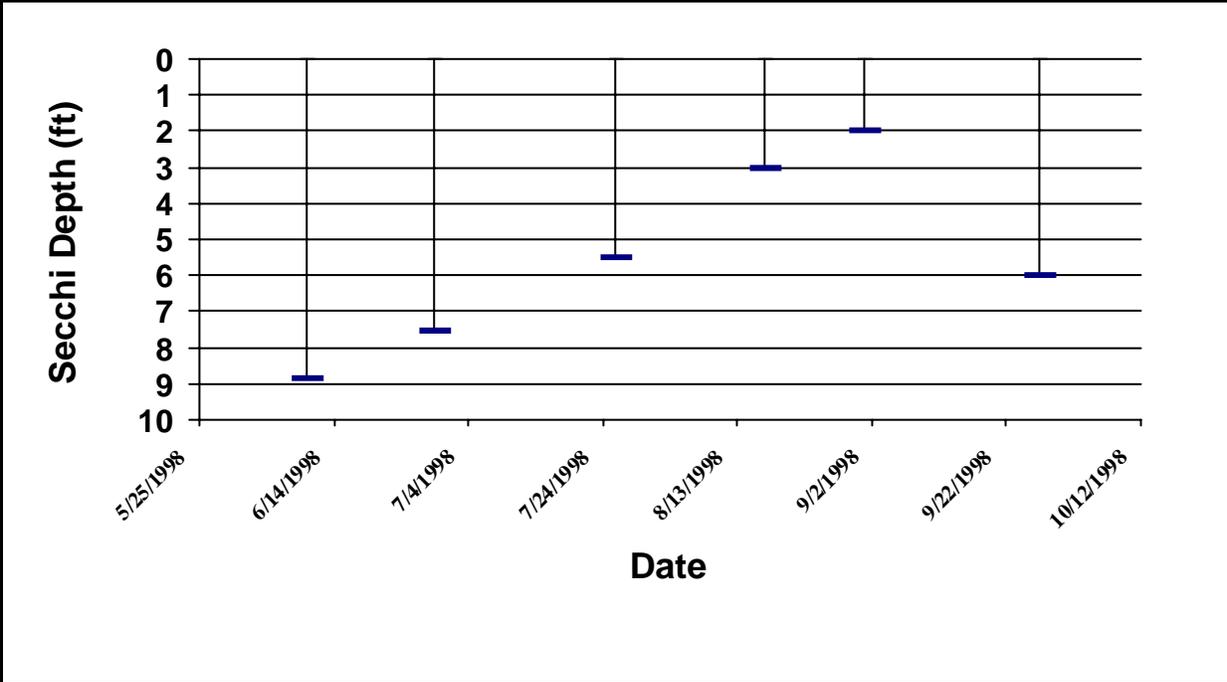
MCINTOSH

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/10/1998						
		0	56	7.9	7.9	18.9
		0.3	55	7.26	7.1	18.9
		0.7	55	7.27	7.2	18.9
		1	55	7.53	7.5	18.9
		1.3	55	7.32	7.2	18.9
		1.7	55	7.37	7.2	18.9
		2	55	7.54	7.4	18.8
		2.3	55	7.24	7.2	18.8
		2.4	55	6.71	7.3	18.7

Secchi Depth and Profile Graphics

Station: 1

MCITH1



Station Information

MCITH1

Primary Station	Station # 1	latitude: 46 51 29.5	longitude: 122 45 39.5
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

MCINTOSH

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 49	B, J, W
TSI_Phos:	55	
TSI_Ch1:		
Narrative TSI:	^b E	

Summary Comments:

The general water clarity of McIntosh Lake was good in 1999; the volunteer monitor's Secchi disk hit the bottom of the lake over 60% of the time. McIntosh Lake is very shallow throughout the entire lake. The Secchi depth readings ranged from 1.5 meters (5.0 feet) to 2.6 meters (8.5 feet) with a mean Secchi depth of 2.1 meters (7.0 feet). For comparison, in 1998 the mean Secchi depth was 1.7 meters (5.6 feet).

Geese and/or other waterfowl were seen on McIntosh Lake by the volunteer monitor during seven of his eight sampling visits made between June and October.

The chemistry data collected for McIntosh Lake showed high phosphorus levels in the epilimnion. This level of phosphorus indicates a high level of productivity where algae growth has the "potential" to be heavy, last long and interfere with recreational and other uses of the lake. No algal blooms were reported by the volunteer monitor this year; however he did report heavy aquatic plant growth beginning in July.

Ecology staff made two site visits in 1999. Dissolved oxygen levels remained constant throughout the water column and no thermal stratification was observed during the first site visit (6/2/1999). During the second site visit (8/17/1999), a slight lowering of the dissolved oxygen levels in the bottom part of the water column was observed but again no thermal stratification was noted. Excessive plant growth was also seen during Ecology's second site visit.

Based on the Secchi depth data and the phosphorus levels, McIntosh Lake is classified as eutrophic. Because of the clarity of the water throughout the water column and the lack of notable algal presence, it is possible the Secchi readings could be higher if the lake was deeper potentially resulting in a different Trophic State Index assessment.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

MCINTOSH

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
------	------	--------	-----------------	-----------------	-------	----------------------------	-------------------------------------	--------------------	-------------------	--------------------

Station 1

6/2/1999 1200 E 24.8

8/17/1999 1200 E 40.5

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

MCINTOSH

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/2/1999		17	8.5 B	3	75	3	2	4	4	0	0	1	0
	Sampler:	KELLOGG		Remarks:	Used a view tube. Volunteer noticed a big increase in algae and plant growth when watershed was logged(8 years ago) and lake was rotenoned (10 years ago) but things have gotten better since then. Lake stocked with trout regularly.								
6/20/1999		20	8 B	6	75	2	1	4	4	25	0	7	0
	Sampler:	KELLOGG		Remarks:	Used a view tube.								
7/5/1999		18	8 B	2	0	3	2	4	4	0	5	7	0
	Sampler:	KELLOGG		Remarks:	Used a view tube.								
7/25/1999		22	7	2	25	1	2	4	4	12	12	2	0
	Sampler:	KELLOGG		Remarks:	Used a view tube. Aquatic vegetation reaching the lake surface.								
8/4/1999		26	7.5 B	2	0	1	1	4	3	6	7	2	0
	Sampler:	KELLOGG		Remarks:	Used a view tube. Aquatic vegetation is beginning to mat on lake surface.								
8/17/1999		21	6 B	2	0	2	3	3	3	1	0	0	0
	Sampler:	KELLOGG		Remarks:	Used a view tube. Heavy plant growth and turbidity. Volunteer thinks lake is getting clearer as time goes on. Sampling day was sunny and calm. Secchi disk hit bottom and entered weeds - hard to see it.								
9/8/1999		22	5.5 W	6	0	1	1	3	3	0	6	1	0
	Sampler:	KELLOGG		Remarks:	Used a view tube.								
9/23/1999		18	5 W	3	75	2	2	4	3	0	3	0	0
	Sampler:	KELLOGG		Remarks:	Used a view tube.								

Profile Report

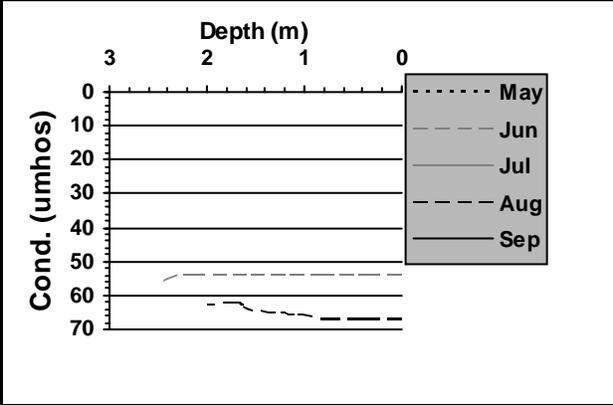
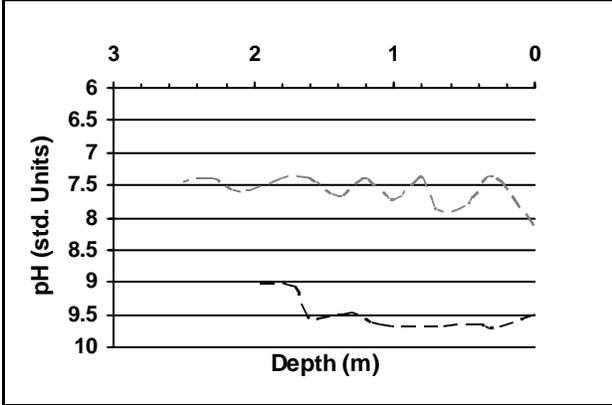
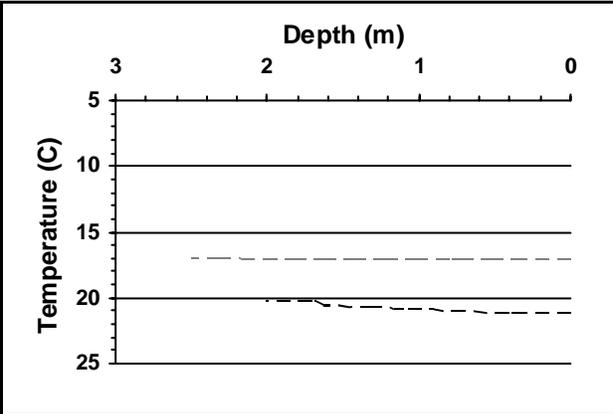
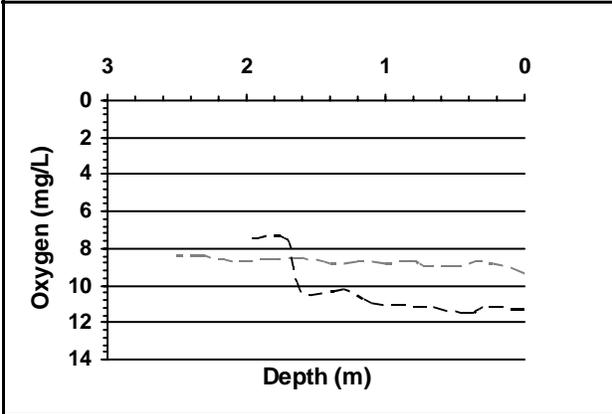
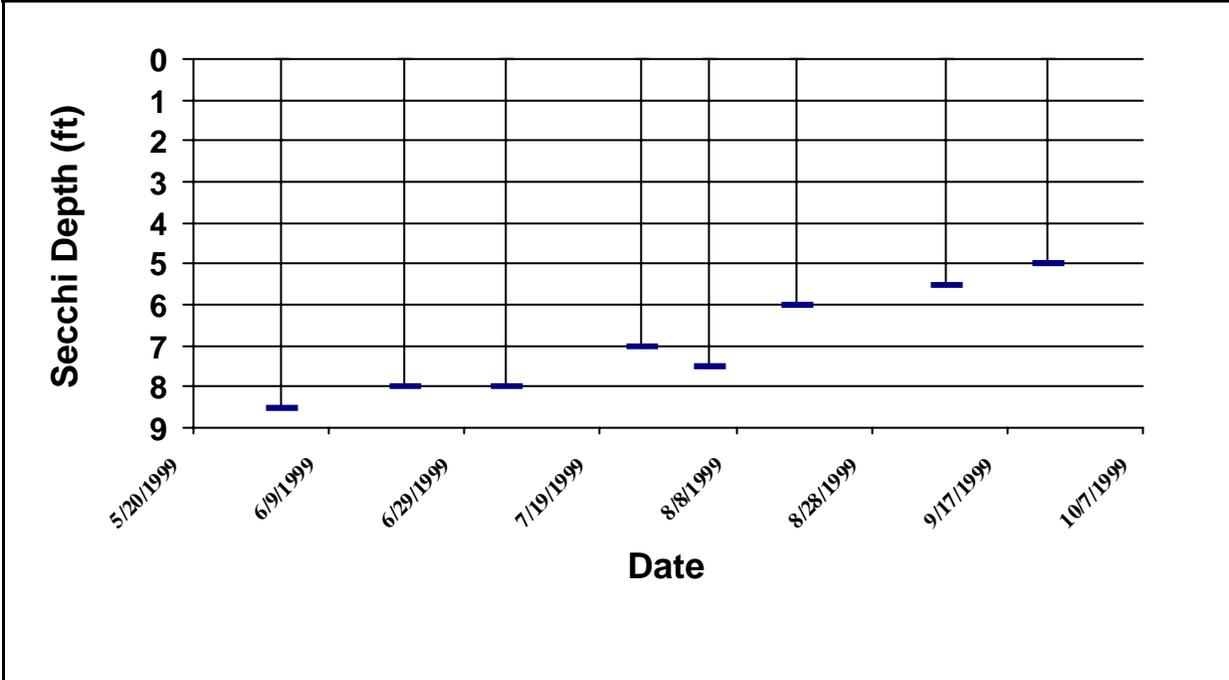
MCINTOSH

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/2/1999						
		0	53.5	9.26	8.1	17.08
		0.3	53.5	8.64	7.33	17.1
		0.5	53.5	8.84	7.8	17.1
		0.7	53.5	8.91	7.85	17.1
		0.8	53.5	8.64	7.33	17.09
		1	53.4	8.79	7.71	17.09
		1.2	53.5	8.64	7.37	17.07
		1.4	53.5	8.73	7.65	17.08
		1.6	53.5	8.41	7.38	17.05
		1.8	53.5	8.51	7.37	17.07
		2.1	53.4	8.64	7.59	17.04
		2.3	53.5	8.33	7.37	16.95
		2.5	56.2	8.37	7.44	16.95
8/17/1999						
		0	66.5	11.27	9.47	21.14
		0.3	66.4	11.11	9.7	21.07
		0.4	66.3	11.43	9.63	21.03
		0.7	66.4	11.09	9.66	20.97
		1.1	65.6	10.93	9.63	20.83
		1.3	64.7	10.19	9.46	20.62
		1.6	63.6	10.38	9.55	20.44
		1.7	62.1	7.47	9.06	20.21
		2	62.5	7.39	9	20.16

Secchi Depth and Profile Graphics

Station: 1

MCITH1



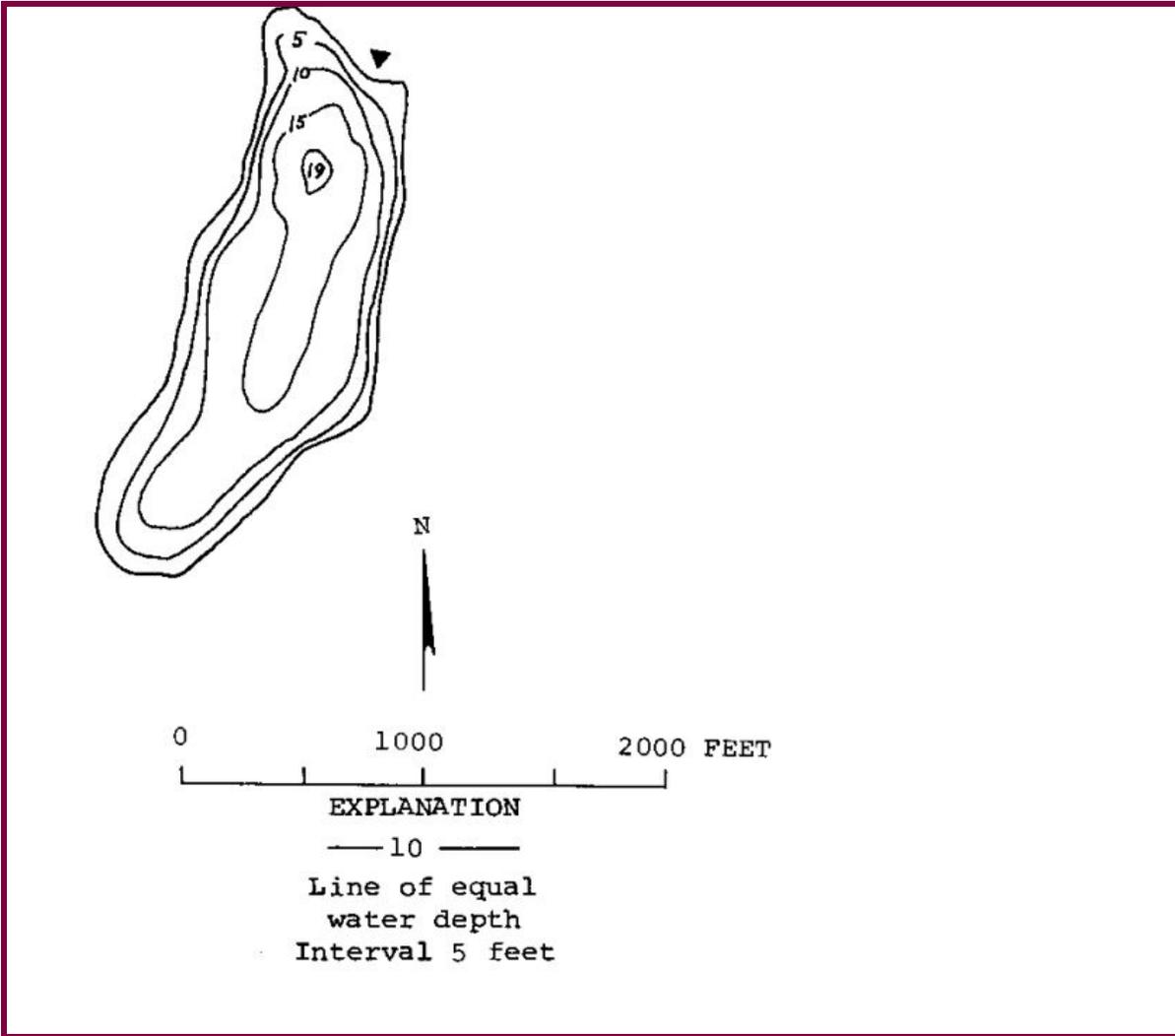
MUNN

THURSTON County

Lake ID: MUNTH1

Ecoregion: 2

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
34	19	10	1	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
350	1.08	139	46 58 56.	122 52 49.



Trophic State Assessment for 1998

MUNN

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 57	J
TSI_Phos:		
TSI_Ch1:		
Narrative TSI:	^b E	

Summary Comments:

The water clarity for Munn Lake was poor for 1998. The Secchi depth readings ranged from 0.9 meters (3.0 feet) to 1.9 meters (6.0 feet) with a mean Secchi depth of 1.4 meters (4.5 feet). This was the first year Munn Lake was monitored so comparison with previous year's data is not possible.

No chemistry data was collected for Munn Lake in 1998.

Twenty geese were counted by the volunteer monitor on 6/1/98 but few to none were seen on the lake after that date. Other waterfowl were observed on the lake during the month of August.

Two site visits were made by Ecology staff in 1998. Thermal stratification of the lake and low dissolved oxygen levels in the hypolimnion were observed during both of the site visits.

The only non-native aquatic plant noted at the lake was *Nympahaea odorata* (fragrant waterlily). This plant rings the entire lake. The sheer mass of these plants can cause impairment to boating, fishing and swimming.

Based on Secchi depth data, Munn Lake is classified as eutrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

MUNN

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/1/1998		18	6.08	6	50	2	2	4	3	20		2	0
	Sampler:	WARD		Remarks:	LAKE HEIGHT MEASURED FROM TOP OF SCREW HEAD ON CEDAR POST TO WATER SURFACE. SCREW PLACED ON POST 6 INCHES ABOVE THE WATER SURFACE ON 6/1/98.								
6/1/1998			6.08		0						0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									
6/14/1998		18.5	6		50	3	2	5	5	0	0		0
	Sampler:	WARD		Remarks:									
6/27/1998		18.5	4.5	7	50	2	4	5	5			0	0
	Sampler:	WARD		Remarks:									
7/18/1998		23	3	6	75	2	2	5	5	3	5	3	0
	Sampler:	WARD		Remarks:									
8/15/1998		23	4		50	1	1	4	4	0	18	4	0
	Sampler:	WARD		Remarks:									
8/25/1998		25	3.42	7	50	2	3	4	4		17	1	0
	Sampler:	WARD		Remarks:									
8/25/1998			3.42		0					0	0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									

Profile Report

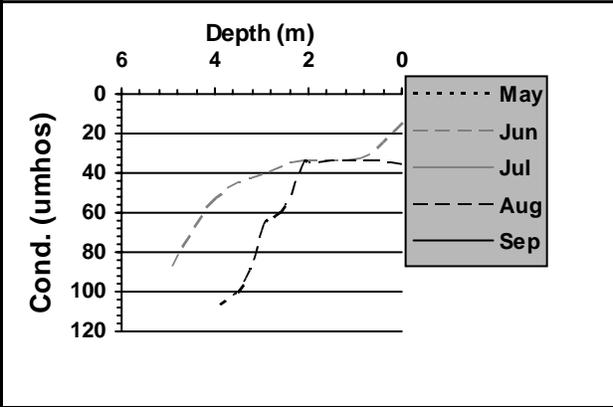
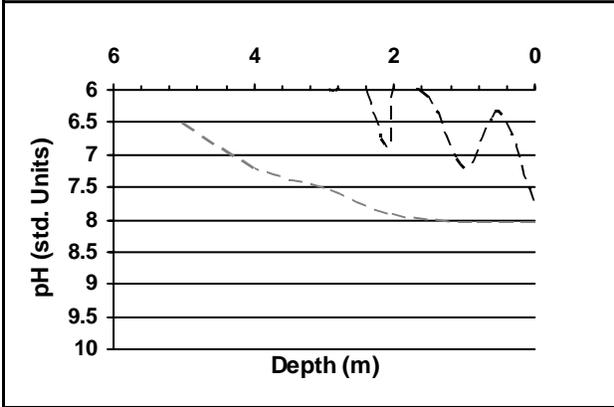
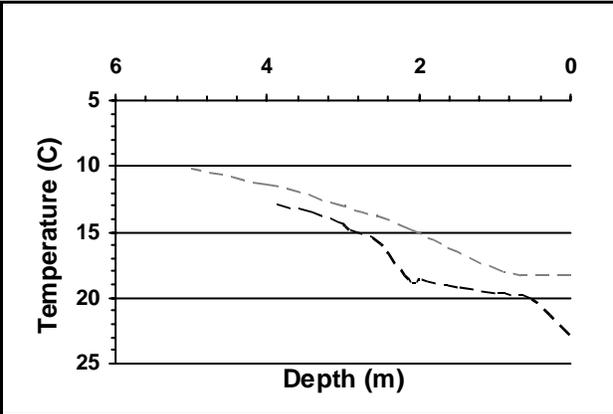
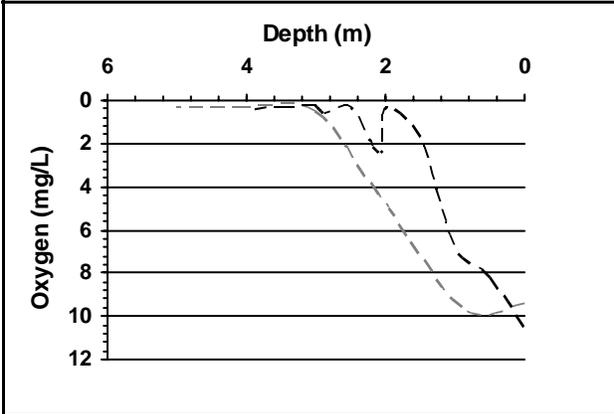
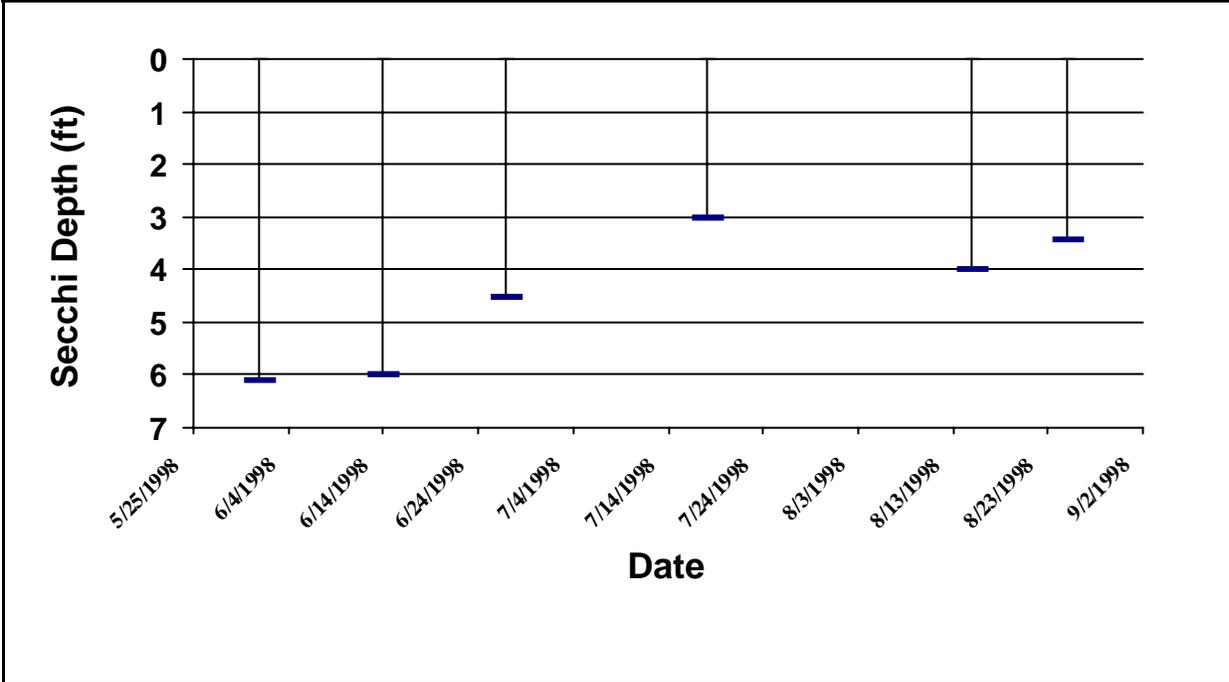
MUNN

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/1/1998						
		0	14	9.37	8	18.2
		0.9	32	9.5	8	18
		2.1	33	4.27	7.9	14.7
		3	40	.48	7.5	13
		4	52	.3	7.2	11.3
		5	88	.23	6.5	10.1
8/25/1998						
		0	35	10.43	7.7	22.8
		0.5	33	8.14	6.3	20.1
		1	33	6.73	7.2	19.6
		1.5	33	1.69	6.1	19.1
		2	34	.25	5.9	18.5
		2.1	33	2.41	6.9	18.9
		2.5	56	.23	5.8	15.8
		2.9	63	.56	6	14.7
		3	66	.22	5.8	14.3
		3.4	96	.26	5.9	13.4
		3.9	106	.33	5.9	12.8

Secchi Depth and Profile Graphics

Station: 1

MUNTH1



NAHWATZEL

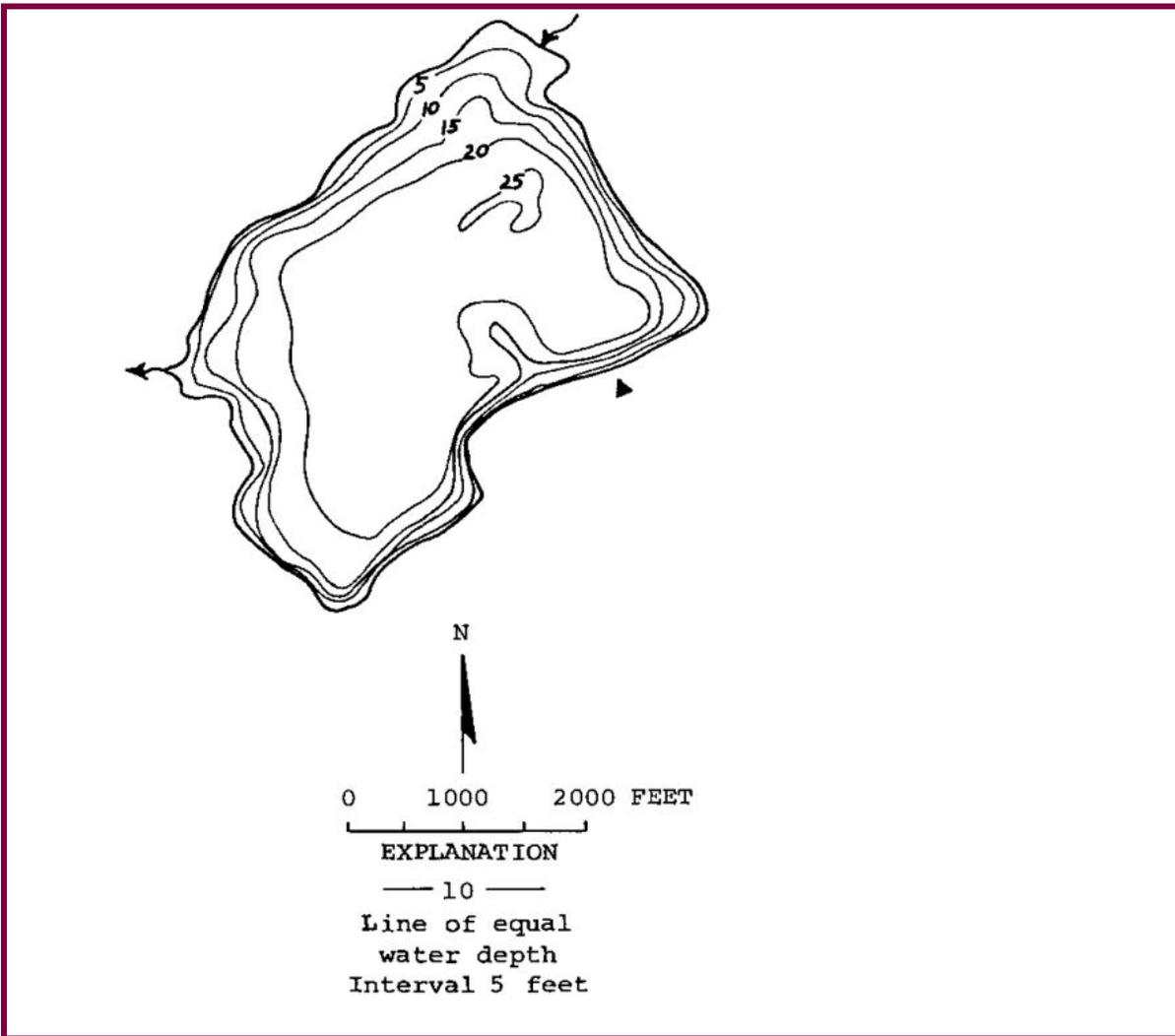
MASON County

Lake ID: NAHMA1

Ecoregion: 2

Lake Nahwatzel is located 11 miles west of Shelton. It has two unconfirmed inlets, and drains via Outlet Creek to the East Fork of the Satsop River. The outlet seeps through a swampy area.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
269	25	17	6	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
4642	2.92	440	47 14 08.	123 20 08.



Station Information

NAHMA1

Primary Station	Station # 1	latitude: 47 14 43.3	longitude: 123 19 37.0
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

NAHWATZEL

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 37	J
TSI_Phos:		
TSI_Ch1:		
Narrative TSI:	^b O	

Summary Comments:

The general water clarity for Lake Nahwatzel was very good in 1998. The Secchi depth readings ranged from 3.7 meters (12.0 feet) to 6.1 meters (20.0 feet) with a mean Secchi depth of 5.1 meters (16.7 feet). For comparison, in 1997 the mean Secchi depth reading was 5.3 meters (17.5 feet).

No chemistry data was collected for Lake Nahwatzel in 1998.

Only one site visit was made by Ecology staff in 1998. There was no thermal stratification observed and dissolved oxygen levels remained high throughout the water column.

A large number (28) of geese was observed by the volunteer monitor only on 6/27/1998.

Based on Secchi depth data and the high levels of dissolved oxygen throughout the water column, Lake Nahwatzel is classified as oligotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

NAHWATZEL

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/16/1998		15.6	20	2	0	1	1	5	5	0	2	3	0
	Sampler:	FOWBLE		Remarks:	SUNNY , 58 DEGREES.								
5/30/1998		16.1	12	2	100	2	4	5	5	0	0	1	0
	Sampler:	FOWBLE		Remarks:									
6/13/1998		17.8	15	2	75	3		5	5	0		3	0
	Sampler:	FOWBLE		Remarks:	ONE BALD EAGLE, ONE OSPREY - FRIDAY EVENING.								
6/27/1998		19.4	17	2	75	1	3	5	5	28	0	1	2
	Sampler:	FOWBLE		Remarks:	TWO OSPREY ON 6/27/98; TWO EAGLES ON 6/20/98.								
7/10/1998		21.1	14	2	75	3	1	4	4	0	0	0	0
	Sampler:	FOWBLE		Remarks:	SAW THREE OSPREY ON 7/3/98.								
7/26/1998		24.4	20	2	0	1	1	5	5	0	0	0	1
	Sampler:	FOWBLE		Remarks:									
8/9/1998		23.3	17.5	2	0	2	1	5	5	1	2	0	0
	Sampler:	FOWBLE		Remarks:									
8/29/1998		21.7	18	2	0	2	1	5	5	0	18	2	0
	Sampler:	FOWBLE		Remarks:									
9/16/1998		22.2	19	2		2	1	5	5	0	0	0	0
	Sampler:	FOWBLE		Remarks:	SUN AND 74 DEGREES.								

Profile Report

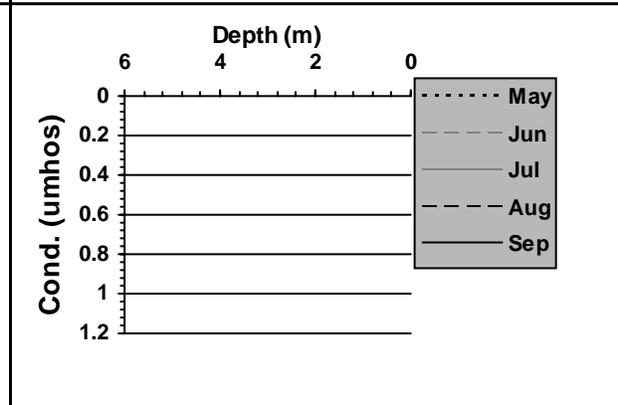
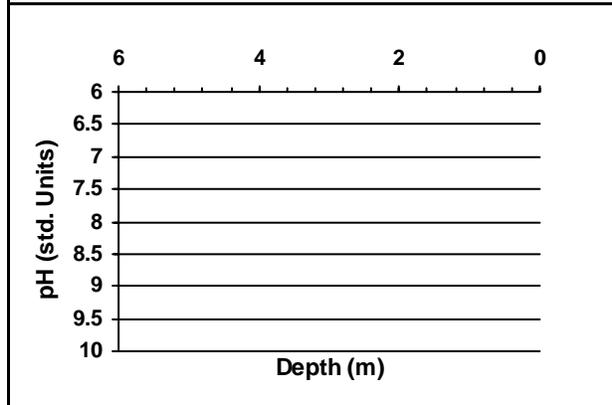
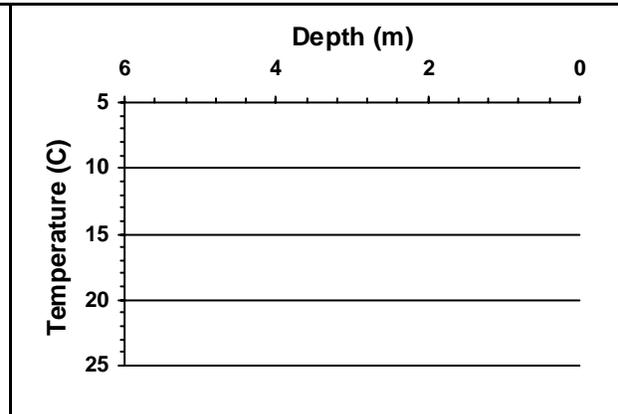
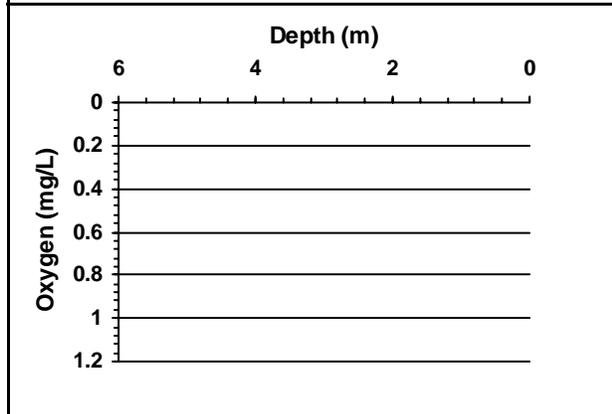
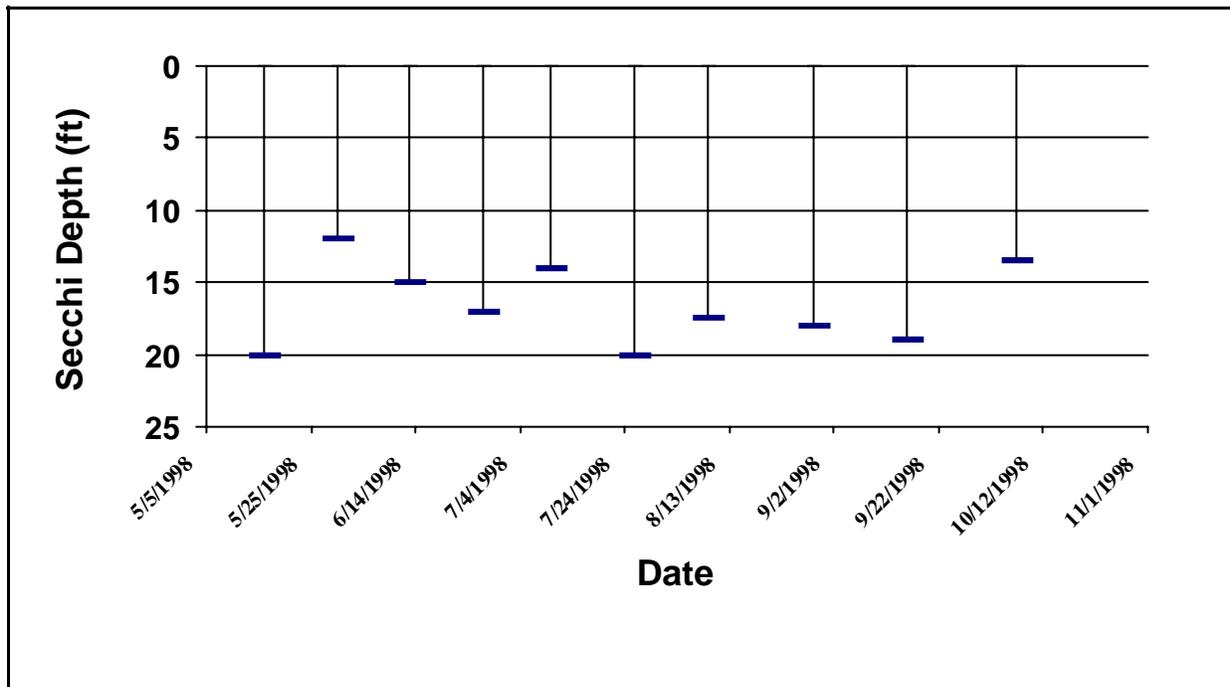
NAHWATZEL

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
10/7/1998						
		0	19	9.38	8.2	17
		0.2	18	9.45	7.5	16.9
		1.1	19	9.25	7.8	17
		1.2	18	9.25	7.5	17
		2	19	9.2	7.7	17
		2.6	18	9.21	7.4	16.9
		2.9	19	9.19	7.6	17
		3.2	19	9.2	7.4	16.9
		3.7	18	9.21	7.4	17
		5	18	9.19	7.4	17
		5.3	18	9.22	7.3	17

Secchi Depth and Profile Graphics

Station: 1

NAHMA1



Station Information

NAHMA1

Primary Station	Station # 1	latitude: 47 14 43.3	longitude: 123 19 37.0
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

NAHWATZEL

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	34
TSI_Phos:		32
TSI_Ch1:		
Narrative TSI:	^b	O

Summary Comments:

The general water clarity of Lake Nahwatzel was excellent in 1999. The Secchi depth readings ranged from 5.2 meters (17.0 feet) to 7.0 meters (23.0 feet) with a mean Secchi depth of 6.0 meters (19.6 feet). For comparison, in 1998 the mean Secchi depth was 5.1 meters (16.7 feet).

Only a few geese and/or other waterfowl were seen on Lake Nahwatzel by the volunteer monitor during his sampling visits made between May and October.

The chemistry data collected for Lake Nahwatzel showed low phosphorus levels in the epilimnion. This level of phosphorus indicates a very low level of productivity where algae growth is not a problem. No algal blooms were reported by the volunteer monitor this year.

Ecology staff made two site visits in 1999. Dissolved oxygen levels remained constant throughout the water column during both visits (6/16/1999 and 9/1/1999) and only a very slight degree of thermal stratification was observed during the first of the two Ecology site visits.

Based on the Secchi depth data, the low phosphorus levels and the lack of low dissolved oxygen levels in the hypolimnion, Lake Nahwatzel is classified as oligotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

NAHWATZEL

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
------	------	--------	-----------------	-----------------	-------	----------------------------	-------------------------------------	--------------------	-------------------	--------------------

Secchi Data and Field Observations

NAHWATZEL

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/22/1999		60	18.5	2	0	2	1	5	5	0	1	1	0
	Sampler: FOWBLE			Remarks: Did not use a view tube. Saw 1 bald eagle and 1 osprey.									
6/13/1999		66	23	2	75	1	1	5	5	0	0	0	0
	Sampler: FOWBLE			Remarks: Did not use a view tube.									
6/16/1999			19										
	Sampler: FOWBLE			Remarks:									
6/26/1999		65	17	2	100	1		4	4	0	0	2	0
	Sampler: FOWBLE			Remarks: Did not use a view tube.									
7/9/1999		70	20.5	2	0	1	1	5	5	25	4	0	2
	Sampler: FOWBLE			Remarks: Did not use a view tube.									
7/17/1999					100	2	5	5	5	0	0	1	
	Sampler: FOWBLE			Remarks: Boat not available for sampling.									
8/21/1999		66	18	2	75		2	5	5	0	0		
	Sampler: FOWBLE			Remarks: Did not use a view tube.									
9/1/1999			18										
	Sampler: FOWBLE			Remarks: No stratification - temperature constant throughout water column. No algae blooms reported or other problems noted. Water seemed clear, no odors. Some construction noted along the shoreline. Sampling day was sunny, slight breeze.									
9/22/1999		68	22	2	0	2	1	5	5	0	0	0	0
	Sampler: FOWBLE			Remarks: Did not use a view tube.									

Profile Report

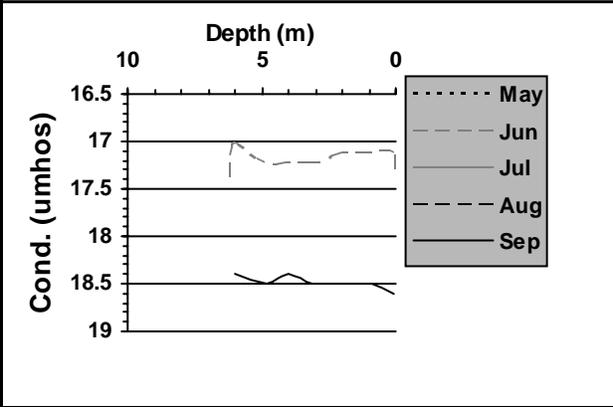
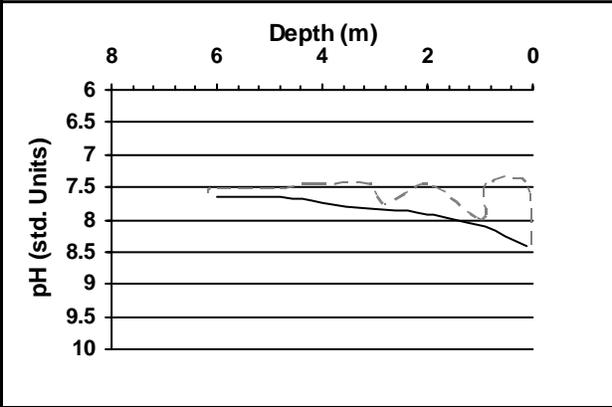
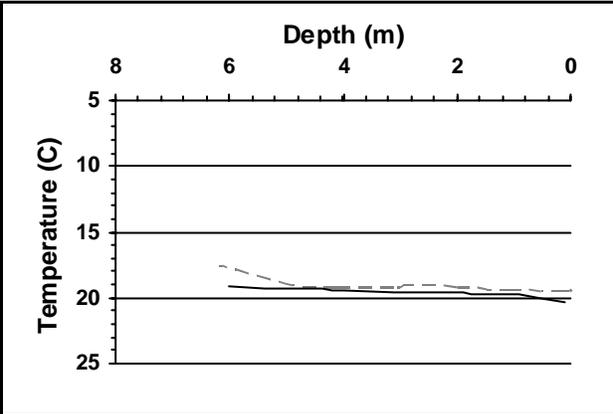
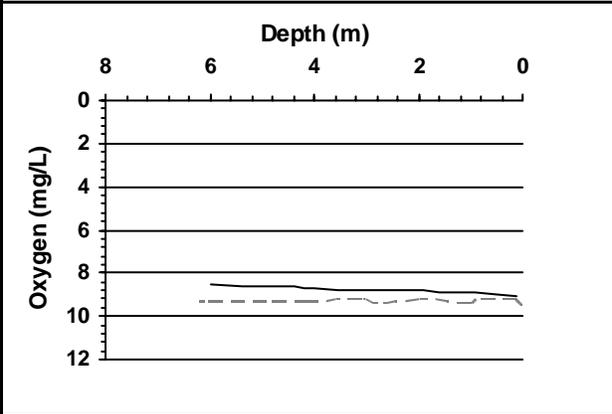
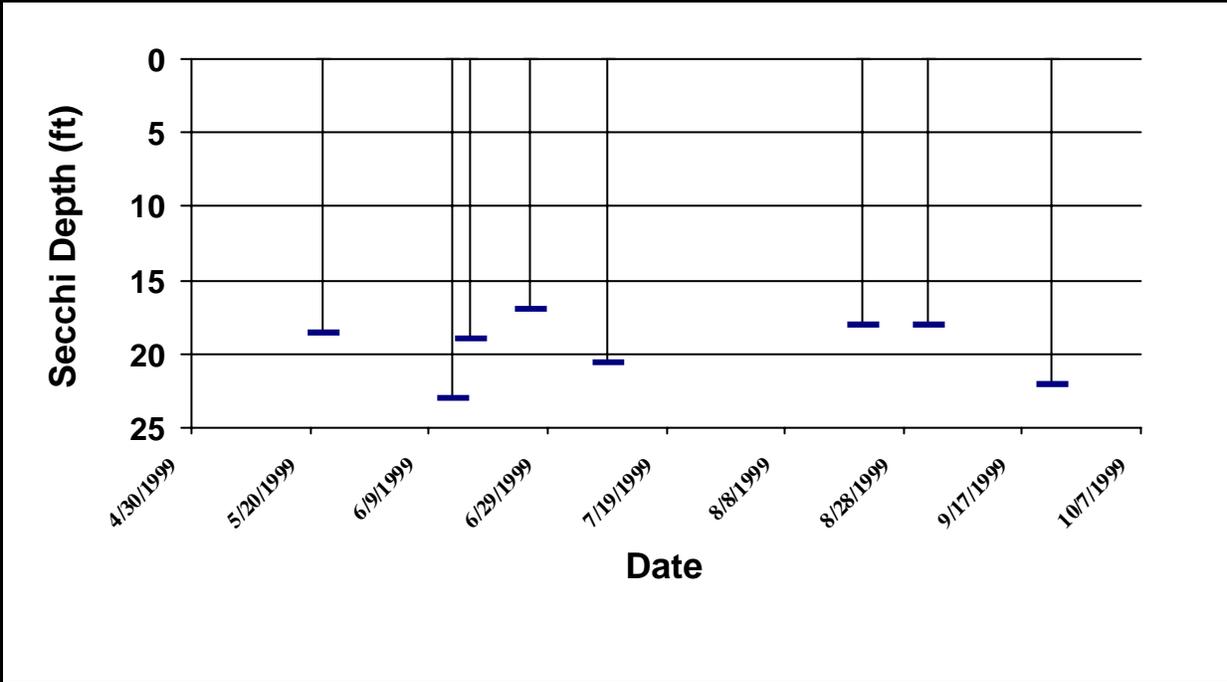
NAHWATZEL

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/16/1999						
		0	17.3	9.57	8.37	19.31
		0.1	17.1	9.12	7.41	19.49
		0.9	17.1	9.14	7.43	19.26
		1	17.1	9.38	7.98	19.32
		2	17.1	9.19	7.42	19.14
		2.8	17.2	9.31	7.74	18.97
		3.1	17.2	9.19	7.43	19.11
		4.1	17.2	9.23	7.45	19.12
		4.9	17.2	9.21	7.49	18.99
		6.1	17	9.22	7.49	17.54
		6.2	17.4	9.27	7.6	17.49
9/1/1999						
		0.1	18.6	9.11	8.4	20.36
		0.9	18.5	8.93	8.11	19.74
		1.6	18.5	8.84	7.99	19.69
		2.2	18.5	8.83	7.89	19.64
		3.1	18.5	8.76	7.83	19.54
		4	18.4	8.7	7.74	19.45
		4.8	18.5	8.63	7.65	19.32
		6	18.4	8.56	7.64	19.21

Secchi Depth and Profile Graphics

Station: 1

NAHMA1



NEWMAN

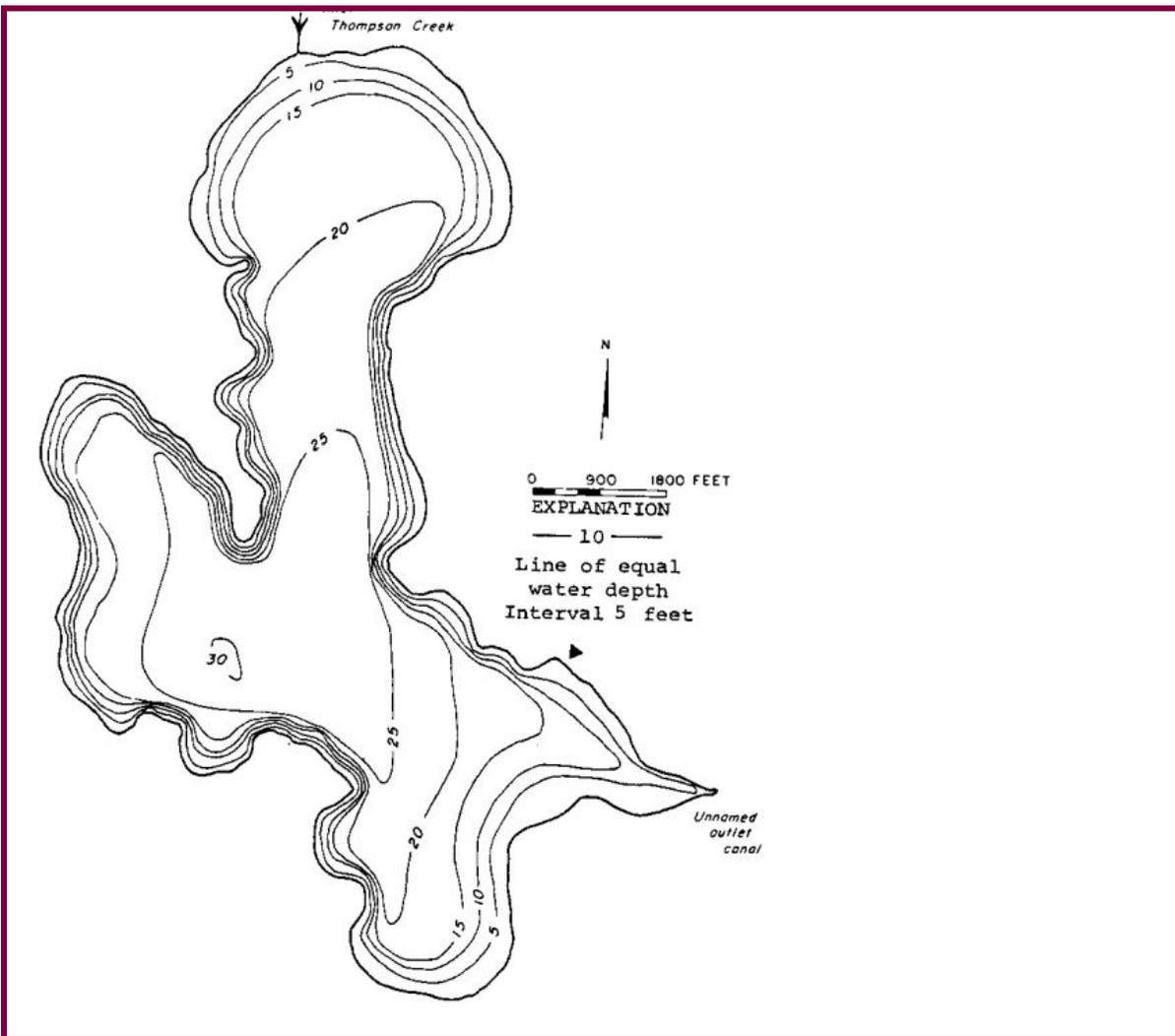
SPOKANE County

Lake ID: NEWSP1

Ecoregion: 7

Newman Lake is located approximately 7 miles northeast of Spokane and approximately 2 miles west of the Idaho border. The inlet for the lake is Thompson Creek. The outlet for the lake is through an unnamed canal.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
1200	30	19	29	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
23000	9.75	2124	47 45 38.	117 05 25.



Trophic State Assessment for 1998

NEWMAN

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	N
TSI_Phos:		
TSI_Ch1:		
Narrative TSI:	^b	

Summary Comments:

There were only two Secchi readings made by the volunteer monitor in 1998. This is not enough data to calculate a Trophic State Index assessment.

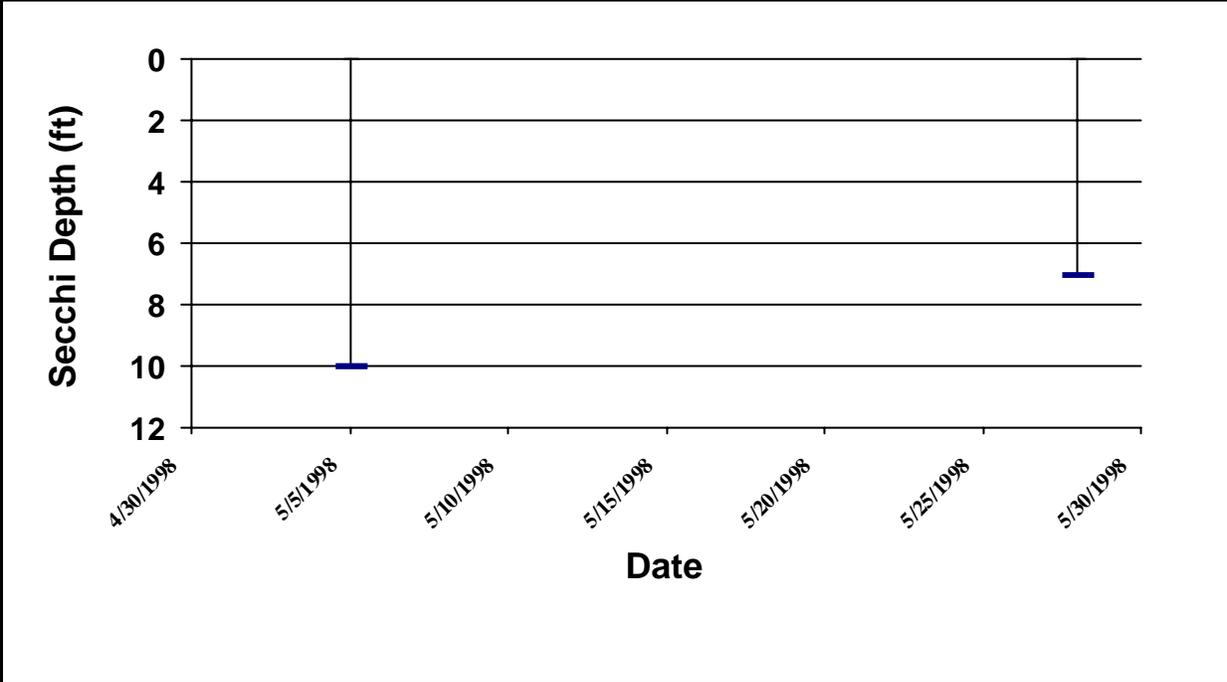
^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Depth and Profile Graphics

Station: 1

NEWSP1



--	--

--	--

Station Information

NEWSP1

Primary Station	Station # 1	latitude:	longitude:
	Description:		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

NEWMAN

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	N
TSI_Phos:	42	
TSI_Chlor:		
Narrative TSI:	^b	

Summary Comments:

There was only one Secchi reading made by the volunteer monitor in 1999. This is not enough data to calculate a Trophic State Index assessment.

The chemistry data collected for Newman Lake showed a moderate phosphorus level in the epilimnion indicating an elevated degree of productivity. At this phosphorus level algae could become a nuisance, though usually not for long periods of time.

Ecology staff made only one site visit in 1999. A very slight degree of thermal stratification was observed during this visit (7/29/1999) and low dissolved oxygen levels in the hypolimnion were noted.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

NEWMAN

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 1										
7/29/1999	1030	E	13.5							

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

NEWMAN

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
7/29/1999			5										
		Sampler: PUPO						Remarks: Water was very cloudy and smelly. Very eutrophic looking lake. No plant problems. Today, water is 2-3 times higher than normal. Aerator doesn't seem to be doing its job. Alum treatment (3 years ago) affected the fisheries. No sewer lines.					

Profile Report

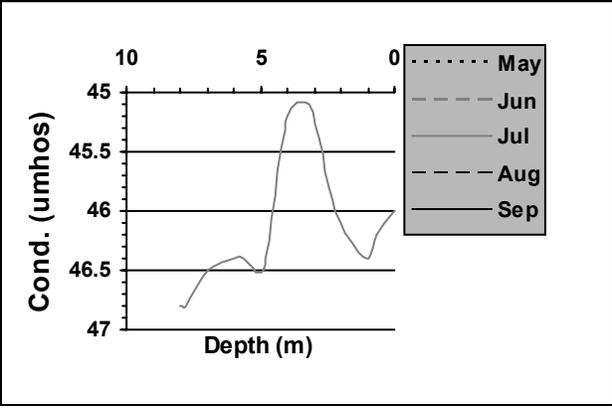
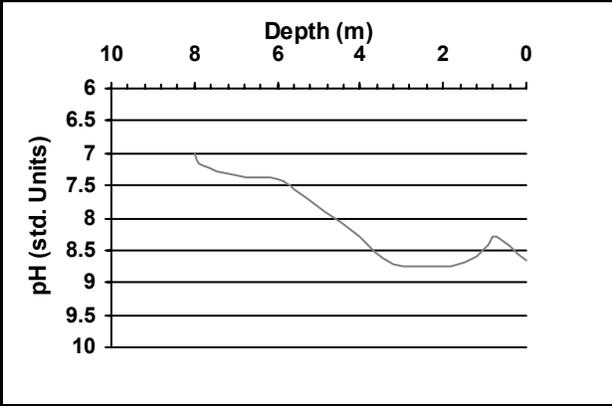
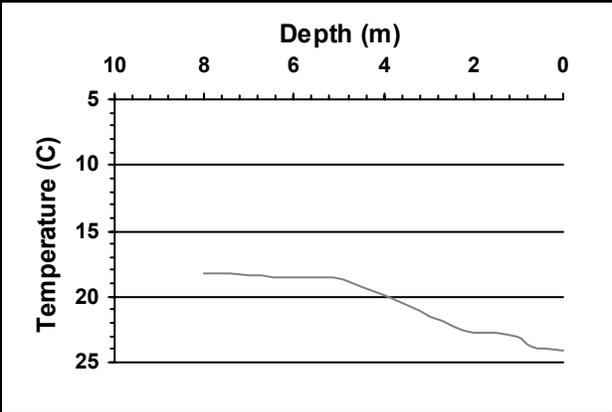
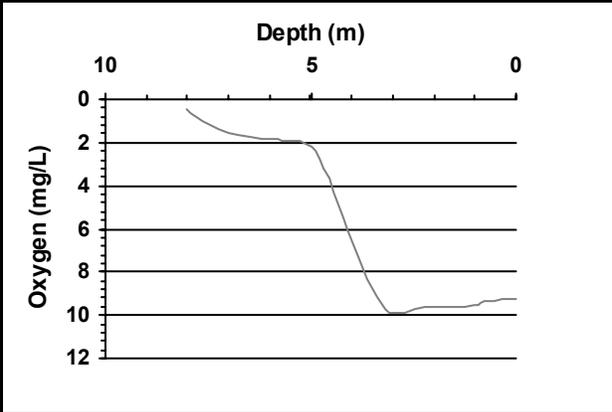
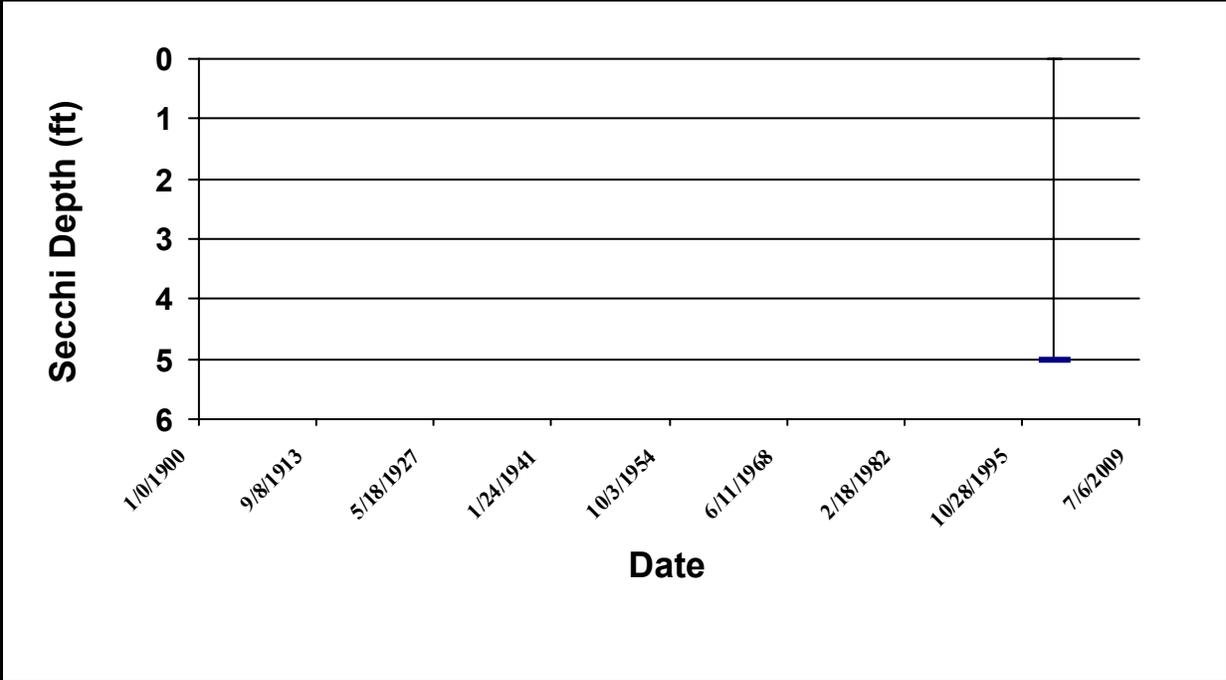
NEWMAN

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
7/29/1999						
		0	46	9.25	8.66	24.04
		0.7	46.2	9.38	8.3	23.77
		1	46.4	9.51	8.47	23.04
		1.5	46.3	9.59	8.68	22.67
		2.2	46	9.59	8.76	22.56
		3.2	45.1	9.68	8.73	21.04
		4	45.2	6.49	8.29	19.96
		4.9	46.5	2.42	7.89	18.61
		5.6	46.4	1.92	7.57	18.51
		6	46.4	1.79	7.41	18.48
		7	46.5	1.6	7.34	18.41
		7.8	46.8	.85	7.18	18.25
		8	46.8	.5	7.01	18.22

Secchi Depth and Profile Graphics

Station: 1

NEWSP1



OFFUTT

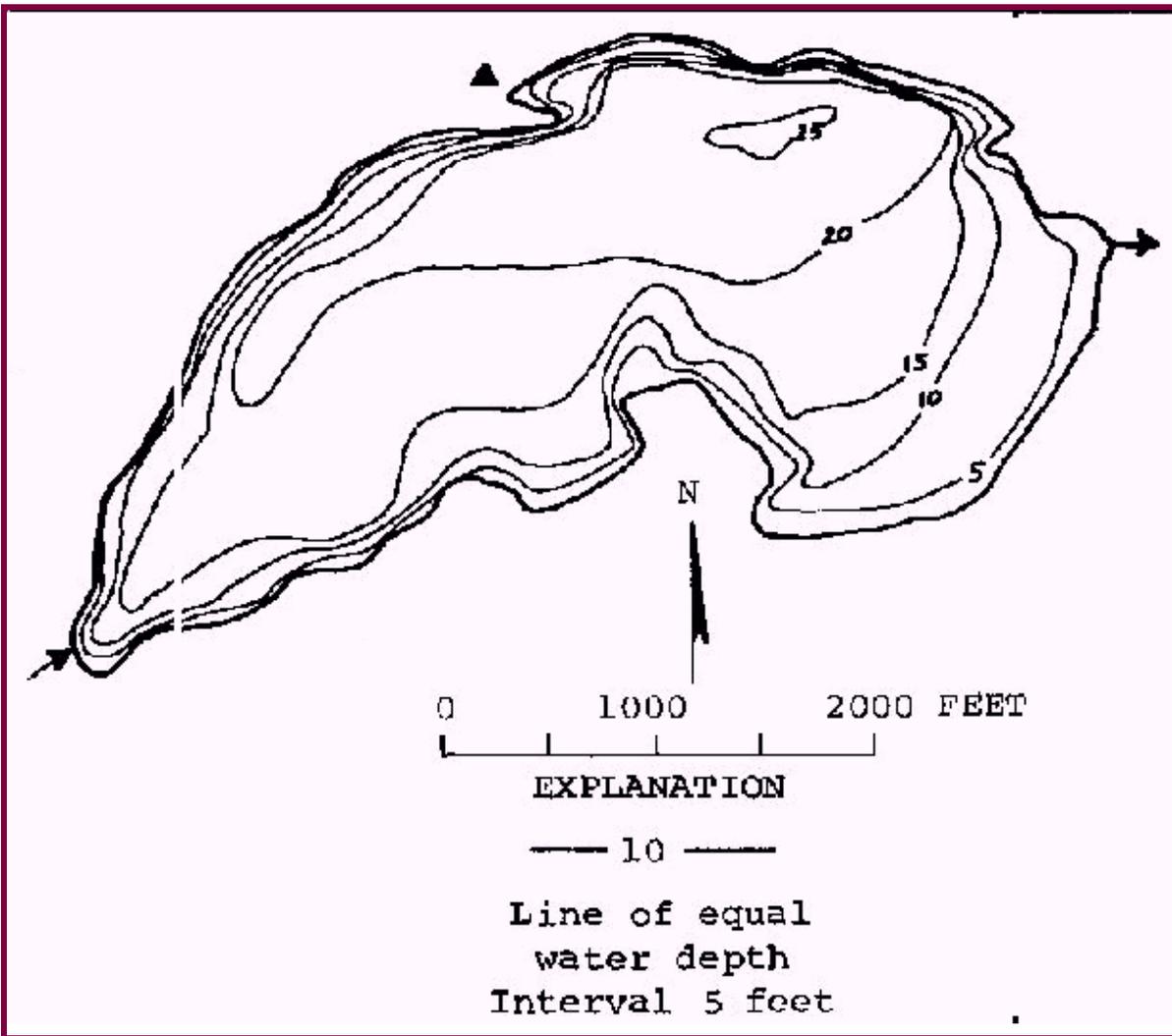
THURSTON County

Lake ID: OFFTH1

Ecoregion: 2

Offutt Lake is in rural Thurston County, about 10 miles south of Olympia. It is fed by an unnamed surface inlet and drains to the Deschutes River. There is a small resort on the lake; however the lake receives little recreational use. Livestock has access to the western shores of the lake.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
200	25	15	3	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
2900	2.86	230	46 55 06.	122 49 04.



vegetation has been allowed to flourish. Aquatic plants were generally sparse. Nutrients in the epilimnion were quite low except in September when concentrations may have been raised after mixing (mean total phosphorus 19.2). Water clarity somewhat indicates a mesotrophic lake despite the tannin colored water which may bias Secchi readings low. Hypolimnetic phosphorus concentrations were very high indicating internal loading. Our 1998 data indicate that Offutt Lake may be phosphorus limited in mid-summer and nitrogen limited in early and late summer. With only four samples in one season, however, this is a very tenuous conclusion; a more thorough examination into biologically active forms of both phosphorus and nitrogen may reveal the true dynamic of nutrient limitation. The habitat survey revealed a shoreline influenced by human structures and modifications. These modifications may not affect water quality much, but they may attract an undesirable population of Canada geese. There were no user surveys returned for Offutt Lake. There is a resort on the lake with a fishing dock so fishing is most likely a valued recreational use. Water quality measurements suggest a "put and take" fishery could be supported; zooplankton tended to be on the small side and dominated by copepods. There is an area where livestock water on the lake. Although there were colonies of blue-green algae observed in the water samples, dense algal blooms were not observed; lake water should be safe for drinking by livestock. There is the potential for livestock to contaminate water supplies with fecal material and nutrients; however, the water samples analyzed in 1998 for fecal coliform bacteria did not indicate a fecal contamination problem.

We recommend that the remaining natural shoreline be protected so that available habitat for Canada geese will not be artificially increased. We recommend the total phosphorus nutrient criterion for Offutt Lake be set at 20 ug/L, the action value in the water quality regulations for Puget Lowlands lower mesotrophic lakes. Due to the limitations of the sampling conducted during this study, it is difficult to determine whether nitrogen is also limiting to the system. Future studies may propose a nitrogen criterion. Some septic infiltration into the lake from some of the older homes along the lake may be occurring. In particular, these septic fields may be a source of nitrogen. Therefore, future investigation of Offutt Lake should include evaluating the effects of nitrogen in the system and consultation with Thurston County officials to determine whether or not there is a septic seepage problem.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

OFFUTT

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 0										
6/1/1998		L					10			
		L					4			

7/23/1998	L					25	
	L					9 J	
8/10/1998	L					4	
	L					6	
9/24/1998	L					1 U	
	L					1	
Station 1							
6/1/1998	E	19.1	.229	12	3	17.9	.8
	H	60.6	.337	6			
7/23/1998	E	7.3	.25	34	2.1		.7
	H	114	.377	3			
8/10/1998	E	12.5	.517	41	7.7		.9
	H	246	.254	1			
9/24/1998	E	38.1	.457	12	21.2		1.8
	H	60.1	.53	9			

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

OFFUTT

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/1/1998			10.5	7	100	2	1	4	4	0	7	6	0
	Sampler: SMITH			Remarks: ZOO NET PULLED THROUGH 6 METERS. FEC#1 AT RESORT, #2 AT BOAT LAUNCH									
6/8/1998		20	9	6	75	2	1	5	4	0		6	0
	Sampler: KELLY			Remarks:									
6/8/1998			9		0						0	0	0
	Sampler: BELL-MCKINNON			Remarks:									
7/7/1998		20	9.5	6	25	2	2	4	4	0	6	4	0
	Sampler: KELLY			Remarks:									
7/21/1998		23	11.58	6	0	2	1	4	4	0	10	1	0
	Sampler: KELLY			Remarks:									
7/23/1998			13.86	2	20			5	5	0	6	0	0
	Sampler: SMITH			Remarks: SLIGHT BLUE-GREEN BLOOM. LOTS OF FRAGRANT LILLIES									
8/4/1998		23	9	6	100	1	1	4	4	0	0	2	0
	Sampler: KELLY			Remarks:									
8/10/1998			11.55	3	0			4	3	0	0	3	0
	Sampler: SMITH			Remarks: NOTICEABLE BLUE-GREEN BLOOM. LARGE MASSES OF BRYOZOANS NEAR BOAT LAUNCH. STRONG MANUE IN THE BREEZE. FEC SAMPLES TAKEN SAME PLACE AS JULY									
8/26/1998		23	9.5	6	100	1	1	4	4	0	0	1	0
	Sampler: KELLY			Remarks: LAKE HEIGHT STICK BROKEN.									
8/26/1998			9.5		0						0	0	0
	Sampler: BELL-MCKINNON			Remarks:									
9/24/1998			6.6		100	3		4	2	0	134	0	0
	Sampler: SMITH			Remarks:									

Profile Report

OFFUTT

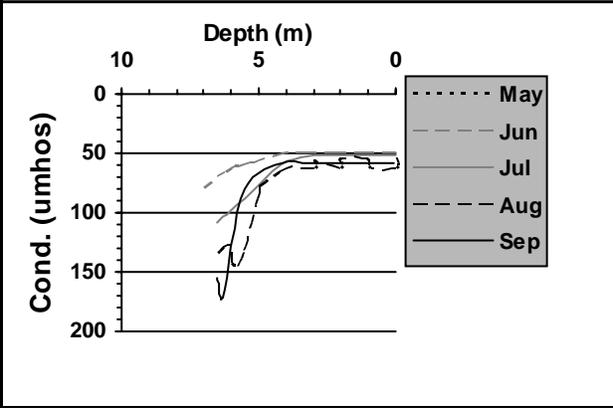
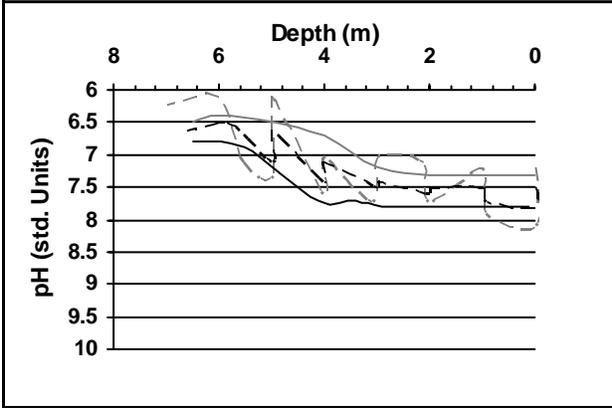
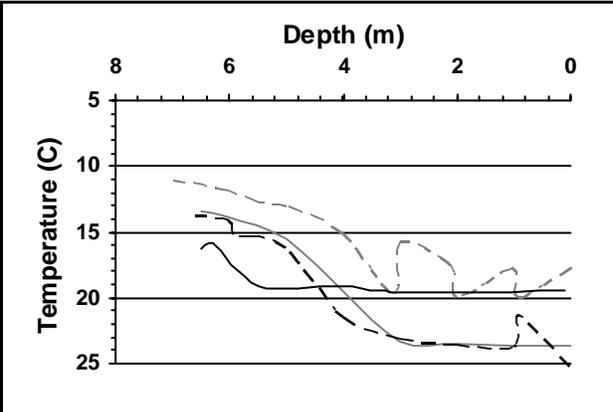
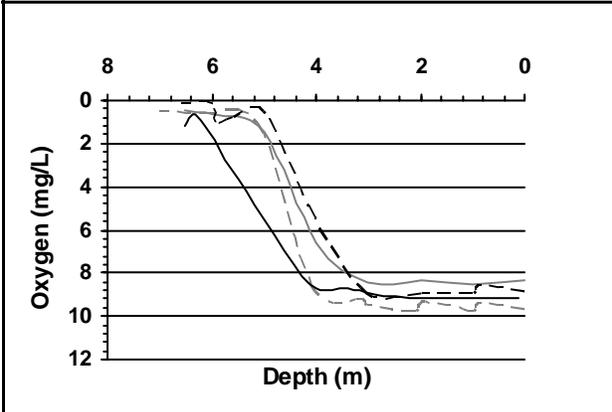
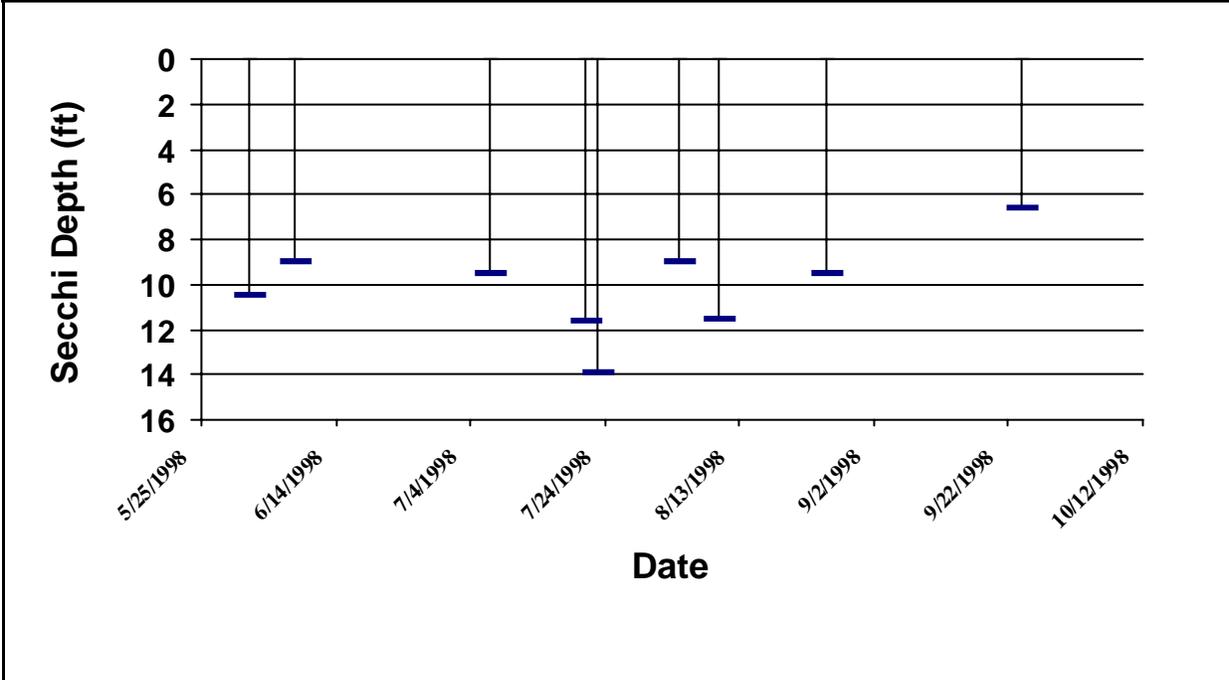
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/1/1998						
		0	49	9.66	7.2	17.6
		1	49	9.67	7.2	17.6
		2.1	49	9.75	7.1	17.5
		3	48	9.41	7	15.7
		4	49	8.77	7	15.1
		5	55	1.51	6.1	13
		6	61	.55	6.1	11.8
		7	78	.45	6.2	11
6/8/1998						
		0	48	9.48	8.1	19.9
		0.9	48	9.31	7.9	19.9
		2	48	9.26	7.7	19.9
		3.1	48	9.18	7.7	19.6
		4	49	7.3	7.6	15.2
		5	55	1.29	7.3	13.4
		5.5	58	.35	7.1	12.7
7/23/1998						
		0	52	8.38	7.3	23.6
		1	52	8.5	7.3	23.6
		2	52	8.33	7.3	23.5
		3	52	8.44	7.2	23.3
		4	57	6.63	6.7	19.6
		5	76	1.47	6.5	15.6
		6	99	.62	6.4	13.8
		6.5	108	.45	6.5	13.4

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
8/10/1998						
		0	54	8.76	7.5	25.1
		1	54	8.86	7.5	23.7
		2	54	8.93	7.5	23.5
		3	55	8.88	7.4	23
		4	61	5.42	7.1	21.4
		5	84	.43	6.6	16.2
		6	127	.13	6.5	14
		6.6	134	.11	6.6	13.7
8/26/1998						
		0	61	8.53	7.8	21.4
		0.9	61	8.54	7.7	21.3
		2	61	8.19	7.6	21
		3	61	7.79	7.5	20.8
		4	61	7.53	7.4	20.5
		5	77	3.55	7.1	19.1
		5.6	134	.73	6.6	15.3
		5.9	145	.97	6.5	15
9/24/1998						
		0.1	58 J	9.14	7.8	19.5
		1.9	58 J	9.14	7.8	19.6
		2.9	58 J	8.94	7.8	19.6
		3.4	58 J	8.69	7.7	19.5
		4.1	58 J	8.56	7.7	19.2
		5.5	80 J	3.63	6.9	19.1
		6.3	171 J	.7	6.8	15.9
		6.5	155 J	1.23	6.8	16.3

Secchi Depth and Profile Graphics

Station: 1

OFFTH1



OSOYOOS

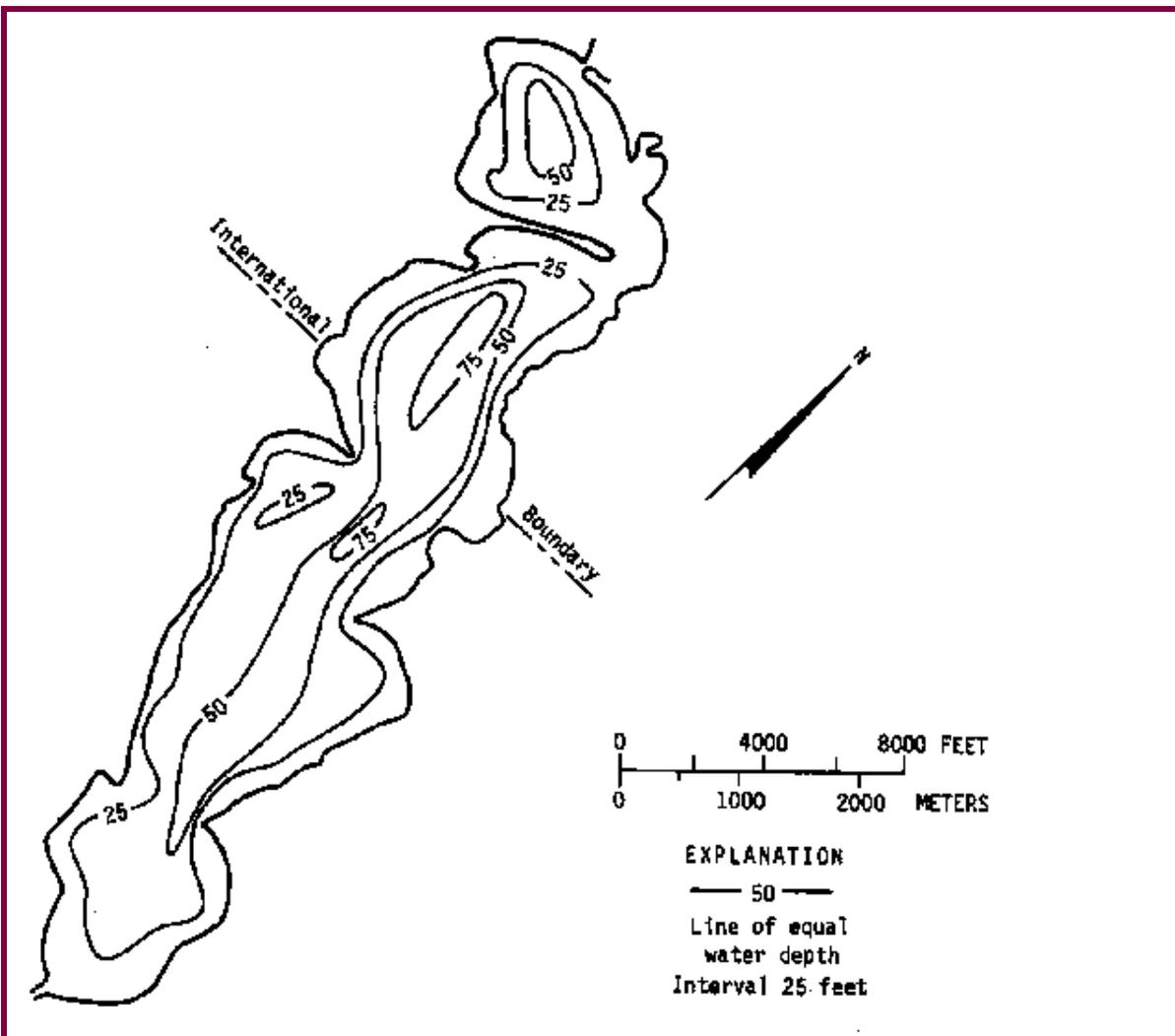
OKANOGAN County

Lake ID: OSOOK1

Ecoregion: 7

Lake Osoyoos is located one mile north of Oroville. It is ten miles long and extends north into Canada. The total size of the lake is 5,729 acres; 3,693 acres lie in British Columbia, Canada, and 2,036 acres lie in the U.S. Lake Osoyoos is fed principally by the Okanogan River in Canada and drains south via the Okanogan River in the U.S. to the Columbia River.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
5800	208	46	3150	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
266000	29.73	911	48 57 00.	119 25 42.



Station Information

OSOOK1

Primary Station	Station # 1	latitude: 48 59 56.8	longitude: 119 26 38.4
	Description: Deep spot of the lake.		

Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

OSOYOOS

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 45 J
TSI_Phos:
TSI_Ch1:
Narrative TSI: ^b M

Summary Comments:

The general water clarity was good for Lake Osoyoos in 1998. The Secchi depth readings ranged from 2.3 meters (7.5 feet) to 3.5 meters (11.5 feet) with a mean of 2.9 meters (9.7 feet). For comparison, in 1997 the mean Secchi depth reading was 3.7 meters (12.0 feet).

No chemistry data was collected for Lake Osoyoos in 1998.

Only one site visit was made by Ecology staff in 1998. Thermal stratification of the lake was observed during this visit (8/17/1998) and low dissolved oxygen levels were noted in the hypolimnion.

The volunteer monitor observed approximately 30 geese on the lake early each morning. Only a few other waterfowl were ever recorded during the sampling visits made by the volunteer monitor between May and October.

The non-native plant *Myriophyllum spicatum* (Eurasian milfoil) occurs in large quantities in Lake Osoyoos. The sheer mass of these plants causes some impairment of boating and swimming in the lake.

Based on the Secchi depth data, Lake Osoyoos is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

OSOYOOS

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/16/1998		17.8	11.5		25	2	4	5	5			0	2
	Sampler:	ULLRICH		Remarks:	THE REAL LAKE HEIGHT IS 912.56 FEET. THIS NUMBER WILL NOT FIT IN THE LAKE HEIGHT DATA FIELD SO I "SUBTRACTED" 900 AND SIMPLY RECORDED THE 12.56 FEET (WHICH CONVERTS TO 150.72 INCHES).								
6/3/1998		17.8	9.5		50	1	1	5	5	0	0	0	0
	Sampler:	ULLRICH		Remarks:	FEW TOURISTS; COLD WEATHER AND WINDY THE LAST THREE DAYS.								
6/11/1998		22.2	11		0	1	2	5	5	15	1	0	0
	Sampler:	ULLRICH		Remarks:	JULY 1 WILL START SUMMER VACATION TIME.								
7/2/1998		25.6	10		75	1	1	5	5	0	0	0	5
	Sampler:	ULLRICH		Remarks:	MUCH MILFOIL AWASH FROM CANADA. RAKED TWO WHEELBARROW LOADS IN THE MORNING AND ANOTHER LOAD IN THE AFTERNOON.								
7/16/1998		23.9	9.5		0	3	2	4	4	0	0	0	7
	Sampler:	ULLRICH		Remarks:	MUCH MILFOIL INLKAЕ. FIRST 90 DEGREE TEMPERATURE FOR OVER A WEEK.								
8/1/1998		26.7	10		0	2	5	5	5			0	1
	Sampler:	ULLRICH		Remarks:	TWO WEEKS HOT WEATHER - 100 DEGREES AND NO WIND. 7/31 - HEAVY WIND, RAIN AND THUNDER. THIRD CANADIAN HOLIDAY - MUCH BOAT TRAFFIC. ALL FOWL OFF LAKE.								
8/17/1998		23.9	8.5		50	2	2	5	5	0	0	0	0
	Sampler:	ULLRICH		Remarks:	SAMPLED WITH MAGGIE BELL-MCKINNON.								
8/17/1998			8.5		0					0	0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									
9/6/1998		25.6	11.5		0	1	1	5	5				
	Sampler:	ULLRICH		Remarks:	CANADIAN LABOR DAY. HEAVY MILFOIL IN THE LAKE - WHAT CAN YOU DO?								

Profile Report

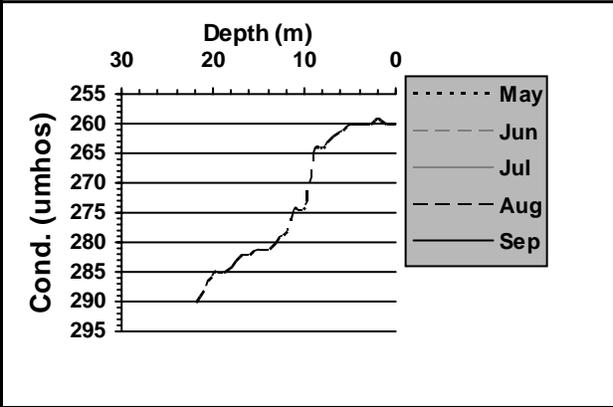
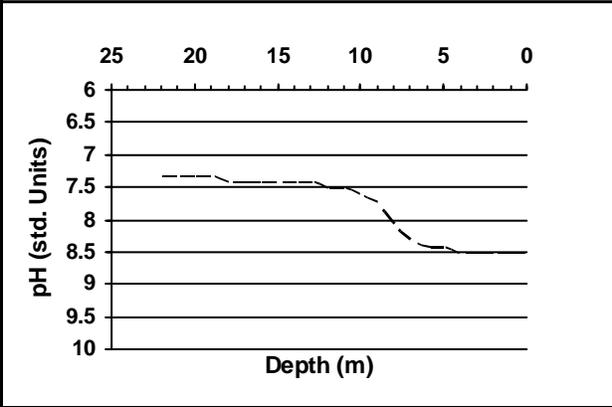
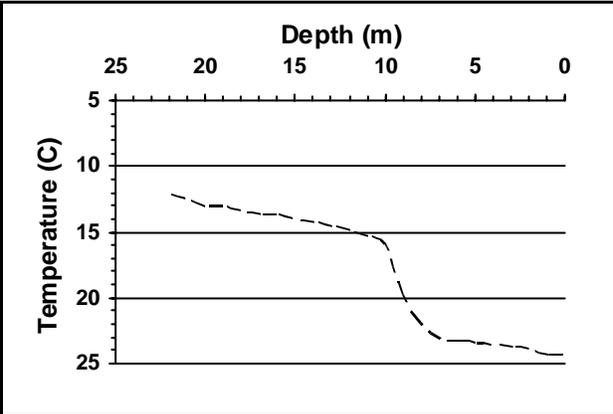
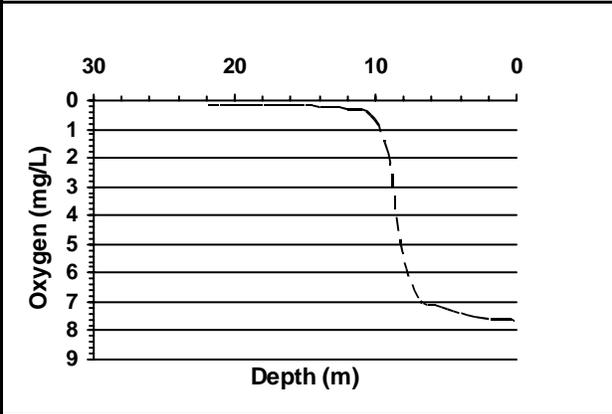
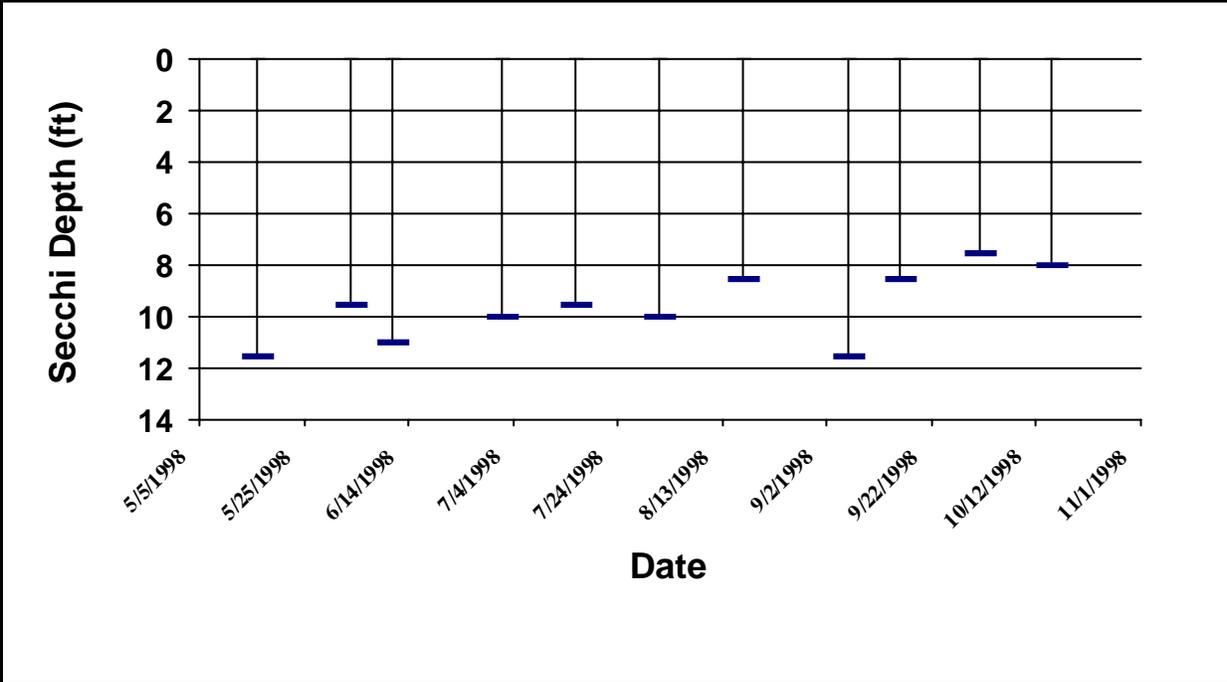
OSOYOOS

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
8/17/1998						
		0.1	260	7.64	8.5	24.3
		0.9	260	7.59	8.5	24.2
		2	259	7.58	8.5	23.8
		2.9	260	7.48	8.5	23.6
		4.1	260	7.36	8.5	23.5
		5	260	7.22	8.4	23.3
		5.8	261	7.09	8.4	23.2
		6.9	262	6.84	8.3	23
		8	264	5.29	8	21.9
		9	264	1.84	7.7	19.7
		10	274	.62	7.6	15.9
		11	274	.29	7.5	15.2
		12	278	.25	7.5	14.7
		12.9	279	.19	7.4	14.4
		13.9	281	.18	7.4	14.2
		15.1	281	.16	7.4	13.8
		16	282	.15	7.4	13.6
		16.9	282	.15	7.4	13.6
		18	284	.15	7.4	13.2
		19	285	.14	7.3	13
		20	285	.13	7.3	12.9
		21.1	288	.15	7.3	12.3
		21.9	290	.14	7.3	12.1

Secchi Depth and Profile Graphics

Station: 1

OSOOK1



Station Information

OSOOK1

Primary Station	Station # 1	latitude: 48 59 56.8	longitude: 119 26 38.4
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

OSOYOOS

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	44
TSI_Phos:		45
TSI_Ch1:		
Narrative TSI:	^b	M

Summary Comments:

The general water clarity of Lake Osoyoos was good in 1999. The Secchi depth readings ranged from 2.3 meters (7.5 feet) to 4.1 meters (13.5 feet) with a mean Secchi depth of 3.1 meters (10.4 feet). For comparison, in 1998 the mean Secchi depth was 2.9 meters (9.7 feet).

One nesting geese pair and a few other waterfowl were seen on Lake Osoyoos by the volunteer monitor during his sampling visits made between May and October.

The chemistry data collected for Lake Osoyoos showed moderate levels of phosphorus in the epilimnion. This level of phosphorus indicates a level of productivity where algae growth may become a nuisance though not usually for very long periods of time.

Ecology staff made one site visit in 1999 (7/27/1999). Low dissolved oxygen levels in the hypolimnion were noted and thermal stratification of the lake was observed. There was also an abundance of suspended algae in the water column. The volunteer monitor commented the algae blooms normally occur later on in the summer and can make the shoreline quite slick. He also commented on the dense growth of the non-native aquatic plant *Myriophyllum spicatum* (Eurasian milfoil) this year; most of this plant growth occurs in the north end of the lake and drifts southward.

Based on the Secchi depth data and the phosphorus levels, Lake Osoyoos is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

OSOYOOS

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/10/1999		58	11.5	2	0	2	2	5	5			0	0
	Sampler:	ULLRICH		Remarks: Used a view tube. Our goose hatched 1 chick out of 4 eggs. Lake too rough at hatch so eggs were abandoned.									
6/4/1999		62	11		50	1	1	5		0	0	0	0
	Sampler:	ULLRICH		Remarks: Used a view tube. Lake came down yesterday from 10,944 inches.									
6/14/1999		70	11	2	0	1	1	5	5	0	10	0	1
	Sampler:	ULLRICH		Remarks: Used a view tube. Zozel gates closed this week.									
7/6/1999		72	10.5		0	2	5	5	5	0	0	0	6
	Sampler:	ULLRICH		Remarks: Used a view tube. Heavy purple loosestrife.									
7/18/1999		72	10		75	3	1	5	5	0	0	0	0
	Sampler:	ULLRICH		Remarks: Used a view tube. Not many out today - 76 degrees.									
7/27/1999		76	12		0	1	1	5	5	0	0	0	5
	Sampler:	ULLRICH		Remarks: Used a view tube. Lots of suspended algae in water. Algae tends to occur in the swimming beach area later in the summer. Milfoil problem was very bad-worst is near bridge on Canadian side.									
8/18/1999		77	8	4	25	1	1	5	5	0	0	0	2
	Sampler:	ULLRICH		Remarks: Used a view tube. Floating milfoil bad. Lady (Kathy Hamel) called from Ecology but no action on milfoil.									
9/1/1999		72	7.5	3	25	1	5	5	5	0	0	1	
	Sampler:	ULLRICH		Remarks: Used a view tube. Cold nights - 65 degree days.									
9/15/1999		70	9.5	4	25	1	1	5	5	0	0	0	0
	Sampler:	ULLRICH		Remarks: Used a view tube. Water murky - lake level falling.									
10/3/1999		60	10	4	0	2	1	5		0	0	1	0
	Sampler:	ULLRICH		Remarks: Used a view tube. Lake is ours again!									
10/13/1999		61	13.5	4	0	1	3	5		0	0	0	0
	Sampler:	ULLRICH		Remarks: Used a view tube. Last card of 1999. Temperature = 69 degrees.									

Profile Report

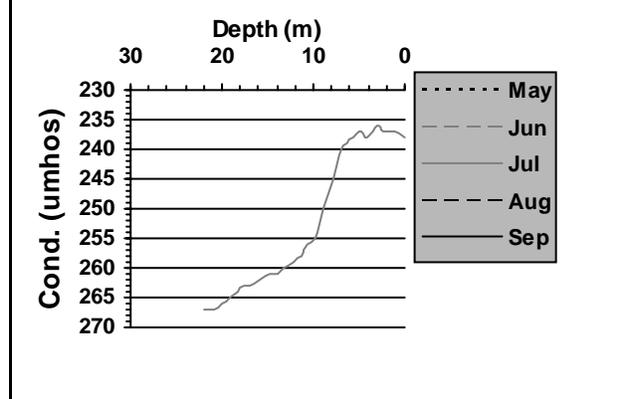
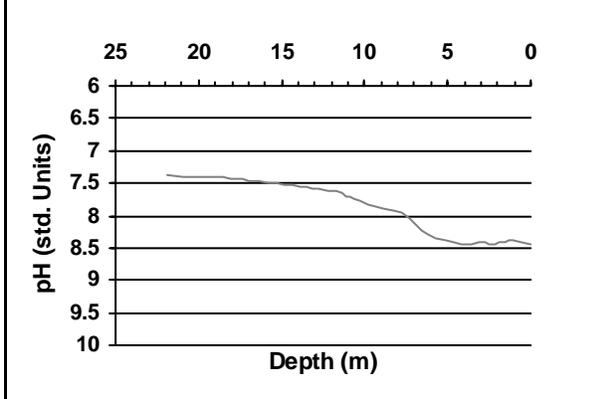
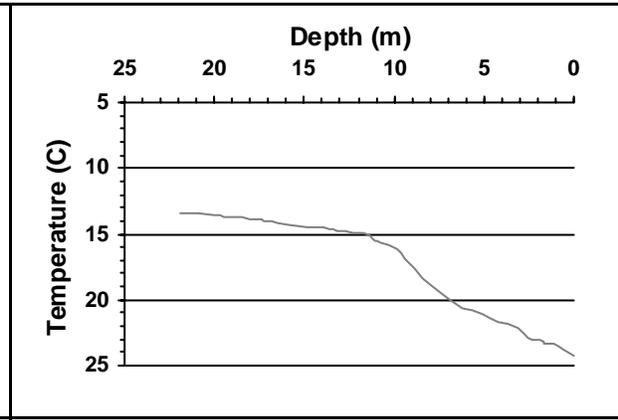
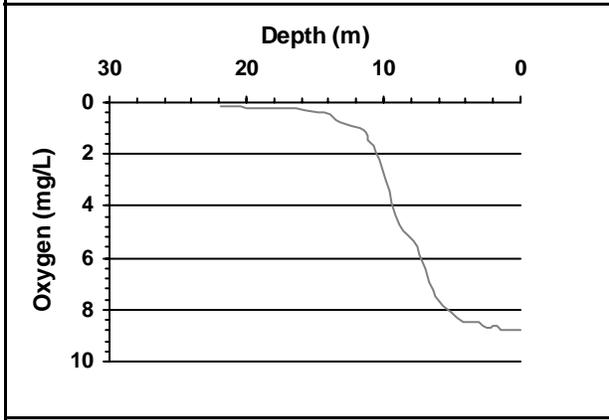
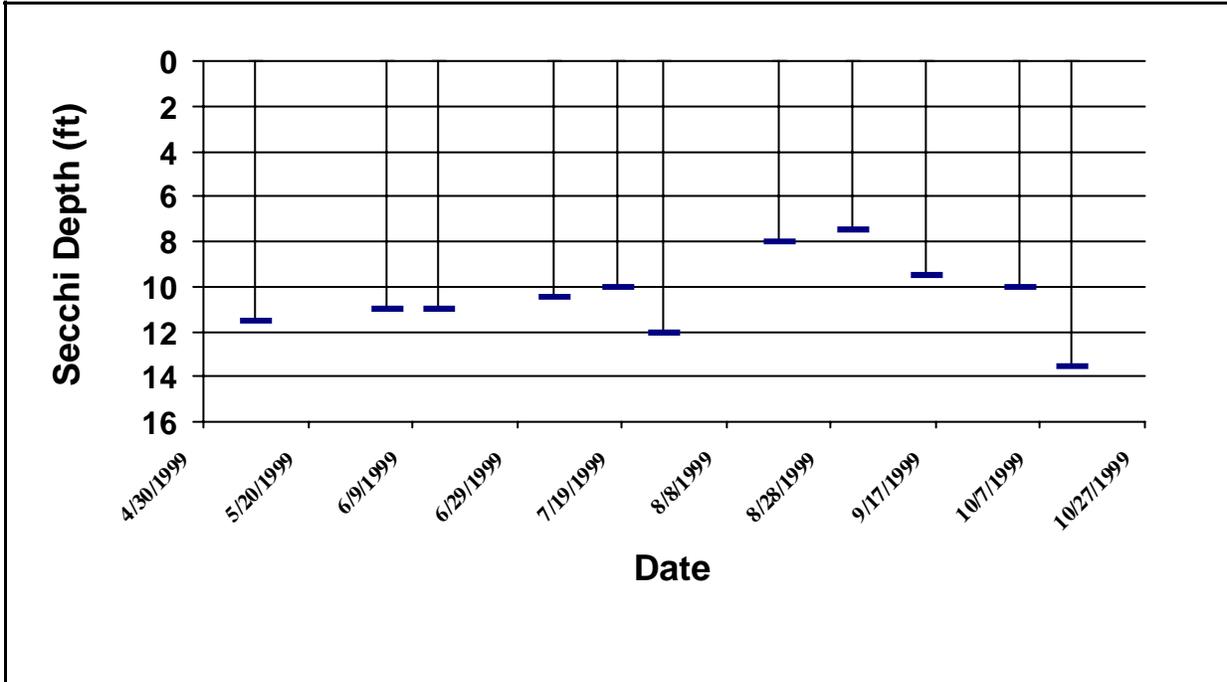
OSOYOOS

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
7/27/1999						
		0	238	8.79	8.43	24.21
		1.1	237	8.75	8.37	23.33
		1.6	237	8.71	8.41	23.28
		1.7	237	8.61	8.42	23.14
		2.1	237	8.63	8.44	23.12
		2.5	237	8.74	8.43	22.82
		3.1	236	8.48	8.41	22.2
		4.2	238	8.45	8.43	21.64
		5.1	237	8.12	8.39	21.06
		6.2	239	7.5	8.3	20.57
		6.9	240	6.4	8.13	20
		7.8	245	5.33	7.96	18.92
		8.9	250	4.75	7.9	17.63
		9.8	255	3	7.82	16.19
		10.7	256	1.69	7.74	15.65
		11.1	257	1.45	7.71	15.48
		11.4	258	1.06	7.65	15.14
		13.2	260	.78	7.6	14.8
		13.9	261	.48	7.56	14.5
		14.8	261	.37	7.53	14.43
		15.8	262	.27	7.5	14.3
		17	263	.23	7.46	14
		17.7	263	.21	7.44	13.93
		19.2	265	.21	7.41	13.79
		20	266	.2	7.4	13.57
		20.9	267	.18	7.39	13.43
		21.9	267	.18	7.38	13.4

Secchi Depth and Profile Graphics

Station: 1

OSOOK1



PALMER

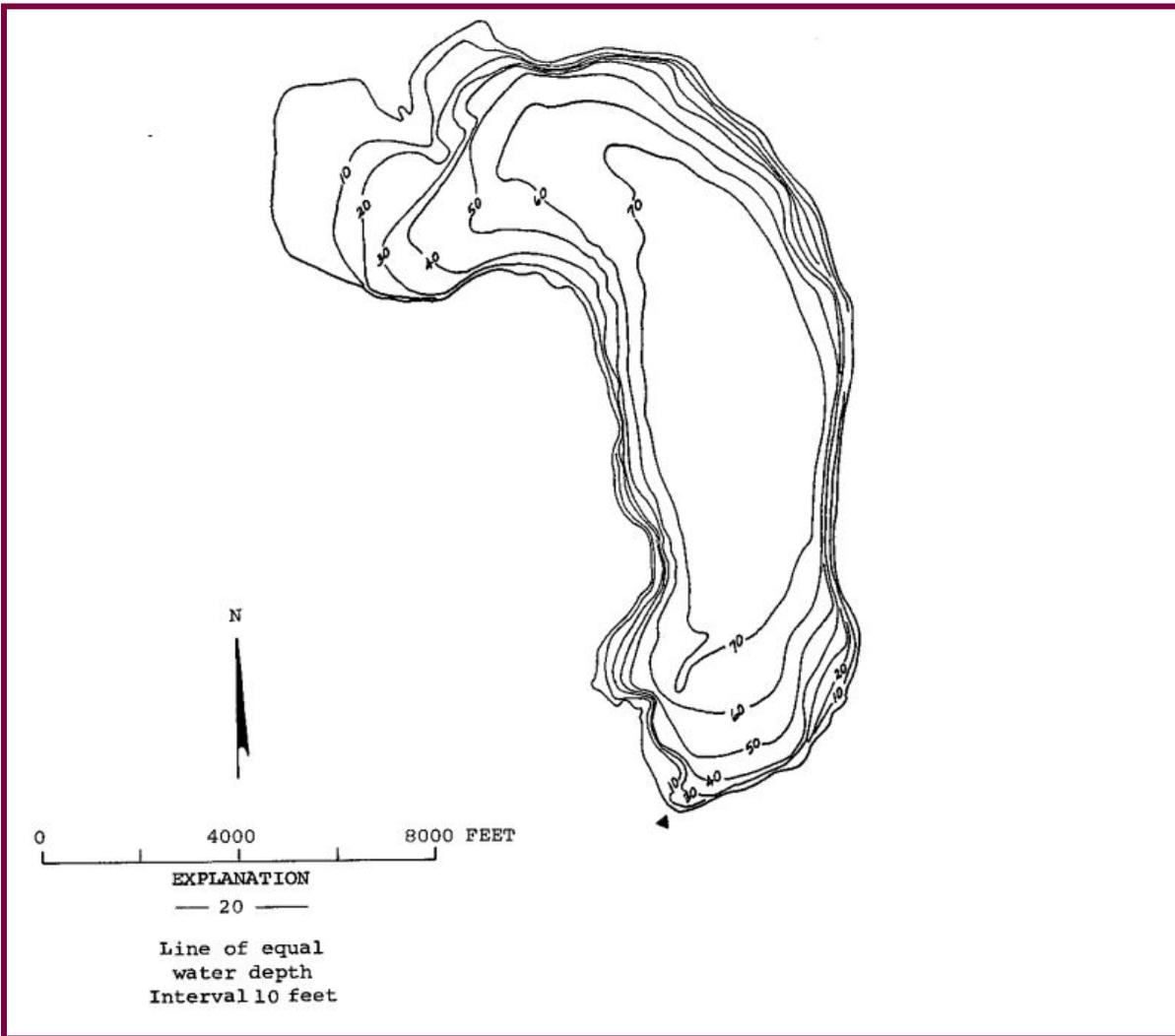
OKANOGAN County

Lake ID: PALOK1

Ecoregion: 7

Palmer Lake is a deep lake located in the Sinlahekin Valley of Okanogan. Its shores are just 6 miles from British Columbia, Canada.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
2110	79	51	296	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
107000	9.93	1145	48 54 39.	119 38 43.



Trophic State Assessment for 1998

PALMER

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a	N
TSI_Phos:	
TSI_Ch1:	
Narrative TSI: ^b	

Summary Comments:

Because there were only three (3) Secchi readings taken in 1998, no trophic state assessment was calculated for Palmer Lake.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

PALMER

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/1/1998		19	11	3	0	1	3	5	5	7	2	0	0
	Sampler: CARLETON		Remarks: LAKE HEIGHT WAS 126 INCHES LAST MONTH. SAW LOTS OF MERGANSERS.										
7/1/1998		21	13	9	0	1	2	5	5	7	8	2	0
	Sampler: CARLETON		Remarks:										
8/18/1998		23	17		0	1	3	5	5	0	0	1	0
	Sampler: CARLETON		Remarks:										
8/18/1998			17		0					0	0	0	0
	Sampler: BELL-MCKINNON		Remarks:										

Profile Report

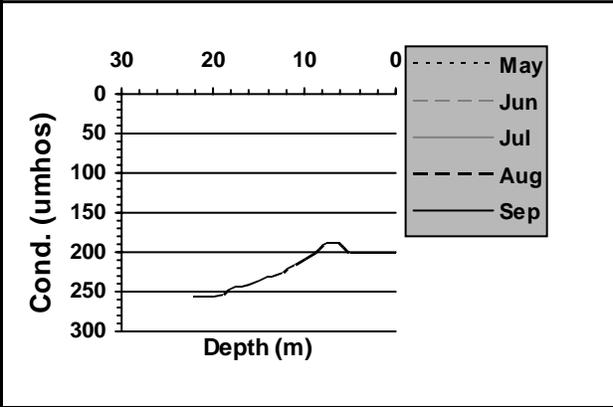
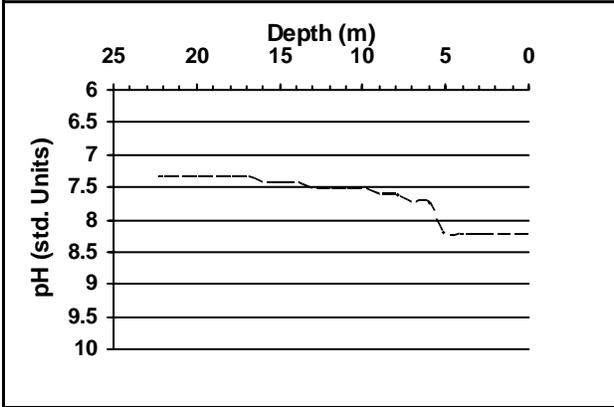
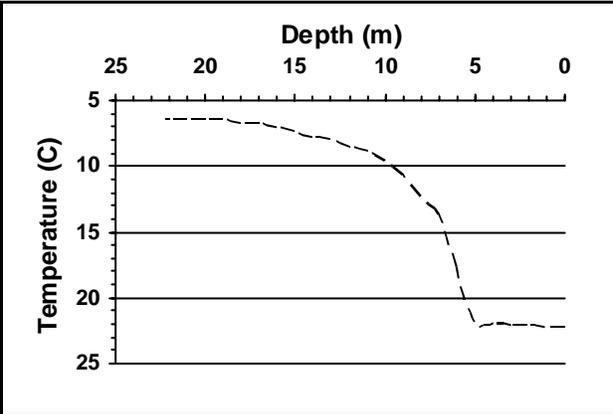
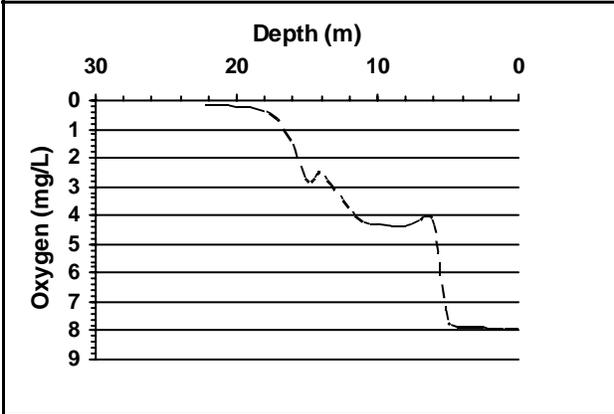
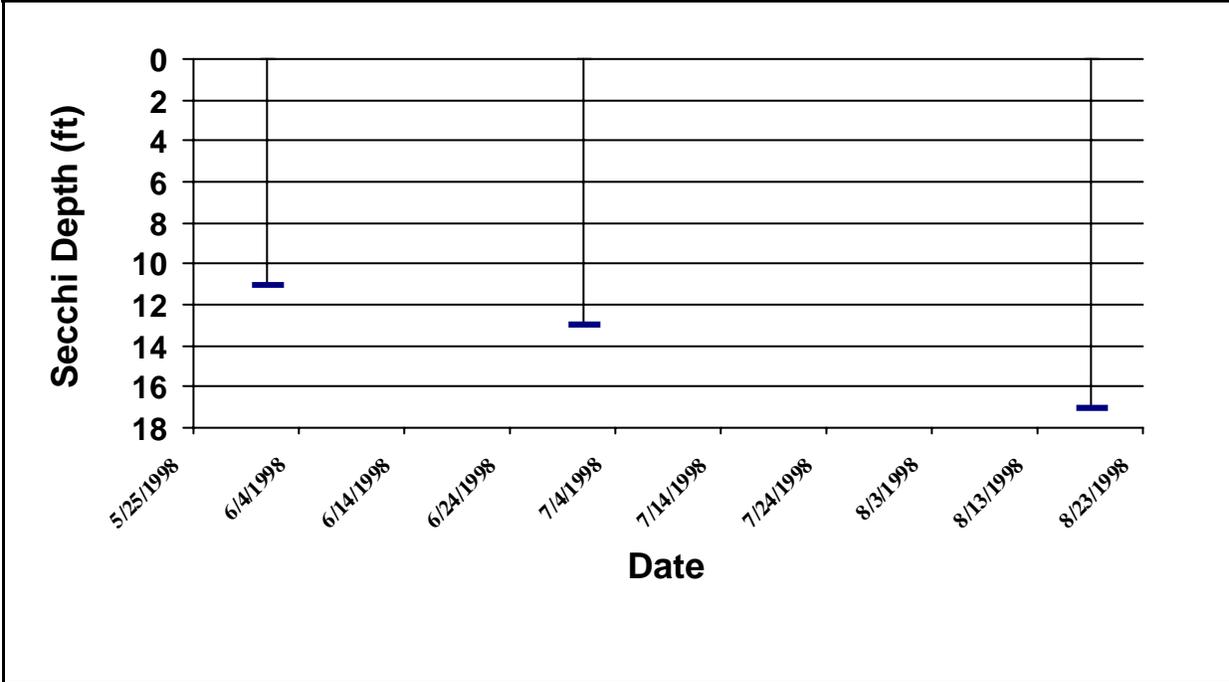
PALMER

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
8/18/1998						
		0	201	7.93	8.2	22.2
		1.1	201	7.9	8.2	22.1
		2.1	201	7.87	8.2	22
		3	201	7.82	8.2	22
		4	200	7.82	8.2	21.9
		5	200	7.64	8.2	21.9
		6	188	4.05	7.7	17.7
		7	188	4.1	7.7	13.6
		8	190	4.31	7.6	12.2
		9	200	4.36	7.6	10.6
		10	208	4.27	7.5	9.5
		11	215	4.17	7.5	8.8
		12	220	3.71	7.5	8.4
		13	227	3.11	7.5	7.9
		14.1	231	2.5	7.4	7.7
		15	235	2.72	7.4	7.3
		16	240	1.38	7.4	6.9
		17	242	.59	7.3	6.7
		18	246	.31	7.3	6.6
		19	253	.2	7.3	6.4
		20	255	.19	7.3	6.3
		21	255	.16	7.3	6.3
		22	256	.16	7.3	6.3
		22.2	256	.14	7.3	6.3

Secchi Depth and Profile Graphics

Station: 1

PALOK1



PATTERSON (NORTH ARM)

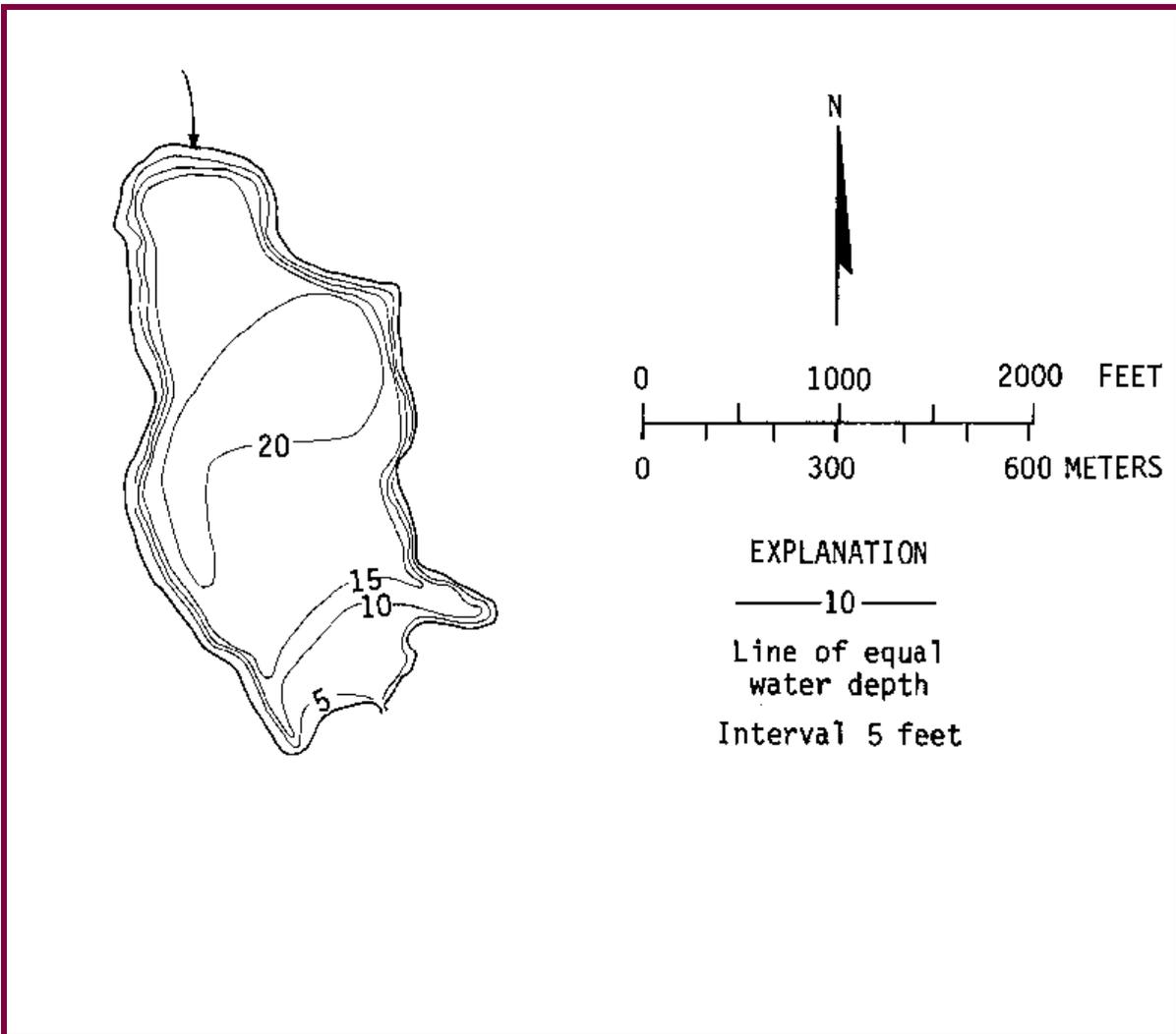
THURSTON County

Lake ID: PATTH1

Ecoregion: 2

Pattison Lake is located six miles southeast of Olympia. It consists of two basins separated by a narrow channel. The north basin covers 75 acres and the south basin covers 190 acres. The north lake is fed by Hicks Lake, drains through south Pattison Lake to Long Lake, which ultimately drains to Henderson Inlet via Himes/Woodland Creek. Pattison Lake is also listed in references as Lake.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
81	22	14	3	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
1120	1.68	154	46 59 48.	122 46 56.



Station Information

PATTH1

Primary Station	Station # 1	latitude: 47 00 06.1	longitude: 122 47 06.8
	Description: Deep spot of the north arm of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

PATTERSON (NORTH ARM)

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 44	N, J
TSI_Phos:	
TSI_Ch1:	
Narrative TSI: ^b	M

Summary Comments:

The general water clarity for Pattison Lake was good in 1998. The Secchi depth readings ranged from 1.7 meters (5.5 feet) to 4.9 meters (16.0 feet) with a mean of 2.9 meters (9.4 feet). For comparison, in 1997 the mean Secchi depth reading was 1.5 meters (4.9 feet).

No chemistry data was collected for Pattison Lake in 1998.

Only one site visit was made by Ecology staff in 1998. Thermal stratification was observed during this visit (9/14/1998) and low dissolved oxygen levels were noted in the hypolimnion.

The volunteer monitor observed geese on the lake on only two of her five sampling visits.

The Trophic State Index calculation is qualified since only four (4) Secchi readings were used in the calculation. However, based on this data, Pattison Lake is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Profile Report

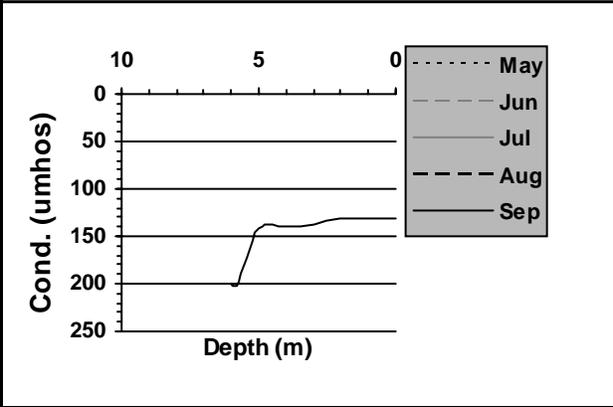
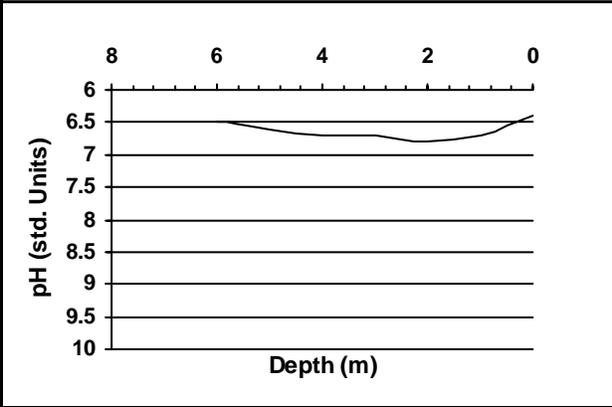
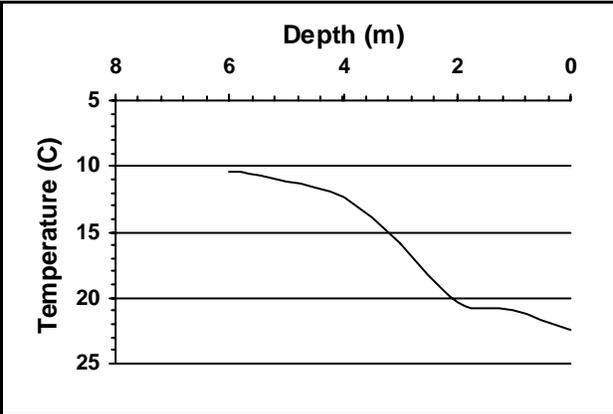
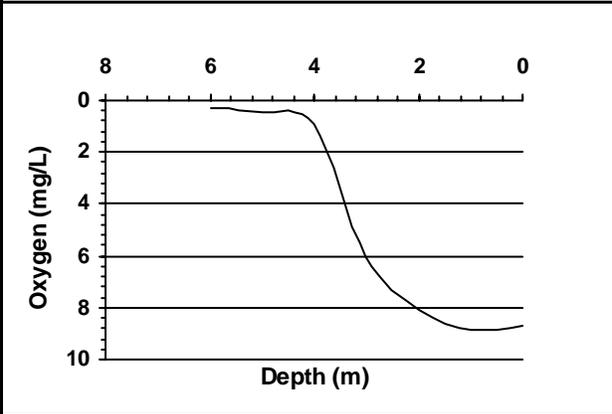
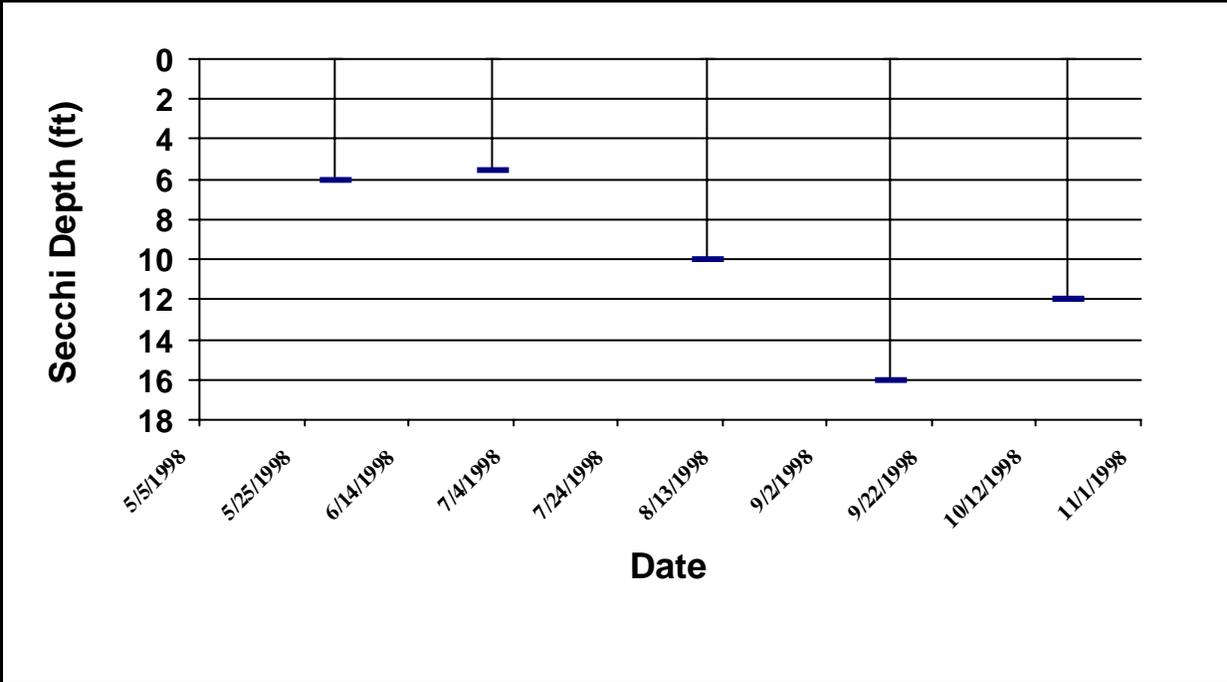
TTERSON (NORTH ARM)

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
9/14/1998						
		0	131	8.72	6.4	22.5
		1	131	8.89	6.7	20.9
		2	131.7	8.1	6.8	20.3
		3	138.4	6.01	6.7	15.8
		4	139	.9	6.7	12.3
		5	141.2	.42	6.6	11.1
		5.8	203.1	.28	6.5	10.4
		6	200.5	.33	6.5	10.4

Secchi Depth and Profile Graphics

Station: 1

PATTH1



Station Information

PATTH1

Primary Station	Station # 1	latitude: 47 00 06.1	longitude: 122 47 06.8
	Description: Deep spot of the north arm of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

PATTERSON (NORTH ARM)

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 52	J
TSI_Phos:	57	
TSI_Ch1:		
Narrative TSI:	^b E	

Summary Comments:

The general water clarity of Pattison Lake (North Arm) was poor in 1999. The Secchi depth readings ranged from 1.5 meters (5.0 feet) to 2.1 meters (7.0 feet) with a mean Secchi depth of 1.8 meters (5.8 feet). For comparison, in 1998 the mean Secchi depth was 2.9 meters (9.6 feet).

Geese and/or other waterfowl were only seen on Pattison Lake by the volunteer monitor during two of her five sampling visits made between May and October.

The chemistry data collected for Pattison Lake showed high levels of phosphorus in the epilimnion. This level of phosphorus indicates a high level of productivity where algae growth has the "potential" to be heavy, last long and interfere with recreational and other uses of the lake.

Ecology staff made two site visits in 1999 (6/29/1999 and 9/22/1999). Low dissolved oxygen levels in the hypolimnion were noted and thermal stratification of the lake was observed during both these visits. Also noted was an abundance of suspended algae in the water column.

Based on the Secchi depth data and the phosphorus levels, the north arm of Pattison Lake is classified as eutrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

PATTERSON (NORTH ARM)

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
------	------	--------	-----------------	-----------------	-------	----------------------------	-------------------------------------	--------------------	-------------------	--------------------

Station 1

6/29/1999 1400 E 37.1

9/22/1999 1330 E 40.9

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Profile Report

PATERSON (NORTH ARM)

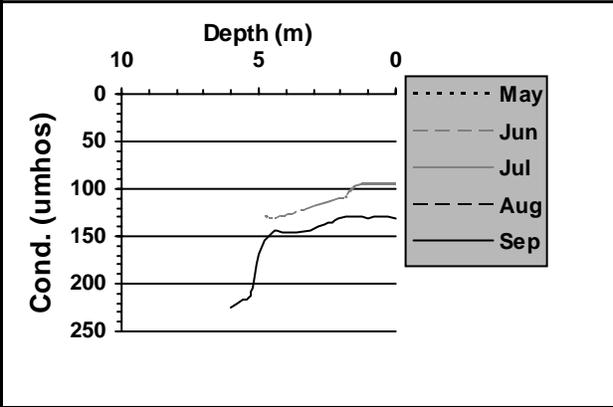
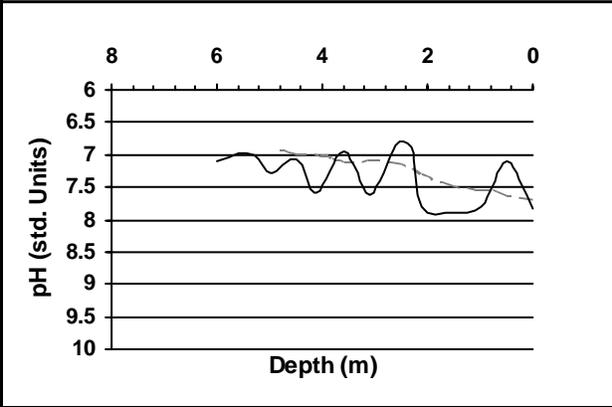
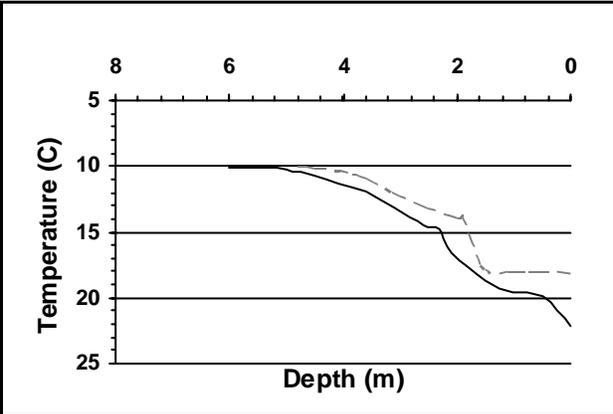
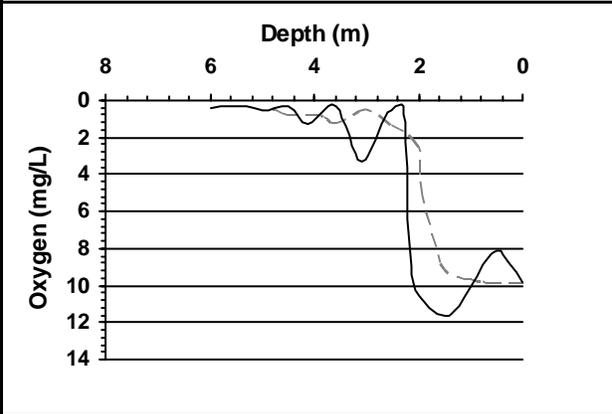
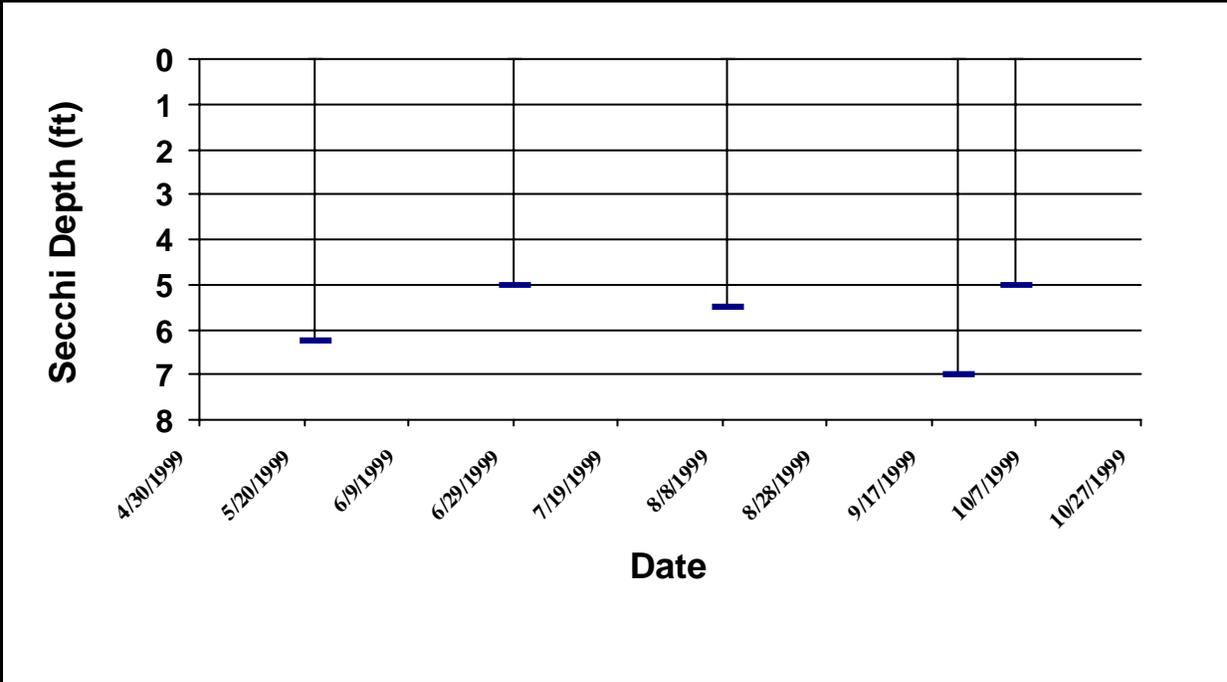
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/29/1999						
		0	94.7	9.82	7.67	18.02
		0.5	94.7	9.78	7.63	17.97
		0.8	94.7	9.68	7.54	17.95
		1	94.7	9.61	7.53	17.94
		1.5	94.8	9.05	7.46	17.83
		1.9	108.3	5.18	7.38	13.93
		2	108.3	2.49	7.32	13.92
		2.5	111.9	1.27	7.14	13.14
		3	117.2	.42	7.06	12.19
		3.6	123.3	1.13	7.09	10.9
		3.9	125.3	.8	7.02	10.34
		4.5	128.8	.72	6.98	10.08
		4.7	128	.56	6.93	10.01
		4.8	128.4	.46	6.93	9.98

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
9/22/1999						
		0	131.1	9.87	7.84	22.19
		0.5	129.3	8.14	7.09	19.83
		1	130.3	10.06	7.81	19.61
		1.5	129.6	11.66	7.9	18.74
		2.1	132	9.81	7.79	16.61
		2.3	135.9	.41	6.89	14.81
		2.6	137.7	.67	6.87	14.54
		3.1	143.6	3.35	7.63	13.09
		3.6	146.6	.29	6.95	11.88
		4.1	146.4	1.28	7.59	11.3
		4.5	145.8	.29	7.08	10.73
		5	169	.57	7.29	10.24
		5.3	212	.37	7.01	10.14
		5.6	217	.36	6.97	10.12
		6	224	.47	7.1	10.09

Secchi Depth and Profile Graphics

Station: 1

PATTH1



PHILLIPS

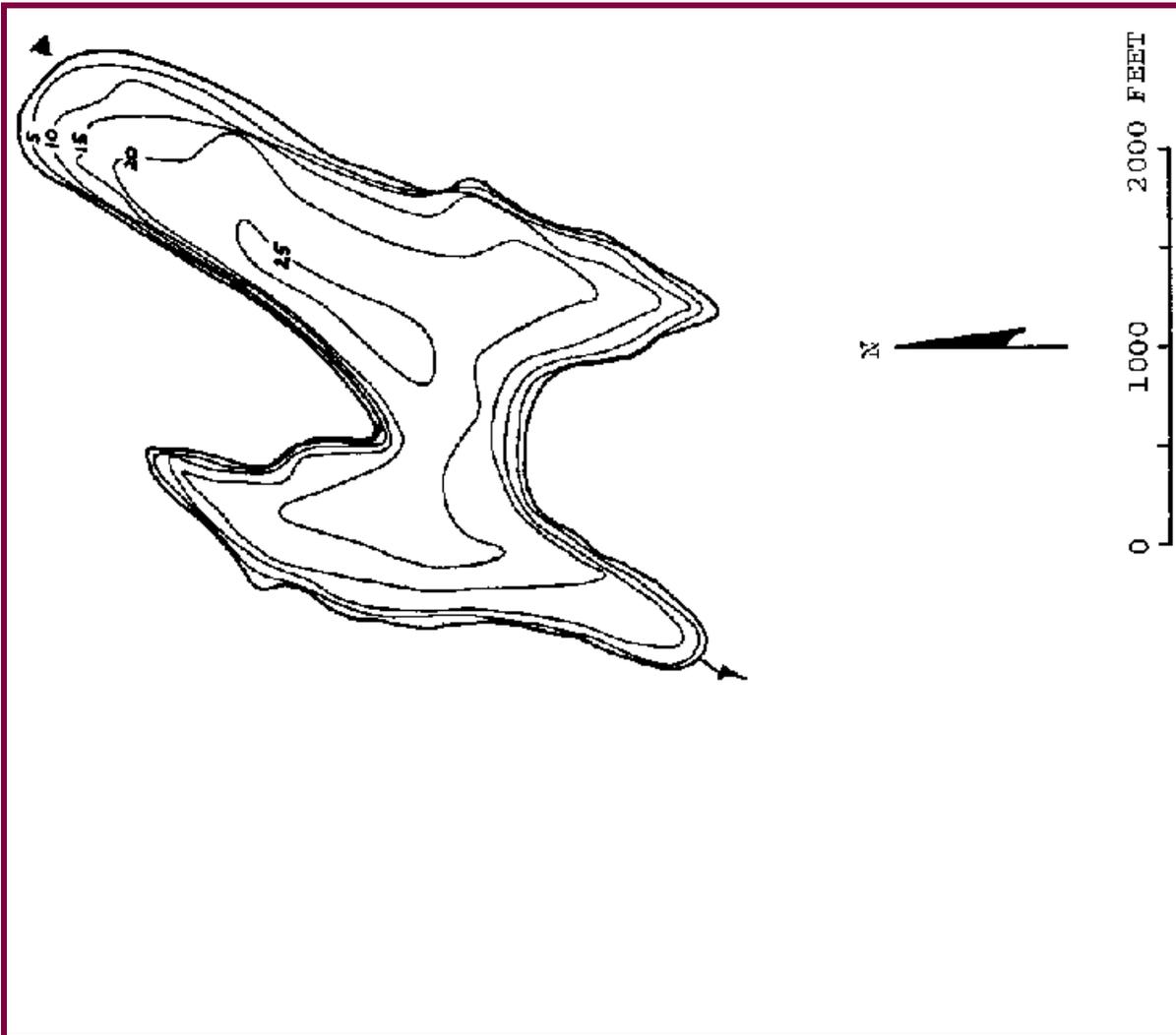
MASON County

Lake ID: PHIMA1

Ecoregion: 2

Phillips Lake is located seven miles north of Shelton. It has no surface inlets, and drains via Campbell Creek through a marshy area to Oakland Bay.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
110	25	16	1	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
1800	2.63	188	47 14 52.	122 57 52.



Station Information

PHIMA 1

Primary Station	Station # 1	latitude: 47 15 32.6	longitude: 122 58 09.7
Description: Deep site, approximately 500 feet east of a major point on the northern shore which bisects the lake into two distinct sides.			

Secondary Station	Station # 2	latitude:	longitude:
Description: Due south (about 1500 feet) from the northwesternmost tip of the lake.			

Trophic State Assessment for 1998

PHILLIPS

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	39
TSI_Phos:		34
TSI_Ch1:		38
Narrative TSI:	^b	O

Summary Comments:

The general water clarity for Phillips Lake was very good in 1998. The Secchi depth readings ranged from 3.5 meters (11.5 feet) to 5.2 meters (17.2 feet) with a mean Secchi depth reading of 4.1 meters (13.6 feet). For comparison, in 1997 the mean Secchi depth reading was 4.3 meters (14.3 feet).

The chemistry data collected for Phillips Lake showed low phosphorus levels (6.2 ug/L to 9.3 ug/L) and low to moderate chlorophyll levels (0.9 ug/L to 4.2 ug/L). These data indicate a low level of productivity in the lake. The volunteer monitor recorded an algae bloom during the month of August; it disappeared by mid-September.

Ecology staff made five site visits in 1998. Thermal stratification was not observed and moderately high levels of dissolved oxygen were noted throughout the entire water column during all of the site visits.

Geese and/ or other waterfowl were observed on the lake by the volunteer monitor during nine of his ten sampling visits between May and October.

A habitat survey, done by Ecology staff, showed most of the shoreline developed with many bulkheads but also many trees left standing and submersed along the shoreline.

Ecology staff conducted an aquatic plant survey on 7/20/1998. The aquatic plant community was found to be sparse and low growing. A good deal of epiphytic algae was found on the substrate and plants in the northeast end of the lake. No non-native plants were observed.

Based on the Secchi depth data, lack of low dissolved oxygen levels in the

hypolimnion and the low levels of nutrients, Phillips Lake is classified as oligotrophic.

The following is an assessment written by Ecology staff, Kirk Smith, to determine the phosphorus criterion for Phillips Lake:

Phillips Lake is an oligotrophic lake that is heavily used in the summer and is nearly built-out along the shoreline. Despite the heavy use, the water quality remains generally good, though there are periodic blue-green algal blooms. The mean phosphorus concentration was relatively low (7.6 ug/L). Non-toxic blooms of *Anabaena flos-aquae* have been identified in the past. Conductivity was extremely low. If more people become permanent residents there may be a higher likelihood of deteriorating water quality. The habitat survey shows substantial human influence along the shoreline. How human influence has impacted the lake is unclear, except that it may be attracting more Canada geese than desired. There have been reports of fish kills on Phillips Lake but there are no obvious water quality problems that may have contributed to those kills. There were no user surveys returned for the lake so we cannot determine whether there is a general perception of deteriorating water quality; however, some lake residents have formally expressed concern in the past by petitioning county commissioners to apply for a grant to study the lake and stop "the deteriorating condition." All beneficial uses appear to be supported. The lake is most likely phosphorus limited.

We recommend the phosphorus criterion for Phillips Lake be set at 10 ug/L, the action value in the water quality regulations for Puget Lowlands oligotrophic lakes.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

PHILLIPS

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 0										
6/2/1998		L					1 U			
		L					3			
8/17/1998		L					1			
		L					4			
9/17/1998		L					3			
Station 1										
6/2/1998		E	6.6	.237	36	.86		9.6	2260	.9
7/25/1998		E	6.2	.235	38	1.5				1.4 J
8/17/1998		E	9.3 J	.277	30	4.1				1
9/17/1998		E	8.1	.247	30	4.2				.9
Station 2										

6/2/1998	E	11.2 J	.234	21	.91
7/25/1998	E	7			
8/17/1998	E	7.9	.263	33	

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

PHILLIPS

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/18/1998		15	12	2	50	2	2	3	3	2	6	2	0
	Sampler: KEELEY			Remarks: STARTED TO RAIN.									
6/2/1998		17.7778	14.5	2	0					0	0	0	0
	Sampler: SMITH			Remarks:									
6/2/1998		17.8	15.5	2	0	2	1	4	3			1	0
	Sampler: KEELEY			Remarks:									
6/16/1998		17.8	15.5	2	50	2	1	3	3	0	5	2	0
	Sampler: KEELEY			Remarks:									
7/2/1998		19.4	15	2	50		2	4	4	7	6	1	1
	Sampler: KEELEY			Remarks:									
7/17/1998		22.2	16	2	0	2	3	4	4	0	2	0	0
	Sampler: KEELEY			Remarks:									
7/25/1998			17.16	2	0			4	4	0	0	0	8
	Sampler: SMITH			Remarks: LOTS OF BOATS. MANY SWIMMERS AT LAUNCH.									
8/5/1998		23.9	12	2	0	3	1		3	3	2	0	0
	Sampler: KEELEY			Remarks:									
8/15/1998		23.3	11.5	6	50	2	3	2	2	4	0	2	1
	Sampler: KEELEY			Remarks: ALGAE BLOOM CONTINUES TO GET WORSE - WATER LOW.									
8/17/1998			12.21	2	90			4	4	0	0	0	0
	Sampler: SMITH			Remarks: CONSIDERABLE ALGAL BLOOM									

Profile Report

PHILLIPS

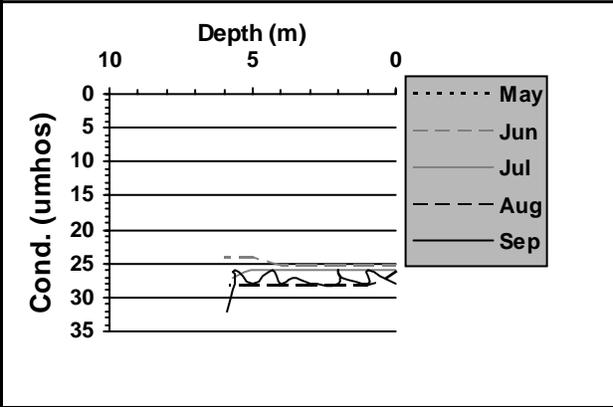
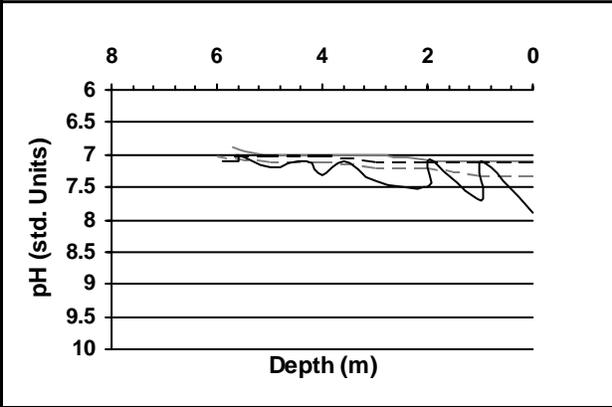
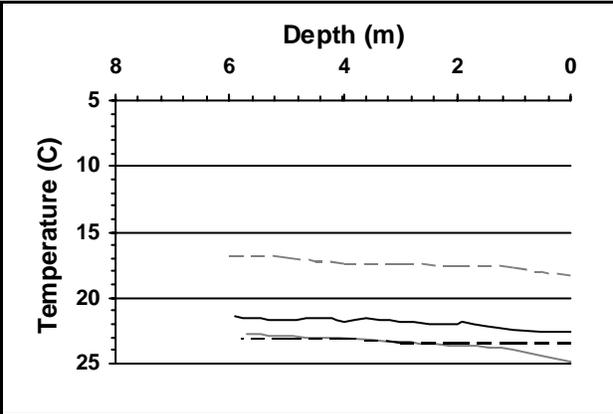
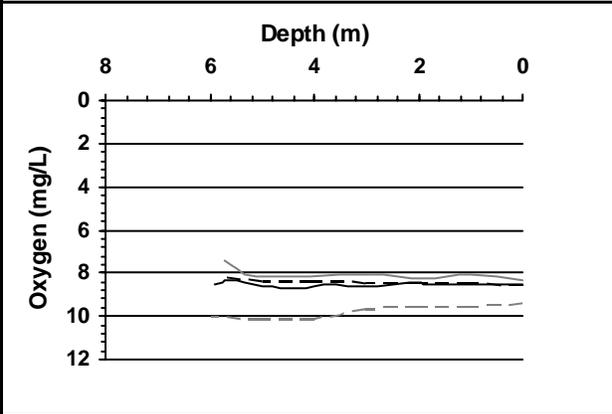
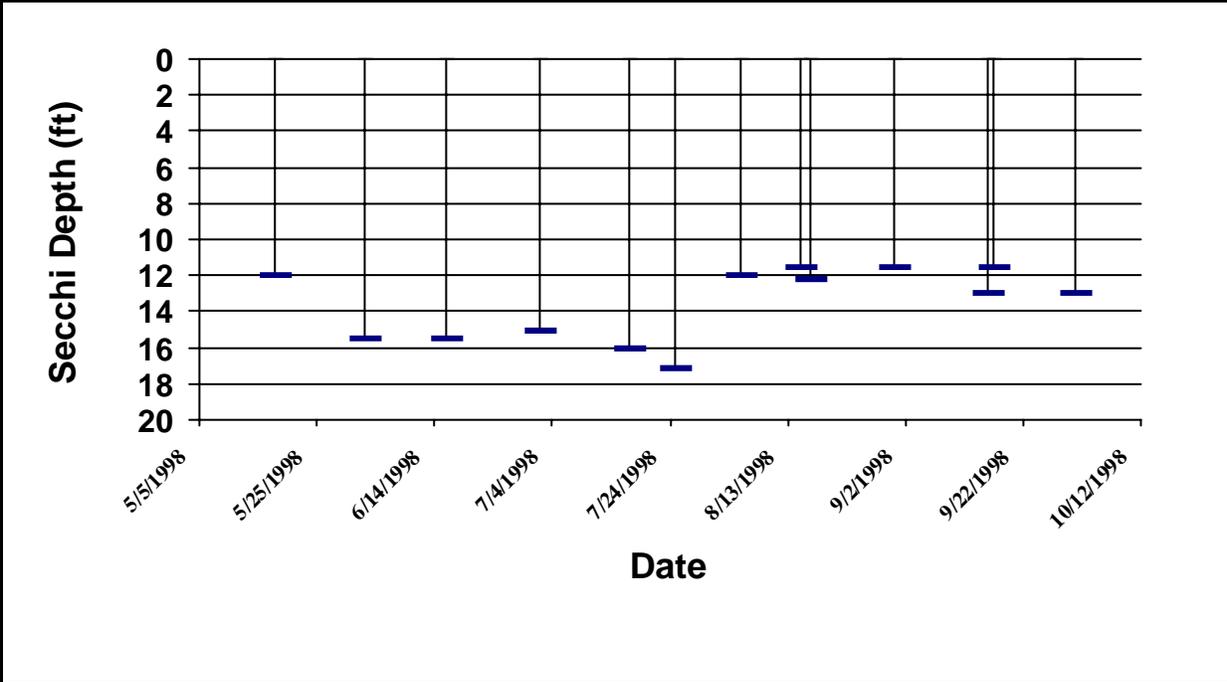
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/2/1998						
		0	25	9.36	7.3	18.2
		1	25	9.54	7.3	17.6
		2	25	9.54	7.2	17.5
		3	25	9.58	7.2	17.4
		4	25	10.04	7.1	17.3
		5	24	10.09	7.1	16.9
		6	24	9.99	7	16.8
7/25/1998						
		0	26	8.32	7.1	24.9
		1	26	8.1	7.1	23.9
		1.9	26	8.24	7.1	23.6
		3	26	8.04	7	23.4
		5.1	26	8.19	7	22.9
		5.7	27	7.43	6.9	22.8
8/17/1998						
		0	26	8.48	7.1	23.4
		1	28	8.43	7.1	23.4
		2	28	8.44	7.1	23.3
		3	28	8.41	7.1	23.3
		4	28	8.36	7	23.1
		5	28	8.36	7	23
		5.8	28	8.12	7	23
9/10/1998						
		0	28 J	8.49	7.9	22.6
		1	28 J	8.48	7.7	22.5
		2	28 J	8.47	7.5	22
		3	28 J	8.61	7.4	21.9
		4	28 J	8.63	7.3	21.9
		5	28 J	8.58	7.2	21.7
		5.6	28 J	8.37	7.1	21.6

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
9/17/1998						
		1	26 J	8.61	7.1	22
		1.9	27 J	8.55	7.1	21.8
		2	26 J	8.46	7.1	21.6
		3.6	27 J	8.51	7.1	21.6
		4.3	26 J	8.69	7.1	21.5
		5.6	26 J	6.84	7	21.4
		5.9	32 J	8.52	7.1	21.4
Station 2						
9/17/1998						
		0	27 J	9.09	7.5	22
		1	27 J	8.92	7.5	21.8
		3.5	27 J	9.04	7.5	21.7
		3.6	27 J	8.82	7.4	21.6
		4	26 J	8.67	7.4	21.5
		4.5	27 J	8.34	7.1	21.5

Secchi Depth and Profile Graphics

Station: 1

PHIMA1



Station Information

PHIMA 1

Primary Station	Station # 1	latitude: 47 15 32.6	longitude: 122 58 09.7
Description: Deep site, approximately 500 feet east of a major point on the northern shore which bisects the lake into two distinct sides.			

Secondary Station	Station # 2	latitude:	longitude:
Description: Due south (about 1500 feet) from the northwesternmost tip of the lake.			

Trophic State Assessment for 1999

PHILLIPS

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	39
TSI_Phos:		37
TSI_Ch1:		
Narrative TSI:	^b	OM

Summary Comments:

The general water clarity of Phillips Lake was excellent in 1999. The Secchi depth readings ranged from 3.5 meters (11.5 feet) to 5.0 meters (16.5 feet) with a mean Secchi depth of 4.3 meters (14.1 feet). For comparison, in 1998 the mean Secchi depth was 4.1 meters (13.6 feet).

Geese and/or other waterfowl were seen on Phillips Lake by the volunteer monitor during five of his six sampling visits made between May and October.

The chemistry data collected for Phillips Lake showed low levels of phosphorus in the epilimnion. This level of phosphorus indicates a very low level of productivity where algae growth is usually not a problem. A small algal bloom was reported by the volunteer monitor in early April and again in September.

Ecology staff made two site visits in 1999 (5/12/1999 and 9/8/1999). Dissolved oxygen levels remained consistently high throughout the entire water column and thermal stratification of the lake was not observed during either of the site visits.

Ecology staff conducted an aquatic plant survey on 6/8/1999. The non-native plant *Iris pseudacorus* (yellow flag) was found in frequent patches along the shoreline. The native aquatic plant community seemed sparse and only starting to emerge at this time with most of this community comprised of *Isoetes* sp. (quillwort) and patches of *Elodea canadensis* (common elodea) and the macroalgae *Nitella* sp.. The substrate seemed gravelly in most areas with silty sediment occurring in the protected areas of the lake. Ecology staff observed that more than fifty (50) percent of the shoreline had bulkheads.

Based on the Secchi depth data and the phosphorus levels, Phillips Lake is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

PHILLIPS

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
------	------	--------	-----------------	-----------------	-------	----------------------------	-------------------------------------	--------------------	-------------------	--------------------

Station 1

5/12/1999 E 14.1

9/8/1999 1430 E 7.36

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

PHILLIPS

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/12/1999		56	17.5	2	50	4	4	5	5	0	0	0	0
	Sampler:	KIDNEY		Remarks: Did not use a view tube. Water temperature and wind kept people away.									
6/6/1999		60	16.5	2	50	3	3	4	4	6	4	2	0
	Sampler:	KEELEY		Remarks:									
7/1/1999		65	15	2	50	3	3	4	4	0	5	0	0
	Sampler:	KEELEY		Remarks: Did not use a view tube.									
8/3/1999		74	14	2	75	2	2	4	4	0	6	0	2
	Sampler:	KEELEY		Remarks: Did not use a view tube. 12 swimmers at the park.									
9/1/1999		68	13	2	75	2	4	2	2	12	6	1	0
	Sampler:	KEELEY		Remarks: Did not use a view tube. Slight bloom - white dots.									
9/8/1999		68	11.5	2		2	1	3	3	0	6	0	0
	Sampler:	KEELEY		Remarks: Did not use a view tube. Noticeable algae bloom suspended throughout water column - volunteer said it started about a week ago. No water odor. Sampling day was sunny with a slight breeze.									

Profile Report

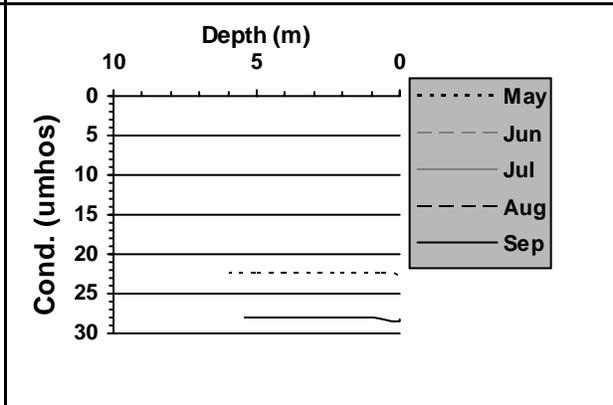
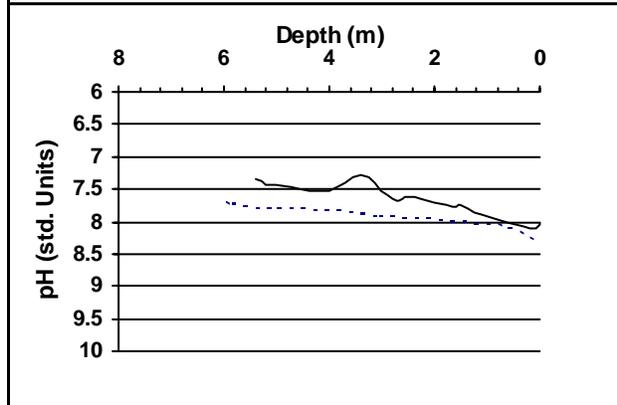
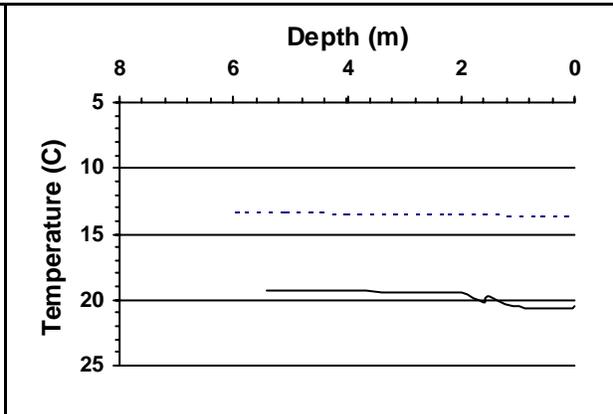
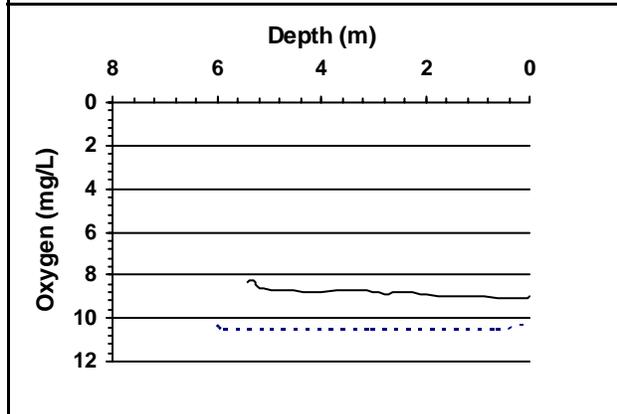
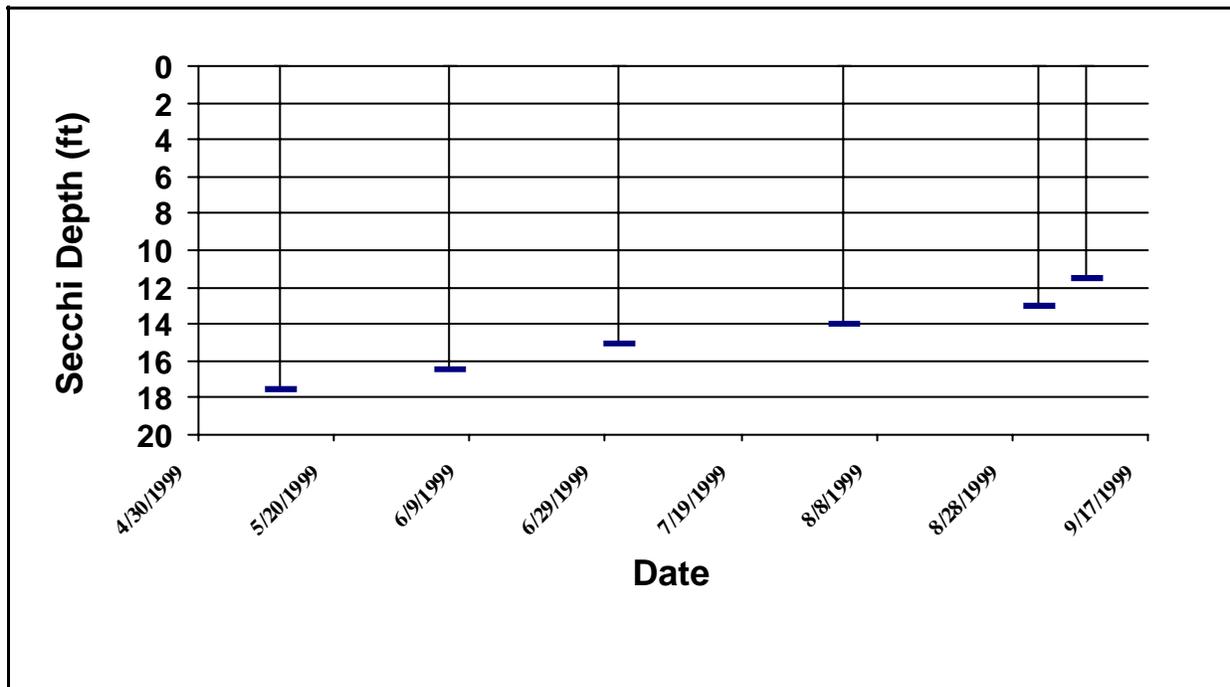
PHILLIPS

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
5/12/1999						
		0.1	22.4	10.28	8.26	13.64
		0.7	22.3	10.44	8.04	13.63
		2.3	22.3	10.45	7.93	13.49
		3.1	22.3	10.45	7.89	13.43
		4	22.2	10.43	7.8	13.37
		5.1	22.2	10.46	7.77	13.3
		5.9	22.2	10.45	7.72	13.3
		6	22.2	10.26	7.68	13.3
9/8/1999						
		0	28.3	9.02	8.01	20.56
		0.1	28.4	9.05	8.11	20.64
		1.1	28.1	8.94	7.89	20.55
		1.5	27.9	8.96	7.73	19.67
		1.6	28	8.95	7.77	20.13
		2	27.9	8.84	7.72	19.51
		2.5	27.9	8.81	7.63	19.46
		2.7	27.9	8.85	7.68	19.46
		2.9	27.9	8.81	7.58	19.43
		3.4	28	8.72	7.29	19.38
		4	27.9	8.79	7.54	19.36
		4.7	27.9	8.7	7.47	19.36
		5.2	28	8.65	7.44	19.29
		5.3	27.9	8.24	7.37	19.27
		5.4	28	8.35	7.33	19.25

Secchi Depth and Profile Graphics

Station: 1

PHIMA1



ROESIGER (NORTH ARM)

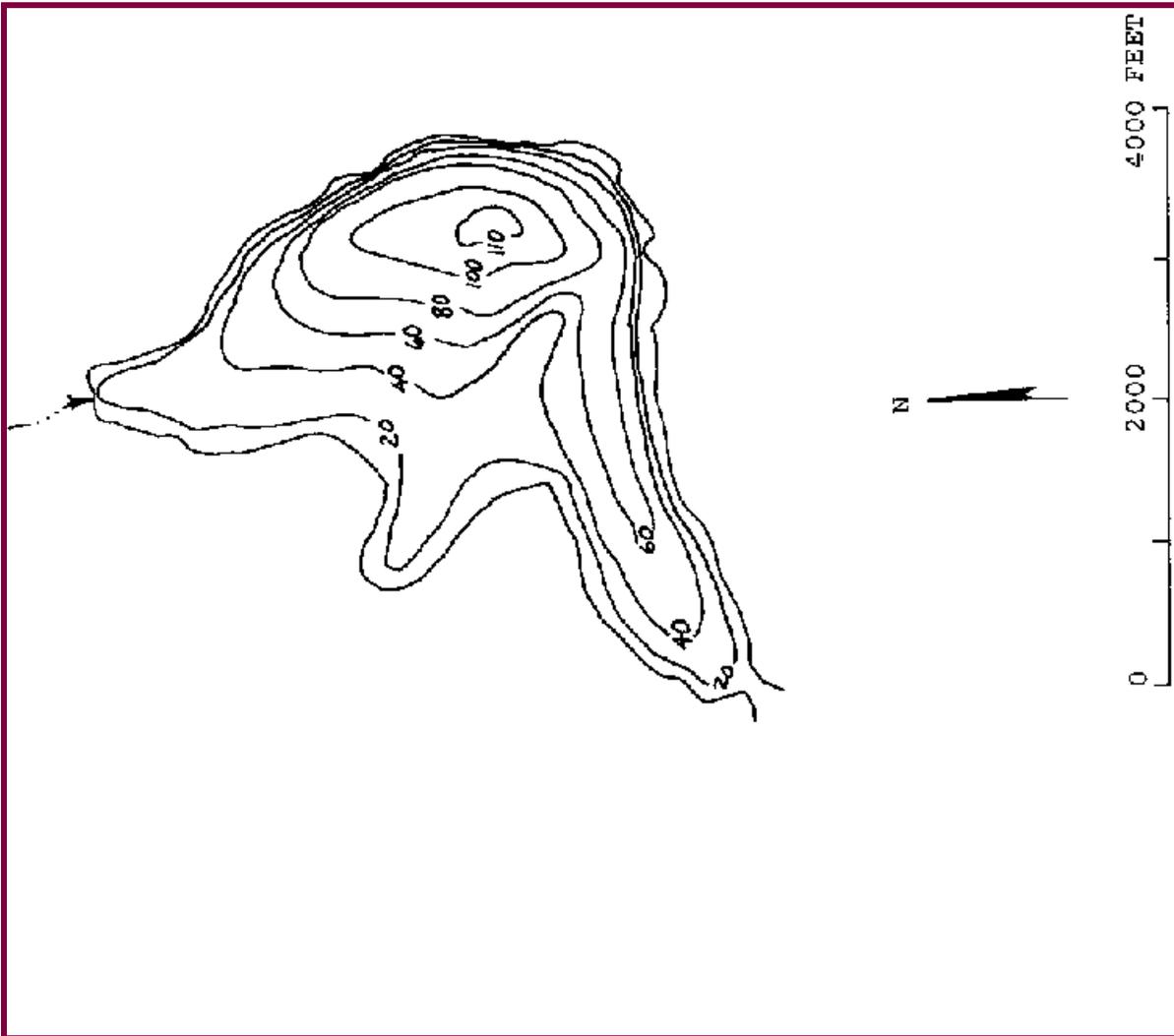
SNOHOMISH County

Lake ID: ROESN1

Ecoregion: 2

Roesiger is located 8.5 miles northeast of Monroe. The north and south basins of the lake are separated by a shallow connecting basin. The north basin of Lake Roesiger is fed by an intermittent stream, and drains southeast through the south basin of the lake via Roesiger Creek to Woods Creek and the Skykomish River.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
200	110	48	2	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
9600	2.92	570	47 59 17.	121 55 04.



Station Information

ROESN1

Primary Station	Station # 1	latitude: 47 59 43.8	longitude: 121 54 23.8
	Description: Deep spot of the north arm of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		
Secondary Station	Station # 3	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

ROESIGER (NORTH ARM)

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	N
TSI_Phos:		
TSI_Ch1:		
Narrative TSI:	^b	

Summary Comments:

There were only three Secchi readings taken by the volunteer monitor in the north arm of Lake Roesiger. This is not sufficient data to calculate a Trophic State Index assessment.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

LOESIGER (NORTH ARM)

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/20/1998		16	21	2		2	1	5	5	0	1	0	0
	Sampler: SORGENFREI		Remarks:										
7/24/1998		23	18	2	75	1	1	4	5	0	0	0	0
	Sampler: SORGENFREI		Remarks: SPECKLED NEAR SHORE WATER SURFACE WITH WHITE POLLEN.										
10/16/1998		14.9			100	1	5			0	0	0	0
	Sampler: SORGENFREI		Remarks: LOST SECCHI DISK IN LAKE. HOMEMADE DISK - NUT CAM CAME LOOSE AND DISK SANK.										

Profile Report

ROESIGER (NORTH ARM)

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
8/6/1998						
		0	27	7.83	7.2	24.3
		1	27	8.15	7.2	24.4
		1.9	26	8.3	7.1	24.5
		2	27	8.45	7.1	24.3
		3	27	8.4	7.2	24.3
		4	26	9.5	7.2	22.3
		5	25	11.77	7.4	17.2
		6	25	12.75	7.5	13.3
		7	25	13.28	7.6	9.9
		8	26	10.8	7.5	8.4
		8.9	25	4.88	7.3	7.1
		9.1	23	12.17	8	7.9
		10	25	3.84	7.1	6.3
		11	26	3.16	6.9	5.9
		12	25	2.47	6.8	5.5
		12.9	26	1.94	6.7	5.4
		13	24	5.73	7.2	5.9
		13.8	24	4.84	6.9	5.9
		14	25	1.41	6.6	5.3
		15	26	.71	6.5	5.2
		16	32	.46	6.4	5.2
		17	37	.33	6.3	5.2
		18	41	.33	6.1	5.2
		18.6	43	.26	6.1	5.2

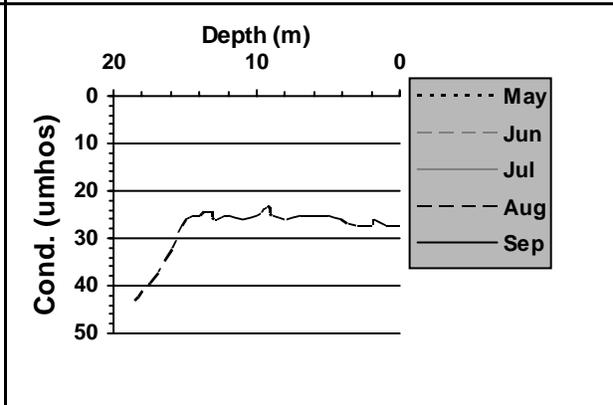
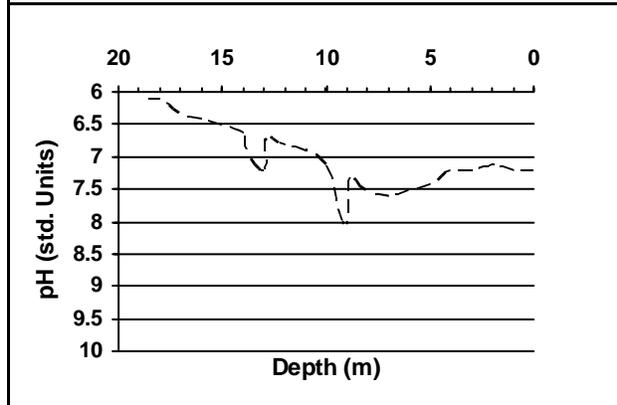
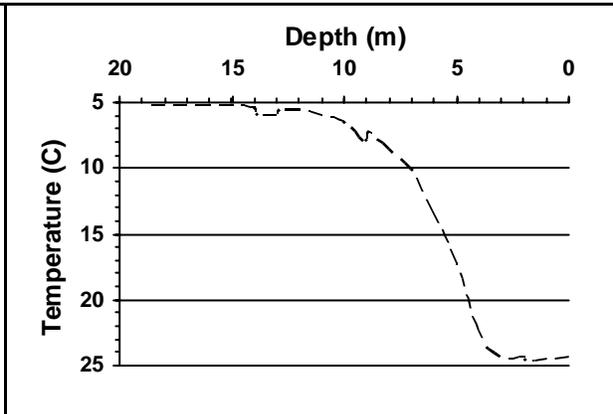
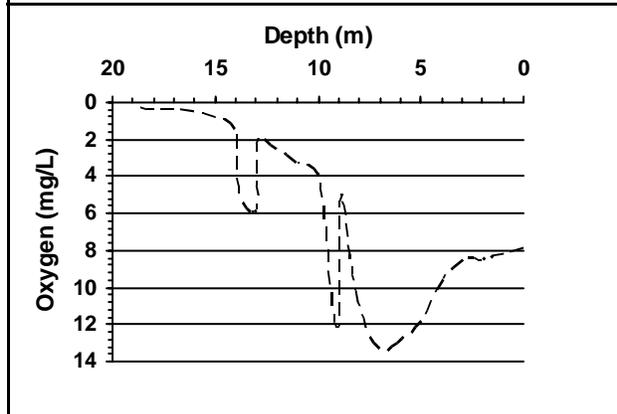
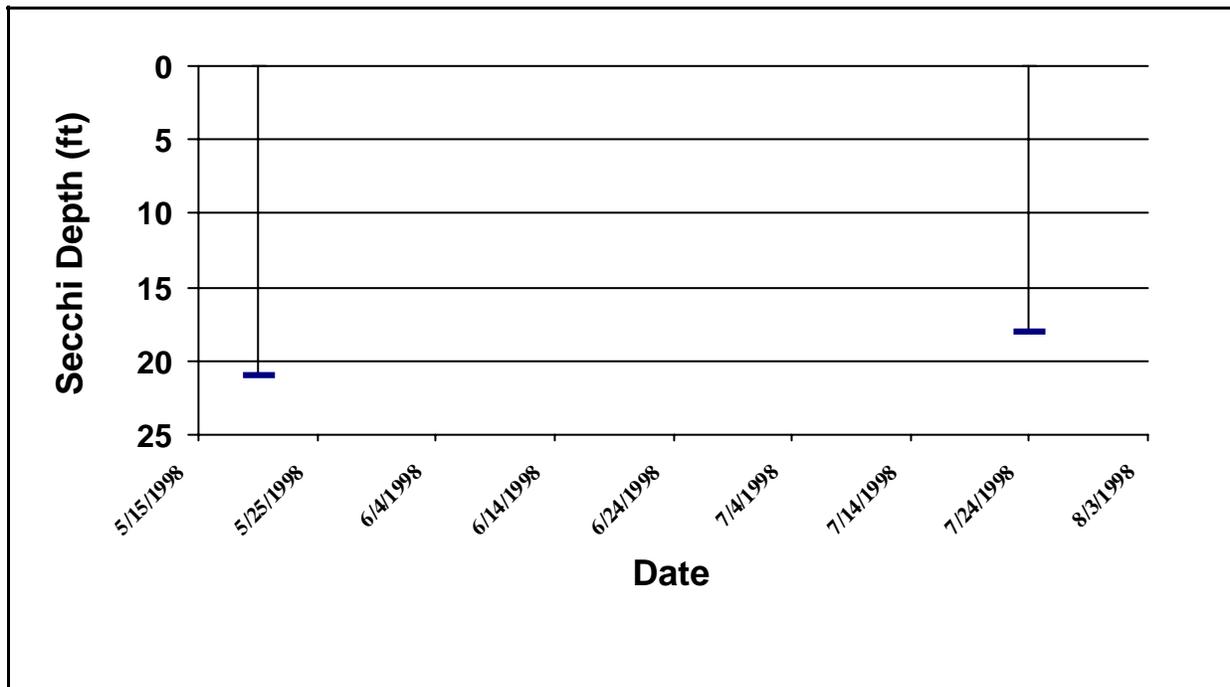
Station 3

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
8/6/1998						
		0	27	7.83	7.2	24.3
		1	27	8.15	7.2	24.4
		2	27	8.45	7.1	24.3
		3	27	8.4	7.2	24.3
		4	26	9.5	7.2	22.3
		5	25	11.77	7.4	17.2
		6	25	12.75	7.5	13.3
		7	25	13.28	7.6	9.9
		8	26	10.8	7.5	8.4
		8.9	25	4.88	7.3	7.1
		10	25	3.84	7.1	6.3
		11	26	3.16	6.9	5.9
		12	25	2.47	6.8	5.5
		12.9	26	1.94	6.7	5.4
		14	25	1.41	6.6	5.3
		15	26	.71	6.5	5.2
		16	32	.46	6.4	5.2
		17	37	.33	6.3	5.2
		18	41	.33	6.1	5.2
		18.6	43	.26	6.1	5.2

Secchi Depth and Profile Graphics

Station: 1

ROESN1



Station Information

ROESN1

Primary Station	Station # 1	latitude: 47 59 43.8	longitude: 121 54 23.8
	Description: Deep spot of the north arm of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		
Secondary Station	Station # 3	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

ROESIGER (NORTH ARM)

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 35
TSI_Phos:	27 J
TSI_Ch1:	
Narrative TSI:	^b OM

Summary Comments:

The general water clarity of Lake Roesiger (North Arm) was excellent in 1999. The Secchi depth readings ranged from 4.4 meters (14.5 feet) to 6.0 meters (19.5 feet) with a mean Secchi depth of 5.4 meters (17.8 feet). For comparison, in 1997 the mean Secchi depth was 5.5 meters (18.1 feet).

No geese and only a few other waterfowl were seen on Lake Roesiger by the volunteer monitor during her sampling visits made between May and October.

The chemistry data collected for Lake Roesiger showed very low levels of phosphorus in the epilimnion. This level of phosphorus indicates a low degree of productivity where algae growth is usually not a problem. A small algal bloom was reported by the volunteer monitor in October.

Ecology staff made two site visits in 1999. Dissolved oxygen levels remained consistently high throughout the entire water column during the first site visit (5/25/1999) but low dissolved oxygen levels were observed in the hypolimnion during the second site visit (8/19/1999). Thermal stratification of the lake was noted during both site visits.

Ecology staff conducted an aquatic plant survey on 8/6/1998. A few plants of the following non-native plants were found in various locations around the lake: *Iris pseudacorus* (yellow flag), *Lythrum salicaria* (purple loosestrife), *Phalaris arundinacia* (reed canarygrass) and *Miriophyllum spicatum* (Eurasian milfoil).

Based on the Secchi depth data and the phosphorus levels, the north arm of Lake Roesiger should be classified as oligotrophic. However, because of the low dissolved

oxygen levels in the hypolimnion, the north arm of Lake Roesiger is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

ROESIGER (NORTH ARM)

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 1										
5/25/1999	1300	E	4.74							
8/19/1999	1237	E	5.04							

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

LOESIGER (NORTH ARM)

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/21/1999		13.2	14.5	4	75	2	3	5	5	0	0	0	0
	Sampler: SORGENFREI		Remarks: Did not use a view tube. Two blue-green swallows.										
5/25/1999		12	18	3	50	3	1	5	5	0	0	0	1
	Sampler: SORGENFREI		Remarks: Did not use a view tube.										
6/16/1999		20	17	4		1	2	3	5	0	0	0	0
	Sampler: LOCH		Remarks: Did not use a view tube. Too much clearcutting of watershed.										
7/13/1999		22	19	3	0	2	1	4	5	0	0	1	0
	Sampler: SORGENFREI		Remarks: Did not use the view tube. Two swallows over the lake.										
8/19/1999		22	19	2	25	1	1	5	5	0	10	1	1
	Sampler: SORGENFREI		Remarks: Did not use a view tube. Lake looked in good shape. Sampling day was sunny with a slight chop on the water.										
9/23/1999		20.1	19.5	4	100	3	1	5	5	0	0	0	0
	Sampler: SORGENFREI		Remarks: Did not use a view tube.										
10/21/1999		15	18	2	0	1	1	5	4	0	1	0	0
	Sampler: SORGENFREI		Remarks: Did not use a view tube. Some thin alga-like scum out in deep water areas.										

Profile Report

ROESIGER (NORTH ARM)

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
5/25/1999						
		0.1	22.8	10.15	8.32	17.32
		0.7	22.8	9.67	7.07	17.2
		0.8	22.9	9.78	7.07	17.25
		2	22.8	9.91	7.14	17.14
		3	22.9	10.2	7.21	16.85
		3.3	21.4	10.46	7.83	15.09
		4.4	22.1	11.21	7.41	12.38
		4.9	22	11.95	8.26	10.79
		5.1	22.1	11.98	7.58	10.63
		5.9	22.1	12.48	7.62	8.44
		6.9	22.1	12.28	7.62	7.23
		8	22.1	11.52	7.56	6.67
		8.6	22.1	11.48	8.06	6.36
		9	22.1	10.66	7.99	6.37
		9.9	22.1	10.25	7.88	6.15
		14.7	22.1	8.93	7.71	5.28
		20.1	22	8.15	7.52	5.06
		25	22.2	7.66	7.47	4.96
		25.2	22.2	7.1	7.3	4.97

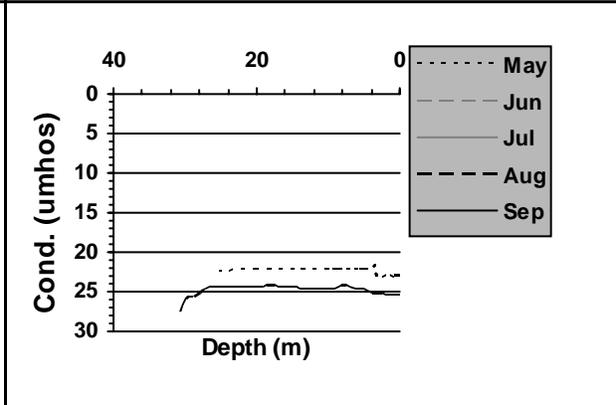
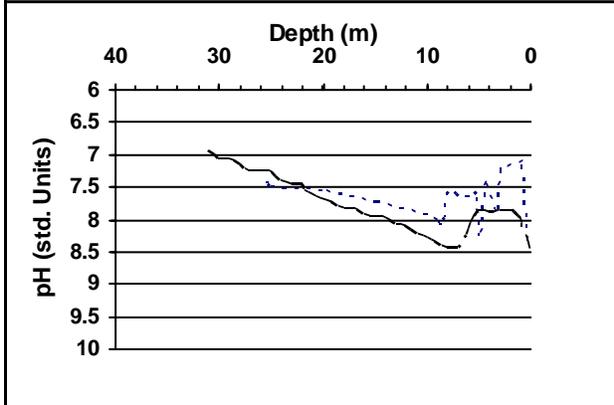
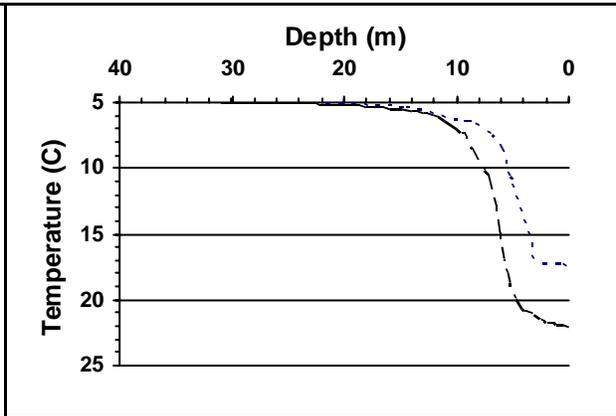
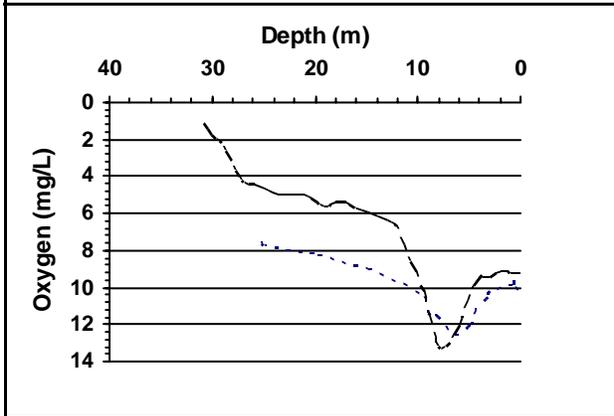
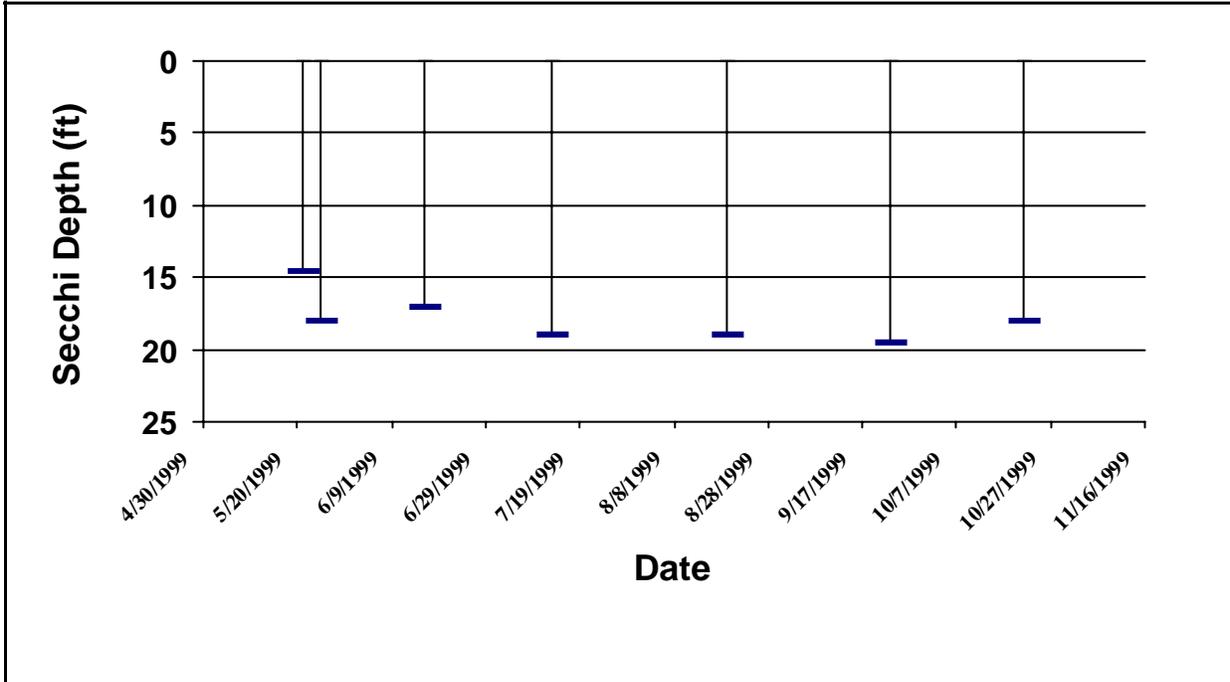
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
8/19/1999						
		0	25.3	9.22	8.43	21.97
		0.9	25.2	9.16	7.94	21.87
		1.1	25.2	9.12	7.93	21.86
		1.6	25.2	9.12	7.86	21.7
		2	25.2	9.12	7.84	21.63
		3.1	25.1	9.4	7.84	20.98
		4	25.1	9.44	7.87	20.7
		5.1	24.5	10.34	7.82	18.73
		6	24.4	11.98	8.05	14.99
		6.9	24.2	12.9	8.39	11.08
		8	24	13.15	8.41	9.31
		9.1	24.6	10.59	8.32	7.55
		10	24.4	9.11	8.25	7.02
		11	24.6	8.05	8.19	6.38
		12	24.5	6.61	8.07	5.95
		13	24.4	6.34	8.04	5.75
		14	24.4	6.06	7.96	5.61
		14.9	24.3	5.85	7.92	5.51
		16	24.3	5.64	7.89	5.42
		17	24.3	5.34	7.8	5.35
		18	24.1	5.37	7.79	5.25
		19.1	24.2	5.59	7.71	5.19
		20.3	24.2	5.18	7.64	5.15
		21.1	24.3	4.94	7.6	5.13
		21.8	24.2	4.89	7.54	5.12
		22.1	24.2	4.9	7.45	5.09
		22.9	24.2	4.95	7.45	5.07
		24.1	24.2	4.83	7.38	5.04
		24.9	24.2	4.57	7.26	5.03
		25.8	24.3	4.39	7.23	5.02
		27.1	24.4	4.13	7.23	5.02

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
		28	25	3.1	7.14	5.01
		29	25.5	2.15	7.05	5.01
		30	25.7	1.69	7.03	5.01
		31	28.2	.92	6.92	5

Secchi Depth and Profile Graphics

Station: 1

ROESN1



ROESIGER (SOUTH ARM)

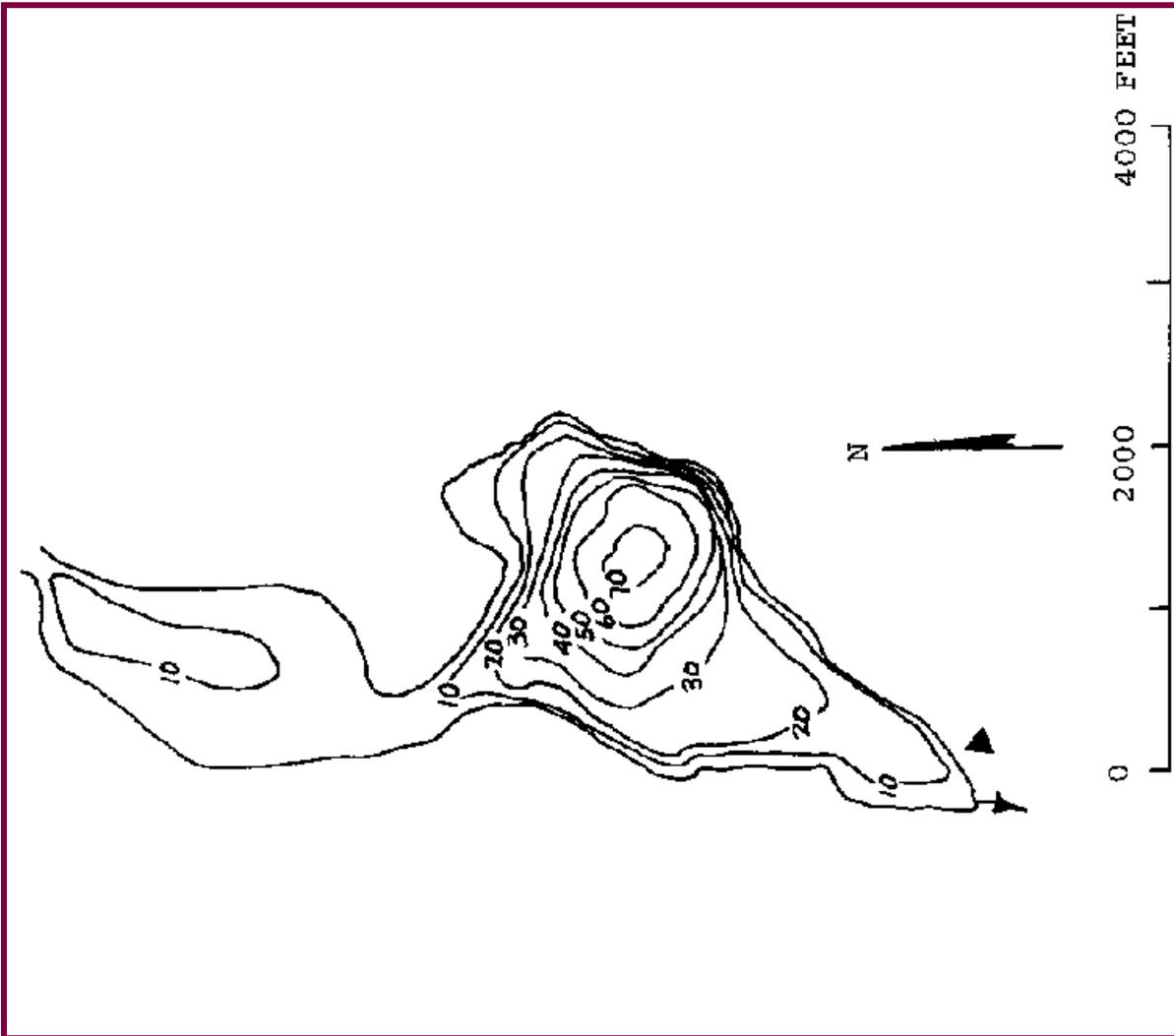
SNOHOMISH County

Lake ID: ROESN2

Ecoregion: 2

Lake Roesiger is located 8.5 miles NE of Monroe. The north and south basins of the lake are separated by a shallow connecting basin. The north basin of Lake Roesiger is fed by an intermittent stream and drains southeast through the south basin of the lake via Roesiger Creek to Woods Creek and the Skykomish River.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
140	70	22	4	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
3000	3.03	570	47 58 19.	121 55 23.



Station Information

ROESN2

Primary Station	Station # 3	latitude: 47 58 34.3	longitude: 121 55 04.0
	Description: Deep spot of the south arm of the lake.		
Secondary Station	Station # 4	latitude:	longitude:
	Description:		
Secondary Station	Station # 1	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

ROESIGER (SOUTH ARM)

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 36	J
TSI_Phos:		
TSI_Ch1:		
Narrative TSI: ^b	OM	

Summary Comments:

The general water clarity for the south arm of Lake Roesiger was good in 1998. The Secchi depth readings ranged from 4.3 meters (14.0 feet) to 5.8 meters (19.0 feet) with a mean Secchi depth of 5.1 meters (16.7 feet). For comparison, in 1997 the mean Secchi depth was 5.4 meters (17.7 feet).

No chemistry data was collected for the south arm of Lake Roesiger in 1998.

Only one site visit was made by Ecology staff in 1998. Thermal stratification was observed during this visit (8/6/1998) and an oxygen depletion was noted in the hypolimnion.

No geese and only a few other waterfowl were counted by the volunteer monitor during his sampling visits between May and October.

An aquatic plant survey was done by Ecology staff in 1998. Two non-native plants were observed during this survey; *Myriophyllum spicatum* (Eurasian milfoil) and *Nymphaea odorata* (fragrant waterlily). The *Myriophyllum spicatum* occurred mostly in the southwest end of the lake while the *Nymphaea odorata* was most dense in the area between the north and south arms of the entire lake.

Based on the Secchi depth data and the low dissolved oxygen in the hypolimnion, the south arm of Lake Roesiger is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

ROESIGER (SOUTH ARM)

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 3													
7/7/1998		21.1	18	2	50	2	1	5	5	0	4	2	1
	Sampler:	MILLER			Remarks:	WE DO HAVE GEESE AND NOW BEAVERS.							
8/6/1998		25	14	2	75		1	5	5	0	0	2	1
	Sampler:	SORGENFREI			Remarks:								
8/6/1998			16		0					0	0	0	0
	Sampler:	BELL-MCKINNON			Remarks:								
8/13/1998		25	16	2	0	1	1	5	5	0	0	0	1
	Sampler:	MILLER			Remarks:	LAKE HEIGHT MEASURED FROM TOP OF DOCK. WE NOW HAVE MILFOIL!							
9/8/1998		21.7	16	2	0	3	1	5	5	0	0	0	0
	Sampler:	MILLER			Remarks:	LAKE HEIGHT MEASURED FROM TOP OF DOCK.							
10/6/1998		17.8	19	2	0	1	1	5	5	0	1	0	0
	Sampler:	MILLER			Remarks:	LAKE HEIGHT MEASURED FROM TOP OF DOCK.							
10/16/1998		14.9	16.5	3	75	1	5			0	1	0	0
	Sampler:	SORGENFREI			Remarks:								

Profile Report

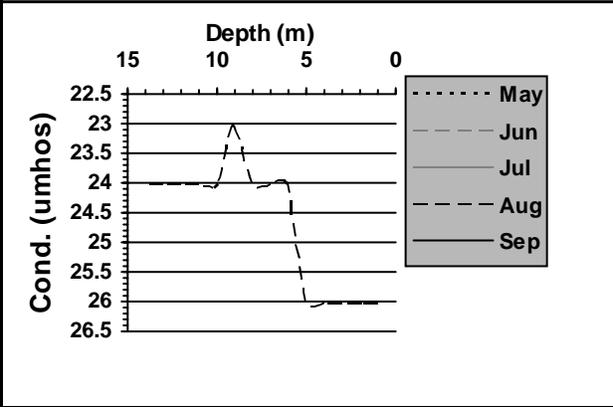
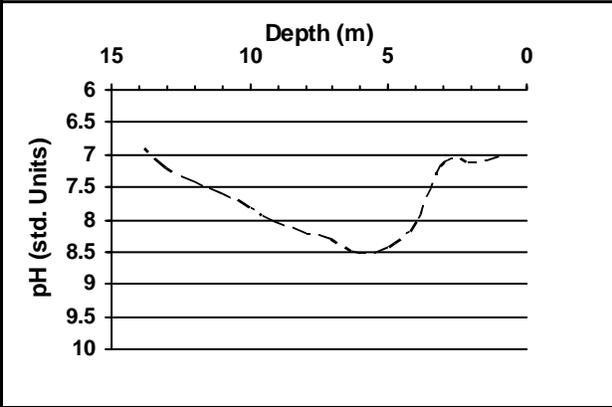
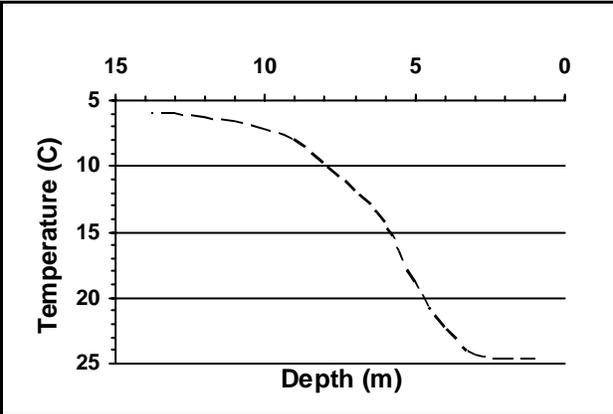
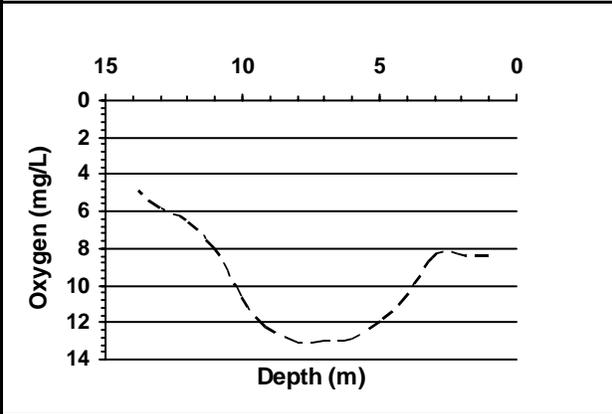
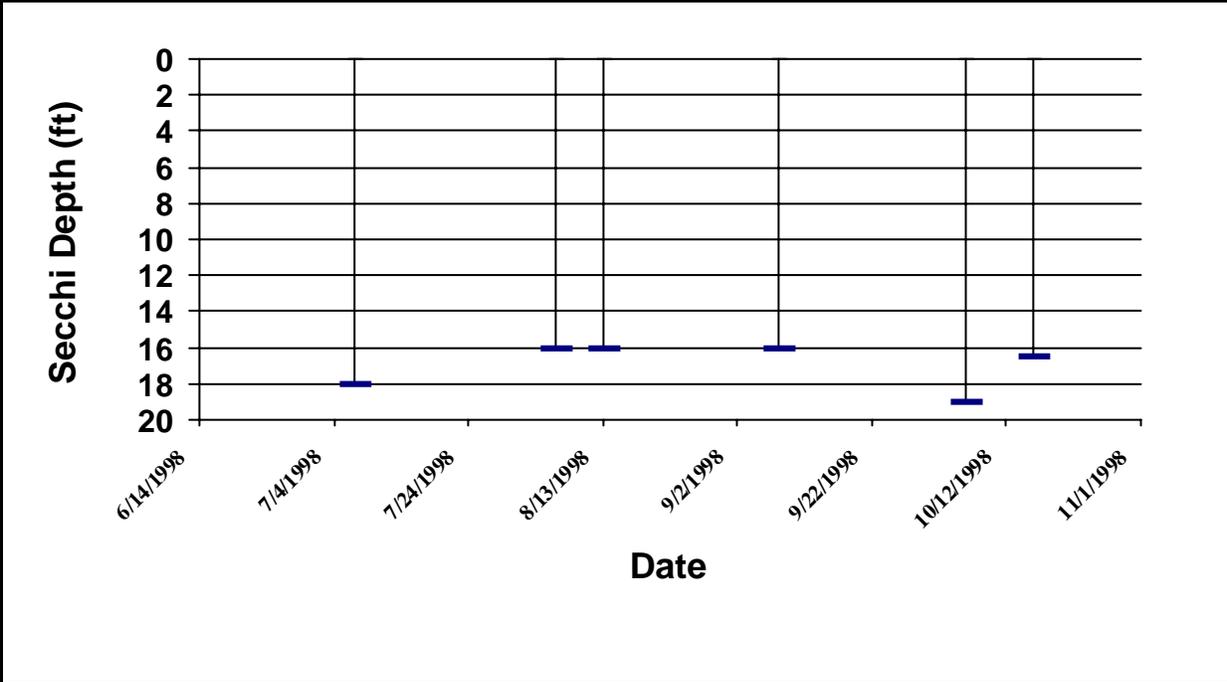
ROESIGER (SOUTH ARM)

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 3						
8/6/1998						
		1	26	8.32	7	24.6
		1.9	26	8.3	7.1	24.5
		3	26	8.2	7.1	24.3
		4	26	10.39	8	22.2
		5	26	11.89	8.4	18.7
		6	24	12.87	8.5	14.1
		7	24	12.9	8.3	11.7
		8	24	13.08	8.2	9.6
		9.1	23	12.17	8	7.9
		10	24	10.53	7.8	7.1
		11	24	7.94	7.6	6.5
		12	24	6.43	7.4	6.2
		13	24	5.73	7.2	5.9
		13.8	24	4.84	6.9	5.9

Secchi Depth and Profile Graphics

Station: 3

ROESN2



Station Information

ROESN2

Primary Station	Station # 3	latitude: 47 58 34.3	longitude: 121 55 04.0
	Description: Deep spot of the south arm of the lake.		
Secondary Station	Station # 4	latitude:	longitude:
	Description:		
Secondary Station	Station # 1	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

ROESIGER (SOUTH ARM)

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	35
TSI_Phos:		39
TSI_Ch1:		
Narrative TSI:	^b	OM

Summary Comments:

The general water clarity of Lake Roesiger (South Arm) was excellent in 1999. The Secchi depth readings ranged from 4.6 meters (15.00 feet) to 6.4 meters (21.0 feet) with a mean Secchi depth of 5.7 meters (18.7 feet). For comparison, in 1998 the mean Secchi depth was 5.1 meters (16.7 feet).

No geese and only a few other waterfowl were seen on Lake Roesiger by the volunteer monitor during his sampling visits made between May and October.

The chemistry data collected for Lake Roesiger showed low to moderate levels of phosphorus in the epilimnion; depending on the date of sampling. This level of phosphorus indicates a lower degree of productivity where algae growth is usually not a problem; if a bloom does occur it usually doesn't last very long.

Ecology staff made two site visits in 1999. Similar to the north arm of Lake Roesiger, dissolved oxygen levels in the south arm of Lake Roesiger remained consistently high throughout the entire water column during the first site visit (5/25/1999) but low dissolved oxygen levels were observed in the hypolimnion during the second site visit (8/19/1999). Thermal stratification of the lake was noted during both site visits.

Based on the Secchi depth data and the phosphorus levels, the south arm of Lake Roesiger should be classified as oligotrophic. However, because of the low dissolved oxygen levels in the hypolimnion, the south arm of Lake Roesiger is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

ROESIGER (SOUTH ARM)

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 3													
5/21/1999		15	18.5	6	25	1	3	5	5	0	0	3	0
	Sampler: SORGENFREI		Remarks: Did not use a view tube.										
5/25/1999		65	21	3	50	2	1	5	4	0	0	0	0
	Sampler: MILLER		Remarks: Did not use a view tube.										
6/15/1999		70	18	3	75	2	2	5	5	0	0	1	0
	Sampler: MILLER		Remarks: Used a view tube.										
7/8/1999		19	15	3	0	3	1	5	5	0	0	1	1
	Sampler: MILLER		Remarks: Did not use a view tube.										
8/19/1999		22.6	19	2	50	1	1	5	5	0	2	1	1
	Sampler: MILLER		Remarks: Used a view tube. Lake looked good. Sampling day was mostly sunny with a slight chop on the water.										
9/22/1999		19	20	2	0	1	1	5	5	0	0	1	0
	Sampler: MILLER		Remarks: Did not use a view tube.										

Profile Report

ROESIGER (SOUTH ARM)

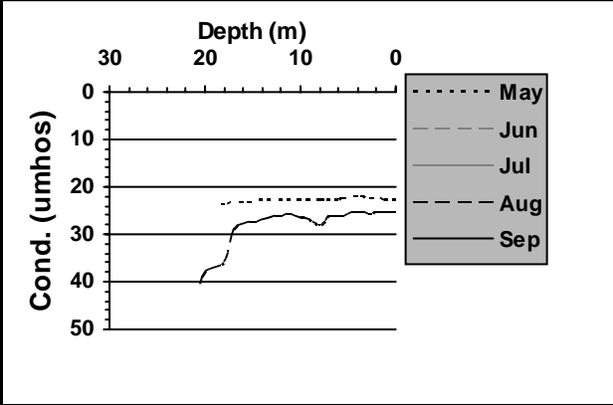
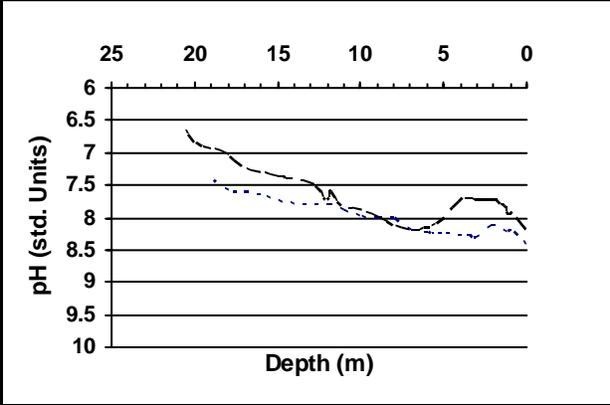
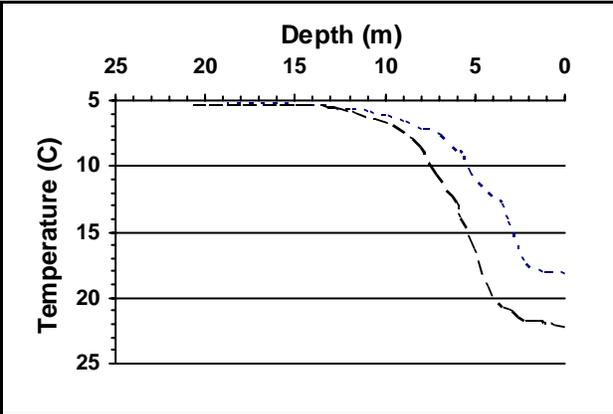
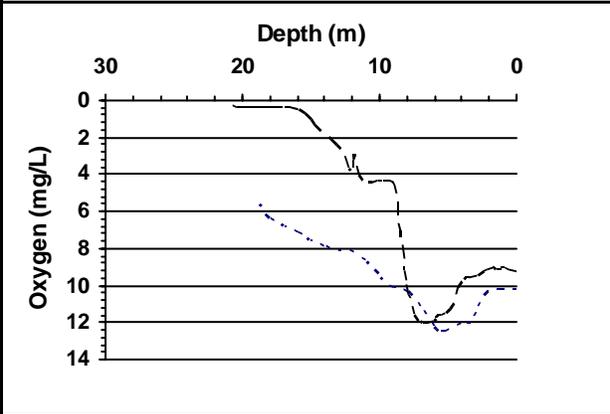
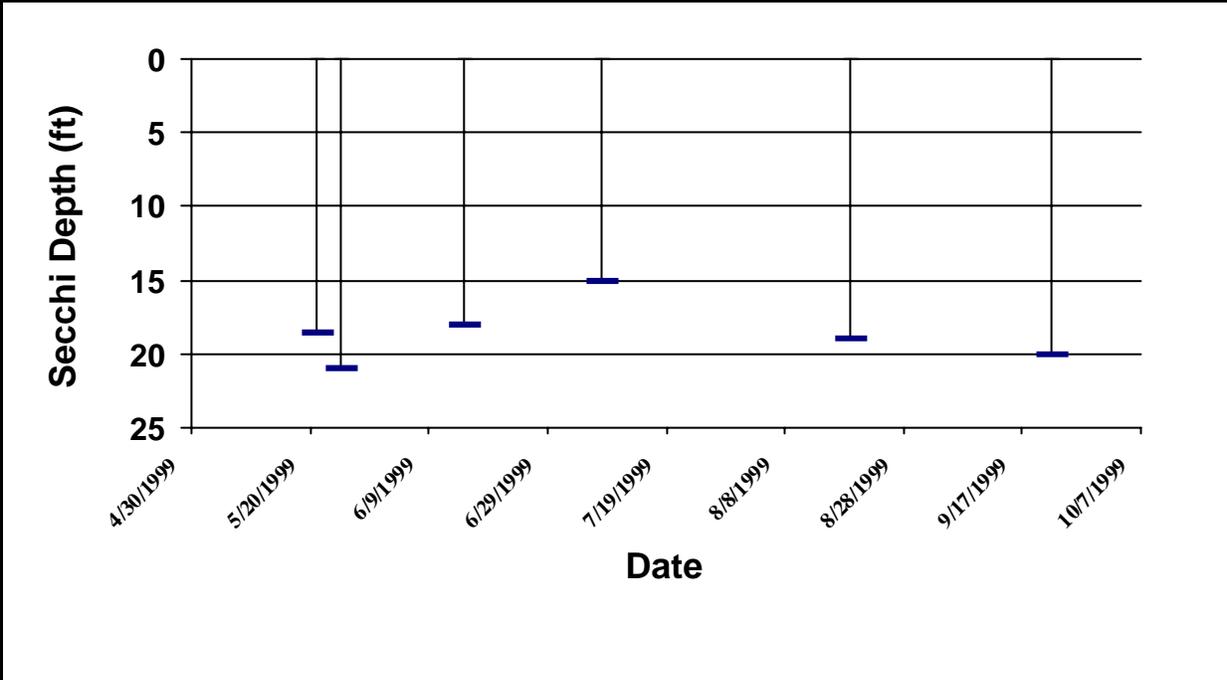
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 3						
5/25/1999						
		0	22.6	10.13	8.41	18.01
		0.9	22.7	10.12	8.16	18
		1.2	22.7	10.19	8.21	17.99
		2.2	22	10.22	8.1	17.2
		3.1	21.9	11.46	8.29	13.96
		3.4	21.8	11.94	8.27	12.73
		4	21.7	12.01	8.26	12.25
		5.2	21.9	12.4	8.22	10.4
		5.6	22.2	12.38	8.22	8.88
		6	22.4	12.17	8.2	8.72
		6.9	22.6	11.13	8.17	7.59
		7.6	22.5	10.5	8.06	7.08
		8	22.5	10.23	7.99	7.08
		9	22.6	10.05	7.98	6.46
		10	22.7	9.31	7.96	6.04
		11	22.5	8.51	7.85	5.7
		11.9	22.6	8.17	7.77	5.53
		14	22.5	7.77	7.76	5.32
		16	22.8	7.1	7.63	5.15
		18	23.2	6.31	7.56	5.12
		18.8	23.9	5.46	7.4	5.12

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
8/19/1999						
		0	25.2	9.15	8.18	22.08
		1	25.1	9.02	7.88	21.83
		1.1	25.1	9.06	7.95	21.82
		1.3	25.1	9.05	7.8	21.76
		1.5	25.1	9.04	7.77	21.75
		1.8	25.1	9.01	7.7	21.72
		2.2	25.1	9.1	7.72	21.7
		2.9	25.6	9.37	7.7	21.01
		4	25	9.69	7.69	19.91
		5	25.5	11.22	7.97	16.22
		5.9	25.7	11.61	8.14	13.25
		6	25.9	11.72	8.13	12.74
		7.1	25.7	11.85	8.18	10.61
		8	27.8	9.75	8.12	8.51
		8.9	26.8	4.62	7.98	7.36
		9.9	26.1	4.32	7.85	6.61
		11.1	25.6	4.24	7.8	6.17
		11.9	25.9	2.85	7.55	5.62
		12.1	25.8	3.78	7.72	5.7
		12.8	25.8	2.57	7.47	5.45
		14.2	26.6	1.63	7.38	5.34
		15	27	.97	7.34	5.3
		16	27.5	.45	7.27	5.29
		17.1	28.6	.35	7.2	5.27
		18	34.9	.29	7	5.27
		19	36.5	.29	6.92	5.25
		20	37.7	.27	6.81	5.25
		20.7	40.3	.26	6.58	5.25

Secchi Depth and Profile Graphics

Station: 3

ROESN2



SAMISH (EAST ARM)

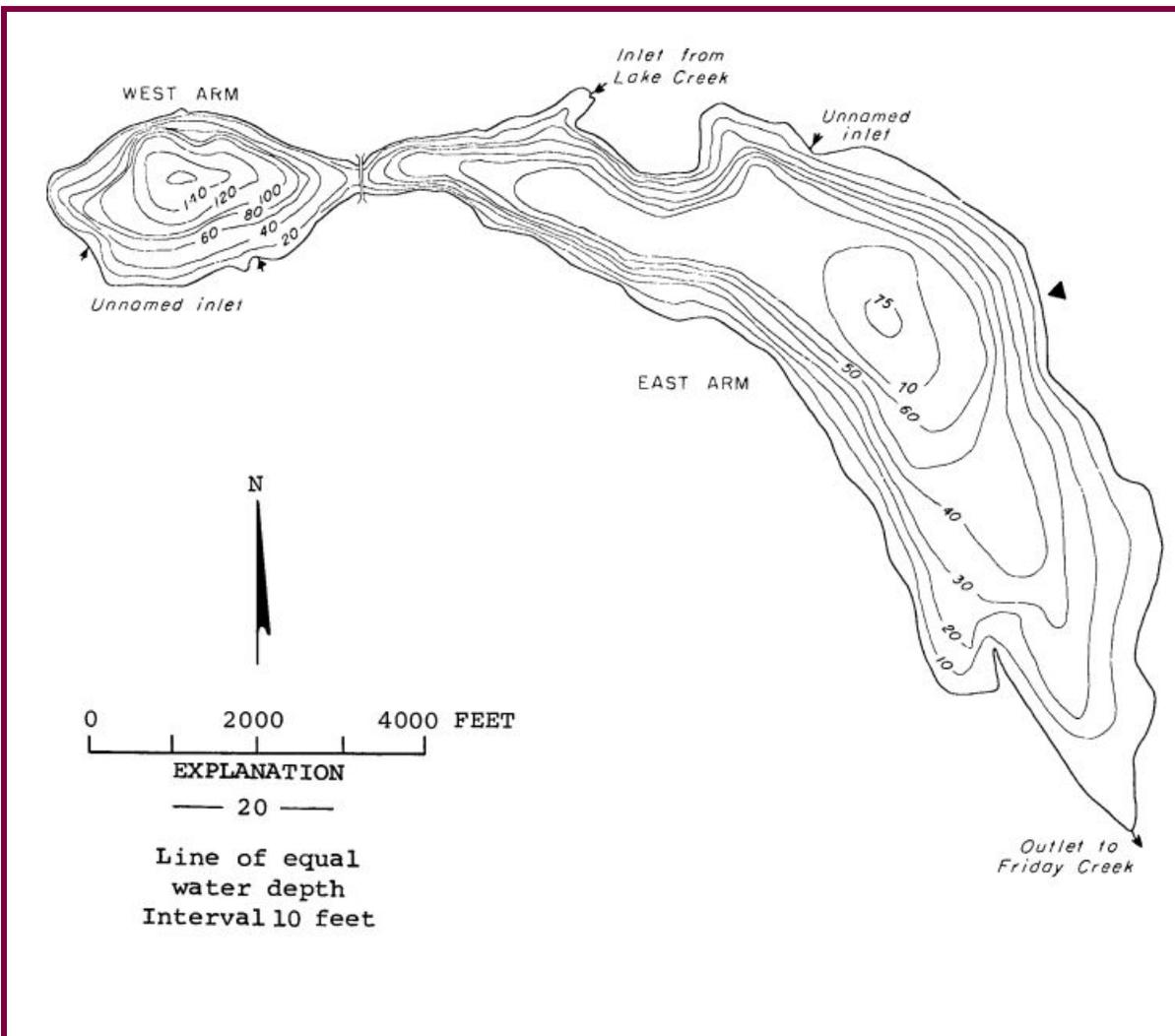
WHATCOM County

Lake ID: SAMWH1

Ecoregion: 2

Lake Samish is located 6.5 miles southeast of Bellingham. It is comprised of two basins which are connected by a narrow strait. The west arm is a small deep bay and the east arm is a larger shallow bay. There are several small inlets that flow into the lake, including Lake Creek and Barnes Creek. Lake Samish drains via Friday Creek to the Samish River.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
680	75	31	9	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
24000	6.27	273	48 38 56.	122 22 15.



Station Information

SAMWH1

Primary Station	Station # 1	latitude: 48 39 26.8	longitude: 122 23 21.0
	Description:	Deep spot of the east arm of the lake.	
Secondary Station	Station # 2	latitude:	longitude:
	Description:		
Secondary Station	Station # 3	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

SAMISH (EAST ARM)

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 38	J
TSI_Phos:		
TSI_Ch1:		
Narrative TSI:	^b OM	

Summary Comments:

The general water clarity for the east arm of Lake Samish was good in 1998. The Secchi depth readings ranged from 3.2 meters (10.5 feet) to 6.6 meters (21.5 feet) with a mean Secchi depth of 4.6 meters (15.3 feet). For comparison, in 1997 the mean Secchi depth was 4.5 meters (14.7 feet).

No chemistry data was collected for the east arm of Lake Samish in 1998.

Only one site visit was made by Ecology staff in 1998. Thermal stratification was observed during this visit (9/28/1998) and a depletion of dissolved oxygen was noted in the hypolimnion.

The volunteer monitor observed that geese are on the lake in the evening and leave in the early morning before he goes out and collects his data.

An aquatic plant survey was done by Ecology staff in 1997. This survey noted the occurrence of some dense patches of the non-native plant *Nymphaea odorata* (fragrant waterlily), especially at the south end of the lake.

Based on the Secchi depth data and the low dissolved oxygen levels in the hypolimnion, the east arm of Lake Samish is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

SAMISH (EAST ARM)

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/1/1998		18	15	2	50	1	2	5	5	0		4	0
	Sampler:	DAVIS		Remarks:	THE REAL LAKE HEIGHT IS 268 FEET, 5 2/3 INCHES. SINCE THIS VALUE WILL NOT FIT IN THE LAKE HEIGHT FIELD ON THE DATA ENTRY FORM, I "SUBTRACTED" 200 FEET FROM THE REPORTED VALUE AND CONVERTED THE REMAINING VALUE TO INCHES.								
6/16/1998		19.5	19	2	25	1	3	5	5	0	0	3	0
	Sampler:	DAVIS		Remarks:	GEESE COME IN THE EVENING.								
6/29/1998		20	21.5	2	50	1	1	5	5	0	0	0	2
	Sampler:	DAVIS		Remarks:									
7/13/1998		21	18.5	2	75	2	4	5	5	0	0	4	1
	Sampler:	DAVIS		Remarks:	LARGE FLOCK OF CANADIAN GEESE COME IN THE EVENING.								
7/28/1998		27	21.25	2	50	2	1	5	5	0	0	0	7
	Sampler:	DAVIS		Remarks:									
8/10/1998		24	15.5	2	50	1	1	5	5	0	0	1	6
	Sampler:	DAVIS		Remarks:									
8/24/1998		23	14	2	75	2	1	5	5	0	3	0	3
	Sampler:	DAVIS		Remarks:									
9/8/1998		23	11	3	75	1	1	5	5				
	Sampler:	DAVIS		Remarks:	LABOR DAY WEEKEND - SO MANY BOATS IT WAS DANGEROUS.								
9/28/1998		19	10.5	2	0	3	1	5	5	0	0		
	Sampler:	DAVIS		Remarks:									
9/28/1998			10.5		0					0	0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									

Date	Time	Temperature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Brightness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5-good)	Swimming (1-poor, 5-good)	Geese (#)	Waterfowl (besides geese #)	Boats-Fishing (#)	Boats-Skiing (#)
10/14/1998		16	10.5	2	75	1	3	5	5	0	5	0	0
	Sampler: DAVIS		Remarks:										

Profile Report

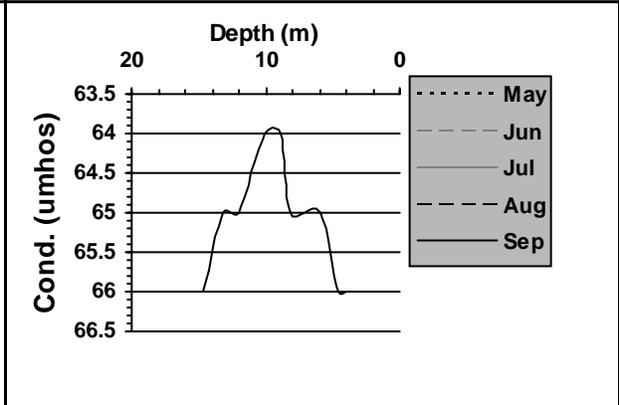
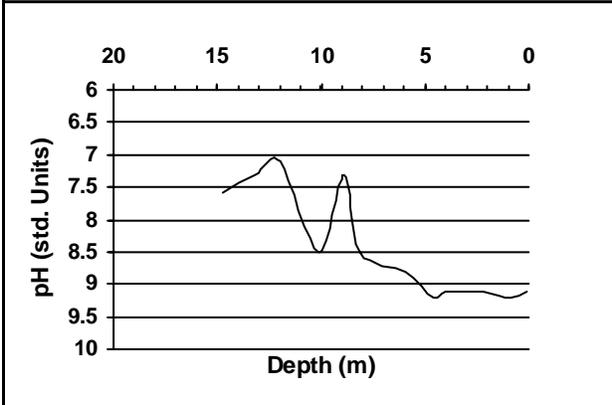
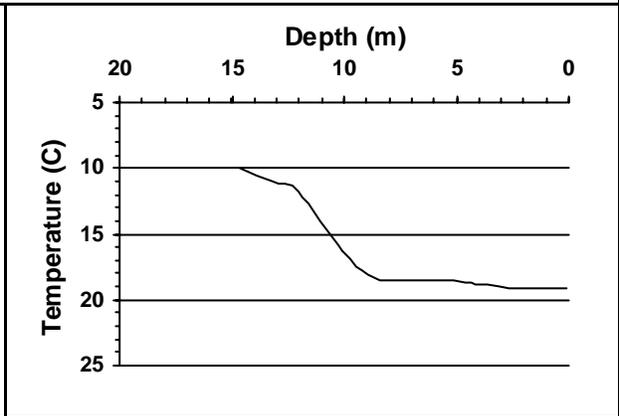
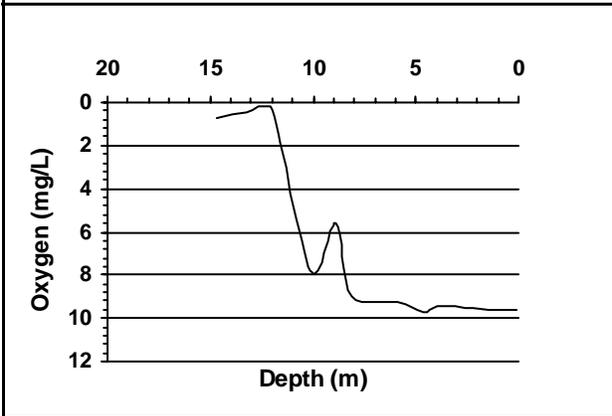
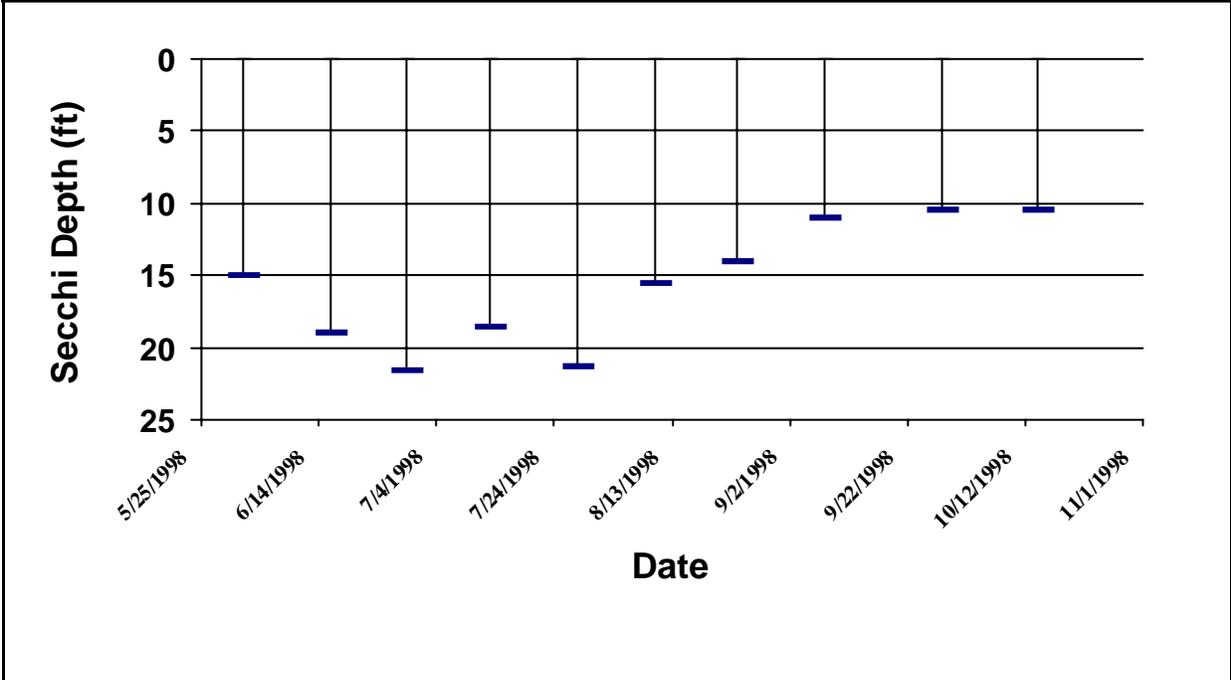
SAMISH (EAST ARM)

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
9/28/1998						
		0.1	66	9.65	9.1	19.1
		0.9	66	9.62	9.2	19.1
		2.2	66	9.49	9.1	19.1
		4	66	9.41	9.1	18.8
		4.6	66	9.71	9.2	18.7
		5.9	65	9.24	8.8	18.6
		8.1	65	8.98	8.5	18.5
		8.9	64	5.56	7.3	18.1
		10.1	64	7.78	8.5	16.3
		12	65	.37	7.1	11.8
		13.2	65	.42	7.3	11
		14.7	66	.72	7.6	10

Secchi Depth and Profile Graphics

Station: 1

SAMWH1



Station Information

SAMWH1

Primary Station	Station # 1	latitude: 48 39 26.8	longitude: 122 23 21.0
	Description: Deep spot of the east arm of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		
Secondary Station	Station # 3	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

SAMISH (EAST ARM)

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 34	
TSI_Phos:	32	J
TSI_Ch1:		
Narrative TSI:	^b OM	

Summary Comments:

The general water clarity of the east arm of Lake Samish was excellent in 1999. The Secchi depth readings ranged from 4.9 meters (16.0 feet) to 7.6 meters (25.0 feet) with a mean Secchi depth of 5.7 meters (18.7 feet). For comparison, in 1998 the mean Secchi depth was 4.6 meters (15.3 feet).

No geese and only a few other waterfowl were seen on Lake Samish - East Arm by the volunteer monitor during his sampling visits made between May and October. The volunteer monitor did comment that from his home he saw geese coming in to the lake area around dusk most evenings.

The chemistry data collected for Lake Samish - East Arm showed very low levels of phosphorus in the epilimnion. This level of phosphorus indicates a lower degree of productivity where algae growth is usually not a problem.

Ecology staff made two site visits in 1999. During the first site visit (5/24/1999) dissolved oxygen levels remained consistently high throughout the entire water column and thermal stratification of the lake was noted. During the second site visit (8/9/1999) low dissolved oxygen levels in the hypolimnion were observed and thermal stratification of the lake was again noted.

Ecology staff conducted an aquatic plant survey on 9/14/1999. Two non-native plants - *Iris pseudacorus* (yellow flag) and *Nymphaea odorata* (fragrant waterlily) - were observed to have a few plants in a patchy distribution in the east arm of Lake Samish. The aquatic plant community was dominated by the native plant *Vallisneria americana* (water celery) where appropriate habitat was available. Bryozoans were also observed. Also noted was the extensively developed shoreline with many large

docks and large homes.

Based on the Secchi depth data and the phosphorus levels, the east arm of Lake Samish should be classified as oligotrophic. However, because of the low dissolved oxygen levels in the hypolimnion, the east arm of Lake Samish is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

SAMISH (EAST ARM)

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 1										
5/24/1999	1400	E	8.63							
8/9/1999	1330	E	6.1							

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

SAMISH (EAST ARM)

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/24/1999		18	19	2	0	2	1	5	5	0	0	0	2
	Sampler:	DAVIS		Remarks: Used a view tube.									
6/10/1999		16	18.5	2	25	2	2	5	5	0	0	0	0
	Sampler:	DAVIS		Remarks: Used a view tube. Geese come in at dusk.									
6/27/1999		17	21.5	2	75	2	3	5	5	0	0	0	4
	Sampler:	DAVIS		Remarks: Used a view tube.									
7/11/1999		20	23.5	2	0	2	1	5	5	0	0	0	8
	Sampler:	DAVIS		Remarks: Used a view tube.									
7/26/1999		24	25	2	0	1	2	5	5	0	0	2	5
	Sampler:	DAVIS		Remarks: Used a view tube.									
8/9/1999		24	16.5	2	50	2	2	5	5	0		0	4
	Sampler:	DAVIS		Remarks: Used a view tube. Luxuriant plant growth around volunteers dock-Nymphaea, Elodea, Vallisneria (?). Large patches of waterlilies at other docks along the shore. Sampling day was mostly sunny with a fair amount of chop on the water.									
8/23/1999		24	16	2	0	2	1	5	5	0	2	0	7
	Sampler:	DAVIS		Remarks: Used a view tube.									
9/13/1999		23	18	2	0	1	1	5	5	0	3	0	1
	Sampler:	DAVIS		Remarks: Used a view tube.									
9/27/1999		18	19.5	2	0	3	1	5	5	0	9	0	1
	Sampler:	DAVIS		Remarks: Used a view tube.									

Profile Report

SAMISH (EAST ARM)

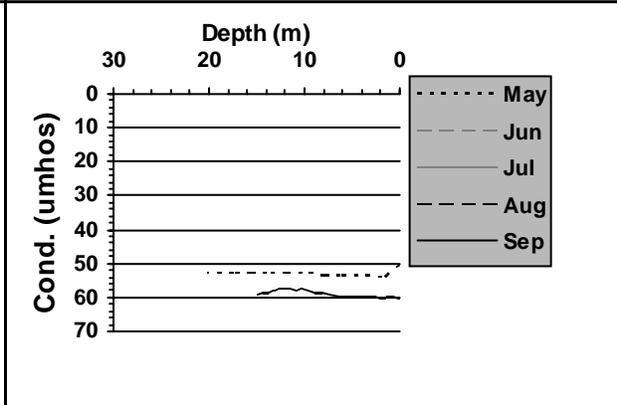
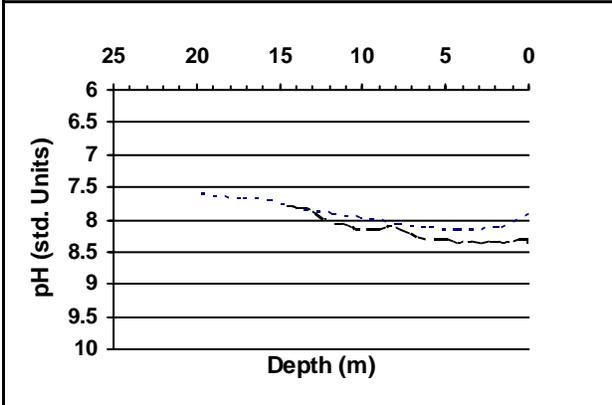
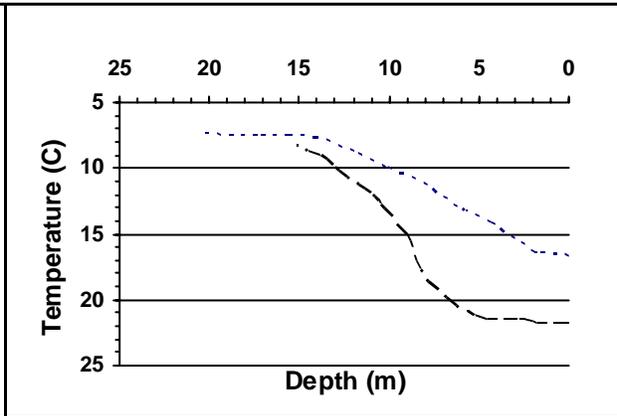
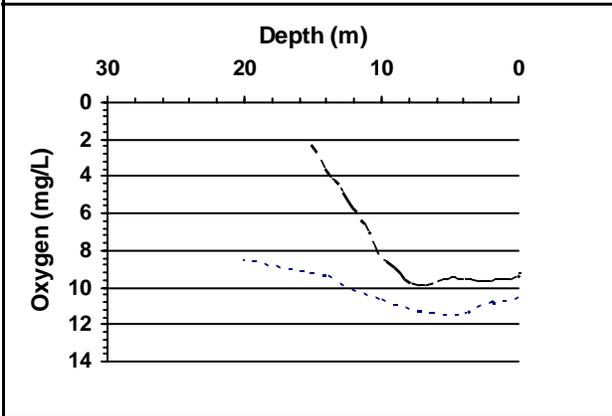
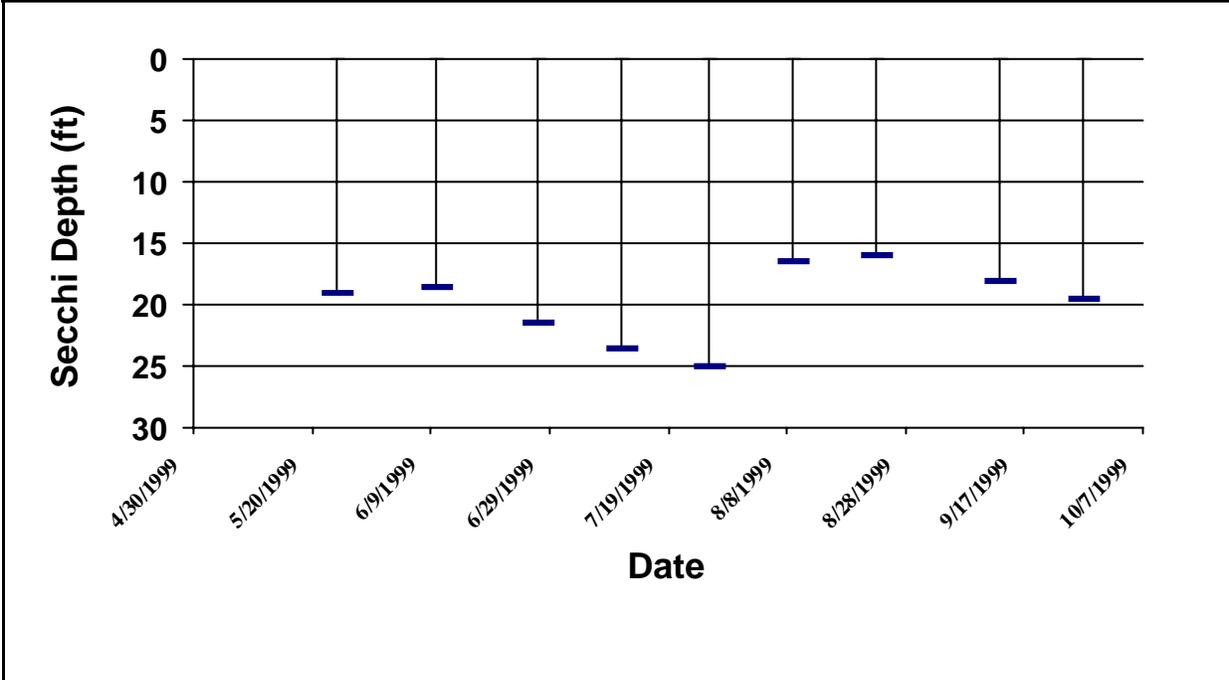
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
5/24/1999						
		0	49.9	10.48	7.9	16.56
		1.8	53.6	10.9	8.1	16.28
		1.9	53.6	10.73	8.11	16.24
		4.3	53.1	11.44	8.13	13.96
		6.2	53	11.36	8.12	12.81
		7.9	53	11.08	8.04	11.12
		10.2	52.7	10.61	7.95	9.85
		11.9	52.6	10.12	7.89	8.63
		14	52.3	9.35	7.8	7.62
		15.6	52.3	9.06	7.69	7.43
		17.4	52.4	8.82	7.65	7.34
		20.2	52.5	8.41	7.59	7.22

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
8/9/1999						
		0	60.3	9.23	8.37	21.65
		0.1	59.8	9.39	8.3	21.74
		1.2	59.7	9.48	8.32	21.72
		1.4	59.8	9.54	8.32	21.68
		1.5	59.8	9.52	8.34	21.66
		2	59.8	9.57	8.33	21.54
		2.9	59.7	9.57	8.35	21.43
		4	59.7	9.46	8.32	21.38
		4.3	59.7	9.5	8.34	21.37
		4.9	59.7	9.38	8.3	21.23
		6.2	59.3	9.75	8.28	20.37
		7.2	58.9	9.81	8.21	19.12
		8.2	58.2	9.51	8.08	17.6
		9	58.3	8.87	8.13	14.91
		10.2	57.1	8.23	8.14	12.95
		10.9	57.5	6.98	8.09	11.7
		12.3	57.4	5.39	7.99	10.58
		13.1	57.8	4.39	7.84	9.69
		13.8	58.4	3.9	7.79	8.98
		15.1	59.2	2.2	7.73	8.16

Secchi Depth and Profile Graphics

Station: 1

SAMWH1



SAMISH (WEST ARM)

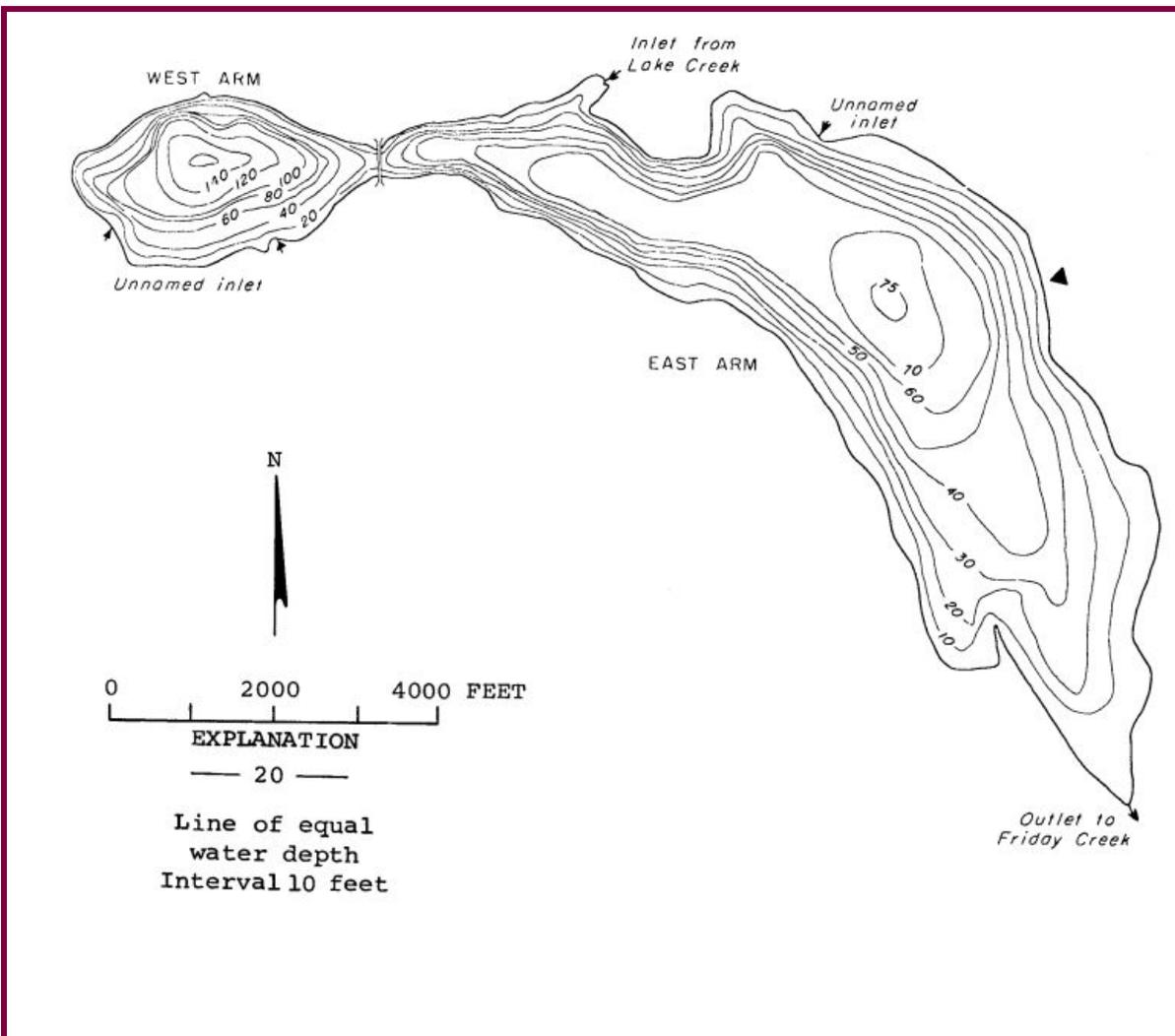
WHATCOM County

Lake ID: SAMWH2

Ecoregion: 2

Lake Samish is located 6.5 miles southeast of Bellingham. It is comprised of two basins which are connected by a narrow strait. The west arm is a small deep bay, and the east arm is a larger shallow bay. There are several small inlets that flow into the lake, including Lake Creek and Barnes Creek. Lake Samish drains via Friday Creek to the Samish River.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
130	140	71	4	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
9100	1.8	273	48 40 15.	122 24 38.



Trophic State Assessment for 1998

SAMISH (WEST ARM)

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 36	J
TSI_Phos:		
TSI_Ch1:		
Narrative TSI:	^b	OM

Summary Comments:

The general water clarity was good for the west arm of Lake Samish in 1998. The Secchi depth readings ranged from 3.5 meters (11.5 feet) to 7.0 meters (23.0 feet) with a mean Secchi depth of 5.1 meters (16.9 feet). For comparison, in 1997 the mean Secchi depth was 5.4 meters (17.8 feet).

No chemistry data was collected for the west arm of Lake Samish in 1998.

Only one site visit was made by Ecology staff in 1998. Thermal stratification was observed during this visit (9/28/1998) and an oxygen depletion was noted in the hypolimnion.

Geese were observed by the volunteer monitor on only one of his sampling visits between May and October.

Based on the Secchi depth data and the low dissolved oxygen levels in the hypolimnion, the west arm of Lake Samish is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

SAMISH (WEST ARM)

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 2													
6/1/1998		18	19.5	2	75	3	2	4	4	0	0	0	0
	Sampler:	JENKINS		Remarks:	THE ACTUAL LAKE HEIGHT IS 268.58 FEET. SINCE THIS VALUE WILL NOT FIT IN THE LAKE HEIGHT FIELD (WHICH IS IN INCHES), I "SUBTRACTED" 200 FEET AND CONVERTED THE REMAINING VALUE TO INCHES.								
6/16/1998		20	18	2	75	1	3	4	4	0	0	0	0
	Sampler:	JENKINS		Remarks:									
6/28/1998		20	23	2	75	1	1	5	5	0	0	0	1
	Sampler:	JENKINS		Remarks:	PILE DRIVER AT WORK.								
7/28/1998		25	19.5	2	75	1	1	5	5	0	0	0	2
	Sampler:	JENKINS		Remarks:									
8/10/1998		25	20	2	75	1	1	5	5	0	0	0	2
	Sampler:	JENKINS		Remarks:									
8/24/1998		24	17	2	75	1	1	5	5			0	3
	Sampler:	DAVIS		Remarks:									
9/8/1998		24	15	2	50	1	1	5	5	0	0	0	0
	Sampler:	DAVIS		Remarks:									
9/28/1998		18	12	2	0	3	1	5	5	0	0	0	0
	Sampler:	DAVIS		Remarks:									
9/28/1998			12		0					0	0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									
10/14/1998		15	11.5	2	75	1	3	5	5	33		0	0
	Sampler:	DAVIS		Remarks:									

Profile Report

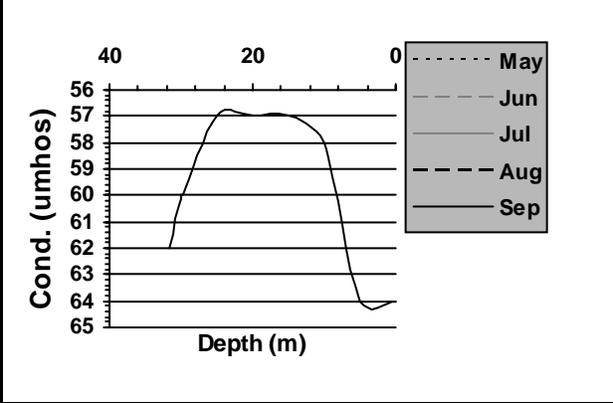
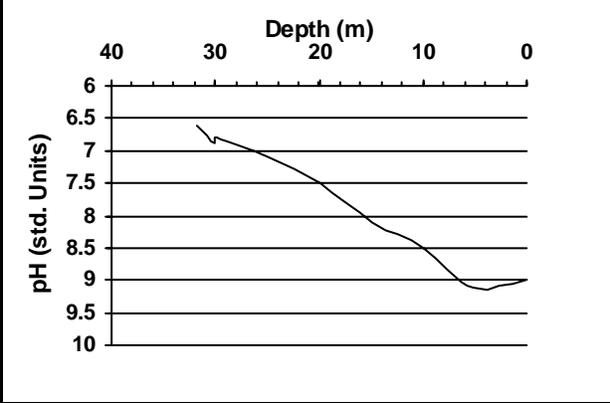
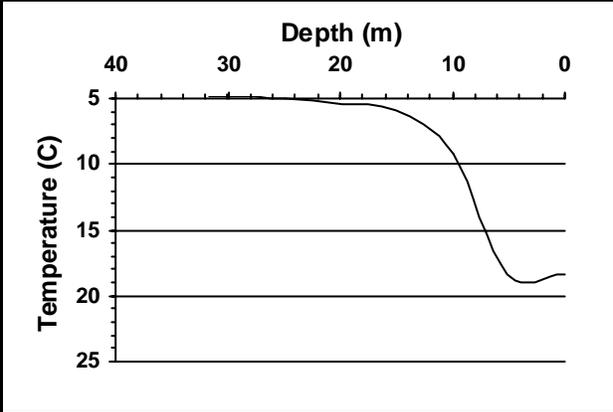
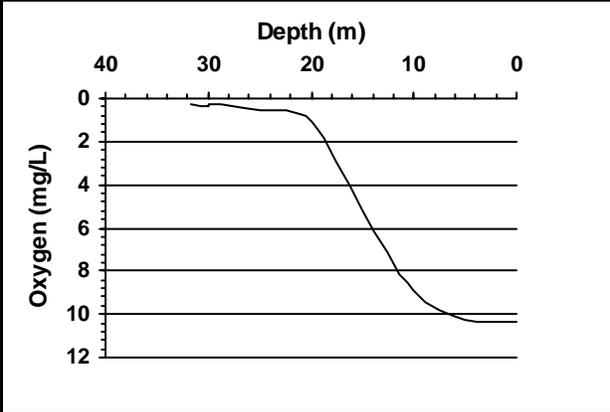
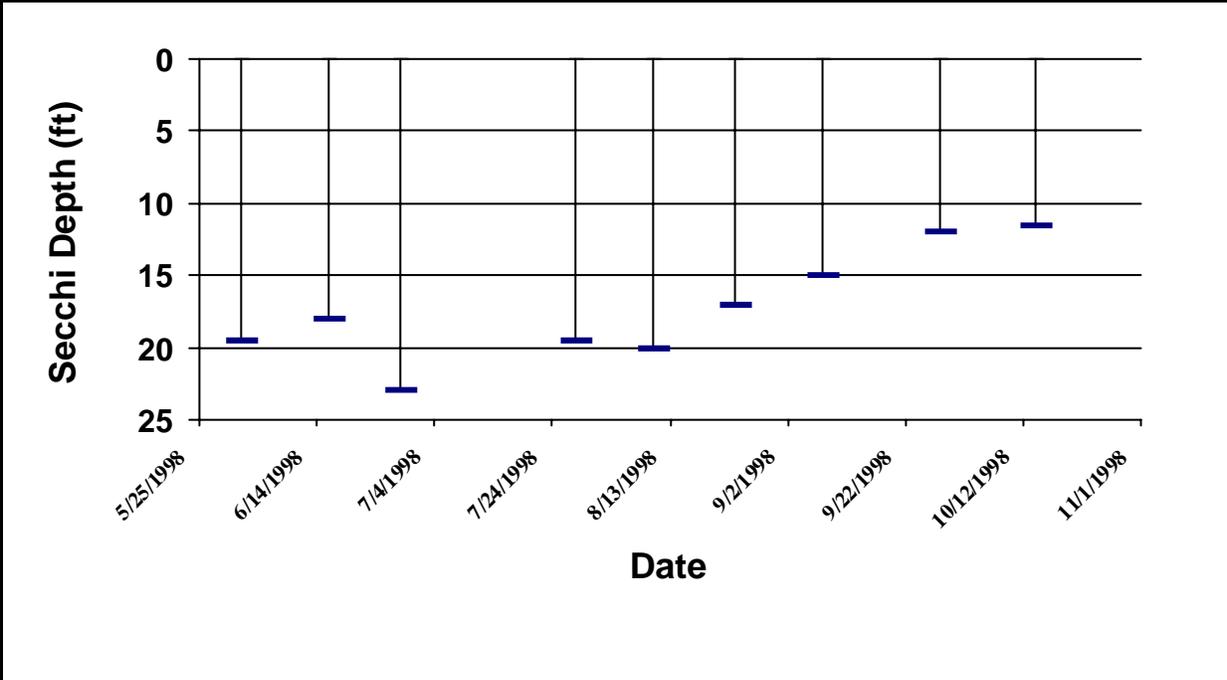
SAMISH (WEST ARM)

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 2						
9/28/1998						
		0	64	10.31	9	18.4
		5.1	64	10.23	9.1	18.4
		10	58	8.84	8.5	9.2
		15	57	5.17	8.1	5.9
		19.9	57	1.13	7.5	5.4
		24.9	57	.57	7.1	5
		29.8	60	.28	6.8	4.9
		30	60	.34	6.9	4.9
		31.7	62	.24	6.6	4.9

Secchi Depth and Profile Graphics

Station: 2

SAMWH2



Trophic State Assessment for 1999

SAMISH (WEST ARM)

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	N
TSI_Phos:	38	
TSI_ChI:		
Narrative TSI:	^b	

Summary Comments:

There were only three Secchi readings made by the volunteer monitor in 1999. This is not enough data to calculate a Trophic State Index assessment.

The chemistry data collected for Lake Samish - West Arm showed very low levels of phosphorus in the epilimnion. This level of phosphorus indicates a lower degree of productivity where algae growth is usually not a problem.

Ecology staff made only one site visit in 1999. A lake profile was not possible due to equipment problems.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

SAMISH (WEST ARM)

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
------	------	--------	-----------------	-----------------	-------	----------------------------	-------------------------------------	--------------------	-------------------	--------------------

Station 2

8/9/1999	1400	E	10.7							
----------	------	---	------	--	--	--	--	--	--	--

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

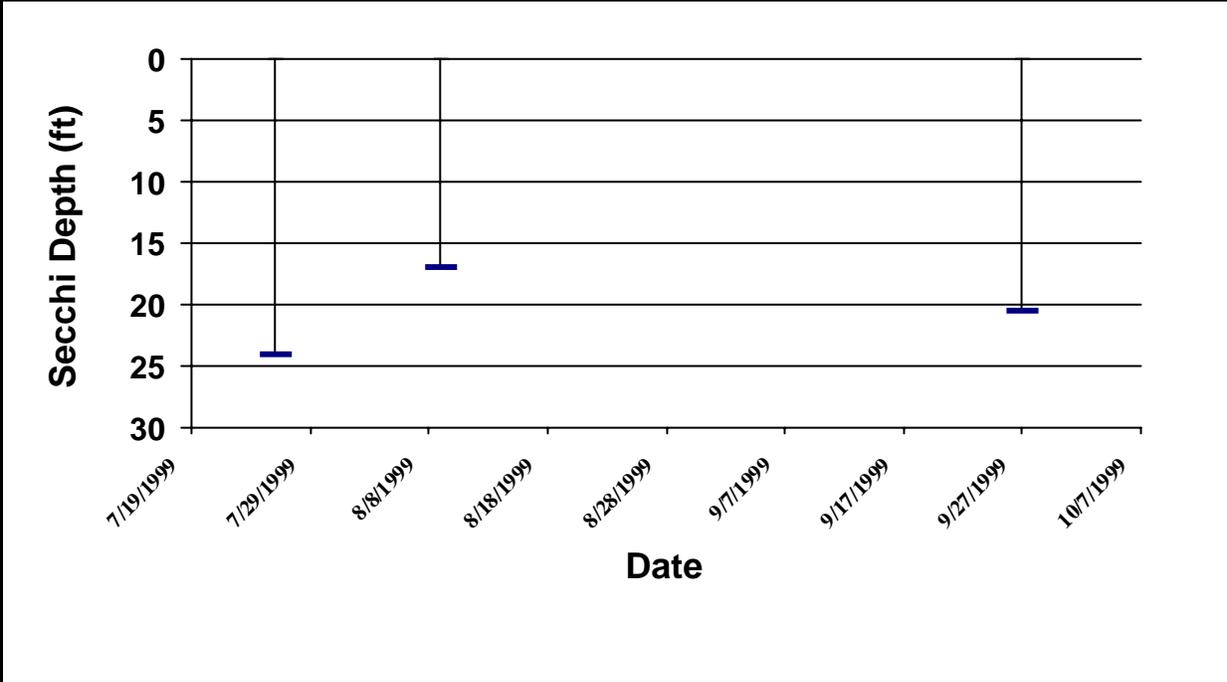
SAMISH (WEST ARM)

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 2													
7/26/1999		24	24	2	0	2	2	5	5	0	0	1	2
	Sampler:	DAVIS		Remarks: Used a view tube.									
8/9/1999		23	17	2	50	2	2	5	5	0		0	1
	Sampler:	DAVIS		Remarks: Used a view tube. No algae blooms or odors noted. No problems since last visit. Saw a bald eagle. Lake level is higher this year than last year.									
9/27/1999		18	20.5	2	0	3	1	5	5	0	0	0	0
	Sampler:	DAVIS		Remarks: Used a view tube.									

Secchi Depth and Profile Graphics

Station: 2

SAMWH2



--	--

--	--

SAWYER

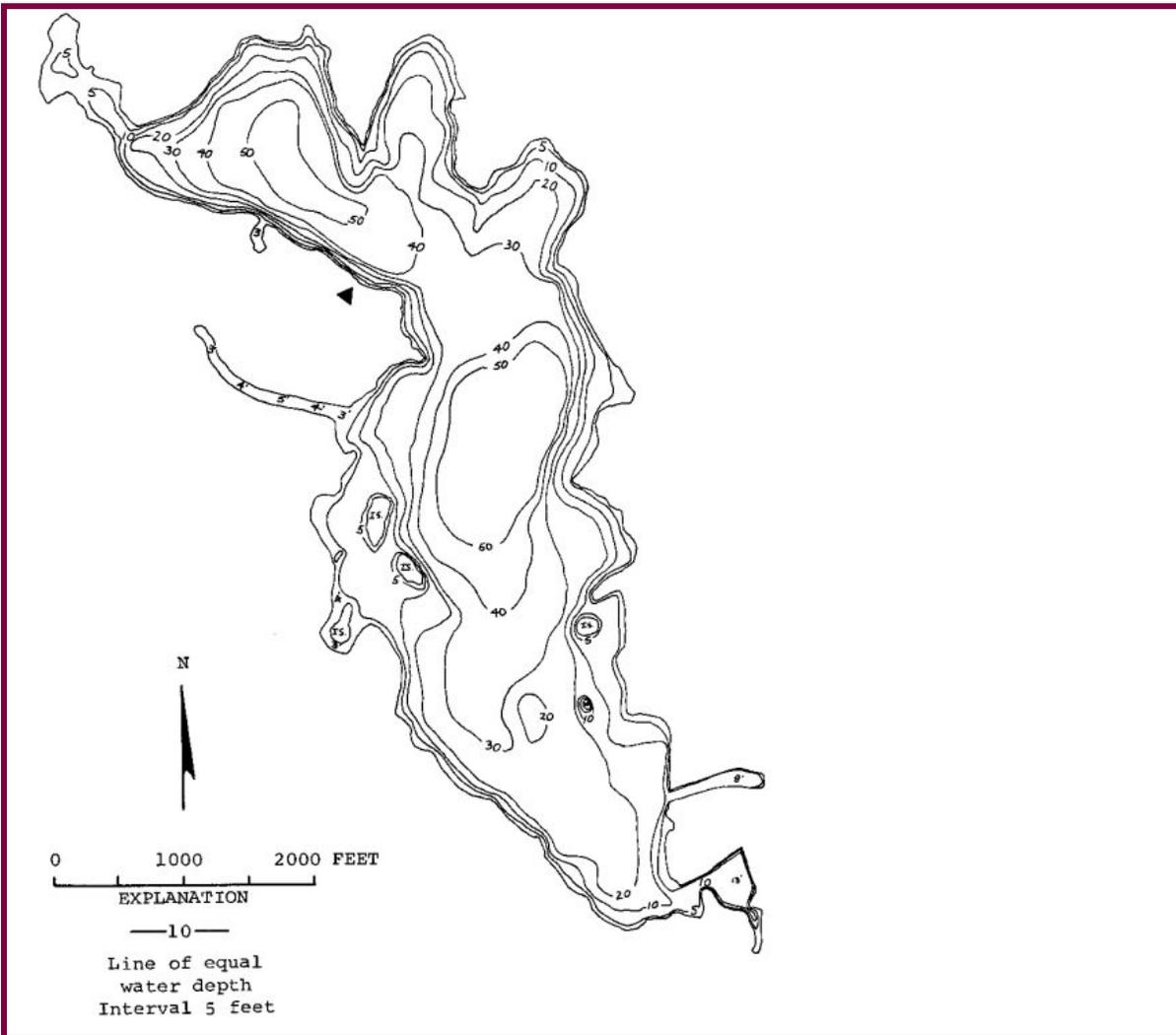
KING County

Lake ID: SAWK11

Ecoregion: 2

Lake Sawyer is located two miles northwest of Black Diamond. It has four small islands. It is fed at the south end of the lake by Rock Creek, Ravensdale Creek, and an extensive wetland. The lake drains via Covington Creek to the Green River. Lake level is controlled by a concrete weir which was constructed in 1952.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
302	58	26	13	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
7744	7.02	512	47 20 03.	122 02 24.



Station Information

SAWKI1

Primary Station	Station # 1	latitude: 47 19 57.9	longitude: 122 02 11.9
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

SAWYER

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 38 J
TSI_Phos:
TSI_Ch1:
Narrative TSI: ^b OM

Summary Comments:

The general water clarity was good for Lake Sawyer in 1998. The Secchi depth readings ranged from 4.1 meters (13.5 feet) to 6.3 meters (20.5 feet) with a mean Secchi reading of 4.9 meters (16.0 feet). For comparison, in 1997 the mean Secchi depth was 3.5 meters (11.5 feet).

No chemistry data was collected for Lake Sawyer in 1998.

Only one site visit was made by Ecology staff in 1998. Thermal stratification was observed and an oxygen depletion was noted in the hypolimnion during this visit (9/18/1998).

The volunteer monitor observed only a few geese and/ or other waterfowl during his sampling visits between May and October. He also commented on the construction this year of a new housing development (42 homes) on the east side of the lake.

An aquatic plant survey was done by Ecology staff in 1997. The non-native *Myriophyllum spicatum* (Eurasian milfoil) was observed throughout the lake although not appearing dominant. Another non-native, *Nymphaea odorata* (fragrant waterlily) was also seen in a wide patchy distribution in the lake.

Based on Secchi depth data and the low dissolved oxygen levels in the hypolimnion, Lake Sawyer is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
------	------	-------------------------	----------------	-----------------------------------	--------------------------	------------------------------	----------------------------------	-----------------------------------	----------------------------------	--------------	-----------------------------------	--------------------------	-------------------------

Profile Report

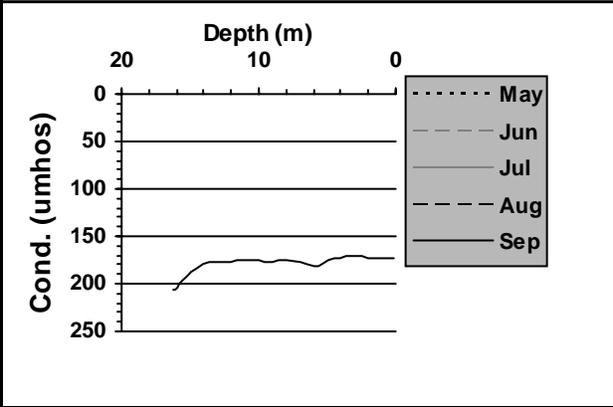
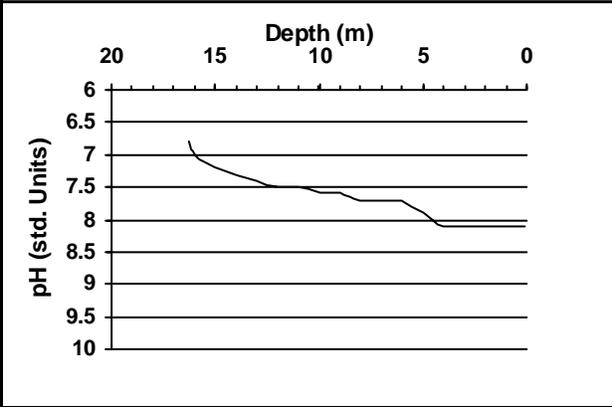
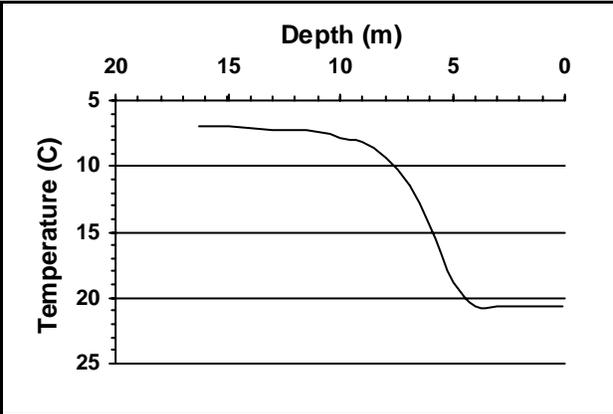
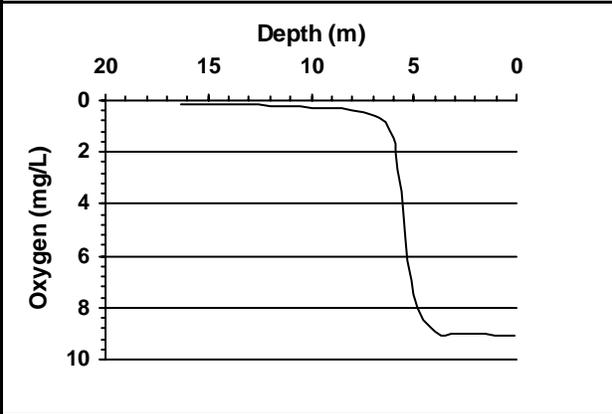
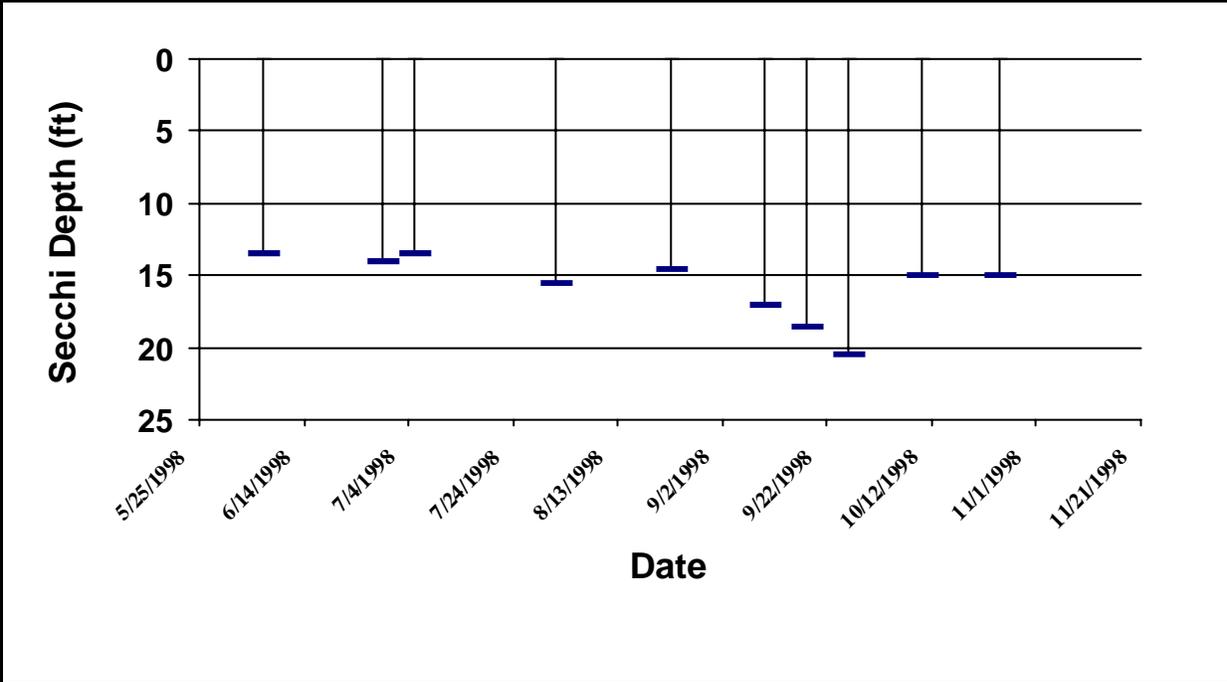
SAWYER

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
9/18/1998						
		0.1	172	9.1	8.1	20.7
		1.1	172	9.05	8.1	20.7
		2	172	8.99	8.1	20.7
		3	171	8.99	8.1	20.7
		4	172	8.94	8.1	20.7
		5	175	7.51	7.9	18.9
		6	181	1.44	7.7	14.4
		6.9	178	.59	7.7	11.4
		8	175	.41	7.7	9.4
		9	177	.32	7.6	8.2
		10	175	.3	7.6	7.8
		11	176	.26	7.5	7.4
		12	177	.21	7.5	7.3
		13	177	.18	7.4	7.2
		14	180	.19	7.3	7.1
		15	188	.19	7.2	7
		16	204	.17	7	7
		16.3	207	.16	6.8	7

Secchi Depth and Profile Graphics

Station: 1

SAWKI1



Station Information

SAWKI1

Primary Station	Station # 1	latitude: 47 19 57.9	longitude: 122 02 11.9
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

SAWYER

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	38
TSI_Phos:		42
TSI_Ch1:		
Narrative TSI:	^b	M

Summary Comments:

The general water clarity of Lake Sawyer was very good in 1999. The Secchi depth readings ranged from 3.7 meters (12.0 feet) to 5.6 meters (18.5 feet) with a mean Secchi depth of 4.6 meters (15.3 feet). For comparison, in 1998 the mean Secchi depth was 4.9 meters (16.2 feet).

Geese and/or other waterfowl were seen on Lake Sawyer by the volunteer monitor during only one of his six his sampling visits made between May and October.

The chemistry data collected for Lake Sawyer showed low to moderate levels of phosphorus in the epilimnion depending on the time of year of the sampling . This level of phosphorus indicates a lower degree of productivity where algae growth is usually not a problem; if an algae bloom does occur it usually doesn't last for a long period of time.

Ecology staff made two site visits in 1999. During both site visits (6/11/1999 and 10/1/1999) low dissolved oxygen levels in the hypolimnion were observed and thermal stratification of the lake was noted. On 10/1/1999 Ecology staff observed dense amounts of suspended algae in the water column.

Ecology staff conducted an aquatic plant survey on 7/21/1999. Three non-native plants were observed: *Iris pseudacorus* (yellow flag) had a few plants in a patchy distribution throughout the lake. *Nympahaea odorata* (fragrant waterlily) occurred in frequent sizeable patches. *Myriophyllum spicatum* (Eurasian milfoil) was found in the far south and the north end of Lake Sawyer; the native plant growth was most dense in these areas as well. A chartreuse colored bacteria was seen at the far south end of the lake. Three patches of *Typha angustifolia* (lesser cat-tail) were also observed.

Based on the Secchi depth data, Lake Sawyer should be classified as oligotrophic. However, because of the phosphorus levels and the low dissolved oxygen levels in

the hypolimnion, Lake Sawyer is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

SAWYER

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 1										
6/11/1999	1300	E	12.6							
10/1/1999	1135	E	15.7							

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

SAWYER

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/23/1999		64	13	6	0	1	1	3	3	5	0	5	0
	Sampler:	GEIGER		Remarks: Used a view tube. Zebra mussel brick is missing.									
6/11/1999		65	12	6	0	2	1	3	3	0	0	3	0
	Sampler:	GEIGER		Remarks: Used a view tube.									
7/3/1999		62	13	6	100	1	5	3	3			2	0
	Sampler:	GEIGER		Remarks: Used a view tube. Heavy rainfall; earthquakes yesterday.									
8/25/1999		73	17.5	2	0	3	2	3	3			3	3
	Sampler:	GEIGER		Remarks: Used a view tube.									
9/26/1999		63	18.5	2	50	1	4	3	3	0	0	2	0
	Sampler:	GEIGER		Remarks: Used a view tube. Lake level is dropping.									
10/1/1999		62	17	2	0	2	1	3	3	0	0	2	0
	Sampler:	GEIGER		Remarks: A lot of suspended algae this visit-no surface blooms. Lake seemed clear the rest of the summer. Lake level seemed higher this year than last year. Plants noted near volunteer's dock: Nymphaea, Eurasian milfoil, quillwort.									

Profile Report

SAWYER

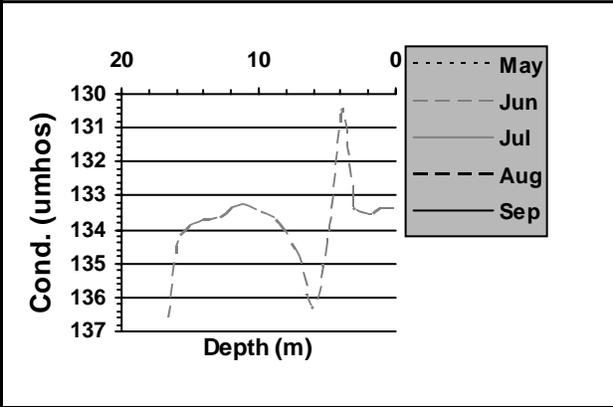
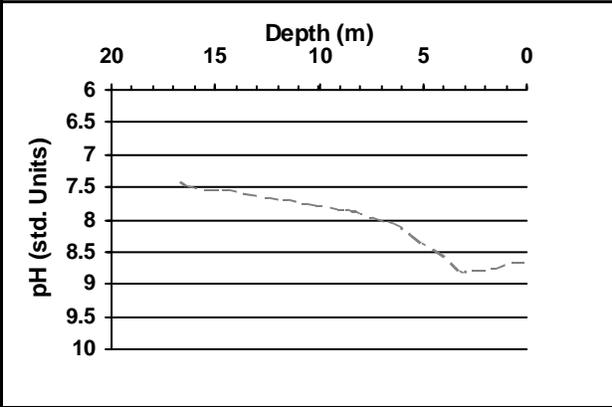
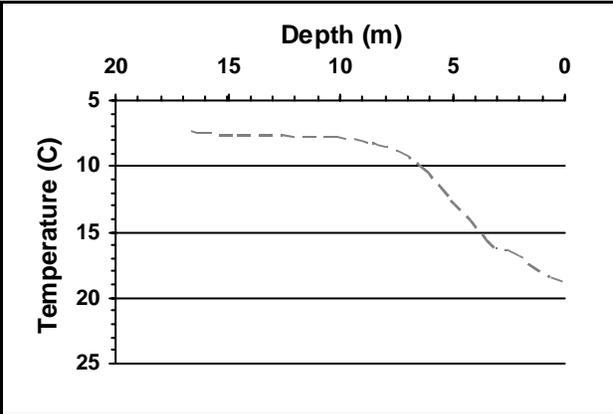
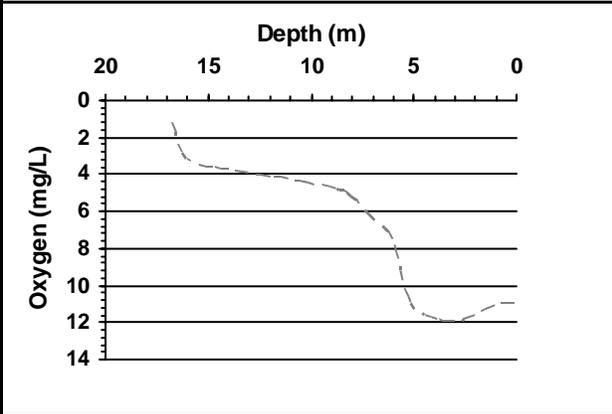
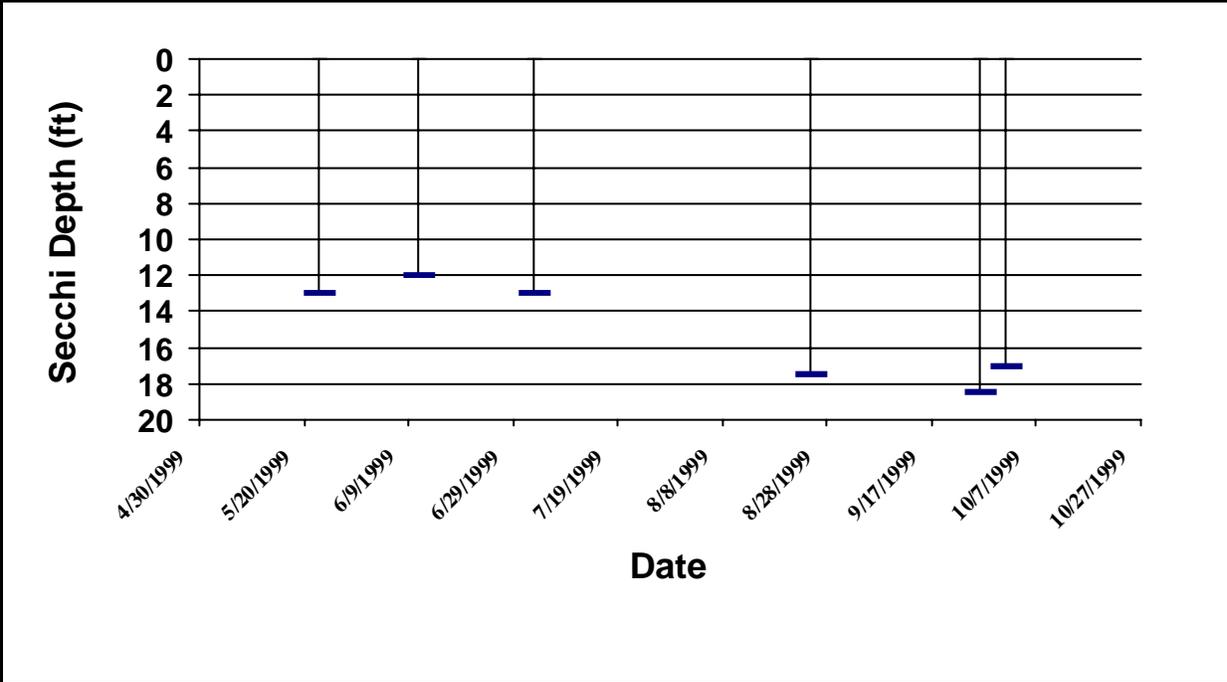
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/11/1999						
		0.1	133.3	10.93	8.66	18.68
		1.1	133.3	11.04	8.7	17.86
		2	133.5	11.59	8.77	16.78
		3	133.3	11.89	8.78	16.09
		3.1	133.1	11.81	8.81	16.12
		3.9	130.4	11.76	8.55	14.63
		5.1	134.4	10.9	8.36	12.27
		6	136.3	7.52	8.1	10.34
		6.9	134.8	6.39	8	9.21
		8	134	5.1	7.88	8.47
		8.8	133.6	4.71	7.84	8.09
		10.1	133.4	4.34	7.76	7.77
		11.1	133.2	4.16	7.72	7.68
		12	133.3	4.02	7.68	7.64
		13	133.6	3.88	7.62	7.56
		14	133.7	3.64	7.57	7.52
		14.8	133.8	3.48	7.53	7.49
		16	134.3	3.15	7.5	7.39
		16.7	136.6	1.16	7.39	7.29

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
10/1/1999		0	144.1	9.15	8.06	16.69
		1	144.2	9.06	8.04	16.48
		1.5	144.2	8.91	8	16.43
		2.1	144.2	8.92	7.97	16.41
		3	144.3	8.97	7.95	16.36
		4	144.3	8.78	7.93	16.34
		5.1	144.4	7.88	7.76	16.25
		6.1	144.7	4.4	7.53	15.66
		7.1	147.8	.82	7.49	12.35
		8	146.4	.31	7.38	10.3
		9.1	144.8	.28	7.3	9.15
		10	144.5	.22	7.25	8.48
		11.1	145.1	.21	7.22	8.14
		11.7	145.1	.2	7.19	7.98
		12	145.1	.2	7.19	7.95
		13	145.3	.19	7.17	7.79
		14.1	146.4	.2	7.11	7.62
		15	152	.19	7.04	7.53
		15.9	169	.18	6.88	7.44
		16.7	175	.18	6.77	7.39

Secchi Depth and Profile Graphics

Station: 1

SAWKI1



SPANAWAY

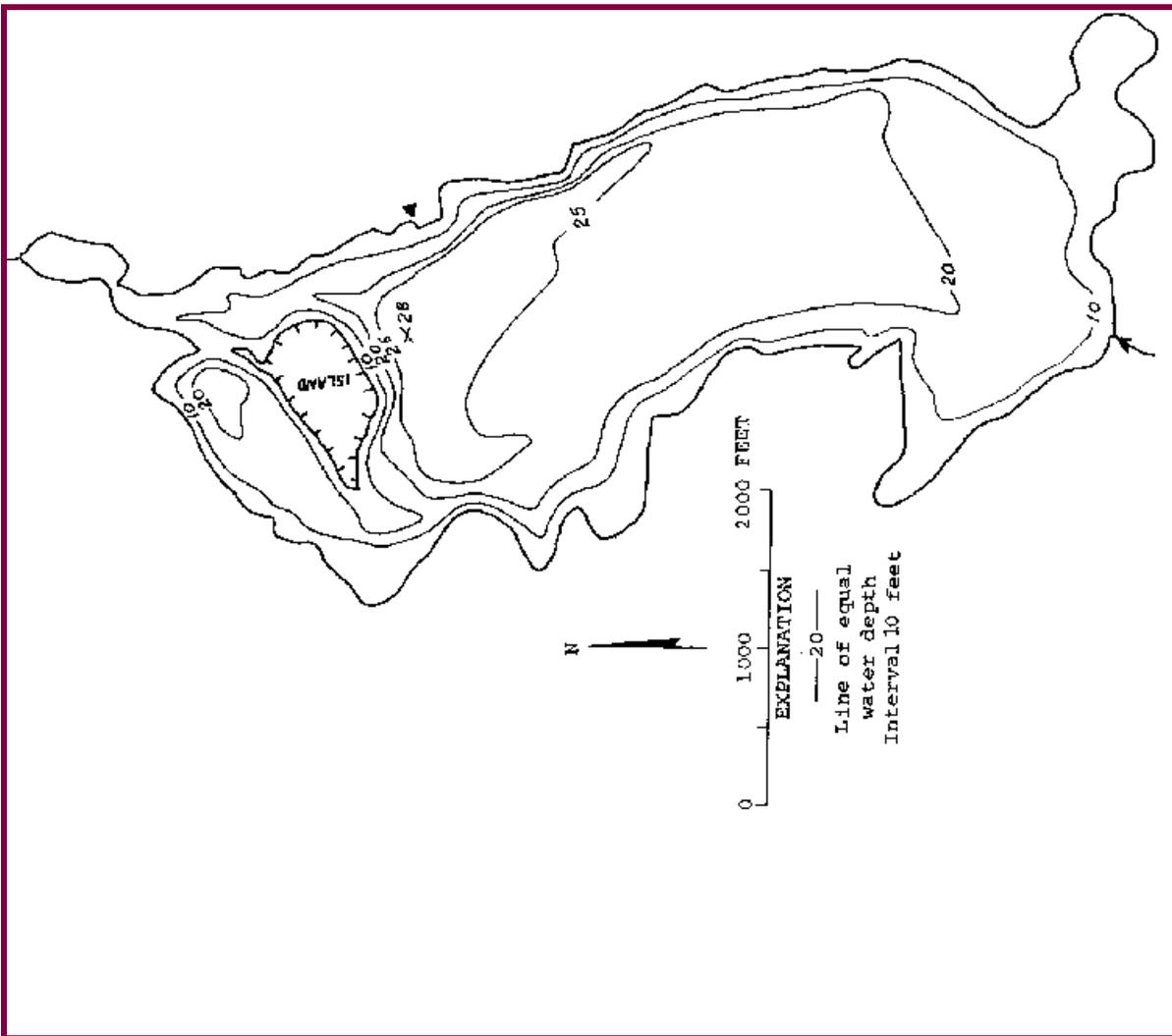
PIERCE County

Lake ID: SPAP11

Ecoregion: 2

Lake Spanaway is located ten miles south of Tacoma, and 0.5 mile west of Spanaway. It is fed by drainage from a swampy area, and drains via Spanaway Creek to Clover Creek and Lake Steilacoom. Daron Island lies in the north portion of the lake

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
280	28	16	17	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
4600	4.36	320	47 07 11.	122 26 45.



Station Information

SPAPII

Primary Station	Station # 1	latitude: 47 06 47.0	longitude: 122 27 01.7
	Description:	In deep part of lake, due west of public boat launch and south of eastern shore of island	
Secondary Station	Station # 2	latitude: 47 06 24.4	longitude: 122 26 58.7
	Description:	Across from boat launch, approximately 500 feet east of west shore at point directly across from boat launch	
Secondary Station	Station # 3	latitude:	longitude:
	Description:	In horizontal middle of lake near south end, directly south of boat launch and directly east of a small cove just north of southern portion of lake; no coordinates recorded	

Trophic State Assessment for 1998

SPANAWAY

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a	44
TSI_Phos:	48
TSI_Ch1:	54
Narrative TSI: ^b	ME

Summary Comments:

The general water clarity for Spanaway Lake was moderately good in 1998. The Secchi depth readings ranged from 2.3 meters (7.5 feet) to 4.7 meters (15.5 feet) with a mean Secchi depth of 3.1 meters (10.3 feet). For comparison, in 1997 the mean Secchi depth was 3.5 meters (11.4 feet).

The chemistry data collected for Spanaway Lake showed levels of total phosphorus (12.8 ug/L to 21.3 ug/L) where algae could become a problem. However the chlorophyll levels were elevated indicating a high level of productivity in Spanaway Lake. This high level of productivity was confirmed by the volunteer monitor who reported a large algae bloom on 6/28/1998 and a moderate amount of "blue-green" algae along the shoreline on 10/18/1998.

Fecal coliform samples were collected by Ecology staff on 8/19/1998 and 9/23/1998; the results showed low levels of fecal coliform. However, the Tacoma/ Pierce County Health Department closed Spanaway Lake to swimmers on 7/17/1998 due to high fecal coliform levels; the lake was reopened to swimming on 9/4/1998.

Ecology staff made four site visits in 1998. Low dissolved oxygen levels in the hypolimnion and thermal stratification was noted during all four site visits.

Numerous geese and/or other waterfowl were counted by the volunteer monitor on the lake during each of her sampling visits between May and October. The highest single visit count was 44 geese on 8/23/1998.

Ecology staff last conducted an aquatic plant survey on 9/11/1996; three non-native plant species were observed. *Lythrum salicaria* (purple loosestrife) occurred in a large patch in the south part of the lake. There were some thick patches of *Nymphaea odorata* (fragrant waterlily) appearing codominant with other vegetation. A few plants of *Phalaris arundinacia* (reed canarygrass) occurred along the shoreline in a patchy distribution. The cove at the south end of the lake had a purplish sediment, later identified as *Thiopedia* sp...

Based on the Secchi depth data and the high chlorophyll levels, Spanaway Lake is classified as mesoeutrophic.

The following is an assessment written by Ecology staff, Kirk Smith, to determine the phosphorus criterion for Spanaway Lake:

Spanaway Lake is an urban lake bordered by a large city park along its northeast shore. The lake has suffered numerous blue-green algal blooms in recent history and shows a tendency to go anoxic in the hypolimnion during the summer, resulting in periodic internal nutrient release and very high hypolimnetic phosphorus concentrations. Records show that the lake was once dredged, which may have provided for many years of artificially clear water. Spanaway Lake is fed by a stream originating from a wetland. The wetland, park, and golf course are potential sources of nutrients to the lake. Natural shoreline is altered in the park and fertilizer runoff from the golf course may contribute to the eutrophication--although most of the runoff likely enters near the outlet of the lake. The user survey suggests the water clarity is deteriorating through the years with only one respondent out of 11 believing the clarity has improved. Detractors to the use of the lake, according to survey respondents, include the poor water clarity and the abundant Canada geese. All respondents said they'd rather have clearer water than fewer aquatic plants. A significant *Aphanizomenon* bloom was observed in August.

Although the lake has been productive for largemouth bass fishing in recent history, it's questionable whether the extensive anoxia in the summertime hypolimnion is conducive to a good trout fishery. Having both a good trout and bass fishery is important to the residents who responded to the survey. Water clarity may impair primary contact recreation at times but the overall Secchi TSI suggests more mesotrophic conditions. We assigned an overall assessment of mesoeutrophic. The habitat survey revealed significant human influence (lawns, buildings and docks) on the habitat of the lake. There was also a high population of geese on the lake to take advantage of all the human influences conveniently provided.

We recommend that a nutrient criterion be set at the ecoregion action value for lower mesotrophic Puget Lowland lakes, 20 ug/L.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

SPANAWAY

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 0										
8/19/1998		L					8			
		L					13			
9/23/1998		L					8			
		L					12			
Station 1										
6/12/1998		E	12.8	.818	64	11		41.7	10800	1.6 J
		H	29.3	1.11	38					
7/30/1998		E	15.8	.476	30	6.8				1.5 J
		H	340	2.31	7					
8/19/1998		E	16.6	.4	24	15.5				1.5
		H	15.3	1.63	107					
9/23/1998		E	21.3	.356	17	11.2				1.5
		H	318	2.39	8					
Station 3										
6/12/1998		E	12.7			8.8				
9/23/1998		E	29.2	.339	12					

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

SPANAWAY

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/16/1998		13.3	11	6	100	4	4	4	4	5	6	1	0
	Sampler: THOMPSON		Remarks:										
5/30/1998		15.6	10.25	6	100	2	2	3	3	8	6	6	1
	Sampler: THOMPSON		Remarks:										
6/12/1998		18.8889	10.5	6	30			3	3	0	0	0	0
	Sampler: SMITH		Remarks: H2S ODOR AT 7 METERS. TWO ZOO TOWS AT SITE #3. The Oxygen result is qualified as an estimate due to postcalibration failing QA/QC requirements.										
6/13/1998		18.9	10	6	100	2	1	3	3	20	6	5	2
	Sampler: THOMPSON		Remarks:										
6/28/1998		19.4	7.5	6	0	3	1	3	3	12	6	0	4
	Sampler: THOMPSON		Remarks: ALOT OF ALGAE.										
7/11/1998		20.6	12	6	75	2	3	3	3	26	2	12	1
	Sampler: THOMPSON		Remarks: JULY 17TH - WARNING POSTED AT COUNTY PARK ON LAKE - "HIGH LEVELS OF FECAL COLIFORM; SWIM AT OWN RISK".										
7/26/1998		25.6	9	6	0	2	1	1	1	28	0	2	23
	Sampler: THOMPSON		Remarks: LAKE STILL CLOSED TO SWIMMERS DUE TO HIGH LEVELS OF FECAL COLIFORM. LAKE HAS BEEN CLOSED SINCE JULY 17, 1998.										
7/30/1998			10.89	6	100	2		1	1	74	110	0	0
	Sampler: SMITH		Remarks: FECS IN THE WATER, CLOSED FOR SWIMMING. PARK ATTENDENT SAID THERE MAY HAVE BEEN ILLEGAL HERB APPLICATIONS ON ISLAND										
8/10/1998		24.4	9.5	6	0	2	1	1	1	25	8	5	5
	Sampler: THOMPSON		Remarks: LAKE STILL OFFICIALLY CLOSED BY TACOMA HEALTH DEPT. DUE TO HIGH LEVELS OF FECAL COLIFORM. LAKE HAS BEEN CLOSED SINCE JULY 17, 1998.										
8/19/1998			8.58	3	0			3	3	0	0	0	0
	Sampler: SMITH		Remarks: 2 OSPREY FLYING TOGETHER. EXTREMELY STRONG H2S ODOR FROM 7.5M SAMPLE. ABUNDANT APHANIZOMENON BLOOM, SAMPLE TAKEN. NO BOATS OR WATERFOWL COUNTED.										

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
8/23/1998		21.1	8.5	6	25	2	1	1	1	44	8	5	1
	Sampler:	THOMPSON		Remarks:	LAKE STILL CLOSED PER HEALTH DEPT. DUE TO FECAL COLIFORM.								
9/6/1998		22.2	15.5	6	0	1	1	3	3	24	6	3	7
	Sampler:	THOMPSON		Remarks:	HEALTH DEPT. REOPENED SPANAWAY LAKE ON 9/14/98. GREAT CLARITY TODAY BUT MORE WEEDS THAN I'VE SEEN IN TEN YEARS.								
9/19/1998		20	9.25	6	25	1	4	3	3	16	6	3	3
	Sampler:	THOMPSON		Remarks:	LAKE REOPENED 9/4/98.								
9/23/1998			10.73	3	0			4	3	30	260	2	0
	Sampler:	SMITH		Remarks:	BALD EAGLE SPOTTED. FEC#1 AT PLATFORM ON SOUTH END; FEC#2 AT PLATFORM AT SWIM BEACH. STRONG H2S IN HYPO.								
9/27/1998		16.7	10.5	6	100	2	5	3	3	8	8	5	0
	Sampler:	THOMPSON		Remarks:									
10/18/1998		14.4	8.5	8	50	1	3	1	1	6	400	7	1
	Sampler:	THOMPSON		Remarks:	BLUE-GREEN ALGAE MODERATE ALONG SHORE. LAKE WATER HAS TURNED BROWN! HUNDREDS(400+) OF ROOTS ON THE LAKE.								

Profile Report

SPANAWAY

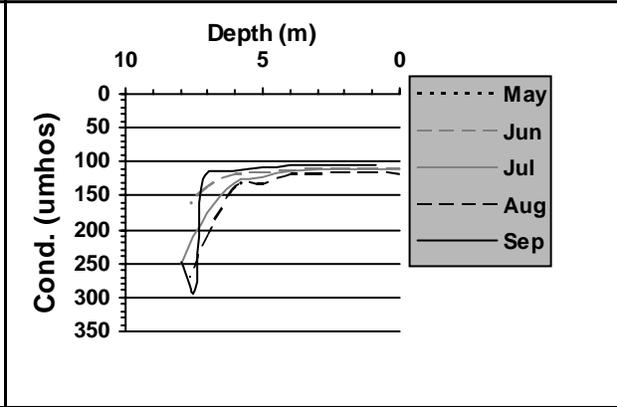
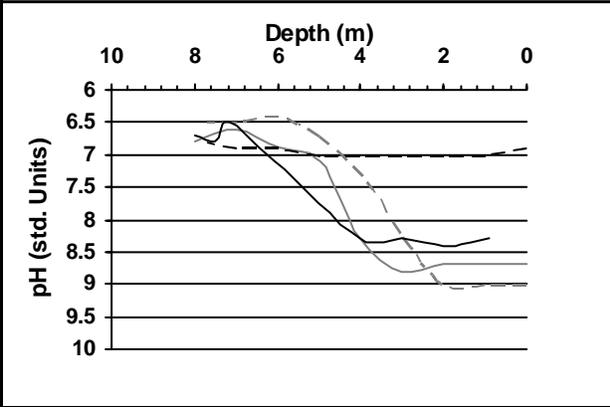
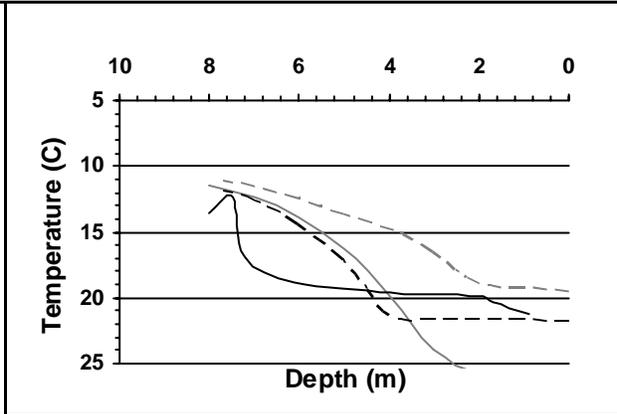
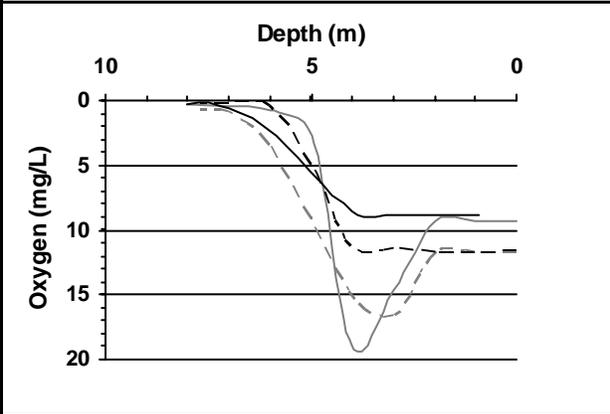
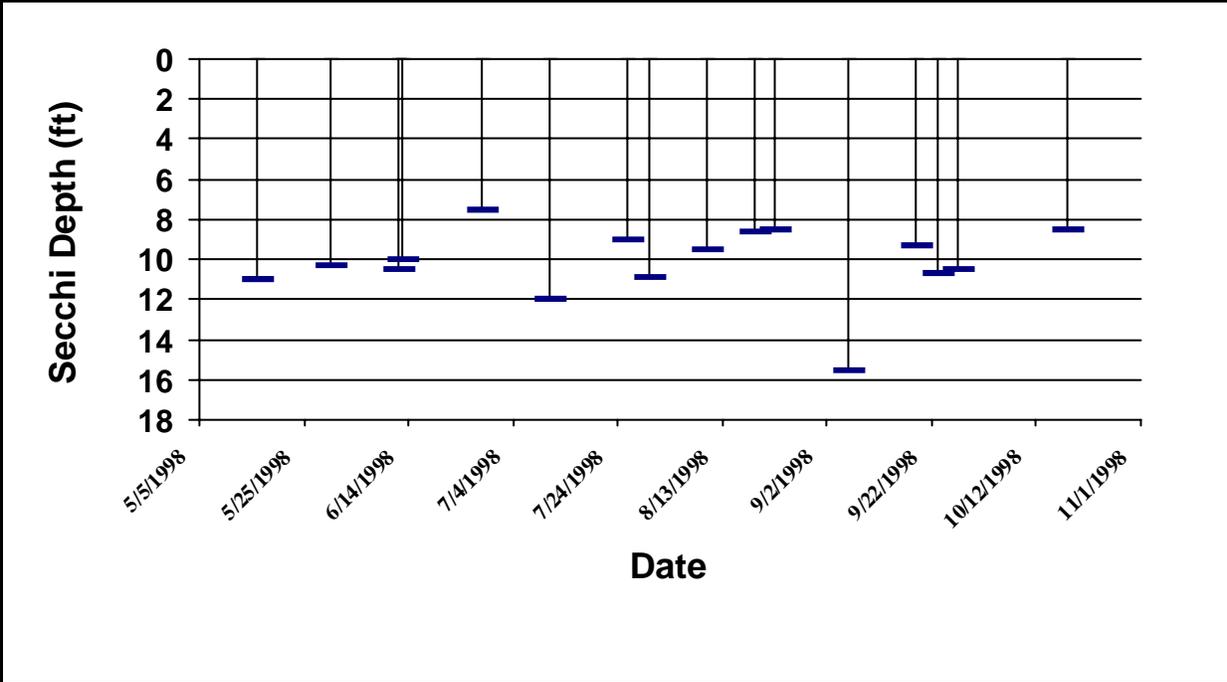
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/10/1998						
		0	107	11.61	9	19.4
		1	107	11.6	9	19.1
		2	107	11.61	9	18.8
		3	107	16.45	8.2	16.5
		3.9	111	15.29	7.3	14.8
		5	113	8.94	6.7	13.5
		6	118	3.41	6.4	12.4
		7	135	.71	6.5	11.4
		7.7	160	.62	6.5	11
7/30/1998						
		0	110	9.34	8.7	25.8
		1	110	9.37	8.7	25.8
		2	110	9.33	8.7	25.7
		3	110	14.59	8.8	24
		4	114	19	8.3	19.9
		5	123	2.81	7.1	16.3
		6	132	.74	6.9	13.9
		7	174	.5	6.6	12.4
		8	251	.23	6.8	11.5
8/19/1998						
		0	116	11.42	6.9	21.7
		1	115	11.59	7	21.6
		2	115	11.53	7	21.6
		3	116	11.37	7	21.5
		4	118	11.16	7	21.3
		5	131	4.81	7	17.1
		6	135	.29	6.9	14.3
		7	206	.17	6.9	12.5
		7.7	271	.13	6.8	11.7

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
9/23/1998						
		0.9	105	8.78	8.3	21.3
		1.7	105	8.9	8.4	20.3
		2	105	8.85	8.4	19.9
		3	105	8.79	8.3	19.8
		4	105	8.61	8.3	19.6
		6.1	113	2.14	7.1	18.8
		7.2	125	.53	6.5	16.9
		7.5	288	.2	6.8	12.4
		8	247	.25	6.7	13.5
Station 3						
6/12/1998						
		0	106	11.09 J	8.9	19.5
		1	107	10.94 J	9	19.3
		2	107	11.16 J	9	19
		3	106	15.19 J	8.5	17
		4	109	15.35 J	8	15.1
		5	117	11.15 J	7.3	13
		6	126	2.11 J	6.4	12.2
		6.6	128	.71 J	6.4	11.7

Secchi Depth and Profile Graphics

Station: 1

SPAPII



Station Information

SPAPII

Primary Station	Station # 1	latitude: 47 06 47.0	longitude: 122 27 01.7
	Description:	In deep part of lake, due west of public boat launch and south of eastern shore of island	
Secondary Station	Station # 2	latitude: 47 06 24.4	longitude: 122 26 58.7
	Description:	Across from boat launch, approximately 500 feet east of west shore at point directly across from boat launch	
Secondary Station	Station # 3	latitude:	longitude:
	Description:	In horizontal middle of lake near south end, directly south of boat launch and directly east of a small cove just north of southern portion of lake; no coordinates recorded	

Trophic State Assessment for 1999

SPANAWAY

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a	41
TSI_Phos:	46
TSI_Ch1:	
Narrative TSI: ^b	M

Summary Comments:

The general water clarity of Spanaway Lake was good to fair in 1999. The Secchi depth readings ranged from 2.1 meters (7.0 feet) to 4.9 meters (16.0 feet) with a mean Secchi depth of 3.6 meters (12.0 feet). For comparison, in 1998 the mean Secchi depth was 3.1 meters (10.3 feet).

Numerous geese and/or other waterfowl were seen on Spanaway Lake by the volunteer monitor during nine of her ten sampling visits made between May and October.

The chemistry data collected for Spanaway Lake showed moderate levels of phosphorus in the epilimnion. This level of phosphorus indicates a degree of productivity where algae growth may become a nuisance though not usually for any long period of time. The volunteer monitor commented on the presence of a large algae bloom which occurred in late August and lasted about two weeks. She also commented on the large number of aquatic plants in the lake this year.

Ecology staff made two site visits in 1999. During both site visits (5/28/1999 and 9/24/1999) low dissolved oxygen levels in the hypolimnion were observed and thermal stratification of the lake was noted.

Based on the Secchi depth data and the phosphorus levels, Spanaway Lake is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

SPANAWAY

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
------	------	--------	-----------------	-----------------	-------	----------------------------	-------------------------------------	--------------------	-------------------	--------------------

Station 1

5/28/1999 1030 E 18.5

9/24/1999 1530 E 17.8

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

SPANAWAY

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/15/1999		56	8.5	6	100	1	4	2	2	2	12	8	0
	Sampler:	THOMPSON		Remarks: Did not use a view tube.									
5/28/1999		65	7	8	75	2	1	1	1	0	0	2	0
	Sampler:	THOMPSON		Remarks: Did not use a view tube.									
6/13/1999		68	7.5	6	0	1	2	3	3	6	0	68	0
	Sampler:	THOMPSON		Remarks: Did not use a view tube. Free fishing this weekend (no license required) and 12,000 fish were planted. A lot of boats!									
6/27/1999		64	10.5	6	100	1	2	3	3	12	10	34	4
	Sampler:	THOMPSON		Remarks: Did not use a view tube.									
7/11/1999		71	10	2	0	2	1	3	3	8	10	20	8
	Sampler:	THOMPSON		Remarks: Did not use a view tube.									
7/25/1999		71	12.5	3	0	1	4	3	3	4	10	20	2
	Sampler:	THOMPSON		Remarks: Did not use a view tube. Still a lot of weeds.									
8/8/1999		71	13.5	3	25	2	4	3	3	8	10	20	10
	Sampler:	THOMPSON		Remarks: Still a lot of weeds - even coming up to the water surface. Fairly clear water.									
8/22/1999		70	16	2	0	2	1	3	3	6	8	22	2
	Sampler:	THOMPSON		Remarks: Did not use a view tube. Water very clear but weeds to the top of water surface. A lot of floating algae pieces - 1/4 inch - very visible. Still a lot of fishermen because of trout plant earlier this summer.									
9/5/1999		68	15.5	2	75	3	2	3	3	4	38	3	1
	Sampler:	THOMPSON		Remarks: Did not use a view tube.									
9/19/1999		68	14.5	6	0	1	1	3	3	12	10	20	1
	Sampler:	THOMPSON		Remarks: Did not use a view tube.									
9/24/1999			15.5										
	Sampler:	THOMPSON		Remarks: Sampling day was overcast and slightly breezy. Large amounts of aquatic plants this year in the lake. 8/22/99 was the height of a huge algae bloom-lasting about two weeks. No odors.									

Profile Report

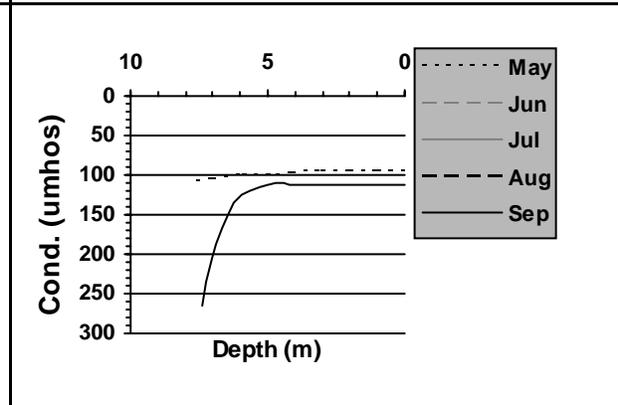
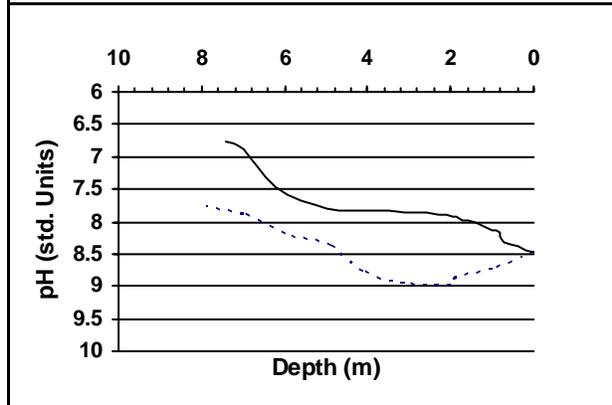
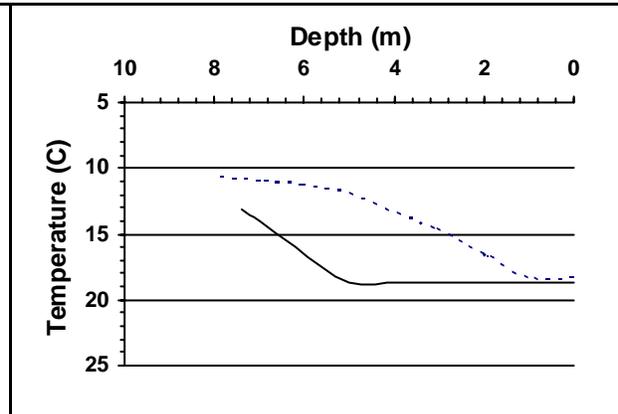
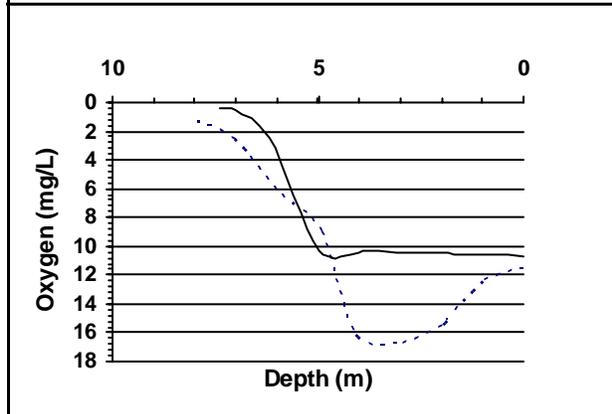
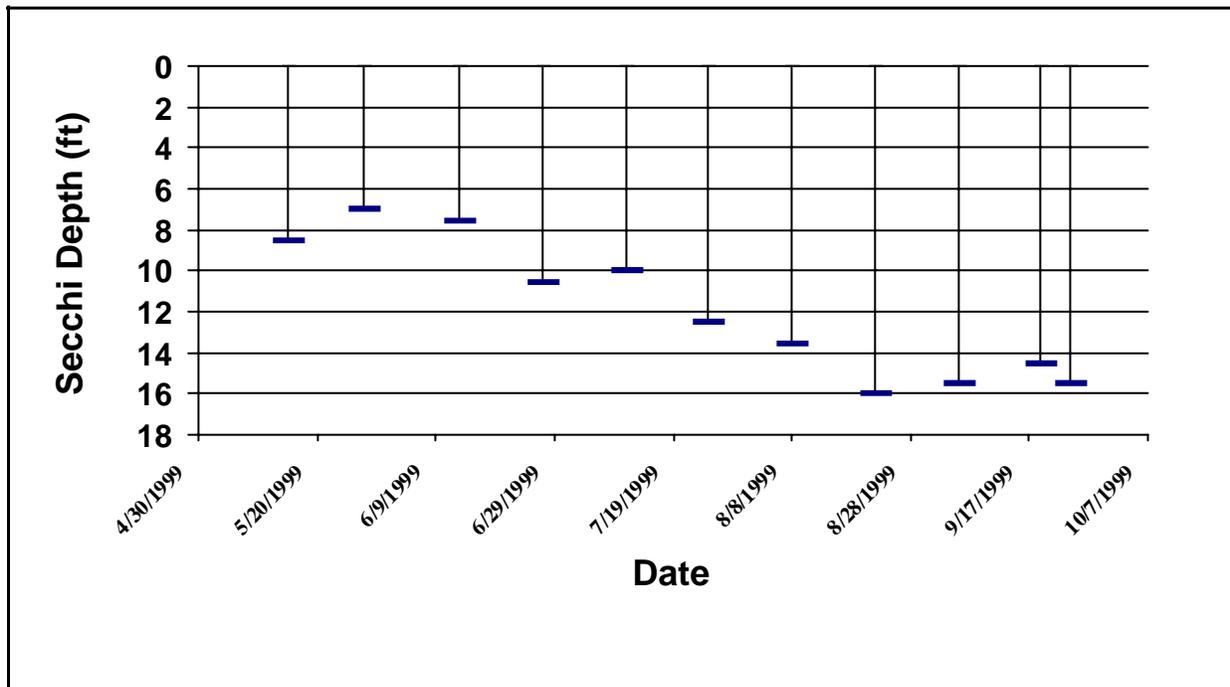
SPANAWAY

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
5/28/1999						
		0	92.8	11.46	8.45	18.24
		1	92.8	12.32	8.72	18.23
		1.9	92.7	15.06	8.85	16.62
		2	93.1	15.44	8.95	16.37
		3.1	93.1	16.6	8.94	14.45
		4.1	94.8	15.79	8.75	13.17
		4.9	96.4	8.89	8.36	11.9
		6	97.9	6.07	8.17	11.21
		7	101.4	2.42	7.85	10.89
		7.9	104.3	1.28	7.75	10.63
9/24/1999						
		0	111.8	10.65	8.48	18.66
		0.7	111.8	10.63	8.33	18.69
		0.8	111.8	10.57	8.18	18.69
		1	111.8	10.54	8.13	18.69
		1.4	111.8	10.53	8	18.69
		1.7	111.8	10.57	7.98	18.69
		2.1	111.8	10.45	7.89	18.69
		3.1	111.8	10.48	7.85	18.69
		3.8	111.8	10.36	7.83	18.68
		4	111.8	10.4	7.82	18.67
		5	111.9	10.24	7.8	18.65
		6.2	135.4	2.42	7.47	15.93
		7	206	.59	6.9	13.97
		7.4	266	.42	6.76	13.07

Secchi Depth and Profile Graphics

Station: 1

SPAPII



SPENCER

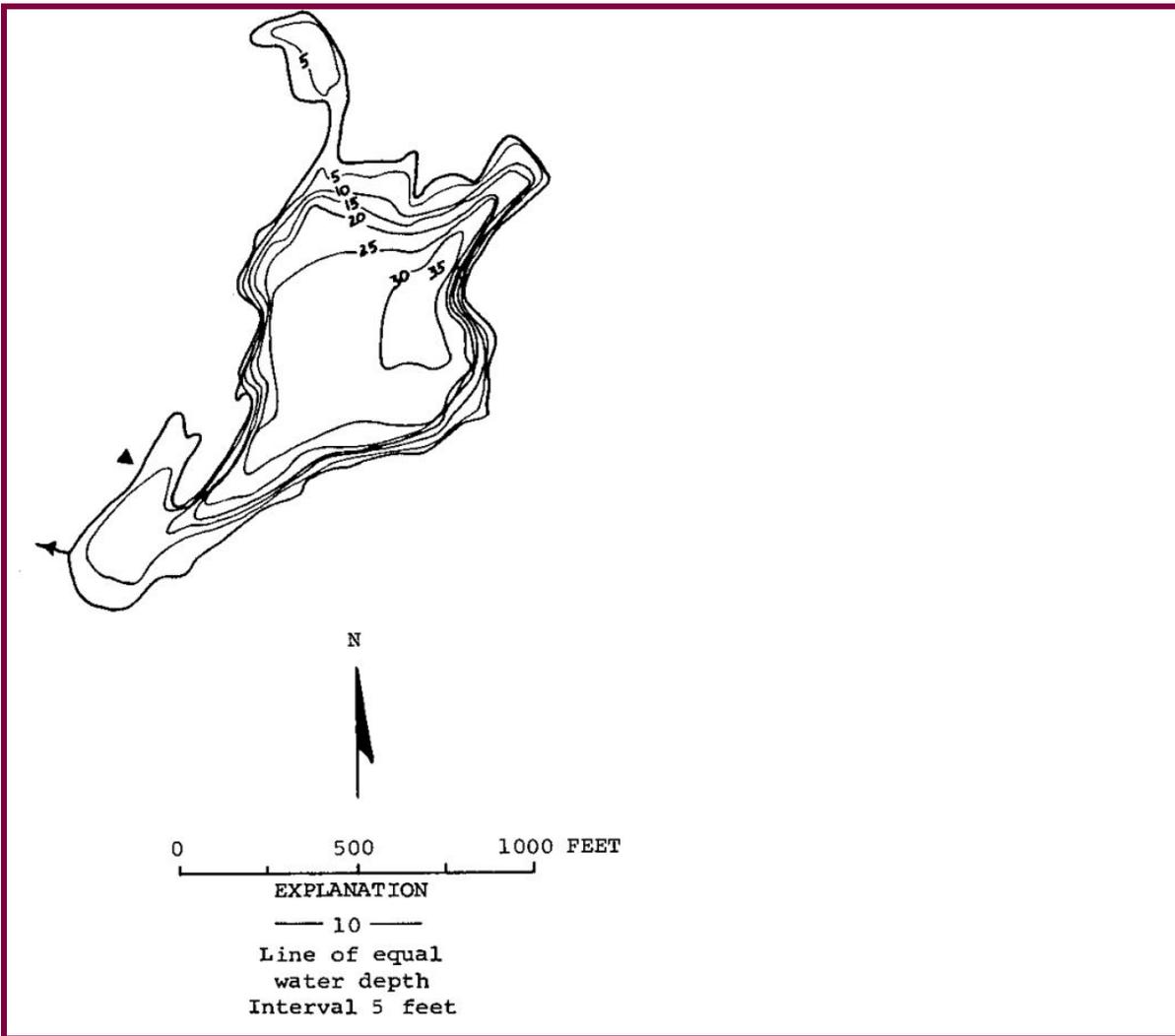
MASON County

Lake ID: SPEMA1

Ecoregion: 2

Spencer Lake is located seven miles northeast of Shelton. It has no inlets, and drains via Malaney Creek to Oakland Bay

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
230	36	22	2	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
5152	4.32	170	47 15 33.	122 58 11.



Trophic State Assessment for 1998

SPENCER

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 38	J
TSI_Phos:		
TSI_Ch1:		
Narrative TSI:	^b	OM

Summary Comments:

The general water clarity for Spencer Lake was good in 1998. The Secchi depth readings ranged from 3.7 meters (12.0 feet) to 5.9 meters (19.3 feet) with a mean Secchi depth of 4.5 meters (14.8 feet). For comparison, in 1996 the mean Secchi depth was 4.6 meters (15.2 feet).

No chemistry data was collected for Spencer lake in 1998.

Two site visits were made by Ecology staff to Spencer Lake in 1998. There was no observed thermal stratification during the first site visit (6/6/1998) and low dissolved oxygen levels were noted in the bottom 1-2 meters of the water column. Only a weak thermal stratification was observed during the second site visit (9/10/1998) with low dissolved oxygen levels in the bottom third of the water column.

Numerous geese and/ or other waterfowl (>10) were counted by the volunteer monitor during six of her eight sampling visits between May and October. She also noted suspended algae in the lake during the month of June.

An aquatic plant survey was made by Ecology staff in 1997. No non-native plants were observed; however the rare plant Lobelia dortmanna (water lobelia) was seen budding on the southeast shore of the lake.

Based on the Secchi depth data and the low dissolved oxygen levels, Spencer Lake is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

SPENCER

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/6/1998		18	19.25	6	0	1	2	4	4	20	7	6	0
	Sampler:	PINK		Remarks:	SUSPENDED ALGAE.								
6/6/1998			19.25		0					0	0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									
6/20/1998		17.5	14.1	6	50	2	2	4	4	20	6	4	1
	Sampler:	PINK		Remarks:									
7/6/1998		19.5	15	6	75	1	3	4	4	21	12	5	0
	Sampler:	PINK		Remarks:									
7/22/1998		23	15	6	0	1	1	4	4	15	15	0	2
	Sampler:	PINK		Remarks:									
8/2/1998		23	15	6	0	1	2	3	3	10	8	3	1
	Sampler:	PINK		Remarks:	SURFACE ORGANIC MATERIAL. LOTS OF WHITE FOAM AND BUBBLES.								
8/17/1998		22	13	6	50	2	3	4	4	16	1	0	1
	Sampler:	PINK		Remarks:									
8/30/1998		21	12	6	25	1	1	4	4	0	10	1	3
	Sampler:	PINK		Remarks:									
9/10/1998		21	14.08	6	0	1	1	4	4	0	2	2	0
	Sampler:	PINK		Remarks:	ALOT OF FLOATING AND SUSPENDED ORGANIC MATERIAL.								
9/10/1998			14.08		0					0	0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									

Profile Report

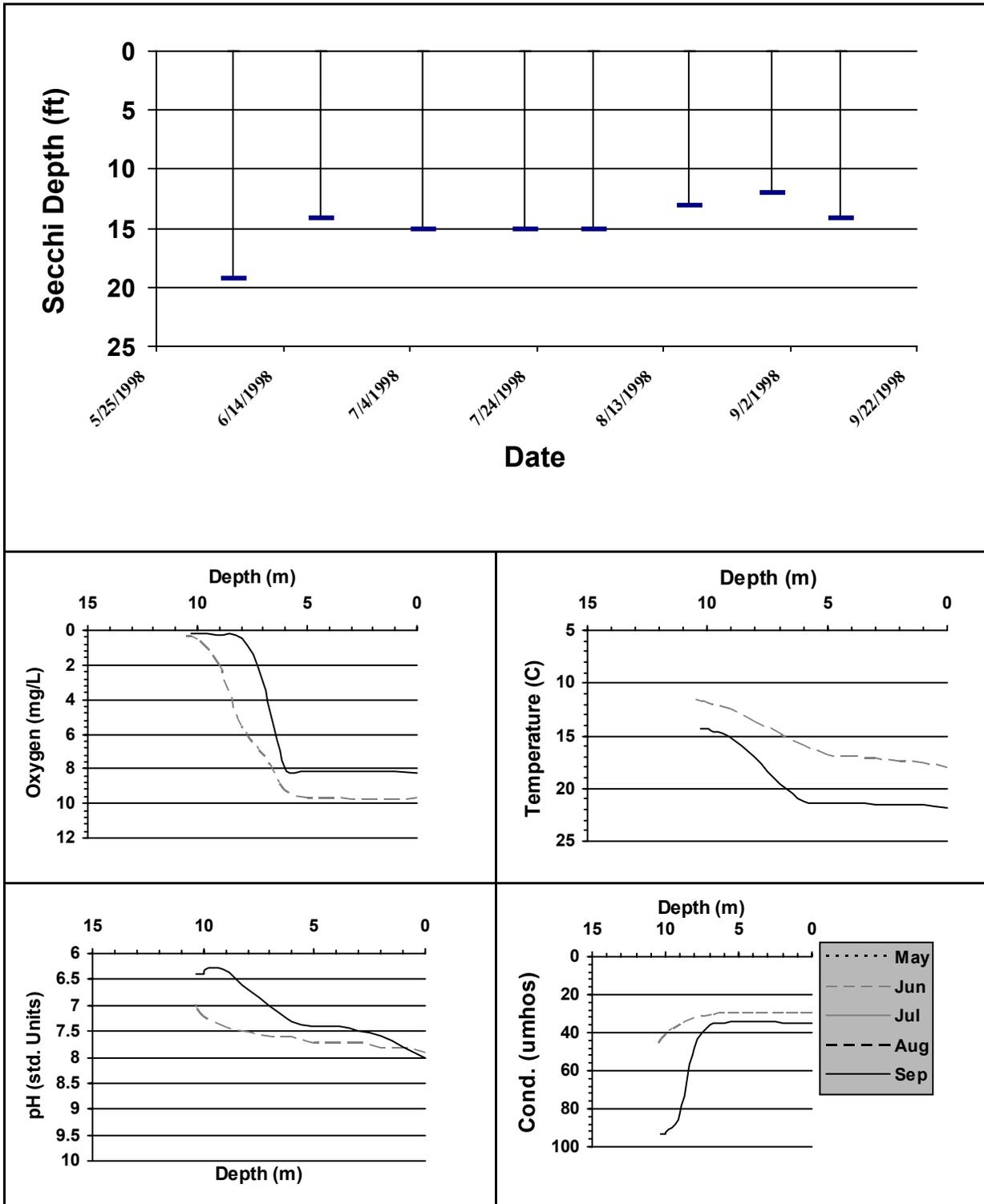
SPENCER

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/6/1998						
		0	29	9.64	7.9	17.9
		1	29	9.7	7.8	17.5
		2	29	9.73	7.8	17.3
		3	29	9.71	7.7	17.1
		4	29	9.64	7.7	16.9
		5	29	9.58	7.7	16.8
		6	29	9.18	7.6	15.9
		6.9	30	7.27	7.6	14.8
		8	32	5.53	7.5	13.5
		9	35	1.88	7.4	12.3
		10	40	.48	7.2	11.8
		10.5	45	.25	6.9	11.5
9/10/1998						
		0	35	8.23	8	21.9
		1	35	8.19	7.8	21.6
		2	35	8.19	7.6	21.6
		3	34	8.16	7.5	21.5
		3.9	34	8.11	7.4	21.4
		5.1	34	8.14	7.4	21.4
		6	35	7.93	7.3	21.2
		7	36	2.91	7	19.6
		8	48	.47	6.7	17
		9.1	86	.23	6.3	15
		9.9	92	.18	6.3	14.4
		10	93	.16	6.4	14.3
		10.3	93	.15	6.4	14.3

Secchi Depth and Profile Graphics

Station: 1

SPEMA1



ST. CLAIR

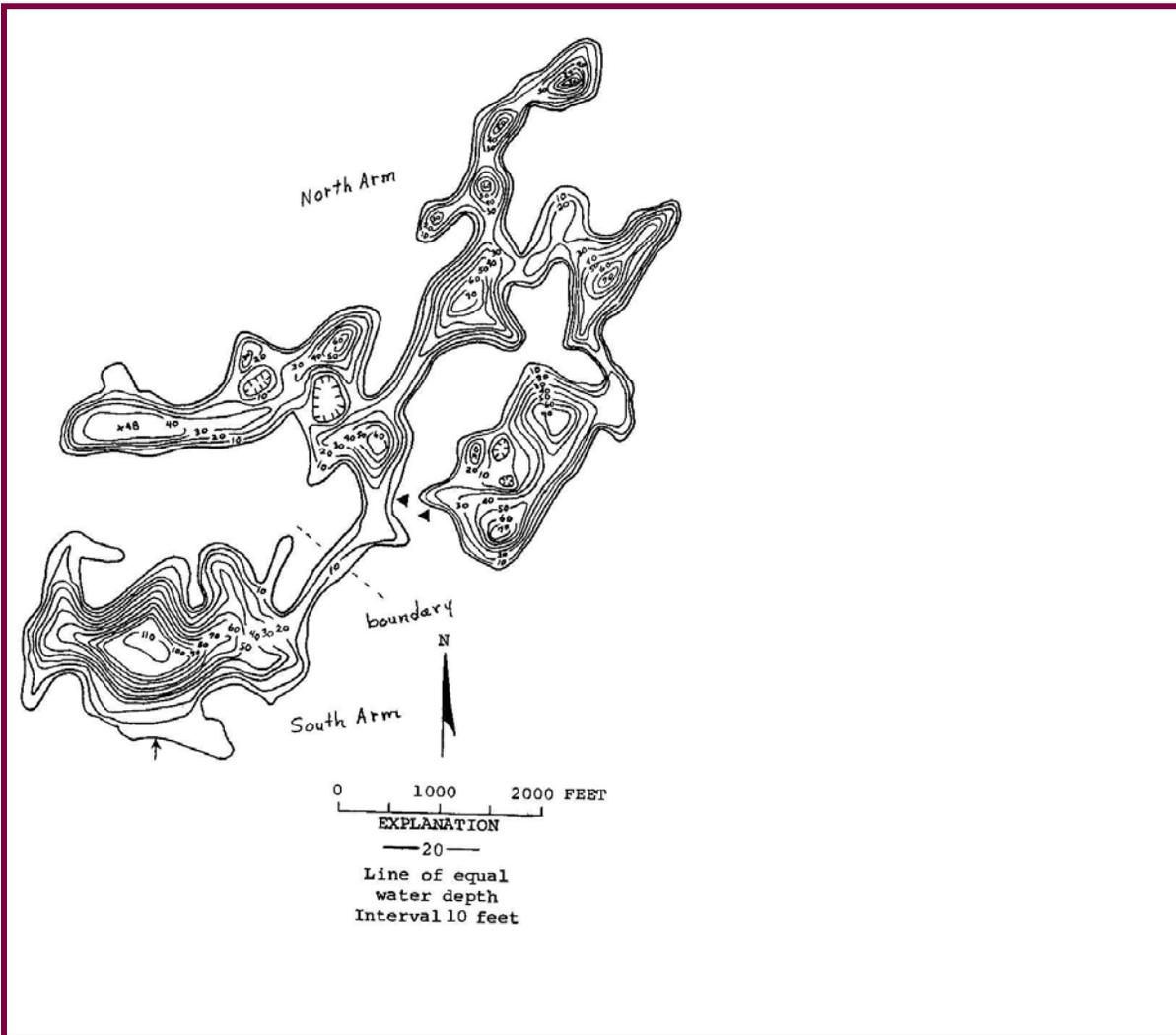
THURSTON County

Lake ID: ST_TH1

Ecoregion: 2

Lake St. Clair is located 6.5 miles northwest of Yelm. It is an irregularly shaped lake with steep sides, numerous narrow arms and four small islands. The lake is fed by Eaton Creek, drains to the Nisqually River, and seeps to McAllister Springs. The south arm of Lake St. Clair is a deep conical-shaped depression.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
268	110	32	21	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
8700	10.36	73	46 59 31.	122 43 22.



Station Information

ST_TH1

Primary Station	Station # 1	latitude: 47 00 11.9	longitude: 122 43 07.4
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

ST. CLAIR

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 44 J
TSI_Phos:
TSI_Ch1:
Narrative TSI: ^b M

Summary Comments:

The general water clarity was good for Lake St. Clair in 1998. The Secchi depth readings ranged from 1.7 meters (5.5 feet) to 4.3 meters (14.0 feet) with a mean Secchi reading of 3.0 meters (10.0 feet). For comparison, in 1997 the mean Secchi depth reading was 2.4 meters (7.8 feet).

No chemistry data was collected for Lake St. Clair in 1998.

Only one site visit was made by Ecology staff in 1998. Thermal stratification was observed during this visit (6/10/1998) and low dissolved oxygen levels were noted in the hypolimnion.

Except for one occasion when 50 geese were observed, only a few geese and/ or other waterfowl were counted by the volunteer monitor during his sampling visits between May and October.

The water in Lake St. Clair appears to have a naturally occurring reddish-brown color to it. This color is usually a result of a higher degree of dissolved organic matter in the water; such as decaying leaves or wood.

Based on the Secchi depth data and the low dissolved oxygen levels in the hypolimnion, Lake St. Clair is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

ST. CLAIR

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/3/1998		18	5.5	9	100	2	2	4	4	2	5	1	0
	Sampler:	CHRISTOPHERSO		Remarks:	ALOT OF BLUE-GREEN ALGAE PARTICLES IN THE WATER. WATER LEVEL UP, THE HIGHEST IT'S BEEN IN SEVERAL YEARS.								
5/16/1998		14	5.5	10	50	4	3	4	4	2	0	1	0
	Sampler:	CHRISTOPHERSO		Remarks:	LAKE LOOKED MORE BROWN THAN USUAL.								
5/29/1998		17	8	10	75	1	3	4	5	2		0	0
	Sampler:	CHRISTOPHERSO		Remarks:	WATER MORE CLEAR, LESS ALGAE. TWO HATCHES OF GEESE (4 OR 5 LITTLE ONES). PARTICLES FLOATING IN WATER.								
6/10/1998		20	9	9	100	2	4	5	5	0		0	0
	Sampler:	CHRISTOPHERSO		Remarks:									
6/10/1998			9		0						0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									
6/23/1998		20	9	9	100	2	1	4	5	0	0	1	0
	Sampler:	CHRISTOPHERSO		Remarks:									
7/6/1998		21	9.5	7	0	2	1	5	5	50	1	1	0
	Sampler:	CHRISTOPHERSO		Remarks:	LESS ALGAE; WATER LOOKS GOOD.								
7/20/1998		23	9.5	7	0	3	1	5	5	0	0	0	0
	Sampler:	CHRISTOPHERSO		Remarks:	LAKE LEVEL DROPPING MORE RAPIDLY (WARM WEATHER, LITTLE RAIN).								
8/2/1998		24	10.5	7	0	1	1	5	5	5	0	2	0
	Sampler:	SPIES		Remarks:	AIR TEMPERATURE IS 72 DEGREES - GREAT DAY TO BE ON THE LAKE!								
8/17/1998		23	10.5	7	25	2	2	4	4	5	1	1	0
	Sampler:	SPIES		Remarks:									

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
9/3/1998		25	14	2	0	2	1	5	5	5	0	1	0
	Sampler:	CHRISTOPHERSO		Remarks:	WATER CLEARED ALOT; ALSO CHANGED FROM REAL REDDISH TO A LIGHT GREENISH. LAKE LEVEL DROPPED TWO INCHES (DRY WARM WEATHER).								
9/14/1998		22	12.5	7	0	2	1		5	0	0	1	0
	Sampler:	CHRISTOPHERSO		Remarks:	SOMEONE DROVE MY MEASURE STAKE DOWN; HAVE NO ACCURATE MEASURE OF LAKE HEIGHT. LOOKS LIKE ABOUT A TOTAL DROP OF 22 INCHES (NOT EXCESSIVE).								
10/5/1998		18	11.5	6	0	2	2	5	5	0	0	1	0
	Sampler:	CHRISTOPHERSO		Remarks:	SLIMY GROWTH ALONG BEACH. GREEN SLIME FIRST TIME IT APPEARED THIS YEAR?								

Profile Report

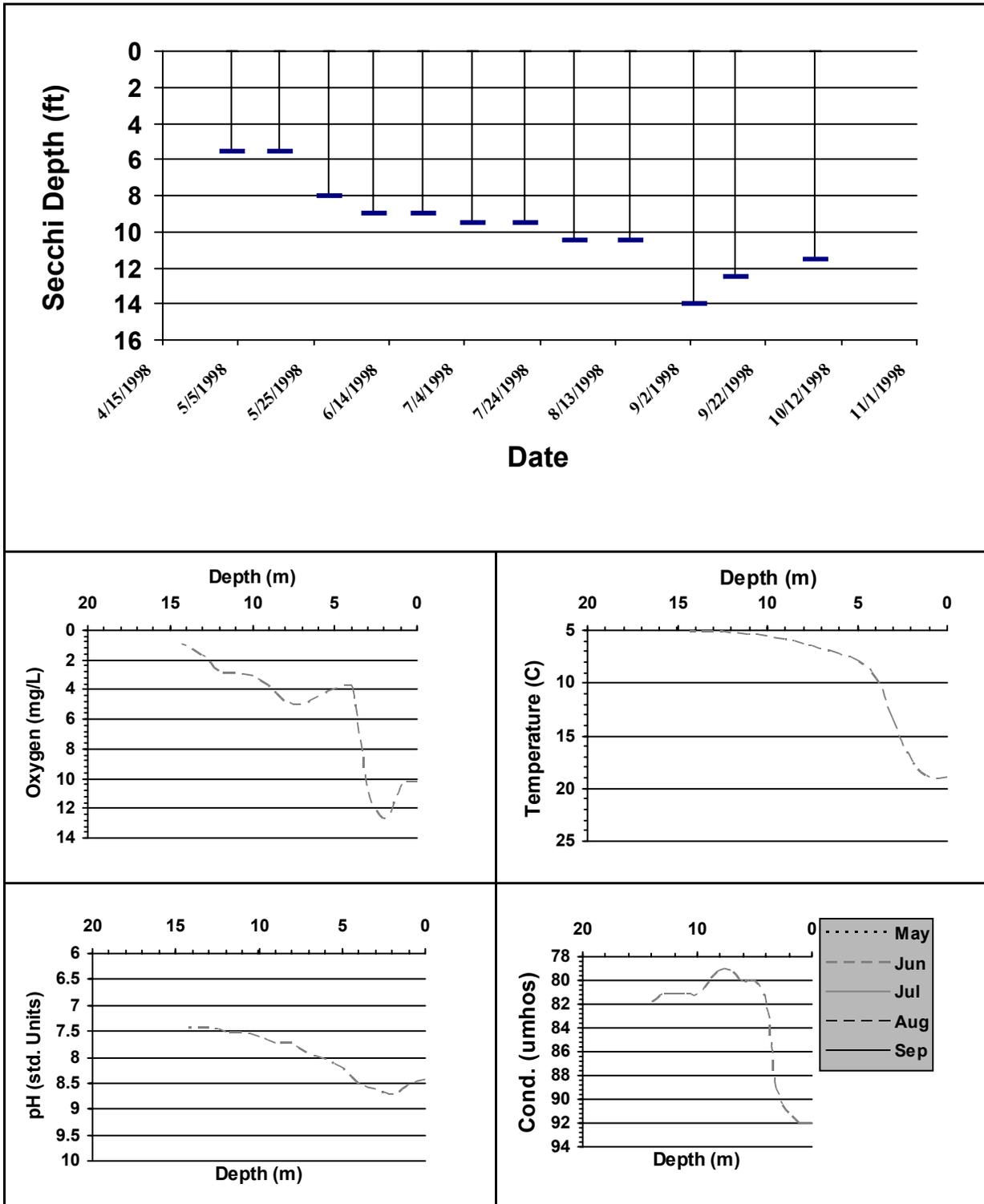
ST. CLAIR

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/10/1998						
		0	92	10.17	8.4	18.9
		1	92	10.32	8.5	18.9
		1.9	91	12.65	8.7	17.5
		3	89	10.45	8.6	13.2
		3.9	82	3.86	8.5	9.5
		4.9	80	3.85	8.2	7.9
		6	80	4.33	8	7.1
		7.1	79	4.94	7.9	6.6
		8	79	4.73	7.7	6.2
		9	80	3.66	7.7	5.8
		10	81	3.03	7.6	5.5
		11.1	81	2.78	7.5	5.3
		12	81	2.63	7.5	5.2
		13	81	1.65	7.4	5
		14.3	82	.82	7.4	5

Secchi Depth and Profile Graphics

Station: 1

ST TH1



Station Information

ST_TH1

Primary Station	Station # 1	latitude: 47 00 11.9	longitude: 122 43 07.4
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

ST. CLAIR

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	44
TSI_Phos:		61
TSI_Ch1:		
Narrative TSI:	^b	ME

Summary Comments:

The general water clarity of Lake St. Clair was good to fair in 1999. The Secchi depth readings ranged from 2.1 meters (7.0 feet) to 4.4 meters (14.5 feet) with a mean Secchi depth of 3.1 meters (10.2 feet). For comparison, in 1998 the mean Secchi depth was 3.0 meters (10.0 feet).

Numerous geese, including a number of goslings, were seen on Lake St. Clair by the volunteer monitor during half of his eight sampling visits made between May and October. No other waterfowl were observed by the volunteer monitor on the lake during this same time period. The volunteer monitor typically made his sampling visits during the afternoon; he commented that he would see 40-50 geese daily on the lake earlier in the day.

The chemistry data collected for Lake St Clair showed high levels of phosphorus in the epilimnion. This level of phosphorus indicates a high degree of productivity where algae growth may be a long term problem unless some other factor is limiting algae growth. The volunteer monitor commented that he notices algae in the water column all summer long but that the surface algae blooms don't normally occur till the fall. Lake St. Clair water color is a distinct yellowish brown. This coloring may be a factor that limits algae growth by acting as a light inhibitor.

Ecology staff made two site visits in 1999. During both site visits (6/29/1999 and 8/26/1999) low dissolved oxygen levels in the hypolimnion were observed and thermal stratification of the lake was noted.

Based on the Secchi depth data and the phosphorus levels, Lake St. Clair is classified as mesoeutrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

ST. CLAIR

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 1										
6/29/1999	1030	E	53.6							
8/26/1999	1515	E	49.5							
Station 2										
8/26/1999	1530	E	48.6							

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

ST. CLAIR

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/24/1999		20	7	6	0	3	1	5	5	8	0	0	0
	Sampler:	CHRISTOPHERSO		Remarks: Used a view tube. Several hatches of geese; 6-8 little ones each.									
6/18/1999		20	10	7	75	3	2	4	4	0		1	0
	Sampler:	CHRISTOPHERSO		Remarks: Used a view tube. Missed one test. However little change in conditions.									
6/29/1999		19	8	7	100	1	2	4	4			2	0
	Sampler:	CHRISTOPHERSO		Remarks: Used a view tube. Algae in water all year long. Surface algae blooms occur in the fall but don't last very long. Water quality seems good; water color is a yellowish-brown. Volunteer sees 40-50 geese daily in the morning-some pairs stay all year.									
7/20/1999		22	9.5	7	0	2	2	5	5	6		2	0
	Sampler:	CHRISTOPHERSO		Remarks: Used a view tube. Water level higher than average for this time of year.									
7/27/1999		23	10	2	0	2	1	4	5	12	0	2	1
	Sampler:	CHRISTOPHERSO		Remarks: Used a view tube. Lake level is staying higher than most years at this time.									
8/26/1999		23	13		0	2	1	5	5	12	0	1	0
	Sampler:	CHRISTOPHERSO		Remarks: Used a view tube. Lake began to clear significantly about 1-2 weeks earlier. No big algae blooms since last visit but some algae still visible in shallows and suspended. Plants noted: P. amplifolius, P. pectinatus, P. robbinsii, Najas, Vallisneria									
9/10/1999		20	14.5	7	0	3	1	5	5	0		2	0
	Sampler:	CHRISTOPHERSO		Remarks: Used a view tube. Lake retained its level better than other years. Down only 22 inches from spring measurement. Water is the clearest it's been for a long time.									
10/3/1999		18	9	7	0	1	1	5	3	0	0	2	0
	Sampler:	CHRISTOPHERSO		Remarks: Used a view tube. A lot of blue-green floating particles in the water. Lake has dropped a total of 27 inches.									

Profile Report

ST. CLAIR

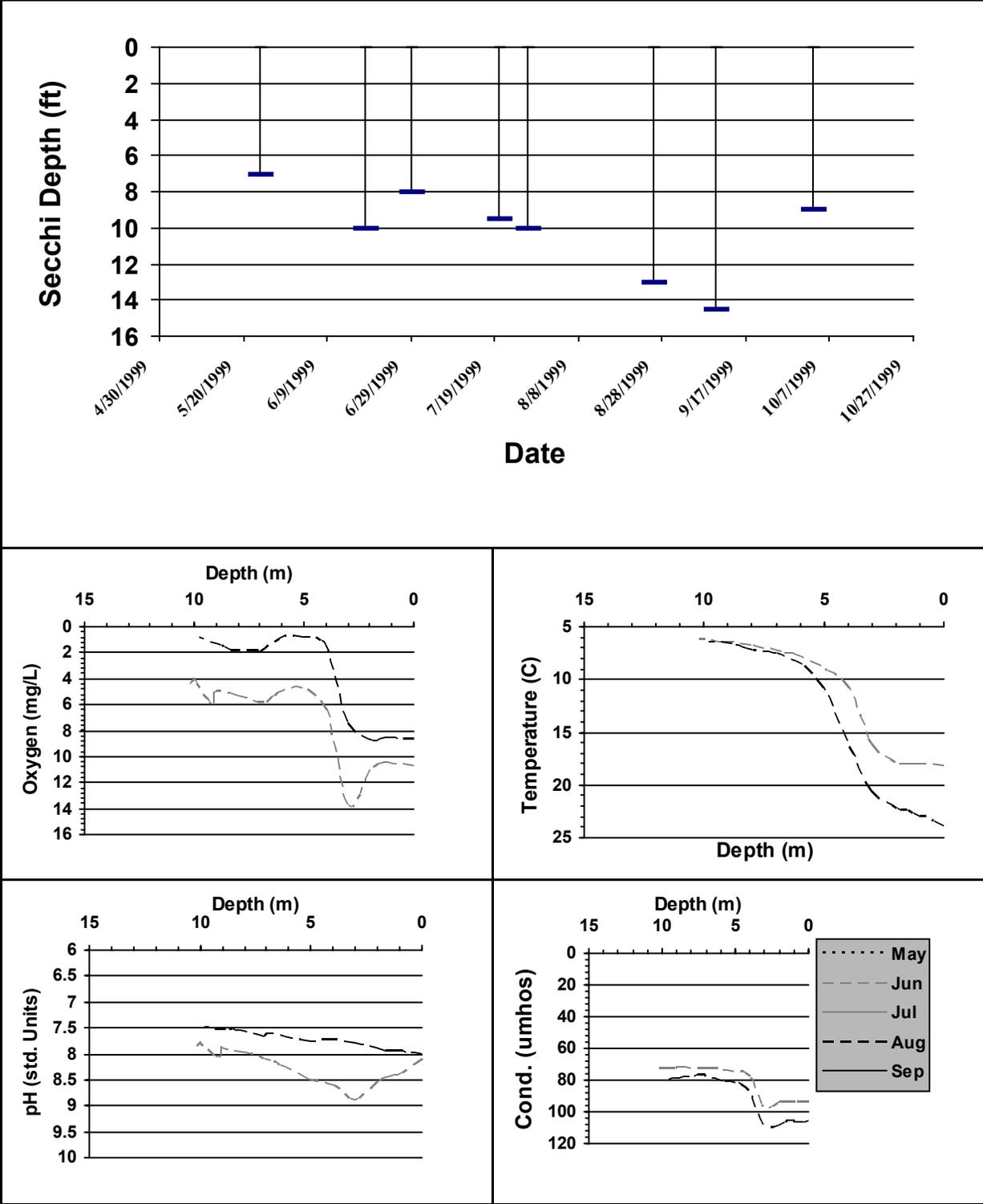
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/29/1999						
		0	93	10.59	8.07	18.04
		0.9	92.7	10.53	8.35	17.94
		1.4	92.5	10.35	8.41	17.88
		2	93.4	10.97	8.51	17.81
		3	96	13.72	8.86	15.99
		3.9	77.1	6.36	8.61	10.68
		5.1	74	4.7	8.46	8.56
		6.2	72.1	5.06	8.24	7.6
		6.8	71.6	5.71	8.11	7.19
		8	71.6	5.27	7.96	6.62
		8.8	71.3	4.92	7.89	6.38
		9.1	71.5	4.98	7.86	6.33
		9.2	71.7	5.82	8.04	6.32
		10	72.2	3.93	7.77	6.12
		10.1	72	4.05	7.79	6.1
		10.2	72.2	4.43	7.82	6.09

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
8/26/1999						
		0	105.2	8.51	7.99	23.73
		0.7	105.7	8.51	7.95	22.9
		1	105.1	8.47	7.93	22.85
		1.5	105.1	8.54	7.91	22.31
		1.9	107.1	8.73	7.9	22.12
		3	107.9	7.31	7.78	20.52
		4	86.4	1.36	7.72	15.8
		5	80.9	.75	7.75	10.78
		5.9	79.6	.65	7.68	8.45
		7	76.8	1.78	7.58	7.38
		7.1	76	1.71	7.64	7.44
		8.2	76.7	1.66	7.54	6.89
		8.8	77.5	1.29	7.49	6.55
		9.8	79	.73	7.46	6.31

Secchi Depth and Profile Graphics

Station: 1

ST TH1



SULLIVAN

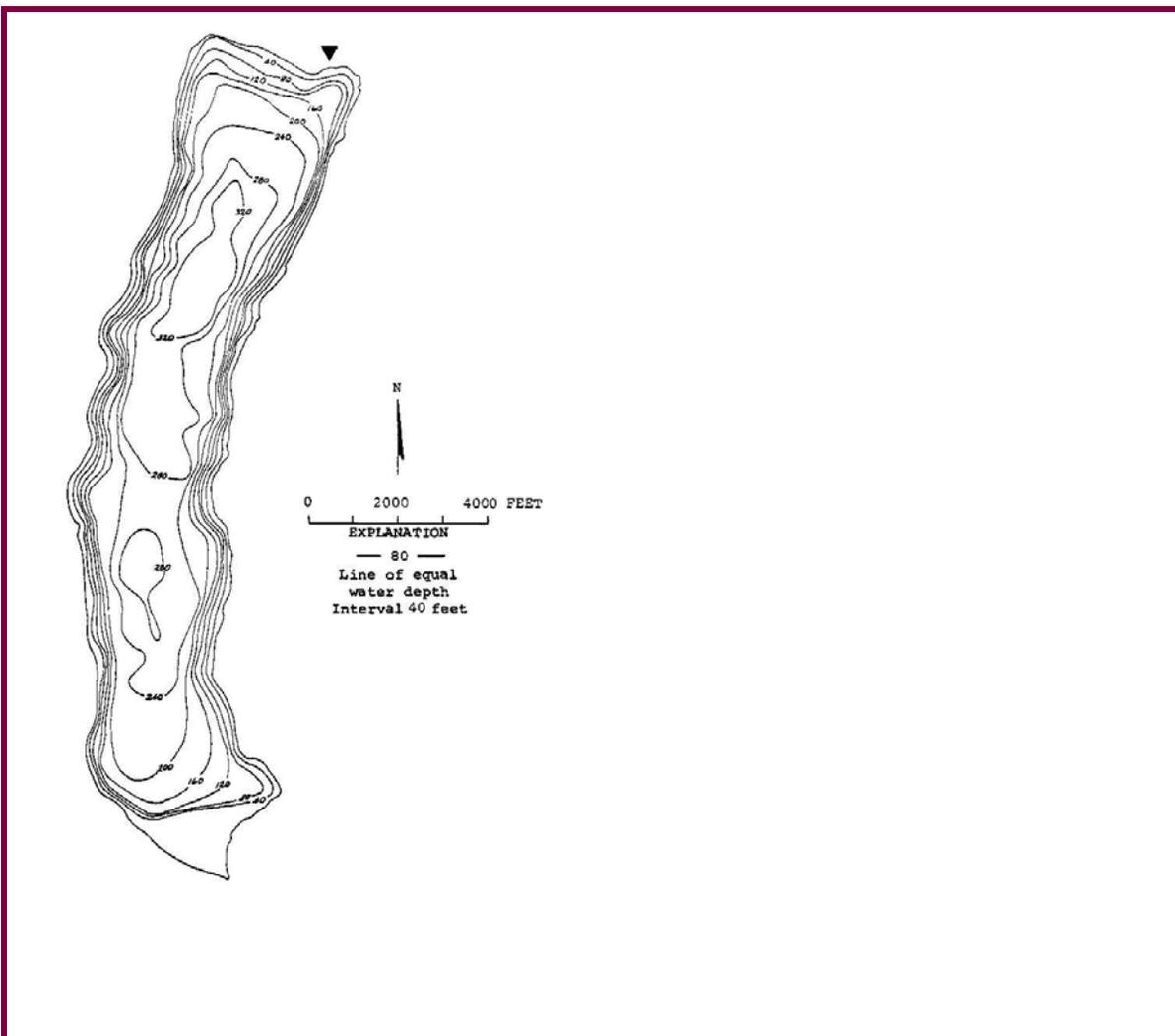
PEND OREILLE County

Lake ID: SULPE1

Ecoregion: 8

Sullivan Lake is located 4.3 miles southeast of Metaline Falls. It is a natural lake that was enlarged by a dam built in Harvey Creek in 1931. The lake is 3.6 miles long and averages 0.6 miles in width. Sullivan Lake drains to Sullivan Creek and the Pend Oreille River. There are campgrounds at both the north and south ends of the lake.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
1380	332	193	51	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
267000	8.89	2583	48 50 22.	117 17 17.



Trophic State Assessment for 1998

SULLIVAN

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a	N
TSI_Phos:	
TSI_Ch1:	
Narrative TSI: ^b	

Summary Comments:

Because there were only three (3) Secchi readings taken in 1998, no Trophic State Index assessment was calculated for Sullivan Lake.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

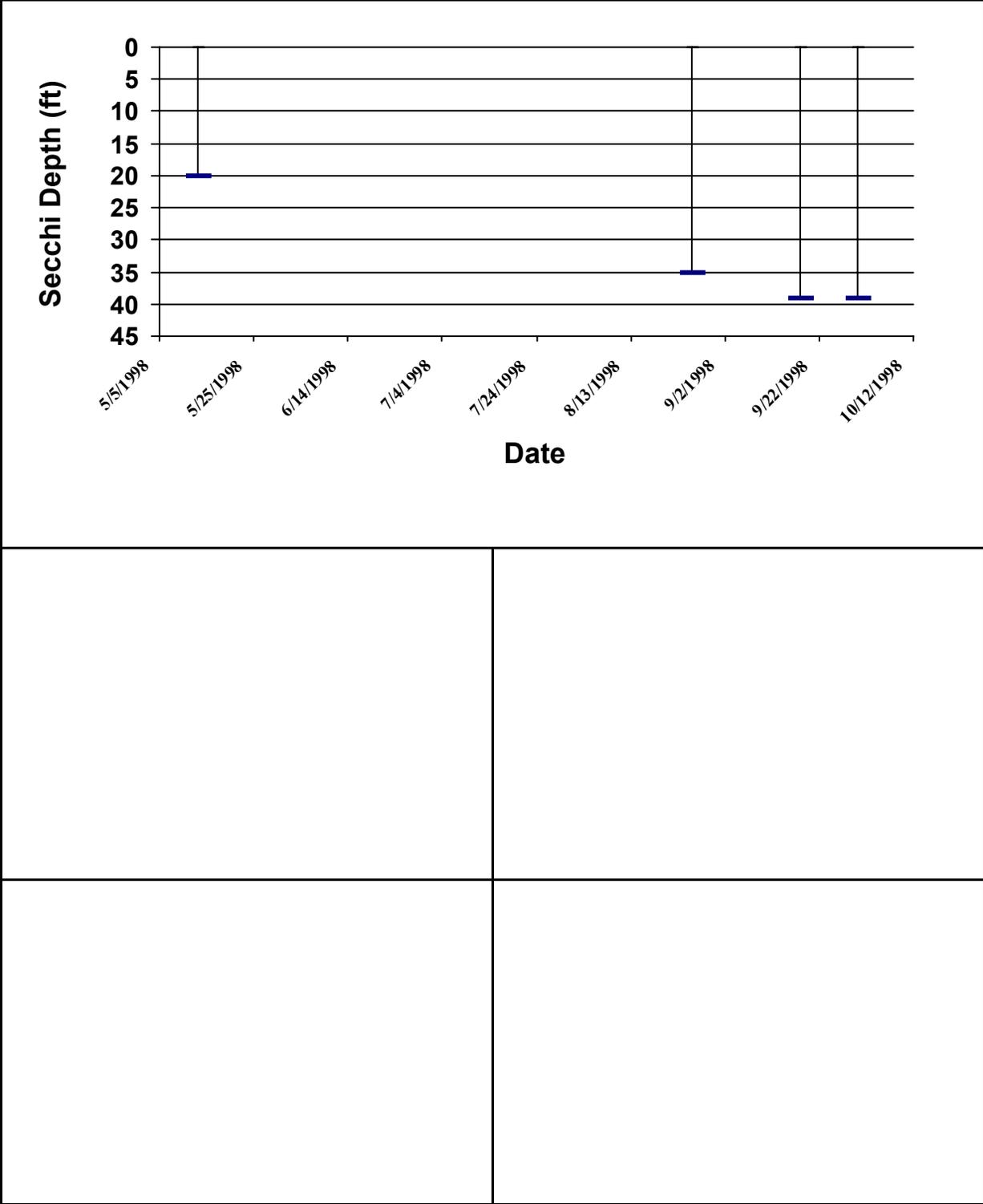
SULLIVAN

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/13/1998		14.4	20	6	0	1	1	5	5	0	0	0	0
	Sampler:	STORY		Remarks:	THE ACTUAL LAKE LEVEL IS 2582.65 MSL. SINCE THIS VALUE WILL NOT FIT IN THE DATA FIELD, I "SUBTRACTED" 2,000 FROM THE ORIGINAL DATA VALUE.								
8/26/1998		21.1	35	4	0	3	1	5	5	0	5	0	1
	Sampler:	STORY		Remarks:	NICE DAY!								
9/18/1998		19.4	39	6	100		3	5	5	0	0	0	0
	Sampler:	STORY		Remarks:	THE BIGGEST PORTION OF THE LAKE IS VERY WAVY; I FOUND A FAIRLY CALM AREA TO SAMPLE.								
9/30/1998		18.6	39	6	0	1	1	5	5	0	7	0	0
	Sampler:	STORY		Remarks:	ANOTHER NICE DAY ON THE LAKE!								

Secchi Depth and Profile Graphics

Station: 1

SULPE1



Trophic State Assessment for 1999

SULLIVAN

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	J, N
TSI_Phos:	42	
TSI_Ch1:		
Narrative TSI:	^b	

Summary Comments:

Only two Secchi readings were made in 1999. This is not enough data to calculate a Trophic State Index.

The chemistry data collected for Sullivan Lake showed moderate levels of phosphorus in the epilimnion indicating an elevated degree of productivity. At this level of phosphorus algae could become a nuisance, though usually not for long periods of time.

Ecology staff made only one site visit in 1999. Thermal stratification was observed during this visit (6/23/1999) and the dissolved oxygen levels were noted as consistently high throughout the entire water column.

In 1996, Ecology staff conducted an aquatic plant survey. The only non-native plant found was Phalaris arundinacia (reed canarygrass) occurring as a few plants with a patchy distribution. Most of the aquatic plants were observed growing at the south end of the lake.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

SULLIVAN

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
------	------	--------	-----------------	-----------------	-------	----------------------------	-------------------------------------	--------------------	-------------------	--------------------

Station 1

6/23/1999 1000 E 13.6

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

SULLIVAN

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/19/1999		46	33	2	75	1	5	5	5	0	0	2	0
	Sampler:	STORY			Remarks:	Did not use a view tube.							
6/23/1999		56	18	3	75	2	4	5	5			0	0
	Sampler:	STORY			Remarks:	Did not use a view tube. Runoff from recent rains - decrease in Secchi due to significant inflow from both precipitation and snowmelt. No algae blooms this spring - typical because of fluctuation in lake height. Lake looked really good - breezy.							

Profile Report

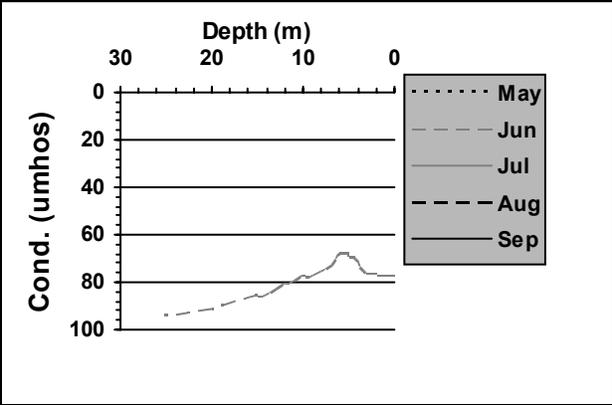
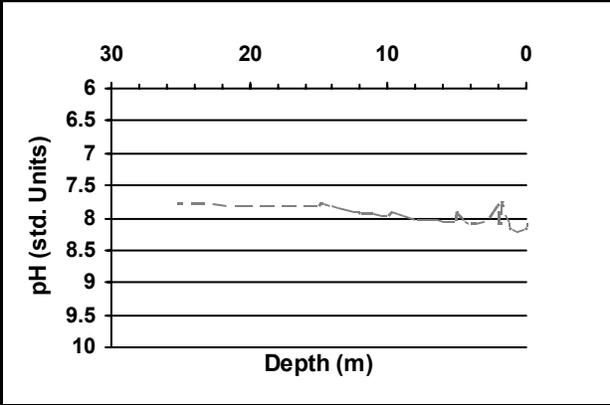
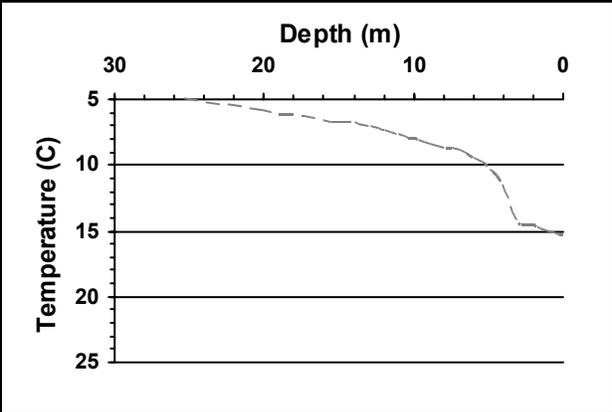
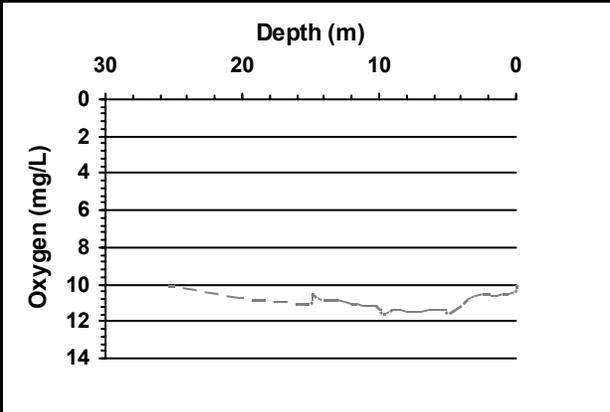
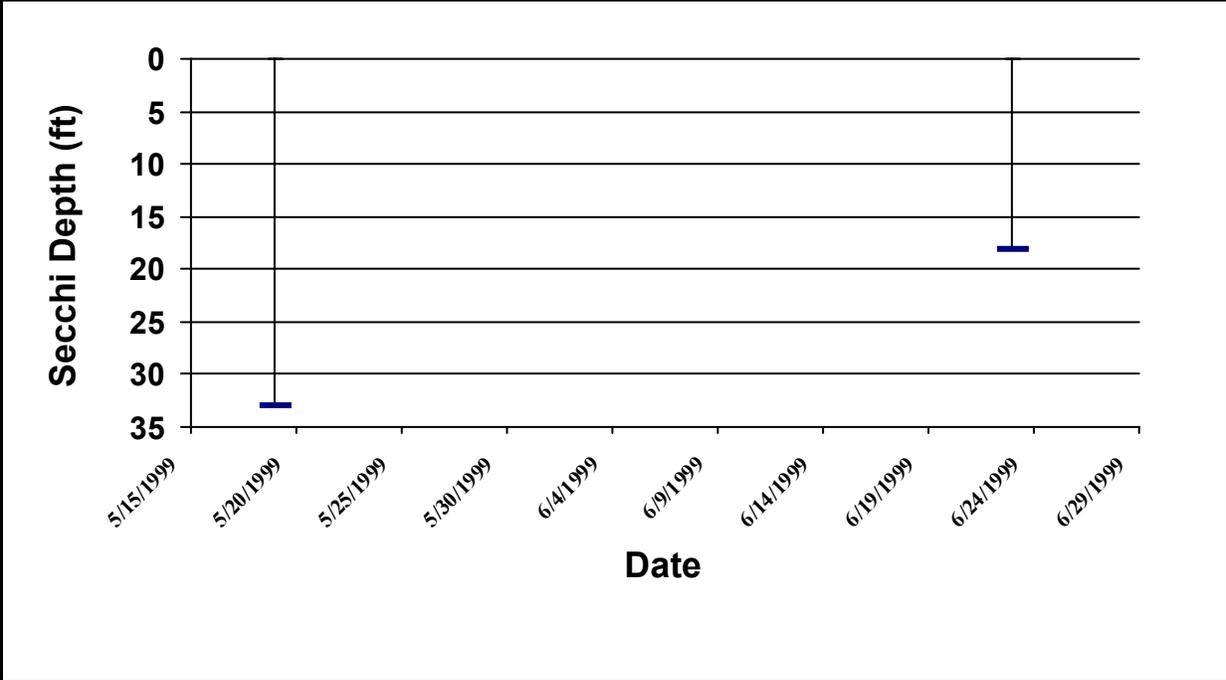
SULLIVAN

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/23/1999						
		0	76.4	10.06	8.08	15.2
		0.1	76.3	10.36	8.18	15.25
		1	76.3	10.42	8.16	14.9
		1.7	76.3	10.53	7.75	14.68
		1.9	76.3	10.47	8.12	14.49
		2	76.2	10.51	7.77	14.52
		3	75.7	10.63	8.05	14.11
		4.1	70.4	11.14	8.08	11.19
		5	69.1	11.5	7.9	10.1
		5.1	67.8	11.36	8.06	9.92
		6	67.4	11.38	8.04	9.4
		6.9	72.9	11.43	8.02	8.76
		8	75.3	11.39	8.01	8.58
		8.9	76.9	11.3	7.96	8.29
		9.7	77.9	11.57	7.88	8.01
		10.1	77	11.16	7.94	7.92
		11.1	79.5	11.11	7.93	7.52
		11.9	80.2	11.03	7.92	7.25
		12	79.9	10.96	7.88	7.2
		13	82.6	10.84	7.85	6.94
		14.2	85.4	10.76	7.81	6.67
		15	86.2	10.45	7.77	6.59
		15.1	85.3	11.03	7.81	6.7
		20.1	91.1	10.69	7.8	5.77
		25.3	93	10.03	7.77	4.92

Secchi Depth and Profile Graphics

Station: 1

SULPE1



SUMMIT

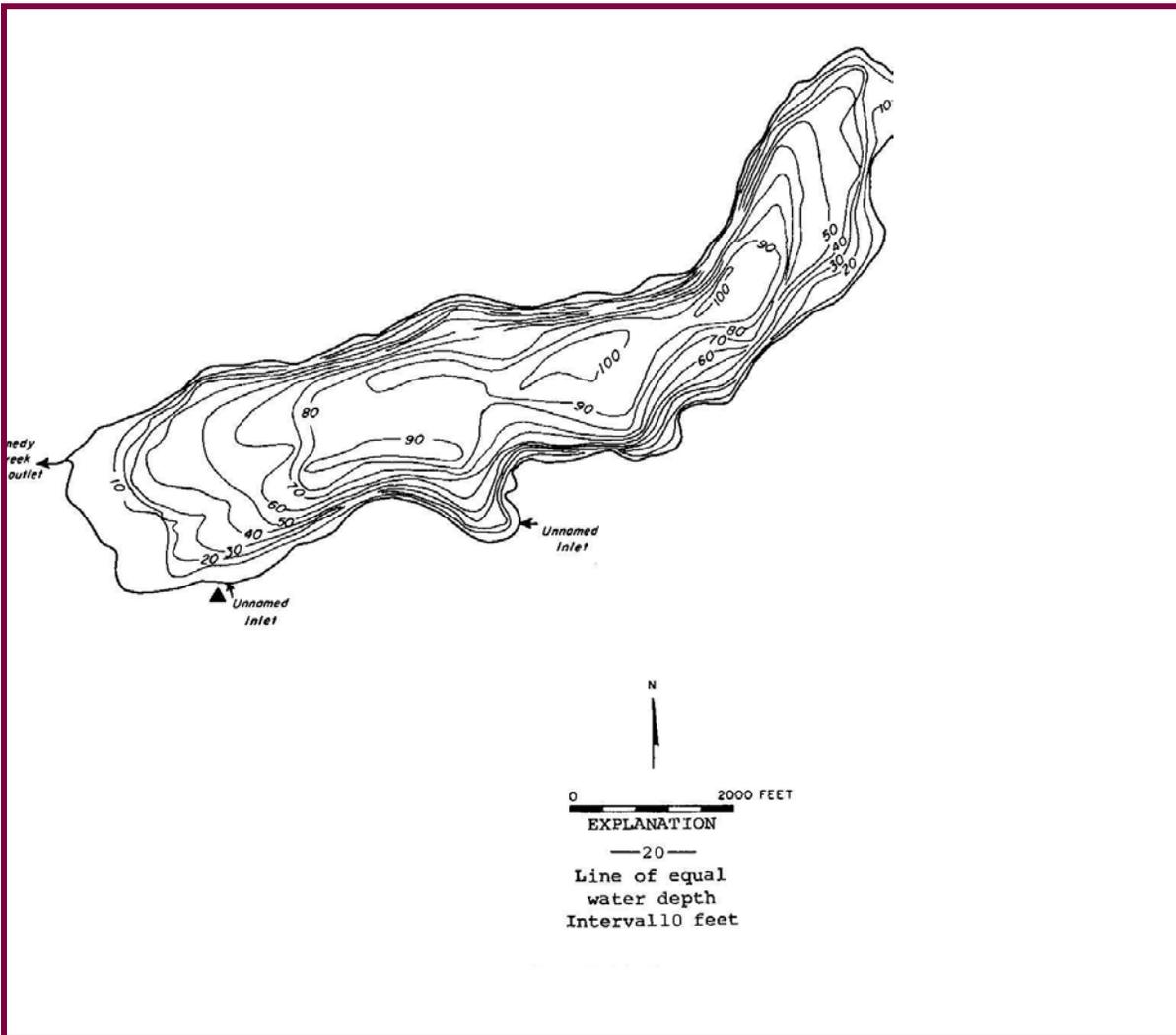
THURSTON County

Lake ID: SUMTH1

Ecoregion: 2

Summit Lake is located in a steep forested valley nine miles west of Olympia. It is two miles long. Summit Lake is fed by intermittent streams, seeps, and springs, and drains via Kennedy Creek to Oyster Bay in Totten Inlet.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
530	100	53	3	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
28000	5.61	500	47 03 12.	123 07 20.



Station Information

SUMTH1

Primary Station	Station # 1	latitude: 47 03 15.2	longitude: 123 06 01.4
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

SUMMIT

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 30 J
TSI_Phos:
TSI_Ch1:
Narrative TSI: ^b OM

Summary Comments:

The general water clarity was very good for Summit Lake in 1998. The Secchi depth readings ranged from 6.4 meters (21.0 feet) to 8.8 meters (29.0 feet) with a mean Secchi depth of 7.8 meters (25.8 feet). For comparison, in 1997 the mean Secchi depth was 7.5 meters (24.7 feet).

No chemistry data was collected for Summit Lake in 1998.

Only one site visit was made by Ecology staff in 1998. Thermal stratification was observed during this visit (9/1/1998) and low dissolved oxygen was noted in the hypolimnion.

A few geese and other waterfowl were counted by the volunteer monitor on only one of his sampling visits between May and October. He also noted a blue-green algae bloom in the lake in October. The volunteer monitor commented that the water level in 1998 was the lowest he's seen in the last 5-10 years.

An aquatic plant survey was done by Ecology staff in 1997. No non-native plants were observed during this survey.

Based on Secchi depth data and the low dissolved oxygen levels in the hypolimnion, Summit Lake is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

SUMMIT

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/31/1998		13.3	26	2	0	2		5	5	2	3	4	1
	Sampler:	DAVIS		Remarks:									
6/16/1998		15.6	27	2	0	2	1	5	5	0	0	3	0
	Sampler:	DAVIS		Remarks:									
7/9/1998		18.9	24	2	25	2	1	5	5	0	0	0	0
	Sampler:	DAVIS		Remarks:									
8/12/1998		22.2	21	3	0	2	1	5	5	0		1	
	Sampler:	DAVIS		Remarks: AIR TEMPERATURE IS 90 DEGREES.									
9/1/1998		22.2	29	2	0	1	1	5	5	0	0	1	2
	Sampler:	DAVIS		Remarks: AIR TEMPERATURE IS 85 DEGREES.									
9/1/1998			29		0						0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									
10/6/1998		16.7	27	3	0	1	1	5	5	0	0	1	0
	Sampler:	DAVIS		Remarks: LAKE LOWEST IN 5-10 YEARS. BLUE-GREEN ALGAE PRESENT.									

Profile Report

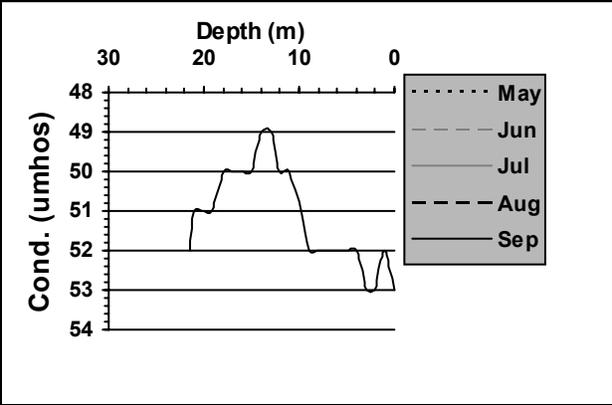
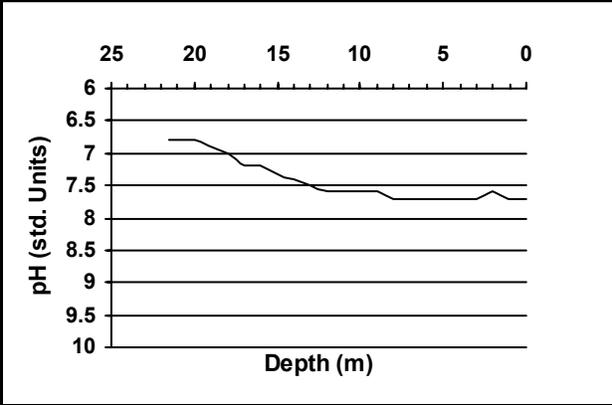
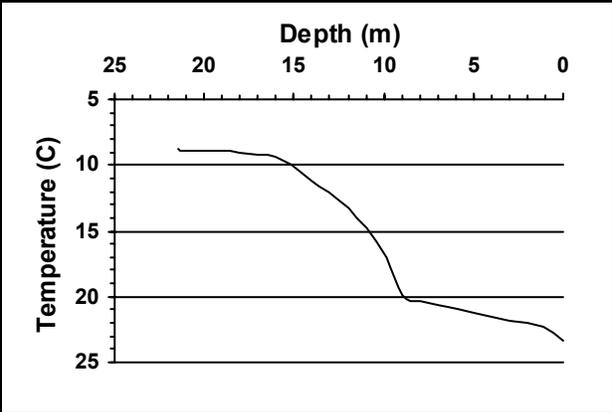
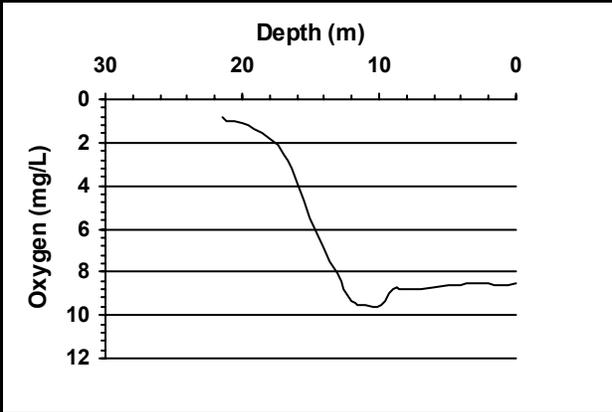
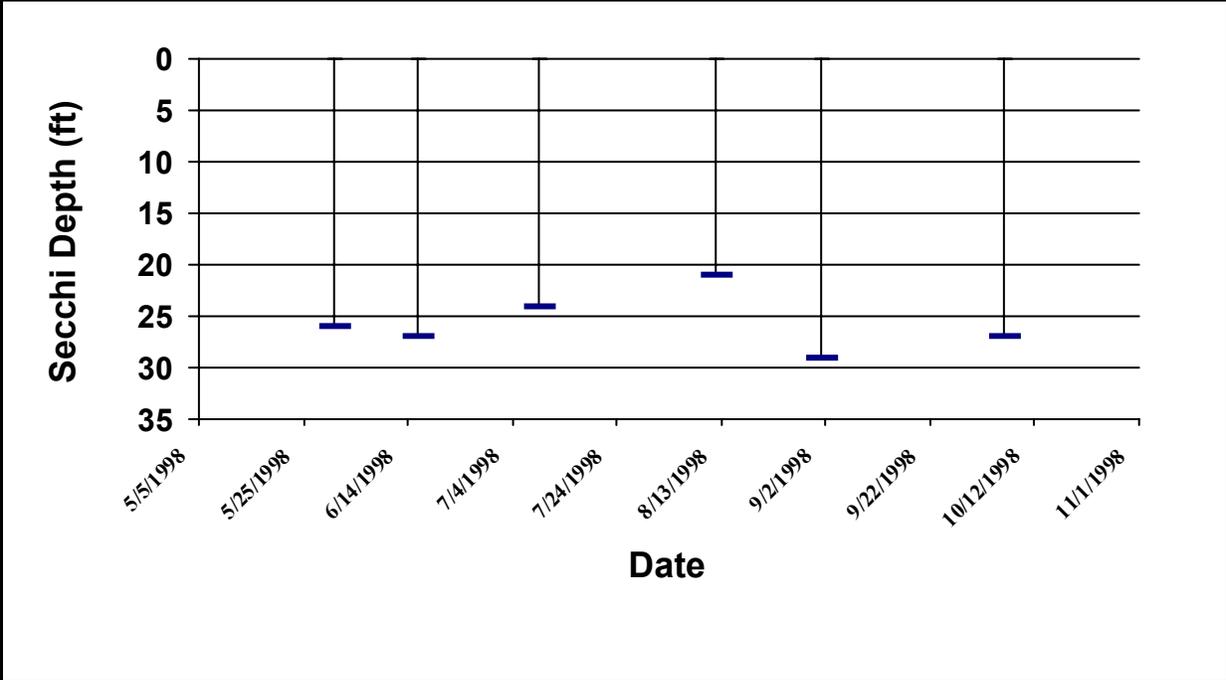
SUMMIT

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
9/1/1998						
		0	53	8.49	7.7	23.3
		1.1	52	8.64	7.7	22.3
		2	53	8.53	7.6	22
		3	53	8.56	7.7	21.9
		4	52	8.61	7.7	21.6
		5	52	8.6	7.7	21.2
		5.9	52	8.69	7.7	21
		7	52	8.77	7.7	20.7
		8	52	8.82	7.7	20.4
		9	52	8.82	7.6	19.9
		9.8	51	9.53	7.6	17.1
		11	50	9.52	7.6	14.8
		12	50	9.3	7.6	13.3
		13	49	8.07	7.5	12.1
		14	49	6.85	7.4	11.1
		15.1	50	5.53	7.3	10
		16	50	3.98	7.2	9.4
		17	50	2.59	7.2	9.2
		18	50	1.8	7	9.1
		19.1	51	1.39	6.9	8.9
		20	51	1.08	6.8	8.9
		21.1	51	.98	6.8	8.9
		21.5	52	.83	6.8	8.8

Secchi Depth and Profile Graphics

Station: 1

SUMTH1



Station Information

SUMTH1

Primary Station	Station # 1	latitude: 47 03 15.2	longitude: 123 06 01.4
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

SUMMIT

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	32
TSI_Phos:		26
TSI_Ch1:		
Narrative TSI:	^b	OM

Summary Comments:

The general water clarity of Summit Lake was excellent in 1999. The Secchi depth readings ranged from 5.8 meters (19.0 feet) to 8.5 meters (28.0 feet) with a mean Secchi depth of 6.8 meters (22.6 feet). For comparison, in 1998 the mean Secchi depth was 7.8 meters (25.8 feet).

Only a few geese and/or other waterfowl were seen on the lake by the volunteer monitor during two of his eight sampling visits made between April and October.

The chemistry data collected for Summit Lake showed low levels of phosphorus in the epilimnion. This level of phosphorus indicates a low degree of productivity where algae growth does not become a problem. The volunteer monitor commented on the appearance of periphyton (attached algae) on the rocks around the lake every year in April. This periphyton usually disappears by June.

Ecology staff made two site visits in 1999. During both site visits (6/3/1999 and 9/24/1999) thermal stratification of the lake was noted. The dissolved oxygen levels remained consistently high throughout the water column during the June site visit; low dissolved oxygen levels in the hypolimnion were noted during the September site visit. Also observed during the September site visit were dense amounts of suspended algae in the water column.

Based on the Secchi depth data and the phosphorus levels, Summit Lake should be classified as oligotrophic. However because of the low dissolved oxygen levels in the hypolimnion during the latter part of the summer, Summit Lake is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

SUMMIT

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 1										
6/3/1999	1423	E	4.37							
9/24/1999	1130	E	4.49							

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

SUMMIT

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
4/23/1999		51	32	2	0	2	1	5	5	2	8	0	1
	Sampler:	DAVIS		Remarks: Did not use a view tube. Heavy bottom algae within 30 feet of shore.									
5/23/1999		56	25	2	0	2	1	5	5	2	0	10	1
	Sampler:	DAVIS		Remarks: Did not use a view tube. Brown algae still on lake bottom near shore.									
6/3/1999		58	28	2	0	2	1	5	5	0	0	1	0
	Sampler:	DAVIS		Remarks: Did not use a view tube. Very windy and choppy-Hydrolab only went down to 20 meters. Algae blooms start the same time every year. Brown algae about 2-3 inches long attached to rocks - never floating. Algae gone by the first week of June.									
7/5/1999		61	21	2	0	2	2	5	5	0		3	3
	Sampler:	DAVIS		Remarks: Did not use a view tube.									
7/27/1999		66	20	2	0	1	1	5	5	0		2	1
	Sampler:	DAVIS		Remarks: Did not use a view tube. There were seven personal watercraft counted today. 80 degrees Fahrenheit.									
8/27/1999		69	19	2	0	2	1	5	5	0	0	0	2
	Sampler:	DAVIS		Remarks: Did not use a view tube. 80 degrees Fahrenheit today.									
9/24/1999		62	23	2	25	2	2	5	5	0		1	0
	Sampler:	DAVIS		Remarks: Lot of suspended algae in lake all August-greenish color. Every year in April, a brown algae appears on the rocks in 1 foot of water-if lake level is down, it can be very smelly. Lake level is lowest in Feb & Sept. Sampling day was high overcast.									
10/15/1999		56	21	2	0	2	1	5	5	0		1	0
	Sampler:	DAVIS		Remarks: Did not use a view tube. Last one of the year.									

Profile Report

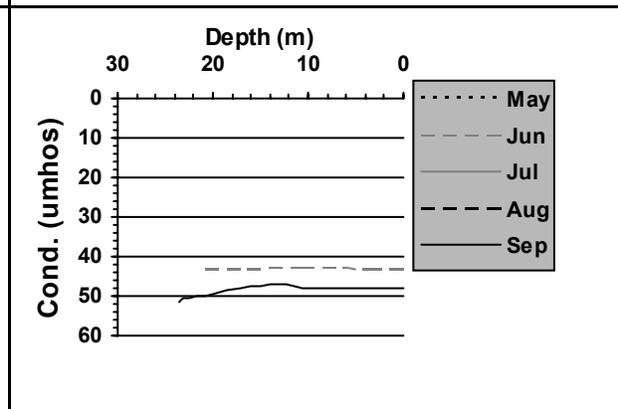
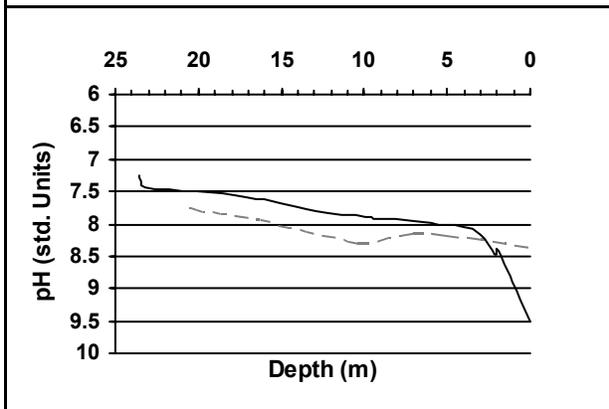
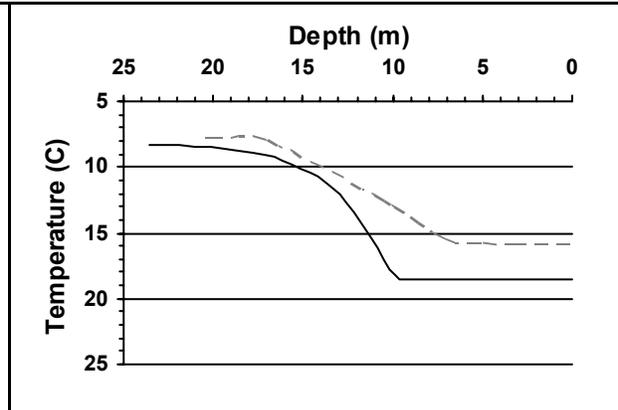
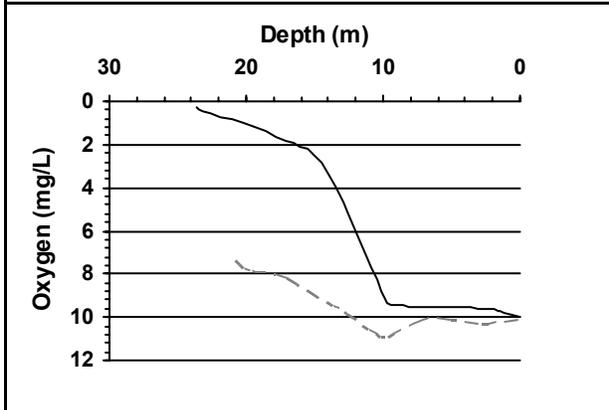
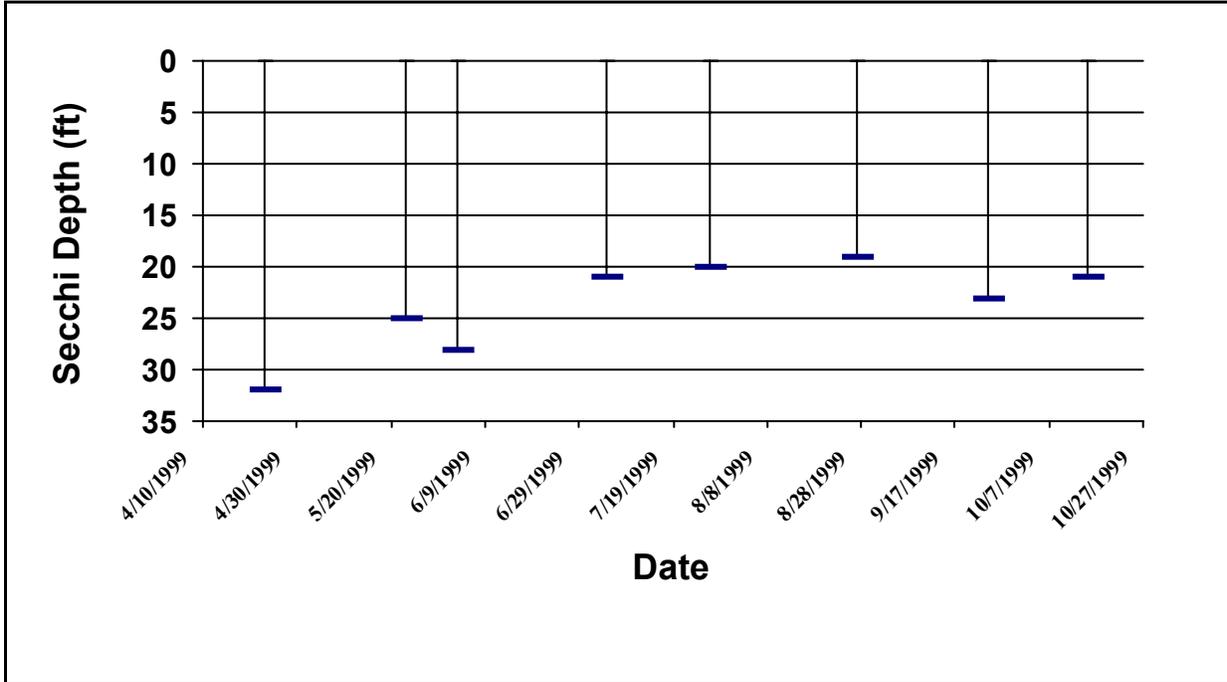
SUMMIT

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/3/1999						
		0.1	43	10.11	8.34	15.85
		3	42.9	10.22	8.24	15.76
		5.1	42.9	10.11	8.17	15.66
		7.1	42.7	10.04	8.13	15.31
		9.8	42.7	10.86	8.29	12.97
		10.4	42.6	10.76	8.29	12.5
		17	42.9	8.15	7.89	7.91
		19.7	43	7.76	7.8	7.75
		20.9	43	7.27	7.71	7.73
9/24/1999						
		0	47.9	10.02	9.52	18.56
		1.1	47.9	9.76	8.9	18.56
		1.6	47.9	9.67	8.63	18.57
		2	47.9	9.59	8.38	18.58
		2.2	47.9	9.62	8.47	18.58
		3	47.9	9.61	8.17	18.57
		4.1	47.9	9.55	8.05	18.58
		5	47.8	9.55	8.02	18.57
		7.1	47.9	9.51	7.96	18.52
		9	47.8	9.39	7.93	18.47
		9.9	47.9	9.16	7.89	18.3
		12.9	47.2	4.69	7.81	12.04
		15.1	47.7	2.48	7.67	10.07
		17.1	48.1	1.79	7.6	9.01
		20.1	49.4	1	7.51	8.45
		23.2	50.7	.46	7.43	8.29
		23.6	51.5	.3	7.26	8.26

Secchi Depth and Profile Graphics

Station: 1

SUMTH1



TAPPS

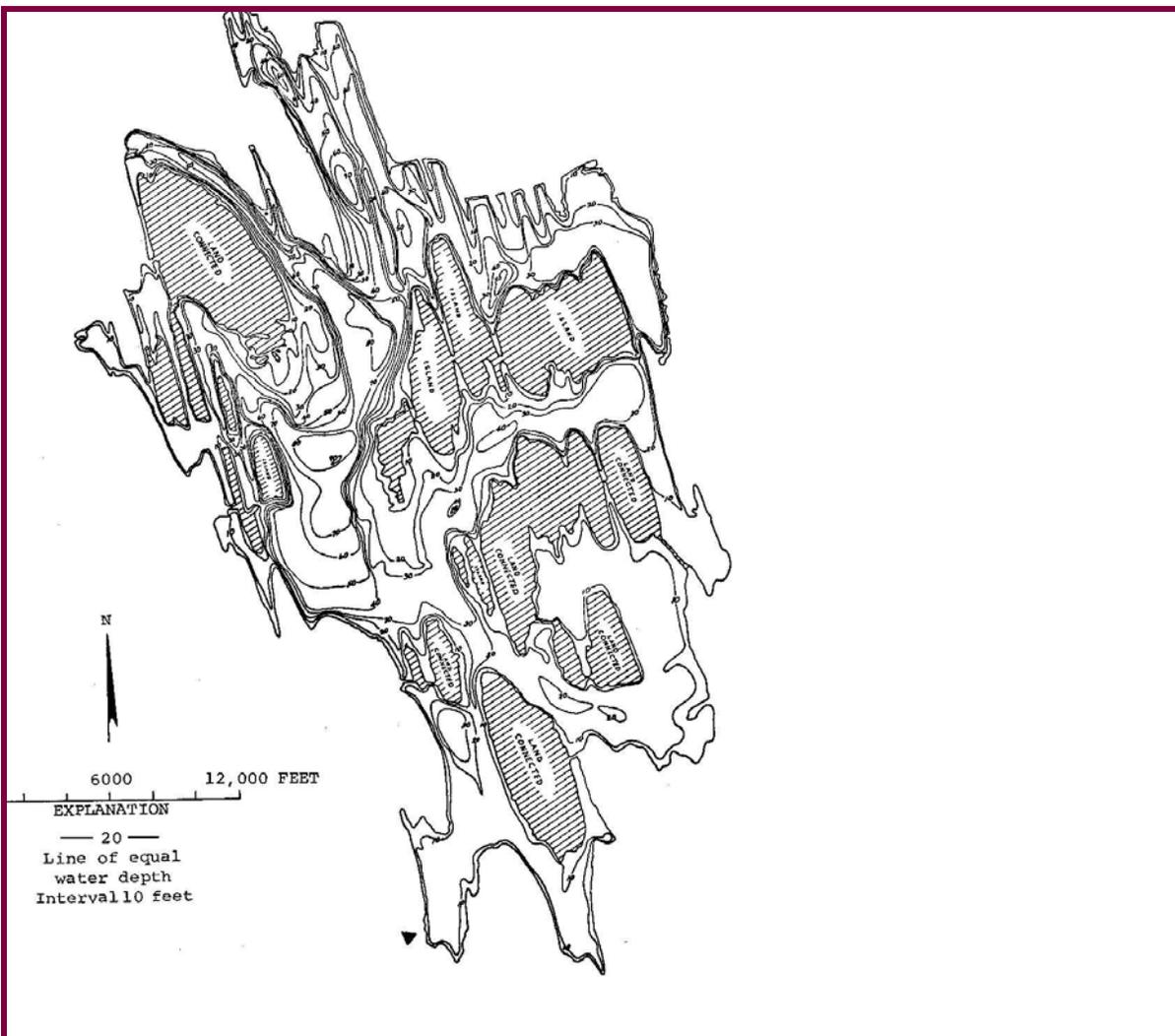
PIERCE County

Lake ID: TAPP11

Ecoregion: 2

Lake Tapps is a large reservoir located approximately 10 miles east of downtown Tacoma. The reservoir was formed by a diversion dam on the White River. It has been used in the past for hydroelectricity but may be maintained solely for aesthetic, recreational and real estate uses in the future. Because of the suspended glacial sediments in the White River, Lake Tapps tends to have a very milky white appearance.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
2707	90	25		
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
67120	41.7	543	47 14 18.	122 12 11.



Station Information

TAPPI1

Primary Station	Station # 1	latitude: 47 13 21.7	longitude: 122 10 29.9
	Description: Deep spot in the middle basin of the lake.		
Secondary Station	Station # 2	latitude: 47 11 48.6	longitude: 122 09 03.2
	Description: Located at inlet of White River		
Secondary Station	Station # 3	latitude: 47 14 19.6	longitude: 122 11 42.1
	Description: Located at outlet of lake to White River		

Trophic State Assessment for 1998

TAPPS

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 61 J
TSI_Phos:
TSI_Ch1:
Narrative TSI: ^b M

Summary Comments:

The general water clarity was very poor for Lake Tapps in 1998. The Secchi depth readings ranged from 0.2 meters (0.7 feet) to 2.6 meters (8.5 feet) with a mean Secchi depth of 1.2 meters (4.0 feet). For comparison, in 1997 the mean Secchi depth was 1.1 meters (3.6 feet).

No chemistry data was collected for Lake Tapps in 1998.

Only one site visit was made by Ecology staff in 1998. Thermal stratification was observed during this site visit (9/17/1998); however dissolved oxygen levels remained high all the way through the water column.

The volunteer monitor commented the lake was much clearer in May than in year's past. However, subsequent comments from the volunteer monitor indicate the water clarity diminishing after May through October.

Lake Tapps is an extremely difficult lake to classify. The lake is fed by a diversion of the White River which, at the point of the diversion, carries a large sediment load. This causes the lake to have very low Secchi readings because of the large amount of suspended sediment. Even with the high Trophic State Index for Secchi, Lake Tapps is classified as mesotrophic. This classification is based on best professional judgement and the low level of productivity in Lake Tapps.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

TAPPS

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/31/1998		10	8.5		0	2	3	4	4	0	0	0	2
	Sampler:	COCHRAN		Remarks:	LAST YEAR'S MAXIMUM SECCHI AT THIS POINT WAS 4 FEET - MOST OFTEN UNDER 2 FEET - MUCH SILT. VERY CLEAR THIS YEAR. THE ACTUAL LAKE HEIGHT IS 543 FEET AND 6 INCHES. I SUBTRACTED 500 FEET AND CONVERTED THE REMAINING VALUE TO INCHES.								
6/12/1998		18	8		0	2	4	5	5	0	0	0	2
	Sampler:	COCHRAN		Remarks:									
6/29/1998		21	4		0	1	1	4	4	0	0	0	1
	Sampler:	COCHRAN		Remarks:	LAKE HAS GONE MILKY FROM GLACIER MELT. WAS CLEARER FROM RUNOFF TWO WEEKS AGO.								
7/18/1998		23	.5		0	3	1	3	3	0	0	0	1
	Sampler:	COCHRAN		Remarks:	TOO MUCH SILT AND GLACIER JUNK.								
8/2/1998		24	.83		0	2	2	3	3	0	3	0	0
	Sampler:	COCHRAN		Remarks:	NO FISHING - VERY LOW VISIBILITY. BOAT AND MAN LOST IN ACCIDENT BECAUSE OF LOW VISIBILITY.								
9/17/1998		19.5	1.08		25	1	1	1	1	0	0	0	1
	Sampler:	COCHRAN		Remarks:	WATER HAS A SLIGHT GREEN TINGE OVER THE WATER COLOR OF GREY-BROWN GLACIAL FLOUR.								
9/17/1998			1.08		0					0	0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									
Station 2													
5/31/1998		5.6	4.5		0	2	3	3	3	0	0	0	1
	Sampler:	COCHRAN		Remarks:	ACTUAL LAKE HEIGHT IS 543 FEET AND 6 INCHES. THIS VALUE IS TOO BIG TO FIT IN THE LAKE HEIGHT DATA FIELD SO I "SUBTRACTED" 500 FEET AND CONVERTED THE REMAINING VALUE TO INCHES. LAKE IS MUCH CLEARER THIS YEAR COMPARED TO LAST YEAR.								
6/12/1998		11	1		0	2	4	1	1	0	0	0	0
	Sampler:	COCHRAN		Remarks:	VERY HIGH SEDIMENT LEVELS.								

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
6/29/1998		13	1.5		0	1	1	2	2	0	1	0	0
	Sampler:	COCHRAN		Remarks:	LIGHT INLET FLOW - DARK COFFEE WITH MILK IN COLOR.								
7/18/1998		15	.08		0	2	1	3	3	0	2	0	0
	Sampler:	COCHRAN		Remarks:	CAN'T SEE - TOO MUCH GLACIAL SILT JUNK. NO FISHING - CAN'T SEE. ECOLOGY COLOR CHART DOESN'T WORK ON THIS LAKE.								
8/2/1998		15	.08		0	2	2	3	3	0	0	0	0
	Sampler:	COCHRAN		Remarks:	CANNOT SEE BECAUSE OF THE GLACIAL SILT JUNK.								
9/17/1998		16	.92		25	1	1	1	1	0	0	0	0
	Sampler:	COCHRAN		Remarks:	POOR WATER CLARITY DOESN'T STOP BOATING OR SWIMMING BUT CAN'T SEE UNDERWATER.								
9/17/1998			.92		0					0	0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									

Profile Report

TAPPS

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
9/17/1998						
		0	55	9.01	7.6	19.8
		0.8	55	8.93	7.6	19.7
		2	55	8.7	7.6	19.5
		3	54	8.4	7.6	17.6
		4	58	8.18	7.5	16.5
		4.9	59	8.35	7.5	16
		6	58	8.37	7.5	15.4
		7	61	8.62	7.4	15
		8	58	8.48	7.4	14.8
		9.1	56	8.12	7.4	14.6
		10.1	52	7.74	7.3	13.9
		11.1	51	7.55	7.3	13.4
		11.9	49	7.67	7.3	12.1
		13.1	50	7.56	7.4	11.1
		14	51	7.51	7.4	10.4
		15	51	7.52	7.4	9.6
		16	52	7.43	7.3	9.3
		16.9	52	7.4	7.3	9.1
		17.9	52	7.31	7.3	9
		19	53	7.08	7.3	8.8
		19.7	53	6.73	7.2	8.7
		20	53	6.81	7.2	8.7

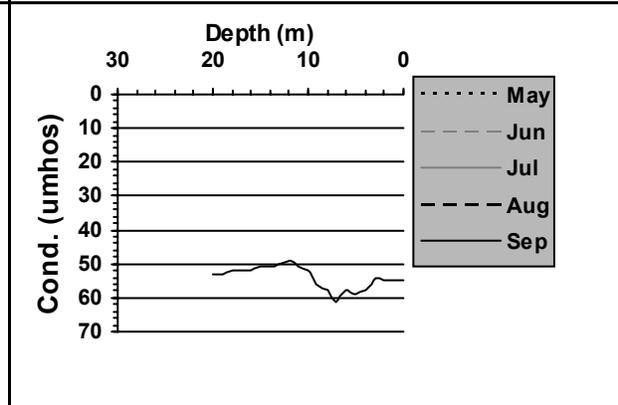
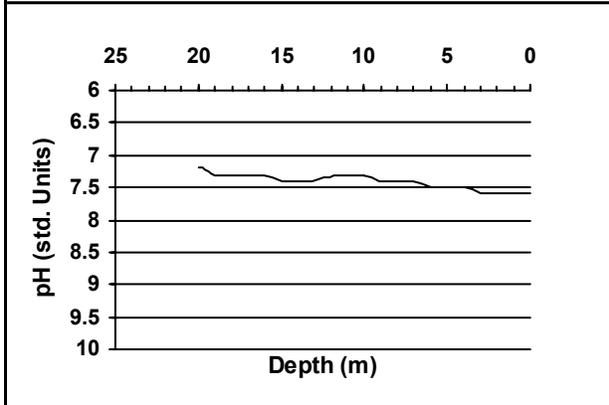
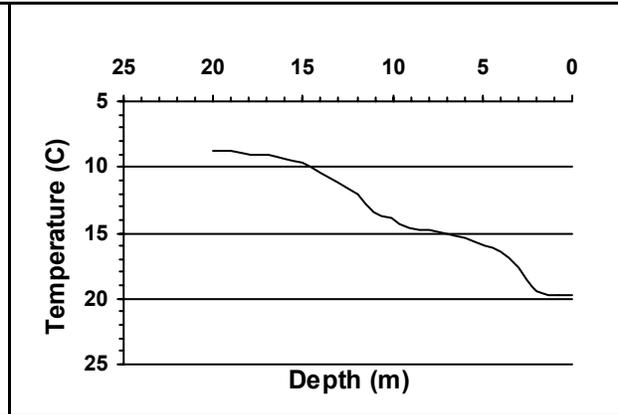
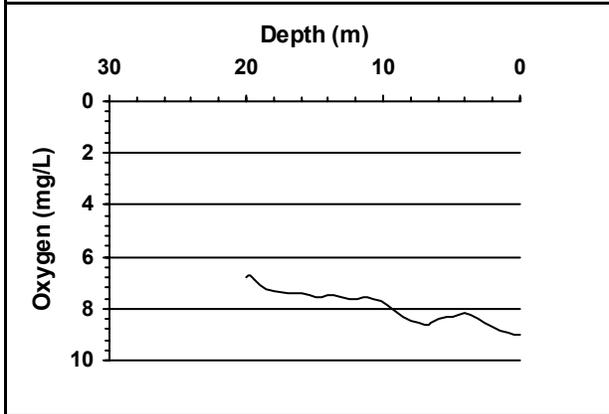
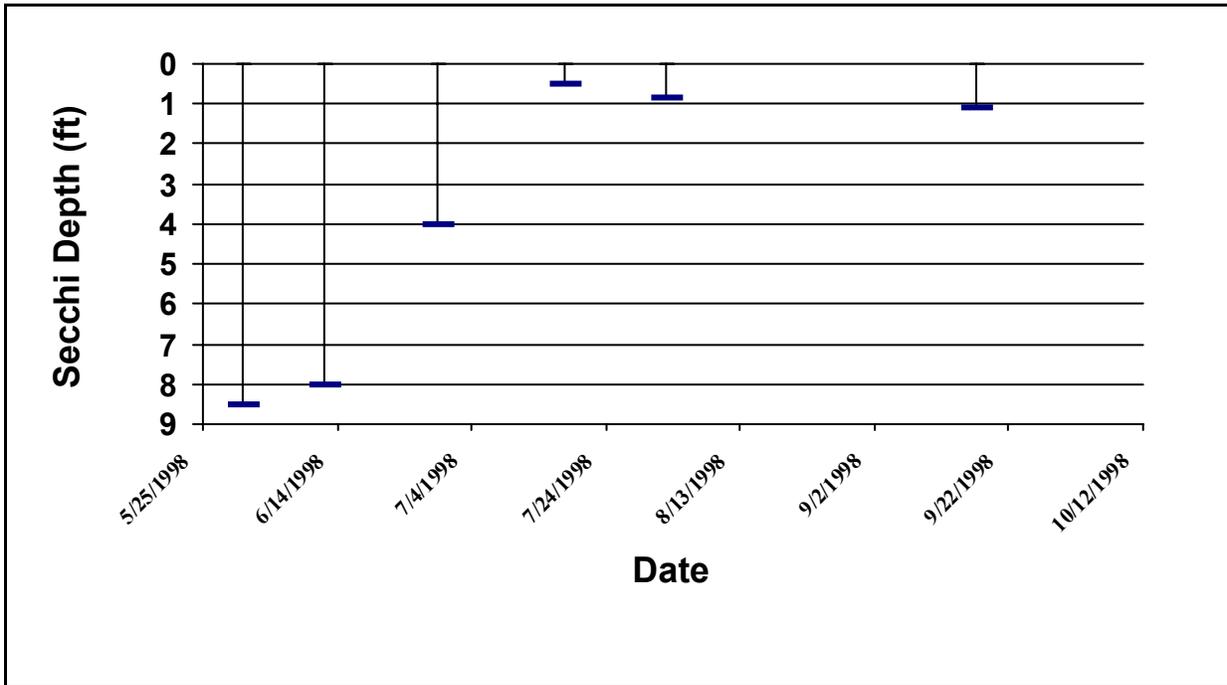
Station 2

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
9/17/1998						
		0.1	60	9.56	8.1	16.1
		0.4	60	9.41	7.8	15.9
		0.9	61	9.92	8	14.2
		1.5	61	9.89	7.8	14.1
		1.9	61	10.03	8	13.9
		2.5	61	10.05	7.9	13.8
		2.7	61	10.03	7.9	13.8
		2.9	62	10.08	7.9	13.8

Secchi Depth and Profile Graphics

Station: 1

TAPPI1



Station Information

TAPPI1

Primary Station	Station # 1	latitude: 47 13 21.7	longitude: 122 10 29.9
	Description: Deep spot in the middle basin of the lake.		
Secondary Station	Station # 2	latitude: 47 11 48.6	longitude: 122 09 03.2
	Description: Located at inlet of White River		
Secondary Station	Station # 3	latitude: 47 14 19.6	longitude: 122 11 42.1
	Description: Located at outlet of lake to White River		

Trophic State Assessment for 1999

TAPPS

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	N
TSI_Phos:	66	J
TSI_Ch1:		
Narrative TSI:	^b	

Summary Comments:

Only two Secchi readings were made in 1999. This is not enough data to calculate a Trophic State Index.

The chemistry data collected for Lake Tapps showed very high levels of phosphorus in the epilimnion indicating an elevated degree of productivity. At this phosphorus level algae could become a long term problem. However this high level of phosphorus does not cause algae blooms in Lake Tapps because of the large amount of suspended sediment in the water column preventing light from extending far into the water column and being made available to the algae cells.

Ecology staff made only one site visit in 1999. Thermal stratification was observed during this visit (6/17/1999) and the dissolved oxygen levels were noted as consistently high throughout the entire water column.

Lake Tapps is fed by a diversion of the White River which carries a large sediment load. This causes the lake to have very low Secchi readings because of the large amount of suspended sediment occurring in the water column.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

TAPPS

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
------	------	--------	-----------------	-----------------	-------	----------------------------	-------------------------------------	--------------------	-------------------	--------------------

Station 1

6/17/1999 1030 E 72.5

Station 2

6/17/1999 1000 E 246

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

TAPPS

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/17/1999		18.5	6.5		25	1	2	5	5	0	0	0	0
	Sampler:	COCHRAN		Remarks:									
7/11/1999		20	4.5		0	3	1	3	3	0	0	0	1
	Sampler:	COCHRAN		Remarks: Used a view tube. Better clarity and color than in 1998.									
Station 2													
6/17/1999		10	.33		25	1	2	1	1	0	0	0	0
	Sampler:	COCHRAN		Remarks:									
7/11/1999		10	.5		0	3	1	1	1	20	2	0	0
	Sampler:	COCHRAN		Remarks: Used a view tube. Starting to get glacial flour as well as sediment.									

Profile Report

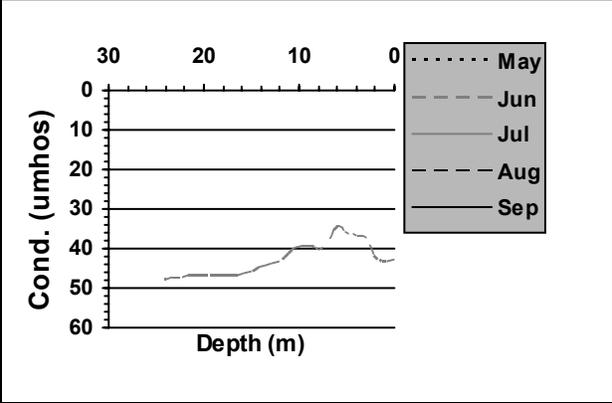
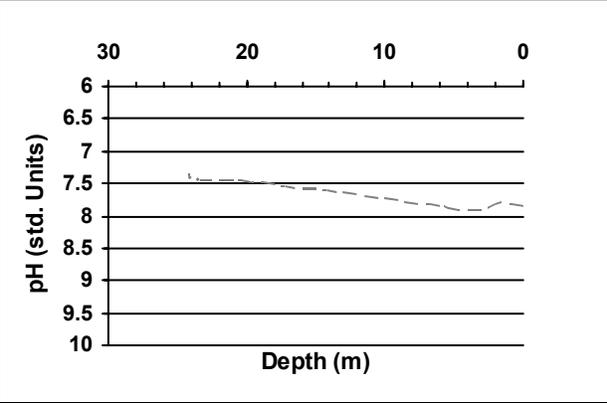
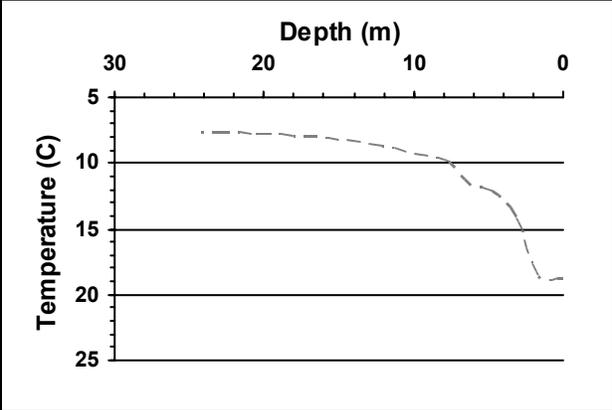
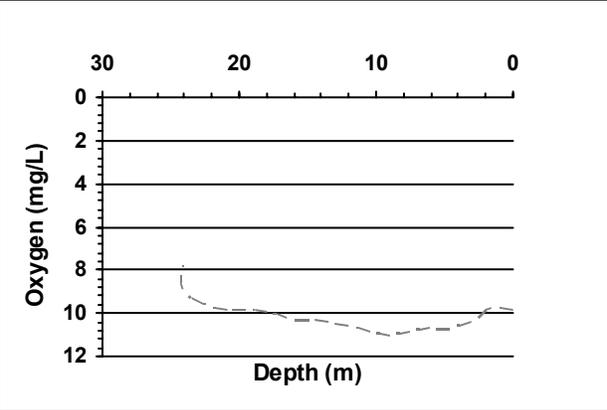
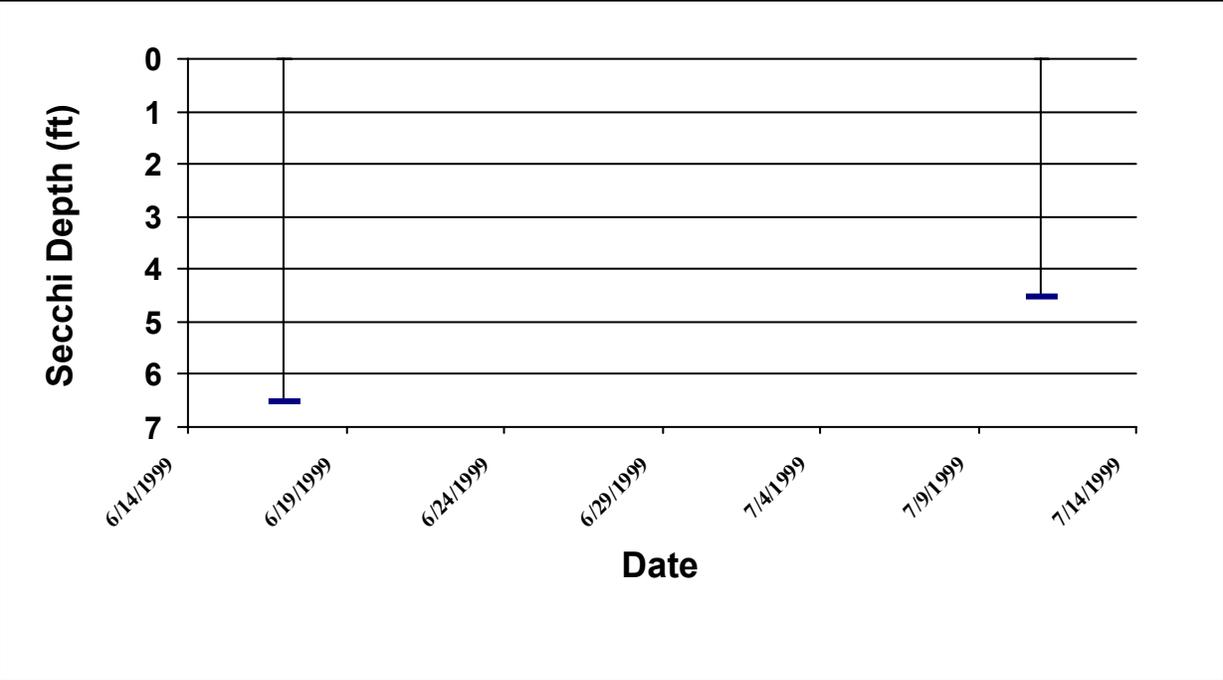
TAPPS

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/17/1999						
		0	42.3	9.76	7.84	18.66
		1.6	42.3	9.72	7.77	18.59
		3	36.9	10.37	7.89	14.01
		4.7	36.2	10.69	7.88	12.02
		6.1	33.8	10.6	7.84	11.58
		7.6	39.5	10.83	7.79	9.88
		9	39.2	10.95	7.75	9.41
		10.5	39.7	10.81	7.71	9.13
		12.1	42.8	10.52	7.64	8.62
		13.5	44.2	10.34	7.61	8.38
		15	45.5	10.24	7.56	8.16
		16.5	46.3	10.15	7.55	7.9
		18	46.6	9.89	7.49	7.79
		19.6	46.6	9.8	7.48	7.76
		20.9	46.7	9.79	7.45	7.71
		22.6	47.2	9.51	7.44	7.61
		24	47.7	8.88	7.41	7.53
		24.1	48	7.77	7.34	7.5
Station 2						
6/17/1999						
		0.1	31.3	11.4	8.33	9.47
		0.5	31.4	11.37	8.22	9.49
		1.1	31.3	11.35	8.14	9.57
		1.5	31.3	11.33	8.09	9.47
		2	31.3	11.3	8.04	9.46
		2.5	31.2	11.33	7.98	9.45
		3	31.2	11.29	7.93	9.39
		3.6	31.2	11.29	7.92	9.39
		3.8	31.2	11.27	7.94	9.39

Secchi Depth and Profile Graphics

Station: 1

TAPPII



THOMAS

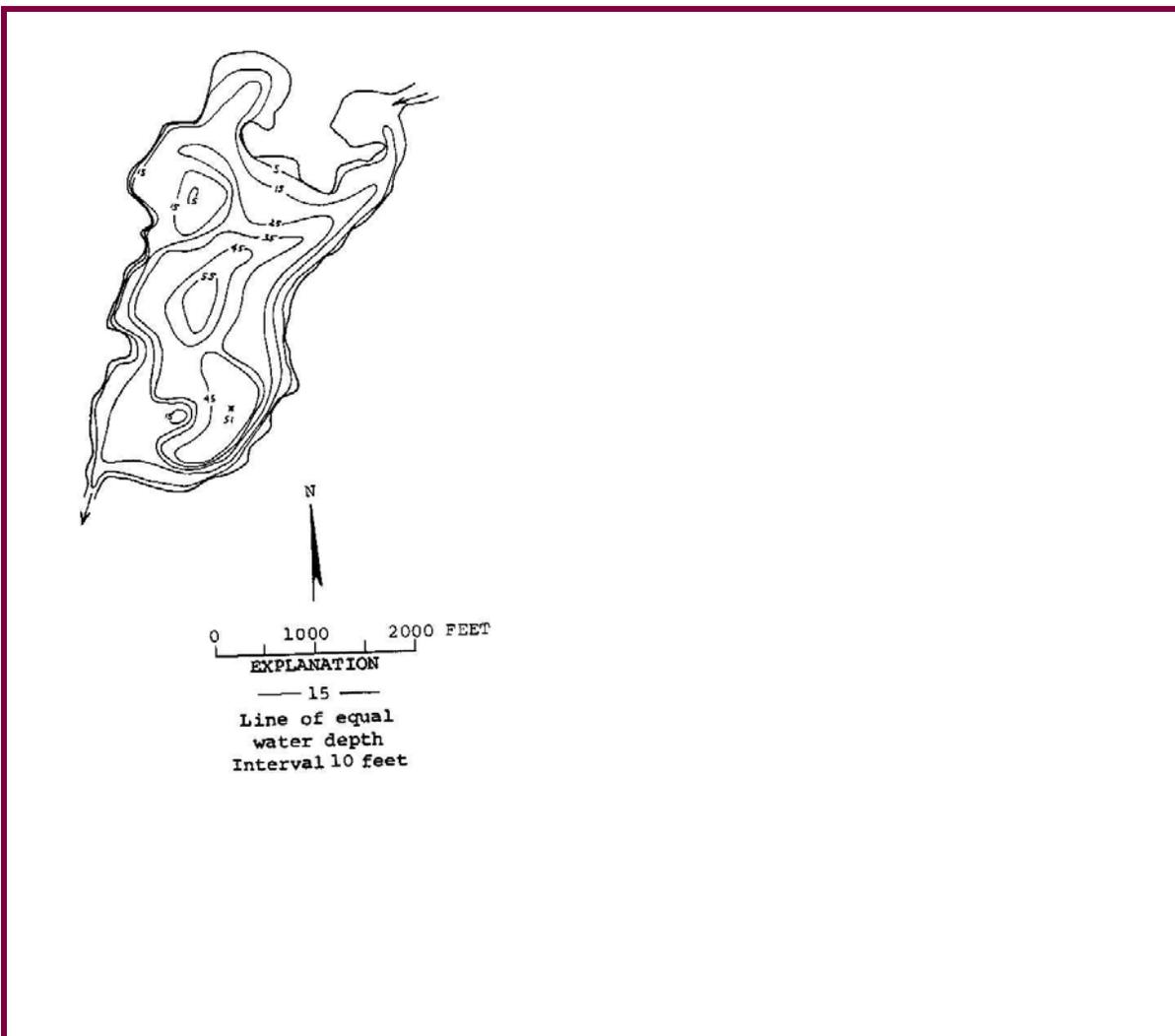
STEVENS County

Lake ID: THOST1

Ecoregion: 8

Lake Thomas is located 17 miles northeast of Colville, and is in the Little Pend Oreille chain of lakes. It is fed by Heritage Lake via a narrow channel, and drains south to Gillette Lake and ultimately to the Little Pend Oreille River. There is no boat ramp on the lake, but it is accessible from the other lakes in the Little Pend Oreille chain.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
170	55	23	13	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
4000	3.31	3147	48 37 07.	117 32 39.



Station Information

THOST1

Primary Station Station # 1 latitude: 48 37 20.9 longitude: 117 32 19.9
Description: Deep spot of the lake.

Trophic State Assessment for 1998

THOMAS

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 41 J
TSI_Phos:
TSI_Ch1:
Narrative TSI: ^b M

Summary Comments:

The general water clarity for Lake Thomas was good in 1998. The Secchi depth data readings ranged from 2.9 meters (9.5 feet) to 4.3 meters (14.0 feet) with a mean Secchi depth of 3.9 meters (12.7 feet). For comparison, in 1997 the mean Secchi depth was 3.8 meters (12.6 feet).

No chemistry data was collected for Lake Thomas in 1998.

Only one site visit was made by Ecology staff in 1998. Thermal stratification was observed during this visit (8/19/1998) and low dissolved oxygen levels were noted in the hypolimnion.

Based on Secchi depth data and the low dissolved oxygen levels in the hypolimnion, Lake Thomas is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

THOMAS

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)	
Station 1														
6/22/1998		21.1	12	2	50	2	5	4	4			1	0	
	Sampler:	HAWK			Remarks:	LAKE LEVEL BASE ESTABLISHED.								
7/9/1998		24.4	9.5	2	25	1	1							
	Sampler:	HAWK			Remarks:									
7/29/1998		26.7	13.5	2	0	2	2	4	5			0	1	
	Sampler:	HAWK			Remarks:									
8/19/1998		22.2	14		75	3	1	5	5			0	1	
	Sampler:	HAWK			Remarks:									
8/19/1998			14		0					0	0	0	0	
	Sampler:	BELL-MCKINNON			Remarks:									
9/5/1998		22.2	13	6	0	4	1	5	5			0	0	
	Sampler:	HAWK			Remarks:	VISIBILITY DOWN POSSIBLY BECAUSE OF SO MANY WATERCRAFT.								

Profile Report

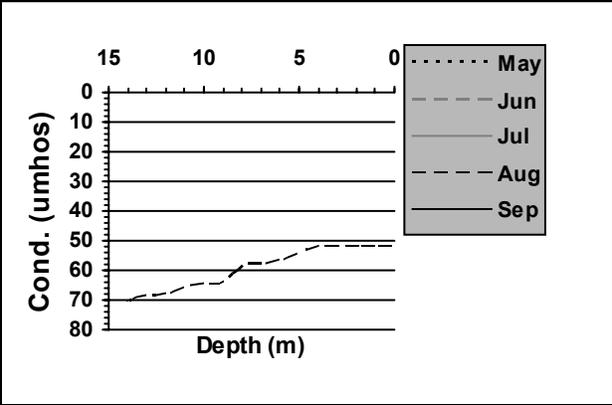
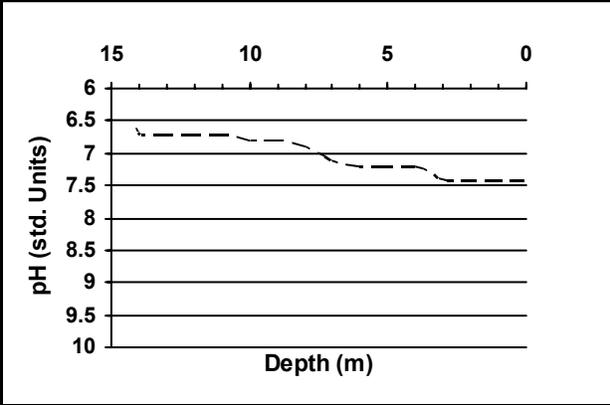
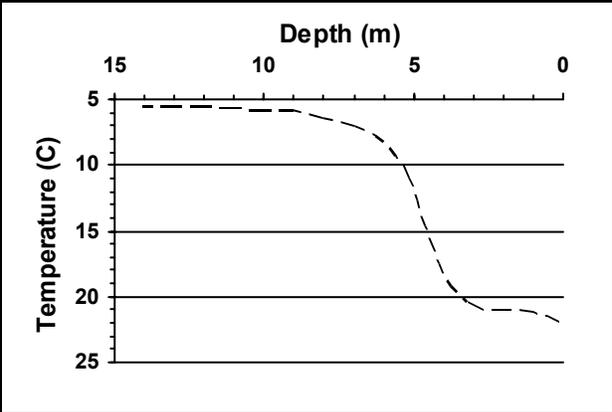
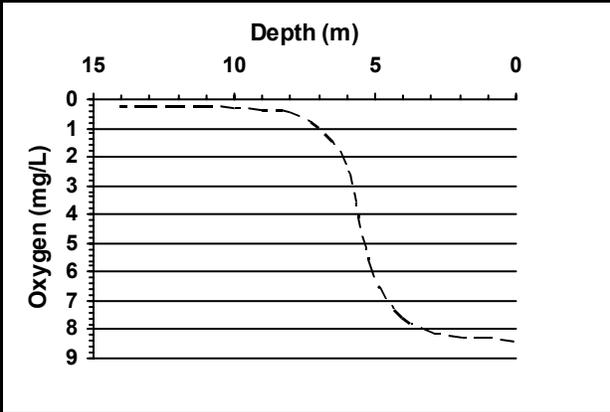
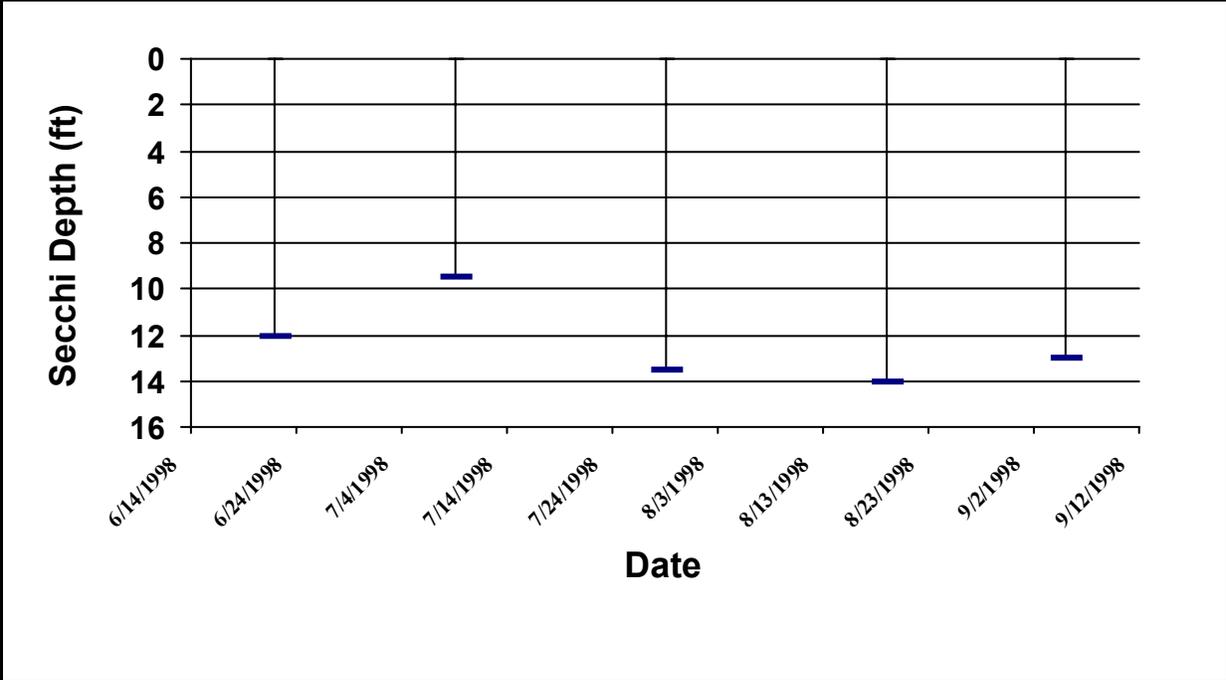
THOMAS

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
8/19/1998						
		0.1	51	8.38	7.4	21.8
		1	51	8.24	7.4	21.1
		1.9	51	8.24	7.4	20.9
		2.9	51	8.14	7.4	20.7
		4	51	7.58	7.2	18.3
		5.1	54	5.95	7.2	11
		6	56	2.28	7.2	8.1
		7	57	.96	7.1	7
		8	58	.39	6.9	6.3
		9	63	.33	6.8	5.8
		10	64	.29	6.8	5.7
		11	65	.24	6.7	5.6
		12	67	.24	6.7	5.5
		13	68	.23	6.7	5.4
		13.9	69	.21	6.7	5.4
		14.1	70	.19	6.6	5.4

Secchi Depth and Profile Graphics

Station: 1

THOST1



Station Information

THOST1

Primary Station Station # 1 latitude: 48 37 20.9 longitude: 117 32 19.9
Description: Deep spot of the lake.

Trophic State Assessment for 1999

THOMAS

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	39
TSI_Phos:		53
TSI_Ch1:		
Narrative TSI:	^b	M

Summary Comments:

The general water clarity of Lake Thomas was very good in 1999. The Secchi depth readings ranged from 4.0 meters (13.0 feet) to 5.0 meters (16.5 feet) with a mean Secchi depth of 4.4 meters (14.6 feet). For comparison, in 1998 the mean Secchi depth was 3.9 meters (12.7 feet).

No geese and only a few other waterfowl were seen on the lake by the volunteer monitor during his sampling visits made between June and October.

The chemistry data collected for Lake Thomas showed moderate to high levels of phosphorus in the epilimnion. This level of phosphorus indicates a higher degree of productivity where algae growth can become a problem.

Ecology staff made two site visits in 1999. During both site visits (6/22/1999 and 9/14/1999) thermal stratification of the lake was noted and low dissolved oxygen levels were observed in the hypolimnion.

Based on the Secchi depth data and the phosphorus levels, Lake Thomas is classified as mesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

THOMAS

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 1										
6/22/1999	1400	E	22.6							
9/14/1999	1200	E	37.7							

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

THOMAS

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/11/1999		62	14	2	25	2	3	5	5	0		2	
	Sampler:	HAWK			Remarks:	Used a view tube.							
6/22/1999		66	13	2	75	3	3	5	5			4	0
	Sampler:	HAWK			Remarks:	Used a view tube. See comments from Lake Gillette on same day.							
7/30/1999		73	13.33	2	75	2	1	5	5	0	0	1	
	Sampler:	STRAUSS			Remarks:	Used a view tube. Second (spot) application of SONAR last week.							
8/13/1999		73	14.08	2	25	2	1	5	5	0	0	0	0
	Sampler:	STRAUSS			Remarks:	Used a view tube.							
8/28/1999		74	15	2	0	2	1	5	5	0	6	0	
	Sampler:	STRAUSS			Remarks:	Used a view tube.							
9/10/1999		64	15.75	2	25	3	1	5	5	0	0	3	0
	Sampler:	STRAUSS			Remarks:	Used a view tube. This is our last 1999 report - leaving for Arizona in a week.							
9/14/1999			16.5										
	Sampler:	STRAUSS			Remarks:	No algae blooms or unusual odors. Sampling day was sunny and calm.							

Profile Report

THOMAS

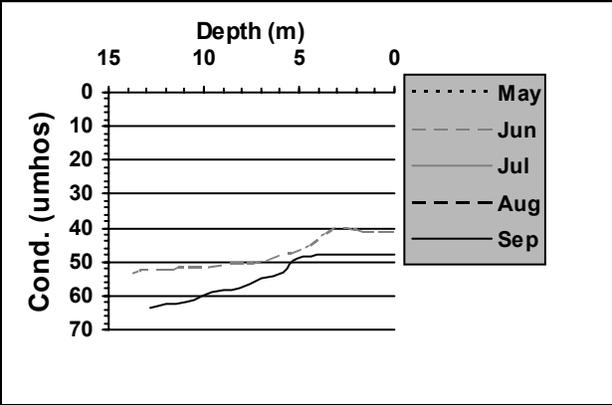
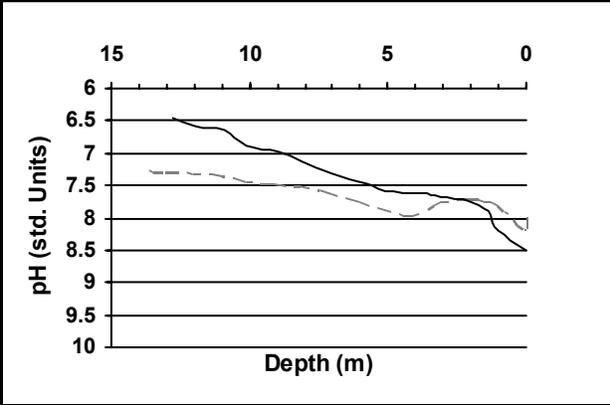
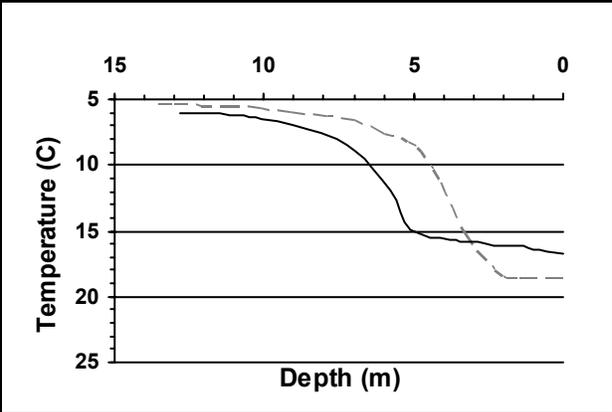
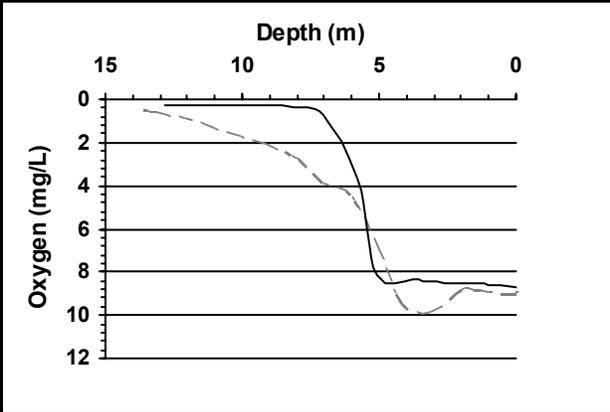
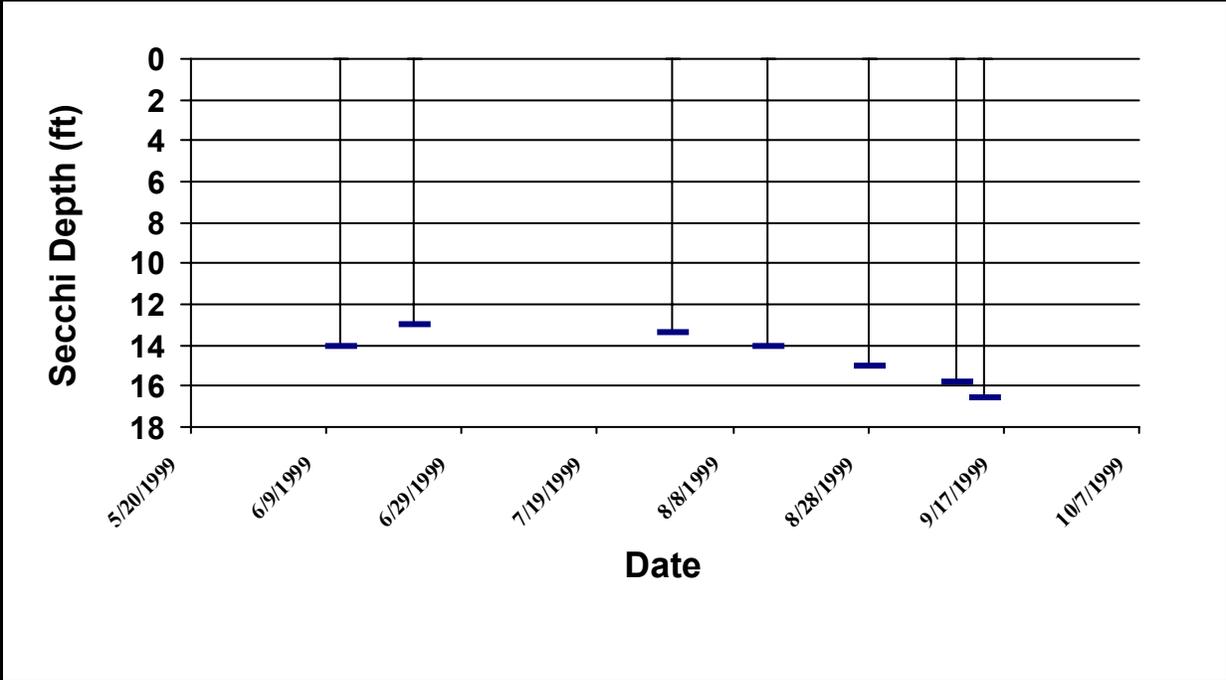
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/22/1999						
		0	40.6	8.92	7.99	18.57
		0.1	40.7	9.02	8.16	18.57
		1	40.6	8.9	7.8	18.59
		1.5	40.6	8.82	7.75	18.52
		2	40.5	8.81	7.72	18.44
		3.1	39.7	9.76	7.74	15.57
		4.1	43.2	9.41	7.94	11.05
		4.9	46.3	7.06	7.9	8.51
		6	47.8	4.42	7.73	7.49
		7	49.4	3.83	7.61	6.56
		7.9	50.2	2.79	7.54	6.13
		9.1	50.8	2	7.47	5.85
		10.1	51.3	1.68	7.45	5.64
		11	51.6	1.32	7.35	5.47
		11.8	52	.94	7.32	5.42
		13.1	52.1	.55	7.29	5.35
		13.8	52.8	.42	7.26	5.34

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
9/14/1999						
		0	48	8.66	8.5	16.77
		1	48.1	8.59	8.19	16.46
		1.3	47.8	8.56	7.94	16.19
		1.5	47.8	8.54	7.86	16.16
		2.1	47.8	8.52	7.75	16.07
		3.1	47.8	8.43	7.68	15.88
		3.8	47.9	8.33	7.63	15.65
		5.1	48.8	8.16	7.59	14.86
		5.8	53.3	3.64	7.47	11.96
		7	55	.69	7.31	8.89
		8.1	57.5	.4	7.12	7.49
		9	58.6	.32	6.97	6.94
		10.1	60.3	.29	6.88	6.44
		10.9	61.8	.25	6.63	6.18
		12	62.6	.24	6.57	6.11
		12.8	63.7	.23	6.46	6

Secchi Depth and Profile Graphics

Station: 1

THOST1



TIGER

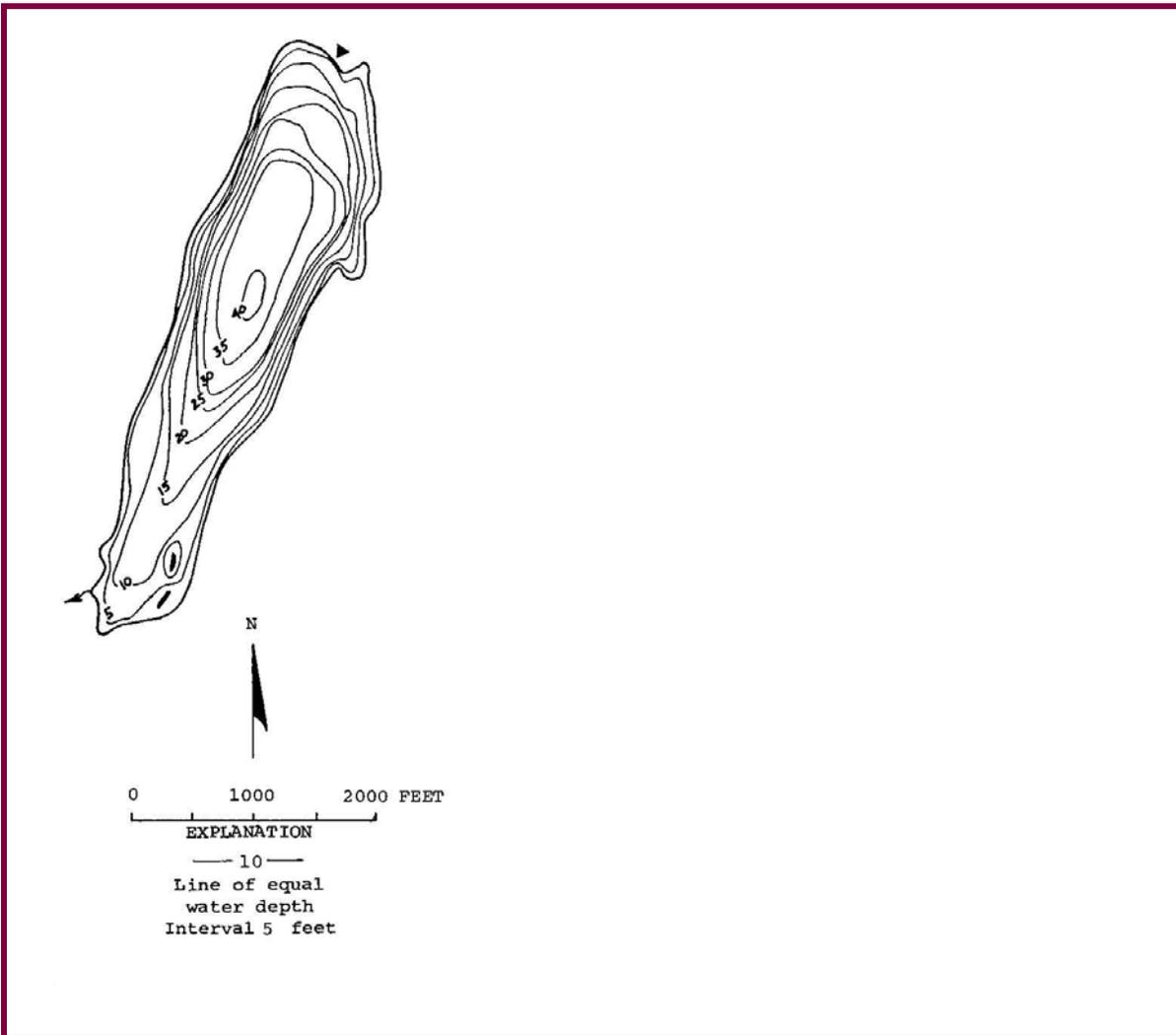
KITSAP/MASON County

Lake ID: TIGK11

Ecoregion: 2

Tiger Lake is located 9.5 miles southwest of Bremerton. Most of the lake (102.8 acres) is in Mason County, and the northern tip of the lake (6.3 acres) is in Kitsap County. Tiger Lake has no surface inlets, and drains via Mission Creek to Hood Canal.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
110	40	19	1	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
2100	2.46	496	47 30 31.	122 50 08.



Trophic State Assessment for 1998

TIGER

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 37	J
TSI_Phos:		
TSI_Ch1:		
Narrative TSI:	^b	OM

Summary Comments:

The general water clarity for Tiger Lake was good to excellent in 1998. The Secchi depth readings ranged from 4.3 meters (15.5 feet) to 5.8 meters (19.0 feet) with a mean Secchi depth of 5.0 meters (16.6 feet). For comparison, in 1997 the mean Secchi depth was 5.1 meters (16.8 feet).

No chemistry data was collected for Tiger Lake in 1998.

Only one site visit was made by Ecology staff in 1998. A slight degree of thermal stratification was observed near the bottom of the water column during this visit (9/22/1998). Corresponding low dissolved oxygen levels were also noted in the bottom meter of the water column.

No geese were observed by the volunteer monitor however he counted other waterfowl during 5 out of 9 sampling visits.

The volunteer monitor noted complaints from fishermen of weeds at the south end of the lake. An aquatic plant survey was done by Ecology staff in 1996. Patches of the non-native *Nymphaea odorata* (fragrant waterlily) were observed at the south end of the lake. In addition, the volunteer monitor observed logging activity on the west side of Tiger Lake.

Based on Secchi depth data and the occurrence of low dissolved oxygen levels, Tiger Lake is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

TIGER

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/12/1998		21.1	18	2	0	3	3	4	4	0	0	3	0
	Sampler:	OLSON		Remarks:	LAND DEVELOPMENT - LOGGING WEST SIDE OF LAKE.								
6/28/1998		20	19	2	0	1	3	5	5	0	4	5	1
	Sampler:	OLSON		Remarks:	FISHERMEN COMPLAINED OF WEEDS.								
7/13/1998		22.2	17	2	75	2	1	4	4	0	7	0	0
	Sampler:	OLSON		Remarks:									
7/27/1998		26.7	15.5	2	0	1	1	5	5	0	4	0	2
	Sampler:	OLSON		Remarks:									
8/8/1998		25.6	17	2	0	1	1	5	5	0	0	0	1
	Sampler:	OLSON		Remarks:									
8/24/1998		23.3	14	2	75	2	1	4	4	0	2	1	0
	Sampler:	OLSON		Remarks:	FISHERMEN COMPLAIN OF WEEDS ON SOUTH END OF LAKE.								
9/9/1998		24.4	15.5	2	75	2	1	4	4	0	0	0	0
	Sampler:	OLSON		Remarks:									
9/22/1998		22.2	16	2	0	1	1	4	4	0	0	0	0
	Sampler:	OLSON		Remarks:									
9/22/1998			16		0					0	0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									
10/21/1998		15.6	15	5	0	1	1	3	2	0	1	1	0
	Sampler:	OLSON		Remarks:	WATER SEEMS MURKY.								

Profile Report

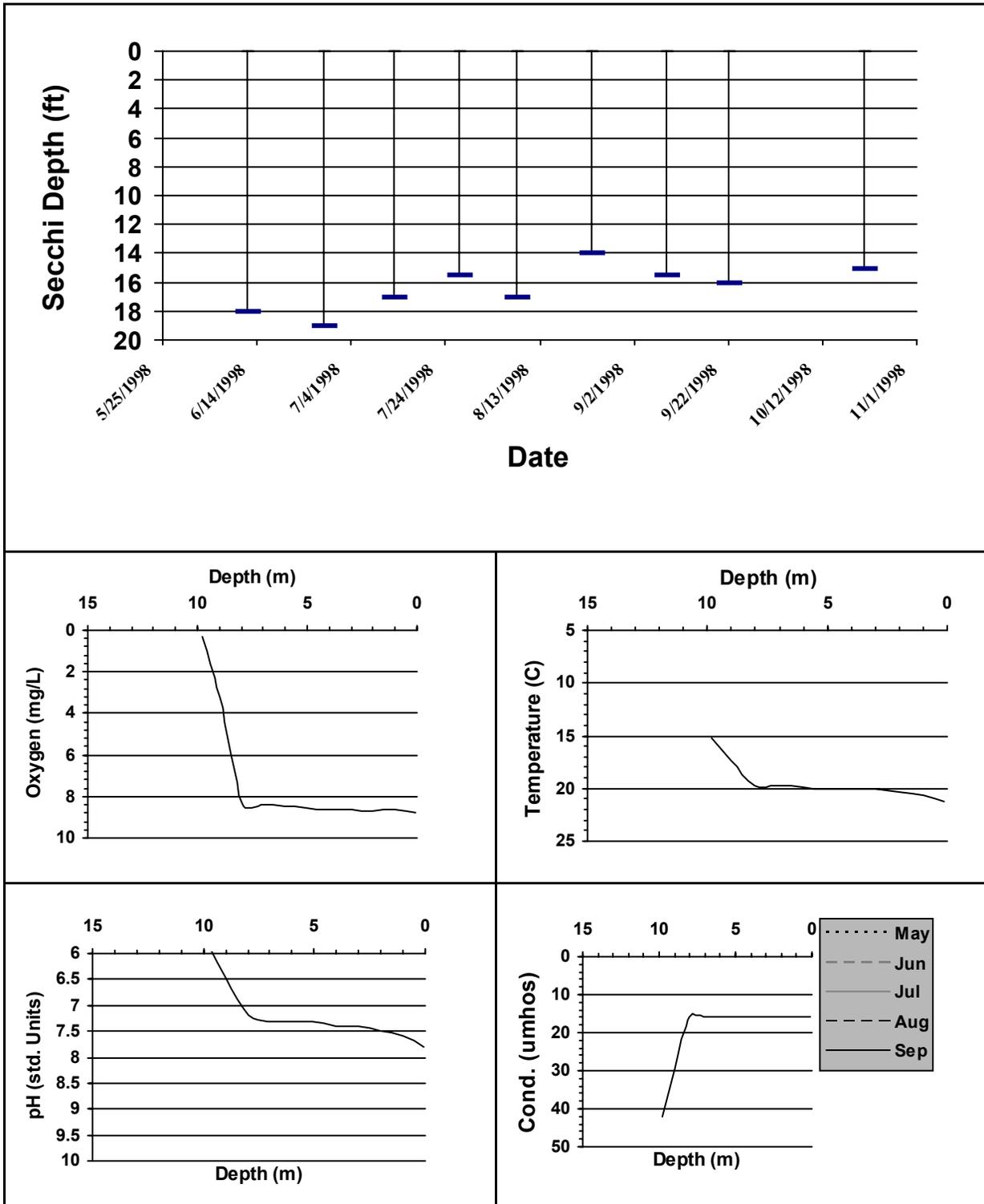
TIGER

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
9/22/1998						
		0.1	16	8.75	7.8	21.3
		1	16	8.65	7.6	20.7
		2	16	8.67	7.5	20.3
		3	16	8.63	7.4	20.1
		4	16	8.6	7.4	20
		5.1	16	8.56	7.3	20
		6	16	8.51	7.3	19.9
		7.1	16	8.41	7.3	19.8
		8	16	8.3	7.2	19.7
		9	29	3.17	6.5	17.3
		9.8	42	.31	5.8	15.3

Secchi Depth and Profile Graphics

Station: 1

TIGKI1



Trophic State Assessment for 1999

TIGER

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 36	J
TSI_Phos:	35	
TSI_Ch1:		
Narrative TSI:	^b OM	

Summary Comments:

The general water clarity of Tiger Lake was excellent in 1999. The Secchi depth readings ranged from 4.3 meters (14.0 feet) to 6.7 meters (22.0 feet) with a mean Secchi depth of 5.2 meters (17.2 feet). For comparison, in 1998 the mean Secchi depth was 5.0 meters (16.6 feet).

No geese and only a few other waterfowl were seen on the lake by the volunteer monitor during his sampling visits made between May and October.

The chemistry data collected for Tiger Lake showed very low levels of phosphorus in the epilimnion. This level of phosphorus indicates a low degree of productivity where algae growth usually does not become a problem.

Ecology staff made two site visits in 1999. During both site visits (5/18/1999 and 8/18/1999) thermal stratification of the lake was noted and low dissolved oxygen levels were observed in the hypolimnion.

An aquatic plant survey was done by Ecology staff on 6/14/1999. Two non-native plants were observed: *Iris pseudacorus* (yellow flag) was seen in a few patches along the shoreline and *Nymphaea odorata* (fragrant waterlily) grew in several patches at the south end of the lake.

Based on the Secchi depth data and the phosphorus levels, Tiger Lake should be classified as oligotrophic. However because of the low dissolved oxygen levels in the hypolimnion, Tiger Lake is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

TIGER

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 1										
5/18/1999		E	8.8							
8/18/1999	1330	E	8.59							

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

TIGER

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/18/1999		60	22	6	0	3	3	4	4	0	2		
	Sampler:	OLSON		Remarks: Used a view tube.									
6/11/1999		66	18	2	0	2	3	5	4	0	1	1	
	Sampler:	OLSON		Remarks: Used a view tube.									
7/6/1999		70	18	2	0	2	2	5	5	0	0	2	1
	Sampler:	OLSON		Remarks: Used a view tube.									
7/26/1999		72	16	2	0	2	2	4	4		2	1	
	Sampler:	OLSON		Remarks: Used a view tube.									
8/18/1999		74	15	2	0	1	2	4	4		4	2	
	Sampler:	OLSON		Remarks: Water seemed very clear - no algae noted. No odors noticed. No plants noted. Sampling day was 100% sunny and slightly breezy.									
9/3/1999		71	17	2	0	1	1	4	4		3	2	1
	Sampler:	OLSON		Remarks: Used a view tube.									
9/18/1999		69	17	2	0	1	1	4	4			2	
	Sampler:	OLSON		Remarks: Used a view tube.									
10/1/1999		66	14	2	0	1	1	4	4				
	Sampler:	OLSON		Remarks: Used a view tube.									

Profile Report

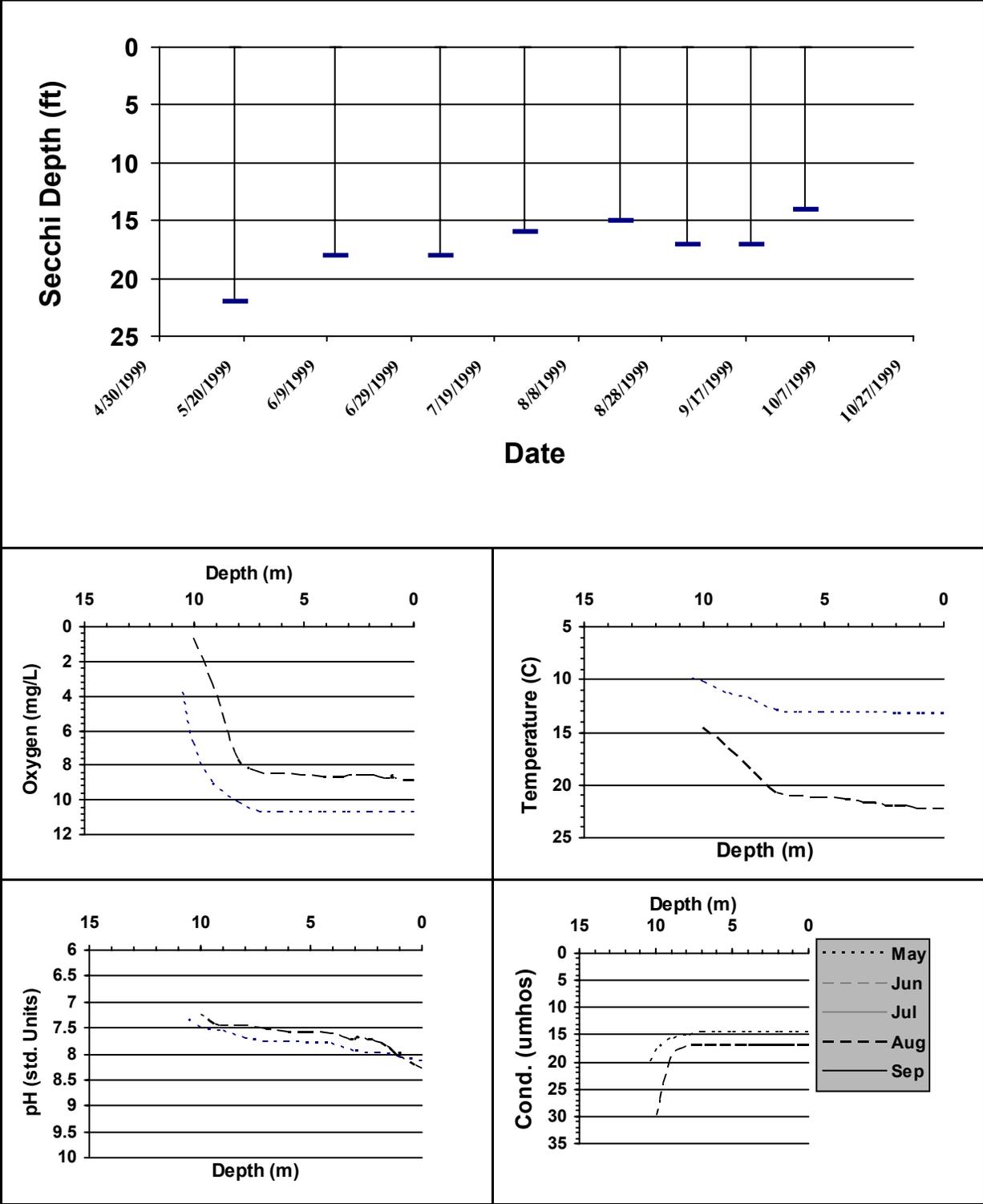
TIGER

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
5/18/1999						
		0	14.4	10.65	8.12	13.13
		1	14.4	10.66	8.04	13.14
		2	14.3	10.64	7.96	13.06
		3.1	14.3	10.66	7.91	12.97
		4.2	14.3	10.66	7.78	12.92
		5.1	14.3	10.64	7.77	12.9
		6.1	14.3	10.62	7.73	12.9
		7	14.3	10.61	7.73	12.86
		8	14.8	10.1	7.67	11.84
		9.1	15.5	9.02	7.54	11.14
		10	17.5	6.73	7.46	10.05
		10.5	20.6	3.58	7.31	9.88
8/18/1999						
		0	16.7	8.76	8.26	22.21
		0.9	16.6	8.68	8.06	22.1
		1	16.6	8.56	7.95	22.1
		1.1	16.6	8.69	8.03	22.1
		1.6	16.6	8.59	7.84	21.82
		2.1	16.6	8.54	7.73	21.79
		2.8	16.5	8.56	7.68	21.65
		2.9	16.5	8.54	7.64	21.55
		3.2	16.5	8.59	7.7	21.52
		4.1	16.5	8.57	7.59	21.21
		5.1	16.5	8.51	7.57	21.1
		6	16.6	8.43	7.57	21
		7	16.5	8.31	7.5	20.64
		8	16.8	7.59	7.43	18.37
		9.1	18.9	3.29	7.42	16.18
		10	29.8	.62	7.23	14.49

Secchi Depth and Profile Graphics

Station: 1

TIGKI1



TRAILS END (PRICKETT)

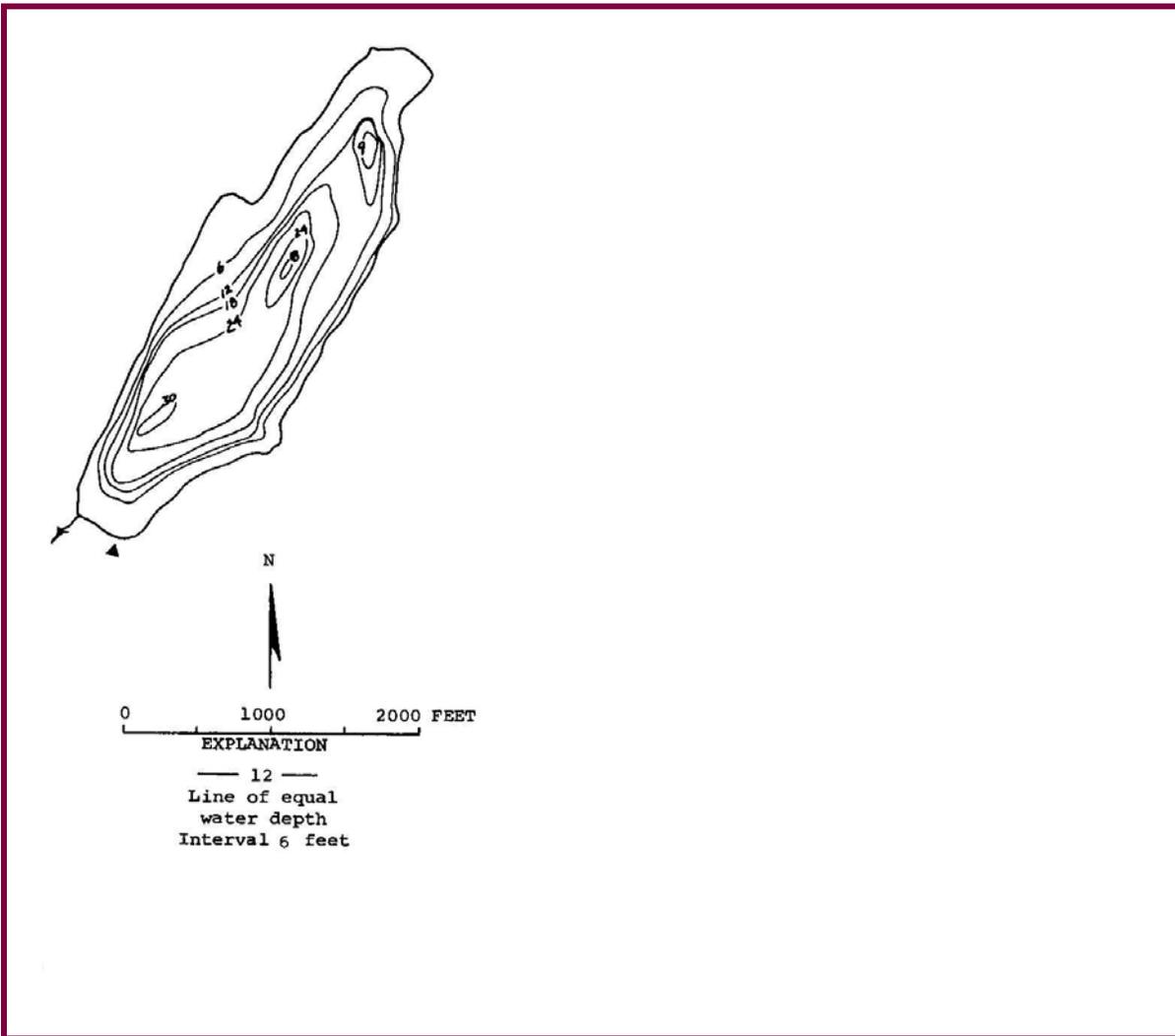
MASON County

Lake ID: TRAMA1

Ecoregion: 2

Trails End Lake is located 5.5 miles southwest of Belfair. It has no surface inlets, and drains via Sherwood Creek to North Bay. Trails End Lake is also referred to as Prickett Lake.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
74	30	13		
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
993	1.68	301	47 22 35.	122 53 29.



Station Information

TRAMA1

Primary Station	Station # 1	latitude: 47 22 54.3	longitude: 122 53 24.4
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

TRAILS END (PRICKETT)

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 39	J
TSI_Phos:		
TSI_Ch1:		
Narrative TSI:	^b	OM

Summary Comments:

The general water clarity for Trails End Lake was good for 1998. The Secchi depth readings ranged from 2.4 meters (8.0 feet) to 6.1 meters (20.0 feet) with a mean Secchi depth of 4.3 meters (14.2 feet).

No chemistry data was collected for Trails End Lake in 1998.

Only one site visit was made by Ecology staff in 1998. During this visit (10/13/1998) there was no thermal stratification noted and the dissolved oxygen levels remained high throughout the entire water column.

A few geese were observed on two sampling visits made by the volunteer monitor. However, other waterfowl were counted on half of the sampling visits made by the volunteer monitor between May and October.

Other observations by the volunteer monitor included low water levels in May which continued to drop throughout the summer reaching their lowest levels (a total drop of over 30 inches) at the end of September.

An aquatic plant survey was done by Ecology staff in 1998. The non-native plants *Lythrum salicaria* (purple loosestrife), *Nymphaea odorata* (fragrant waterlily) and *Utricularia inflata* (big floating bladderwort) were observed during this survey. The *Utricularia inflata* was the most prevalent of the non-natives forming dense mats in some of the sheltered areas of the lake. The volunteer monitor noted the *Nymphaea odorata* was sprayed on 6/17/1998.

Based on Secchi depth data, Trails End Lake is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

TRAILS END (PRICKETT)

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
4/28/1998		16.1	18		0	1	1						
	Sampler:	SMITH		Remarks:									
5/24/1998		16.7	17	2	75	1		4	4	0	1	5	0
	Sampler:	SMITH		Remarks:	BLADDERWORT SPREADING. LAKE LEVEL LOW.								
6/6/1998		20	20	2	0	2	2	4	4	4	21	3	0
	Sampler:	SMITH		Remarks:	LOW WATER - LOTS OF LILIES.								
6/21/1998		18.3	15.5	6	0	2	1	4	4	4		2	
	Sampler:	SMITH		Remarks:	LILIES SPRAYED ON 6/17/98. BLADDERWORT EVERYWHERE.								
7/5/1998		17.8	14.5	3	50	1	3	5	5	0	1	1	0
	Sampler:	SMITH		Remarks:	LOTS OF LILIES.								
7/19/1998		22.2	13.25	2		2	1	4	4	0	0	3	0
	Sampler:	DUNGAN		Remarks:									
8/3/1998		27.8	8	2	0	2	1	4	4	0	2	0	1
	Sampler:	SMITH		Remarks:	CLARITY OFF BY SIX FEET!								
8/17/1998		24.4	8.5	3	25	1	1	4	4	0	3	0	0
	Sampler:	SMITH		Remarks:	LAKE LEVEL NEAR LOWEST ON RECORD.								

Date	Time	Temperature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Brightness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5-good)	Swimming (1-poor, 5-good)	Geese (#)	Waterfowl (besides geese #)	Boats-Fishing (#)	Boats-Skiing (#)
8/29/1998		22.2	12.5	2	0	1	1	4	4	0	0	0	0
	Sampler:	SMITH		Remarks:	LOW WATER - LOTS OF MUD.								
9/12/1998		21.7	13	3	0	1	1			0	0	2	0
	Sampler:	WILKINS		Remarks:	LAKE DOWN - MUD SHORES.								
9/26/1998		20.6	17.5	2	0	1	3	5	4	0	0	1	0
	Sampler:	SMITH		Remarks:	LOW LOW WATER!								
10/13/1998		15	16	3	100	2	4	4	4	0	0	0	0
	Sampler:	SMITH		Remarks:									
10/13/1998			16		0					0	0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									

Profile Report

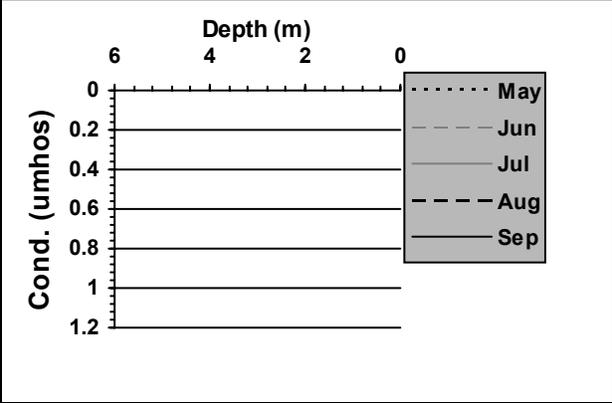
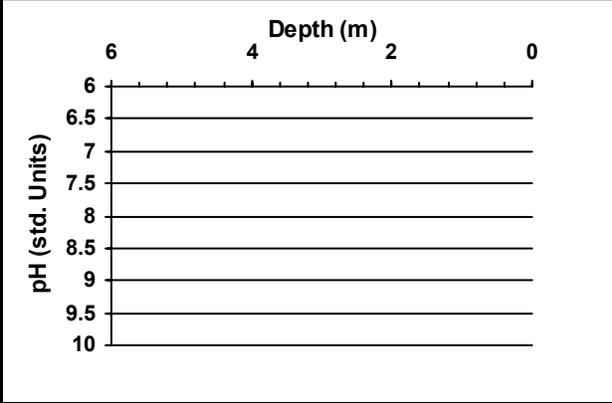
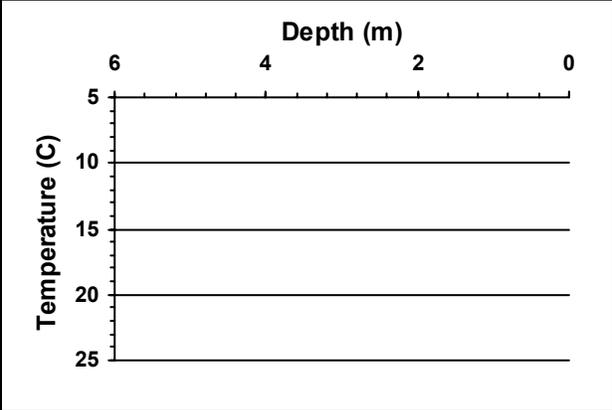
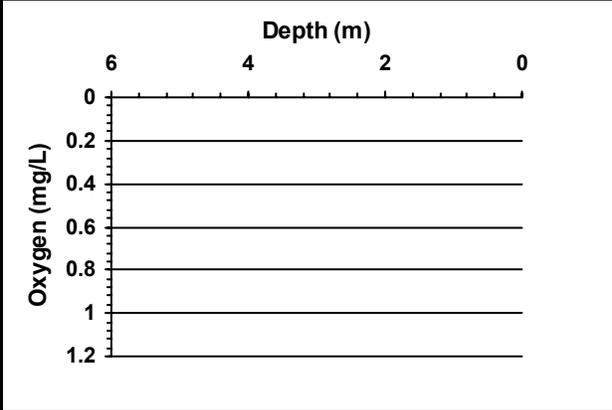
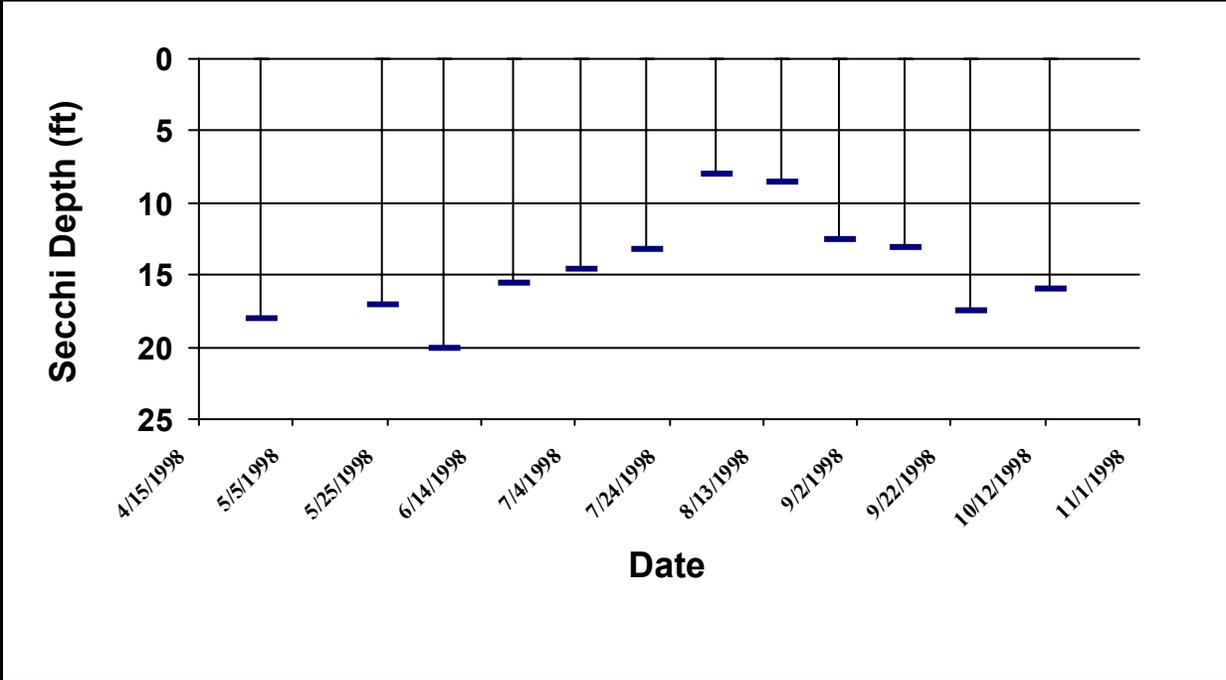
TRAILS END (PRICKETT)

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
10/13/1998						
		0.1	17	9.55	8.2	14.5
		1.1	17	9.15	7.9	14.5
		2	17	8.92	7.7	14.5
		2.2	17	10.03	6.6	14.5
		3	17	9.2	7.6	14.5
		4	17	9.1	7.5	14.5
		5.2	17	9.11	7.4	14.4
		5.3	19	8.38	7.1	14.4
		5.4	17	8.04	6.6	14.5

Secchi Depth and Profile Graphics

Station: 1

TRAMA1



Station Information

TRAMA1

Primary Station	Station # 1	latitude: 47 22 54.3	longitude: 122 53 24.4
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

TRAILS END (PRICKETT)

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	36
TSI_Phos:		38
TSI_Ch1:		
Narrative TSI:	^b	O

Summary Comments:

The general water clarity of Trails End Lake was excellent in 1999. The Secchi depth readings ranged from 4.0 meters (13.0 feet) to 6.0 meters (19.5 feet) with a mean Secchi depth of 5.4 meters (17.7 feet). For comparison, in 1998 the mean Secchi depth was 4.3 meters (14.2 feet).

A few geese and/or other waterfowl were seen on the lake by the volunteer monitor during his sampling visits made between May and October.

The chemistry data collected for Trails End Lake showed low levels of phosphorus in the epilimnion. This level of phosphorus indicates a low degree of productivity where algae growth usually does not become a problem.

Ecology staff made one site visit in 1999. During this site visit (8/3/1999) thermal stratification of the lake was not observed and dissolved oxygen levels were consistently high throughout the water column.

Based on the Secchi depth data and the phosphorus levels, Trails End Lake is classified as oligotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

TRAILS END (PRICKETT)

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
------	------	--------	-----------------	-----------------	-------	----------------------------	-------------------------------------	--------------------	-------------------	--------------------

Station 1

8/3/1999	1200	E	10.4							
----------	------	---	------	--	--	--	--	--	--	--

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

TRAILS END (PRICKETT)

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/19/1999		58	13	4	75	3	2	3	3	0	2	1	0
	Sampler:	WILKINS		Remarks: Did not use a view tube. Green slime on shore rocks.									
5/27/1999		68	16	6	25	3	2	3	3	0	7	0	0
	Sampler:	WILKINS		Remarks: Did not use a view tube. HydroLab reading and phosphorus samples were not taken - boat was too fragile.									
6/11/1999		64	18.33	6	25	3	1	3	3	0	3	0	0
	Sampler:	WILKINS		Remarks: Did not use a view tube.									
6/26/1999		66	19			3	3	4	4	0	0	0	0
	Sampler:	WILKINS		Remarks: Did not use a view tube.									
7/9/1999		71	17.5	6	0	2	1	4	4	0	8	0	0
	Sampler:	WILKINS		Remarks: Did not use a view tube.									
7/27/1999		74	17.33	6	0	2	1	4	4	0	2	0	0
	Sampler:	WILKINS		Remarks: Did not use a view tube.									
8/3/1999		75	18.5	6	0		1	4	4	0	0	0	0
	Sampler:	WILKINS		Remarks: Did not use a view tube. Observed coontail near volunteer's dock. Lake level was dropping about one inch per week. Sampling day was sunny and calm.									
8/22/1999		72	19.5	6	25		1	5	5	0	0	0	0
	Sampler:	WILKINS		Remarks: Did not use a view tube.									
9/3/1999		70	19	6	0	2	1	5	5	12	0	1	0
	Sampler:	WILKINS		Remarks: Did not use a view tube.									
9/15/1999		67	17.5	6	25	2	1	5	5	0	1	0	0
	Sampler:	WILKINS		Remarks: Did not use a view tube.									
9/28/1999		64	18	6	0	2	1	5	5	10	0	1	0
	Sampler:	WILKINS		Remarks: Did not use a view tube.									

Profile Report

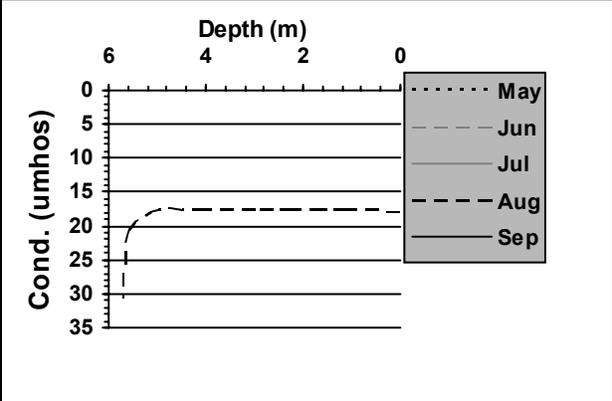
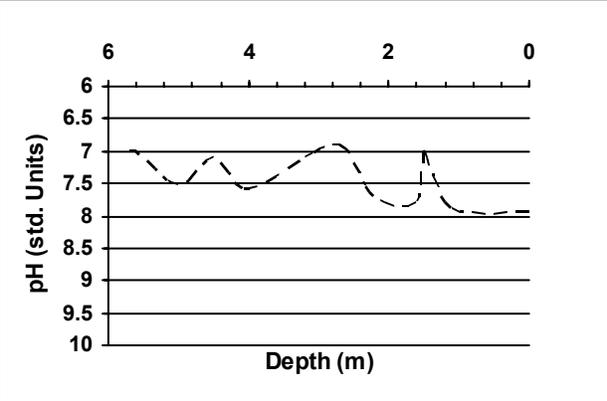
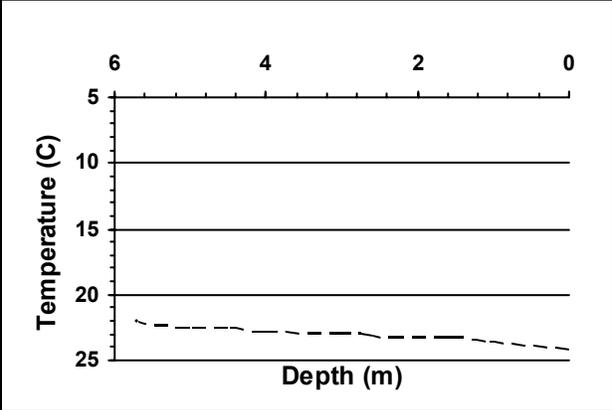
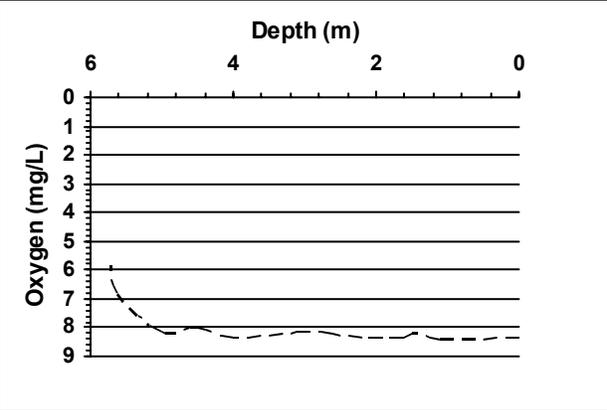
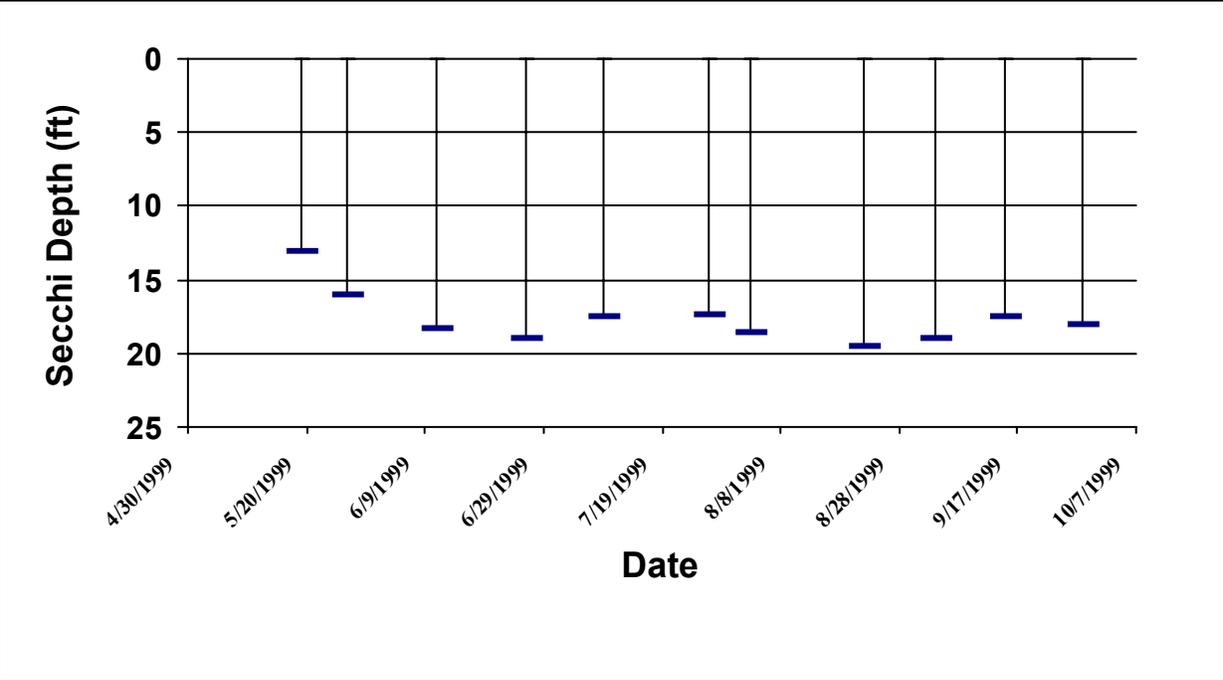
TRAILS END (PRICKETT)

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
8/3/1999						
		0	17.7	8.31	7.92	24.11
		1.1	17.6	8.37	7.86	23.5
		1.5	17.6	8.19	6.97	23.25
		1.6	17.6	8.33	7.77	23.26
		2.2	17.6	8.34	7.67	23.14
		2.6	17.6	8.2	6.96	22.98
		3	17.6	8.09	6.95	22.86
		4	17.6	8.28	7.57	22.74
		4.5	17.6	7.99	7.08	22.51
		5	17.6	8.13	7.5	22.46
		5.6	20.3	6.81	6.99	22.2
		5.7	30.6	5.85	6.97	21.82

Secchi Depth and Profile Graphics

Station: 1

TRAMA1



WARD

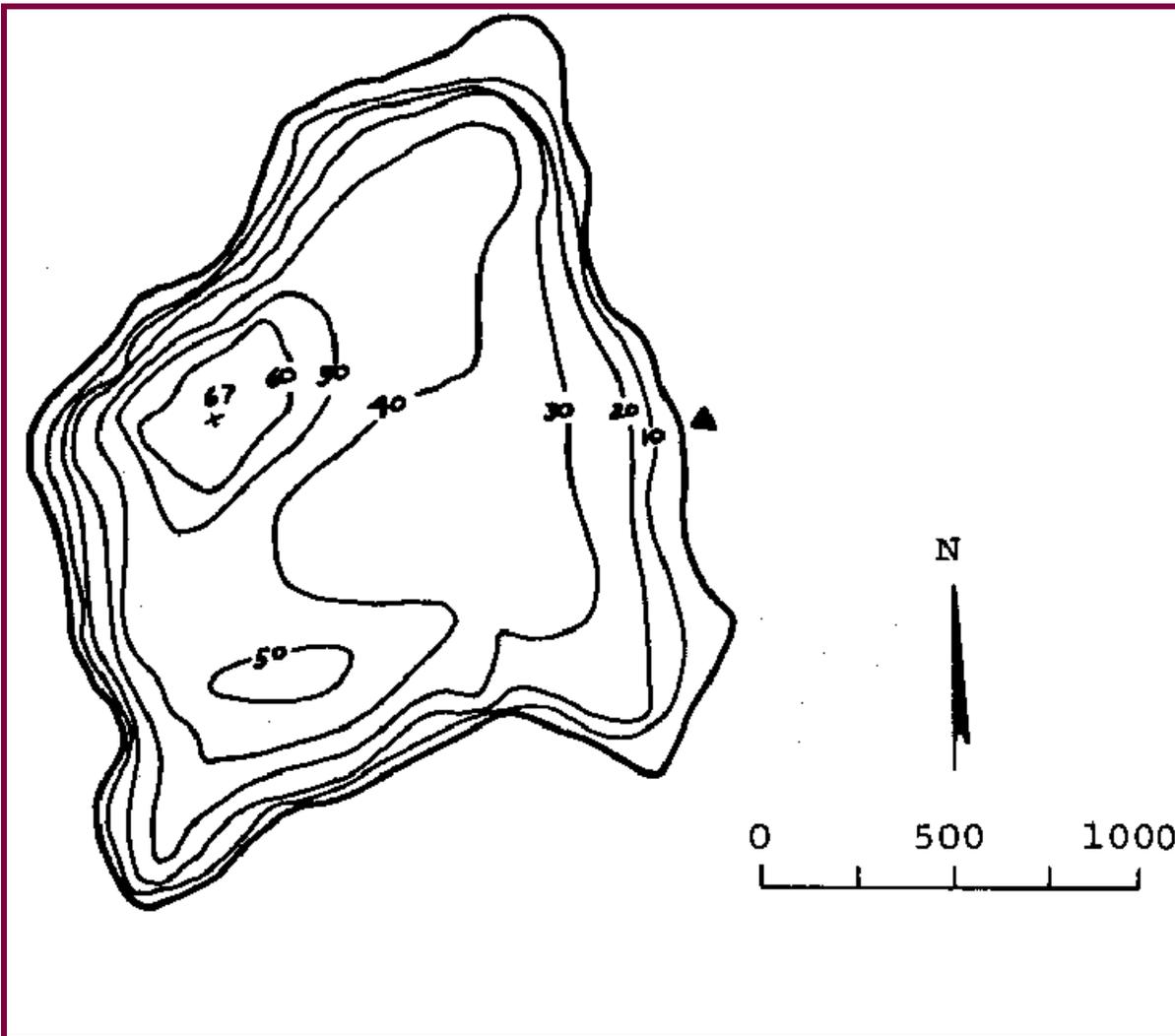
THURSTON County

Lake ID: WARTH1

Ecoregion: 2

Ward Lake is located 2.5 miles south of Olympia, in a kettle depression. It is spring-fed, and has no surface outlets. It is within the Deschutes River watershed.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
65	67	33	1	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
2100	1.36	123	47 00 21.	122 52 36.



Station Information

WARTH1

Primary Station Station # 1 latitude: 47 00 26.3 longitude: 122 52 44.2
Description: Deep part of lake directly west of boat launch about 500 feet east of west shore

Trophic State Assessment for 1998

WARD

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a	40
TSI_Phos:	34
TSI_Ch1:	37
Narrative TSI: ^b	OM

Summary Comments:

The general water clarity for Ward Lake was very good in 1998. The Secchi depth readings ranged from 2.4 meters (8.0 feet) to 5.3 meters (17.5 feet) with a mean Secchi depth of 3.8 meters (12.6 feet). For comparison, in 1997 the mean Secchi depth was 4.5 meters (14.9 feet).

The chemistry data collected for Ward Lake showed low phosphorus levels (7.4 ug/L to 10.9 ug/L) and chlorophyll levels (1.5 ug/L to 2.6 ug/L). Both of these numbers indicate a low level of productivity for the lake.

Ecology staff made five site visits in 1998. Low dissolved oxygen levels in the hypolimnion and thermal stratification was observed during all five site visits. The volunteer monitor counted geese and/or other waterfowl on the lake during six of his nine sampling visits between June and October.

Ecology staff conducted an aquatic plant survey on 7/6/1998. Sparse plant cover was observed with the non-native *Nymphahaea odorata* (fragrant waterlily) present along most of the lake shoreline out to approximately three meters deep.

Based on the Secchi depth data and the low dissolved oxygen levels in the hypolimnion, Ward Lake is classified as oligomesotrophic.

The following is an assessment written by Ecology staff, Kirk Smith, to determine the phosphorus criterion for Ward Lake:

About 60% of Ward Lake's shoreline is densely residential, the rest is undeveloped. The watershed is very small. The lake shows many characteristics of an oligotrophic lake (mean total phosphorus was 8.8 ug/L) but its late summer anoxic hypolimnion, significant internal loading, and noticeable algal blooms are more indicative of a mesotrophic lake. We have assigned an oligomesotrophic assessment. There were only two user surveys returned for Ward Lake and we cannot draw conclusions based on so few questionnaires. However, Ward Lake has been included in Ecology's Lake

Water Quality Assessment program for many years and its uses have remained fairly constant during that time. The lake is primarily used by residents for swimming. The boat launch is frequented by fishermen who fish the lake primarily for kokanee and trout. The lake supports a very popular and healthy kokanee fishery. The habitat survey suggests there is abundant aquatic vegetation growth in the shallow portions of the lake near the shore. The survey also indicates that human influences on the shoreline include lawns and buildings. The substrate is mostly silt. The lake may be subjected to watershed impacts from runoff of lawn fertilizers and a nearby plant nursery. Algal blooms in 1998 produced a very green lake at times which is unusual for Ward Lake, though chlorophyll concentrations were still low to moderate. However, with the exception of a high fecal bacteria count in June, it appears that all the beneficial uses of the lake are still supported by the present water quality conditions.

Therefore, we recommend the nutrient criterion for Ward Lake be set at the ecoregional action value for oligotrophic Puget Lowland lakes, 10 ug/L total phosphorus.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

WARD

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 0										
6/1/1998		L					7			
		L					240 J			
7/23/1998		L					6			
		L					3			
8/10/1998		L					11			
9/24/1998		L					4			
Station 1										
6/1/1998		E	10.9	.156	14	2		5	1290	.6
		H	56.2	.366	7					
7/23/1998		E	9.1	.246	27	1.9				1.3
		H	116	.393	3					
8/10/1998		E	7.8	.222	28	1.5				.6
		H	294	.726	2					
9/24/1998		E	7.4	.237	32	2.6				.6
		H	377	.972	3					

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

WARD

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/1/1998			17	6	100	2		5	5		2	2	0
	Sampler:	SMITH			Remarks:	ZOO TOW DOWN TO 10 METERS AT DEEP SITE. HIGHLY RESIDENTIAL APPROX 40% SHORELINE NATURAL. SMALL WATERSHED							
6/1/1998		17.5	17.5	3	75	2	1	5	5	10	6	4	0
	Sampler:	CLOUD			Remarks:								
6/1/1998			17.5		0						0	0	0
	Sampler:	BELL-MCKINNON			Remarks:								
6/16/1998		21	12	3	0	2	2	5	4	0	0	1	0
	Sampler:	CLOUD			Remarks:	BLOOM STARTING - MUCH CLEARER 4 DAYS AGO.							
6/27/1998		19	8	4	75	1	2	5	4	30	1	1	0
	Sampler:	CLOUD			Remarks:								
7/10/1998		22	9	3	50	1	1						
	Sampler:	CLOUD			Remarks:								
7/23/1998			11.88	2	100			4	4	0	7	2	0
	Sampler:	SMITH			Remarks:	H2S IN THE HYPOLIMNION							
7/26/1998		25	10	7	0	1	1	5	4	0	0	2	0
	Sampler:	CLOUD			Remarks:								
8/10/1998			16.83	2	80			5	5	9	9	0	0
	Sampler:	SMITH			Remarks:	OXYGEN WAS INCREDIBLY LOW IN HYPOLIMNION							
8/10/1998		26	13	8	0	1	1	5	5	0	4	0	0
	Sampler:	CLOUD			Remarks:								

Profile Report

WARD

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/1/1998						
		0.1	16	10.02	7.1	17.5
		1	16	10	7	17.5
		2	16	10.14	7	16.9
		3	16	10.21	7	16.4
		4	16	10.32	7	15.8
		5	16	12.16	7.7	12.6
		6	16	13.05	8.7	10.8
		7	18	13.3	9.6	9
		8	16	9.81	8.8	7.8
		9	17	5.46	7	7.2
		10	17	3.78	6.4	6.9
		12	17	2.2	6.1	6.7
		15	17	1.69	5.7	6.6
		16.5	18	1.02	5.5	6.6
7/23/1998						
		0	16	8.46	7	24
		1	16	8.54	7	24
		2	16	8.54	6.9	24
		3	16	8.59	6.9	23.8
		4	16	9.82	6.9	22.3
		5	21	13.48	9.3	17.7
		6	16	13.06	8.7	12.8
		7	16	10.05	8	10.1
		8	17	5.59	7.1	8.3
		10	18	2.18	6.5	7.3
		15	22	1.07	6.2	6.8
		18.9	35	.22	6.1	6.6

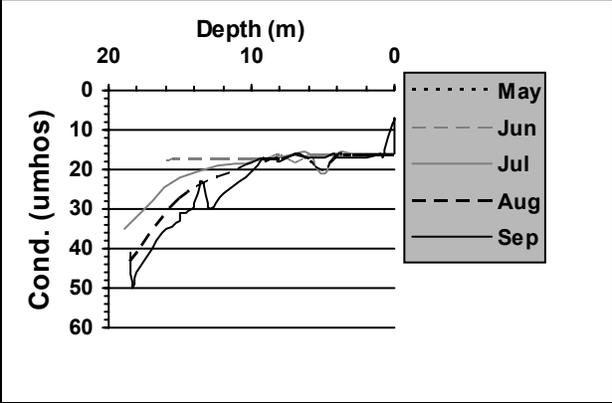
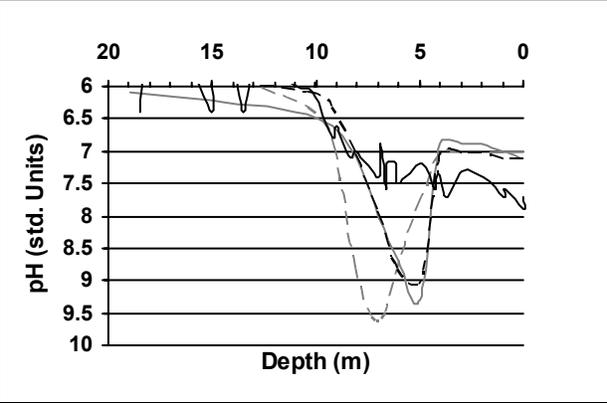
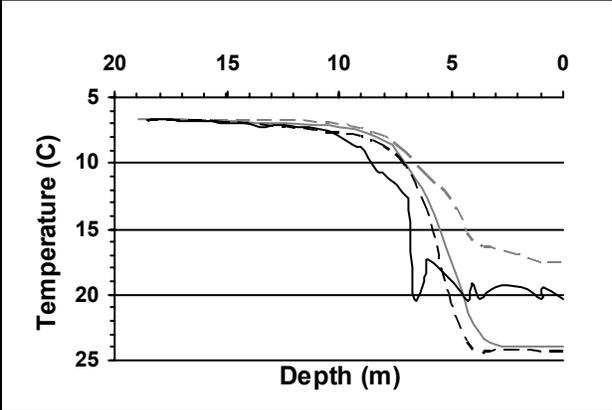
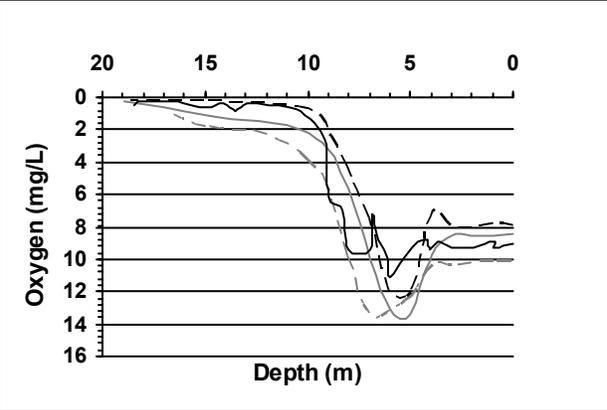
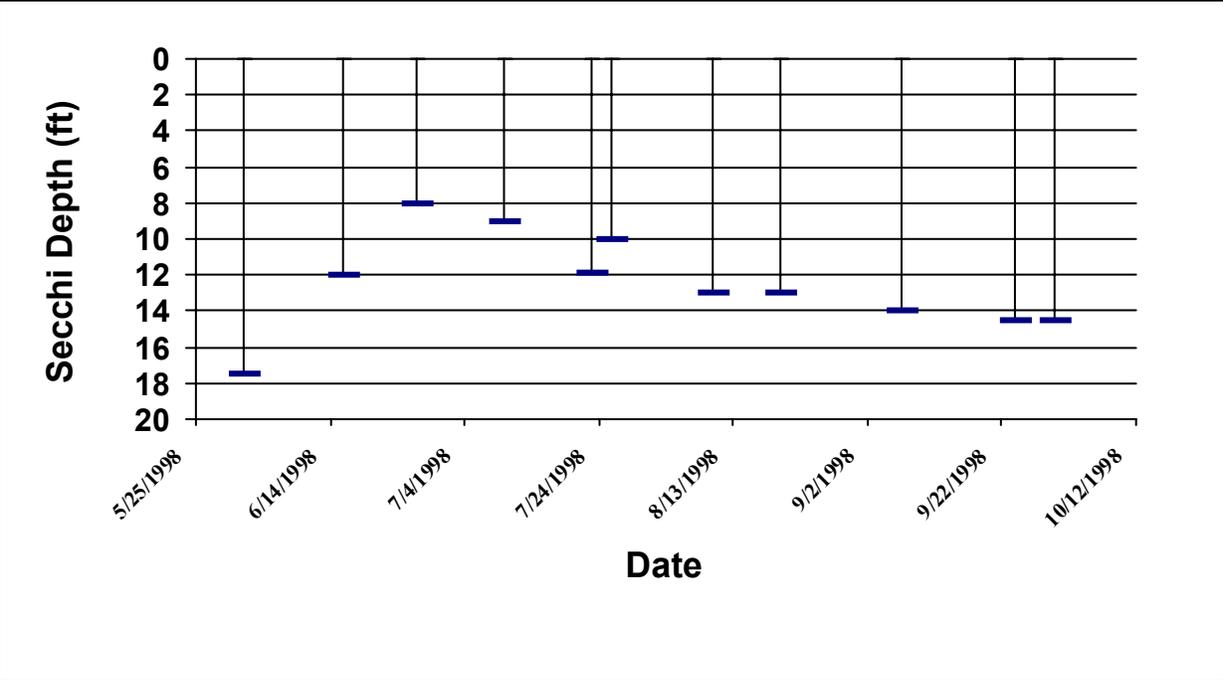
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
8/10/1998						
		0	16	7.87	7.1	24.2
		1	16	7.72	7.1	24.2
		2	16	7.96	7	24.1
		3	16	7.87	7	24.1
		4	16	7.02	7	24.1
		5	20	11.92	9	20.6
		6	17	12.02	8.8	13.6
		7	16	7.48	7.9	10.1
		8	17	4.28	7	8.6
		9	17	1.83	6.4	7.8
		10	18	.61	6.1	7.5
		15.1	27	.13	5.9	6.8
		18.6	43	.09	5.9	6.6
9/24/1998						
		0	16 J	9.09	7.7	20.3
		1	16 J	8.96	7.7	20.3
		3.7	17 J	8.88	7.7	20.3
		4.2	16 J	8.81	7.6	20.3
		4.3	16 J	8.82	7.6	20.3
		6	17 J	11.08	7.5	17.4
		6.6	16 J	8.78	7.6	20.3
		7	16 J	9.45	7.4	12.5
		8.3	17 J	7	7.1	10.5
		9.2	17 J	2.52	6.8	8.8
		13.5	23 J	.89	6.4	7.3
		15	31 J	.59	6.4	6.9
		18.5	41 J	.43	6.4	6.8

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
9/30/1998						
		0	7	9.35	7.9	19.5
		0.9	17	9.31	7.6	19.5
		1.9	17	9.33	7.4	19.5
		3	17	9.32	7.3	19.5
		4.1	17	9.39	7.3	19.1
		4.9	17	9.31	7.2	19.1
		6.1	17	10.06	7.2	18.4
		6.6	16	9.32	7.2	13.3
		6.9	16	7.2	6.9	12.9
		8	18	9.46	7	10.8
		9	18	6.08	6.6	8.7
		10.1	21	1.09	6.1	7.8
		10.9	23	.59	6	7.4
		11.9	26	.46	5.8	7.2
		12.9	30	.38	5.5	7.1
		14.1	30	.31	5.5	7
		15	33	.26	5.5	6.9
		16.3	36	.23	5.5	6.8
		16.9	40	.22	5.6	6.8
		18	46	.2	5.7	6.7
		18.3	50	.19	5.7	6.7

Secchi Depth and Profile Graphics

Station: 1

WARTH1



Station Information

WARTH1

Primary Station Station # 1 latitude: 47 00 26.3 longitude: 122 52 44.2
Description: Deep part of lake directly west of boat launch about 500 feet east of west shore

Trophic State Assessment for 1999

WARD

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	41	
TSI_Phos:		36	J
TSI_Ch1:			
Narrative TSI:	^b	OM	

Summary Comments:

The general water clarity of Ward Lake was good in 1999. The Secchi depth readings ranged from 2.4 meters (8.0 feet) to 5.5 meters (18.0 feet) with a mean Secchi depth of 4.0 meters (13.1 feet). For comparison, in 1998 the mean Secchi depth was 3.8 meters (12.6 feet).

Numerous geese and only a few other waterfowl were seen on the lake by the volunteer monitor during his sampling visits made between June and October.

The chemistry data collected for Ward Lake showed low levels of phosphorus in the epilimnion. This level of phosphorus indicates a low degree of productivity where algae growth usually does not become a problem. The volunteer monitor noted an algal bloom in early July that disappeared within two weeks.

Ecology staff made two site visits in 1999. During both site visits (6/15/1999 and 9/22/1999) thermal stratification of the lake was noted and low dissolved oxygen levels were observed in the hypolimnion.

Based on the Secchi depth data and the low dissolved oxygen levels in the hypolimnion, Ward Lake is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

WARD

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 1										
6/15/1999	1400	E	10.8							
9/22/1999	1500	E	7.56							

Station 2

9/22/1999 1530 E 11

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

WARD

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/11/1999		20	12	4	0	2	1	1	3	19		0	0
	Sampler:	CLOUD			Remarks:								
6/15/1999		21	14	3	75	2	2	5	3	0	0	1	0
	Sampler:	CLOUD			Remarks:	The pH changed from 5.8 to 7.0 around 3-4 meters - perhaps heavy layer of algae photosynthesizing at this depth. No noticeable algae blooms this year. Volunteer noticed some turbidity around 4/99. Attributed it to lake side construction.							
7/6/1999		21	8	3	75	2	1	5	5	41	0	4	0
	Sampler:	CLOUD			Remarks:	Used a view tube. Bloom under way.							
7/18/1999		20	18	3	75	1	1	5	5	31	0	2	0
	Sampler:	CLOUD			Remarks:	Used a view tube. Bloom gone.							
8/7/1999		21.3	14	3	0	2	1	5	5	12	0	1	0
	Sampler:	CLOUD			Remarks:	Used a view tube.							
8/21/1999		21.5	13	3	0	2	1	5	5	3	1	2	0
	Sampler:	CLOUD			Remarks:	Used a view tube.							
9/11/1999		20	14	3	0	1	1	5	5	0	5	0	0
	Sampler:	CLOUD			Remarks:	Used a view tube.							
9/22/1999		22	11		0	1	1	5	5	0	0	0	0
	Sampler:	CLOUD			Remarks:	Construction site right next to boat launch-removed all vegetation down to the waterline. Volunteer has spoken to city about this site. Appears sediment could move easily into lake. Sampling day was sunny and calm.							

Profile Report

WARD

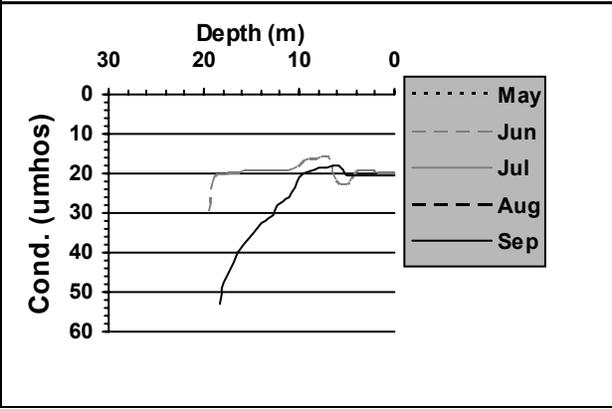
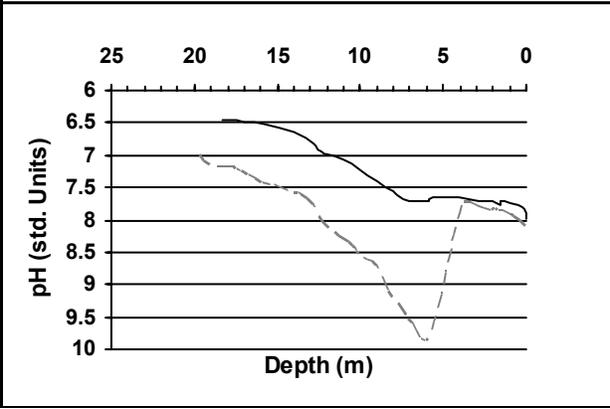
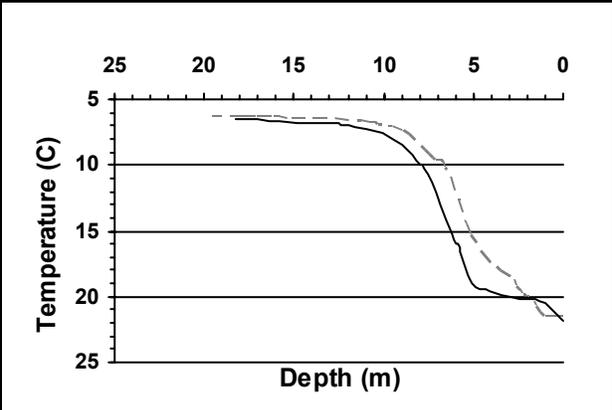
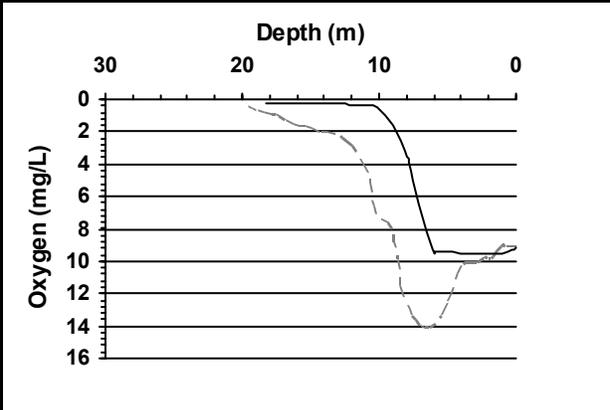
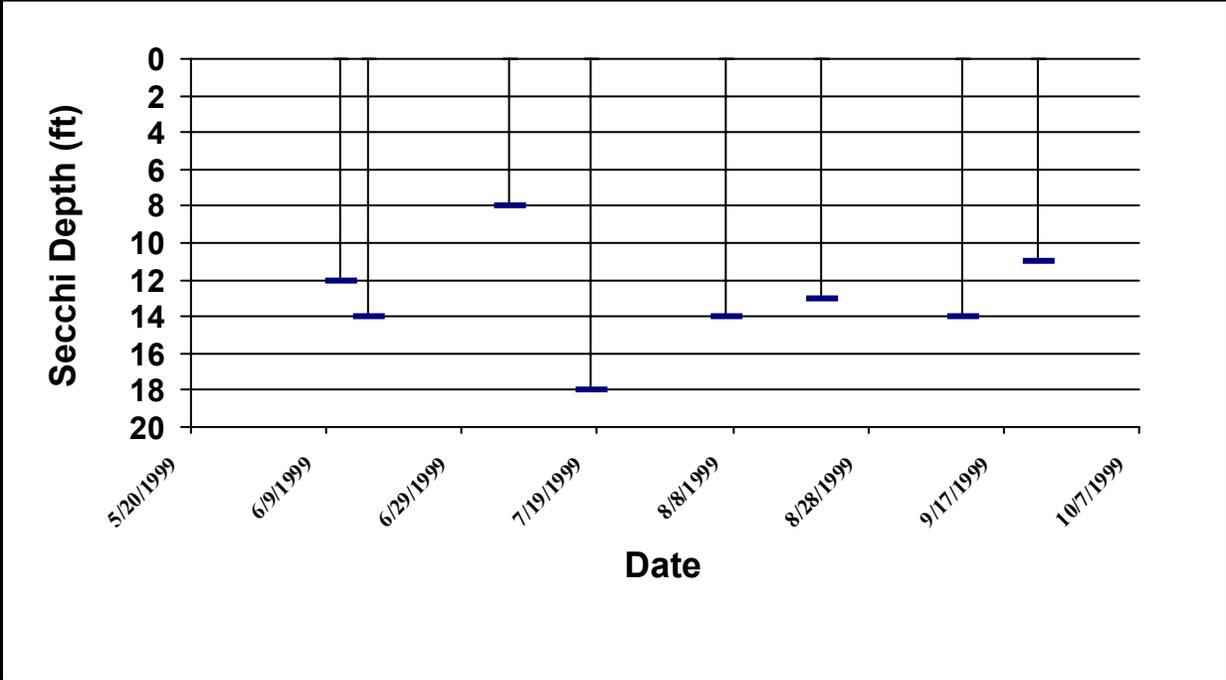
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
6/15/1999						
		0	19.7	9.03	8.09	21.34
		0.7	19.6	9.06	7.91	21.33
		1	19.7	8.94	7.88	21.33
		1.9	19.3	9.81	7.8	19.86
		2.2	19.1	9.7	7.84	19.81
		2.9	19.2	10	7.76	18.33
		4	19	10.27	7.76	17.26
		5.1	22.3	12.58	9.14	15.3
		6	21.5	13.82	9.83	11.89
		6.6	16.7	14.01	9.68	9.72
		7.2	15.5	13.51	9.46	9.39
		8.2	15.8	11.8	9.09	8
		9	16.1	7.99	8.68	7.32
		10.1	17.3	7.05	8.49	6.78
		10.7	18.4	4.48	8.31	6.6
		11.9	18.8	2.83	8.1	6.46
		13.2	18.9	2.05	7.64	6.37
		14.4	19	1.91	7.54	6.32
		15.4	19.2	1.61	7.42	6.28
		16.3	19.5	1.44	7.34	6.26
		17.2	19.7	1.03	7.21	6.24
		17.8	20	.83	7.17	6.21
		19	20.6	.59	7.12	6.21
		19.6	30.2	.39	6.97	6.21

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
9/22/1999						
		0	20.7	9.15	7.98	21.85
		0.1	20.7	9.32	7.83	21.62
		1	20.5	9.54	7.75	20.45
		1.5	20.5	9.51	7.7	20.24
		1.6	20.5	9.56	7.76	20.22
		2	20.5	9.52	7.71	20.14
		2.9	20.4	9.51	7.72	20.03
		4.1	20.4	9.49	7.66	19.65
		5.1	20.3	9.45	7.65	19.06
		5.9	18.2	9.46	7.69	15.96
		6	17.8	9.52	7.7	16.02
		7.1	18.3	6.52	7.71	12.06
		7.8	18.6	3.86	7.63	10.01
		8	18.7	3.6	7.57	10.03
		9	19.4	1.54	7.41	8.43
		10.1	20.8	.53	7.23	7.57
		11	26.1	.37	7.08	7.22
		12.2	27.9	.31	6.97	6.98
		12.8	30.4	.27	6.83	6.87
		14	32.6	.25	6.63	6.77
		15.8	37.8	.24	6.52	6.6
		18	47.5	.22	6.47	6.45
		18.3	53	.22	6.47	6.44

Secchi Depth and Profile Graphics

Station: 1

WARTH1



WENATCHEE

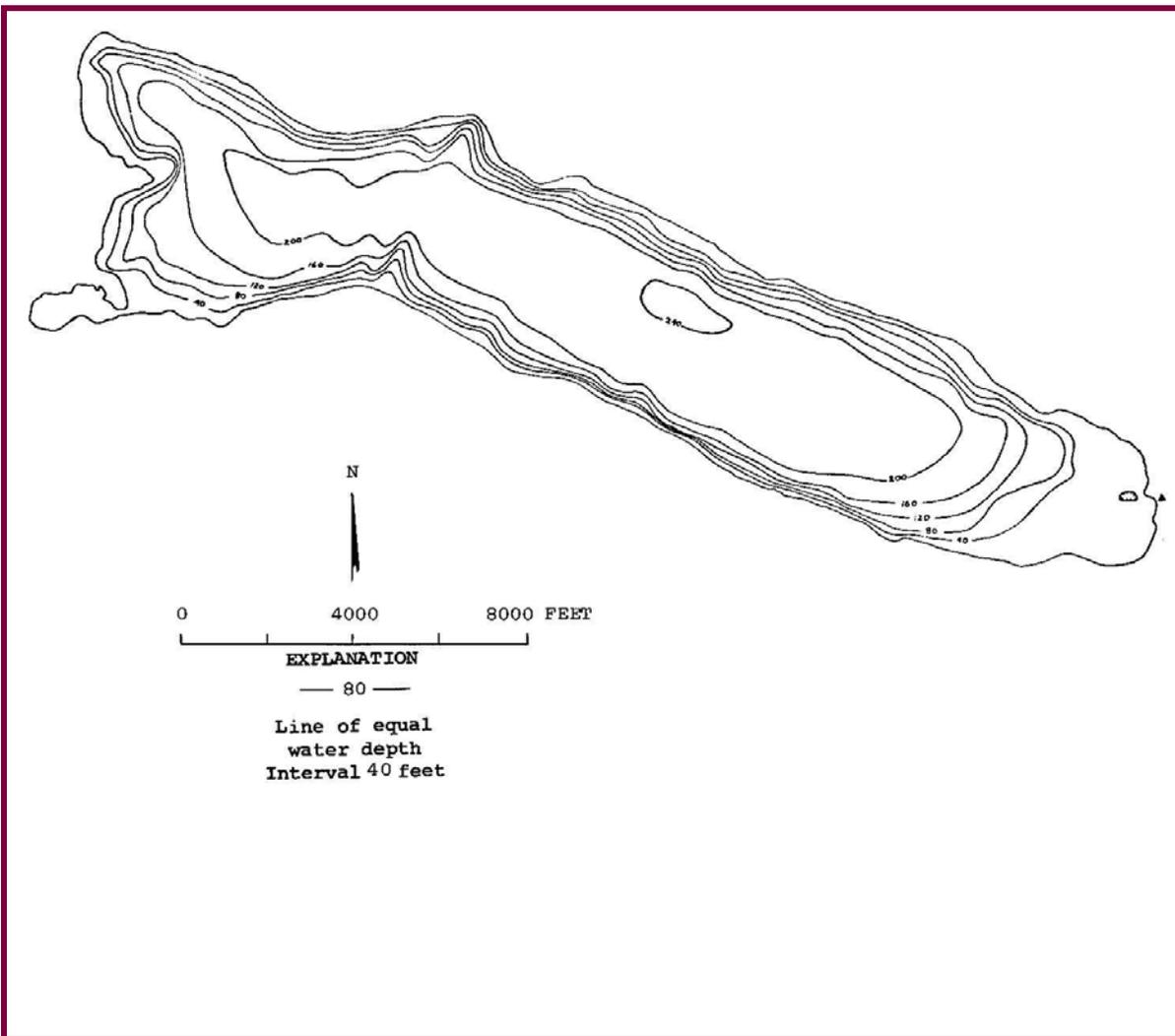
CHELAN County

Lake ID: WENCH1

Ecoregion: 4

Lake Wenatchee is a large, steep-sided lake located 15 miles north of Leavenworth in the Wenatchee National Forest. It is fed principally by the Little Wenatchee River and the White River, and drains to the Wenatchee River. There is a large wetland at the northeast end of the lake.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
2480	244	147	273	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
360000	13.3	1875	47 48 31.	120 43 35.



Station Information

WENCH1

Primary Station	Station # 1	latitude: 47 49 49.3	longitude: 120 48 12.3
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

WENATCHEE

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 32 J
TSI_Phos:
TSI_Ch1:
Narrative TSI: ^b O

Summary Comments:

The water clarity for Lake Wenatchee was excellent in 1998. The Secchi depth readings ranged from 6.4 meters (21.0 feet) to 8.8 meters (29.0 feet) with a mean Secchi depth of 7.1 meters (23.6 feet). For comparison, in 1997 the mean Secchi depth was 6.6 meters (21.6 feet).

No chemistry data was collected or Ecology site visit made for Lake Wenatchee in 1998.

Numerous geese and/ or other waterfowl were seen by the volunteer monitor during his sampling visits between May and September.

An aquatic plant survey was done by Ecology staff in 1998. No non-native plants were observed at the lake.

Based on Secchi depth data, Lake Wenatchee is classified as oligotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

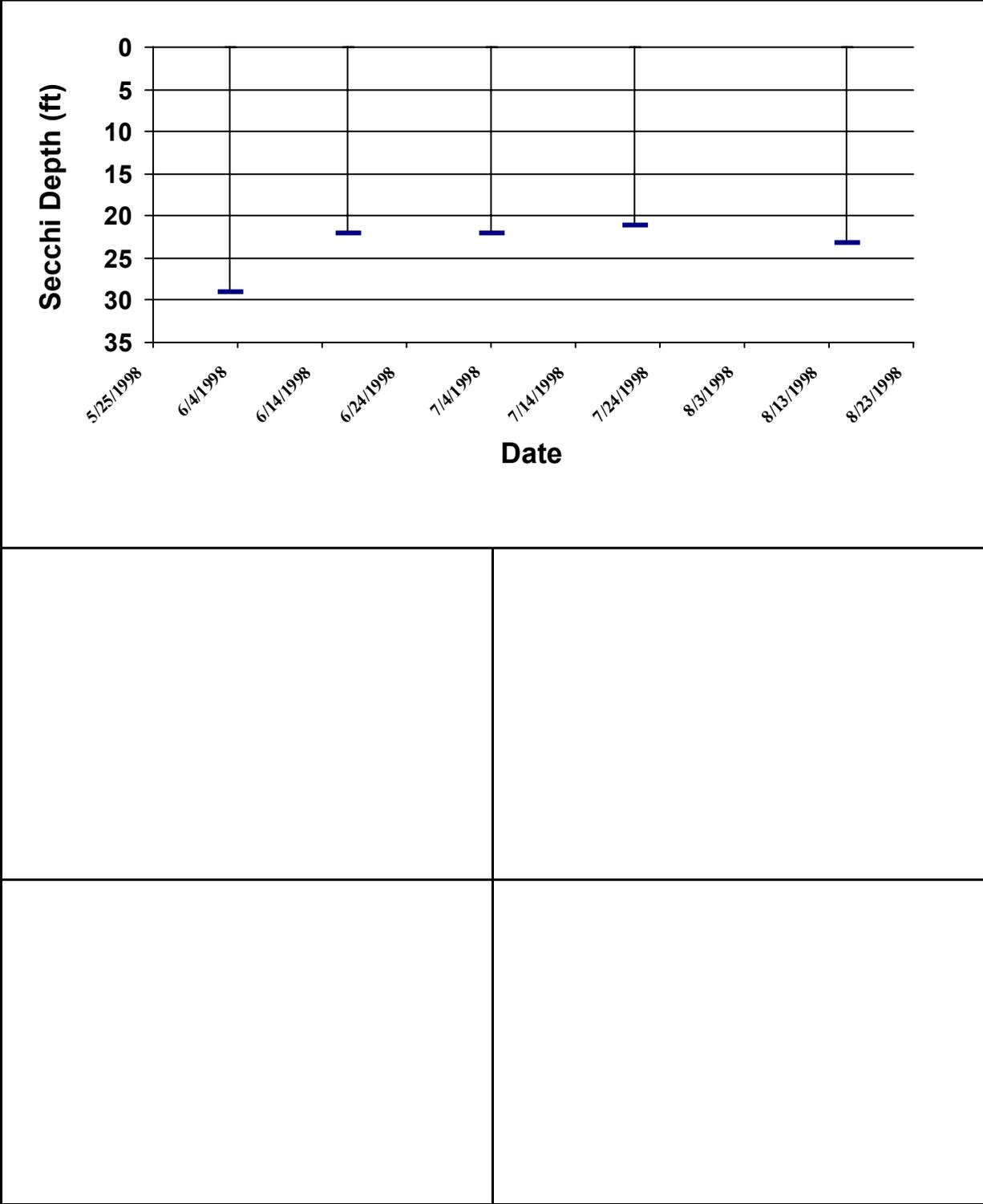
WENATCHEE

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/3/1998			29	2	50	2	5	5	5	12	4	1	0
	Sampler:	CRAIG			Remarks:	RAINED HEAVY - ONE HOUR.							
6/17/1998		8	22		75	5	1			0	6	0	0
	Sampler:	CRAIG			Remarks:	VERY WINDY THE LAST FIVE DAYS.							
7/4/1998		20	22	2	25	1	1	5	5	0	10	2	5
	Sampler:	CRAIG			Remarks:								
7/21/1998		21	21	2	0	1	1	5	5	0	10	0	2
	Sampler:	CRAIG			Remarks:	FIRST DAY NO WIND FOR FIVE DAYS.							
8/15/1998		18.2	23.15		100	3	2			0	0	0	0
	Sampler:	CRAIG			Remarks:	AIR TEMP = 50 DEGREES F							

Secchi Depth and Profile Graphics

Station: 1

WENCH1



Station Information

WENCH1

Primary Station	Station # 1	latitude: 47 49 49.3	longitude: 120 48 12.3
	Description: Deep spot of the lake.		

Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

WENATCHEE

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	32
TSI_Phos:		26
TSI_Ch1:		
Narrative TSI:	^b	0

Summary Comments:

The general water clarity of Lake Wenatchee was excellent in 1999. The Secchi depth readings ranged from 6.1 meters (20.0 feet) to 8.8 meters (29.0 feet) with a mean Secchi depth of 7.1 meters (23.6 feet). For comparison, in 1998 the mean Secchi depth was also 7.1 meters (23.6 feet).

Numerous geese and/or other waterfowl were seen on the lake by the volunteer monitor during his sampling visits made between May and October.

The chemistry data collected for Lake Wenatchee showed very low levels of phosphorus in the epilimnion. This level of phosphorus indicates a low degree of productivity where algae growth usually does not become a problem.

Ecology staff made only one site visit in 1999. During this visit (7/26/1999) the water temperature dropped approximately two degrees Celsius in the first meter of the water column. After that thermal stratification of the lake was not observed throughout the rest of the water column. The dissolved oxygen levels remained consistently high throughout the water column.

An aquatic plant survey was done by Ecology staff on 8/9/1999. Most of the aquatic plants occurred at both the east and west ends of the lake, the rest of the shoreline appeared too steep and rocky to support aquatic plant growth. A species of *Myriophyllum* (water milfoil) was observed at the west end of the lake - it was not identified as to whether it was the invasive non-native species or the native species.

Based on the Secchi depth data and the low phosphorus levels, Lake Wenatchee is classified as oligotrophic.

Secchi Data and Field Observations

WENATCHEE

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/19/1999		48	29	2	0	1	3	5	5	2	8	0	0
	Sampler:	CRAIG		Remarks: Used a view tube.									
6/17/1999		8.5	22.5		0	1	1	5	5	26	4	0	0
	Sampler:	CRAIG		Remarks: Used a view tube. Windy off and on. Calm wind in the morning, breezy in the afternoon.									
7/8/1999		9	21		0	5	1	5	5	0	1	0	0
	Sampler:	CRAIG		Remarks: Used a view tube. Very windy last 2 days. Calm on 7/4/99 but windy previous week.									
7/26/1999		62	20	2	0	1	1	5	5		1	0	1
	Sampler:	CRAIG		Remarks: Did not use a view tube. Very high water this year. Color of water this year is milky green because of high runoff. Since fish pens came in (1993) algae appeared near them; but the rest of the lake is clear of algae.									
8/15/1999		15	23	1	0	1	2	5	5	30	8	1	0
	Sampler:	CRAIG		Remarks: Water level moving down quickly.									
9/4/1999		16	25	1	25	1	4	5	5		4	0	1
	Sampler:	CRAIG		Remarks: Water is cold for swimming. Water level droped to about normal.									

Profile Report

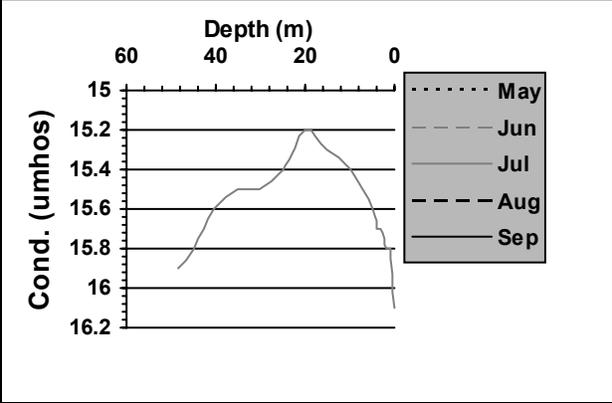
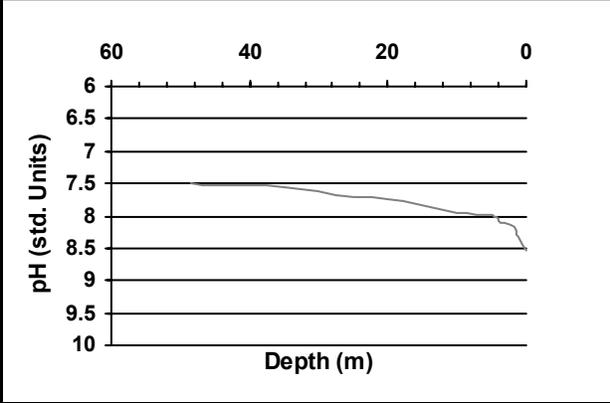
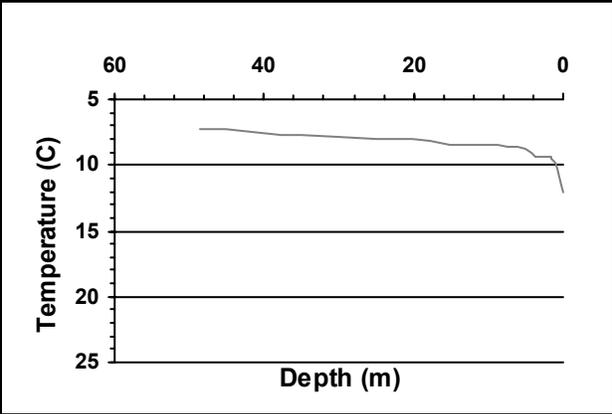
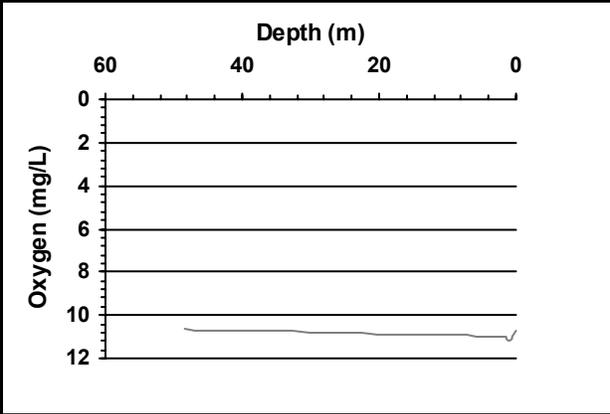
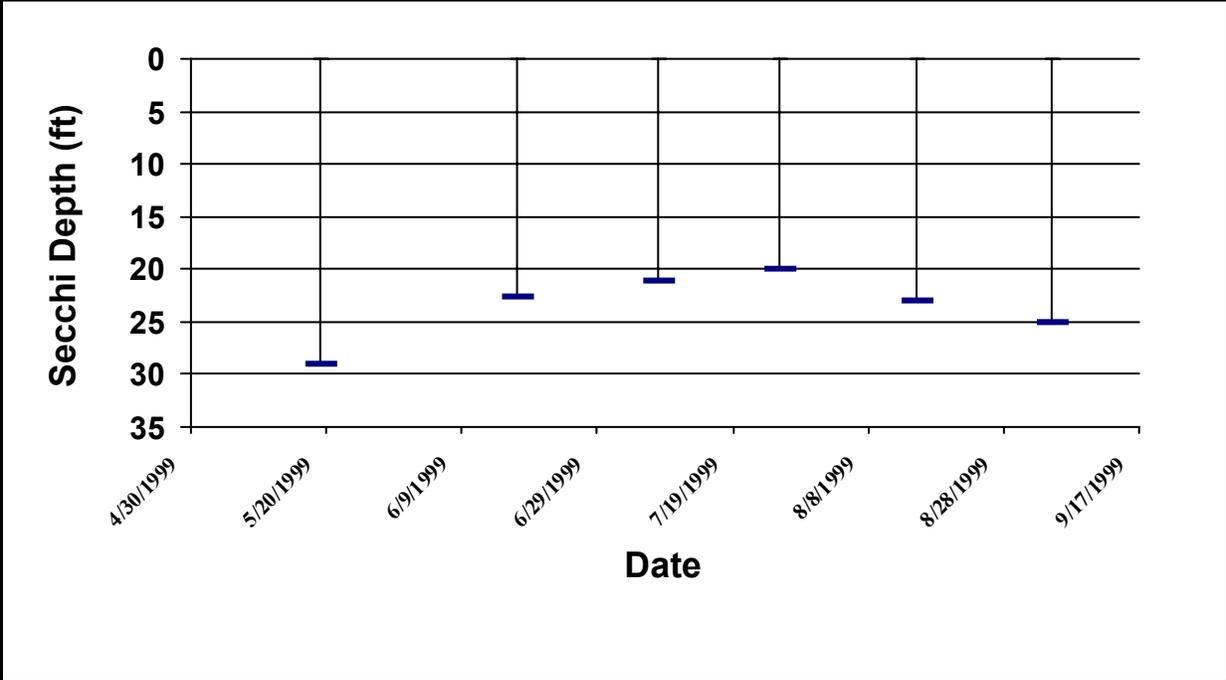
WENATCHEE

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
7/26/1999						
		0	16.1	10.73	8.53	12.02
		1	15.8	11.13	8.37	9.78
		1.5	15.8	11.09	8.29	9.53
		1.8	15.8	11.02	8.17	9.41
		3.2	15.7	11	8.12	9.29
		4.1	15.7	10.96	8.09	9.16
		5	15.6	10.95	7.99	8.77
		10	15.4	10.94	7.95	8.45
		15.1	15.3	10.92	7.82	8.39
		20.2	15.2	10.88	7.73	8.05
		25	15.4	10.8	7.7	7.98
		30.1	15.5	10.81	7.63	7.79
		35.1	15.5	10.76	7.55	7.75
		40.3	15.6	10.75	7.53	7.52
		45.1	15.8	10.72	7.52	7.33
		48.5	15.9	10.66	7.5	7.26

Secchi Depth and Profile Graphics

Station: 1

WENCH1



WILDCAT

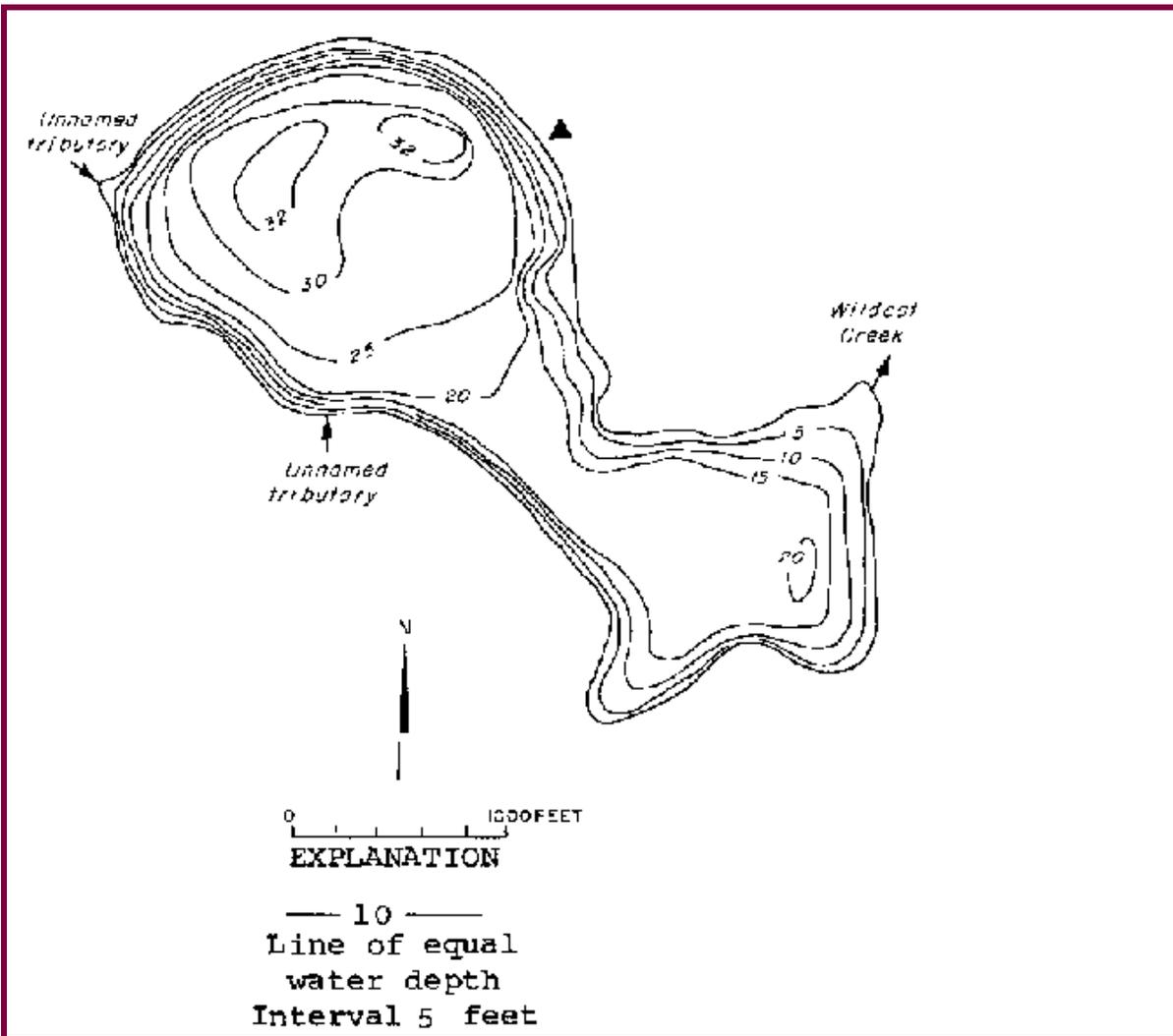
KITSAP County

Lake ID: WILK11

Ecoregion: 2

Wildcat Lake is located six miles northwest of Bremerton. It is fed by two inlets, and drains via Wildcat Creek to Dyes Inlet.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
120	33	18	3	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
2200	2.24	377	47 35 59.	122 45 35.



Station Information

WILKII

Secondary Station	Station # 1	latitude: 47 35 56.9	longitude: 122 46 23.8
	Description:	Approximately 200 feet from boat launch on a line extending from launch to southern tributary; pre-1996 data	

Primary Station	Station # 2	latitude: 47 35 48.1	longitude: 122 45 40.2
	Description:	Deep part of lake, in the approximate center of a line extending from northwest tributary to boat launch; post-1996 data	

Secondary Station	Station # 3	latitude:	longitude:
	Description:	In southeast portion of lake in the approximate middle of a line extending from the narrowest point in the lake to the southeasternmost end of shore	

Trophic State Assessment for 1998

WILDCAT

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a	36
TSI_Phos:	33
TSI_Ch1:	35
Narrative TSI: ^b	OM

Summary Comments:

The general water clarity for Wildcat Lake was very good in 1998. The Secchi depth readings ranged from 4.6 meters (15.0 feet) to 6.4 meters (21.1 feet) with a mean Secchi depth reading of 5.2 meters (17.1 feet). For comparison, in 1997 the mean Secchi depth reading was 5.0 meters (16.6 feet).

The chemistry data collected for Wildcat Lake showed low phosphorus levels (6.2 ug/L to 9.2 ug/L) and low chlorophyll levels (0.7 ug/L to 3.0 ug/L). These data indicate a low level of productivity in the lake.

Ecology staff made seven site visits in 1998. Low dissolved oxygen levels in the hypolimnion and thermal stratification was observed during all of the site visits.

Geese and/or other waterfowl were counted by the volunteer monitor on nine of his eleven sampling visits made between May and October.

Ecology staff conducted an aquatic plant survey on 8/20/1998. The non-native plant *Nymphaea odorata* (fragrant waterlily) was observed growing dense in patches around the lake. Most areas had macrophyte growth with quite a diverse vegetative community being observed.

Based on the Secchi depth data and the low levels of nutrients, Wildcat Lake should be classified as oligotrophic. However, because of the low dissolved oxygen levels in the hypolimnion observed throughout the summer, Wildcat Lake is classified as

oligomesotrophic.

The following is an assessment written by Ecology staff, Kirk Smith, to determine the phosphorus criterion for Wildcat Lake:

Wildcat Lake is an oligomesotrophic lake on the Kitsap peninsula. The watershed is about 75% forested, 15% residential, and 10% agriculture. The water is very clear and supports a put-and-take trout fishery and a bass fishery. There were no user surveys distributed on Wildcat Lake so we cannot determine the full extent of the uses and the public perception of their quality. However, besides the fishery, there is a public swimming beach on the lake. There is a speed limit for boats; no wakes are allowed. The habitat survey revealed buildings and lawns to be the most prominent human disturbances along the shoreline as is the case on most urban lakes. Aquatic vegetation was sparse which is not supportive of the bass fishery. The watershed survey revealed an area where a tributary was impacted by grazing livestock. Most of the lawns near the lake appeared to be well manicured and could be a source of nutrients from fertilizers. The lake is quite clear and low in phosphorus (mean total phosphorus was 7.7 ug/L). With little vegetation and low productivity, a bass fishery is most likely not supported in this lake. Zooplankton tended to be small with copepods dominant. The water quality is much better suited for the trout fishery and as a nursery for coho salmon smolts.

We recommend the nutrient criterion for Wildcat Lake be set at the ecoregional action value for oligotrophic Puget Lowland lakes, 10 ug/L total phosphorus.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

WILDCAT

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 0										
6/16/1998		L					1			
		L					10			
8/18/1998		L					7			
		L					7			
9/21/1998		L					2			
		L					1			
Station 2										
6/16/1998		E	6.2	.231	37			20.7	5100	.5
		H	19.9	.374	19					
7/24/1998		E	9.2	.181	20	.71				.7 J

	H	11.9	.274	23		
8/18/1998	E	6.8	.161	24	.5 U	.6
	H	24.7	.28	11		
9/21/1998	E	8.5	.189	22	3	.6
Station 3						
6/16/1998	E	8	J			
7/24/1998	E	5.3	.176	33	1.4	
8/18/1998	E	6.6	.16	24	2.3	

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

WILDCAT

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 2													
5/11/1998		16.7	16	7	75	2	3	5	5	0	2	3	0
	Sampler:	SNOW			Remarks:	FIRST READING OF 1998.							
5/11/1998			16		0					0	0	0	0
	Sampler:	BELL-MCKINNON			Remarks:								
5/25/1998		16.7	18	7	75	2	3	5	5	2		1	0
	Sampler:	SNOW			Remarks:	SPEED LIMIT 7 MPH ON LAKE.							
5/31/1998		20	17	6	0	1	2	5	5	30	4	7	0
	Sampler:	SNOW			Remarks:	70 DEGREES IN THE SHADE.							
6/13/1998		21.1	15	7	25	1	2	5	5	0	4	2	0
	Sampler:	SNOW			Remarks:	TEMPERATURE IS 70 DEGREES OUTSIDE SHADE.							
6/16/1998			15	2	50					10	11	2	0
	Sampler:	SMITH			Remarks:	ZOOPLANKTON DUPS AT 4 METERS AT SITE #3							
6/28/1998		21.1	15	7	0	1	2	5	5	0			
	Sampler:	SNOW			Remarks:	70 DEGREES IN THE SHADE.							
7/12/1998		22.2	15	7	75	1	2	5	5	30	2	4	0
	Sampler:	SNOW			Remarks:								
7/24/1998			20.13	2	10					13	0	0	0
	Sampler:	SMITH			Remarks:								

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
8/1/1998		25.6	16	6	0	1	2	5	5	8	4	4	0
	Sampler:	SNOW		Remarks:	68 DEGREES IN THE SHADE.								
8/8/1998		25.6	17	7	0	1	1	5	5	8	3	5	0
	Sampler:	SNOW		Remarks:	72 DEGREES IN THE SHADE.								
8/18/1998			17.49	2	100			5	5	0	0	0	0
	Sampler:	SMITH		Remarks:	FEC#1 TAKEN AT POINT BETWEEN TWO BASINS; FEC#2 TAKEN AT BOAT RAMP. FECS TAKEN APPROX. 1230. NO BLUE-GREEN OBSERVED; UNUSUALLY CLEAR FOR THIS TIME OF YEAR. The pH results are qualified as estimates due to postcalibration failing QA/QC requirements.								
8/24/1998		23.3	15	7	0	1	1	5	5	0	0	0	0
	Sampler:	SNOW		Remarks:	65 DEGREES. LAKE IS LOW.								
9/7/1998		23.3	17	8	75	1	1	5	5	6	4	3	0
	Sampler:	SNOW		Remarks:									
9/21/1998			21.12	2	0	1		5	5	1	23	1	0
	Sampler:	SMITH		Remarks:	FEC #1 AT NEW SWIMMING AREA. The Conductivity and Oxygen results are qualified as estimates due to postcalibration failing QA/QC requirements.								
9/23/1998		21.7	19	7	0	2	1	5	5	2	8	0	0
	Sampler:	SNOW		Remarks:	70 DEGREES IN THE SHADE.								
9/23/1998			19		0					0	0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									

Profile Report

WILDCAT

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 2						
5/5/1998						
		0	43.6	9.55	7.9	15.8
		0.8	43.6	9.64	7.8	15.8
		2	43.7	9.43	7.7	15.8
		3	41.7	9.99	7.7	15.6
		4	41.4	11.4	7.8	12.5
		5	40.4	9.04	7.7	10.8
		6	40.7	7.13	7.7	9.3
		7	41.7	5.05	7.6	8.3
		8	43	2.99	7.4	7.8
		8.2	46	1.86	7.3	7.7
5/11/1998						
		0	43.6	9.55	7.9	15.8
		0.8	43.6	9.64	7.8	15.8
		2	43.7	9.43	7.7	15.8
		3	41.7	9.99	7.7	15.6
		4	41.4	11.4	7.8	12.5
		5	40.4	9.04	7.7	10.8
		6	40.7	7.13	7.7	9.3
		7	41.7	5.05	7.6	8.3
		8	43	2.99	7.4	7.8
		8.2	46	1.86	7.3	7.7

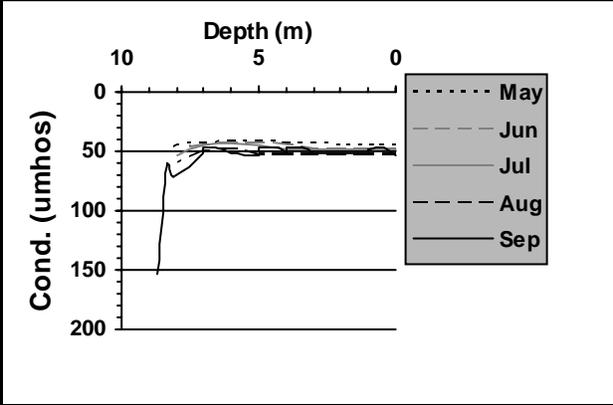
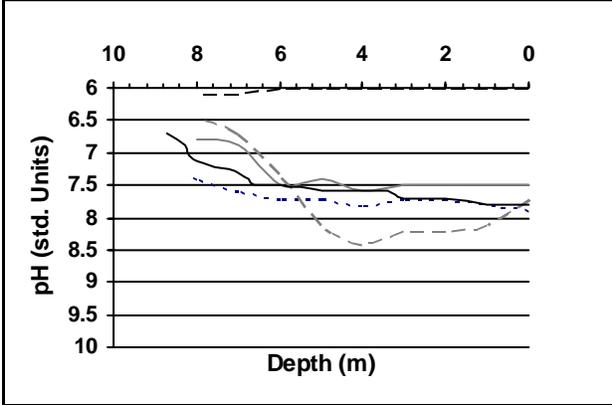
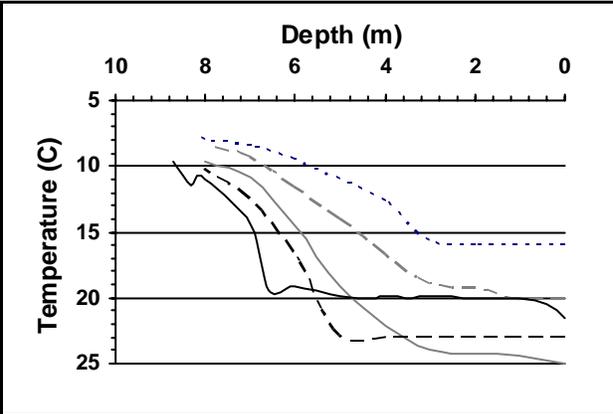
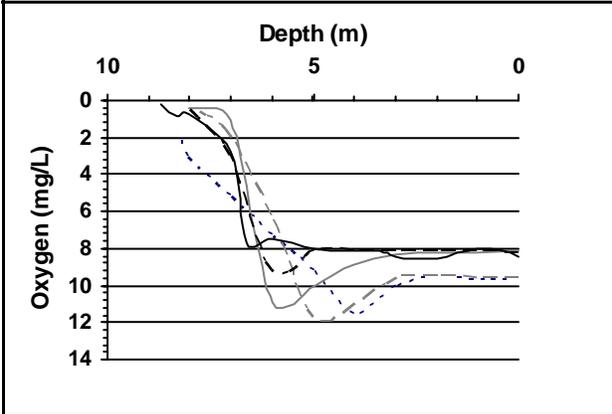
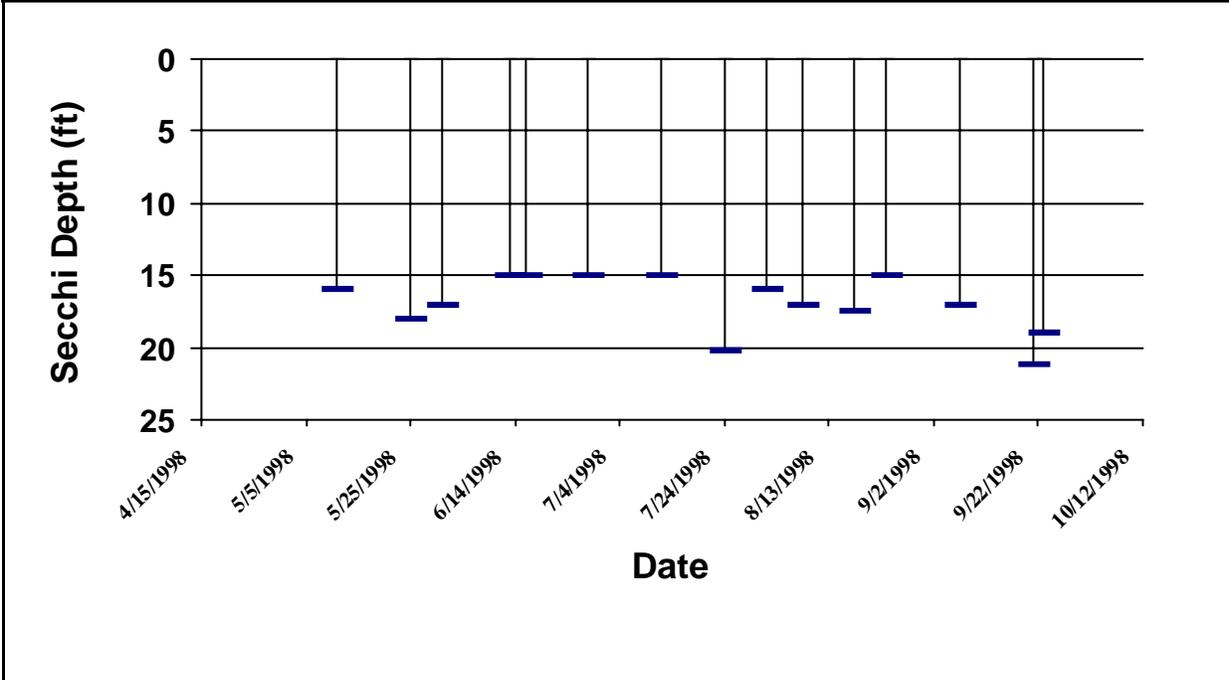
Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
6/16/1998						
		0	46	9.5	7.7	20.1
		1	46	9.49	8.1	20.1
		2	46	9.42	8.2	19.2
		3	46	9.52	8.2	18.8
		4	44	10.88	8.4	16.6
		5	42	11.63	8.1	13.9
		6	41	6.24	7.3	11.5
		7	43	1.81	6.7	9.2
		7.8	48	.43	6.5	8.5
7/24/1998						
		0	49	8.13 J	7.5	25
		1	49	8.26 J	7.5	24.4
		2	49	8.23 J	7.5	24.2
		3	49	8.3 J	7.5	23.9
		4	48	8.83 J	7.6	22.2
		5	45	10.01 J	7.4	19.2
		6	43	10.88 J	7.5	14.4
		7	45	1.03 J	6.9	10.8
		8	53	.38 J	6.8	9.6
8/18/1998						
		0	52	8.1	6 J	22.9
		1	52	8.05	6 J	22.9
		2	52	8.06	6 J	22.9
		3	52	7.99	6 J	22.9
		4	52	8.02	6 J	22.9
		5	51	8	6 J	22.7
		6	46	9.04	6 J	16.5
		7	48	2.88	6.1 J	12.4
		8	58	.35	6.1 J	10.1

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
9/21/1998						
		0.4	47 J	8.17 J	7.8	20.5
		1	48 J	8.02 J	7.8	20.1
		3.4	47 J	8.16 J	7.6	20
		4	47 J	8.08 J	7.6	19.9
		4.3	47 J	8.07 J	7.6	20
		5	47 J	8.06 J	7.6	19.9
		6.6	47 J	7.7 J	7.5	19.4
		7	47 J	2.73 J	7.3	14.4
		8.3	62 J	.81 J	6.9	11.5
9/23/1998						
		0	53	8.46	7.8	21.5
		1	52	8.52	7.8	20.6
		2	52	8.53	7.7	20
		3	52	8.45	7.7	19.9
		4	52	8.3	7.6	19.9
		5	53	8.28	7.6	19.8
		6	52	7.5	7.5	19.1
		7	52	1.87	7.3	14.3
		8.1	71	.63	7.1	10.7
		8.7	154	.25	6.7	9.7

Secchi Depth and Profile Graphics

Station: 2

WILKII



Station Information

WILKII

Secondary Station	Station # 1	latitude: 47 35 56.9	longitude: 122 46 23.8
	Description:	Approximately 200 feet from boat launch on a line extending from launch to southern tributary; pre-1996 data	

Primary Station	Station # 2	latitude: 47 35 48.1	longitude: 122 45 40.2
	Description:	Deep part of lake, in the approximate center of a line extending from northwest tributary to boat launch; post-1996 data	

Secondary Station	Station # 3	latitude:	longitude:
	Description:	In southeast portion of lake in the approximate middle of a line extending from the narrowest point in the lake to the southeasternmost end of shore	

Trophic State Assessment for 1999

WILDCAT

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a	36
TSI_Phos:	45
TSI_Ch1:	
Narrative TSI: ^b	OM

Summary Comments:

The general water clarity of Wildcat Lake was very good in 1999. The Secchi depth readings ranged from 4.3 meters (14.0 feet) to 6.4 meters (21.0 feet) with a mean Secchi depth of 5.4 meters (17.7 feet). For comparison, in 1998 the mean Secchi depth was 5.2 meters (17.1 feet).

Numerous geese and/or other waterfowl were seen on the lake by the volunteer monitor during his sampling visits made between June and October.

The chemistry data collected for Wildcat Lake showed moderate levels of phosphorus in the epilimnion. This level of phosphorus indicates a degree of productivity where algae growth may become a problem but usually not for long periods of time. The volunteer monitor did report an algae bloom early in the spring.

Ecology staff made only one site visit in 1999. During this visit (6/9/1999) thermal stratification was noted and low dissolved oxygen levels were observed at the very bottom of the water column. Throughout the rest of the water column, the dissolved oxygen levels remained consistently high.

Based on the Secchi depth data and the phosphorus levels, Wildcat Lake is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

WILDCAT

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
------	------	--------	-----------------	-----------------	-------	----------------------------	-------------------------------------	--------------------	-------------------	--------------------

Station 2

6/9/1999 1530 E 16.8

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Secchi Data and Field Observations

WILDCAT

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 2													
6/9/1999		64	18	7	75	1	4	5	5	25	7	2	0
	Sampler:	SNOW			Remarks:	Used a view tube.							
6/25/1999		68	16	7	75	2	3	4	4	0	6	2	0
	Sampler:	SNOW			Remarks:	Used a view tube.							
7/12/1999		74	14	7	0	1	1	4	4	0	4	1	0
	Sampler:	SNOW			Remarks:								
8/2/1999		76	16	7	50	1	1	4	4	0	6	1	
	Sampler:	SNOW			Remarks:								
8/16/1999		72	19	7	75	2	3	4	4	3	6	1	0
	Sampler:	SNOW			Remarks:								
8/21/1999		72	19	7	75	1	2	4	4	0	6	2	
	Sampler:	SNOW			Remarks:								
8/30/1999		71	17	7	25	2	3	4	4	0	0	1	
	Sampler:	SNOW			Remarks:								
9/6/1999		71	18	7	25	2	3	4	4	0	2	1	
	Sampler:	SNOW			Remarks:	One reading remaining for the season.							
9/25/1999		68	21	8	0	1	3	4	4	12	0	2	
	Sampler:	SNOW			Remarks:	Last reading for the season.							

Profile Report

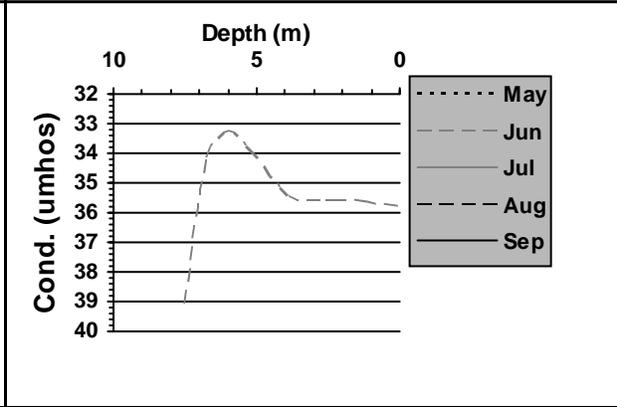
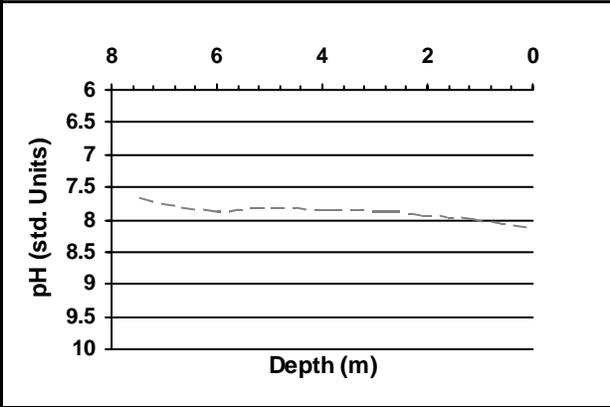
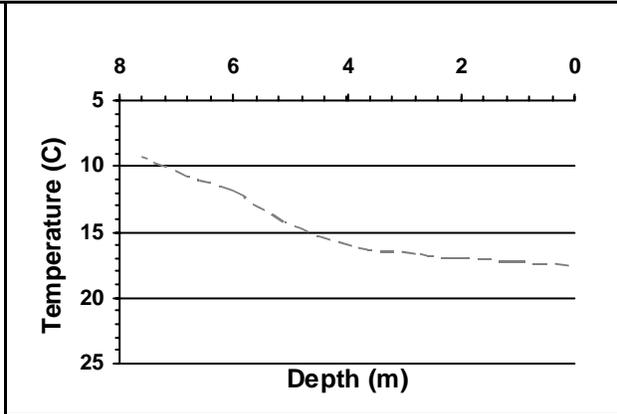
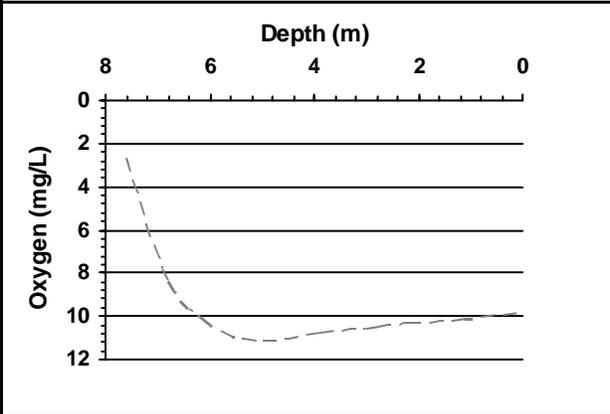
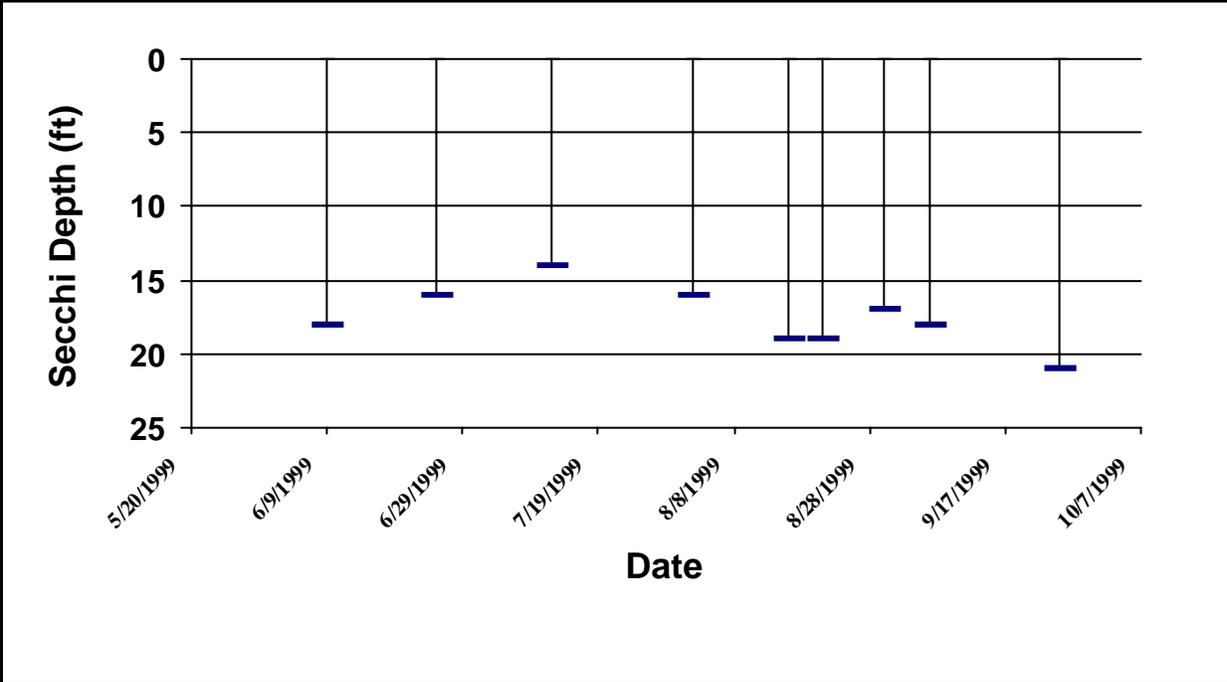
WILDCAT

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 2						
6/9/1999						
		0.1	35.7	9.8	8.1	17.55
		1.1	35.6	10.07	7.97	17.19
		2.1	35.5	10.24	7.91	16.83
		2.8	35.5	10.44	7.87	16.64
		3.9	35.4	10.76	7.83	16
		5.1	34	11.1	7.8	14.16
		6	33.2	10.31	7.86	11.71
		6.8	34.2	8.36	7.76	10.71
		7.6	39.2	2.7	7.62	9.27

Secchi Depth and Profile Graphics

Station: 2

WILKII



WOOTEN

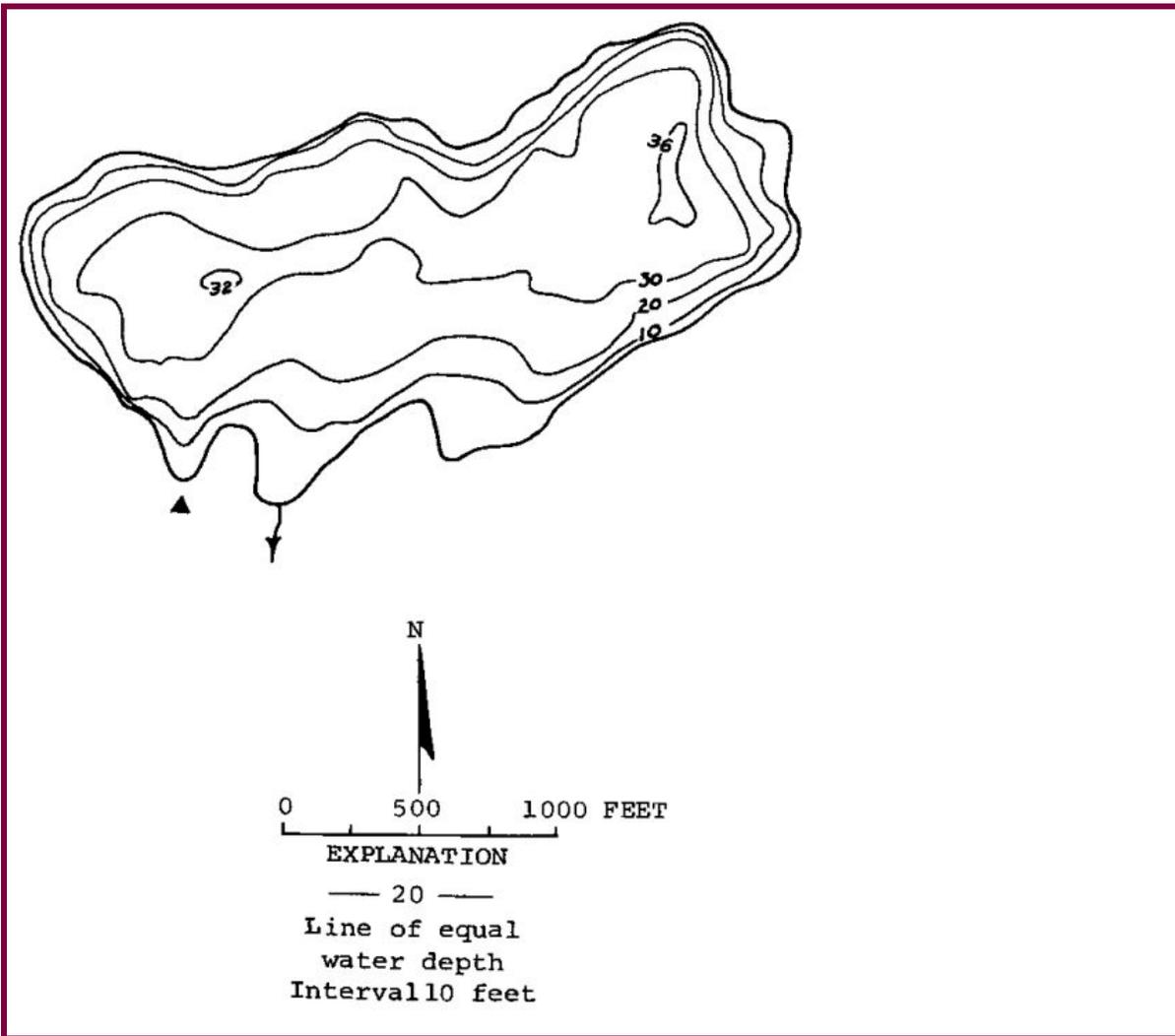
MASON County

Lake ID: WOOMA1

Ecoregion: 2

Lake Wooten is located seven miles west of Belfair. The lake has no inlet and drains to Haven Lake and the Tahuya River.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
68	36	23		
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
1530	1.55	407	47 27 55.	122 58 57.



Station Information

WOOMA1

Primary Station	Station # 1	latitude: 47 27 58.7	longitude: 122 58 57.5
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

WOOTEN

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 32 J
TSI_Phos:
TSI_Ch1:
Narrative TSI: ^b O

Summary Comments:

The general water clarity for Wooten Lake was excellent in 1998. The Secchi depth readings ranged from 4.7 meters (15.5 feet) to 8.3 meters (27.3 feet) with a mean Secchi depth of 7.2 meters (23.8 feet). For comparison, in 1997 the mean Secchi depth was 7.0 meters (22.9 feet).

No chemistry data was collected for Wooten Lake in 1998.

Only one site visit was made by Ecology staff in 1998. During this visit (9/22/1998) there was no thermal stratification noted and the dissolved oxygen levels remained high throughout the entire water column.

The volunteer monitor noted a slight algae bloom occurring during the end of July and another bloom in the beginning of September which continued through the end of October.

Based on Secchi depth data and the high levels of dissolved oxygen throughout the water column, Wooten Lake is classified as oligotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Profile Report

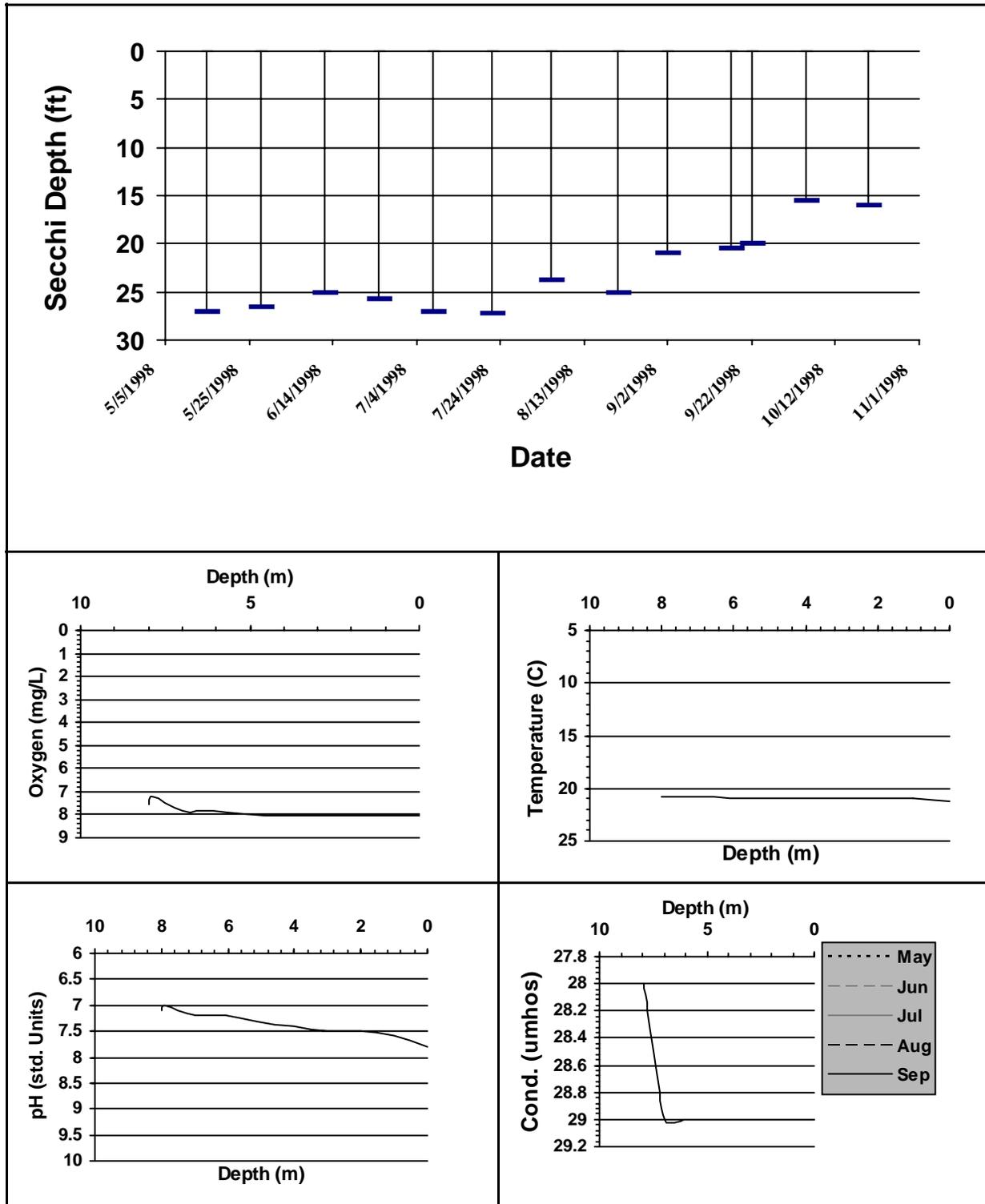
WOOTEN

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
9/22/1998						
		0	29	8.05	7.8	21.3
		1	29	8.06	7.6	21
		2	29	8.06	7.5	21
		3	29	8.06	7.5	20.9
		4	29	8.01	7.4	20.9
		5.1	29	7.97	7.3	20.9
		6.1	29	7.84	7.2	20.9
		7	29	7.82	7.2	20.8
		7.9	28	7.23	7	20.8
		8	28	7.59	7.1	20.8

Secchi Depth and Profile Graphics

Station: 1

WOOMA1



Station Information

WOOMA1

Primary Station	Station # 1	latitude: 47 27 58.7	longitude: 122 58 57.5
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

WOOTEN

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a	33
TSI_Phos:		29
TSI_Ch1:		
Narrative TSI:	^b	OM

Summary Comments:

The general water clarity of Wooten Lake was excellent in 1999. The Secchi depth readings ranged from 3.9 meters (12.8 feet) to 8.2 meters (27.0 feet) with a mean Secchi depth of 6.6 meters (21.7 feet). For comparison, in 1998 the mean Secchi depth was 7.2 meters (23.8 feet).

No geese and only a few other waterfowl were seen on the lake by the volunteer monitor during her sampling visits made between May and October.

The chemistry data collected for Wooten Lake showed very low levels of phosphorus in the epilimnion. This level of phosphorus indicates a low degree of productivity where algae growth is usually not a problem. The volunteer monitor did report an algae bloom in early August and an increase in algae growth early in October.

Ecology staff made two site visits in 1999. During the first site visit (5/19/1999) thermal stratification was noted near the bottom of the water column and the dissolved oxygen levels remained consistently high throughout the water column. During the second Ecology site visit, thermal stratification again was noted near the bottom of the water column with corresponding low dissolved oxygen levels.

Based on the Secchi depth data, the phosphorus levels and the low dissolved oxygen levels, Wooten Lake is classified as oligomesotrophic.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

WOOTEN

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
------	------	--------	-----------------	-----------------	-------	----------------------------	-------------------------------------	--------------------	-------------------	--------------------

Secchi Data and Field Observations

WOOTEN

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/19/1999		14	19.75	2	100	2	3	5	5	0	6	0	0
	Sampler:	KIDRICK		Remarks: Chara and Nitella in the same spot as last year.									
6/18/1999		19	25	2	50	3	1	5	5	0	3	1	0
	Sampler:	KIDRICK		Remarks:									
6/30/1999		18	25	2	100	1	2	5	5	0	0	0	0
	Sampler:	KIDRICK		Remarks: Did not use a view tube.									
7/13/1999		21	26.25	2	0	2	1	5	5	0	0	1	0
	Sampler:	KIDRICK		Remarks: Did not use a view tube.									
7/28/1999		22	27	2	0	1	1	5	5	0	0	0	1
	Sampler:	KIDRICK		Remarks: Did not use a view tube.									
8/11/1999		24	23.5	2	100	3	1	5	5	0	0	0	0
	Sampler:	KIDRICK		Remarks: Did not use a view tube. Algae blooms noted during hot weather between 8/1-8/7/99. Sampling day was overcast and breezy. Outflow from lake only flows 6 months of the year.									
8/31/1999		20	17.5	2	75	2	2	5	5	0	0	0	0
	Sampler:	KIDRICK		Remarks: Did not use a view tube. Water color more green tint than blue.									
9/20/1999		19	17	2	0	1	1	5	5	0	0	0	0
	Sampler:	KIDRICK		Remarks: Did not use a view tube.									
10/4/1999		16	12.75	2	0	1	1	5	5			1	0
	Sampler:	KIDRICK		Remarks: Did not use a view tube. Because of lack of rain, algae has increased.									

Profile Report

WOOTEN

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
5/19/1999						
		0	20.4	10.87	8.32	14.11
		0.1	20.5	10.78	8.41	14.12
		1.1	20.3	11.06	8.19	13.91
		2.1	20.3	10.98	8.15	13.88
		3.2	20.3	10.84	8.09	13.84
		3.9	20.3	10.98	8.1	13.6
		4	20.2	10.97	8.1	13.53
		4.9	20.2	11.13	8.08	13.33
		6.1	20.2	11.18	8.11	13.17
		7	20.5	11.63	8.13	11.81
		8.2	22.2	10.95	7.98	10.72
		8.3	22.5	9.05	7.92	10.62
8/11/1999						
		0	24.1	8.72	8.26	23.32
		0.8	24.1	8.66	7.99	23.34
		0.9	24.1	8.59	7.94	23.34
		1.5	24.2	8.51	7.88	23.34
		1.9	24.2	8.51	7.82	23.34
		2.2	24.3	8.44	7.78	23.35
		3	24.2	8.49	7.7	23.35
		4	24.2	8.53	7.62	23.34
		5	24.2	8.48	7.59	23.35
		6	24.3	8.56	7.53	23.16
		7	25.1	9.15	7.56	22.14
		8	29.5	5.66	7.38	20.7
		8.3	30.5	3.02	7.08	20.27

WYE

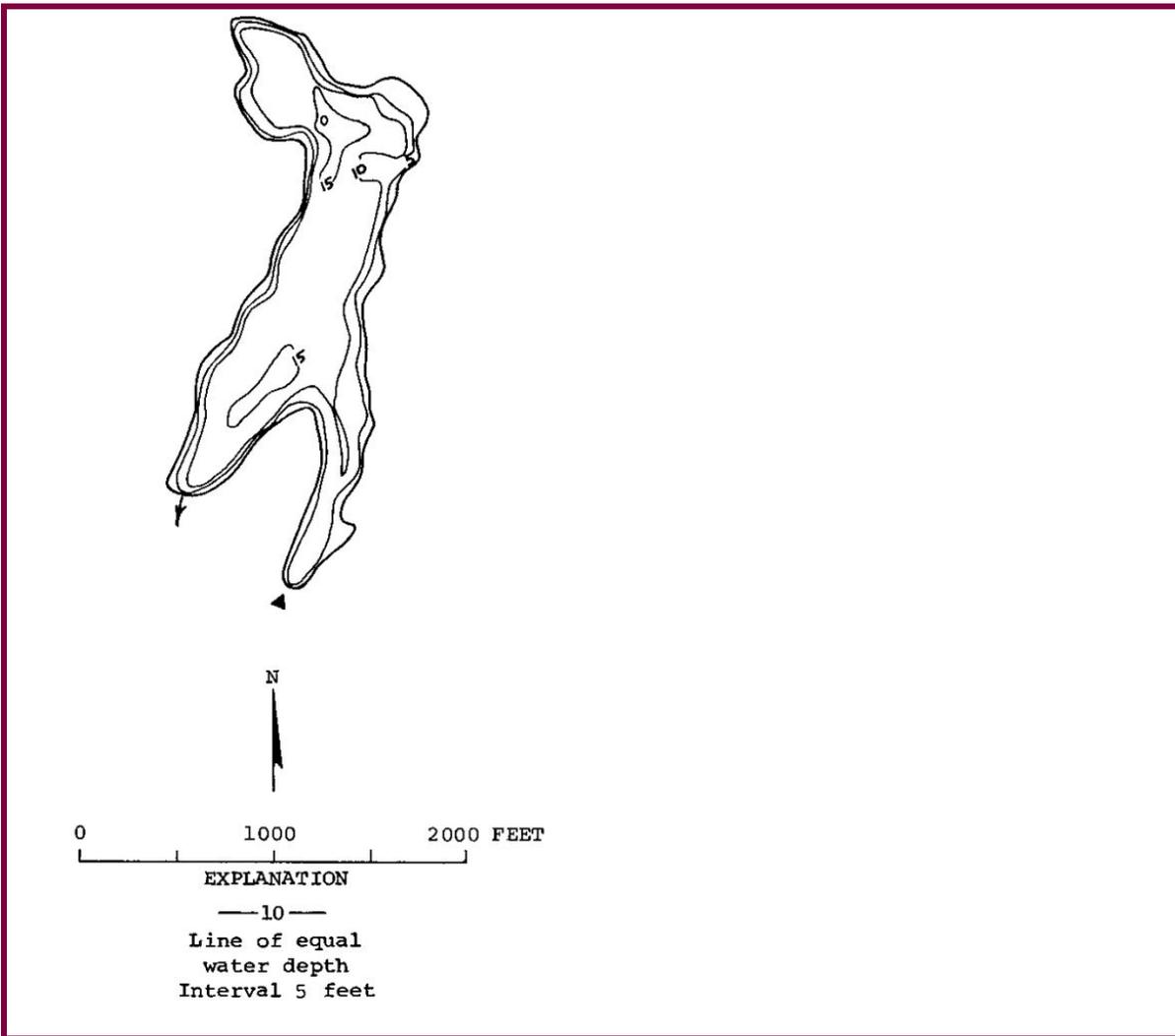
KITSAP County

Lake ID: WYEK11

Ecoregion: 2

Wye Lake is located 3.5 miles southeast of Belfair. It is fed by about six intermittent inlets, and drains via an unnamed creek to Fern Lake, Rocky Creek and ultimately to Case Inlet.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
39	15	10	1	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
370	1.71	300	47 25 22.	122 45 27.



Station Information

WYEKI1

Primary Station	Station # 1	latitude: 47 25 39.8	longitude: 122 45 26.4
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1998

WYE

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi: ^a 40	B, J
TSI_Phos:	
TSI_Ch1:	
Narrative TSI: ^b	OM

Summary Comments:

The water clarity for Wye Lake was excellent in 1998. The Secchi disk hit bottom during every Secchi measurement. The Secchi depth readings ranged from 3.7 meters (12.3 feet) to 4.5 meters (14.7 feet) with a mean Secchi depth of 4.1 meters (13.4 feet). For comparison, in 1997 the mean Secchi depth was 4.3 meters (14.2 feet). The difference in the Secchi readings (even though the disk hit bottom every time) is due to the lake level lowering over the summer sampling period and the volunteer monitor not hitting the exact same sampling location every time.

No chemistry data was collected for Wye Lake in 1998.

Only one site visit was made by Ecology staff in 1998. During this visit (9/23/1998) there was no thermal stratification noted and the dissolved oxygen levels remained constantly high throughout the entire water column.

The volunteer monitor counted geese and/ or other waterfowl on only a few of her sampling visits between may and October.

Based on Secchi depth data, Wye Lake is classified as oligomesotrophic. However, because of the clarity of the water throughout the water column and the lack of a notable algae presence, it is possible the Secchi readings could be higher if the lake was deeper, resulting in an oligotrophic Trophic State Index.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

WYE

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
4/26/1998		17.5	15 B	6	0	1	3	5		2	4		
	Sampler:	GOLD		Remarks:	COLD WATER!								
5/10/1998		18	14.75 B	6	50	2	1	5	5	0	0	2	0
	Sampler:	GOLD		Remarks:									
5/28/1998		17	14.67 B	6	50	2	4	5	4	0	2	0	0
	Sampler:	GOLD		Remarks:	USING DIRECT COMPARISON - pH IS CLOSEST TO 6.0; USING JUDGEMENT - ABOUT 6.2.								
6/11/1998		19.5	14.42 B	6	25	2	1	5	4	0	0	0	0
	Sampler:	GOLD		Remarks:									
6/25/1998		21	14.17 B	6	75	2	3	4	4	0	2	1	0
	Sampler:	GOLD		Remarks:									
7/17/1998		23	13.92 B	6	0	1	3	4	4	0	0	0	0
	Sampler:	GOLD		Remarks:	LARGE BASS HATCH!								
8/14/1998		25	13.25 B	6	0	1	1	4	4	0	2	0	0
	Sampler:	GOLD		Remarks:									
8/27/1998		24	12.83 B	6	0	2	1	4	4	0	0	0	0
	Sampler:	GOLD		Remarks:	RAINED LAST WEEK - EVENINGS ARE COOL NOW.								
9/13/1998		24	12.5 B	6	25	2	1	5	5	0	2	0	0
	Sampler:	GOLD		Remarks:									
9/23/1998		22	12.25 B	6	50	2	1	5	5	0	0	0	0
	Sampler:	GOLD		Remarks:									

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
9/23/1998			12.25		0					0	0	0	0
	Sampler:	BELL-MCKINNON		Remarks:									
10/7/1998		20	12.25 B	6	0	2	3	5	5	0	0	0	0
	Sampler:	GOLD		Remarks:	FALL HAS FALLEN - IT'S CHILLY!								
10/21/1998		19	12.17	6	0	2	3	5	4	0	8	1	0
	Sampler:	GOLD		Remarks:	WATER TOO COLD FOR SWIMMING!								

Profile Report

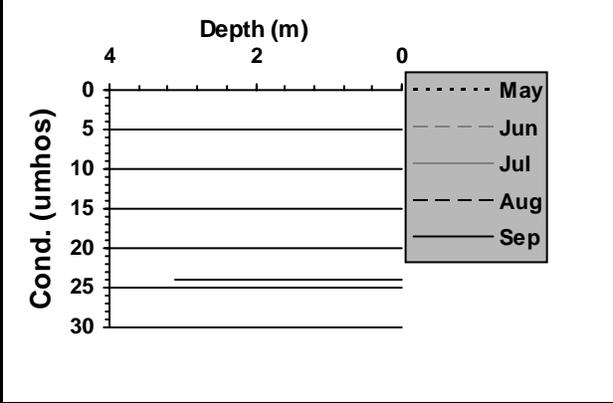
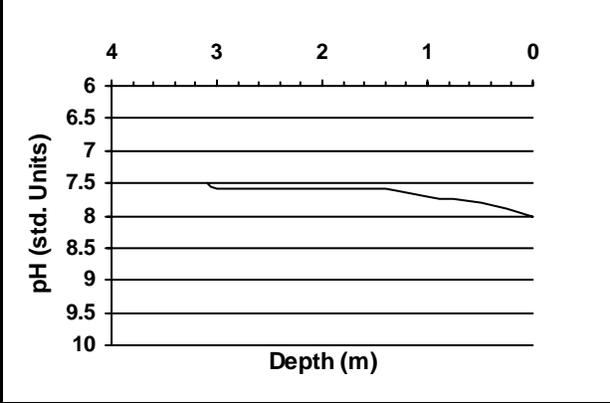
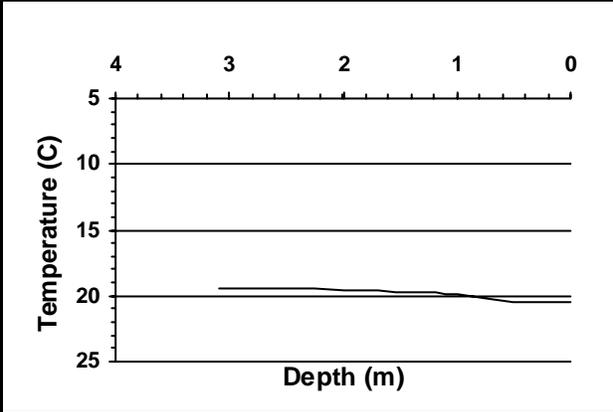
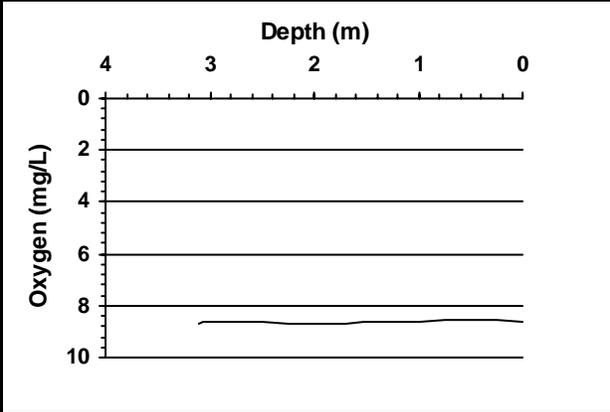
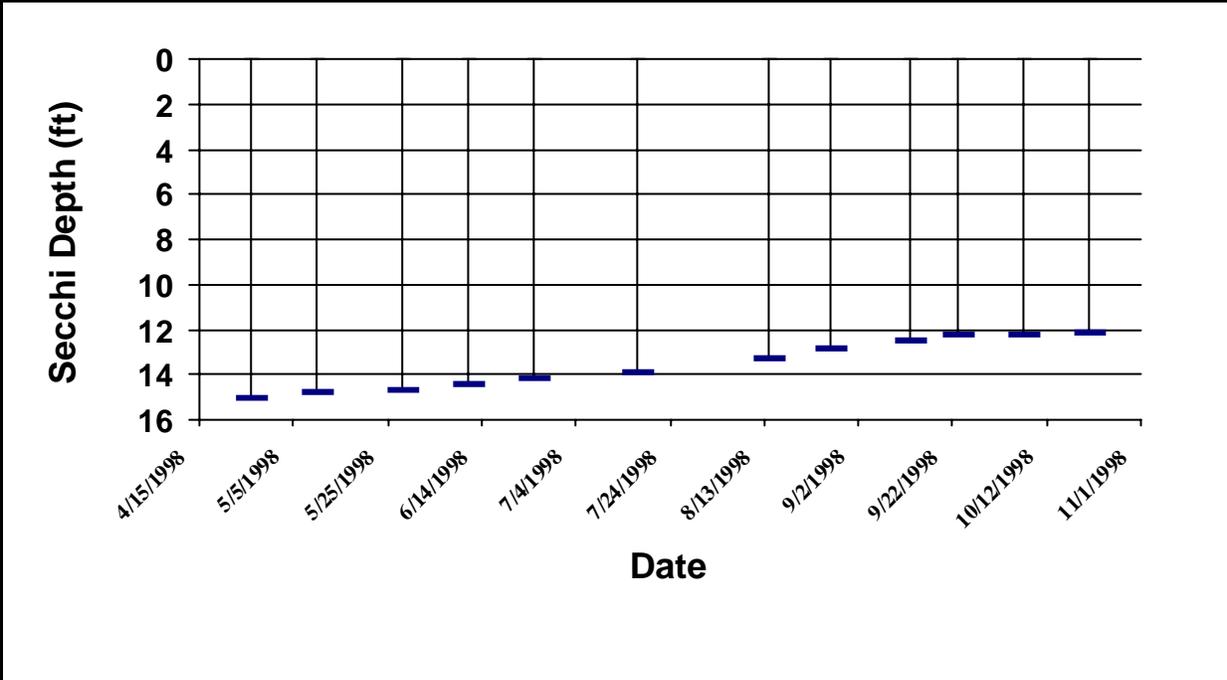
WYE

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
9/23/1998						
		0	24	8.61	8	20.5
		0.5	24	8.56	7.8	20.5
		1	24	8.62	7.7	19.9
		1.4	24	8.65	7.6	19.8
		2	24	8.68	7.6	19.6
		2.5	24	8.66	7.6	19.5
		3	24	8.66	7.6	19.5
		3.1	24	8.72	7.5	19.5

Secchi Depth and Profile Graphics

Station: 1

WYEK11



Station Information

WYEKI1

Primary Station	Station # 1	latitude: 47 25 39.8	longitude: 122 45 26.4
	Description: Deep spot of the lake.		
Secondary Station	Station # 2	latitude:	longitude:
	Description:		

Trophic State Assessment for 1999

WYE

Analyst: MAGGIE BELL-MCKINNON

TSI_Secchi:	^a 40
TSI_Phos:	31
TSI_Ch1:	
Narrative TSI:	^b OM

Summary Comments:

The general water clarity of Wye Lake was excellent in 1999. The Secchi disk hit bottom during every Secchi measurement. The Secchi depth readings ranged from 3.5 meters (11.5 feet) to 4.5 meters (14.7 feet) with a mean Secchi depth of 4.0 meters (13.3 feet). For comparison, in 1998 the mean Secchi depth was 4.1 meters (13.4 feet). The difference in the Secchi readings (even though the disk hit bottom every time) is due to the lake level lowering over the summer sampling period.

Only a few geese and no other waterfowl were seen on the lake by the volunteer monitor during her sampling visits made between May and October.

The chemistry data collected for Wye Lake showed very low levels of phosphorus in the epilimnion. This level of phosphorus indicates a low degree of productivity where algae growth is usually not a problem.

Ecology staff made two site visits in 1999. During both visits (5/27/1999 and 8/18/1999) thermal stratification was not noted and the dissolved oxygen levels remained consistently high throughout the water column.

Based on the Secchi depth data, Wye Lake is classified as oligomesotrophic. However because of the clarity of the water throughout the water column and the lack of a notable algae presence, it is possible the Secchi disk readings could be higher if the lake was deeper, resulting in an oligotrophic Trophic State Index assessment.

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Secchi Data and Field Observations

WYE

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
5/15/1999		16	14.67	2	25	3	3	5	5	3	0	1	0
	Sampler:	GOLD		Remarks: Did not use a view tube. Way too cold to swim!									
5/27/1999		20	14.5 B	2	0	1	1	5	4	0	0	0	0
	Sampler:	GOLD		Remarks: Did not use a view tube.									
6/13/1999		23.5	14	2	0	2	2	5	5	0	0	3	0
	Sampler:	GOLD		Remarks:									
6/26/1999		21	14	2	75	2	5	5	5	0	0	0	0
	Sampler:	GOLD		Remarks: Did not use a view tube.									
7/13/1999		25	13.5	2	0	3	1	5	5	0	0	0	0
	Sampler:	GOLD		Remarks: Did not use a view tube.									
7/26/1999		24	13.17	6	0	2	2	5	4	4	0	0	0
	Sampler:	GOLD		Remarks: Did not use a view tube. We have baby otters!									
8/15/1999		22.5	13	6	75	2	3	5	4	0	0	0	0
	Sampler:	GOLD		Remarks: Did not use a view tube.									
8/18/1999			11.5										
	Sampler:	GOLD		Remarks: Water was very clear-could see Secchi all the way to the bottom of lake. Only plants seen were Chara on bottom. U. inflata didn't bloom on the lake this year-usually very heavy near boat launch. Sampling day was overcast and calm.									
9/18/1999		23	12.25	6	0	1	1	5	5	0	0	0	0
	Sampler:	GOLD		Remarks: Did not use a view tube.									
10/2/1999		18	12	2	0	3	1	5	4	0	0	0	0
	Sampler:	GOLD		Remarks: Did not use a view tube.									

Profile Report

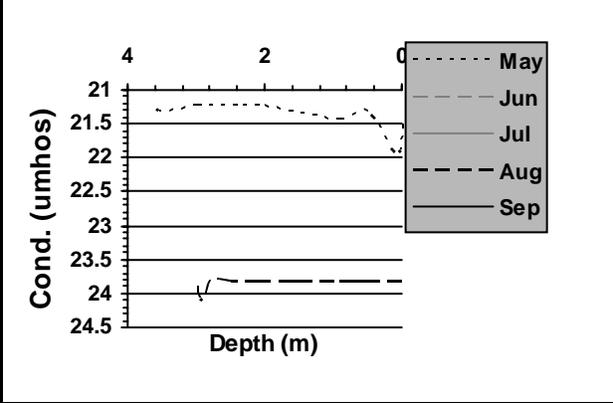
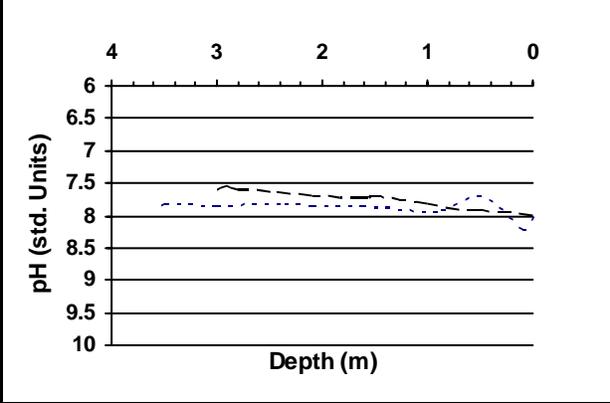
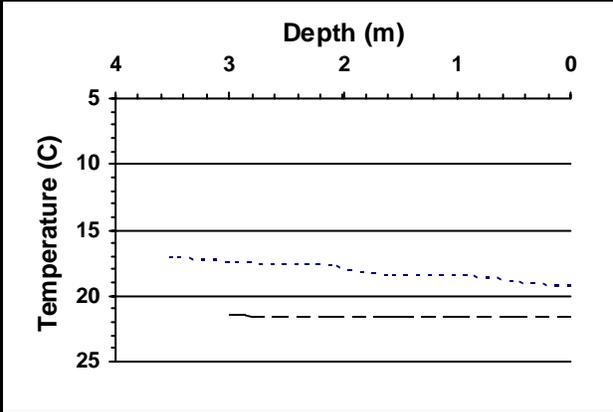
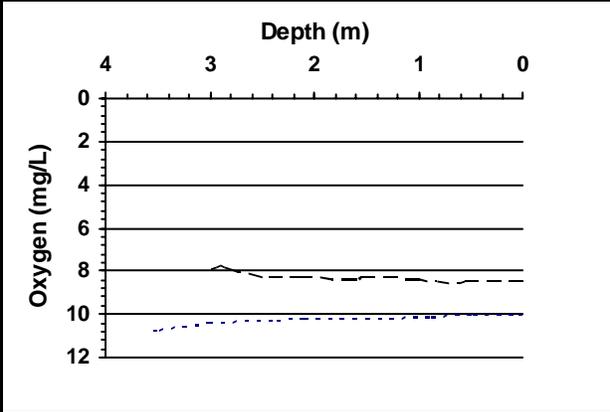
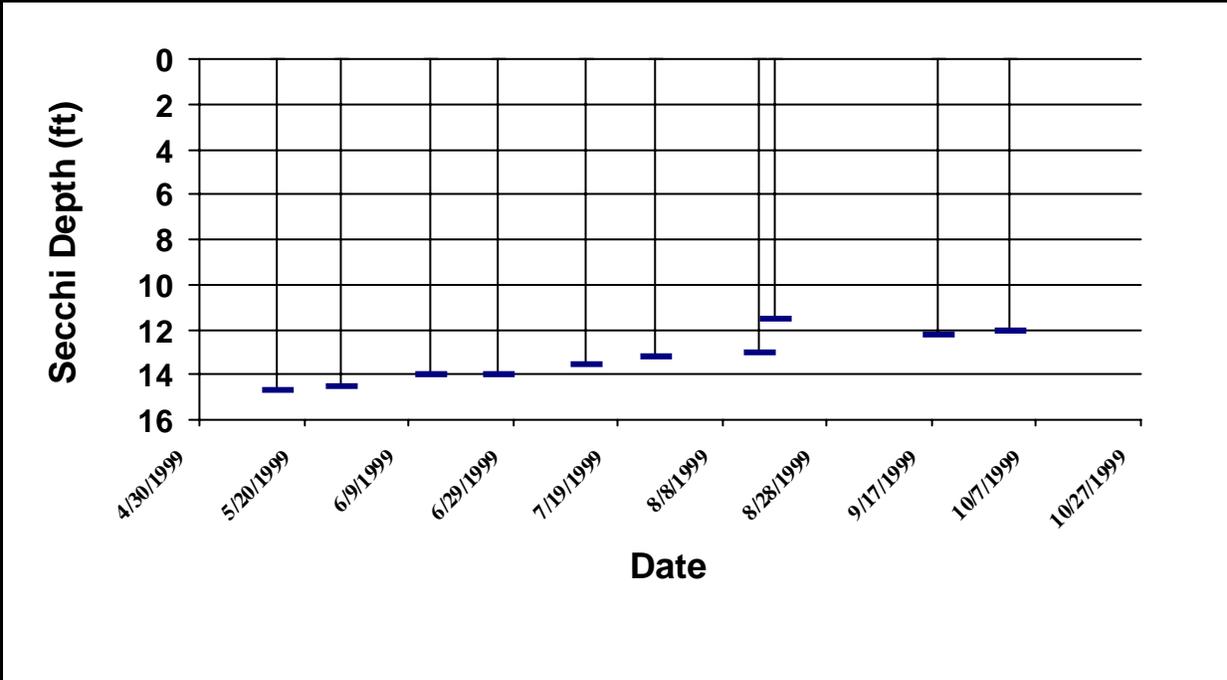
WYE

Date	Time	Depth (m)	Conductivity (ug/L)	Oxygen (mg/L)	pH (Std. Units)	Temperature (C)
Station 1						
5/27/1999						
		0	21.5	10.02	8.02	19.11
		0.1	21.9	10	8.2	19.14
		0.5	21.3	9.94	7.68	18.77
		0.9	21.4	10.12	7.91	18.44
		1.6	21.3	10.16	7.84	18.32
		2.1	21.2	10.17	7.84	17.69
		2.4	21.2	10.28	7.81	17.51
		3	21.2	10.32	7.84	17.35
		3.5	21.3	10.72	7.81	17.09
		3.6	21.2	10.59	7.85	17.2
8/18/1999						
		0	23.8	8.47	7.99	21.56
		0.5	23.8	8.39	7.88	21.57
		0.7	23.8	8.5	7.88	21.57
		1	23.8	8.3	7.79	21.57
		1.5	23.8	8.24	7.68	21.57
		1.6	23.8	8.31	7.72	21.57
		2.1	23.8	8.25	7.67	21.57
		2.5	23.8	8.22	7.62	21.57
		2.8	23.8	7.89	7.58	21.47
		2.9	24.1	7.69	7.53	21.38
		3	23.8	7.85	7.58	21.4

Secchi Depth and Profile Graphics

Station: 1

WYEK11



Appendix B

Quality Assurance/Quality Control Results for 1998 and 1999

For details on procedures for evaluating QC data see Ecology's *Lake Water Quality Assessment Project Quality Assurance Project Plan* (Hallock, 1995-draft). This appendix is an evaluation of laboratory data and Secchi data in accordance with the quality assurance project plan.

Appendix B - Quality Assurance/ Quality Control Results for 1998

Accuracy Coefficient of Variation

LAKE (COUNTY)	DATE	VOLUNTEER SECCHI	ECOLOGY SECCHI	%CV
ALICE (KING)	98/09/09	15.30	15.00	1
BLACK (STEVENS)	98/08/19	14.00	13.00	5
BLACK (THURSTON)	98/06/02	8.75	9.00	2
BLACK (THURSTON)	98/09/30	6.00	6.00	0
BOSWORTH (SNOHOMISH)	98/09/29	12.00	11.50	3
CHAMBERS (THURSTON)	98/05/14	2.00	3.50	39
CHAMBERS (THURSTON)	98/08/25	0.83	1.00	13
CLEAR (SPOKANE)	98/06/16	9.50	9.00	4
CONCONULLY (OKANOGAN)	98/08/18	22.00	19.00	10
GILLETTE (STEVENS)	98/08/19	15.00	16.00	5
HAVEN (MASON)	98/05/14	19.50	22.00	9
HICKS (THURSTON)	98/09/14	9.00	9.08	1
ISABELLA (MASON)	98/09/01	11.00	11.00	0
ISLAND (MASON)	98/09/24	22.00	23.00	3
KITSAP (KITSAP)	98/08/27	16.50	15.00	7
LACAMAS (CLARK)	98/09/08	4.67	4.50	3
LAWRENCE (THURSTON)	98/06/10	10.50	13.17	16
LAWRENCE (THURSTON)	98/08/26	10.33	11.00	4
LIBERTY (SPOKANE)	98/06/14	21.20	20.00	4
LIBERTY (SPOKANE)	98/08/10	20.46	22.44	7
LIMERICK (MASON)	98/06/04	10.25	10.25	0
LIMERICK (MASON)	98/09/24	8.66	9.50	7
LONG (KITSAP)	98/06/10	8.00	9.00	8
LOON (STEVENS)	98/06/16	28.00	24.00	11
MARTHA (LAKE MARTHA - SNOHOMISH)	98/09/28	15.25	15.50	1
MARTHA (MARTHA LAKE - SNOHOMISH)	98/10/12	14.10	14.85	4
MASON (MASON)	98/10/13	21.00	21.50	2
MCINTOSH (THURSTON)	98/06/10	8.83	8.33	4
MUNN (THURSTON)	98/06/01	6.08	5.83	3
MUNN (THURSTON)	98/08/25	3.42	2.67	17
NAHWATZEL (MASON)	98/10/07	13.50	17.00	16
OFFUTT (THURSTON)	98/06/08	9.00	10.00	7
OFFUTT (THURSTON)	98/08/26	9.50	10.00	4
OSOYOOS (OKANOGAN)	98/08/17	8.50	10.00	11
PALMER (OKANOGAN)	98/08/18	17.00	15.50	7
PATTISON-NORTH ARM (THURSTON)	98/09/14	16.00	13.00	15
PHILLIPS (MASON)	98/06/02	14.50	14.25	1
ROESIGER-SOUTH ARM (SNOHOMISH)	98/08/06	16.00	16.00	0
SAMISH-EAST ARM (WHATCOM)	98/09/28	10.50	9.25	9
SAMISH-WEST ARM (WHATCOM)	98/09/28	12.00	13.08	6
SAWYER (KING)	98/09/18	18.50	18.25	1
SPANAWAY (PIERCE)	98/06/12	10.50	10.00	3

Appendix B - Quality Assurance/ Quality Control Results for 1998

Accuracy Coefficient of Variation

LAKE (COUNTY)	DATE	VOLUNTEER SECCHI	ECOLOGY SECCHI	%CV
SPENCER (MASON)	98/06/06	19.25	18.25	4
SPENCER (MASON)	98/09/10	14.08	14.50	2
ST. CLAIR (THURSTON)	98/06/10	9.00	9.25	2
SUMMIT (THURSTON)	98/09/01	29.00	26.00	8
TAPPS (PIERCE)	98/09/17	1.08	1.17	6
THOMAS (STEVENS)	98/08/19	14.00	15.00	5
TIGER (KITSAP/MASON)	98/09/22	16.00	17.50	6
TRAILS END (MASON)	98/10/13	16.00	16.00	0
WARD (THURSTON)	98/06/01	17.50	17.00	2
WARD (THURSTON)	98/09/30	14.50	14.50	0
WILDCAT (KITSAP)	98/05/11	16.00	15.00	5
WILDCAT (KITSAP)	98/09/23	19.00	20.00	4
WOOTEN (MASON)	98/09/22	20.00	20.00	0
WYE (KITSAP)	98/09/23	12.25	11.50	4

Appendix B - Quality Assurance/ Quality Control Results for 1998
Precision Coefficient of Variation (for lakes with CV> 10%)

LAKE (COUNTY)	DATE	SECCHI 1	SECCHI 2	%CV
BLACK (THURSTON)	98/06/02	8.75	10.75	15
CHAMBERS (THURSTON)	98/05/29	3.00	3.50	11
CHAMBERS (THURSTON)	98/06/12	2.50	3.50	24
CHAMBERS (THURSTON)	98/07/10	3.00	3.50	11
CHAMBERS (THURSTON)	98/07/25	1.50	3.00	47
CHAMBERS (THURSTON)	98/08/16	2.00	3.00	28
CHAMBERS (THURSTON)	98/08/25	0.83	1.00	13
CRAWFISH (OKANOGAN)	98/05/09	8.17	9.83	13
DUCK (GRAYS HARBOR)	98/07/22	3.00	3.50	11
DUCK (GRAYS HARBOR)	98/09/14	6.00	7.00	11
LAWRENCE (THURSTON)	98/06/10	10.50	13.17	16
PATTISON-NORTH ARM (THURSTON)	98/05/31	6.00	7.00	11
PATTISON-NORTH ARM (THURSTON)	98/09/14	16.00	13.00	15
PATTISON-NORTH ARM (THURSTON)	98/10/18	12.00	9.00	20
TAPPS (PIERCE)	98/06/12	1.00	1.17	11
WENATCHEE (CHELAN)	98/08/15	23.15	18.20	17

Appendix B - Quality Assurance/ Quality Control Results for 1999

Accuracy Coefficient of Variation

LAKE (COUNTY)	DATE	VOLUNTEER SECCHI	ECOLOGY SECCHI	%CV
ALICE (KING)	6/11/99	16.50	16.00	2
ALICE (KING)	8/30/99	14.70	15.00	1
BIG MEADOW (PEND OREILLE)	6/23/99	13.00	12.50	3
BIG MEADOW (PEND OREILLE)	9/15/99	10.25	10.42	1
BLACK (STEVENS)	6/22/99	14.00	13.00	5
BLACK (STEVENS)	9/14/99	19.00	18.00	4
BOSWORTH (SNOHOMISH)	5/25/99	15.50	16.50	4
BOSWORTH (SNOHOMISH)	8/10/99	16.00	17.50	6
CLEAR (SPOKANE)	7/28/99	12.00	12.00	0
CONCONULLY (OKANOGAN)	7/27/99	11.00	13.00	12
CRAWFISH (OKANOGAN)	7/27/99	16.17	14.50	8
CURLEW (FERRY)	6/17/99	14.50	14.90	2
DEEP (STEVENS)	6/21/99	14.50	14.50	0
DEER (STEVENS)	6/14/99	32.40	31.90	1
DEER (STEVENS)	7/12/99	28.90	28.22	2
GILLETTE (STEVENS)	6/22/99	14.00	12.00	11
GILLETTE (STEVENS)	9/14/99	15.00	15.00	0
HAVEN (MASON)	5/19/99	17.00	19.00	8
HAVEN (MASON)	8/11/99	18.50	15.00	15
HICKS (THURSTON)	6/10/99	9.00	10.00	7
HICKS (THURSTON)	8/31/99	7.00	7.00	0
HORSESHOE (KITSAP)	5/17/99	17.00	15.00	9
HORSESHOE (KITSAP)	8/4/99	13.00	12.00	6
ISABELLA (MASON)	6/15/99	10.00	10.00	0
ISABELLA (MASON)	9/1/99	10.00	10.00	0
KITSAP (KITSAP)	5/18/99	20.50	19.50	4
KITSAP (KITSAP)	9/8/99	10.00	10.00	0
LACAMAS (CLARK)	6/7/99	5.50	5.50	0
LACAMAS (CLARK)	9/2/99	3.50	3.58	2
LAWRENCE (THURSTON)	6/9/99	14.00	13.00	5
LAWRENCE (THURSTON)	8/17/99	10.50	10.75	2
LELAND (JEFFERSON)	6/8/99	6.00	6.00	0
LELAND (JEFFERSON)	9/7/99	9.00	9.00	0
LIBERTY (SPOKANE)	7/28/99	8.20	9.00	7
LIMERICK (MASON)	5/12/99	12.50	11.60	5
LIMERICK (MASON)	8/23/99	14.00	13.50	3
LOON (STEVENS)	7/28/99	24.00	22.00	6
MARTHA (LAKE MARTHA - SNOHOMISH)	9/10/99	16.50	15.75	3
MASON (MASON)	5/11/99	23.00	22.00	3
MASON (MASON)	8/3/99	21.00	20.00	3

Appendix B - Quality Assurance/ Quality Control Results for 1999

Accuracy Coefficient of Variation

LAKE (COUNTY)	DATE	VOLUNTEER SECCHI	ECOLOGY SECCHI	%CV
MCINTOSH (THURSTON)	6/2/99	8.50	8.50	0
MCINTOSH (THURSTON)	8/17/99	7.50	6.00	16
MUNN (THURSTON)	6/30/99	5.67	5.75	1
NAHWATZEL (MASON)	6/16/99	19.00	19.00	0
NAHWATZEL	9/1/99	18.00	17.00	4
NEWMAN	7/29/99	5.00	4.50	7
OSOYOOS	7/27/99	12.00	13.00	6
PATTISON (NORTH ARM)	6/29/99	5.50	5.00	7
PATTISON (NORTH ARM)	9/22/99	8.00	8.00	0
PHILLIPS	5/12/99	17.50	17.50	0
PHILLIPS	9/8/99	11.50	11.50	0
ROESIGER (NORTH ARM)	5/25/99	18.00	18.00	0
ROESIGER (NORTH ARM)	8/19/99	19.00	20.00	4
ROESIGER (SOUTH ARM)	5/25/99	21.00	21.00	0
ROESIGER (SOUTH ARM)	8/19/99	19.00	19.00	0
SAMISH (EAST ARM)	8/9/99	16.50	17.00	2
SAMISH (WEST ARM)	8/9/99	17.00	18.00	4
SAWYER	6/11/99	12.00	13.00	6
SAWYER	10/1/99	17.75	16.00	7
SPANAWAY	5/28/99	7.00	7.00	0
SPANAWAY	9/24/99	15.50	15.00	2
ST. CLAIR	6/29/99	8.50	9.00	4
ST. CLAIR	8/26/99	13.00	12.50	3
SULLIVAN	6/23/99	18.00	18.00	0
SUMMIT	6/3/99	28.00	27.00	3
SUMMIT	9/24/99	23.00	23.00	0
TAPPS	6/17/99	6.50	6.00	6
THOMAS	6/22/99	13.00	13.00	0
THOMAS	9/14/99	16.50	16.00	2
TIGER	5/18/99	22.00	20.00	7
TIGER	8/18/99	15.50	18.00	11
TRAILS END (PRICKETT)	5/27/99	16.00	15.00	5
TRAILS END (PRICKETT)	8/3/99	19.33	20.00	2
WARD	6/15/99	14.50	14.00	2
WARD	9/22/99	11.00	11.00	0
WENATCHEE	7/26/99	20.50	20.00	2
WILDCAT	6/9/99	18.00	18.00	0
WOOTEN	5/19/99	20.25	19.50	3
WOOTEN	8/11/99	24.75	22.75	6
WYE	5/27/99	14.50	14.50	0
WYE	8/18/99	11.50	12.00	3

Appendix B - Quality Assurance/ Quality Control Results for 1999

Precision Coefficient of Variation (for lakes with CV> 10%)

LAKE (COUNTY)	DATE	SECCHI 1	SECCHI 2	%CV
ALICE (KING)	8/18/99	8.30	9.80	12
BOSWORTH (SNOHOMISH)	7/17/99	16.00	19.00	12
CURLEW (FERRY)	6/13/99	12.00	10.00	13
HORSESHOE KITSAP)	10/3/99	10.00	8.00	16
MCINTOSH (THURSTON)	8/17/99	6.00	7.50	16
PATTISON - NORTH ARM (THURSTON)	5/22/99	6.25	5.25	12
SULLIVAN (PEND OREILLE)	5/19/99	28.00	33.00	12

Appendix B - Quality Assurance/ Quality Control Results for 1999

1999 TOTAL PHOSPHORUS DATA

TOTAL PHOSPHOROUS LAB SPLITS											
May						August					
Lake	#1 (ug/L)	#2 (ug/L)	Mean	S	CV%	Lake	#1 (ug/L)	#2 (ug/L)	Mean	S	CV%
Haven	8.2	8.0	8.1	0.14	1.75	Lawrence	23.6	22.5	23.1	0.78	3.37
Samish	8.6	8.3	8.5	0.21	2.50	Wye	6.5	5.9	6.2	0.42	6.71
McIntosh	24.8	22.6	23.7	1.56	6.56	Limerick	16.4	16.7	16.6	0.21	1.28
Lacamas	41.2	39.2	40.2	1.41	3.52	Alice	9.3	7.9	8.6	1.01	11.81
Lawrence	21.0	18.8	19.9	1.56	7.82	Hicks	13.0	14.1	13.6	0.78	5.74
Isabella	22.4	23.1	22.8	0.49	2.18	Thomas	37.7	39.3	38.5	1.13	2.94
Deep	20.4	20.4	20.4	0.00	0.00	Sawyer	15.7	15.4	15.6	0.21	1.36
Median CV%					2.50	Median CV%					3.37

All total phosphorous lab splits fall within the acceptable limit of median CV less than 7.5%.

TOTAL PHOSPHOROUS NONSEQUENTIAL DUPLICATES											
May						August					
Lake	#1 (ug/L)	#2 (ug/L)	Mean	S	CV%	Lake	#1 (ug/L)	#2 (ug/L)	Mean	S	CV%
Haven	8.2	7.1	7.65	0.78	10.2	Samish (East Arm)	6.1	10.7	8.4	3.25	38.7
Roesiger (North Arm)	4.74	4.06	4.4	0.48	10.9	Roesiger (North Arm)	15.1	5.04	10.07	7.11	70.6
Tapps	246	72.5	159.25	122.68	77.0	St. Clair	49.5	48.6	49.05	0.64	1.3
Median CV %					10.9	Ward	7.56	11.0	9.28	2.43	26.2
Median CV %					10.9	Median CV %					32.5

All total phosphorus nonsequential duplicates do not fall within the acceptable limit of median CV less than 21%

TOTAL PHOSPHOROUS SEQUENTIAL DUPLICATES											
May						August					
Lake	#1 (ug/L)	#2 (ug/L)	Mean	S	CV%	Lake	#1 (ug/L)	#2 (ug/L)	Mean	S	CV%
Haven	7.1	7.2	7.15	0.07	1.0	St. Clair	48.6	46.6	47.6	1.41	3.0
Median CV %					0.1	Ward	11	8.82	9.91	1.54	15.6
Median CV %					0.1	Median CV %					1.5

There is no QAPP standard for total phosphorus sequential duplicates.

Appendix C

Hydrolab[®] Quality Assurance/Quality Control Results for 1998 and 1999

For details on procedures for evaluating Hydrolab[®] QC data see Ecology's *Lake Water Quality Assessment Project Quality Assurance Project Plan* (in draft) (Hallock, 1995) or see the Hydrolab[®] post-calibration results of any prior Ecology lake water quality assessment program annual report.

Appendix C - HydroLab Quality Assurance/ Quality Control Results for 1998

P = pass calibration F = fail calibration

Date	Postcalibration for	DO air calibration	pH 7	pH 10	Conductivity	Temperature
6/1/1998	Kitsap & Wildcat	P	P	P	P	P
6/2/1998	Munn & Ward	P	P	P		
6/6/1998	Black	P	P	P		
6/8/1998	Spencer	P	P	P		
6/9/1998	Offutt	P	P	P		
6/16/1998	St. Clair, McIntosh & Lawrence	P	P	P		
8/6/1998	Chambers & Haven	P	P	P		
8/17/1998	Roesiger	P	P	P		
8/18/1998	Osoyoos	P	P	P		
8/19/1998	Palmer & Conconully	P	P	P		
8/25/1998	Black (Stevens), Thomas & Gillette	F	P	P		
8/26/1998	Chambers & Munn	P	P	P		
8/27/1998	Offutt & Lawrence	P	P	P		
9/1/1998	Kitsap	P	P	P		
9/8/1998	Summit & Isabella	P	P	P		
9/9/1998	Lacamas	P	P	P		
9/10/1998	Alice	P	P	P		
9/14/1998	Loon & Clear	P	P	P		
9/17/1998	Hicks & Pattison	P	P	P		
9/18/1998	Tapps	P	P	P		
9/22/1998	Spencer & Phillips	P	P	F		
9/23/1998	Wooten & Tiger	P	P	P		

Appendix C - HydroLab Quality Assurance/ Quality Control Results for 1999

P = pass calibration F = fail calibration

Date	Postcalibration for	DO air calibration	DO field check	pH 7	pH 10	Conductivity	Temperature
5/12/1999	Mason	P	P	P	P	P	P
5/17/1999	Phillips & Limerick	P	P	P	P		
5/18/1999	Horseshoe	P	F	P	P		
5/19/1999	Kitsap & Tiger	F	F	P	P		
5/24/1999	Haven & Wooten	P	F	P	P		
5/25/1999	Samish	P	P	P	P		
5/27/1999	Bosworth & Roesiger	P	F	P	P		
5/28/1999	Trails End & Wye	P	P	P	P		
6/2/1999	Spanaway	P	P	P	P		
6/3/1999	McIntosh	P	P	P	P		
6/7/1999	Summit	P	P	P	P		
6/8/1999	Lacamas	P	P	P	P		
6/9/1999	Leland	P	P	P	P		
6/10/1999	Lawrence& Wildcat	P	F	P	P		
6/11/1999	Hicks	P	P	P	P		
6/15/1999	Alice & Sawyer	P	P	P	P		
6/16/1999	Isabella & Ward	P	P	P	P		
6/17/1999	Nahwatzel	P	P	P	P		
6/21/1999	Tapps	P	P	P	P		
6/22/1999	Deep	P	F	P	P		
6/23/1999	Black (Stevens), Thomas & Gillette	P	F	P	F		
6/29/1999	Sullivan & Big Meadow	P	F	P	P		
6/30/1999	St. Clair & Pattison	P	F	P	P		
7/1/1999	Munn	P	F	P	P		

Appendix C - HydroLab Quality Assurance/ Quality Control Results for 1999

P = pass calibration F = fail calibration

Date	Postcalibration for	DO air calibration	DO field check	pH 7	pH 10	Conductivity	Temperature
8/10/1999	Samish	P	P	P	P		
8/11/1999	Bosworth & Roesiger	P	P	P	P		
8/17/1999	Wooten & Haven	P	P	P	P		
8/18/1999	Lawrence & McIntosh	P	P	P	P		
8/19/1999	Wye & Tiger	P	P	P	P		
8/23/1999	Roesiger	P	P	P	P		
8/26/1999	Limerick	P	P	P	P		
8/30/1999	St. Clair & Pattison	P	F	P	P		
8/31/1999	Alice & Sawyer	P	P	P	P		
9/1/1999	Hicks	P	P	P	P		
9/2/1999	Isabella & Nahwatzel	P	P	P	P		
9/7/1999	Lacamas	P	F	P	P		
9/8/1999	Leland	P	P	P	P		
9/14/1999	Kitsap & Phillips	F	P	P	P		
9/15/1999	Black (Stevens), Thomas & Gillette	F	P	P	P		
9/22/1999	Big Meadow	F	F	P	P		
9/24/1999	Pattison & Ward	P	P	P	P		
10/1/1999	Summit & Spanaway	P	F	P	P		
10/7/1999	Sawyer	P	P	P	P	P	P