

Panther Lake

Panther Lake appears to be in healthy condition, with moderate water clarity, moderate levels of nutrients, and moderate aquatic plants and algae. Maintaining the health of the lake depends on controlling nutrient runoff from land development around the lake shore and the watershed.

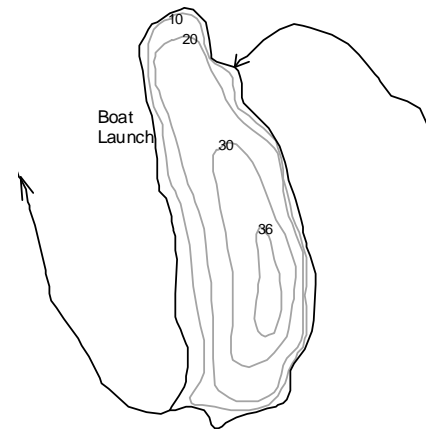


State of the Lakes Report
March 2003

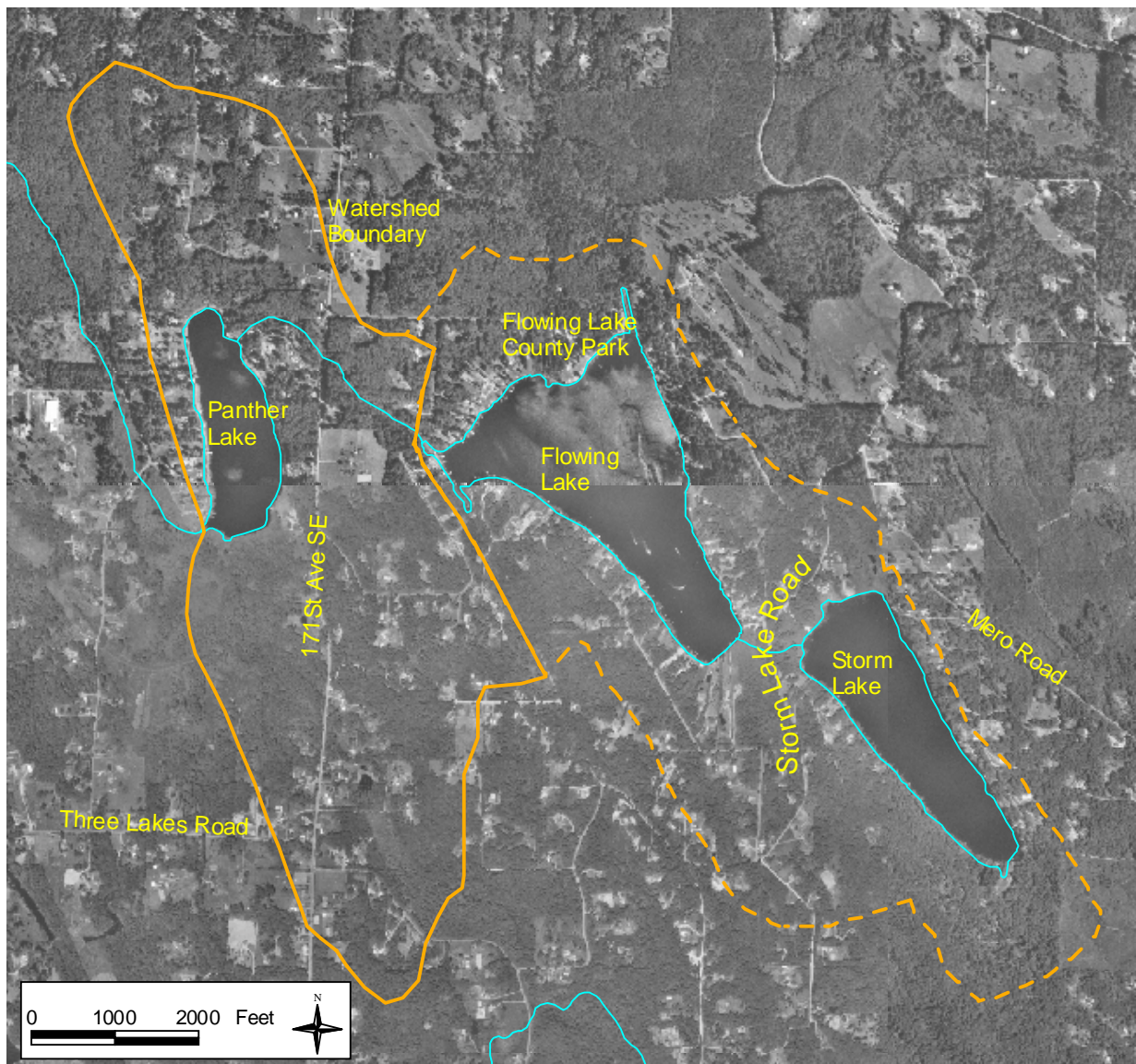
Snohomish County Public Works
Surface Water Management

LAKE AND WATERSHED DATA

Lake Area: 45 acres
 Watershed Area: 619 (1367 total area) acres
 Watershed to Lake Area Ratio: 13.8 (30.4 total area)
 Maximum Depth: 36 feet (11.0 meters)
 Average Depth: 23 feet (7.0 meters)
 Lake Volume: 1100 acre-feet
 Length of Shore: 1.3 miles



	<u>1973</u>	<u>MID-90'S</u>
# of nearshore homes	25	28
# of homes/1000' of shoreline	3.6	4.1
% of homes with bulkhead or fill		46%
% of homes with some native vegetation near shore		25%
% of watershed developed (residential or commercial)	2%	13% (est.)



LAKE ASSESSMENT

DESCRIPTION

■ Location/Access – Panther Lake, located four miles northeast of Snohomish, is the last of the “Three Lakes” chain of lakes. Storm Lake drains into Flowing Lake, which feeds Panther Lake. The outlet of Panther Lake flows into Panther Creek and the Pilchuck River. There is a public boat launch on the west side of the lake. Gas-powered boats are not permitted.

■ Size/Shape – The lake is 45 acres in size with a maximum depth of 11 meters and an average depth of 7.0 meters. The lake volume contains 1,100 acre-feet of water.

■ Watershed – The immediate Panther Lake watershed, including the lake, covers 619 acres. Adding the watersheds of Storm Lake and Flowing Lake (which drain into Panther) brings the total watershed to 1,367 acres. The immediate watershed is almost 14 times the size of the lake—slightly greater than the median for Snohomish County lakes—but the total watershed is over 30 times the size of the lake. The condition of the water flowing out of Storm and Flowing lakes and into Panther could have the potential to affect the water quality of Panther Lake. Most of the immediate lake watershed was undeveloped or forested in 1973—only 2 % contained residential uses. Residential development increased to approximately 13% by the mid-1990s.

■ Shoreline –The shoreline of Panther Lake is 1.3 miles in length. There is a large wetland at the south end that limits lakefront development. A small horse pasture is also located on the lake shore. Along the shoreline, there were 25 homes in 1973 and 28 in the mid-1990s, giving Panther one of the less developed shorelines in the county. About 46% of the nearshore homes have modified the shoreline with bulkheads or fill. Only 25% of the homes have retained some native vegetation along the shore. A zone of vegetation is important for filtering pollution.



LAKE CONDITIONS

■ Water Clarity – Summer water clarity averages in Panther Lake ranged from 2.3 to 3.3 meters from 1990 through 1999. The average water clarity has been higher—3.9 to 4.3 meters—during 2000-2002. This seems to be a shift toward improved clarity, but there is not yet evidence of a statistically significant trend, so the higher values may be within the natural range for this lake.

■ Color – The lake water is moderately colored by dissolved organic (humic) material from wetlands and from wood waste left behind when the lake served as a log storage pond. The water color is generally described as light or medium brown.

■ Nutrients – Summer average total phosphorus concentrations in the epilimnion ranged from 9 to 15 $\mu\text{g/l}$ from 1996 to 2002, which is low to moderate for Snohomish County lakes. Total phosphorus averages in the hypolimnion were higher, ranging from 19 $\mu\text{g/l}$ to 49 $\mu\text{g/l}$ from 1996 to 2002. This suggests a moderate release of phosphorus from the bottom sediments during times of oxygen depletion. Single samples from 1973 showed comparable total phosphorus values. Composite samples taken by the Department of Ecology in 1990, 1993, and 1996 showed similar values in the epilimnion and slightly lower values in the hypolimnion. These data are not directly comparable to the discrete samples discussed above, but confirm that Panther Lake has low to

moderate phosphorus levels. Total nitrogen levels were moderate when measured in 1973 and 1990-1996. This suggests that nitrogen is relatively abundant and that phosphorus availability is probably limiting algal growth.

- Alkalinity– Data from 1994 and 1995 indicate that Panther Lake has a low buffering capacity and may be sensitive to nutrient pollution.

- Oxygen/Temperature– Vertical profiles of dissolved oxygen and temperature for the summers of 1995 to 2002 show strong stratification between warm, oxygenated upper waters and cool, oxygen-depleted bottom waters. The graphs indicate that decaying organic matter in the lake bottom depletes dissolved oxygen in the water below about 7 meters by mid summer and below 4 meters by late summer. Two measurements in 2000 showed spikes in dissolved oxygen at 3 to 4 meters depth, suggesting vigorous algal growth at this level.

- Algae– Chlorophyll *a* samples from the summers of 1993 to 1996 produced values from 1.5 to 13.2 µg/l. Four samples in 2002 averaged 2.9 µg/l. These data suggest moderate production of algae in the lake. Analysis of three algae samples in 1994 and 1995 revealed moderate to high biovolumes dominated by gold-brown/diatoms in late summer and by cryptomonads in the July sample. Blue-green algae, which are responsible for most nuisance algal blooms, were generally limited in these samples.

- Aquatic Plants– Panther Lake supports moderate to dense growths of aquatic plants, mainly along the west and south shores. Steeper slopes, coupled with the lake’s moderate water color, limit the habitat for aquatic plants on the east shore. In all locations, the dominant aquatic plant is the non-native fragrant water-lily. Other plants include elodea, bladderwort, pondweeds, and yellow water-lily.

SUMMARY

- Trophic State– Based on moderate water clarity, low to moderate phosphorus concentrations, hypolimnetic oxygen depletion, and moderate amounts of algae and aquatic plants, Panther Lake may be classified as mesotrophic.

- Current Conditions/Trends– Panther Lake appears to be in healthy condition. Monitoring data have not revealed any statistically significant trends in water quality since 1990, although water clarity may be improving.

- Future Concerns/Targets– The primary concern for Panther Lake is the potential for negative water quality impacts if significant development occurs in the watershed or around the lake shore. Maintaining current water clarity and phosphorus levels is the target for the lake.

- Recommendations– The lake should be monitored to identify any changes in water clarity, nutrient levels, or algal blooms. New development in the watershed and on the lake shore should take precautions to control runoff and reduce nutrient pollution.

CITIZEN VOLUNTEERS

Thanks to Ken Chisholm, Charles Gilbert, and Jeff Onstad for volunteer monitoring of Panther Lake.

DATA SUMMARY TABLE

Source	Date	Secchi Depth (meters)	Total Phosphorus (ug/l)		Color (Pt-Co scale)	Chlorophyll a (ug/l)
			Surface	Bottom	Epilimnion	Epilimnion
Bortleson, et al, 1976	8/3/73	2.1	13	51	35	-
DOE	Summer 1990	1.8 - 2.7 (2.3) n = 8	-	-	-	-
Volunteer	Summer 1992	2.5 - 3.6 (3.1) n = 4	-	-	-	-
DOE	Summer 1993	-	-	-	-	1.5 - 4.7 (3.1) n = 2
SWM Staff	Summer 1994	3.1 - 3.5 (3.3) n = 2	-	-	25 (25) n = 2	3.5 - 5.3 (4.4) n = 2
SWM Staff or Volunteer	Summer 1995	2.3 - 3.1 (2.6) n = 12	-	-	35	7.1
SWM Staff, Volunteer or DOE	Summer 1996	2.1 - 4.0 (3.0) n = 7	8 - 10 (9) n = 2	15 - 23 (19) n = 2	-	3.7 - 13.2 (8.5) n = 2
SWM Staff or Volunteer	Summer 1997	2.3 - 3.2 (2.5) n = 5	14 - 15 (15) n = 2	22 - 49 (36) n = 2	-	-
Volunteer	Summer 1998	2.1 - 2.8 (2.4) n = 4	6 - 18 (13) n = 4	30 - 75 (49) n = 4	-	-
SWM Staff or Volunteer	Summer 1999	2.3 - 3.0 (2.5) n = 4	11 - 17 (13) n = 4	26 - 77 (42) n = 4	-	-
SWM Staff	Summer 2000	3.3 - 4.6 (3.9) n = 4	4 - 14 (9) n = 4	8 - 46 (24) n = 4	-	-
SWM Staff	Summer 2001	3.4 - 4.8 (3.9) n = 4	6 - 29 (15) n = 4	18 - 44 (32) n = 4	-	-
SWM Staff or Volunteer	Summer 2002	3.1 - 5.2 (4.3) n = 21	9 - 14 (11) n = 4	14 - 49 (30) n = 4	-	0.5 - 3.7 (2.9) n = 4

NOTES

- Table includes summer (May-Oct) data only.
- Each box shows the range on top, followed by summer average in () and number of samples (n).
- Total phosphorus data are from samples taken at discrete depths only.

SUMMARY OF OTHER DATA

■ **Total Phosphorus** – composite samples taken by the Department of Ecology in 1990, 1993, and 1996 ranged from 11 -- 23 µg/l in the epilimnion and 9 -- 24 µg/l in the hypolimnion. These are not directly comparable to the discrete samples shown above, but confirm that Panther has moderate phosphorus levels.

■ **Total Nitrogen** – single samples in 1973 showed 0.40 mg/l in the epilimnion and 0.66 mg/l in the hypolimnion with high (0.50 mg/l) ammonia near the lake bottom; 1990-1996 Ecology data averaged 0.46 in the epilimnion and 0.47 mg/l in the hypolimnion; these data suggest that nitrogen is abundant and does not limit algal growth.

■ **Alkalinity** – data from 1994 and 1995 ranged from 14 -- 23 mg/l CaCO₃, which suggests that Panther has a low buffering capacity and may be sensitive to nutrient pollution.

■ **pH** – readings from 1994 through 2000 averaged 7.2 near the surface and 6.2 near the bottom, with occasional peaks to 8.6 during algal blooms. Readings from 2001-2002 were similar.

■ **Conductivity** – 1994-2000 data averaged 43 µmhos in the epilimnion and 72 µmhos near the lake bottom, indicating moderate levels of dissolved materials in the water. Readings from 2001-2002 were similar.

■ **Iron** – limited 1994-95 data showed high levels in the epilimnion (avg. 173 µg/l) and the hypolimnion (avg. 1110 µg/l, high of 1700 µg/l), which indicates release of iron and phosphorus from the bottom sediments under low oxygen conditions.

■ **Algae** – the following table shows the total biovolume and percent biovolume of the main types of algae from three samples collected in 1994-95. The data show that the total algal volumes were relatively high and that gold-browns/diatoms and cryptomonads were most prevalent. Cell counts of the same samples revealed a similar pattern of abundance.

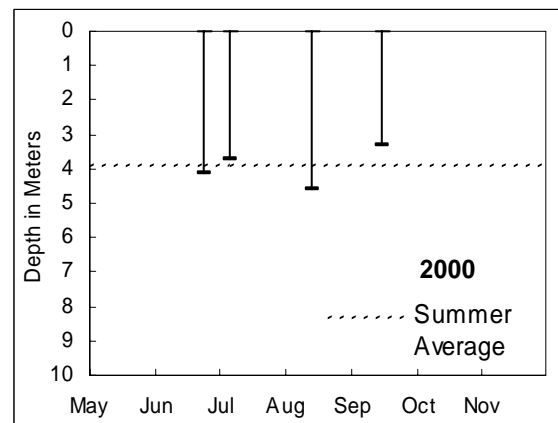
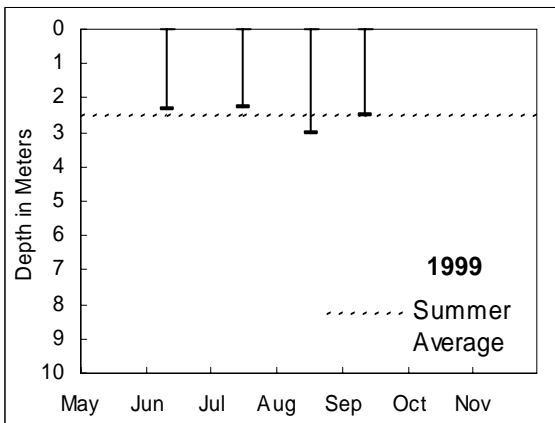
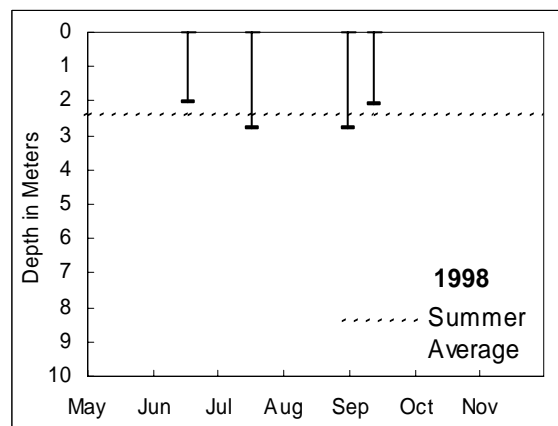
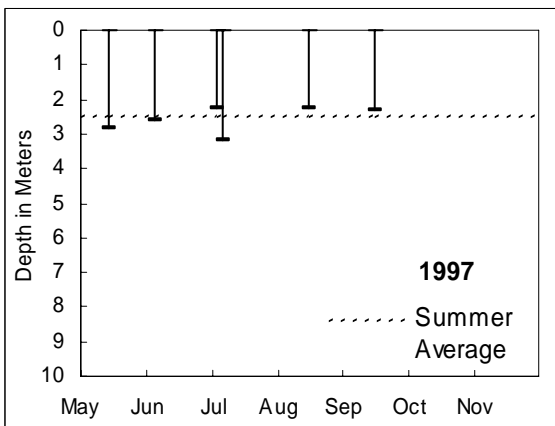
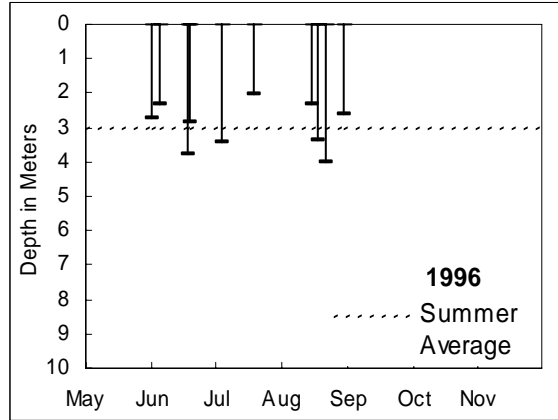
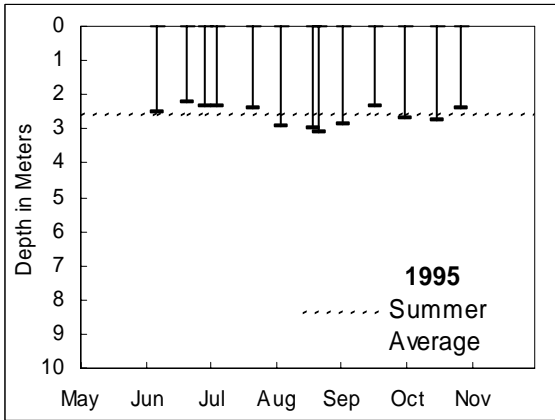
ALGAE TYPES	7/11/94	9/8/94	8/23/95
Cyanophyta (Blue-greens)	0%	0%	5%
Chlorophyta (Greens)	5%	10%	11%
Chrysophyta (Golden/diatoms)	21%	56%	77%
Cryptophyta (Cryptomonads)	69%	7%	5%
Euglenophyta (Euglenoids)	0%	4%	0%
Pyrrhophyta (Dinoflagellates)	5%	22%	1%
TOTAL BIOVOLUME (mm ³ /l)	2.812	1.092	1.996

■ **Fish** – according to the Washington State Department of Fish and Wildlife (WDFW), fish species found in Panther Lake include rainbow trout, largemouth bass, black crappie, pumpkinseed sunfish, and brown bullhead catfish. WDFW usually stocks the lake each year with rainbow trout.

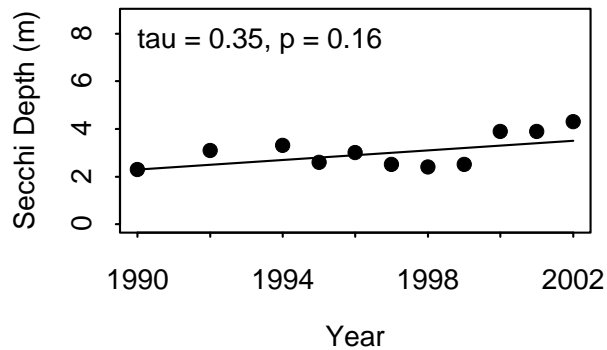
DATA SOURCES

In addition to data from Snohomish County SWM staff and citizen volunteers, data for Panther Lake are also available from: Bortleson, et. al., 1976 and Rector, 1996. Please refer to the full list of references in the County-Wide Summary.

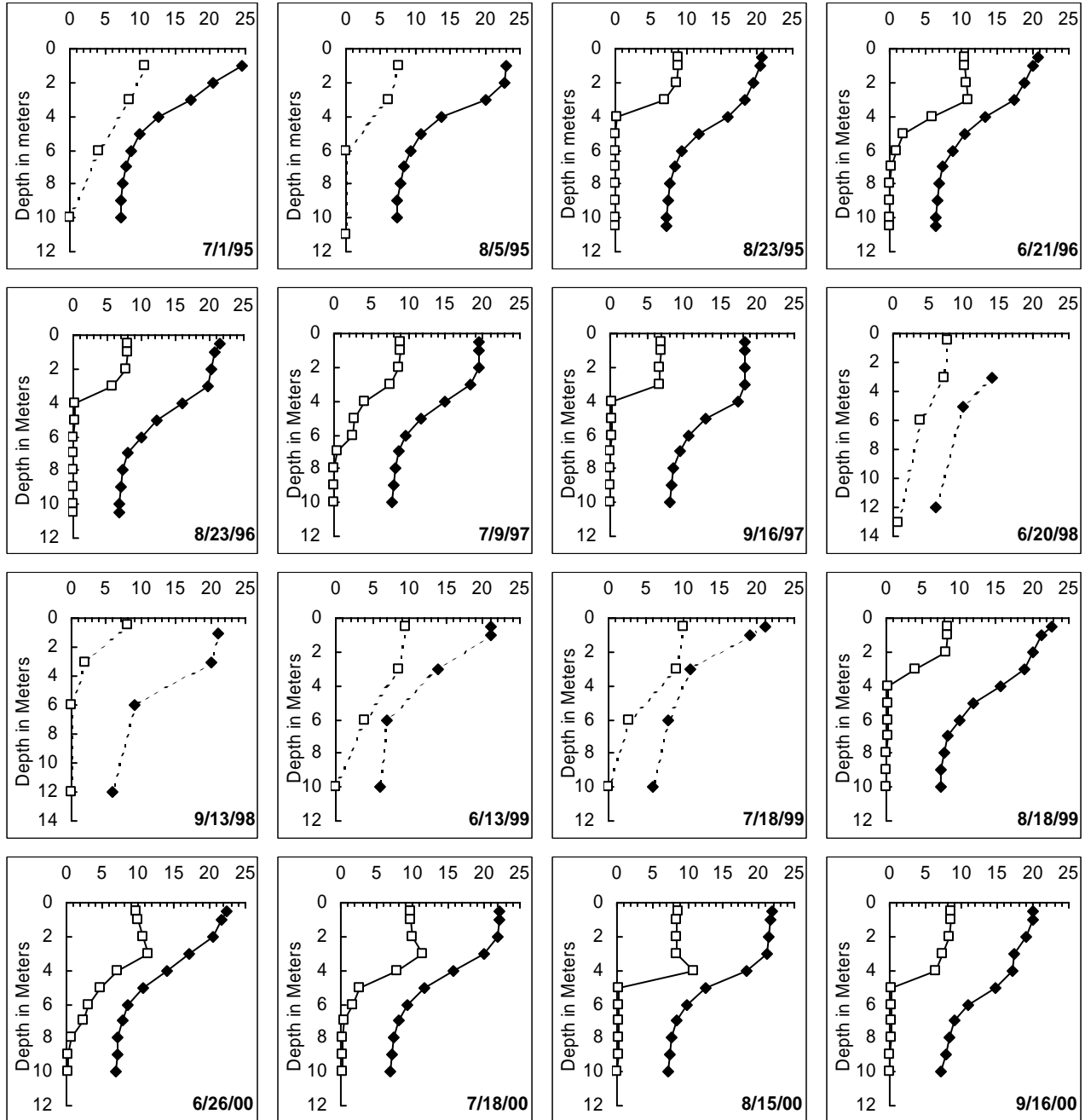
WATER CLARITY



TREND ANALYSIS



DISSOLVED OXYGEN AND TEMPERATURE PROFILES (SELECTED YEARS)



—□— DO (mg/l) —◆— Temp (°C)

AQUATIC PLANTS



Area	Density	Dominant Plants	Other Plants
A	Dense	<i>Nymphaea odorata</i> (Fragrant water-lily)	<i>Elodea canadensis</i> (Common elodea) <i>Utricularia vulgaris</i> (Common bladderwort) <i>Potamogeton amplifolius</i> (Large-leaf pondweed) <i>Potamogeton sp.</i> (Thin-leaf pondweed) <i>Nuphar polysepalum</i> (Yellow water-lily)
B	Moderate	<i>Nymphaea odorata</i> (Fragrant water-lily)	<i>Elodea canadensis</i> (Common elodea) <i>Utricularia vulgaris</i> (Common bladderwort) <i>Potamogeton amplifolius</i> (Large-leaf pondweed) <i>Potamogeton sp.</i> (Thin-leaf pondweed) <i>Nuphar polysepalum</i> (Yellow water-lily) <i>Nitella sp.</i> (Brittlewort)
C	Patchy	<i>Nymphaea odorata</i> (Fragrant water-lily)	<i>Elodea canadensis</i> (Common elodea) <i>Utricularia vulgaris</i> (Common bladderwort) <i>Potamogeton amplifolius</i> (Large-leaf pondweed) <i>Potamogeton sp.</i> (Thin-leaf pondweed) <i>Nuphar polysepalum</i> (Yellow water-lily)

Note: *Typha sp.* (Cattail) is found around the lake shore.

BASIC MONITORING DATA

1995									
DATE	Secchi Depth (meters)	Temp (C)	Temp (C)	Level (in)	Clouds (%)	Rain	Wind	Color	COMMENT
6/9/1995	2.5	23	22	8	90	none	calm	medbrown	Slight algae. 20 geese, 50-60 ducks.
6/23/1995	2.3	19	20	8	10	trace	light	lt brown	Slight algae. 17 geese & 4 ducks.
7/1/1995	2.4	29	25		0	none	calm	lt brown	Slight algae. 15 geese & 4 ducks.
7/7/1995	2.4	20	21	8	90	light	light	lt brown	Slight algae. 17 geese & 5 ducks.
7/23/1995	2.4	19.5	20	7	75	none	light	lt brown	Slight algae. 12 geese & 6 ducks.
8/5/1995	3.0	16	22.5	6	100	none	breezy	lt brown	Slight algae. 4 geese & 10 ducks.
8/20/1995	3.0	21.5	21	11	10	heavy	light	lt brown	Slight algae. 8 ducks & 16 geese.
*08/23/95	3.1				90	none	breezy	dk brown	Some scum (algae? oil?) near boat launch. Nymphaea thicker and extending farther out than in previous years (per Wayne).
9/3/1995	2.9	23	22.5	9	50	none	light	dk brown	Slight algae. 11 ducks & 16 geese.
9/17/1995	2.4	19	20	8	100	none	breezy	dk brown	Slight algae. 3 ducks & 16 geese. Beer cans and plastic bag floating in the lake.
10/1/1995	2.7	15	18	10.5	100	heavy	calm	lt brown	Slight algae. 5 ducks.
10/16/1995	2.8	13	13.5	15.5	100	heavy	breezy	grn brown	Slight algae. 10 ducks & 18 geese.
10/27/1995	2.4	8	9.5	15	100	heavy	calm	grn brown	44 geese, 22 ducks. Slight algae.
11/12/1995	2.0	8.5	8.5	17.5	100	heavy	light	dk brown	No scum, plants, odor; slight algae; 34 geese, 22 ducks. Horses standing in lake on south end.
11/27/1995	2.2	11	9	21	100	heavy	strong	dk brown	Slight algae, no scum, odor, plants. 21 geese, 46 ducks. Highest water level ever seen!

1996									
DATE	Secchi Depth (meters)	Air Temp (C)	Water Temp (C)	Lake Level (in)	Clouds (%)	Rain	Wind	Color	COMMENT
6/8/1996	2.3	14	18	20	25	none	breezy	lt brown	3 deer on south home lawn, 4 fishing boats. No algae, scum, odor, slight plants (waterlily).
*06/21/96	3.8				25	none	light	grn brown	Nymphaea dominant - many large patches, some large-leaf pondweed.
6/22/1996	2.9	14	19	22	100	none	light	grn brown	4 boats - 11 fishermen. No algae, scum, odor, moderate water lilies.
7/6/1996	3.5	16	20	24	0	light	light	lt brown	3 fishing boats - 6 swimmers. No algae, scum, odor, moderate water lilies. 5 ducks.
7/21/1996	2.1	18	19.5	22.5	50	moderate	light	grn brown	4 boats, 7 fishermen
8/17/1996	2.3	14	21	27	100	none	calm	ltbrown	No fishermen.
*08/23/96	4.0				0	none	light	yelbrown	
8/31/1996	2.6	16	21	28.5	75	light	light	lt brown	No boats, no fishermen.

Non-summer data indicated by shading.

*Indicates data collected by Snohomish County staff.

1997									
DATE	Secchi Depth (meters)	Air Temp (C)	Water Temp (C)	Lake Level (in)	Clouds (%)	Rain	Wind	Color	COMMENT
5/18/1997	2.9	17	21	22	0	none	calm	other	No algae, scum or odor, slight aquatic plants. 3 geese. 4 boats, 10 land fishermen.
6/8/1997	2.7	14	19	22	50	trace	light	lt green	No algae, scum or odor. Moderate plants (lily pads). 4 geese, 5 ducks. 4 boats, 8 fishermen, 10 shore fishermen.
7/6/1997	2.3	17	21	26	100	mod	breezy	lt brown	Moderate plants - lilies. 10 geese, 6 ducks.
*07/09/97	3.2				50	mod	breezy	medbrown	
8/17/1997	2.3	23	25	26	0	none	calm	lt brown	moderate water lilies. 6 ducks, 10 geese.
*09/16/97	2.3				100	mod	breezy	medbrown	nuphar. Fall conditions.

1998									
	Secchi D (m)	Air T (C)	Water T (C)	Lake L I (in)	Clouds	Rain	Wind	Color	COMMENT
6/20/1998	2.2		19		25	trace	light	lt brown	No algae, scum or odor; slight water Lilies; 20 geese; 3 ducks.
7/19/1998	2.8	20	26	23	90	trace	light	lt brown	Temp. taken @ 11m = 6; DO taken @ 9m = 0.8; no algae, scum or odor; mod. water lilies; 3 ducks.
9/1/1998	2.8	21	24	28	25	none	calm	lt brown	No algae, scum or odor; moderate water lilies.
9/13/1998	2.2	17	21	31	50	none	light	lt brown	No algae, scum or odor; slight water lilies.

1999									
DATE	Secchi Depth (meters)	Air Temp (C)	Water Temp (C)	Lake Level (in)	Clouds (%)	Rain	Wind	Color	COMMENT
6/13/1999	2.3	24	21		75	trace	calm	lt brown	
7/18/1999	2.3	18	21	21	90	moderate	light	lt brown	
8/18/1999	3	21	22.6		25	none	calm	dk brown	Abundant Nymphaea.
9/12/1999	2.5	22	20		0	none	breezy	lt green	

2000									
DATE	Secchi D (meters)	Air T (C)	Water T (C)	Lake L I (in)	C (%)		Wind	Color	COMMENT
*06/26/00	4.1	24	22.31		0	none	light	medyelbrn	2 ducks, slight algae and aquatic plants, and no algae scum.
*07/08/00	3.7	15	22.25		75	none	light	lt green	Slight algae, no algae scum, and moderate aquatic plants.
*08/15/00	4.6	20	21.8		25	none	light	medyelbrn	No ducks, slight algae and aquatic plants, and no algae scum.
*09/16/00	3.3	22	20.04		75	none	light	med brown	Lots of zooplankton. 5 ducks, moderate algae, no algae scum, and slight aquatic plants.

[Click here to view more recent data.](#)

HOW YOU CAN HELP PANTHER LAKE

- Educate yourself about lake ecology and the lake's health.
- Use lawn and garden fertilizers sparingly; test your soil first; choose low or no phosphorus fertilizers.
- Retain or plant native vegetation adjacent to the water to protect the shoreline and filter pollution.
- Infiltrate or filter the runoff from rooftops, patios, and driveways rather than piping it to the lake.



- Cover or mulch bare soil areas.
- Use pesticides, herbicides, and household chemicals sparingly and never near the water.
- Maintain your septic system—have it inspected every two years and pumped when needed.
- Conserve water both inside and outside.
- Clean up pet wastes and keep livestock away from the lake shore.

- Learn to identify non-native invasive aquatic plants and animals; check your boat and trailer for invaders; never empty an aquarium into the lake.
- Do not feed geese or ducks.
- Join with neighbors or the local property owners' association to work together to protect the lake.



Contact Snohomish County Surface Water Management at 425-388-3464 for information about these topics or if you have questions about Panther Lake.

(TTY users call 425-388-3700)