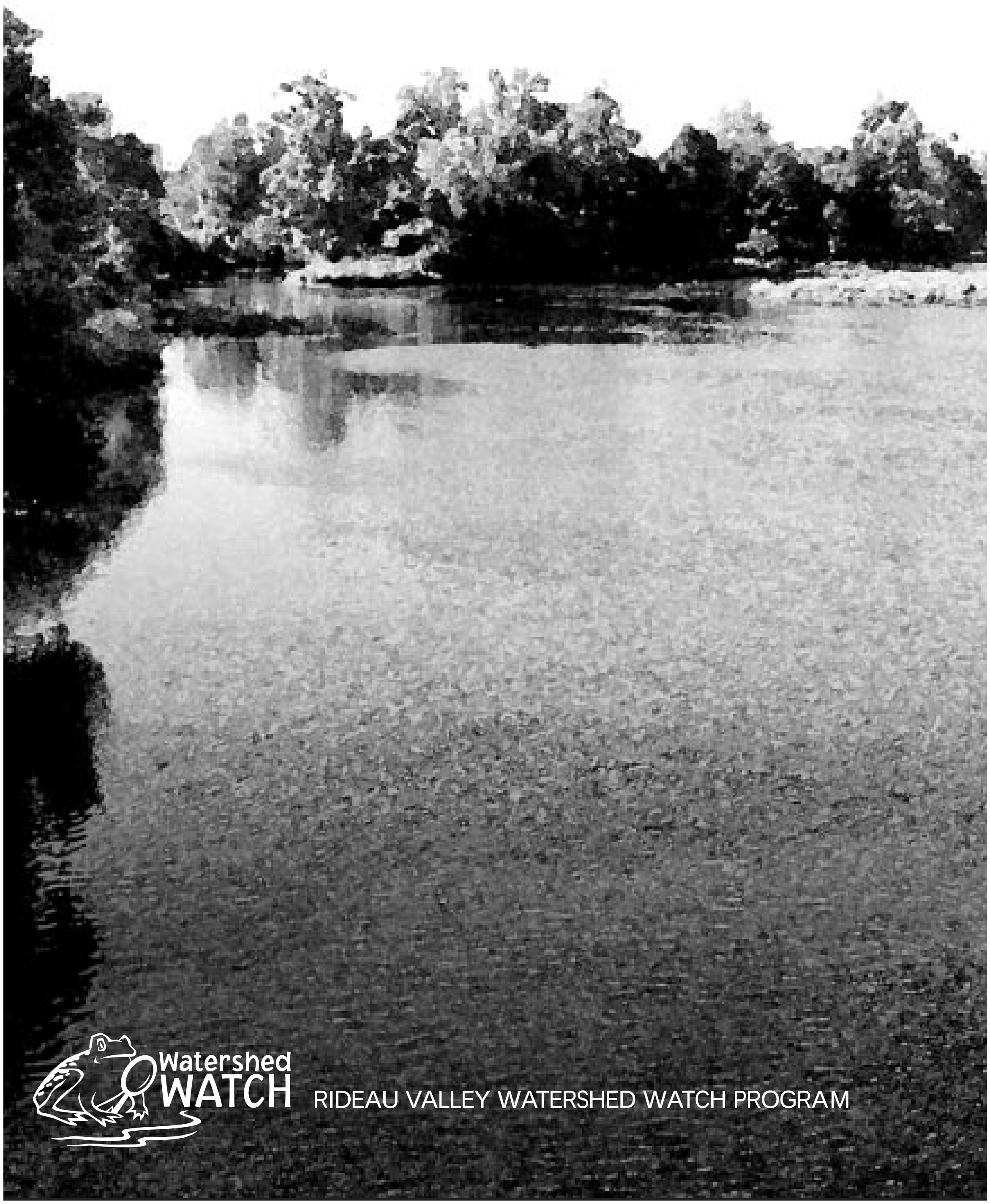
STATE OF THE

LAKE ENVIRONMENT REPORT-2001



RIDEAU VALLEY WATERSHED WATCH PROGRAM

THE ONTARIO TRILLIUM FOUNDATION
LA FONDATION TRILLIUM DE L'ONTARIO

FENDOCK

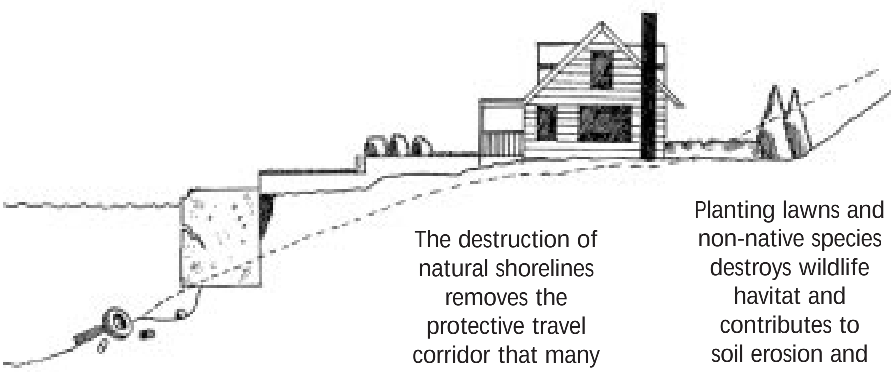
RIDEAU VALLEY
CONSERVATION AUTHORITY

Lanark
COMMUNITY STEWARDSHIP COUNCIL OF LANARK COUNTY

- Alliance of Rideau Lakes Associations
- Big Rideau Lake Association
- Farren Lake Property Owners Association
- Rideau Valley Conservation Foundation and its many donors
- Township of Bathurst Burgess Sherbrooke

"The Ribbon of Life"
Where the Land Meets the Water

Water quality is affected by many things: natural processes of erosion and runoff accelerated by clearing of shorelines, the use of artificial fertilizers and leachate from sewage disposal systems. All result in too many nutrients reaching the lake.



Retaining walls destroy littoral zones. Waves deflected off retaining walls, stir up contaminated sediments and destroy vegtation.

The destruction of natural shorelines removes the protective travel corridor that many species rely on in their journeys between land and water.

Planting lawns and non-native species destroys wildlife havitat and contributes to soil erosion and a reduction in water quality.

Too many nutrients causes profuse weed and algae growth which affects the aquatic animal species makeup by altering habitat and food sources and by reducing oxygen and light penetration.

The shallow waters and first ten metres of shoreland area form a "Ribbon of Life" around lakes. This ribbon- where the land meets the water - is where much of the lake life is born, raised and fed. Many landowners, unaware of the importance of this area, have cleared the shorelines of native vegetation and replaced it with lawns, non-native ornamental vegetation, retaining walls and boathouses. This has a negative effect on fish and wildlife habitat and water quality. Natural vegetation retained or restored along the shoreline helps prevent erosion and improves water quality by binding nutrients before they can enter the lake.

The Rideau Valley Conservation Authority has long recognized the recreational and aesthetic value of lakes within the watershed and is committed to maintaining and protecting water quality and fish habitat. The Conservation Authority has joined together with volunteer Lake Stewards throughout the watershed to take steps to protect and restore water quality by launching the Watershed Watch program. Watershed Watch is an environmental monitoring and awareness program. The objectives of the program are to collect reliable environmental data to document current water quality conditions and use the data as an essential educational tool to encourage shoreline residents, both seasonal and permanent, to become personal stewards of their lake and to adopt sound stewardship practices aimed at preserving and protecting water quality. By taking an active role in restoring and enhancing their shoreline, they can help to maintain water quality and a healthy lake environment.

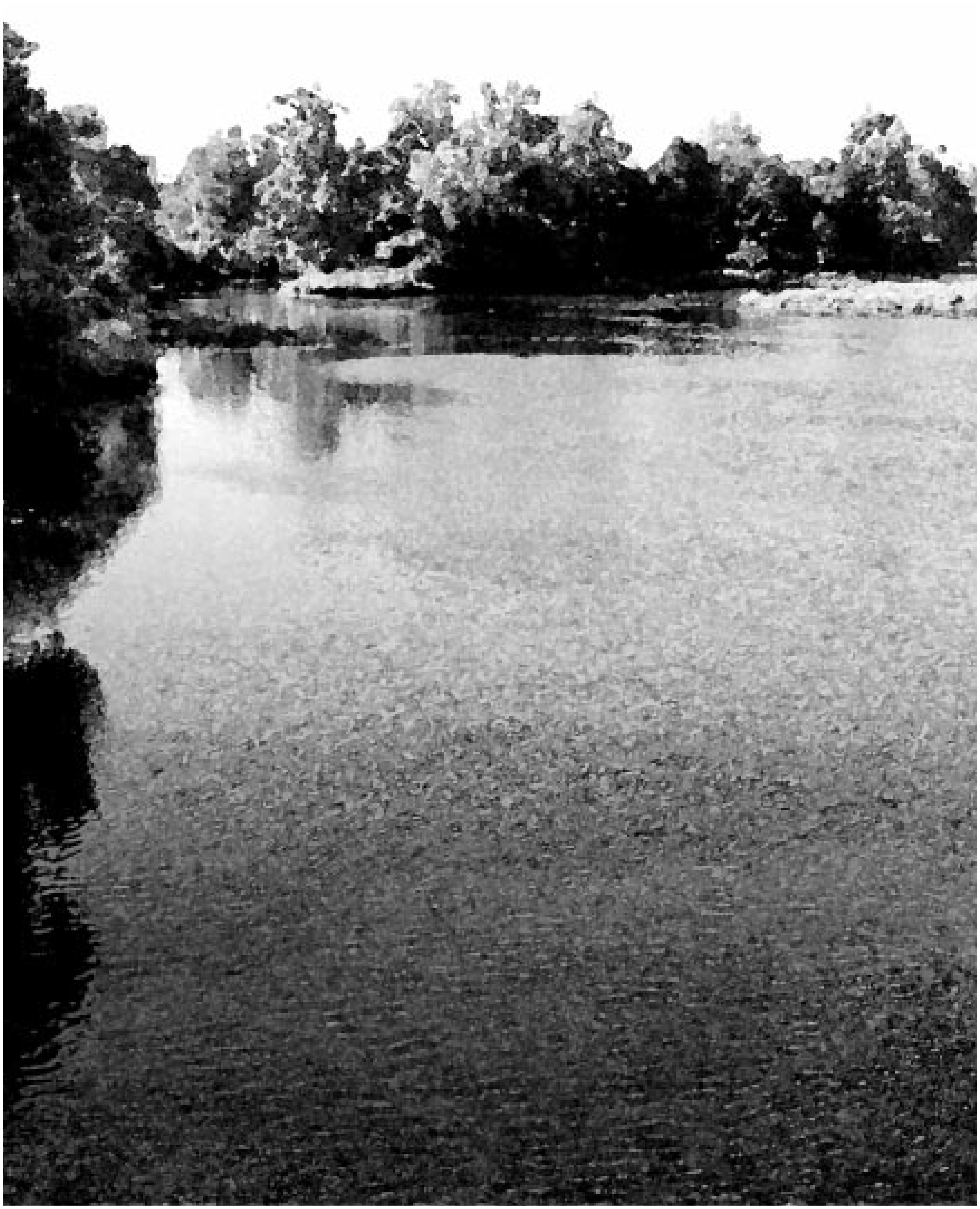
Recreational water quality can be expressed in terms of how clear the water appears. Water clarity is influenced by the amount of soil sediment and phytoplankton, or microscopic algae, present in the water. Clarity is measured by a simple visual test using a **Secchi Disk**, a 20 centimetre black and white disk attached to a measured line that is lowered into the lake until it is no longer visible. Analysis of water samples for **chlorophyll** a, which provides the green pigment in phytoplankton, gives a more specific measure of the abundance of small creatures in the water. Another perspective is gained through analysis of samples for nutrients, particularly **phosphorus** but also **nitrogen**, which tells how much food is available for the algae and aquatic plants. In the late summer when the algae drops to the bottom of the lake, its decomposition uses oxygen so, to find out how much oxygen is available for fish and other aquatic animals, **dissolved oxygen and temperature** profiles are done.

These tests combine to give an indication of the Aage@ of a lake and what can be expected. An Aold@ or **eutrophic** lake will have profuse plant growth and relatively few fish species because of the lack of open water and the competition for oxygen. A Amiddle-aged@ or mesotrophic lake will support the greatest diversity of fish species with a variety of habitats and sufficient oxygen available. AYoung@ or **oligotrophic** lakes have very little or no vegetation and are usually well oxygenated but will have relatively few fish species.

While lake users are interested in how weedy a lake is and what kind of fishing stories they can experience, they also want to know if the water is safe for drinking and swimming. Eschericia coli **(E.coli.)** are in a family of fecal coliform bacteria common to warm-blooded mammals. A few members of the family are harmful themselves but E.coli. are also a good indicator of the presence of pathogenic or other hazardous bacteria because where there is E.coli., the others will usually be present. Analysis of water samples for E.coli., which is relatively more abundant and easier to count than the other organisms, gives an indication of problems with leaking septic systems or other sources of contamination.

Through WATERSHED WATCH, lakes in the watershed will be monitored for these key water quality indicators. Knowing what is in the water will assist the lake stewards when devising a strategy to protect the Ribbon of Life which will reduce the human impact on the aging process and ensure that our lakes will endure for future generations to enjoy.

Davern Lake



DAVERN LAKE - 2001

LOCATION:	Township of Bathurst Burgess Sherbrooke – drains to the Tay River upstream of Christie Lake
ELEVATION:	lake surface approximately 175 metres above mean sea level
DIMENSIONS:	perimeter: 4.45 kilometres; maximum depth: 25.1 metres.; area: 53.2 hectares
LAKE WATERSHED:	drainage area: 290 hectares
FISHERY:	warm water fishery - northern pike, walleye, bass.
DEVELOPMENT LEVEL:	17 cottages, one camp
BACKGROUND DATA:	Ministry of Environment Self-Help and Lake Partner Programs (1980-2001); Ministry of Environment Recreational Lakes Program (1980) - total phosphorus, chlorophyll a, secchi disk, dissolved oxygen profiles

The sampling component of the Watershed Watch program consisted of the following:

SITES:	one site at deepest point of lake and around shoreline adjacent to cottage groupings (see map)
TOTAL PHOSPHORUS (TP):	samples from deepest point at the surface and one metre above the bottom; at three shoreline sites at approximately half metre depth in one metre of water
TOTAL KJELDAHL NITROGEN (TKN):	samples from deepest point at the surface and one metre above the bottom; at three shoreline sites at half metre depth in one metre of water
SECCHI DISK:	at deepest point – measurement is depth where disk can no longer be seen
DISSOLVED OXYGEN/TEMPERATURE (DO/Temp):	at deepest point - readings taken at intervals from surface to bottom
CHLOROPHYLL a (Chl):	a composite sample taken in the euphotic zone (layer which light penetrates – twice the secchi disk depth) at deepest point
ESCHERICHIA COLI (E. coli):	at three shoreline sites at approximately half metre depth in one metre of water
INVASIVE SPECIES (IS):	not done 2001

How Davern Lake measured up in 2001:

Table 1: Grading Scheme

TP	TKN	Secchi	DO	Chl a	E.coli	IS	Score
< 0.005	.1 - .2	> 5	> 5	0 - 0.00125	0 - 10	No	4
0.005 - 0.01	.2 - .3	4 - 5	4 – 5	0.00125 - .0025	10 - 40		3
0.01 - 0.015	.3 - .4	3 - 4	3 - 4	0.0025 - .00375	40 - 70		2
0.015 - 0.02	.4 - .5	2 - 3	2 - 3	0.00375 - 0.005	70 - 100		1
> 0.02	< .1, > .5	< 2	< 2	> 0.005	> 100	Yes	0

Overall Grading	
Score	Grade
> 3.5	A
2.6 - 3.5	B
1.6 - 2.5	C
0.5 - 1.5	D
< 0.5	F

The scores in Table 2 below come from Table 1: Grading Scheme, above. The result or average value of sample results for 2001 for a particular parameter is compared to the range under that parameter in Table 1. Once the appropriate range is found, move in that row horizontally to the score column. For example, a value for TKN of .36 is in the range .3 - .4 for which the score is 2. The overall grade shown at the bottom of Table 2 is found by taking the average of the scores, finding the Score Range in Table 1 to get the grade from the right hand column e.g. an average score of 2.75 is in the range 2.6 - 3.5 which yields a grade of B.

This scoring/grading is not a scientifically rigourous scheme. It is based on schemes used by others but was derived specifically for this report to provide an indication of the overall status of the lake based on all the aspects included in the Rideau Valley Watershed Watch sampling program in 2001. The elements being compared here are not all directly related e.g. the presence of spiny flea has no direct bearing on the amount of TP in the lake and vice versa. Most of the scores are related to an accepted benchmark. The failing score of zero is given for anything above or below the benchmark, depending on the particular parameter, such as 0.02 for TP which is the concentration, expressed in milligrams per litre, used as the Provincial Water Quality Objective (PWQO) above which a marked impact can be expected. In the case of Invasive Species, IS, the presence or absence is what is important and only two scores are needed.

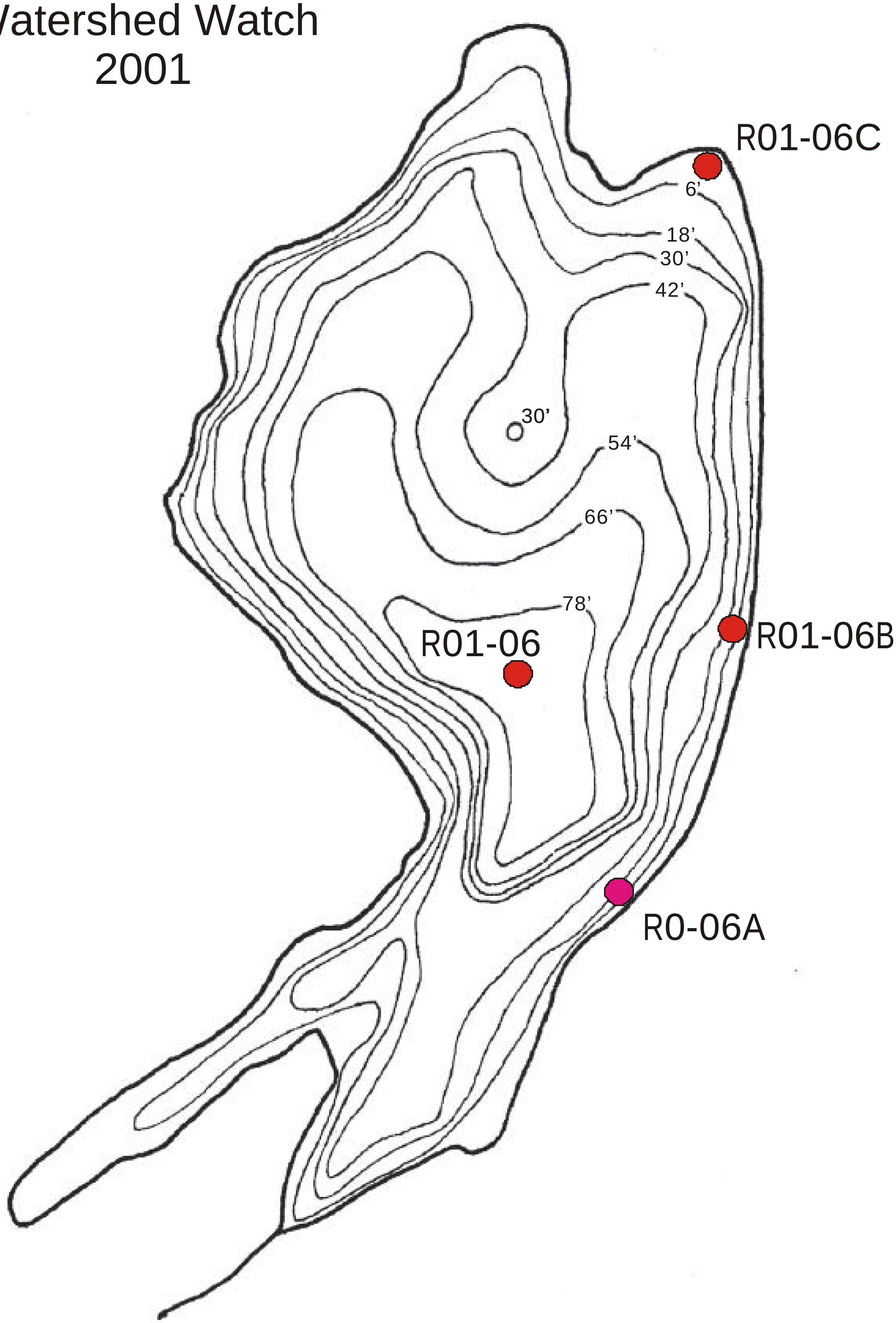
Table 2: Scoring

Parameter	Result	Score	
TP (milligrams/ Litre (mg/L))	0.011	2	Phosphorus comes from soaps, detergents, fertilizers and pesticides and is the main nutrient contributing to the growth of algae. The PWQO for lakes is to keep total phosphorus levels below 0.02 mg per litre of water to avoid excess algae and aquatic plant growth
TKN (mg/L)	0.38	2	Nitrogen contributes to the growth of algae and aquatic plants. Some of its forms can be toxic to aquatic animals in excess quantity and/or when an imbalance occurs. Nitrogen comes from fertilizers, pesticides and human and animal waste. There is no PWQO for Total Kjeldahl Nitrogen but a generally accepted guideline is that TKN levels less than 0.1 and greater than 0.5 mg/L can have harmful effects on the aquatic environment (some nitrogen is required hence the lower limit of the range)
Secchi (metres (m))	5.4	4	The secchi disk reading is a measurement of water clarity. The greater the depth that the disk remains visible indicates correspondingly lower quantities of suspended soil, debris and micro-organisms.
DO/Temp (mg/L)	3.68	2	Result is the average of the DO measured in the epilimnion. The measurements were done in September when the lake waters were beginning to cool and had an increased oxygen capacity. Circumstances prevented the profile from being done in late August when waters are typically warmer and more indicative of the lake summer condition. Therefore, DO is here as information and has not been included in the average score. Note that the oxygen content is reasonably good for the time of year.
Chl a (mg/L)	0.0019	3	Chlorophyll a is the green pigment in microscopic algae that live in water. More than 0.005 milligrams of Chl a in a litre of lake water indicates an excessive quantity of algae is present which will negatively affect the clarity and oxygen content of the lake.
E.coli (coliform units/ 100 millitres (CFU/100 mL))	2.5	4	E.coli bacteria is used to indicate the presence of harmful disease-causing organisms (bacteria, pathogens). It is present in human and animal waste. The PWQO for drinking water is 0 CFU/100 mL which means that using untreated lake water as a drinking water source is not recommended. The PWQO for swimming is 100 CFU/100 mL
Invasive Species	N/A		Invasive species can significantly alter the lake character. They are typically very aggressive and tend to overwhelm native species in various ways reducing the biodiversity throughout the food chain.
	average score	2.83	**Overall Grade: B**

Davern Lake had a low nutrient load, good dissolved oxygen concentrations and no significant bacteria counts in 2001 which is good for a grade of B. This grade indicates that Davern Lake is quite healthy resting on the fence between oligotrophic ("young") and mesotrophic ("middle-aged"). However, people can't relax completely at their cottages. Phosphorus and nitrogen concentrations, while below the PWQO, are slightly elevated and could lead to some algae blooms. The amount of dissolved oxygen in the lake is reasonably good with about half the depth containing sufficient oxygen for the various fish species but an increase in algae growth could be expected to reduce the available oxygen. All lake users need to continue to make every effort to minimize their impact on the lake. Reduction of human source nutrient loading as well as the style of property use (e.g. natural versus groomed shorelines) will help to slow the aging of the lake.

A special thank-you to the staff of the YMCA/YWCA Camp Davern for providing the Watershed Watch crew with access to Davern Lake for the 2001 sampling season.

Davern Lake
Watershed Watch
2001



DAVERN LAKE – 2001
Looking a little deeper:

The basic characteristics of a lake depend on the physical properties (dimensions and geology) and climate. Six processes or actions further define an individual lake:

- Precipitation directly onto the lake surface deposits phosphorus and other chemicals and runoff from the lake watershed carry bacteria and pathogens, plant debris and soil particles, which bear phosphorus and other chemical elements, into the water;

- Use by aquatic plants of the nutrients (phosphorus, etc.) has two impacts:
  - plant communities develop in the lake becoming profuse over time which limits the development and diversity of other plants and aquatic animals, and
  - along with plant debris and sediment from the shoreline, dead phytoplankton and other plants settle to the lake bottom where it decomposes using up oxygen and releasing nutrients;

- Each spring and fall temperature changes in the lake cause a mixing or turnover of the waters which can bring phosphorus from bottom waters to the surface to be available for aquatic plant and microorganism growth;

- A "sink" of phosphorus is created by settling of phosphorus-bearing sediment and the decay process at the bottom of all lakes with the phosphorus either held adsorbed to the lake bed soil particles when dissolved oxygen levels are high or in solution when the dissolved oxygen levels decline.

- After the spring turnover, the lake warms and stratification occurs creating a warmer surface layer (epilimnion), a transition zone (metalimnion) and colder deep waters (hypolimnion). As water warms, the ability to hold dissolved oxygen decreases. While the warm waters of the epilimnion can hold less the air/water contact and wave action ensures that there is a constant supply. As the deep waters of the hypolimnion warm, there is no mechanism to get new oxygen. The demand for oxygen for the decay process can cause the hypolimnion to become anoxic (no dissolved oxygen);

- Lakeshore development affects the shoreline runoff/erosion characteristics which usually leads to increased sediment, bacterial and nutrient loading of lake waters by changes to the vegetation composition, hardening the surface (buildings, roads, retaining walls, etc.) and installation and sometimes poor maintenance of septic facilities;

There are several methods of measuring the impacts of these processes or actions. The common ones are:
- measurement of water clarity using a Secchi disk,
- dissolved oxygen (DO)/Temperature profiles to show what the extents of the aquatic habitat are (most fish species inhabit the warmer, oxygenated surface waters),
- analysis of samples for nutrients: Total Phosphorus (TP) - the limiting nutrient for plant and microorganism growth, and/or
- presence or concentration of phytoplankton indicated by the amount of chlorophyll a, a pigment in phytoplankton

Added for the Watershed Watch program were:
- Total Kjeldahl Nitrogen (TKN), a secondary nutrient, to see if the high counts found elsewhere in the watershed occur in the lakes, and
- Eschericia Coliform (E.Coli) sampling around the lake nearshore to check for bacterial pollution problems.

An obstacle to assessing the condition of lakes is the length of the historical data record, however, data are available for several years for Davern Lake (Table 1, below). The general nature of the parameters does not allow a detailed analysis of Davern Lake so what follows is a set of observations about the available data which should be of assistance in setting goals for future lake management.

Table 1: 1980 - 2001, Deep Point of Lake

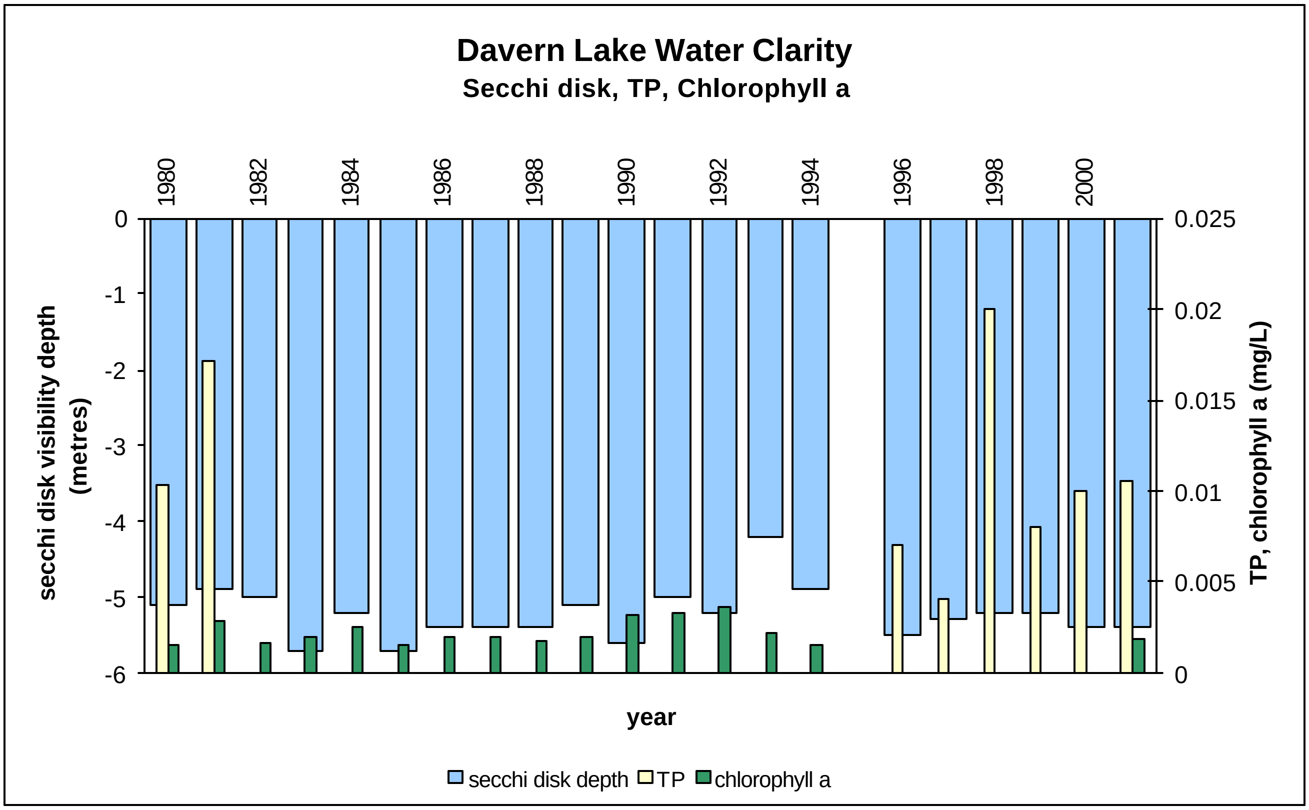
Sample Year	Secchi Disk [Metres]	Total Phosphorus Surface Sample [mg/L]	Total Phosphorus Bottom Sample [mg/L]	Chlorophyll a [mg/L]
1980	5.1	0.0103	0.026	0.0016
1981	4.9	0.0172	0.032	0.0028
1982	5			0.0017
1983	5.7			0.002
1984	5.2			0.0025
1985	5.7			0.0016
1986	5.4			0.002
1987	5.4			0.002
1988	5.4			0.0018
1989	5.1			0.002
1990	5.6			0.0032
1991	5			0.0033
1992	5.2			0.0036
1993	4.2			0.0022
1994	4.9			0.0016
1995				
1996	5.5	0.007		
1997	5.3	0.004		
1998	5.2	0.02		
1999	5.2	0.008		
2000	5.4	0.01		
2001	5.4	0.0106	0.0343	0.0019
n	21	8	3	16
Minimum	**4.2**	**0.004**	**0.026**	**0.0016**
Maximum	**5.7**	**0.02**	**0.0343**	**0.0036**
Mean	**5.2**	**0.011**	**0.031**	**0.0022**

*****Includes MOE Recreational Lakes Program Data. Chlorophyll a data prior to 1985 has been adjusted to reflect new lab procedures in filtering resulting in an increase in chl a concentrations by 35%.

Chlorophyll a was used as the primary indicator of lake trophic state (age or nutrient level) until 1994 when it was replaced by total phosphorus because sampling and analysis for TP has been shown to be more reliable and more economical. The relationship between the two is that chlorophyll a is one of the pigments found in phytoplankton and phosphorus is the primary nutrient affecting the proliferation of phytoplankton. For comparison with the historical data, analysis for chlorophyll a was included in the Watershed Watch sampling in 2001

Figure 1, a graph of data from Table 1, shows that both **Secchi disk** and chlorophyll a results over the 21 years of record have been very good and 2001 was not an exception. The average chlorophyll a concentration is well below threshold levels and the euphotic zone (the depth of the water column that light penetrates – about twice the Secchi disk depth) is more than a third of the total depth at the deepest point.

Figure 1



There are **Total Phosphorus** data for eight years for Davern Lake. As shown in Figure 1, there is no obvious trend in the phosphorus data. The last three years (1999 through 2001) had a progression of increased concentrations but were preceded in 1998 with the highest concentration in the dataset. On average, the concentration of TP has been in keeping with clarity and chlorophyll a results. Also, sporadic analyses over the years for **Total Kjeldahl Nitrogen** have given results that have been well below the Provincial Water Quality Objective (PWQO) indicating that Davern Lake typically has relatively low quantities of nutrients in the surface waters

There are only three years of data for **TP at the bottom of the lake** (Table 1) and, in all cases, the concentration was above the PWQO. However, TP concentrations at the bottom were actually relatively low over the summer of 2001 except in samples taken in early July and late October that caused the average to be in excess of the PWQO (Table 2 in column three, TP deep point – Bottom). However, the only time that the bottom TP would have had an impact on concentrations in the surface waters is at turnover in the spring and fall. After that, the water becomes thermally stratified and the only movement in the water would be debris and dead phytoplankton settling to the bottom. The first sample taken in 2001 was in early June when stratification was probably at or near completion. The TP concentration was low because, with oxygen concentrations still high, the phosphorus would not have been in solution but adsorbed to the bottom sediment and, therefore, there was little TP available to be taken up to the surface. The elevated concentration in October would likely have been due to decay of plant material and phosphorus in solution because of lower oxygen content.

Figure 2

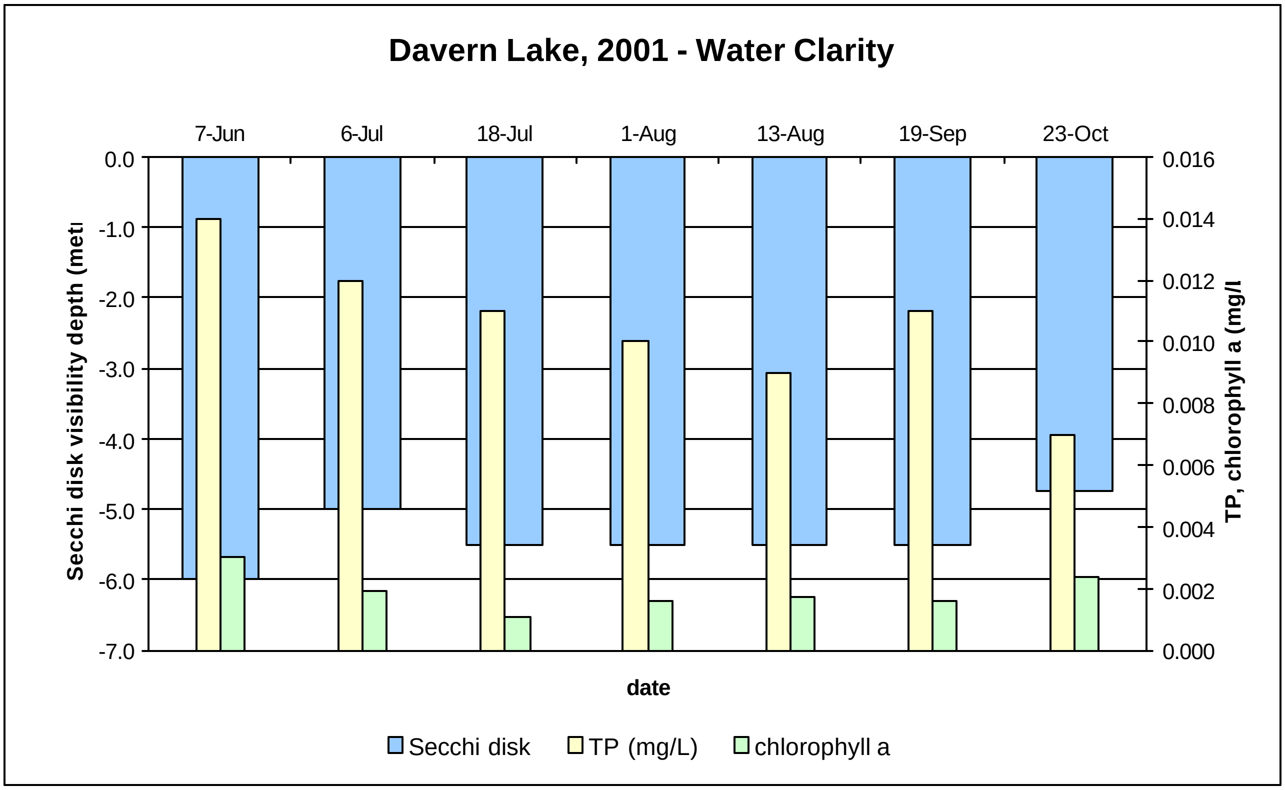


Table 2: Davern Lake, 2001 - Deep Point

	TP C-S (mg/L)	TP C-B (mg/L)	Chl a (mg/L)	Secchi (metres)
7-Jun	0.014	0.013	0.0030	-6.0
6-Jul	0.012	0.055	0.0019	-5.0
18-Jul	0.011	0.010	0.0011	-5.5
1-Aug	0.010	0.016	0.0016	-5.5
13-Aug	0.009	0.031	0.0017	-5.5
19-Sep	0.011		0.0016	-5.5
23-Oct	0.007	0.081	0.0024	-4.8
average	0.0106	0.0343	0.0019	-5.4

Note: TP DP-S and TP DP-B refer to the total phosphorus sample at the surface (S) and bottom (B) taken at the deep point (DP)

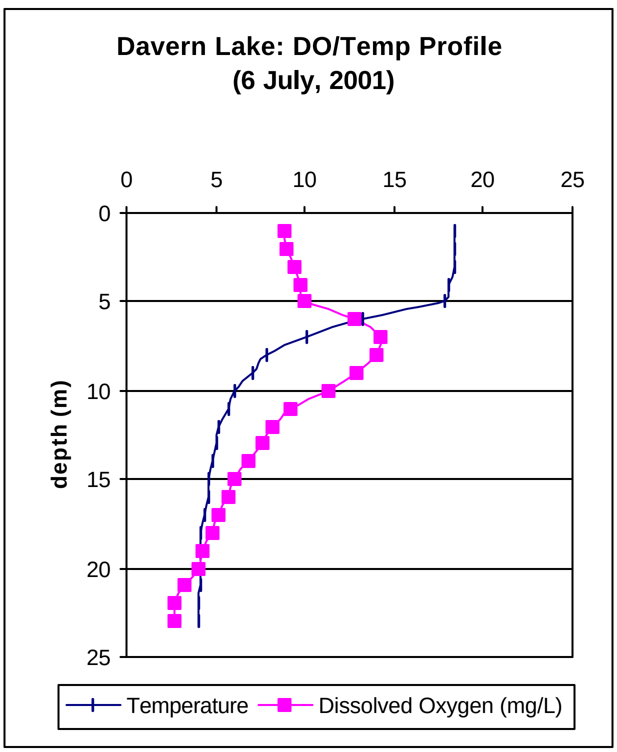
Dissolved oxygen and temperature profiling is important for all lakes because both parameters affect all aquatic organisms and the chemistry of the lake environment. The various fish species require a minimum of 4 milligrams per litre concentration of oxygen and temperatures between 10 and 25 degrees Celsius. Lake trout require cooler temperatures while pike, walleye and bass, for example, prefer warmer water. As oxygen levels are lowered, phosphorus in the bottom sediments become more readily soluble adding to the loading available for plant growth.

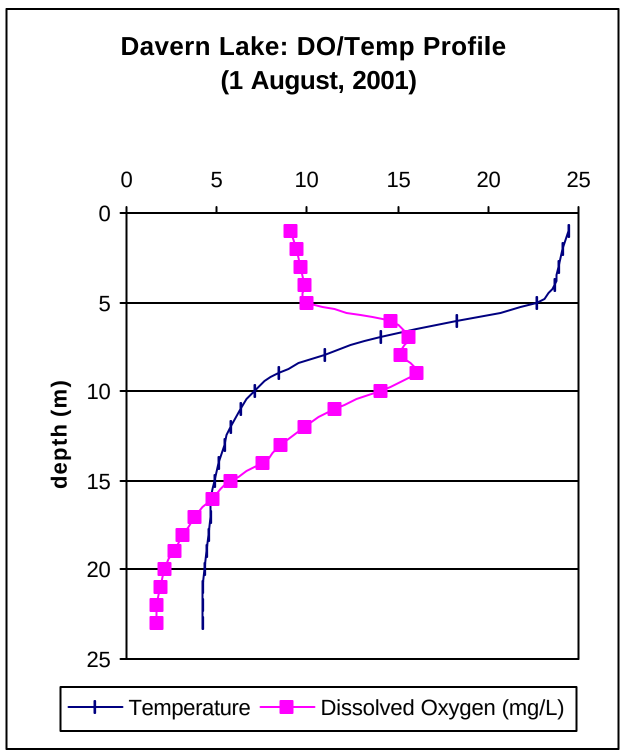
Profiles were done three times through the summer at the same time as water samples were collected. Dissolved oxygen concentrations were good throughout the water column in July but declined considerably through the summer until the bottom 6 metres were anoxic (>1 mg/L) by mid-September. It is likely that the upper few metres were too warm for all fish species by mid-August with temperatures approaching 25 degrees by August 1st (Table 3 and Figures 3 to 6, below)

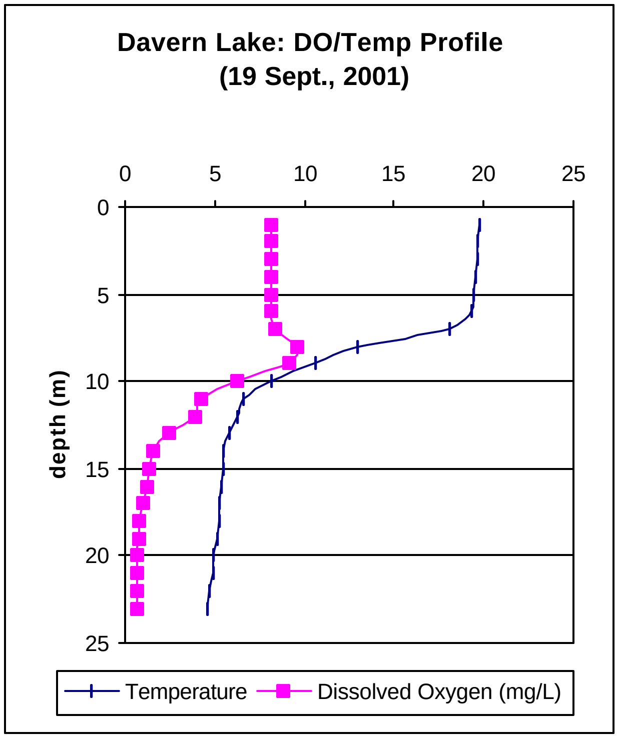
Table 3: Davern Lake – Deep Point, Dissolved Oxygen/Temperature - 19 Sept., 2001

Depth [Metres]	Temperature [Degrees Celsius]	Dissolved Oxygen [mg/L]	Percent Saturation [%]	Lake Stratification
1	19.7	8.1	88	Epilimnion
2	19.6	8.1	88	
3	19.6	8.1	88	
4	19.5	8.2	89	
5	19.4	8.1	87	
6	19.3	8.1	87	
7	18.1	8.4	88	
8	13.0	9.6	90	Metalimnion or Thermocline
9	10.6	9.1	82	
10	8.1	6.2	53	
11	6.6	4.2	34	
12	6.2	3.9	31	
13	5.8	2.4	19	Hypolimnion
14	5.5	1.6	12	
15	5.5	1.3	10	
16	5.4	1.2	8	
17	5.3	1.0	8	
18	5.3	0.8	6	
19	5.1	0.8	6	
20	4.9	0.7	6	
21	4.9	0.7	6	
22	4.7	0.7	5	
23	4.6	0.7	5	

Figures 3, 4, 5, 6







Near the shore:

In addition to sampling at the deep point in the lake, the Watershed Watch program included sampling at a number of sites near the shore. The objectives were:

a) to look at the phosphorus and nitrogen distribution around the lake.
b) to do general sampling for bacterial pollution (E.Coli) in proximity to the larger groupings of cottages to see if there was a problem with septic and grey water entering the lake.

Table 4: TP - Davern Lake, 2001

SITE	7-Jun-01	6-Jul-01	18-Jul-01	1-Aug-01	13-Aug-01	19-Sep-01	23-Oct-01	average
DP-B	0.013	0.055	0.01	0.016	0.031		0.081	0.034
DP-S	0.014	0.012	0.011	0.01	0.009	0.011	0.007	0.011
A		0.007	0.006	0.006	0.007	0.008	0.009	0.007
B		0.006	0.005	0.005	0.007	0.009	0.007	0.007
C		0.016	0.021	0.028	0.020	0.024	0.014	0.021
							average	**0.011**

Generally, TP concentrations are moderately low in Davern Lake with near shore concentrations lower than at the deep point. However, there appears to be a persistent source of TP in the vicinity of sampling site C at the north end of the lake. In early July, the concentration at site C was relatively high compared to the other surface sites and increased to concentrations in excess of the PWQO by mid-July and not declining until October. Nitrogen and bacteria levels were not correspondingly high which suggests that the source is not a septic system. More detailed study would be needed to determine the source and the significance of the discharge.

The upper end of the range of the provincial guideline for **Total Kjeldahl Nitrogen** is 0.50 mg/L. Only two of the twenty-five surface samples exceeded that level through the sampling period (Table 5). Similar concentrations were found in the Recreational Lakes program survey of Davern Lake in1983. TKN values throughout the Tay River Watershed system are typically high which suggests that there is a naturally occurring background level.

Average TKN concentrations at the bottom for the 2001 sample period exceeded the provincial guideline. Averages in 1980 and 1981 were both slightly above the guideline which shows that there is some but not an excessive amount of nitrogen available to the lake system.

Table 5: TKN - Davern Lake, 2001

SITE	7-Jun-01	6-Jul-01	18-Jul-01	1-Aug-01	13-Aug-01	19-Sep-01	23-Oct-01	average
DP-B	0.36	0.94	0.33	0.27	0.58		1.08	0.59
DP-S	0.37	0.4	0.47	0.28	0.4	0.32	0.33	0.37
A		0.36	0.38	0.26	0.4	0.37	0.38	0.36
B		0.51	0.41	0.25	0.39	0.34	0.32	0.37
C		0.43	0.39	0.45	0.53	0.36	0.37	0.42
							average	**0.38**

Table 6: E.Coli - Davern Lake, 2001

SITE	7-Jun-01	6-Jul-01	18-Jul-01	1-Aug-01	13-Aug-01	19-Sep-01	23-Oct-01	average
A	5	3	2	2	2	2	2	2.57
B	2	2	2	2	2	2	2	2.00
C	3	2	2	2	2	6	2	2.71
							average	**2.50**

Escherichia coliform (E.Coli) is used as an indicator of the potential presence of other harmful bacteria and pathogens in water. The main sources of bacteria are animal (decay of dead animals, defecation near and in the water) and human waste (septic systems, grey water). Levels above the PWQO of 100 counts/100 mL can mean that the water is unsafe for swimming. As a general precaution, lakes should not be used as the primary drinking water source and use for washing and cooking should be limited.

The results for Davern Lake indicate that there are very low levels of E.Coli bacteria in the water. While all parts of the lake were not sampled, the E.Coli results can be considered to reasonably indicate that the waters of Davern Lake did not pose a health concern for cottagers and residents for swimming and other water contact recreational use in 2001.

(Note: Not all bacteria are harmful. Some can be a food source for macroscopic aquatic invertebrates. Also, what is commonly referred to as blue-green algae, is a bacteria which shares many characteristics with algae and can be toxic to aquatic species as well as cause reactions in humans).

Davern Lake was not tested for **invasive species** in 2001 ie. zebra mussels and spiny water flea. Residents need to take precautions to avoid bringing in invasive species as well as to ensure that all access points to the lake have posted signs indicating what boaters can do to avoid infesting the lake. (http://www.invadingspecies.com/ for more information)

In conclusion:

The historical data and the results of Watershed Watch sampling through the summer of 2001 indicate that Davern Lake has a low concentration of nutrients and the lake can be considered to be in the mesotrophic category of lake “age”. It would be useful to determine what the source of the higher concentrations of total phosphorus are at the north end of the lake. It is conceivable that a septic system is the source and the sample site is sufficiently far enough away from the source that any bacteria dies off before it reaches the site so a more intensive sampling program as well as an inspection of nearby septic systems is recommended. This will eventually have a detrimental affect on the diversity of fish and other aquatic animal species and summer fish kills may become a common occurrence.

Of the six things in the list on the first page of this section of processes and actions that affect the character of a lake, the first point has to be addressed by society as a whole. The amount of phosphorus reaching lakes by airborne deposition can be reduced by controlling the amount that gets into the air from industrial and other emissions. It is the last point in that list which is entirely the responsibility of those who own property around the lake to act on. It is not possible to restore Davern Lake to a “youthful”, nutrient free condition nor should that be the objective because it would mean that the present degree of biodiversity would be lost. Effort needs to be expended to slow the process of lake aging as follows:

FIVE EASY STEPS TO IMPROVE WATER QUALITY

1. Build at least 30 metres away from the shoreline.
2. Keep your lot well treed and preserve or replant native vegetation along the shoreline.
3. Pump out your septic tank every three to five years and have the tank and tile field inspected periodically.
4. Reduce water use and use phosphate free soaps and detergents.
5. Keep the size of your lawn to a minimum; do not use fertilizers, herbicides or pesticides.

LOW PHOSPHORUS LIFESTYLE		HIGH PHOSPHORUS LIFESTYLE	
HUMAN WASTE	535 g	HUMAN WASTE	535 g
NO DISHWASHER	0 g	DISHWASHER USING POWDERED DETERGENT ONCE PER DAY	650 g
NO FERTILIZER	0 g	LAWN FERTILIZED ONCE/YEAR	1,960 g
TREES NOT CUT DOWN	20 g	LOT CLEARED OF TREES	30 g
USES PHOSPHATE-FREE PRODUCTS	20 g	USES PRODUCTS WITH PHOSPHATES	180 g
TOTAL	**575 g**		**3,355 g**

For more information regarding *Watershed Watch* or for free advice on how you can help protect or enhance your lake environment, contact the Landowner Resource Centre at (613) 692-2390 or lrc@rideauvalley.on.ca