Rec'd 6/21/94

Oregon Lakes Association

A Voice for Our Quiet Waters

P.O. Box 586 • Portland, Oregon 97207

OLA News

A Board meeting of the Oregon Lakes Association was held on June 4 at Fishhawk Lake. The Fishhawk Lake Recreation Club was our host. They provided their lakeside facility for the meeting as well as lunch. For those of you that missed the meeting, you must live with the fact that you will not likely have another opportunity to experience Sally Doherty's chili - it will go down in the OLA annals as a truly memorable occasion (it sure beats the stuff at Richard's Restaurant where our Board meetings are usually held). Many thanks to everyone at Fishhawk for their hospitality.

The meeting provided an opportunity to discuss organizational issues for lake residents. There was a good turnout of people from Fairview Lake, who are just getting started on lake management. Dave Wagner reported on his contacts with the Special Districts Association. The upcoming legislative session may be a good one for introducing the concept of lake or watershed management districts as a method for funding management of Oregon's lake resources. There will be further discussion of OLA's collaboration with the Special Districts Association at the annual meeting in September.

Anjala Ehelebe is putting together a great program for the annual meeting in September. Special sessions on aquatic plants, nonpoint pollution, and organizing lake associations are planned. We are working on obtaining the assistance of the Institute of Conservation Leadership for a Strategic Planning session on Friday, September 16th. The Institute's Program for Lake Organizations focuses on helping lake groups become more effective. A number of state lake organizations across the country have found the Institute's program useful. Our planning effort last year was a good start - a followup session this year at the Annual Meeting will help give OLA more direction.

Another item of discussion at the Board meeting was nomination of candidates for officers in 1995. We have several open positions to fill including: Secretary, Treasurer, President-Elect, and Director. OLA needs the services of people who are concerned about Oregon's lakes to help out. Any OLA member can serve on the governing board. If you or someone you know is interested in getting more involved now is the time to step forward. Please complete the nomination form below and return by July 1.

A copy of the *Lake Watcher*, the newsletter of the Oregon Citizen Lake Watch program, is also enclosed. The Citizen Lake Watch program is funded by DEQ and EPA to encourage lay people to become involved in protecting Oregon's lakes by volunteering to collect information on a lake. Currently, 36 people regularly monitor water quality in 27 lakes in Oregon. One volunteer collected information on 42 lakes that were visited once. These people range from retired truck drivers to

college professors. The common characteristic of everyone involved is that they are concerned about lakes and want to help protect and enhance lakes in Oregon. Some volunteers collect basic water clarity and water temperature information, others take on more responsibility by measuring dissolved oxygen and mapping aquatic plants in a lake. Participation requires sampling every other week during the summer, access to a boat is helpful. If you are interested in the program, contact Mark Sytsma or Richard Petersen at Portland State University for more information (725-4241).

*****The next Board meeting will be held July 13 at 6:15 PM at Richard's Restaurant in Salem.*****
(Call 725-4241 for directions)

Oregon Lakes Association

NOMINATION FORM

President-Elect _____

_____

Secretary _____

_____

Treasurer _____

_____

Board of Directors _____

_____

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Return by July 1 to: Oregon Lakes Association
P.O. Box 586
Portland, OR 97207

The Lake Watcher

Volume 2 Issue 1 Spring 1994

◆ *Lake focus*

Suttle and Blue Lakes

Suttle and Blue Lakes lie near the Santiam Pass in the Cascades Ecoregion. The lakes are within one-half mile of each other but have quite different characteristics. Blue Lake is often called "the Crater Lake of the Central Oregon Cascades" because it was formed by a violent explosion much like its larger cousin to the South. The explosion occurred about 3500 years ago and formed a deep crater (maximum depth over 300 feet). Its great depth accounts for the "blueness" of the lake, it is certainly the bluest of the many blue-water lakes in Oregon.

Suttle Lake is much older than Blue Lake. It was formed by glacial scouring in the Pleistocene Epoch when all the high mountain areas of Oregon were buried in ice. Suttle Lake is 75 feet deep.

The Suttle/Blue Lake drainage basin is within the Deschutes National Forest. The southwest portion of the drainage lies in the Mount Washington Wilderness. The Blue Lake drainage is primarily forested and includes Corbett Memorial State Park at the southern end of the lake. At the northern end of Blue lake there is a private home and Blue Lake Resort, which includes cabins, campgrounds, a boat dock, boat rental, and a small swimming area. Gary Lovegren owns Blue Lake Resort and is the volunteer monitor for the lake.

The outlet of Blue Lake flows into Suttle Lake. The watershed adjacent to

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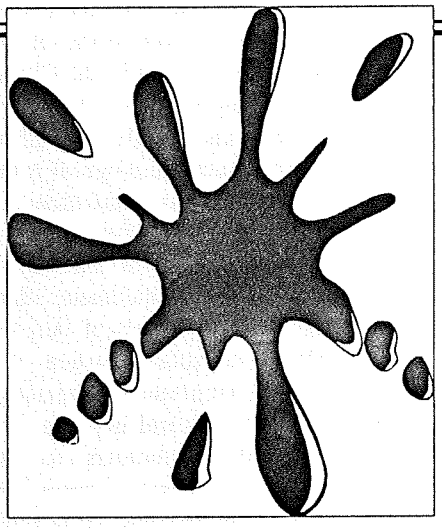

◆ *Program Notes*

The Citizen Lake Watch Program is still around! You may have been wondering what happened to the program because you haven't heard from anyone for awhile. There have been some changes in the program since the last newsletter that have taken some time to work out, but now we're staffed up and ready to go again.

Steve Daggett, who was the coordinator of the program for the past few years, finished up his Masters thesis at Portland State and has moved

Continued on page 4

◆ *Aquatic Plants*

Hydrilla

Hydrilla (*Hydrilla verticillata*) is one of the most pernicious and damaging aquatic plants. Although it hasn't been reported in Oregon yet, it has been found near Redding, California; which is much too close for comfort.

Hydrilla is a super plant. It grows at very low light levels-and it grows fast. It produces thousands of tubers and turions, small dormant structures that permit hydrilla to spread rapidly and crowd out the native plants that the fish and invertebrates in a lake depend on for food and shelter. In addition to its impact on fish and fishing, invasion of a lake also has serious repercussions for other uses of a lake: boating and swimming are eliminated and the plants clog irrigation and hydroelectric plant intakes. Joe Knight, with the Corps of Engineers, reported a correlation between lake use and area of hydrilla in Georgia's Lake Seminole

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Inside This Issue

◆ *A message from the new Coordinator*

From exquisite Crater Lake to the saline lakes of the desert southeast and the shallow lakes on the coast, Oregon has diverse and unique lake resources. To a limnologist (someone who studies freshwater lakes), this diversity makes Oregon a fascinating place to live and I am happy to be on board at PSU as the new coordinator of the Citizen Lake Watch Program.

Thanks to Steve Daggett and you, the volunteers, Oregon has an excellent program in place for collecting baseline information on the state's lake resources; and thanks to the hard work of some dedicated people at DEQ and PSU, the program this year will allow me to provide some new services to citizens and local governments. As the *Program notes* section of this issue of **The Lake Watcher** points out, these services include providing technical advise on lake and watershed management issues and searching for funding for lake protection and restoration in Oregon.

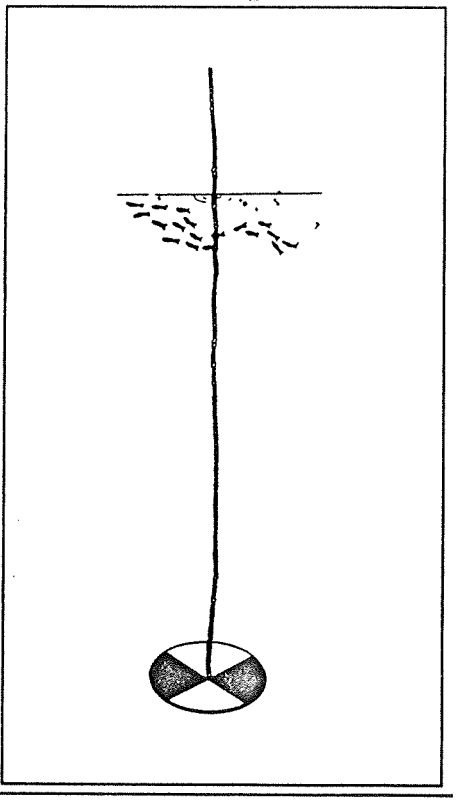
By way of introduction, I was born and raised on a farm in Iowa, graduated from Iowa State University with a degree in Biology, and promptly left Iowa for the Pacific Northwest. I obtained a Master's degree in Environmental Science and Engineering at the University of Washington, where I studied the use of mechanical harvesting for control of Eurasian watermilfoil, a common aquatic weed. I spent a year in Sweden doing research on reed biology, and then went to the University of California in Davis for my Ph.D. My doctoral research was on the biology and management of Parrotfeather, an aquatic weed common in Oregon's coastal lakes. I returned to the Northwest after completing my Ph.D. in 1992 and worked for an environmental consulting firm prior to coming to PSU the first of May.

Since coming to Oregon I have been impressed by the work of the volunteers who take part in the Citizen Lake Watch Program. Your efforts are commendable, and DEQ's and EPA's decision to enhance the program is due in large part to your dedication and commitment. I hope that you will continue monitoring your lake(s) and help me recruit new volunteers. Many people are willing to help if they are just asked, especially when the program is so important for protecting Oregon's unique natural heritage. The information the volunteers in the Citizen Lake Watch Program are collecting is used by DEQ and EPA to track water quality in the state. The information forms a basis for detecting early stages in the degradation in water quality, and early detection is critical to protection of Oregon's lake resources. The importance of your efforts cannot be overstated.

For my part, I will try to provide you with assistance and direction in dealing with the management of your lake. Please do not hesitate to call me with questions, or to just chat about what's happening in your lake (I can be reached through Dr. Richard Petersen at PSU for now at 725-4241, I'll send a note when my permanent number is assigned). I have enclosed a questionaire with this issue of **The Lake Watcher** to get some feedback froorm the volunteers. I will soon start to schedule a training workshop for early June. I will also start scheduling times when I can come and visit you and your lake during the summer. A second training workshop will be held during the Oregon Lakes Association (OLA) annual meeting in Seaside on September 16 and 17, where we would like to provide workshops on how to manage problems in lakes. A workshop on aquatic plant management has been tentatively scheduled, let me know what other subjects you would like to see addressed. The OLA meeting would also be a good place for everyone involved in the Citizen Lake Monitoring Program to meet and discuss mutual problems and solutions. Think about your schedule and consider attending.

Lastly, as President-Elect and Chair (and only member) of the Membership Committee, I would like to encourage you to join OLA and its parent organization, the North American Lake Management Society (NALMS). If you join OLA you will receive a quarterly newsletter that will keep you abreast of lake-happenings in Oregon. If you also join NALMS, you will receive **Lakeline**, a very informative magazine on lake management. If you're interested, call or drop me a line and I'll make sure you receive membership application material.

Thanks agan for the good work. I look forward to meetng each of you and working with you to protect and manage Oregon's lakes. **Remember, a Secchi disk is a terrible thing to waste.**

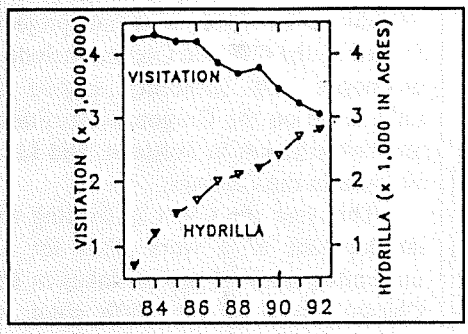


"Like the environment they strive to protect, (lake-monitoring) volunteers themselves are a precious resource offering important contributions we cannot slight or take for granted. We simply cannot afford to waste this valuable national treasure."

Frank Lapensee
EPA Clean Lakes Chief

◆ *Hydrilla continued*

(see the Figure below) and estimated that $13 million was lost from the local economy because of the decline in visitation.



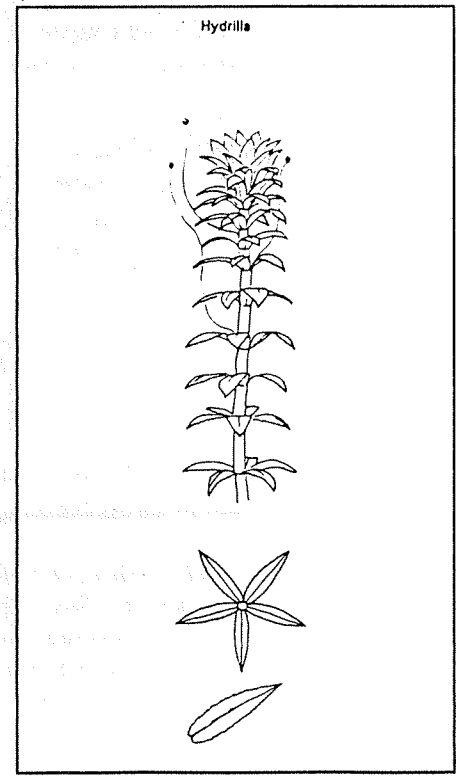
Hydrilla is native to Asia and the Indian subcontinent. It grows as far north as northern China, a latitude similar to Oregon's and an area with a much more severe climate. In the United States, hydrilla currently creates problems as far north as the Potomac River near Washington D.C. It is the most troublesome plant faced by lake managers in the southeastern U.S. Millions of dollars are spent annually to control hydrilla in lakes and reservoirs across the South.

The irrigation-based agricultural economy of the Imperial Valley of Southern California faced a catastrophy when hydrilla invaded and blocked flow in hundreds of miles of irrigation canals. In response, the State of California allowed introduction of triploid grass carp, a sterile, weed-eating fish, into the canal system. The grass carp succeeded in reducing the infestation to just a few miles of canal within a few years. California prohibits introduction of grass carp into the natural waters of the State, however, and has implemented an intensive survey and eradication program to prevent runaway hydrilla invasions elsewhere. Nearly every year a new infestation is found that requires immediate and expensive eradication.

Although the Oregon Department of Agriculture trains county extension agents to recognize hydrilla and has placed hydrilla on the "A" list for noxious weeds, there is no formal hydrilla survey program in Oregon. Early detection of a hydrilla infestation is important for effective eradication. A small plant fragment can regenerate an entire plant, so it is easier to prevent spread of the plant when the infestation is small. In addition, tubers form on the roots in the sediment quite quickly and provide a "seed source" for reinfestation of the waterbody if the stems are removed. Once formed, it is not possible to remove the tubers short of dredging the entire lake or river.

A number of herbicides are effective in controlling hydrilla including fluoridone (Sonar) and chelated copper compounds (Komeen). A few insects are currently under study for hydrilla-specific biocontrol, although none have proven effective in climates similar to Oregon's.

Hydrilla is difficult to identify. It resembles the common aquatic weed brazialian elodea (*Egeria densa*) and the native canadian pondweed (*Elodea canadensis*). Hydrilla has whorls of 3 to 5 leaves at each node on the stem that have tiny spines, which gives the plant a rough feel. The presence of tubers on the roots is a key feature of hydrilla-the other two species don't form tubers. If you find a plant that resembles the illustration call Mark Sytsma at PSU (725-4241).



Oregon Citizen Lake Watch Program

The Oregon Citizen Lake Watch Program is sponsored by the Department of Environmental Quality and coordinated by Portland State University. The program is funded by an EPA Clean Water Quality Assessment Grant. The goal of the program is to involve citizen volunteers in collecting reliable water quality data in an effort to identify long-term trends in the water quality of Oregon's lakes.

The Lake Watcher is produced quarterly at Portland State University under a grant from the Oregon Department of Environmental Quality. For more information about the Citizen Lake Watch Program or this newsletter, please contact the Citizen Llake Watch Coordinator at:

Citizen Lake Watch Program
Oregon Department of
Environmental Quality
Water Quality Division
811 SW 6th Ave.
Portland, OR 97204

or call 725-4241 or 229-5279.

◆ *Program notes continued*

on to a position with the Oregon Division of State Lands. Steve did a great job and the lakes of Oregon are better off because of his attention.

Some other people have also been hard at work. Andy Schaedel and Doug Larson at DEQ, and Richard Petersen at PSU were interested in expanding the Citizen Lake Watch Program to provide more help for Oregon's lakes. They assembled a proposal and submitted it to the U.S. Environmental Protection Agency (EPA). Because the Oregon Lake Watch volunteers have been doing such a great job and have shown a committment to the lakes of Oregon, EPA and DEQ agreed to fund a new, exanded lakes program at PSU.

The Citizen Lake Watch Program will continue as before with staff at PSU coordinating the program. In addition to the Citizen Lake Watch, PSU will provide technical assistance to citizens and local governments on lake management issues and will work toward building a lake and watershed management program in Oregon. Specific new activities will include:

- Collecting and cataloging publications and data on lakes in Oregon and establishment of a Lake Library at PSU that will be accessible to anyone with an interest in Oregon's lakes
- Identification of significant local and regional issues relating to lakes in Oregon
- Assist in finding additional funding for lake monitoring, improvement, and protection projects in Oregon.

Dr. Mark Sytsma will coordinate the new program (see his note in this newsletter). Your participation in the Citizen Lake Watch Program is as important as ever. In fact, the commitment and efforts of Oregon's volunteer lake monitors was an important factor in convincing EPA to fund the expanded program. Thanks for your good work on Oregon's lakes!

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"In the industrial world, significant progress has been made in recent years toward cleaning up the water. In the United States, for example, the Clean Water Act of 1972 has reduced pollution levels markedly. ... Overall, however, the pollution of global water resources has been growing steadily and dramatically worse.

According to an Environmental Protection Agency survey, almost half of all American rivers, lakes, and creeks are still damaged or threatened by water pollution. ... The lakes and rivers sustain us; they flow through the veins of the earth and into our own. But we must take care to let them flow back out as pure as they came, not poison and waste them without thought for the future."

Vice President Al Gore
Earth in the Balance, 1992

◆ *CWA Reauthorization*

Oregonians and Oregon's lakes have benefited from the Clean Water Act (CWA) since it was originally introduced in 1972. Current projects funded by the CWA in Oregon include a diagnostic and feasibility studies of Lake Lytle on the Oregon coast, Smith and Bybee Lakes in Portland, and Lake Natosha in the Cascades.

This year the CWA is funding the development of a work plan for an innovative study of several lakes in the Clatsop Plains on the north coast, as well as continuing work on Smith and Bybee Lakes, and partial funding of the Citizen Lake Watch Program coordinator position at PSU.

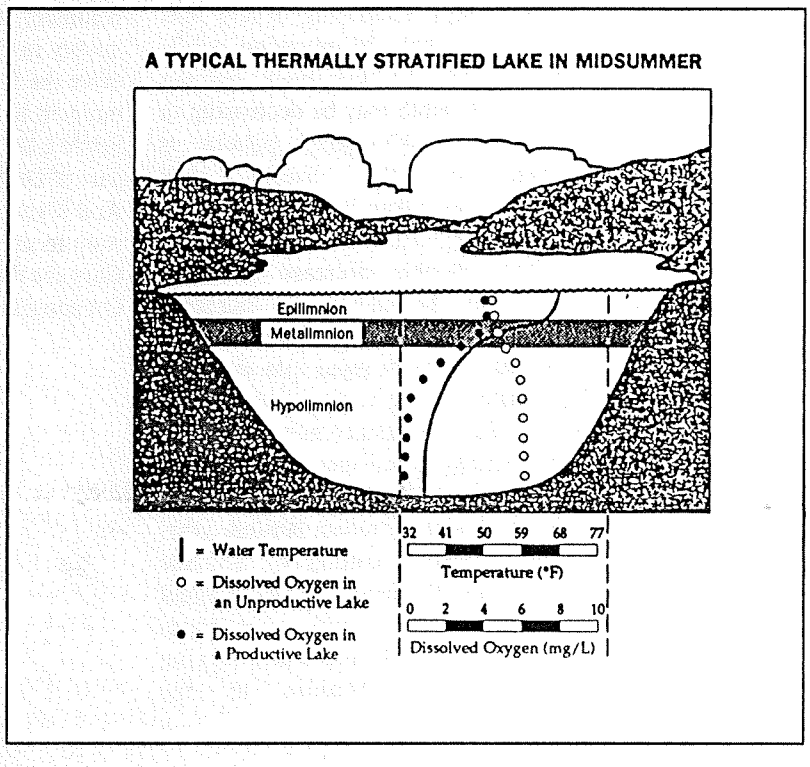
The CWA is up for reauthorization this year. At a recent conference in Chicago, Mr. Robert H. Wayland III, Director of the Office of Wetlands, Oceans & Watersheds at EPA, indicated that the Clean Lakes Program would likely be "nested" into the watershed programs in the new version of the CWA. Lakes would not receive funding dedicated to solving problems unique to lake ecosystems. Since lakes are often the "point of contact" of citizens and the water resources in a watershed, there is some concern that lack of dedicated funding for lakes may cause a general decline in people's interest and support for water resource management.

The Oregon Lakes Association (OLA) provides a forum for discussion of the pros and cons of the new Clean Water Act and how it relates to Oregon's lakes. Contact the Lake Watch Coordinator for information on OLA. The future of Oregon's lakes depends on it!

Check your boat trailer when you pull it out of the water and remove all plants. Many nuisance aquatic weeds like milfoil, fanwort, parrotfeather, and brazilian elodea are transported from lake to lake on boat trailers. Help stop the spread of non-native aquatic plants that are pests by cleaning your trailer <u>before</u> you leave hit the road. The lake you save me be your own.

◆ *Lake Wise*

Most lakes in Oregon with a depth of 20 feet or more develop two temperature-defined layers during the summer as the upper, surface waters are warmed by the sun. Warm, less dense surface waters stop mixing with colder, more dense bottom waters. When lakes develop this type of zonation the lakes are called "stratified". Limnologists refer to the upper layer as the epilimnion and the bottom layer as the hypolimnion. The epilimnion (epi=upper) is separated from the hypolimnion (hypo=bottom) by a transition zone called the metalimnion (meta=middle). The metalimnion is a zone where temperature changes rapidly with depth, and functions as a mixing barrier.



The upper layer is well mixed by wind so that dissolved gases are in near equilibrium with the atmosphere. The hypolimnion is not exposed to the atmosphere, however, because the metalimnion prevents its mixing with the surface waters. As a result, the hypolimnetic water chemistry and gas content can be quite different from the epilimnion.

In eutrophic (well-fed) lakes, which have a lot of algal growth, the oxygen concentration in the hypolimnion can be reduced to near zero by the bacteria and fungi, which consume the dead algal cells that rain down from the epilimnion. In oligotrophic (poorly-fed) lakes, which don't have alot of algal growth, the "algal rain" from the epilimnion isn't heavy enough to support as much decomposition and oxygen concentrations remain high.

Since the organisms that we commonly observe and like to see in our lakes require oxygen for survival [only some types of bacteria can survive in anoxic (no oxygen) environments], oxygen depletion in the hypolimion can reduce the habitat availability. Cold-water fish like trout, for example, can't move into the colder water of the hyplimnion to escape the high water temperatures in the epilimnion if there is no oxygen available. Similarly, the zooplankton can't use the dark waters of the hypolimnion to hide from the fish that eat them if there is no oxygen present. Zooplankton populations can be reduced to very low levels when they can't escape from the fish. As a consequence, the algae populations that are kept in check by zooplankton grazing can explode causing water quality problems.

In addition to its effect on the animals that live in a lake, oxygen depletion also has profound effects on the solubility of various chemical compounds important in lake ecology. Phosphorus availability, for example, often limits growth of algae in lakes. In oxygenated water, phosphorus is bound to iron compounds in the water that settle out of the water column and are not available for the algae to use. Iron-phosphate complexes account for much of the phosphorus in surface sediment of lakes. When the oxygen concentration in the hypolimnion is depleted the oxidation state of iron changes, the iron-phosphate complexes breakdown, and both iron and phosphate are released into the hypolimnion. As a result of this process, the hypolimnion of a eutrophic lake often has very high concentrations of iron and phosphorus.

In the fall, when air temperatures drop and the surface waters cool to the same temperature as the bottom water, the resistance to mixing is removed and the entire lake can freely circulate in response to wind action. The fall breakdown in thermal statification and complete mixing of a lake is called "fall turnover". Because the bottom waters often contain high phosphorus concentrations, their mixing with the surface waters often results in fall algae blooms.

In mild-winter areas, like on the coast and in the Willamette Valley, lakes usually continue to completely mix during the winter. In colder regions of Oregon, however, inverse stratification can occur. Inverse stratification happens when surface waters are colder than the bottom waters. In spring, as the surface waters warm and the lake becomes isothermal (the same temperature throughout the water column) wind action can again cause complete mixing of the lake and spring turnover occurs. Like in the fall, spring turnover can often lead to algae blooms.

The temperature changes that occur in your lake with depth and throughout the year are key to understanding how your lake works. Sampling bottom waters, however, requires some special equipment. If you are interested in developing a deeper understanding (pun intended) of your lake's temperature changes contact the Citizen Lake Watch Coordinator.

◆ Suttle and Blue Lakes continued

Suttle Lake is also primarily forested but receives considerably more recreational use than Blue Lake. Suttle Lake is ringed by several National Forest campgrounds, hiking trails, a resort, marina, and church-owned camps.

The hydrology of the Suttle/Blue Lake basin is dominated by groundwater. Blue Lake is fed by several large springs on the East side of the lake at about the 240 foot depth. No perennial surface streams flow into Blue Lake; surface runoff comes primarily from snow melt. Although Suttle Lake receives surface water from Blue Lake via Link Creek, groundwater is also a major source of water for Suttle Lake.

In spite of a common water source, phosphorus concentration, and their proximity, the biology of Blue lake and Suttle Lake is quite different. Blue Lake has clear water, low algal abundance, and a Secchi disk depth that averages about 34 feet. Suttle Lake, in contrast, has abundant cyanobacteria (blue-green algae) and a Secchi disk depth that averages about 11 feet.

The reason for the difference in the algal production in the two lakes has not been satisfactorily explained. Mulvey (1986 Master's Thesis, PSU) suggested that some micronutrient, lake flushing rate, or water temperature may account for the differences in algal growth in the two lakes.

Whatever the cause(s) of the differences between the lakes, there is some evidence that water clarity and algal production is increasing in both. Thanks to Rick and Pat Peterson, Suttle Lake has the longest record of Secchi disk depth of any Cascade lake in the Citizen Lake Watch Program. Rick and Pat have been measuring Secchi disk depth since 1988. Examination of the data suggests that maximum summer Secchi disk depth may be decreasing in Suttle Lake. A similar pattern is evident in the Secchi disk measurements taken by Gary Lovegren at Blue Lake since 1989.

The possible decrease in water clarity may be caused by increased algal abundance in the water column or increased sediment input into the lake-both influence the clarity of the water. Higher algal abundance may be a result of an increase in nitrogen input into the lakes caused by human activities in the watershed, or may reflect natural, year-to-year variation caused by climatic fluctuations. Increased sediment input to lakes typically occurs when roads and trails are built and when logging activities cause erosion in the watershed.

This profile of Suttle Lake and Blue Lake illustrates two important points: 1) each lake is a unique feature of the landscape, with characterisitcs that are determined by a complex set of influences including origin, depth, hydrology, water chemistry, biota, land use in the watershed, and a miriad of other known and unknown factors; and 2) the value of Citizen Lake Watch volunteer efforts in tracking water quality in Oregon's lakes. Next time you drive the Santiam Highway take a moment to stop and get acquainted with Suttle Lake and Blue Lake. They are part of Oregon's natural history legacy. And if you ever get the chance you may want to say "Thanks" to Rick, Pat, and Gary for their efforts in behalf of Oregon's lakes.

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Citizen Lake Watch Program
Oregon Department of Environmental Quality
Water Quality Division
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