

BC Lake Stewardship Society (BCLSS)

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A Chapter of the North American Lake Management Society (visit NALMS at www.nalms.org)

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November 2003

The Nechako River White Sturgeon Population: Evidence for Recruitment Failure

by Todd French

After years of research, fisheries scientists now suspect that white sturgeon (*Acipenser transmontanus*) in the Nechako River (joins the Fraser River at the City of Prince George) are not reproducing at all, or that reproduction is taking place so slowly (or unsuccessfully) that fish numbers are declining towards possible extinction. While white sturgeon are thought to live primarily in large rivers, they are known to inhabit some of the large lakes that drain into the Nechako River system, e.g., Fraser, Stuart, Trembleur and Takla lakes. Three of the four sturgeon tagged in Stuart Lake in 2001/02 moved downstream to the Nechako River in 2003, and are currently in overwintering areas downstream of Vanderhoof. However, further research is required to confirm whether white sturgeon move on a regular basis between these lakes and the Nechako River, and whether reproduction takes place between individuals from lake and river habitats.



Lheidli T'enneh Band biologists doing research on upper Fraser River white sturgeon (courtesy of Lheidli T'enneh Band).

What is the evidence for the apparent “reproductive” or “recruitment” failure in the Nechako River? The evidence comes from years of data on population structure, and more recently from investigations of population genetics (or DNA). As shown by the blue bars on Figure 1 (see page 16), population data collected between 1995 and 1999 indicate that the white sturgeon population in the Fraser River (from Torpy River, upstream of Prince George to Hope) is largely composed of fish younger than 20 years, with relatively few fish representing the older age classes. The structure of the age distribution observed in the Fraser River is one that would be expected from a healthy and sustainable population such that there are more fish in the younger age classes than in the older age classes (i.e., fish die as they age, as is the case in most animal populations). Moreover, the prevalence of young fish in the Fraser River would seem to confirm that successful reproduction is taking place.

While there is evidence that Fraser River white sturgeon are

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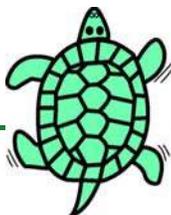
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President's Report

by Norm Zirnhelt

Much has been accomplished at BCLSS over the past year and the future looks promising and exciting for BCLSS. Following is an overview of some of our major activities.

Strategic Plan

In August of 2002, the BCLSS board adopted our Strategic Plan. The development of the plan resulted in our defining the organization's mission and objectives more clearly. Articulating what we are about gives us and others a picture of what we do and where we are going. This was a major accomplishment for BCLSS and it has already paid off for us in a number of ways.

Improved Services to Members

We have been making considerable effort to provide more consistency in services through better communication with members, and by canvassing their needs. Some examples include:

- Improving our newsletter to make it more interesting and useful to members
- Timely and consistent production of the newsletter
- Moving of the annual AGM/Conference around the province to make it (and board members) accessible to a larger number of people. In 2001, we held it at Chimney Lake (near Williams Lake), in 2002 we were at Tye Lake (near Smithers), and in 2003 it was held in Penticton.
- Responding to our member's information needs

Website

We are in the process of revising our website. The new website will be available in 2004 and will be more user-friendly and up-to-date. It will include a description of all our current projects, a database of lake groups throughout the province, and a wide range of lake-related resources available on the internet and through the BCLSS office.

LakeKeeper's Program

A considerable amount of time has gone into revising and completing the LakeKeeper's Manual (refer to update in this issue).

Corporate Sponsorship

We have developed an attractive Corporate Sponsorship package that offers a level to suit any budget. We have had good feedback from our sponsors and the number of sponsors continues to grow.

Funding for the BC Lake Stewardship & Monitoring Program

In January of 2003, we were successful in obtaining a grant from the Ministry of Water, Land, and Air Protection for a three year program to strengthen the volunteer sector in the area of lake stewardship and monitoring (see March 2003 newsletter). Environment Canada, Department of Fisheries and Oceans, and BC Gaming are also partners. This has given BCLSS a measure of stability, however we are still reliant on contributions from a variety of funders to run BCLSS. We have had very positive response from people as they hear about this program.

(Continued on page 3)

(President's Report, continued from page 2)

NALMS 2004 in Victoria, BC

We are pleased to be co-hosting the large annual international conference of the North American Lake Management Society (NALMS) in Victoria next year. I hope many of you will be able to attend as these conferences are very interesting and stimulating – watch for details in future newsletters.

BCLSS Staff & Directors

All of the good things happening at BCLSS are because of the people involved. We have two dedicated and hard working staff, Heidi Hicks (nee Bennett) and Angie Cleveland, who deliver our programs and keep the office running smoothly. Our directors all put in substantial volunteer time on various committees. Our committees cover such things as newsletters, financial management, sponsorship, memberships, fundraising, LakeKeeper's, and conferences. Without the hard work and dedication of our directors and staff, these things would not be happening.

Members & Sponsors

Our organization needs members and sponsors in order to continue our services. The funding we obtain from grants is project specific and we use our membership and sponsorship income to print the newsletter and provide other services. Please renew your membership when due, and encourage corporate sponsors when you can.

Looking Ahead (2003/04)

It should be an exciting year ahead as our new *BC Lake Stewardship and Monitoring Program* gathers steam and more and more lakes are monitored throughout BC!

Norm Zirnhelt, President
BC Lake Stewardship Society,
Williams Lake

LakeKeeper's Update

by LakeKeeper's Committee

Director Bruce Carmichael (Prince George) has put considerable time into revising and completing the LakeKeeper's Manual. Those revisions are now complete and, thanks to assistance from the BC Habitat Conservation Trust Fund, Bruce and Director Todd French are working with local visual artist Keith Carlson on diagram production. With regard to training, BCLSS was able to provide water sampling training at both the 2002 and 2003 conferences. We are also developing a 2 - 3 day *Limnology and Water Quality Certification Course* that we hope to be able to offer soon.



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Putting North-eastern BC on the International Percid Map

by Nick Baccante

On July 20-24, 2003, the Third International Percid Fish Symposium, or Percis3, was held in beautiful Madison, Wisconsin. Percis3 is a follow up to previous symposia, the first held near Thunder Bay, Ontario in 1976 and published in the *Journal of the Fisheries Research Board of Canada* in 1977. The second one was held in Vaasa, Finland in 1995, and published in the *Annales Zoologici Fennici* in 1996. Percis3 was hosted by the University of Wisconsin Sea Grant and sponsored by a number of agencies. One of the members of the steering committee was Dr. Peter Colby, my former supervisor (and friend) who is now retired, after heading walleye research in Ontario for over 20 years. Peter organized the first Percis and was on the steering committees for the second and third symposia. Participants at Percis3 came from Canada, U.S., and many countries from Europe and the former U.S.S.R.

Percid fishes include: walleye, sauger, yellow perch, darters, and their relatives from Europe, such as, zander, Eurasian perch, gobies, ruffe and others. One interesting aspect of European species is that, many of them have invaded the Great Lakes through ballast water in ships, and have established viable populations which have changed the ecology of those waters significantly. There were a number of sessions at Percis3 which focused on many aspects of percid fishes, such as biology, recovery, management, aquaculture and ecology. I had the pleasure of organizing the latter session which had about 30 papers.

What's all this got to do with north-eastern BC, more specifically the Peace Region? Percis3 provided me an opportunity to make a presentation and submit a synthesis of walleye in BC, and more specifically about Charlie Lake (Figure 1). Our region has virtually all the known walleye waters in the province. It represents the western-most edges of the distribution of walleye in Canada. There are walleye waters within the Liard and Peace river drainages. Perhaps the best known is Charlie Lake, just outside the city of Fort St. John. Charlie Lake has a very interesting history of its fish community. Early surveys had identified a simple species assemblage of white sucker, stickleback, pearl and redbelly dace. Following a number of successful and unsuccessful introductions over a period of 20-30 years, Charlie Lake now supports walleye, northern pike, yellow perch, burbot, brook stickleback, spottail shiner, and pearl dace.

Charlie Lake is very interesting for a number of reason. The introduced walleye have adapted very well at utilizing the very dense plankton and benthic species in the lake. This lake is extremely productive, mostly due to the nutrients which get dispersed throughout the water column every year due to turnover. These nutrients provide a perfect environment for blue-green algae (also known as cyanobacteria), and other organisms, which then become food for plankton and insects. Walleye feed on these year-round. This is quite different from what happens in more

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(Percid Conference, continued from page 4)

“typical” walleye populations, where they rely primarily on other fish species as prey, at least for the majority of the year. Walleye in Charlie Lake may be more efficient at utilizing available energy, since they feed directly on primary producers, rather than on other fish, which they in turn would then feed on insects.



Figure 1. The Charlie Lake watershed, north-eastern British Columbia.

This efficient use of the vast source of energy in Charlie leads to walleye yields which far exceed expectations based on conventional predictive models. For example, using a variety of predictive models to estimate walleye production in Charlie Lake, we obtain numbers ranging from about 0.4 to 1.6 kilograms per hectare per year (kg/ha/yr). Yields estimated from angling survey data average around 5 kg/ha/yr, well above those predicted by existing models. Catch rates of walleye in Charlie Lake are also well-above those reported for walleye lakes throughout North America. It's important for people who enjoy Charlie Lake to know this, because often we take for granted what we get used to.

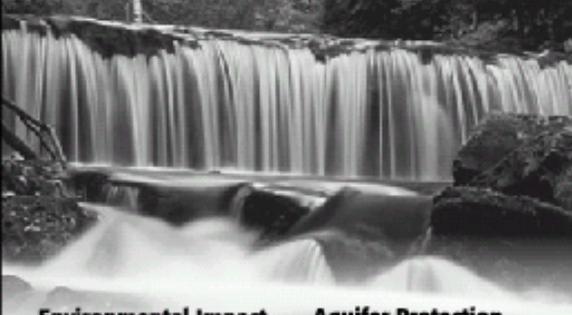
Attending Percis3 and presenting walleye data from Charlie Lake also represents, to my knowledge, the first time that walleye data from BC were presented and published in a symposium. It was gratifying to get a lot of questions about walleye in Charlie Lake, from many people who didn't realize that we had them in BC.

The proceedings from Percis3 will eventually be available, and hopefully I will post a notice in a future issue of this newsletter.

Nick Baccante, Head, Ecosystem Section
BC Ministry of Water, Land and Air Protection,
Fort St. John

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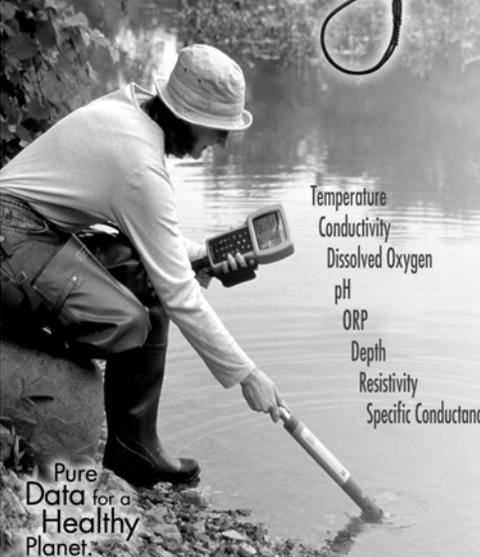




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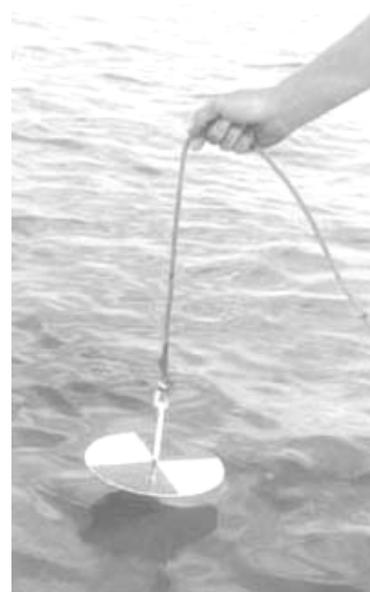
The Great North American Secchi Dip-In 2003

by Angie Cleveland

This year's Secchi Disk Dip-In was another great success! Within BC, participation in the Dip-In increased by over 50% from last year. The Great North American Secchi Disk Dip-in demonstrates the potential of volunteers to collect and monitor valuable water quality data. The collected data provides a global perspective on water quality trends and gives scientists and volunteers a sense of how transparency can vary depending on water type, regional geology, and land use. Check out the Great North American Secchi Disk Dip-in website for more information: <http://dipin.kent.edu>.

History of the Secchi Disk

The secchi disk originated with Pietro Angelo Secchi, an astrophysicist and scientific advisor to the Pope in the 1800s. In 1865, when he was asked to measure the transparency in the Mediterranean Sea, Secchi designed a white disk that he lowered into the water and recorded the depth. He "dipped" his disk consistently and compared the readings from season to season and year to year. And, with that, the Secchi disk was born! Various sizes of disks have been used since that time, but the most frequently used disk is an 8 inch diameter plastic disk with alternate black and white quadrants.



(Secchi Disk being lowered into the water)

(Continued on page 7)

(Secchi Dip-In, continued from page 6)

How is the Secchi Disk used?

The process is simple: using the attached rope, lower the plastic black and white disk into the water until you can no longer see the pattern. Record the depth using the meter-increments on the rope attached to the disk. Bring the disk back up until you can see the pattern again. Record this distance and then average the two. It's that easy!

British Columbia's Dip-In Participation

Now that BCLSS has launched the *BC Lake Stewardship and Monitoring Program*, the Secchi Disk Dip-In has taken on an even bigger role in BC. BCLSS's goal was to increase the number of BC participants in the Dip-In. This year, we are pleased to announce that the number of "dippers" has increased by 56% and the number of "dips" has increased by 52%.

Welcome New Dippers

In 2003, we had 19 returning dippers and welcomed 27 new ones. Our participation in each region has increased everywhere except the Lower Mainland.

Returning Dippers from 2002

Bouchie Lake
Charlie Lake
Fork Lake
Francois Lake
Gun Lake
Jewel Lake
Lakelse Lake
Mara Lake
Mitchell (First) Lake
Ness Lake
Okanagan Lake
Opheim Lake
Osoyoos Lake
Osprey Lake
Pease Lake
Sulphurous Lake
Tchesinkut Lake
Ten Mile Lake
Third Lake

Welcome New Dippers

Blinkhorn Lake
Bridge Lake
Christina Lake
Dragon Lake
Felker Lake
Florence Lake
Glen Lake
Hathaway Lake
Haynes Lake
Horse Lake
Kathlyn Lake
Lac Des Roches
Langford Lake
Lower Thetis Lake
Mattheson Lake
McGuire Lake
Moberly Lake
Nadsilnich Lake
Nukko Lake
Puntchesakut Lake
Rosen Lake
Round Lake
Swan Lake (Omineca/
Peace)
Swan Lake (Southern
Interior)
Tatla Lake
Upper Thetis Lake
Williams Lake

What's new this year?

New information was added to the Dip-In forms this year. Measurements such as temperature, pH, and observations such as perception and changes in water quality add more valuable data to the database. Changes in surface temperature can affect the stratification, or layering, of the water within a lake. By measuring surface temperature, we may be able to provide valuable data to scientists studying climate change. Similarly, pH, which is the measure of hydrogen ions in the water, can be a valuable water quality indicator. Things like photosynthesis, lake depth, and pollution, can cause the pH levels to fluctuate.

Over 58% of our dippers sent in temperature results and over 19% sent in pH readings. The coldest temperature was found in Moberly Lake (Omineca/Peace Region) at 10°C, while the warmest was found in Glen Lake (Vancouver Island) at 23.2°C. Measured consistently over the years, this data may provide us with clues on the effects of climate change and pollution.

Most-Transparent Lake in BC?

Once again, the deepest recorded depth in BC is awarded to Gun Lake in the Southern Interior, measuring in at 21.0 meters. This is up from last year's measurement of 20 meters. The final results for North America are not fully compiled yet, but if they are similar to last year's, Gun Lake will be one of the deepest measurements in Canada and the US. The second deepest lake in BC this year is Tchesinkut Lake in the Skeena region measuring in at 15.3 meters.

What does the Secchi Depth Tell Us?

The depth of a Secchi disk helps us to measure the transparency of the water. Transparency is an indicator of the amount of particles within a lake. These particles can be a combination of things such as zooplankton, algae, pollutants, and silt. The Secchi disk readings are used to determine the changes in clarity (amount of particles) for a lake from year to year. Every lake is a different size, shape, and depth, and has a different combination of particles – that is what makes them unique. Each Secchi disk reading provides a "snapshot" of the water quality within a lake. In order to get an overall idea of the health of an individual lake, the Secchi disk readings should be taken and compared consistently. The Dip-In measurements contribute to the collection of this valuable data.

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(Secchi Dip-In, continued from page 7)

What can cause changes in the Secchi Reading?

If the Secchi disk depths of a lake are getting shallower during the summer season, it may be due to one or more of the following:

1. Increased abundance of free floating algae.
2. Erosion of the shoreline or erosion from site development near the lake.
3. Recirculation of bottom sediment from motorboat activity.
4. Discolouration of the water from wetland runoff and/or plant decomposition.
5. Reduced zooplankton populations.

Most lakes will experience increased boat activity on weekends and holidays. Taking Secchi disk readings on the day following a weekend or holiday, and comparing these readings with others taken at different times, may reveal the affect of boating activity on the amount of particles in the

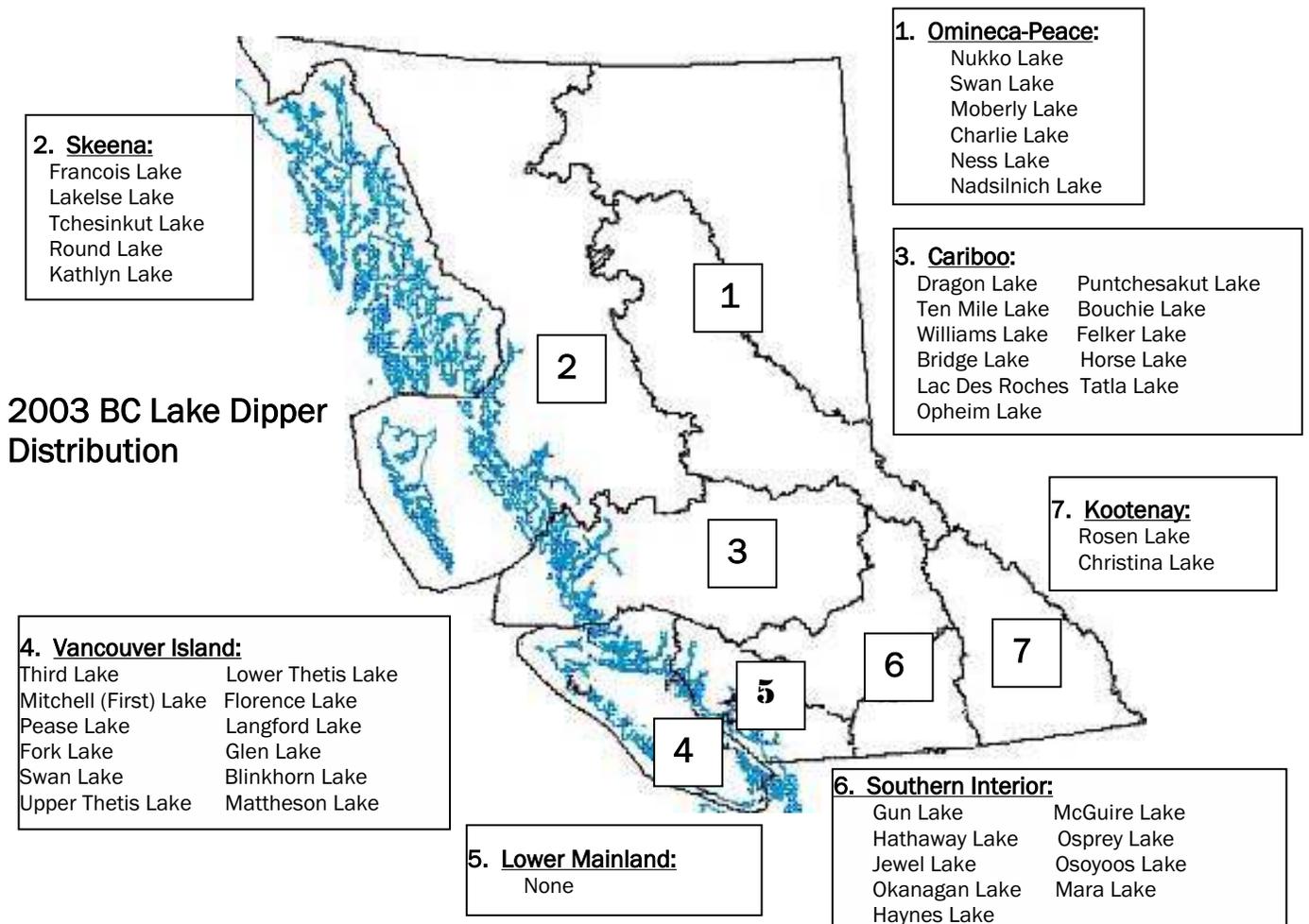
lake. Significant storm events and stormwater runoff within the watershed can also cause lower Secchi disk readings.

How do I become a Dipper?

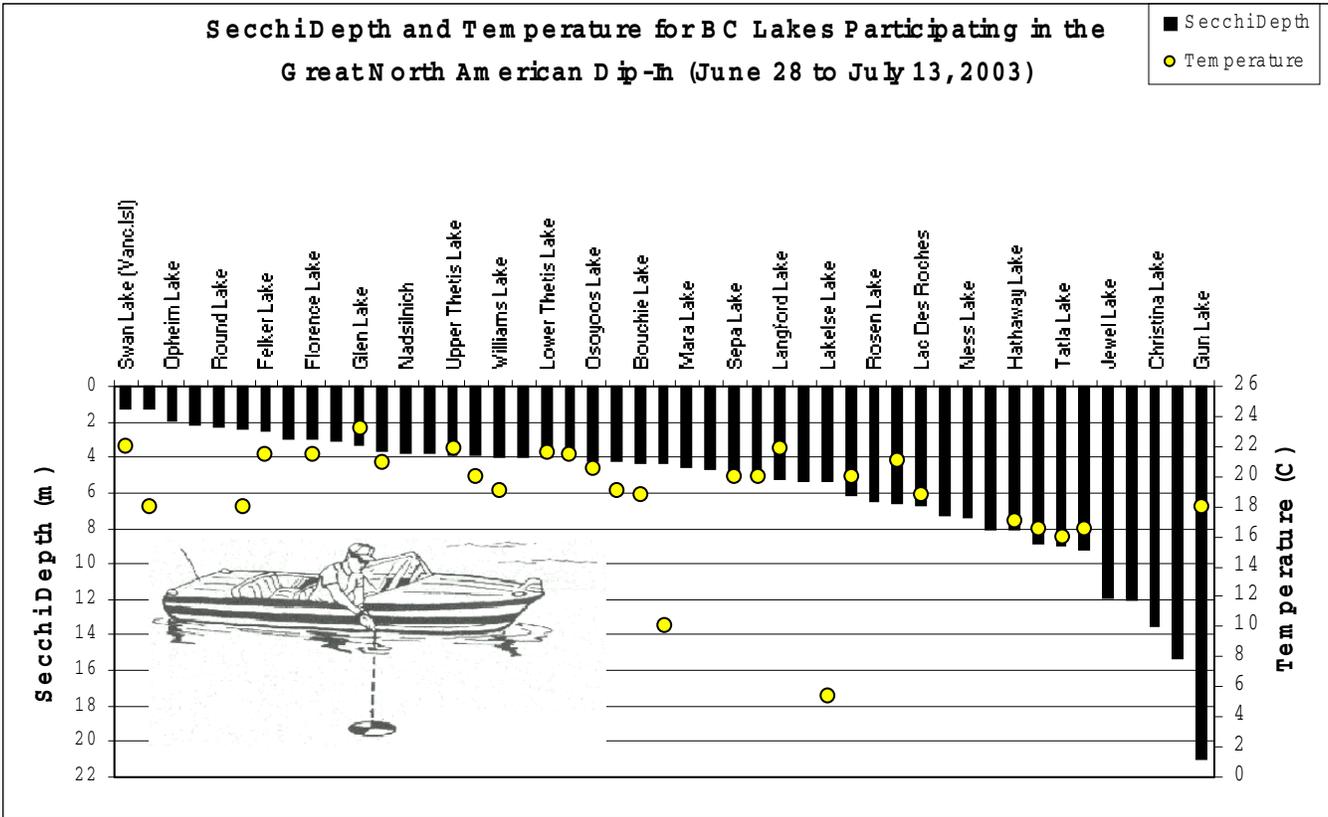
Would you like to become a dipper for the 2004 Dip-In? The dates for the next Dip-In have not been officially set, but should be last the week of June and the first week of July (ie. June 27 to July 11). We will keep you posted on the dates in the upcoming newsletters. BCLSS provides full instructions and a Secchi disk to each participant. Registration is easy: phone our office or send us your name, address, and phone number. We will send you the information, instructions, and disks in the spring. Secchi disks are FREE to members and \$10.00 for non-members. Help put your lake on the map - participate in the Great North American Secchi Disk Dip-In!

Angie Cleveland, Assistant Project Manager
BC Lake Stewardship Society,
Kelowna

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(Secchi Dip-In, continued from page 8)



BC Lake Stewardship Conference and Annual General Meeting

by Brian Nikurak

The City of Penticton was the location of the 2003 BCLSS conference and AGM. If you were unable to attend, you missed a most informative and even entertaining conference not to mention the awesome food donated by Urban Harvest from Kelowna and water from Culligan. There were a number of wonderful door prizes courtesy of the Cannery Brewing Company, Tumbleweed Gallery, and BCLSS. The conference was made possible by our valued sponsors:

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Penticton presentations



"Furthering Lake Stewardship Through Communication and Education"

(Continued on page 10)

(BCLSS Conference and AGM, continued from page 9)

Presenters and Topics: Saturday June 21

Limnology Primer-Bruce Carmichael

An introduction into the intricate processes by which a lake lives.

Nasty Lakes – Rick Nordin

A fascinating look at several deadly and dangerous lakes.

BC Lake Stewardship Monitoring Program – Heidi Bennett

Introduction to the new and exciting lake monitoring programs that are being facilitated by the Society.

Twin Lakes Stewardship Group – Volunteer Lake Monitoring Initiatives – Vic Jensen and Brian Nickurak

Review of the history, volunteer monitoring program formation and data collected from a local small Okanagan Lake.

Climate Change Impacts on Water Resources in the Okanagan Basin – Tina Neale

Computer modeling of the effect of climate change in the Okanagan and the some of the technology that is being developed in response to imminent changes in water availability.

Osoyoos Lake Stewardship Program – Lionel Dallas

A review of initiatives taken on and projects completed by one of the best organized and most dedicated lake stewardship groups in North America.

The Caps Program and Lake Stewardship – Sarah Kipp

Co-founder of the Living by Water Project, a most welcome resource to lake front residents, Sarah presented some of the latest ventures and successes of this foundation.

Reservoirs or Recreation Lakes? – Don Dobson

This question is posed and analyzed with respect to the provincial conundrum of how to mitigate Lake Usage and development.

Paleolimnological Assessment of Recent Human Impacts On Shannon and Wood Lakes – Ian Walker

Ian discusses research undertaken to give insight, by core sampling, into the history and possible destiny of some small Okanagan Lakes.

Okanagan Lake Action Plan: Current Achievements and Future Challenges – Ken Ashley and Steve Matthews

A large lake challenged with many issues and differing interests, Ken and Steve gave an update on research and planning being undertaken to address impacts of human use on the fishery and other parts of the lake ecosystem.

Sunday June 22

Volunteer Lake Monitoring Workshop – Bruce Carmichael

Director of the BCLSS and Lake Stewardship advocate Bruce Carmichael provided instruction on fundamental lake monitoring practices and procedures. The Workshop was well attended with 12 keen students.

(Continued on page 11)

(BCLSS Conference and AGM, continued from page 10)

The dedication and hard work of the BCLSS staff and volunteers made this conference a great success. Without payment and only modest extortion, the Directors were thankful to attract presenters of a very diverse background, delivering fascinating, and thought provoking presentations. The time and expense involved in the preparation and presentation of these topics is much appreciated by the BCLSS Board of Directors and all of the Attendees. The feedback from the conference was resoundingly positive.

Thank you to those who contributed!

Brian Nikurak, Director
BC Lake Stewardship Society,
Penticton



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Share your Information with Us!!

One of the primary objectives of the BC Lake Stewardship Society is to provide a public forum to discuss information on specific lakes and watersheds, lake conservation issues/concepts and educational programs relevant to British Columbia's freshwater resources. The BC Lake Stewardship Society Board of Directors welcomes written submissions, whether short articles, advertisements, or photos/figures relevant to British Columbia's lakes from both Members and the community at large. If you have information on BC's lakes, please forward it to us for publication in our quarterly newsletter. The BC Lake Stewardship Society Editor will be pleased to assist you with your submission upon request.

Please send articles and lake information to:

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Angie Cleveland (Staff):
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Above: Engineered wetland as part of a school wastewater treatment program that includes water reuse.

Below: Holding pond for treated effluent used for golf course irrigation.



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Elodea canadensis!

E*lodea canadensis*, or Canadian waterweed, is a rooted aquatic plant with many-branched stems. Its leaves are dark green and are usually about 2 cm long and 0.5 cm wide. They usually occur in whorls of 3 or 4. In July to September white flowers may appear. *E. canadensis* spreads by the detachment of leafy stalks from the parent plant. These stalks float away, re-root themselves and start new plants. The growth of this plant has increased noticeably in British Columbia lakes in the last several years. Based on patterns of infestation already seen in some Northern BC lakes, *E. canadensis* will likely continue spreading until it occupies much of the shoreline. This would lead to a significant decrease in lake water quality and could have detrimental effects on other aspects of the lake ecosystem.



Dense stand of *Elodea canadensis* (Canada waterweed). Note "pipe cleaner" shape of species.

Have You Seen this Plant growing in floating or rooted mats in local lakes or rivers?

The BC Ministry of Water, Land and Air Protection, Omineca

(Continued on page 13)

(Elodea canadensis, continued from page 12)

Peace Region is working with the British Columbia Lake Stewardship Society to identify lakes with *E. canadensis*. The Ministry is seeking province-wide information on the spread and growth cycles of this plant. If you have noticed an introduction of *E. canadensis* in your lake, or have noticed a pattern of infestation, please contact Heidi Hicks (nee Bennett) or Angie Cleveland at (250) 717-1212 or 1-877-BCLAKES, or by email at heidib-bclss@shaw.ca or angiec-bclss@shaw.ca.

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P.O. Box 174 Prior Road,
Likely, BC, Canada, V0L 1N0
Contact: Richard Holmes
Phone Number: 250-790-2456

J.S. Hart and Associates Ltd.

P.O. Box 18,
Tatla Lake, BC, Canada,
V0L 1V0
Tel/Fx: 250-476-1120

The Community-based Action Program for Shorelines and Lake Stewardship (June 2003 BCLSS Conference, Penticton, BC)

by Sara Kipp

This presentation summarized how the Living by Water Project is working with community-based groups through its Community-based Action Program for Shorelines (CAPS). The presentation included a few highlights about Conservation Action Marketing, and its “client-centred” approach to marketing products and services. Some examples of client-centred communication were given in the presentation. Clinics in conservation action marketing are one of the services offered through the CAPS program. Other services include helping community groups with outreach to shoreline residents – for example, through workshops, and through training in carrying out shoreline home visits. Through the CAPS program, the Living by Water Project also supports community groups in promoting the concept of healthy shorelines to specific audiences in communities, by helping local groups work with realtors and municipal councillors, and by helping with public information sessions. For example, one concept which has met with success is a “Living by Water dessert evening”. The Living by Water Project can also help groups with materials about healthy shorelines, including its 144 page handbook for shoreline residents (*On the Living Edge – Your Handbook for Waterfront Living* – available through the BCLSS office or Living by Water office), brochures and other resources. Some materials – such as the Shoreline Event and Activity Manual – are available through the website www.livingbywater.ca. For further information email shorelines@jetstream.net or phone 250 832 7405.



Sara Kipp,
The Living by Water Project,
Salmon Arm



A World Leader in

Environmental Monitoring Solutions

Dangerous and Nasty Lakes

(June 2003 BCLSS Conference, Penticton, BC)

by Rick Nordin

Most lakes are places of quiet and serenity. Most are beautiful and benign places, but there are some lakes which have been, or are, or could be very undesirable places to be.

Lake Nyos is in the west African country of Cameroon. In August 1986 a huge release of carbon dioxide from the lake suffocated 1,700 people and large numbers of their cattle. A potentially far more dangerous situation exists in the East African **Lake Kivu**. This is a large lake (2,200 km² and 480 m deep) which is permanently stratified (as is the case with most deeper tropical lakes) and in which there is a buildup of carbon dioxide and methane in the deeper waters. If the lake's stratification is disturbed, it could unleash an unimaginable catastrophe – turnover of a lake filled with millions of tonnes of toxic and flammable gases.

The last lake of potential catastrophe is **Lake Sarez** one of the largest lakes in the world in the remote central Asian country of Tajikistan. Sarez (80 km² and 550 m deep 17 km³ of water) was formed by a landslide in a steep valley in 1911. The material which restrains this huge mass of water has been described as extremely erodable and unstable. The area is geologically active (earthquakes of magnitude 10 have been reported from the area and Sarez was formed by an earthquake of between 9 and 10. People downstream are in considerable danger. The probable outburst of waters

would effect the countries of Tajikistan, Afghanistan, Uzbekistan and Turkmenistan, affect over 5 million people, destroy industrial and agricultural facilities, crops, vegetation cover, and kill animals over an area of 52,000 km². The collapse of this natural dam would be a huge social, financial and ecological disaster.

Nothing quite as horrific is ever likely to happen in British Columbia, however we do have some antisocial lakes. A recent newspaper article described a less serious but still very unpleasant occurrence last autumn when **Nitinat Lake**, a tidal fjord lake on the west coast of Vancouver Island, had the thin layer of fresh water on its surface mixed into the deeper anoxic saltwater by strong winds and caused a huge dieoff of fish (about 100,000 salmon) and other aquatic organisms. The stench of hydrogen sulphide made living in the whole valley almost unbearable. This phenomenon seems to happen on an occasional basis when low inflows and low water stability occur. It last happened in the 1970's and then the stench was so bad that the village of Malachan was evacuated for four days.

Rick Nordin, Director
BC Lake Stewardship Society,
Victoria



Viewing platforms that The Central Okanagan Regional District constructed at Bertram Creek Regional Park (Okanagan Lake), in partnership with the BC Lake Stewardship Society. The summer 2003 fires burned much of the surrounding area; however, the viewing platforms survived the fires.

Constructed with financial support from TD Friends of the Environment Foundation. Thank You!

How to Become a BCLSS Member

Membership/Sponsorship Form Become a Member!

To become a BCLSS member, please fill out the form below and return to BCLSS with cheque or money order payable to the BCLSS: \$10 Student, \$20 Individual, \$40 Group.

Name: _____

Mailing Address: _____

Phone #: _____

Fax #: _____

e-mail address: _____

Other information: _____

We are always trying to update our membership database, so please contact us with any changes to the above information.

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Corporate sponsorship of the BCLSS has many benefits! Donations will be gratefully acknowledged with tax deductible receipts as well as through the following:

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Class III-Bronze-\$50

- Listing on BCLSS website
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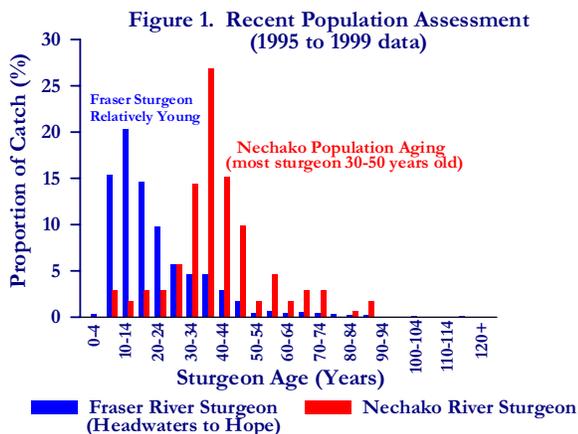
Regional BCLSS Contacts

For information on BCLSS activities in your area, please contact:

- Vancouver Island
 - Dr. Rick Nordin, Victoria (250-721-7120)
 - Eric Bonham, Victoria (250-474-5252)
 - Kevin Rieberger, Victoria (250-387-1188)
- Lower Mainland
 - Irene Calbick, Burnaby (250-238-2444)
- Okanagan
 - Brian Nickurak, Penticton (250-497-7156)
 - Darryl Arsenault, Kelowna (250-862-4832)
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 - Bob Grace, Kamloops (250-371-6289)
 - Don Holmes, Kamloops (250-573-2928)
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 - Bonnie Winter, 108 Mile (250-791-9240)
 - Norm Zirnheld, Williams Lake (250-398-4545)
- Omineca-Peace
 - Todd French, Prince George (250-563-4249)
 - Bruce Carmichael, Prince George (250-565-6455)
- Smithers
 - Lisa Torunski (250-847-1484)

We are currently looking for additional Directors to represent the Peace-Liard and Kootenay Boundary regions. If you are interested in becoming a director, please contact the BCLSS Nominating Committee at the BCLSS office in Kelowna for information on positions available or up for re-election at the upcoming AGM, as well as nomination requirements. Please consider joining the BCLSS as a Director!

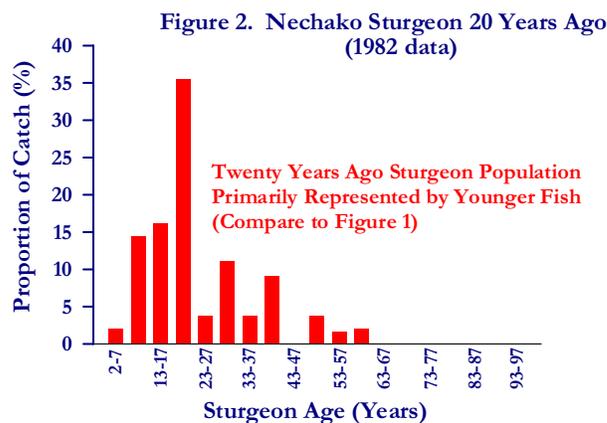
(White Sturgeon, continued from page 1)



successfully reproducing, population data collected from the Nechako River over the period 1995 to 1999 would seem to support the idea that there has been a recruitment failure in the Nechako population. As shown by the red bars on Figure 1, most of the white sturgeon in the Nechako River are between the ages of 30 and 50 years, with relatively few fish representing younger age classes. So what does this mean? Simply put, the scarcity of young sturgeon in the Nechako River means that older fish in the population will not be replaced as they die by younger fish and, perhaps more importantly, that reproduction rates are either very low or that mortality rates of young life stages are high. The low numbers of young white sturgeon in the Nechako River will, in the future, mean that there will be fewer numbers of fish reaching reproductive maturity.

An alternate hypothesis, other than recruitment failure, explaining the low numbers of young sturgeon in the Nechako River has been put forth. It has been suggested that low numbers of young sturgeon are observed in the Nechako River because spawning and rearing takes place outside of the Nechako River (e.g., in the Fraser or Stuart rivers). Fitting with this hypothesis, it has been further suggested that young fish born outside of the Nechako River do not move into the Nechako until they reach maturity; thus explaining the apparent lack of young sturgeon in the Nechako River. However, biologists who have been studying white sturgeon in the Nechako River for several years have more-or-less dismissed the possibility that there has not been a recruitment failure. One argument defending the conclusion of recruitment failure is that young sturgeon have historically been observed in the Nechako River and that the present near-absence of young sturgeon is a relatively recent occurrence. In support of this argument, population data collected in 1982 clearly show that young sturgeon were, at one point in time, prevalent in the Nechako River (see Figure 2). The white sturgeon in the \pm 20-year age classes observed in 1982 (Figure 2) are very likely from the same cohort as those observed in the \pm 35-year age classes during the 1995

to 1999 surveys (15 years later; see Figure 1). Furthermore, recent comparisons of the DNA of Nechako River versus Fraser River white sturgeon have shown that the Nechako population is reproductively isolated from the Fraser populations (i.e., Nechako River sturgeon are genetically distinct from Fraser River sturgeon). According to Don Cadden (Fish & Wildlife Science & Allocation Section Head, BC Ministry of Water, Land and Air Protection, Prince George), the results of the genetics study are consistent with observations made during radio-telemetry tracking investigations that have shown that movements of Fraser River sturgeon into the Nechako River are fairly uncommon. One of the objectives of the Nechako River White Sturgeon Recovery Initiative is to learn more about the ecological and environmental factors that control white sturgeon reproduction and survivorship, and to use this knowledge to develop a strategy that will ensure the future success of white sturgeon in the Nechako River.



To learn more about white sturgeon in British Columbia, you can visit the following websites which will be updated as new information becomes available:

<http://wlapwww.gov.bc.ca/nor/fish/sturgeon/index.html>

<http://wlapwww.gov.bc.ca/wld/fishhabitats/index.html>

http://wlapwww.gov.bc.ca/wld/fishhabitats/sturgeon/fraser_sturgeon.html

<http://www.rickhansen.com/fraser/fraser.html>

http://wlapwww.gov.bc.ca/wld/fishhabitats/sturgeon/columbia_sturgeon.html

Todd French, Co-ordinator and Member
Nechako River White Sturgeon Recovery Initiative,
Prince George