



Workshop Summary

Water Quality and Eurasian Watermilfoil Technical Workshop

A workshop to support the health of Cultus Lake and Nicola Lake

PRESENTED BY:

The Fraser Basin Council

LOCATIONS:

University of the Fraser Valley, Gathering Place, Chilliwack
Nicola Valley Institute of Technology, Merritt (via videoconference)

WORKSHOP DATE: February 15, 2013

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A close-up of Eurasian watermilfoil (*Myriophyllum spicatum*). Photo courtesy of Thomas Woolf.

Acknowledgements

Event organizers and facilitators (Marion Robinson, Tracy Thomas and Mike Simpson of the Fraser Basin Council) thank all who attended the *Water Quality and Eurasian Watermilfoil Technical Workshop*. We extend particular appreciation to our presenters, hosts and technicians, and to our funders for making the workshop possible.

Presenters

Dr. Dan Selbie, Fisheries and Oceans Canada
Dr. John Madsen, Mississippi State University
Dave Caswell, Okanagan Basin Water Board
Tom Woolf, Department of Agriculture, State of Idaho
Danielle Toperczer, Invasive Species Council of British Columbia

Hosts

Eddie Gardner, Sto:lo Elder
Dr. Jonathan Hughes and Elaine Malloway, University of the Fraser Valley
Mary Malloway and extended family, Yakwekwwoose First Nation

Technicians

Greg Davis, University of the Fraser Valley
Christie L. Culp and Angie Sowers, University of Idaho
Garth McMillian and Brian Skwarchuk, Nicola Valley Institute of Technology

Funders

Cultus Lake Park Board
FVRD Electoral Area E
Parks Enhancement Fund
Fraser Valley Invasive Plant Council
BC Living Rivers Trust Fund
Thompson-Nicola Regional District



Introduction

Introduced to British Columbia by human activity, Eurasian watermilfoil (EWM) is an invasive, foreign aquatic plant that is now pervasive in the littoral areas of Cultus Lake, Nicola Lake and many other water systems in the Pacific Northwest.

Globalization, climate change, increased international trade and greater public access in natural areas have escalated the introduction and spread of this invasive species. An effective response to any invasive species requires the active involvement of all levels of government, non-governmental organizations, stakeholders and citizens. While many actions are underway on invasive plant and animal species across BC and beyond, the focus of this workshop was on Eurasian watermilfoil and other milfoil species, and specifically as these affect Cultus and Nicola Lakes.

At Cultus Lake, decision-makers and watershed stewards have grappled with the “milfoil problem” for many years. The Fraser Basin Council, in partnership with others, organized a workshop to create a wider understanding of the milfoil issue. This was part of a “Caring For Cultus Lake” community initiative. The “Water Quality and Eurasian Watermilfoil Technical Workshop” brought together scientists, lake managers, stewards and citizens to learn about limnology, milfoil physiology and science, best management practices, mitigation options and lessons learned.

Eurasian watermilfoil (EWM) is a growing problem in a number of BC's lakes and rivers. EWM and other milfoil species push out native aquatic plants, impede recreation and impact fish and wildlife habitat. *Photo courtesy of Thomas Woolf.*



This workshop was held on February 15, 2013 at the Gathering Place at the University of the Fraser Valley (Chilliwack campus), with a videoconference link to the Nicola Valley Institute of Technology. Another videoconference link to the University of Idaho connected one of the workshop speakers. More than 100 people took part at the Fraser Valley and Nicola Valley locations. The speakers were Dr. Dan Selbie (Limnologist, Fisheries and Oceans Canada), Dr. John Madsen (Mississippi State University), Dave Caswell (Milfoil Control Operator, Okanagan Basin Water Board), Tom Woolf (Aquatic Plant Program Manager, Idaho State Department of Agriculture) and Danielle Toperczer (Manager, Invasive Species Council of BC).

Key Points from the Workshop

When it comes to managing Eurasian watermilfoil, the first key message and caveat is that there is no “silver bullet.” The EWM issue is complex and connected to every other lake-care issue. Depending on the degree of EWM infestation in Cultus and Nicola Lakes, eradication may not be possible and may not be the best goal.

The second key message is that it is important to outline management goals clearly and, based on the current state of the lake, to work within the boundaries of what can be done. Land managers need to develop adaptive management plans that incorporate best practices and continuous improvement by learning from operational results.

First steps include detection and identification. As one speaker emphasized, “first know what kind of [milfoil](#) you have.” There are 14 species of watermilfoil in North America, one of which is native to British Columbia. Eurasian watermilfoil is a foreign species, identifiable by flattened, square tips on the leaves when compared with most other kinds of milfoil, which have more pointed leaves.

After detection comes mitigation. Mitigation of watermilfoil encompasses mechanical, biological, chemical, physical and institutional methods. Not all methods are approved in BC or Canada.

Another important consideration is to understand the nature of the lakes where the watermilfoil is found. Cultus and Nicola Lakes are different from each other in many ways and occur in very different climates. Nicola Lake is eutrophic and dimictic. It has a high nutrient count per unit of water compared with other lakes. Eutrophic lakes have less dissolved oxygen and have murky water due to the production of algae and plant growth. Dimictic means that the lake water mixes twice a year in the spring and fall. Cultus Lake is less eutrophic than Nicola Lake and is monomictic. It never freezes, and is thermally stratified throughout much of the year, only mixing once rather than twice a year. The density difference between the surface water and the deep water prevents this lake from mixing in the summer. Lacking significant thermal stratification, Cultus Lake has the ability to thoroughly mix from top to bottom each winter.

Nutrient loading in lakes drives milfoil growth and usually comes from direct or indirect human sources and activities, such as septic fields, fertilizers and agricultural activities. As both these lakes are very different, nutrient management must be specific to each lake.

Some Actions and Strategies

- ❖ First ask whether to manage or not to manage watermilfoil. Is milfoil a threat? What is the real impact of different management techniques? How do these techniques compare with each other, and to no management?
- ❖ What are reasonable expectations in managing milfoil?
- ❖ Develop management goals. Manage in a way that is cost-effective, causes minimal damage to the lake system, complies with regulations and is acceptable to stakeholders.
- ❖ Select management practices tailored to site-specific needs and priorities. Evaluate site-specific economic and environmental constraints. Consider all techniques based on their merits. Use various techniques both spatially and temporally.
- ❖ Time the milfoil management to coincide with vulnerable points in the milfoil life cycle, to reduce regrowth or overwintering, and to prevent auto-fragmentation.
- ❖ Reduce carbohydrate at the roots/root crown and growing points. Don't provide nutrients in the sediment to milfoil roots.
- ❖ Every method has some drawbacks. For example, mechanical harvesting does not reduce milfoil in a lake, but is a practice followed for recreational purposes. Mechanical harvesting changes predator-prey hiding places, and kills small vertebrates and invertebrates.
- ❖ Hand-pulling is the same as in the terrestrial environment, but is much more difficult underwater because visibility is obscured and because securing the root crowns is not easy.
- ❖ Rototilling can create more colonies, is not suitable for all lake bottoms and interferes with habitat. Still, it is working as a wintertime management activity in the Okanagan.
- ❖ Mats or barriers may work in limited spots adjacent to docks or swimming areas, but these alter the lake bottom for fish and other aquatic life. Depending on the material used for barriers, milfoil is able to grow on them "like Velcro."
- ❖ Both mats/barriers and hand-pulling are too onerous for milfoil control in large areas.
- ❖ In the United States, herbicides have proved successful, but this practice is not available in Canada. At the same time, keeping milfoil out of treated lakes requires resources while we still have to maintain vigilance to keep out other new invasives, such as zebra mussels.
- ❖ Established milfoil becomes habitat. We need to learn about predator-prey adaptations when making decisions on milfoil management.
- ❖ Use sound science as the basis for management decisions.
- ❖ Build community; encourage members of the public to become involved in lake care.

- ❖ Management plans include inventory, prevention, assessment, site-specific actions (e.g., containment), evaluation, monitoring and education.
- ❖ For more on management, see the *Biology and Control of Aquatic Plants: A Best Management Practices Handbook* published by the Aquatic Ecosystem Restoration Foundation in Georgia: www.aquatics.org/bmp.html

A point to emphasize: there is great value in signage and outreach activities to educate the public about boat inspections, boat wash stations and other ways of preventing the movement of invasive species, which could include zebra mussels, fish pathogens and invasive snails. Milfoil is an existing issue, but our speakers made it clear that “there is more trouble coming.”

Lessons Learned

- ❖ Respond to invasive species as early as possible.
- ❖ Focus efforts so they are in line with resources.
- ❖ Engage stakeholders / lake stewards; get them involved.
- ❖ Identify stable funding sources.
- ❖ Make a plan and get to work on the ground. Aquatic invasives move fast.
- ❖ Milfoil is the issue now, but there are other invasives coming our way.

Concluding Comments

About the Process — Community Building

Holding a workshop to share information with interested parties is important to raising awareness. Even more important is to do this in a way that helps build community through shared values. Social scientists remind us that core values are wired into us.¹ Research shows that, regardless of their language or culture, all people understand and value trust, honesty, respect, love and mindfulness, among other values. Accordingly, it is helpful to demonstrate inclusion and non-adversarial approaches when bringing people together to address difficult topics.

For the Water Quality and Eurasian Watermilfoil Technical Workshop, the organizers acknowledged Aboriginal worldviews and operating styles and reached out to include people from near and far. We reduced our ecological footprint with videoconferencing, sourced local food and traditional cooks, used bio-degradable materials and generated very little garbage, to name a few actions stemming from our values.

The Cultus Lake Aquatic Stewardship Strategy (CLASS) group was actively involved in this workshop and is a good example of community-building on difficult issues, including watermilfoil. Formed in 2007,

¹ Sources include Richard Barrett from www.valuescentre.com, Dr. Liz Elliot, Centre for Restorative Justice, SFU, Robert Putnam, author of *Bowling Alone*, and videos produced by Heartspeak Productions.

CLASS now has over 60 agencies and individuals that come together to advance lake care. CLASS recognized that milfoil and other invasive aquatics are a result of human activity, and are a symptom of a degrading lake for which people must take responsibility. For more than five years, CLASS participants have worked on various lake-care topics, including nutrient-loading reduction, species at risk, water quality, temperature, lake levels, fish habitat, spawning beds and sediment run-off, all addressed through existing mandates, partnerships and connections. To learn more about CLASS, visit: <http://cultusstewards.shawbiz.ca/>.

Next Steps

This workshop is one step in raising awareness of Eurasian watermilfoil and building community for lake care generally, both at Cultus and Nicola Lakes. The next step for workshop organizers is to share information from the workshop with those managers and agencies that have responsibilities for the lakes and surrounding land. We are ready to assist as they identify management goals, explore implementation strategies, and engage the community on these issues.



Appendix 1: Speaker Biographies and Presentation Summaries

Here are our speaker profiles and presentation summaries from the Water Quality and Eurasian Watermilfoil Technical Workshop. Copies of the presentations are available on the Fraser Basin Council website: www.fraserbasin.bc.ca/resources_summaries.html.

Dan Selbie, PhD

Dr. Dan Selbie is a limnologist and paleolimnologist with Fisheries and Oceans Canada's Science Branch, located at the Cultus Lake Salmon Research Laboratory. Dr. Selbie has a BSc in Environmental Biology and a PhD in Biology from Queen's University and has completed a post-Doctoral Fellowship at McGill University. His research principally focuses on the trophic ecology of Sockeye salmon (*Oncorhynchus nerka*) nursery lake ecosystems and the identification of both freshwater and marine forcing mechanisms responsible for stock production and nursery ecosystem dynamics. Current research interests include: (1) Regulatory mechanisms of productive capacity in Sockeye salmon nursery ecosystems; (2) Impacts and interactions of climate change on Sockeye salmon and nursery habitat; (3) Exogenous forcing mechanisms responsible for long-term Pacific salmon production dynamics and ecosystem interactions; and (4) Mechanisms of heterogeneity in northern climate-warming trends. His current research program integrates monitoring, targeted ecosystem experiments and studies, long-term ecological research and paleoecology to achieve research goals.

Presentation: Cultus Lake and Nicola Lake

Dr. Selbie is involved in long-term ecological research on Cultus Lake and a project to determine nutrient sources and loadings to Cultus Lake. In addition, he has conducted paleolimnological work, reconstructing the lake conditions as they were up to 200 years ago. He spoke about Cultus Lake and human threats to the system, its milfoil history, and unanswered questions about how milfoil may influence species at risk.

John D. Madsen, PhD

Dr. John D. Madsen is an Associate Professor of Research and Extension in the Geosystems Research Institute and the Department of Plant and Soil Sciences, Mississippi State University. Dr. Madsen has been involved in research on the ecology and management of invasive aquatic plants around the United States for over 25 years. He has a Bachelor of Science degree from Wheaton College, Wheaton, Illinois, and Master of Science and Doctor of Philosophy degrees in Botany from the University of Wisconsin-Madison. He is currently an Associate Editor for the journals *Invasive Plant Science and Management* and *Journal of Aquatic Plant Management*, and is on the Editorial Board for the *Journal of Freshwater Ecology*. Dr. Madsen is currently on the Board of Directors for the Aquatic Plant Management Society, the Council for Agricultural Science and Technology, the North American Invasive Species Network and the Weed Science Society of America.

Presentation: Eurasian watermilfoil — Biology and Physiology

Eurasian watermilfoil (*Myriophyllum spicatum*) is a widespread non-native plant that is invasive to lakes and rivers in North America. The biology and physiology of this plant have enabled it to spread and dominate in a wide variety of habitats in North America. For example, it is able to develop stem fragments and canopy-forming growth. Understanding these biological and physiological traits will improve the ability to search for this plant, and develop successful management strategies for long-term control. While specific control recommendations will not be made, some management strategies

will be discussed in the context of how they do (or do not) exploit aspects of Eurasian watermilfoil life history, biology and physiology.

Danielle Toperczer, PAg (speaker) | Lisa Morello (author)

Danielle is a Manager with the Invasive Species Council of BC. She oversees various projects, such as a horticulture pilot project to be rolled out in the spring of 2013, and fund development. Her past work experience includes fisheries surveys, range management and not-for-profit work.

Presentation: The Invasive Species Council of BC — Overview and Programs

The presentation offered an overview of ISCBC partnerships and the importance of working collaboratively. It also outlined the ISCBC “Take Action” program, with two areas of focus:

- ❖ The “Clean, Drain, Dry” boater awareness initiative that was launched in the spring of 2012 across BC. This program worked with public to change behaviour towards cleaning, draining and drying their boats before launching into another body of water to help prevent the introduction and spread of aquatic invasive species.
- ❖ The Horticulture Pilot program, which aims to change the behaviour of retailers and consumers, and create a culture of invasive-free gardening. This program is an extension of the popular Grow Me Instead resource, assisting consumers in choosing responsible alternatives to planting invasive species in their gardens.

Dave Caswell

Dave Caswell is a milfoil control operator for the Okanagan Basin Water Board (OBWB). Trained as a SCUBA diving instructor and commercial diver, he approaches aquatic invasive plant control with a long-term view and sense of respect for the aquatic landscape. He gained diving experience throughout the Caribbean, and later took over the Milfoil Control Operations in Christina Lake, BC in 2005. After spearheading a successful modernization effort of Christina Lake’s milfoil control program, Dave Caswell now devotes his time primarily to the OBWB milfoil program and the Okanagan Valley’s lakes.

Presentation: Milfoil Control in the Okanagan Valley

The Okanagan Basin Water Board has been responsible for control of Eurasian Milfoil (*Myriophyllum spicatum*) in the Okanagan Valley for the past 40 years. Eurasian watermilfoil is a submerged aquatic plant with an aggressive growing habit; the plant spreads primarily via small fragments which re-root wherever they come to rest. This milfoil tends to outgrow native lake plants, leading to a range of negative impacts. Dense Eurasian Milfoil beds choke out native plant populations, alter shoreline habitats, and pose a nuisance and risk to swimmers, boaters and anglers. Early attempts at Eurasian watermilfoil control in the mid-1970s included hand removal of plants by SCUBA divers, dredging with a suction barge, attempts at root-removal using a water-jet system, and a brief foray into the application of aquatic herbicides. These measures were each defeated by a combination of public opinion, changes in regulations, and advancements in control methods.

Currently, the OBWB employs a program of winter rototilling using three custom-made aquatic rototillers, coupled with a summer harvesting program that uses two harvester machines running full time. The OBWB is currently engaged in comprehensive invasive plant surveys and mapping process in all of the Eurasian Milfoil treatment areas using GIS technology. This is to further advance the

understanding and application of control measures in the Okanagan Valley.

Thomas Woolf

Thomas Woolf has a BSc degree in Biology from Adams State College in Colorado and a Master's Degree in Environmental Science from Minnesota State University. His Master's work focused on invasive plant impacts on aquatic ecosystems. He began working for the Idaho State Department of Agriculture as the Aquatic Program Manager in 2007. His responsibilities on invasive species include education, prevention, surveying and treatment in Idaho.

Presentation: Idaho's Eurasian Watermilfoil Program

Idaho initiated an aggressive Eurasian watermilfoil (EWM) program in 2006. This was an Early Detection Rapid Response (EDRR) program that was meant to eradicate EWM populations wherever possible and prevent further expansion in the state. Today EWM remains in some areas, but densities are significantly reduced and no further spread of the plant has been detected. A number of EWM populations have been reduced to the point where EWM is difficult to find, if not eradicated from the system. The EWM program also led to the development of Idaho's Watercraft Inspection Program which inspects watercraft to prevent the transport of invasive aquatic weeds and invasive animals such as zebra and quagga mussels. This is now a state-wide program focused on preventing movement and introduction of invasive aquatic species into the waters of Idaho and the region.

Appendix 2: Resources

Best Management Practices Handbook: www.aquatics.org/bmp.html

Western Aquatic Plant Management Society: www.wapms.org

Invasive Species Council of BC: www.bcinvasives.ca

Fraser Valley Invasive Plant Council: www.fraservalleyweeds.com

Madsen, J.D. (2000). "Advantages and disadvantages of aquatic plant management techniques," ERDC/EL MP-00-1, U.S. Army Engineer Research and Development Center, Vicksburg, MS. Available in PDF format at the following web page link: <http://ucanr.org/sites/csnce/files/57542.pdf> or email Dr. Madsen at jmadsen@gri.msstate.edu.

Idaho Invasive Species Program: information about boat inspection stations:
www.agri.idaho.gov/Categories/Environment/InvasiveSpeciesCouncil/indexInvSpCouncil.php

Additional website recommendations from Thomas Woolf:

- ❖ www.100thmeridian.org/
- ❖ www.aquatics.org/