Upper Columbia Basin Zebra and Quagga Veliger Monitoring Project 2012-2013

Report Prepared by: *The Central Kootenay Invasive Plant Committee (CKIPC), Aquatic Invasive Species Working Group*

Zebra mussel (Photo credit: Ohio Sea Grant)

Project Funded by:

This project was undertaken with the financial support of the Government of Canada.

Ce projet a été réalisé avec l'appui financier du gouvernement du Canada.

Canada

Additional support provided by:

FORTIS BC

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BRITISH COLUMBIA CONSERVATION FOUNDATION

Central Kootenay CKIPC Invasive Plant Committee

Acknowledgements

This project would not be possible without funding from the Environment Canada Environmental Damages Fund. In-kind monitoring and analytical support was gratefully provided by the BC Ministry of Environment, BC Ministry of Forests, Lands and Natural Resource Operations, the Slocan Lake Stewardship Society, FortisBC and Teck Metals Ltd. Also thanks to British Columbia Conservation Foundation for project management services, and to the CKIPC for ongoing support with outreach and report development.

Introduction

Background

The zebra mussel (*Dreissena polymorpha*), an invasive freshwater bivalve from the Ukraine, is responsible for extensive ecological and economic impacts in areas in which they are not native. Since its initial discovery in the Great Lakes region of Canada and the U.S. in the late 1980's, this species has spread to more than 20 states and 2 provinces (Figure 1). Its rapid spread has been facilitated by transport of adult mussels on boats and veliger movement by water currents from infested to uninfested portions of watersheds.

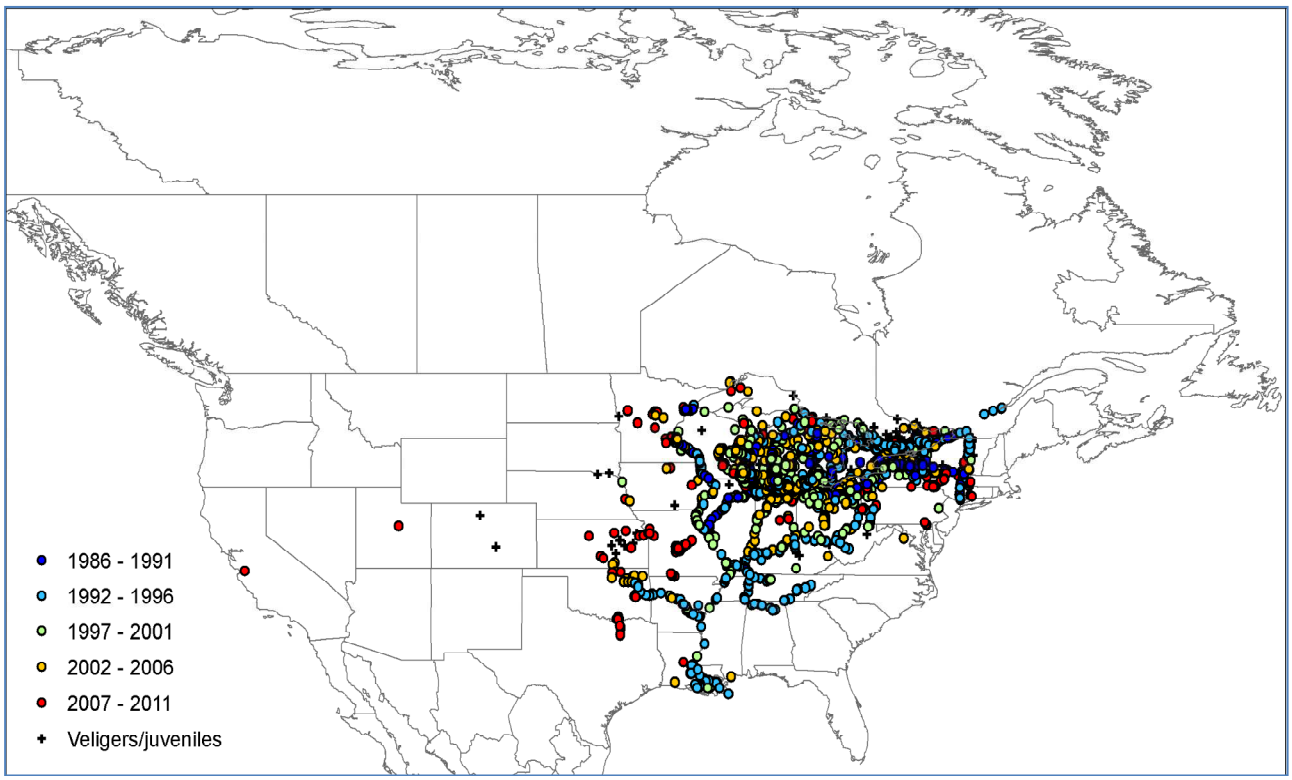

Figure 1: Reported sightings of adult Zebra Mussels between 1986 and 2011 in North America. Data obtained from the US Geological Society (Benson et al., 2012a).

Although not yet found in British Columbia or east of Ontario, zebra mussels have crossed over the 100th meridian in the U.S. and are now found in California, Utah and Colorado. In July 2012, dead Quagga mussels (*Dreissena rostriformis bugensis*), a close relative of the zebra mussels, were found on a boat at Shuswap Lake in British Columbia. The discovery of these mussels at Shuswap Lake sparked a flurry of monitoring and outreach activity in British Columbia. Prior to the discovery of these mussels in the province, early detection monitoring of the species was limited.

The purpose of the "Upper Columbia Basin Zebra and Quagga Veliger Monitoring Project 2012-2013" was to develop volunteer monitoring resources, support the existing provincial monitoring program, expand veliger monitoring in the Columbia Basin (Figure 2) and support outreach activities in the region.

Figure 2: Study Area – The Canadian Columbia Basin (Source: Google Earth.)

Zebra Mussels

Once mature, female zebra mussels can produce up to one million eggs per year depending on water quality conditions. The eggs hatch into free-swimming microscopic larvae called veligers. During this stage, which lasts for approximately 8 to 33 days, the larvae remain suspended in the water. It is during this stage that the veligers can be transported undetected from lake to lake in bait buckets, live wells, and bilge water. Early detection can be realized through monitoring for the presence of veligers.

The distribution of zebra mussels is thought to be controlled mainly by temperature and calcium concentration in the water. They begin laying eggs when water temperatures rise to approximately 12 ºC and continue until it cools below this temperature in the fall. Calcium is required for mussels to develop their hard shell.

Adult zebra mussels can survive out of water, in moist conditions, for up to two weeks. They attach to boats or other equipment being transported from one body of water to another and easily spread to new areas.

The Columbia Basin

The drainage basin of the Columbia River occupies a large area–about 673,396 square kilometres (260,000 sq mi)–of the Pacific Northwest region of North America. The Columbia River pours more water into the Pacific Ocean than any other river in North or South America. In its 1,270 miles (2,040 km) course to the Pacific Ocean, the Columbia flows through four mountain ranges—the Rockies, Selkirks, Cascades, and Coast—and drains 668,000 km^2.

There are 14 hydroelectric dams on the Columbia's main stem and over 450 additional dams and structures on its tributaries produce more hydroelectric power than those of any other North American river. The Canadian dams in the Columbia Basin generate approximately 50% of the hydroelectric power in British Columbia (Figure 3). In addition to the hydroelectric development in the basin, there are numerous water intakes associated with refineries, mills, sewage treatment, and water treatment as well as unlimited recreational water uses.

Figure 3: Dams within the study area – red circle. (http://en.wikipedia.org/wiki/File:Kootenay_dams.jpg)

Economic Impact and Likelihood of Zebra Mussel Establishment

The potential economic impact of a zebra mussel infestation to the Canadian Columbia Basin has not been calculated. The likelihood of establishment of the species and the socio-economic impact of an infestation in the Columbia Basin is predicted to be high (Lodge, 2006; Therriault 2013 and Figure 4).

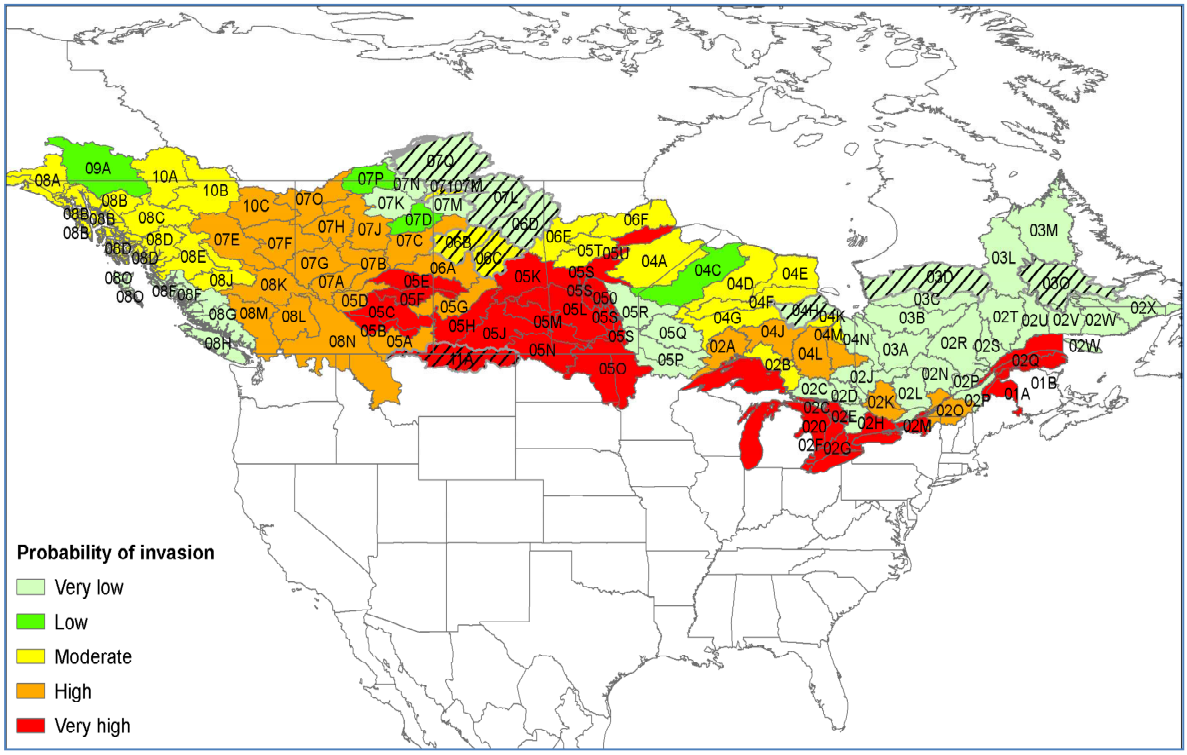

Figure 4: Probability of Zebra Mussel invasion based on probability of survival and arrival. Hatched watersheds had less than 5 sampling sites (Therriault et al, 2013)

Some estimates of the current cost of this problem in eastern Canada and U.S. are upwards of $30 million per year to manage invasive zebra mussels that clog intake pipes of power plants and water intake facilities (Lodge, 2006). In a 2005 study by Phillips et al, the estimated cost for a hypothetical zebra mussel mitigation strategy, based upon two response scenarios (a sodium hypochlorite (NaOCl) injection system and anti-fouling paint), at 13 select hydroelectric projects, was $23,621,000. The cost per generator was $62,599 for the NaOCl system, and $81,000 for antifouling paint (not including labor). Removal, painting, sandblasting and installation could potentially double antifouling paint treatment costs. Average annual operating costs of these systems would vary, but was estimated at $100, 000 per facility.

Outreach and prevention of spread of the mussels and veligers will help slow the arrival of the species to the Columbia Basin. Early detection of the species if it is to find its way into the Columbia basin, would buy operators time in which to plan and implement mitigation solutions.

Objectives and Scope of Work for the Project

The objective of the "Upper Columbia Basin Zebra and Quagga Veliger Monitoring Project 2012-2013" was to address the lack of information about the presence or absence of *Dreissenid* sp. by monitoring temperature and larva at nine key locations throughout the Columbia Basin. These locations include the two boat launches on the Arrow Lakes, two boat launches on Kootenay Lake, two boat launches on Slocan Lake, two sites on the Pend Oreille River and two sites on the Columbia River near Trail (Figure 5). In addition, outreach materials were developed as part of the project.

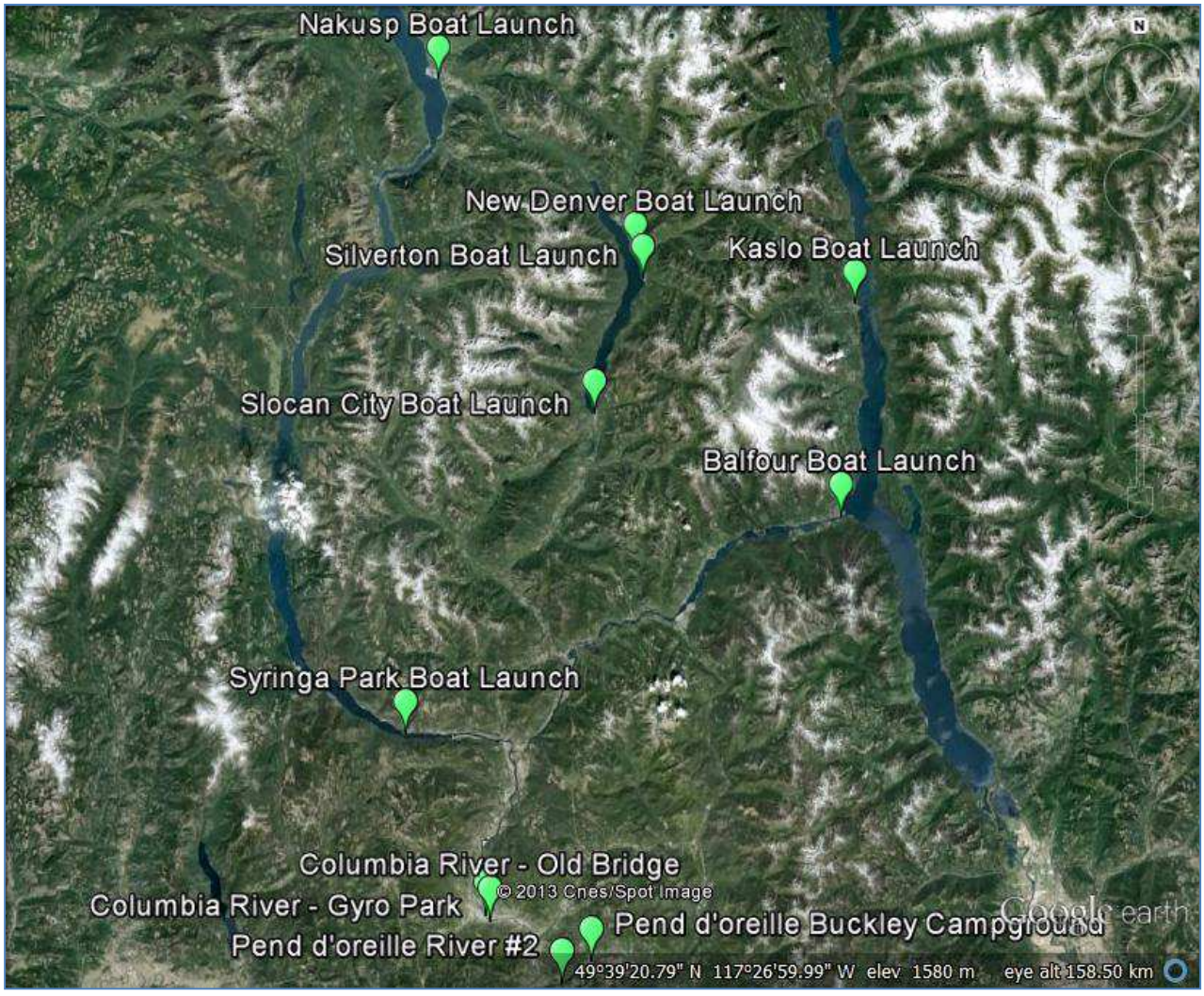

Figure 5: Veliger Sample locations for 2012 in the Canadian Columbia Basin

The scope of work for the project included the following:

1. Identification and training of volunteer monitors.
2. Development of standard sampling procedures for veliger sample collection, preservation and handling by volunteer monitors.
3. Assembly of veliger sampling kits for distribution and use by volunteer monitors.
4. Identification of sample locations.
5. Oversight of sample collection by volunteer monitors.
6. Sample analysis by Ministry of Environment.
7. Report preparation.

Outreach activities related to the project included:

1. Media releases at the start and end of the project.
2. CKIPC website update to include aquatic invasive species webpages.
3. Preparation and distribution of three priority aquatic invasive species profiles.
4. Purchase and distribution of educational resources (carabiners, pamphlets, etc).
5. Attendance and dissemination of information and resources at community events.

Veliger Sampling

Identification of Sampling Locations

Sample locations were selected based on usage pressure, access, socio-economic sensitivity and opportunistic collaboration with existing sampling programs. Figure 5 provides a map of the sample locations and Table 1 provides the site names and coordinates. At total of nine sites were monitored in 2012.

Identification and Training of Volunteer Monitors

Volunteers were selected based on existing technical knowledge and existing sampling programs. A number of water quality sampling programs were in progress and the volunteers were provided with the sampling kits and equipment to include the veliger sample collection in their program. The monitors were provided with the sampling methodology and because of their prior technical training, were proficient at taking the sample without further instruction.

Volunteer monitors were represented by the following organizations:

- FortisBC Inc.
- TECK Metals
- BC Ministry of Environment
- Slocan Lake Stewardship Society

Sampling Methodology

The sampling protocol used during the project is provided in detail in Appendix I.

Sampling equipment such as nets, thermometers, bottles and preservative were purchased by the program and provided to each group for use during the 2012 sampling season and for future monitoring use. Masonite multi-plated samplers (Figure 6) were also purchased by the program and installed at each sample location for long-term visual monitoring.

Figure 6: Zebra mussel sampling equipment purchased by the program for monitoring kits including Multi-plated Masonite samplers (left) and veliger nets (right)

Sampling Results

A total of 22 samples were collected by the volunteer monitors and analysed by the BC Ministry of Environment. No zebra mussel veligers were detected in the samples. Native mussel veligers were detected in 4 samples. The results are provided in Table 1 below.

Table 1: Results of the Zebra Mussel Veliger sampling program

Lake	Site	Date	Tows	Coordinates	Zebra Quagga veliger	Native Mussel Species	Average Calcium (mg/L)
Slocan Lake	Slocan boat launch	08.10.2012.	2 tows @ 20ft	49.461311 N, 117.281456 W	-	-	14
Slocan Lake	Slocan boat launch	07.29.2012	4 tows @ 20ft	49.461311 N, 117.281456 W	-	Ostracoda	14
Slocan Lake	Slocan boat launch	09.02.2012	4 tows @ 20ft	49.461311 N, 117.281456 W	-	-	14
Slocan Lake	Silverton boat launch	09.30.2012.	4 tows @ 20ft	49.954416 N, 117.362466 W	-	-	14
Slocan Lake	Silverton boat launch	08.12.2012	4 tows @ 20ft	49.954416 N, 117.362466 W	-	-	14
Slocan Lake	Silverton boat launch	10.10.2012	4 tows @ 20ft	49.954416 N, 117.362466 W	-	-	14
Slocan Lake	New Denver boat launch	09.30.2012.	4 tows @ 20ft	49.984520 N, 117.377531 W	-	-	14
Slocan Lake	New Denver boat launch	08.12.2012	4 tows @ 20ft	49.984520 N, 117.377531 W	-	-	14
Slocan Lake	New Denver boat launch	09.03.2012	4 tows @ 20ft	49.984520 N, 117.377531 W	-	-	14
Pend d'oreille River	Buckley campground	08.12.2012.	3 tows @ 20ft	49.2933 N, 117.293300 W	-	Ostracoda	26
Pend d'oreille River	Pend d'oreille #2	09.11.2012	3 tows @ 20ft	49.003839 N, 117.331153 W	-	Ostracoda	26
Kootenay Lake	Balfour boat launch	09.07.2012.	2 tows (0 - 5m)	N 49 37 21.3, W 116 57 53.8	-	-	22
Kootenay Lake	Balfour boat launch	08.13.2012.	3 tows (0 - 6m)	N 49 37 21.3, W 116 57 53.8	-	-	22
Kootenay Lake	Kaslo boat launch	08.14.2012.	2 tows (0 - 7m)	N 49 54 55.6, W 116 54 18.4	-		22
Kootenay Lake	Kaslo boat launch	08.29.2012.	2 tows (0 - 5m)	N 49 54 55.6, W 116 54 18.4	-		22
Upper Arrow Lake	Nakusp boat launch	09.12.2012.	2 tows (0 - 4m)	N 50 14 11.5, W 117 47 52.1	-		18.4
Upper Arrow Lake	Nakusp boat launch	08.22.2012.	2 tows (0 - 4.5m)	N 50 14 11.5, W 117 47 52.1	-		18.4
Lower Arrow Lake	Syringa boat launch	08.20.2012.	3 tows (0 - 5.9m)	N 49 20 27.3, W 117 52 16.9	-	-	18.4
Columbia River	Gyro park boat launch	09.07.2012.	4 tows @ 20ft	49.060753 N, 117.422723 W	-	-	19.5
Columbia River	Gyro park boat launch	10.09.2012.	4 tows @ 20ft	49.060753 N, 117.422723 W	-	Unionidae	19.5
Columbia River	Old Bridge	09.11.2012.	4 tows @ 20ft	49.053861 N, 117.415572 W	-	-	19.5
Columbia River	Old Bridge	10.09.2012.	4 tows @ 20ft	49.053861 N, 117.415572 W	-	-	19.5

Outreach

A key component of this project was public outreach. A media release in October 2012 announced the commencement of the monitoring project. Aquatic invasive species identification carabiners (key chains), pamphlets and profiles were ordered, prepared, printed and distributed at the following events during 2012 and 2013:

- Trail Wildlife Society's Awareness Week - Trail (February)
- Fly Fishing Symposium - Castlegar (March)
- CKIPC AGM and Speaker Series - Castlegar (April)
- Annual Field Tour - Creston (June)
- BCWF Wetlandkeepers Workshop - Castlegar (June)
- BCLSS Annual Conference - New Denver (June)
- Hills Garlic Festival - New Denver (September)
- Creston Rod and Gun Club - Creston (June)
- Toadfest - Summit Lake (August)
- RBCM Aliens Among Us - Nelson (December to February)

The regional invasive species website (www.ckipc.ca) was also updated with an aquatic invasive species webpage hosting regionally specific aquatic invasive species information including links to a variety of resources, priority species profiles, and prevention information (see http://www.ckipc.ca/target-species/aquatic-species; http://www.ckipc.ca/about-us/subcommittees).

Conclusion and Recommendations

The samples collected and analysed for the "Upper Columbia Basin Zebra and Quagga Veliger Monitoring Project 2012" did not detect the presence of *Dreissenid* sp. in the main water bodies of the Canadian Columbia River drainage. Recently published reports from Fisheries and Ocean Canada indicate that the risk of dreissenid establishment in the Columbia Basin region is high. Given that the likely socio-economic impact of a *Dreissenid* infestation in the Columbia Basin is considerable due to the large number of hydroelectric and industrial facilities and high use recreational sites in the area, ongoing early detection monitoring is very important.

The project has developed a team of trained and equipped volunteer monitors in the region that can continue to contribute to the Provincial sampling program as needed. It is recommended that the CKIPC Aquatic Invasive Species Working Group continue to work closely with the province to provide local knowledge and establish effective and ongoing monitoring support for the existing province-lead aquatic invasive species monitoring initiative. Regular observations of the multi-plated sampling device should also be recorded. A common data entry sheet should also be developed and implemented to facilitate consistent data recording.

Effective outreach can help slow the timing of arrival and establishment of the species. The CKIPC website continues to be an excellent resource for the distribution of information on regional priority species. Populating and expanding the new CKIPC aquatic invasive species webpages with downloadable outreach materials, species profiles, regulatory updates and informative research documents will give stakeholders and the public a trustworthy source of information.

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Appendix I: Sampling Protocol

ZEBRA MUSSEL VELIGER SAMPLING PROTOCOL

Zebra mussel. (Photo credit: Ohio Sea Grant)

Developed for the Columbia Basin Volunteer Monitoring Project 2012, Trail BC Canada

May 1, 2012

This project was undertaken with the financial support of the Government of Canada.

Ce projet a été réalisé avec l'appui financier du gouvernement du Canada.

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Zebra Mussel Veliger Sampling Protocol

RATIONALE

Since their accidental introduction to eastern North America in the 1980's , zebra and quagga mussels have had serious ecological and economic impacts. Both species can completely replace native mussels and can also re-engineer the entire ecosystem. This results in the elimination of plankton communities, causing a collapse of the native food chain that supports open water fish populations. A variety of studies have reported economic impacts of zebra mussels in the eastern US, including a recent survey that estimates $268 million in zebra mussel-related impacts just to drinking water and power plant facilities from 1989 to 2004.

Zebra and quagga mussels could survive in a number of drainage units, as these species can thrive in a range of habitats from warm, productive, shallow water to deep, unproductive, cold-water habitats. Additionally, zebra mussels have been found on recreational water crafts entering the Columbia River Basin. There have been over 100 interceptions of watercrafts with attached zebra mussels in western states during 2004-2006. In 2008, zebra mussel populations were confirmed for the first time in several water bodies west of the 100th Meridian, including Lake Pueblo in Colorado and San Justo Reservoir in California.

While not currently known to be present in British Columbia (BC) or in adjacent waters, their recent spread into the western USA has triggered a number of initiatives like the Columbia River Basin Zebra and Quagga Mussel Rapid Response Plan and a number of state wide outreach and monitoring programs. BC recently signed on to the plan which allows us to closely work with our southern neighbours to prevent zebra and quagga mussels to enter BC waters. Currently the States of Idaho, Washington, Montana, Oregon all monitor for dreissenids in their waters.

The hydroelectric dams in the Columbia basin generate approximately 50% of the hydroelectric power in British Columbia. In addition to the hydroelectric development in the basin, there are numerous water intake associated with refineries, mills, sewage treatment, water treatment as well as unlimited recreational water uses. The economic and social impact of a zebra mussel infestation is considerable therefore prevention and early detection of zebra mussels is essential to the region.

PLANKTON COLLECTION PROTOCOLS FOR VELIGER MONITORING

(Adapted from Portland State University Protocols)

Site Locations

Samples should be collected from a boat, if possible, at a minimum of three sites in each water body. A boat allows the sampling to be independent of land-accessible structures (e.g. docks). Samples should be collected in near shore and in the open water areas. Sampling should be focused on areas near boat launches and marinas, near outflows (e.g. intakes for powerhouse), near inputs (e.g. aqueduct entering a reservoir), in downstream and downwind positions and other areas plankton collects (e.g. eddy).

Sampling Frequency and timing

Veligers can exhibit spatial and temporal patchiness in the water column and high sampling frequency (weekly or biweekly) increases the likelihood of collecting veligers. The optimal time to sample veligers in North America is between July and August or when water temperatures are between 16° and 19°C. Ideally, sample a minimum of three times during the June through October period. Veliger sampling can be performed anytime during the day but preferably not immediately following a storm event. Storm events can increase water turbidity and hence the time required to process the sample.

Sampling Methods

Equipment

- Plankton net (simple, conical plankton-tow net, 63 um pore size, 0.25 m diameter net opening, removable, weighted cod-end piece) (Figure 1)
- Line for deploying the net (8 m or about 25 feet long)
- Sample container (polyethylene material, 50 to 500 mL volume, screw lid)
- Decontamination materials (white vinegar (5% solution of acetic acid), 5-7% solution of household bleach, tap water (do NOT use lake or river water)
- Preservative (95% regular ethanol (ETOH))
- Field sheets and pen/ pencils
- Thermometer
- Permanent marker

- Global Positioning Satellite unit (GPS) (*recommended*)
- Tweezers or small spatula (*recommended*)
- Boat (*recommended*)
- Multiprobe water quality instrument (e.g. Hydrolab®) (*recommended*)
- Measuring tape or ruler (*optional*)

Plankton sample collection

Collect a minimum of four plankton tows at each site and combine in one sample container. More than four plankton tows may be collected to increase the likelihood of collecting veligers. The sample container should be no more than about 1/4 full to allow room for preservative. If samples are too large to combine into one bottle and still allow enough volume for the preservative use a separate sample container for each tow.

Collect each plankton tow in a different area of the site to further increase the likelihood of collecting veligers. Figure 2 depicts plankton collection at a site.

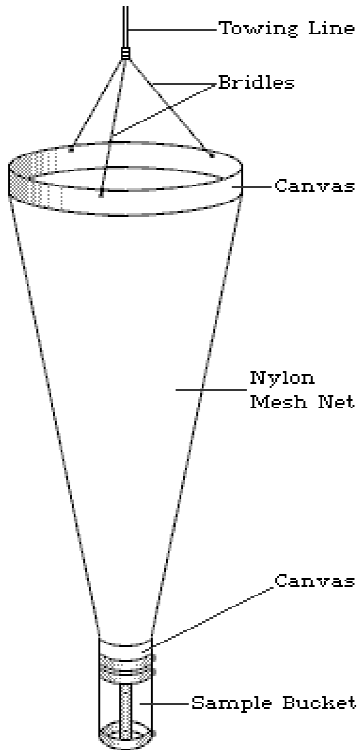

Figure 1: Simple conical plankton-tow net

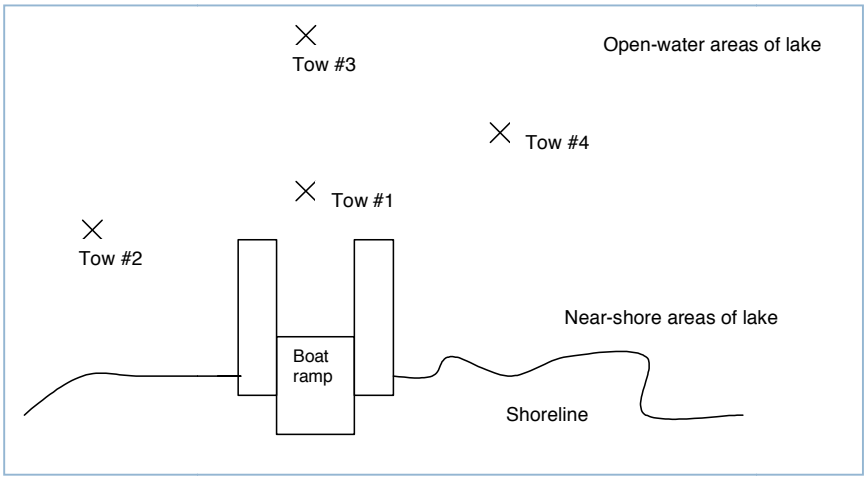

Figure 2: An example of plankton collection at a site location

Figure 3: Plankton sample being collected by US Army Corps of Engineers staff (Photo credit: Portland State University)

Vertical Plankton Tow

1. Secure the cod-end piece and check that the line is securely attached to plankton net. Secure the other end of the line to the boat.
2. Lower the net 6.1 m (20 ft) below water surface, or to 1 m above the sediment. Record the depth the net is lowered.
3. Keep net at this depth for 60 seconds and then manually retrieve using a hand-over-hand technique at a rate of 0.5 m/s (1.5 ft/ s). Slow and steady retrieval is the key to collecting a good plankton tow.
4. Rinse the net by raising the net so that the cod end of the net is at the water surface. Rinse organisms into the cod end of the net by lowering the net back into the water, keeping the opening above the water surface. Then quickly pull net straight up; this action will move collected plankton into the cod-end piece. Repeat this procedure several times to ensure that all the organisms inside the net are in the cod end.
5. A squirt bottle, filled with either tap water or water from the lake or river, can be used to squirt down the sides of the net. Spray the outside of the net starting at the mouth to rinse organisms into the cod end.
6. Condense the sample as much as possible before pouring into sample container. Carefully remove the cod-end piece without spilling collected water and plankton. Condense the sample by swirling the

cod-end piece. You may need to use tweezers or a spatula to gently clear the mesh netting in the cod-end piece to allow the water to filter through.

7. Lower the cod-end-piece (separated from the plankton net) into the water, keeping the opening above the water surface. Condense the sample again and pour into the sample container. Repeat this procedure until the cod-end piece appears clean.
8. It is important to record the number and length of tows so that the quantity of water sampled can be determined.

Horizontal Plankton Tow

Horizontal plankton tows are taken near shore in depths that are too shallow to collect a vertical tow. A weight (1-2 kg or 2-4 lbs) is attached to the rope immediately in front of the net opening to keep the net below the water surface. The net is thrown into the water and allowed to sink. Slowly pull the net back to you at a slow and steady rate as described above. Keep the net off the sediment to avoid both snagging and collecting debris. Note the distance that the net is towed through the water and record. Repeat techniques used for vertical plankton tows to concentrate organisms into the cod end of the net.

Metadata for each sample container

- Site location (GPS coordinates and/ or detailed descriptions)
- Name of water body
- Number of tows
- Length of tows
- Type of tow (vertical or horizontal)
- Date of collection
- Name of collector
- Water temperature and depth(s) of reading (°C)

Sample Preservation

Preserve samples in a 70% ETOH solution immediately after collection to ensure sample integrity. Use regular ETOH instead of denatured ETOH because denatured ETOH will dissolve the calcite in shells more than regular ETOH. To make a 70% solution in the sample container note the volume of sample in the container and then add 3 times the volume of 95% ETOH to the sample.

For example, if your sample bottle contained 1 inch of sample, you would add 3 inches of 95% ETOH so that the sample bottle contained 4 inches of combined sample and preservative. This is why it is important to not fill the sample bottle more than ¼ full of sample. A measuring tape or ruler may be placed alongside the sample container to estimate the volumes. ETOH is the preferred preservative.

Decontamination

Field equipment must be decontaminated at the site to prevent transfer of organisms within and between systems and samples. The plankton net, cod-end piece and affiliated rope are decontaminated by soaking in a solution of 5% acetic acid (i.e. white vinegar). Vinegar dissolves calcite in the shells of veligers. The ideal soak time is 24 hours and the minimum soak time is four hours. Multiple sets of field equipment are recommended. Equipment is thoroughly rinsed with clean water in a spray bottle before and after the vinegar soak. The vinegar may be reused.

The boat bilge, hull, through-hull fittings, anchor, anchor lines, bow line, and propulsion system are decontaminated using hot water power wash (≥140°F) and/ or a 5-7% bleach solution (i.e. approximately 0.05 mL of active chlorine per L of water assuming 10% of bleach solution is active chlorine). To make the bleach solution, add 7oz (a little less than 1 cup) of household bleach to 1 gal (16 cups/ 128 oz) of water. The 5 to 7% bleach solution is carefully poured into a spray bottle and applied to hull, propulsion system and through-hull fittings on pavement or concrete a minimum of 200 ft from open water. Fresh towels are used to dry hull, through-hull fittings and propulsion system following application of bleach solution. Bleach solution is poured into bilge and allowed to sit for a minimum of 60 minutes. Ropes, anchors and anchor lines may be soaked in the bleach solution in boat bilge or in buckets of vinegar. Bleach is corrosive and equipment must be thoroughly rinsed with tap water following decontamination.

Labeling

Sample containers must be labeled. The label should contain date, detailed location, tow number and length, and sampler information. This information should also be recorded in a separate field log for backup information if the label should come off the bottle. Below is an example of a label on a sample container.

3/26/2007
Columbia River
Chinook Boat Landing boat ramp
N 44.3221374 W 122.4552241
4 tows 25ft, 25 ft, 16 ft, 12 ft
Steve Wells

Sample Handling and Custody

Samples preserved with ETOH may be stored in a cool, dry place a maximum of three months prior to analysis. Avoid placing samples in direct sunlight or freezing conditions. Samples that cannot be preserved immediately after collection should be placed on ice until preservative can be added. Do not wait more than 3hours to preserve samples.

ETOH is a Class 3 flammable liquid and there are restrictions regarding its transport. ETOH can only be transported on the ground/ surface. Do not fly in an airplane with ETOH. Keep preserved samples in a plastic container such as a bin or cooler in the back of the car while in transit. ETOH can be mailed but there are training, certification, labeling and shipping requirements. Ship or mail ETOH-preserved samples to PSU via ground or surface mail using USPS and/ or FedEX according to the protocols below, which allow exemptions for training and certification.

USPS PROTOCOLS FOR MAILING ETOH:

1. Samples must be in plastic containers with a screw lid. There can be multiple containers but the total volume of the entire package CANNOT exceed 473 mL. Secure screw lids.

2. Place all containers into a sealable plastic bag (e.g. Zip Lock) and then place this bag into another sealable plastic bag.
3. Place sealed bags and sample containers into box and add cushioning material such as grocery bags or scrap paper. Seal this box with clear packing tape. The box does NOT need to be a specific type of box so long as it is sturdy.
4. Place this box into another box and add cushioning material as needed. The outer box does NOT need to be a specific type of box either, so long as it is sturdy. Seal box with clear packing tape.
5. Include a complete return address on the package and also label the address side of box with the information shown below:

Surface Mail Only
Consumer Commodity ORM-D
Flashpoint = 55.6°F

6. Mail via USPS domestic surface transport as Standard Mail or Parcel Post to:

Att'n: Lidija Vidmanic
Limno Lab Ltd.
506-2260 W 10th Ave
Vancouver, BC
V6K 2H8
Courier to buzz #1030 at door
Tel. 604-323-0370

FEDEX PROTOCOLS FOR MAILING ETHANOL:

1. Samples must be in plastic containers with a screw lid. The volume in each container cannot exceed 30 mL. Secure screw lids.
2. A maximum of 16 containers per box. The total volume in all the containers can NOT exceed 500ml.
3. Place all containers into a sealable plastic bag (e.g. Zip Lock) and then place this bag into another sealable plastic bag.
4. Place sealed bags and sample containers into a box and add cushioning material such as plastic grocery bags or scrap paper. Seal this box with clear packing tape. The box does NOT need to be a specific type of box so long as it is sturdy.
5. Place this box into another box and add cushioning material as needed. The outer box does NOT need to be a specific type of box so long as it is sturdy. Seal box with clear packing tape.
6. Include a complete return address. Label that is placed on address side of box as shown below:

This package conforms to 49 CFR 173.4

7. Mail via FedEx ground transport to:
   Att'n: Lidija Vidmanic
   Limno Lab Ltd.
   506-2260 W 10th Ave
   Vancouver, BC
   V6K 2H8
   Courier to buzz #1030 at door
   Tel. 604-323-0370

Contact information

Lidija Vidmanic	Lab Technician Limno Lab Ltd.	604-323-0370	vidmanic@telus.net
Sheila Street	Chair of the CKIPC- AIS	250-368-0317	Sheila.street@fortisbc.com
Crystal Klym	Executive Director Central Kootenay Invasive Plant Committee (CKIPC)	250)- 352-1160	coordinator@kootenayweeds.com
Matthias Herborg	Aquatic Invasive Species Coordinator, BC Ministry of Environment	250 356-7683	Matthias.Herborg@gov.bc.ca