

## Saskatchewan Adult Invasive Mussel Monitoring (AIMM) Protocols

### **INTRODUCTION**

Coordinated by Saskatchewan's Fisheries Unit, the Adult Invasive Mussel Monitoring (AIMM) Program is a partnership project with non-government organizations (NGOs) and other agencies to detect unwanted aquatic invasive mussels. Monitoring of adult invasive mussels, including zebra (*Dreissena polymorpha*) and quaga (*Dreissena bugensis*) mussels is an important element of early detection in Saskatchewan. This protocol was developed by combining materials from Wisconsin, California, Alberta and British Columbia, with the goal of having a low cost, low effort monitoring program that provides a valuable tool for widespread early detection across many waters in the province. The objective is to establish partnerships with community organizations including local stewardship, administrative, community, and business groups to provide valuable local involvement, information and data in a coordinated and collaborative manner. By following this protocol and the Saskatchewan Conservation Data Center's (SKCDC) data entry protocol, the reporting of information may be submitted by a primary contact group (i.e. watershed stewardship group) or by an individual volunteer.

### **HOW TO USE THIS GUIDE**

#### **Section 1 - Substrate Sampling**

Outlines the choice of substrate sampler and provides the list of materials and building instructions for the samplers. This section also includes the instructions for **WHERE and HOW TO DEPLOY YOUR SAMPLER, WHAT EQUIPMENT** you may need, and **WHEN TO MONITOR**. At the end is the **DATA FORM** required for substrate sampling.

#### **Section 2 – Shoreline Surveying**

This section provides the instructions for WHERE AND HOW to complete a shoreline survey. Provided is a list of **WHAT EQUIPMENT** you may need. At the end is the DATA FORM required for completing the shoreline surveys.

#### **Section 3 – Safety and Personal Protective Equipment**

Safety is an important part of any field work or monitoring program. In Section 3, a list of personal protective equipment (PPE) is suggested.

#### **Section 4 - Contact Information**

This section provides a list of contact names and their information for further assistance, if required.

**\*REMEMBER**, both the Substrate Sampling and Shoreline Survey should be incorporated together; however if achieving this is not possible, then the **Shoreline Survey** should be the one program implemented.

## Section One – Substrate Sampling

### 1. Substrate Samplers

There are two (2) types of substrate samplers: 1) stacked-plate design, and 2) Portland Sampler (Figures 1 and 2). The Portland Sampler (Figure 1) is a low cost, minimum effort sampler that works best for detecting the presence or absence of invasive mussels. The stacked-plate design is often used in circumstances where understanding the change in an invasive mussel population is of interest, rather than just presence/absence.

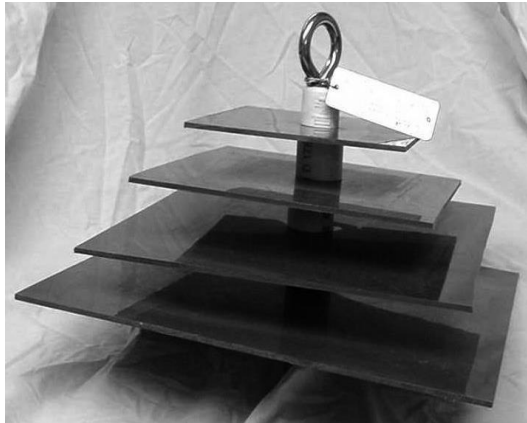


Figure 1. Substrate sampler for zebra mussel monitoring.



Figure 2. Image of a “Portland Sampler” substrate (Portland State University Center for Lakes & Reservoirs).

### 2. How to Build a Portland Sampler

#### **Materials**

- coded clothesline wire, or other heavy line
- 5 cm (2”) PVC pipe, cut into 15 cm (6”) lengths
- Sandpaper
- Cement or an Attachable Weight
- 10 cm (4”) I-bolt

#### **How to Construct**

- Cut the 5 cm PVC pipe in 15 cm (6”) pieces.
- Rough up the outside of the PVC with the sandpaper.
- Drill a hole through the pipe in the approximate center (7.5 cm/3”) of the pipe to allow the I-bolt to pass through.
- Attach the I-Bolt.
- Prepare the cement as directed on the package and then fill **half** the PVC pipe with cement. This assist in weighing down the sampler. Another option would be to find an object that can be attached to the sampler to weigh it down, therefore eliminating the need for cement.

### 3. Location Selection

1. Ideally the sampler would be deployed in a shady area as deep as possible (preferably at least 6 feet, but can be shallower) with some water flow in the area.

2. Avoid areas where there is a large amount of current.

3. As boat traffic is a vital part of the spread of aquatic invasive species, it is recommended that sampler be deployed in areas of high boat traffic (e.g. marinas, docks, piers, boat launches).

4. Other access points, fishing hotspots, resorts, campgrounds, or where diving ducks tend to reside are additional areas for potential deployment of substrate samplers.

### 4. How to Deploy Your Sampler

1. **Always ask permission before deploying/attaching a substrate sampler to any structure like a dock, buoy, or swim area marker.**

2. At each location one substrate should be deployed in a manner that will not interfere with boater or swimmer activities. The number of locations will vary from-one-water to another.

3. In efforts, to prevent wildlife from severing the line suspending the sampler, plastic-coded clothes wire or chain may work better than rope. As an option to increase the sampling surface area, mesh or pot scouring pads can be attached along the line suspending the substrate sampler.

4. A small brick or concrete block anchor will help hold the sampler in place and provides an additional substrate sampler.

5. A physical description of the area, a lake map indicating each sampler location and corresponding GPS coordinates - should be obtained at the initial time of deployment.

6. If possible, record the local contact information for the person who will be checking the substrate most often for each site/location.

Table C is a small data table that outlines the information a person should record when deploying a substrate sampler.

<b>Deployment</b>				
<b>Sampling location (lake and nearest town)</b>	<b>Date (dd/mm/year)</b>	<b>Latitude or UTM (NAD 83)</b>	<b>Longitude or UTM (NAD 83)</b>	<b>Site description (include depth of water, substrate used, structure it was attached to)</b>

## 5. Monitoring

- Substrate samplers should be checked at minimum once a month during the timeframe when water temperatures are most suitable for invasive mussels to spawn. Initial deployment should happen before the water temperature reaches 12°C.
  
- Monitoring shall be conducted as follows:
  1. Remove substrate from water slowly and carefully.  
**\*REMEMBER, Don't clean the Substrate Sampler off.**
  2. Place substrate into a bucket for inspection to capture anything that may fall off.
  3. Closely inspect all surfaces of the substrate paying close attention to corners and holes as well as the suspending lines and anchors.
  4. Juvenile mussels are very small so inspect carefully by feeling along all the surfaces for a rough sandpaper-like feeling which, if present, may indicate the presence of small juvenile mussels.
  5. While doing inspection also look for other potential invasive species. Suspect organisms can be collected, labelled and frozen in water - arrangements will be made for pick up.
  6. If attached mussels are found or suspected - remove the substrate from the water, place in a sealed plastic bag or container, call the **TIP LINE 1-800-667-7561** **immediately** and deploy a new substrate (if one is available).
  7. If no invasive mussels are found replace any damaged or worn materials and deploy again (**do not clean substrate sampler**).
  
- Completely fill out a reporting form each time the substrate sampler is checked. Including taking note of any aquatic or riparian plant coverage in the area of the substrate.

## 6. List of Equipment You May Need

- Personal Protective Equipment & Supplies
- Clip board w/ forms and field book
- GPS and Digital Camera w/ spare batteries
- Heavy monofilament or braided fishing line, rope, and/or coded clothesline wire
- Small concrete block or brick to act as anchor
- Basic tools (e.g. knife, screw driver etc.)
- Boat hook (might helpful when retrieving the substrate sampler during monitoring)

## 7. End of Season

During the final substrate sampler monitoring event of the season follow the steps identified on in the AIMM protocol and remember if attached mussels are found or suspected – place substrate sampler in a sealed plastic bag or container, call the **TIP LINE 1-800-667-7561 immediately**.

If no invasive mussels are found, rather than redeploying the substrate sampler it can be cleaned – which will help prevent the transfer of organisms while preparing the samplers for reuse next year. To do this, follow the steps below:

1. Remove all vegetation, mud or debris that may be clinging to the complete substrate sampler set-up (including all deployment lines, floats, anchors etc.) and dispose of properly;
2. In a bucket or container, submerge the complete sampler set-up (i.e. anything that came in contact with the lake) in hot tap water 50°C (or warmer) for at least 10 minutes;
3. Untie any knots or clamps, and thoroughly scrub all surfaces including the space inside the PVC pipe (a bottle brush may work well for this), then rinse with hot water;
4. Allow everything to completely dry before placing it in storage for the winter; and
5. To be safe, dump all water used during this process on land in a suitable location away from any storm drains, ditches and waterways.

## 8. Substrate Sampler Monitoring Form

Primary Data Collector				
Name	Phone number	Email		
Monitoring Location				
Waterbody Name	Nearest Town	RM		
Latitude	Longitude			
Date, Time, Depth and Temperatures				
Date (dd/mm/year)	Time	Water depth at location:	Air Temp (°C)	Water Temp(°C)
Anything attached to substrate (describe):	Physical assessment: what does the substrate sampler feel like?	Type of substrate used:	Comments:	
		Portland Sampler: ___ Stocked-plate: ___ Mussels: present? YES    NO SUSPECTED		
General Comments/Observations of substrate and overall surroundings:				

**\*If any invasive mussels, or other AIS, are suspected - call the TIP Line [1-800-667-7561](tel:1-800-667-7561) immediately!\***

## **Section Two – Shoreline Survey**

The advantage of shoreline surveys for the presence/absence of adult invasive mussels is that an observer can monitor a much larger amount of substrate/shoreline relative to the substrate samplers in a short period of time.

### **1. List of equipment you may need:**

- Rubber boots and/or waders (deeper waters)
- Personal Protective Equipment
- Clip board w/ forms and field book
- GPS and Digital Camera w/ spare batteries

### **2. Location Selection and Frequency**

- Shoreline surveys should be conducted periodically (i.e. once a month) during the time when water temperatures reach 12°C - the most appropriate for zebra or quagga mussel reproduction.
- Target areas similar to those for potential substrate deployment, specifically those that are likely to have a lot of boating traffic in the area.

### **3. How to conduct shoreline surveys**

1. Walk along the shore and in the water up to 3 feet deep and observe any hard surface:
  - Rocks, under docks, boats, piers, dock posts, boat launch pads, plant material, dock floatation, buoys, mooring line, cables, concrete, logs or drift wood, etc.
2. Carefully rub your hands along the submerged surfaces to feel for invasive mussels which may feel gritty, like sandpaper.
3. Pay attention to cracks and crevices in rocks and structures as the mussels like those areas.
4. Zebra mussels can also be attached to plants, so observe the aquatic vegetation when assessing the shoreline.
5. Pay close attention to structures removed from the water for invasive mussels. This includes: docks, piers, boats, buoys, swimming docks, etc. particularly at the end of the season in the fall before winter ice forms.

### **4. If mussels are found or suspected to be present**

- Record the lat/long of the location and mark/describe the location(s) on the back of the data sheet.
- Record the type of substrate the mussel(s) was found on.
- Take multiple digital pictures.

**\*If any invasive mussels, or other AIS, are suspected:**

**Call the TIP Line [1-800-667-7561](tel:1-800-667-7561) immediately!\***

**5. Shoreline Survey Form**

Primary Data Collector		
Name	Phone number	Email
Monitoring Location		
Waterbody Name	Nearest Town	RM
Latitude	Longitude	
Date, Time, Depth and Temperatures		
Date (dd/mm/year)	Time	

Did you Observe:	Yes, No or N/A	Comments:
Under docks		
Piers		
Structures holding up docks		
Boat launch		
Pads		
Plant material		
Dock floatation		
Buoys		
Mooring lines		
Any concrete in water		
Rocks in water		
Logs or drift wood		
Other:		
Other:		

DID YOU SUSPECT:		
<b>Any Invasive Mussels?</b>	<b>YES</b>	<b>NO</b>
<b>Any other AIS?</b>	<b>YES</b>	<b>NO</b>
<b>If YES, collect the following information &amp; immediately call the TIP LINE 1-800-667-7561</b>		
Exact GPS Location	Substrate Type	Comments
<b>Comments:</b>		



## Section 3 - Safety and Personal Protective Equipment

Safety is an important part of any field work or monitoring program. Although the objectives and goal of the AIMM Program is to help monitor Saskatchewan waters for invasive mussels, the purpose of the program is much more important as it is about education and enjoying time at your favorite destination. Please ensure the appropriate safety measures and safety equipment is used– both before venturing out into the field and during the actual monitoring.



### Safety and Safety Equipment Tips

1. **Work together versus alone.** Accidents do happen, and having a partner ensures that your safety is maintained at all times.
2. **File a work plan.** Before your group heads out, ensure that others know where you are going and what time they should expect you back. In the event you are hurt or lost, your contact can notify emergency personal as soon as possible.
3. **Personal Floatation Device (PFD)** – any work that is done from a boat, regardless of the depth of water, should include persons in the boat wearing a PFD.
4. **Boat safety equipment** – Bailing bucket, whistle, floating rope, light
5. **Bug repellent** – With the potential to contract West Nile Virus, clothing or bug repellents that limit bug bites should be considered when in the field.
6. **Chest waders** – when wearing chest waders, ensure that a strap or belt is worn around the waste to ensure protection from drowning.

## **Section 4 - Contact Information**

**\*If any invasive mussels, or other AIS, are suspected - call the TIP Line [1-800-667-7561](tel:1-800-667-7561) immediately!\***

For Information or guidance on the AIMM Program, please contact:

**With the Ministry of Environment:**

**Chad Doherty**

Fisheries Biologist – Meadow Lake Area

Office: 306.236.0454

[Chad.doherty@gov.sk.ca](mailto:Chad.doherty@gov.sk.ca)

### **Ministry of Environment Offices**

<b>Office</b>	<b>Phone #</b>	<b>Office</b>	<b>Phone #</b>
Assiniboia	306.642.7242	Melville	306.728.7480
Beauval	306.288.4710	Moose jaw	306.694.3659
Big River	306.469.2520	Moose Mountain	306.577.2600
Buffalo Narrows	306.235.1740	Nipawin	306.862.1790
Candle Lake	306.929.8400	North Battleford	306.446.7416
Chitek Lake	306.984.2343	Outlook	306.867.5560
Christopher Lake	306.982.6250	Pierceland	306.839.6250
Creighton	306.668.8812	Pinehouse	306.884.2060
Dorintosh	306.236.7680	Porcupine Plain	306.278.3515
Duck Mountain	306.542.5500	Preeceville	306.547.5660
Estevan	306.637.4600	Prince Albert	306.953.2322
Fort Qu'Appelle	306.332.3215	Regina	306.787.2080
Greenwater	306.278.3515	Rowan's Ravine	306.725.5200
Hudson Bay	306.865.4400	Saskatoon	306.933.6240
Humboldt	306.682.6726	Shaunavon	306.297.5433
Kindersley	306.463.5458	Southend	306.758.6255
La Ronge	306.425.4234	Spiritwood	306.883.8501
Leader	306.628.3100	Stony Rapids	306.439.2062
Lloydminster	306.825.6430	Swift Current	306.778.8205
Loon Lake	306.837.2410	Wadena	306.338.6254
Maple Creek	306.662.5434	Weyburn	306.848.2344
Meadow Lake	306.236.7557	Yorkton	306.786.1463
Melfort	306.752.6214		

**With a local Watershed Stewardship Group:**

<p><b>Assiniboine Watershed Stewardship Association</b>  <b>Jesse Nielsen, Manager</b>  Office: 306.783.1696  Website: <a href="http://www.assiniboinewatershed.com">www.assiniboinewatershed.com</a></p>	<p><b>Carrot River Valley Watershed Association</b>  <b>Lynne Roszell, Manager</b>  Office: 306.920.8166  Website: <a href="http://www.crwatershed.ca/crvwa/index.html">www.crwatershed.ca/crvwa/index.html</a></p>
<p><b>Swift Current Creek Watershed Stewards</b>  <b>Arlene Unvoas, Executive Director</b>  Office: 306.770.4607  Website: <a href="http://www.sccws.com">www.sccws.com</a></p>	<p><b>South Saskatchewan River Watershed Stewards</b>  <b>Lloyd Saul, Project Coordinator</b>  Office: 306.343.9549  Website: <a href="http://www.southsaskriverstewards.ca">www.southsaskriverstewards.ca</a></p>
<p><b>North Saskatchewan River Basin Council</b>  <b>John Kindrachuk, Project Coordinator</b>  Office: 306.549.2360  Website: <a href="http://www.nsrbc.ca">www.nsrbc.ca</a></p>	<p><b>Upper Souris Watershed Association</b>  <b>David Pattyson, Watershed Coordinator</b>  Office: 306.634.7074  Website: <a href="http://www.uppersouriswatershed.ca">www.uppersouriswatershed.ca</a></p>
<p><b>Wascana Upper Qu'Appelle/Wascana Creek</b>  <b>Colleen Fennig, General Manager</b>  Office: 306.757.1704  Website: <a href="http://www.wuqwatr.ca">www.wuqwatr.ca</a></p>	<p><b>Lower Qu'Appelle Watershed Stewards</b>  <b>Alice Davis, Watershed Coordinator</b>  Office: 306.745.9774  Website: <a href="http://www.lowerquappellewatershedstewards.ca">www.lowerquappellewatershedstewards.ca</a></p>
<p><b>Moose Jaw River Watershed Stewards</b>  <b>Tammy Myers, Manager</b>  Office: 306.691.3399  Website: <a href="http://www.mjriver.ca">www.mjriver.ca</a></p>	<p><b>Lower Souris River Watershed</b>  <b>Tyler Fewings, Watershed Coordinator</b>  Office: 306.452.3293  Website: <a href="http://www.lowersourisriverwatershed.com">www.lowersourisriverwatershed.com</a></p>
<p><b>Old Wives Watershed Association</b>  <b>Kelly Williamson, Executive Director</b>  Office: 306.648.3220  Website: <a href="http://www.oldwiveswatershed.com">www.oldwiveswatershed.com</a></p>	

Reference Pictures



All images courtesy of Province of British Columbia. 2015.