British Columbia Aquatic Invasive Plant Survey & Sampling Protocols

Invasive Plant Program

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1. INTRODUCTION

This document outlines the appropriate methods for *Aquatic Invasive Plant* reporting, collecting samples, and surveying in British Columbia (BC).

Preventing the introduction and spread of aquatic invasive species (AIS) is the single most effective method of invasive species control. For more information on priority AIS and how to identify them, see Section 2. Identification and Section 7. Other Aquatic Invasive Species.

Aquatic invasive species can be reported using the ReportInvasivesBC website; with options including mobile applications, an online form, email, or phone. This website can be used to report all suspected invasive species occurrences. Reports are forwarded to a provincial invasive species specialist who will confirm species identification and take appropriate follow up actions, determined by the species status and location in BC.

Surveillance is critical for early detection of new invasive plant species in BC and for improving our knowledge of existing populations.

1.1. Regulations & Permits

To ensure all survey and sampling activities are compliant with federal and provincial regulations, the jurisdiction of each waterway must be determined and related permits obtained prior to commencing work. If a lake or river contains a species that is registered under the Federal *Species at Risk Act* (SARA) then a federal SARA permit (issued by Fisheries and Oceans Canada (DFO) SARA Department) may be required. The BC Species and Ecosystems Explorer contains information on the distribution of Species at Risk in BC, a provincial government regional biologists can be contacted for further information. Note, the collection of aquatic invasive plants will NOT require a SARA permit. Sampling in National Parks requires a special Research Permit, a Parks Canada Research Coordinator must be contacted for further information.

2. IDENTIFICATION

For detailed information on invasive plant species in BC visit the Ministry of Forests (FOR) Invasive Plant Program website. Additional aquatic plant identification resources include:

- Pondweeds, Bur-reeds and their relatives of British Columbia (Brayshaw, 2001)
- Buttercups, Waterlilies and their relatives of British Columbia (Brayshaw, 1989)
- Studies on Aquatic Macrophytes Part XXXIII: Aquatic Plants of British Columbia, (Warrington (1994).

3. SURVEY DESIGN

3.1. Survey Types

There are two types of surveys used to track B.C. aquatic invasive plant populations, 1) Presence (Surveillance) Surveys and 2) Extent Surveys. These survey types are used for different purposes in the plant management process, producing significantly different data outputs.

3.1.1. Presence (Surveillance) Surveys

Purpose The purpose of Presence (Surveillance) Surveys is to identify the general presence and diversity of invasive and native plant species in a target waterway.

These surveys are used in the early detection stage of the plant management process. They provide a baseline for measuring waterway health and diversity, aquatic invasive plant provincial population ranges, and for early detection of new species to the province or spread from one region to another.

Data Outputs A Presence (Surveillance) Survey will generate multiple InvasivesBC Observation Field Records and spatially mapped points of the search area (kmz file), indicating general presence of invasive and native plant species in a target waterway. Each sample point is represented as an Observation record in InvasivesBC (see Section 5. Data Management). The map will reflect sample points which may focus on high use areas such as boat launches, fishing and swimming docks, and discharge pipes OR a standardized grid that covers the entire waterway. Each sample point will list the plant species found to be visibly present following the retrieval of a weighted rake to the wetted substrate. When a rake toss (Section 4.2 Survey Methods) results in no plants present, the sample point will indicate No Weed Found. Absence data is just as valuable as presence data, similarly, identifying the presence of only native plants in a waterway is extremely valuable (Figure 5).

3.1.2. Extent Surveys

Purpose The purpose of an Extent Survey is to map ALL occurrences (patches and individual plants) of a target species in a waterway to indicate total extent or presence.

These surveys are used at four stages of the plant management process, 1) defining the scope of the occurrence to qualify the risk, 2) identifying the outer perimeter of the occurrence to implement physical containment, 3) planning the response to identify effective management options and develop treatment prescriptions; and 4) monitoring rate of spread and treatment efficacy by comparing extent data from year to year.

Data Outputs An Extent Survey will generate a single or multiple InvasivesBC Observation Field Records and spatially mapped points and polygons of the search area (kmz file), indicating total extent or presence for each target species based on visual observations or sampling of the entire waterway. The map will clearly indicate the area searched by the surveyor with polygons and points indicating target plants found, where a polygon represents patches larger than one square metre (>1m^2) and a point

represents patches equal to or lesser than one square metre (≤1 m^2) or individual plants. Each polygon or point represents an Observation record in InvasivesBC (see Section 5. Data Management). Where extent surveys are completed, a track log (geospatial recording of travel route) is recommended as a data output, in addition to the polygon mapping or in place of the polygon mapping where no target plants are detected. Track logs will document the thoroughness of the Extent Survey and, where no target plants are detected, that the extent survey occurred. When a previously recorded point or polygon is found to be not present, indicating No Weed Found is useful information, as aquatic plant locations often shift over time (Figure 5).

3.2. Where to Survey

Prioritize surveys at a greater frequency at high-risk locations, such as popular recreational areas, waters downstream from a known infestation, areas of slow flow or deposition points, or waters with associated pathways of invasive plant introduction or vectors of invasive plant spread.

3.2.1. Lakes & Reservoirs

Focus surveys near dams, outflows, inflows, marinas, boat launches, and in back eddies where plant fragments may be carried by water currents or the wind.

3.2.2. Streams & Rivers

Prioritize locating the source of the introduction, whether upstream or through a water use. Focus surveys in areas where plant fragments are likely to be introduced such as beaches, recreational fishing access areas, and boat launches, or in areas of low flow where fragments may be deposited and become established, such as oxbows, side channels, and near structures that create back eddies. Aquatic invasive plants may be found near shore and in up to 7.5 m (metres) of water depending on water clarity.

3.2.3. Intertidal Areas

Priority survey areas are determined by the target plant species habitat. Most intertidal plants are restricted to a narrow range of the intertidal environment, based on salinity, inundation, and substrate type. Knowing the type of environment your target plant occupies can narrow down your search area greatly. The search area can be further reduced to a specific elevation (low marsh, mid-high marsh) or specific environmental condition such as cobble beach, mudflats, or near a fresh water source (less salinity) (DUC, 2024). For example, *Spartina anglica* (English cordgrass) occurs in the mid to low mudflats and is the only plant known to occur in this habitat. Most plant species will be found in the upper intertidal area, just below and above the high tide deposition zone.

3.3. When to Survey

3.3.1. Timing

Survey timing will significantly influence the accuracy of survey results, as optimal timing will maximize access and target plant detection.

Plant Phenology Understand the phenology or life cycle of the target plant(s) and plan to survey when the species is most visible. This is typically during the period of active growth, with plants being more visible at maturity due to maximum stature and flowering (see Table 1).

Seasonal Hydrology Surveys should be completed during seasonal lowest water levels to maximize detection and access. Avoid sampling when algal blooms create poor water clarity.

Local Hydrology Survey areas may be subject to significant water level changes as a result of marine tides, seasonal high flows, surge channels, significant rain events, dams, pump stations or weirs. It is important that the surveyor understands the hydrology of the waterway in advance of surveying to ensure that surveys are completed during the lowest water levels. Tidally influenced areas will ideally be surveyed when high tide is no greater than 1.0 m above sea level (asl), especially in those areas with low water visibility. For information about waterway hydrology, see:

- Canadian Tide Stations (electronic)
- Canadian Tide and Current Tables (printable)
- Canada Real-Time Hydrometric Data
- B.C. Current Streamflow Conditions
- Local governments for information about dam, pump station, or weir management schedules.

Tidal Cycles Understanding the tidal cycle of the survey area is important for both practical reasons and general safety. To identify the times when the survey area is free of water, reference the nearest Canadian Tide Station, visit the area during a steeply receding tide and note the tidal height when the area is free of water. The tidal work window can then be identified using the tide prediction tables for the same tide station. The time period when the predicted water level is below the maximum tidal height is the work window (this will vary by time of year). Predicted tidal data is available well in advance, but observed tidal heights may vary slightly due to factors like wind and precipitation. Low tides occur earlier in the day during the summer season, and later at night during the winter (DUC, 2024). To maximize plant detection and access, and for safety reasons, it is advisable to complete most survey work during the lowest portion of the tide cycle.

3.3.2. Frequency

Survey frequency may be determined by invasive plant management plans, the condition of adjoining waterways (presence of high priority aquatic invasive plants), or waterways with associated pathways of

invasive plant introduction or vectors for invasive plant spread. How to prioritize waterways for surveying is described in Section 3.2. Where to Survey.

Actively Managed Waterways Where invasive plants are under active management in a waterway, extent surveys may be required twice a year, pre and post treatment.

Adjoining/Associated Waterways Waterways adjoining or associated with waterways impacted by high priority aquatic invasive plants may require surveillance surveys annually or once every two or three years, depending on the risk of spread and resourcing.

Other Waterways Surveillance surveys in lower risk waterways, or waterways without the presence or association with high priority aquatic invasive plants, may only require surveys once every five years.

3.4. Survey Equipment

- Double sided thatching rake and line for deploying the rake (Note: cut the handle near the rake head and attach a rope (30 m on spool or about 100 feet). For deep-water sampling you may need to put a 10 lb weight on the rake).
- Field data sheets (waterproof paper), labels, and waterproof marker and pencils
- GPS enabled electronic device with ability to record data
- Boat - if sampling on a lake or reservoir *(recommended*)
- Measuring tape or ruler
- White tub to place plants for identification when removed from rake
- Sealable plastic bags (e.g., Ziploc)
- Cooler with cubed/ crushed ice
- Plant identification guide(s)
- Paper towels
- Digital waterproof camera
- Bucket, measuring cup and bleach for post survey equipment disinfection
- Hand lens
- Optional considerations:
    - Secchi disk (if sampling lake or reservoir)
    - Sample vials prefilled with ethanol (for samples needing genetic confirmation)
    - Plant press board (for voucher collections)
    - GPS coupled photo points (for photo comparison over time)

Table 1. Aquatic Invasive Plant Target Survey Timing.

(Note: This is a representative list of priority aquatic invasive plants in B.C. and is not complete.)

SPECIES	TARGET GROWTH STAGE	OPTIMAL SURVEY TIME	NOTES
***Brazilian elodea** (*Egeria densa*)	Actively growing, prior to senescence.	Late spring to early fall.	
Cabomba/Fanwort *(Cabomba caroliniana)*	Flowering; max growth.	Late July - mid Sept.	
***Common cordgrass** *(Spartina anglica)*	Senesced.	Mid Sept - Late Oct.	Green longer than most native intertidal plants (mid to late fall). Only plant growing in mid to low inter-tidal mudflats.
Curly leaf pondweed (*Potamogeton crispus*)	Prior to fruiting	June - July following highwater flow	Summer dormant species (may die back mid-summer)
***Dense-flowered cordgrass** *(Spartina densiflora)*	Senesced.	Mid Sept - Late Oct.	Green longer than most native intertidal plants (mid to late fall). Occurs in upper intertidal zone.
***European common reed** *(Phragmites australis subsp. australis)*	Flowering; max growth.	Late July - late Sept.	Giant emergent grass with showy inflorescence. Native Phragmites is common look-alike.
Eurasian watermilfoil (*Myriophyllum spicatum*)	Flowering; max growth.	Late July - mid Sept.	
***Flowering rush** (*Butomus umbellatus*)	Flowering (may not flower); max growth.	Late July - early Sept.	May appear submerged or emergent; with or without flower.
Fragrant water lily *(Nymphaea oderata)*	Flowering; max growth.	July - early Sept.	
Giant reed *(Arundo donax)*	Flowering; max growth.	Late July - late Sept.	Giant emergent grass with showy inflorescence.
***Hydrilla** (*Hydrilla verticillata*)	Actively growing.	Late spring to early fall.	Actively grows in water temperatures 10 to 35°C.
Parrot feather (*Myriophyllum aquaticum*)	Flowering; max growth.	June - Aug.	
***Salt meadow cordgrass** *(Spartina patens)*	Senesced.	Mid Sept - Late Oct.	Green longer than most native intertidal plants (mid to late fall). Occurs in upper intertidal zone.
***Smooth cordgrass** *(Spartina alterniflora)*	Senesced.	Mid Sept - Late Oct.	Green longer than most native intertidal plants (mid to late fall).
***Water hyacinth** (*Eichhornia crassipes*)	Actively growing.	Late spring to early fall.	Free-floating, not rooted to substrate.
***Water lettuce** (*Pistia stratiotes)*	Actively growing.	July - Sept	Free-floating, not rooted to substrate.
***Water soldier** *(Stratiotes aloides)*	Flowering; max growth.	July - Aug.	
Yellow flag iris *(Iris pseudacorus)*	Flowering; max growth.	Jun - Aug	Emergent
***Yellow floating heart** (Nymphoides petiolate)	Actively growing.	Late spring to early fall.	Capable of thriving on dry substrates.

*Candidate for provincial eradication.

3.5. Survey & Sampling Best Practices

Prior to the survey, develop the survey and sampling design by incorporating the following factors. These practices will produce the most efficient and accurate results for all survey types.

Determine Survey Type Survey type will be based on the management objectives (see Section 3.1. Survey Types), 1) Extent or 2) Presence (Surveillance).

Understand the Waterway Review bathymetric maps[1], drainage and flow drawings (e.g. ditches or detention ponds); and identify inflows, outflows, registered water licenses and jurisdiction.

Identify Sample Locations Surveys should be designed and conducted to be repeatable over time. The number and locations of sample points is based on the type of survey, size and shape of the waterway, and should be adequate to find relatively small plant populations (<1 m2) or individual plants.

- Extent Surveys will cover the entire waterway. All patches and individual plants will be mapped using either polygons or points. For submerged target plants this may require a dense grid of sample points. If a continuous occurrence of the target plant population is encountered, sample methods will record the UTM coordinates at the start point, presence or absence every 50 m, perimeter, and the end point. This will generate a polygon delineating the plant population (Figure 5). Regular sampling frequency resumes once the continuous occurrence ceases. Survey 100m upstream and downstream from the last detected target plant occurrences to confirm the perimeter of plant population. The extent survey area may be reduced based on the target species habitat limitations (e.g. minimum and maximum water depth tolerance). Care should be taken to conduct spot checks outside of these targeted search areas to capture rogue plant occurrences because sometimes plants do not follow their own rules.
- Presence (Surveillance) Survey sample points should target high use areas, inflows, outflows, beaches and other points of deposition. If a continuous occurrence of a species is encountered the sample point design will not change, the prevalence of this species will be represented in the species list at each sample point (Figure 4). Survey 100 m upstream and downstream from initial access point using rake toss (every 25 m) and/or underwater viewers. This approach will result in seven (7) sample points at each high-risk feature on the waterway: one (1) at the feature, three (3) downstream of the feature (at 25 m intervals) and three (3) upstream of the feature (at 25 m intervals).

Select Watercraft Select the survey transportation mode best suited to the target waterway. Watercraft navigable lakes or wide rivers and sloughs are best surveyed using motorized watercraft to maximize the survey area covered. In waterways where gas motors are restricted, an electric motor may be a viable and efficient option. A kayak is appropriate in shallow waters or ponds to maximize access. Creeks, narrow rivers, ditches, and intertidal areas are most efficiently accessed on foot wearing chest waders, hip waders, gumboots or neoprene booties.

[1] Bathymetric maps show water depth based on geographical coordinates.

Target Plant Growth Forms Surveys will occur for emergent riparian target plant species along shorelines and for emergent and submerged aquatic target plants in wetted areas.

Plant Sample Collection

- Unknown plant species observed at sample points can be collected and sent to the Ministry of Forests Invasive Plant Program or Royal BC Museum herbarium for identification.
- Voucher specimen of plant species new to the province or found outside of the documented provincial range should also be collected, preserved, and sent to the Royal BC Museum Herbarium for identification confirmation and archiving (See Section 6. Sample Collection, Labelling & Preservation and Appendix C Sample Collection Form).

Additional Observations

- At each sample point record the presence of native aquatic species since this will help identify sites that may have optimal habitat for non-native species and serve as a measure of waterway health.
- If invasive emergent shoreline plants are present (e.g., yellow flag iris) they should be noted and UTM coordinates recorded on a new Aquatic Invasive Plant Observation Record (see Section 5. Data Management and Appendix C).
- Note any fragments of invasive species floating or washed up on shore while surveying, if different from those species noted in the sampling.
- Note water features, such as fountains, aerators, benthic mats, or unregistered inflows or outflows. These features may influence treatment planning.

Safety Regardless of the chosen transportation mode, appropriate Personal Protective Equipment (PPE) should be worn at all times and a safety plan in place to manage unplanned events. Fieldwork in and adjacent to water should always be conducted by at least a two-person crew for safety. Field crews working in or adjacent to swift water, still water, or intertidal areas may improve safety procedures, skills, and ability to assess risk with additional training.

4. SURVEY METHODS

4.1. Collecting Field Data

Waterway Field Data All surveys in all waterways will be initiated onsite by completing the general information portion of an Aquatic Invasive Plant Observation Record (see Section 5. Data Management and Appendix B). Additional site information, such as factors influencing plant growth may be recorded at this time.

Sample Point Field Data Complete the aquatic invasive plant information portion of an Aquatic Invasive Plant Observation Record (see Section 5 Data Management and Appendix C). Remember, it is just as important to record the absence of plants at a sample point as the presence. Collecting Secchi depth[2]

[2] Secchi depth is the depth at which the pattern on the Secchi disk is no longer visible and is taken as a measure of the transparency (clarity) of the water.

readings at a minimum of two locations within the water body is optional but useful information for treatment planning. Wetted sample points will require the use of a sampling rake (2 rake tosses per site) or divers (or combination) to identify submergent aquatic plants.

4.2. Rake Toss

Sampling from the shoreline or via boat can be difficult in deeper water. A weighted rake toss will yield a representative sample of the aquatic plants present at a given sample point. The dense, multiple prongs on a thatch rake head will retrieve the highest quantity of samples (Figure 1). Weighting the rake head (e.g. attach 10 lb dive weight to rake head handle using zip ties) will ensure that the rake descends to the substrate regardless of plant obstructions, water current, or wave action. The throw rope attached to the rake head can be marked in half metre (0.5 m) increments to assist in measuring depth (Note, throw ropes will stretch and the distance measures will need to be re-marked over time to ensure accuracy).

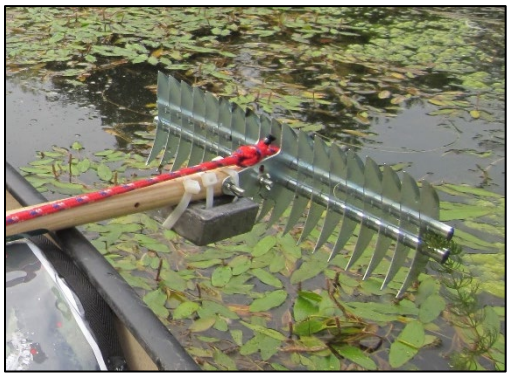


Figure 1. Thatch rake with weight for aquatic plant sampling. Photo credit: BC Government.

- **Step 1** Toss the rake head into the water at the sample point (Tip: Ensure you have a good hold on the other end of the rope before tossing).
- **Step 2** Give the rake time to drop to the bottom. If in a boat, gently pull along side the location where the rake entered the water. Record sample point coordinates.
- **Step 3** Gently pull the rake to the surface. Be careful to avoid dragging the rake across the substrate to avoid damaging aquatic life. Note the wetted point on the line for approximate water depth. Free the plants from the rake (careful to avoid breakage) and place them in a 5-gallon bucket half filled with water from the sample location.
- **Step 4** Identify all aquatic plant species present in the bucket and record sample point field data using InvasivesBC Observation Field Form (Section 5. Data Management) (Note: InvasivesBC will currently accept only invasive plant field data. Native aquatic plant observations or other species will need to be recorded using a separate form). If collecting samples or taking pictures, this is the time to do it. If a new aquatic invasive plant species is detected for the first time in a waterway, a sample will need to be collected for verification and a

Figure 2. Aquatic plant sampling using rake toss from shore. Photos credit: Portland State University.

sample voucher submitted to the Royal BC Museum (Section 6. Sample Collection, Labelling & Preservation).

- **Step 5** All plant fragments should be returned to the waterway at the sample point location to avoid spreading fragments in the waterway. If the rake toss collected the only visible fragments of a new aquatic invasive plant species in the waterway, these fragments should be disposed of in a sturdy garbage bag and deposited at the nearest dryland landfill.

4.3. Lakes & Reservoirs (Littoral Zone - water <8 m deep)

- Review bathymetric maps to identify the littoral survey area, this is the typical water depth range where aquatic plants will occur.
- Extent Survey points can be pre-selected on a GIS generated map, and distribution and frequency of aquatic vegetation can be determined by the point intercept method described by Madsen, 1999[3].
- Frequency of occurrence for each plant species in a lake or reservoir can be calculated two ways:
    1. By dividing the number of survey points where the individual species was observed by the total number of points surveyed for a given water body, then multiplying by 100 to achieve a percent. Note: Frequency calculations will be highly influenced by the number of points surveyed (i.e., sampling intensity). For example, if you survey/sample 100 points and find *Myriophyllum spicatum* (Eurasian water milfoil) at 10 of those points the frequency will be 10%, however if you only sample 25 points and record *M. spicatum* at the same 10 points the frequency becomes 40% which is likely an overestimate of the population.
    2. To estimate broad classes of density and distribution (see density/distribution classes in Appendix D) where a site is an entire lake or reservoir, an estimate is made based on the average density and distribution observed at each sample point. This approach is not suitable for shore surveys as only accessible points for survey would be reflected in the results, and inaccessible and/or remote shoreline sections would not be captured.

4.3.1. Lake & Reservoir Boat Surveys

- Littoral surveys are best conducted from a boat using rake tosses and/or underwater viewers, by snorkeling or SCUBA divers.
- Presence (Surveillance) Survey sample points should target high use areas, inflows, outflows, beaches and other points of deposition and species representation in the general waterway can be obtained by establishing a sample point every lateral 100 m. Visual observations should be made between points to optimize potential of locating small infestations. Be sure to survey the entire littoral zone in the lake/reservoir, up to the high-water mark (HWM).

[3] Madsen, JD 1999. Point intercept and line intercept methods for aquatic plant management. APCRP Technical Notes Collection (TN APCRP-MI-02) u. s. Army Engineer Research and Development Center, Vicksburg, MS 16 pp.

4.3.2. Lake & Reservoir Shore Surveys

- If possible, conduct a quick visual reconnaissance from a point above the site prior to sampling to note areas of likely plant colonization (i.e., Suitable substrate, points of substrate deposition, etc.) and presence of existing aquatic vegetation. This will assist in focusing sampling efforts.
- Some high-use priority sample points (boat docks; fishing access points; beaches, etc.) on a lake or reservoir will be conducted from shore.

4.4. Streams & Rivers

High priority sample points along streams and rivers include sites where stream gradient slows (areas of deposition), areas of high use (fishing access sites) and back-water sloughs and channels.

4.4.1. Stream & River Point Surveys

- Survey in a zig-zag pattern (visual observation with bottom viewer, snorkeling, and/or rake toss depending on water depth) for 100 m upstream and downstream from initial access point (be sure to sample riffles, pools and slack-water areas).
- Conduct survey sampling in an upstream direction so disturbed sediment does not reduce visibility.

4.4.2. Navigable River Boat Surveys

- Survey sections of the river in addition to access points. Select sections of the river suitable for aquatic plant colonization and growth (e.g., sloughs, backwater channels, oxbows). Selection can be done in the office to optimize sample efficiency for the length of river section selected.
- Depending on the river sample area, a 2–3-person crew is recommended. Two boats with one team member each (one on each side of the river), increases the probability of detecting a non-native aquatic plant. The third crew member can drive to the take-out access point and complete “point surveys” as described above.
- The number of points surveyed in each river will vary based on river channel variability and the location of aquatic plant occurrences.
- If an aquatic invasive plant is observed continue surveying upstream river segments (or points) until the source (upper-most occurrence) is located. Survey 100 m upstream of this point to confirm the upstream perimeter of the plant population.
- If invasive emergent shoreline plants are present (e.g., yellow flag iris) they should be noted and coordinates recorded on a new Site and Invasive Aquatic Plant Inventory Record.

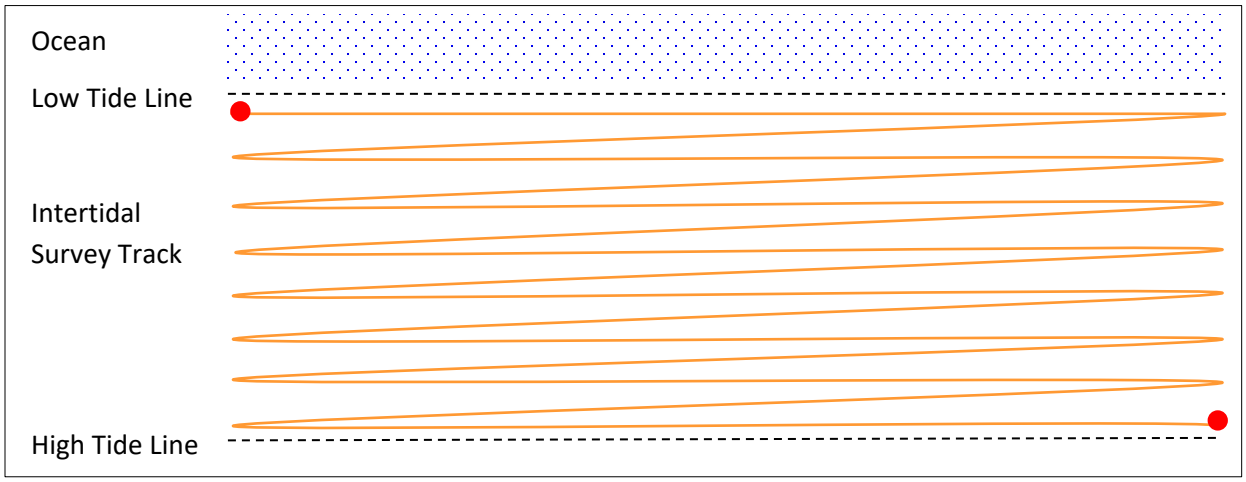
4.5. Intertidal

- The intertidal survey area will be defined by the type of survey and target plant species. Presence (Surveillance) Surveys may occur over an entire intertidal area, including low to high tide. Extent

Survey areas will be limited to the preferred habitat of the target species (Section 3.2.3), with periodic spot checks outside of these targeted search areas to capture rogue plant occurrences.

- Intertidal surveys may be completed by air boat or, more commonly, by foot wearing waders with detachable boots or neoprene booties, depending on saturation and stability of substrate.
- The survey area should be walked as a grid, starting at a low tide corner and traveling in a zig-zag pattern, with the final search line occurring along the highest tide line (Figure 3).

Figure 3. Intertidal Survey Search Pattern.



4.5.1. Equipment

Intertidal surveys completed by foot will require special footwear. This can be hard to find and should be secured in advance of the work window. The safest footwear options for intertidal work are neoprene tide boots or hip/chest waders with detachable boots and a wading belt. Ideally, the wader boots will avoid metal components to reduce corrosion from salt water. Most wader companies make boots specifically for salt water and these may require advance ordering. Rubber boots and waders with attached boots are not recommended as they will easily become stuck in the mud and come off the foot (DUC, 2024).

4.5.2. Safety

Terrain Intertidal environments may appear flat, but they can be treacherous for walking, as deep channels, debris, and hummocks can be concealed by vegetation and mud. Walking on logs and crossing deep channels is a common occurrence, and physical fitness is an important safety consideration. Logs and wood that wash ashore often have protruding metal and/or nails; extra caution should be used in these areas.

Generally, it is advisable to avoid placing full weight on your foot until the stability of the ground underneath is confirmed and to avoid stepping on any man-made flat boards until they are confirmed to be free of nails and sharp edges. When working in a group, these hazards should be identified to all crew members following behind to avoid injury (DUC, 2024).

Substrate The sediment of intertidal mudflats can vary in consistency and stability, and some areas will be generally less stable for walking. Heavier individuals may be prone to greater sinking and find it more challenging to move across or thru the mud. Being stuck in the mud is significantly more dangerous on an approaching, rising tide. Intertidal survey field crews should have a good understanding of the safety plan and how to efficiently become free of the mud prior to beginning field work (DUC, 2024).

- Tide charts should always be referenced in advance of fieldwork, with the fieldwork planned for the period of lowest tide.
- Tidal areas often have a complete lack of shade, so plan accordingly in the summer months.
- A PFD, walking stick, throw rope, GPS, and radio are some of the important safety aids when working in intertidal areas.
- Fieldwork in intertidal areas should always be conducted by at least a two-person crew for safety.

Emergency Services Depending on your location, the Canadian Coast Guard may be the fastest or best option for an emergency response. Each field crew member should have a means of communication and carry the Coast Guard emergency number on their person. Some mobile phone providers allow access to the Coast Guard by dialling ***16**. If calling **911** in an emergency, it is important to inform the operator that you are in an intertidal area and request Coast Guard assistance. The Coast Guard will likely ask for your location coordinates (latitude/longitude). Each field crew member should have a GPS enabled electronic device on their person and know where to locate current coordinates (DUC, 2024).

Hazards There are also a large variety of hazards that can wash ashore, including spent flairs, items related to criminal activity, derelict boats, fishing gear and rope, dead animals, and very rarely human remains. It is important that the safety plan includes the phone numbers needed to deal with these hazards, such as (DUC, 2024):

  - Canadian Coast Guard Emergency Line
  - Canadian Coast Guard Reporting Service (derelict vessels, pollution releases, etc.)
  - Police Non-Emergency Line or Crime Stoppers
  - Marine Mammal Rescue
  - Conservation Officer Service or RAPP line (poachers, injured wildlife, etc.)
  - DFO Reporting Line
  - Local Water Taxi (if there is a risk of stranding due to tidal changes)

5. DATA MANAGEMENT

New Invasive Plants New invasive plants to BC are candidates for eradication and should be reported directly to **ReportInvasivesBC**. The B.C. Ministry of Forests Invasive Plant Program maintains the list of provincial invasives plant eradication candidate species.

InvasivesBC Access Survey data for plants with confirmed presence can be entered into the provincial InvasivesBC database and mapping application. To enter data into InvasivesBC one must obtain an IDIR or BCeID.

Observations Records Observations of invasive plants found in aquatic environments should be entered into InvasivesBC using the Aquatic Invasive Plant Observation Form. Alternatively, the InvasivesBC Batch Uploader tool allows users to load multiple new observations simultaneously via the Observation-Aquatic Plant excel schema (batch templates). For more information see Section 5 and the InvasivesBC Reference Guide.

Survey Data For the purpose of documenting aquatic plant surveys in InvasivesBC, an Observation is defined as one or more sample points where the target plant presence is confirmed in a single waterway. The number of sample points included in a single Observation record is determined by the type of survey completed. A Presence (Surveillance) Survey represents each sample point as an Observation record in InvasivesBC. An Extent Survey may cluster multiple sample points into a single polygon Observation record and/or individual plants or occurrences as individual Observation records. A polygon is created for a target plant patch or occurrence larger than one square metre (>1 m^2) and a point represents patches equal to or lesser than one square metre ($\leq$1 m^2) or individual plants. Each polygon or point represents an Observation record in InvasivesBC (Figure 4, Section 5, and the InvasivesBC Reference Guide).

Plant occurrences in each water inflow and outflow to the surveyed waterway are documented as new observations. For example, in Figure 5 extent survey mapping represents multiple sample points as a single polygon when they are part of a single continuous uniform occurrence, and points represent discreetly occurring individual occurrences of plants or small patches <1 m^2. Each point and polygon will be entered as an InvasivesBC Observation record. If mapping a previously documented target plant location and there is no invasive plant detected, an observation record is completed in InvasivesBC with the NOT FOUND field selected. This can also be done using the InvasivesBC Batch Uploader tool.

When entering data for aquatic invasive plant presence surveys or extent surveys a user will need to enter information about the survey type, waterway, target plant(s), and voucher specimen collected. The observation records and data fields are described in the InvasivesBC Reference Guide Part 4-Tables 1, 2, 4, 5 and 6 and Appendix 1 Part 2-Aquatic Plant Observations. See the reference guide for more information about entering, viewing, and accessing data in the provincial invasive plants database.

Figure 4. InvasivesBC Presence (Surveillance) Survey Observation Numbering Example.

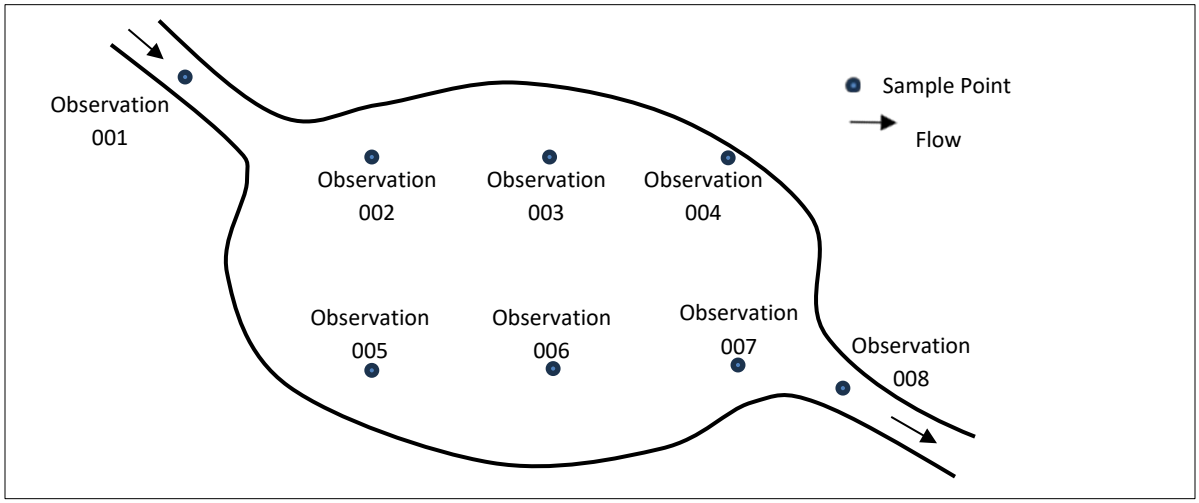
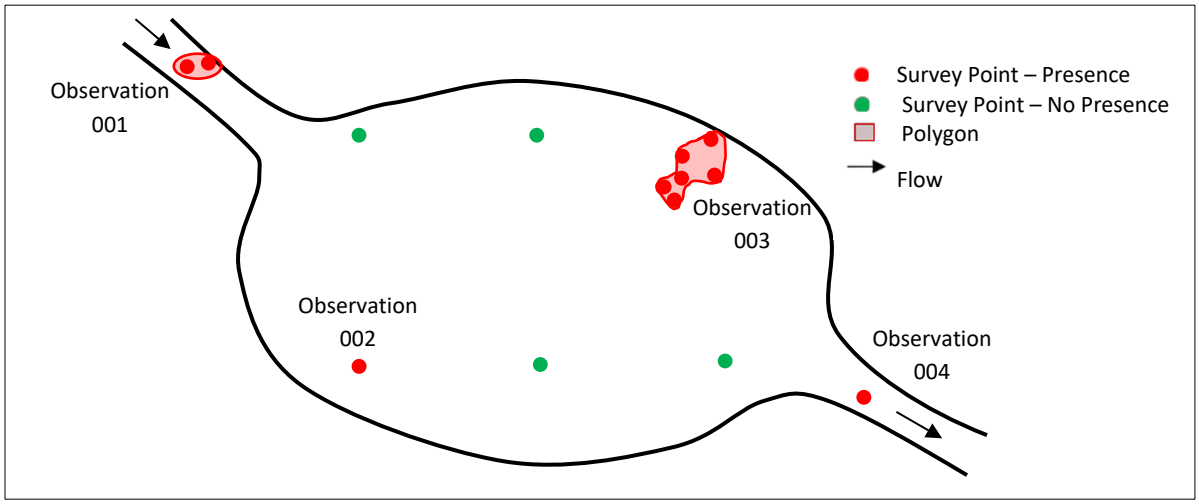


Figure 5. InvasivesBC Extent Survey Observation Numbering Example.



6. SAMPLE COLLECTION, LABELING AND PRESERVATION

A plant sample may be required to verify species identification or document a species range expansion. Collect a sample of the plant and place it in a sealable plastic bag with damp paper towels, label as described below, and put the bag in a cooler or other container to protect from damage (heat, cold, physical damage). Unless otherwise specified, collect the entire plant including underground parts, stems, fruits and flowers.

6.1. Wet Samples

- Record the following information on both the sample bag and plant identification form (see below). Use a waterproof permanent marker for sample bag label and a pencil for the identification form.
    - Collection Date
    - Collector Name & Agency
    - Water Body Name
    - UTM Coordinates: Zone (10 or 11); Easting (6-digits); Northing (7-digits)
    - Site Location
- Mailing the sample: Samples should be sent in damp paper towels in a sealable plastic bag. The bag should be placed in a padded box so the sample cannot be crushed, and mail priority delivery (Monday through Thursday). Shipping addresses are shown on the plant identification form located at the end of this document.
    - Complete the plant identification form and send the form and the sample to the Royal BC Museum diagnostic lab for analysis (see Appendix D for the form and contact information).

6.2. Dry Samples

- Press the entire plant intact until dry.
- Standard Plant Press: 46 cm x 30 cm (18”x12”); consists of corrugated cardboard sheets with wooden frames (or plywood) on each end; held together tightly with straps or rope.
- Specimens are placed in newsprint and then pressed between corrugates. Place in warm place with air circulation. Change cardboard daily until dry (if no access to drier). Ensure diagnostic features, such as leaf segments and whorls, are clearly visible when pressed.
- **Standard Herbarium Mounting Paper: 41 cm x 28 cm (16”x11”).** Specimens should be no larger than the dimensions of the paper.
- Seeds or other loose plant parts can be collected in a small, labeled envelope and kept with the voucher.
- Put label information together with specimen(s) and mail in well-protected, cardboard-lined envelope (in original pressing paper is fine). Shipping addresses are shown on the plant identification form located at the end of this document.
    - Complete the plant identification form and send the form and the sample to the Royal BC Museum diagnostic lab for analysis (see Appendix D for the form and contact information).
- If the sample is suspected to be a new or limited species to BC, please email to Ken Marr (Curator Botany, RBCM): KMARR@royalbcmuseum.bc.ca AND Becky Brown (Invasive Plant Specialist – Provincial EDRR Coordinator, FLNR): Becky.N.Brown@gov.bc.ca with the following information:
    - Preliminary sample ID
    - Indicate if species Prohibited weed and/or rapid verification required
    - Indicate if sender wants to be notified of verification

- Date sample in the mail
- Sample gift to museum or return of sample to sender required

7. OTHER AQUATIC INVASIVE SPECIES

Preventing the introduction and spread of aquatic invasive species (AIS) is the single most effective method of invasive species control. To report non-plant aquatic and semi aquatic invasive species such as amphibians, reptiles, fish, invertebrates, and diseases use the **ReportInvasivesBC** website; with options including mobile applications, an online form, email or phone.

Detailed information about the identification, status and management of these invasive species in BC can be found at Amphibians and Reptiles, Fish, Invertebrates (including Zebra and Quagga Mussels), and Whirling Disease.

Additional identification resources for reptiles and amphibians include:
B.C. Reptiles & Amphibians a partnership between the Province of B.C. and Thompson Rivers University
B.C. Frogwatch Program information for the identification and reporting of frogs and toads.
Any frogs or toads encountered during surveying should not be disturbed and observations should be reported.

For any questions or additional information on aquatic invasive non-plant species, please contact invasive.fauna@gov.bc.ca.

7.1. Whirling Disease

The first documented case of whirling disease in BC was in winter 2023 in Yoho National Park. Whirling disease is a disease affecting juvenile salmonid fish including trout and whitefish. It is caused by a microscopic parasite, *Myxobolus cerebralis*, which infects fish through their skin. Physical signs of the disease may include a deformed body or skull, and dark colouration of the tail area. Deformations sometimes cause a whirling swimming pattern. Although there is no risk to human health, the parasite can be lethal in susceptible fish populations (trout, salmon, whitefish). The movement of fish, mud, and water can spread whirling disease. There is no treatment currently available for whirling disease therefore containment and prevention are the best response.

7.1.1. Best Practices for Preventing Spread

Best Practices for preventing the spread of whirling disease, include:

- Never move fish or fish parts from one waterbody to another.
- Use fish cleaning stations where available or put fish parts in the local solid waste system. Do not dispose of fish or any fish parts in a kitchen garburator.

- Clean, Drain and Dry boats or any equipment (waders, life jackets, kayaks, etc.) before moving between waterbodies.

Pull the plug! It's the law! It is now illegal to transport your watercraft in BC with the drain plug still in place.

- Before transporting a boat or other watercraft, owners/operators must remove the drain plug and drain all water on dry land including all internal compartments such as ballasts, bilges, and live wells.

For more information visit B.C. Whirling Disease. Please forward any reports or inquiries regarding whirling disease in B.C. to WhirlingDisease@gov.bc.ca.

7.2. Invasive Mussel Defence Program

Zebra and quagga mussels are invasive freshwater species that have not yet been detected in B.C. If introduced, these mussels will threaten native species and fisheries in our lakes and rivers. The potential economic impact of these mussels has been estimated to range between $64 to $129 million annually in costs to hydropower, infrastructure, irrigation, tourism, property values and boating. Zebra and quagga mussels can attach onto watercraft and fishing gear, and be transported from infested water bodies in other jurisdictions into B.C.

Look for Conservation Officers at watercraft inspection stations located at key border crossings and highways into B.C. If you are transporting a watercraft (including non-motorized watercraft like canoes, kayaks, car toppers, and inflatable boats) in B.C., it is mandatory to stop at all watercraft inspection stations that are open along your travel route. Failure to stop at an open watercraft inspection station could result in a fine of $690.

Any suspected, transport, possession, sale or release of invasive mussels should be reported immediately to the Conservation Officer Services Report All Poachers and Polluters: 1-877-952-7277 (RAPP). For more information visit B.C. Invasive Mussels.

7.3. Clean, Drain and Dry Watercraft

To help prevent the introduction of zebra and quagga mussels and other AIS such as Eurasian watermilfoil and whirling disease, anglers should follow these steps:

Clean After a watercraft is pulled from the water, thoroughly clean all plants, animals, and mud from the watercraft, motor, trailer, and other equipment.

Drain Drain all water onto the ground from the watercraft (including bilges, engine compartments, hull, and intakes) and from any containers that can hold water (like bait containers, live wells, and ballast).

Pull the plug! It's the law!
It is illegal to transport your watercraft in BC with the drain plug still in place.

- Before transporting a boat or other watercraft, owners/operators must remove the drain plug and drain all water on dry land including all internal compartments such as ballasts, bilges, and live wells.

Dry Allow all items to dry completely before transporting the watercraft and equipment to another water body.

Out-of-Province Watercraft If you're bringing your boat from outside of B.C., e-mail the provincial program at COS.Aquatic.Invasive.Species@gov.bc.ca to determine if your boat is HIGH-RISK, and should be disinfected for possible presence of zebra or quagga mussels before accessing B.C.'s lakes and rivers. It's free!

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APPENDIX A: EQUIPMENT DISINFECTION

These equipment disinfection procedures are best management practices to prevent the introduction and spread of aquatic invasive species (AIS) between B.C. waterways during fieldwork or recreation activities. The introduction and spread of a variety of AIS poses an increasing risk to fisheries, biodiversity, water quality, and water infrastructure in B.C.

One major pathway for the spread of these species is the accidental transport of 'aquatic hitchhikers' on waders, boats, trailers, nets and other equipment moved between waterways. Many of these organisms can grow from fragments hardly visible to the human eye, so proper disinfection procedures need to be followed to prevent the spread of AIS between waterways, especially those not naturally connected. When followed, these procedures will prevent the spread of freshwater invasive species like New Zealand mud snail, Eurasian watermilfoil, Zebra/Quagga mussels, and Whirling Disease.

NOTE: For industries that use heavy equipment in and around water, or extract water for industrial uses, separate disinfection protocol is in development. Please reference Whirling Disease News for updates.

A.1. Requirements to Prevent the Spread

The actions taken to prevent invasive mussels also help prevent the spread of whirling disease and other aquatic invasive species. These include requiring all watercraft to 'pull the plug' and recommending a disinfection process for gear, especially within the Columbia River Watershed. In addition, there will be more signs and information throughout the province about keeping boats and gear clean, drained, and dry to protect B.C.'s waterways.

The use of felt-soled waders is strongly discouraged, as they are a major pathway for the dispersal of aquatic hitchhikers, and particularly difficult to disinfect. Newly developed rubber-soled alternatives are available on the market, and provide the same non-slip qualities, but are much easier to clean. Some regions have already moved to rubber-soled waders and are satisfied with their performance.

To prevent the spread of AIS, the Province of B.C. has introduced new requirements and guidance.

1. Handle fish carefully.
2. Clean Drain Dry all watercraft, equipment, and gear.
3. Disinfect all watercraft, equipment and gear leaving waterbodies in the Columbia watershed.

A.1.1. Handle Fish Carefully

- Never move fish or fish parts from one waterbody to another.
- Use fish-cleaning stations where available or put fish parts in the garbage. Do not dispose of fish parts in a kitchen garburator or down a drain.

A.1.2. Clean Drain Dry All Watercraft, Equipment and Gear

Before moving a boat or any equipment (e.g. waders, buckets, life jackets, kayaks, swimsuits) between water bodies, be sure to always follow the Clean, Drain, Dry steps outlined below. As of May 2024, you must pull your drain plug – it's the law.

CLEAN

- Clean and inspect all watercraft, trailers, and equipment on dry land away from storm water drains, ditches, and waterways.
- Remove all mud, sand, and plant materials before leaving the shore.
- Rinse or wash your boat and equipment away from storm drains, ditches, or waterways.
- Bathe pets before allowing them to enter another water body.

DRAIN

- Before leaving a waterbody, drain all water on dry land (including all internal compartments such as ballasts, bilges, and livewells), coolers, life jackets and other gear.
- Raise and lower outboard engines several times to ensure all water has drained out.
- Drain non-motorized watercraft by inverting or tilting the watercraft, opening compartments, and removing seats if necessary.
- **Pull the plug.** In B.C. it is now illegal to transport your watercraft with the drain plug in place.

DRY

- Dry the watercraft and/or equipment completely between trips and allow the wet areas to air dry. Leave compartments open on boats and equipment.
- It is recommended to allow for a minimum of 24 hours of drying time before entering new waters.

A.1.3. Disinfect All Watercraft, Equipment and Gear Leaving Waterbodies in the Columbia River Watershed

Priority Area – Columbia River Watershed

- Additional cleaning and disinfection procedures are recommended when moving equipment and boats within and out of high-risk areas for whirling disease to help reduce its spread.
- The Columbia River Watershed (Figure 6) has been identified as the high-risk area for whirling disease due to the connectivity to upstream areas where whirling disease has been detected within Yoho National Park.
- The disinfection protocol outlined below should be followed after the equipment has been thoroughly cleaned using the clean, drain and dry steps outlined above.

Disinfection Protocol –Checklist

- Prior to working with any disinfectant, refer to the product label or material safety data sheet (MSDS) for safety and handling instructions and appropriate use of Personal Protective Equipment (PPE). The recommended disinfectants and the appropriate concentrations can be found in Table 2.
- Please note that household bleach can cause corrosion to fabrics, plastics, rubber, and metal so caution should be taken when applying it. Quaternary Ammonium Compounds (QACs') (eg. Quat plus) are common cleaning agents used in homes and hospitals and are safe for most equipment, vehicles and machinery when used at the recommended concentrations and followed by a thorough rinse.
- Care and maintenance instructions for more sensitive equipment should be carefully reviewed prior to using any disinfectant.
- Bleach should not be disposed of directly into the environment. Small quantities of disinfectant may be disposed through a sanitary sewer but should be diluted with an equal volume of water if indicated on the product label or MSDS sheet. Local authorities responsible for operating municipal wastewater treatment facilities should be consulted before disposing of larger volumes of disinfectant down sanitary sewers.

Disinfection Protocol - Steps

- Ensure that all organic material, including mud, is removed prior to application of chemical treatment. Not doing so can make the application of chemicals ineffective.
- Submersible items must be immersed (consider using a rigid rubber tote) such that all surfaces which were in contact with potentially contaminated water, mud, or fish, are submerged for 10 minutes.
- Non-submersible items, sensitive, non-waterproof or large equipment including personal floatation devices, floater jackets and life jackets that were not submerged in the waterbody should be thoroughly wiped or sprayed.
    - Surface disinfection can be accomplished by wiping wetted surfaces with a heavy-duty towel which has been soaked in a disinfectant.
    - Surfaces must be kept damp with disinfectant for 10 minutes.

- Any disposable items (i.e. shop towels) used for this purpose must be disposed of in the garbage away from water.
- The disinfectant solution can be applied using garden variety pump-up style sprayers and the solution should be liberally sprayed on both the outside and the inside of the equipment, keeping surfaces moist for 10 minutes. Avoid letting the disinfectant dry on items as it is harder to rinse off once dry.
- Take care to protect electronic components that are not water resistant.

Figure 6. Columbia River Watershed in B.C.

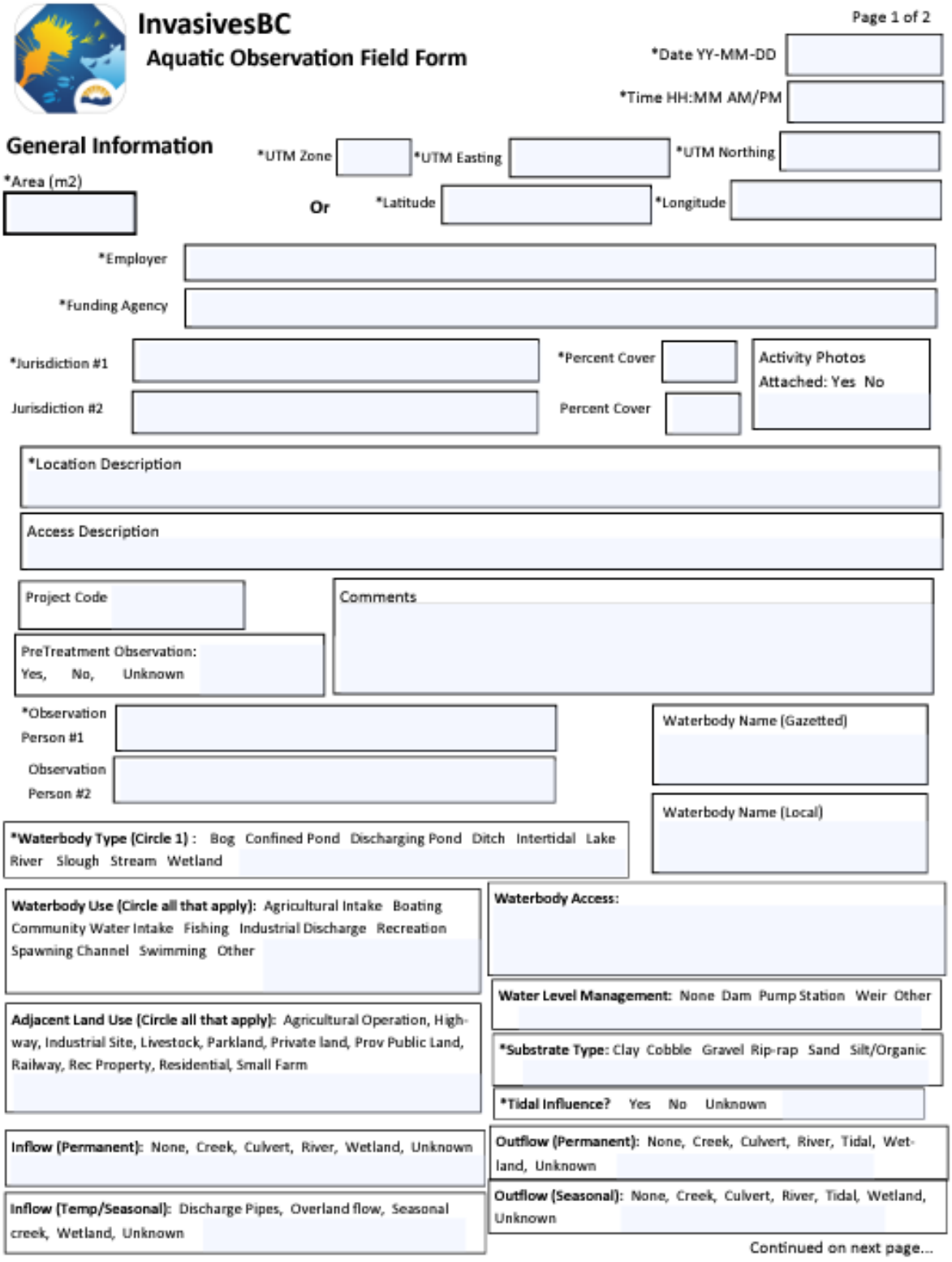
- Make sure to thoroughly rinse the items using water (not from the exiting waterbody) following the application of disinfectant to prevent the buildup of disinfectant residue.
- Once treatment and rinse are completed, allow items to dry as long as possible (24 hours minimum recommended).

Table 2. Equipment Disinfection Information.

	Concentration	Contact Time	Disposal	Cautions	Additional Info
Household bleach	1:10 (volume to volume) mixture of household bleach and freshwater.	15 minutes	Sodium thiosulphate can be used to neutralize prior to disposal or small quantities of solution may be disposed into a sanitary sewer with an equal volume of water.	Can cause corrosion to fabrics, plastics, rubber, and metal. Bleach is quickly inactivated by organics, so organic materials should be removed before disinfection.	This is equal to 1 cup (250 mL) of bleach with 10 cups (2.5 L) of water.
Quaternary Ammonium Compounds (QACs)(e.g. Quat plus)	Soaking: 1500 ppm Wiping and spraying: 1500 ppm	10 min for soaking and spraying	Small quantities may be discarded in sanitary sewer if indicated on the product label.	QAC products can cause corrosion when used on aluminum. Alternative cleaning methods should be utilized for aluminum equipment.	QUAT PLUS is a common cleaning agent for homes and restaurants.

APPENDIX B: AQUATIC INVASIVE PLANT OBSERVATION FIELD FORM

(electronic version)



InvasivesBC

Aquatic Observation Field Form

Page 1 of 2

*Date YY-MM-DD

*Time HH:MM AM/PM

General Information

*UTM Zone *UTM Easting *UTM Northing

*Area (m2)

Or *Latitude *Longitude

*Employer

*Funding Agency

*Jurisdiction #1 *Percent Cover Activity Photos Attached: Yes No

Jurisdiction #2 Percent Cover

*Location Description

Access Description

Project Code

Comments

PreTreatment Observation: Yes, No, Unknown

*Observation Person #1

Observation Person #2

Waterbody Name (Gazetted)

Waterbody Name (Local)

*Waterbody Type (Circle 1) : Bog Confined Pond Discharging Pond Ditch Intertidal Lake River Slough Stream Wetland

Waterbody Use (Circle all that apply): Agricultural Intake Boating Community Water Intake Fishing Industrial Discharge Recreation Spawning Channel Swimming Other

Waterbody Access:

Water Level Management: None Dam Pump Station Weir Other

Adjacent Land Use (Circle all that apply): Agricultural Operation, Highway, Industrial Site, Livestock, Parkland, Private land, Prov Public Land, Railway, Rec Property, Residential, Small Farm

***Substrate Type:** Clay Cobble Gravel Rip-rap Sand Silt/Organic

***Tidal Influence?** Yes No Unknown

Inflow (Permanent): None, Creek, Culvert, River, Wetland, Unknown

Outflow (Permanent): None, Creek, Culvert, River, Tidal, Wetland, Unknown

Inflow (Temp/Seasonal): Discharge Pipes, Overland flow, Seasonal creek, Wetland, Unknown

Outflow (Seasonal): None, Creek, Culvert, River, Tidal, Wetland, Unknown

Continued on next page...

InvasivesBC

Aquatic Observation Field Form

Shoreline types (circle all that apply): Boat launch or dock infrastructure, Fence, Livestock grazing access, Riparian vegetation, Rip-rap, Road/ Parking lot, Turf **Include Percent of each type:**

WATER QUALITY

Maximum Depth (m)	Secchi Depth (m)	Water Colour

Suitable for biocontrol agent(s)

Yes No Unknown

AQUATIC INVASIVE PLANT INFORMATION

***Invasive Plant #1**

Sample Point ID

Observation Type - Circle One: Positive Occurrence / [1]Negative Occurrence

***Density (plants/m2) Code:**

***Distribution Code or Unknown:**

[1]Density, Distribution, Life Stage & Voucher collection do not apply to Negative Occurrence

***Life Stage (Circle 1):** Unknown, Small germinating plants, Rosettes, Seedlings, Plants are Senescing, Mature Plants, Mature: Flowering, Mature: immature fruit, Mature: mature fruit, Mature: vegetative only, Mature: in bud, Mature: fading, Mature: dispersing fruit, Dead, Other: add notes

*Voucher Specimen Collected? Y N

Invasive Plant #2 (if used, Total Percent cover must = 100%)

Sample Point ID

Observation Type - Circle One: Positive Occurrence / [1]Negative Occurrence

Density (plants/m2) Code:

Distribution Code or Unknown:

[1]Density, Distribution, Life Stage & Voucher collection do not apply to Negative Occurrence

Life Stage (Circle 1): Unknown, Small germinating plants, Rosettes, Seedlings, Plants are Senescing, Mature Plants, Mature: Flowering, Mature: immature fruit, Mature: mature fruit, Mature: vegetative only, Mature: in bud, Mature: fading, Mature: dispersing fruit, Dead, Other: add notes

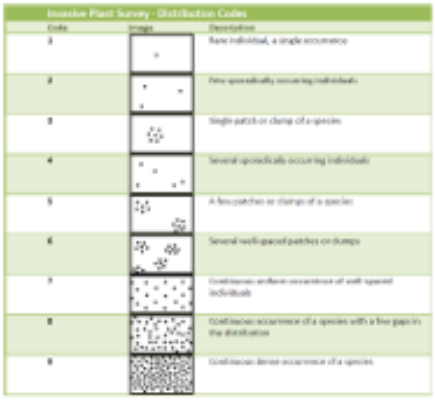
Voucher Specimen Collected? Y N

*** = MANDATORY**

Density codes

Unknown
1|<= 1plant/m2 (Low)
2|2-5 plants/m2 (Med)
3|6-10 plants/m2 (High)
4|>10 plants/m2 (Dense)
Not Applicable - actual footprint

Distribution codes



July 26, 2023

APPENDIX C: AQUATIC INVASIVE PLANT SAMPLE COLLECTION FORM

Herbarium, Royal BC Museum

675 Belleville St.

Victoria, BC V8W 9W2

Collection Date (MM/DD/YY): _____ / _____ / _____

Client Name: _____

Email: _____

Phone: _(_____)_____

Accompanying this form is a plant sample to be identified. Please answer all items before submitting the plant sample.

1. CONTACT

Collector Name:	
Phone:	Address:

2. SAMPLE LOCATION

Regional District:		Water Body Name:
Water Body Type: LAKE | SLOUGH | MAN-MADE POND | RIVER | CREEK | DON'T KNOW		
UTM Zone (10 or 11):	Easting (6-digits):	Northing (7-digits):

3. COLLECTION HABITAT (circle below):

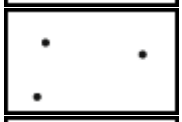
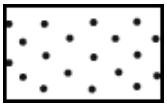
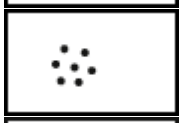
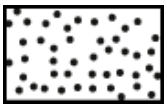
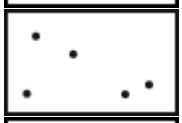
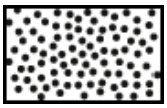
STREAM/RIVER | POND (<10 ACRES) | AQUASCAPE (ORNAMENTAL POND) | LAKE (>10 ACRES) | OTHER (SPECIFY BELOW)

DESCRIBE:

4. PLANT FORM (circle below):

MOSS	BROADLEAF	GRASS	DON'T KNOW

5. DISTRIBUTION (circle below):

1		RARE INDIVIDUAL, A SINGLE OCCURRENCE	6		SEVERAL WELL-SPACED PATCHES OR CLUMPS
2		FEW SPORADICALLY OCCURRING INDIVIDUALS	7		CONTINUOUS UNIFORM OCCURRENCE OF WELL-SPACED INDIVIDUALS
3		SINGLE PATCH OR CLUMP OF A SPECIES	8		CONTINUOUS OCCURRENCE OF A SPECIES WITH A FEW GAPS IN THE DISTRIBUTION
4		SEVERAL SPORADICALLY OCCURRING INDIVIDUALS	9		CONTINUOUS DENSE OCCURRENCE OF A SPECIES
5		A FEW PATCHES OR CLUMPS OF A SPECIES			

6. OTHER PLANT INFORMATION:

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7. Send email to Ken Marr (Curator Botany, RBCM): KMARR@royalbcmuseum.bc.ca (cc: Ministry of Forests Invasive Plant Specialist) with the following information:

- Preliminary sample ID
- Indicate if species Prohibited weed and/or rapid verification required
- Indicate if sender wants to be notified of verification
- Date sample in the mail
- Sample gift to museum or return of sample to sender required