Invasive Aquatic Plant Screening and Mapping Survey Procedures

Though many of the methods and tools used to conduct the various IAP surveys are the same, there are some distinctions among survey types that are worth noting. Invasive aquatic plant surveys generally fall into three categories: 1) IAP Screening Surveys; 2) Baseline Infestation Surveys; and 3) Infestation Monitoring Surveys. Because each survey type is suited to a specific goal or purpose, each is approached a bit differently. The following table provides an overview of the fundamentals of conducting all three IAP surveys.

TYPE	GOAL / PURPOSE	APPROACH
IAP Screening Survey	Early Detection	The target waterbody is checked on a regular basis in order to detect any new introductions as early as possible. The scope and frequency of screening surveys may be adjusted in accordance with the availability of resources.
Baseline Infestation Survey	Evaluation of a newly-identified infestation	The target waterbody is thoroughly surveyed to determine the full extent of a newly-identified infestation and is mapped using characterization codes. The resulting survey map can be used in the development of a successful control strategy.
Infestation Monitoring Survey	To monitor progress of ongoing control activities, and to identify new pioneer plants and areas of concern	The target waterbody is surveyed on a regular basis to monitor the infestation and to update the infestation map. Special attention is given to evaluating the status of current and recent control sites and to identifying new infested areas.

The primary goal of your screening survey project is to 1) visually scan as much of the existing aquatic plant habitat as possible, looking for possible invaders, and 2) to record the location of any suspicious organisms (or invasive species colonies) in a way that will ensure timely and effective follow up action.

An active, well trained, fully equipped survey team benefits your lake community in many ways. The team can rule out the presence of invasive aquatic plants annually, help educate and engage the lake community (friendly face-to-face encounters, dockside, are commonplace during plant surveys), and provide a better understanding of your lake's unique native plant communities.

Volunteers use a trunk scope during a screening survey. *Photo: Lake Stewards of Maine.*

Screening surveys may be conducted at various levels of detail, depending on the time and resources available to devote to the task. A Level 1 survey includes public access points and areas of concentrated boat traffic (e.g., marinas), Level 2 surveys include all Level 1 plus areas where aquatic plant growth occurs, and Level 3 surveys cover the entire shoreline and littoral zone. Surveys may be conducted over a period of time, especially Level 3 surveys on large lakes, which may require several weeks or longer to complete.

Getting Ready

You will need to obtain or create a base map for your waterbody. Simple lake depth maps are available on the LSM Lakes of Maine website: lakesofmaine.org, and higher quality depth maps may be available commercially. Other sources of maps showing shorelines and wetland areas are available from state natural resource agencies, state geological survey offices, USGS, Google Maps, Google Earth, etc.

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Invasive Aquatic Plant Survey Levels

Level 1

Points of public access and other areas of concentrated boat traffic (e.g., marinas and narrow navigation channels) are surveyed. Survey areas extend horizontally along the shoreline at least 100 meters (~300 feet) on either side of the high-risk zone, and outward along the entire length to the depth at which the bottom is no longer visible from the surface.

Level 2

Level 2 surveys include all Level 1 areas, plus all areas of the shoreline that are likely to provide suitable habitat for aquatic plants, such as shallow, sheltered coves. Floating leaved plants are often a good indicator of a rich plant community below the surface. In addition to supporting native plants, these areas may provide suitable habitat for an invader to take hold and (at least initially) hide.

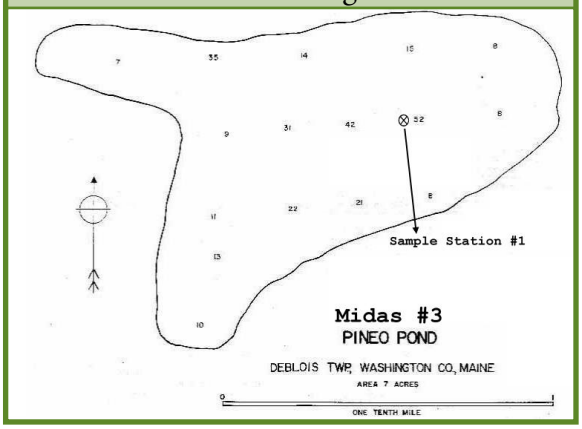
Level 3

A Level 3 survey covers the entire shoreline area and littoral zone. (The littoral zone includes all areas in the waterbody where sunlight reaches the bottom and rooted aquatic plants may grow.) In the case of the confirmed presence of an invasive aquatic plant in a waterbody, it is recommended that a Level 3 survey be conducted in order to determine the full extent of the infestation.

Using highlighters, colored pencils, marking pens, etc., color in the littoral zone (The *littoral zone* includes all areas in the waterbody where sunlight reaches the bottom and rooted aquatic plants may grow.) It is also helpful to mark the location of protected areas that are likely to provide good plant habitat, inlets, outlets, and area with high boat traffic (e.g. public and private boat launches, marinas, etc.). Make copies of the base map for use by volunteers in the field.

Need a lake map?

Depth maps for many Maine lakes are available on the LSM Lakes of Maine website: lakesofmaine.org



Study invasive and native plant identification guides and keys so you will be familiar with all invasive aquatic plants of concern. Most invasive plants have native look-alikes such as variable watermilfoil (*Myriophyllum heterophyllum*) which looks like the native coontail (*Certatophyllum* sp.), water marigold (*Bidens beckii*), and some bladderworts (*Utricularia* sp.). Milfoils exhibit a wide degree of vegetative variability, often making it difficult to distinguish between native and invasive species without assistance. Learning the structural characteristics of the look-alike species before beginning the survey will save you a great deal of time.

Conducting the Survey

During the screening survey you are trying to visually scan as much of the littoral area as possible, looking for suspicious organisms, and recording their location. Primarily you are looking for any possible invaders, but since you are going through the process of conducting a comprehensive survey of the waterbody, you may wish to expand the scope of your screening survey to include identifying native species. Some lake groups inventory just the dominant native plant species, while others create a comprehensive list of all native species growing in the waterbody. Consideration

Is your lake already mapped?

It is possible that the initial screening survey on your lake has already been done. Be sure to check with your state's environmental protection department or other lake organizations to determine if this is the case.

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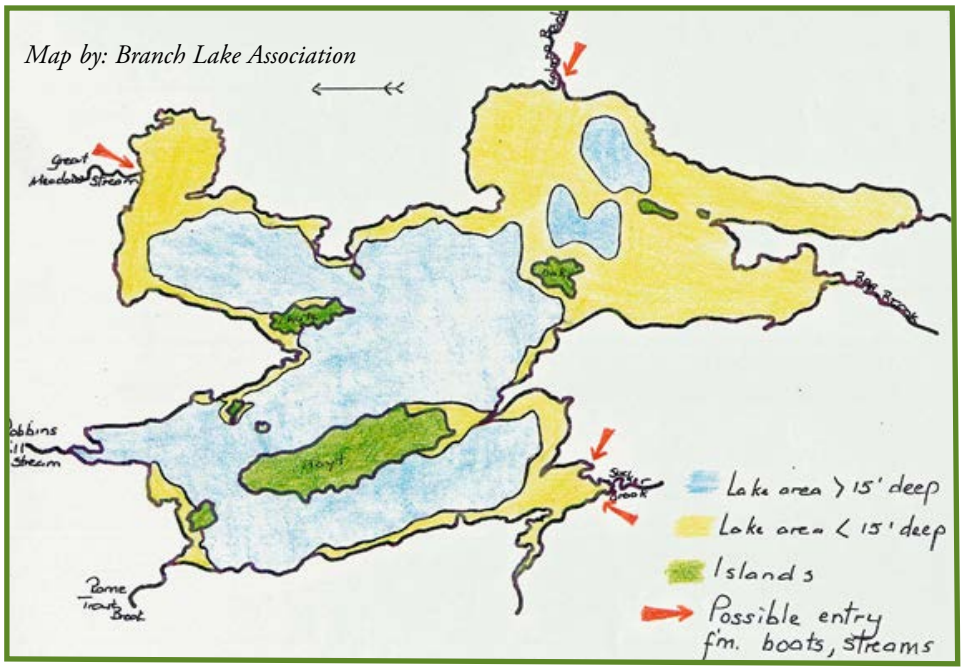

of the time and number of people you have available for this project should help you to determine an appropriate scope for your survey before you set out.

Surveys should be conducted when there is adequate light, and when conditions are relatively calm. Early morning conditions are often ideal because the water is calm and reflection on the water surface is minimal. It will be difficult to conduct an effective survey during windy conditions and weekends may be problematic because of heavy powerboat activity.

As far as season timing, July through September is generally the best time of year to conduct screening surveys. Prior to July, many aquatic plants are not fully developed. Emergent flowering structures are sometimes needed for plant identification and for many species flowers do not typically start to develop until July. Curly-leaf pondweed (*Potamogeton crispus)* is an exception to this rule, usually reaching maturity by late spring to early summer.

The area to be surveyed extends from the shoreline to the point at which it is no longer possible to see the lake bottom with a viewing scope. The depth of the littoral zone may actually go out further, depending on water clarity. Very clear lakes may support rooted plants at depths of 15-20 feet. Hydrilla *(Hydrilla verticilata)*, one of the most notorious invasive aquatic plants, can grow in extremely low light to depths of 30 feet or more. Using SCUBA divers, an underwater video camera, or a weed weasel enables surveying to these greater depths.

The course surveyors' travel will vary in accordance with the natural variability of the littoral zone and, to a lesser extent, occasional human-placed obstacles. In areas where the lake bottom drops relatively steeply from the shore, plotting a straight course roughly parallel to the shore generally allows adequate screening of the area from both sides of the boat. Working in groups of two or more, one surveyor scans the area from the boat toward the shore, the other from the boat toward the outward extent of the littoral zone. Scanning will involve looking through the glass-like surface of the water, when weather and light conditions are optimum; or through the view scope, when they are not. In addition for scanning the area for aquatic invaders, the surveyor is generally watching for submersed hazards such as rocks, logs, and mooring lines, while the surveyor in the stern is steering the boat.

The relatively straight line of travel along the shore may wiggle and contort from time to time to conform to and accommodate shoreline features, docks, moored boats, floats, and the like. The assumed width of the littoral zone should be verified from time to time by spiking out (heading out perpendicular to shore) and visually checking the depth.

In areas where the littoral zone is wider, in shallow coves, inlets and outlets, and where the plant community is dense and complex, other course patterns including point-to-point transects should be employed. Shallow ponds may support rooted plants from shore to shore. The overall goal in selecting a proper course pattern is to optimize direct observation of the plant communities. Highlighter pens or colored pencils are

VOLUNTEER SURVEYORS

We recommend that all novice surveyors attend an Invasive Plant Patrol training workshop before survey activity, and that an experienced surveyor provides oversight to ensure that standard procedures and protocols are followed. IPP training and technical support is offered free to volunteers though the Lake Stewards of Maine (lakestewardsofmaine.org).

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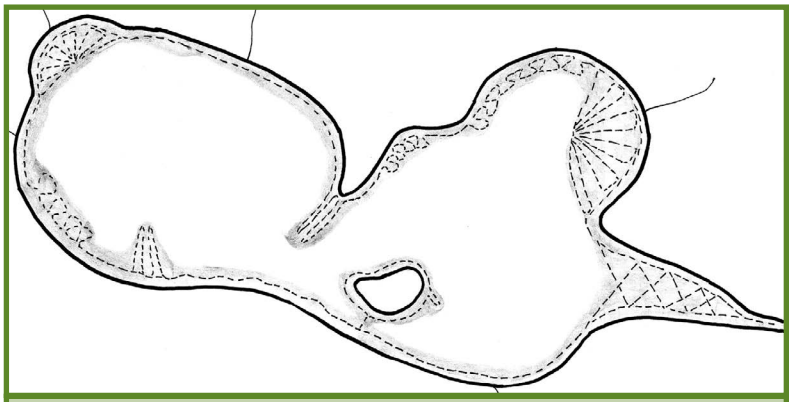
used to track the progress of the survey on the field map.

Surveyors obtain specimens when a closer look is needed to distinguish friend from foe. Collect a representative sample or specimen and float it in clean water in a white tray or container. Use a hand lens to view minute features and consult your identification guides and keys. If you are noting dominant native plants observed in your survey, be sure to record these as you go.



The gray area represents the littoral zone. The dotted line represents the patterns of travel used to optimize direct observation of the areas.

If you have determined that an invader has been found, mark the location using a weighted buoy and mark it on the field map. Be sure to indicate local landmarks (shoreline cottages, unusual rocks or trees, etc.) to help others re-locate the site. If you have a GPS, mark the waypoint or record the longitude/latitude coordinates. But remember, unless you have a high-end GPS unit, the accuracy may be off by 15 feet or more. Use a consistent marking code on the survey form, the plant specimen bag, the map, and the marking buoy.

If larger infested areas are encountered, places where plants and plant clusters are sparsely distributed and too numerous to mark individually, the entire infested area should be shaded in on the map. Mark the perimeter of the infested areas with a series of buoys and/or GPS waypoints.

A volunteer taking a closer look at a plant while conducting a screening survey.
Photo: Lake Stewards of Maine.

Many aquatic plants (native and invasive) can spread through fragmentation so avoid disturbing plants unless a specimen is required. Specimens should be obtained by a clean cut, if possible. Scoop up any and all fragments with the leaf rake or a net.

When the survey is complete, organize your findings and consider how you are going to use the survey results. Data may be organized simply by copying and collating the documentation forms and field maps. However, to share your findings with the public, you will want to present the information in more user-friendly formats, such as a narrative report, a poster sized map, a PowerPoint presentation, etc.

Evaluating and Mapping an infestation

Knowing the current status of your infestation at any point in time is essential to developing and implementing an effective control strategy. Since even minor infestations may persist for at least several years, and most infestations persist for significantly longer, you should plan accordingly. Conducting an initial Baseline Infestation Survey and developing, activating, and supporting a sustainable Monitoring Infestation Survey program should be a critical part of your IAP action plan.

Two distinct types of surveys are required for effective IAP management: the Baseline Infestation Survey and the Infestation Monitoring Survey. Each has a specific purpose and emphasis, and the strategies for accomplishing each survey type may vary.

- The purpose of the Baseline Infestation Survey is to determine the extent of the infestation and gain a clear understanding of the unique characteristics of each infested area and use that information to develop

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the optimum control strategy. With a Baseline Infestation Survey the emphasis is on thoroughness. The best way to achieve this is to conduct a comprehensive Level-3 survey and to clearly record and map all survey findings. A group that does not yet have an existing volunteer-based survey team may opt to hire professionals or trained student interns to conduct this initial baseline survey, or develop and activate a trained volunteer IAP survey and mapping team.

Surveying by snorkeling provides an excellent view of submersed plants.
Photo: Lake Stewards of Maine

• The purpose of the Infestation Monitoring Survey is to regularly monitor (annually or more frequently) the infested waterbody to assess control activity effectiveness and detect new pioneer colonies as early as possible, in order to inform ongoing adjustments to the management strategy. With an Infestation Monitoring Survey, the emphasis is on vigilance. Possible strategies for this ongoing monitoring effort include: the development of the volunteer team, engaging the control crew in the monitoring and assessment of the control sites, engaging boaters and shoreline property owners in a buoy-marking campaign, or a combination of the above.

Much of the process involved in both types of infestation surveying is similar to conducting a screening survey. The difference being that for the infestation surveys you know there is an invader in your waterbody and that invader is the primary target of your survey activity.

Primarily you are looking for the "confirmed" invader. But since you are going through the process of conducting a comprehensive survey of the waterbody, you may wish to expand the scope of your survey to include being on the lookout for the other invasive plants that are listed IAPs in Maine.

Conducting an infestation survey

A dense stand of variable watermilfoil, *(Myriophyllum heterophyllum)*.
Photo: Lew Wetzel.

When there is a confirmed presence of an invasive aquatic plant in a waterbody, it is recommended that a Baseline Infestation Survey is conducted and the entire littoral zone is surveyed. The earlier the detection of all invasive plant populations in the waterbody, the better the chances for successful control and the greater the potential to prevent spread of the invader to other, non-infested regions of the water body.

It is important to note that some invasive aquatic plants may be found at depths beyond those typical for a littoral zone. Hydrilla can grow in water depths of 50 feet. Whatever the target plant, it is always advisable that you research its growth habits and adjust your survey strategy accordingly. Spend time getting familiar with the appearance and growth habit of the target invader. Visit a known infested area to observe the plants as they appear from the boat, and carefully collect a sample for closer inspection.

As with the screening survey, obtain a base map for your waterbody and, using colored pencils or highlighters, shade in the areas to be surveyed. Provide copies of the base map for each of your infestation survey teams with assigned sections. When an IAP population is found indicate where on the map and note local landmarks (shoreline cottages, unusual rocks or trees) to help others re-locate the site. Mark the GPS waypoint or record longitude/latitude coordinates if you are using this technology. To keep the map readable, you can simply number the observation on the map and then record the location, landmarks, and/or waypoints on a separate form.

Characterize all of your IAP observations on the map and/or separate form. The chart on the next page is

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Figure A - Buoy illustration.
Figure: Lake Stewards of Maine.

Figure B - Marker buoys in amongst floating plants.
Photo: Jacolyn Bailey.

The perimeter of larger infested areas may be marked with a series of weighted buoys.

an example of a simple code system that can be used for characterizing each IAP observation. Record each characterization code under the observation number on the form. In some cases it may be appropriate to use more than one code, for example SIA/MXN would indicate an infested area where invasive plants are sparsely scattered among a dense colony of native plants.

Once a Baseline Infestation Survey has been completed, it can be used to determine management priorities and methodologies. It is crucial to continue a surveying program over the long-term in order to assess control activities and help guide management priorities going forward. This is when an Infestation Monitoring Survey should be conducted. Mapping and infestation characterization still occurs as in Baseline Infestation Surveys however the survey area consists of the known locations of infestations. Surveyors can assist control crews by marking the location of an invasive plant with weighted buoys. If it is a larger infested area where plants and plant clusters are sparsely distributed and too numerous to mark individually, the can mark along the perimeter of the site with a series of buoys.

In addition to your infestation survey teams, engage lake residents to look for invasive populations. Shorefront property owners, for example, can be issued marker buoys and use them to indicate any new IAP sightings they may happen upon while they are out on the lake.

CODE	OBSERVATION CHARACTERIZATION
IN	Individual IAP
SDP	Small Dense Patch of IAP; primarily single species stands, covering an area less than 100 square feet
MDP	Medium-sized Dense Patch of IAP; primarily single species stands, covering an area 100 to 500 square feet
LDP	Large Dense Patch of IAP; primarily single species stands, covering an area over 500 square feet (Provide an estimate of the area coverage for LDP if possible.)
SIA	Sparsely Infested Area; plants and plant clusters sparsely distributed over a wide area, too numerous to mark individually (Shade SIA on the map &/or mark outer boundaries with series of GPS way points)
MIA	Moderately Infested Area; Plants and plant clusters moderately distributed over a wide area, too numerous to mark individually (Shade MIA on map &/or mark outer boundaries with a series of GPS waypoints)
HIA	Heavily Infested Area; Plants and plant clusters are heavily distributed over a wide area, too numerous to mark individually (Shade HIA on map &/or mark outer boundaries with a series of GPS waypoints)
MXN	IAP mixed in with a significant colony of native plants (Use to modify any of the above codes.)

When the survey is complete, organize your findings and consider how you are going to use the infestation data. Data may be organized simply by copying and collating the documentation forms and field maps or by creating a report or poster that can be used to determine your control strategy and share your findings with the public.

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Survey Equipment

With the exception of the boat(s), the equipment needed to conduct a screening survey is fairly simple, inexpensive, and easy fabricate. Surveys are accomplished most easily, and are safer, with two or more persons in the boat: one to paddle/steer; one to watch for obstacles, scan for the target organism(s), make observations, and record findings.

Here is what you will need:

- □ Small shallow-draft boat, canoe or kayak **(Large boats & motors not recommended as they make the process more difficult and destroy sensitive aquatic vegetation.)**
- □ Personal flotation device
- □ Documentation forms, pencil, and clipboard
- □ Base map of the survey area
- □ Pocket knife or snips
- □ Viewing scope - available commercially or easily constructed
- □ Depth finder or weighted measuring tape
- □ Zip-seal plastic bags (various sizes) and cooler; for storing specimens
- □ Species identification guides and keys
- □ Buoys to mark suspicious plant location
- □ Permanent marker pens - to mark specimen containers
- □ Magnifying glass or hand lens - for examining plant specimen structure. 10X to 20X strength are recommended.
- □ Small white tray or shallow plastic container (e.g., margarine tub) - for floating and observing specimens in the field
- □ Polarized sun glasses - greatly improve visibility under most conditions

The following items are not essential, but may be very helpful:

- □ Colored pencils or highlighter pens - for tracking survey progress on the map
- □ Long-handled net - used for catching stray plant fragments; a leaf rake can perform this task sufficiently
- □ Long-handled cultivator - for collecting bottom specimens out of reach
- □ Weed weasel - a tined tool on a rope, used in deeper water to obtain plant samples not visible from the boat.
- □ Underwater video camera - used in deeper water to see plants that are not visible from the boat
- □ Small gas-powered or electric motor - facilitates travel to survey locations and through plant-free sections of the littoral zone **(Motors should not be used in areas where there is significant plant growth.)**

View Scopes

View scopes are an essential tool for conducting screening surveys. Ripples and surface reflection may obstruct a surveyor's view of plants below: a scope penetrates through these surface disturbances allowing surveyors to see more effectively. Though scope designs vary, the best scopes are easy and comfortable to use, provide a relatively wide angle of view, and are constructed of opaque materials to shield out as much side and back light as possible. (Being relatively cheap and easy to construct is another plus!). Directions for constructing your own scopes are available online at www.lakestewardsofmaine.org.

MAINE SURVEYORS

Be sure to submit copies of all survey and mapping data to MEDEP and LSM to ensure that this important information will be included in Maine's statewide database.

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If You Find a Suspicious Plant

Following the procedures outlined below will help ensure the timely, accurate identification of your specimen. You may email us a digital photo or send us live plant material. First, however, you'll need to collect a specimen. Be very careful not to create fragments while collecting the plant specimen.

Mark the location as described in 'Conducting a Survey', above. When collecting samples from a live lake plant, please be sure not to remove the whole plant. Snip off one or two pieces of stem from the plant (roughly 8 to 12 inches long) including as many different features as you can (flowers, fruits, leaves, etc.). In the event that your plant is invasive this will help the DEP quickly locate the infestation and take proper action.

Keep your plant specimen in water, in a cool place (e.g., refrigerator). This will help keep it fresh until you are ready to photograph or ship.

IMPORTANT: Depending upon the plant, a photograph may not be adequate. We may need to see the physical specimen, so please do not discard it until you hear from us. (Be sure to keep it fresh, as described above.)

Send us Digital Photos

Taking your photo/s –

- Gently clean off any attached debris from your specimen.
- Float the plant in a tray of water long enough to stretch the sample out fully, with enough water for the plant to float freely. The tray bottom should be white (or clear and placed on a white surface).
- Put something in photos to show scale e.g., a ruler or coin.
- Take a high-resolution digital picture.
- The image must be in focus and show the greatest amount of detail possible. Adjust lighting to minimize glare.
- If possible, take close-ups of specific features, such as individual leaves, a single whorl of leaves, flowers, fruits or other structures.

Submitting your photo/s – Send the image/s by email to stewards@lakestewardsme.org. Write "Plant ID" in the subject line. Include the following information in the body of the message: your name and contact info; waterbody name and town; date the plant was collected.

Documenting your submission – Log on to the LSM website and complete an online *Suspicious Plant Form*. This will alert LSM staff to the fact that you have submitted photos via email, and provide us with the information needed to record your find in the statewide aquatic plant database.

Send us a Live Plant Specimen

Contact LSM – The staff is often out in the field during the summer, and it is important that someone be here to receive and process your plant properly.

Package your plant – Put your sample in a resealable plastic bag. Include some water to cushion it during shipping. Be sure to seal the bag tightly. Place the bag in a small box with enough packing material to prevent movement.

Include a Suspicious Plant Form – The form can be downloaded from our site at www.lakestewardsme.org. If you need help finding or filling out the form, call us at 207-783-7733.

Ship your plant specimen – Plants should be shipped early in the week. Plants mailed too late may arrive on Saturday, when no one is here to process them.

Send packaged specimens to:

LSM, 24 Maple Hill Road, Auburn, ME 04210

You will be contacted within 72 hours of our receiving your specimen.

If you have questions about submitting a suspicious plant, contact LSM at stewards@lakestewardsme.org or 207-783-7733.

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Make Your Own Bucket Scope

You Will Need:

- clean 5 gallon black bucket (OR black flat spray paint)
- 1/8” Plexiglas, pre-cut to proper size (see step two)
- 100% silicone sealant (clear)
- three to six stainless steel, #8-32 machine screws (1/2” long) with #8-32 nuts
- six to twelve stainless steel #8 washers
- saber saw, jig saw, or other appropriate tool
- electric drill and 3/16” drill bit as well as a large (ideally ½”) drill bit.

Directions

1. If your bucket scope is not already black, paint the inside of the bucket black to prevent glare and light filtering through the material. Let dry.

2. Find the diameter of the bottom of the bucket. The Plexiglas when placed over the bottom of the bucket should fit almost perfectly within the lip of the bucket bottom. Usually, measuring the bucket diameter and subtracting 1/8” will provide the correct size.

3. Draw a circle on the bottom of the bucket that has a diameter that is at least 1 ¼” less than the diameter of the Plexiglas. This is the area that will be cut out of the bottom of the bucket to make the viewing window. If you plan to make a large number of buckets, it will be useful to create a template out of cardboard or some other stiff material for marking the circle.

4. Using the largest drill bit you have, drill a starting hole just inside the drawn circle. With the saw, cut the circle out of the bottom of the bucket. (Figure 1)

5. Center the Plexiglas over the hole in the bucket – the hole should be completely covered, as well as the majority of the bucket lip.

6. Holding the Plexiglas in place, mark three to six points, relatively equidistant from each other, around the edge of the Plexiglas circle. Use the 3/16” drill bit to make a hole in the Plexiglas and bucket at one of these points. (Figure 2) [Be careful to avoid cracking the Plexiglas. You may wish to drill the three to six holes in the Plexiglas and then place that on the bucket and use those holes as the guide for the holes in the bucket.] Place one of the bolts in the hole.

7. Use the first bolt to hold the Plexiglas in place – the Plexiglas should be loosely fastened with the screw & nut assembly. Drill the second hole and place the second bolt in this hole. Repeat procedure with the remaining holes.


Figure 1


Figure 2


Figure 3

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8. There should be protective plastic on the Plexiglas. Remove the Plexiglas from the bucket and, being very careful to keep the right side up as well as the orientation of the holes correct, peel off the protective plastic.

9. Make a continuous ring of silicone – roughly ¼" wide – along the edge of the bucket's lip as well as around the screw holes. (Figure 3)

10. Seat the Plexiglas back onto the bucket and fit the screws (w/ washers) through the holes. If you maintained the correct alignment this should be relatively easy. Attach the washer and nut assembly to the bolts and tighten (Figure 4), forming a continuous ring of silicone between the bucket and the glass.

11. Tighten the nuts firmly (two wrenches may be necessary to do this). Do not over-tighten the nuts – this may cause the Plexiglas to crack.

12. Allow the silicone to cure for the amount of time directed (usually 24-48 hours). Check for leaks (figure 5). The bucket scope is now ready for use!

Figure 4

Figure 5

Buffy's Bucket Scope Cover

Materials:

- 36 inches of 3/16" bungee cord
- 18 inch circle of dark, washable fabric

1. Cut one 18" circle of dark fabric. Turn under at a 1½ inch hem. Clip edges and sew to create a channel for the bungee cord, leaving about a 1½ inch opening.
2. Cut a 5 inch hole in the center of the fabric and bind the inner edge to keep it from stretching while being used.
3. Cut a 36 inch piece of 3/16" bungee cord. Tie a knot at each end. Thread bungee through channel and tie ends together so the cover fits snugly over the top of the bucket scope.

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IPP - MARKER FLOAT - ASSEMBLY

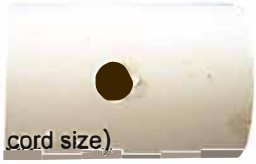
CUT CPVC PIPE (9" or 12") LENGTH - Cut from 10' stock length

STEP 1

STEP 2

CUT FOAM INTO 2" or 4" LENGTHS

DRILL 1/8" or 3/16" HOLE APPROXIMATELY 1" FROM END OF PIPE
(Hole diameter dependent upon cord size)



STEP 3

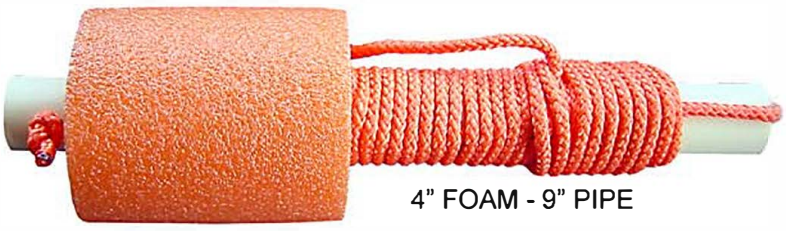
STEP 4

CUT CORD INTO 12.5' LENGHTS (6 pieces per 75'). SEAL CUT ENDS WITH FLAME OR SOLDERING IRON (heat melts plastic rope fabric)

STEP 5

STEP 6

Mark all buoys with "IAP SURVEY - DO NOT REMOVE", the name of your self or your lake association, and a phone number people can call with questions.



4" FOAM - 9" PIPE

CORD CAN BE WRAPPED AROUND THE PIPE -or- FLOAT AND CORD CAN BE "STUFFED" INTO AN OLD SOCK FOR STORAGE & TRANSPORT

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IPP - MARKER ANCHOR - FABRICATION

STEP 1

CUT A LENGTH OF VINYL COATED CLOTHES LINE WIRE (either solid or multi-stranded type) APPROXIMATELY 16" LONG. BEND AS SHOWN. THE OVERALL HEIGHT SHOULD BE ABOUT 1" "TALLER" THAN THE DEPTH OF THE PLASTIC CONTAINER (MOLD). THE "FOOT" FOLDS SHOULD ALLOW THE TOP LOOP OF THE "HOOK" TO BE CENTERED IN THE MOLD.

STEP 2

PLACE HOOK IN THE CENTER OF THE MOLD AS SHOWN.

STEP 3

MIX CONCRETE PATCH TO A "POURING" CONSISTENCY. FILL MOLD WITH CONCRETE TO JUST BELOW THE RIM. TAMP THE MOLD ON A FIRM SURFACE TO SETTLE THE MIX AND REDUCE AIR BUBBLES. VERIFY THAT THE HOOK IS CENTERED.

STEP 4

AFTER 24 HOURS THE CONCRETE SHOULD BE SUFFICIENTLY SET TO UNMOLD THE WEIGHT. TURN THE MOLD UPSIDE DOWN. GRIP THE RIM WITH THE FINGERS OF BOTH HANDS AND GENTLY APPLY THUMB PRESSURE ON THE CENTER OF THE MOLD BOTTOM. SIGHTLY FLEX THE MOLD RIM TO ALLOW AIR TO ENTER THE MOLD AND REDUCE THE "SUCTION" BETWEEN THE CONCRETE AND MOLD WALLS. THE WEIGHT SHOULD DROP OUT. USING A GLOVED HAND, GENTLY RUB THE TOP RIM OF THE WEIGHT TO SMOOTH THE SHARP EDGE. SET THE WEIGHT ASIDE FOR SEVERAL DAYS TO ALLOW THE CONCRETE TO COMPLETELY CURE (dry)

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Building a View-Canoe or Kayak

by George Lewis, Certified Invasive Plant Patroller, Branch Lake

Placing a viewing window in the bottom of a canoe or kayak involves three operations:

- Cutting an opening in the bottom of the canoe and covering it with a piece of clear plastic.
- Providing a covering so sunlight does not hit the top side of the plastic window.
- Adding a seat for the person viewing the area under the canoe.

If you are using a kayak the third step is unnecessary because the normal kayak seat works fine.

In selecting a canoe, try to find one with a wide center section without a keel. We used an Old Town Guide canoe. The center section is wide and relatively flat with a thwart across the canoe near the center. If you are working with a kayak it is unlikely that you will have a flat space large enough to fit a window. Don't be discouraged. It is possible to build up the front and back section of the opening to provide a flat surface to mount the plastic window.

Install the flat plastic window

In our canoe we cut a 10" x 13" opening in the center, just forward of the thwart using a saber saw. We obtained a section of Lexan polycarbonate resin thermoplastic intended to replace glass where higher strength is needed. A piece 13"x16" x 1/4" was used to allow 1 1/2" overlap on all four sides. Lexan is a registered trademark of GE, but there are other companies that make similar materials that are as good.

A row of holes were drilled around the edge of the opening in the canoe about 3/4" in from each edge. The holes are slightly larger than the diameter of a #6 machine screw. We used #6 machine screws and mating T-nuts with the screw heads on the bottom of the canoe. Using the holes in the canoe as a template, drill a similar set of holes in the plastic sheet. The holes in the plastic must be slightly larger than the holes in the canoe to accept the T-nuts. The holes in both the plastic and the canoe should not be too snug to allow for some movement between the plastic sheet and the canoe surface.

Then, using 3M Marine Adhesive/Sealant, make two beads of the material around the plastic sheet. One bead should be just inside the row of holes and one just outside the row of holes. Be sure to use sufficient material, so that when the plastic sheet with the adhesive on it is placed against the bottom of the canoe the adhesive will fill

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the screw holes and provide a water tight seal. As soon as the adhesive is spread, place the plastic sheet over the holes in the bottom of the canoe with the adhesive in contact with the inside of the canoe.

Hold the plastic sheet in place by putting a machine screw and T-nut in the center of each side. The T-nut is placed in the hole in the plastic and the machine screw is put in the hole in the canoe with the head on the bottom of the canoe. When the screws are tightened, the threaded part should be flush with the top of the nut or just below the top. Add screws and nuts to the corners. Complete the operation by installing the remaining screws and nuts. When all screws and nuts are in place, tighten them just enough to spread the adhesive across the overlapping area. Do not over tighten these screws. This operation will require at least two people - one holding the nuts on the inside of the canoe and one installing the screws from the outside of the canoe. Support the canoe on its side so both people can work comfortably.

If you are installing the view window in the bottom of a kayak, the procedure is similar, but the bottoms of most kayaks are sloped. To provide a flat surface for the window it will probably be necessary to build up an area just forward and behind the opening in the kayak. This can be done using the fiberglass material from the opening cut in the kayak or a commercial material like Marine-Tex. The opening in our kayak was 8”x10” and the plastic sheet was 10”x 12”-allowing a 1” overlap on each side.

Provide a covering to shield the surface of the view window from the light

In the canoe we installed a 1’’x 6” board just ahead of the existing thwart. A piece of plywood was placed across the canoe covering the thwart and the added 1x6 board and the space between them. Then a hole was cut in the plywood that would accept a short piece of 6” plastic pipe. The pipe is installed at an angle so the viewer can look down the pipe easily. A section of soft plastic material is mounted around the upper section of the pipe that can be adjusted up or down by the viewer.

A rectangular box under the shelf is provided to block out most of the light. Our box was made using 1/8” Masonite. If Masonite is used it must be coated with something to keep it from getting wet.

When using a kayak, a similar rectangular box was made as a separate unit so it can be placed in position over the view window after getting in the kayak.

Add a seat for the person viewing the area under the canoe

The final step is to provide a comfortable seat that can be adjusted to suit the viewer. For our canoe we found a commercial seat in the Overton Catalog at a reasonable price. Two padded strips of wood were added to the bottom to provide a seat that can be moved around the canoe without damaging the surface.

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The Trunk Scope

(or as we here at the LSM are inclined to call it: "Ross's Rolls Royce")

Invasive Plant Patroller Ross Wescott, dissatisfied with the limitations of the bucket scope (e.g., not well shielded from backlighting; limited view area) set out to make improvements. By the time Ross completed his self-imposed redesign project; Maine had its first "trunk scope." The trunk scope is crafted from a large heavy-duty plastic trunk. It floats on the surface and may be lashed to the front, back, or side of the boat. A Plexiglas window in the bottom of the trunk provides three times the view area of the typical bucket scope, while the hinged top and black-curtain sides shield out unwanted light. The scope is ergonomic and easy to use; just sit back and observe the wonders passing before you!

Ross's ingenious viewing device is already being used by many other Plant Patrollers here in Maine; soon it will be sweeping the nation! Ross has also developed a new scope designed specifically for lone-kayakers, with a low profile and smaller case.

Ross Wescott's detailed step-by-step instructions on how to construct your own trunk scope are now available on line at http://www.lakestewardsme.org/wp-content/uploads/2013/11/TrunkScopeBinder_11.pdf

PS – Kayak Scope directions are now available online here http://www.lakestewardsme.org/wp-content/uploads/2013/11/How-to-Make-a-Kayak-Scope.pdf

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How to make a Weed Weasel

This homemade double-sided throwing rake (affectionately dubbed the weed weasel) is a handy tool for sampling a plant community. The weed weasel is made from two sawed-off garden rakes bolted together back-to-back. The tines are tied together with "quick-connect" ties, and a 20 to 30 foot length of rope is attached by means of an eyebolt. Also, when using any sampling rake, be sure to remove all plant fragments generated during the process from the water.

Note that the weasel is for point sampling only—NOT for "cleaning up" the lake bottom.

Here are the instructions for building your own weed weasel.

Materials Needed:

- 2 garden rakes
- 2 regular bolts
- 1 eyebolt
- 3 nuts
- several tie-wraps
- 20-30 feet of line (clothesline is OK)
- duct tape

Tools needed:

- drill
- saw

- Saw off the rake handles at 1.5 to 3 feet.
- Place the rakes back to back (tape them together with duct tape to hold them tight).
- Drill a hole through both handles near the top of the handles, at the middle, and near the bottom.
- Place bolts through two lower holes and secure with nuts. Use the eyebolt in the top hole.
- Tie the rakes together with tie-wraps between tines.
- Tie the line to the yoke part of the weasel and thread through the eyebolt.

Adapted from Massachusettes Water Watch Partnership web site which is supported in part by Executive Office of Environmental Affairs Watershed Initiative and the Massachusetts Environmental Trust

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