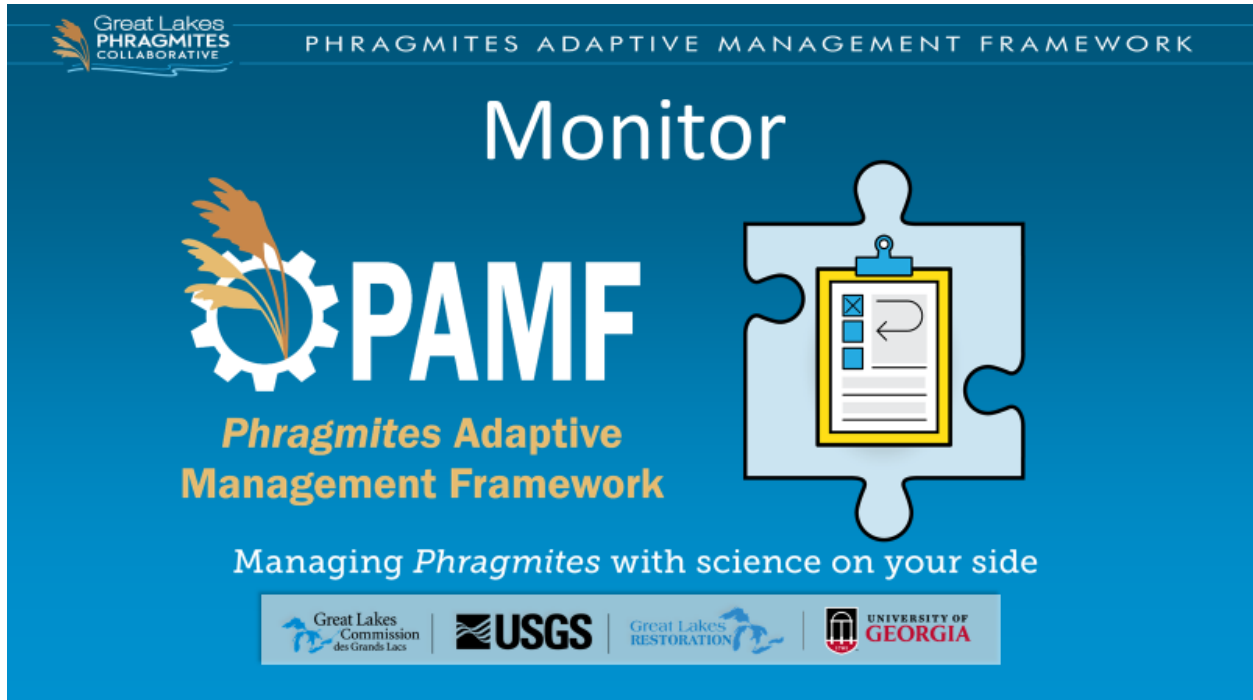




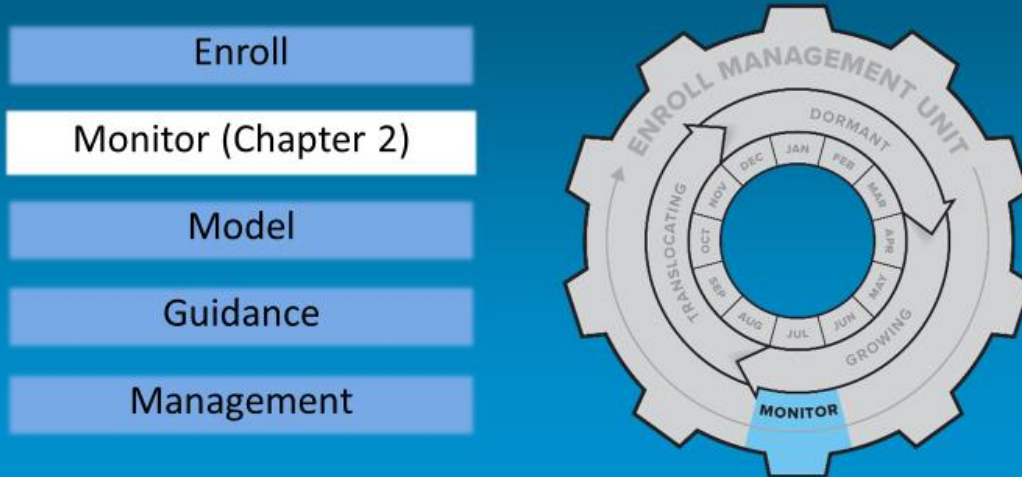
Monitoring: Video Transcription

June 2020



[The second step in the PAMF participant cycle is monitoring a management unit!]

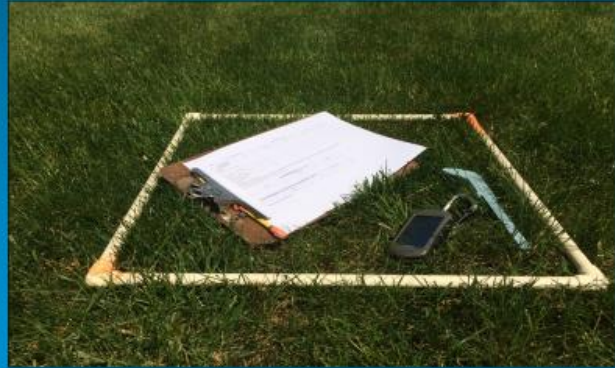
PAMF Participation Cycle



[Monitoring is an important element of PAMF, and as a PAMF participant you agree to monitor once per year in July. You are asked to follow a standardized monitoring protocol within each management unit enrolled in PAMF, making sure to upload the data you collect to the Web Hub by August 1st so it can be used to inform the management guidance you receive in mid-August. We recommend monitoring 1 month after implementing any management action during the growing season, which typically means data should be collected in mid to late July. The goal with monitoring is to accurately capture the state of *Phragmites* infestation in your management unit so that PAMF's predictive model can give you the most relevant management guidance. Monitoring is covered in chapter 2 of the [PAMF Participant Guide](#).]

Monitoring a Management Unit

- July monitoring window
- Equipment (PAMF Kit):
 - Field Sheet & Pencil or Wireless device
 - 0.25-m² Quadrat
 - Vernier Calipers
 - GPS device



[There are a few pieces of equipment you'll need in order to monitor: a printed field sheet and pencil or a wireless device with access to the Web Hub so you can enter data in the field as you go, a GPS device, a quarter-meter square quadrat, and Vernier calipers. All of the monitoring supplies that you need (minus the GPS capable device) are included in the PAMF kit that are available to all participants upon request. To request a PAMF kit, just send an email with your mailing address to pamf@glc.org. Data can also be entered in the field on a wireless device, however there's no way to save on the mobile version of the website so if you don't think you're going to have consistent cellular coverage it will be best to record your data on a printed data sheet and enter it on the Web Hub at a later time.]

Monitoring a Management Unit

Field component includes:

- Whole MU
 - Percent establishment
 - *Phragmites* spread
- 5 Quadrats
 - Stem count
 - 3 Stem diameters
 - Stress



Submit by August 1st deadline!

Phragmites Adaptive Management Framework
Managing *Phragmites* with science on your side

Monitoring Field Sheet

Participant Name: _____ Date: _____ Management Unit (MU): _____

Management Unit Observations			
Percent Establishment (circle one)	0-10%	11-50%	51-100%
Has <i>Phragmites</i> spread from your MU? (circle one)	Yes	No	

Remember: Take Pictures!

* Only answer after Year 1

Quadrat	1	2	3	4	5
GPS Coordinates ¹ (decimal degrees)					
Live Stem Count (#)					
Live Stem Diameters ² (mm)					
Visible stress on the majority of live <i>Phragmites</i> in quadrat? ³					
If Yes, indicate cause of stress ⁴					

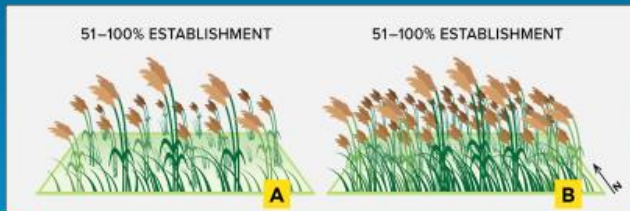
¹ If known
² 3 measurements per quadrat – closest live *Phragmites* stem to the center of the quadrat and two opposite corners
³ Yes, No, or Unsure
⁴ Environmental, Pathogen, or Insect

USGS science for a changing world | Great Lakes PHRAGMITES COLLABORATIVE | Great Lakes Commission des Grands Lacs

[In order to monitor, you will need to become familiar with this field sheet, a customized version of which can be printed from the Web Hub. Monitoring is done in 2 stages: first, you look at the management unit as a whole and observe the percent establishment and see whether the *Phragmites* has spread outside of your management unit boundaries. Then collect data on stem count, stem diameters, and check for signs of stress within your quadrat at five different monitoring locations.]

Monitoring a Management Unit

% Establishment



Phragmites Spread



[To determine percent establishment, look at your management unit as a whole to estimate the extent to which live *Phragmites* exists throughout the area of the management unit. Response options are 0-10%, 11-50% and 51-100%; these categories were determined by our PAMF Technical Working Group members through an exercise that involved identifying important threshold levels of infestation. For this part the stem density doesn't matter - we are only interested in the percent of land on which *Phragmites* grows in your management unit. The image on the left shows two management units, both of which have 51-100% establishment because *Phragmites* is present throughout the majority of both units, even though their stem density is quite different. Once you have determined the percent establishment, take a look around the borders of your management unit - has *Phragmites* spread outside your management unit? The amount of *Phragmites* inside your management unit may diminish due to management activities, but if it's expanding beyond the management unit boundaries, we'd like to know. The image above shows *Phragmites* biomass on the ground within a management unit after having been treated, but if *Phragmites* occurs immediately outside the management unit boundaries where it hasn't been present before, as in this photo, that would be considered spread and should be noted on your monitoring form.

This question about spread is only required for participants after their first year of management; if you do not recall where your management unit boundaries lie, we suggest using your GPS to retrace the boundary.]

Monitoring a Management Unit

Monitoring Location

- Spot where you place the quadrat and perform the standardized monitoring protocol

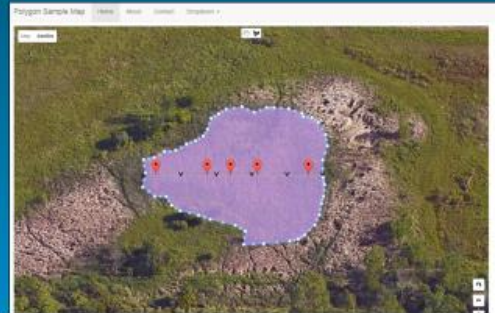
Web Hub-Established Locations

- Automatically generated along the approved transect when you enroll an MU (preferred)

Participant-Established Locations



Selected by the participant to be representative of the MU's *Phragmites* establishment (back-up)



Quadrat	Suggested Monitoring Locations (Lat/Long, Decimal Degrees)
1	(43.07290, -83.60305)
2	(43.07146, -83.60305)
3	(43.06965, -83.60305)
4	(43.06785, -83.60305)
5	(43.06729, -83.60305)

[Next, you go to individual monitoring locations within your management unit. Monitoring locations are the spots at which you will place the quadrat to perform the standardized monitoring protocol. When you enroll your management unit on the Web Hub you answer questions that help inform the position of the monitoring transect based on gradients or the geometry of your unit. The Web Hub then generates 5 random monitoring locations each year along the resulting transect as you can see with the red pins on the image. We call these Web Hub-established locations. Be sure to take note of these coordinates on your printed form or have them ready to view on your wireless device before going out into the field because at your management unit, you'll use your GPS to navigate to each location. If one of the suggested monitoring locations doesn't contain any live *Phragmites*, is outside of your management unit, or you don't have a GPS signal, please use one of the [Participant-Established Monitoring Locations Flow Chart](#), which is available on the PAMF Web Hub to navigate to a new, random, monitoring location.]

Monitoring a Management Unit

Placing a Quadrat

- Build the quadrat on 3 sides
- Toss the quadrat into the *Phragmites* just in front of you
- Move the quadrat to the ground and add 4th side
- Pull out any stems not rooted within



[As you approach one of your 5 monitoring locations, you will need to decide where to place the quadrat. The monitoring locations are randomly generated, but there is still the potential for bias if a participant intentionally selects the “best” looking *Phragmites* stems to place the quadrat around. To avoid any potential bias, we have established protocols on placing the quadrat. Upon your approach, have the quadrat built on three sides. If you build the fourth side too soon, you won’t be able to get it over the top of the *Phragmites* stems. When you have arrived at your monitoring location, toss the quadrat into the *Phragmites* immediately in front of you while facing the same direction you did as you approached. The quadrat is unlikely to fall nicely to the ground, so instead move it to the ground and add the fourth side. Once you pull out any *Phragmites* stems that are not rooted within the quadrat, you are ready to take your measurements.]

Monitoring a Management Unit

Stem Count

- Only count live *Phragmites*
- Around 8-15 stems/quadrat



3 Stem Diameters

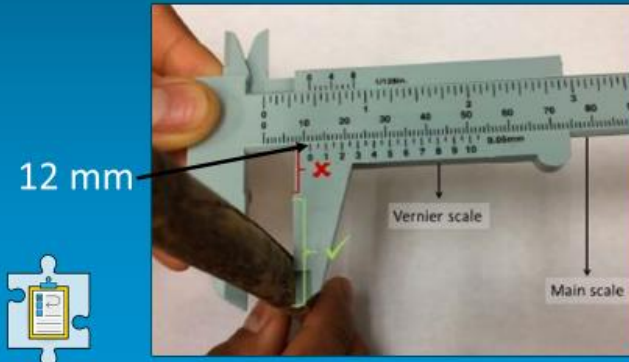
- Use Vernier calipers as close to the ground as possible



[The last few steps will require you to use the equipment out in the field. For stem count, set up your quadrat at one of your monitoring locations and count the live *Phragmites* stems within the quadrat. Be sure to look out for any potential look-a-like species and count only the live *Phragmites* stems. Also, avoid any dead stems from previous years. If you get a high stem count, for example 60 or more, there is a chance that you may have counted some non-*Phragmites* stems. It is also best practice to do a second count or have two people each do a count. Generally, you may find 8-15 live stems in a well establish stand with lots of dead standing biomass. But there can be a lot of variation, and even if you get a high stem count, it doesn't necessarily mean you have done something wrong. Next, measure stem diameters at this same location. Take 3 stem diameters from each quadrat using the Vernier calipers. In another attempt to avoid bias, we have guidelines on how to select which stems to measure. When you build the quadrat, you will notice that there are two black corners and two white corners. Place those corners opposite of each other. When selecting three stems to measure, choose the stems closest to each of the black corners and the stem that is closest to the middle. It is unlikely that the *Phragmites* is going to grow really nice and uniform throughout the management unit, so just do your best to figure out which stems are closest to the corners and closest to the middle. This will help you avoid any potential bias. If there are less than three stems in the quadrat, you only need to measure the one or two stems that are present.]

Monitoring a Management Unit

Measuring stem diameter with calipers



[To measure a stem, grip the stem with the lower grip of the calipers as close to the soil as possible. To read the calipers, find the last number on the main scale before the “0” hash mark on the Vernier scale (point to this in picture). Record the main scale’s number as the stem diameter in mm. Additional instructions can be found in Appendix A of the [PAMF Participant Guide](#). So, you can see the zero hashmark it's lining up with the twelve, so stem diameter on the screen is 12 millimeters.]

Monitoring a Management Unit

Environmental



Identifying Stress

Pathogen



Insect



[Lastly, within your quadrat (before you move it) look for signs of stress not caused by management actions. This can include environmental stress from things such as wind like in the image on the left, pathogen or fungal stress which can appear as dark spots along the leaves like the image in the middle, or stress from insects such as clear signs of herbivory on the leaves as shown in the image on the right. If you think your *Phragmites* is stressed but are unsure, you can select “uncertain” on the Web Hub and upload a picture of the plants and we can make that determination for you.]

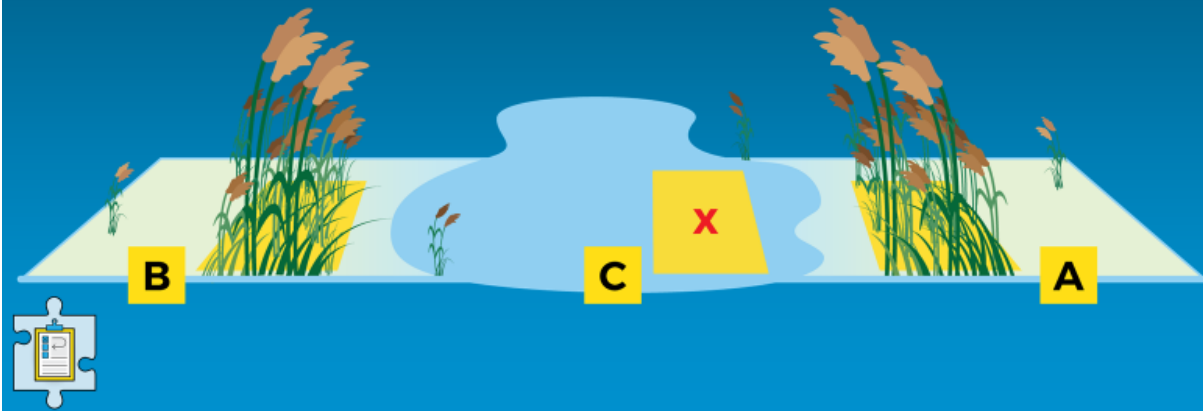
Monitoring a Management Unit

- Upload pictures
 - To document stress
 - To keep track of the MU, its boundaries, and changes over time



[Take pictures of your management unit just beyond signs of stress and that will help you keep track of where the boundaries are relative to the change in vegetation. After completing those steps, you've successfully monitored your management unit. For the average management unit, it will take around 1 to 2 hours to monitor depending on the size and the time it takes to walk between those 5 monitoring locations.]

Why does every quadrat need *Phragmites*?



[I wanted to spend a minute and walk through one of the most frequently asked questions of monitoring, “why does every quadrat need *Phragmites*?” Situations arise during monitoring and where quadrats don't have any live *Phragmites* stems in them. In this case, we don't want you to report zeros if there are other locations within the management unit that have live stems that can be measured. In the management unit image, two out of three of the monitoring locations has live *Phragmites* stems, however instead of reporting zeros for monitoring locations C, it should be moved to another location where live stems are growing and that doesn't overlap with one of the other two quadrats.]

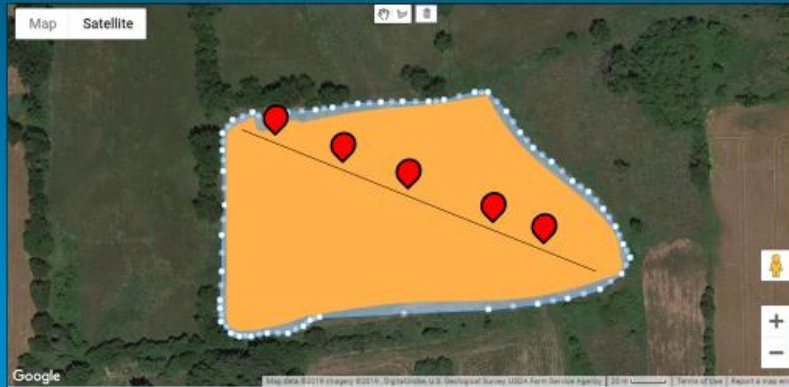
Why does every quadrat need *Phragmites*?



51 – 100% established

[Well let's explore this question a little bit further because I'm sure some of you are now asking "aren't I creating bias by moving my quadrat to a new location within the management unit if there's no *Phragmites* growing at my Web Hub established monitoring locations?" To help answer those questions I want to walk through a quick scenario. Imagine this is your management unit and the big yellow coloring represents live *Phragmites* stems. You would have observed that your management unit has 51 to a 100 percent establishment of *Phragmites* (so, most of it is established).]

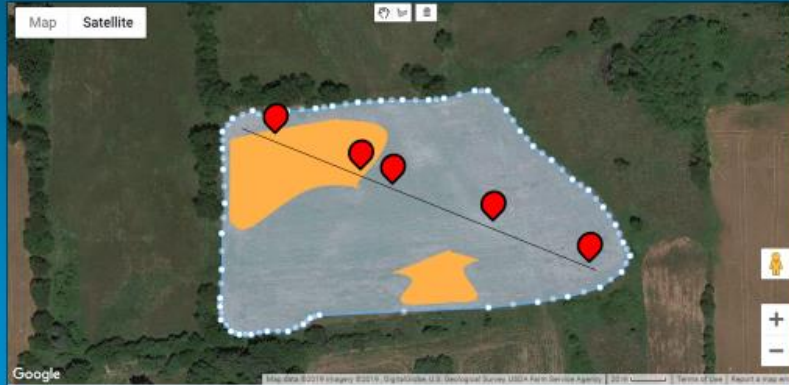
Why does every quadrat need *Phragmites*?



51 – 100% established

[The first year you monitor, all of the monitoring locations fall nicely within the live *Phragmites* stems. But you continue on with PAMF and you have a really great successful year, your treatments effective and *Phragmites* in your management unit begins to decline.]

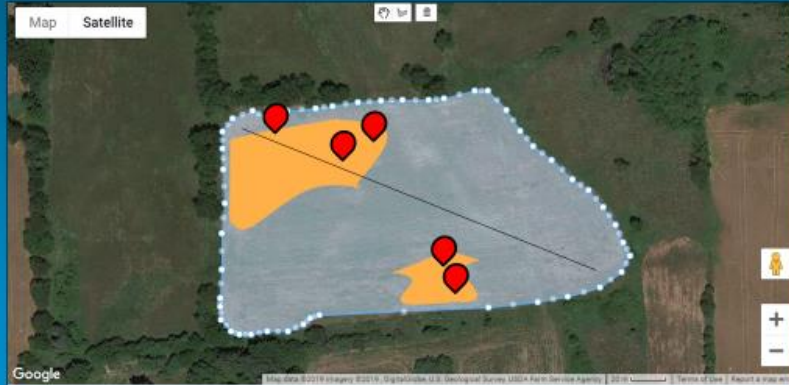
Why does every quadrat need *Phragmites*?



0 – 10% established

[Next July you come back to monitor and you find that you have a couple patchy stands of *Phragmites* left in your unit. This is good news, but now your new set of monitoring locations don't all fall within the live *Phragmites* stands left in your unit. Instead of reporting zeros for three of the monitoring locations, you would establish new random locations for those three quadrats using the [participant established locations guide](#) that is available on the Web Hub.]

Why does every quadrat need *Phragmites*?



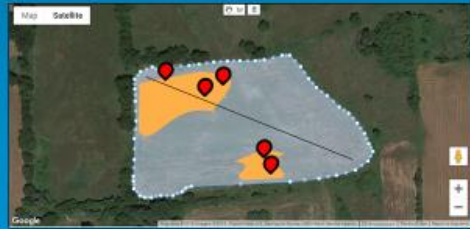
0 – 10% established

[Now all five of your quadrats have live *Phragmites* stems!]

Did I just bias my data?

Percent establishment: Proportion of MU infested with *Phragmites*

Quadrat data: Density of remaining *Phragmites*

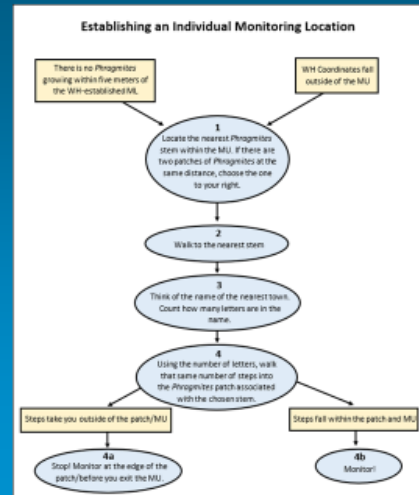


[

To understand why you're not biasing your monitoring data, you need to understand the distinction between percent establishment and stem density, which are the two measures that the model is looking at to understand the *Phragmites* infestation within your unit. By assessing the percent establishment, you're telling the model how much of your unit is infested. The quadrat measurements are then looking to describe the health of that remaining phragmites. So, by leaving quadrat measurements blank, you would be giving the model less information to work with. In short, percent establishment and stem count are two different measures that help us understand different aspects of the *Phragmites* invasion within a management unit. Zeros are acceptable for stem counts when there are so few live *Phragmites* stems that you are not able to fit 5 quadrats around the live stems without those quadrats overlapping.]

Participant Established Locations

- When Web Hub established monitoring locations are not feasible, there are alternative actions to take
- Examples:
 - No *Phragmites* growing in the plot
 - Coordinates fall outside the MU



[If you do need to establish your own management locations, you can do so by following the instruction in the [Participant Established Locations Guide](#) located on the Web Hub!

This document gives you step by step instructions that will help you navigate to new random selected locations.]

Monitoring a Management Unit

In Summary

- Monitoring occurs each July
- You can request a PAMF kit
- All quadrats should have live stems
- Resources available on the Web Hub
- Monitoring isn't always easy, but PAMF staff is here to help!



pamf@glc.org



[As a reminder, monitoring occurs annually in July and all reports, including your monitoring report, are due each year by August 1st. You are able to request a PAMF kit by emailing the PAMF coordinator at pamf@glc.org. The monitoring data you collect is used to by the PAMF model to understand the invasion status of your unit. Thus, it is important to ensure that all of your monitoring locations have live *Phragmites* stems. Monitoring isn't always easy, but we have resources on the PAMF Web Hub to help! And of course, the PAMF staff is always available to answer questions and provide support!]

