Guidebook for Starting A Wetland Monitoring Program
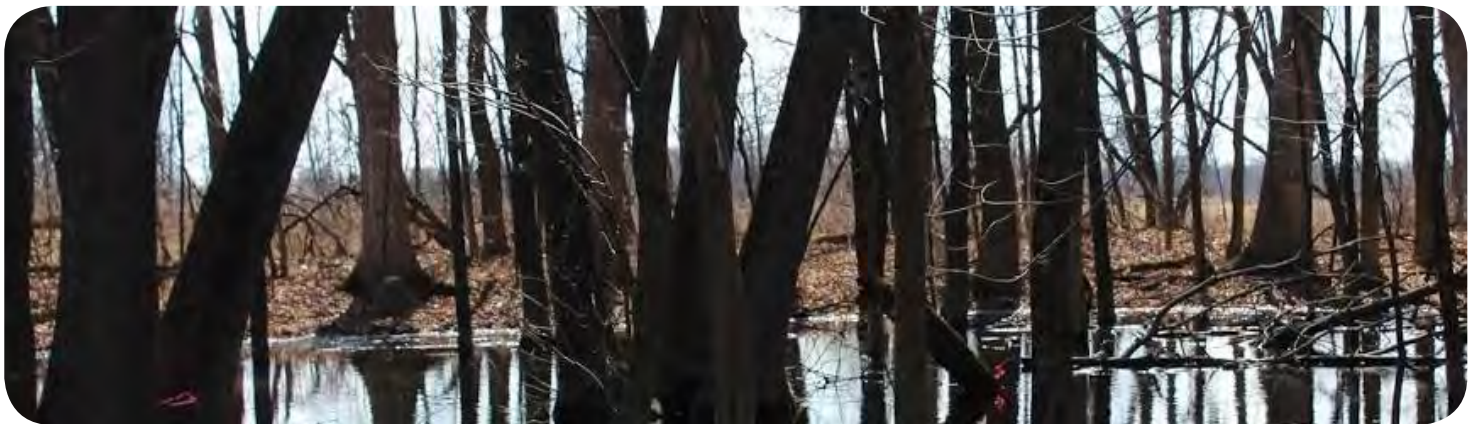
MILWAUKEE COUNTY
PARKS

WHO SHOULD USE THIS GUIDEBOOK?

Any organization that has access to or owns property with wetlands can start a wetland monitoring program! Here are just some of the different groups that have participated in wetland monitoring in Milwaukee County:

- Parks departments
- Nature centers
- Universities
- Middle-high school environmental science courses
- Clubs (eco-clubs, conservation clubs, Sierra Club chapters)
- Master Naturalists
- Friends groups
- Land trusts, land conservancies
- Private landowners

It is important that any monitoring program have clearly defined goals. Does your organization want to use wetland monitoring as an educational tool to engage a large corps of community volunteers? Or, is the goal of your program strictly to collect baseline data to aid in the protection and management of wetlands on your property? Depending on the goals of the program, the level of time and effort expended on outreach, coordination, and data management will vary. Some programs may be implemented internally, with a few staff members or interns being trained to conduct wetland surveys, where others may engage a larger base of volunteers from the general public. Regardless of the scope of your program goals, this guidebook can be used to establish a successful wetland monitoring program that will produce valuable data on sensitive ecosystems in your natural areas. For the purposes of this guidebook, volunteers and staff will be referred to collectively as "monitors", except when an aspect of the guidebook is referring specifically to one or the other.

Contents

Introduction

Why Monitor Wetlands?

Wisconsin's culture is steeped in outdoor recreation and natural resource management, striving to balance the protection of our state's rich biodiversity alongside continual land development. Those at the center of this unique challenge focus their time and effort by enacting management strategies that will maximize the ecological success of natural areas, especially those facing tumultuous social and environmental threats. The purpose of this guidebook is to help groups and/or organizations create a monitoring program that will preserve wetland biodiversity, specifically through community engagement, and will significantly contribute to their ability to effectively consider wildlife populations while planning conservation and restoration projects.

Since the late 1800s, 50% of Wisconsin's wetlands have been lost as wetlands were drained and filled and watersheds altered to construct cities, towns, and road networks. A profound 75% of Wisconsin's wildlife is known to rely on wetlands for at least one stage in their lifecycle. This might include breeding, juvenile development, migration, foraging, and overwintering adults. Additionally, wetlands are crucial in providing us with clean drinking water by removing sediments and pollutants, capturing storm water, reducing erosion along shorelines, and are an important part of Wisconsin's tourism and outdoor recreation economy (i.e. paddling, hunting, fishing, etc.). By establishing an inventory of wetland wildlife, natural resource management can be implemented to protect current wildlife populations and focus future restoration projects.

While wetland habitat loss and fragmentation affects the majority of Wisconsin's wildlife species, many unique wetland species also face a disproportionate amount of compounding threats from climate change, disease, environmental contaminants, and invasive species. As climate change alters habitat and prey distribution through increased seasonal variability, the distribution of regional herpetofauna (reptiles and amphibians) will be further constrained by fragmented landscapes. Habitat toxification from chemical runoff and effluent discharge can dramatically impact some sensitive aquatic species like frogs and salamanders, impeding population growth while attributing to bioaccumulation throughout freshwater ecosystems. The introduction and spread of invasive species, both aquatic and terrestrial, has destabilized native flora and fauna growth, further diminishing the amount of habitat available for wetland species throughout their lifecycles.

Coupling an understanding of the imminent threats to wetland resources along with a database on the species present at managed sites will influence the prioritization of resources and effort. When unique wildlife populations are documented, the sites in which they are encountered can become a high priority for habitat restoration and management for those species.

1.1 Ephemeral Ponds

Wetlands come in many shapes, sizes, and varieties. While any wetland type may be the focus of your organization's monitoring efforts, ephemeral wetlands are a unique habitat feature that may warrant special prioritization for monitoring and management.

Ephemeral ponds, also referred to as vernal pools, are crucial aquatic habitats that can be easily overlooked due to their often small size and seasonal nature. Defined as temporary bodies of water, ephemeral ponds fill in spring as snow melts and precipitation from spring storms pool in small basins.

Pooled water will typically dry up by late summer or early fall, and it is this "ephemeral" nature that makes the ponds particularly valuable for pond-dwelling amphibians and invertebrates. Due to the wet-dry cycle, these wetlands do not ordinarily support fish populations, dramatically decreasing the amount of predation amphibians and invertebrates face during their breeding season, a characteristic not often associated with permanent bodies of water. However, in urban areas, it is not uncommon for ephemeral ponds along larger waterways to become inundated with floodwater during storm events which may result in the temporary introduction of fish into the pond. Without fish predation, eggs laid by frogs, salamanders, and other amphibians are more likely to hatch and young are more likely to survive until adulthood. A wide variety of invertebrates like fairy shrimp, caddisflies, and crayfish also benefit from decreased predation pressure and comprise the base of many ephemeral wetland food webs. Species known as ephemeral pond obligates like wood frogs and blue-spotted salamanders strictly rely on this distinct wetland type for reproductive success.

The presence of such obligate species within a wetland is often indicative of an ephemeral pond and may be used to help verify and select wetland habitats to be further monitored within an organization's project area. Finding empty caddisfly cases or encysted fairy shrimp eggs in the leaf litter of a dry depression during late summer or fall may also indicate the presence of an ephemeral wetland and warrant further investigation during the following spring.

Even small ephemeral ponds can provide critical wildlife habitat for amphibians and invertebrates.

There are several other "signs" to look for when assessing a project area for potential ephemeral pond habitats aside from the presence of an obvious pond basin. Examining the vegetation within the project area may indicate potential ephemeral ponds. Pond basins found in forested areas may contain bottomland trees but little or no herbaceous plants.

Trees growing within an ephemeral pond basin will typically exhibit a distinct "water mark" along the base of the trunk. In more open landscapes ephemeral ponds may be indicated by the presence of seed-rich herbaceous vegetation including grasses and sedges. In addition to visual ques, becoming familiar with the soil types within the project area may also reveal hydric soils, an assured indicator of seasonal saturation and potential ponds. Aerial photos may also be consulted, as images taken before leaf-out often allow for the identification of standing water as it appears as dark circles within a woodland.

Ephemeral Ponds
1.2 Wisconsin Ephemeral Ponds Project (WEPP)

The Wisconsin Ephemeral Ponds Project (WEPP) was active between 2004 and 2010 and its goal was to accurately map and inventory ephemeral ponds throughout southeastern Wisconsin.

Managed by the Wisconsin Department of Natural Resources (WDNR) and the University of Wisconsin-Extension, the project focused on ephemeral ponds throughout eight counties: Kenosha, Milwaukee, Ozaukee, Racine, Sheboygan, Walworth, Washington, and Waukesha; and the upper reaches of the Milwaukee River Basin in parts of Fond du Lac County.

Potential ephemeral ponds were identified using aerial maps, soil types and delineated wetland layers in ArcGIS. A total of 9,058 ephemeral ponds were originally mapped and those designated as "potential ephemeral ponds" were investigated from 2006-2012 over several field seasons by WDNR staff and volunteers.

Monitors for this project examined a variety of parameters for each mapped pond. They described the presence or absence of a "pond basin", defined as a depression that can collect water. Basin dimensions, soil type, ground cover, vegetation, and connectivity to other water features were also recorded. Periodical visits to each site allowed monitors to assess trends in water level, as well as the occurrence of some indicator species (mainly macro-invertebrates).

The Milwaukee County Department of Parks, Recreation and Culture (DPRC) participated in WEPP from 2008-2012, surveying ponds found throughout DPRC managed natural areas. Staff from the DPRC's Natural Areas Program used GIS data provided by WDNR to field verify ephemeral ponds and then used the collected data to plan its Citizen-based Wetland Monitoring Project (Section 1.3). Interested organizations may also obtain GIS data indicating the location of potential wetlands by examining surface water, wetland delineations, and wetland soil layers within the Surface Water Data Viewer accessible at http://dnr.wi.gov/topic/Wetlands/mapping.html. Program Coordinators should verify the presence of ephemeral ponds or other wetland types within their project area before designating sites for further volunteer or staff monitoring.

Ephemeral pond measurements should be recorded from ice-off until the pond dries up.
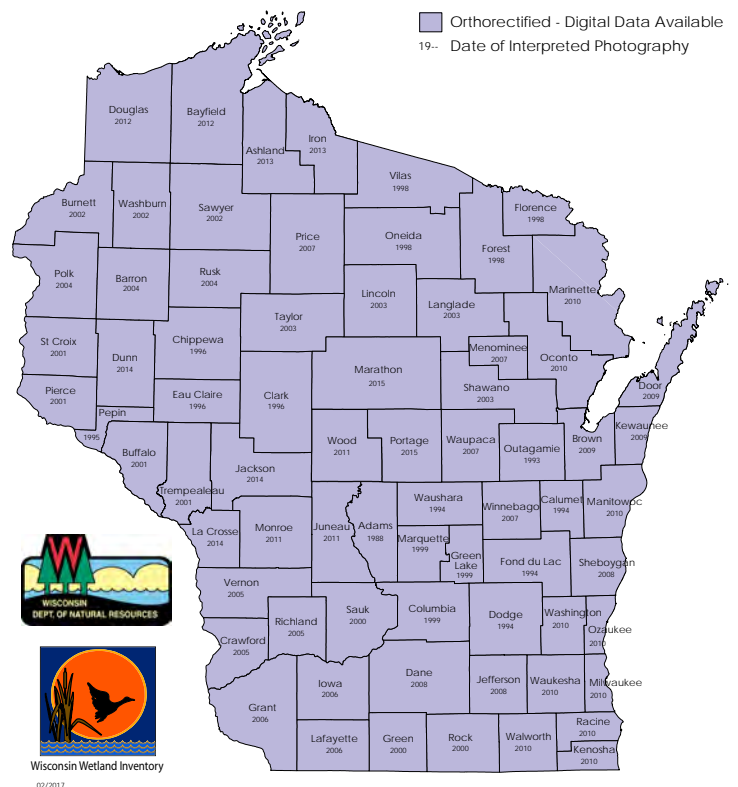
Ephemeral Ponds

1.3 Wisconsin Citizen-based Monitoring Network (WCBMN)

The WCBMN is a comprehensive stakeholder collaboration designed to improve the efficiency and effectiveness of monitoring efforts by providing coordination, communication, technical and financial resources and recognition to members of the Wisconsin citizen-based monitoring community. Since 2004, WDNR and the WBCM Network have sought to expand citizen and volunteer participation in natural resource monitoring through Partnership Program funded contracts.

Beginning in 2014, grant funds received through the Partnership Program have helped establish and implement the Milwaukee County DPRC's Citizen-based Wetland Monitoring Program. Successful program management in Milwaukee County has inspired hopes for a regional expansion of wetland monitoring for which this guidebook will be used to assist conservation agencies, nature centers, and other interested organizations in developing their own wetland monitoring programs with a focus on acquiring species data that will inform future natural resource management decisions while inspiring a deeper connection to the natural world through community engagement.

Citizen-based monitoring programs create an opportunity for volunteers from a variety of backgrounds to connect with their natural areas. These trained volunteers were fortunate to observe populations of blue-spotted and tiger salamanders in a natural area within Milwaukee County.

2. Survey Protocols

A successful wetland monitoring program allows monitors to contribute valuable data on wetland ecosystems. To maximize a Program Coordinator's ability to collect and assess data from wetland monitors, it is crucial that proven and respected protocols are followed when conducting wetland surveys.

The following protocols have been designed to efficiently collect pertinent data while keeping the safety and well-being of both the monitor, as well as wildlife and their habitats in mind. By thoroughly understanding the protocols used when conducting wetland monitoring, coordinators will be able to equip their monitors with the knowledge and tools to interact with their assigned wetland in a productive, safe, and ethical manner. Depending on the goals of an organization's monitoring program and the resources available to train monitors and manage their data, one or more of these survey types can be implemented to assess wetland biodiversity.

The Milwaukee County DPRC Natural Areas staff and volunteers follow protocols for aquatic funnel trapping surveys (Section 2.4), visual encounter surveys (Section 2.5), and frog call surveys (Section 2.7) adapted from those developed by Dr. Gary S. Casper of the University of Wisconsin-Milwaukee's Field Station. The protocol for secretive marsh bird surveys described in this chapter and the Partners in Amphibian and Reptile Conservation's *Inventory and Monitoring: Recommended Techniques for Reptiles and Amphibians* was developed by the Wisconsin Bird Conservation Initiative (WBCI) and the Wisconsin Department of Natural Resources. Procedures for conducting macro-invertebrate samples are also included in this guidebook (Section 2.6) and were developed by the Wisconsin Ephemeral Ponds Project (WEPP).

Blue-spotted salamanders are just one of the many species monitors might find living in their ephemeral wetlands.

Wetland species can be quite cryptic and given the seasonal variability of some wetland types, detecting species can be challenging. To prevent potentially "missing" species that are present but in low numbers, or that are more difficult to detect, Program Coordinators should plan to monitor wetlands for at least three field seasons within the assured breeding season for target species. Target species can be identified based on knowledge of existing local wildlife, species life histories and range extents, critical habitat needs, and historical records. While not required, historical data should be referenced to ensure monitoring covers all relevant species in your area. Museum records as well as species observations from wildlife atlas sites such as HerpMapper (Global Herp Atlas), eBird, and iNaturalist should be searched when planning monitoring projects.
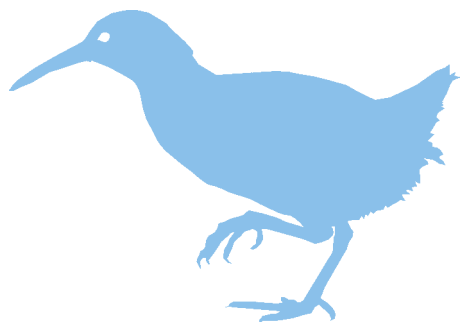
Survey Protocols
2.1 Required Permissions (Land Access)

Program Coordinators must consider the ownership of lands when planning which wetlands to monitor. Permission regarding access and activity must be received from the landowner. Proof of permission should be obtained and either an email or signed copy be kept with each party during all site visits.

For those organizations planning to monitor on their own properties, it is also recommended that each volunteer keep a signed proof of permission with them in the event they are asked to display identification by law enforcement. A volunteer agreement form with the organization that is coordinating the monitoring program may serve as proof of permission for volunteers that are surveying wetlands (Section 3.4.4). Wetlands to be monitored can be isolated and off the beaten path, make sure to notify organization employees (i.e. land managers, park rangers, maintenance staff, etc.) that may be surprised to find wetland monitors in places that are seldom used by the general public.

Ensure access has been granted to all monitors performing surveys. Always respect property boundaries and local ordinances.

Survey Protocols

2.2 Wetland Monitoring Ethics

Wetland monitoring gives monitors the opportunity to visit unique habitats that are sensitive to disturbance. Throughout the training process, remind monitors of good outdoor ethics and that they will be entering the habitat of many species, often while they are breeding and most vulnerable. With this in mind, practicing "leave no trace" principles and following set protocols can limit intrusive activity and in turn increase success in observing species while minimizing potential negative impacts.

When entering and walking through a wetland, monitors should make careful and deliberate movements as they place and check traps, perform visual surveys, or collect macro-invertebrate samples. Monitors should walk slowly through the water and around vegetation or downed debris. When inspecting stems, submerged branches, and other downed debris for amphibian eggs, monitors should return any lifted material to its original position. Eggs may be delicately attached to inspected vegetation and special attention should be given to ensure suspended eggs are not lifted out of the water or else left hanging in a precarious position. Photo vouchers may be successfully taken by lifting eggs to the water's surface with a flat hand. If eggs cannot be safely handled, photo vouchers should not be taken.

As noted in the aquatic funnel trap protocol (Section 2.4), traps should be securely placed, using string or fishing line if necessary, against logs or debris and with 2-3 inches of air exposed. Make sure that traps can be removed from vegetation without breaking stems or branches, causing disturbance. When releasing the contents of traps, monitors should place species behind their intended travel path to avoid accidently walking through the area of release.

Aquatic funnel traps should be placed securely along downed debris.

Monitors should follow the same travel path if multiple people are in the water at the same time, although having one team member check traps while the other records data from a nearby shore further decreases disturbance. Monitors can increase their efficiency by keeping all necessary equipment on hand throughout the survey. As an additional benefit, monitors should also diligently pick up any garbage at the wetland during each visit and double-check to make sure all equipment and any debris is picked up before departing from the site. Any fishing line and/or flagging tape that is used to anchor or demark trap locations should also be removed from the site at the end of the wetland monitoring season.
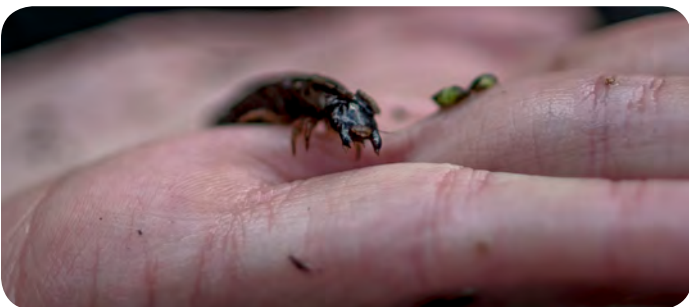
Survey Protocols

2.3 Decontamination of Field Equipment

Pathogens, whether bacterial, viral, or fungal, can pose a significant threat to amphibians, especially those that are already under stress from environmental disturbances. Chytridiomycosis disease is a fungal pathogen caused by the etiological agent Batrachochytrium dendrobatidis, often referred to as "chytrid," that has been associated with die-off events and declines of amphibian populations in North America. In order to prevent the transmission of any pathogens, wetland monitors are asked to follow equipment decontamination procedures.

Decontamination is especially important when the same equipment is used at multiple sites. Program Coordinators or monitors visiting multiple sites should adhere to the site visit decontamination procedure. Once equipment is recollected and organized at the completion of the monitoring season, follow the "end of season decontamination" procedure to keep equipment clean and ready for use the next monitoring season.

While many chemical disinfectants are available, a mixture of 1-4% household bleach to 96-99% water is recommended for cost-effective purposes and will ensure 100% effectiveness (G. Grater, K. Buhlmann, L. Wilkinson, J. Gibbons, 2013).

2.3.1 Site Visit Decontamination Procedure (Program Coordinators and Monitors)

1. Remove all mud or vegetation from hip-waders, aquatic funnel traps and all other equipment. Horse pick brushes work very well as boot and equipment brushes. Carefully brush aquatic funnel traps as the small mesh can easily bend, perforate, or loosen from edge joints.

2. Spray the bottom and sides of boots with a generous amount of mixed disinfectant solution (Section 2.3) using a traditional spray bottle, making sure to soak the entire sole of the boot. Spray and rinse equipment with clean water and allow it to dry before entering another wetland.

3. Check all clothing for burrs, seeds, and other plant matter and remove it before entering and leaving the site.

Chytrid disease can quickly devastate multiple amphibian populations within a wetland.

2.3.2 End of Season Decontamination Procedure (Program Coordinators)

1. Remove all mud or vegetation from hip-waders, aquatic funnel traps and all other equipment. Carefully brush aquatic funnel traps as the small mesh can easily bend, perforate, or loosen from edge joints.

2. Fill a large enough container for dipping and soaking hip-wader soles and other equipment with disinfectant solution. Container may have to be dumped and refilled depending on the amount of equipment to be disinfected.

3. Soak small pieces such as scoops, thermometers, and horse pick brushes in solution for at least 30 seconds. Use a sponge to wipe solution on the sides and bottoms of boots and throughout aquatic funnel traps.

4. Rinse equipment with clean water.

5. Store equipment in a dry, well-ventilated place. Aquatic funnel traps should be stacked together loosely, and stored laying on their sides (NOT vertically).

Survey Protocols

2.4 Procedure for Aquatic Funnel Trap (AFT) Survey

The aquatic funnel trap survey is the most effective method of determining the presence of both salamander and crayfish species present in a wetland. Unlike anurans (frogs and toads), salamanders, newts, and crayfish do not acoustically broadcast calls to attract mates during the breeding season.

Therefore, more technical sampling procedures, such as funnel trapping and visual encounter searches, must be used to determine their presence. Aquatic funnel trapping is extremely time sensitive, especially when targeting salamanders or newts. When targeting salamanders and/or newts, surveys must coincide with their annual spring breeding migration to wetlands. These mass movements usually occur over the course of a couple weeks in early spring.

2.4.1 Requirements

All wetland monitors using aquatic funnel traps must purchase an annual fishing license through the Wisconsin Department of Natural Resources (WDNR). Fishing licenses may be purchased online for immediate printing or in-person at local vendors. Monitors should be able to identify all species likely to be encountered during their surveys. While the focus of the survey is salamanders, newts, frogs, and crayfishes, some small fish species and many aquatic insects are routinely captured. Consult resources found in the resource binder for proper identification along with additional resources listed in Appendix B. Early surveys require working in ice-cold water, so proper clothing is important. Gloves can be worn but may make handling of species difficult.

2.4.2 Seasonal Timing of Sampling

The Program Coordinator should monitor weather conditions and breeding activity at local reference site(s) in order to notify participants when to initiate surveys. This is typically after the first warm rain following ice out in ponds, or when wood frogs begin to breed (typically late March).

Two trapping sessions should be run in early spring (late March to late April). A third session should be run from late April to late May targeting late spring/early summer breeding species. Each "session" consists of 4-5 trap nights. The initial sessions must include a rain event – watch the weather forecast and time the sampling for a rain event.

> Monitors can begin aquatic funnel trap surveys as soon as ice-off conditions exist, typically in late March.

2.4.3 Proper Conditions for Sampling

Surveys can be conducted at any time of day while there is adequate sunlight. Monitors are not required to conduct surveys at the same time each day. Monitors should not conduct a survey if:

- Ice cover on the wetland inhibits the monitors ability to set traps
- Excessive rain or severe storm events are in the forecast

Survey Protocols
Procedure for Aquatic Funnel Trap (AFT) Survey

2.4.4 Pre-survey Preparation

1. Scout the wetland. Monitors should be provided with a site map and any access instructions. Program Coordinators should schedule a site visit with volunteers prior to beginning surveys to help them become familiar with the area and may assist in picking trap placement locations. Program Coordinators may also consider flagging access points or lightly trimming access trails to ease future navigation to the wetland. Volunteers are not be permitted to trim any access trails without consent from and coordination with the landowner.

2. Traps should be placed in accessible areas in shallow water so that the top 2-3 inches of the traps are exposed to air. Secure traps with sticks placed on either side, or tie the trap to a convenient branch or piece of vegetation. Orient traps so that the long axis is parallel with a shoreline or log, to provide a natural fence, which will guide animals into the funnel trap opening.

3. Survey effort: Each trapping session should be 4-5 nights long. Check traps daily when they are set (they can be checked any time of day as long as there is adequate sunlight). If monitors cannot complete all three trapping sessions they should notify the Program Coordinator. Sessions may be split up, or shortened, due to inclement weather or scheduling conflicts, but should still be completed within a reasonably close timeframe. Note that if splitting up sessions, traps must be removed between site visits.

4. Make sure any vehicles have enough gas to complete the travel, especially if monitoring remote sites.

5. Safety. Monitors should notify someone before heading out for a survey. Having a partner is strongly recommended for safety when working in the water.

Preparing traps for placement before entering the wetland increases survey efficiency.

6. Make certain monitors have all necessary equipment.
*   Permit (e.g. volunteer agreement, land access agreement/ consent form, etc.)
*   Aquatic Funnel Traps (at least 5, recommended traps are 1/8 inch mesh galvanized steel commercial minnow traps with 1-inch openings, such as the Gee Exotic Trap (9 inches by 17.5 inches) see: http://www.memphisnet.net/)
*   Trap identification tags (with the Program Coordinators name and phone number on them)
*   Flagging Tape (optional)
*   Fishing Line or String (to secure traps to vegetation/woody debris to limit trap movement)
*   Map of survey site
*   Data sheets with survey instructions
*   Clipboard
*   Pencil
*   Thermometer
*   Digital camera or cell phone capable of taking pictures
*   Field guides (see references)
*   First aid kit (optional)
*   Insect abatement (optional)
*   Proper clothing
*   5-gallon bucket (optional, but may be helpful for examining contents of traps)
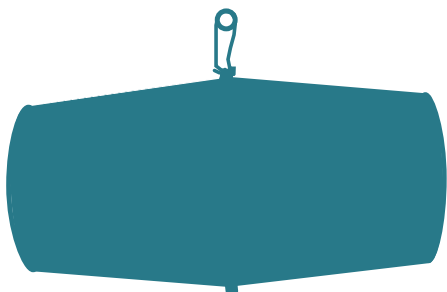
Survey Protocols

Procedure for Aquatic Funnel Trap (AFT) Survey

2.4.5 Survey Procedure

1. Watch the weather forecast and begin a 4-5 day trapping session to ideally coincide with a rain event.

2. Approach the wetland quietly and record all wildlife observed as visual observations, include calling frogs and birds heard. Fill out the preliminary information on the data form (name, date, time, etc.). Take the water temperature and record weather parameters (cloud cover and wind speed).

3. Check traps systematically, keeping each trap number consistent each time it is checked. Monitors can write the trap number on the attached flagging tape or trap tag, if possible, to avoid confusion.

4. Recording Data: An example of a completed data sheet can be referenced in Appendix B. Monitors should identify and record all species found in traps to the best of their ability. Species groups may also be used if an exact species identification cannot be made, such as "salamander larvae". Monitors should also note anything they think might be affecting sampling, such as water levels or disturbance to traps. If necessary, traps can be moved with receding or rising water levels without compromising the survey.

5. A five-gallon bucket may be used to shake the trap contents into, but monitors may simply crack the trap open and remove contents recording data as they go.

6. Handle animals gently. Some aquatic insects may bite and crayfishes may pinch. Remember amphibians have permeable skin that they use to essentially 'breath' through and absorb nutrients. Make sure hands are free of any lotions and are wet while handling amphibians. Monitors should release all live animals into the water in the direction away from their intended travel path.

Monitors should record data as each trap is checked, referencing ID keys, and double-checking accuracy before moving on to the next trap.

7. Mortality in the traps is rare but sometimes occurs. If in good condition, carcasses can serve as valuable physical voucher specimens and can be deposited at a museum. If a Scientific Collectors Permit has been obtained, carcasses may be saved in labeled zip lock bags and frozen until the Program Coordinator can retrieve them. A specimen in "good condition" shows distinguishable identification marks, has retained the majority of its original color, shows little or no decay, and is fully intact. While beneficial, the collection of the physical voucher specimens is not required.

8. Photo vouchers of all species found within traps are recommended. Monitors should take up to three photo vouchers of each species per site. Reference Appendix A.6. for the complete photo voucher procedure.

2.4.6 Post-survey (Monitors)

1. Consolidate all data sheets and place them in a secure location.
2. If available, transcribe data from the data sheets into the Digital Data Workbook (Section 4.2).
3. Place paper data sheets in a safe, dry place until it is time to submit data to the Program Coordinator.

Survey Protocols

2.5 Procedure for Visual Encounter Surveys for Amphibians: Terrestrial Search and Amphibian Egg Mass Surveys

Visual encounter surveys are an effective way to determine the presence of amphibian populations at a site with the use of limited equipment. Salamanders and frogs lay egg masses that can be readily observed on the surface of the water or within the water column.

As embryo development is temperature dependent, egg masses will typically be laid in depths no greater than 3 feet, and in sunny, well-vegetated areas of a wetland. Visual encounter surveys are also less labor intensive than aquatic funnel trapping, as they often require less time to conduct and require fewer site visits. However, in order to maximize the accuracy of the data that is being collected, it is recommended that wetland monitoring programs implement visual encounter surveys in conjunction with aquatic funnel trapping. If resources are limited and the time cannot be expended conducting aquatic funnel trapping sessions, visual encounter surveys and frog call surveys are sufficient methods for determining amphibian species presence.

2.5.1 Requirements

Monitors should be able to identify all species likely to be encountered during their surveys. Consult resources found in the resource binder for proper identification along with additional resources listed in Appendix C. Early surveys require working in ice-cold water, so proper clothing is important. Gloves can be worn but may make handling of species difficult.

The American toad is a species often observed during terrestrial surveys.

2.5.2 Seasonal Timing of Sampling

Terrestrial search surveys should be conducted after the first warm rain following ice out in wetlands, or when wood frogs begin to breed (typically late March). Depending on the type of wetland being surveyed, aquatic egg mass searches should begin when eggs are observed at reference site(s), typically early April to early May, within one week of first hearing wood frogs calling. Surveys should end when eggs begin hatching. A total of three visual encounter surveys (terrestrial and aquatic egg mass searches) should be conducted throughout the season. If monitors are surveying a wetland that is considered to be an ephemeral wetland, visual encounter surveys should be concentrated during early April until early May (weather dependent). If monitors are surveying a wetland that is considered to be a permanent, or semi-permanent, wetland visual encounter surveys should either be increased to include additional surveys during late May until mid-July and/or "spread out" (i.e. not all concentrated in early spring) to accommodate detecting late breeding species such as leopard frogs, green frogs, toads, and bullfrogs.

Survey Protocols

Procedure for Visual Encounter Surveys for Amphibians: Terrestrial Search and Amphibian Egg Mass Surveys

2.5.3 Proper Conditions for Sampling

Surveys can be conducted at any time of day while there is adequate sunlight. Monitors are not required to conduct surveys at the same time each site visit. Monitors should not conduct a survey if:

- Wind speeds are greater than Beaufort scale 3 (8-12 mph),
- Nighttime temperatures are below 32°F, daytime temperatures are above 80°F,
- Ice cover, heavily overcast skies, or rain compromises visibility for aquatic egg mass searches.

The conditions favoring maximum detection vary with the target species as follows:

Terrestrial Searches (targeting salamanders): Salamanders spend much of their time hidden underground or inside logs and duff (the layer of decomposing organic material underneath leaf litter). Conditions that drive salamanders underground (and hence make them undetectable) are extreme cold, heat and dryness. Typically, mid-summer is too hot and dry, and early spring and late fall are too cold.

Terrestrial Searches (targeting frogs): Frog behavior is generally dependent on temperature and recent weather conditions. Aquatic or semi-aquatic frog species (i.e. wood frog, chorus frog, green frog) are easiest to find during dry, sunny weather basking and feeding at ponds and other wetlands. More terrestrial frog species (i.e. American toad) are easiest to find during wet or overcast conditions. In general, frog activity is greatest during calm weather. They may remain active during very light breezy and rainy conditions, but as wind speed increases, frogs will seek cover and remain inactive. Rain stimulates activity and creates moist conditions that allow frogs to move about without dehydration, but will greatly reduce visibility if attempting to conduct aquatic egg mass searches as well.
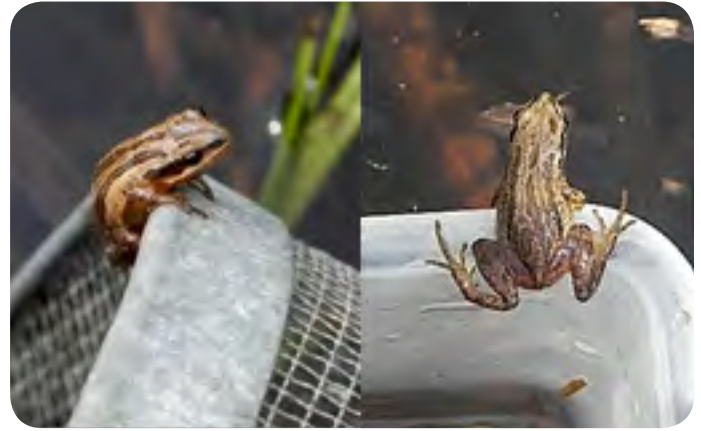
A chorus frog posing for its close-up. Some species are easier to take photo vouchers of than others.

Aquatic Egg Mass Searches: Ambystomid salamanders migrate to ponds and breed during the first few rains of the spring. Depending on the species, most ambystomid salamander eggs hatch in 3-7 weeks. Frog egg masses are much easier to count within the first week of being laid and about 80% of egg masses will be laid within a 1-week period (in most years all egg masses are laid in the same week, but a split breeding season can occur where some egg masses are laid, temperatures drop very low for more than a week, and then more egg masses are laid).

Survey Protocols

Procedure for Visual Encounter Surveys for Amphibians: Terrestrial Search and Amphibian Egg Mass Surveys

2.5.4 Pre-survey Preparation

1. Scout the wetland. Monitors should be provided with a site map and any access instructions. Project Coordinators should schedule a site visit with volunteers prior to beginning surveys to help them become familiar with the area. Project Coordinators may also consider flagging access points or lightly trimming access trails to ease future navigation. Volunteers are not be permitted to trim any access trails without consent from and coordination with the landowner.

2. Survey effort: For each type of visual encounter survey (terrestrial searches and aquatic egg mass searches) monitors should conduct a minimum of three surveys at each wetland during the prescribed weather and timing conditions. Surveys should not be conducted on "back-to-back" days, rather be spaced out over several days or weeks. Depending on the type of wetland being monitored, seasonal timing of visual encounter surveys may need to be adjusted in order to detect all potential target species (Section 2.5.2).

3. Make sure any vehicles have enough gas to complete the travel, especially if monitoring remote sites.

4. Safety. Monitors should notify someone before heading out for a survey. Having a partner is strongly recommended for safety when working in the water.

5. Make certain monitors have all necessary equipment.
   - Permit (e.g. volunteer agreement, land access agreement/consent form, etc.)
   - Map of survey site
   - Data sheets with survey instructions
   - Polarized sunglasses
   - Clipboard
   - Pencil
   - Thermometer
   - Digital camera or cell phone capable of taking pictures
   - Stopwatch (or other time piece to time the survey)
   - Field guides (see references)
   - First aid kit (optional)
   - Insect abatement (optional)
   - Proper clothing

Young monitors hard at work diligently inspecting their survey materials.

2.5.5 Survey Procedure - Terrestrial Searches

1. Approach the wetland quietly and record all wildlife observed as visual observations, include calling frogs and birds heard. Fill out the preliminary information on the data form (name, date, time, etc.). Take the water temperature and record weather parameters (cloud cover and wind speed).Visually delineate a search area of terrestrial habitat adjacent to the wetland that is relatively homogeneous (similar vegetative cover, leaf litter, canopy cover, etc.).

2. A timed 30-person-minute search is required (i.e. two people searching 15 minutes each equates to 30-person-minutes). If desired, monitors may immediately repeat second or third 30-minute searches, but should move to un-searched portions of the same contiguous habitat patch around the wetland. Performing these replicates is recommended whenever possible to increase survey accuracy and the likelihood of detecting target species.

Survey Protocols

Procedure for Visual Encounter Surveys for Amphibians: Terrestrial Search and Amphibian Egg Mass Surveys

3. Proceed by searching all available cover in the delineated area. For larger logs, first search top layers of bark or wood before turning the log to look underneath. Remember to practice ethical survey methods and replace all cover to its original position. Record observations by starting a new row for each species encountered, and making tally marks as you go for counts, and totaling at the end of the survey. Record all species of herptiles seen or heard. If monitors handle species that were encountered under logs or other cover objects, the specimens should be placed adjacent to the logs or debris rather than back underneath before replacing the log or debris in order to avoid potential injury.

4. If monitors stop for extended periods to take notes, or are not actively searching, stop the stopwatch. Restart when active searching begins again.

5. When the survey is completed, monitors should stop the stopwatch and record the end time. Monitors may revise their original habitat description now that they have looked closely at the soil and downed woody debris conditions during their survey.

6. For subsequent searches of the same habitat at a site allow at least two weeks between surveys, or select a different area of similarly suitable habitat, contiguous with the spot searched previously.

Northern leopard frogs are one of several frog species that lay their eggs in colonial mats, often numbering in the thousands.

2.5.6 Survey Procedure - Egg Mass Searches

1. Approach the wetland quietly and record all wildlife observed as visual observations, include calling frogs and birds heard. Fill out the preliminary information on the data form (name, date, time, etc.). Take the water temperature and record weather parameters (cloud cover and wind speed). Enter the pond and start the survey and stopwatch.

2. Proceed to circle the entire accessible portions of the pond up to about 3 ft. (1.2 m) in depth. Search for eggs by peering into the water column, paying special attention to stems and sticks where eggs may be attached. Lift larger branches gently to see if eggs are attached (but not out of the water or eggs may detach). Where stems are dense, separate them with your hands to search the stem bases. Some frog and toad egg masses are typically laid on the surface of the water amidst vegetation in a sunny area of the wetland.

3. When eggs are encountered, count the egg masses as best as possible (estimates are ok). Record all species of herptiles seen or heard.

4. If monitors stop for extended periods to take notes, or count egg masses, stop the stopwatch. They should restart when they begin searching again.

5. If the wetland is not entirely searched, monitors should note why the entire wetland wasn't searched and what percentage of the wetland was actively searched during their visit.

6. When the survey is completed stop the stopwatch and record the end time.

2.5.7 Post-survey (Monitors)

1. Consolidate all data sheets and place them in a secure location.

2. If available, transcribe data from the data sheets into a spreadsheet or database.

3. Place paper data sheets in a safe dry place until it is time to submit data to the Program Coordinator.

Survey Protocols

2.6 Procedure for Macro-invertebrate Scoop Surveys

Macro-invertebrate refers to an invertebrate that is visible to the naked eye. Macro-invertebrates make up the essential base of the food web in wetland ecosystems.

Macro-invertebrate species such as daphnia, copepods, amphipods, and fairy shrimp comprise a large component of the larval salamander, newt, frog and toad diet. If Program Coordinators have several wetlands to select from for monitoring, priority should be given to those that support a diverse macro-invertebrate base, as those wetlands are more likely to also support breeding amphibian and crayfish populations. Macro-invertebrate sampling requires little effort but can provide much needed insight into a wetland's ecology. These surveys can easily be conducted in conjunction with aquatic funnel trapping and visual encounter surveys, or, they can be the sole focus of a program's initial wetland monitoring efforts.

2.6.1 Requirements

Monitors should be familiar with the macro-invertebrate species that they are likely to encounter during their surveys. Consult resources found in the resource binder for proper identification along with additional resources listed in Appendix B. Early surveys require working in ice-cold water, so proper clothing is important.

2.6.2 Timing of Sampling and Significance

It is recommended that macro-invertebrate scoop sample surveys be performed during the same visit as other surveys (i.e. aquatic funnel trap and/or visual encounter surveys). Monitors should always complete the scoop sample survey first, as walking through the wetland for other survey types will disturb macro-invertebrates and stir up sediment, reducing water visibility and the clarity of the sample. Macro-invertebrate sampling should not be conducted if wind speeds are greater than Beaufort scale 3 (8-12 mph) or when heavily overcast skies or rain compromises visibility.

Water scorpions can be discovered by taking scoop samples along the stems of aquatic vegetation.

2.6.3 Equipment

As most monitors perform this survey in conjunction with other wetland monitoring surveys during the same visit, the only additional equipment needed will be a macro-invertebrate key and a receptacle used for scooping. A clear Tupperware container is sufficient for taking samples, and a hand lens may be useful for identifying macro-invertebrates, but is not required.

Survey Protocols
Procedure for Macro-invertebrate Scoop Surveys

2.6.4 Survey Procedure

1. Approach the wetland quietly and record all wildlife observed as visual observations, include calling frogs and birds heard. Fill out the preliminary information on the data form (name, date, time, etc.). Take the water temperature and record weather parameters (cloud cover and wind speed). If pairing with other surveys during the same site visit, preliminary information may already be recorded.

2. Macro-invertebrates tend to gather in well-lit areas of vegetation, among woody debris and floating leaf litter. Skim the surface of the water with the receptacle to collect macro-invertebrates swimming near the surface. It is not necessary to submerge the receptacle while taking a scoop sample. The sample may not be immediately clear, allowing silt and debris to settle on the bottom of the container for a few minutes will increase the monitor's ability to see macro-invertebrates. Remove leaves from the sample as necessary but check for clinging macro-invertebrates first. Work to identify the species and record their presence on the data form. Marking "Y" for yes and "N" for no next to each species on the data form. Monitors may make additional notes for species that can be identified but are not included on the data sheet. For the purposes of this survey, only indicator species are included on the data sheet and monitors are not required to key out or identify additional macro-invertebrates observed in their samples.

3. Repeat the process at a different location within the wetland for a total of two scoop samples per survey. Monitors may wish to include additional samples depending on the complexity and size of the monitored wetland.

2.6.5 Post-survey (Monitors)

1. Consolidate all data sheets and place them in secure location.

2. If available, transcribe data from the data sheets into a spreadsheet or database.

3. Place paper data sheets in a safe dry place until it is time to submit data to the Program Coordinator.

Survey Protocols

2.7 Procedure for Frog Calling Surveys

Frogs and toads advertise for mates during their breeding season by broadcasting species-specific calls. This makes them readily identifiable through the use of acoustic surveys.

This survey type requires little equipment, and relatively little effort. The WDNR has been running a volunteer-based frog and toad survey throughout Wisconsin since 1981. Program Coordinators should check to see if there is an existing frog and toad call survey route already in place that encompasses their wetland(s) to be monitored.

2.7.1 Requirements

All monitors should pass the USGS frog call quiz (https://www.pwrc.usgs.gov/frogquiz/). It is very important to know the calls and visual identification of all species likely to be encountered. Consult resources found in the resource binder when identifying species (Appendix B).

2.7.2 Seasonal Timing of Sampling

Monitor weather conditions and breeding activity at local reference site(s) and initiate surveys after wood frogs begin to breed (typically late March/early April). Monitor green frog and bullfrog breeding activity at local reference site(s) in June and when calling begins conduct 3-4 additional surveys (surveys typically finish by mid-July).

Monitors should not conduct a survey if:

- Wind speeds are greater than Beaufort scale 4 (8-12 mph),
- Temperature is below 32°,
- Precipitation is constant (more than a light mist or flurries), and/or
- Excessive noise that greatly interferes with your ability to hear calls is present (e.g. traffic).

2.7.3 Pre-survey Preparation

1. Scout the wetland. Monitors should be provided with a site map and any access instructions. Program Coordinators should schedule a site visit with volunteers prior to beginning surveys to help them become familiar with the area. Program Coordinators may also consider flagging access points or lightly trimming access trails to ease future navigation. Volunteers are not be permitted to trim any access trails without consent from and coordination with the landowner.

2. Survey effort: Monitors should conduct surveys approximately once per week from roughly April until July. Select an evening when weather conditions are met (Section 2.7.2). It is OK to miss one survey per month, but if more are missed the risk of overlooking species may increase.

3. Make sure any vehicles have enough gas to complete the travel, especially if monitoring remote sites.

4. Safety. Monitors should notify someone before heading out for a survey. Having a partner is strongly recommended for safety when working in the water.

5. Make certain monitors have all necessary equipment. Permit (e.g. volunteer agreement, land access agreement/consent form, etc.)
   - Map of survey site
   - Data sheets with survey instructions
   - Clipboard
   - Pencil
   - Flashlight or headlamp
   - Stopwatch (or other timepiece)
   - Thermometer
   - Field guides and audio recordings (see references)
   - First aid kit (optional)
   - Insect abatement (optional)
   - Proper clothing

Survey Protocols
Procedure for Frog Calling Surveys

2.7.4 Survey Procedure

1. Monitors should begin frog call surveys 30 minutes after sunset.

2. At each site, quietly wait 2-3 minutes after arriving at the listening point before starting the stopwatch for a 5-minute listening survey. During this 2-3 minute waiting period, expose the thermometer bulb to the air so it begins equalizing with air temperature, and fill out the preliminary weather and time information on the data form. After the waiting period, start the survey and record frogs and toads heard. At the end of the 5-minute listening period, take the water temperature and fill in the remaining data.

3. Listen to and record frogs and toads from the wetland being monitored, but also record species heard in the distance as "distant" calls and note the direction. Distance calls are from other wetlands, not the one monitors are actively surveying.

4. Any time noise from passing vehicles, storms, etc. makes hearing impossible, elapsed time should be stopped on the stopwatch at the point of interruption and continued afterwards until the survey has been conducted for the full 5-minutes. Record the elapsed time on the data sheet.

5. Monitors may record any birds or other wildlife detected in the comments section, along with comments on anything they think may have disturbed the survey.

American toads call out in sustained high pitched trills as they attempt to attract a mate!

2.7.5 Post-survey (Monitors)

1. Consolidate all data sheets and place them in secure location.

2. Place all wet equipment in a place where it can dry.

3. If available, transcribe data from the data sheets into a spreadsheet or database. This can be started the next morning, especially if tired, to avoid errors.

4. Place paper data sheets in a safe dry place until it is time to submit data to the Program Coordinator.

Survey Protocols

2.8 Procedure for Secretive Marsh Bird Surveys

Secretive marsh birds such as rails, bitterns, coots, and grebes are some of the most poorly studied bird groups in North America (WBCI).

This survey type does require the use of some technical equipment. It is also a survey that can only be conducted at wetland types that are considered permanent or semi-permanent, and contain adequate habitat to support the critical species habitat needs of secretive marsh birds (i.e. shallow marshes, emergent aquatic vegetation, cattails, reeds, etc.).

2.8.1 Requirements

Monitors should be able to identify all target species by sight and sound that are likely to be encountered on a survey. Numerous books and online resources are available. Primary target species in southeast Wisconsin include:

Primary Target Species	Code
American Bittern	AMBI
King Rail	KIRA
Least Bittern	LEBI
Sora	SORA
Virginia Rail	VIRA
Yellow Rail	YERA

2.8.2 Seasonal Timing of Sampling

The peak of marsh bird calling happens during the breeding season in spring and early summer. In southern Wisconsin, surveys should be conducted between May 1 and June 15. A minimum of three surveys should be conducted at each point during the survey period.

- 1st survey – May 1-10
- 2nd survey – May 17-27
- 3rd survey – June 3-13

The Virginia Rail is a highly cryptic bird, slipping between marsh vegetation without detection. Surveys will help locate individuals, and potentially pairs in suitable breeding habitat.

2.8.3 Proper Conditions of Sampling

Surveys may be conducted in the morning or evening. Morning surveys should start 30 minutes before sunrise and be completed 3 hours after sunrise. Evening surveys should start 3 hours before sunset and be completed by dark. Based on anecdotal experience, evening surveys tend to be more productive during the earlier sampling periods compared to morning surveys.

Monitors should not conduct a survey if:

- Wind speeds are greater than Beaufort scale 3 (8-12 mph),
- Precipitation is constant (more than a light mist or flurries), and/or
- Visibility is less than ½ mile.

Survey Protocols
Procedure for Secretive Marsh Bird Surveys

2.8.4 Pre-survey Preparation

1. Scout the wetland. Monitors should be provided with a site map and any access instructions. Program Coordinators should schedule a site visit with volunteers prior to beginning surveys to help them become familiar with the area. Program Coordinators may also consider flagging access points or lightly trimming access trails to ease future navigation. Volunteers are not be permitted to trim any access trails without consent from and coordination with the landowner.

2. If monitors are surveying more than one point at a wetland regularly, they should change the order of the points with each survey. For example, if there are 5 points, survey 1-2-3-4-5 first, next time survey 2-3-4-5-1, third time 3-4-5-1-2, etc. If Program Coordinators intend to survey a wetland for secretive marsh birds long-term, they should have monitors survey from the same point(s) year after year, and as close to the same dates as possible.

3. Make sure any vehicles have enough gas to complete the travel, especially if monitoring remote sites.

4. Safety. Monitors should notify someone of where they are going before heading out for a survey. Enlist a partner whenever possible for safety.

5. Make certain monitors have all necessary equipment.
- Permit (e.g. volunteer agreement, land access agreement/consent form, etc.)
- Call Back Box (preloaded with secretive marsh bird calls)
- Map of survey site
- Data sheets with survey instructions
- Clipboard
- Pencil
- Binoculars
- Field guides
- First aid kit (optional)
- Insect abatement (optional)
- Proper clothing
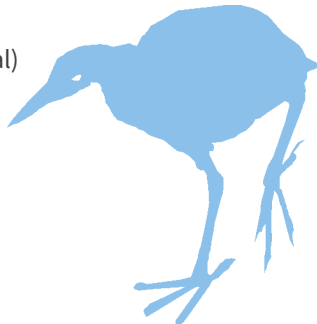
The amount of background noise is significantly less on calm days without wind, which can ultimately affect the results of secretive marsh bird surveys.

2.8.5 Survey Procedure

1. Approach the site quietly and note any wildlife observed or heard in the other observations field. Surveys at each point consist of two parts; an initial 5-minute passive listening period followed by successive 1-minute segments of broadcast calls for target species from the call back box. Each 1-minute segment consists of 30 seconds of playing the target species' vocalizations followed by 30 seconds of silence to listen for any response(s).

2. The recorded calls are broadcasted using the call back box. Point the speaker towards the center of the wetland before the survey and do not move/rotate the speaker at any point during the survey. Record all observations on the survey form and make additional notes per observation if necessary.

3. Each point surveyed will take approximately 11 minutes; 5 minutes of passive listening followed by 1-minute call-broadcast segments for each of the six target species.

2.8.6 Post-survey (Monitors)

1. Consolidate all data sheets and place them in secure location.

2. If available, transcribe data from the data sheets into a spreadsheet or database.

3. Place paper data sheets in a safe dry place until it is time to submit data to the Program Coordinator.

3. VOLUNTEER RECRUITMENT AND ENGAGEMENT

Establishing a wetland monitoring program is an exciting chance to engage an organization's current volunteers as well as an opportunity to recruit a diverse group of new volunteers that are looking for a unique way to connect to their local natural areas. The variety of wetland monitoring survey types affords an organization the chance to engage potential volunteers of diverse age groups, skill sets, and backgrounds. Volunteers may consist of individuals, families, students, retirees, clubs, schools, and much more. Through volunteer recruitment, training, and engagement during the field season, volunteers develop a connection with their wetland by spending time completing field surveys and sharing their experiences. Program Coordinators should be ready to listen to their stories and help along the way as volunteers further develop into potential stewards, advocates, donors, and in effect a corps of restoration ecologists and citizen-scientists!

3.1 Volunteer Recruitment & Engagement Timeline

Planning and implementing a wetland monitoring program that is geared towards also involving volunteers from the general public takes diligent planning and coordination, especially the first season of the program. Late summer through winter provides a great timeframe during which planning and outreach can be conducted prior to the start of the monitoring season in spring. Here we provide a recommended general timeline for wetland monitoring program activities. The number of orientations and field trainings that an organization hosts is dependent on the desired scope of the program. If it is a goal of the program to engage as many volunteers as possible, multiple orientations and field trainings should be hosted to accommodate the variable schedules of potential volunteers (e.g. college students, high school classes, standard work hours, etc.).

- **August-December** Identify and prioritize potential wetland(s) to be monitored (Section 1.1-1.2)
- **December** Schedule Wetland Monitoring Program Orientation(s) and Field Training Workshop(s)
- **December-February** Advertise for Wetland Monitoring Program Orientation(s)
- **February** Conduct Wetland Monitoring Program Orientation(s)
- **March** Conduct* Wetland Monitoring Field Training Workshop(s)
- *Field trainings should start around **mid-March**, but unpredictable spring conditions and unexpected freeze-thaw cycles may force trainings to be rescheduled if wetlands are inaccessible
- **February-April** Complete site visits with volunteers before the monitoring season begins (if necessary)
- Site visits help familiarize volunteers with the wetland to be monitored, access and parking information, pertinent plant communities, and overall familiarity with their site
- **March-June** Volunteers conduct surveys, project coordinators check-in with volunteers periodically
- **Late June-August** Project coordinators collect all equipment and data from volunteers
- **July** Schedule an equipment return and data Wrap-Up Party! OPTIONAL
- **July-August** Project coordinators compile data and inventory equipment
- **August** Project coordinators complete program summary and release to volunteers

VOLUNTEER RECRUITMENT AND ENGAGEMENT

3.2 Advertising for a Wetland Monitoring Program

Advertising for the first season of wetland monitoring will seem like a daunting task, but this is where Program Coordinators can lean on their network of current volunteers and partner organizations for support. Not only may current volunteers be interested in wetland monitoring, but they may also know others that might wish to participate in the program. Reaching out to partners or potential-partners like schools, local governments, conservation agencies, community service programs, friends groups, nature centers, Audubon chapters, and naturalist clubs, can also provide a boost to recruiting new volunteers.

Create a brochure to highlight your new program (Appendix C)! Make sure to include what your Wetland Monitoring Program is, the significance of the program, and a basic description of wetland types and their potential to contain unique species of wildlife. Also include what is involved in wetland monitoring and how volunteers can get involved. Provide contact information for the Program Coordinator and a link to your webpage for more information (if applicable). Program Coordinators should also consider including any upcoming orientation date(s).

Good brochures balance text with photos that will catch the viewer's attention. Use pictures of unique wildlife like salamanders, crayfish, frogs, and even fairy shrimp that have the potential to peak the viewer's interest, and perhaps introduce them to something they've never seen before. "Citizen-science" has the potential to sound intimidating to community members that may feel like they don't have enough experience or "know enough about nature" to participate. Encourage hesitant community members to register for orientation by emphasizing the amount of training and support volunteers receive prior to and throughout wetland monitoring. Also state that attending orientation is not a commitment to the program, but rather an introduction for those wishing to learn more about it.

What are some other ways you can advertise for your wetland monitoring program?

- Share your program brochure online at your organization's webpage and online.
- Utilize social media accounts to post about your new program and the opportunity to be a part of the first season of discovery!
- Request that your program be added to the Wisconsin Citizen-Based Monitoring Network's directory.
- Share physical or electric copies of your brochure with partner organizations.
- Post program flyer/brochure on community bulletin boards in places (i.e. coffee shops, co-ops, libraries, university buildings, community centers) that may attract volunteers.
- Create a press release and contact local media outlets to notify them of your program.
- Post the orientation event on Google Calendar and share with your contacts.
- Even if the goals of an organization's wetland monitoring program do not include engaging the public and creating a large wetland monitoring volunteer base, it is recommended that Program Coordinators consider promoting the fact that their organization is conducting such valuable research!

VOLUNTEER RECRUITMENT AND ENGAGEMENT
3.3 Orientation Events

Orientation events set the stage for a wetland monitoring program, allowing potential volunteers to meet the Program Coordinator(s) and learn more about the program's goals, volunteer responsibilities, and ultimately decide whether or not they will participate.

By the end of each orientation event, Program Coordinators will have a good idea of how many volunteers are interested in participating during the field season and be able to assign wetlands to monitor accordingly. Spring is a busy time of year for most people, with school and spring break typically coinciding with the start of the wetland monitoring season. If possible, have spring field training workshop dates available at the orientation(s) for reference, noting that they are weather dependent so that volunteers can plan their schedules accordingly.

3.3.1 Volunteer Capacity
Prior to opening registration for orientation, know your organization's volunteer capacity for the program. Capacity may be based on available equipment or the number of wetlands to be monitored. If your property contains only a few known wetlands, consider offering volunteers the opportunity to join staff on surveys on a set schedule, or encourage interested volunteers to form a "team" that monitors a wetland on a set rotation decided by the group. One of the best parts of field surveys can be making observations with friends, family, or classmates!

3.3.2 Scheduling Orientation Events
Project Coordinators should plan to hold at least 1-2 orientation events, typically during the fall and winter prior to the following spring field season. Wednesday nights and Saturday mornings have yielded the best attendance in our experience. Orientation events typically last for two hours in order to cover all the necessary material (including breaks). Online registration for orientation events is recommended in order to collect and manage potential volunteer contact information effectively. There are several free, online applications for creating registration forms such as: "Cognito Forms".

3.3.3 Orientation Supply Checklist
- Online registration list (should include name, email, mailing address, and phone number)

- Wetland Monitoring Program PowerPoint presentation (reference template, Appendix C)

- Survey equipment examples (aquatic funnel trap, field guides, call back box, etc.)

- Site sign-up form (for volunteers that decide they would like to commit to monitoring a wetland)

- Map of the project area with all wetlands indicated (optional, but recommended)

- Individual site maps for each wetland to be monitored (optional, but recommended)

- Brochures

- Live specimens (appropriate for orientations being hosted at facilities such as nature centers that may have live animal rooms including amphibians for display)

VOLUNTEER RECRUITMENT AND ENGAGEMENT

3.3.4 Orientation Itinerary (PowerPoint presentation)

- Introductions (Organization, Project Coordinator, partner organizations)
- What is the Wetland Monitoring Program?
    - Define "habitat", wetland types, wetland services, indicator species, obligate species, etc.
    - Program goals
    - Explain how the data will be used (e.g. habitat management plans, preservation, species reintroductions, etc.)
- Summary of prior years' program results (if applicable)
- Describe types of surveys
    - Aquatic funnel trap, visual encounter surveys, frog and toad call surveys, macro-invertebrate samples, secretive marsh bird surveys
- Clearly define time commitment and responsibilities of volunteers
- Announce wetland monitoring field training date(s)
- Thank everyone for attending and encourage potential volunteers to sign-up for a site to monitor

3.3.5 Recording Attendance and Wetland Monitoring Site Sign-up Forms

Have a sign-in form available for those in attendance and request that attendees verify that all of their contact information taken from the registration form is correct. Project Coordinators should digitize and file the sign-in sheet for future grant applications and reporting purposes. At the orientation(s) Project Coordinators should also have site sign-up forms available for those volunteers who are ready to sign-up to monitor a wetland for the program. Forms should include the following fields:

- Name
- Phone number
- Email
- Mailing address
- Survey type(s) of interest
- Wader size (if survey type(s) selected by the volunteer includes aquatic funnel trap, macro-invertebrate samples, and/or visual encounter surveys)
- Will volunteer have a partner(s) and be monitoring site a together?
- Site selected (if known)
- Additional notes (e.g. physical restrictions, potential allergens, location preferences)

VOLUNTEER RECRUITMENT AND ENGAGEMENT

3.4 Between Orientation and the Field Training Workshop(s)

3.4.1 Compiling Volunteer Contact Information and Volunteer Management Database

After the orientation event(s), Project Coordinators should begin compiling all volunteer contact information and participation form responses and input them into a computer database (Microsoft Excel recommended). Assign wetlands to volunteers if not previously selected based on their preferred survey type. Assign each volunteer team an equipment kit number and begin creating equipment kits for each volunteer team.

Check to see if individual volunteers can partner for specific sites if necessary. Pairing inexperienced volunteers with more experienced volunteers can increase participation and promote significant camaraderie. It can also work well to pair volunteers that sign up for acoustic surveys like frog call surveys or secretive marsh bird surveys with other volunteers that have signed up for similar surveys. Pairing volunteers of this type works to increase participation without the need for additional equipment. Before pairing volunteers, check with both parties for agreement.

3.4.2 Organizing Volunteer Equipment Kits

Before holding an orientation for your wetland program, it is important to know the maximum number of volunteer teams your current equipment inventory will accommodate. Assign equipment kits to volunteers based on their survey interests and clarify if the volunteer team will require hip-boots. Some volunteers may have their own hip-waders or chest-waders and wish to use them for surveys. Volunteers conducting aquatic funnel trap surveys and visual encounter surveys should be given priority when providing hip-waders as a part of their equipment kit. Volunteers conducting secretive marsh bird or frog call surveys should generally not require hip-waders (shin-high boots should suffice) to successfully complete their surveys.

Volunteers should receive clean and complete equipment kits. Double-check all kits before volunteer check-out for accuracy. It is recommended that Project Coordinators use large reusable bags to carry the contents of each kit. Each piece of equipment should be labeled with the organization name and phone number using a marker. Also label completed kits with the assigned volunteer name.

The following are lists of items that Project Coordinators should anticipate on providing volunteers with in their monitoring kit(s). Volunteers should be permitted to use their own equipment as long as they follow all decontamination procedures and receive approval from the Project Coordinator.

Frog Call Survey Kit
- Resource binder (containing documents tailored to assigned wetland and surveys to be conducted)
- Head-lamp (optional)
- Clip board with pencil

Secretive Marsh Bird Survey Kit
- Resource binder (containing documents tailored to assigned wetland and surveys to be conducted)
- Call back box (preinstalled with marsh bird calls)
- Binoculars (optional)
- Clip board with pencil

Aquatic Funnel Trap Survey/Visual Encounter Survey/Scoop Sample Kit
- Resource binder (containing documents tailored to assigned wetland and surveys to be conducted)
- If resources permit, at least five (5) minnow traps with clips (trap ID tags and fishing line should be attached)
- Tupperware container, or other type of clear receptacle, with a lid (for macro-invertebrate samples)
- Digital camera with batteries and SD card or cell phone that can take high quality pictures
- Hand lens (optional)
- Flagging tape
- Thermometer
- Polarized sunglasses
- Ziploc bags (optional, but recommended for physical voucher specimen collection)
- Clip board with pencil
- Hip-waders (one pair per kit, more if resources permit)

VOLUNTEER RECRUITMENT AND ENGAGEMENT
Between Orientation and the Field Training Workshop(s)

3.4.3 Resource Binders

Volunteers should receive a binder full of documents tailored to the site and surveys to be completed throughout the field season. Digital copies of binder materials should be available for volunteers upon request. Some volunteers may require additional data sheets. The resource binder includes data sheets, protocols, and additional resources helpful for field identification of species. The following documents should be included and organized in the following order:

1. Data management reminder form (include Project Coordinator contact information)

2. Copy of permit and/or volunteer agreement

3. Volunteer hours tracking log

4. Site map with marked wetland(s) and access details

5. Survey protocol(s)

6. Species identification documents

7. Data sheets (with enough copies for the required number of surveys, digital copies can be emailed)

3.4.4 Volunteer Agreements

Volunteer agreements must be completed and signed by volunteers prior to conducting any wetland surveys. These agreements prevent the organization that is coordinating the program from being held liable for any unforeseen injury/ distress experienced by the volunteer during their surveys. Organizations may wish to modify an existing document to include the scope of the wetland monitoring program. Agreements should include fields for contact information, emergency contact, and the dates of agreement. Two copies should be signed by the volunteer (one for the coordinating organization's office to file, and one to be kept with the volunteer during field surveys). These agreements can also serve as the volunteer's permit for access to a particular site owned by the coordinating organization.

The agreement should also include a photo release section to clarify permission for photos taken during orientation, training workshops, and field work, so that your organization can use them in future program materials, social media posts, and other related materials. Bring volunteer agreement forms to field training workshop(s). Only check-out equipment kits to volunteers who have returned completed agreement forms.

3.4.5 Pre-field Training Workshop Reminder

Volunteers are required to attend one field training workshop, which includes both a classroom and field component, before beginning their own surveys. Field training workshops are not only vital to creating well-trained wetland monitoring volunteers, but often serve as the "kick-off" to the wetland monitoring field season and inspire volunteers to bring their passion to the program. Remind volunteers of upcoming workshops by email and request that they notify you about which workshop they plan to attend. Be sure to follow-up with volunteers on any additional information regarding survey sites, equipment, or forms if necessary. Note that not all volunteers may use email and carefully keep track of those that will require phone correspondence.

3.4.6 Site Visits

Scheduling time to meet with volunteers at their assigned wetland(s) ensures that they can locate and access their wetland(s) safely and helps avoid accidental trespassing on private land. It also presents the opportunity to show volunteers some of the major features of their wetland(s), property boundaries, ideal locations for placing aquatic funnel traps (if applicable), points for conducting listening surveys, and other exciting ecosystem nuances. Address any volunteer concerns and remind them of the upcoming field training workshop(s). Project Coordinators should bring copies of the volunteer agreement to the site visit in order to expedite the equipment kit check-out process at the field training. Depending on the property within which the wetland to be monitored occurs, and the overall accessibility of the wetland, site visits with the Project Coordinator may not be necessary.

VOLUNTEER RECRUITMENT AND ENGAGEMENT

3.5 Field Training Workshop

It's time to show your eager group of volunteers the ins-and-outs of wetland monitoring! From species identification and protocol explanations in the classroom, to performing mock surveys in the field, start the field season off on a high note with a well-organized and implemented field training workshop!

3.5.1 Scheduling Field Training Workshops

Depending on the number of interested volunteers, plan to hold at least two field training workshops, preferably in mid-March when the training wetland is accessible for aquatic funnel trapping. Unpredictable weather and extensive cold temperatures may require training to be take place in late March, as wetlands may still be frozen over. Therefore, it is important to monitor wetlands leading up to training dates for ice cover. It is recommended to schedule training events to include one weekday evening and one weekend morning. On average, the field training workshop should take 3-4 hours in order to cover all material between both the classroom and field portions. The day before each field training workshop, the Project Coordinator must set aquatic funnel traps in the training wetland. Depending on overall pond size, setting at least 10 traps is recommended to increase the chances of catching a variety of species. During the training, volunteers will be instructed to stand on the side of the wetland and observe the Project Coordinator retrieving traps. Emphasize the importance of quality trap placement and navigating the pond with as little disturbance as possible.

It is important to select a training site that contains an ephemeral pond with a known presence of early spring breeding species such as wood frogs, blue-spotted salamanders, or crayfish. Project Coordinators may have to monitor several sites prior to the start of their wetland monitoring program to find an ephemeral pond that is suitable for training volunteers. While not absolutely essential, a successful training workshop will allow volunteers to personally see and/or hold live specimens. For many volunteers, holding their first salamander is an amazing experience that inspires continued hard work and participation throughout the field season. Field identification of species greatly improves volunteer confidence and allows Project Coordinators to point out diagnostic characteristics over a variety of specimens.

3.5.2 Field Training Workshop Supply Checklist

- Sign-in sheet
- Volunteer agreements (two copies must be signed prior to equipment kit check-out)
- In-class wetland monitoring review (optional)
- Labeled volunteer equipment kits to be checked-out
- Hip-waders (bring a variety of sizes for volunteers to select from, one per kit)
- Digital camera (don't forget to take a group photo!)

3.5.3 Field Training Workshop Itinerary (Classroom Portion)

- Volunteers sign-in
- Collect signed volunteer agreements
- Schedule any remaining site visits with volunteers
- Deliver resource binders
- Go through a resource binder with the group as they follow along, ensuring that all binders are complete with the necessary resources and any questions are answered.
- Equipment kit check-out
- Go through an equipment kit with the group as they follow along, ensuring that all kits are complete and any questions about equipment maintenance and/or use are answered.
- Wetland Monitoring Review (optional)
- Species identification
- Survey protocols
- Data management
- Volunteer commitment reminders

3.5.4 Field Training Workshop Itinerary (Field Portion)

- Navigate to the training wetland and make it easily accessible
- Conduct mock surveys of the various survey types
- Macro-invertebrate Sample Survey (demonstrate how to use the key to identify indicator species)
- Visual Encounter Survey (terrestrial and egg mass)
- Aquatic Funnel Trap Survey (demonstrate trap placement, anchoring, handling, etc.)
- Photo Voucher exercise (demonstrate how to collect a good photo voucher)
- Species identification and handling
- Demonstrate decontamination procedures
- Q&A

VOLUNTEER RECRUITMENT AND ENGAGEMENT
3.6 Recording Volunteer Hours

Keeping volunteer hours organized throughout the field season will increase the Project Coordinator's ability to efficiently write program reports for grants and other organizational updates. As all volunteers are required to attend an orientation and field training workshop before beginning their own field surveys, each volunteer will have already accrued approximately 5-6 "donated" hours before their first field survey. Be sure to update the volunteer management database to reflect hours accrued during orientation events, site visits, and field training workshops. This database will eventually also include the hours logged by volunteers on their individual timesheets throughout the wetland monitoring season. If organizations are inviting the public to participate in staff and/or intern led wetland surveys they should still document the number of volunteers and amount of time spent conducting the surveys.

VOLUNTEER RECRUITMENT AND ENGAGEMENT
3.7. Field Season Volunteer Engagement: Reminders & Answering Questions

Most volunteers will begin conducting their wetland surveys shortly after they attend a field training workshop, but the Project Coordinator should continue to assess the weather throughout March into April and advise volunteers of upcoming periods of sustained freezing temperatures or significant storms that could negatively influence monitoring sessions. As described in the survey protocols, the beginning of an aquatic funnel trapping session should coincide with a rain event to maximize the potential of catching aquatic species. However, heavy storms may dramatically increase water levels within a wetland and may warrant the removal of traps mid-session. Sending inclement weather reminders to volunteers will help reduce the amount of damaged or lost traps in each season, as well as help prevent mortality of animals caught in traps.

Project Coordinators should also check the progress of volunteers once a month during the field season to ensure surveys are being evenly conducted and offer words of encouragement. Depending on the survey type they are conducting, expect volunteers to begin finishing their surveys in June/July and coordinate data and equipment collection as needed. Follow through on a final data and equipment turn-in date which could coincide with an optional wrap-up party at the end of the season. Encourage all volunteers to come and swap stories and share their experiences from the past season! Responding to volunteer emails and phone calls efficiently maintains volunteer enthusiasm and strengthens accurate data collection during the field season. The majority of messages will include pictures or descriptions for species verification. Encourage volunteers to send you photo vouchers of newly encountered species as they find them to provide them with a quick verification as they fill out their data sheets. Data sheets can always be amended, but the more detailed a species account is, the better. Always be positive when identifying species and reassure confident identifications with praise. Many species encountered in wetlands can show a wide degree of variance and it may be helpful to share pictures of unique specimens with all volunteers.

It is crucial that traps are appropriately checked each day that they are set in the water. Volunteers should be reminded to remove traps if they know that they cannot check them the following day. In the case of an emergency, volunteers should contact the Project Coordinator so that arrangements can be made to have the traps checked.

There is a chance that volunteers may have trouble accessing their wetland or become uncomfortable reaching traps if the water level of their pond has increased significantly. In these events, Project Coordinators may reassign wetlands to accommodate comfort levels or ask if volunteers would consider continuing at the same location conducting surveys that would not require them to enter the water such as acoustic surveys or taking scoop samples around the water's edge.

VOLUNTEER RECRUITMENT AND ENGAGEMENT

3.8 Wetland Monitoring Volunteer Appreciation Celebration (optional)

Ending each field season with a gathering celebrates the success and hard work of all your wetland monitoring volunteers. Volunteer appreciation can go a long way in sustaining future participation and concludes the season on a high note. While not required, consider one for your program! Encourage volunteers to come and share their favorite parts about monitoring their wetland, their favorite species encountered, challenges along the way, and other surprises from the field. Bring photo vouchers received throughout the season and display them proudly with volunteer descriptions. Use the event as an opportunity to collect raw data sheets and equipment from volunteers and make a note of those in attendance. This will make it easier to follow-up on other volunteers and track down remaining borrowed equipment. Double-check volunteer binders for the volunteer time logs.

3.9 Final Equipment and Data Return

Follow-up with any volunteers that have yet to turn in their data or equipment and schedule pickup. Send an email thanking your wetland monitoring crew for all their hard work and request that they write a short testimonial about their experience. Volunteer testimonies make great additions to program reports and should be incorporated into future outreach and advertisement for your growing program. Let volunteers know that you are looking forward to compiling all of their data and will share a data summary with them in the coming months.

Begin to breakdown and inventory returned equipment kits. Follow End of Season Decontamination Protocols (reference chapter 2.3.2). Aquatic funnel traps should be stored loosely packed on their side. Do not store funnel traps upright in stacks as the wire mesh will bend and render traps unusable in the future. Clean off other pieces of equipment and store in a cool, dry place. Make sure hip boots are dry before storage.

4. DATA MANAGEMENT

Establishing and growing a wetland monitoring program will a yield significant and sometimes overwhelming amount of data regarding the current presence of species throughout monitored wetlands.

Several databases should be created and maintained to drive the success of wetland monitoring projects. This chapter will outline each database and provide templates for your use.

Organizing the data collected during each field season will help direct monitoring efforts in subsequent years and create a means for assessing wetland health and ability to support a variety of species. Data compilation will also allow natural resource managers to plan conservation and restoration strategies that will promote the increased sustainability of focal species. Designated focal species may be those of local or statewide conservation interest, indicator species that describe ecosystem health, or flagship species garnering increased public interest.

Actively incorporating your wetland monitoring program's ability to contribute accurate species data into land management plans will help ensure a holistic perspective on future projects. Additionally, it is recommended that organizations consider contributing their wetland monitoring data towards other, larger datasets such as atlas databases, statewide monitoring programs, or even public platforms depending on the species (eBird, iNaturalist, HerpMapper).

Any wetland monitoring programs in Wisconsin may also contribute their data to the Wisconsin Wildlife Action Plan (WWAP). The WWAP lists "developing a monitoring protocol to assess the taxa groups most reflective of maintaining biological diversity in ephemeral ponds" as a priority conservation action for Species of Greatest Conservation Need (SGCN). Submitting wetland monitoring program data to the Natural Heritage Inventory for Wisconsin will help to ensure that data collected for SGCN is incorporated into the WWAP.

"Any wetland monitoring programs in Wisconsin may also contribute their data to the Wisconsin Wildlife Action Plan (WWAP). "

Data collected through wetland monitoring will also contribute information on species composition and distribution throughout ephemeral wetlands in Wisconsin that can then be addressed/incorporated into the statewide ephemeral pond management plan. Surveys targeting breeding secretive marsh bird species such as American bitterns, least bitterns, soras, Virginia rails, and king rails will greatly contribute towards statewide efforts to gather population data on these species for which little exists. The American bittern, Virginia rail, and king rail are all listed as SGCN in the WWAP as well as being listed as priority species in the Wisconsin Bird Conservation Initiative's (WBCI) All Bird Conservation Plan. In order to ensure that wetland monitoring program data is incorporated into the All Bird Conservation Plan, and other regional bird conservation initiatives, organizations should input their program's data into eBird (a publically accessible online database for bird observations run by the Cornell Lab of Ornithology).

DATA MANAGEMENT
4.1 Volunteer Management Database

For wetland monitoring programs that involve volunteers, Program Coordinators should create a "Volunteer Management Database" using software such as Microsoft Excel or Access.

This spreadsheet will include all of the contact information for each volunteer. In regards to contact information, column headings should include volunteer name, email, phone number, emergency contact, and address. Add "Participation Year," indicating the number of years the volunteer has participated in wetland monitoring. Add the fields: "Monitoring Site", indicating their assigned monitoring site location (i.e. park/property name); "Wetland ID", indicating either the assigned ephemeral pond ID number or a description of the wetland type, if not an ephemeral pond; and "Survey Type", indicating the survey(s) to be conducted at the wetland by the volunteer.

Once sites are assigned to volunteers and survey type(s) confirmed, insert columns for: "Signed Agreement", indicating whether or not the volunteer has completed a volunteer agreement; "Site Visit", indicating whether or not a site visit has been completed with the volunteer; and "Received Kit", indicating if the volunteer has checked-out an equipment kit. Also include a column for the volunteer's hip-wader size. Include a "Notes" column that should be used for indicating volunteer partners, restrictions, and other relevant equipment or site notes.

Lastly, add a column for "Total Hours" donated by that volunteer towards monitoring. This number can be collected from the volunteer time log which volunteers should complete and turn in with their resource binder at the completion of the monitoring season. When calculating volunteer hours donated, it is recommended that travel time also be accounted for. On average, volunteers spend one hour per survey traveling to and from their assigned site.

DATA MANAGEMENT
4.2 Digital Data Workbook

The raw data sheets received from monitors must be entered into a Microsoft Excel (or Access) workbook. Ideally, monitors will enter their data into the workbook actively throughout the monitoring season as they are collecting data. For wetland monitoring programs that are being conducted internally within an organization, by staff and/or interns, active data entry should be feasible. However, for volunteers this may not be the case, so Program Coordinators should anticipate having to digitize volunteer collected wetland monitoring data at the end of the monitoring season. Storing only raw copies of data, and never transcribing into a digital format, is irresponsible data management as these raw copies may become lost or damaged over time. Additionally, digitizing wetland monitoring data allows for easy file sharing, importation into ArcGIS, and analysis of data. Once data from the monitoring season has been entered into the data workbook, it can then be used to create a master database of wildlife occurrences for the project area.

Prior to starting their surveys, all volunteers should receive a digital copy the data workbook and Program Coordinators should encourage volunteers to enter their own raw data into the workbook. This will eliminate the entering of raw data twice (once from the volunteer, and once from the Project Coordinator). Volunteer workbooks should be double-checked for accuracy and completion once received from volunteers. Once volunteer data has been reviewed and proofed for errors, the workbooks should be combined into one file by simply copying and pasting into a new workbook that will serve as the main data workbook. The data workbook should consist of at least five sheets labeled: Weather Data, Trap Data, Frog Call Data, Marsh Bird Call Data, and Visual Observations.
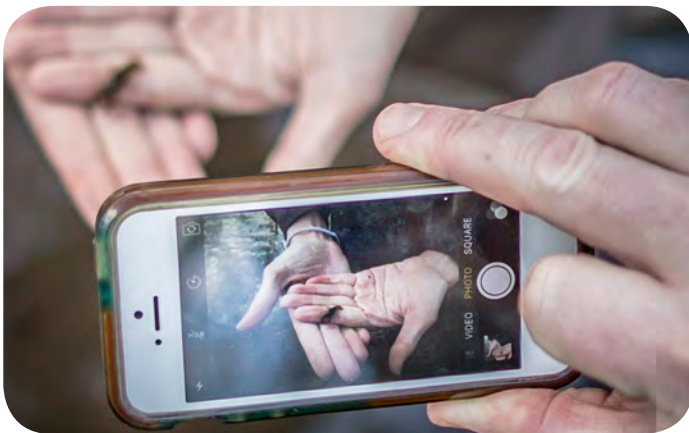
The "Weather Data" sheet should have the following column headings:

- Surveyor – name(s) of all participating volunteers
- Date – indicating the date of the survey that was conducted
- Session – indicating the trap session (4-5 days per session) or visual encounter survey number
- Site name – includes property name and wetland ID
- Start time – the start time of the survey
- Air temperature (F) – the air temperature at the start of the survey
- Water temperature (F) – the water temperature at the start of the survey
- Wind – corresponding wind code from Beaufort Wind Scale (provided in resource binder and protocols)
- Sky – corresponding to sky code descriptions in survey protocols
- Last rain (days) – indicating when the last day it rained was prior to the survey, 0 indicates that it has rained within the past 24-hour period
- End time – time of survey completion
- Comments – volunteers may wish to include comments on water level, habitat, disturbances, etc.

The "Marsh Bird Call Data" sheet should have the following column headings:
- Surveyor – name(s) of all participating volunteers
- Date – indicating the date of the survey that was conducted
- Session – indicating the number of the survey at the point
- Site name – includes property name and wetland ID
- Start time – the start time of the survey
- Point number – indicating the point at which species detections were made
- Species – common name of species
- Observation type – indicating whether a species detected visually or heard calling
- Minute observed – indicating what minute during the 11-minute survey a species was observed
- Other observations/notes

DATA MANAGEMENT
Digital Data Workbook

The "Trap Data" sheet should have the following column headings:

- Surveyor – name(s) of all participating volunteers
- Date – indicating the date of the survey that was conducted
- Session – indicating the trap session (4-5 days per session)
- Site name – includes property name and wetland ID
- Species – common name of species detected
- Columns designated Trap 1, Trap 2, Trap 3, Trap 4, Trap 5 – to be filled with a number value for the number of observed species within each corresponding trap
- Sum Count – Trap 1 + Trap 2 +Trap 3 +Trap 4 +Trap 5 equals the sum count
- N Traps – the number of traps collected during the survey, this value should always equal 5 unless monitors are using more than 5 traps
- Photo voucher – the file name of the photo voucher for the specimen
- Other observations/notes

The "Frog Call Data" sheet should have the following column headings:

- Surveyor – name(s) of all participating volunteers
- Date – indicating the date of the survey that was conducted
- Session – indicating the number of the survey at the point
- Site name – includes property name and wetland ID
- Start time – the start time of the survey
- Point number – indicating the point at which species detections were made
- Species – common name of species
- Call index – a value indicating the estimated level of individuals calling
- Distant calls – indicating species heard calling from a wetland that is not the focus of the survey
- Other observations/notes

The "Visual Observations" sheet should have the following column headings:

- Surveyor – name(s) of all participating volunteers
- Date – indicating the date of the survey that was conducted
- Session – indicating the trap session (4-5 days per session) or visual encounter survey number
- Site name – includes property name and wetland ID
- Species – common name of species detected (based on visual identification of egg masses or adults), does not include animals caught and recorded in the "Trap Data" sheet
- Life stage – if applicable, indicate life stage of species detected (i.e. adult, juvenile (tadpole), egg mass), each life stage should be recorded in its own row
- Number – indicate number of species observed outside of traps or during visual encounter surveys (i.e. egg mass count)
- Photo voucher – the file name of the photo voucher for the specimen
- Other observations/notes

Data from the macro-invertebrate scoop surveys can be entered into the sheet for "Visual Observations". The life stage, number, and photo voucher fields will not be applicable for macro-invertebrate surveys. For the "Trap Data", "Frog Call Data", "Marsh Bird Call Data" and "Visual Observations" sheets include the following instructions in row at the top of the sheet: For each date, use a new row for each site and species.

It is important that all survey data be recorded and entered into the data workbook, even if no species detections were made during a survey. No data is still good data!

DATA MANAGEMENT

4.3 Species Observation Master Database (optional, but recommended)

Once raw data sheets are digitized and the data compiled into the main data workbook, the "Species Observation Master Database" can be created. The Species Observation Master Database (SOMD) will contain one record of each species observed per wetland per year. It is this database that is most conducive for file sharing and importation into ArcGIS. The database should include the following column headings to be populated:

- Date – indicating the date of the species observation
- Site name – includes park/property name and wetland ID
- Surveyor – name(s) of all participating volunteers
- Latitude – east-west unit of location coordinate (in decimal degrees)
- Longitude – north-south unit of location coordinate (in decimal degrees)
- Taxa – taxa of observed species (i.e. frog, turtle, fish, invertebrate, mammal, bird…)
- Species – common name of species detected
- Latin name – formal name of species, genus-species
- Photo voucher – the file name of the photo voucher for the specimen
- Notes – additional notes on the observation, habitat, behavior, etc.

4.4 Annual Data Summary (optional, but recommended)

While not required, it is recommended that organizations conducting wetland monitoring, whether it be solely with internal staff or with volunteers, create an annual report summarizing the results of the wetland monitoring season. This summary can be inserted into existing annual reports, shared with partner organizations and volunteers, and even used in future grant applications. Summaries should, at minimum, include the number of volunteers that participated (if applicable), hours donated (if applicable), the total number of wetlands monitored, and the total number of species detected and their conservation status (i.e. species of local conservation interest, statewide special concern, threatened, endangered).

4..5 Photo Voucher Database

Creating a photo voucher database provides a permanent record of observed species with evidence that can be verified. These photo vouchers and physical specimens, if collected, can be incorporated into existing museum catalogs as well. The Program Coordinator should file photo vouchers as received by volunteers and store them within folders separated by taxa, then by location, then by specific occurrence. The file name of each photo voucher should follow the format (acronyms are okay to use if needed): Location_ WetlandID_Species_Date

For example, a Digger Crayfish found in pond number 90072 at Oak Creek Parkway on 4-27-2017 would be saved as: OCP_90072_DiggerCrayfish_4-27-17
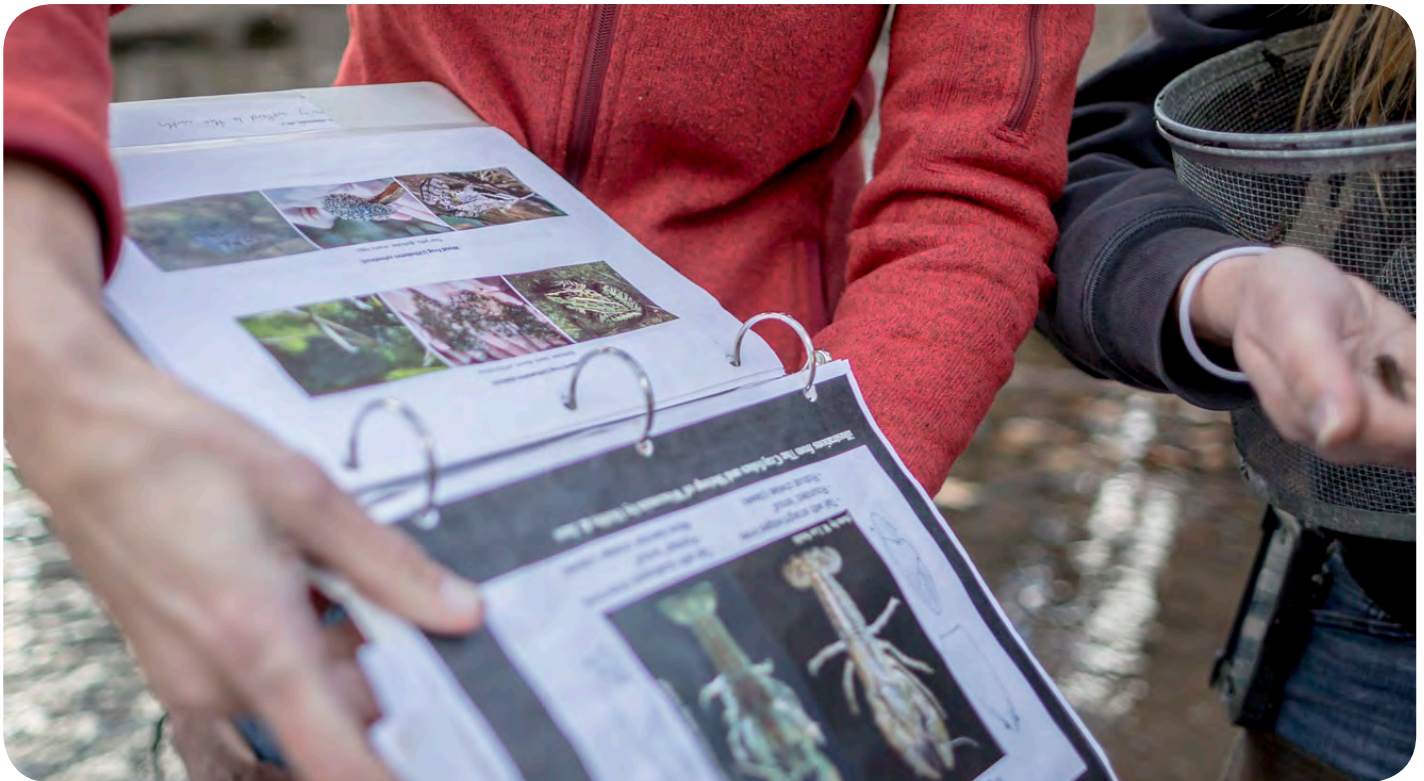
Complete photo vouchers often include several photos that display different diagnostic markings and views. It is good practice to include photos of the dorsal, ventral, and lateral side of a species. Additional photos displaying diagnostic patterns and body parts should also be included. See Appendix C for a detailed procedure on taking adequate photo vouchers.

CLOSING STATEMENT

It is appropriate to modify the methods and protocols described in this guidebook to meet the needs of your organization and characteristics of the wetland(s) being monitored. It is recommended that any modifications of methods be done in consultation with regional experts (e.g. herpetologists), university researchers, or local naturalists.

Good luck, and enjoy your wetlands!

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