ATTACHMENT E

The text that follows herein is a Report, entitled “Draft Conceptual Framework of Recommendations for Monitoring Amphibian and Reptiles Using Non-Calling Surveys and Volunteers,” prepared by Yu Man Lee, August 2012. Michigan Natural Features Inventory. Lansing, MI. 21 pp. with appendices.

The entire 130 pp. report is available from:

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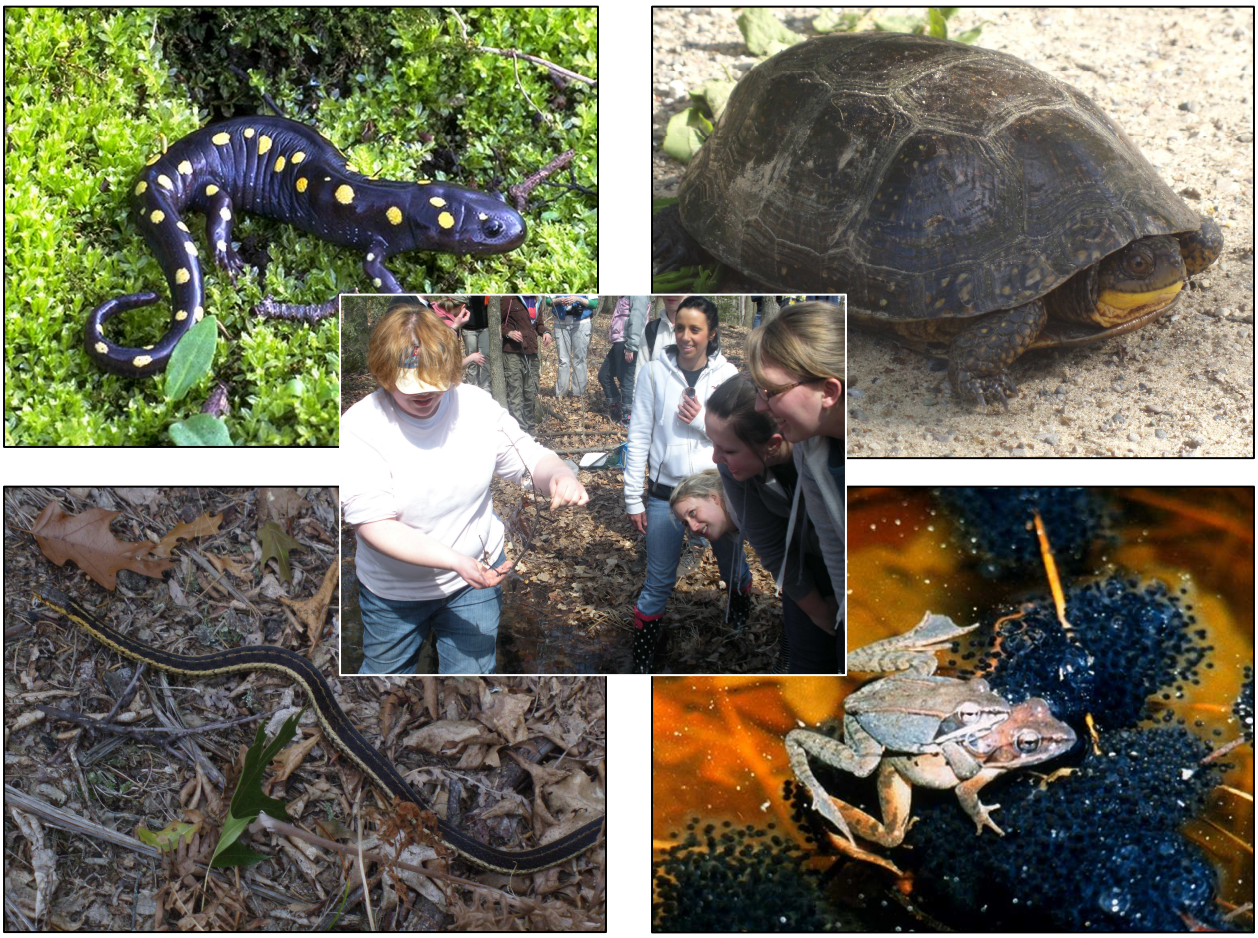
# Draft Conceptual Framework of Recommendations for Monitoring Amphibians and Reptiles Using Non-Calling Surveys and Volunteers

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Cover photographs:
Top left – Spotted Salamander (*Ambystoma maculatum*). Photo by the Vernal Pool Association.
Top right – Blanding's Turtle (*Emydoidea blandingii*), Photo by Yu Man Lee.
Bottom left – Eastern Garter Snake (*Thamnophis sirtalis sirtalis*). Photo by Yu Man Lee.
Bottom right – Wood Frogs (*Lithobates sylvaticus*) in amplexus and egg masses. Photo by the Vernal Pool Association.
Center – Students from the University of Michigan-Flint conducting herp surveys as part of pilot volunteer testing effort in 2011. Photo by Yu Man Lee.

# DRAFT CONCEPTUAL FRAMEWORK OF RECOMMENDATIONS FOR MONITORING AMPHIBIANS AND REPTILES USING NON-CALLING SURVEYS AND VOLUNTEERS

## INTRODUCTION

All states in the continental U.S. have included amphibian and reptile (i.e., herpetofauna or herps) Species of Greatest Conservation Need (SGCN) in their State Wildlife Action Plans (WAP's) as taxa which are either poorly studied or in need of better management. These species are particularly vulnerable given their narrow home ranges or specialized habitat or life history requirements in the face of increased habitat loss and modifications due to development and other threats including climate change. In addition, herpetofauna face unique challenges such as the trade demands for amphibians and reptiles (i.e., for pets and commercial food trade) and related regulatory issues. Baseline information for amphibians and reptiles is generally lacking in comparison to other vertebrates. Furthermore, only about one-third of the 50 states have dedicated staff charged with management of amphibians and reptiles; other states and territories rely on their general biologist staff, many of whom have little specific background or expertise with amphibians and reptiles. As a result, there is a need for basic tools and resources to provide information on amphibians and reptiles at a broad scale, which in turn can assist management at a local scale.

Monitoring the status and distribution of amphibian and reptile populations and the response of these populations to environmental change is critical for effective conservation and management of these species. While states recognize the importance of monitoring, limited resources and expertise, lack of baseline information, and challenging life histories or ecology of some species have made it difficult to implement monitoring efforts for many amphibians and reptiles, particularly on a broad scale. Many states currently do not have adequate resources to inventory and monitor for amphibian and reptile species. Given dwindling budgets and increased costs for services, states are often seeking opportunities for volunteers to assist in data collection. The U.S. Geological Survey (USGS) has developed and tested plans and conceptual designs for monitoring amphibians, with programs such as the North American Amphibian Monitoring Program (NAAMP), which uses volunteer surveyors for data collection on calling frogs and toads. Similar efforts to monitor the status and distribution of other amphibians and reptiles, particularly non-calling species, are needed.

To address this need, we have developed a draft conceptual framework of recommendations for monitoring amphibian and reptiles utilizing non-calling or non-auditory surveys and volunteers. To develop this framework, we compiled and reviewed information from past and current amphibian and reptile inventory and/or monitoring programs that have utilized non-calling surveys and volunteers. These programs were identified and compiled in response to a request for examples of such programs that was sent to Partners in Amphibian and Reptile Conservation (PARC) members, state herpetologists, and other lead contacts for amphibians and reptiles in state agencies. Additional examples of herp inventory and/or monitoring programs, particularly those utilizing non-calling surveys and volunteers, were identified through a literature review and online search. We compiled the following information on the volunteer-based herp inventory and/or monitoring programs: targeted species or taxon group; state(s) in which the monitoring program is conducted; spatial extent or scale of the monitoring program; goal or objective of the monitoring program; inventory/monitoring technique(s) used; sampling design; number of volunteers; volunteer training

and evaluation or data evaluation; program success, strengths, challenges or lessons learned; lead and partner agencies/organizations; monitoring program duration; annual program cost; data analysis and storage; if the state has a herp atlas; and if so, where the herp atlas is stored or managed, and if the monitoring data are included in the herp atlas. We also requested and compiled copies of monitoring protocols when they were available. We used information from these programs to identify non-calling survey and monitoring techniques and protocols that can be utilized in volunteer-based amphibian and reptile monitoring programs.

In developing the framework, other sources of information also were consulted. We compiled and examined other volunteer-based wildlife monitoring programs to obtain additional information on utilizing volunteers for wildlife monitoring and general monitoring issues or sampling designs. We also examined additional references related to herp inventory and monitoring and wildlife monitoring in general, working with volunteers or citizen scientists, and evaluations of volunteer-based herp or wildlife monitoring programs. We met and/or consulted with amphibian and reptile and other wildlife monitoring experts, sampling design experts, and statisticians from various state and federal agencies, universities, Partners in Amphibian and Reptile Conservation (PARC), and other organizations, primarily in Michigan and the Midwest, to discuss sampling design and statistical considerations and provide recommendations for the monitoring framework. We also conducted field testing of some of the recommended amphibian and reptile survey and monitoring techniques using volunteers in Michigan to provide additional insights and suggestions.

This conceptual framework provides recommendations for developing effective and robust amphibian and reptile monitoring programs using non-calling surveys and volunteers based on information from the herp monitoring programs that were compiled and examined, other volunteer-based wildlife monitoring programs, expert input, additional monitoring references, and results of the volunteer pilot effort in Michigan. The goal of this framework is to provide recommendations for developing volunteer-based herp monitoring programs that maximize data quality, maximize efficiency, and minimize bias by identifying herp monitoring techniques, protocols, and sampling designs for use with volunteers that are effective, relatively simple, economically efficient, and scientifically defensible. The framework first provides a general overview and summary of findings from the volunteer-based herp monitoring programs that were submitted and/or compiled. It is important to note, though, that the monitoring programs that were compiled and summarized for this effort do not represent a complete or exhaustive list of all volunteer-based herp monitoring programs that have been conducted, and additional examples of such programs were likely missed. The framework also provides a summary of expert feedback regarding sampling design and statistical defensibility, and results from the pilot volunteer effort in Michigan.

The monitoring framework and associated recommendations, once reviewed and finalized, will be provided to all state wildlife agencies and other partners and stakeholders interested in developing and/or implementing amphibian and reptile monitoring programs using volunteers. The goal is to provide this information to help states develop and implement amphibian and reptile monitoring programs to address their State WAP's. This also will help facilitate coordination and collaboration among states by providing information on recent or ongoing herp monitoring efforts and providing recommendations that could lead to initiation of similar monitoring efforts across states. Improved information on the status and distribution of amphibians and reptiles will enhance the effectiveness of herp management and conservation efforts. Enlisting the help of volunteers also would help engage more people and get them interested and involved in herpetofaunal conservation.

## GENERAL OVERVIEW/SUMMARY OF FINDINGS FROM EXAMPLE PROGRAMS

- Overall, 63 examples of amphibian and reptile inventory and/or monitoring programs or projects using non-calling surveys and volunteers were submitted and/or compiled (see Appendix A – Herp Monitoring Program Summary Table). Three additional volunteer-based frog and toad monitoring programs that rely on auditory surveys also were compiled and consulted. The following is an overview of results or findings based on information provided by or available on the volunteer-based inventory and/or monitoring programs utilizing non-calling surveys that were submitted and/or compiled, although some information was not provided by some of the programs. Again, it is important to note that these programs do not represent a complete or exhaustive list of all volunteer-based herp monitoring programs targeting non-calling species that have been conducted, and additional programs exist or have been conducted.

- <u>Goal of the program</u>
  - Of the 63 example programs that were compiled, 14 of the programs indicated the goal of the program was inventory, 13 programs indicated the goal was monitoring, 31 programs indicated the goal was both inventory and monitoring, and 5 programs indicated the goal was other than or in addition to inventory and/or monitoring. This included research, stewardship, and testing of volunteer proficiency.

- <u>Regional distribution of programs</u>
  - The amphibian and reptile inventory and/or monitoring programs utilizing volunteers and non-calling surveys that were submitted or compiled were distributed fairly evenly geographically across the U.S. with 18 programs from the eastern U.S., 18 programs from the Midwest and Great Plains, and 17 programs from the western U.S. Additionally, 10 international monitoring programs based in countries outside the U.S. were submitted or compiled. These volunteer programs were conducted in 30 different states or provinces and 8 different countries. Sixteen of the states, provinces, and countries outside the U.S. had multiple monitoring programs within their state, province, or country.

- <u>Spatial/geographic scale or scope of programs</u>
  - Programs varied in spatial or geographic scope or focus, but most programs had a statewide or local geographic focus. These included 1 internationally-focused program, 4 nationally-focused programs, 3 regional programs (i.e., programs conducted across or within multiple states/provinces), 29 statewide programs, and 25 locally-based or locally-focused programs (i.e., conducted at one or several sites or within a small area within a state).

- <u>Target herp group(s)</u>
  - About half of the programs/projects included inventory and/or monitoring of multiple species or taxa groups (e.g., all native herps or pond-breeding amphibians), while the other half focused on one or two species or a single taxon group.
  - 37 programs included inventory and/or monitoring of frogs and toads (some programs included auditory surveys), 33 programs included inventory and/or monitoring of salamanders, 27 programs included turtles/tortoises, 23 programs included snakes, 21 programs included lizards, and 1 program included alligators.

- Methods/techniques
  - 42 of the 63 programs (67%) utilized multiple sampling methods/techniques.
  - 11 of the programs (17%) let the volunteers choose the survey methods/techniques they would like to use. These included programs that let volunteers choose among a set of optional methods (generally limited to methods that did not require trapping or handling animals without a permit) or compiled incidental observations from volunteers (e.g., herp atlas programs, box turtle surveys).
  - The most common method or technique across all herp groups was visual encounter surveys. Additional sampling methods/techniques were utilized in the various programs.

- Sampling design/approach
  - 24 of the 63 programs (38%) let volunteers select the survey/monitoring sites (e.g., herp atlas programs, inventory programs interested in basic data/information on species presence, species richness/composition, and species distribution)
  - 29 programs (46%) selected and targeted specific sites for surveys/monitoring and recruited volunteers to survey or monitor those sites.
  - 12 programs (19%) set up a sample design ahead of time (e.g., systematic, simple random, or stratified random), and assigned volunteers or let volunteers choose from systematic or randomly selected survey/monitoring sites.

- Number of volunteers
  - Ranged from a fairly small number of volunteers (<10-50) to large numbers of volunteers (200/300 to 1,000+) for some programs, depending on program goal, need/scope, duration, etc.

- Training and type of training
  - 35 of the 63 programs (56%) indicated that training was provided to volunteers. 16 of the programs (26%) responded that training was not provided to volunteers, and the remaining programs did not respond or indicate whether training was provided.
  - The type of training that was provided to volunteers varied. This included training workshops in the classroom (19 programs) and/or in the field (10 programs), working with experts in the field (15 programs), training or informational materials/resources (14+ programs), and ongoing consultation with experts (6 programs).
  - 20 of the 35 programs that provided training to volunteers offered multiple training opportunities for their volunteers (e.g., training workshops in the classroom and in the field, or training workshops, working with experts in the field, and training materials/resources).
  - Some programs did not indicate that training was provided but did have some information or resources available online on their websites. These programs may not have indicated this in the survey because they might have viewed training as active training (e.g., training workshops).

- Data evaluation
  - 25 of the 63 programs (40%) indicated that the program included some method of actively evaluating the data submitted by volunteers or evaluating or testing the volunteers' skill/ability to accurately identify species or collect requested data.
  - Programs evaluated volunteer data and/or their skills/abilities in various ways which included the following:
    - Expert verification or review of the data (12 programs)
    - Photo documentation or submission of other materials (e.g., video, specimen, shed snake skin) (11 programs)
    - Formal or informal testing (e.g., online quiz, in-person classroom testing, field test) or interviews of the volunteers (8 programs)
    - Multiple visits to the same sites by different surveyors (1 program)
    - Working with experts at regular intervals (1 program)
    - Rating volunteers/observers based on their level of experience (e.g., novice, 1 year experience, 2+ years experience; 1 program).
  - Five of the programs employed more than one method of evaluating volunteer data or skills/abilities (e.g., online quiz and photo documentation).
  - Only seven of the programs reported results of their volunteer testing/data evaluation. Six of the seven programs reported favorable results, indicating volunteers were able to identify species or carry out designed measurements accurately (e.g., one program reported 89% of the herp records submitted were verifiable and accepted). However, these programs also indicated accuracy of volunteer data may vary depending on the type of data collected (e.g., one program reported species identification data more reliable than population size data), and may vary by species or life stage (e.g., one program reported volunteer proficiency varied by salamander species and life stage).

- Program successes and strengths
  - 47 of the 63 programs compiled (75%) indicated their inventory and/or monitoring program was successful or partially successful, although six of the programs are still in the early stages of the program (i.e., only 1-3 years into the program). One program indicated the success of the program was still to be determined, and the remaining programs did not respond.
  - Program success was defined in a number of ways which included the following successes and strengths:
    - *Volunteer response/engagement* – Responses from 14 programs indicated that a success of the effort was increased public or community involvement, support, or interest in sound science and amphibian and reptile inventory, monitoring, field research, and/or conservation. Several programs also cited a success of the program was that it provided opportunities for educators to involve their classrooms and for students to get involved in field research.
    - *Education and outreach/increased knowledge and awareness of herps* – Responses from 12 programs indicated that part of their programs' success was advancing education and outreach and increasing knowledge, awareness and appreciation of amphibians and reptiles.
    - *Enhanced data collection* – Responses from 29 programs indicated the volunteer programs were successful in enhancing data collection efforts in

terms of collecting increased, good quality data and/or data that would generally be difficult or more difficult to obtain (e.g., observations of rare or cryptic species, long-term monitoring data, data over extensive geographic areas, and large quantities of data over a short time period).

- *Financial benefit* – Responses from 7 programs cited financial benefit as a success of their programs primarily in terms of being able to acquire substantial and good quality data at minimal cost. One program also utilized volunteer hours as non-federal match for federal funding that helped support the program.
- *Conservation benefit* – Responses from 13 programs indicated their programs were successful because the data or volunteer efforts associated with their program assisted with management, protection, conservation, or recovery efforts of amphibian and reptile populations and/or their habitats.

- Challenges/lessons learned
  - 32 programs responded and identified challenges or lessons learned primarily associated with three main themes: 1) data collection, submission and/or evaluation; 2) technical or logistical challenges; and 3) volunteer recruitment, coordination, training and/or retention. The following summarizes the number of programs and examples of challenges and lessons learned associated with these three main themes.
  - Data collection, submission and/or evaluation – 22 programs
    - Some programs reported limitations on the types of data that volunteers can collect, techniques that volunteers can employ, areas that volunteers can survey, and use or value of the data. For example, in some programs, volunteers provide presence-only data, inventory data (as they're not allowed to mark, measure, etc. without a permit which most volunteers do not have), and/or incidental reports. These types of data can provide an overall picture of distribution, but do not necessarily provide good insight into the health of populations, particularly for long-lived species such as turtles. Also, volunteers may select or may be assigned to sample sites that are easy to access or opportunistic, which can bias or limit the use of some data.
    - Some herp species or taxa groups are more challenging to find and/or identify, and have not been as well-represented as other species or groups in some inventory and/or monitoring programs. For example, one program reported that salamander and lizard records have not been as well represented as anuran records (most likely because anurans can be detected by sight and sound). The program has employed several strategies that have been helpful in increasing records for the underrepresented taxa including the availability of real-time data through the herp atlas database which has allowed participants to be informed of the disparity in the record counts for the different groups, and sharing information with participants on how to survey for the underrepresented groups, which has resulted in an increase in record counts for salamanders and lizards. Another program found that larval salamander species and even some adult salamander species were difficult for volunteers and even experienced biologists to distinguish. The program found that volunteers could improve their proficiency with additional training focused on the more difficult to identify species and life stages, particularly if

the training could include better methods for discrimination among similar species/life stages to reduce identification errors.
    - Sampling protocol development is difficult and expensive, but necessary for good data. Also, it is important to design a sampling approach that is robust and meaningful, but also needs to be acceptable to volunteers. Rigorous methods are not implementable by the public, and lack of systematic distribution can produce skewed results if analysis is not appropriate.
    - Several programs reported low data return rates (e.g., <10-25% of the volunteers submitted data), particularly with null/negative data.
    - One program indicated as a lesson learned having citizens create a photo library of the amphibians they catch and having those identified by an expert before submitting data.
    - Three programs reported challenges with transitioning from hardcopy materials to online registration and data submission after the program started. The process can be slow, and having to enter a backlog of hardcopy data and getting the volunteers to transition from mailing in data forms to uploading data online can be challenging. The development of engaging technological infrastructure also is resource-intensive.
- Technical/logistical challenges – 3 programs
    - One program reported issues with placing their sampling equipment (refugia/PVC pipes) at ecotone or stream's edge with flooding/drought and how this would influence their captures and data.
    - Ensuring everyone disinfects all of their equipment prior to surveying a new site can be challenging.
- Volunteer recruitment, coordination, training and retention – 14 programs
    - Working with volunteers requires a lot of work (e.g., recruiting, training and coordinating volunteers, providing feedback to volunteers). One program notifies volunteers when to survey which can be very challenging because weather conditions change rapidly and microclimates vary widely.
    - One program reported “word-of-mouth”, or rather passing-on/forwarding emails, proved to be an effective means of advertising and recruiting volunteers. Traditional media did not seem to an effective means of advertising web resources.
    - Getting enough volunteers, especially those who were good quality, knowledgeable and willing to dedicate sufficient time and effort, was a challenge for some programs. Two programs needed knowledgeable people or experts to work with or manage smaller groups of volunteers. It was sometimes challenging to get enough knowledgeable volunteers or experts and enough surveyors in general in order for all sites to be surveyed or to ensure methods worked smoothly and high quality data were collected.
    - Having a main contact that the volunteers can call for support would be helpful.
    - Providing training to volunteers before sending them out to the field is very important. Volunteers must be well-trained for certain data collection efforts.
    - Retaining volunteers requires regular communication between the project management team and data collectors. One program indicated that a monthly electronic newsletter and a social networking website have been valuable tools to retain volunteers and increase communication.

        - Maintaining or securing ongoing funding for volunteer training, staffing, and especially retention of volunteers was an issue for several programs.
        - One program indicated the more rigorous the volunteer program, the more likely it is to lose out to other volunteer programs that may be more educational-focused and less scientifically rigorous.
        - Working with partners takes time and can be challenging sometimes.

- <u>What programs would do differently</u>
    - 14 programs identified items their programs would do differently. These items were primarily related to data collection and submission and working with volunteers and partners. A couple of items from the monitoring programs that focus on auditory surveys for frogs and toads also are included.
    - Data collection, submission, and/or evaluation
        - Expand number of sampling sites and increase monitoring efforts throughout the year.
        - Incorporate submission of digital photos for data verification.
        - Incorporate web-based reporting and online data submission/data entry, particularly at outset of program. Create a database for volunteers to access online to enter their data for review by a biologist to save agency biologist time entering data.
        - Modify sampling scheme – e.g., develop more systematic survey method to identify unoccupied habitat, or more area-based than pond-based.
        - Employ less intensive protocols. Plot sampling may not be the best (too intensive) for volunteer monitoring efforts.
        - Have more balanced coverage spatially across geographic area of interest.
        - One program indicated it may better to use volunteers for simple monitoring program and focus on education, and use agency personnel for systematic inventory.
    - Working with volunteers and partners
        - Provide additional training and streamline training – e.g., provide additional training materials to help streamline data collection (e.g., checklist of attributes), focus more on difficult to identify species and life stages and better methods for discriminating among similar species/life stages to reduce identification errors.
        - Specify program expectations and schedule for reporting back to volunteers more clearly from the outset.
        - Work more with partners/other interested organizations (e.g., PARC).
        - Identify a dedicated, ongoing revenue stream.

- <u>Lead agencies/organizations</u>
    - The lead agencies or organizations for the volunteer-based inventory and/or monitoring programs that were submitted or compiled consisted of eight different types of agencies or organizations. A summary of the number of programs led by the different types of agencies/organizations is provided below:
        - Federal government agency – 7 programs
        - State government agency – 20 programs
        - Local government agency – 1 program
        - Environmental education center/nature center – 5 programs

- Zoo/aquarium/museum – 4 programs
- University – 6 programs
- Other non-governmental organization/conservation group – 13 programs
- Private consultant – 2 programs

- Partners
  - 35 of the 63 programs collaborated with partners.

- Duration of program
  - Program duration ranged from 1 year or less to over 20 years. Most of the programs that responded have been between 2 and 10 years in duration, and eight of the programs have lasted over 10 years. The following is summary of the duration of programs that provided data:
    - 1 year or less – 6 programs
    - 2 - 5 years – 18 programs
    - 6 -10 years – 12 programs
    - 11 – 15 years – 5 programs
    - 16 – 20 years – 2 programs
    - 20+ years – 1 program

- Annual program cost
  - Only 19 of the 63 programs responded and provided data on this. Annual program costs ranged from <$1,000 to $50,000 to $75, 000. An additional program reported a cost of $20,000 in the first 1.5 years of the program, but not sure this will be annual program cost. The following is a summary of annual program costs and number of programs based on those that provided data:
    - <$1,000 – 4 programs
    - $1,000 - $5,000 – 6 programs
    - $6,000 - $10,000 – 4 programs
    - $21,000 - $25,000 – 2 programs
    - $31,000 - $40,000 – 1 program
    - $50,000 - $75,000 – 1 program

- Data analysis and storage/maintenance
  - Only 43 of the 63 programs responded and provided information on who analyzes and stores or maintains the inventory and/or monitoring data for the program.
  - In all but four cases, the lead agency/organization for the program (or a representative from the lead agency) also analyzes and stores/maintains the data. In the four cases in which the lead agency/ organization did not analyze and/or store the data, it was a partner agency or individual that analyzed or stored the data.
  - Three programs involved students in data analysis, but most programs had professional staff and/or other experts analyze the data.

- Herp Atlas
  - The programs that were compiled indicated active or ongoing herp atlases in 9 states in the U.S. (Florida, Georgia, Kentucky, Maryland, Michigan, Montana, New Hampshire, Pennsylvania, Wisconsin), 2 provinces in Canada (Manitoba and

Ontario), and 2 countries outside the U.S. Two additional states/provinces (Ohio and Alberta, Canada) indicated their states/provinces have herp atlas field guides.

- Additional state herp atlases exist in the U.S. but are not included in the program summary table because they did not respond to the initial request for example programs and were identified after the programs were compiled. These include the Carolina Herp Atlas and the Kansas Herp Atlas. Additional herp atlases may exist.

## SUMMARY OF FEEDBACK FROM EXPERT MEETINGS/WORKSHOPS

- The following is a summary of expert input or feedback regarding amphibian and reptile monitoring methods and approaches using non-calling surveys and volunteers, sampling design, volunteer/data evaluation, statistical defensibility/considerations, and recommendations for the monitoring framework. We held several meetings with herp experts, monitoring experts, sampling design experts, statisticians, biologists, and managers from various state and federal agencies, universities, Partners in Amphibian and Reptile Conservation (PARC), and other organizations, primarily in Michigan and the Midwest, to discuss issues, challenges, and recommendations that we should consider and address in the monitoring framework. The first meeting was held at the Midwest PARC meeting in 2009, and included herp experts, other wildlife monitoring experts, biologists, managers, and researchers. A meeting with statisticians from the Michigan Department of Natural Resources and the Michigan Natural Features Inventory, Michigan State University Extension was convened on September 30, 2010 at the Association of Fish and Wildlife Agencies' annual meeting in Grand Rapids, Michigan to discuss sampling design and statistical considerations for the monitoring framework and recommendations. A follow-up workshop occurred in East Lansing, Michigan on April 4, 2011. This workshop included faculty members, statisticians, and herp experts from Michigan State University, University of Michigan-Flint, Northern Illinois University, Michigan Department of Natural Resources, Toledo Zoo, Herpetological Resource and Management, Michigan Natural Features Inventory, and Association of Fish and Wildlife Agencies/PARC.

- <u>General recommendations/considerations for developing and implementing an effective volunteer-based herp monitoring program</u>
  - It is critical to identify the goals and objectives of the monitoring program, basic reason(s) for doing the monitoring, and what types of data, information, or results you would like to get out of the monitoring program or what you are going to do with the data (e.g., conservation goal or management question) before designing and developing the monitoring program. It also is critical to identify the minimum data needed to meet the program's goals and objectives.
  - It is important to recognize and understand that there are different goals or types of monitoring (e.g., surveillance/ baseline/status monitoring, trends monitoring, effects monitoring, effectiveness or evaluation monitoring for adaptive management), and to clearly identify the specific goal(s) or type(s) of monitoring the program is going to address up front.
  - Sampling/monitoring has to be tied to questions and time frame of interest.
  - Be agile, flexible, and realistic. Be straightforward about assumptions.
  - Partner or work closely with a statistician/biometrician.

- Sampling design recommendations/considerations
  - Sample unit/site selection depends on the sample method. First define the sample unit, which is defined by the survey/monitoring method(s), and then define the sample frame (i.e., all possible sample units). For example, if monitoring frog populations using breeding frog call surveys from the road, then the sample unit would be a roadside route/stretch or road.
  - Sample units can be species- or place-based. Space/location and time should also be part of the sampling frame. An octagon/hexagon sample grid may be a good design but depends on the sample method(s).
  - Habitat assessment also could be part of the sampling design.
  - If the goal of the monitoring program is to assess or determine population status and trends or response to environmental variables across an area or region (e.g., across the entire state or species range), sampling has to be based on a probabilistic or probability-based sampling design (i.e., sample sites are randomly selected from the set of all possible sites within a region).
  - If the goal of the monitoring program is primarily to increase public awareness, then a probabilistic sampling design is not needed, and another sampling design can be used (e.g., sample sites can be haphazardly selected or selected based on a particular criteria or access).
  - Probabilistic sampling design is critical, but getting volunteers to conduct surveys also is critical, so may need to find a way to balance the two needs. Some programs have found ways to balance these two needs. For example, some programs have randomly generated survey sites and have allowed volunteers to select the sample sites they would like to survey from the randomly generated sites (e.g., North American Amphibian Monitoring Program (NAAMP)), or have assigned volunteers to randomly selected survey sites within a certain distance of a volunteer's residence (e.g., British National Amphibian and Reptile Recording Scheme (NARRS)).
  - Letting volunteers select from randomly selected sites, however, could potentially lead to some bias in the data. For example, for NAAMP, routes in or near urban areas were selected and sampled more frequently than routes farther away from urban areas. But there are ways to address and deal with this bias (e.g., stratify and weight data appropriately), or acknowledge bias and interpret results accordingly. Another option could be to potentially limit choices for volunteers (e.g., maybe only provide routes in area(s) of interest). A stratified random sampling design also could be applied in which the state could be stratified or divided into several regions or quadrants, and sample sites could be randomly selected within each region or quadrant to assure sample units are distributed throughout the state and randomly generated, and then assign or let volunteers pick sample unit(s) within a particular region or quadrant. However, if the goal of the program is to increase public awareness and engagement, then it might be okay to let volunteers select survey sites if this means they will be more likely to participate in the monitoring program.
  - Sampling design and data analysis will need to be able to handle flexibility and changes in monitoring sites and volunteers as volunteers come and go, monitoring sites are added or dropped, and/or monitoring sites may change over time due to changing conditions. If the goal/objective is to monitor and detect broad-scale trends in distribution and abundance, a mixed model or mixed panel sampling design is recommended or a good option for dealing with this. A mixed-model sampling design includes some fixed sites and some sites that are not fixed (i.e., not sampled

every year or as frequently as fixed sites). This sampling design is more effective than monitoring just fixed sites for detecting broad-scale trends. A mixed panel design also allows both inventory and monitoring by surveying new or additional sites every year. For example, the MDNR Fisheries Division uses a mixed panel design in their fish/stream monitoring program in which some streams are considered core sites and are monitored annually while some streams are only monitored on a 3-year rotation.

- If the goal/objective of the monitoring program, however, is to monitor and detect trends at particular sites or fixed sites, then a standard repeat survey design where repeated site visits are conducted over time at a fixed or given site is recommended.
- It is important not to drop or exclude monitoring sites where species are currently not detected (non-detection sites) because opportunity for site to become occupied or population to come back in the future.

- <u>Survey design and methods recommendations/considerations</u>
  - Ideally, detection probability should be quantified for volunteers, if possible, and data collection and analysis should be designed or revised based on detection probability.
  - Because of imperfect detection, multiple visits to each sample site are ideal, especially if a longer survey period is available.
  - A double- (or triple-) observer design can be used to address or replace multiple visits but must be an independent design (i.e., observers surveying independently); can be a more efficient option potentially. A double-observer independent design may be a particularly good option to address multiple visits if only a short survey period is available.
  - When volunteer surveyors vary between site visits or years, a double-observer dependent design, where two observers are surveying together and discussing observations as they survey, can help minimize bias, especially if trained and untrained observers are paired.
  - To make valid comparisons over time, survey methods should be standardized as needed depending on taxa and how methods affect detection probability. For example, if detection probability of a species is significantly different in April and May than in July and August, then survey methods should be standardized so that surveys occur in April and May over multiple years.
  - A set survey window and protocols could potentially be identified for volunteer monitoring efforts. For example, herp bioblitzes could potentially be held at multiple sites all on the same day (e.g., Earth Day). Another example is the Center for Snake Conservation's annual spring and fall snake counts in which volunteers are asked to survey and document snakes across North America during a particular week in the spring and fall.
  - Volunteers may come and go, or don't survey or submit data every year. Missing data should be recorded as "missing data" and not "0."
  - Recommendations from experts for non-calling survey methods for particular species or taxa groups that work particularly well with volunteers include the following:
    - Egg mass counts may be difficult/challenging for volunteers and doesn't indicate survival of eggs or salamanders, but may be appropriate for indicating general quality or value of ponds in terms of level of use by salamanders for breeding.

        - Ceramic tile in streams may be a good method for volunteers to survey for stream salamanders.
        - Road cruising for snakes. Road kill should be salvaged if possible.
        - Basking surveys and traps for turtles – Volunteers could help set traps and check traps with experts or experienced surveyors.

- <u>Volunteer recruitment and evaluation/data evaluation recommendations/considerations</u>
    - Recommendations or considerations for volunteer recruitment include:
        - Focus on/utilize existing networks of volunteers
        - Take full advantage of willing volunteers as opportunities present themselves
        - Potential sources of volunteers include zoos, state herp groups or societies, Audubon chapters, state park naturalists program, watershed groups, herpetology professors/academic researchers, college students, high school students
    - Volunteers may be reliable and appropriate to use for monitoring in some cases but may not be as reliable or appropriate for monitoring in other cases or for certain species. For example, volunteers could do a good job monitoring species with high detectability (e.g., more common species) and could help monitor broad-scale trends for more common species with higher detection probability. However, monitoring rare species may need more targeted and increased efforts to overcome low detections, and volunteers may be able to provide the level of effort needed to survey and monitor rare species.
    - The type and rigor of volunteer evaluation/data evaluation efforts depend on the monitoring goal or question, amount of resources available for these efforts, and the level of accuracy and caliber of needed for the data.
        - If the monitoring program requires very high level or caliber of data and resources permit, and if volunteer base is largely inexperienced, then time and resources could be spent to test or evaluate volunteer abilities or proficiency. But if monitoring program doesn't really require very high caliber data, then may be better off investing time and energy into monitoring rather than testing or evaluating volunteers.
        - If monitoring really requires very high caliber data, maybe it should be conducted by professionals rather than volunteers.
        - It also depends on what you are going to do with the data/information – again, sampling has to be tied to questions and time frame of interest.
    - A double-observer design can be used to evaluate volunteer abilities and ensure data quality/reliability, esp. if a more experienced observer is paired with a less experienced observer.
        - For example, the Lake Erie Watersnake Monitoring Program (and several other programs) has experienced professionals or volunteers work with less experienced volunteers.
    - Additional recommendations for ensuring data quality or minimizing bias include:
        - Make sure to record survey effort in some way.
        - Have volunteers enter their own data. This helps them realize what they might have done wrong or didn't fill out in the field.
        - Photo verification
        - Establish a volunteer coordinator

## SUMMARY OF PILOT VOLUNTEER EFFORT

- Pilot testing of a subset of non-calling herp monitoring methods recommended for use with volunteers was conducted with volunteers in the field in Michigan in the spring of 2011 and 2012. Several presentations on the project and volunteer field testing were conducted at various meetings/conferences in 2011, including the annual meeting of the Michigan Chapter of PARC, to recruit volunteers for field testing. Survey methods that were selected for volunteer field testing included visual encounter surveys, egg mass count surveys, dip net/sweep sampling, aquatic funnel trapping, and artificial cover/cover boards. Basking surveys and roadside surveys also were initially selected for testing but were not able to be implemented during the pilot testing effort. Monitoring protocols, field identification handouts, and data forms were developed for the volunteers to use for field testing (Appendix B). An indoor training session and presentation and an outdoor training session in the field were developed and conducted. The volunteer field testing consisted primarily of working with faculty, student and community volunteers from the University of Michigan-Flint and Eastern Michigan University. A total of 47 individuals participated in the volunteer field testing. Volunteer field testing was conducted at one site in southeast Michigan. Volunteer field testing was conducted on April 9 and May 13 in 2011 and on May 14 in 2012. Volunteers surveyed as a group on each of those days. Surveys were conducted in four vernal ponds and surrounding habitats. A volunteer field testing follow-up survey (Appendix B) was developed and administered to solicit feedback from the volunteers on the field testing methods, training, and materials. Survey data and feedback from the volunteers were obtained and compiled in the spring of 2012 (Appendices C and D). Results and feedback from the volunteer field testing were used to revise the monitoring framework and associated recommendations. A summary of the results and feedback from the pilot volunteer effort in Michigan is provided below.

- <u>Volunteer survey data/results</u>
  - Volunteer surveys were able to document a total of 1,344 individual adults, tadpoles, and egg masses of 15 different species over three days of surveys in 2011 and 2012 across all five survey methods (visual encounter surveys, dipnetting/sweep sampling, aquatic funnel trapping, artificial cover, and egg mass counts) (Appendix C). Observed species included one species of special concern and three additional species of greatest conservation need (SGCN) in Michigan.
  - In 2011, a total of 812 individual adults, tadpoles, and egg masses of 15 different amphibian and reptile were documented (Appendix C). Aquatic funnel trapping yielded the highest number of observations, with 586 observations of 6 different species, but wood frog tadpoles comprised 90% of these observations. Visual encounter surveys resulted in the second highest number of observations and the highest number of species observed, with 104 observations of 7 different species, including a species of special concern.
  - In 2012, a total of 532 individual adults, tadpoles, and egg masses of 11 different species were documented (Appendix C). Of the five survey methods, visual encounter surveys detected the highest number of individual observations and the highest number of species (180 observations of 6 different species), followed by dipnetting/sweep sampling (137 individuals/egg masses of 4 different species).

- Volunteer testing evaluation/feedback
  - Only 15 volunteers completed the survey and provided feedback on the pilot testing.
  - Volunteers appeared to be able to successfully conduct all five survey techniques during the pilot testing effort with proper training and guidance. All the volunteers who responded indicated they were able to successfully apply all the survey techniques, although several volunteers requested more specific instructions or clearer protocols, particularly regarding dipnetting/sweep sampling (Appendix D). Three volunteers also commented that the visual encounter surveys did not have pre-defined time or area constraints so had to determine this in the field, and took a long time to mark locations of observations in the field with GPS.
  - Volunteers indicated that they thought they could successfully conduct all or most of the survey techniques on their own if given proper training and materials. Two volunteers expressed some reservations about conducting dipnetting/sweep sampling and egg mass count surveys on their own, because of potential difficulty with species identification. Another volunteer commented that surveys that require identification of tadpoles and larval salamanders would be difficult to apply (Appendix D).
  - Training in the classroom and on-site training appeared to be adequate for the most part, but some volunteers did indicate the need for additional training in the field, especially on how to fill out the data forms, and clearer protocols and data forms.
  - Training materials including the survey protocol and identification guides/handouts and posters were sufficient and helpful for over half the volunteers, but a number of volunteers indicated the need for more identification keys or guides, especially materials that they could use and carry with them for reference in the field. A key to eggs, tadpoles and larvae would be particularly helpful or essential as well as photos showing representatives of each species. Several volunteers also commented on the need for clarification and additional explanation of the survey protocol.
  - Most volunteers were able to successfully fill out the data forms, but a number of volunteers indicated some parts of the data forms were confusing and difficult to complete, and commented that additional training and explanation on how to fill out the data forms would be helpful. Parts of the data forms that volunteers found challenging or needed more explanation included written directions, site description (e.g., habitat use, land use), and map sections. One volunteer suggested providing an example data sheet filled out correctly (Appendix D).
  - 9 of the 15 volunteers indicated they were beginners and had no prior experience surveying for herps. Four volunteers indicated they were novices (1-2 years experience), and only one volunteer had advanced (5+ years) experience.
  - All the volunteers seemed to enjoy the experience, including spending time in the field, surveying for and seeing the animals, and contributing scientific data. Most volunteers indicated they would be interested in participating in additional herp monitoring surveys (Appendix D).
  - Suggestions for potential sources of volunteers include local high school students that need service hours, high school and college biology classes, Boy Scouts and Girl Scouts, universities/university clubs with service requirements, nature centers, and county park systems. Suggestions for ways to recruit volunteers include Facebook, flyers around communities or college campuses, e-mail notifications, and a website.
  - Additional suggestions included conducting only 1-2 survey methods per site to minimize disturbance to the site and time commitment, and keeping things simple.
  - Overall, results of the pilot volunteer testing were favorable and helpful.

## GENERAL RECOMMENDATIONS FOR DEVELOPING AND IMPLEMENTING EFFECTIVE HERP MONITORING PROGRAMS USING NON-CALLING SURVEYS AND VOLUNTEERS

These recommendations are based on what we learned from the example monitoring programs that were compiled, feedback from experts and the pilot volunteer effort, and monitoring references including the Northeast Bird Monitoring Handbook (Lambert et al. 2009), U. S. Geological Survey (USGS) Patuxent Wildlife Research Center's Managers' Monitoring Manual (http://www.pwrc.usgs.gov/monmanual/), Partners in Amphibian and Reptile Conservation (PARC) Inventory and Monitoring Manual (Graeter et al. *In press*), the National Park Service (NPS) Inventory and Monitoring Program's Guidance for Designing an Integrated Monitoring Program (2012), and Director's Guide to Best Practices Programming – Citizen Science published by the Association of Nature Center Administrators (ANCA) (Prysby and Super 2007).

- Clearly define purpose, goals and objectives of the monitoring program up front, and what data or results you would like to get out of the monitoring program including minimum data needed to meet program's goals and objectives.
    - Goals can include inventory and/or monitoring and specific type of monitoring (e.g., surveillance/status, trends, or effectiveness monitoring) as well as education and outreach. An effective and successful volunteer monitoring program balances research and educational objectives (Prysby and Super 2007).
    - Define the problem. Identify and consult with stakeholders. Set a conservation goal. Develop monitoring goal and objectives that are linked to conservation goal.
        - Monitoring objectives should be specific and quantifiable.
    - Consider whether use of volunteers is appropriate and can reliably provide data needed to meet program's goals and objectives.
        - Monitoring with volunteers can be particularly useful for assessing or tracking broad-scale trends in distribution and abundance or collecting coarse-level data over large geographic areas. Broad-scale monitoring data can help identify potential issues/areas that need additional or more intensive monitoring or research by professional or experienced surveyors, researchers or experts. However, volunteers also can provide significant and appropriate assistance with site-level or more intensive monitoring or research in some cases, depending on the study's objectives, methods, and data needs.

- Decide what you are going to monitor – which species, set of species or populations, and what types of information need to be collected about those species or populations.
    - The USGS' Managers' Monitoring Manual provides some guidance on political, philosophical, and biological factors that should be considered. For example, some herp species, taxa groups, or particular life stages of certain species are more challenging to find and/or identify reliably (e.g., salamanders, esp. larvae). This could affect data quality and a program's ability to meet its goals/objectives.
    - Types of information you can collect or monitor include species distribution, population size, other population parameters such as rates of population growth or survival, proportion of area occupied, probabilities of extinction and immigration.
        - Repeated presence-absence surveys to monitor changes in species distributions or occupancy across a landscape, or proportion of area occupied (PAO), may be a good fit for monitoring programs in which volunteers can't

handle or mark animals and primarily collect presence/absence data. This monitoring approach is based on the assumption that changes in abundance will likely correspond to a change in the PAO by the species. This approach is called occupancy modeling, and has gained wider recognition and use in recent years (MacKenzie et al. 2005).

- Determine whether an existing program or protocol meets your needs.
  - Consult with national, regional, state, or local registries or monitoring programs.
  - Need to make sure information from other programs meets your purpose and needs.

- Assemble team of partners or collaborators with complementary interests and skills.
  - Form or participate in a monitoring partnership to help avoid or reduce redundancy and maximize resources. Examples of herp monitoring partnerships include:
    - Wisconsin Salamander Survey – partnership with Audobon Chapters.
    - Georgia Adopt-a-Stream Monitoring added amphibian monitoring to existing stream monitoring conducted by watershed groups – same volunteers, sites, and monitoring visits.
    - Kentucky Herp Monitoring for WAP – The Kentucky DNR is partnering with the KY Herpetological Society (KHS) by providing travel money and supplies (e.g., cover boards) and KHS provides volunteers to conduct surveys/monitoring, and volunteer time is used as match for SWG funds.
  - Engage people with necessary quantitative expertise to assist with development of sampling designs and protocols and analytical methods.

- Build a conceptual model to describe and summarize the relationship of target species or populations to other ecosystem elements, processes and stressors. A conceptual model can help identify important response variables and covariates to monitor.

- Develop a statistically robust approach to sampling and data analysis. Designing and implementing an appropriate sampling design is critical for an effective monitoring program. Detailed explanations or overviews of different sampling designs and monitoring approaches can be found in a number of references, including the PARC Inventory and Monitoring Manual, USGS Managers' Monitoring Manual, NPS' Inventory and Monitoring Program's website, Thompson et al. 1998, and other references.
  - Identify and delineate population of interest or target population.
  - Identify appropriate analytical procedures.
  - Define the sample frame from which sample units will be selected. Sample unit is defined by the survey method. Sample units can be species- or place-based.
  - If main goal of the monitoring program is education and outreach or inventory, the monitoring program can use a less rigid or standardized sampling and study design. If the goal is to monitor status and trends and make comparisons over time at a fixed site and/or across multiple sites, or to evaluate species or population response to environmental variables, a more rigorous, standardized, and/or probabilistic sampling design will need to be developed and utilized.
  - The sampling design also may need to balance statistical considerations with volunteer considerations, such as facilitating sufficient volunteer participation. One approach that has been used to balance a probabilistic sampling design with volunteer participation considerations is to randomly select sample sites and assign

or let volunteers select their sample sites from among the randomly selected sites. Utilizing a stratified random sampling design or a generalized random tessellation stratified (GRTS) design may help ensure a broader or more spatially balanced distribution of sample sites.
    - Consider a sampling design and analytical procedure that will be able to handle flexibility and changes in monitoring sites and volunteers as volunteers may come and go, monitoring sites are added or dropped, or monitoring sites may change over time due to changing conditions. A mixed model or mixed panel sampling design may be a good option for dealing with this flexibility or variability.
    - Estimate sample size, or minimum sample size, needed to meet monitoring goal. Sample size is based on a number of factors including inherent variability in the data, magnitude and precision of the trend you would like to measure, the statistical test or analysis you are going to use, number of years over which parameter will be measured, size of the area to be monitored, number of survey visits, and available resources. See the USGS Managers' Monitoring Manual for more information about sample size estimation.
    - Minimize, control, or model site effects or survey effects by stratifying sites, collecting covariate data, and/or standardizing survey methods to some degree.
    - Some monitoring methods or approaches account for variation in detection rates. Detection probability should be quantified for a particular monitoring program or group of volunteers from a pilot study, or obtained from a previous study conducted under similar conditions.

- Establish clear, simple, and straightforward sampling protocols. This will help assure data quality and will help in recruiting and retaining volunteers (Prysby and Super 2007).
    - Use multiple, effective survey methods or techniques if possible to increase detection of certain species or more species in a given site/area. But focus on a few priority species, survey methods, and tasks to keep things simple.
    - Conducting multiple visits to each site is ideal. A double-observer independent design can be used instead of multiple visits if necessary.
    - Make sure protocols written appropriately for target audience. Match the data sheets to the protocols, and make sure data sheets are written simply and clearly.
    - Test protocols and data sheets with a pilot group if possible to get initial feedback.
    - Obtain peer review of protocols, from independent and diverse reviewers if possible.

- Need to successfully recruit, train, coordinate, and retain volunteers to ensure effective volunteer monitoring program.
    - Identify target audience from which to recruit volunteers, and ensure audience is appropriate and a good match for the monitoring objectives (e.g., appropriate age, degree of skill and training needed, required survey time and effort).
    - Develop a volunteer recruitment plan (Prysby and Super 2007).
        - Recruit volunteers from existing networks of volunteers and other organizations (e.g., zoos, state herp groups, Audobon chapters, county and state park systems, nature centers, watershed groups, herpetology professors/academic researchers, universities and clubs with service requirements, college and high school biology and other students esp. those who need service hours, Boy Scouts, and Girl Scouts).

        - Use various media to advertise and recruit volunteers including "word-of-mouth" or e-mail notifications, listserves, websites, social media (e.g., Facebook), and advertising through partners (e.g., newsletters).
    - Ensure volunteers have equipment they need and can access sample sites. Inability to find or access study sites is a common reason for volunteer attrition (Prysby and Super 2007).
    - Consider including several levels of participation for volunteers (Prysby and Super 2007). Differing roles allow participants with different levels of ability and commitment to get involved with the program, can give experienced volunteers more responsibility over time, and can help retain volunteers.
    - Develop a training plan for volunteers, and invest sufficient time and resources into training volunteers on species identification, sampling protocol, filling out data sheets, and data submission process. Training volunteers is critical.
        - Develop and provide volunteers with a range of training opportunities including trainings in the classroom and in the field, written materials/resources, information online/on a website, and opportunities to consult and work with experts in the field. Trainings in the field, written materials/resources, and information online are especially helpful.
        - Written materials/resources esp. identification keys/guides that provide photos of all target species, photos or keys to help identify species or life stages that are difficult to distinguish (e.g., amphibian eggs, tadpoles, salamander larvae), and materials that can be taken into the field for reference would be particularly helpful.
        - Provide focused or additional training as needed to address particular challenges or difficulties that volunteers face (e.g., focused training on how to distinguish hard-to-identify salamander species).
    - Address safety concerns for volunteers.
    - Develop a sustainability and funding plan for monitoring program.
    - Develop a plan or strategies for retaining volunteers, which should include:
        - Volunteer recognition or appreciation
        - Following up with volunteers in a timely manner to let them know how their data will be used and will fit into overall program goals.
        - Establishing a newsletter, either online or hard copy, and a social networking website, a listserv, or chat room to provide regular updates and facilitate communication with volunteers, partners and stakeholders including researchers and managers who use the data.
    - Maintain institutional and staff support.
        - Consider establishing a volunteer coordinator.
    - Develop partnerships to help maintain and support volunteer program.

- Develop an easy and efficient data submission plan/process for volunteers.
    - Develop and offer an online data entry system at the start of the monitoring program, if possible, to facilitate easy submission of data and ability to easily access and share data online.
    - To encourage increased submission of data, esp. negative data, could offer incentives for returning data, and stress importance of returning all data including negative or null data and that null data are important as well.

- Develop an effective and efficient data verification/volunteer evaluation system.
  - The type and rigor of the data verification/volunteer evaluation process depend on the monitoring goal, level of data accuracy that is needed, and available resources.
  - The most common and simplest methods for evaluating and verifying data are expert review and verification, and photo documentation.
  - Some programs also allow or require collecting and submitting a specimen (e.g., Ohio Salamander Monitoring Program), but this is more challenging logistically and volunteers often do not have permits for collecting specimens.
  - Formal or informal testing of volunteers also can be used to evaluate volunteer skill/ability and data. For example, the North American Amphibian Monitoring Program (NAAMP) uses an online quiz to test volunteers, and only includes data in the analysis if observer scores >65% on quiz. In-person tests in the classroom and in the field and interviews also are options.
  - A double-observer system in which multiple observers survey the same site can be used to ensure data quality/reliability, esp. if a more experienced surveyor is paired with a less experienced surveyor and work together.

- Implement the monitoring program.

- Explore and analyze the data. Share and present results to volunteers, partners, and stakeholders in a format that allows data to be readily used to support sound management and conservation decisions.

- Evaluate and adjust monitoring and management, if necessary.

## RESOURCES FOR ADDITIONAL MONITORING INFORMATION


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# APPENDICES

**Appendix A. Summary of herp monitoring programs using non-calling surveys and volunteers that were submitted and/or compiled in 2011 and 2012.**

| Target Herp Group - Salamanders, Frogs/Toads, Lizards, Snakes, Turtles/Tortoises, Multiple Groups, Other | Target Species (if any), or Specify Multiple Groups or Other | Region | State(s) in which protocol has been or is used | Name of Monitoring Program/Protocol | Spatial/ Geographic Scale of Monitoring Program - National, Regional (multi-state), Statewide, Local | If Regional or Local scale, please specify geographic area [e.g., Great Lakes Region, SE Colorado, Clinch River Valley, Cascade Mountain Range, Yellowstone National Park, Wilderness State Park, Oakland County Park, etc.] | Goal of the Program- Inventory, Monitoring, Both, or Other | If Other, please specify | Inventory/ Monitoring Technique 1 | Inventory/ Monitoring Technique 2 |
|---|---|---|---|---|---|---|---|---|---|---|
| Frogs/Toads | Green, Cuban, and Squirrel Tree Frogs | Eastern US | Florida | Based on the study by Robin Boughton and Jennifer Staiger at UF: Use of PVC Pipe Refugia as a Sampling Technique for Hylid Treefrogs | Local | Green Cay Wetlands in Boynton Beach | Monitoring | | PVC pipe surveys | |
| Turtles/Tortoises | Loggerhead sea turtles and green turtles | Eastern US | Florida | Sea Turtle Research and Monitoring Program/ Sea Turtle Conservation Program | Regional | Sanibel and Captiva Islands and other nesting beaches along Gulf Coast and also in Massachusetts - Sebastian Inlet State Park and Melbourne Beach | Monitoring | Nest monitoring and protection, nest relocation, head-starting | Nest counts | Visual encounter surveys |
| Salamanders | Streamside salamanders primarily, and treefrogs | Eastern US | Georgia | GA Adopt-A-Stream Amphibian Monitoring Program | Statewide | | Both | | Artificial cover | Dipnetting and sweep samples |
| Multiple Groups | All - frogs/toads, SALAMANDERS, lizards, snakes, turtles, alligators | Eastern US | Georgia | Georgia Herp Atlas | Statewide | | Both | | Visual encounter surveys | Auditory surveys |
| Multiple Groups | Focus on State Wildlife Action Plan reptiles (mostly) and amphibians of conservation need; focus mainly on snakes but occurrence data for other taxa also are opportunistically reported. | Eastern US | Kentucky | Kentucky State Wildlife Action Plan Herp Monitoring | Statewide | Focus is mainly in the Mississippi Embayment and Mississippian Plateau physiographic regions. | Both | | Artificial cover | Visual encounter surveys |
| Multiple Groups | Amphibians associated with vernal pools - wood frog, spotted salamander, blue-spotted salamander | Eastern US | Maine | Maine Vernal Pools Project - Municipal Vernal Pool Mapping and Assessment and Significant Vernal Pool Identification | Statewide | | Inventory | | Egg mass counts | Visual encounter surveys |

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|---|---|---|---|---|---|---|---|---|---|---|
| Multiple Groups | | Eastern US | Maryland | Maryland Amphibian and Reptile Atlas (MARA) | Statewide | | Both | | Visual encounter surveys | Auditory surveys |
| Multiple Groups | Amphibians and Spotted Turtles | Eastern US | Massachusetts | New England Aquarium and Ducks Unlimited Burrage Pond Herp Survey | Local | | Inventory | | Visual encounter surveys | Basking surveys and traps |
| Multiple Groups | Salamanders: Ambystoma maculatum; Ambystoma jeffersonianium; Frogs: Rana sylvatica | Eastern US | New Hampshire | Keene Vernal Pool Project | Local | Keene, NH | Inventory | | Area-constrained searches | Visual encounter surveys |
| Multiple Groups | All native herps - NH | Eastern US | New Hampshire | Reptile and Amphibian Reporting Program (RAARP) | Statewide | | Inventory | | Other | |
| Multiple Groups | Salamanders: Ambystoma maculatum; Ambystoma jeffersonianium; Frogs: Rana sylvatica; Pseudacris crucifer | Eastern US | New Hampshire | Salamander Crossing Brigades | Local | southwest New Hampshire | Other | Stewardship -- preventing road mortality | Road cruising | Other |
| Multiple Groups | Vernal pool species - mainly frogs and salamanders | Eastern US | New Hampshire | Vernal Pool Identification | Statewide | | Inventory | | Egg mass counts | Dipnetting and sweep samples |

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|---|---|---|---|---|---|---|---|---|---|---|
| Multiple Groups | Amphibians | Eastern US | New York | Assessing presence of Bd in amphibian populations | | | | | | |
| Salamanders | Plethodontid stream salamanders | Eastern US | Pennsylvania | Stream Plethodontid Assemblage Response (SPAR) Index -- Volunteer Monitoring Study | Statewide | N/A | Other | Testing of volunteers to ID/detect stream salamanders | Area-constrained searches (4 m sq. plots) | Visual encounter surveys (within plots) |
| Salamanders | Aquatic and terrestrial salamanders | Eastern US | Tennessee | Citizen Science Project - Aquatic and Terrestrial Salamander Monitoring | Local | Great Smoky Mountains National Park, Walker Valley streams | Monitoring | | Artificial cover | |
| Multiple Groups | Pond-breeding amphibians - frogs and salamanders | Eastern US | Tennessee | Citizen Science Project - Pond-Breeding Amphibian Monitoring | Local | Great Smoky Mountains National Park | Monitoring | | Egg mass counts | |
| Multiple Groups | Reptiles | Eastern US | Tennessee | Citizen Science Project - Reptile Inventory | Local | Great Smoky Mountains National Park | Inventory | | Artificial cover | Visual encounter surveys |
| Multiple Groups | Frogs - Hyla arborea, Bufo calamita, Alytes obstetricians, Bombina variegata, Pelophylax lessonae, P. ridibundus, P. esculentus, and newts - Triturus cristatus, Triturus vulgaris | International | Aargau | Amphibienmonitoring Aargau | Statewide | Aargau (a Swiss canton/state) | Monitoring | also: control of effectiveness of measurements taken | Time-constrained searches | Visual encounter surveys |
| Multiple Groups | Reptiles | International | Canada - Alberta | Alberta Snake Hibernaculum Inventory | Statewide | Alberta (NOTE Column E should have "Province-wide" as an option on pull-down menu. | Both | | Visual encounter surveys | |

**Appendix A. Summary of herp monitoring programs using non-calling surveys and volunteers that were submitted and/or compiled in 2011 and 2012.**

| Target Herp Group - Salamanders, Frogs/Toads, Lizards, Snakes, Turtles/Tortoises, Multiple Groups, Other | Target Species (if any), or Specify Multiple Groups or Other | Region | State(s) in which protocol has been or is used | Name of Monitoring Program/Protocol | Spatial/ Geographic Scale of Monitoring Program - National, Regional (multi-state), Statewide, Local | If Regional or Local scale, please specify geographic area [e.g., Great Lakes Region, SE Colorado, Clinch River Valley, Cascade Mountain Range, Yellowstone National Park, Wilderness State Park, Oakland County Park, etc.] | Goal of the Program- Inventory, Monitoring, Both, or Other | If Other, please specify | Inventory/ Monitoring Technique 1 | Inventory/ Monitoring Technique 2 |
|---|---|---|---|---|---|---|---|---|---|---|
| Multiple Groups | Amphibians | International | Canada - Alberta | Alberta Volunteer Amphibian Monitoring Program | Statewide | Alberta (NOTE Column E should have "Province-wide" as an option on pull-down menu. | Both | | Auditory surveys | Visual encounter surveys |
| Multiple Groups | | International | Canada - Manitoba | Manitoba Herps Atlas | Statewide | Manitoba Province | Both | Raise awareness of herps in Manitoba and need to manage habitats properly to conserve these species, and to engage in scientific data collection and empower them to aid in decisionmaking regarding their natural heritage. | Visual encounter surveys - looking under cover and debris, under rocks in streams, in breeding ponds, along trails and roadways, and along wetlands | Flashlight surveys at night in breeding ponds for salamander larvae |
| Lizards | Plestiodon septentrionalis (Northern Prairie Skink) | International | Canada - Manitoba | Skink Watch | Local | SW Manitoba | Both | | Artificial Cover | Visual encounter surveys |
| Turtles/Tortoises | Focus on Blanding's Turtle which is endangered provincially and nationally. | International | Canada - Nova Scotia | Turtle Monitoring Program | Local | SW Nova Scotia - Kejimkujik Area | Monitoring | | Nest counts | Visual encounter surveys |
| Multiple Groups | all terrestrial herpetofauna (i.e. excludes marine turtles) | International | Mainly mainland UK (GB) but scheme includes Northern Ireland, Isle of Man and Jersey (Channel Island) | National Amphibian and Reptile Recording Scheme (NARRS) - National Amphibian Survey and National Reptile Survey | National | | Monitoring | Goal of program to obtain baseline data against which trends can be detected | Area-constrained searches | Transect surveys |
| Multiple Groups | Frogs and salamanders | International | Netherlands | Amphibian Monitoring Program of the Netherlands | National | | Monitoring | | Auditory surveys | Transect surveys |

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| Target Herp Group - Salamanders, Frogs/Toads, Lizards, Snakes, Turtles/Tortoises, Multiple Groups, Other | Target Species (if any), or Specify Multiple Groups or Other | Region | State(s) in which protocol has been or is used | Name of Monitoring Program/Protocol | Spatial/ Geographic Scale of Monitoring Program - National, Regional (multi-state), Statewide, Local | If Regional or Local scale, please specify geographic area [e.g., Great Lakes Region, SE Colorado, Clinch River Valley, Cascade Mountain Range, Yellowstone National Park, Wilderness State Park, Oakland County Park, etc.] | Goal of the Program- Inventory, Monitoring, Both, or Other | If Other, please specify | Inventory/ Monitoring Technique 1 | Inventory/ Monitoring Technique 2 |
|---|---|---|---|---|---|---|---|---|---|---|
| Multiple Groups | All reptiles | International | Netherlands | Dutch Reptile Monitoring Scheme/Programme (Dutch sand lizards) | National | | Both | | Transect surveys | |
| Multiple Groups | 5 widespread native species - common frog, common toad, smooth newt, palmate newt, great crested newt | International | UK - Great Britain | British National Amphibian and Reptile Recording Scheme - Application of Occupancy Modelling Study | Local | Lowland area in east Kent and upland area in central Wales | Both | Looked at occupancy modelling and detection probability | Visual encounter surveys | Dipnetting and sweep samples |
| Multiple Groups | all native herps | Midwestern US | Indiana, Michigan, Minnesota and Wisconsin | National Park Service Western Great Lakes Inventory & Monitoring Network | Regional | The park units in the Network are: Apostle Islands National Lakeshore, Grand Portage National Monument, Indiana Dunes National Lakeshore, Isle Royale National Park, Mississippi National River and Recreation Area, Pictured Rocks National Lakeshore, St. Croix Scenic Riverway, Sleeping Bear Dunes National Lakeshore, Voyageurs National Park | Both | | Auditory surveys (inc. automated recording systems) | aquatic funnel traps |
| Salamanders | Pond-breeding and terrestrial salamanders | Midwestern US | Michigan | Ann Arbor Salamander Survey | Local | Ann Arbor Parks | Monitoring | | Visual encounter surveys | Funnel trapping-aquatic |
| Multiple Groups | all native herps | Midwestern US | Michigan | Ottawa National Forest Herp Inventory and Monitoring Program | Local | Ottawa National Forest | Both | | Auditory surveys (inc. automated recording systems) | aquatic funnel traps |

**Appendix A. Summary of herp monitoring programs using non-calling surveys and volunteers that were submitted and/or compiled in 2011 and 2012.**

| Target Herp Group - Salamanders, Frogs/Toads, Lizards, Snakes, Turtles/Tortoises, Multiple Groups, Other | Target Species (if any), or Specify Multiple Groups or Other | Region | State(s) in which protocol has been or is used | Name of Monitoring Program/Protocol | Spatial/ Geographic Scale of Monitoring Program - National, Regional (multi-state), Statewide, Local | If Regional or Local scale, please specify geographic area [e.g., Great Lakes Region, SE Colorado, Clinch River Valley, Cascade Mountain Range, Yellowstone National Park, Wilderness State Park, Oakland County Park, etc.] | Goal of the Program- Inventory, Monitoring, Both, or Other | If Other, please specify | Inventory/ Monitoring Technique 1 | Inventory/ Monitoring Technique 2 |
|---|---|---|---|---|---|---|---|---|---|---|
| Multiple Groups | Smallmouth salamander, Plains narrowmouth toad, American toad, Northern leopard frog, Western gray treefrog, Great plains toad, Northern cricket frog, Plains leopard frog, Plains spadefoot toad, Eastern tiger salamander, Barred tiger salamander, Boreal chorus frog, Woodhouse toad, Bullfrog | Midwestern US | Nebraska (main state), some Iowa and South Dakota | Nebraska Amphibian Conservation Education Project | Statewide | | Both | Test Nebraska amphibians for the Chytrid fungus. | Hand collecting | Area-constrained searches |
| Snakes | Lake Erie Watersnake | Midwestern US | Ohio | Lake Erie Watersnake Annual Census aka "The Nerodio" | Local | Lake Erie Islands | Both | | Hand collecting | Area-constrained searches |
| Frogs/Toads | Lithobates catesbeianus, L. pipiens, L. clamitans, Hyla versicolor, Pseudacris triseriata, Bufo americanus | Midwestern US | Ohio | Mitigated Wetland Research- | Local | | Monitoring | | Hand collecting | Dipnetting and sweep samples |

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| Target Herp Group - Salamanders, Frogs/Toads, Lizards, Snakes, Turtles/Tortoises, Multiple Groups, Other | Target Species (if any), or Specify Multiple Groups or Other | Region | State(s) in which protocol has been or is used | Name of Monitoring Program/Protocol | Spatial/ Geographic Scale of Monitoring Program - National, Regional (multi-state), Statewide, Local | If Regional or Local scale, please specify geographic area [e.g., Great Lakes Region, SE Colorado, Clinch River Valley, Cascade Mountain Range, Yellowstone National Park, Wilderness State Park, Oakland County Park, etc.] | Goal of the Program- Inventory, Monitoring, Both, or Other | If Other, please specify | Inventory/ Monitoring Technique 1 | Inventory/ Monitoring Technique 2 |
|---|---|---|---|---|---|---|---|---|---|---|
| Salamanders | Pond-breeding salamanders, stream-dwelling salamanders, and terrestrial salamanders | Midwestern US | Ohio | Ohio Salamander Monitoring Program | Statewide | | Both | To monitor the occurrence and abundance of Ohio's salamander species | Funnel trapping - aquatic | Dipnetting and sweep samples |
| Lizards | 3 skink species - Plestiodon fasciatus, Plestiodon obtusirostris, Scincella lateralis | Midwestern US | Oklahoma | Ecology and Natural History of Three Oklahoma Species | Local | Mixed-grass prairie in Payne County, Oklahoma | Other | research on methodology and ecology and population structure | Artificial cover | Other |
| Frogs/Toads | | Midwestern US | Texas | Texas Amphibian Watch - Adopt-a-Frog Pond Frog Malformation Monitoring | Statewide | | Both | | Visual encounter surveys | Dipnetting and sweep samples |
| Multiple Groups | Frogs, toads, salamanders | Midwestern US | Texas | Texas Amphibian Watch - Amphibian Spotter Program | Statewide | | Inventory | | Visual encounter surveys | |

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| Target Herp Group - Salamanders, Frogs/Toads, Lizards, Snakes, Turtles/Tortoises, Multiple Groups, Other | Target Species (if any), or Specify Multiple Groups or Other | Region | State(s) in which protocol has been or is used | Name of Monitoring Program/Protocol | Spatial/ Geographic Scale of Monitoring Program - National, Regional (multi-state), Statewide, Local | If Regional or Local scale, please specify geographic area [e.g., Great Lakes Region, SE Colorado, Clinch River Valley, Cascade Mountain Range, Yellowstone National Park, Wilderness State Park, Oakland County Park, etc.] | Goal of the Program- Inventory, Monitoring, Both, or Other | If Other, please specify | Inventory/ Monitoring Technique 1 | Inventory/ Monitoring Technique 2 |
|---|---|---|---|---|---|---|---|---|---|---|
| Turtles/Tortoises | Eastern Box Turtle, Ornate Box Turtle | Midwestern US | Texas | Texas Box Turtle Survey | Statewide | | Inventory | | Visual encounter surveys | |
| Lizards | Texas Horned Lizard, Roundtail Horned Lizard, Short-horned Lizard | Midwestern US | Texas | Texas Horned Lizard Watch | Statewide | | Both | | Visual encounter surveys | Time-constrained searches |
| Turtles/Tortoises | Freshwater aquatic turtles or basking turtles | Midwestern US | Texas | Texas Turtle Watch Program | Statewide | | Monitoring | | Basking surveys and traps | |
| Multiple Groups | all native herps | Midwestern US | Wisconsin | Ozaukee Washington Land Trust - Citizen Science based herp monitoring program | Local | Ozaukee and Washington counties | Both | | Auditory surveys | aquatic funnel traps |
| Multiple Groups | all native herps, but most effort has been towards snakes | Midwestern US | Wisconsin | Urban Ecology Center- Citizen Science based herp monitoring program | Local | three properties in Milwaukee, Wisconsin | Both | | Auditory surveys | aquatic funnel traps |
| Multiple Groups | all native herps | Midwestern US | Wisconsin | Wisconsin Herp Atlas | Statewide | | Inventory | | | |

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|---|---|---|---|---|---|---|---|---|---|---|
| Salamanders | Pond-breeding Salamanders - Blue-spotted Salamander, Spotted Salamander, Eastern Tiger Salamander, Central Newt, Four-toed Salamander | Midwestern US | Wisconsin | Wisconsin Salamander Survey | Statewide | | Both | | Funnel trapping - aquatic | |
| Multiple Groups | all native herps | Midwestern US and Canada | Michigan, Minnesota, Ontario and Wisconsin | Lake Superior Basin Amphibian and Reptile Monitoring Program | Regional | Lake Superior Basin | Both | | Auditory surveys (inc. automated recording systems) | aquatic funnel traps |
| Multiple Groups | All - salamanders, frogs, toads, lizards, snakes, turtles, plus birds, insects, mammals and many others. We have protocols for many of these groups, and are open to developing protocols to taxa/species not on our lists, if there is interest among observers. | National - USA | not sure at this point - our animal monitoring program was piloted in 2010, but they are intended for use in states where the species occur | Nature's Notebook, a plant and animal program of the USA National Phenology Network | National | | Monitoring | | Time-constrained searches | Area-constrained searches |
| Turtles/Tortoises | Desert box turtles (T. ornata) | Western US | Arizona | Desert box turtles inventory | Statewide | | Inventory | | Other | |

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|---|---|---|---|---|---|---|---|---|---|---|
| Turtles/Tortoises | Desert tortoise | Western US | Arizona | Desert tortoise monitoring at a long-term study site | Local | | Monitoring | | Area-constrained searches | Other |
| Turtles/Tortoises | Exotic turtles | Western US | Arizona | Exotic turtle removal | Local | Phoenix Zoo | other | exotic removal | Basking surveys and traps | |
| Snakes | Mexican gartersnake (Thamnophis eques) | Western US | Arizona | Mexican gartersnake radio tracking | Statewide | | Both | | Other | |
| Frogs/Toads | Rana chiricahuensis & R. tarahumarae | Western US | Arizona | Ranid Frog Monitoring | Statewide | | Both | | Visual Encounter Surveys | |
| Snakes | Shovel-nosed snake (Chionactis occipitalis) | Western US | Arizona | Shovel-nosed snake tissue sampling | Statewide | | Both | | Road cruising | Other |
| Multiple Groups | Frogs/toads, lizards, snakes, turtles | Western US | Arizona | Sonoita Creek State Natural Area Herpetological Inventory | Local | Sonoita Creek State Natural Area | Inventory | | Visual Encounter Surveys | Funnel trapping terrestrial |
| Turtles/Tortoises | Sonoran mud turtle (Kinosternon sonoriense) | Western US | Arizona | Sonoran mud turtle monitoring | Statewide | | Both | | | |
| Turtles/Tortoises | three-toed box turtle (Terrapene carolina triunguis) and Ornate box turtle (T. ornata ornata) | Western US | Arkansas | Arkansas box turtle citizen science survey | Statewide | | Inventory | | Other | |
| Lizards | Lizards | Western US | California | Lost Lizards of Los Angeles | Local | Los Angeles County | Inventory | | Other | |

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|---|---|---|---|---|---|---|---|---|---|---|
| Multiple Groups | | Western US | California | Monitoring Terrestrial Reptiles and Amphibians in the Mediterranean Coast Network (MEDN) - Santa Monica Mountains National Recreation Area (SAMO), Cabrillo National Monument (CABR), and Channel Islands National Park (CHIS). | Local | National Park Service Mediterranean Coast Network | Both | | Terrestrial drift fences & pitfall traps | Funnel trapping terrestrial |
| Multiple Groups | Western Toad (Bufo boreas) | Western US | Montana | MT Natural Heritage Inventory | Statewide | | Inventory | Some replication of previous surveys, low precision monitoring | Dipnetting and sweep samples | Area-constrained searches |
| Snakes | Snakes | Western US | Multiple - 30-40 states | The Snake Count | International | Across North America (U.S., Canada, and Mexico) | Both | Education/to raise awareness about snake conservation. It is a chance for everyday "citizens" to be directly involved in snake conservation. | Visual encounter surveys | Road cruising (walking, biking, or driving along road) |
| Frogs/Toads | Amargosa toad (Anaxyrus nelsoni) | Western US | Nevada | Amargosa Toad Surveys | Local | White River near Beatty, NV | Both | | Area-constrained searches | Visual encounter surveys |

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|---|---|---|---|---|---|---|---|---|---|---|
| Multiple Groups | Lizards, snakes | Western US | Nevada | Night Drive Surveys | Statewide | Can be applied anywhere with roads | Both | | Road cruising | Visual encounter surveys |
| Frogs/Toads | Columbia spotted frog (Rana luteiventris) | Western US | Nevada | Spotted Frog Surveys | Local | Indian Valley (central NV) | Both | | Area-constrained searches | Visual encounter surveys |
| Frogs/Toads | Wyoming toad | Western US | Wyoming | Wyoming Toad Monitoring | Local | Mortenson Lake National Wildlife Refuge | Both | | Time-constrained searches | Area-constrained searches |
| Frogs/Toads | | Eastern US | USA | FrogWatch USA | National | | Both | | Auditory surveys | |
| Frogs and Toads | Frogs and Toads | Midwestern US | Wisconsin | Wisconsin Frog and Toad Survey | Statewide | | Both | | Auditory surveys | |
| Frogs/Toads | Calling frogs and toads | Northeast, Southeast, Midwest of USA | DE, FL,, GA, IN, IA KY, LA, ME, MD, MA, MN, Mississippi, MO, NH, NJ, NY, NC, PA, SC, TN, TX, VT, VA, West VA | North American Amphibian Monitoring Program (NAAMP) | Northeast, Southeast, Midwest of USA | Northeast, Southeast, Midwest of USA | Monitoring | | Auditory surveys | |
| | | | | | | | | | | |
| | =- Volunteer-based herp monitoring programs that only utilize auditory surveys. | | | | | | | | | |

**Appendix A. Summary of herp monitoring programs using non-calling surveys and volunteers that were submitted and/or compiled in 2011 and 2012.**

| State(s) in which protocol has been or is used | Name of Monitoring Program/Protocol | Inventory/ Monitoring Technique 3 | Inventory/ Monitoring Technique 4 | Inventory/ Monitoring Technique 5 | Inventory/ Monitoring Technique 6 | If other or additional techniques are/were used, please specify, or if you would like to provide more information about monitoring techniques. | Sampling design of monitoring effort (please select from drop-down menu) | Please describe or explain sampling design, if possible. |
|---|---|---|---|---|---|---|---|---|
| Florida | Based on the study by Robin Boughton and Jennifer Staiger at UF: Use of PVC Pipe Refugia as a Sampling Technique for Hylid Treefrogs | | | | | | Targeted Specific Sites | Each site has three PVC pipes measuring 1.5 in, 1.0 in, and 0.5 in. |
| Florida | Sea Turtle Research and Monitoring Program/ Sea Turtle Conservation Program | | | | | Monitored, tagged, measured, and weighed nesting female turtles; nest counts, nesting attempts, and hatchlings; nest relocation; headstarting; nest protection | Targeted Specific Sites | |
| Georgia | GA Adopt-A-Stream Amphibian Monitoring Program | PVC pipe surveys | | | | Would like to add leaf litter bag to put in streams for larval salamanders; looking into FrogWatch USA for call surveys | Systematic. Volunteers select site to monitor. Set sampling design after site is selected. | Monitors select site to be monitored (stream or wetland). For wetland sampling volunteers place refugia/cover along the ecotone every so many feet and in pairs (see manual). For streams, volunteers setup 6 stations of boards/pipes evenly within their stream reach on one side of the stream at oft and 3 ft from water's edge. For dipnetting, volunteers follow our AAS macroinvertebrate sampling protocols (see biological manual). |
| Georgia | Georgia Herp Atlas | | | | | VOLUNTEERS WERE ONLY LIMITED TO LEGAL TECHNIQUES. IN ADDITION TO VISUAL ENCOUNTER AND AUDITORY SURVEYS SOME USED TRAPS FOR LEGALLY TRAPPABLE SPECIES OR SPECIES THEY HAD PERMITS TO TRAP | Volunteer Selected | Volunteers were asked to fill out and submit field cards for any reptile or amphibian seen anywhere in the state during the 5-yr period AND PROVIDE VERIFICATION IN THE FORM OF PHOTOGRAPHS, AUDIO OR VIDEO RECORDINGS, SALVAGED DEAD ANIMALS, SHED SKINS, ETC.. |
| Kentucky | Kentucky State Wildlife Action Plan Herp Monitoring | Road cruising | Terrestrial drift fences | Funnel trapping - terrestrial | Area-constrained searches | Monitoring efforts consist of state-wide artificial cover (tin, cover boards) sites, and drift fences with funnel traps that KHS checks between Feb and Nov. Also document herp species encountered opportunistically during coverboard surveys. KY Dept of Fish and Wildlife partners with KY Herpetological Society and reimburses KHS for fuel costs (usually around $6000/year) and all the time spent monitoring is recorded as non-federal matching funds for SWG (usually provide over $25K/year in non-federal match). | Targeted Specific Sites | Focus on the Mississippi Embayment and Mississippian Plateau physiographic regions to target rare reptiles in Kentucky. Target habitat is identified. Overarching goal is to locate and monitor populations of rare SWG species. |
| Maine | Maine Vernal Pools Project - Municipal Vernal Pool Mapping and Assessment and Significant Vernal Pool Identification | | | | | | Assign citizen scientists to pools | |

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|---|---|---|---|---|---|---|---|---|
| Maryland | Maryland Amphibian and Reptile Atlas (MARA) | Artificial cover | Basking surveys | Other | | Two approaches for data collection: "active searching" or "incidental observations." Active searching is the main source of atlas data and involves intentional looking for reptiles and amphibians. No standardized methods for active searching, and include listening surveys for calling frogs and toads, searching various habitats, turning over logs and cover boards, scanning ponds for turtles, turning over rocks along streams, and so forth. Volunteers select methods. | Systematic | Sampling grid based on US Geological Survey 7.5-minute topographic quadrangle maps (quads) divided into six equal blocks. Each atlas block approximately 25 $km^2$/same grid system used in MD breeding bird atlases). To help assure dispersed geographic coverage across the state, established two goals for adequate coverage based on number of species discovered (at least ten species per atlas block and 25 species per quad) and the amount of time spent actively searching (at least 25 hours of active searching within each quad). Once these thresholds are reached in a block or quad, then surveyors should move to another less thoroughly searched area. Cumulative time spent searching in a particular block is captured within the database as a record of effort for future comparisons. |
| Massachusetts | New England Aquarium and Ducks Unlimited Burrage Pond Herp Survey | | | | | | Targeted Specific Sites | Burrage Pond, state property |
| New Hampshire | Keene Vernal Pool Project | Egg mass counts | | | | | Targeted Specific Sites | Maps of potential vernal pools were generated by spatial analysis of high-resolution aerial photographs; volunteers were given these maps and asked to ground truth and document the presence of vernal pools. |
| New Hampshire | Reptile and Amphibian Reporting Program (RAARP) | | | | | Technique up to observer-capture techniques would need permit though | | |
| New Hampshire | Salamander Crossing Brigades | | | | | In addition to identifying spring-breeding amphibians that are attempting to cross roads during their migration to vernal pools, our volunteers also move them across the roads by hand. | Targeted Specific Sites | See below.* |
| New Hampshire | Vernal Pool Identification | Auditory surveys | Visual encounter surveys | | | | Volunteer Selected | |

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|---|---|---|---|---|---|---|---|---|
| New York | Assessing presence of Bd in amphibian populations | | | | | | | |
| Pennsylvania | Stream Plethodontid Assemblage Response (SPAR) Index -- Volunteer Monitoring Study | | | | | subset of salamanders surveyed by volunteers were collected as vouchers for ID verification | Volunteer Selected | volunteers were asked to select sites that were forested and not degraded. |
| Tennessee | Citizen Science Project - Aquatic and Terrestrial Salamander Monitoring | | | | | | Targeted Specific Sites | |
| Tennessee | Citizen Science Project - Pond-Breeding Amphibian Monitoring | | | | | | Targeted Specific Sites | |
| Tennessee | Citizen Science Project - Reptile Inventory | | | | | | Targeted Specific Sites | |
| Aargau | Amphibienmonitoring Aargau | Auditory surveys | Dipnetting and sweep samples | | | none | Other | 1. Complete survey of all ponds in each of 10 areas (ca. 30-100 km2), 2 -3 areas per year, 2. Random selection of ca. 100 ponds per year , 3. complete yearly survey of all ponds of Hyla arborea |
| Canada - Alberta | Alberta Snake Hibernaculum Inventory | | | | | | Volunteer Selected | Simple visual encounter surveys, road kill observations, den site observations |

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| State(s) in which protocol has been or is used | Name of Monitoring Program/Protocol | Inventory/ Monitoring Technique 3 | Inventory/ Monitoring Technique 4 | Inventory/ Monitoring Technique 5 | Inventory/ Monitoring Technique 6 | If other or additional techniques are/were used, please specify, or if you would like to provide more information about monitoring techniques. | Sampling design of monitoring effort (please select from drop-down menu) | Please describe or explain sampling design, if possible. |
|---|---|---|---|---|---|---|---|---|
| Canada - Alberta | Alberta Volunteer Amphibian Monitoring Program | | | | | Volunteers are free to choose where, when and how often they like to monitor and are provided information on how to conduct call surveys and visual encounter surveys (all age classes) | Volunteer Selected | Simple visual encounter surveys and call surveys |
| Canada - Manitoba | Manitoba Herps Atlas | Auditory surveys | Dipnetting and sweep samples | Funnel trapping - aquatic | Seining | Provide tips on how to find various species. These include a number of techniques depending on the species. Participants can choose how they would like to survey for the various species based on the tips provided or their own methods. So no standard or specified techniques. - volunteers can choose based on recommendations. The techniques mentioned here are included in the tips. | Volunteers select. | NA |
| Canada - Manitoba | Skink Watch | | | | | | Targeted Specific Sites | cover boards put out in appropriate habitat and checked biweekly |
| Canada - Nova Scotia | Turtle Monitoring Program | Radio-telemetry | | | | Volunteers monitor turtle nesting habitat, protect turtle nests with exclosures, watch nests for emerging hatchlings and release them from the exclosures, assist with radio-telemetry, and conduct visual surveys throughout the summer. Live-trapping using aquatic hoop-net traps also have been conducted for population surveys. | Targeted Specific Sites | Volunteers are trained according to standard protocols outline by recovery team and volunteers become researchers and lead turtle monitoring program. |
| Mainly mainland UK (GB) but scheme includes Northern Ireland, Isle of Man and Jersey (Channel Island) | National Amphibian and Reptile Recording Scheme (NARRS) - National Amphibian Survey and National Reptile Survey | Dipnetting and sweep samples | Egg mass counts | Artificial cover | Funnel trapping - aquatic | Other - torchlight survey - night counts using a 500,000 candle power torch; visual surveys during the day for all life stages including egg masses; see protocols at www.narrs.org.uk | Stratified Random | A fully random design of target survey 1km squares proved unworkable - volunteers are now given a random survey square within 5 km of their home postal code. Obtain robust data from at least 400 randomly selected amphibian survey squares from 2007-2012; volunteers are allocated/assigned a pond (or several). Visit site 1-3 times during day or evening in the spring. Volunteer conducts landowner contact. |
| Netherlands | Amphibian Monitoring Program of the Netherlands | | | | | | | Each site visited 4 times annually, including night visits. |

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|---|---|---|---|---|---|---|---|---|
| Netherlands | Dutch Reptile Monitoring Scheme/Programme (Dutch sand lizards) | | | | | | Volunteer Selected | Volunteers are guided in choosing their transect location but only sites are selected that are likely to contain reptiles. Volunteers select and survey 2-km transects . Transect counts replicated typically 7 times within each activity season (Mar-Oct) for an arbitrary number of years with individual surveys spaced ≥5 days. Reptiles are counted up to 5 m on either side of transect, and each survey lasts about 2 h. |
| UK - Great Britain | British National Amphibian and Reptile Recording Scheme - Application of Occupancy Modelling Study | Funnel trapping - aquatic | Other | Egg mass counts | | Other - torchlight survey - night counts using a 500,000 candle power torch; visual surveys during the day for all life stages including egg masses | Targeted Specific Sites | At least for subset of program/specific study - Species presence/absence recorded on up to five survey visits using four survey methods; each method limited to 30 mins per activity per pond. |
| Indiana, Michigan, Minnesota and Wisconsin | National Park Service Western Great Lakes Inventory & Monitoring Network | hoop-net traps | visual encounter surveys (variety of timed terrestrial, shoreline and egg searches) | artificial cover | casual observations | | Inventory surveys performed a gap analysis on historical and modern distribution data to select gaps for sampling. Sampling designs for coordinated monitoring are under development, but will likely be initially restricted to 10 sites sampled with automated recording systems in a repeated measures design for calling frogs and toads per park stratified on wetlands with 3 hydroperiods, with visual egg searches and visual terrestrial searches as supplemental protocols. | |
| Michigan | Ann Arbor Salamander Survey | Dipnetting and sweep samples | Artificial cover | | | | Targeted Specific Sites | Volunteers are assigned vernal pond in a city park and go out on a select night to look for pond-breeding salamanders. |
| Michigan | Ottawa National Forest Herp Inventory and Monitoring Program | hoop-net traps | visual encounter surveys (variety of timed terrestrial, shoreline and egg searches) | artificial cover | casual observations | nest site mark-recapture surveys for wood turtles | Inventory surveys performed a gap analysis on historical and modern distribution data to select gaps for sampling. Sampling designs for ongoing monitoring are under development, but will likely be based on recommendations from the Lake Superior Basin project but modified for Forest objectives. The Forest may contribute 10 permanent automated recording system sampling sites to participate in coordinated monitoring of calling frogs and toads. | |

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|---|---|---|---|---|---|---|---|---|
| Nebraska (main state), some Iowa and South Dakota | Nebraska Amphibian Conservation Education Project | Dipnetting and sweep samples | | | | | Volunteer Selected | |
| Ohio | Lake Erie Watersnake Annual Census aka "The Nerodio" | Visual encounter surveys | | | | | Targeted Specific Sites | We have 15 primary study sites located on the 4 large Lake Erie Islands that are censused annually using mark-recapture. There are 5 other small islands that are censused bi-annually. |
| Ohio | Mitigated Wetland Research- | | | | | | Targeted Specific Sites | Biweekly sampling of a single, mitigated wetland (soon to be two adjacent mitigated wetlands) during spring, summer and fall) |

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|---|---|---|---|---|---|---|---|---|
| Ohio | Ohio Salamander Monitoring Program | Leaf-litterbag surveys | | | | | Volunteer Selected | **Pond-breeding salamanders** - Volunteers select site to survey in year prior to commencing survey. Traps are placed systematically around the pond perimeter and equidistant from each other. Volunteers construct and set 10 funnel traps and survey for a 24-hour period once during each of three survey periods 1) first survey for adults - late winter (early-mid-Feb - early April); 2) second survey for larvae - mid-May to early June; 3) third survey for larvae - end of June to first week July. Also conduct dip-net sampling during second and third survey. **Stream salamanders** - Volunteers select stream and 60-m segment within stream to survey (incl. pools, riffles, runs and cobble substrate). Flag segment and measure bankfull width. Volunteers construct 12 mesh leaf bags which are placed along edge of stream at 5-m intervals equidistant from each other along 60-m segment. Mesh leaf bags are placed in stream in mid-late April which allow for 2 sampling periods prior to June. |
| Oklahoma | Ecology and Natural History of Three Oklahoma Species | | | | | Can pitfall traps (w/o drift fences) | Targeted Specific Sites | Two 1-ha trapping grids of can pitfall traps and 100 coverboards with inter-trap distance of 10 m |
| Texas | Texas Amphibian Watch - Adopt-a-Frog Pond Frog Malformation Monitoring | Hand collecting | | | | | Volunteer Selected | Volunteers can choose their own sites. |
| Texas | Texas Amphibian Watch - Amphibian Spotter Program | | | | | | Volunteer Selected | Volunteers can choose their own sites. |

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|---|---|---|---|---|---|---|---|---|
| Texas | Texas Box Turtle Survey | | | | | | Volunteer Selected | Volunteers can choose their own sites; incidental reports are most common. |
| Texas | Texas Horned Lizard Watch | Transect surveys | | | | | Volunteer Selected | Volunteers are free to choose their own survey sites. |
| Texas | Texas Turtle Watch Program | | | | | | Volunteer Selected | Volunteers can choose their own sites. |
| Wisconsin | Ozaukee Washington Land Trust - Citizen Science based herp monitoring program | hoop-net traps | visual encounter surveys (variety of timed terrestrial, shoreline and egg searches) | artificial cover | casual observations | | Sampling sites are prioritized by ownership status, and effort constrained by volunteer resources. | |
| Wisconsin | Urban Ecology Center- Citizen Science based herp monitoring program | hoop-net traps | visual encounter surveys (variety of timed terrestrial, shoreline and egg searches) | artificial cover | casual observations | | Sampling sites are restricted to UEC managed lands, and effort constrained by volunteer and grant resources. | |
| Wisconsin | Wisconsin Herp Atlas | | | | | Accepts any occurrence data regardless of technique | Not applicable. | |

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|---|---|---|---|---|---|---|---|---|
| Wisconsin | Wisconsin Salamander Survey | | | | | May expand to visual encounter surveys for eggs and terrestrial searches for red-backed salamanders | Volunteer Selected. Follows Lake Superior Basin Standard Operating procedure for methods, and sites are constrained by volunteer resources. | Each volunteer chooses one wetland or pond to survey. Volunteers set 5 traps at each site. Recommend trap each pond for at least 5 consecutive 24-hr periods using 5 traps per pond. Recommend survey in late March in southern WI and April-occasionally early May in northern WI. |
| Michigan, Minnesota, Ontario and Wisconsin | Lake Superior Basin Amphibian and Reptile Monitoring Program | hoop-net traps | visual encounter surveys (variety of timed terrestrial, shoreline and egg searches) | artificial cover | casual observations | | Inventory surveys performed a gap analysis on historical and modern distribution data to select gaps for sampling. Sampling designs for coordinated monitoring are under development, but will likely be general recommendations with each partner program finalizing sampling designs for their specific objectives. | |
| not sure at this point - our animal monitoring program was piloted in 2010, but they are intended for use in states where the species occur | Nature's Notebook, a plant and animal program of the USA National Phenology Network | Visual encounter surveys | | | | | Volunteer Selected | |
| Arizona | Desert box turtles inventory | | | | | Incidental observations and photos are provided | Volunteer Selected | Incidental observations and photos are provided |

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|---|---|---|---|---|---|---|---|---|
| Arizona | Desert tortoise monitoring at a long-term study site | | | | | Telemetry | Targeted Specific Sites | |
| Arizona | Exotic turtle removal | | | | | | Targeted Specific Sites | Trap and remove turtles |
| Arizona | Mexican gartersnake radio tracking | | | | | Radio tracking | Targeted Specific Sites | After receiving appropriate training, (no written protocols) volunteers work independently and use specialized field equipment to track snakes and collect relevant field data. |
| Arizona | Ranid Frog Monitoring | | | | | There are repatriation efforts carried out by closely supervised volunteers, although no data are collected. Additionally, there are bullfrog removal efforts under direct supervision of AGFD. | Targeted Specific Sites | Surveys are in both lotic and lentic systems in all recovery units (RACH). |
| Arizona | Shovel-nosed snake tissue sampling | | | | | Tissue samples were collected | Volunteer Selected | Volunteers drove roads; worked independently; no written protocols; filled out data sheets and collected tissue samples. |
| Arizona | Sonoita Creek State Natural Area Herpetological Inventory | Terrestrial drift fences | Other | | | Incidental collection of road-killed specimens. | Targeted Specific Sites | |
| Arizona | Sonoran mud turtle monitoring | | | | | | | |
| Arkansas | Arkansas box turtle citizen science survey | | | | | Incidental observations statewide were reported | Volunteer Selected | The program consists of anecdotal observations reported by citizens via an online report form, email, mail or phone. |
| California | Lost Lizards of Los Angeles | | | | | incidental observations were reported in LA County | Volunteer Selected | The program consists of anecdotal observations reported by citizens via an online report form |

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| California | Monitoring Terrestrial Reptiles and Amphibians in the Mediterranean Coast Network (MEDN) - Santa Monica Mountains National Recreation Area (SAMO), Cabrillo National Monument (CABR), and Channel Islands National Park (CHIS). | Artificial cover | | | | MEDN is a 3 park network. CHIS uses coverboards along transects to survey for terrestrial amphibians (no volunteers, all expert biologists performing surveys). CABR and SAMO use drift fencing with pitfall traps and funnel traps for snakes. CABR and SAMO both use well-trained interns, volunteers, and staff biologists for monitoring. | SAMO - Stratified Random; CABR and CHIS - Targeted Specific Sites | SAMO: study area has been stratified by veg type, and GRTS sampling selected 20 sites per veg type for pitfall array sites. CABR and CHIS have used judgement sampling to locate their sampling sites. |
| Montana | MT Natural Heritage Inventory | Visual encounter surveys | | | | | Opportunistic | We stratified wetlands into 6th code HUCs and target known toad breeding ponds if possible. But majority of wetlands selected in the HUC are based on opportunity (near road, easy access) for volunteers. |
| Multiple - 30-40 states | The Snake Count | | | | | | Volunteer Selected | The Snake Count is a Citizen Science Program to map and track snake distributions across North America. The goal is to document every species of snake that occurs in the United States in a single time period during annual one-week spring and fall counts. This way we can say whether a species still exists and where it occurs in 2012. The data collected during the Snake Count will be used by the CSC to map the current distribution of snakes. In particular, the data collected will confirm the existence of some rare species and provide baseline data to help monitor selected populations of more common species in the future. Individual citizens register to participate in snake count, can survey for snakes wherever they like during the count period using either visual/pedestrian counts and/or road counts, and submit data online. Volunteers are asked to survey for at least 15 minutes. Regional and state volunteer coordinators help recruit and organize volunteers and local data. |
| Nevada | Amargosa Toad Surveys | Hand collecting | | | | | Targeted Specific Sites | Known and historic sites are sampled with crews (agency and volunteers), specimens are captured/marked (PIT tag), or recaptured and measured |

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|---|---|---|---|---|---|---|---|---|
| Nevada | Night Drive Surveys | Hand collecting | Area-constrained searches | | | Incidental collection of road-killed specimens. | Opportunistic/targeted specific sites that met criteria | Wherever roads exist that meet the survey criteria, surveys are conducted |
| Nevada | Spotted Frog Surveys | Dipnetting and sweep samples | Egg mass counts | Automated recording systems | Hand collecting | | Targeted Specific Sites | Known and historic sites are sampled with crews (agency and volunteers), specimens are captured/marked (PIT tag), or recaptured and measured |
| Wyoming | Wyoming Toad Monitoring | Visual encounter surveys | Hand collecting | | | | Systematic | Systematic survey for Wyoming toads at the last known breeding population |
| USA | FrogWatch USA | | | | | Volunteers locate, characterize, and register a wetland to monitor and conduct nocturnal visits (at least 30 minutes after sunset). Species and calling intensities heard within a 3 minute period are recorded. www.frogwatch.org | Volunteer selected | Biweekly sampling of selected wetland during multiple evenings from February through August; no fewer than 4 times per season. |
| Wisconsin | Wisconsin Frog and Toad Survey | | | | | | Follows North American Amphibian Monitoring Program (NAAMP). See website for details: http://wiatri.net/inventory/FrogToadSurvey/ | |
| DE, FL,, GA, IN, IA KY, LA, ME, MD, MA, MN, Mississippi, MO, NH, NJ, NY, NC, PA, SC, TN, TX, VT, VA, West VA | North American Amphibian Monitoring Program (NAAMP) | | | | | | stratified random | Random roadside routes with 10 listening stops per route. |
| | | | | | | | | |
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|---|---|---|---|---|---|---|---|---|
| Florida | Based on the study by Robin Boughton and Jennifer Staiger at UF: Use of PVC Pipe Refugia as a Sampling Technique for Hylid Treefrogs | Sites are spread out over different habitat islands in a recreated 100 acre wetland that pumps in treated wastewater. | | 6 sites | 2 | Information was distributed to different high school teachers and college teachers across Palm Beach County. | Yes | one-day classroom/field workshop, ongoing consultation |
| Florida | Sea Turtle Research and Monitoring Program/ Sea Turtle Conservation Program | nesting beaches | | 22 at least over the years | Currently 100+ island residents each summer | Project or Unit Leader personally recruited island residents and students to volunteer | Yes | |
| Georgia | GA Adopt-A-Stream Amphibian Monitoring Program | wetland (ecotone), stream (reach) | Stream reach = width of stream times 12. | | Right now we have a handful of teams conducting the monitoring. | Through our AAS program which conducts other types of water quality monitoring workshops and certifications. See www.georgiaadoptastream.org for further information | Yes | 3 hour workshop. 1.5 hrs in classroom, 1-1.5 outdoors. In classroom includes a 40 minute presentation introducing amphibian ecology, life history, conservation needs in Georgia, monitoring protocols. Indoor session also includes 20 minutes on frog calls and introducing the NAAMP/FrogWAtch programs. In classroom also includes about 15-20 minutes on safe handling procedures of amphibians and identification tips. Outdoor portion includes demonstration of site setup and monitoring protocols, and then we listen look for amphibians. |
| Georgia | Georgia Herp Atlas | VOLUNTEERS WERE ONLY LIMITED BY THE STATE BOUNDARY | | | 465-492 | Civic programs, newspaper, and magazine articles, posters, newsletters to volunteers, WORD OF MOUTH | No | Sent newsletters to volunteers with hints on how to find particular species. HELD PERIODIC "HERP FORAYS" AND VOLUNTEERS THAT PARTICIPATED LEARNED SAMPLING TECHNIQUES |
| Kentucky | Kentucky State Wildlife Action Plan Herp Monitoring | Area sampled by a tin site or drift fence is largely unknown, especially over long periods of time. | N/A | 50+ | Two members of the herp society provide the bulk of the volunteer hours | Will Bird and Phil Peak are avid herp enthusiasts and founders of the Kentucky Herp Society. The partnership came naturally. | No | |
| Maine | Maine Vernal Pools Project - Municipal Vernal Pool Mapping and Assessment and Significant Vernal Pool Identification | vernal pools in different landscape contexts | | | | | | |

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|---|---|---|---|---|---|---|---|---|
| Maryland | Maryland Amphibian and Reptile Atlas (MARA) | Atlas block | 25 $km^2$ | 1,300 blocks within all or portions of 260 quads | 488 | Articles in newspapers and nature club newsletters. Recruited at wildlife/nature festivals at nature centers. Advertised through Maryland Association of Environmental and Outdoor Education. Recruited volunteers from previous Maryland breeding bird atlases and at Maryland Ornithological Society annual conferences and articles in their newsletter. Volunteers also recruited through Facebook and Volunteer Match (http://www.volunteermatch.org/). | Yes | Training handbook, other training/information resources, and maps developed and provided to volunteers, and available online. Training sessions indoor and public hikes to provide training in the field. |
| Massachusetts | New England Aquarium and Ducks Unlimited Burrage Pond Herp Survey | | | | | | Yes | Volunteers worked with trained Aquarium and State personnel |
| New Hampshire | Keene Vernal Pool Project | Potential vernal pools within larger forest stands or wetland complexes | Parcels (delineated by property tax maps) | 112 potential vernal pools on 35 parcels | approx. 10 | email announcements & media | Yes | 2-hour classroom presentation + 2 hour field training + volunteer handbook with information on documentation protocols & egg mass identification |
| New Hampshire | Reptile and Amphibian Reporting Program (RAARP) | | | | ~300 | | Yes | some initial training; not required to participate (Note from YL: Nice website with lots of helpful information including key and guides to herps, also regular/annual newsletters) |
| New Hampshire | Salamander Crossing Brigades | Sections of road with high migratory amphibian mortality (crossing "hotspots") | 200 feet -- 2 mile long stretches of road, depending on the site | 10 | 100+ | email announcements & media | Yes | 2-hour classroom presentation + volunteer handbook with information on road crossing protocols + species identification |
| New Hampshire | Vernal Pool Identification | vernal pool | | | | | No | |

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|---|---|---|---|---|---|---|---|---|
| New York | Assessing presence of Bd in amphibian populations | | | | | | | |
| Pennsylvania | Stream Plethodontid Assemblage Response (SPAR) Index -- Volunteer Monitoring Study | plot | 4m sq. plot | at least 22 (one per volunteer -- not clear in report) | 64 trained | targeted certain groups, also broad printed and e-mail announcements | Yes | one-day classroom workshop, post-training field test |
| Tennessee | Citizen Science Project - Aquatic and Terrestrial Salamander Monitoring | | | | | Primarily student volunteers and teachers | | |
| Tennessee | Citizen Science Project - Pond-Breeding Amphibian Monitoring | | | | | Primarily student volunteers and teachers | | |
| Tennessee | Citizen Science Project - Reptile Inventory | | | | | Primarily student volunteers and teachers | | |
| Aargau | Amphibienmonitoring Aargau | wetland or pond | variable | ~250 per year | 90 | | Yes | classroom-presentations (3 evenings) and on-site training (3 excursions) |
| Canada - Alberta | Alberta Snake Hibernaculum Inventory | Various | | | | Various - presentations, media, extension products | No | |

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|---|---|---|---|---|---|---|---|---|
| Canada - Alberta | Alberta Volunteer Amphibian Monitoring Program | Various | | | Over 800 program members | Various - presentations, media, extension products | Yes | Volunteers are provided a comprehensive monitoring booklet and CD featuring the calls of Alberta's frogs and toads |
| Canada - Manitoba | Manitoba Herps Atlas | Varies - breeding ponds, streams, etc.Volunteers select. | | | | Contacted known amateur and professional herpetologists and special interest groups such as the Manitoba Naturalists Society and the Manitoba Herpetological Society. Posted notices online on website, targeted emails, public notices and some media coverage. Also conducted number of promotional workshops to increase public awareness of the effort. | Yes | Training materials and resources developed and made available online. |
| Canada - Manitoba | Skink Watch | variable. From prairie openings, to large pastures, to yard sites | | ? | landowners conduct sampling | NA | No | |
| Canada - Nova Scotia | Turtle Monitoring Program | | | | 150+ annually | | | |
| Mainly mainland UK (GB) but scheme includes Northern Ireland, Isle of Man and Jersey (Channel Island) | National Amphibian and Reptile Recording Scheme (NARRS) - National Amphibian Survey and National Reptile Survey | 1km grid squares (in the case of amphibians, the sw-most pond in that square). Pond - using Pond Conservation definition of any waterbody between 1 square metre and 2 hectares in area, which holds water for at least four months of the year. | variable | aim to set baseline occupancy rate data for British species, need in theory 400 squares each for repts and amphibs within survey period 2007 - 2012 | >1,400 people signed up in 2007; 1000+ in theory but only 25% provide data | targeted UK Amphibian and Reptile Groups + other special interest (see www.arg-uk.org.uk) | Yes | 10+ nationwide events each year, usually 1 or 2 days each and including field survey sessions/classroom run by experienced surveyors |
| Netherlands | Amphibian Monitoring Program of the Netherlands | Breeding ponds and transects | on average, a monitoring unit is on average a maximum of 100 ha, but sample potential breeding sites within unit. | 253 in 2004 | | | | |

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|---|---|---|---|---|---|---|---|---|
| Netherlands | Dutch Reptile Monitoring Scheme/Programme (Dutch sand lizards) | Transect | 2-km transect | | | | | |
| UK - Great Britain | British National Amphibian and Reptile Recording Scheme - Application of Occupancy Modelling Study | Pond | Varied | 48 | | | | |
| Indiana, Michigan, Minnesota and Wisconsin | National Park Service Western Great Lakes Inventory & Monitoring Network | Individual Parks will stratify by habitat types. | | Initially 10 per Park | NA | NA | NA | |
| Michigan | Ann Arbor Salamander Survey | vernal pond | | | | | Yes | 1.5 hour workshop |
| Michigan | Ottawa National Forest Herp Inventory and Monitoring Program | Entire Forest, likely will become an occupancy model design with habitat types as covariates. | | NA for inventory, to be developed for monitoring | roughly 10/year | word of mouth | Yes | materials, working with experts, ongoing consultation |

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|---|---|---|---|---|---|---|---|---|
| Nebraska (main state), some Iowa and South Dakota | Nebraska Amphibian Conservation Education Project | wetland, pond, portion of a stream, lake or river, backyard | varies | varies | About 500 | Partnered with school districts and 4-H. We also did several workshops for teachers, 4-H leaders and informal educators throughout the state. The project quickly spread from there. | Yes | Training mainly targets educators, who then pass their knowledge onto the students. Occasionally, the training does include the students as well. Training is typically between2-3 hours in length. If time and location is available, the trainees spend part of the time listening to a presentation about the project background, which includes information on amphibians. The other part of the training is spent in the field going over proper procedures and practice collecting samples. As the project grows, I would like to streamline training and require a certain amount for teacher/classrooms before they can go out in the field. |
| Ohio | Lake Erie Watersnake Annual Census aka "The Nerodio" | defined shoreline transect | variable | 15 primary | 30-60 annually | word of mouth, herp interest groups | Yes | We have on going training/consultation in the field by having our volunteers work alongside experts. The level of involvement and data collection by a particular volunteer is determined by the amount of experience they have with our program. |
| Ohio | Mitigated Wetland Research- | wetlands (mitigated) | ca 100 x 100 m | two | 6-12 | targeted undergraduate students and local landowners | Yes | working with expert; ongoing |

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| Ohio | Ohio Salamander Monitoring Program | **Pond-breeding salamanders** - Vernal pool within or adjacent to a forest (or more open situations for some species). Body of water should hold water in typical year into July. Permanent water sources may be selected as well. **Stream salamanders** -Small cold, headwater streams with drainage area <20 sq. mi. Intermittent streams that maintain some pools of water at all times. | **Pond-breeding salamanders** - Varies. **Stream salamanders** - 60-m stream segment | | | | | |
| Oklahoma | Ecology and Natural History of Three Oklahoma Species | Two 1-ha trapping grids | 1 ha trapping grid | Two | 50 | targeted undergraduate students | Yes | Hands-on training and worked with graduate student researcher |
| Texas | Texas Amphibian Watch - Adopt-a-Frog Pond Frog Malformation Monitoring | | | | | | | |
| Texas | Texas Amphibian Watch - Amphibian Spotter Program | | Variable | | | press releases; targeted Texas Parks and Wildlife Department staff | No | |

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|---|---|---|---|---|---|---|---|---|
| Texas | Texas Box Turtle Survey | Variable--backyards to ranches to roadsides | Variable | 1310 sightings from 2005-09 | 527 people from 2005-09 | press releases; targeted Texas Parks and Wildlife Department staff | No | |
| Texas | Texas Horned Lizard Watch | Variable--backyards to ranches to roadsides | Variable | Avg. about 25/year; about 300 total since 1997 | Avg. abut 25/year; about 215 total since 1997 | press releases; teacher workshops; Texas Master Naturalist presentations and workshops | Yes | Participants can join without training, but in some cases volunteers were recruited with a two-hour classroom and field-based training |
| Texas | Texas Turtle Watch Program | Aquatic habitat - pond, lake, river, etc. | Variable | | | | Yes | |
| Wisconsin | Ozaukee Washington Land Trust - Citizen Science based herp monitoring program | Individual properties with habitat types as covariates. | | variable | roughly 15/year | word of mouth, website, events | Yes | materials, working with experts, ongoing consultation, workshops |
| Wisconsin | Urban Ecology Center- Citizen Science based herp monitoring program | Individual properties with habitat types as covariates. | | variable | | | Yes | materials, working with experts, ongoing consultation, workshops |
| Wisconsin | Wisconsin Herp Atlas | Not applicable. | | NA | quite variable year to year | word of mouth, website, events | NA | |

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| Wisconsin | Wisconsin Salamander Survey | Wetland or pond, semi-permanent to permanent or long-duration ephemeral ponds, shallow, and fishless except for minnows. Ponds should be located in both open and closed canopy settings or adjacent to both these community types. Majority of uplands surrounding pond within 300 m should support natural community such as large old field, prairie, woodland, forest, or some combination thereof. Avoid ponds in cropland or pasture. | Variable | 56 | 52 | Targeted Audobon Society volunteers | Yes | materials, working with experts, ongoing consultation |
| Michigan, Minnesota, Ontario and Wisconsin | Lake Superior Basin Amphibian and Reptile Monitoring Program | Entire Basin, likely will become an occupancy model design with habitat types as covariates. | | Will be variable based on partner participation | NA | various ways | Yes | materials, working with experts, ongoing consultation |
| not sure at this point - our animal monitoring program was piloted in 2010, but they are intended for use in states where the species occur | Nature's Notebook, a plant and animal program of the USA National Phenology Network | A monitoring site is the area within which you will look for your chosen animal species. | A site should be no larger than 15 acres. | As many as the participant chooses | Up to participant to decide to work independently or with others | Word of mouth, media outlets, etc | Yes | Training materials are made available on our website (http://www.usanpn.org/training_videos) and include videos, online materials, and a handbook. |
| Arizona | Desert box turtles inventory | | | | | public education outreach | | |

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|---|---|---|---|---|---|---|---|---|
| Arizona | Desert tortoise monitoring at a long-term study site | | | | | | No | I'm not sure if training was provided - spreadsheet would not let me modify cell W15. |
| Arizona | Exotic turtle removal | pond | | | | public education outreach | Yes | on-site |
| Arizona | Mexican gartersnake radio tracking | | | | | | Yes | working with experts |
| Arizona | Ranid Frog Monitoring | Recovery Unit | | | | | No | N/A |
| Arizona | Shovel-nosed snake tissue sampling | Sections of roads | | | | | No | I'm not sure if training was provided - spreadsheet would not let me modify cell W14. |
| Arizona | Sonoita Creek State Natural Area Herpetological Inventory | All available herp habitats esp. in riparian zones along Sonoita Creek, and uplands. | | | 12 | Mostly from Tucson Herpetological Society | No | N/A |
| Arizona | Sonoran mud turtle monitoring | | | | | | No | N/A |
| Arkansas | Arkansas box turtle citizen science survey | N/A | N/A | N/A | N/A | Education outreach program solicited | No | N/A |
| California | Lost Lizards of Los Angeles | N/A | N/A | N/A | N/A | Education outreach program solicited | No | N/A |

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| California | Monitoring Terrestrial Reptiles and Amphibians in the Mediterranean Coast Network (MEDN) - Santa Monica Mountains National Recreation Area (SAMO), Cabrillo National Monument (CABR), and Channel Islands National Park (CHIS). | Sampling unit is the entire park and surrounding areas for all 3 parks (SAMO, CABR, and CHIS) | For example, SAMO covers at least 60,000ha. | There is only one SAMO! | 2 volunteers do 10 pitfall arrays everyday for 5 days = 20 sites in 1 week. This occurs 2x/month for a total of 40 sites visited one week per month per person. | We advertise for wildlife interns on Texas A&M job board. Interns are interviewed, hired and trained. They must commit to 4 months and are given a stipend of $100/week + housing in most cases. | Yes | 2-hour presentation, reading materials, working with experts in the field for at least 5 field days (=40 hours). |
| Montana | MT Natural Heritage Inventory | Typically we survey 100% of shoreline of wetland. If wetland is too large (more than 5 acres or so), we survey NE shoreline | Ranges from 0.25 acre to 20 acre | Sample about 30 per year. | About 20 youths and 10 adults per year | Combination of news release, targeted school teachers, targeted volunteer coordinators and word-of-mouth from previous participants. Usually get about 40 interest calls and have to limit attendance to 30 or so. | Yes | We have 1.5 hours of classroom training (PowerPoint slides) and then match volunteers with experienced agency personnel. |
| Multiple - 30-40 states | The Snake Count | Varies - backyards, parks, trails, roads, etc. Volunteers select. | Varies | | Over 230 snake count participants/ volunteers in fall 2011 snake count | Website, targeted e-mails, through regional and local coordinators, word of mouth | Yes | On-line materials/toolkit with information on how to look for snakes, survey protocols, list of materials needed, and additional resources. |
| Nevada | Amargosa Toad Surveys | riparian areas in and around Beatty, NV | | ~5 | ~10 | Incidental communication with NDOW personnel | Yes | Brief presentation of identification, capture methods and measuring just before working with experts. ~15 minutes. |

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| Nevada | Night Drive Surveys | 20 mile stretch of road | 20 miles | 18 | 10 | Incidental communication with NDOW personnel | Yes | It requires one ride-along with the State Herpetologist to illustrate survey techniques, during which background information is gathered, skills are assessed and protocols are reviewed and illustrated. One survey is usually ~4 hours. |
| Nevada | Spotted Frog Surveys | Riparian areas in Indian Valley | | ~8 | ~5 | Incidental communication with NDOW personnel | Yes | Brief presentation of identification, capture methods and measuring just before working with experts. ~15 minutes. |
| Wyoming | Wyoming Toad Monitoring | blocks within Mortenson Lake National Wildlife Refuge | | | 30 | solicited from USFWS & the Association of Zoos and Aquariums' Wyomin Toad Species Survival Plan | Yes | one day of training on survey protocol and techniques |
| USA | FrogWatch USA | Individual wetland(s) (e.g., swamp, marsh, bog/fen, vernal pool, wet meadow, prairie pothole, ditch, playa lake, or "other") | No specific size - avoid overlap of calling populations in nearby wetlands | ~3,500 nationwide, but not all monitored annually (From 1998 - 2010 there were ~7,800 sites, ~3,500 with survey data) | Average 500 annually (From 1998-2010, there were >10,500 registered volunteers) | Combined effort between national office (AZA) and local chapters using various techniques: chapters recruit local volunteers & establish local partnerships; use advertisement to news media, online, through e-mail and social media, seasonal newsletters, presentations | Yes | Volunteer training is strongly encouraged, but not required, for participation. Chapter coordinators are trained in-person or online and then train local volunteers. Volunteer trainings sessions are 2-4 hours using AZA-supplied templates (standardized). Online resources are available to all, regardless of participation in training session. |
| Wisconsin | Wisconsin Frog and Toad Survey | wetland/lake | | 95 in 2010 | 97 in 2010 | | Yes | |
| DE, FL,, GA, IN, IA KY, LA, ME, MD, MA, MN, Mississippi, MO, NH, NJ, NY, NC, PA, SC, TN, TX, VT, VA, West VA | North American Amphibian Monitoring Program (NAAMP) | Each listening stop has some kind of potential anuran breeding habitat (pond, roadside ditch, vernal pool, etc.) | | 5000+ | 500+ | through state partners | | online quiz and any training state partners provide |
| | | | | | | | | |
| | | | | | | | | |

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|---|---|---|---|---|---|---|
| Florida | Based on the study by Robin Boughton and Jennifer Staiger at UF: Use of PVC Pipe Refugia as a Sampling Technique for Hylid Treefrogs | Yes | in-person testing while in the field | Volunteers, with practice, were able to effectively carry out the designed measurements in the study. | Yes | This monitoring method is easy to maintain, has little cost, and provides research experience for area students. |
| Florida | Sea Turtle Research and Monitoring Program/ Sea Turtle Conservation Program | | | | Yes | Seems like program was able to do get a lot of local citizens/residents involved and was able to do education and outreach as well as monitoring; program has expanded and has lasted 51 years on at least 1-2 of the islands |
| Georgia | GA Adopt-A-Stream Amphibian Monitoring Program | No | | | So far, it has engaged many citizens so far and as we strengthen and develop our QA/QC testing procedures, we will have a better handle on the effectiveness of their data collection. | 1. We have a knowledgeable committee helping to develop our program 2.Large volunteer pool to attract to the monitoring program 3. Well developed methods thus far 3. Experience developing QA/QC procedures as a volunteer program |
| Georgia | Georgia Herp Atlas | Yes | Verification required - could be clear photo, video, audio (for frogs and alligators), actual specimens, and shed snake skins | 89% of the 7,452 (6,763) submitted records were verifiable and accepted. | Yes | BECAUSE VERIFICATION WAS REQUIRED ANYONE COULD PARTICIPATE REGARDLESS OF THEIR ID SKILLS. VERY GENERAL AND SIMPLE GUIDELINES/REQUIREMENTS MADE ANYONE COMFORTABLE WITH PARTICIPATION (WHICH INCREASED PARTICIPATION) |
| Kentucky | Kentucky State Wildlife Action Plan Herp Monitoring | Yes | The state herpetologist is intimately familiar with the field ID skills of herp society volunteers from time spent in the field together. Data is only accepted if it has been verified by the two members of the KY Herp Society who KDFWR works closely with and trusts. | Very positive as the two volunteers collecting the data are considered experts in identifying reptiles in Kentucky. | Yes | Volunteers provide many hundreds of man-hours monitoring herps in Kentucky, while providing KDFWR with non-federal match (volunteer hours). This set-up is really a win/ win. |
| Maine | Maine Vernal Pools Project - Municipal Vernal Pool Mapping and Assessment and Significant Vernal Pool Identification | Yes | Photodocumentation required for data to be accepted | | | |

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| Maryland | Maryland Amphibian and Reptile Atlas (MARA) | Yes | For most common species, no additional information is required although photos for each occurrence or each species found within a quad are encouraged. However, verification is required for certain species (i.e., rare species, species that are hard to identify, eggs or larvae of any species), and surveyors complete an additional data form for those observations. Photodocumentation is the main practice to verify species identity, but written documentation can be considered. All photos, audio recordings of anuran calls, and verification forms are reviewed by a verification committee who are experienced with Maryland's herps. | Voucher photographs or audio recordings accompanied 37% (5,203) of the submitted records. Through February 22, 2012, the verification committee has reviewed 4,406 records and determined that only 4% of the submitted records were misidentified. | Yes - MARA has resulted in a total of 13,919 occurrence records, including records of rare and cryptic/difficult to find species, in just 25 months, and compares well with other successful herpetofauna atlases. | Significant public participation and data provided. Solid volunteer corps. Regular updates on progress to volunteers via project website, monthly electronic newsletter, and a social networking website to retain volunteers and increase communication. On course to achieve statewide goals by the end of 2014 - have achieved minimum coverage goal of 25 active search hours within 52% of quads and coverage goal of at least 10 species per block in 41% of blocks. This will allow effort and change in effort for individual blocks, crucial sources of variation, to be accounted for in repeated atlases. Verification process able to identify and correct errors, quantify and correct error rates, and provide feedback to citizen scientists to reduce further errors. Will establish baseline data by which future changes in the native herp distribution can be assessed, inform long-term conservation and protection, and provide opportunity for citizens to actively learn about native species while collecting valuable data. |
| Massachusetts | New England Aquarium and Ducks Unlimited Burrage Pond Herp Survey | | | | | Got major partners, the Aquarium, and Ducks Unlimited involved in herp conservation and habitat restoration efforts at the site; opportunity for public outreach |
| New Hampshire | Keene Vernal Pool Project | Yes | Photo documentation. | Vernal pool data were not considered complete without full photo documentation of the pool and evidence of obligate species breeding (typically, egg masses). | 2010 was a great start; 27 potentials vernal pools were field checked, and approx. 20 pools were documented. | Volunteer training & support -- excellent field maps & simplified instructions for photo-documenting pools with built-in data (such as "in-picture labels" of important information, written on whiteboards or chalkboards and photographed next to relevant natural features, such as vernal pools or egg masses.) |
| New Hampshire | Reptile and Amphibian Reporting Program (RAARP) | No | reports evaluated one at a time | | Yes- lots of reports. | education of public, receive lots of reports at minimal cost |
| New Hampshire | Salamander Crossing Brigades | Yes | Photo documentation was requested in a share-the-fun-with-the-community kind of way, and less as data verification, though photos were occasionally used to authenticate rare finds or verify identification when volunteers were unsure of the species. | | Yes | Widespread community support & involvement; successfully prevent road mortality of thousands of individual amphibians each year; amphibian count data led one local Conservation Commission to purchase a parcel of land for protection of a migratory amphibian corridor |
| New Hampshire | Vernal Pool Identification | No | | | | |

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| New York | Assessing presence of Bd in amphibian populations | | | | | |
| Pennsylvania | Stream Plethodontid Assemblage Response (SPAR) Index -- Volunteer Monitoring Study | Yes | in-person classroom testing, post-training field test | Some salamander species and life stages were more difficult to identify than others. Volunteer proficiency also varied by salamander species and life stage even after the training | Yes in that the evaluation of volunteer performance improved with the training | improvement in ID following training; researchers felt that improvement by the volunteers as a result of training was worth the time and cost to conduct the training. |
| Tennessee | Citizen Science Project - Aquatic and Terrestrial Salamander Monitoring | | | | | |
| Tennessee | Citizen Science Project - Pond-Breeding Amphibian Monitoring | | | | | |
| Tennessee | Citizen Science Project - Reptile Inventory | | | | | |
| Aargau | Amphibienmonitoring Aargau | Yes | multiple-visits of same sites by different persons with differing skills | species are found with good reliability; population-sizes are highly variable | Yes | volunteers feel responsible for "their" site; they will report if something happens |
| Canada - Alberta | Alberta Snake Hibernaculum Inventory | Yes | photo documentation, interviews, expert verification | Qualitative | Yes | Numerous reptile observations and snake den records |

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| Canada - Alberta | Alberta Volunteer Amphibian Monitoring Program | Yes | photo documentation, interviews, expert verification | Qualitative | Yes | Several thousand amphibian records from all over Alberta |
| Canada - Manitoba | Manitoba Herps Atlas | Yes | All records will be subject to scrutiny by NatureNorth.com and by contributing experts with Manitoba Conservation and other agencies. Suspect data entries will be removed if necessary. The precise manner of "quality control" applied to the data submitted by observers will develop as the project progresses. | | Still TBD but first year of the atlas was successful. | In its first year of operation the MHA has proven to be successful, adding nearly 1100 records of locations of reptiles and amphibians in Manitoba. More than 100 records for species of significant conservation concern (S1 or S2) were collected. The MHA has been embraced by a number of people and feedback has been very positive. It has provided a number of Manitobans with the opportunity to get involved in biodiversity data collection and has released pent-up interest in Manitoba's reptiles and amphibians in a number of these individuals. |
| Canada - Manitoba | Skink Watch | No | photo documentation is recommended | From another study landowners seem to be able to distinguish skinks from salamanders | Still TBD | getting landowners to submit the data once they've collected it, is a challenge |
| Canada - Nova Scotia | Turtle Monitoring Program | | | | Yes - esp. in recruiting and involving large number of volunteers | |
| Mainly mainland UK (GB) but scheme includes Northern Ireland, Isle of Man and Jersey (Channel Island) | National Amphibian and Reptile Recording Scheme (NARRS) - National Amphibian Survey and National Reptile Survey | No | | | As of 2010, half-way through first survey cycle of 6 years, to date, the number of results received is about 60% of the number required, so slightly exceeding targets at present | volunteer engagement, will be (amazingly) first robust and repeatable baseline data for UK |
| Netherlands | Amphibian Monitoring Program of the Netherlands | | | | | |

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| Netherlands | Dutch Reptile Monitoring Scheme/Programme (Dutch sand lizards) | Yes | Observers must know reptiles well and observers were rated for their experience level - 1=novice, 2=with at least 1 yr experience, 3=with at least 2-3 yrs experience | | | |
| UK - Great Britain | British National Amphibian and Reptile Recording Scheme - Application of Occupancy Modelling Study | | | | | |
| Indiana, Michigan, Minnesota and Wisconsin | National Park Service Western Great Lakes Inventory & Monitoring Network | | | | Yes | Inventory data advanced, education advanced, monitoring potential achieved |
| Michigan | Ann Arbor Salamander Survey | | | | | |
| Michigan | Ottawa National Forest Herp Inventory and Monitoring Program | No | | | Yes | Inventory data advanced, education advanced, monitoring potential achieved |

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|---|---|---|---|---|---|---|
| Nebraska (main state), some Iowa and South Dakota | Nebraska Amphibian Conservation Education Project | Yes | Once the data is uploaded to our database, it is vetted by an expert. If the data is not reliable it can be edited or deleted from the database. | | Definitely and we plan to continue this project into the future, | Unique project. Citizen scientists have not been asked to test for Chytrid fungus in amphibians. Typically, programs with amphibians focus on identifying and recording frog calls, We have had a great response from educators looking for real field experiences for their classrooms, which has created a very unique group of dedicated teachers. |
| Ohio | Lake Erie Watersnake Annual Census aka "The Nerodio" | No | | | Yes | We are able to census multiple sites and gather large amounts of data in a short amount of time. For example, this year we processed almost 2000 snakes in 10 days. Our ability to obtain and process this quantity of data is one of the reasons we were able to show population recovery in this species so quickly. |
| Ohio | Mitigated Wetland Research- | No | n/a | n/a | Yes | Strengths were sustained volunteerism, excellent data collection, spreading enthusiasm, some external funding, lots of local cooperation |

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| Ohio | Ohio Salamander Monitoring Program | Yes | Recommended photo documentation of adults. Larvae were assigned to "morpho-species" in the field, and one representative voucher specimen of each "morpho-species" was collected, preserved, and submitted to survey coordinator for identification and catalogued into museum collection. | | | |
| Oklahoma | Ecology and Natural History of Three Oklahoma Species | Yes | Tested volunteers on ability to detect/find PIT tags under coverboards using modified portable reader | Found that volunteers could detect 65 76.5% of the PIT tags under cover boards and no bias for finding tags under different cover boards, suggesting good methodology for augmenting surveys for these fossorial, secretive and difficult to capture species | Yes - entire master's project/research was completed with help of over 50 volunteers | |
| Texas | Texas Amphibian Watch - Adopt-a-Frog Pond Frog Malformation Monitoring | | | | | |
| Texas | Texas Amphibian Watch - Amphibian Spotter Program | No | Volunteers can submit photos or recorded calls if uncertain of ID but are not required. | | | |

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|---|---|---|---|---|---|---|
| Texas | Texas Box Turtle Survey | No | Some data is discarded based on inappropriate description of behavior, habitat, or size. | | Somewhat--the goal was to assess whether or not box turtles are have disappeared from much of their range and whether further monitoring or conservation was needed. | Inexpensive; participation of TPWD staff greatly increased the data being submitted. |
| Texas | Texas Horned Lizard Watch | Yes | Minimal documentation is pursued; if the volunteer is using TPWD materials which contain photographs, then no follow-up is used; if the volunteer has not viewed the program materials, then they are directed to websites with identification aids | In some cases sightings are discarded because they are out of expected range and the volunteer cannot confirm the identification | Yes--reports have been received from 173 of Texas' 254 counties. Statistically significant data has been collected about habitat attributes, such as ant species presence. | Inexpensive; addresses a popular species with much public interest; produced significant findings regarding distribution and habitat attributes; because volunteers provided data from unoccupied habitat, we could analyze important habitat variables. |
| Texas | Texas Turtle Watch Program | | | | | |
| Wisconsin | Ozaukee Washington Land Trust - Citizen Science based herp monitoring program | Yes | online quiz, photo documentation | | Yes | Inventory data advanced, education advanced, monitoring potential achieved |
| Wisconsin | Urban Ecology Center- Citizen Science based herp monitoring program | | | | Yes | Inventory data advanced, education advanced, monitoring potential achieved |
| Wisconsin | Wisconsin Herp Atlas | | | | Yes | Inventory data advanced, education advanced |

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|---|---|---|---|---|---|---|
| Wisconsin | Wisconsin Salamander Survey | | | | Yes | Inventory data advanced, education advanced, monitoring potential achieved |
| Michigan, Minnesota, Ontario and Wisconsin | Lake Superior Basin Amphibian and Reptile Monitoring Program | Yes | online quiz, photo documentation | | Yes | Inventory data advanced, education advanced, monitoring potential achieved |
| not sure at this point - our animal monitoring program was piloted in 2010, but they are intended for use in states where the species occur | Nature's Notebook, a plant and animal program of the USA National Phenology Network | No | | | We feel that the program is successful, but it has only been through a single pilot season and hasn't yet been evaluated and the data have not yet been used by decision-makers or researchers. | |
| Arizona | Desert box turtles inventory | | | | | program is in its early stages |

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|---|---|---|---|---|---|---|
| Arizona | Desert tortoise monitoring at a long-term study site | | | | Yes | provides long-term monitoring data for tortoises |
| Arizona | Exotic turtle removal | Yes | Expert verification | qualitative | Yes | successful removal of non-native turtles |
| Arizona | Mexican gartersnake radio tracking | Yes | Expert verification | qualitative | Yes | assists with management of Mexican gartersnakes |
| Arizona | Ranid Frog Monitoring | No | N/A | N/A | Yes | Assists with recovery efforts for Chiricahua leopard frog. |
| Arizona | Shovel-nosed snake tissue sampling | | | | Yes | assists with management of shovel-nosed snakes |
| Arizona | Sonoita Creek State Natural Area Herpetological Inventory | No | N/A | N/A | Yes | we developed a reasonable species list, accompanied by photo vouchers for all species and specimen vouchers for some |
| Arizona | Sonoran mud turtle monitoring | Yes | Expert verification | qualitative | Yes | successful monitoring of Sonoran mud turtles |
| Arkansas | Arkansas box turtle citizen science survey | No | N/A | N/A | Yes | Provided inventory data for Arkansas turtles |
| California | Lost Lizards of Los Angeles | No | N/A | N/A | Yes | provided inventory data for LA County lizards |

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|---|---|---|---|---|---|---|
| California | Monitoring Terrestrial Reptiles and Amphibians in the Mediterranean Coast Network (MEDN) - Santa Monica Mountains National Recreation Area (SAMO), Cabrillo National Monument (CABR), and Channel Islands National Park (CHIS). | Yes | In-person informal testing, expert verification, working with experts at regular intervals. | Interns provide invaluable data for the Inventory and Monitoring program | Yes | Lots of very good data collected over many years. |
| Montana | MT Natural Heritage Inventory | No | N/A | N/A | Partially. Volunteers allow agency personnel to sample more wetland shoreline than otherwise possible. But volunteers restrict sampling design to opportunistic and so we forego some wetlands. Due to limited agency time, cannot get to other wetlands. We continue this program because of unwritten value it has to engage children in wetland protection. | Volunteers, especially youth, tend to be surprised and delighted at their discoveries. We greatly increase their understanding and appreciation of amphibs and reptiles. The program has been popular with agency heads because it uses so many volunteers in a unique way. Therefore, even in tough budget years, this program tends to be a priority. |
| Multiple - 30-40 states | The Snake Count | Yes | Volunteers are asked to take and submit/upload photos of snakes observed for species identification or confirmation. But photos are not required for data submission/acceptance. | | Still early but Fall 2011 Snake Count was huge success for first event. Over 230 participants and 40 states represented. 535 snakes of 93 species/subspecies were recorded in 31 states during Fall 2011 Snake Count. | |
| Nevada | Amargosa Toad Surveys | No | N/A | N/A | Yes | effective monitoring and management of Amargosa toad endemic population in Beatty, NV |

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|---|---|---|---|---|---|---|
| Nevada | Night Drive Surveys | Yes | Expert verification | qualitative | Yes | Simple inventory and monitoring technique easily implemented by volunteers with minimal equipment |
| Nevada | Spotted Frog Surveys | No | N/A | N/A | Yes | effective monitoring and management of Columbia spotted frog populations in Central NV |
| Wyoming | Wyoming Toad Monitoring | No | N/A | N/A | Yes | Has assisted with the recovery of the Wyoming toad |
| USA | FrogWatch USA | Yes | A "Certification" is optional for chapter volunteers. Individuals must achieve a 80% or greater on each component of a two part assessment administered by chapter coordinators. Part 1 is a 20 question written assessment demonstrating protocol comprehension (standardized across program). Part 2 is a frog and toad call ID quiz (adapted for local species). | The certification process was implemented in 2010 & is still being evaluated. To date, volunteers taking the optional certification have demonstrated knowledge and received qualifying scores, typically on the first try. Additional attempts are allowed, but very rarely more than 2 are needed. No re-certification process is implemented at this time (i.e., once certified, always certified) | Yes - has generated a long-term, nationwide dataset, making trend analysis possible. Has contributed to knowledge of species' ranges and also detected presence of rare and invasive species. | - Generates national dataset<br>- Engages volunteers in sound science<br>- Expands participant content knowledge and appreciation for amphibians and wetlands. |
| Wisconsin | Wisconsin Frog and Toad Survey | Yes | online quiz | | Yes | Inventory data advanced, education advanced, monitoring potential achieved |
| DE, FL,, GA, IN, IA KY, LA, ME, MD, MA, MN, Mississippi, MO, NH, NJ, NY, NC, PA, SC, TN, TX, VT, VA, West VA | North American Amphibian Monitoring Program (NAAMP) | Yes | Online quiz | Online quiz allows us to ensure that observers are skilled at frog call identification. | Yes | Partnership among states allowing common survey effort. Volunteer observers provide hundreds of hours of field work each year. |
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| Florida | Based on the study by Robin Boughton and Jennifer Staiger at UF: Use of PVC Pipe Refugia as a Sampling Technique for Hylid Treefrogs | Sampling sites must be changed over time if habitat changes for optimal success. | Expand the amount of sampling sites. Increase monitoring efforts throughout the year. | Green Cay Nature Center | Eva Matthews ematthews@pbcgov.org 561-966-7003 | Park Vista High School, Boynton Beach, FL | 2007 | 4 |
| Florida | Sea Turtle Research and Monitoring Program/ Sea Turtle Conservation Program | | | Caretta Research Inc. originally/ Sanibel Captiva Conservation Foundation currently | Charles LeBuff previously/ | USFWS, residents, schools | 1959 | 20+ |
| Georgia | GA Adopt-A-Stream Amphibian Monitoring Program | 1. Have citizens create a photo library of the amphibians they catch and have those identified by an expert before submitting data 2. Issues with putting our refugia/pipes at ecotone or stream's edge with flooding/drought and the influences on their captures and what that means datawise 3.Working with Frogwatch to get state coordinators has been an issue-we really want to start a frog call program where citizens can select their own site (unlike NAAMP), but Frogwatch hasn't been able to train in GA and we want to get a program going! | 1. Get a frog calling program started immediately and involve our efforts more so with PARC (we're trying to work however with the GA chapter which hopefully will start soon). | Our citizens are all privately based. | | Jones Ecological Research Center; Atlanta Botanical Gardens, GA Department of Natural Resources; Stone Mountain Memorial Association; Amphibian ARC; University of Georgia Odum School of Ecology | 2005 | 2 |
| Georgia | Georgia Herp Atlas | | AT THE TIME, IT WAS NOT FEASIBLE TO HANDLE THE REPORTING OF SPECIES AND THE VERIFICATIONS DIGITALLY, BUT NOW THAT EVERYONE HAS A DIGITAL CAMERA AND HAS EMAIL ACCESS, MUCH OF THE HARDCOPY PRODUCTS COULD BE MORE EASILY HANDLED | Georgia Dept of Natural Resources Nongame Wildlife & Natural Heritage Section (NOW, NONGAME CONSERVATION SECTION) | JOHN JENSEN JOHN.JENSEN@GADNR.ORG 478-994-1438 | GEORGIA MUSEUM OF NATURAL HISTORY | 1996 | 5 |
| Kentucky | Kentucky State Wildlife Action Plan Herp Monitoring | The two volunteers involved are enthusiasts who spend most of their spare time herping and reporting data to KDFWR. People willing to dedicate this amount of time and effort as volunteers are fairly uncommon. | Nothing. | Kentucky Dept of Fish and Wildlife Resources | Danna Baxley; danna.baxley@ky.gov; 502-564-7109 | Kentucky Herpetological Society (KHS) | 2007 | 4 |
| Maine | Maine Vernal Pools Project - Municipal Vernal Pool Mapping and Assessment and Significant Vernal Pool Identification | | | University of Maine, Dept of Wildlife Ecology | Aram JK Calhoun, Dept of Wildlife Ecology, University of Maine, calhoun@maine.edu, 207-581-3010 | | | |

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| Maryland | Maryland Amphibian and Reptile Atlas (MARA) | Majority of species records submitted by less than 10% of the volunteers. Retaining volunteers requires regular communication between the project management team and data collectors. Monthly electronic newsletter and social networking website have been valuable tools to retain volunteers and increase communication. To date, majority of records have been anuran (most likely because anurans can be detected by sight and sound), and salamander and lizard records have not been well represented. Several strategies have been helpful to increase records for these species - availability of real-time data through the MARA database has allowed participants to be informed of the disparity in the record counts for the different groups, and information on how to survey for the underrepresented groups was shared with participants, resulting in an increase in record counts for those groups from 2010 to 2011. | | Maryland Department of Natural Resources | Glenn D. Therres, Maryland DNR, gtherres@dnr.state.md.us | Natural History Society of Maryland | 2010 | Pilot effort in 2009, program/data collection started in 2010, intended to span 5 years (until 2014) |
| Massachusetts | New England Aquarium and Ducks Unlimited Burrage Pond Herp Survey | | | New England Aquarium, Massachusetts Dept of Conservation and Recreation? | Charlie Innis, New England Aquarium vet | New England Aquarium, Ducks Unlimited, Massachusetts Dept of Conservation and Recreation | 2007 | |
| New Hampshire | Keene Vernal Pool Project | Low volunteer turnout and low data return rates, particularly with null data (potential vernal pools that are not actual vernal pools). | | Ashuelot Valley Environmental Observatory (AVEO), a program of the Harris Center for Conservation Education | Brett Amy Thelen, Program Director, brett@aveo.org | | formally 2010, though AVEO led less-structured vernal pool programs in nearby towns from 2005-2009 | 1 or less |
| New Hampshire | Reptile and Amphibian Reporting Program (RAARP) | | we are working on a web based reporting | NH Fish & Game | same as above | | 2001 | 9 |
| New Hampshire | Salamander Crossing Brigades | Predicting amphibian migrations in order to notify volunteers when to help with road crossings is exceptionally difficult, as weather conditions change rapidly & microclimates vary widely; road closings are a goal, but working with local authorities to implement road closings for wildlife on short notice (necessitated by the weather-dependent nature of amphibian migrations) has been a logistical challenge. | We're still refining our relationships with local decisionmakers to improve opportunities for land conservation & road closings related to amphibian migration. | Ashuelot Valley Environmental Observatory (AVEO), a program of the Harris Center for Conservation Education | Brett Amy Thelen, Program Director, Ashuelot Valley Environmental Observatory (AVEO), brett@aveo.org | Our program is modeled after a similar program run by the Bonnyvale Environmental Education Center (BEEC) in Brattleboro, VT. | 2005 | 6 |
| New Hampshire | Vernal Pool Identification | Lots of interest in surveys; not many forms actually completed and submitted | | NH Fish & Game | Michael Marchand, NH Fish & Game, michael.marchand@wildlife.nh.gov; 603-271-3016 | | 2002 | 8 |

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|---|---|---|---|---|---|---|---|---|
| New York | Assessing presence of Bd in amphibian populations | | | | | | | |
| Pennsylvania | Stream Plethodontid Assemblage Response (SPAR) Index -- Volunteer Monitoring Study | ID'ing larval salamander species (Desmognathus and Eurycea, in particular) was difficult for volunteers to distinguish. Also, distinguishing Desmognathus adult species was problematic (between fuscus and ochrophaeus). These are very similar species, difficult even for experienced biologists to discern without additional verification; classroom testing predicted that this would be difficult for the volunteers. **Lessons learned: volunteer training was beneficial, but proficiency was highly variable and varied by salamander species. Volunteers could improve with additional training focused on the more difficult to identify species and life stages, particularly if it could include better methods for discrimination among similar species/life stages to reduce identification errors.** | Actual monitoring efforts using volunteers not likely to include such intensive protocols; future training may need to be focused on the more difficult to identify species and life stages, particularly if it could include better methods for discrimination among similar species/life stages to reduce identification errors. Plot sampling may not be the best (too intensive) for volunteer monitoring efforts. | Penn State University, Cooperative Wetlands Center | Giann Rocco, Penn State University, Cooperative Wetlands Center, gxr124@psu.edu | | 2002 | Single season study, March - May 2002 |
| Tennessee | Citizen Science Project - Aquatic and Terrestrial Salamander Monitoring | | | Great Smoky Mountains Institute, National Park Service | Paul Super, Science Coordinator, Great Smoky Mountains National Park, paul_super@nps.gov, 828-926-6251; or GSMI - Tiffany Beach, Citizen Science Coordinator, tiffany@gsmit.org | Great Smoky Mountains National Park, Great Smoky Mountains Institute | 1993 and 1999? | |
| Tennessee | Citizen Science Project - Pond-Breeding Amphibian Monitoring | | | | | | | |
| Tennessee | Citizen Science Project - Reptile Inventory | | | | | | | |
| Aargau | Amphibienmonitoring Aargau | | some modifications of the sampling concept (more area-based than pond-based) | Hintermann & Weber AG, Christoph Bühler, Austrasse 2a, CH-4153 Reinach BL, Switzerland | Department Bau, Verkehr & Umwelt, Abt. Landschaft und Gewässer, Isabelle Flöss, Entfelderstrasse 22, CH-5001 Aarau, Switzerland; Tel. 0041 62 835 34 76 | | 1999 | 11 to 15 |
| Canada - Alberta | Alberta Snake Hibernaculum Inventory | Online registration and data submission option underway - innovations to the program from hardcopy materials to online, electronic have been slow | We continue to strengthen an already strong program. | Alberta Conservation Association | Kris Kendell (kris.kendell@ab-conservation.com/780-410-1978/1-877-777-FROG | Alberta Sustainable Resource Development (Alberta Fish and Wildlife) | 1992 | 16 to 20 |

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|---|---|---|---|---|---|---|---|---|
| Canada - Alberta | Alberta Volunteer Amphibian Monitoring Program | Online registration and data submission option underway - innovations to the program from hardcopy materials to online, electronic have been slow | We continue to strengthen an already strong program. | Alberta Conservation Association | Kris Kendell (kris.kendell@ab-conservation.com/780-410-1978/1-877-777-FROG | Alberta Sustainable Resource Development (Alberta Fish and Wildlife) | 1992 | 16 to 20 |
| Canada - Manitoba | Manitoba Herps Atlas | Work remains to be done, however, to expand awareness. Efforts to promote the MHA were successful in some regards, but frustrating in others. "Word-of-mouth", or rather passing-on/forwarding email contacts proved to be an effective means of informing many of those that have become involved in the project. Traditional media do not seem to be an effective means of advertising web resources. | | NatureNorth.com | Doug Collicutt, NatureNorth.com | Manitoba Conservation, Manitoba Education | 2010 | 1.5 |
| Canada - Manitoba | Skink Watch | having a go-to person that the landowners can call for support would be helpful. | Would have group training or someone to take landowners out and show them where to place boards. | Skink Recovery team | Pamela Rutherford or Allison Krause Danielsen, prairie.skinks@gmail.com , Skink Recovery Team | Manitoba Conservation, Nature Conservancy of Canada, Nature North, Brandon University, Assiniboine Hills Conservation District | 2009 | 2 |
| Canada - Nova Scotia | Turtle Monitoring Program | | | Parks Canada - Kejimkujik National Park and National Historic Site of Canada | Duncan Smith, Parks Canada - Kejimkujik National Park and National Historic Site of Canada, duncan.smith@pc.gc.ca | Kejimkujik Southwest Nova Volunteer Program - Parks Canada, Friends of Keji, Mersey Tobeatic Research Institute, and Bird Studies Canada. | | |
| Mainly mainland UK (GB) but scheme includes Northern Ireland, Isle of Man and Jersey (Channel Island) | National Amphibian and Reptile Recording Scheme (NARRS) - National Amphibian Survey and National Reptile Survey | issues are ongoing funding (for training and staffing) and especially retention of volunteers. Also only subset of volunteers (~25%) submitting data. | lay out expectations and schedule for reporting back to volunteers more clearly from the outset | Amphibian and Reptile Conservation Trust | Dr. John W. Wilkinson, johnw.wilkinson@arc-trust.org, Amphibian and Reptile Conservation Trust | see http://www.narrs.org.uk/narrspartners.htm | 2007 | 4 |
| Netherlands | Amphibian Monitoring Program of the Netherlands | | | RAVON | Edo Groverse, e.groverse@uva.nl, RAVON | Statistics Netherlands | 1997 | 11 to 15 |

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| Netherlands | Dutch Reptile Monitoring Scheme/Programme (Dutch sand lizards) | | | RAVON and Statistics Netherlands | RAVON and Statistics Netherlands | | 1994 or maybe even back to 1960's | 11 to 15 |
| UK - Great Britain | British National Amphibian and Reptile Recording Scheme - Application of Occupancy Modelling Study | Emphasize importance of giving training to volunteers before sending them out to the field | | | | | 2007 | 2 |
| Indiana, Michigan, Minnesota and Wisconsin | National Park Service Western Great Lakes Inventory & Monitoring Network | Sampling protocol development is difficult and expensive, but necessary for good data. | | National Park Service Western Great Lakes Network Office | Bill Route, Bill_Route@nps.gov, (715) 682-0631 x221, National Park Service Western Great Lakes Network Office | National Park Service Western Great Lakes Network Office | 2002 | 9 |
| Michigan | Ann Arbor Salamander Survey | | | Ann Arbor Parks - Natural Areas Program | David Mifsud, davidamifsud@gmail.com , Ann Arbor Parks - Natural Areas Program | | | 8 |
| Michigan | Ottawa National Forest Herp Inventory and Monitoring Program | Sampling protocol development is difficult and expensive, but necessary for good data. Reliance on volunteers is problematic. | | USFS Ottawa National Forest | Jeff Soltecz, jsoltesz@fs.fed.us, 906-932-1330 x513, USFS Ottawa National Forest | USFS Ottawa National Forest | 2004 | 7 |

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| Nebraska (main state), some Iowa and South Dakota | Nebraska Amphibian Conservation Education Project | We were unable to get the database set up prior to the project beginning. This created a backlog of data that needed to be entered. It also created a challenge in transitioning educators from mailing data forms to the Zoo to uploading the data onto the website. | It would have been beneficial to streamline the training. | Omaha's Henry Doorly Zoo | Emily Brown educate@omahazoo.com (402) 738-2092 Ext. 5054, Omaha's Henry Doorly Zoo | Nebraska 4-H, Riverside Zoo, University of Nebraska Lincoln Dept. of Computer Science | 2007; Sampling potion of the project began in summer of 2009 | 3 |
| Ohio | Lake Erie Watersnake Annual Census aka "The Nerodio" | As long as you have a core group of people who can manage smaller groups of volunteers, our methods work smoothly. When there is only one expert among 5 or more novice volunteers, there is some draw back and this can result in lower quality data. | nothing | Northern Illinois University | Kristin Stanford (contact info at end) | Northern Illinois University; Ohio Division of Wildlife; USFWS; OSU Stone Laboratory; The Toledo Zoo (groups that have given matching time or monetary support of program) | 2001 | 10 |
| Ohio | Mitigated Wetland Research- | Successes bring ideas for extensions of the study - e.g., ringing a newly constructed wetland site with pitfalls and drift fence to monitor initial colonization events, or testing laboratory interactions between species in a field setting, both requiring additional funding. | Would not change the approach | The University of Findlay, College of Sciences | Terry D. Schwaner, schwaner@findlay.edu, 419-434-5377 | None, presently | 2008 | 3 |

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| Ohio | Ohio Salamander Monitoring Program | The more rigorous the volunteer program, the more likely it is to lose out to other vol programs (more educational, less scientific). | | Ohio Division of Wildlife | Greg Lipps, GregLipps@gmail.com | | | |
| Oklahoma | Ecology and Natural History of Three Oklahoma Species | | | Oklahoma State University | Cybil Nicole Cavalieri (cybil.smith@okstate.edu, 405-714-7575) and Dr. Stanley Fox, OSU | | 2008 | 2 |
| Texas | Texas Amphibian Watch - Adopt-a-Frog Pond Frog Malformation Monitoring | | | | | | | |
| Texas | Texas Amphibian Watch - Amphibian Spotter Program | | | | | | | |

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|---|---|---|---|---|---|---|---|---|
| Texas | Texas Box Turtle Survey | Incidental reports can give an overall picture of distribution, but, of course, do not provide good insight into the health of the populations, in important consideration for long-lived turtles. | Provide a checklist of attributes to help eliminate sightings of aquatic turtle species. We also plan to develop more of a systematic survey method to identify unoccupied habitat. | Texas Parks and Wildlife Department | Lee Ann Linam leeann.linam@tpwd.state.tx.us 512-656-1222 | | 2005 | 6 |
| Texas | Texas Horned Lizard Watch | It is important to design an approach that is meaningful, but also acceptable to volunteers. Rigorous methods are not implementable by the public and lack of systematic distribution can produce skewed results if analysis is not appropriate. | We have reinvigorated interest in the project by "partnering" with interested organizations--providing them with permits and extra resources. Public participation could be increased if online data entry were available. | Texas Parks and Wildlife Department | Lee Ann Linam leeann.linam@tpwd.state.tx.us 512-656-1222 | Texas Master Naturalist program | 1997 | 11 to 15 |
| Texas | Texas Turtle Watch Program | | | Fort Worth Zoo | David Walker dwalker@fortworthzoo.org, 817-759-7225 | Texas Parks and Wildlife Department, the Fort Worth Nature Center, Texas Master Naturalists, Texas State University, Turtle Survival Alliance and the University of Texas - Arlington | 2010 | 1 or less |
| Wisconsin | Ozaukee Washington Land Trust - Citizen Science based herp monitoring program | Sampling protocol development is difficult and expensive, but necessary for good data. Reliance on volunteers is problematic. | | Ozaukee Washington Land Trust | Mike Hoffer, (910) 612-1909, MHoffer@OWLT.org | Ozaukee Washington Land Trust | 2005 | 6 |
| Wisconsin | Urban Ecology Center- Citizen Science based herp monitoring program | Sampling protocol development is difficult and expensive, but necessary for good data. Reliance on volunteers is problematic. | | Urban Ecology Center | Tim Vargo, tvargo@urbanecologycenter.org, 414-964-8505 | Urban Ecology Center | 2007 | 4 |
| Wisconsin | Wisconsin Herp Atlas | Limitations of presence-only data | | UWM Field Station | Gary Casper, 262-689-40950, gscasper@uwm.edu | | 1986 | 25 |

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| State(s) in which protocol has been or is used | Name of Monitoring Program/Protocol | Challenges/Lessons Learned | What would you do differently, if anything? | Lead Agency/ Organization coordinating/ implementing protocol | Lead Program Contact and E-mail/ Phone Number (if known) | Partner Agencies/ Organizations | Year Program Started (if known) | Duration of Program - Please indicate number of years program has been conducted. |
|---|---|---|---|---|---|---|---|---|
| Wisconsin | Wisconsin Salamander Survey | Sampling protocol development is difficult and expensive, but necessary for good data. Reliance on volunteers is problematic. | | Randy Korb | Randy Korb, 715-483-2742, rkorbbio@aol.com | Wisconsin Herp Atlas | 2008 | 3 |
| Michigan, Minnesota, Ontario and Wisconsin | Lake Superior Basin Amphibian and Reptile Monitoring Program | Sampling protocol development is difficult and expensive, but necessary for good data. Reliance on volunteers is problematic. | | Lake Superior Binational Program, Habitat and Terrestrial Wildlife Community Committees | Ann McCammon Soltis, 715-682-6619, ext. 102, amsoltis@glifwc.org | Lake Superior Binational Program, a consortium including the National Park Service, U.S. Forest Service, state DNRs, EPA, Great Lakes Indian Fish and Wildlife Commission, Canadian Wildlife Services and Environment Canada: see http://www.fs.fed.us/r9/twcc/ | 2001 | 10 |
| not sure at this point - our animal monitoring program was piloted in 2010, but they are intended for use in states where the species occur | Nature's Notebook, a plant and animal program of the USA National Phenology Network | | | USA National Phenology Network | | | Animal phenology monitoring begun in 2010 | 1 or less |
| Arizona | Desert box turtles inventory | | | Arizona Game & Fish Department | Tom Jones Tjones@azgfd.gov 623-236-7735 | | | |

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| Arizona | Desert tortoise monitoring at a long-term study site | | | Arizona Game & Fish Department | Tom Jones Tjones@azgfd.gov 623-236-7735 | | | |
| Arizona | Exotic turtle removal | | | Arizona Game & Fish Department | Tom Jones Tjones@azgfd.gov 623-236-7735 | Phoenix Zoo | | |
| Arizona | Mexican gartersnake radio tracking | | | Arizona Game & Fish Department | Tom Jones Tjones@azgfd.gov 623-236-7735 | | | |
| Arizona | Ranid Frog Monitoring | | | Arizona Game & Fish Department | Tom Jones Tjones@azgfd.gov 623-236-7735 | USFWS, Sky Island Alliance | | |
| Arizona | Shovel-nosed snake tissue sampling | | | Arizona Game & Fish Department | Tom Jones Tjones@azgfd.gov 623-236-7735 | | | |
| Arizona | Sonoita Creek State Natural Area Herpetological Inventory | One summer is not adequate for a complete inventory | | The Nature Conservancy in Arizona? | Dale Turner, TNC-AZ, dturner@tnc.org, 520-545-0182 | Arizona State Parks Department | 2006 | 1 or less |
| Arizona | Sonoran mud turtle monitoring | | | Arizona Game & Fish Department | Tom Jones Tjones@azgfd.gov 623-236-7735 | | | |
| Arkansas | Arkansas box turtle citizen science survey | | | Arkansas Natural Heritage commission | Jane Jones-Shulz Jane@arkansasheritage.org 501-324-9159 | local high schools, private land owners | 2007 | 3 |
| California | Lost Lizards of Los Angeles | | | Los Angeles County Museum of Natural History | lostlizards@nhm.org 213-763-3238 | | | |

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|---|---|---|---|---|---|---|---|---|
| California | Monitoring Terrestrial Reptiles and Amphibians in the Mediterranean Coast Network (MEDN) - Santa Monica Mountains National Recreation Area (SAMO), Cabrillo National Monument (CABR), and Channel Islands National Park (CHIS). | Interns must thoroughly vetted before hiring, and must be very well-trained. | We are continuing this protocol the way I have described. | National Park Service | Katy Semple Delaney | | 2000 | 10 |
| Montana | MT Natural Heritage Inventory | We have now sampled all of the easy, opportunistic wetlands (approx 200). This survey technique has limited monitoring value and we are not sure what to do next. Using youths as young as age 7 may be too restrictive for our needs. | It might have been better if we used the volunteers for a simple monitoring program and focused on education. We should have used agency personnel for a systematic inventory. | USDA Forest Service, Flathead National Forest | bgardner@fs.fed.us 406-837-7508 | Montana Natural Heritage Program (who helped initially train FS employees) | 1998 | 11 to 15 |
| Multiple - 30-40 states | The Snake Count | | | Center for Snake Conservation | Cameron Young (info@snakeconservation.org, 770-500-0000) | | 2011 | <1 year |
| Nevada | Amargosa Toad Surveys | | | Nevada Department of Wildlife | Brian Hobbs, bhobbs@ndow.org 702-486-5127 x3310 | US Fish & Wildlife Service, BLM, Amargosa toad conservation groups, private landowners | 2000 | 10 |

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| Nevada | Night Drive Surveys | Volunteers can basically only provide inventory data, as they're not allowed to mark, measure, etc. without a permit (most volunteers do not have) to obtain more detailed monitoring data | Create a database for volunteers to access online to enter their data for review by a biologist, to save agency biologist time entering data | Nevada Department of Wildlife | Polly Conrad 702-486-5127 x3718 | US Fish & Wildlife Service, BLM, Bureau of Reclamation, National Park Service | 2005 | 5 |
| Nevada | Spotted Frog Surveys | A challenge is to get enough knowledgeable people, such that one is on each crew and to get enough surveyors in general, in order for all sites to be surveyed. Also, ensuring everyone disinfects all of their equipment prior to surveying a new site can be challenging. | | Nevada Department of Wildlife | Teri Slatauski 775-482-3153 | US Fish & Wildlife Service, US Forest Service, BLM | 2005 | 5 |
| Wyoming | Wyoming Toad Monitoring | | | US Fish & Wildlife Service - Wyoming Field Office | Jan McKee, Jan_McKee@fws.gov 307-772-2374x242 | Association of Zoos and Aquariums' Wyoming Toad Species Survival (including various zoos and aquariums), Wyoming Outdoor Council, Wyoming Laramie Rivers Conservation District, BLM, Wyoming Game and Fish Department | 2008 | 2 |
| USA | FrogWatch USA | -Previous issues with protocol adherence (e.g., daytime observations >3 minutes in length); chapter coordinators train and engage volunteers and review first four datasheets which has helped<br>'- Dataset is regionally skewed (most participation in the northeast): using NSF ISE grant to expand program coverage and utility<br>'-Making data accessible online by volunteers and interested parties; development of engaging technological infrastructure is resource-intensive | -Have more balanced coverage across the nation and analyze data by ecoregion<br>'-Would like to grow chapter participation outside of zoos and aquariums, particularly with National Wildlife Refuges, as technological infrastructure develops<br>'-Establish or link to online data entry at outset of program<br>'-Identify a dedicated, on-going revenue stream | Association of Zoos and Aquariums (AZA) | FrogWatch USA Coordinator (frogwatch@aza.org; 301-562-0777) - currently Rachel Gauza (rgauza@aza.org; x246), alternate Shelly Grow (sgrow@aza.org; x263) | Nationwide network of chapters primarily at AZA-accredited institutions, but also at local parks, Audubon societies, and others; grant partners with National Geographic Society and Project BudBurst | 1998 | 11-15 |
| Wisconsin | Wisconsin Frog and Toad Survey | Under-sampling limits data use. | | Wisconsin DNR | WFTS@wisconsin.gov | | 1984 | 27 |
| DE, FL,, GA, IN, IA KY, LA, ME, MD, MA, MN, Mississippi, MO, NH, NJ, NY, NC, PA, SC, TN, TX, VT, VA, West VA | North American Amphibian Monitoring Program (NAAMP) | | | USGS | Linda Weir, lweir@usgs.gov | state agencies and other partners | 2001 for unified protocol, some earlier data in a few states | various, depends on state |
| | | | | | | | | |
| | | | | | | | | |

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|---|---|---|---|---|---|---|---|
| Florida | Based on the study by Robin Boughton and Jennifer Staiger at UF: Use of PVC Pipe Refugia as a Sampling Technique for Hylid Treefrogs | <$1,000 | Yes | Yes | Eva Matthews, Green Cay Nature Center, Ematthews@pbcgov.org, 561-966-7003 | | |
| Florida | Sea Turtle Research and Monitoring Program/ Sea Turtle Conservation Program | | | | Paul Zajicek - zajicep@doacs.state.fl.us; Amanda Bryant - abryant@sccf.org | http://www.sccf.org/content/43/Sea-Turtles.aspx | |
| Georgia | GA Adopt-A-Stream Amphibian Monitoring Program | $1,000 - 5,000 | Yes | No | Tara Muenz, tara.muenz@gaepd.org; Georgia Adopt-A-Stream, Georgia Department of Natural Resources, Environmental Protection Division, 404-675-1635; 4220 International Parkway, Suite 101, Atlanta , GA 30354 404-675-1635 | http://georgiaadoptastream.com//db/Default.asp__ | http://georgiaadoptastream.com/Manuals_etc/Amphibian/Amp_Manual.pdf |
| Georgia | Georgia Herp Atlas | <$1,000 | Yes | No | John.Jensen@dnr.state.ga.us, Georgia DNR, Nongame Conservation Section, 116 Rum Creek Drive, Forsyth, GA 31029, (478) 994-1438, Fax - (478) 993-3050 | http://www.georgiawildlife.com/node/1583 | |
| Kentucky | Kentucky State Wildlife Action Plan Herp Monitoring | $6,000 -10,000 | We do not call our database a "herp atlas;" however, we have all herp distribution data catalogued and saved in our state information system database. | YES | Danna Baxley, KY Dept. of Fish and Wildlife Resources, #1 Sportsman's Lane, Frankfort, KY 40601, 502-564-7109 ext. 4521, danna.baxley@ky.gov | | |
| Maine | Maine Vernal Pools Project - Municipal Vernal Pool Mapping and Assessment and Significant Vernal Pool Identification | | | | Aram Calhoun, University of Maine, calhoun@maine.edu | http://www.umaine.edu/vernalpools/ | |

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|---|---|---|---|---|---|---|---|
| Maryland | Maryland Amphibian and Reptile Atlas (MARA) | | Yes | Yes | gtherres@dnr.state.md.us, also - atlas@marylandnature.org Maryland DNR | http://marylandnaturalist.org/mara/ | http://www.hindawi.com/journals/ijz/2012/348653/ |
| Massachusetts | New England Aquarium and Ducks Unlimited Burrage Pond Herp Survey | | | | Susannah Corona, Massachusetts Dept of Conservation and Recreation, SCorona5@verizon.net | | |
| New Hampshire | Keene Vernal Pool Project | | Yes | Yes | Brett Amy Thelen, AVEO/Harris Center for Conservation Education, brett@aveo.org; 83 King's Highway, Hancock, NH 03449 | http://keeneweb.org/aveo/citizen-science/vernal-pools/ | |
| New Hampshire | Reptile and Amphibian Reporting Program (RAARP) | $1,000 - 5,000 | This is it | Yes | Michael Marchand, NH Fish & Game, michael.marchand@wildlife.nh.gov; 603-271-3016 | http://www.wildlife.state.nh.us/Wildlife/Nongame/reptiles_amphibians.htm | |
| New Hampshire | Salamander Crossing Brigades | $6,000 -10,000 | Yes | Yes | Brett Amy Thelen, AVEO/Harris Center for Conservation Education, brett@aveo.org; 83 King's Highway, Hancock, NH 03449 | http://keeneweb.org/aveo/citizen-science/salamander-crossing-brigades/ | |
| New Hampshire | Vernal Pool Identification | <$1,000 | Yes | Yes | Michael Marchand, NH Fish & Game, michael.marchand@wildlife.nh.gov; 603-271-3016 | http://www.wildlife.state.nh.us/Wildlife/Nongame/reptiles_amphibians.htm | |

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|---|---|---|---|---|---|---|---|
| New York | Assessing presence of Bd in amphibian populations | | | | Penny Danielewicz, Buffalo Zoo, pdanielewicz@buffalozoo.org | | |
| Pennsylvania | Stream Plethodontid Assemblage Response (SPAR) Index -- Volunteer Monitoring Study | N/A | Pennsylvania Herp Education and Resource Program | Yes | Gian Rocco, Penn State University, gxr124@psu.edu | | |
| Tennessee | Citizen Science Project - Aquatic and Terrestrial Salamander Monitoring | | | | Paul Super via Kirsten Leong, National Park Service, paul_super@nps.org, kirsten_leong@nps.gov | http://www.gsmit.org/CitizenScience.html | http://www.gsmit.org/CSProjects.html |
| Tennessee | Citizen Science Project - Pond-Breeding Amphibian Monitoring | | | | | | |
| Tennessee | Citizen Science Project - Reptile Inventory | | | | | | |
| Aargau | Amphibienmonitoring Aargau | $50,000 - 75,000 | Yes | No | Christoph Bühler, Hintermann & Weber AG, Austrasse 2a, CH-4153 Reinach BL, Switzerland | | |
| Canada - Alberta | Alberta Snake Hibernaculum Inventory | $21,000 - 25,000 | Alberta has one field guide specific to Alberta herps | | Kris Kendell, Alberta Conservation Association, kris.kendell@ab-conservation.com, 780-410-1978, 1-877-777-FROG | http://www.srd.alberta.ca/ManagingPrograms/FishWildlifeManagement/SensitiveSpeciesInventoryGuidelines.aspx | |

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|---|---|---|---|---|---|---|---|
| Canada - Alberta | Alberta Volunteer Amphibian Monitoring Program | $21,000 - 25,000 | Alberta has one field guide specific to Alberta herps | | Kris Kendell, Alberta Conservation Association, kris.kendell@ab-conservation.com, 780-410-1978, 1-877-777-FROG | http://www.srd.alberta.ca/ManagingPrograms/FishWildlifeManagement/AmphibianMonitoring/AlbertaVolunteerAmphibianMonitoringProgram.aspx | |
| Canada - Manitoba | Manitoba Herps Atlas | $20,000 in first 1.5 years of the project | Yes - this one | Yes - just started, plan to continue for at least 5 years | | http://www.naturenorth.com/Herps/Manitoba_Herps_Atlas.html | |
| Canada - Manitoba | Skink Watch | | Yes, in the process | ongoing | Allison Krause Danielsen, Graduate Student, University of Manitoba, alley.danielsen@gmail.com, 204-285 7210 | http://www.naturenorth.com/Skink/SOS_monitoring.html | |
| Canada - Nova Scotia | Turtle Monitoring Program | | | | Duncan Smith, Kejimkijik National Park and National Historic Site of Canada, Duncan.Smith@pc.gc.ca | http://www.speciesatrisk.ca/stewardship/BlandingsTurtle.html | http://www.pc.gc.ca/eng/pn-np/ns/kejimkujik/activ/activ14.aspx |
| Mainly mainland UK (GB) but scheme includes Northern Ireland, Isle of Man and Jersey (Channel Island) | National Amphibian and Reptile Recording Scheme (NARRS) - National Amphibian Survey and National Reptile Survey | | scheme does not include atlassing per se; in UK, county A+R groups produce own atlasses | | John W. Wilkinson, ARC Research Officer, johnw.wilkinson@arc-trust.org | http://www.narrs.org.uk/index.htm | http://www.narrs.org.uk/natamphibsurvey.htm |
| Netherlands | Amphibian Monitoring Program of the Netherlands | | | | Edo Groverse, University of Amsterdam, e.goverse@uva.nl | | |

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|---|---|---|---|---|---|---|---|
| Netherlands | Dutch Reptile Monitoring Scheme/Programme (Dutch sand lizards) | | | | Marc Kery, Swiss Ornithological Institute, marc.kery@vogelwarte.ch | | |
| UK - Great Britain | British National Amphibian and Reptile Recording Scheme - Application of Occupancy Modelling Study | | | | Dr. David Sewell, University of Kent, Marlowe Building, Canterbury, Kent CT2 7NR, +44 (0) 1227 824076, D.L.Sewell@kent.ac.uk | http://www.narrs.org.uk/index.htm | |
| Indiana, Michigan, Minnesota and Wisconsin | National Park Service Western Great Lakes Inventory & Monitoring Network | | Yes, except not sure about Illinois and Indiana | Yes | Gary Casper, UWM Field Station and Great Lakes Ecological Services, LLC, gc@greatlakeseco.com 262-689-4095 | http://science.nature.nps.gov/im/units/GLKN/aboutus.cfm | |
| Michigan | Ann Arbor Salamander Survey | | | | | http://www.a2gov.org/government/publicservices/fieldoperations/NAP/volunteering/Pages/SalamanderSurvey.aspx | |
| Michigan | Ottawa National Forest Herp Inventory and Monitoring Program | | Yes | Yes | Gary Casper, UWM Field Station and Great Lakes Ecological Services, LLC, gc@greatlakeseco.com 262-689-4095 | http://www.fs.usda.gov/ottawa | |

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|---|---|---|---|---|---|---|---|
| Nebraska (main state), some Iowa and South Dakota | Nebraska Amphibian Conservation Education Project | $6,000 -10,000 | Not that I am aware. | | Emily Brown, meducate@omahazoo.com Omaha's Henry Doorly Zoo 3701 S. 10th St, Omaha, NE 68003 (402) 738-2092 Ext. 5054 | | |
| Ohio | Lake Erie Watersnake Annual Census aka "The Nerodio" | $31,000 - 40,000 | Kind of, they have a diversity data base that records state listed species | Yes, but in the process of being modified | Kristin Stanford, Northern Illinois University and OSU Stone Laboratory, theislandsnakelady@yahoo.com (419-285-1847) | | |
| Ohio | Mitigated Wetland Research- | <$1,000 | Yes | Yes | Terry D. Schwaner, The University of Findlay, College of Sciences, schwaner@findlay.edu; 4194345377 | | |

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|---|---|---|---|---|---|---|---|
| Ohio | Ohio Salamander Monitoring Program | | | | Greg Lipps 419-376-3441 greglipps@aol.com | http://www.ohioamphibians.com/salamanders/monitoring/index.html | |
| Oklahoma | Ecology and Natural History of Three Oklahoma Species | | | | Cybil Nicole Cavalieri, Oklahoma State University, cybil.smith@okstate.edu, 405-714-7575 | | |
| Texas | Texas Amphibian Watch - Adopt-a-Frog Pond Frog Malformation Monitoring | | | | Lee Ann Linam, Texas Parks & Wildlife Dept., leeann.linam@tpwd.state.tx.us 512-656-1222 | http://www.tpwd.state.tx.us/learning/texas_nature_trackers/amphibian_watch/ | http://www.tpwd.state.tx.us/learning/texas_nature_trackers/amphibian_watch/adopt_a_frog/ |
| Texas | Texas Amphibian Watch - Amphibian Spotter Program | | No | | Lee Ann Linam, Texas Parks & Wildlife Dept., leeann.linam@tpwd.state.tx.us 512-656-1222 | http://www.tpwd.state.tx.us/learning/texas_nature_trackers/amphibian_watch/ | http://www.tpwd.state.tx.us/learning/texas_nature_trackers/amphibian_watch/amphibian_spotters/ |

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|---|---|---|---|---|---|---|---|
| Texas | Texas Box Turtle Survey | $1,000 - 5,000 | No | | Lee Ann Linam, Texas Parks & Wildlife Dept., leeann.linam@tpwd.state.tx.us 512-656-1222 | http://www.tpwd.state.tx.us/learning/texas_nature_trackers/box_turtle_survey/ | |
| Texas | Texas Horned Lizard Watch | $6,000 -10,000 | No | | Lee Ann Linam, Texas Parks & Wildlife Dept., leeann.linam@tpwd.state.tx.us 512-656-1222 | http://www.tpwd.state.tx.us/learning/texas_nature_trackers/horned_lizard/ | |
| Texas | Texas Turtle Watch Program | | No | | David Walker, Fort Worth Zoo, dwalker@fortworthzoo.org, 817-759-7225 | http://www.fortworthzoo.org/conserve/txturtlewatch.html | |
| Wisconsin | Ozaukee Washington Land Trust - Citizen Science based herp monitoring program | | Yes | Yes | Gary Casper, UWM Field Station and Great Lakes Ecological Services, LLC, gc@greatlakeseco.com 262-689-4095 | http://owlt.org/ | |
| Wisconsin | Urban Ecology Center- Citizen Science based herp monitoring program | | Yes | Yes | Gary Casper, UWM Field Station and Great Lakes Ecological Services, LLC, gc@greatlakeseco.com 262-689-4095 | http://www.urbanecologycenter.org/ | |
| Wisconsin | Wisconsin Herp Atlas | | Yes | Yes | Gary Casper, UWM Field Station and Great Lakes Ecological Services, LLC, gc@greatlakeseco.com 262-689-4095 | http://www4.uwm.edu/fieldstation/herpetology/atlas.html | |

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|---|---|---|---|---|---|---|---|
| Wisconsin | Wisconsin Salamander Survey | | Yes | Yes | Randy Korb - Independent - rkorbbio@aol.com, PO Box 5, St Croix Falls, WI 54024, 715/483-2742; Gary Casper - gc@greatlakeseco.com 262-689-4095, UWM Field Station and Great Lakes Ecological Services, LLC | http://www.rkthefrogguy.com/salamander.htm | http://stcroixwildlife.org/salamander.htm |
| Michigan, Minnesota, Ontario and Wisconsin | Lake Superior Basin Amphibian and Reptile Monitoring Program | | Yes, all states and Ontario do | Yes | Gary Casper, UWM Field Station and Great Lakes Ecological Services, LLC, gc@greatlakeseco.com 262-689-4095 | http://www.fs.fed.us/r9/twcc/ | http://flash.lakeheadu.ca/~shecnar/?display=page&pageid=8 |
| not sure at this point - our animal monitoring program was piloted in 2010, but they are intended for use in states where the species occur | Nature's Notebook, a plant and animal program of the USA National Phenology Network | | | | Theresa Cummins, USA National Phenology Network, 1955 E. Sixth St., Tucson, AZ 85721, (520) 792-0481; theresam@u.arizona.edu | http://www.usanpn.org/ | http://www.usanpn.org/participate/observe |
| Arizona | Desert box turtles inventory | | | | Tom Jones, Arizona Game & Fish Department, Tjones@azgfd.gov 623-236-7735 | | |

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| Arizona | Exotic turtle removal | | | | Tom Jones, Arizona Game & Fish Department, Tjones@azgfd.gov 623-236-7735 | | |
| Arizona | Mexican gartersnake radio tracking | | | | Tom Jones, Arizona Game & Fish Department, Tjones@azgfd.gov 623-236-7735 | | |
| Arizona | Ranid Frog Monitoring | | | | Tom Jones, Arizona Game & Fish Department, Tjones@azgfd.gov 623-236-7735 | | |
| Arizona | Shovel-nosed snake tissue sampling | | | | Tom Jones, Arizona Game & Fish Department, Tjones@azgfd.gov 623-236-7735 | | |
| Arizona | Sonoita Creek State Natural Area Herpetological Inventory | $1,000 - 5,000 | | | Dale Turner, Conservation Planner, TNC-Arizona, 1510 East Fort Lowell Road, Tucson, AZ 85719. dturner@tnc.org, 520-545-0182 | http://tucsonherpsociety.org/Turner%202007_20(4)38.pdf | |
| Arizona | Sonoran mud turtle monitoring | | | | Tom Jones, Arizona Game & Fish Department, Tjones@azgfd.gov 623-236-7735 | | |
| Arkansas | Arkansas box turtle citizen science survey | | | | Jane Jones-Shulz, Arkansas Natural Heritage Commission, Jane@arkansasheritage.org 501-324-9159 | | |
| California | Lost Lizards of Los Angeles | | | | Lila Higgins, Los Angeles County Museum of Natural History, lostlizards@nhm.org 213-763-3238 | http://www.nhm.org/site/activities-programs/community-science/lost-lizards-project | |

**Appendix A. Summary of herp monitoring programs using non-calling surveys and volunteers that were submitted and/or compiled in 2011 and 2012.**

| State(s) in which protocol has been or is used | Name of Monitoring Program/Protocol | Annual Program Cost, if known (including staff time, supplies, travel, etc.) | Does the state have a herp atlas? | If so, is it ongoing or active? | Information Source, Affiliation, Contact information (e-mail address, phone number) | Website(s) for additional information | Website(s) for additional information |
|---|---|---|---|---|---|---|---|
| California | Monitoring Terrestrial Reptiles and Amphibians in the Mediterranean Coast Network (MEDN) - Santa Monica Mountains National Recreation Area (SAMO), Cabrillo National Monument (CABR), and Channel Islands National Park (CHIS). | | I don't know | | Katy Semple Delaney, Santa Monica Mountains National Recreation Area, National Park Service, katy_delaney@nps.gov, (805) 370-2386 | http://science.nature.nps.gov/im/units/medn/im/monitoring/mednmonitoring.cfm | http://science.nature.nps.gov/im/units/medn/im/monitoring/mednvitalsigns.cfm |
| Montana | MT Natural Heritage Inventory | $1,000 - 5,000 | Yes | Active | Beth Gardner, Flathead National Forest, bgardner@fs.fed.us 406-837-7508 | | |
| Multiple - 30-40 states | The Snake Count | | | | Cameron Young, Center for Snake Conservation, (info@snakeconservation.org, 770-500-0000) | http://www.snakeconservation.org/ | http://www.snakecount.org/ |
| Nevada | Amargosa Toad Surveys | | No | N/A | Brian Hobbs, Nevada Department of Wildlife, bhobbs@ndow.org 702-486-5127 x3310 | | |

**Appendix A. Summary of herp monitoring programs using non-calling surveys and volunteers that were submitted and/or compiled in 2011 and 2012.**

| State(s) in which protocol has been or is used | Name of Monitoring Program/Protocol | Annual Program Cost, if known (including staff time, supplies, travel, etc.) | Does the state have a herp atlas? | If so, is it ongoing or active? | Information Source, Affiliation, Contact information (e-mail address, phone number) | Website(s) for additional information | Website(s) for additional information |
|---|---|---|---|---|---|---|---|
| Nevada | Night Drive Surveys | $1,000 - 5,000 | No | N/A | Polly Conrad, Nevada Department of Wildlife, pconrad@ndow.org 702-486-5127 x3718 | | |
| Nevada | Spotted Frog Surveys | | No | N/A | Teri Slatauski, Nevada Department of Wildlife, tslatauski@ndow.org 775-482-3153 | | |
| Wyoming | Wyoming Toad Monitoring | | | | Jan McKee, US Fish and Wildlife Service, Jan_McKee@fws.gov 307-772-2374 x242 | | |
| USA | FrogWatch USA | From 2010-2015, supported by NSF ISE grant; no dedicated revenue stream beyond that. | Yes, there is a Maryland Amphibian and Reptile Atlas Program running from Jan 2010 - Dec 2014, but FrogWatch USA is in all states and not all have atlases | Yes (in MD) | Rachel Gauza & Shelly Grow, Association of Zoos and Aquariums, rgauza@aza.org; sgrow@aza.org | http://www.aza.org/frogwatch/ | |
| Wisconsin | Wisconsin Frog and Toad Survey | | Yes | Yes | Gary Casper, UWM Field Station and Great Lakes Ecological Services, LLC, gc@greatlakeseco.com 262-689-4095 | http://wiatri.net/inventory/frogtoadsurvey/index.cfm | |
| DE, FL,, GA, IN, IA KY, LA, ME, MD, MA, MN, Mississippi, MO, NH, NJ, NY, NC, PA, SC, TN, TX, VT, VA, West VA | North American Amphibian Monitoring Program (NAAMP) | | | | Linda Weir, USGS Patuxent Wildlife Research Center, lweir@usgs.gov, naamp@usgs.gov | http://www.pwrc.usgs.gov/naamp/ | www.pwrc.usgs.gov/frogquiz |
| | | | | | | | |
| | | | | | | | |

# APPENDIX B

## Volunteer Testing Pilot Survey Protocol, Data Forms, and Follow-up Survey Form

**VOLUNTEER HERP MONITORING PROTOCOLS USING NON-CALLING SURVEYS**

**EGG MASS COUNTS**

General Information:

- Method consists of walking along and searching the perimeter and, if possible, the interior of amphibian breeding sites (streams, ponds, seasonal wetlands) for masses of amphibian eggs, and identifying and counting them
- Focus on ***ponds*** – permanent/semi-permanent ponds (ideally should be fishless except for minnows) and vernal/temporary ponds that hold water until at least July
- Target species - focus on egg masses of ***pond-breeding salamanders and frogs***, esp.

Salamanders

- Spotted Salamander
- Blue-spotted Salamander
- Eastern Newt - maybe
- Eastern Tiger Salamander?

Frogs

- Wood Frog
- American Toad
- Gray Treefrog
- Green Frog
- Spring Peeper and other frogs

Protocol:

- Select a pond (or ponds) to survey
- Map location of pond using GPS and provide coordinates, and/or provide a map/air photo
- Take photo of pond – see example below.
- Conduct egg mass counts during amphibian breeding season and incubation
  - Mid-late March to mid-late April ideally for salamanders
  - Mid-late March to late April and as late as June/early July for frogs
- Conduct egg mass counts at same sites and same time as visual encounter surveys, dipnetting and/or aquatic funnel trapping as much as possible.
- Conduct 2-4 visits for egg mass counts during ideal or recommended time periods.
  - At least 2 visits should be in the early time period for targeting salamanders
- Look along shore (e.g., within 10 ft) but also look in interior of pond if possible
  - Egg masses are usually not right along edge of pond.
  - Salamander egg masses usually within 10 ft of shore and less than 2 feet deep.
- Identify egg masses observed in pond to species, if possible. If can't identify, photo-document with data sheet – see example below.
- Refer to salamander and/or egg mass field guide(s)/key(s)
- Fill out data form for egg mass count surveys.
  - Include sketch of pond and where survey was conducted and egg masses were found – see example sketch below.
- Take photo of at least one representative example of egg mass of each species found in pond for species identification and/or confirmation/documentation. Be careful of glare from pond water surface when taking photos.
  - Gently raise egg masses to water surface for better detail in photos
  - Do not remove egg masses from attachment sites (e.g. a stick or branch)
- Also can use detailed language to describe egg masses observed in the field, esp. if no camera.
  - Is the mass globular or round?
  - Are the eggs clumped, separated, or on a string?
  - What color and shape are the embryos?
  - Is the jelly surrounding the eggs firm or loose?

- Is there a film on the surface of the mass?
- To what type of vegetation is the mass attached?

- Make sure to label photos in photo and filename when taking photo as soon as possible, and please submit attached to field form or with field form in photo
  - Subject of photo (e.g., Wood Frog or WFeggmass)
  - Site name (e.g, Hogbacks)
  - Your last name (Lee)
  - Survey date (3-19-11)
  - Photo filename - WFeggmass_Hogbacks_Lee_3-19-11.jpg
- Submit completed data form, photos, and/or maps to survey coordinator after egg mass and/or other surveys are completed.

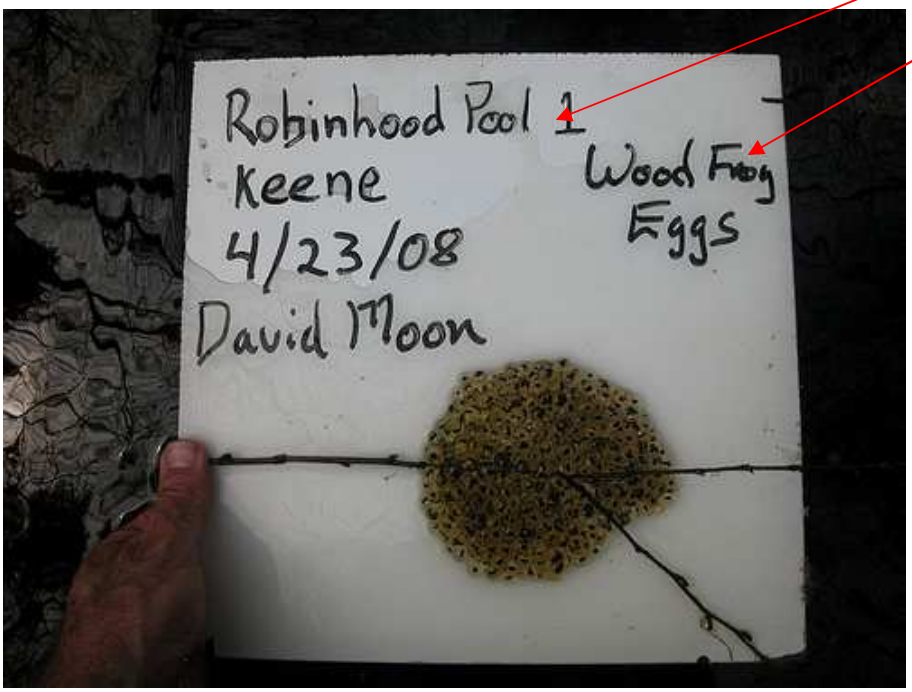
Field supplies/gear:

- Data sheets
- Maps/air photos of survey site
- Digital camera
- Dipnet (if necessary to scoop eggs out and into something)
- Dish/containers (for counting eggs in)
- Data recording materials
- Clipboard
- Measuring materials (e.g., metric ruler)
- Rubber boots, waders, or sneakers and pants that can get wet
- Cell phone
- Binoculars (optional)
- Polarized glasses (optional)
- GPS unit (optional)
- Magnifying glass (optional)

Example of photo of survey site/pond

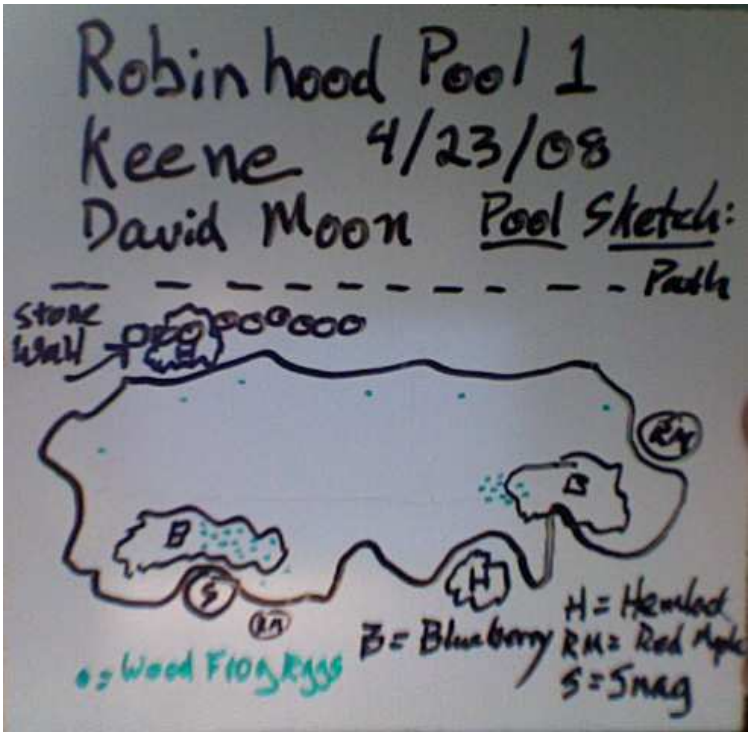

Include the name and location (GPS coordinate, or township, range, and section) of survey site/pond, county, date of survey, and surveyor name in the photo

Example below of egg mass photo documentation




Put the name and location (GPS coordinate, or township, range, and section) of survey site/pond, county, date of survey, surveyor name, and egg mass identification on white sheet or plastic board for photo

Example of sketch of pool surveyed and where egg masses were found



**DIPNETTING AND SWEEP SAMPLES**

General Information:

- Method consists of sweeping a dipnet through small, shallow aquatic habitats or bodies of water such as vernal or temporary ponds, wetlands, and/or small creeks/streams.
- Focus on ***ponds*** – permanent/semi-permanent ponds (ideally should be fishless except for minnows) and vernal/temporary ponds that hold water until at least July; also can be used in ***small streams/creeks***
- Target species - ***pond-breeding salamanders and frogs*** (adults and larval/metamorph salamanders, frog/toad tadpoles and metamorphs) as well as *stream-breeding salamanders*

Salamanders

- Spotted Salamander
- Blue-spotted Salamander
- Eastern Newt
- Four-toed Salamander
- Eastern Tiger Salamander?

Frogs

- Wood Frog
- American Toad
- Gray Treefrog
- Green Frog
- Spring Peeper and other frogs

Protocol:

- Select a pond (or ponds) to survey
- Map location of pond using GPS and provide coordinates, and/or provide a map/air photo
- Take photo of pond/survey site – see example above under EGG MASS COUNTS.
- Conduct dipnetting surveys during amphibian breeding season and larval period prior to metamorphosis/emergence from ponds
    - Mid-late March to early-mid April for adult salamanders
    - Early June to early-mid July for larval salamanders and metaphorphs
    - April through July (and even later) for frog/toad tadpoles and metamorphs
- Conduct dipnetting surveys at same sites and same time as visual encounter surveys, egg mass counts, and/or aquatic funnel trapping as much as possible.
- Conduct 2-3 visits for dipnetting survey during ideal or recommended time periods below.
    - First visit should be conducted in mid-late March to early-mid April to target adult salamanders during appropriate survey/weather conditions
        - Emergence/spring migration triggered by first snowmelt or warm rain above 40$^{o}$F, and following rainfall/high humidity (above 80%) and daytime temperatures that exceed 50-55$^{o}$F)
    - Second visit should be conducted in early June to target larval salamanders and frogs/toads.
    - Third visit should be conducted in early-mid-July for larval or metamorph salamanders and frogs/toads.
    - Because larvae found during the second visit or survey may be more difficult to identify, the second visit is not critical. If only two survey visits are conducted, please conduct surveys during the first visit and third visit time periods.
- The type of dipnet is not critical, so long as the mesh is small enough to capture any salamander larvae or frog/toad tadpoles and sturdy enough to withstand the vegetation and debris at the site.
- Dipnet along the shore (e.g., within 10 ft) but also dipnet in interior of pond. Sweep the net through the water in all of the different habitats available at the site and distributed throughout the pond/site if possible. Also sweep into the muck or bottom of the pond as larvae tend to hide here.

- Sweep each pond 10 times distributed throughout the pond and in all different habitats.
- With each sweep, move any captured salamander larvae or forg/toad tadpoles into a sorting tray or bucket containing water.
- When you have finished dipnetting, examine and identify larvae and metamorphs you have captured to species, if possible. If can't identify, photo-document with data sheet – see example above under EGG MASS COUNTS.
- Refer to salamander and frog/toad field guide(s)/key(s)
- Fill out data form for dipnetting surveys.
    - Include sketch of pond and where sweeps were conducted and salamanders and frogs/toads were generally found in the pond – see example sketch above under EGG MASS COUNTS.
- Take photo of at least one representative example of larva/metamorph of each species found in pond for species identification and/or confirmation/documentation.
    - Remember to include information on name and location of pond, survey date, surveyor, and species in photo – see example of egg mass photo documentation above EGG MASS COUNTS.
- Make sure to label photos in photo and filename when taking photo as soon as possible, and please submit attached to field form or with field form in photo
    - Subject of photo (e.g., Spotted Salamander or SSlarva)
    - Site name (e.g, Hogbacks)
    - Your last name (Lee)
    - Survey date (3-19-11)
    - Photo filename - SSlarva_Hogbacks_Lee_3-19-11.jpg
- Submit completed data form, photos, and/or maps to survey coordinator after egg mass and/or other surveys are completed.

<u>Field gear</u>:

- Data sheets
- Maps/air photos of survey site
- Digital camera
- Dipnet
- Sorting trays/dishes/containers or buckets
- Data recording materials
- Clipboard
- Measuring materials (e.g., metric ruler)
- Rubber boots, waders, or sneakers and pants that can get wet
- Cell phone
- Polarized glasses (optional)
- GPS unit (optional)
- Magnifying glass (optional)

**AQUATIC FUNNEL TRAPPING**

General Information:

- Method consists of setting aquatic minnow traps (see example trap below) along the margins of shallow wetlands or water bodies in which salamanders and frogs may be breeding
- Focus on ***ponds*** – permanent/semi-permanent ponds (ideally should be fishless except for minnows) and vernal/temporary ponds that hold water until at least July
- Target species - ***pond-breeding salamanders and frogs*** (adults and larval/metamorph salamanders, frog/toad tadpoles and metamorphs)

| Salamanders | Frogs |
|---|---|
| ▪ Spotted Salamander | ▪ Wood Frog |
| ▪ Blue-spotted Salamander | ▪ American Toad |
| ▪ Eastern Newt | ▪ Gray Treefrog |
| ▪ Four-toed Salamander | ▪ Green Frog |
| ▪ Eastern Tiger Salamander? | ▪ Spring Peeper and other frogs |

Protocol:

- Select a pond (or ponds) to survey
- Map location of pond using GPS and provide coordinates, and/or provide a map/air photo
- Take photo of pond/survey site – see example above under EGG MASS COUNTS.
- Conduct aquatic funnel trapping during amphibian breeding season and larval period prior to metamorphosis/emergence from ponds
    - Mid-late March to early-mid April for adult salamanders
    - Early June to early-mid July for larval salamanders and metaphorphs
    - April through July (and even later) for frog/toad tadpoles and metamorphs
- Conduct aquatic funnel trapping at same sites and same time as visual encounter surveys, egg mass counts, and/or dipnetting as much as possible.
- Conduct 3-4 visits for aquatic funnel trapping during recommended time periods below.
    - First visit should be conducted in mid-late March to early-mid April to target adult salamanders during appropriate survey/weather conditions
        - Emergence/spring migration triggered by first snowmelt or warm rain above $40^{o}$F, and following rainfall/high humidity (above 80%) and daytime temperatures that exceed 50-$55^{o}$F)
    - Second visit should be conducted in early June to target larval salamanders and frogs/toads.
    - Third visit should be conducted in early-mid-July for larval or metamorph salamanders and frogs/toads.
    - If four survey visits are possible, conduct additional visit during first survey window. Can survey on two consecutive days/nights during this time period as long as traps are checked within 24 hour period or at least every 24 hours.
- 10 traps will be set in each pond during each survey visit. Five traps can be set in small ponds if too small for 10 traps.
- Traps should be placed equally distributed throughout the pond. Each trap should be numbered and marked with flagging on the string, and the location of each trap should be marked using a GPS unit and/or mapped on a drawing or map of the pond.
- Traps should be placed along or out from the shore. Traps need to be placed in water deep enough for the funnel opening to be completely submerged and most of the trap to be submerged except for a small area on the top of the trap that penetrates the top of the water to create an air pocket. This air pocket is extremely important during the second and third

survey visits. Ideally, the traps also should be flush with the substrate or bottom of the pond. Traps should be tied to branches and other woody debris in the ponds.

- Traps should be placed in the same locations during subsequent visits, and should not be moved unless absolutely necessary. If traps need to be moved, provide new locations/map.
- Traps will be set on one day in the afternoon or early evening and checked the following day within a 24-hour period, ideally in the early morning on the day after placement. Traps must be checked at least every 24 hours.
- Record date and time of trap placement, air and water temperature, and names of people involved in placing the traps. Air temperature should be recorded at waist height in the share, and water temperature should be recorded at 2 cm below the water surface. Estimate or measure average/range of water depth in pond. Also note any egg masses, spermatophores, and/or salamanders or frogs observed.
- When traps are checked, retrieve each trap and bring to shore. On shore, unzip the trap opening (or invert the funnel opening if using constructed traps), and carefully shake contents into a sorting tray/container or bucket containing some water. All other organisms other than salamanders and frogs can be returned to the pond.
- For each trap, record the number and species of adults captured and return them to the pond. Photograph representative example of each species found.
- Larval salamanders and tadpoles should be placed in a plastic Zip-loc bag with pond water and clearly marked with trap number. When all traps have been checked and all larval salamanders have been placed into marked plastic bags or containers with pond water, carefully inspect the animals. Compare all the animals to see if you have captured more than one species. Identify the larvae to a specific species if possible. If not, at least identify to a morpho-species concept (see below). Record number of larvae captured of each species or morpho-species captured in each trap.
- Photo document representative example of each species or morpho-species. For each type of morpho-species, collect one specimen of each type of morpho-species if have permission to collect specimens. Place one specimen of each type into separate vials or bags of alcohol for preservation. Each vial/bag should be clearly labeled identifying morpho-species type, date, and pond name and location. Release remaining larvae back into the pond.
    - Remember to include information on name and location of pond, survey date, surveyor, and species in photo – see example of egg mass photo documentation above EGG MASS COUNTS.
- Refer to salamander and frog/toad field guide(s)/key(s)
- Fill out data form for aquatic funnel trapping surveys.
    - Include sketch of pond and where traps were located – see example sketch above under EGG MASS COUNTS.
- Make sure to label photos in photo and filename when taking photo as soon as possible, and please submit attached to field form or with field form in photo
    - Subject of photo (e.g., Spotted Salamander or SSlarva)
    - Site name (e.g, Hogbacks)
    - Your last name (Lee)
    - Survey date (3-19-11)
    - Photo filename - SSlarva_Hogbacks_Lee_3-19-11.jpg
- Submit completed data form, photos, and/or maps to survey coordinator after egg mass and/or other surveys are completed.

Field gear:

- Data sheets
- Maps/air photos of survey site
- Digital camera
- Aquatic funnel traps
- Thermometer for recording air and water temperatures
- Sorting trays/dishes/containers or buckets
- Data recording materials
- Clipboard
- Measuring materials (e.g., metric ruler)
- Rubber boots, waders, or sneakers and pants that can get wet
- Cell phone
- Polarized glasses (optional)
- GPS unit (optional)
- Magnifying glass (optional)

**VISUAL ENCOUNTER SURVEYS**

- Visual encounter surveys consist of observers walking within pre-defined areas for a set period of time looking for reptiles and amphibians on the surface or under cover (e.g., under downed logs).
- Ideally, volunteers would visit the site 3-5 times to conduct visual encounter surveys throughout the active season for amphibians and reptiles (April-September), or at least during peak activity times when species would be most active and visible (April – June).
- Visual encounter surveys can be conducted with other surveys (e.g., aquatic funnel trapping, egg mass counts, dipnetting) as time permits and whenever possible.
- Visual encounter surveys will be conducted throughout the proposed focus area.
- Fill out data form for visual encounter surveys.
    - Include GPS location and map and sketch of area surveyed – see example sketch above under EGG MASS COUNTS.
- All animals that are found or encountered will be identified, documented, and photographed in the field. This may require temporarily capturing and/or handling the animal (i.e., for couple minutes), but all animals will be released where they were encountered after being identified and photographed.
- All animal observations will be recorded using a GPS whenever possible or marked on a map or air photo.
- Make sure to label photos in photo and filename when taking photo as soon as possible, and please submit attached to field form or with field form in photo
    - Subject of photo (e.g., Spotted Salamander or SSlarva)
    - Site name (e.g, Hogbacks)
    - Your last name (Lee)
    - Survey date (3-19-11)
    - Photo filename - SSlarva_Hogbacks_Lee_3-19-11.jpg
- Submit completed data form, photos, and/or maps to survey coordinator after egg mass and/or other surveys are completed.

# Egg Mass Count Survey 2011

Egg Mass Data Sheet- MNFI

Monitor Name(s)_____

Street _____Town _____MI Zip_____

Phone ( ) _____-_____Email_____

**Local/Natural Area Name** (if applicable) **or Landowner Name**_____

**Location of survey Must use GPS Coordinates**. **Also give written directions to pond.**

Pond Name/Number_____ GPS Coordinates: _____ LAT _____ LON

**Written directions to pond**:

_____

**Other options useful, not required.** Twp ___ N Range ___ E / W Sec ___, ___¼ ___¼

**Property Ownership:** Public Private Unknown **IF PRIVATE LAND, PLEASE OBTAIN LAND OWNER CONSENT**

**Habitat type surveyed** (perm. pond, semi-perm. pond, ephemeral pond, river/stream, etc.)

**General land use in vicinity of pond** (agriculture, forest, grassland, pasture, etc.)

***Visit 1***—Observer Name: _____ Date: ___/___/_____ Last Rain ___ Days Ago
Start Time:_____ Water Temp:_____ Air Temp:_____ Avg. Water Depth: _____ End Time:_____

***Visit 2***—Observer Name: _____ Date: ___/___/_____ Last Rain ___ Days Ago
Start Time:_____ Water Temp:_____ Air Temp:_____ Avg. Water Depth: _____ End Time:_____

***Visit 3***—Observer Name: _____ Date: ___/___/_____ Last Rain ___ Days Ago
Start Time:_____ Water Temp:_____ Air Temp:_____ Avg. Water Depth: _____ End Time:_____

***Visit 4***—Observer Name: _____ Date: ___/___/_____ Last Rain ___ Days Ago
Start Time:_____ Water Temp:_____ Air Temp:_____ Avg. Water Depth: _____ End Time:_____

| Species – record # of egg masses/spermatophores by species for each visit | VISIT 1 | VISIT 2 | VISIT 3 | VISIT 4 |
|---|---|---|---|---|
| Spotted Salamander | | | | |
| Blue-spotted Salamander | | | | |
| Wood Frog | | | | |
| Other species – list below | | | | |
| | | | | |
| | | | | |
| | | | | |

Blue-Spotted Salamander--BSS | Spotted Salamander--SS | Eastern Tiger Salamander--TS | Central Newt—CN | Redback Salamander--RS | Four-Toed Salamander--FTS | Wood Frog--WF | Spring Peeper--SP | Leopard Frog--LF | Chorus Frog--CF

## 2011 Egg Mass Data Sheet-MNFI

Did you take digital photos of your wetland site or trapping activities? Y / N Photo names/#:

_____

Did you take digital photos of egg masses found on site? Y / N Photo names/#:

_____

_____

**<u>Comments</u>: Please note here or on the back of your data sheet any observations of amphibians and reptiles that you see or hear <u>outside</u> of egg mass counts and specify the date. Also note here any drops in water level, or any other circumstances relevant to the survey. Also please provide map/sketch and/or GPS coordinates of locations of egg masses found in pond.**

Blue-Spotted Salamander--BSS | Spotted Salamander--SS | Eastern Tiger Salamander--TS | Central Newt—CN | Redback Salamander--RS | Four-Toed Salamander--FTS | Wood Frog--WF | Spring Peeper--SP | Leopard Frog--LF | Chorus Frog--CF

# Dipnetting Survey 2011

Data Sheet - MNFI

Monitor Name(s)_____

Street _____Town _____MI Zip_____

Phone ( ) _____-_____Email_____

**Local/Natural Area Name** (if applicable) **or Landowner Name**_____

**Location of survey Must use GPS Coordinates**. **Also give written directions to pond.**

Pond Name/Number_____ GPS Coordinates: _____ LAT _____ LON

**Written directions to pond**:

_____

**Other options useful, not required.** Twp ___ N Range ___ E / W Sec ___, ___¼ ___¼

**Property Ownership:** Public Private Unknown **IF PRIVATE LAND, PLEASE OBTAIN LAND OWNER CONSENT**

**Habitat type surveyed** (perm. pond, semi-perm. pond, ephemeral pond, river/stream, etc.)

**General land use in vicinity of pond** (agriculture, forest, grassland, pasture, etc.)

***Visit 1***—Observer Name: _____ Date:___/___/_____ Last Rain ___ Days Ago

Start Time:_____ Water Temp:_____ Air Temp:_____ Avg. Water Depth: _____ End Time:_____

| | Sweep 1 | Sweep 2 | Sweep 3 | Sweep 4 | Sweep 5 |
|---|---|---|---|---|---|
| Salamander Species- use abbreviation & record # of individuals | | | | | |
| Other amphibian species- use abbreviation & record # of individuals | | | | | |
| | Sweep 6 | Sweep 7 | Sweep 8 | Sweep 9 | Sweep 10 |
| Salamander Species- abbreviate & record # of indl's | | | | | |
| Other amphibian species-abbreviate & record # of indl's | | | | | |

***Visit 2***—Observer Name:_____ Date:___/___/_____ Last Rain ___ Days Ago

Start Time:_____ Water Temp:_____ Air Temp:_____ Avg. Water Depth_____ End Time:_____

| | Sweep 1 | Sweep 2 | SWEEP 3 | SWEEP 4 | SWEEP 5 |
|---|---|---|---|---|---|
| Salamander Species- abbreviate & record # of indl's | | | | | |
| Other amphibian species-abbreviate & record # of indl's | | | | | |

***Please indicate species code and full name for any additional codes/species found in ponds other than ones listed on sheet.***

Blue-Spotted Salamander--BSS | Spotted Salamander--SS | Eastern Tiger Salamander--TS | Central Newt—CN | Redback Salamander--RS | Four-Toed Salamander--FTS | Wood Frog--WF | Spring Peeper--SP | Leopard Frog--LF | Chorus Frog--CF

| | SWEEP 6 | SWEEP 7 | SWEEP 8 | SWEEP 9 | SWEEP 10 |
|---|---|---|---|---|---|
| Salamander Species-abbreviate & record # of indl's | | | | | |
| Other amphibian species-abbreviate & record # of indl's | | | | | |

***Visit 3***—Observer Name:_____ Date:___/___/_____ Last Rain ___ Days Ago
Start Time:_____ Water Temp:_____ Air Temp:_____ Avg Water Depth_____End Time:_____

| | SWEEP 1 | SWEEP 2 | SWEEP 3 | SWEEP 4 | SWEEP 5 |
|---|---|---|---|---|---|
| Salamander Species-abbreviate & record # of indl's | | | | | |
| Other amphibian species-abbreviate & record # of indl's | | | | | |
| | SWEEP 6 | SWEEP 7 | SWEEP 8 | SWEEP 9 | SWEEP 10 |
| Salamander Species-abbreviate & record # of indl's | | | | | |
| Other amphibian species-abbreviate & record # of indl's | | | | | |

***Visit 4***—Observer Name:_____ Date:___/___/_____ Last Rain ___ Days Ago
Start Time:_____ Water Temp:_____ Air Temp:_____ Avg Water Depth_____End Time:_____

| | SWEEP 1 | SWEEP 2 | SWEEP 3 | SWEEP 4 | SWEEP 5 |
|---|---|---|---|---|---|
| Salamander Species-abbreviate & record # of indl's | | | | | |
| Other amphibian species-abbreviate & record # of indl's | | | | | |
| | SWEEP 6 | SWEEP 7 | SWEEP 8 | SWEEP 9 | SWEEP 10 |
| Salamander Species-abbreviate & record # of indl's | | | | | |
| Other amphibian species-abbreviate & record # of indl's | | | | | |

Blue-Spotted Salamander--BSS | Spotted Salamander--SS | Eastern Tiger Salamander--TS | Central Newt—CN | Redback Salamander--RS | Four-Toed Salamander--FTS | Wood Frog--WF | Spring Peeper--SP | Leopard Frog--LF | Chorus Frog--CF

Did you take digital photos of your wetland site or dipnetting activities? Y / N Photo names/#:

_____

Did you take digital photos of your animals captured? Y / N Photo names/#:

_____

_____

**<u>Comments</u>: please note here or on the back of your data sheet any observations of salamanders, frogs, or egg masses that you see or hear <u>outside</u> sweeps and specify the date. Also note here any photos taken, drops in water level, or any other circumstances relevant to the survey. Also please provide map/sketch and/or GPS coordinates of locations of sweeps.**

# Aquatic Funnel Trapping Survey 2011

Adult Data Sheet- MNFI

Monitor Name(s)_____

Street _____Town _____MI Zip_____

Phone ( ) _____-_____Email_____

**Local/Natural Area Name** (if applicable) **or Landowner Name**_____

**Location of survey Must use GPS Coordinates**. **Also give written directions to pond.**

Pond Name/Number_____ GPS Coordinates: _____ LAT _____ LON

**Written directions to pond**:

_____

**Other options useful, not required.** Twp ___ N Range ___ E / W Sec ___, ___¼ ___¼

**Property Ownership:** Public Private Unknown **IF PRIVATE LAND, PLEASE OBTAIN LAND OWNER CONSENT**

**Habitat type surveyed** (perm. pond, semi-perm. pond, ephemeral pond, river/stream, etc.)

**General land use in vicinity of pond** (agriculture, forest, grassland, pasture, etc.)

***Visit 1***—Observer Name: _____ Set Date:___/___/_____ Check Date: ___/___/_____ Last Rain ___ Days Ago

Start Time:_____ Water Temp:_____ Air Temp:_____ Avg. Water Depth: _____ End Time:_____

| | TRAP 1 | TRAP 2 | TRAP 3 | TRAP 4 | TRAP 5 |
|---|---|---|---|---|---|
| Salamander Species- use abbreviation & record # of individuals | | | | | |
| Other amphibian species- use abbreviation & record # of individuals | | | | | |
| | TRAP 6 | TRAP 7 | TRAP 8 | TRAP 9 | TRAP 10 |
| Salamander Species- abbreviate & record # of indl's | | | | | |
| Other amphibian species-abbreviate & record # of indl's | | | | | |

***Visit 2***—Observer Name:_____ Set Date:___/___/_____ Check Date: ___/___/_____ Last Rain ___ Days Ago

Start Time:_____ Water Temp:_____ Air Temp:_____ Avg. Water Depth_____ End Time:_____

| | TRAP 1 | TRAP 2 | TRAP 3 | TRAP 4 | TRAP 5 |
|---|---|---|---|---|---|
| Salamander Species- abbreviate & record # of indl's | | | | | |
| Other amphibian species-abbreviate & record # of indl's | | | | | |

***Please indicate species code and full name for any additional codes/species found in ponds other than ones listed on sheet.***

Blue-Spotted Salamander--BSS | Spotted Salamander--SS | Eastern Tiger Salamander--TS | Central Newt—CN | Redback Salamander--RS | Four-Toed Salamander--FTS | Wood Frog--WF | Spring Peeper--SP | Leopard Frog--LF | Chorus Frog--CF

| | TRAP 6 | TRAP 7 | TRAP 8 | TRAP 9 | TRAP 10 |
|---|---|---|---|---|---|
| Salamander Species-abbreviate & record # of indl's | | | | | |
| Other amphibian species-abbreviate & record # of indl's | | | | | |

***Visit 3***—Observer Name:_____ Set Date:___/___/_____ Check Date: ___/___/_____ Last Rain ___ Days Ago
Start Time:_____ Water Temp:_____ Air Temp:_____ Avg Water Depth_____End Time:_____

| | TRAP 1 | TRAP 2 | TRAP 3 | TRAP 4 | TRAP 5 |
|---|---|---|---|---|---|
| Salamander Species-abbreviate & record # of indl's | | | | | |
| Other amphibian species-abbreviate & record # of indl's | | | | | |
| | TRAP 6 | TRAP 7 | TRAP 8 | TRAP 9 | TRAP 10 |
| Salamander Species-abbreviate & record # of indl's | | | | | |
| Other amphibian species-abbreviate & record # of indl's | | | | | |

***Visit 4***—Observer Name:_____ Set Date:___/___/_____ Check Date: ___/___/_____ Last Rain ___ Days Ago
Start Time:_____ Water Temp:_____ Air Temp:_____ Avg Water Depth_____End Time:_____

| | TRAP 1 | TRAP 2 | TRAP 3 | TRAP 4 | TRAP 5 |
|---|---|---|---|---|---|
| Salamander Species-abbreviate & record # of indl's | | | | | |
| Other amphibian species-abbreviate & record # of indl's | | | | | |
| | TRAP 6 | TRAP 7 | TRAP 8 | TRAP 9 | TRAP 10 |
| Salamander Species-abbreviate & record # of indl's | | | | | |
| Other amphibian species-abbreviate & record # of indl's | | | | | |

Blue-Spotted Salamander--BSS | Spotted Salamander--SS | Eastern Tiger Salamander--TS | Central Newt—CN | Redback Salamander--RS | Four-Toed Salamander--FTS | Wood Frog--WF | Spring Peeper--SP | Leopard Frog--LF | Chorus Frog--CF

Did you take digital photos of your wetland site or trapping activities? Y / N Photo names/#:

_____

Did you take digital photos of your animals captured? Y / N Photo names/#:

_____

_____

**<u>Comments</u>: please note here or on the back of your data sheet any observations of salamanders, frogs, or egg masses that you see or hear <u>outside</u> traps and specify the date. Also note here any photos taken, drops in water level, or any other circumstances relevant to the survey. Also please provide map/sketch and/or GPS coordinates of locations of traps.**

# Visual Encounter Survey 2011

Data Sheet - MNFI

Monitor Name(s)_____

Street _____Town _____MI Zip_____

Phone (  ) _____-_____Email_____

**Local/Natural Area Name** (if applicable) **or Landowner Name**_____

**Location of survey area. Must use GPS Coordinates. Also give written directions to survey area.**

GPS Coordinates: _____ LAT _____ LON

**Written directions to survey area**:

_____

**Other options useful, not required.** Twp ___ N Range ___ E / W Sec ___, ___¼ ___¼

**Property Ownership:** Public  Private  Unknown  **IF PRIVATE LAND, PLEASE OBTAIN LAND OWNER CONSENT**

**Habitat type surveyed** (perm. pond, semi-perm. pond, ephemeral pond, river/stream, upland forest, lowland forest, etc.)

_____

**General land use in vicinity of artificial cover** (agriculture, forest, grassland, pasture, etc.)

***Visit 1***—Observer Name: _____ Date:___/___/_____ Last Rain ___ Days Ago Relative Humidity (%): _____

Start Time:_____ Air Temp:_____ Wind (mph/Beaufort scale): _____ End Time:_____

| ***Species*** | ***Number observed*** | ***GPS Location*** | ***Habitat type*** | ***Describe microhabitat (on log, under log, under leaves, in tree, etc.)*** |
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Blue-Spotted Salamander--BSS | Spotted Salamander--SS | Eastern Tiger Salamander--TS | Central Newt—CN | Redback Salamander--RS | Four-Toed Salamander--FTS |

## Visual Survey Data Sheet- MNFI

***Visit 2***—Observer Name:_____ Date:___/___/_____ Last Rain ___ Days Ago Relative humidity (%):_____
Start Time:_____ Air Temp:_____ Wind (mph/Beaufort scale): _____ End Time:_____

| ***Species*** | ***Number observed*** | ***GPS Location*** | ***Habitat type*** | ***Describe microhabitat (on log, under log, under leaves, in tree, etc.)*** |
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***Visit 3***—Observer Name:_____ Date:___/___/_____ Last Rain ___ Days Ago Relative humidity (%):_____
Start Time:_____ Air Temp:_____ Wind (mph/Beaufort scale): _____ End Time:_____

| ***Species*** | ***Number observed*** | ***GPS Location*** | ***Habitat type*** | ***Describe microhabitat (on log, under log, under leaves, in tree, etc.)*** |
|---|---|---|---|---|
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Blue-Spotted Salamander--BSS | Spotted Salamander--SS | Eastern Tiger Salamander--TS | Central Newt—CN | Redback Salamander--RS | Four-Toed Salamander--FTS | Wood Frog--WF | Spring Peeper--SP | Leopard Frog--LF | Chorus Frog--CF

# Visual Encounter Survey 2011

Data Sheet - MNFI

***Visit 4***—Observer Name:_____ Date:___/___/_____ Last Rain ___ Days Ago Relative humidity (%):_____
Start Time:_____ Air Temp:_____ Wind (mph/Beaufort scale): _____ End Time:_____

| ***Species*** | ***Number observed*** | ***GPS Location*** | ***Habitat type*** | ***Describe microhabitat (on log, under log, under leaves, in tree, etc.)*** |
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***Visit 5***—Observer Name:_____ Date:___/___/_____ Last Rain ___ Days Ago Relative humidity (%):_____
Start Time:_____ Air Temp:_____ Wind (mph/Beaufort scale): _____ End Time:_____

| ***Species*** | ***Number observed*** | ***GPS Location*** | ***Habitat type*** | ***Describe microhabitat (on log, under log, under leaves, in tree, etc.)*** |
|---|---|---|---|---|
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Blue-Spotted Salamander--BSS | Spotted Salamander--SS | Eastern Tiger Salamander--TS | Central Newt—CN | Redback Salamander--RS | Four-Toed Salamander--FTS |

## Visual Survey Data Sheet- MNFI

Did you take digital photos of your survey area/site? Y / N Photo names/#:

_____

Did you take digital photos of your animals captured? Y / N Photo names/#:

_____

_____

**<u>Comments</u>: please note here or on the back of your data sheet any observations of amphibians and reptiles that you see or hear <u>outside</u> visual encounter surveys and specify the date. Also note here any photos taken, drops in water level, or any other circumstances relevant to the survey. Also please provide map/sketch and/or GPS coordinates of locations of survey area.**

Blue-Spotted Salamander--BSS | Spotted Salamander--SS | Eastern Tiger Salamander--TS | Central Newt—CN | Redback Salamander--RS | Four-Toed Salamander--FTS | Wood Frog--WF | Spring Peeper--SP | Leopard Frog--LF | Chorus Frog--CF

# Artificial Cover Survey 2011

Data Sheet - MNFI

Monitor Name(s)_____

Street _____Town _____MI Zip_____

Phone ( ) _____-_____Email_____

**Local/Natural Area Name** (if applicable) **or Landowner Name**_____

**Location of survey area and artificial cover objects (see table below). Must use GPS Coordinates**. **Also give written directions to survey area.** GPS Coordinates: _____ LAT _____ LON

**Written directions to survey area**:

_____

**Other options useful, not required.** Twp ___ N Range ___ E / W Sec ___, ___¼ ___¼

**Property Ownership:** Public Private Unknown **IF PRIVATE LAND, PLEASE OBTAIN LAND OWNER CONSENT**

**Habitat type surveyed** (perm. pond, semi-perm. pond, ephemeral pond, river/stream, upland forest, lowland forest, etc.)

_____

**General land use in vicinity of artificial cover** (agriculture, forest, grassland, pasture, etc.)

**Number and type of artificial cover objects:** _____ **Cover object labels:** _____

***Visit 1***—Observer Name: _____ Date:___/___/_____ Last Rain ___ Days Ago Relative Humidity (%): _____

Start Time:_____ Air Temp:_____ Wind (mph/Beaufort scale): _____ End Time:_____

| | Cover _____<br>Lat_____<br>Long_____ | Cover _____<br>Lat_____<br>Long_____ | Cover _____<br>Lat_____<br>Long_____ | Cover _____<br>Lat_____<br>Long_____ | Cover _____<br>Lat_____<br>Long_____ |
|---|---|---|---|---|---|
| Salamander Species - use abbreviation & record # of individuals | | | | | |
| Snake Species – record species/code & number of individuals | | | | | |
| | Cover _____<br>Lat_____<br>Long_____ | Cover _____<br>Lat_____<br>Long_____ | Cover _____<br>Lat_____<br>Long_____ | Cover _____<br>Lat_____<br>Long_____ | Cover _____<br>Lat_____<br>Long_____ |
| Salamander Species - use abbreviation & record # of individuals | | | | | |
| Snake Species – record species/code & number of individuals | | | | | |
| | Cover _____<br>Lat_____<br>Long_____ | Cover _____<br>Lat_____<br>Long_____ | Cover _____<br>Lat_____<br>Long_____ | Cover _____<br>Lat_____<br>Long_____ | Cover _____<br>Lat_____<br>Long_____ |
| Salamander Species - use abbreviation & record # of individuals | | | | | |
| Snake Species – record species/code & number of individuals | | | | | |

Blue-Spotted Salamander--BSS | Spotted Salamander--SS | Eastern Tiger Salamander--TS | Central Newt—CN | Redback Salamander--RS | Four-Toed Salamander--FTS |

## Artificial Cover Data Sheet- MNFI

***Visit 2***—Observer Name:_____ Date:___/___/_____ Last Rain ___ Days Ago Relative humidity (%):_____
Start Time:_____ Air Temp:_____ Wind (mph/Beaufort scale): _____ End Time:_____

| | Cover _____ | Cover _____ | Cover _____ | Cover _____ | Cover _____ |
|---|---|---|---|---|---|
| Salamander Species - use abbreviation & record # of individuals | | | | | |
| Snake Species – record species/code & number of individuals | | | | | |
| | Cover _____ | Cover _____ | Cover _____ | Cover _____ | Cover _____ |
| Salamander Species - use abbreviation & record # of individuals | | | | | |
| Snake Species – record species/code & number of individuals | | | | | |
| | Cover _____ | Cover _____ | Cover _____ | Cover _____ | Cover _____ |
| Salamander Species - use abbreviation & record # of individuals | | | | | |
| Snake Species – record species/code & number of individuals | | | | | |

***Visit 3***—Observer Name:_____ Date:___/___/_____ Last Rain ___ Days Ago Relative humidity (%):_____
Start Time:_____ Air Temp:_____ Wind (mph/Beaufort scale): _____ End Time:_____

| | Cover _____ | Cover _____ | Cover _____ | Cover _____ | Cover _____ |
|---|---|---|---|---|---|
| Salamander Species | | | | | |
| Snake Species | | | | | |
| | Cover _____ | Cover _____ | Cover _____ | Cover _____ | Cover _____ |
| Salamander Species | | | | | |
| Snake Species | | | | | |
| | Cover _____ | Cover _____ | Cover _____ | Cover _____ | Cover _____ |
| Salamander Species | | | | | |
| Snake Species | | | | | |

Blue-Spotted Salamander--BSS | Spotted Salamander--SS | Eastern Tiger Salamander--TS | Central Newt—CN | Redback Salamander--RS | Four-Toed Salamander--FTS | Wood Frog--WF | Spring Peeper--SP | Leopard Frog--LF | Chorus Frog--CF

# Artificial Cover Survey 2011

Data Sheet - MNFI

***Visit 4***—Observer Name:_____ Date:___/___/_____ Last Rain ___ Days Ago Relative humidity (%):_____
Start Time:_____ Air Temp:_____ Wind (mph/Beaufort scale): _____ End Time:_____

| | Cover _____ | Cover _____ | Cover _____ | Cover _____ | Cover _____ |
|---|---|---|---|---|---|
| Salamander Species - use abbreviation & record # of individuals | | | | | |
| Snake Species – record species/code & number of individuals | | | | | |
| | Cover _____ | Cover _____ | Cover _____ | Cover _____ | Cover _____ |
| Salamander Species - use abbreviation & record # of individuals | | | | | |
| Snake Species – record species/code & number of individuals | | | | | |
| | Cover _____ | Cover _____ | Cover _____ | Cover _____ | Cover _____ |
| Salamander Species - use abbreviation & record # of individuals | | | | | |
| Snake Species – record species/code & number of individuals | | | | | |

***Visit 5***—Observer Name:_____ Date:___/___/_____ Last Rain ___ Days Ago Relative humidity (%):_____
Start Time:_____ Air Temp:_____ Wind (mph/Beaufort scale): _____ End Time:_____

| | Cover _____ | Cover _____ | Cover _____ | Cover _____ | Cover _____ |
|---|---|---|---|---|---|
| Salamander Species | | | | | |
| Snake Species | | | | | |
| | Cover _____ | Cover _____ | Cover _____ | Cover _____ | Cover _____ |
| Salamander Species | | | | | |
| Snake Species | | | | | |
| | Cover _____ | Cover _____ | Cover _____ | Cover _____ | Cover _____ |
| Salamander Species | | | | | |
| Snake Species | | | | | |

Blue-Spotted Salamander--BSS | Spotted Salamander--SS | Eastern Tiger Salamander--TS | Central Newt—CN | Redback Salamander--RS | Four-Toed Salamander--FTS |

## Artificial Cover Data Sheet- MNFI

Did you take digital photos of your wetland site or artificial cover activities? Y / N Photo names/#:

_____

Did you take digital photos of your animals captured? Y / N Photo names/#:

_____

_____

**<u>Comments</u>: please note here or on the back of your data sheet any observations of amphibians and reptiles that you see or hear <u>outside</u> artificial cover surveys and specify the date. Also note here any photos taken, drops in water level, or any other circumstances relevant to the survey. Also please provide map/sketch and/or GPS coordinates of locations of cover objects.**

Blue-Spotted Salamander--BSS | Spotted Salamander--SS | Eastern Tiger Salamander--TS | Central Newt—CN | Redback Salamander--RS | Four-Toed Salamander--FTS | Wood Frog--WF | Spring Peeper--SP | Leopard Frog--LF | Chorus Frog--CF

**Volunteer Herp Monitoring Field Testing Follow-up Survey**

Name (optional): _____ Today's Date: _____

Survey/Monitoring Site: _____ Survey Date(s): _____

Phone/e-mail if follow-up needed: _____

1. Please check all the herp survey techniques/methods that you conducted and tested.
   Visual encounter surveys _____ Aquatic funnel trapping_____
   Dipnetting/sweep samples _____ Egg mass counts _____
   Cover board surveys _____ Basking surveys _____
   Roadside surveys _____

2. Were you able to successfully apply <u>all</u> the survey techniques/methods you used according to the survey protocol provided? If not, which techniques were you able to successfully apply?

3. Which survey techniques/methods were you not able to successfully apply or had difficulty applying? Why was this? Is there anything we could do to help you or volunteers be able to successfully apply these techniques/methods?

4. Which survey techniques/methods do you think that you would be able to successfully conduct on your own after receiving appropriate training and materials?

5. Which survey techniques/methods, if any, do you think that you would <u>not</u> be able to successfully conduct or would have difficulty conducting on your own even with training?

6. Was the training presentation and on-site training sufficient or adequate? Did you receive enough information and training to successfully conduct the surveys? If not, what could we do differently to provide sufficient or additional training and information?

7. Were the survey protocol, identification keys/guides, and other background materials provided adequate or sufficient for helping you successfully conduct the surveys and identify species found? What did you find most helpful? Is there anything we can do to make the materials more helpful?

8. Were you able to successfully fill out the survey data forms? Is there anything we can do to improve the data forms and make them clearer and easier to fill out?

9. What did you like best about conducting the surveys? What did you like the least?

10. Did you have prior experience conducting surveys for amphibians and reptiles? If so, please indicate years and level of experience conducting herp surveys and describe experience?

    Beginner/No prior experience _____ Novice (1-2 years experience) _____
    Intermediate (3-4 years experience) _____ Advanced (5+ years experience) _____

    Describe previous experience (e.g., for fun/hobby, previous volunteer herp surveys, employment doing herp surveys, conducted herp research, etc.): _____
    _____
    _____
    _____

11. Would you be interested in participating in additional volunteer herp surveys/monitoring in the future, or recommending others to participate?

12. Do you have any suggestions for how to identify, recruit, and/or retain volunteers?

13. Any additional suggestions or comments?

THANK YOU FOR YOUR TIME AND ASSISTANCE!!!

**Appendix C. Summary of amphibian and reptile survey results from pilot volunteer testing at a site in southeast Michigan in 2011 and 2012.**

| Date | Species | Age Class | Dipnetting/ sweep sampling | Visual encounter survey | Aquatic funnel trapping | Artificial cover | Egg mass count | Incidental | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| 4/9/2011, 05/13/2011 | Green Frog | Adult | 8 | 33 | 8 | 0 | 0 | 0 | **49** |
| 4/9/2011, 05/13/2011 | Wood Frog | Adult | 13 | 45 | 6 | 0 | 0 | 0 | **64** |
| 4/9/2011, 05/13/2011 | Wood Frog | Tadpole | 40 | 0 | 547 | 0 | 0 | 0 | **587** |
| 4/9/2011, 05/13/2011 | Wood Frog | Egg mass | 1 | 0 | 0 | 0 | 0 | 0 | **1** |
| 4/9/2011, 05/13/2011 | American Toad | Adult | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 4/9/2011, 05/13/2011 | American Toad | Tadpole | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 4/9/2011, 05/13/2011 | Spring Peeper | Adult | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 4/9/2011, 05/13/2011 | Northern Leopard Frog | Adult | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 4/9/2011, 05/13/2011 | Gray Treefrog | Adult | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 4/9/2011, 05/13/2011 | Spotted Salamander (SGCN) | Adult | 0 | 2 | 20 | 1 | 0 | 0 | **23** |
| 4/9/2011, 05/13/2011 | Spotted Salamander (SGCN) | Egg mass | 0 | 0 | 0 | 0 | 12 | 0 | **12** |
| 4/9/2011, 05/13/2011 | Blue-spotted Salamander (SGCN) | Adult | 0 | 0 | 2 | 0 | 0 | 0 | **2** |
| 4/9/2011, 05/13/2011 | Blue-spotted Salamander (SGCN) | Egg mass | 0 | 0 | 0 | 0 | 3 | 0 | **3** |
| 4/9/2011, 05/13/2011 | Dusky Salamander | Adult | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 4/9/2011, 05/13/2011 | Red-backed Salamander | Adult | 0 | 20 | 0 | 42 | 0 | 0 | **62** |
| 4/9/2011, 05/13/2011 | Four-toed Salamander (SGCN) | Adult | 0 | 0 | 0 | 2 | 0 | 0 | **2** |
| 4/9/2011, 05/13/2011 | Eastern Spotted Newt | Adult | 0 | 0 | 3 | 0 | 0 | 0 | **3** |
| 4/9/2011, 05/13/2011 | Blanding's Turtle (SC) | Adult | 0 | 2 | 0 | 0 | 0 | 0 | **2** |
| 4/9/2011, 05/13/2011 | Northern Water Snake | Adult | 0 | 1 | 0 | 0 | 0 | 0 | **1** |
| 4/9/2011, 05/13/2011 | Brown Snake | Adult | 0 | 1 | 0 | 0 | 0 | 0 | **1** |
| **TOTAL** | | **15** | **62** | **104** | **586** | **45** | **15** | **0** | **812** |

**Appendix C. Summary of amphibian and reptile survey results from pilot volunteer testing at a site in southeast Michigan in 2011 and 2012.**

| Date | Species | Age Class | Dipnetting/ sweep sampling | Visual encounter survey | Aquatic funnel trapping | Artificial cover | Egg mass count | Incidental | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| 05/14/2012 | Green Frog | Adult | 12 | 1 | 11 | 0 | - | 38 | **62** |
| 05/14/2012 | Wood Frog | Adult | 18 | 143 | 0 | 3 | - | 49 | **213** |
| 05/14/2012 | Wood Frog | Tadpole | 21 | 0 | 57 | 0 | - | 0 | **78** |
| 05/14/2012 | American Toad | Adult | 0 | 1 | 0 | 0 | - | 1 | **2** |
| 05/14/2012 | American Toad | Tadpole | 6 | 0 | 0 | 0 | - | 0 | **6** |
| 05/14/2012 | Spring Peeper | Adult | 0 | 4 | 0 | 0 | - | 1 | **5** |
| 05/14/2012 | Northern Leopard Frog | Adult | 0 | 0 | 0 | 0 | - | 3 | **3** |
| 05/14/2012 | Gray Treefrog | Adult | 0 | 0 | 0 | 0 | - | 1 | **1** |
| 05/14/2012 | Spotted Salamander (SGCN) | Egg mass | 80 | 0 | 0 | 0 | - | 0 | **80** |
| 05/14/2012 | Dusky Salamander | Adult | 0 | 7 | 0 | 2 | - | 0 | **9** |
| 05/14/2012 | Red-backed Salamander | Adult | 0 | 24 | 0 | 40 | - | 0 | **64** |
| 05/14/2012 | Eastern Spotted Newt | Adult | 0 | 0 | 8 | 0 | - | 0 | **8** |
| 05/14/2012 | Blanding's Turtle (SC) | Adult | 0 | 0 | 0 | 0 | - | 1 | **1** |
| **TOTAL** | **11** | | **137** | **180** | **76** | **45** | **-** | **94** | **532** |

**Appendix D. Summary of responses from volunteer field testing follow-up surveys from 2011-2012.**

| | | Survey techniques conducted and tested | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **No.** | **Year** | **Visual surveys** | **Dipnetting/ sweep samples** | **Coverboard surveys** | **Aquatic funnel trapping** | **Egg mass counts** | **Were you able to successfully apply all the survey techniques?** | **Comments** | **Which survey techniques were you not able to successfully apply?** | **Which techniques do you think you would be able to conduct on your own?** | **Which techniques do you think you could not conduct on your own?** | **Was training presentation and on-site training sufficient?** | **Comments** |
| 1 | 2011 | X | | X | | X | Yes | | None | All of the above | None | Yes | |
| 2 | 2011 | X | X | X | X | X | Yes | | Dipnetting protocol was little confusing - unclear how many times you sweep in an area of pond or where/when to move around pond | Coverboard, VES, Egg mass counts | Aquatic funnel trapping only b/c no equipment | Yes | |
| 3 | 2011 | X | | X | | X | Yes | More specific instructions would be helpful though. | None | Coverboard surveys easier to do on own | Trapping seemed slightly difficult | Yes | Some questions on forms could be confusing. |
| 4 | 2011 | X | | X | X | | Yes | | None | All - Coverboards, VES, aquatic funnel trapping | None | Yes | On-site training was sufficient. |
| 5 | 2011 | X | | X | X | | Yes | | VES - difficult to record location | All - Coverboards, VES, aquatic funnel trapping | Possibly dipnetting | No? | Provide example of data sheet beforehand and how it is expected to be filled out. Need little more attention individually to feel comfortable on own. |
| 6 | 2011 | X | X | | X | X | Yes | | None | All - Coverboards, VES, aquatic funnel trapping, dipnetting | None | No? | Training on paperwork could have been more clear. |
| 7 | 2011 | X | | X | | | | Found numerous salamanders under coverboards. | Trapping - did not catch anything in traps | Coverboards, VES, egg mass counting | Trapping due to lack of materials | Yes | Loved doing the surveys. |
| 8 | 2011 | X | X | | X | X | Yes | Although dipnetting was less effective | | VES, aquatic funnel trapping, egg mass counts | None | Yes | |
| 9 | 2011 | X | X | X | X | X | Yes | | None | Aquatic funnel trapping | None | Yes | Only needed more information about how to classify the area. |
| 10 | 2011 | X | X | | X | X | Yes | Dipnetting could have used a little more description | None | Trapping, VES | None | No? | Needed a little more direction on-site |
| 11 | 2011 | X | | | | X | Yes | | None | VES, trapping, dipnetting and egg mass counts | None | Yes | Training presentation was somewhat useful, but learned the most from onsite training. |

**Appendix D. Summary of responses from volunteer field testing follow-up surveys from 2011-2012.**

| | | Survey techniques conducted and tested | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **No.** | **Year** | **Visual surveys** | **Dipnetting/ sweep samples** | **Coverboard surveys** | **Aquatic funnel trapping** | **Egg mass counts** | **Were you able to successfully apply all the survey techniques?** | **Comments** | **Which survey techniques were you not able to successfully apply?** | **Which techniques do you think you would be able to conduct on your own?** | **Which techniques do you think you could not conduct on your own?** | **Was training presentation and on-site training sufficient?** | **Comments** |
| 12 | 2011 | X | X | X | X | X | Yes | For the most part | | VES, coverboard surveys, dipnetting, aquatic funnel trapping, egg mass counts | None - with training | No? | Maybe provide more hands-on training, esp. with proper identification |
| 13 | 2011 | X | | X | X | | Yes | All techniques - VES, coverboards, aquatic trapping | Unsuccessful at capturing any herps in aquatic funnel traps | VES, coverboard (roadside and basking) surveys would be easiest but all techniques could be done successfully | Dipnetting/ sweep samples, egg mass counts would be most difficult as it pertains to identifying the animal | Yes | If had no experience or exposure with any of the methods, would have found it difficult but even with minimal experience, believe with info given survey could be done successfully |
| 14 | 2012 | X | | | X | | Yes | | Didn't have too much trouble with the methods. Some took considerably longer than others, however, particularly with marking GPS points for VES | VES, coverboard survey (and all other surveys) | Aquatic funnel trapping unless had own traps | Yes | |
| 15 | 2012 | X | X | X | X | X | Yes | | VES - no time or area defined so had to make up an appropriate time or area to constrain the search. For surveys requiring tadpole or larval salamander ID, a key must be provided. Even with a key, some species are almost impossible to distinguish, so indicating one or the other may be more appropriate. | All. After talking with students, think most feel they would be able to complete all survey techniques if given proper training and materials. On-site training in the field is needed. Biggest constraint - time - combining several techniques requires a tremendous amount of time | Surveys that require ID of tadpoles and larval salamanders | No | Tried to simplify protocol - added a General Protocol section that summarizes things they should be doing for each survey technique. Helped show similarities among sampling first, and then broke down each method showing differences among them and specifics for each method. |

**Appendix D. Summary of responses from volunteer field testing follow-up surveys from 2011-2012.**

| | | | | | | Prior experience surveying for herps? | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **No.** | **Were protocol, ID guides, and other materials sufficient?** | **Comments** | **Were you able to successfully fill out forms?** | **What did you like best?** | **What did you like least?** | **Beginner/ No prior experience** | **Novice (1-2 years)** | **Intermediate (3-4 years)** | **Advanced (5+ years)** | **Interested in participating in additional herp monitoring?** | **Suggestions for other volunteers and how to ID, recruit, and retain volunteers** | **Additional suggestions/ comments** |
| 1 | Yes | Visual field guide (pics of salamanders very helpful. | - | Hiking, being in the field | | X | | | | Maybe | High school students that need service hours | |
| 2 | Yes - except dipnetting | Directions were very clear, gave good examples, dipnetting instructions slightly confusing | Yes | Everything | | X | | | | Yes | Facebook page | |
| 3 | Yes | They were all very helpful. | Some parts of the form were difficult to figure out what answer looking for. | Being out in nature, helping to get scientific data | | X | | | | | | |
| 4 | Yes | Enough material was provided. | Yes - Survey data forms were easy to understand and fill out. | Funnel traping b/c caught a lot of salamanders | | | X | | | Yes | No | |
| 5 | No | Need more keys/guides - did not really know what to expect - esp. egg mass | Go through data form befoehand | Search for animals | Did not participate in all aspects | X | | | | Maybe | Biology classes - high school, college | |
| 6 | Yes | | Should be explained better. | Being outdoors - enjoyed the experience | | X | | | | | | |
| 7 | Yes | Cool to have poster with color photos on site | They were somewhat difficult at top to fill (location, site information), but the data were easy to fill. | Enjoyed seeing the different salamanders and egg masses | | X | | | | Yes - at same location | Flyers around campus | |
| 8 | No | Materials could have been smaller and easier to carry | Explanation of the forms would have been helpful. | Multiple ways to survey the area | | X | | | | Yes | | |
| 9 | Yes | The key and guides were very helpful. Never had looked at different herp species before and now can identify them. | Yes - except what type of land could be improved | Liked it all | | | | | | Yes | Boy scouts and girl scouts | |
| 10 | | Never saw materials | Recorder said forms could have had more explanation | Being out in woods, trapping & VES | Looking for egg masses | | X | | | Yes | local high schools, boy scouts/clubs | Key with photos of local herps |
| 11 | No | Some sort of booklet to carry around would be useful. Only had a poster which wasn't too helpful. | Didn't fill out any | Like the whole survey | | X | | | | Yes | Perhaps work with univeriswty and university clubs as ways to fill service requirements | |

**Appendix D. Summary of responses from volunteer field testing follow-up surveys from 2011-2012.**

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **No.** | **Were protocol, ID guides, and other materials sufficient?** | **Comments** | **Were you able to successfully fill out forms?** | **What did you like best?** | **What did you like least?** | **Beginner/ No prior experience** | **Novice (1-2 years)** | **Intermediate (3-4 years)** | **Advanced (5+ years)** | **Interested in participating in additional herp monitoring?** | **Suggestions for other volunteers and how to ID, recruit, and retain volunteers** | **Additional suggestions/ comments** |
| 12 | Yes | ID keys seemed adequate. Color pictures helpful. | Yes | Liked coverboard surveys the best. | | | X | | | Yes | Post flyers around community esp. college campuses. Use Internet - e.g., Facebook. | |
| 13 | Yes | Background material wsa good. Some of the survey protocol was a little confusing and needed further explanation to be understood (i.e., photo taking & drawing locations of specimens & ponds | Yes - fairly straightforward | Something rewarding about every part of the survey | | X | | | | Yes | Through e-mail to wildlife biology students, flyers, through wildlife club, a website | |
| 14 | Yes | Survey protocols were nice to have on hand for reference. Having ID keys with us for identifying eggs and larvae were particularly helpful. | Make environmental data sheet the same format as other data sheets. Also may want to have a datasheet for drawing maps of ponds with reminders about should be provided | Observation and ID of herps | | | X | | | Yes | | During VES, stopping for every herp we located took too much time. Instead, broke team up into two parts. Search team flagged locations and wrote some data on flags. Recording team came behind, filled out data sheet and marked location with GPS. |
| 15 | No | Tadpole and larval salamander keys are needed as well as photos showing representatives of each species. Also providing "General Protocol" section. | Yes - Most students filled out data sheets without a problem. Providing an example data sheet that is filled out completely and correctly may help. Struggled with written directions section. Units was another common error - specify writing units with numbers or require recording in particular unit. | Surveys are a great class project but are very time consuming and can potentially be very destructive to area being sampled. | | | | | X | Yes - as well as future classes | Work with organizations, nature centers, universities and individuals. Examples include UMF, EMU, Genesee County Parksw, Boy or Girl Scouts | 1) Key to eggs, tadpoles, and larvae must be provided. Students also should be told that certain species very difficult to identify and may not be distinguishable in the field. 2) Using multiple survey methods in the same pond can be extremely destructive. Choose a survey method or two at most to do at a particular site. 3) Extremely time consuming - spend 2-6 hours in the field and additional time setting traps, gathering supplies, traveling to and from sites. Great activity for class but will be difficult for volunteer to put in amount of time and effort. Suggestion would be to pick a technique or two and a pond or two, depending on time volunteer can commit. Overall, students really enjoyed the experience and can be a great opportunity for volunteers. |