

NORTH AMERICAN AMPHIBIAN MONITORING PROGRAM Protocol

U.S. Department of the Interior
U.S. Geological Survey
Patuxent Wildlife Research Center
Laurel, MD, USA 20708-4038
<http://www.pwrc.usgs.gov/naamp>
Contact: Linda Weir, email: naamp@usgs.gov
<http://www.mp2-pwrc.usgs.gov/NAAMP/other/>

Route Creation

Routes are generated in a stratified random block design at USGS Patuxent Wildlife Research Center. Routes are then distributed to Regional Coordinators. These roadside routes are then groundtruthed to determine suitability (not too dangerous, not too noisy to hear) and stop placement. There are 10 stops per route. Two methods of stop placement are permitted: equidistant stops or stratified by habitat. In equidistant stop placement, each stop is 0.5 miles apart. When stratified by habitat, the stops are at least 0.5 miles apart and are located at wetland habitats. The wetland habitat should be appropriate potential habitat (pond, vernal pool, roadside ditch, etc) but the presence or absence of amphibians should not be used as a selection factor. Some alteration of the route may occur during groundtruthing, see Groundtruthing Guidelines for more information. Stop locations and any route alterations should be shared with NAAMP to keep route maps accurate and up to date. Once a route has been groundtruthed and the 10 stops determined the route and stops are not changed, unless exceptional circumstances occur, see Stop Inaccessibility, Stop Relocation, and Stop Retirement section of this document. In addition, some regions may have nonrandom routes that were created by other methods.

Seasonal Sampling Periods

There are three seasonal sampling periods, separated by intervals of at least two weeks, and selected by each region to cover the calling periods of its local species. Regions may also elect to add an earlier sampling period, targeted towards very early breeding species, such as wood frogs (*Rana sylvatica*) that typically breed during a brief, relatively unpredictable period in early spring when vernal ponds first melt and fill. The optional sampling period for early breeding species has no required time interval between it and the next sampling period, and in some years these may overlap.

The total number of potential sampling days varies regionally in relation to the length of the calling season. The maximum number of potential sampling days is sixty percent of the calling season duration (i.e., from the beginning of the peak of the species with the earliest calling phenology, through the peak of the latest species). Thus the number of potential sampling days is greatest in southern

states. Each sampling period is no longer than six weeks; for many regional programs the sampling periods are two to three weeks. The regional program may divide the available number of sampling days equally or unequally among the sampling periods.

Regional coordinators set the sampling periods based upon experience and the available data on breeding phenology. Different sampling periods may be set within a given regional program, for example in two or three bands within a given state, to accommodate phenological differences due to elevation or latitude. Neighboring regional programs coordinate sampling periods as much as possible, to encourage consistency across political boundaries.

Nightly Sampling Conditions

A survey may begin 30 minutes after sunset or later. No matter what time a route is started, it should be completed by 1 a.m. Appropriate sampling conditions are based upon wind, sky, and air temperature conditions. For most regions the wind code should be at level 3 or less, but the wind prone Great Plains region is permitted to sample at level 4 or less. Surveys should not be conducted during heavy rainfall, but light rainfall is acceptable (sound of the rain may impair hearing ability).

The air temperature criteria are the minimum allowable temperatures, varying for each sampling period.

3 Run System Minimum Temperature

Run 1	5.6° C	(42° F)
Run 2	10° C	(50° F)
Run 3	12.8° C	(55° F)

4 Run System Minimum Temperature

Run 1	5.6° C	(42° F)
Run 2	5.6° C	(42° F)
Run 3	10° C	(50° F)
Run 4	12.8° C	(55° F)

A regional program may choose to set higher minimum temperatures based upon regional phenology information.

Sampling should occur during “good frog weather” for the region. For some areas a humid night is sufficient, along with the above criteria. In southern states and the Great Plains, it is recommended that the survey occur after a rainfall event.

Data Collection

Stops are conducted in numerical order, in one night by one observer. We encourage, but do not require, that one observer conduct all surveys of a route in a given year. Because some observers have assistants who may also wish to

collect data, multiple observers are instructed to each fill out their own datasheet, separately and independently. One observer is the official recorder of the route whose data will be entered into the NAAMP database. All datasheets are returned to the Regional Coordinator for archival purposes. This “one observer per datasheet” rule allows each survey conducted to be of equal effort.

Observers record the time, sky code, and wind code, at the beginning and end of each survey to verify that the sampling conditions were met on the evening of the survey. At each stop air temperature is recorded to verify that sampling conditions were met on the sampling night; at least eight of the 10 stops must meet temperature guidelines. For southern states that record air temperature only at the beginning and end of a survey, both temperature readings must meet these guidelines. Gulf Coast and Great Plains states require documentation of the last rainfall event, since possible routes should be conducted within 3 days of rainfall.

At each stop the observer listens for 5 minutes, and then records the amphibian calling index for each species heard. The 5 minute listening period has no initial waiting period. The observer indicates whether background noise impaired his/her ability to hear (most surveys use yes/no checkbox; some have adopted the noise index developed by Massachusetts). If there is a major noise disturbance, lasting one minute or longer, the observer may break the listening period to avoid sampling during the excessive noise. If such a time out is taken, this is noted on the datasheet. After the major disturbance ends, the observer resumes listening for the time remaining. The time out should not be used for background noise.

Stop Inaccessibility, Stop Relocation, and Stop Retirement

Stop Inaccessibility: Temporary stop inaccessibility may occur for some transient reason (i.e. traffic accident blocks road access).

If only one stop will be missed, then route can be considered complete. The observer should write on the datasheet which stop was missed and note why in the comments section. When entering the data into the database, mark the checkbox indicating which stop was missed.

If more than one stop would be missed, the route should be re-run on another night.

Stop Relocation: Stop relocation is when a stop needs to be shifted to a new location, after the groundtruthing phase has occurred. During groundtruthing the permanent stop locations are set (see groundtruthing guidelines). Stop relocations should be a rare event.

Stop relocation should only occur for safety reasons (i.e. route was safe before- or appeared to be, but perhaps a homeowner fired a gun in the air as warning to observer).

Stops should NOT be relocated because of habitat loss or lack of calling amphibians at the site.

To relocate (for safety reasons) a stop, the Regional Coordinator should use their best judgment on when it is necessary and where to relocate. If can be moved a short distance away, not impacting the 0.5 mile apart rule this is preferable. If that is not possible, then relocate by creating a new stop at the end of the route and renumbering all the stops. Keep a written record of when, why, and how a stop relocation occurred. If time permits we will build into the database a checkbox or some way to indicate that a route has had some post-groundtruthing alteration. When data are analyzed all the stops of a route are considered one unit (the route), so it is okay that the individual stops are renumbered.

Stop Retirement: Once the route has been groundtruthed and listening stations established, these locations are permanent and locations may not be changed unless a safety issue arises. If habitat destruction occurs at a listening station, and a local extinction of amphibians occurs, this is important information. To document habitat destruction the location should be surveyed for three seasons beyond the destruction date. After three seasons of non-activity, the listening station may be retired, and null data will be assumed for this site. A listening station cannot be retired merely because the wetlands are uninhabited by anurans. Retired stops should be visited periodically to verify that no suitable habitat exists, but five minutes of listening is no longer required.

Data Review Process

What checks on data collection and data entry will Regional Coordinators perform each year to ensure all data follows the same review procedures? Some checks and balances are incorporated into the database design (pop-up warning boxes, etc), while others are procedures Coordinators will need to do. These procedures were adopted at the Nashville NAAMP Coordinators meeting.

All data entered same way: All datasheets will be entered "as they appear" and then "checked" for any errors. This pattern is obvious if the volunteer did the data entry, the Regional Coordinator would not be able to "check" the data before it was entered. This pattern should be followed, even for datasheets that the Regional Coordinator will enter. That way all data goes through the same data review process. Also, the database documents changes, so by entering the data "as is" and then making the correction, the database will have a record of the correction and why it occurred.

The only exceptions are "simple obvious errors" such as the observer wrote 70 degrees and then marked Celsius (when meant Fahrenheit). The database wouldn't let you enter such an error anyway, so the Coordinator may make that "correction" during the data entry process. If any such corrections are made to data, then these changes should be marked on the datasheet. The change should be initialed on the datasheet and the reason noted.

An example of an error that should not be changed during data entry is the observer wrote down they heard a species that you know was highly unlikely they heard (you will handle this during step three - documenting other changes).

Manual check of data: After data are entered (by Volunteer or Coordinator), there will be a manual check - comparing the electronic entry to the physical datasheet. This will help catch any data entry errors. If a data entry error is found, the correction is made and since the data are already in the database, the database will be able to keep track of who did the change and why. To indicate data has been through the manual check, the database has a checkbox to mark when you have completed the review for each run of each route (see the NAAMP Regional Coordinator Database Guide).

Documenting other changes: How do we deal with other potential errors (i.e. misidentification)? Rule: Do not change the data until you have conferred with the volunteers. If the volunteer agrees that they made an error, then the entry should be changed using the edit button. If the volunteer does not agree, then the data can be flagged as suspect data. In either case it will be documented by the database as to who is making the change (or marking as questionable) and why.

Reasons for changing data will be designated as: observer error or data entry error.

Reasons for questionable data will be documented as: questionable identification, observer uncertainty, outside known distribution, or outside phenology.

More details will be available in the NAAMP Regional Coordinator Database Guide once the Data Review section is completed.

Deadline: Data entry and review should be completed each year by December 15th. Review includes the physical comparison of the datasheet to the data entry, viewing the flags created by the database, and any subjective questions/review by Coordinator. Having a deadline for when to finish entry and review is helpful for your fellow Regional Coordinators. It allows report generation to be complete: other states may want to use information from neighboring states in newsletters, etc. Having one deadline allows everyone know when data should be finalized and available for use. Also, we can archive the year at that point. You can still enter a late datasheet after the deadline, it just will not be part of the year-end reports.

Datasheet archiving: State/provincial programs should maintain the original datasheets.