

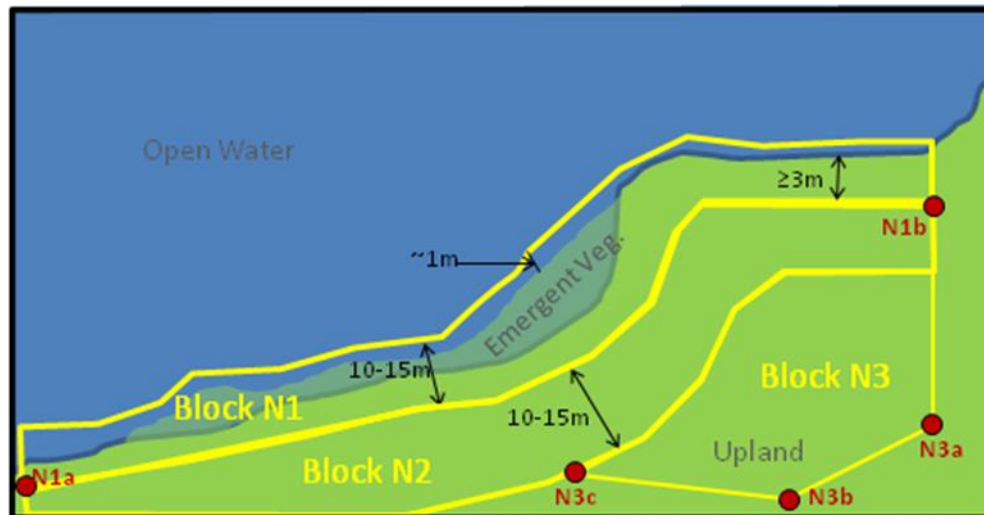
Wyoming Toad Monitoring Protocol

2010

General Information

The intention of this survey protocol is to estimate the abundance of adult Wyoming toads in the areas of highest likelihood-of-occurrence, primarily areas proximate to fixed bodies of water and deemed to be moist through much of the spring-summer season, as confirmed by their vegetation composition.

1. **GPS:** Make sure all GPS units are set to the same datum and projection. Datum should be NAD 1983 (which usually appears as “NAD83” on most units). Projection should be UTM, Zone 13 (which appears as “UTM UPS” on most units).
2. **Survey Sessions:** Surveys should occur at least two times per year
 - a. **Breeding Season:** Depending on weather, roughly between June 7 and June 20.
 - b. **Post-Breeding / Pre-Hibernation:** Depending on weather, roughly between August 7 and August 20.
3. **Search Blocks:** To delineate search effort, each property is stratified into “search blocks” of known area.



- a. *Shoreline search blocks* (e.g., Block N1) should be roughly 10 - 15 meters wide, extending about 1 m into open water (depending on depth and vegetation) and at least 3 meters onto shore past the water's edge. The end points of the block are defined by navigation points (e.g., N1a, N1b). The upland and open-water boundaries of the block are defined relative to the shoreline and will therefore change with water levels.
- b. *Near-shore search blocks* (e.g., Block N2) should be roughly 10 - 15 meters wide, extending upland from the highest point of the adjacent shoreline block. The end

points of the block are defined by navigation points (e.g., N1a, N1b). The other boundaries of the block are defined relative to the shoreline and will therefore change with water levels.

- c. *Upland search blocks* (e.g., Block N3) can be virtually any shape and are defined by navigation points (e.g., N3a, N3b, N3c).
4. **Search Types:** There are three classes of amphibian searches conducted during this monitoring effort: initial searches, replicate searches, and egg mass searches. Unless otherwise noted, searches are visual encounter surveys with strict documentation of survey effort (e.g., Heyer et al. 1994)
- a. *Initial Search:* Purpose is to determine where toads are dispersing and select sites for replicate searches. An initial search of all search blocks should be conducted within roughly 5 days of each other.
 - i. Search in all delineated search blocks.
 - ii. Conduct all initial searches at a site within 5 days of each other, to minimize migration of toads between blocks and minimize the effects of variable weather conditions.
 - iii. Two technicians will search each block at a rate of approximately 30 minutes per acre. Since each block is a different size, refer to the search time chart to determine how long to spend in each block.
 - iv. Count all toads and toadlets/young of the year and collect additional information for each adult (as discussed below).
 - v. Use a countdown timer (e.g., Robic SC-502) to record search time, stopping the timer when not actively searching (e.g., when processing adult toads).
 - vi. Only conduct searches when wind is ≤ 4 on the Beaufort scale (Table 1)
 - vii. Only conduct searches when weather conditions are ≤ 3 on the weather scale (Table 2).
 - b. *Replicate Searches:* Purpose is to search occupied blocks **two more times** in order to get a depletion rate that can be used to determine abundance of toads.
 - i. All methods same as initial search, except as follows.
 - ii. Conduct two additional searches in each block where adult-sized toads were observed during initial searches.
 - iii. Conduct both replicate searches within 2 days of the associated initial search.
 - c. *Shoreline search for Egg Masses:* The purpose of egg-mass searches is to increase our chance of documenting wild breeding, should it occur. Most shorelines should be searched using the above initial and replicate searches. For the breeding season surveys, technicians should conduct an additional search looking specifically for egg masses. This is an un-timed search wherein

technicians carefully search all moist, vegetated shorelines within one search block of any previous toad observations.

5. **Sanitation:** To reduce the spread of chytrid fungus the following things procedures must be employed.
 - a. Sanitize boots when traveling between survey sites by removing all mud and vegetation and then saturating the exterior of the boot with a 10% bleach solution.
 - b. Sanitize nets used to capture toads between survey sites and if possible between capture of individual toads within a site. This can be done with alcohol (e.g., rubbing alcohol) or with a 10% bleach solution.
 - c. Use a new pair of rubber gloves for handling each new toad.
 - d. Rinse or wipe plastic containers and photo grids with an alcohol swab or 10% bleach solution between each toad.
 - e. Follow field sterilization protocols when implanting PIT tags.

Search Protocol

1. Check to make sure you have all necessary equipment.
2. Sanitize equipment as noted above.
3. Searches must be done by TWO technicians working simultaneously.
4. Locate the defining ends of search block using GPS coordinates. Place pin flags to visually define the corners of the search block.
5. Mentally plot each person's search path through the block, trying to cover all available habitat. It is recommended that zig-zag paths be used, with one person focusing on the "water-side" of a block and the other person focusing on the "land-side" of a block.
6. Set countdown timer to the recommended time for the given search block.
7. Start timer and begin search.
8. Count all toads seen as you search.
9. For adult toads that are large enough to be processed, stop the timer and process the toad, recording all data suggested below. After processing is complete, release the toad and resume the search from the positions when the timer was stopped.
10. Continue till end of block is reached, or until time is up. Try to reach the end of the block EXACTLY as time expires. If you have not completed the block when time is up, finish the block and record how much additional time was taken.
11. Remove pin flags.

Data Collection

Example data sheets are attached to this protocol.

1. **Basic:** The following basic data must be recorded during each day of survey.
 - a. Date (dd-MM-yy)
 - b. Survey Site (e.g., Buford, Shaffer, Mortenson, etc.)
 - c. Names of all observers
 - d. Datum and projection of GPS coordinates (e.g., NAD 1983, UTM Zone 13)
2. **Search Data:** The following additional data is recorded for each search block.
 - a. Search Type being conducted. The following are possible search types: Initial Search (L1), Replicate Searches (L2 and L3), and Shoreline search for egg masses (S). In addition, record the location of all incidentally observed toads and list the search type as “Incidental (I)”.
 - b. Block Identification Number. Each block is assigned a unique identification number (e.g., M-01).
 - c. Start time. Time that the search was initiated on each search block.
 - d. Duration: The actual length of time the block was searched, which is particularly important if the suggested time was exceeded.
 - e. Wind speed using the Beaufort Scale (Table 1).
 - f. Ambient Temperature in degrees Fahrenheit.
 - g. Weather / Sky code (Table 2).
 - h. Categorical estimate of tadpole abundance in the search block using the following scale: N = None, F = Few (e.g., < 5), S = Some (e.g., 6-20), M = Many (e.g., 21-50), V = Very many (e.g., >50).
 - i. Number of toadlets/young of the year observed in each search block.
 - j. Number of overwintered adults observed in each search block.
 - k. Number of potential breeders observed in each search block.
 - l. Notes.
3. **Adult information:** The following additional information is collected at each adult’s first incidence of capture.
 - a. Take a dorsal photograph using a standard centimeter grid as background. Record picture numbers for later reference, making sure there are no duplicate numbers between cameras or sites. Make the photograph as close-up as possible.
 - b. Sex (M = male, F = female or U = unknown)

- c. Estimated Age Class, where Y = Young of Year (hatched this year); O = Overwintered (first year after hibernation), and PB = potentially breeding adult (2nd year or older).
 - d. Individual identification number.
 - i. Identification numbers will be given to each toad. The first letter of the ID number is the presumed sex of the toad (F or M). The next two digits are the last digits of the year, and the remaining two digits are sequential numbers beginning at 01 with the first season of survey and increasing throughout the monitoring program (F10-01, M10-01, F10-02, etc.).
 - ii. Check larger toads (≥ 18 grams) for a PIT tag and record the tag number. If no tag is present, implant a PIT tag and record the tag number.
 - e. Exact easting and northing from a Global Positioning System (GPS) receiver. This should be in UTM coordinates, Zone 13 and based on the NAD 1983 map datum.
 - f. Snout-vent length (SVL) to the nearest millimeter using calipers.
 - g. Weight to the nearest tenth gram using a digital scale.
 - h. Collect a chytrid swab, as per directions provided by Dr. Pessier and record the necessary data on a specimen form.
4. **Habitat Information:** For all adults, tadpole aggregations, and egg masses, be sure the following information is recorded:
- a. Substrate: Record the substrate on which the toad was found using the following categorical scale: G = dry or firm, moist ground; M = soft, muddy ground; W = water.
 - b. Water Depth: Record depth of water to the nearest centimeter using a standard ruler. Do not insert the ruler into muck at the bottom of the pond. Ideally, record the average depth of the water based on at least 5 measurements near the toad or egg mass, or within the tadpole aggregation.
 - c. Water temperature: Record the temperature in the middle of the water column in which the aggregation, egg mass or adult was found. Use degrees Fahrenheit. Ideally, record the average temperature of the water based on at least 5 measurements.
 - d. Habitat photograph: Take a photograph of the habitat that the toad, tadpole aggregation or egg mass was found in. This should be taken from above at a height of 2 meters (~ six feet) above the surface of the ground or water. Be sure that shadows from the observer are not in the picture.
5. **Egg Mass and Tadpole Aggregation Information:** In addition to GPS coordinates and habitat data, record the following for each egg mass or tadpole aggregation found.
- a. Egg Mass
 - i. Assign each egg mass an identification number (EM10-01, etc).

- ii. Take at least one close-up photograph of the egg mass and record the picture number.
- b. Tadpole Aggregation
 - i. Assign each aggregation an identification number (T10-01, etc).
 - ii. Estimate the number of tadpoles in the aggregation by counting the number of tadpoles in a confined area (e.g., 1 square foot) and multiplying by the size of the aggregation. For example, if there are 35 tadpoles in one square foot and the aggregation covers 8 square feet, then the aggregation contains roughly 280 tadpoles ($35 \times 8 = 280$).

Pointers

1. Practice Timing: One of the most critical and difficult to master aspects of searching is getting the timing EXACTLY RIGHT. Practice before doing real searches.
2. Take multiple photos of toads. Often photos come out blurry even though they look good on the camera screen. The more photos we have, the more likely we are to get a good one.

Wyoming Toad Surveys - Equipment List

Each crew of two should have the following equipment on hand while searching.

1. General Searches

- a. GPS unit preloaded with coordinates of navigation points defining the search blocks. Unit must be set to Projection = UTM, Zone 13 and Datum = NAD 1983.
- b. Map of search blocks and navigation points.
- c. Table listing the search times for each search block.
- d. Survey datasheets.
- e. Copy of the following references:
 - i. Toad size chart
 - ii. Beaufort Wind Scale
 - iii. Sky / Weather condition chart
 - iv. Toad identification guide
- f. Extra pens or pencils for recording data.
- g. Countdown timer with a “pause” feature, for tracking the amount of time spent searching.
- h. Digital camera to take pictures of toads, egg masses and habitat.
- i. Photographic background for taking pictures of the dorsum of toads, which is divided into a metric grid.
- j. Digital scale to weigh adult toads.
- k. Holding container for toads. A medium-sized plastic container is good. The container must be sanitized for each new toad.
- l. Rubber gloves for handling toads.
- m. Garbage bag to store used supplies (rubber gloves, swap wrappers, etc.)
- n. Rubber boots, preferably hip boots since some search blocks contain water that is over knee-high.
- o. Thermometers for measuring ambient air temperature and water temperature.
- p. Yard-stick or ruler for measuring height of camera when taking habitat photographs and for measuring depth of water.
- q. Pin flags, for marking the boundaries of search blocks prior to searches.
- r. Small aquarium dip nets to facilitate capture of toads and tadpoles.
- s. Spare batteries for all electronic equipment (e.g., GPS unit, camera, scale).
- t. Handheld counter for counting toadlets / young of the year (optional).

- u. Calipers for measuring snout-vent length (SVL)
- v. A medium sized plastic container and spill-proof top with 10% bleach solution for disinfecting equipment between processing adult toads.
- w. Alcohol swabs
- x. Clipboard

2. Supplies for implanting PIT tags.

- a. Small container with rubbing alcohol.
- b. PIT tags.
- c. PIT tag reader.
- d. Super glue.
- e. An opaque plastic container to place over toad.
- f. Sharp scissors.

3. Supplies for collecting Chytrid swabs. – COLLECT 2 SAMPLES PER SPECIMEN

- a. Sterile cotton swabs.
- b. Wire cutters.
- c. Sterile vials.
- d. Fine tipped sharpies.
- e. Ice: place samples on ice and then freeze ASAP.

4. Specimen collection equipment

- a. Specimen datasheet
- b. Whirlpacs
- c. Ethanol-proof pen to label whirlpacs: label with *date*, *site name*, and *specimen number* that corresponds to the specimen datasheet.
- d. Scissors should be used to make an incision into stomach cavity (to allow fixation)
- e. Ethanol should be added to whirlpac to submerge specimen.

Tables

Table 1: Beaufort Wind Scale (Searches can be conducted up to “4”)

Scale (force)	Wind (MPH)	WMO Class	Effect on Water	Effect on Land
0	under 1	Calm	Sea surface smooth and mirror-like	Calm, smoke rises vertically
1	1 – 3	Light Air	Scaly ripples, no foam crests	Smoke drift indicates wind direction, still wind vanes
2	4 – 7	Light Breeze	Small wavelets, crests glassy, no breaking	Wind felt on face, leaves rustle, vanes begin to move
3	8 – 12	Gentle Breeze	Large wavelets, crests begin to break, scattered whitecaps	Leaves and small twigs constantly moving, light flags extended
4	13-18	Moderate Breeze	Small waves 1-4 ft. becoming longer, numerous whitecaps	Dust, leaves, and loose paper lifted, small tree branches move
5	19-24	Fresh Breeze	Moderate waves 4-8 ft taking longer form, many whitecaps, some spray	Small trees in leaf begin to sway
6	25-31	Strong Breeze	Larger waves 8-13 ft, whitecaps common, more spray	Larger tree branches moving, whistling in wires
7	32-38	Near Gale	Sea heaps up, waves 13-20 ft, white foam streaks off breakers	Whole trees moving, resistance felt walking against wind
8	39-46	Gale	Moderately high (13-20 ft) waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks	Whole trees in motion, resistance felt walking against wind
9	47-54	Strong Gale	High waves (20 ft), sea begins to roll, dense streaks of foam, spray may reduce visibility	Slight structural damage occurs, slate blows off roofs
10	55-63	Storm	Very high waves (20-30 ft) with overhanging crests, sea white with densely blown foam, heavy rolling, lowered visibility	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	64-72	Violent Storm	Exceptionally high (30-45 ft) waves, foam patches cover sea, visibility more reduced	NA
12	73 and over	Hurricane	Air filled with foam, waves over 45 ft, sea completely white with driving spray, visibility greatly reduced	NA

Table 2: Sky Cover / Weather Scale (Searches can be conducted up to “3”)

Scale	Condition
0	0-15% cloud cover
1	16-50% cloud cover
2	51-75% cloud cover
3	76-100% cloud cover
4	fog
5	drizzle
6	light rain
7	heavy rain