

Lentic Site Survey Protocol for Amphibians and Aquatic Reptiles

What is a survey location and what is a survey?

Each lentic site (standing water body) is a survey location and each person surveying the site is considered an independent survey of the site.

Selection of Survey Locations

All standing water bodies present within each QQuad grid cell on 1:24k scale topographic maps or found incidentally while in the field should be surveyed if they are safely accessible and on public land or are on private lands where you have received permission to survey these sites. If no standing water bodies are found on the topographic maps, accessible lands should be ground truthed by driving roads or hiking major trails to examine areas of low topographic relief or backwaters of streams that might provide lentic breeding habitat. If there are too many standing water bodies to survey within the 3 days allocated to each QQuad grid cell, then those likely to have more suitable habitat should be prioritized for survey over springs and wells.

Survey Methodology

Use timed visual encounter and dip net surveys in all portions of the water bodies that are less than 50 cm in depth. If little emergent vegetation is present then careful examination of these shallow water environments for the presence of eggs, larvae, or post metamorphic animals may suffice. However, in areas with dense emergent vegetation, it will be necessary to intensely sample the area with a dip net. At sites where water depths drop off steeply from the shoreline, visual searches and dip netting may be performed from the shoreline. However, areas with extensive shallows will require systematic searches and dip netting while wading through the area on evenly spaced transects. Note that occupancy analysis assumes that surveys are independent and do not influence one another with regard to the detection of various life history stages of species, so be sure to take steps to ensure that surveyors do not influence one another. If ill or dying animals are encountered at a site, place individual animals in individual zip lock bags and keep them on ice so that they can be shipped to a pathologist for analysis. Collect voucher specimens of amphibians and reptiles if the record fills in a significant hole or extends the species' known range or if species identity is uncertain (e.g., toad tadpoles in eastern MT).

Data and Photographs

Data sheets should be filled out thoroughly and care should be taken to ensure that data recorded is consistent with the site drawing and all related data fields (see description sheet for all datasheet fields). Record all detections by individual surveyors on the lower back of the datasheet. However, the front of the datasheet should only include a summary of the greatest numbers of animals observed for an individual life history stage for each species detected. Lentic sites within a 200-meter radius of mapped sites should be lumped under the same data sheet. Digital photographs of each site should be taken from a vantage point that allows the entire site to be seen in the context of surrounding habitats. Ideally only a single photograph will be needed. However, if multiple photographs are necessary, they should be labeled a, b, c, etc. as viewed from left to right. Each lentic site surveyed should be labeled on the QQuad map as A-01, A-02, ...etc..

Washing and Decontamination Procedures

In order to prevent the spread of fungal and viral pathogens, care should be taken to wash mud, aquatic vegetation, and other materials off of dip nets, boots, socks, and other equipment prior to departing from a site. Survey gear should be left to dry in the sun for as long as possible between sites. Dip nets, boots, socks, and other survey equipment should be decontaminated with a mixture of 10% bleach (4 ounces or one half cup) per gallon of water) between all Quarter Quadrangle grid cells, sites where dead, dying, or ill animals are encountered, and sites on different sides of divides separating major drainage basins. This can be accomplished by washing gear in tubs or by simply spraying washed gear down with pressurized sprayer containing 10% bleach and allowing it to dry in the sun. Do not rinse bleached equipment between sites. Instead allow the bleach to remain on the equipment to ensure that pathogens are killed. Most bleach will evaporate between sites so the amount of bleach introduced at the next site should be quickly diluted.

Site Data Form for Lentic Breeding Amphibian and Aquatic Reptile Surveys

Locality Information

Date		Observer(s)		Owner		Site Detection: Aerial Photo Topo Map NWI Map Incidental				GPS EPE	
Strata Number		HUC Number		Site Number		State		County		Map Name	
Locality						T		R		S	
Map Elevation		UTM Zone: FT		UTM North		UTM East		Survey Type 0 1 2 3 4 5 6 7 8			

Habitat Information

Begin Time		End Time		Total Person Minutes of Search			Site Overview Photo Taken <input type="checkbox"/> Photo Description(s)																
Site Dry: Y N		Site Origin: Beaver Water Depressional Manmade Other					Support Reproduction? Y N		GIS Mapping 0 1 2 3 4 5 6 7														
Habitat Type:		Lake/ Pond		Wetland/ Marsh		Bog/ Fen		Backwater/ Oxbow		Spring/ Seep		Active Beaver Pond		Inactive Beaver Pond		Site Multipooled		Ditch/ Puddle		Reservoir/ Stockpond		Well/ Tank	
Weather: Clear Partly Cloudy Overcast Rain Snow				Wind: Calm Light Strong				Air Temp °C		Water Temp °C		pH											
Color: Clear Stained		Turbidity: Clear Cloudy		Water Connectedness: Permanent Temporary Isolated			Water Permanence: Permanent Temporary		Max Depth: < 1 M 1-2 M > 2 M		Percent of Site > 2 M 0 1-25 26-50 51-75 76-100												
Site Length:		Site Width:		Percentage of Site Searched: 1-25 26-50 51-75 76-100				Percent of Site at ≤ 50 cm Depth: 0 1-25 26-50 51-75 76-100				~ Emergent Veg Area (M ²)											
Percent of Site with Emergent Veg: 0 1-25 26-50 51-75 76-100				Percent of Site with Larval Activity: 0 1-25 26-50 51-75 76-100				Rank Emergent Vegetation Species in Order of Abundance: Sedges Grasses Cattails Rushes Water Lily Shrubs Other															
Primary Substrate of Shallows: Silt/Mud Sand Gravel Cobble Boulder/Bedrock						North Shoreline Characteristics: Shallows Present: Y N Emergent Veg Present: Y N						Distance (M) to Forest Edge:											
Grazing Impact None Light Heavy Structure Heavy Structure and Water Heavy Water						Water Dammed/Diverted Y N		Timber Harvest in Area Y N		Mining Activity Y N													
Other Human Impacts Or Modifications:						Fish Detected? Y N		Time at First Detection:		Fish Species If Identified:													
Fish Spawning Habitat Present? Y N U			Inlet Width:		Inlet Depth:		Inlet Substrate		Outlet Width		Outlet Depth		Outlet Substrate										

Species Information

Amphibian Species		Time at first detection		E L M J A		No. Egg Masses		5-20mm larvae		≤10 ≤100 ≤1000 ≤10K >10K			
20-50mm larvae		≤10 ≤100 ≤1000 ≤10K >10K		>50mm larvae		≤10 ≤100 ≤1000 ≤10K >10K		Number Juveniles		Number Adults			
Tissue Number		Voucher Number		Breeding with Fish?		Y N		If breeding with fish is cover present?		Y N			
Amphibian Species		Time at first detection		E L M J A		No. Egg Masses		5-20mm larvae		≤10 ≤100 ≤1000 ≤10K >10K			
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20-50mm larvae		≤10 ≤100 ≤1000 ≤10K >10K		>50mm larvae		≤10 ≤100 ≤1000 ≤10K >10K		Number Juveniles		Number Adults			
Tissue Number		Voucher Number		Breeding with Fish?		Y N		If breeding with fish is cover present?		Y N			
Reptile Species		Time at first detection		E J A		Number Individuals		SVL in CM		Tissue Number		Voucher Number	
Reptile Species		Time at first detection		E J A		Number Individuals		SVL in CM		Tissue Number		Voucher Number	
Reptile Species		Time at first detection		E J A		Number Individuals		SVL in CM		Tissue Number		Voucher Number	
Reptile Species		Time at first detection		E J A		Number Individuals		SVL in CM		Tissue Number		Voucher Number	

Definitions of Variables on Lentic Breeding Amphibian Survey Data Sheet

Locality Information

Date: Use MM-DD-YY format (e.g. 5/12/00 for May 12 of 2000).

Observers: List names or initials of individuals involved with survey of this site and circle the name of the recorder.

Owner: Use abbreviation of the government agency responsible for managing the land you surveyed. (e.g. USFS, BLM). If private land was surveyed list the owner's full name to indicate that you did not trespass.

Site Detection: Was site detected on aerial photo, topographic map, NWI map, or was it observed incidentally while in the field.

GPS EPE: The estimated positional error reported by the GPS receiver in meters.

Strata Number: The sample strata in which the 6th level HUC watershed lies (one of nine defined in western Montana).

HUC Number: The sample number of the 6th level HUC in one of the nine sample strata defined for western Montana.

Site Number: The number pre-assigned to the water body within each 6th level HUC. If the water body was not pre-assigned a number because it was not on topographic maps or aerial photos then assign it a sequential number and draw it on the topo map.

State: Use the two-letter abbreviation.

County: Use the full county name.

Map Name: List the name of the USGS 7.5-minute (1:24,000 scale) topographic quadrangle map.

Locality: Describe the specific geographic location of the site so that the type of site is described and the straight-line air distance from one or more permanent features on a 7.5-minute (1:24,000 scale) topographic map records the position of the site (e.g., Beaver pond, 1.5 miles south of Elephant Peak and 1.3 miles east of Engle Peak).

T: Record the Township number and whether it is north or south.

R: Record the Range number and whether it is east or west.

S: Record the Section number.

Section Description: Describe the location of the site at the ¼ of ¼ section level (e.g., SENE indicates SE corner of NE corner).

Map Elevation: The elevation of the site as indicated by the topographic map in feet (avoid using elevations from a GPS)

UTM Zone: Universal Transverse Mercator zone recorded on the topographic map. Use NAD 27 as the map and GPS datum.

UTM North: Universal Transverse Mercator northing coordinate in meters as recorded on the topographic map or GPS receiver. Be sure to note any major differences between UTM coordinates on the map and those on the GPS receiver.

UTM East: Universal Transverse Mercator easting coordinate in meters as recorded on the topographic map or GPS receiver. Be sure to note any major differences between UTM coordinates on the map and those on the GPS receiver.

Survey Type: Circle the appropriate number defined as follows: 0 = private land so site was not surveyed; 1 = site not surveyed due to logistics; 2 = site is a lotic spring/seep not worth future survey; 3 = lentic site that is worth future survey; 4 = misidentified as a potential lentic site on the aerial photograph or on the topographic map (e.g., a shadow from a tree or a talus slope) and not worth future survey; 5 = inactive beaver dam that now only has lotic habitat and is not worth future survey; 6 = only lotic habitat is present and the site is not worth future survey, but it appears possible that the meadow was an historic beaver dam complex; 7 = a lentic site because it would hold water for at least a short time period during wetter conditions, but it is not worth future survey because it would never hold enough water long enough to support amphibian reproduction; 8 = site is not worth future survey for some reason other than those listed above.

Habitat Information

Begin Time: List the time the survey began in 24-hour format.

End Time: List the time the survey ended in 24-hour format.

Total Person Minutes of Search: Record the total person minutes the site was searched (e.g. if one person surveys for 15 minutes and another surveys for 30 minutes, but takes 5 minutes to measure a specimen the total person minutes is 40 minutes).

Camera and Photo Number(s) / Description (s): Identify the camera and the number of the photo as viewed on the camera's view screen and a description of the contents of the photograph (e.g., 13 = 1 x ASMO larvae and 14 = 1 x habitat). Take photos of all portions of the site and anything else that may be of interest (e.g., areas with fish versus areas with amphibians).

Site Dry: Circle whether the site was dry or not at the time of the survey.

Site Origin: Circle whether the site origin is glacial, beaver, water (i.e., flooding or spring), depressional, manmade, or describe other origin.

Support Reproduction: Is site capable of supporting reproduction so it is worth resurveying (e.g. in wetter years if now dry)?

GIS Mapping: Circle the appropriate number defined as follows: 0 = site not surveyed; 1 = a 4 in the survey type and site is not worth future survey; 2 = a 2, 5, 6, or 8 in survey type and site is not worth future survey; 3 = 7 in survey type and site is not worth future survey; 4 = a 3 in the survey type and site is dry, but is worth future survey; 5 = a 3 in the survey type and site has ephemeral water and is worth future survey (including high elevation sites that freeze solid); 6 = a 3 in the survey type, site is worth future survey, has emergent vegetation, and has permanent water that lasts all summer long and does not freeze solid in the winter so that it is likely to support aquatic overwintering; 7 = a 3 in the survey type, site is worth future survey, does not have functional amounts of emergent vegetation, and has permanent water that lasts all summer long and does not freeze solid in the winter so that it is likely to support aquatic overwintering.

Habitat Type: Circle the appropriate habitat type of the site being surveyed. If site is multi-pooled water information does not need to be gathered for every pool, but you may wish to record this information on the map. If breeding activity is limited to one pool at a multi-pooled site water information should be recorded for this pool and this should be noted in the comments.

Weather: Circle weather condition during survey.

Wind: Circle wind condition during survey (> 20 mph winds should be classified as strong).

Air Temp: Record air temperature at chest height in the shade. Record temperature in Celsius. °C = (°F - 32)/1.8

Water Temp: Record water temperature where larvae or egg masses are observed or at 2 cm depth 1 meter from the margin of the water body. Record temperature in Celsius. °C = (°F - 32)/1.8

Water pH: Record water pH at the same location water temperature was recorded.

Color: Circle whether the water is clear or stained a tea or rust color from organic acids.

Turbidity: Circle whether water is clear or cloudy.

Water Connectedness: Circle if water body has permanent connection to flowing water (Permanent), is connected to flowing water for a temporary period each year (Temporary), or is never connected to flowing waters or other water bodies (Isolated).

Water Permanence: Circle whether the site contains water throughout the entire year (Permanent), or contains water for only a portion of the year (Temporary).

Max Depth: Circle the category corresponding to the maximum depth of the water body.

Percent of Site > 2 M: Circle the percentage of the site with water depth greater than 2 meters deep.

Site Length: The length of the longest dimension of the standing water body.

Site Width: The width of the second longest dimension of the standing water body.

Percentage of Site Searched: Circle the percentage of the site surveyed.

Percentage of the Site at ≤ 50 cm Depth: Circle the appropriate percentage.

Approximate Area with Emergent Veg (M^2): The approximate area of the site that contains emergent vegetation.

Percentage of Site with Emergent Veg: Circle the percentage of the entire site with emergent vegetation.

Percentage of Site with Larval Activity: Circle the percentage of the site where amphibian larvae were observed.

Rank Emergent Veg Species in Order of Abundance: Record the rank order of abundance in front of the 3 most prevalent emergent vegetation species. If the vegetation present is "other" indicate what it is.

Primary Substrate: Circle the substrate that covers the majority of the bottom of the site.

North Shoreline Characteristics: Circle whether shallows and emergent vegetation are present or absent on the north shoreline.

Distance (M) to Forest Edge: Record the closest distance between the water's edge and the forest margin in meters.

Grazing Impact: Circle the appropriate grazing category defined as follows: no grazing in vicinity of the site; grazing noted in the vicinity of the site, but no major impacts to wetland structure or water quality; heavy structural impacts to site (e.g., vegetation destroyed creating bare ground, hummocks, pugging, or altered hydroregime); heavy structural impacts and water quality impacted due to animal waste; and water quality impacted due to animal waste.

Water Dammed/Diverted: Circle whether or not water has been dammed or diverted at the site (including blow outs or pits).

Timber Harvest: Circle whether or not timber has been harvested within 200 meters of the site.

Mining Activity: Circle whether or not there is evidence of mining activity within 200 meters of the site.

Other Human Impacts or Modifications: Briefly describe if, how, and when the site has been altered by human activities. If the site has not been altered record none for not altered. If multiple anthropogenic impacts exist document all of these using the back of the data sheet if necessary and qualify approximate timing of impact (e.g., recent versus historic).

Fish Detected?: Circle whether or not fish were detected.

Time at First Detection: If fish were detected, indicate the time in total person minutes of survey when they were first detected.

Fish Species if Identified: List the fish species identified.

Fish Spawning Habitat Present?: Are shallow waters with adequate gravels/cobbles present that would allow salmonid fishes to spawn? An active search for fry is also a good idea.

Inlet Width: What is the average width of the inlet stream in meters?

Inlet Depth: What is the average depth of the inlet stream in centimeters?

Inlet Substrate: What is the primary substrate at the inlet stream (Silt/Mud, Sand, Gravel, Cobble, or Boulder/Bedrock)?

Outlet Width: What is the average width of the outlet stream in meters?

Outlet Depth: What is the average depth of the outlet stream in centimeters?

Outlet Substrate: What is the primary substrate at the outlet stream (Silt/Mud, Sand, Gravel, Cobble, or Boulder/Bedrock)?

Species Information

For each species record the first two letters of the scientific genus and species names for all amphibian and reptile species found at the site (e.g., BUBO for *Bufo boreas*). Record the total number of person minutes of survey required before each life history stage of each species was encountered beside the E (egg), L (larvae), M (metamorph), J (juvenile), or A (adult). Record the number or category of number of each of the specified life history and/or size classes. For amphibians indicate whether they have bred in the same water body where fish are present, and if they have, indicate whether there is protective cover (e.g., extensive shallows with emergent vegetation, a log barrier, talus). Record the tissue number or range of tissue numbers for tissue samples collected (see tissue collection protocols). If the animal was swabbed in preparation for testing the animal for chytrid infection indicate the chytrid sample number in the Tissue Number field. Record the preliminary museum voucher specimen number for voucher specimens collected (see voucher specimen collection protocols).

Site Map for Lentic Breeding Amphibian and Aquatic Reptile Surveys

General: Include a rough sketch of the site including the shape of the site and the shape and spatial relations of surrounding biotic and abiotic features. Indicate the area covered with emergent vegetation with cross-hatching. Indicate a 2-meter depth contour for the water body with a dashed line. Indicate the location where the water temperature was taken, the location where the GPS position was taken, the location where clinometer readings for southern exposure were taken, and the location of any photographs with an arrow indicating the direction in which the photo(s) were taken. Make sure that the orientation of the sketch (i.e. the north arrow) corresponds to the orientation of the site.

Grid Scale: Indicate the approximate scale of the grid lines relative to the site sketched in meters.

Other Notes: Include any other notes of interest in this space. Examples: (1) areas of highest larval density; (2) thoughts on why a species may not have been detected at a site; (3) problems associated with the survey of the site (e.g., dangerous boggy conditions); (4) If a site was dry would it support reproduction during wetter years.

Southern Exposure: From a site on along the northern shoreline that would most likely to be used as an oviposition or larval rearing area (e.g., shallow waters with emergent vegetation in the NW corner of the water body) record the degree inclination from your position to the skyline (e.g., mountain or solid tree line) at each of the eight compass bearings listed. Note that the compass bearings are true north so you will need to adjust your compass according to the map being used to correct for the deviation from magnetic north (15 to 19.5 degrees in western Montana).