Amphibian and Aquatic Reptile Inventories Conducted On and Around Lands Administered by the Missoula Field Office of the Bureau of Land Management

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I thank Jo Christensen at the Missoula Field Office of the Bureau of Land Management, Ann Carlson at the Region 1 Office of the U.S. Forest Service and Henning Stabins at Plum Creek Timber Company for providing funding for this project and allowing access to BLM, U.S. Forest Service, and Plum Creek Timber Company lands. Numerous individuals have reported incidental observations of herpetofauna within the region covered by this report. Most notable among these individuals are Jeff Black, Royal Brunson, Chris Clancy, Chris Funk, Paul Hendricks, Judy Hoy, Jim Reichel, Al and Evelyn Wilson, and Kirwin Werner. Steve Amish, Matthew Bell, Mickey Bland, Anna Breuninger, Jessica Easley, Eric Dallalio, Alex Gunderson, Renee Hoadley, Grant Hokit and a number of his students from Carroll College, Ryan Killackey, Todd Leifer, Patrick Lizon, Gary Maag, Lorraine McInnes, Rachelle Owen, Stacy Polkowske, Thomas Schemm, Keif Storrar, Anatole Suttschenko, John Thayer, Allan Thompson, Brian Tomson, Ryan Zajac, and Franz Zikesch helped conduct field surveys. Steve Amish, Beth Clarke, Teri Hamm, Ryan Killackey, Amy Puett, Allan Thompson, Lisa Wilson, and Alison Zmud helped review and manage data. Existing records of herpetofauna in the area came from the Point Observation Database at the Montana Natural Heritage Program and the book Herpetology in Montana (Maxell et al. 2003) for which Kirwin Werner, at the Confederated Salish-Kootenai College, helped write many museums across the country to obtain information on museum voucher specimens in their collections. Dave Wrobelski, Brian Riggers, and Jennifer Copenhaver passed on the first photo documentation of Idaho Giant Salamanders (*Dicamptodon aterrimus*) in Montana. Many GIS layers were provided by the Montana Natural Resources Information System and Gerry Daumiller and Duane Lund deserve special thanks for their assistance with these. Vanetta Burton and Joe Ball, at the Montana Wildlife Cooperative Research Unit, were instrumental in managing the contracts and accounts for this project.

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EXECUTIVE SUMMARY

Amphibian populations around the world and in Montana have undergone local and regional declines (Alford and Richards 2000; Houlahan et al. 2000; Maxell 2000; Maxell et al. 2003; Werner 2003; Werner et al. 2004) and as a group are thought to be more threatened than other vertebrate taxa (Young et al. 2004). Furthermore, large portions of the area encompassed by the Missoula Field Office of the BLM had not been surveyed in a systematic manner for either amphibians or aquatic reptiles. Thus, there was a serious lack of baseline information for species such as the Coeur d'Alene Salamander (*Plethodon idahoensis*), Western Toad (*Bufo boreas*), and Northern Leopard Frog (*Rana pipiens*) which are listed as "Sensitive Species" by the BLM and U.S. Forest Service in western Montana and Montana "Species of Concern" by the Montana Natural Heritage Program and Montana Department of Fish, Wildlife, and Parks (MTHP 2004). In light of these declines and the lack of baseline information (Maxell and Hokit 1999; Maxell 2000; Maxell et al. 2003), a multi-agency funded project to conduct baseline inventories for amphibians and aquatic reptiles at all standing water bodies in randomly selected watersheds across Montana has been undertaken during the 2000-2005 field seasons (Maxell 2004a-e; see overview in Maxell 2005). While not fully summarized in this report, these surveys will serve as a valuable baseline for comparison with future surveys so that trends in status of species can be determined over time.

Within the overall boundaries of the Missoula Field Office of the BLM, 138 watersheds were surveyed, 2,809 lentic site surveys were conducted, and more than 2,500 amphibian and reptile species records were gathered between 2000 and 2004. Together, these surveys nearly doubled the number of herpetofauna species records existing for this region. In addition to field surveys conducted in 2000-2004, historic observations and museum records of amphibian and reptile species were gathered from the Point Observation Database at the Montana Natural Heritage Program and by writing museums across the country. Survey results were placed in a database compatible with the Montana State BLM's Point Observation Database, the "Fauna" and "Water" modules of the U.S. Forest Service's "NRIS" database, and the U.S. Geological Survey's National Amphibian Research and Monitoring Initiative (ARMI) database and will eventually be loaded into these databases. In the mean time, a copy of the distribution and relative abundance information (only with positive detection information and without the habitat information) has been placed in the Point Observation Database at the Montana Natural Heritage Program.

Nine native amphibian and 9 native reptile species have now been documented within the boundaries of the Missoula Field Office. Three of these amphibian species and 2 of these reptile species are listed as Montana State Species of Concern by the Montana Natural Heritage Program and Montana Department of Fish, Wildlife, and Parks (MTHP 2004). Furthermore, recent first detections of native populations of the Idaho Giant Salamander (*Dicamptodon aterrimus*) and possibly native populations of the Western Fence Lizard (*Sceloporus occidentalis*) highlight the lack of historic information available for amphibians and reptiles in Montana. The maps of geographic distribution in this report also clearly highlight the fact that terrestrial reptiles generally lack proper baseline survey data on general distribution and relative abundance. Finally, the ongoing spread of the exotic American Bullfrog (*Rana catesbeiana*) indicates that they may be capable of dispersing to lower elevation permanent waters across the region, thereby representing a threat to a variety of native aquatic or semiaquatic taxa in the region.

Breeding, foraging, and aquatic overwintering habitat requirements and known migration distances are summarized for each of Montana's amphibian species in Maxell (2000). Thus, in conjunction, the watershed reports in this report and the habitat requirements summarized in Maxell (2000) can be used to identify likely impacts from a variety of anthropogenic activities so that appropriate measures can be taken to ensure the persistence of species in this region.

Qualitative and Subjective Summary of Status of Amphibians and Reptiles within the Boundaries of the Missoula Field Office of the Bureau of Land Management

Nine native amphibian and 9 native reptile species have been documented within the boundaries of the Missoula Field Office. Three of these amphibian species and 2 of these reptile species are listed as Montana State Species of Concern by the Montana Natural Heritage Program and Montana Department of Fish, Wildlife, and Parks (MTHP 2004). Furthermore, recent first detections of native populations of the Idaho Giant Salamander (*Dicamptodon aterrimus*) and possibly native populations of the Western Fence Lizard (*Sceloporus occidentalis*) highlight the lack of historic information available for amphibians and reptiles in Montana. Finally, the exotic American Bullfrog (*Rana catesbeiana*) appears capable of dispersing to lower elevation permanent waters across the region and may, therefore, represent a threat to a variety of native taxa.

Species Definitively Documented within the Boundaries of the Missoula Field Office of the BLM

Species	Qualitative and Subjective Assessment of Status	Comments
Long-toed Salamander (*Ambystoma macrodactylum*)	Common	Detected in a high percentage of watersheds and at a high percentage of lentic sites, especially those that lack fish.
Tiger Salamander (*Ambystoma tigrinum*)	Rare	Detected only in the Tobacoo Root Valley in Lincoln County. Populations in this area are the only populations in Montana west of the Continental Divide and some mass mortalities have been reported their recently.
Idaho Giant Salamander (*Dicamptodon aterrimus*)	Very Rare	Reported in 1979 on Gilt Edge Creek without definitive proof and redocumented with photograph proof in 2005 in West Fork of Big Creek below Gilt Edge Creek. Range in state may be limited to a handful of drainages in southwest Mineral County. Stream surveys are needed.
[1]Coeur d'Alene Salamander (*Plethodon idahoensis*)	Rare	The region contains the boundaries of the known distribution of this species in Montana. However, relatively few breeding populations are known for the region due to a lack of survey effort and the species dependence on moist microhabitats.
Rocky Mountain Tailed Frog (*Ascaphus montanus*)	Common	Commonly encountered across the region by fisheries personnel conducting stream surveys and also encountered at potential Coeur d'Alene Salamander sites.
[1]Western Toad (*Bufo boreas*)	Rare	Detected in a low percentage of watersheds and lentic sites and detected breeding in even fewer. Some evidence to suggest species has undergone declines across the region since the mid 1970s.
Pacific Treefrog (*Pseudacris regilla*)	Common Northwest of Missoula - Rare Elsewhere	Common at low elevation in sites without fish northwest of Missoula. Isolated populations near and south of Missoula should be monitored and protected.
American Bullfrog (*Rana catesbeiana*)	Exotic Threat to Native Species	Appears to be common along the Bitterroot, Lower Clark Fork and Lower Flathead Rivers and is likely to spread to warmer permanent standing water bodies.
Columbia Spotted Frog (*Rana luteiventris*)	Common	Detected in a relatively high percentage of watersheds and at a high percentage of sites with emergent vegetation
[1]Northern Leopard Frog (*Rana pipiens*)	Widely Extirpated with few Populations Remaining	Apparently extirpated from most of its historic range in the region. Only small populations remain near Kalispell and Eureka. Protection and reintroduction efforts needed.
Painted Turtle (*Chrysemys picta*)	Relatively Common	Relatively common at lower elevations in warmer permanent waters with good solar exposure.
[2]Northern Alligator Lizard (*Elgaria coerulea*)	Rare, but lack surveys	Relatively few records, but lack surveys and they may therefore be more common then currently documented.
[2]Western Skink (*Eumeces skiltonianus*)	Rare, but lack surveys	Relatively few records, but lack surveys and they may therefore be more common then currently documented.
Western Fence Lizard (*Sceloporus occidentalis*)	Very Rare	First reported in 2001 from near Perma. Surveys and study of genetic relatedness needed.
Rubber Boa (*Charina bottae*)	Rare, but cryptic	Rarely encountered, but cryptic and so are likely to be more common/widespread then currently documented.
Eastern Racer (*Coluber constrictor*)	Rare, but lack surveys	Relatively few records, but lack surveys and they may therefore be more common then currently documented.
Gophersnake (*Pituophis catenifer*)	Rare, potentially threatened	Relatively few records and lack survey effort. However, they may be threatened by encroaching humans that feel threatened by this relatively large snake.
Terrestrial Gartersnake (*Thamnophis elegans*)	Common	Commonly encountered in and around lentic and lotic habitats across the region.
Common Gartersnake (*Thamnophis sirtalis*)	Common	Commonly encountered in and around lentic and lotic habitats across the region.
Prairie Rattlesnake (*Crotalus viridis*)	Rare	Relatively few records and lack survey effort. However, they may be threatened by encroaching humans that feel threatened by this poisonous snake.

[1] Listed as a Sensitive Species by the BLM and USFS in western Montana and Montana State Species of Concern by the Montana Natural Heritage Program and Montana Department of Fish, Wildlife, and Parks (MTHP 2004).

[2] Listed as a Montana State Species of Concern by the Montana Natural Heritage Program and Montana Department of Fish, Wildlife, and Parks (MTHP 2004).

INTRODUCTION

Amphibian populations around the world and in Montana have undergone local and regional declines (Alford and Richards 2000; Houlahan et al. 2000; Maxell 2000; Maxell et al. 2003; Werner 2003; Werner et al. 2004) and as a group are thought to be more threatened than other vertebrate taxa (Young et al. 2004). Seven major factors, and their interaction, have been implicated as causative agents of these declines. These include: (1) loss, deterioration, and fragmentation of aquatic and terrestrial habitats (e.g., Beebee 1997; Jochimsen et al. 2004); (2) introduction of nonindigenous species (e.g., Bradford et al. 1993); (3) environmental pollutants (e.g., Dunson et al. 1992); (4) increased ambient UV-B radiation (e.g., Blaustein et al. 1994); (5) climate change (e.g., Pounds et al. 1999); (6) pathogens (e.g., Lips 1999); and (7) human commerce (e.g., Pough 1998).

Furthermore, large portions of the area encompassed by the Missoula Field Office of the BLM had not been surveyed in a systematic manner for either amphibians or aquatic reptiles. Thus, there was a serious lack of baseline information for species such as the Coeur d'Alene Salamander (*Plethodon idahoensis*), Western Toad (*Bufo boreas*), and Northern Leopard Frog (*Rana pipiens*) which are listed as "Sensitive Species" by the BLM and U.S. Forest Service in western Montana and Montana "Species of Concern" by the Montana Natural Heritage Program and Montana Department of Fish, Wildlife, and Parks (MTHP 2004).

In light of these declines and lack of baseline information (Maxell and Hokit 1999; Maxell 2000; Maxell et al. 2003), a multi-agency funded project to conduct baseline inventories for amphibians and aquatic reptiles at all standing water bodies in randomly selected watersheds across Montana has been undertaken during the 2000-2005 field seasons (Maxell 2004a-e; see overview in Maxell 2005). The primary response variables of interest for this project are the percent of watersheds and sites occupied by each species and the percent of watersheds and sites with breeding detected for each species. These response variables are valuable measures of the regional and local status of amphibian and aquatic reptile species that can be used for determining the management status of individual species across the region so that agency plans can be appropriately revised and project-level planning can take appropriate measures to ensure the persistence of species of concern. Furthermore, these surveys will serve as a valuable baseline for comparison with future surveys so that trends in status of species can be determined over time. In addition, because these baseline surveys are conducted at all standing water bodies on public land in each watershed, patterns of detection/non-detection and relative abundance of amphibians and aquatic reptiles can be correlated with landscape level characteristics, including anthropogenic impacts, that allow populations to persist not only at individual sites but across entire watersheds. This is an important advance over looking at detection/nondetection and relative abundance at individual sites because the health of individual populations is often tied to neighboring habitats and populations and human, biotic, and abiotic factors often have impacts at the watershed scale (e.g., watershed size and topography, number of breeding sites in a watershed, creation of breeding habitats by beaver, fish stocking, damming and diverting of waters, livestock grazing, roads, mining, and timber harvest).

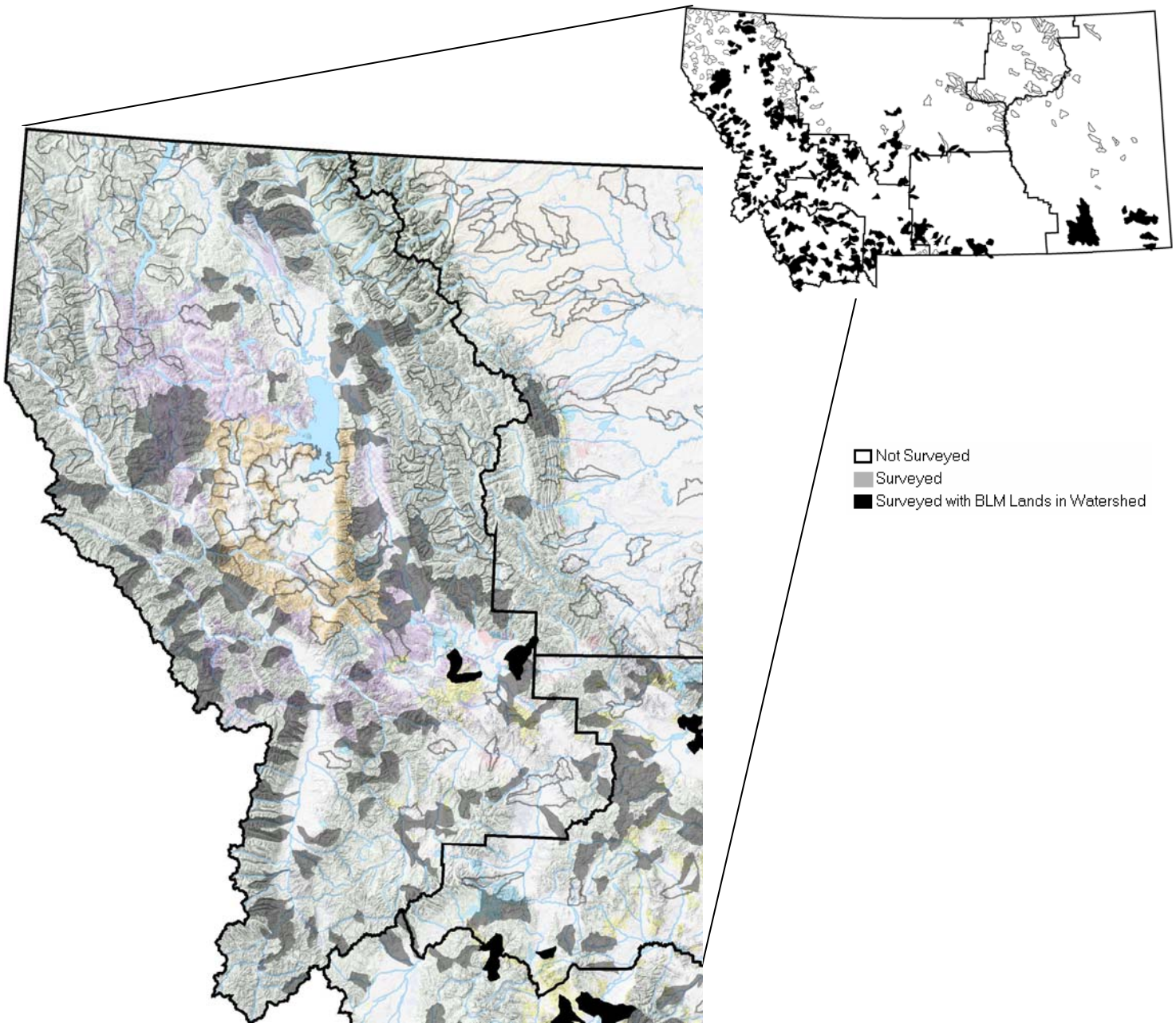
Breeding, foraging, and aquatic overwintering habitat requirements and known migration distances are summarized for each of Montana's amphibian species in Maxell (2000). Thus, in conjunction, the watershed reports in this report and the habitat requirements summarized in Maxell (2000) can be used to identify likely impacts from a variety of anthropogenic activities so that appropriate measures can be taken to ensure the persistence of species in this region.

METHODS

Sampling Scheme for Lentic Site Surveys

Because the status of amphibian populations is often dependent on adjacent populations, and human activities and management actions often take place at the scale of a local watershed, our sampling scheme used 6th field (12 digit) hydrologic unit code (HUC) watersheds as the basic sampling unit. Within each watershed we surveyed all potential lentic water bodies identified on 7.5-minute (1:24,000 scale) topographic maps and aerial photographs. The overall focus of this project was to thoroughly survey all lentic sites in randomly selected watersheds dominated by public land ownership. Within the overall boundaries of the Missoula Field Office of the BLM, 138 watersheds were surveyed. Watersheds that were randomly selected and contained BLM land included watersheds 4_047 (3 potential lentic sites on BLM land, 2 potential lentic sites on Plum Creek land, and 5 potential lentic sites on USFS land), and 052 (no potential lentic sites on public lands identified). In addition, watersheds 4_996 (25 potential lentic sites on BLM land, 7 potential lentic sites on Plum Creek land, and 12 potential lentic sites on state land) and 4_998 (no potential lentic sites on public lands identified) were non-randomly selected for survey out of interest by BLM personnel.

Watersheds Surveyed Across Montana and Within Boundaries of the Missoula Field Office of BLM



Methods for Lentic Site Surveys

Lentic site surveys conducted within the boundaries of the Missoula Field Office of the BLM were conducted between 2000 and 2004 with the focal BLM watersheds being surveyed in 2004. Within each watershed we surveyed all potential lentic water bodies identified on 7.5-minute (1:24,000 scale) topographic maps and aerial photographs. In addition, we searched areas within a 200-meter radius of these potential sites for additional "incidental" water bodies that may be utilized by amphibians or aquatic reptiles. Finally, we surveyed any other lentic sites encountered incidentally while navigating to potential lentic sites identified on maps and aerial photographs. At each standing water body field crews conducted timed visual encounter and dipnet surveys of all shallow (<50cm) water habitats, which yielded information on both detection/non detection and relative abundance (number of individuals detected per surveyor per unit time) of each species and life history stage encountered (Heyer et al. 1994; Olson et al. 1997). Field crews took digital photographs of sites and photographs of species were taken when of particular interest. GPS units were used to identify the exact UTM coordinates of each site. Museum voucher specimens and tissue samples that can be used for future genetic analysis were gathered at at least one site in each watershed for each species encountered; adult western toads were not collected because they are a state species of concern and are listed as a Sensitive Species by the USFS and BLM (MNHP 2004). Pathogen decontamination procedures were followed between individual watersheds (see attached). Site, habitat, and species information was recorded on standardized hard copy data sheets (see attached) and was also entered into a database on a handheld computer at the time of the survey. After all sites were surveyed in a watershed, data was summarized by watershed (see watershed summaries).

Methods for Surveys of Potential Coeur d'Alene Salamander Sites

Sites with the potential for the presence of Coeur d'Alene Salamanders (i.e., springs, seeps, waterfall spray zones, damp talus and fractured rock covered slopes with bryophyte cover, and streamsides with extensive canopy cover) were identified while driving or hiking to lentic sites scheduled for survey. Additional sites were identified from previous survey work conducted by Wilson and Simon (1987, 1988). Potential Coeur d'Alene Salamander sites were searched systematically either at night while animals were present on the surface or during the day by turning over cobble, rock slabs, and bryophyte mats to reveal animals hiding under this surface material (see attached for variables recorded).

Database Management

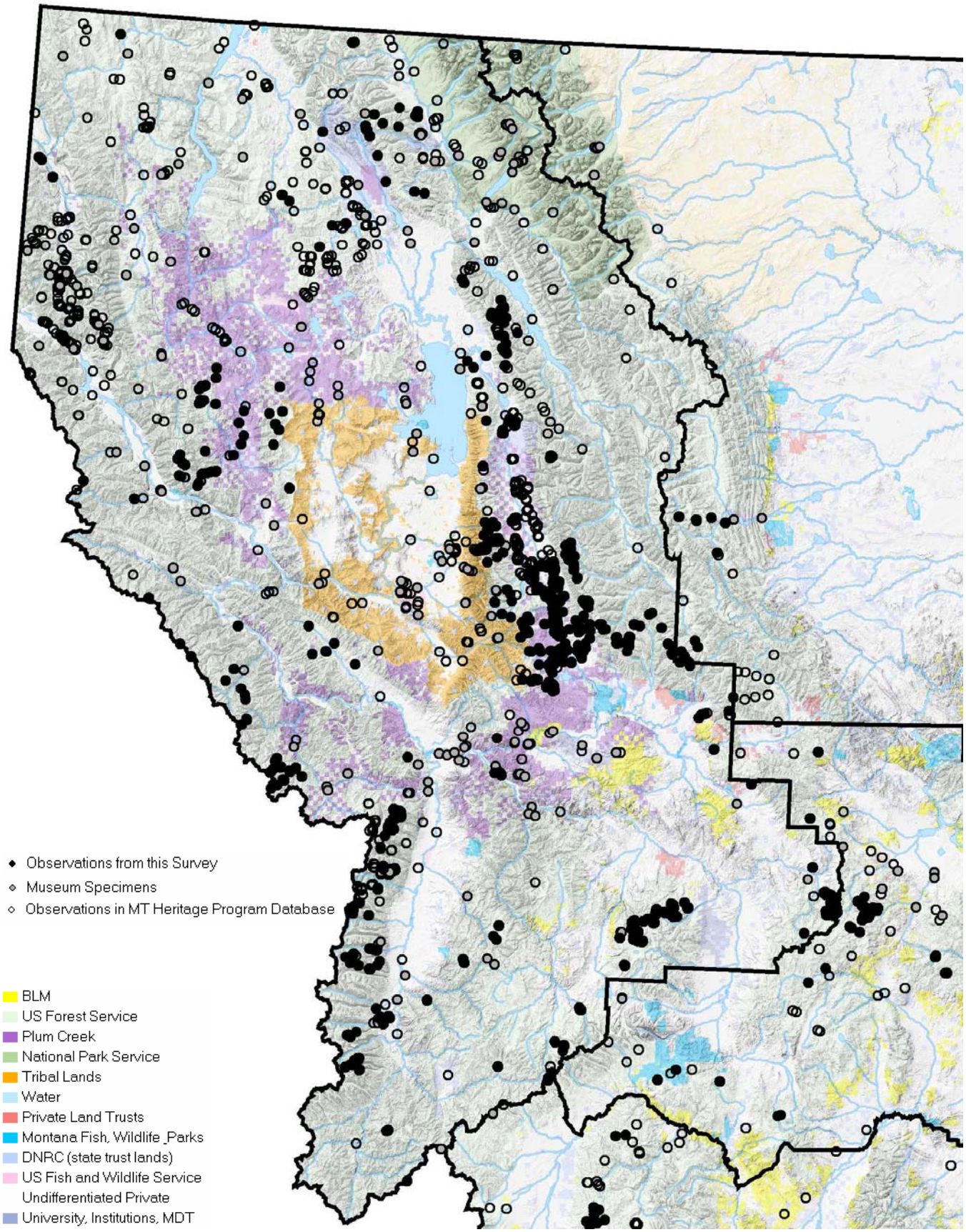
Incidental observations of species away from standing water bodies were also recorded on a standardized data sheet (see attached) and entered into a databases on a handheld computer. The site occupancy and breeding database (with habitat information and both detection and non-detection information) is compatible with the BLM's point observation database, the "Fauna" and "Water" modules of the U.S. Forest Service's "NRIS" database, the U.S. Geological Survey's national Amphibian Research and Monitoring Initiative (ARMI) database and will eventually be loaded into these databases. In the mean time, a copy of the distribution and relative abundance information (only with positive detection information and without the habitat information) has been placed in the Point Observation Database at the Montana Natural Heritage Program.

Detection of Amphibians and Aquatic Reptiles

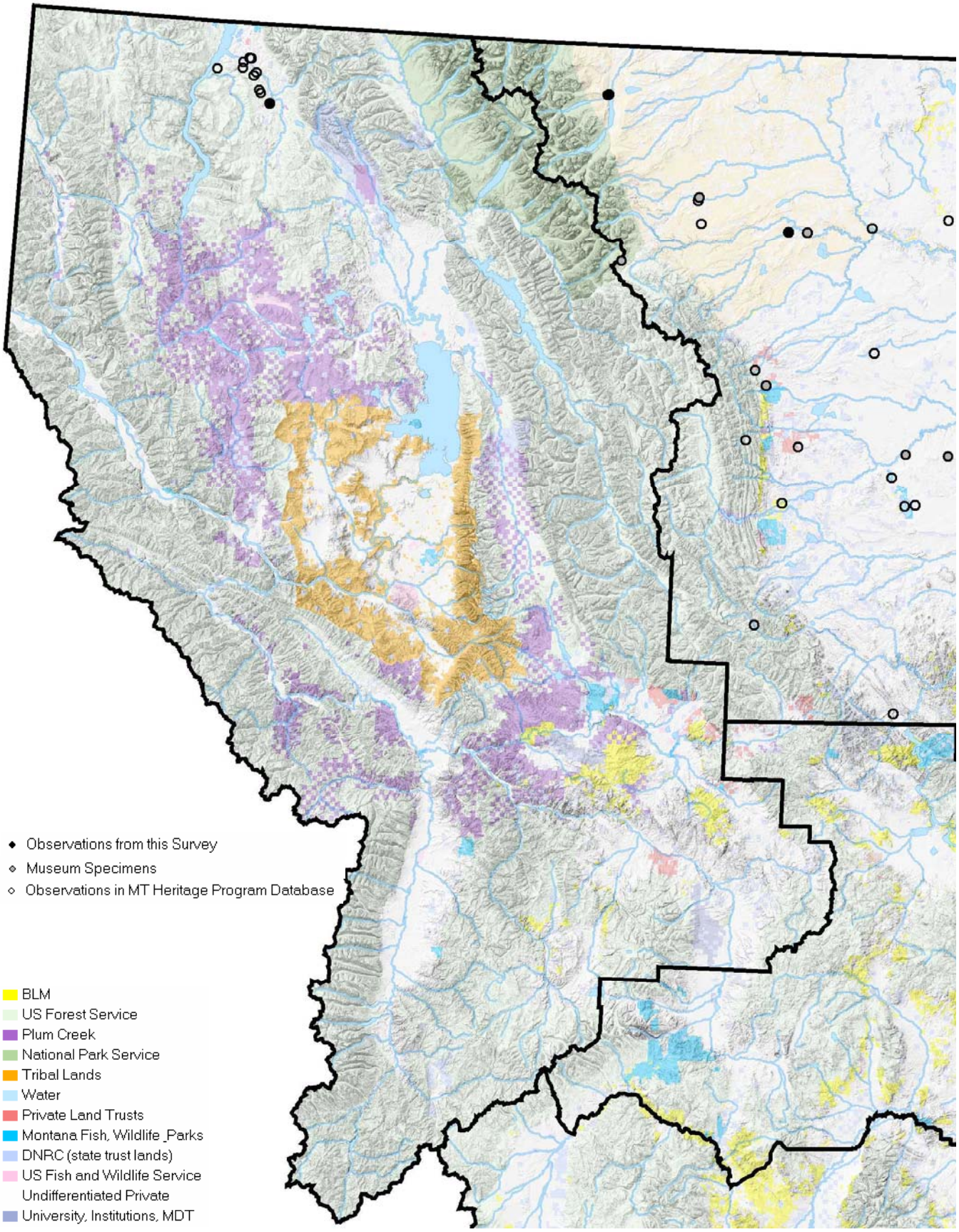
It is important to realize that the detection information included in this report is only an index. The true probability of detecting each life history stage of a species, given that it is indeed present at a particular lentic site, can only be determined by visiting a site multiple times. The detection/nondetection information from the multiple visits can then be used in a maximum likelihood framework analogous to mark-recapture data in order to determine the true probability of detecting each life history stage of a species (Mackenzie et al. 2002). Multiple visits to sites were not feasible in this study due to budgetary and logistical constraints, so the true probability of detection is unknown. Multiple visits to a small subset of watersheds across western Montana is being undertaken in order to estimate general probabilities of detection for each species in the future. In general, for experienced field assistants, we believe that detection probabilities are high for most life history stages of most amphibian species. Detection probabilities of Terrestrial Gartersnakes and Common Gartersnakes are almost certainly an exception to this and are probably very low as a result of their non-continuous presence at lentic sites. However, there is no reason to believe that this index of relative abundance would not be consistently biased by the same magnitude so results of future surveys for these species using the same methods should be directly comparable.

Geographic Distribution of Amphibians & Reptiles Detected within the Boundaries of the Missoula Field Office of the BLM

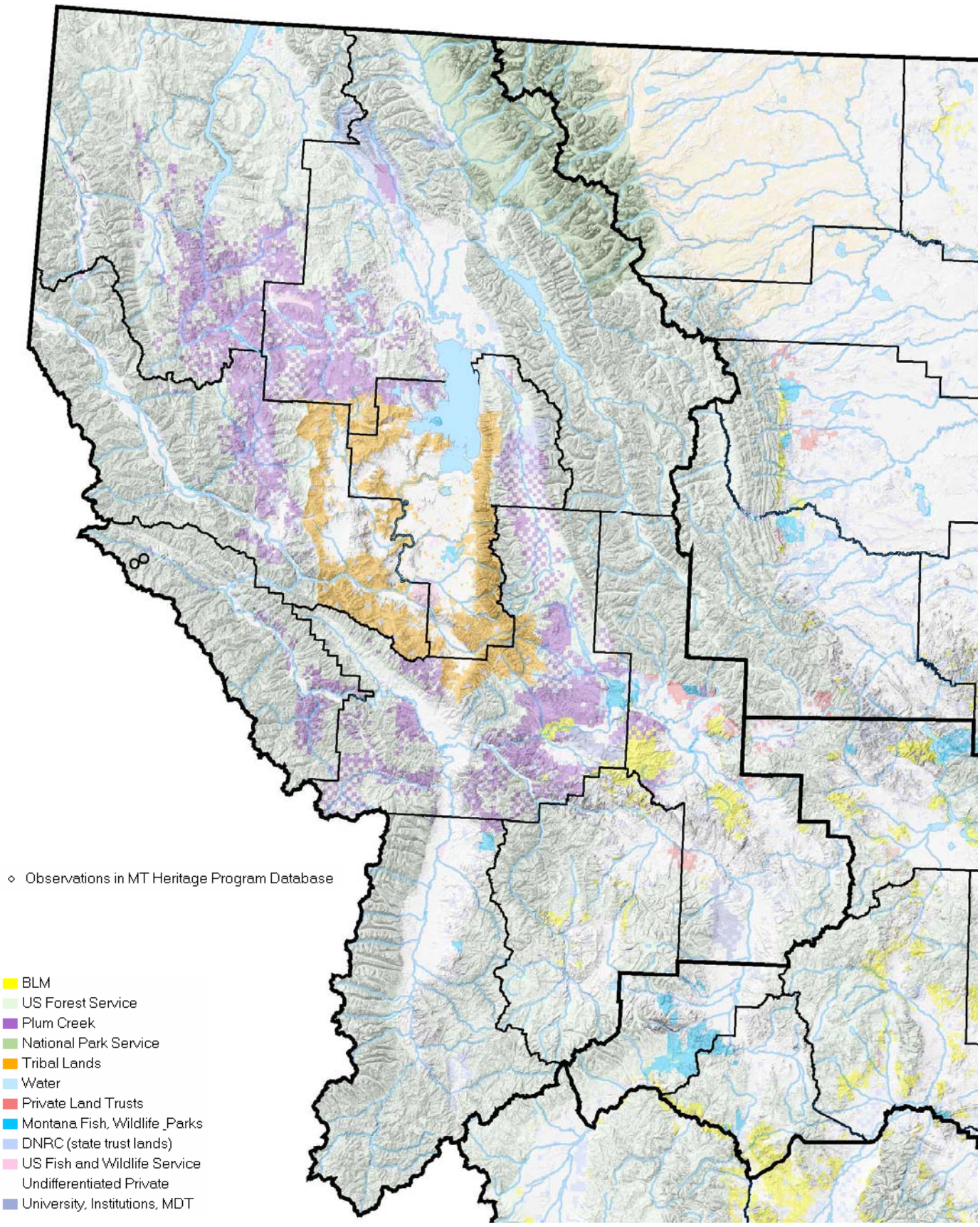
Geographic Distribution of Long-toed Salamander (*Ambystoma macrodactylum*)



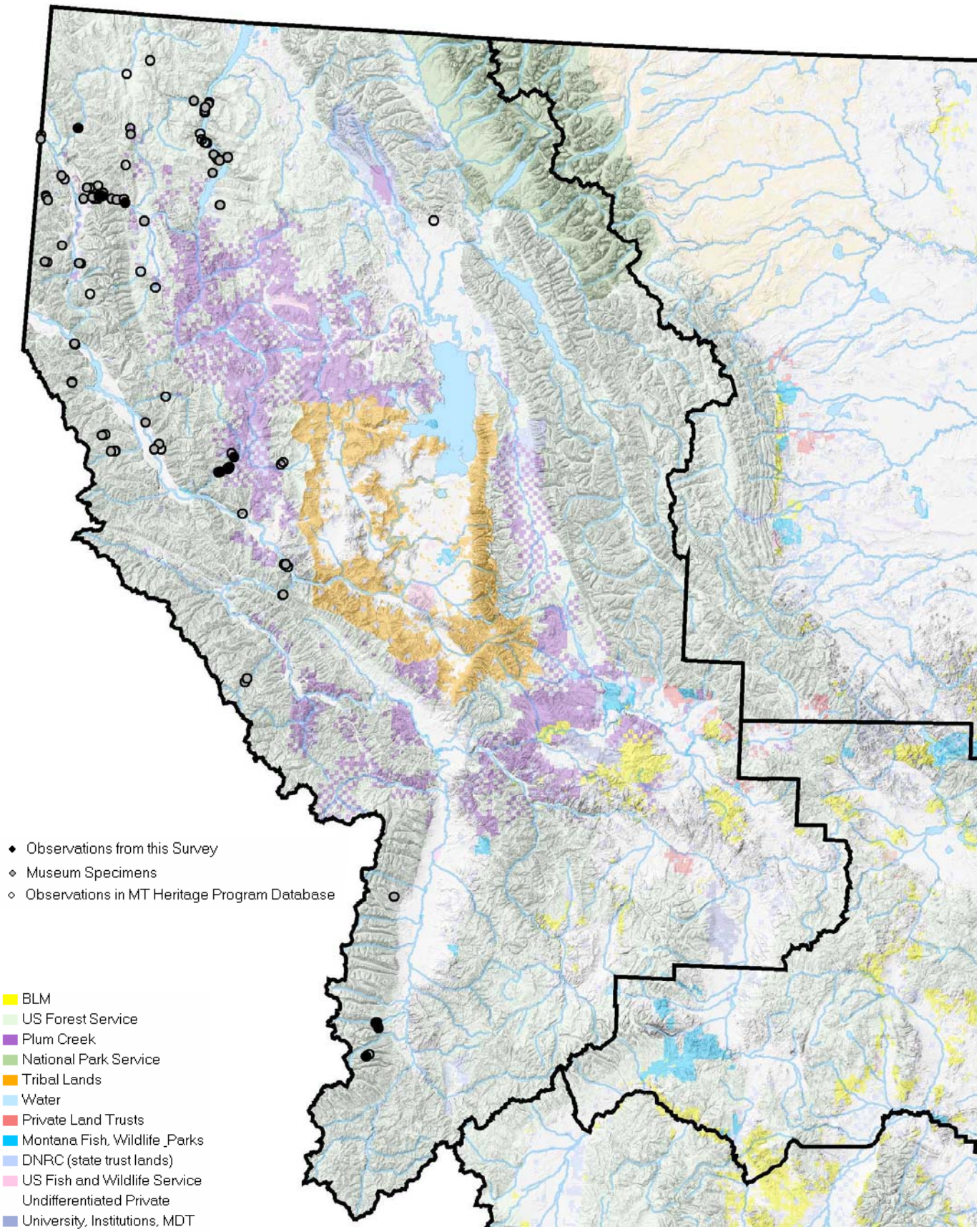
Geographic Distribution of Tiger Salamander (*Ambystoma tigrinum*)



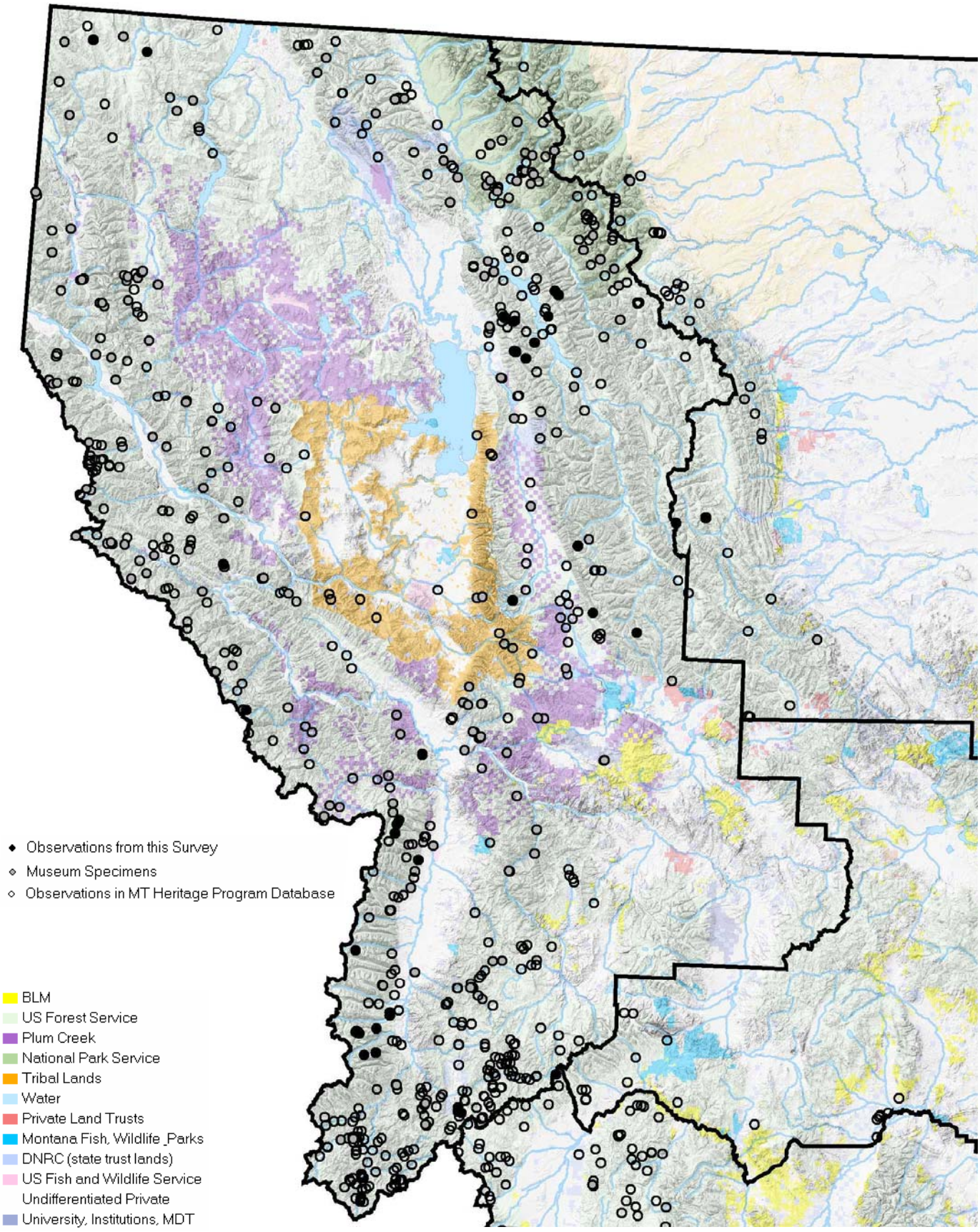
Geographic Distribution of Idaho Giant Salamander (*Dicamptodon aterrimus*)



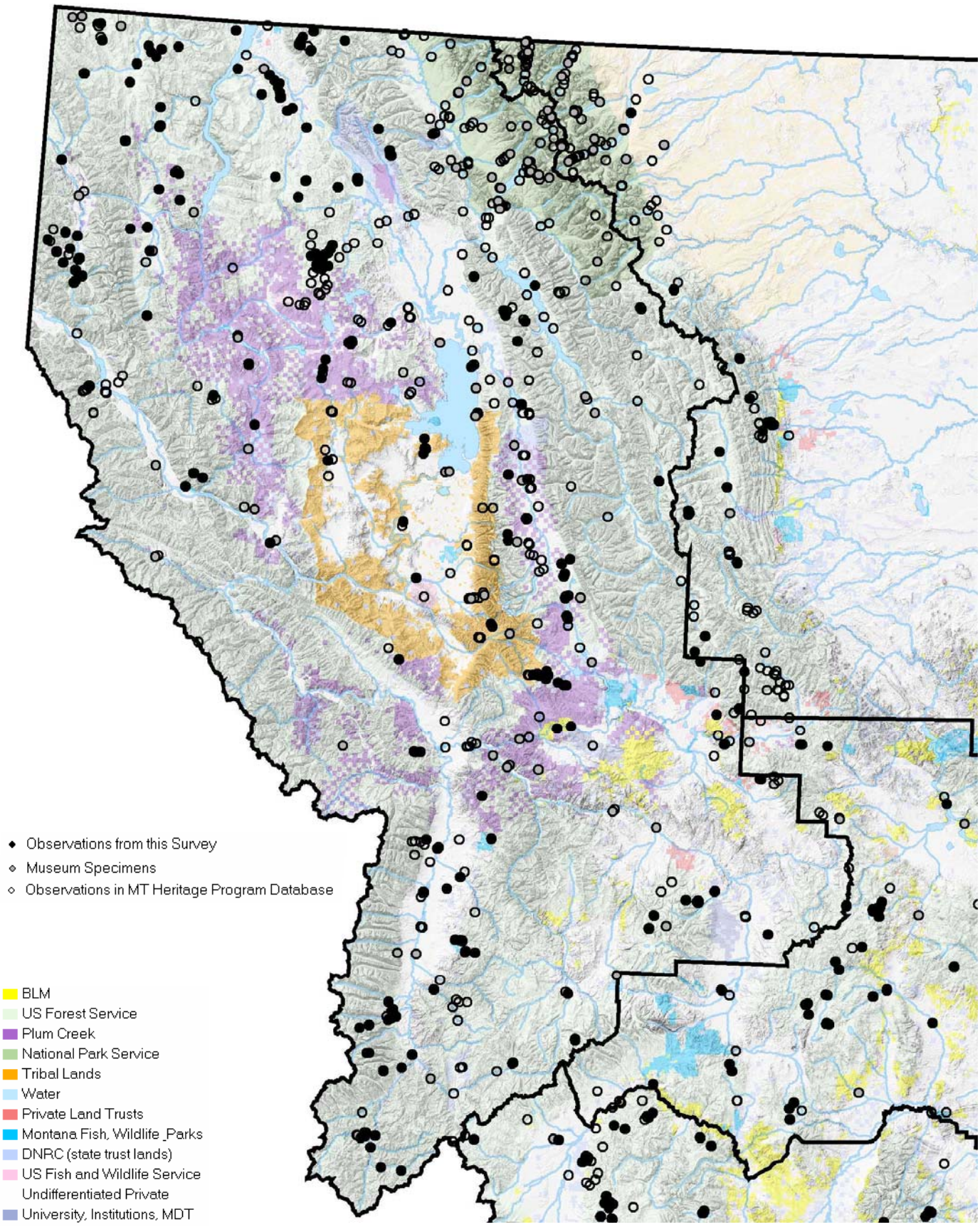
Geographic Distribution of Coeur d'Alene Salamander (*Plethodon idahoensis*)



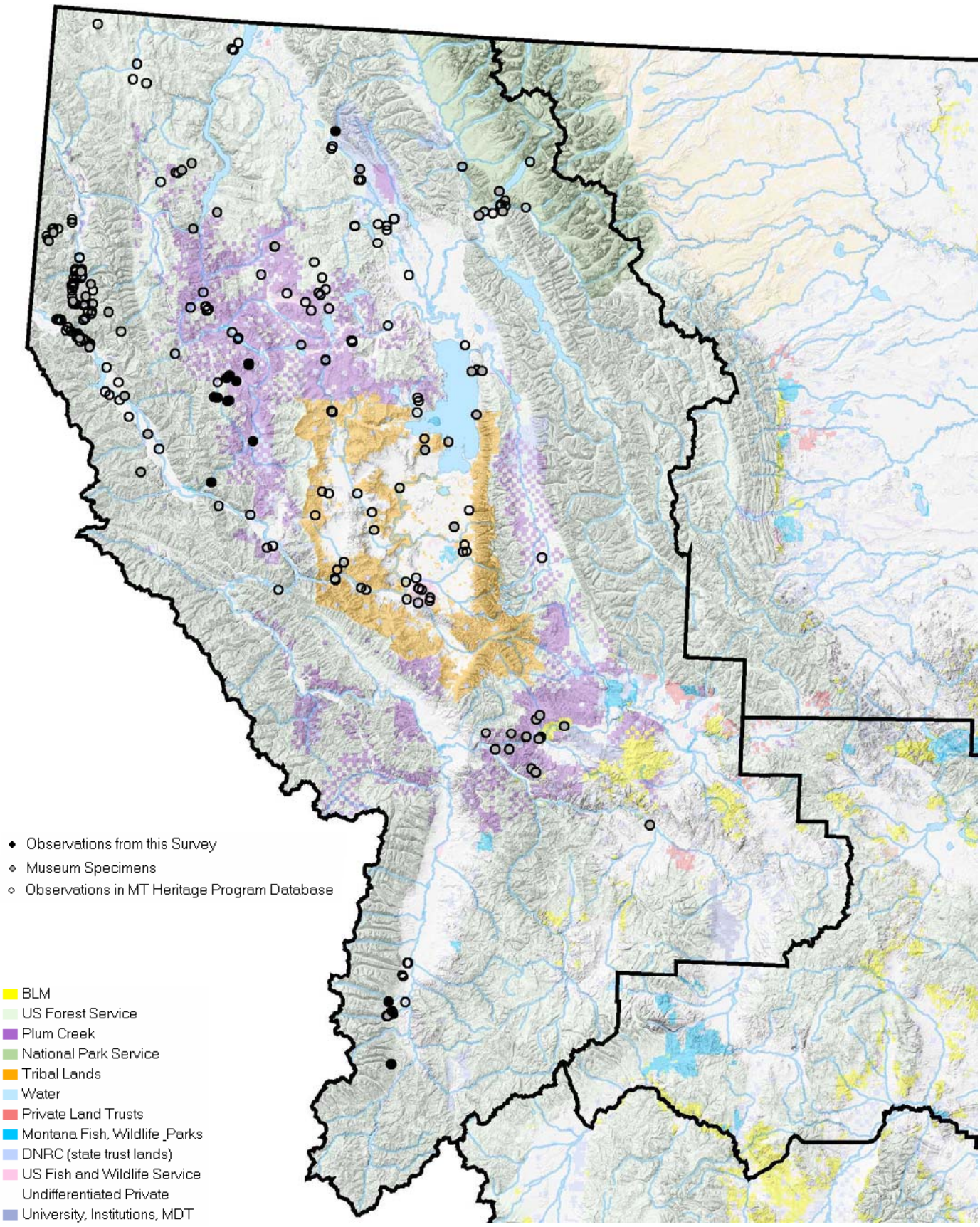
Geographic Distribution of Rocky Mountain Tailed Frog (*Ascaphus montanus*)



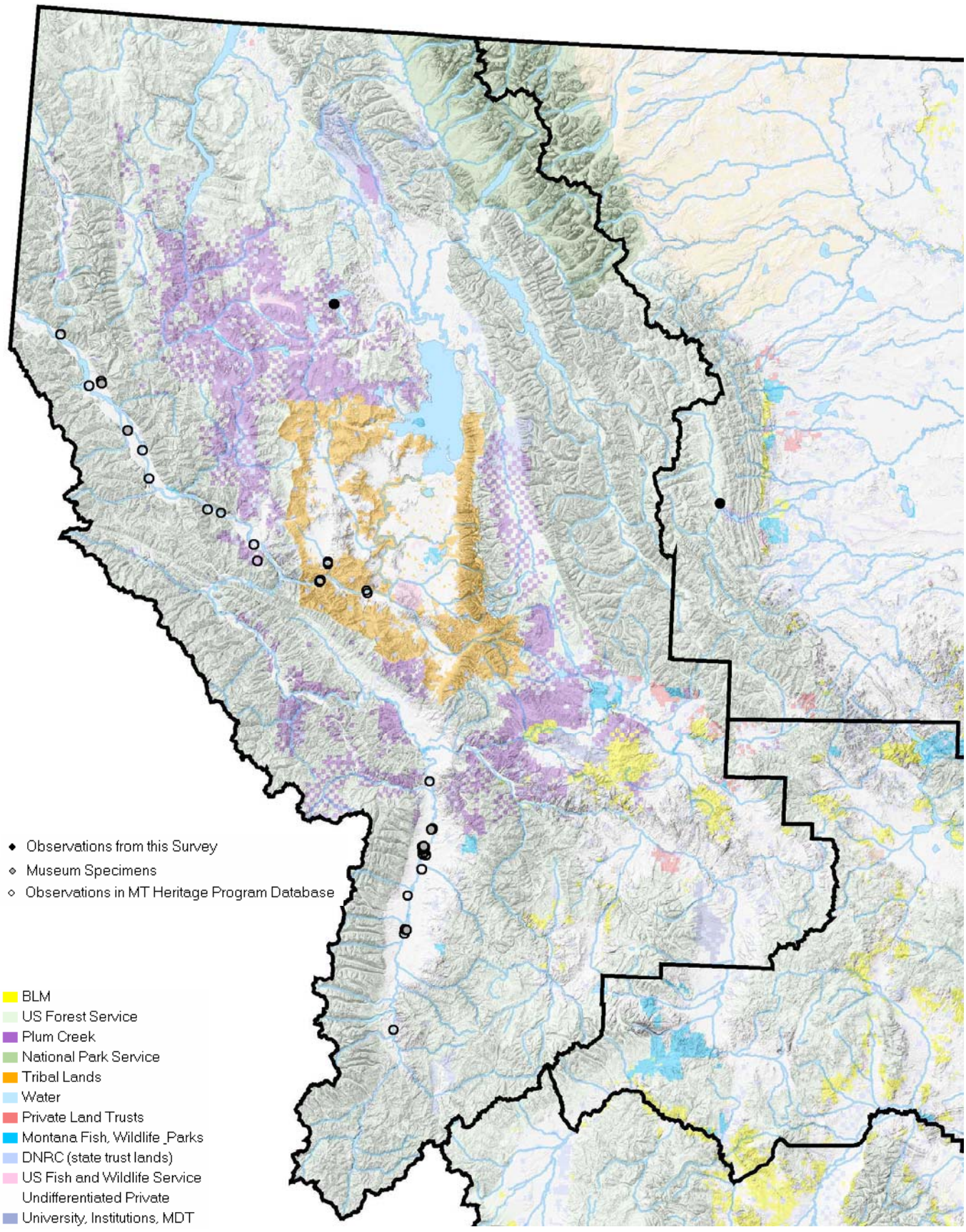
Geographic Distribution of Western Toad (*Bufo boreas*)



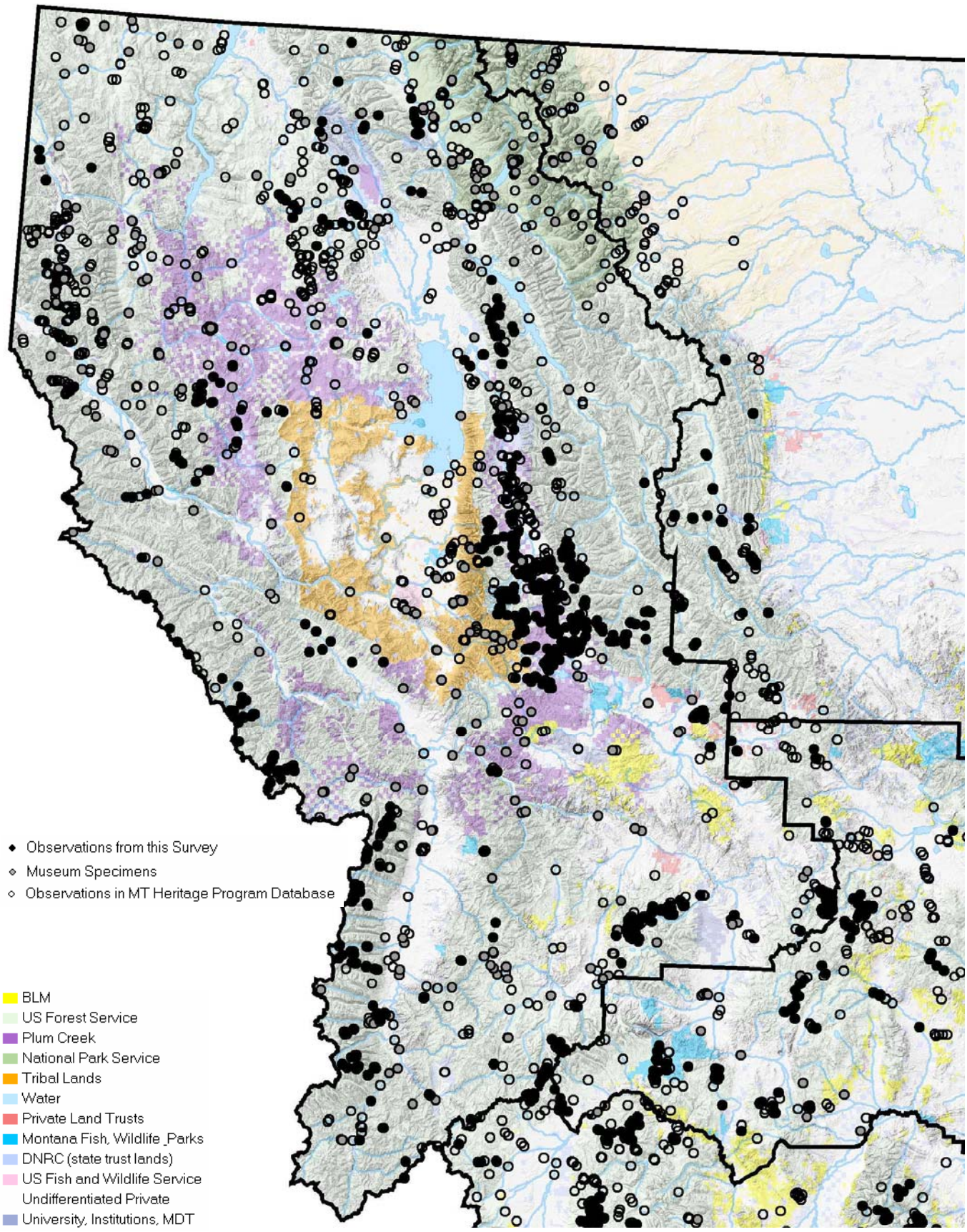
Geographic Distribution of Pacific Treefrog (*Pseudacris regilla*)



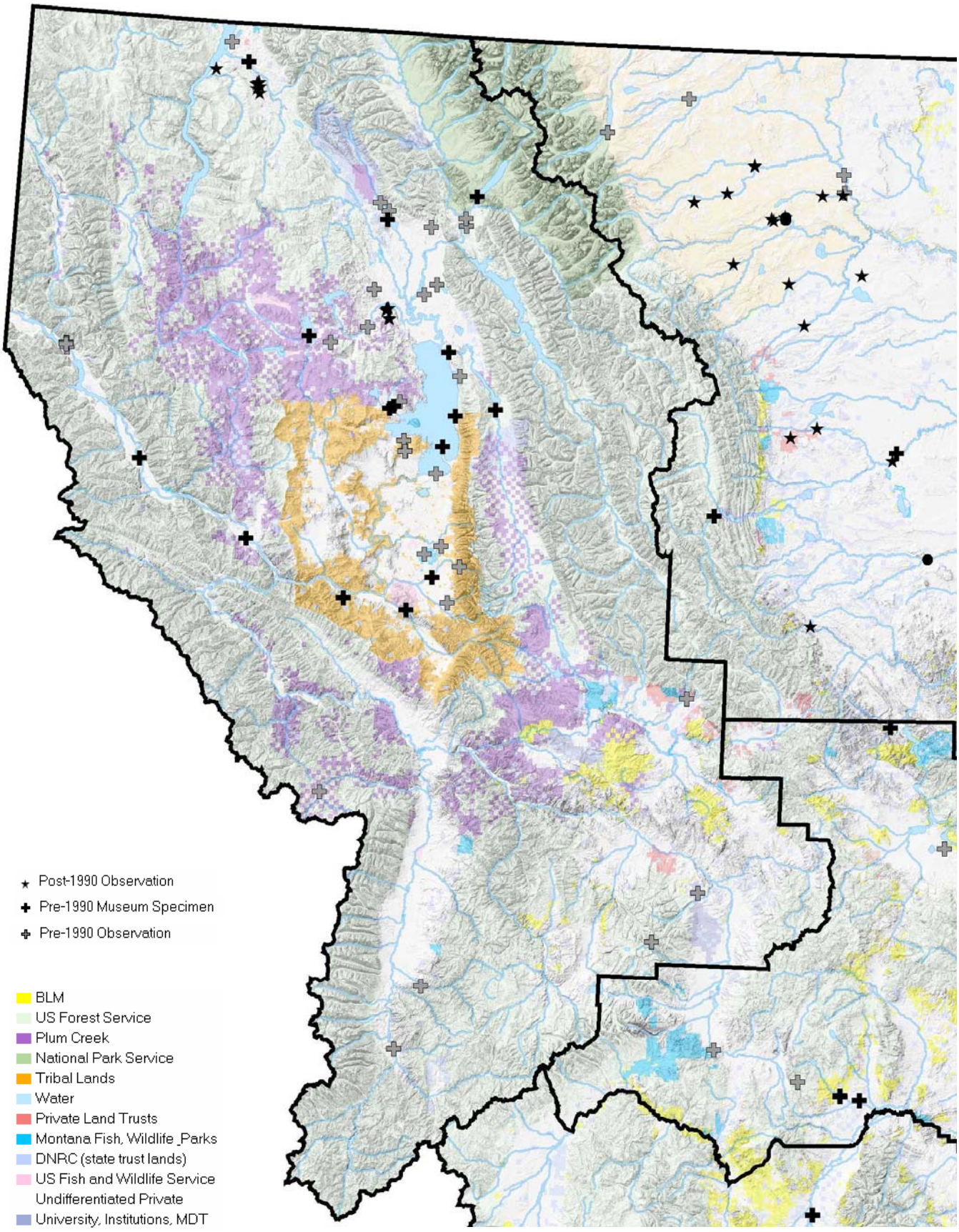
Geographic Distribution of American Bullfrog (*Rana catesbeiana*)



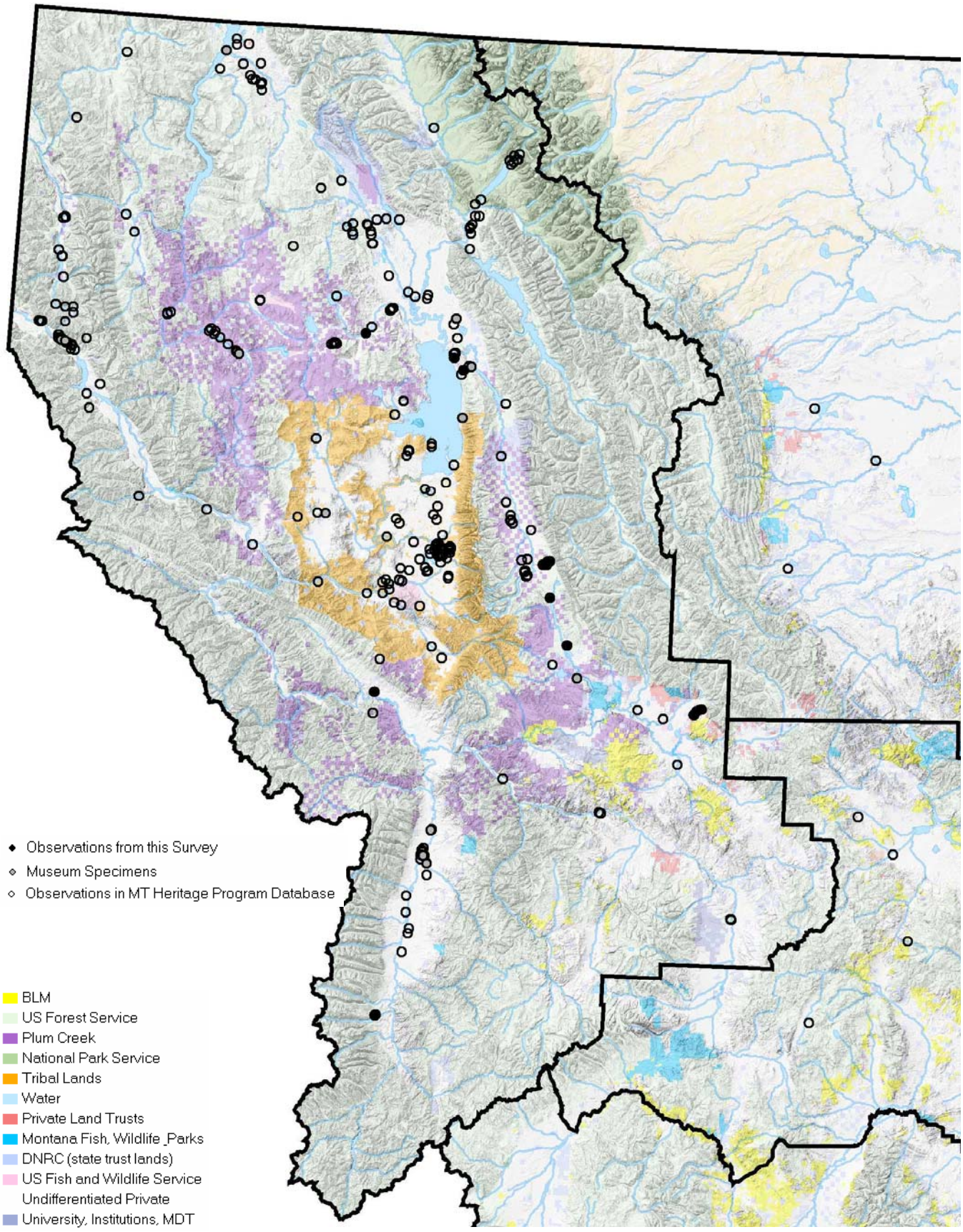
Geographic Distribution of Columbia Spotted Frog (*Rana luteiventris*)



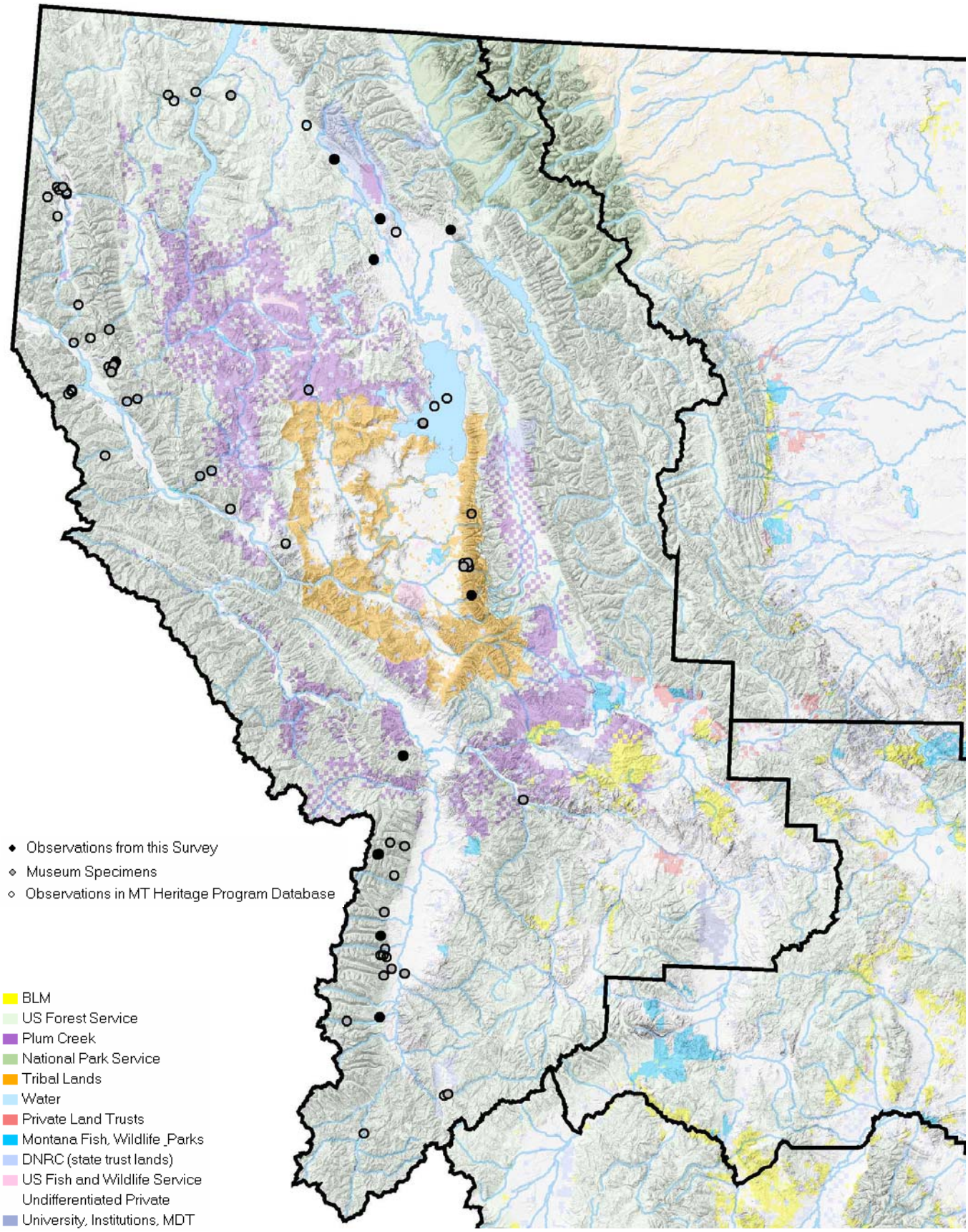
Historic and Current Geographic Distribution of Northern Leopard Frog (*Rana pipiens*)



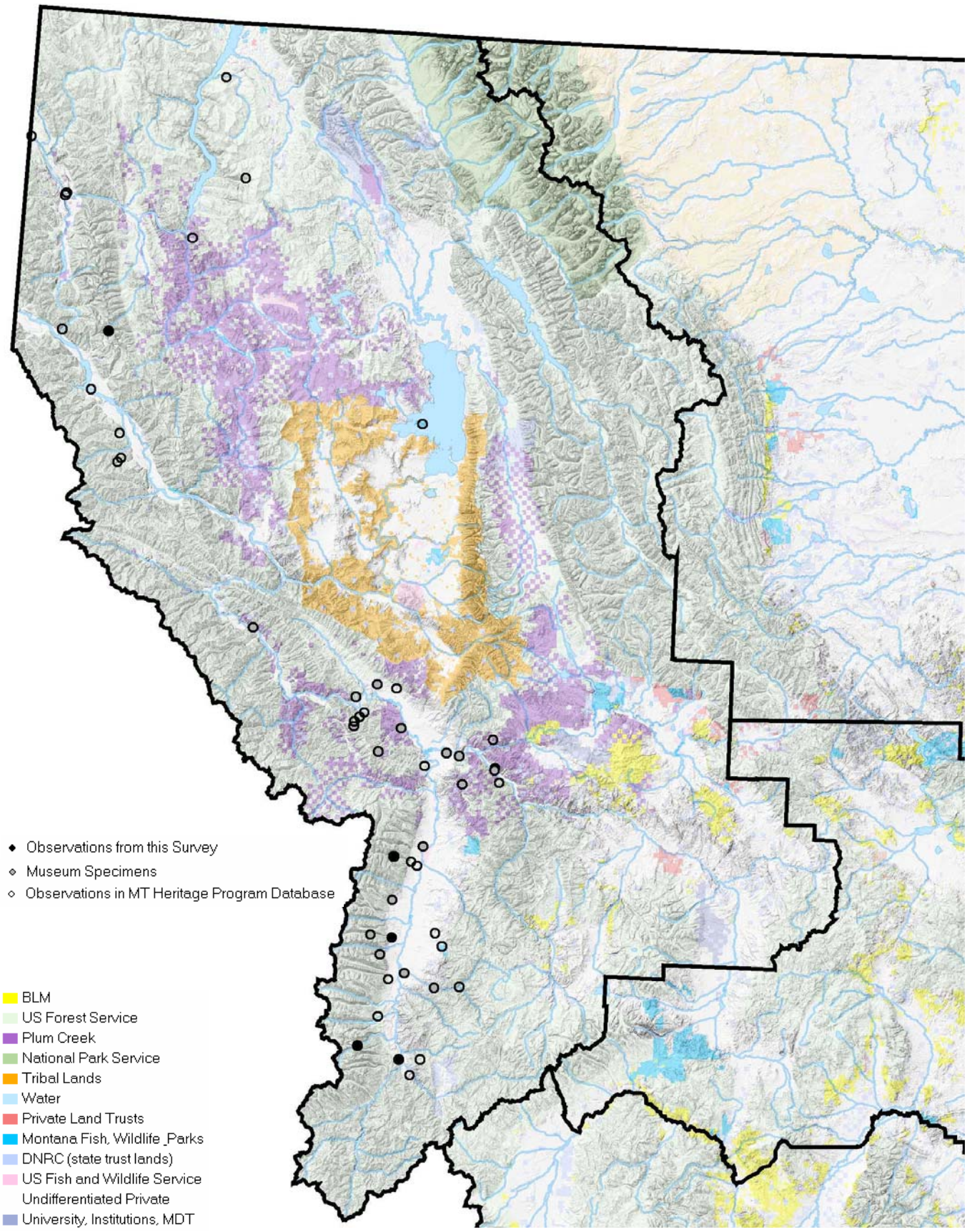
Geographic Distribution of Painted Turtle (*Chrysemys picta*)



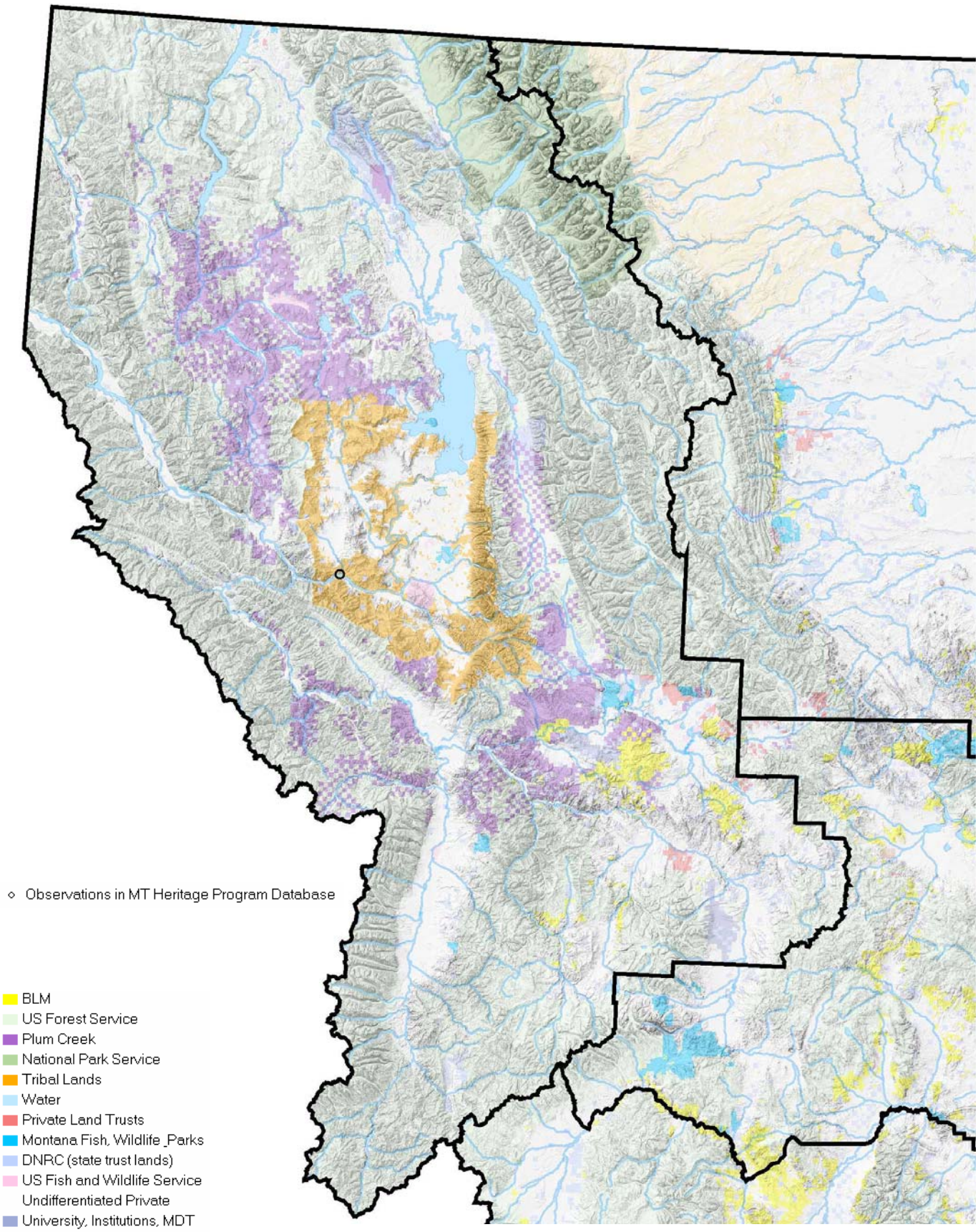
Geographic Distribution of Northern Alligator Lizard (*Elgaria coerulea*)



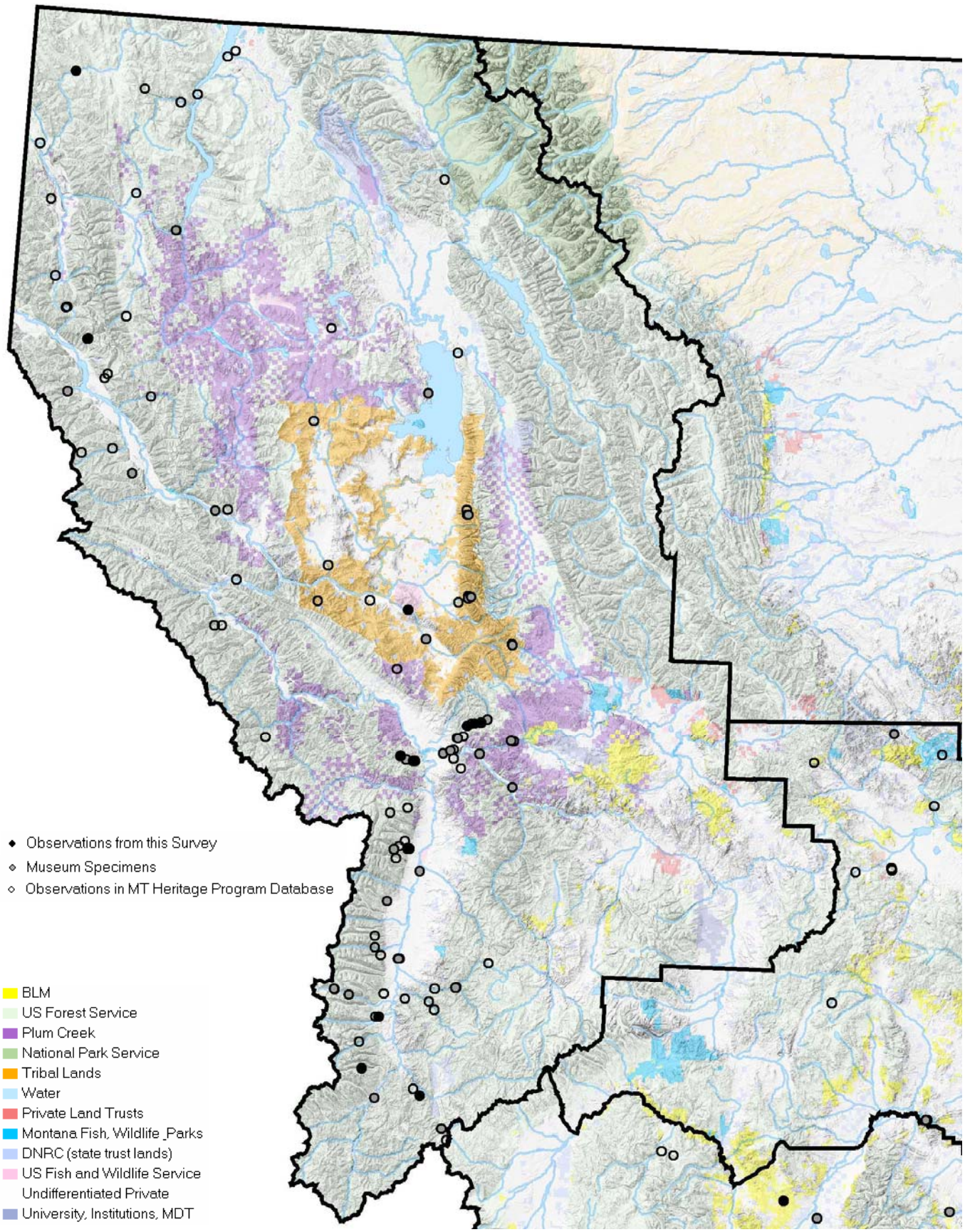
Geographic Distribution of Western Skink (*Eumeces skiltonianus*)



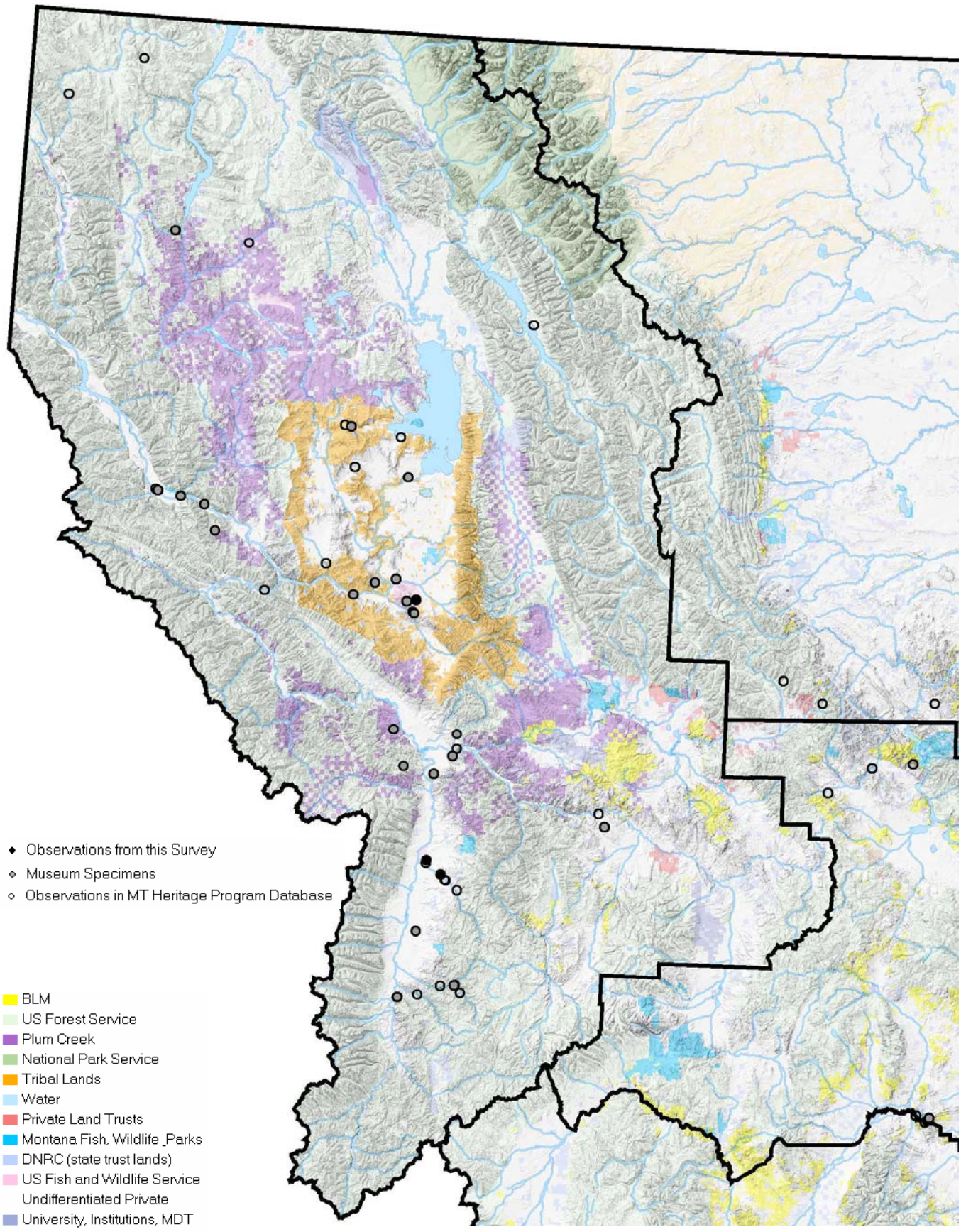
Geographic Distribution of Western Fence Lizard (*Sceloporus occidentalis*)



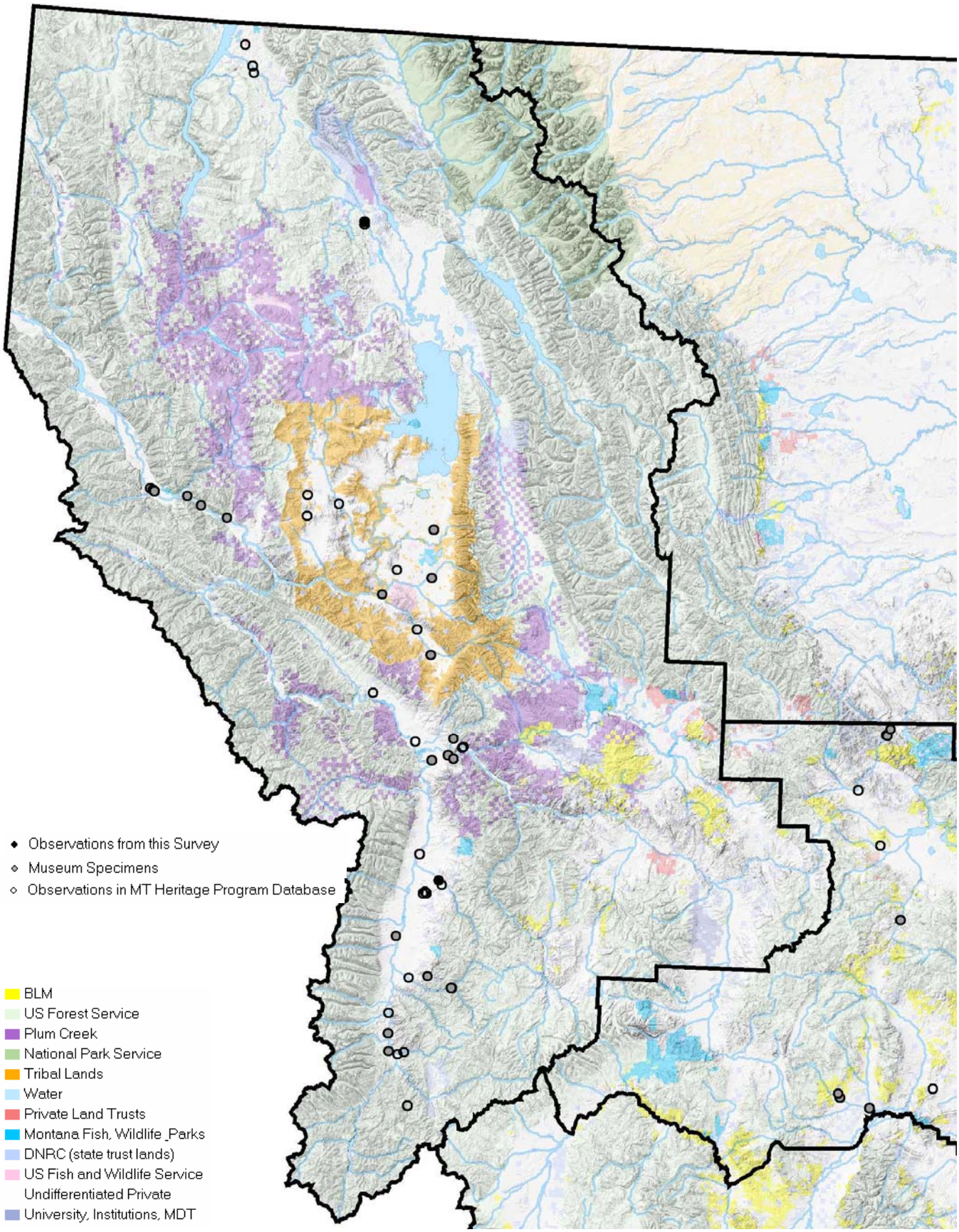
Geographic Distribution of Rubber Boa (*Charina bottae*)



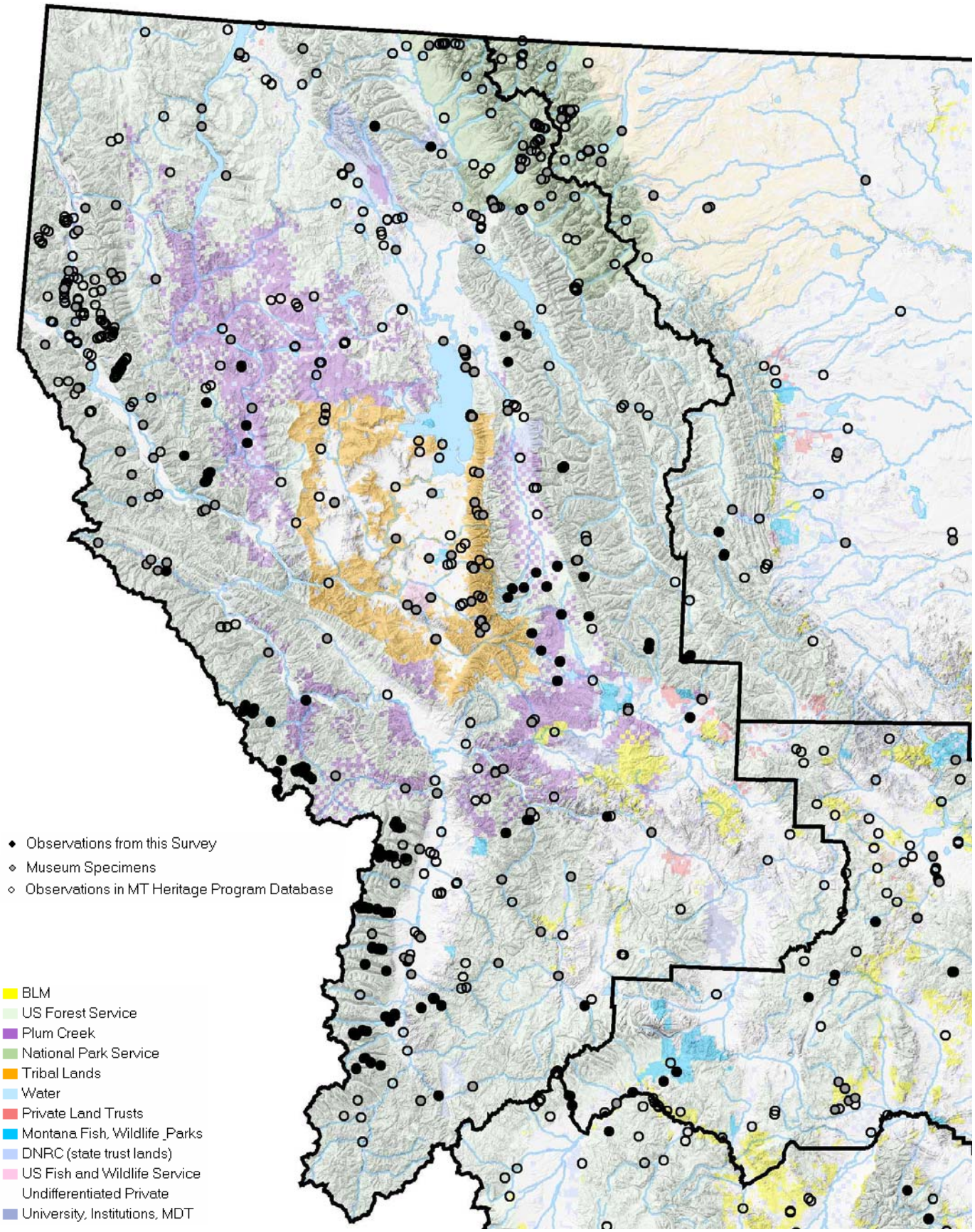
Geographic Distribution of Eastern Racer (*Coluber constrictor*)



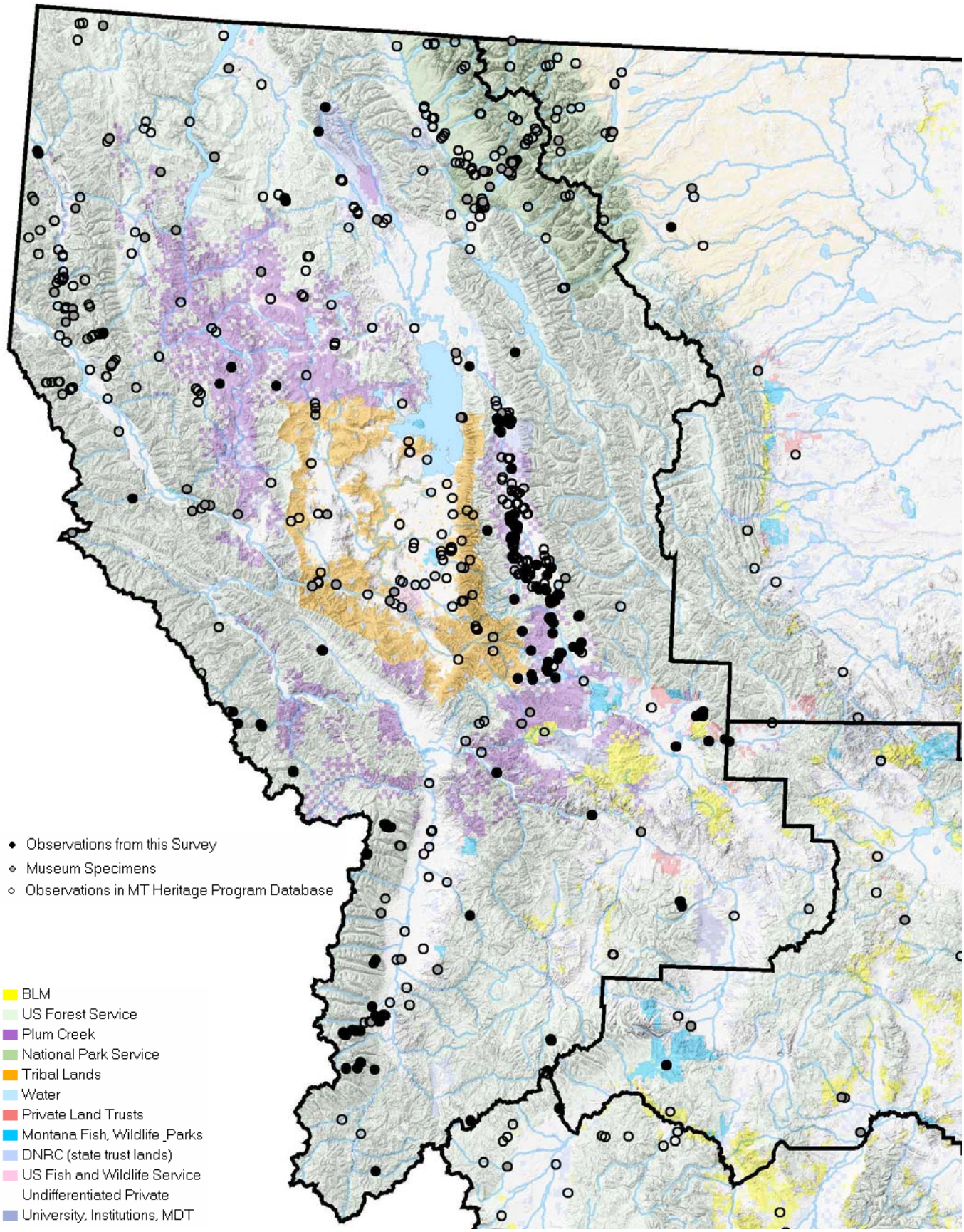
Geographic Distribution of Gophersnake (*Pituophis catenifer*)



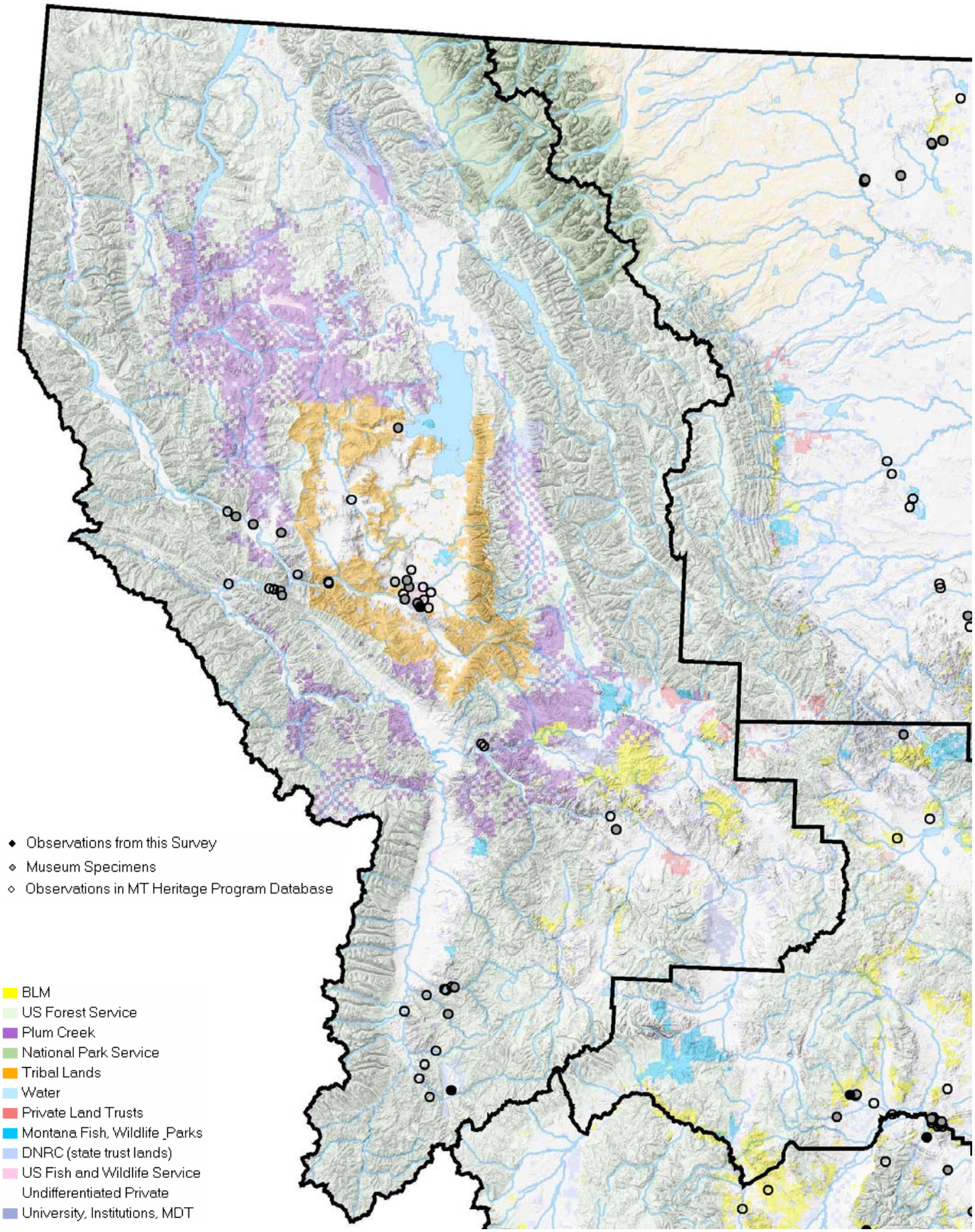
Geographic Distribution of Terrestrial Gartersnake (*Thamnophis elegans*)



Geographic Distribution of Common Gartersnake (*Thamnophis sirtalis*)



Geographic Distribution of Prairie Rattlesnake (*Crotalus viridis*)



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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	Section Description	
Map Elevation FT	UTM Zone:	UTM East	UTM North	Survey Type 0 1 2 3 4 5 6 7 8	

Habitat Information

Begin Time	End Time	Total Person Minutes of Search	Camera and Photo Number(s)/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	Water 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 $\leq$ 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	

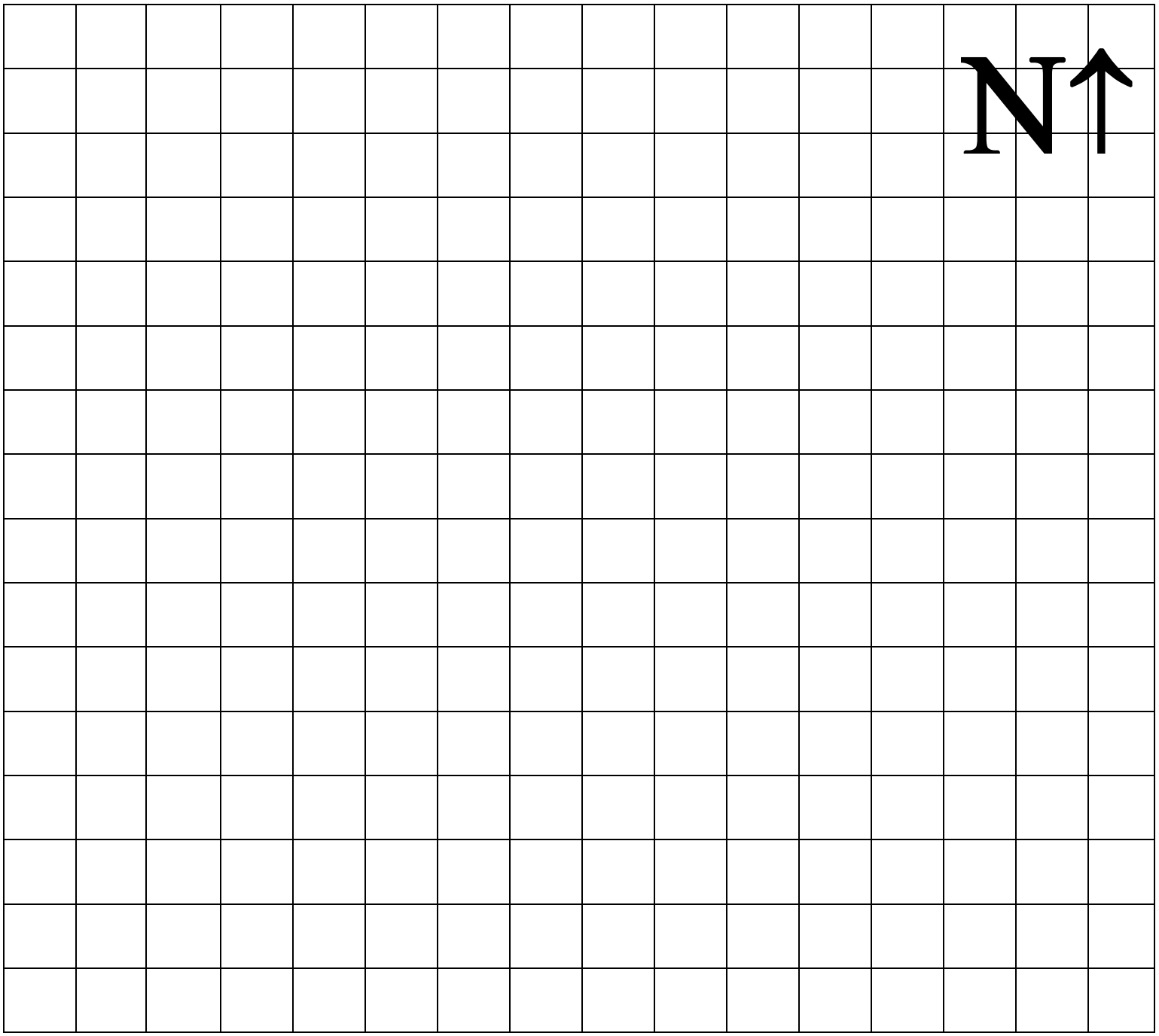
Species Information

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
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
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
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	

Site Map for Lentic Breeding Amphibian and Aquatic Reptile Surveys

Grid Scale:



***** Indicate the following locations on the map: **T** = temperature, **G** = GPS reading, **C** = clinometer reading, and **P→** = photo locations and directions of photos. Indicate area with emergent vegetation with cross-hatching and indicate a 2-meter depth contour with a dashed line.

Other Notes:

Compass Bearing	70°	90°	110°	130°	150°	170°	190°	210°
Inclination (degrees)								

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 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.
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.
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 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; 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 2cm 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 noted in the 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.
Timber Harvest: Circle whether or not timber has been harvested in the vicinity of the site.
Mining Activity: Circle whether or not there is evidence of mining activity in the vicinity 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 fish 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).

Data Form for Coeur d'Alene Salamander (*Plethodon idahoensis*) Site Surveys

Locality Information

Cluster Number:	Site Number:	Locality:	GPS EPE (ft)

State:	County:	Map Name:	T	R	S	Section Description:

Owner:	Map Elevation: FT	Datum:	UTM Zone:	UTM East:	UTM North:

Habitat Information

Date:	Observer(s)	Begin Time:	End Time:	Total Person Minutes of Search:	Area (M^2) Searched:

Percentage of Site Searched: 1-25 26-50 51-75 76-100	Habitat Type: Spring /Seep Waterfall Sprayzone Streamside w/o Sprayzone Moist Site w Cobble Moist Site w Fractured Rock Subterranean Flow No Suitable Habitat

Percent Slope:	Percent Canopy Cover:	Aspect: N NE NW S SE SW E W

General Cover Type / Habitat Description and Specific Microhabitat Where Animals Were Found:

Photo Frame Number(s) / Description(s):

Weather: Clear Partly Cloudy Overcast Rain Snow	Air Temp Start: °C	Air Temp End: °C

Water Temp: °C	Water pH:	Water Flow: CFS	Days Since Last Rain:	Support Population: Y N

Habitat Threats:

Species Information

Herp Species:	Number, Life Stage, Size, and Time at First Detection (e.g., 2 x adult females, TL = 80-90mm @ 10 minutes)
Tissue Number:	Substrate Association (Circle): under wood/vegetation under 4-20cm rock fragments under >20cm rock fragments under bryophyte mat on bryophyte mat in rock fracture other________________
Voucher Number & Description:	

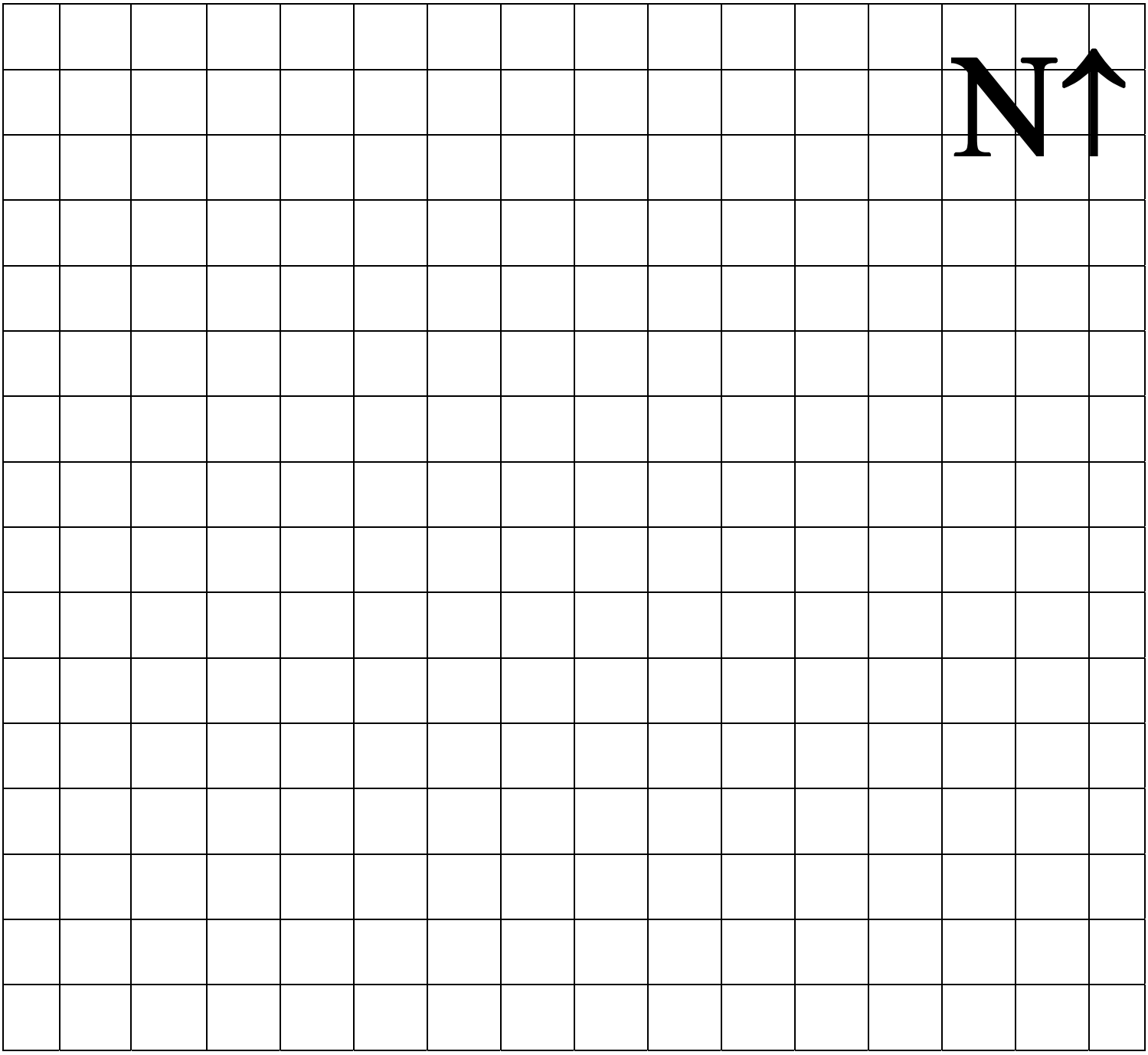
Herp Species:	Number, Life Stage, Size, and Time at First Detection (e.g., 2 x adult females, TL = 80-90mm @ 10 minutes)
Tissue Number:	Substrate Association (Circle): under wood/vegetation under 4-20cm rock fragments under >20cm rock fragments under bryophyte mat on bryophyte mat in rock fracture other________________
Voucher Number & Description:	

Herp Species:	Number, Life Stage, Size, and Time at First Detection (e.g., 2 x adult females, TL = 80-90mm @ 10 minutes)
Tissue Number:	Substrate Association (Circle): under wood/vegetation under 4-20cm rock fragments under >20cm rock fragments under bryophyte mat on bryophyte mat in rock fracture other________________
Voucher Number & Description:	

Other Species: (slugs, snails, millipedes)	Time at First Detection:	Voucher Number:	Voucher Description / Comments:
Other Species: (slugs, snails, millipedes)	Time at First Detection:	Voucher Number:	Voucher Description / Comments:
Other Species: (slugs, snails, millipedes)	Time at First Detection:	Voucher Number:	Voucher Description / Comments:

Site Map for Coeur d'Alene Salamander (*Plethodon idahoensis*) Site Surveys

Grid Scale:



***** Draw a rough sketch of the site labeling major features such as streams, talus slopes, habitat cover types, etc. Be sure to indicate where animals were detected and label the following locations on the map: **T** = temperature, **G** = GPS reading, and **P→** = photo locations and directions of photos.

Other Notes:

Site Information

Cluster Number: Number identifying cluster of sites being monitored for each PLID breeding locality (range = 001-999). Typically this would be the same number for all localities in a local watershed (e.g., a 6th Code (12-digit) HUC).

Site Number: Site number within each breeding cluster (range = 001-999).

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., Waterfall spray zone just below falls on Rock Creek, 1.5 miles north of Engle Peak).

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.

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).

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.

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

Datum: The map datum used (use NAD 27 in order to correspond with topographic maps).

UTM Zone: Universal Transverse Mercator zone recorded on the topographic map.

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.

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.

Survey Information

Date: Use MM-DD-YY format (e.g. 05/12/00 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.

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).

Area (M^2) Searched: Area in square meters that was surveyed.

Habitat Type: Circle the appropriate habitat type.

Percent Slope: Percent slope of site. Enter range if variable.

Percent Canopy Cover: Percent canopy cover at the site - averaged if site extends over a larger area.

Aspect: Circle primary aspect of the site.

Cover Type / Habitat Description: Give a thorough description of the immediate and surrounding habitats, including forest type, hydrologic regime, inferences regarding subterranean habitat, and spray zone at the site.

Photo Frame Number(s) / Descriptions: 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 PLID juvenile and #14-18 = 5 x habitat). Take photos of all portions of the site and anything else that may be of interest (e.g., slugs, millipedes, snails, and potential site threats).

Weather: Circle weather condition during survey.

Air Temp Start: Record air temperature in °C at chest height in the shade at the beginning of the survey. °C = (°F – 32)/1.8

Air Temp End: Record air temperature in °C at chest height in the shade at the end of the survey. °C = (°F – 32)/1.8

Water Temp: Record water temperature in °C of water body adjacent to area surveyed.

Water Flow: Record estimated flow rate of water adjacent to area surveyed in cubic feet per second (CFS).

Days Since Last Rain: Record number of days between survey date and last significant rainfall.

Support Population: Based on the sites' aspect, canopy cover, presence of subterranean habitat, and presence/absence of a spray zone what is your best judgment as to whether enough habitat is present to support a population of *P. idahoensis*.

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., AMMA = *Ambystoma macrodactylum*, PLID = *Plethodon idahoensis*, ASMO = *Ascaphus montanus*, BUBO = *Bufo boreas*, THEL = *Thamnophis elegans*, THSI = *Thamnophis sirtalis*). Record the number, life stage, size, and time at first detection (e.g., 2 x adult females, TL = 80-90mm @ 10 minutes) for all life history stages encountered. Record the tissue number or range of tissue numbers for tissue samples collected (see tissue collection protocols). Record the preliminary museum voucher specimen number and description for voucher specimens collected (see voucher specimen collection protocols). Circle the substrate the animal was associated with at time of detection. Record the presence of other species detected at the site (e.g., slugs, snails, millipedes), the time at first detection, and the voucher number and description of animals collected (see voucher and tissue collection protocols).

Incidental Observation Form for Amphibians and Reptiles

Contact Information for Individual Reporting Observations: Name_____; Phone Number_____; *Use NAD 27 as a datum or indicate otherwise.

1. Species	Locality	County	Township Range Section ¼ ¼ Section	UTM Zone	UTM North	UTM East	Date	Elevation Ft / M	
Observer	Life History Stage (Circle Most Appropriate) Egg Larvae Metamorph Juvenile Adult	Number _____ 100-1000 1000-10000	10-100 >10000	Comments					
2. Species	Locality	County	Township Range Section ¼ ¼ Section	UTM Zone	UTM North	UTM East	Date	Elevation Ft / M	
Observer	Life History Stage (Circle Most Appropriate) Egg Larvae Metamorph Juvenile Adult	Number _____ 100-1000 1000-10000	10-100 >10000	Comments					
3. Species	Locality	County	Township Range Section ¼ ¼ Section	UTM Zone	UTM North	UTM East	Date	Elevation Ft / M	
Observer	Life History Stage (Circle Most Appropriate) Egg Larvae Metamorph Juvenile Adult	Number _____ 100-1000 1000-10000	10-100 >10000	Comments					
4. Species	Locality	County	Township Range Section ¼ ¼ Section	UTM Zone	UTM North	UTM East	Date	Elevation Ft / M	
Observer	Life History Stage (Circle Most Appropriate) Egg Larvae Metamorph Juvenile Adult	Number _____ 100-1000 1000-10000	10-100 >10000	Comments					
5. Species	Locality	County	Township Range Section ¼ ¼ Section	UTM Zone	UTM North	UTM East	Date	Elevation Ft / M	
Observer	Life History Stage (Circle Most Appropriate) Egg Larvae Metamorph Juvenile Adult	Number _____ 100-1000 1000-10000	10-100 >10000	Comments					
6. Species	Locality	County	Township Range Section ¼ ¼ Section	UTM Zone	UTM North	UTM East	Date	Elevation Ft / M	
Observer	Life History Stage (Circle Most Appropriate) Egg Larvae Metamorph Juvenile Adult	Number _____ 100-1000 1000-10000	10-100 >10000	Comments					
7. Species	Locality	County	Township Range Section ¼ ¼ Section	UTM Zone	UTM North	UTM East	Date	Elevation Ft / M	
Observer	Life History Stage (Circle Most Appropriate) Egg Larvae Metamorph Juvenile Adult	Number _____ 100-1000 1000-10000	10-100 >10000	Comments					
8. Species	Locality	County	Township Range Section ¼ ¼ Section	UTM Zone	UTM North	UTM East	Date	Elevation Ft / M	
Observer	Life History Stage (Circle Most Appropriate) Egg Larvae Metamorph Juvenile Adult	Number _____ 100-1000 1000-10000	10-100 >10000	Comments					
9. Species	Locality	County	Township Range Section ¼ ¼ Section	UTM Zone	UTM North	UTM East	Date	Elevation Ft / M	
Observer	Life History Stage (Circle Most Appropriate) Egg Larvae Metamorph Juvenile Adult	Number _____ 100-1000 1000-10000	10-100 >10000	Comments					
10. Species	Locality	County	Township Range Section ¼ ¼ Section	UTM Zone	UTM North	UTM East	Date	Elevation Ft / M	
Observer	Life History Stage (Circle Most Appropriate) Egg Larvae Metamorph Juvenile Adult	Number _____ 100-1000 1000-10000	10-100 >10000	Comments					
11. Species	Locality	County	Township Range Section ¼ ¼ Section	UTM Zone	UTM North	UTM East	Date	Elevation Ft / M	
Observer	Life History Stage (Circle Most Appropriate) Egg Larvae Metamorph Juvenile Adult	Number _____ 100-1000 1000-10000	10-100 >10000	Comments					

Instructions and Definitions of Variables on Incidental Observation Form for Amphibians and Reptiles

Instructions

Use this sheet to report incidental observations of all amphibian and reptile species, especially those with limited distribution data or of management concern. DO NOT report observations unless you are absolutely certain of the identification of the species. This information is highly important for most amphibian and reptile species. Documentation with photographs or collection of individual animals is necessary for records outside the documented range of species and for all of the following species, which are undocumented, but possibly present, in Montana: Idaho giant salamander (western edge of state), Canadian toad (NE corner of state), wood frog (NW corner of state or Bighorn Mountains), and pigmy short-horned lizards (SW Montana). Individuals reporting incidental observations should send this data sheet to the Montana Natural Heritage Program, 1515 East 6th Avenue, P.O. Box 201800, Helena, Montana 59620-1800, or enter the data on there website. Employees of federal or state agencies should enter this observational data in a database with data fields that correspond to those in the statewide point observation database at the Montana Natural Heritage Program and then forward a digital copy of this database to the Heritage Program. A template of this database can be obtained by contacting the Montana Heritage Program or Bryce A. Maxell.

Data Definitions

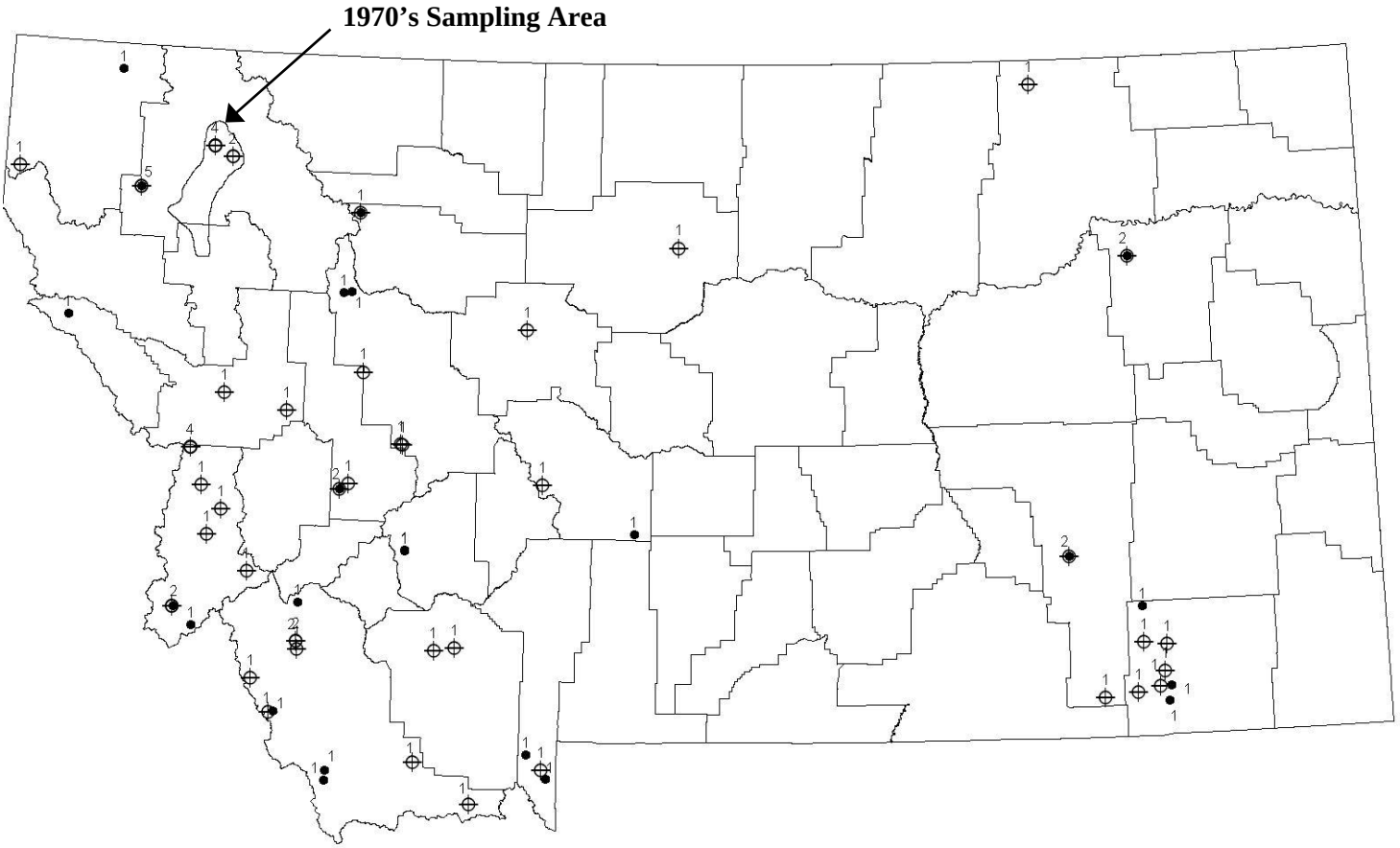
Species: For each species record the first two letters of the genus and species names for all amphibian and reptile species found at the site. (e.g., BUBO for *Bufo boreas*).
Locality: Describe the specific geographic location of the site so that the type of site is described and the straight-line distance 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).
County: Use the full county name.
Township Range Section ¼ ¼ Section: Describe the location of the site in reference to a 1:24,000 or 1:100,000 scale map by recording the Township number and whether it is north or south, the Range number and whether it is east or west, the Section number, and at the location with the section at the ¼ of ¼ level (e.g., SENE indicates SE corner of NE corner).
UTM Zone: Universal Transverse Mercator zone recorded on the topographic map. Note: It is important to report this information in addition to Township, Range, Section information because UTMs are more precise, are easier to map in a GIS, and provide double confirmation of the site locality.
UTM East: Universal Transverse Mercator easting coordinate in meters as recorded on a 1:24,000 scale topographic or GPS receiver (it is best to compare the GPS coordinates with map coordinates to check for agreement). Note: It is important to report this information in addition to Township, Range, Section information because UTMs are more precise, are easier to map in a GIS, and provide double confirmation of the site locality.
UTM North: Universal Transverse Mercator northing coordinate in meters as recorded on a 1:24,000 scale topographic map or GPS receiver (it is best to compare the GPS coordinates with map coordinates to check for agreement). Note: It is important to report this information in addition to Township, Range, Section information because UTMs are more precise, are easier to map in a GIS, and provide double confirmation of the site locality.
Date: Use MM-DD-YY format (e.g. 05/12/00 for May, 12 of 2000).
Map Elevation: The elevation of the site as indicated by the topographic map in feet (GPS elevations are often inaccurate).
Observer: Record the full name or names of individuals who made the observation.
Life History Stage: Circle the appropriate life history stage of the amphibian or reptile. If multiple life history stages are present circle all that apply.
Number: Enter the number of individuals or circle the most appropriate category of numbers of individuals for each life history stage present. If multiple life history stages are present enter the first letter of the life history stage by the number or number category (e.g., E 50 for 50 eggs, L 1000-10000 for 1000-10000 larvae, etc.).
Comments: Include method of observation (i.e., heard individuals calling or incidental visual observation), measurements of the snout-to-vent length, total length, or the length and width of the carapace and plastron, habitat observed in, and how specimen was identified if a rare species. If tissue samples are collected record the tissue number or range of tissue sample numbers. If a museum voucher specimen was collected record the preliminary museum voucher specimen number assigned to the animal. Attach additional pages if necessary.

Detection of (*Batrachochytrium dendrobatidis*), the Chytrid Fungus Associated with Global Amphibian Declines, in Montana Amphibians

In order to identify potential causes of declines in the northern leopard frog (*Rana pipiens*) and western toad (*Bufo boreas*) which have been noted since the 1980s and assess the risk posed to other amphibian species whose status is uncertain, we submitted 98 tissue samples gathered from 8 amphibian species across Montana for PCR based identification of the chytrid fungus (*Batrachochytrium dendrobatidis*). This chytrid fungus has been associated with declines, extirpations, and losses of numerous amphibian populations and entire species around the globe over the last 2 decades. Tissue samples from 30 museum voucher specimens of 3 species collected in the Flathead Valley in the 1970s, prior to amphibian declines in the area, were all negative for *B. dendrobatidis*. However, 4 species and 26 of 68 tissue samples gathered during inventory work across the state since 1998 tested positive for *B. dendrobatidis*. In light of its association with other amphibian declines, *B. dendrobatidis*, acting alone or synergistically with other stressors, is a potential cause of the declines observed and should be regarded as an ongoing threat to Montana amphibians. In order to prevent additional spread of this fungal pathogen personnel working in either lentic or lotic systems should thoroughly rinse and decontaminate all equipment with 10% bleach between (1) any sites where dead, dying, or ill amphibians are encountered, (2) sites located in different local watersheds or definitive clusters of sites, (3) all breeding sites of sensitive species separated by more than 1 kilometer.

Spatial Distribution of Tissues Tested for *Batrachochytrium dendrobatidis*

Positive = ● Negative = ⊕ Sample sizes are listed above symbols



Fungal and Viral Pathogen Decontamination Procedures

When to Decontaminate

1. After any site where dead, dying, or ill animals are encountered
2. Between sites located in different watersheds
3. Between individual sites that are surveyed when traveling distances greater than 5 kilometers or between definitive clusters of sites.
4. Between all breeding sites of sensitive species that are surveyed and separated by more than 1 kilometer.

What to Decontaminate

1. Boots
2. Dipnets
3. Socks
4. Fingernails
5. Any other body parts, clothing, or other equipment that was exposed to waters or mud.

Washing and Decontamination Procedures (separate issues)

1. Washing - Once surveys are completed at a site or watershed scrub and rinse all equipment to remove any lingering mud. In general it is a good idea to do this between all sites if possible.
2. Decontamination - Prepare a mixture of 10% bleach by putting 4 ounces of bleach (half cup) in one gallon of clean water in a waterproof tub or bucket that can be carried in your vehicle between watersheds or sites. Use a fresh bottle of bleach each field season for this. Also in order to ensure that concentrations remain around 10%, a new bleach mixture should be made on a regular basis. If the solution of disinfectant becomes cloudy or brown with mud, silt, and vegetation, it should be discarded and a fresh solution made. Diluted bleach solutions should also be discarded after decontaminating equipment from any site where dead, dying, or ill animals are encountered. When discarding used bleach pour it out at least 30-40 meters away from water.
3. After rinsing equipment dip and thoroughly scrub individual items in the container of 10% bleach. An alternative approach for remote sites and where carrying a tub of bleach is impractical is to spray rinsed equipment with a concentrated (25-30%) bleach solution out of a large spray bottle and then let equipment dry between sites.
4. Do not rinse bleached equipment between sites. Instead allow the bleach to remain on the equipment to ensure that all fungal pathogens are killed. Most bleach will evaporate between sites so the amount of bleach introduced at the next site should be quickly diluted.

Handling Ill or Dying Animals

1. When handling ill or dying animals at a site use fresh rubber gloves for each animal to ensure that you are not transferring pathogens between individual animals.
2. Place individual animals in individual zip lock bags and keep them on ice continuously prior to shipping them to a pathologist for analysis.

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Detection Summaries for Watersheds Surveyed

A detection summary is included for the 4 watersheds surveyed within the boundaries of the Missoula Field Office of the BLM which contained BLM owned lands. Each watershed summary consists of a map paired with a table summarizing the results of the surveys as described below. The map and table can be used together to identify likely combinations of breeding, foraging, and overwintering habitats in the watershed given what is known about habitat use for each species so that likely impacts of a variety of human actions, including road building and maintenance and increased vehicle use, can be determined. See Maxell (2000) for a review of season habitat use and known migration distances for Montana amphibian species.

Each watershed map consists of:

1. A title identifying the major drainage in the watershed, the sampling strata and watershed numbers, and the 12 digit hydrological unit code watershed identification number.
2. A 1:24,000 scale topographic map image showing the outline of the 12 digit (6^{th} code) hydrologic unit watershed boundary.
3. Symbols showing the location and site identification number for each potential lentic site that was identified on topographic maps, aerial photographs, or incidentally while surveying the watershed.
4. A map legend identifying the map symbols as follows:
   - Black Circles = Potential lentic sites not surveyed due to reasons indicated in watershed notes or surveyed, but providing no breeding or overwintering habitat and not worth future survey due to reasons indicated in the watershed notes.
   - Black Square = Incidental observation of species indicated.
   - Brown Circle = Ephemeral lentic site that may support larval development in a wetter year, but was dry at the time of the survey.
   - Light Blue Circle = Ephemeral, or possibly a shallow permanent, lentic site that is likely to support larval development, but is unlikely to support aquatic overwintering.
   - Green Circle = Permanent lentic site with emergent vegetation that could support larval development and aquatic overwintering.
   - Dark Blue Circle = Permanent lentic site without emergent vegetation that could support larval development and aquatic overwintering.

Each watershed summary table consists of:

1. A title identifying the major drainage in the watershed, the sampling strata and watershed numbers, and the 12 digit hydrologic unit code watershed identification number.
2. The number of potential lentic sites identified on topographic maps, aerial photographs, or incidentally while in the field that were surveyed.
3. The number of wet lentic sites that would support amphibian reproduction.
4. The number of dry lentic sites that would support amphibian reproduction in a wetter year.
5. The number of permanent lentic sites that have potential for supporting amphibian aquatic overwintering.
6. The number of fishless potential amphibian aquatic overwintering sites.
7. Site numbers for all permanent potential amphibian aquatic overwintering sites and those permanent potential amphibian aquatic overwintering sites with and without emergent vegetation.
8. Site numbers, and total numbers and percentages of sites where each herpetofauna and fish species was detected and detected breeding.
9. Notes indicating why some potential lentic sites were not surveyed.
10. Notes indicating why some potential lentic sites surveyed are not worth future survey.
11. Notes identifying what flowing waters in the watershed might potentially support aquatic overwintering.
12. Notes indicating how various percentages were calculated.
13. Notes identifying previous observations and museum voucher records of herpetofauna in the watershed.
14. A summary of fish stocking records in the watershed from the statewide DFWP fish stocking database.
15. Notes identifying sites that were noted as having been heavily impacted by grazing.
16. Other notes of observations of particular interest in the watershed.

Blackfoot River (Arrastra Creek) - (HUC ID = 4_047 & ICBEMP HUC ID =170102032401)

2004 Water Body and Survey Summary

Number of Potential Lentic Sites Surveyed	7	Number of Fishless Potential Lentic Overwintering Sites	4
Number of Wet Lentic Sites	7	Potential Lentic Overwintering Sites	002, 007, 015, 023
Number of Dry Lentic Sites	0	Permanent Lentic Sites with Emergent Vegetation	002, 007, 015, 023
Number of Potential Lentic Overwintering Sites	4	Permanent Lentic Sites without Emergent Vegetation	None

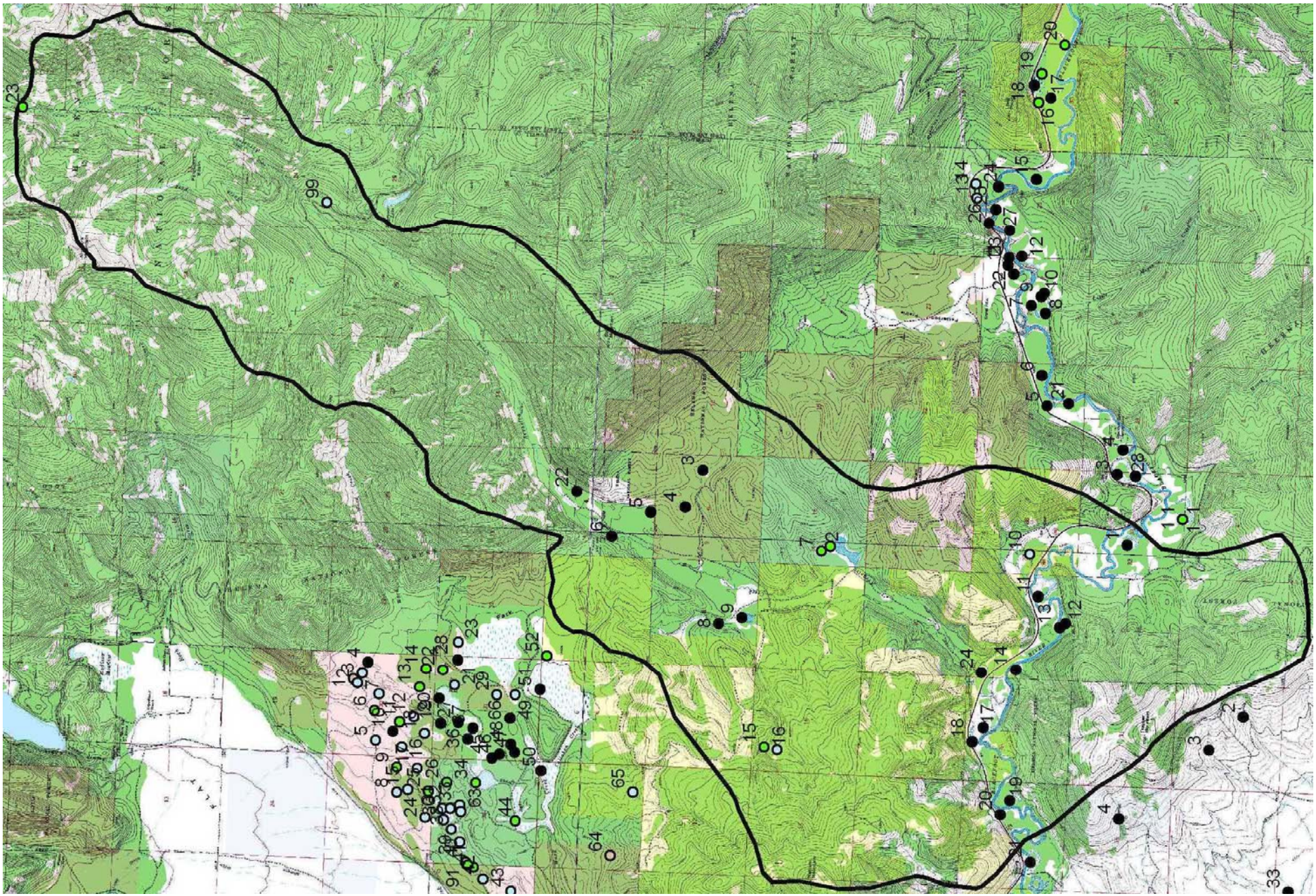
2004 Species Detection Summary

Species	Lentic Sites Where Detected (Underlined = breeding)	Number and % of Lentic Sites Where Detected	Number and % of Lentic Sites with Breeding Detected	Comments
Long-toed Salamander (AMMA)	<u>023</u>, <u>099</u>	2 (29%)	2 (29%)	-
Columbia Spotted Frog (RALU)	023, 099	2 (29%)	0 (0%)	-
Common Gartersnake (THSI)	010	1 (14%)	-	-
Fish Detected	None	0 (0%)[4]	-	-

Notes:

1. Sites 001, 005, 006, 008, 009, 011-014, and 017-022 are all on private land and were not surveyed in 2004.
2. Sites 003, 004, and 024 were not surveyed due to confusion over land ownership in our conversations with Jim Sparks.
3. Other Potential aquatic overwintering areas include Arrastra Creek below 5,400 feet and the Blackfoot River within the watershed boundary.
4. Number of potential lentic overwintering sites (i.e. those capable of supporting fish) was used to calculate percentage of sites occupied by fish.
5. The statewide DFWP fish stocking database has 11 different records stocking cutthroat trout, and 13 different records of stocking rainbow trout in Arrastra Creek between 1968 and 1969.

Blackfoot River (Arrastra Creek) - (HUC ID = 4_047 & ICBEMP HUC ID =170102032401)



Chamberlain Creek - (HUC ID = 4_052 & ICBEMP HUC ID =170102031202)

2004 Water Body and Survey Summary

Number of Potential Lentic Sites Surveyed	0	Number of Fishless Potential Lentic Overwintering Sites	0
Number of Wet Lentic Sites	0	Potential Lentic Overwintering Sites	None
Number of Dry Lentic Sites	0	Permanent Lentic Sites with Emergent Vegetation	None
Number of Potential Lentic Overwintering Sites	0	Permanent Lentic Sites without Emergent Vegetation	None

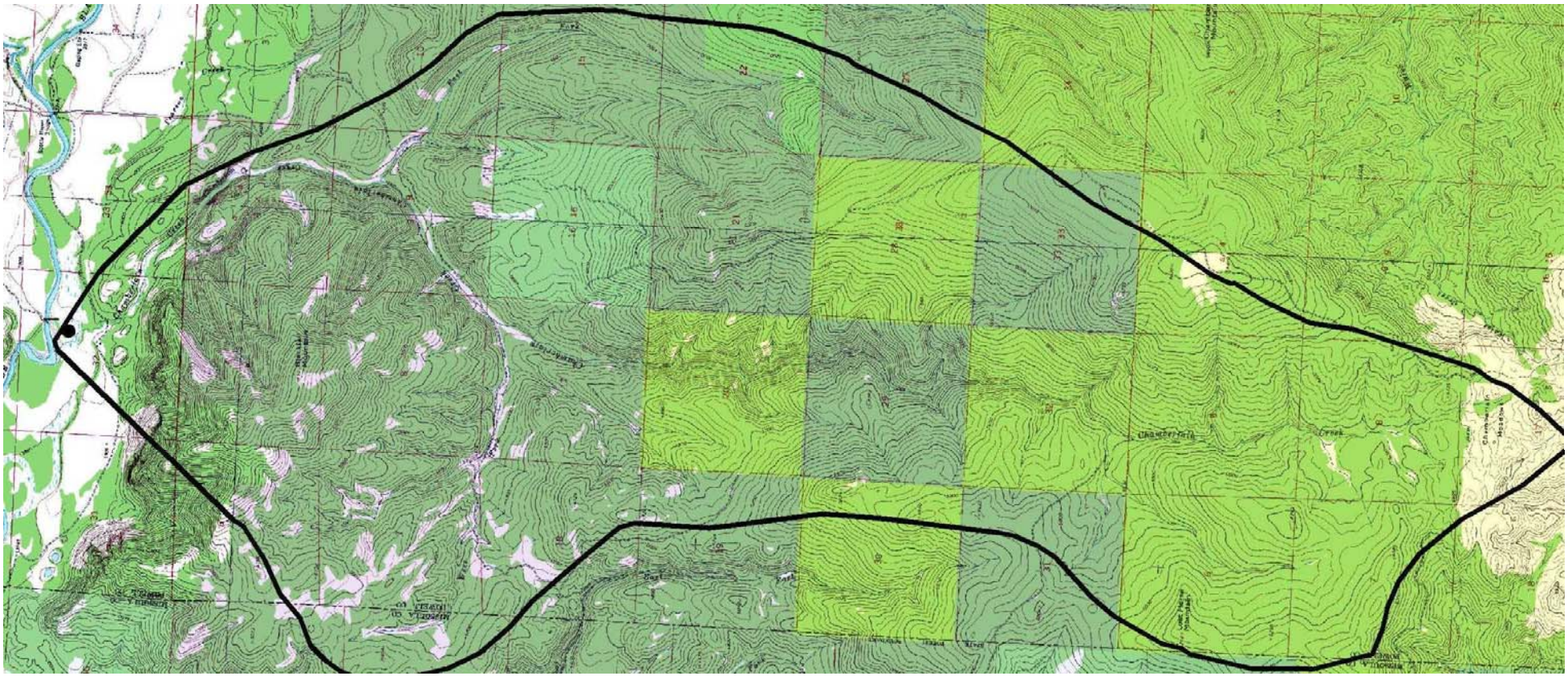
2004 Species Detection Summary

Species	Lentic Sites Where Detected (Underlined = breeding)	Number and % of Lentic Sites Where Detected	Number and % of Lentic Sites with Breeding Detected	Comments
No Herpetofauna Species were Detected in this Watershed	**No Herpetofauna Species were Detected in this Watershed**	-	-	-
Fish Detected	None	-	-	-

Notes:

1. Site 001 is on private land and was not surveyed in 2004.
2. Huc was ground thruthed in 2004 by RPK, and no additional waterbodies were detected on public land.
3. Beyond site 001, other potential aquatic overwintering areas in the watershed include Chamberlain Creek below 4,400 feet.
4. Museum voucher records of Columbia spotted frogs (RALU) were collected at a small pond off a BLM road in the Garnett Mountains (T013N R013W sec 07 SENE) on 8/23/1995 (IMNH 1743) and at Lower Chamberlain Meadows on 8/24/1995 by J.D. Reichel (IMNH 765)
5. The statewide DFWP fish stocking database has 2 different records of stocking cutthroat trout and 3 different records of stocking rainbow trout in Chamberlain Creek between 1938 and 1948.

Chamberlain Creek - (HUC ID = 4_052 & ICBEMP HUC ID =170102031202)



Ward Creek - (HUC ID = 4_996 & ICBEMP HUC ID =170102031604)

2004 Water Body and Survey Summary

Number of Potential Lentic Sites Surveyed	45	Number of Fishless Potential Lentic Overwintering Sites	14
Number of Wet Lentic Sites	40	Potential Lentic Overwintering Sites	006, 009, 011, 013, 014, 022, 025, 026, 034, 041, 044, 052, 053, 091
Number of Dry Lentic Sites	2	Permanent Lentic Sites with Emergent Vegetation	006, 009, 011, 013, 014, 022, 025, 026, 034, 041, 044, 052, 053, 091
Number of Potential Lentic Overwintering Sites	14	Permanent Lentic Sites without Emergent Vegetation	None

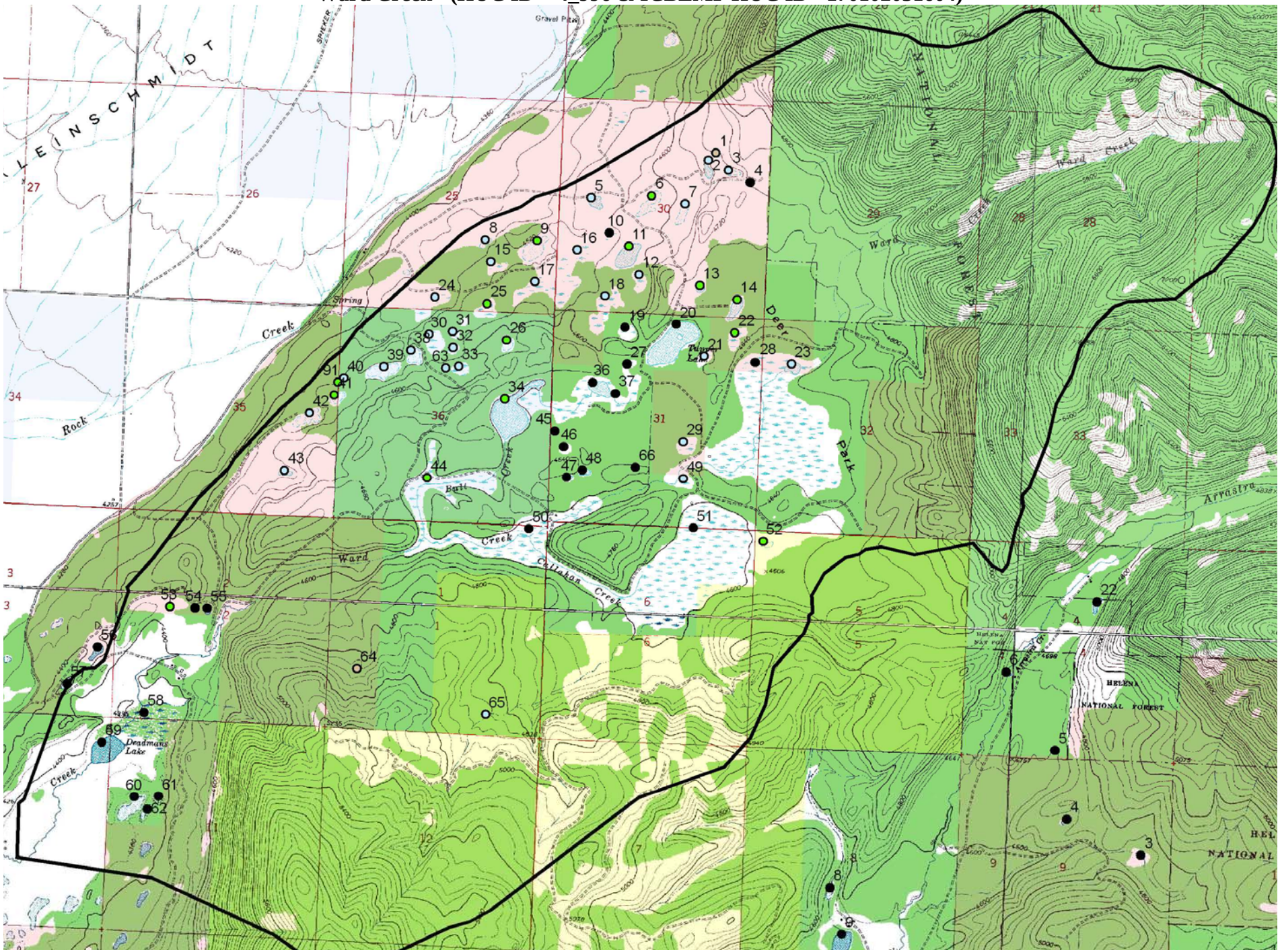
2004 Species Detection Summary

Species	Lentic Sites Where Detected (Underlined = breeding)	Number and % of Lentic Sites Where Detected	Number and % of Lentic Sites with Breeding Detected	Comments
Long-toed Salamander (AMMA)	005, 008, 040	3 (7%)	3 (7%)	-
Columbia Spotted Frog (RALU)	002, 003, 006, 007, 015, 017, 018, 023, 026, 028, 029, 034, 038, 041, 043, 044, 049, 052	18 (45%)	4 (10%)	-
Painted Turtle (CHPI)	002, 005, 008, 040	4 (10%)	-	
Common Gartersnake (THSI)	003, 011, 014, 018, 021, 063	6 (15%)	-	-
Incidental Herpetofauna Observations	1 x Observation of Western Toad (BUBO)	-	-	-
Fish Detected	020 (Cutthroat and Rainbow Trout) [7], 059 (Cutthroat and Rainbow Trout) [7]	2 (14%)[6]	-	-

Notes:

1. Site 034 and 035 were combined under site number 034.
2. Site 010 is not a lentic site. It is lotic and is not worth future survey.
3. Site 004 is lentic but will not hold enough water long enough to support amphibian reproduction and is not worth future survey.
4. Sites 019, 020, 027, 029, 036, 037, 045-048, 050, 051, 054-062, and 066 are on private land and were not surveyed in 2004.
5. Other potential aquatic overwintering areas occur along Ward Creek below site 023.
6. Number of potential lentic overwintering sites (i.e. those capable of supporting fish) was used to calculate percentage of sites occupied by fish.
7. The statewide DFWP fish stocking database has 1 record of stocking 1,548 cutthroat trout and 8 different records of stocking rainbow trout in Tupper Lakes (site 020) between 1933 and 1966, 1 record of stocking 312 cutthroat trout and 1 record of stocking 4, 480 rainbow trout in Green Lake between 1942 and 1950, 4 different records of stocking cutthroat trout in Bull Creek between 1934 and 1958, 7 different records of stocking cutthroat trout and 5 different records of stocking rainbow trout in Deadman Lake (site 059) between 1931 and 1960.

Ward Creek - (HUC ID = 4_996 & ICBEMP HUC ID =170102031604)



Wales Creek - (HUC ID = 4_998 & ICBEMP HUC ID =170102031802)

2004 Water Body and Survey Summary

Number of Potential Lentic Sites Surveyed	0	Number of Fishless Potential Lentic Overwintering Sites	0
Number of Wet Lentic Sites	0	Potential Lentic Overwintering Sites	None
Number of Dry Lentic Sites	0	Permanent Lentic Sites with Emergent Vegetation	None
Number of Potential Lentic Overwintering Sites	0	Permanent Lentic Sites without Emergent Vegetation	None

2004 Species Detection Summary

Species	Lentic Sites Where Detected (Underlined = breeding)	Number and % of Lentic Sites Where Detected	Number and % of Lentic Sites with Breeding Detected	Comments
No Herpetofauna Species were Detected in this Watershed	**No Herpetofauna Species were Detected in this Watershed**	-	-	-
Fish Detected	None	-	-	-

Notes:

1. Watershed was ground truthed in 2004 by RPK, and no additional water bodies were detected on public lands.
2. Sites 001-017 are on private land and were not surveyed in 2004.
3. Other potential aquatic overwintering areas occur in Wales Creek below site 001.
4. The statewide DFWP fish stocking database has 5 different records of stocking cutthroat trout and 1 record of stocking 1,488 rainbow trout in Wales Creek between 1928 and 1950.

Wales Creek - (HUC ID = 4_998 & ICBEMP HUC ID =170102031802)