Great Basin National Park Amphibian Inventory
2002/2003 Final Report

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Abstract

The 2001 Mojave Inventory and Monitoring Network Biological Inventory Study Plan identified amphibians as GRBA's highest inventory priority with 0 of 8 (0%) potential amphibian species documented. Funding was jointly provided for 2002 and 2003 by GRBA and the Servicewide I&M program. Inventory efforts focused on surveying potential amphibian breeding habitat and documenting new species from within GRBA through data mining or field surveys. Potential breeding habitat was identified only in the alpine lakes (Stella, Theresa, Brown, Dead, Johnson, and Baker Lakes). One amphibian species (*Spea intermontana*) was documented from the Administrative Site in Baker. Data mining was conducted at twenty museums. Visual Encounter Surveys (VES) were used during the amphibian inventory. Data entry is complete.

PMIS#-
Funding Source-Servicewide I&M
FY2002

Introduction

In fiscal year 2000, a nationwide program to inventory vertebrates and vascular plants within the national parks was begun. An inventory plan ("Mojave Inventory and Monitoring Network Biological Inventory Study Plan") was developed in 2001 for the Mojave Network, including Great Basin National Park (GRBA). GRBA identified inventory of amphibians as its highest inventory priority with an assessment of inventory completeness indicating that 0 of 8 (0%) potentially occurring amphibian species in the park had been documented (through museum specimens and/or scientific literature).

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Budget

The total budget for inventory of amphibians at GRBA was $27,454. This figure represents $15,454 from the Servicewide I&M Program in addition to $12,000 (represents 37% of project total) contributed by GRBA in the form of a GS-404-06 Biological Technician hired as field crew leader on this project.

Technical assistance was provided by Mike Adams, Forest and Rangeland Science Center, Corvallis, Oregon.

Objectives

(1) Inventory and document the occurrence of 90% of amphibian species at GRBA.
(2) Provide one voucher specimen for each species identified. Information provided for each voucher should follow guidelines provided in the Mojave Network Biological Inventory Study Plan.

(3) Provide a list of sensitive species that are known to be federally or state listed, rare, or worthy of special consideration that occur within priority sampling locations. Provide a GIS-compatible digital file of the precise coordinates for all species of special concern.
(4) Enter all species data into the National Park Service NPSpecies database.
(5) Provide all deliverables as outlined in the Mojave Network Biological Inventory Study Plan.

Sampling Design and Methods

Primary efforts were directed at identifying potential breeding habitat by walking perennial streams to identify associated springs and seeps and searching benches or other flat areas that may have unmapped ponds. Streams within the park are high gradient systems that cannot host breeding populations of amphibians although adult anurans may use them for feeding in late summer. Potential amphibian breeding habitat was documented using a global positioning system (GPS).

Potential breeding habitat was identified only in the alpine lakes (Stella, Theresa, Brown, Dead, Johnson, and Baker Lakes) during the 2002 amphibian inventory.

Streams, ponds, lakes, and springs were searched using visual encounter surveys (Thoms el al. 1997). Two observers slowly searched all shallow areas for eggs, larvae, and adult amphibians. Potential breeding locations were identified in 2002 and targeted for further sampling in 2003. Although listening for vocalizations associated with breeding aggregations of amphibians (Rosen and Lowe 1995) is an important sampling technique in many areas, it was not utilized during this inventory. Investigators and park staff also collected information opportunistically (ie. roadkill specimens).

In addition to VES, an amphibian survey was conducted at over 150 springs as part of GRBA's aquatic inventory. Amphibians were also noted during electrofishing surveys as part of the Bonneville cutthroat trout restoration program.

Protocols, datasheets, and databases used were developed by USGS for Amphibian Research & Monitoring Initiative (ARMI) under the direction of Mike Adams Ph.D., Forest and Rangeland Science Center, Corvallis, Oregon. All data collected was recorded on field forms and entered into a Microsoft Access 2000 database.

Results

In 2002 90% of potential amphibian habitat was surveyed. 171.5 person hours were spent searching this habitat. Eight lakes, nine perennial streams, and thirteen springs were searched. Only two streams were surveyed on the west side of the park (Pine & Ridge Creeks), which although identified as a priority area due to the dearth of past search efforts, was deemed unlikely to support amphibian populations because of the high elevation, steep gradient, low volume, and isolation of the streams.

The only potential amphibian breeding habitat identified in the park were high elevation, alpine lakes: Stella, Theresa, Brown, Dead, Johnson, and Baker Lakes. Stella, Theresa, Brown, and Dead Lakes are fishless and are considered more likely to support amphibians than Johnson and Baker Lakes, which contain non-native trout. GRBA springs and streams are generally too steep to support breeding amphibians.

During 2002, we cooperated with spring and fisheries restoration crews to supplement our efforts. Spring crews conducted a quick visual survey at each spring they visited (13 springs in 2002) and fisheries crews were asked to report any amphibians they observed during electroshocking surveys. Neither crews observed any amphibians during 2002.

In 2003 all potential amphibian breeding habitat was surveyed (Stella, Theresa, Brown, Dead, Johnson, and Baker Lakes). Stella, Theresa, Brown, and Dead Lakes are fishless and were considered more likely to support amphibians than Johnson and Baker Lakes, which contain non-native trout. GRBA springs and streams are generally too steep to support breeding amphibians. During 2003, 7.5 search hours and 14.5 person hours were spent on VES. No amphibians were observed.

Crews conducting aquatic inventories in 2003 surveyed over 150 springs and observed no amphibians.

Crews conducting electrofishing surveys as part of the Bonneville cutthroat trout restoration program observed no amphibians.

Anecdotal reports of amphibians by park staff in Lehman Creek, Strawberry Creek, and Shingle Creek were not confirmed during surveys.

One *Spea intermontanus* was observed in a pitfall trap on 30 April 2003 (N-4322369, E-748732, elevation-1608, Zone 11, NAD 1983, UTM). The individual was photographed and released. A photovoucher of this specimen will be accessioned at BYU.

Data Mining

Museum searches were conducted at the following institutions: American Museum of Natural History, Auburn University , Bringham Young University, California Acadamy of Sciences, Carnegie Museum of Natural History, Cornell University, Chicago Field Museum of Natural History, University of Kansas, University of New Mexico, Berkely Museum of Vertebrate Zoology, San Diego Natural History Museum, University of Arizona , University of Michigan, Utah Museum of Natural History, University of Nevada-Reno, Smithsonian Museum of Natural History, University of Texas-Arlington, University of Nevada-Las Vegas (Barrick Museum), Nevada State Museum, and Natural History Museum of Los Angeles County. No amphibians from GRBA were documented in these searches. Pertinent amphibian records from are surrounding GRBA may be found in Table 1. Table 2 shows all the museums searched. All museum records and the museums searched were recorded into Microsoft Excel. A digital copy of these records was saved on CD and is kept with this report. Bryan Hamilton digitized many of the records generated from Snake and Spring valleys, near GRBA, into a map (appendix 1.). An identification guide was created in 2002 to allow park employees and visiting researchers to identify all the potential amphibians found in GRBA and the surrounding valleys. The guide is available through the GRBA Resource Management office.

Data Management

All data was recorded on field forms and entered into a Microsoft Access 2000 database. All data was checked for accuracy. A copy of this database was saved on CD and is kept with this report. All field forms are kept with this report.

Update on Potentially Occurring Species

In 2002 a potential species list for GRBA was generated by Bryan Hamilton based upon literature review, conversations with local amphibian experts, museum searches, and personal observations. A discussion of this list follows:

Ambystoma tigrinum (Tiger Salamander). **Not found near GRBA**. Occur in many habitats, breeds in fishless, still water, below 12,000 feet. Adults are highly fossorial, larvae and egg masses could occur in early spring, in Dead, Theresa, Stella, and Brown Lakes. Absent from much of the Great Basin, disjunct record south of the park (Stebbins 2003) also found along the Wasatch Front in the extreme eastern Great Basin.

Bufo boreas (Western Toad). **Not found near GRBA**. Stella, Theresa, Brown, Dead, Johnson, and Baker Lakes are suitable breeding habitat however the absence of any reports of amphibians or larvae from these lakes makes their occurrence suspect. Occurs in desert streams, springs, and mountains, below 11,800 feet. Adults are fossorial distribution surrounds park and West Desert region (Stebbins 1985). Nearest museum records are from Ruby mountains, extreme northwestern White Pine county (MVZ 11955) over 100 miles from GRBA. Bryan Hamilton attempted to verify a "dot" in Stebbins 2003 from near Gandy. The Utah Division of Wildlife Resources and Robert Stebbins were unable to provide a record supporting this dot. Bryan Hamilton considers the dot to be erroneous as no specimen or record exists to corroborate it.

Bufo woodhousei (Woodhouse's Toad). Unlikely to occur in GRBA. Occur in sandy shrub and woodland habitats, breeds in quiet streams, marshes, pools, and ditches, below 8,500 feet. Adults are terrestrial. Nearest museum record to GRBA from Warm Creek, Millard county, Utah (UMMZ 84788) , 35 miles north of GRBA, were it may still occur.

Pseudacris regilla (Pacific treefrog). **Not found near GRBA**. Occur in shrub and woodland, breeds in slow streams, wetlands, and ditches, below 11,600 feet, often in low vegetation near water. Found in western White Pine county (BLM 1992).

Rana pipiens (Northern Leopard Frog). Unlikely to occur in GRBA. Occur in woodland, grassland, and shrub habitats in springs, slow streams, wet meadows, and marshes with permanent water and aquatic vegetation, below 11,000 feet. Found in Spring and Snake Valley marshes, nearest museum record from Shoshone ponds, 5 miles west of GRBA, however there is no stream connection between GRBA and these ponds.

Rana luteiventris (Columbia Spotted frog). Unlikely to occur in GRBA. Occur in shrub, forest, and woodland habitats in slow streams, springs, marshes, and ponds, below 6,000 feet. Adults are highly aquatic. Nearest museum record, Lake Creek, near source, Millard county, Utah (University of Nevada-Reno specimen #3551), 10 miles from GRBA, and Bishop Springs, Snake Valley, Millard county, Utah 40 miles northeast of GRBA (Utah Department of Natural Resources 2000).

Rana catesbeiana (Bullfrog). May occur in GRBA. Introduced in many habitats in permanent water, below 9,000 feet. Responsible for many native amphibian and fish declines. Observed in Strawberry Creek below park boundary (Setser et al 2002).

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Spea intermontana (Great Basin Spadefoot). Documented from GRBA only from the Administrative Site in Baker. Occur in loose, alkaline soils in shrub, woodland, and forests, breed in temporary or permanent water, often after spring rains. Adults are highly fossorial and may aestivate for a full year.

General Discussion

The following is a general discussion of amphibians from Great Basin National Park, Snake Range, Spring Valley, and Snake Valley.

Great Basin National Park

The only amphibian documented from Great Basin National Park (*Spea intermontana*) was documented in 2003 at the Baker Administrative Site. *Spea intermontana* is generally restricted to the sandier soils of valleys and alluvial fans but may occur in the park along sandy riparian corridors, such as Strawberry Creek and Snake Creek. No other amphibians have been documented in the park. Anecdotal reports of frogs jumping into streams, Shingle Creek, Lehman Creek, and Strawberry Creek, by reputable park biologists bear mention. It is possible that these individuals were seeing voles (*Microtus ssp*) or water shrews (*Sorex palustris*).

The absence of museum records, historic accounts, and visitor descriptions of amphibians from the park (Hovingh 1997) **as well as a the failure of this inventory to document amphibians within the mountainous portions of the park leads to the conclusion that amphibians were historically and presently are absent from the mountains of the Snake Range, including the majority of Great Basin National Park.**

Snake Valley and Spring Valley

Five species of amphibians are documented from Snake Valley. *Spea intermontana* occurs throughout the valley in sandier soils and breeds in permanent and ephemeral water sources. *Rana pipiens* presently occurs in Bishop Springs and the springs along the Salt Lake Marsh in North Spring Valley. *Rana luteiventris* occurs sympatrically with *Rana pipiens* in Bishop Springs and along the Salt Lake Marsh. *Rana luteveintris* was vouchered from Lake Creek in 1953 although it may be extirpated from there. *Bufo woodhousei* was vouchered from Warm Creek, Snake Valley in 1938 and has not been documented since. *Bufo boreas*, although shown as a dot near Gandy, Utah in Stebbins 2003 historically and presently is absent from Snake Valley. *Rana catesbeiana* is documented from Lower Strawberry Creek and Bishop Springs. This is an introduced species that is responsible for many native amphibian species declines. Two amphibian species are documented from Spring Valley. *Spea intermontana* occurs throughout Spring Valley in sandier soils and breeds in permanent and ephemeral water sources. *Rana pipiens* occurs at Shoshone Springs, Shoshone Ranch, and Cleveland Ranch.

The difference in amphibian diversity between Spring Valley (2 species) and Snake Valleys (4 native species) is comparable to the difference in fish diversity, Spring Valley (1 native species) in and Snake Valley (7 native species). This difference can be explained by examining the area of the Pleistocene lakes which covered Spring and Snake Valleys thousands of years ago. Lake Bonneville extended into Snake Valley and had an area of 19,970 miles ^{2} while Spring Lake, which covered Spring Valley, had an area of 233 miles ^{2} (Grayson 1993). Larger lakes are correlated with more fish and amphibian species. It should be noted that several fish (*Cottus bairdi semiscaber)* and amphibian *(Bufo woodhousei*) species have likely been extirpated from Snake Valley.

Literature Cited

Setser et al. 2002 Herpetofauna of the Southern Snake Range of Nevada and Surrounding Valleys. Western North American Naturalist. Volume 62 (2), pages 234-239.

Stebbins, R.C. 2003. Field Guide to Western Reptiles and Amphibians, Second Edition. Houghton Mifflin Co., Boston, Massachusetts.

Thoms, C., C. C. Corkran, and D. H. Olson. 1997. Basic amphibian survey for inventory and monitoring in lentic habitats. Pages 35-46 in D. H. Olson, W. P. Leonard, and R. B. Bury, editors. Sampling amphibians in lentic habitats: methods and approaches for the Pacific Northwest. Society for Northwestern Vertebrate Biology, Olympia, WA.

Utah Department of Natural Resources. 2000. Columbia Spotted Frog (*Rana luteiventris*) Conservation Agreement and Strategy Annual Progress Report 2000. Utah Division of Wildlife Resources-Native Aquatic Species Publication # 01-12.

Hovingh, P. 1997. Amphibians of the Eastern Great Basin (Nevada and Utah): A geographical study with Paleozoological models and conservation implications. Herp. Nat. History 5(2):97-134.

Grayson, Donald K. 1993. The Deserts Past. Smithsonian Institute Press, Washington, London.

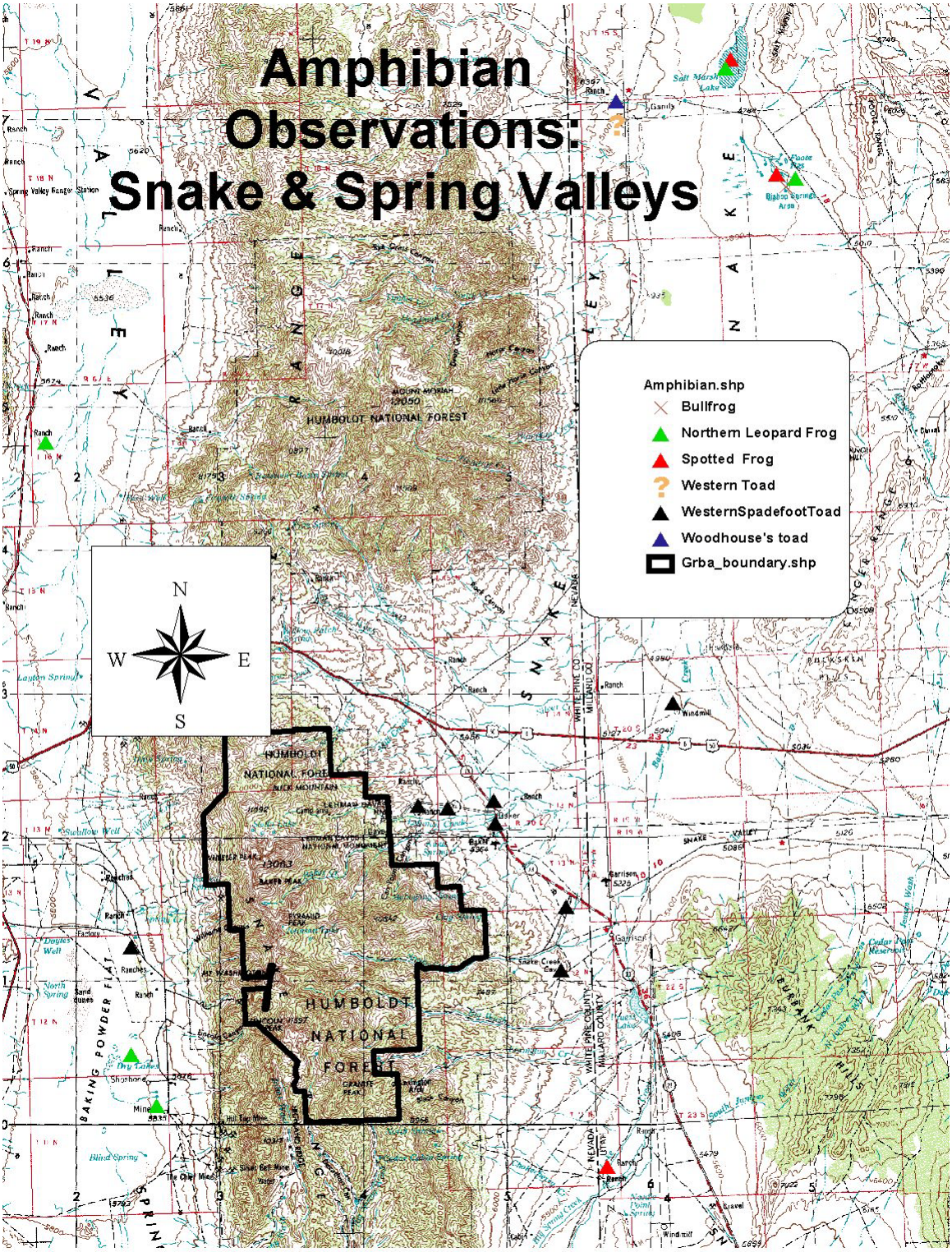

Figure 1: Amphibian Observations: Snake & Spring Valleys

Table 1. Amphibian Vouchers near GRBA

	CollectingEventID	CollectionObjectID	ContainerType
BYU		Bufo woodhousei	USA Utah Millard: Gandy
BYU		Bufo woodhousei	USA Utah Millard: Gandy
BYU		Spea intermontana	USA Utah Millard: 10 mi S of Gandy.
BYU		Spea intermontana	USA Utah Millard: 10 mi S of Gandy.
BYU	784	Spea intermontana	USA Utah Millard: 10 mi S of Gandy.

	number	genus	species	month	day	year	state	county	locality
UMMZ	139096	BUFO		JUNE	26	1942	NEVADA	WHITE PINE	BUTTE VALLEY STRATTON RANCH SPRING CREEK
UMMZ	91749	BUFO	BOREAS	JUNE	26	1942	NEVADA	WHITE PINE	OWENS RANCH BUTTE VAL
UMMZ	91750	BUFO	BOREAS	JUNE	26	1942	NEVADA	WHITE PINE	STRALTON RANCH BUTTE VAL
UMMZ	139102	RANA		JUNE	8	1942	NEVADA	WHITE PINE	6 MI ABOVE IBAPAH SPRINGS ALONG W DEEP CREEK
UMMZ	84848	RANA	PIPIENS	JULY	8	1938	NEVADA	WHITE PINE	SHOSHONE SPR
UMMZ	91729	RANA	PRETIOSA	JUNE	8	1942	NEVADA	WHITE PINE	1/4 MI FROM UTAH LINE W DEEP CR
UMMZ	91788	RANA	CATESBEIANA	JUNE	10	1942	UTAH	JUAB	FISH SPRINGS
UMMZ	84788	BUFO	WOODHOUSII	JULY	7	1938	UTAH	MILLARD	WARM CR
UMMZ	91744	SPEA	INTERMONTANA	JUNE	13	1942	UTAH	MILLARD	KNOLL SPR 12 1/2 MI N E NEVADA LINE SNAKE VAL
UMMZ	91781	SPEA	INTERMONTANA	JUNE	13	1942	UTAH	MILLARD	12 1/2 MI N E NEVADA LINE SNAKE VAL
UMMZ	176693	RANA	PIPIENS	JULY	17	1960	UTAH	MILLARD	GANDY (WARM CREEK RANCH)
UMMZ	91728	RANA	PRETIOSA	JUNE	13	1942	UTAH	MILLARD	W SIDE SALT FLAT N E GANDY
UMMZ	70523	AMBYSTOMA	TIGRINUM	JULY	31	1931	UTAH	MILLARD	1 MI W FILLMORE
UMMZ	73259	AMBYSTOMA	TIGRINUM	JUNE	20	1932	UTAH	MILLARD	FLATS W OF FILLMORE

Museum	Cat. No.	Genus	Species	Original Locality
CAS-SUA	6450	Rana	pipiens	Shoshone Springs, White Pine Co., Nevada
CAS-SUA	6451	Rana	pipiens	Shoshone Springs, White Pine Co., Nevada
CAS	223402	Rana	pipiens	1.5 mi W of Hwy 894, 1.7 mi NW of Shoshone, Spring Valley, White Pine Co., NV 38 59.833 N 114 25.163 5780 ft
CAS	223378	Spea	intermontana	2.8 mi W of Hwy 487 on Hwy 488, W of Baker S. Snake Range White Pine Co., Nevada

UNR #	Species	Date	County/Parish	State/Province	Locality
3549	*Spea intermontana*	25 June 1953	White Pine	Nevada	Spring Creek Rearing Station, near Baker
3551	*Rana lutieventris*	18 June 1953	White Pine	Nevada	Lake Creek, near source, Snake Mountains
3552	*Rana lutieventris*	18 June 1953	White Pine	Nevada	Lake Creek, near source, Snake Mountains
7535	*Rana pipiens*	30 June 2001	White Pine	Nevada	Shoshone Ranch, route 894, ~ 46 mi SE Ely (1770 m)
7536	*Rana pipiens*	1 July 2001	White Pine	Nevada	Highline Road, Spring Valley, ~1 mi W route 894 (1773 m)
7585	*Rana pipiens*	11 July 2001	White Pine	Nevada	N Spring Valley, ~0.5 mi E and 30 mi N on route 893 (1716 m)
7586	*Rana pipiens*	11 July 2001	White Pine	Nevada	South Millick Spring, N Spring Valley, ~0.5 mi NE and 11 mi N on Eight Mile Ranch Road (1705 m)
7587	*Rana pipiens*	12 July 2001	White Pine	Nevada	Wamboldt Spring, C & A Ranch, route 93, 27.8 mi S Major's Place (1818 m)
7588	*Rana pipiens*	11 July 2001	White Pine	Nevada	~1 mi N Millick Springs, N Spring Valley, 1 mi W and 12 mi N on Eight Mile Ranch Road (1701 m)
7582	*Rana pipiens*	10 July 2001	White Pine	Nevada	N Spring Valley (just outside nudist colony), 19.5 mi N on route 893 (1709 m)

Cat_Num	genus	species	State_Prov	County	Spec_Locality	Collectors	Verbatim_Date
MVZ 11278	Spea	intermontana	Nevada	White Pine Co.	2.5 mi E Baker	E. Raymond Hall	30-May-29
MVZ 187458	Spea	intermontana	Nevada	White Pine Co.	near Baker	E. K. Teberg C. Hunter	20-Aug-65
MVZ 187459	Spea	intermontana	Nevada	White Pine Co.	near Baker	E. K. Teberg C. Hunter	20-Aug-65
MVZ 227628	Spea	intermontana	Nevada	White Pine Co.	1.2 mi E of Hwy. 93 on Hwy. 486	J. Robert Macey	16-Aug-83
MVZ 227629	Spea	intermontana	Nevada	White Pine Co.	1.2 mi E of Hwy. 93 on Hwy. 486	J. Robert Macey	16-Aug-83
MVZ 12281	Rana	pipiens	Nevada	White Pine Co.	Cleveland Ranch, Spring Valley	Robert D. Moore E. Raymond Hall	31-Jul-30
MVZ 227630	Spea	intermontana	Utah	Millard Co.	3.7 mi E of the Nevada state line on Hwy. 21	J. Robert Macey	14-Aug-83
MVZ 227631	Spea	intermontana	Utah	Millard Co.	17.0 mi E of the Nevada state line on Hwy. 21	J. Robert Macey	14-Aug-83

Table 2. Museums Searches

Museum Name	Acronym	Contact	e-mail
American Museum of Natural History	AMNH	Cole, Charles	
Auburn University	AUM	Guyer, Craig	cguyer@acesag.auburn.edu
Bringham Young University	BYU	Skidmore, Skip	wesley_skidmore@byu.edu
California Acadamy of Sciences	CAS	http://www.calacademy.org/research/herpetology/	
Carnegie Museum of Natural History	CM	Rogers, Steve	rogerss@carnegiemuseums.org
Cornell University	CU	Friel, John	jpf19@cornell.edu
Chicago Field Museum of Natural History	FMNH	Resetar, Alan	aresetar@fmnh.org
University of Kansas	KU	Simmons, John	jsimmons@eagle.cc.ukans.edu
University of New Mexico	MSB	Snell, Howard	msbherp@unm.edu
Berkely Museum of Vertebrate Zoology	MVZ	http://elib.cs.berkeley.edu/mvz/	
San Diego Natural History Museum	SDSNH	Hollingsworth, Brad	bhollingsworth@sdnhm.org
University of Arizona	UAZ	Bradley, George	gbradley@u.arizona.edu
University of Michigan	UMMZ	Scheider, Greg	ges@umich.edu
Utah Museum of Natural History	UMNH	Rickart, Eric	rickart@umnh.utah.edu
University of Nevada-Reno	UNR	Tracy, Dick	dtracy@unr.edu
Smithsonian Museum of Natural History	USNM	Crombie, Ronald I.	crombie.ron@nmnh.si.edu
University of Texas-Arlington	UTA	Ustach, Paul	PCUSTACH@uta.edu
University of Nevada-Las Vegas (Barrick Museum)		Heindl, Alex	heindla@nevada.edu.
Nevada State Museum		Austin, George	
Natural History Museum of Los Angelas County	LACM	Kizirian, David	kizirian@nhm.org