

**Report on 2003 Survey for
Cirsium Virginensis in
Lake Mead National Recreation Area**

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Lake Mead National Recreation Area
July 2003

Introduction

During the summer of 2003, a survey was conducted to assess the status of *Cirsium virginensis*, (Virgin thistle). The National Park Service lists *C. Virginensis* (figures 1a and 1b) as having priority status LAME-P1 (Lake Mead NRA priority 1 rare plant species) which is a plant having status with State of Arizona, Nevada, or with Nevada Natural Heritage Program, Clark County MSHCP; BLM or other agency, globally or regionally rare and/or considered sensitive. *Cirsium virginensis* is on the Heritage Program sensitive list; is a MSHCP evaluation species with low priority; and is a U.S. Fish and Wildlife species of concern. Surveys for this species were conducted in 1993 and 1997 but did not cover LMNRA.

Cirsium virginensis is a taprooted perennial with creeping roots, 6-20 dm tall and is endemic to southern Nevada, northern Arizona, and southern Utah in moist, alkaline soils of seeps, springs, and one hanging garden. In Nevada, the elevational range for Virgin thistle is 380-660 m, ca. 450 m in Arizona, and extends up to 950 m in Utah.

Cirsium virginensis (Figure 1) was described by Stanley L. Welsh in 1982. The holotype specimen was collected near St. George, Utah in a hanging garden in sandstone cliffs at 900 m elevation and resides at BYU Herbarium. In addition, isotypes were sent to 8 other institutions. *Cirsium virginensis* appears to be related to *C. mohavensis*; however, there are some differences. *Cirsium virginensis* is a perennial, and *C. mohavensis* is a biennial. Further, *C. virginensis* has strongly decurrent leaf bases (Figure 2) that sometimes extend the full length of the internode, while *C. mohavensis* has less decurrent leaf bases (Figure 3). Both species are taprooted and appeared to have creeping roots. More study is necessary to confirm both species perennial or biennial growth habit and taxonomic specificities.

It has been suggested that *C. virginensis* is a geographical variant of *C. mohavensis* (personal communication Patricia Barlow-Irick). David Keil is treating *C. virginensis* as a synonym for *C. mohavensis* in the upcoming Flora of North America believing that there is no way to separate the two (personal communication. D. Keil). Contrary to David Keil's opinion, Stanley Welsh is keeping the two species separate in the updated, not yet published, Utah Flora (personal communication S. Welsh). The species were described by Arthur Cronquist in the Intermountain Flora as two separate species. Arthur Cronquist could not find enough similarities to merge the two species (personal communication S. Welsh). For the purposes of this survey, *C. virginensis* will be treated as a separate species following the current published taxonomic distinctions, also, based on my field observations of both *C. virginensis* and *C. mohavensis* populations.

Methods

This survey was conducted within Lake Mead National Recreation Area (LMNRA) plus a few select locations on Bureau of Land Management (BLM) land within three miles of the park boundary. The survey was conducted between May 23, 2003 and August 21, 2003. The springs/seeps surveyed included areas where *C. virginensis* had been previously recorded in addition to new areas in proximity of the existing populations that met the substrate requirements in or near LMNRA. Location

information was obtained from various herbariums including University of Nevada, Las Vegas (UNLV), Lake Mead study collection, and the U.S. National Herbarium (NY) (table 1). Based on this information, I re-located all of the existing sites and surveyed them for *C. virginensis*. The survey included assessing the populations for number of *C. virginensis* individuals, associated plant species, soil type, and health of populations. Throughout this survey, plants without a stalk were classified as rosettes, and plants with a flowering stalk were classified as mature plants. All GIS data reported here are given in NAD 27.

Previously recorded sites (in or near LMNRA) where *C. virginensis* was found

1. Blue Point Springs- LMNRA- UTM Z11; 730,631E; 4,030,072N.
2. Slim Creek-Blue Point Springs Drainage- LMNRA- UTM Z11; 730,631E; 4,030,072N.
3. Rogers Spring- LMNRA- UTM Z11; 729,435E; 4,028,683N.
4. Rogers Spring Drainage- LMNRA- UTM Z11; 729,555E; 4,028,306N.
5. Honey Bee Pond- UTM Z11; 731,217E; 4,045,706N.
6. Mud Wash-Gold Butte- BLM- Road to Bitter Ridge. T17S, R70E, S25.
7. Tassi Spring- LMNRA- Grand Wash Area. T33N, R16W, S13.
8. Valley of Fire Wash-LMNRA- two localities- UTM Z11; 730,770E; 4,031,961N.
9. Wash N. of Blue Point Spring- LMNRA- UTM Z11; 731,069E; 4,030,841N.
10. Scirpus Spring- LMNRA- UTM Z11; 729,006E; 4,028,303N.

New sites searched (in or near LMNRA) where *C. virginensis* was found

1. Corral Spring- LMNRA- UTM Z11; 727,969E; 4,027,817N.

Previously recorded sites searched (in or near LMNRA) where no *C. virginensis* was found

1. Unnamed spring-LMNRA- East of Gnatcatcher Spring. UTM Z11; 731,055E; 4,028,972N.

New sites searched (in or near LMNRA) where no *C. virginensis* was found

1. Red Rock Spring- Gold Butte Area- BLM. UTM Z11; 749,231E; 4,038,243N.
2. Cottonwood Spring- LMNRA- Gold Butte Area. UTM Z11; 759,237E; 4,019,543N.
3. Whiskey Spring- LMNRA- Grand Wash Area. T34N, R16W, S26.
4. Burro Spring- LMNRA- Grand Wash Area. UTM Z11; 769,193E; 4,019,260N.
5. Gnatcatcher Spring-LMNRA- UTM Z11; 730,293E; 4,029,309N.
6. Unnamed Spring- LMNRA- UTM Z11; 730,035E; 4,026,491N.

***Cirsium mohavensis* site within LMNRA**

1. Grapevine Spring, near Pearce Ferry -LMNRA- UTM; 768,721E; 3,993,381N.

Population Data

Blue Point Springs and Slim Creek (Map 1)

Blue Point Springs is located in Clark County, Nevada on the northeast side of the Muddy Mountains in Lake Mead National Recreation Area. The spring flows in a southeast direction until reaching Lake Mead. The soil type consists of moist to muddy, alkaline soil. The typical plants associated with the spring are as follows: *Allenrolfea occidentalis*, *Washingtonia filifera*, *Anemopsis californica*, *Juncus nevadensis*, *Prosopis glandulosa*, *Vitis arizonica*, *Pluchea sericea*, *Acacia greggii*, *Solidago confinis*, and *Sporobolus airoides*.

Cirsium virginensis was scattered all along the above ground water course west of Northshore Road (NSR) and was restricted to within 1.5m of the water. *Cirsium virginensis* appeared to prefer open areas, in which it was the tallest plant and was not noted in areas with thick brush except for a few on the outskirts of the shrubs. A total of 197 plants were observed and of those, the number of rosettes totaled 101 and the number of mature plants totaled 96.

The continuation of the spring on the east side of NSR, also known as Slim Creek, supports one individual *C. virginensis* plant in close proximity to NSR and one *C. virginensis* population at UTM Z11; 731,633E;4,029,683N. This population totaled 23 plants (16 rosettes, 7 mature). The soil type consists of moist to muddy, alkaline soil. Associated plants at this location are as follows: *Allenrolfea occidentalis*, *Anemopsis californica*, *Juncus nevadensis*, *Acacia greggii*, *Solidago confinis*, *Pluchea sericea*, and *Vitis arizonica*.

There was evidence of burro activity (chewed & broken plants, and burro scat) as well as four burros present on site during the time of the survey.

Rogers Spring and Rogers Spring Drainage (Map 1)

Rogers Spring is located in Clark County, Nevada on the northeast side of the Muddy Mountains. The spring at 1,588ft (490m), flows southeast to Lake Mead. The soil type that encompasses the area consists of alkaline, gravelly, sandy soil with patches of gypsum throughout. Plants associated with *C. virginensis* at Rogers Spring are as follows: *Washingtonia filifera*, *Populus fremontii*, *Pluchea sericea*, *Juncus nevadensis*, *Phragmites australis*, *Vitis arizonica*, *Prosopis glandulosa*, *Allenrolfea occidentalis*, *Baccharis emoryi*, *Solidago confinis*, and *Sporobolus airoides*.

Cirsium virginensis appeared to prefer the open areas of the spring and was restricted to within 4 meters of the above ground water course. *Cirsium virginensis* was present around the pond and under the palm tree stands up to the point of the thick stands of *P. australis* and *V. arizonicus*. There were no *C. virginensis* evident among the thick stands of *P. australis* and *V. arizonicus*. *Cirsium virginensis* was observed after the *P. australis* and *V. arizonicus* thinned out. The total for the population west of NSR is 805 plants (533 rosettes, 272 mature).

The spring becomes a drainage system to the east of NSR where it supports a large number of *C. virginensis* plants scattered along the wash to Lake Mead. The following is the data from those locations from northernmost location in the wash (Location 1) to locations to the south and southeast:

Location 1: 348 rosettes, 48 mature.

Location 2: 143 rosettes, 221 mature.

Location 3: 7 rosettes, 10 mature.

Location 4: 69 rosettes, 89 mature.

Location 5: 30 rosettes, 142 mature.

Location 6: 3 rosettes, 26 mature.

Location 7: 42 rosettes, 205 mature.

There was above ground water in many areas of the drainage system. Moist, alkaline soils dominated the drainage system and *C. virginensis* was restricted to above ground water or within four meters of the water. Plants along this drainage system included the following: *Pluchea sericea*, *Juncus nevadensis*, *Vitis arizonica*, *Prosopis pubescens*, *Allenrolfea occidentalis*, *Anemopsis californica*, *Sporobolus airoides*, and *Distichlis spicata*.

There was evidence of burro activity at this location, such as trailing through vegetation and burro scat. Although this area is well traveled by the public, threats by people seem unlikely.

Valley of Fire Wash (Map 1)

Valley of Fire Wash is located in Clark County, Nevada and originates in the Valley of Fire State Park (VFSP). The wash is directed southeast towards Lake Mead ending at Fire Bay. The portion of the wash surveyed was limited to the border of LMNRA and VFSP and everything east of the border until reaching Lake Mead. *Cirsium virginensis* was located ca. one mile up the wash from NSR at an unnamed spring. There was some standing water at this site and the soil was very moist and probably alkaline. This site supported a large population of *C. virginensis* (estimated at 825 total rosettes + mature) as well as populations of *Yucca angustissima*, *Salsola tragus*, *Datura wrightii*, *Tamarix ramosissima*, *Anemopsis californica*, *Phragmites australis*, *Solidago confinis*, and *Distichlis spicata*.

There was strong evidence of burro activity (many chewed and broken plants, and burro scat) at this location: More so than any of the other sites surveyed.

Cirsium virginensis was also located at an unnamed spring ca. 1.3 miles east of NSR at UTM Z11; 733,044E; 4,031,345N. The population consisted of 43 plants (26 mature, 17 rosettes). There was some standing water and the soil was moist and apparently alkaline.

There is a potential threat of encroachment by *Tamarix ramosissima* which is moving inland from the shoreline. There was also evidence of burro activity such as, scat, trampling, and shallow holes dug to access sub-surface water.

Wash North of Blue Point Springs (Map 1)

This wash is located midway between Blue Point Spring and Valley of Fire Wash to the west of NSR. Three sub-populations are identified and are shown on Map 1. A sub-population was located at UTM Z11; 731,069E; 4,030,841N, was adjacent to NSR in alkaline moist soil, and supported 54 plants (22 mature and 32 rosettes). A second sub-population to the southwest of the first sub-population was located at UTM Z11; 730,951E; 4,030,742N and consisted of only 2 plants (1 rosette, 1 mature). There was very little standing water at this second location. The soil type consisted of alkaline soil with surrounding gypsum and desert shrub communities. The plants associated with *C. virginensis* at this location are as follows: *Distichlis spicata*, *Juncus nevadensis*, *Isocoma acradenia*, and *Allenrolfea occidentalis*. The third sub-population was located up the wash about 400m to the northwest of the second sub-population at UTM Z11; 730,838E; 4,030,717N. This location supported 453 individuals (380 rosettes, 73 mature). There was some standing water at this location. The plants associated with *C. virginensis* are as follows: *Prosopis glandulosa*, *Prosopis pubescens*, *Isocoma acradenia*, *Allenrolfea occidentalis*, *Distichlis spicata*, *Juncus nevadensis*, *Tamarix ramosissima*, and *Atriplex confertifolia*.

There was evidence of burro activity, such as scat and holes dug to access sub-surface water.

Corral Spring (Map 1)

Corral Spring is located on the northeast side of the Muddy Mountains approximately 1.5 miles southwest of Rogers Spring. The spring flows in a southeasterly direction until it infiltrates the soil and becomes a wash. There is a moderate population of *C. virginensis* (47 rosettes, 5 mature) at Corral Spring. The plants appeared to be in good health with little apparent damage from burros or Bighorn sheep, although, I observed Bighorn sheep at the spring, as well as burro and sheep scat, during the time of the survey.

The spring supported a variety of plant species including these: *Distichlis spicata*, *Juncus nevadensis*, *Isocoma acradenia*, *Allenrolfea occidentalis*, *Anemopsis californica*, *Phragmites australis*, *Prosopis pubescens*, *Scirpus americanus*, *Vitis arizonica*, and *Eleocharis rostellata*. The soil type consists of moist, alkaline and gypsum soils with a minimal amount of standing water.

Scirpus Spring (Map1)

Scirpus Spring is located on the northeast side of the Muddy Mountains approximately one mile southwest of Rogers Spring. The spring flows in a southeasterly direction until it infiltrates the soil and becomes a dry wash. There was a fairly large population of *C. virginensis* at Scirpus Spring that totaled 288 plants (243 rosettes, 45 mature). There was some evidence of trampling and breakage by animals, as well as burro and sheep scat.

Plants associated with *C. virginensis* at Scirpus Spring are as follows: *Distichlis spicata*, *Juncus nevadensis*, *Isocoma acradenia*, *Allenrolfea occidentalis*, *Anemopsis californica*, *Phragmites australis*, *Prosopis pubescens*, *Scirpus americanus*, *Vitis arizonica*, *Eleocharis rostellata*, *Atriplex hymenelytra*, *Phoenix dactylifera*, *Juncus nevadensis*, and *Pluchea sericea*. The soil consisted of moist, alkaline soil with patches of gypsum surrounding the spring. The gypsum areas supported plants such as these: *Enceliopsis argophylla*, *Krameria erecta*, *Atriplex hymenelytra*, and *Psoralea fremontii*.

Honey Bee Pond (Map 2)

Overton Wildlife Management Area (OWMA) is located in Clark County, Nevada near the town of Overton. OWMA consists of 29 ponds sectioned by dirt roads. Of the 29 accessible ponds only one, Honey Bee Pond, supported a population of *C. virginensis*. Honey Bee Pond is in the northeast corner of OWMA (pond 3). The soil type consisted of moist alkaline soil. Plants associated with *C. virginensis* at Honey Bee were as follows: *Washingtonia filifera*, *Pluchea sericea*, *Typha domingensis*, *Anemopsis californica*, *Heliotropium curassavicum*, and *Phragmites australis*. There was one small population at the pond which resides among the stand of *Washingtonia filifera*. *Cirsium virginensis* was again found in open areas near an above ground water source and few plants were found in areas thick with vegetation. The plants in this population totaled 38 (12 rosettes, 26 mature). There was evidence of rabbit activity at this site, as well as, the presence of several rabbits during the time of the survey. I observed lower leaves that appeared chewed on *C. virginensis*. However, this predation appeared to be no real threat to the plants.

Gold Butte – Mud Wash (Map 3)

Mud Wash is located in the Gold Butte area and originates on BLM land and proceeds through BLM and NPS land in a northwest direction until reaching Lake Mead. The wash is ephemeral and functions as a road in some areas. *Cirsium. virginensis* was found near the Mud Wash about ¾ mile south of Red Rock Springs along a seepage area on the west face of a sandstone cliff (Figure 3). The Mud Wash population of *C. virginensis* was restricted to the seepage area. The soil type consisted of moist, sandy alkaline soil. Plants associated with *C. virginensis* at this location were as follows: *Washingtonia filifera*, *Prosopis glandulosa*, *Typha domingensis*, *Anemopsis californica*, and *Distichlis spicata*.

There were four sub-populations within a mile of each other. The first sub-population had a total of 187 plants (175 rosettes, 12 mature) and is located at UTM Z11; 749,659E; 4,037,545N. The second sub-population had 77 plants (72 rosettes, 5 mature) and is located at UTM Z11; 749,693E; 4,037,269N. The third sub-population had 16 plants (14 rosettes, 2 mature) and is located at UTM Z11; 749,724E; 4,037,152N. The final sub-population had 31 plants (29 rosettes, 2 mature) and is located south of the fenced spring in a small gorge at UTM Z11; 749,770E; 4,037,003N.

There was evidence of burro and cattle activity.

Tassi Spring (Map 4)

Tassi Spring is located in Mohave County, Arizona west of the Gyp Hills and east of Grand Wash Bay. The spring can be found in T33N, R16W, S13 where it flows in a southwest direction for about ¼ mile before infiltrating the soil.

Cirsium virginensis was located in only one area of the spring on the back side of Tassi Ranch among running water in a clearing surrounded by mesquite at UTM Z12; 234,156E; 4,016,109N. *C. virginensis* was restricted to above ground water and within 0.5 meters of the water. Due to the dense patch of *C. virginensis* at this location, the following numbers are estimates: 220 total (150 rosettes, 70 mature). The soil type that surrounded the spring was moist to muddy, alkaline soil. Plants associated with *C. virginensis* at this location were as follows: *Prosopis glandulosa*, *Chilopsis linearis*, and *Solidago confinis*.

Results

Over a 10 day period, 20 sites were surveyed for *C. virginensis*. Of the 4,694 individuals found in this survey, most were near the Overton Arm portion of Lake Mead NRA.

Map 5 shows the current population distribution of *C. virginensis* in and around LMNRA as a result of this survey. *Cirsium virginensis* was abundant on the west side with one population on the east side of the Overton arm area of LMNRA and has one outlying population near the Grand Wash area at Tassi Spring. The soil types at each location surveyed are consistently moist and alkaline and the major plant associates are all very similar. *Cirsium virginensis* is also known to a few localities in southern Utah with the bulk of the species in the Lake Mead area.

In Utah, *C. virginensis* is restricted to the St. George area in Washington County, where there is a small population in a hanging garden. The population is somewhat impacted from garbage haphazardly discarded by people, but it has not been noted to harm the health of the population (personal communication S. Welsh).

One previously existing *C. virginensis* population (Juanita Springs Ranch) was not visited throughout this survey due to difficulty in accessing the area (located on fenced-off private property).

Management action needed

Burros should be actively removed from Lake Mead NRA in the Overton arm area south to Echo Wash, as well as the Mud Wash area. Roaming cattle should also be removed from the Mud Wash area.

Tamarix ramosissima was encroaching Spring A (see map 1) from Fire Bay and should be actively removed in the vicinity of the spring to prevent loss of plant diversity at this unique spring. There are two large *T. ramosissima* trees and a few seedlings at the spring in the wash south of Blue Point Spring, which supports a large population of *C. virginensis*.

Conclusions

The limited distribution and low population numbers of *C. virginensis* has led to my recommendation that *C. virginensis* be considered for upgrading to an MSHCP evaluation species of high priority. Further discussion is necessary to determine its status. If David Keil publishes *C. virginensis* as a synonym for *C. mohavensis* in the upcoming North American Flora, that would increase the distribution of this plant to include all *C. mohavensis* localities. *Cirsium mohavensis* is reported from southern California in Inyo, San Bernardino, and Los Angeles Counties. In Nevada it is known from Eureka, Mineral, Nye, Esmeralda, Lincoln and Clark Counties. In Arizona it is recorded from northwest Mohave County. *Cirsium mohavensis* specimen collection data from the Wesley E. Niles

Herbarium at UNLV show approximately 11 locations for *C. mohavensis*, in which most collectors noted *C. mohavensis* as common.

If the opinion of David Keil and The North American Flora is valued over the opinions of Welsh and Cronquist who believe this is a separate taxon, then *C. virginensis* should be considered for removal from the MSHCP evaluation list.

A morphological and genetic analysis is recommended for these two species to determine their taxonomic status. Also, I intend to continue to tag and monitor individuals of select *C. virginensis* and *C. mohavensis* populations to confirm their perennial or biennial classification. So far, six *C. mohavensis* individuals were tagged at Grapevine Spring and will be monitored over the next year.

Cirsium virginensis is found in unique and sensitive spring environments and is threatened in some locations by the encroachment of invasive species and trampling/grazing by burros. If after considering all taxonomic studies, *C. virginensis* is classified as a separate taxon, then the National Park Service supports actively protecting this species.



Figure 1- C. virginensis at Blue Point Spring



Figure 2- C. virginensis, decurrent leaves

Dianne Bangle
Cirsium virginensis survey
8/28/03



Figure 3- C. mohavensis at Grapevine Springs, stem



Figure 4- C. mohavensis at Grapevine Spring, rosettes



Figure 2- C. virginensis at Rogers Spring

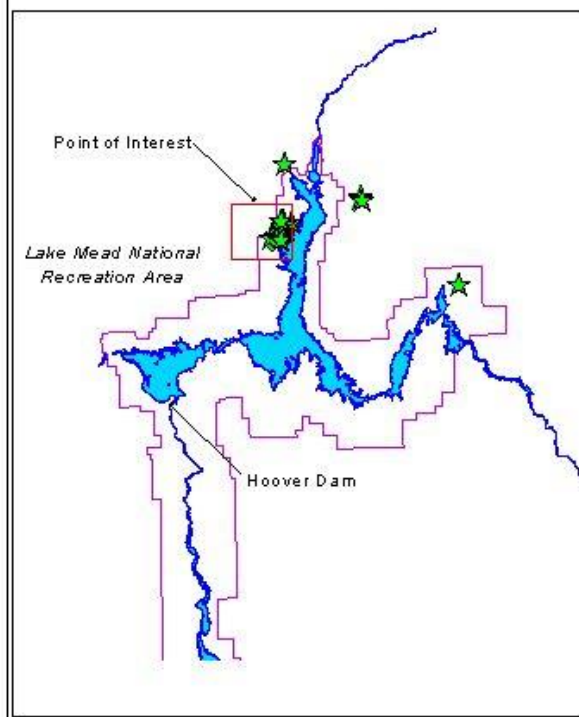
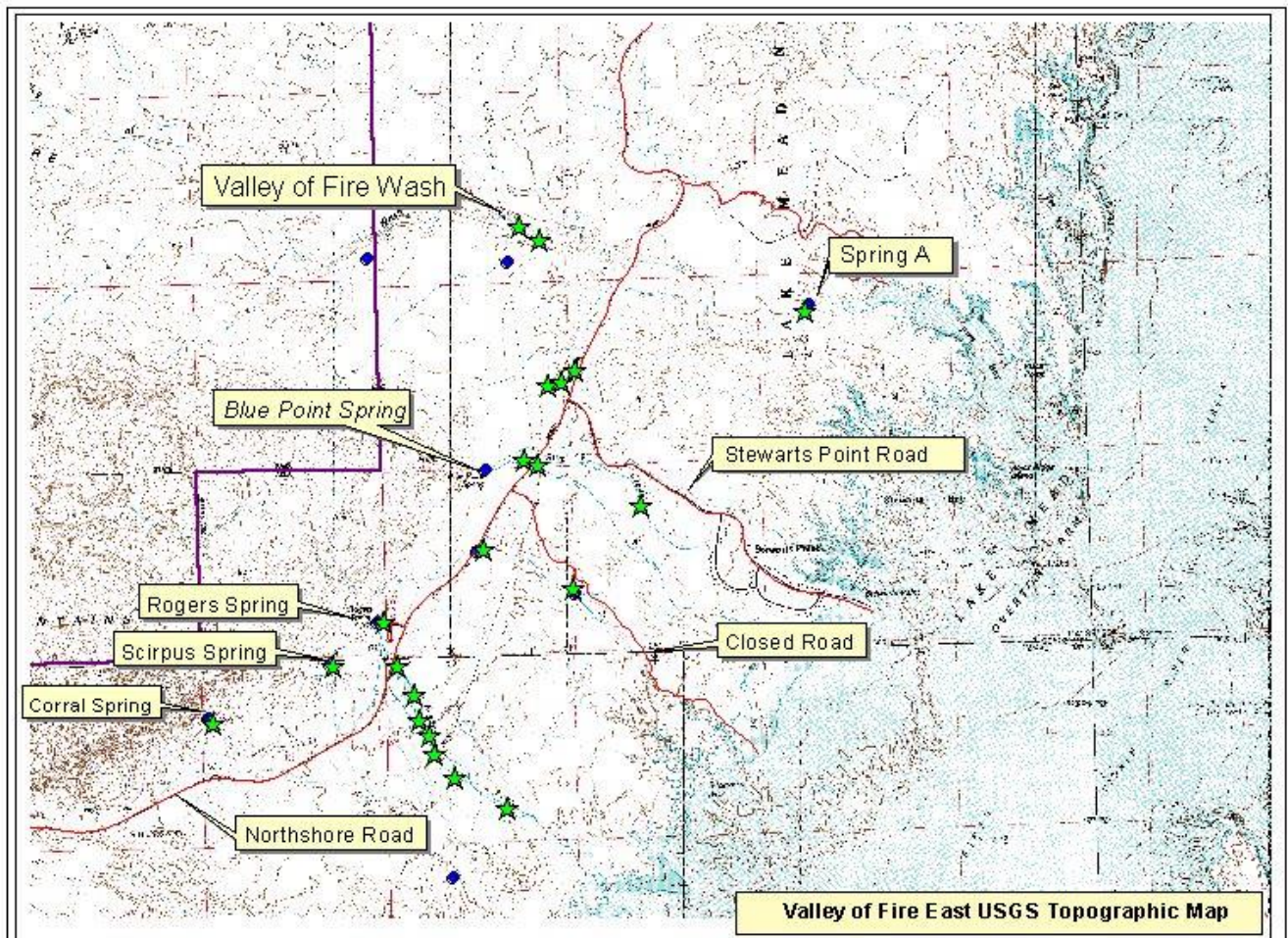


Figure 3- C. virginensis- seep area at Mud Wash

Herbarium Collection Data

Table 1

Acc. #	County/State	Collector(s)	Coll. #	Date	Location
UNLV 34165	Clark/NV	Kirkeeng, K.	0-3	10/25/82	LMNRA, Blue Point Spring. T18S, R68E, S6.
UNLV 37470	Clark/NV	Niles, W.E.	4707	4/11/97	BLM, Gold Butte. Mud Wash, T17S, R70E, S18, 19, 20.
UNLV 37735	Clark/NV	Marble, J.R.	123	11/12/80	LMNRA, Rogers Spring, T18S, R67E, S22.
UNLV 38882	Clark/NV	Leary, P.J.; et al	4850	11/4/94	BLM, Virgin Mtns., Juanita Springs Ranch. UTM Z11; 745,750E; 4,058,120N.
UNLV 39002	Clark/NV	Niles; Alexander	N4138	7/21/95	LMNRA, Overton Wildlife Management Area, Honey Bee Pond, T16S, R68E, S20.
UNLV 39003	Clark/NV	Niles; Alexander	N4139	7/13/95	LMNRA, Overton Wildlife Management Area, Honey Bee Pond, T16S, R68E, S20.
UNLV 25320	Washington/Utah	Warrick R.B.	2961	8/19/86	Pine Valley Mts., 0.5 mi E of Danish Ranch. T41S, R14W, S34.
Lake Mead Herbarium	Mohave/Arizona	Atwood, Higgins	26231	10/13/00	LMNRA, Tassi Spring, T33N, R16W, S13 se1/4
NY 167535	Washington/Utah	Welsh, S.L.	21234	6/13/82	St George. T42S, R15W, S19. Isotype.
NY 658370	Washington/Utah	Higgins, L.C.	19755	6/20/98	St. George. T42S, R15W, S30.
NY 658371	Washington/Utah	Thorne; Clark; Welsh	5384	6/17/87	On road to Smithsonian Butte at jcn. Of Wire Mesa Rd. T42S, R11W, S14.
NY 658372	Washington/Utah	Higgins, L.C.	14427	6/19/84	St George. On Red Hill north of town. T42S, 15W, S19-20.
NY 658374	Utah	Warrick R.B.	2404	7/11/86	Jcn. Of Blake-Harmony Trail and Browse Road. On Straight Cliff Formation. T39S, R13W, S30.
NY 658376	Utah	Welsh; Neese; Thorne	23224	10/6/84	On the Red Hills. On the Navajo Formation. T42S, R15W, S19.
NY 658377	Mohave/Arizona	Bundy, C. E.	200		I-15 river bridge near Little Field. T40S, R15W, S4.
NY 658378	Washington/Utah	Warrick R.B.	2995	8/21/86	On north end of Grass Valley. T38S, R14W, S31.
NY 658380	Washington/Utah	Higgins, L.C.	14010	7/28/83	16 miles due west of Enterprise. T37S, R19W, S6.
New collection	Mohave/Arizona	Bangle, D.	269	6/18/03	Tassi Spring behind ranch. UTM Z12; 234,156E; 4,016,109N
New collection	Clark/NV	Bangle, D.	271	8/6/03	Wash north of Blue Point Spring. UTM Z11; 730,838E; 4,030,717N.
New collection	Clark/NV	Bangle, D.	279	8/14/03	Rogers Spring with root. UTM Z11; 729,384E; 4,028,626N.



U.S. Department of the Interior
National Park Service
Cirsium virginensis Location Map
Lake Mead National Recreation Area

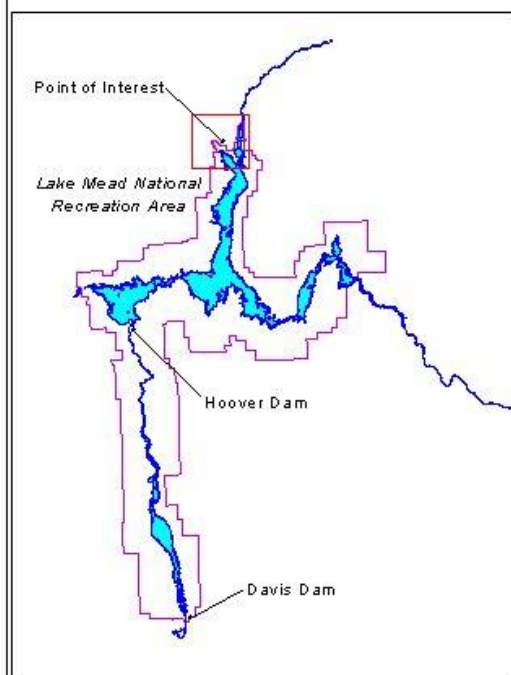
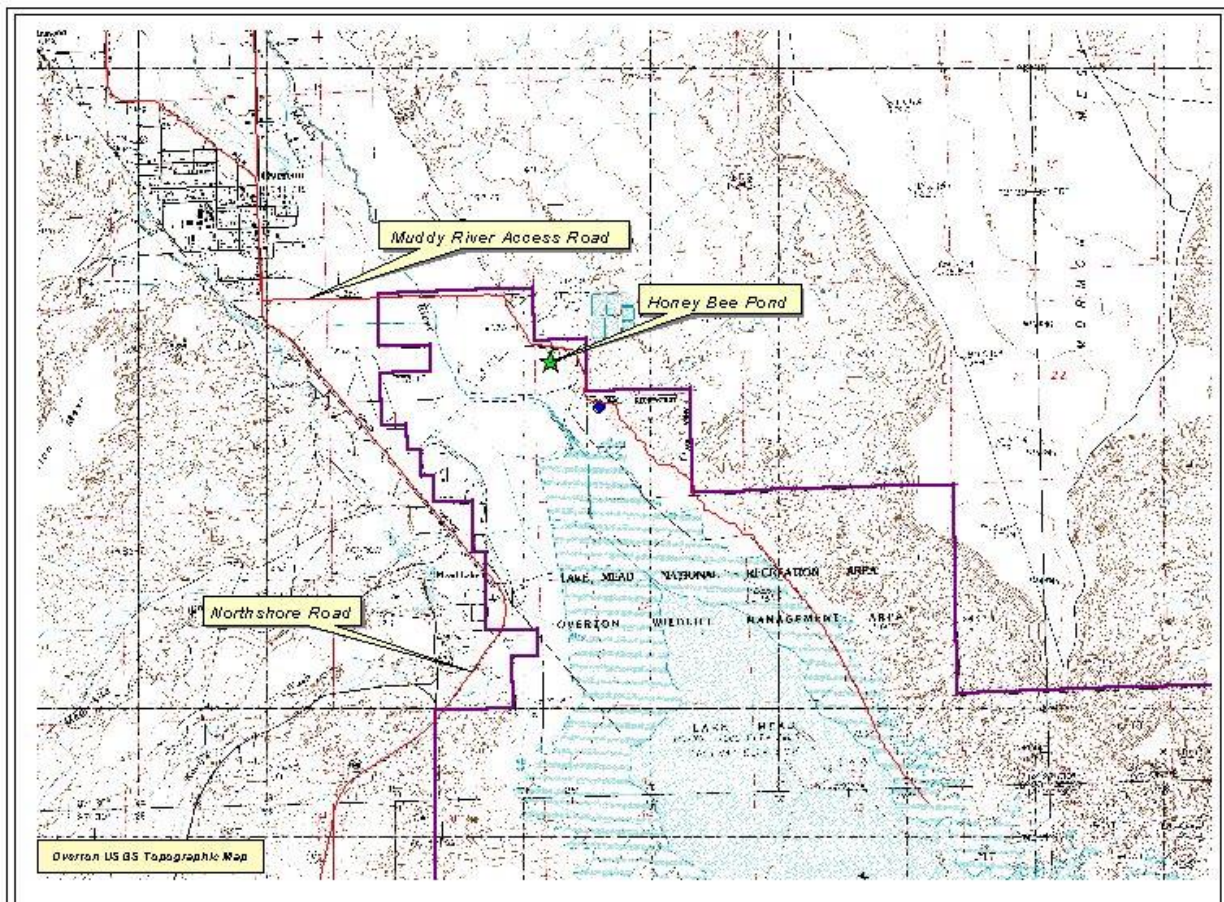
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Map Legend

- ★ *Cirsium virginensis*
- Springs
- Approved Roads
- Lake Mead Administrative Boundary



Map 1



U.S. Department of the Interior
National Park Service
***Cirsium virginensis* Location Map**
Lake Mead National Recreation Area

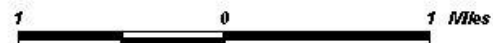
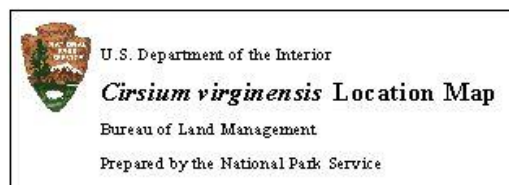
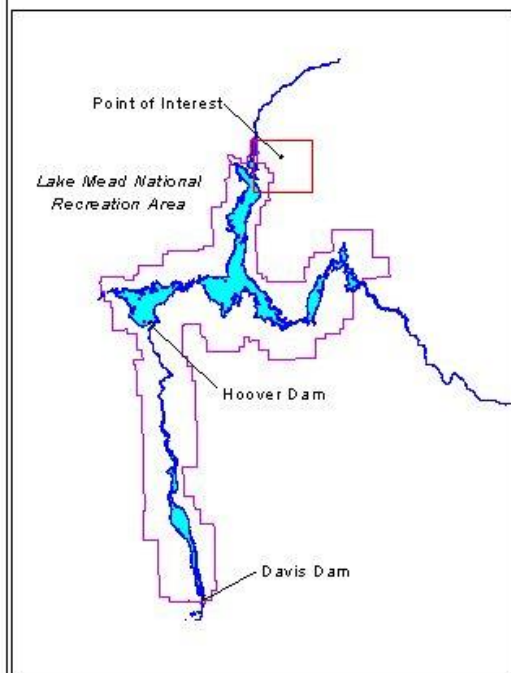
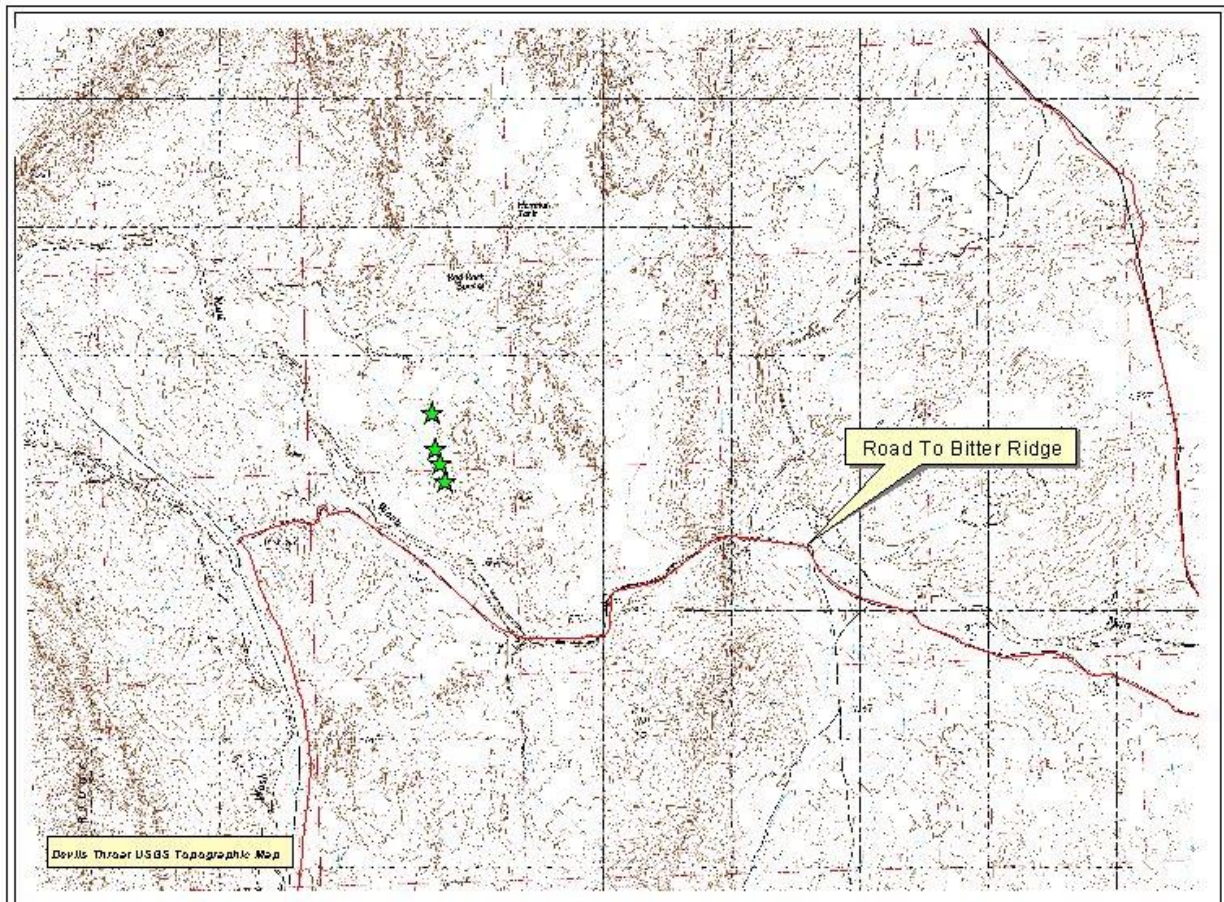
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Map Legend

- ★ *Cirsium virginensis*
- Springs
- Approved Roads
- Lake Mead Administrative Boundary



Map 2

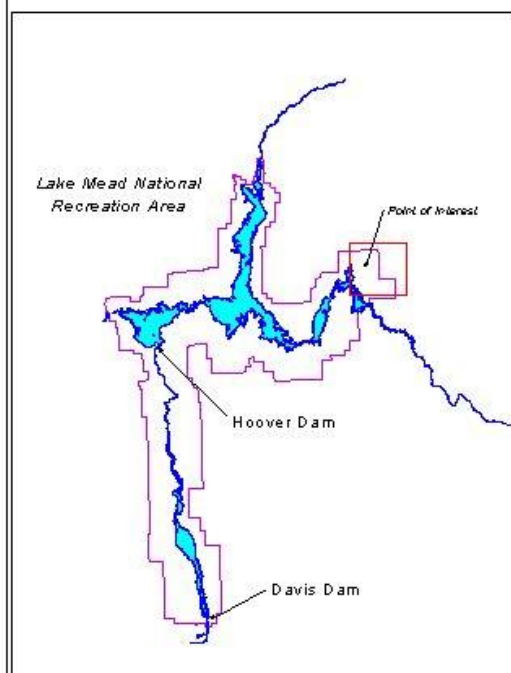
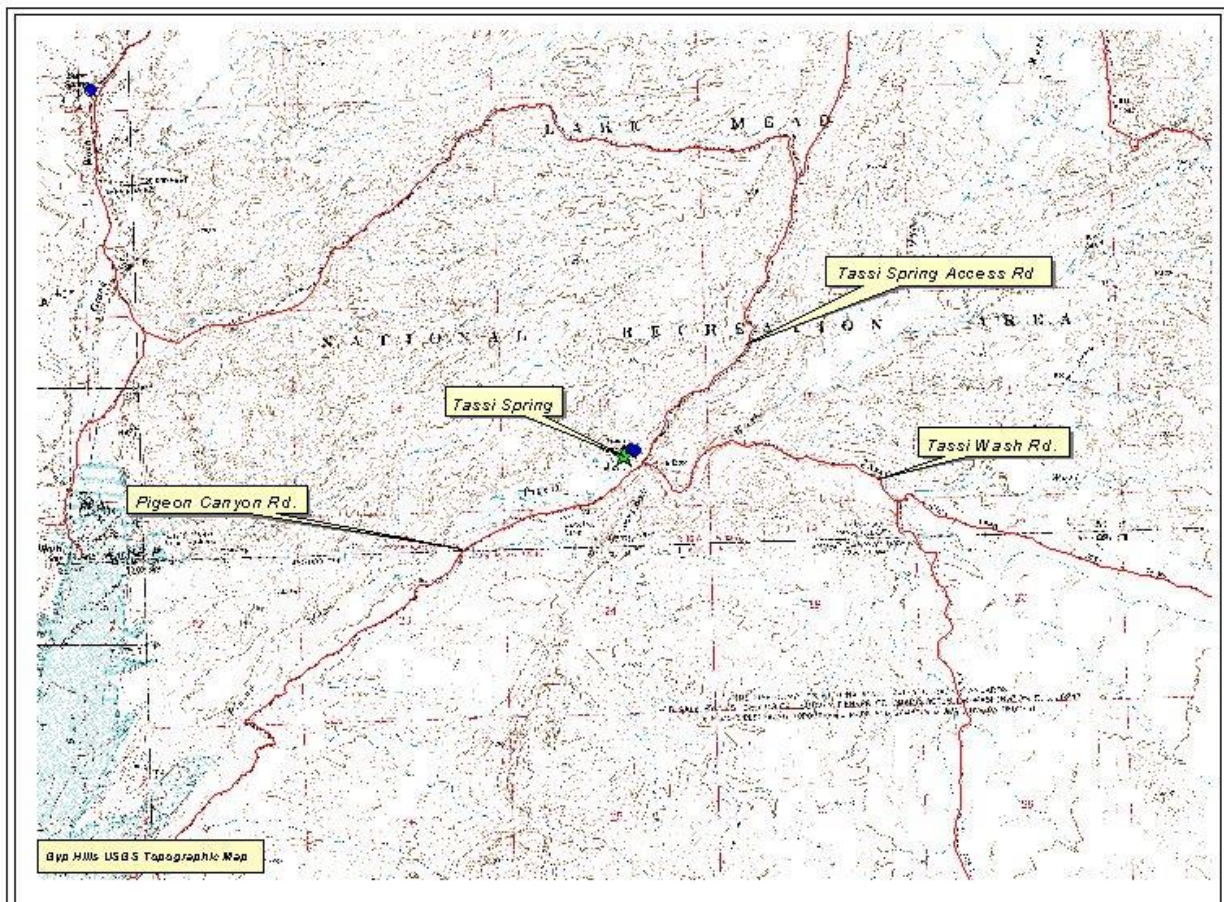


Map Legend

- ★ *Cirsium virginensis*
- W Approved Roads



Map 3




 U.S. Department of the Interior
 National Park Service
***Cirsium virginensis* Location Map**
 Lake Mead National Recreation Area

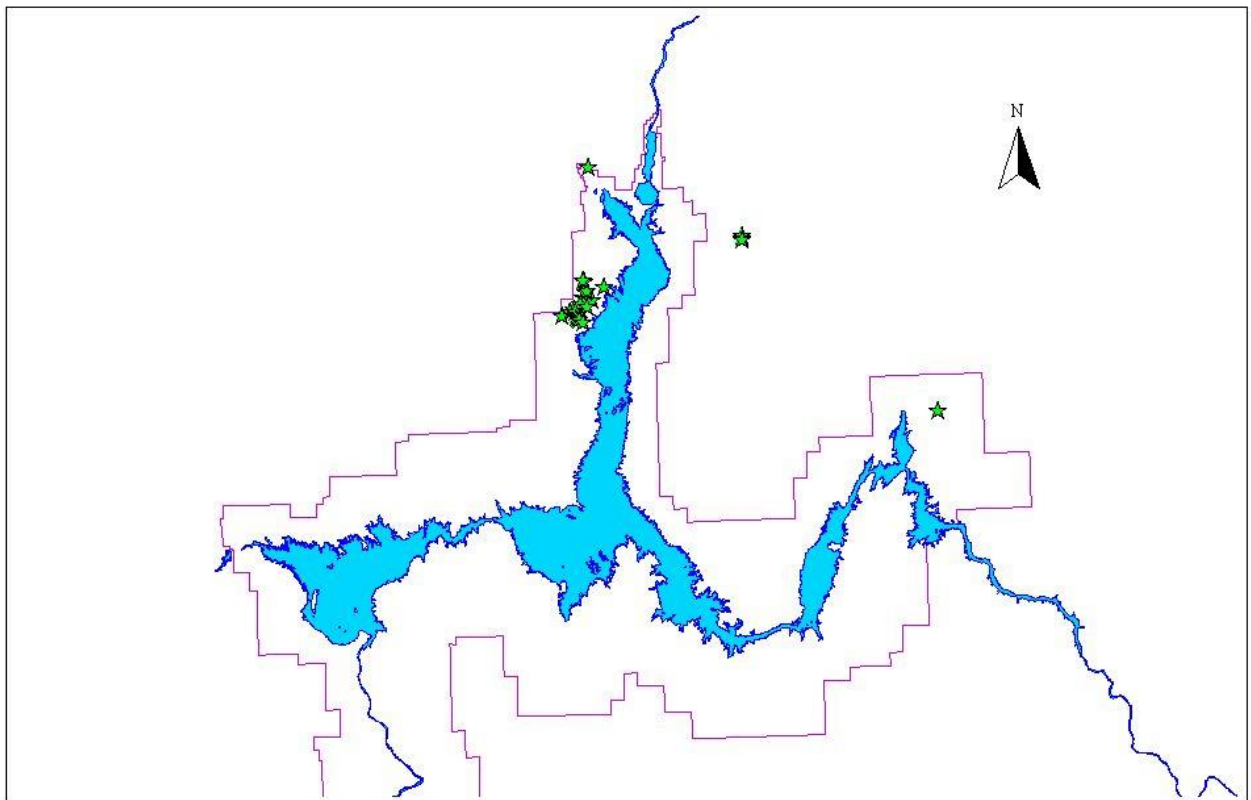
1 0 1 Miles


Map Legend

- ★ *Cirsium virginensis*
- Springs
- Approved Roads
- Lake Mead Administrative Boundary



Map 4



Cirsium virginensis
Local Distribution Map

4 0 4 8 Miles

Map 5