REPORT
ON
THE STATUS AND CONSERVATION
OF
THE BOREAL TOAD
Bufo boreas boreas
IN
THE SOUTHERN ROCKY MOUNTAINS

2006 - 2007

Prepared By The Colorado Division of Wildlife
Tina Jackson, Coordinator
REPORT ON THE STATUS AND CONSERVATION OF THE BOREAL TOAD
*Bufo boreas boreas*
IN THE SOUTHERN ROCKY MOUNTAINS

2006-2007

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**Introduction**

This is the eighth in a series of reports updating information provided in the Boreal Toad Recovery Plan (Colorado Division of Wildlife 1994, 1997) and the Boreal Toad Conservation Plan and Agreement (Loeffler 1998, 2001). The purpose of this document is to provide a summary and progress report of boreal toad conservation work in the Southern Rocky Mountains for the 2006 and 2007 field seasons.

The boreal toad (*Bufo boreas boreas*) was once considered common in the Southern Rocky Mountains of Wyoming, Colorado, and New Mexico but, by the early 1980’s, dramatic declines were becoming apparent. The current understanding within the conservation community is that these declines are due to *Batrachochytrium dendrobatidis* (Bd) infection (Carey, 1993). Other factors, including water quality and habitat changes, may also be responsible for some losses (Loeffler, 2001).

Recovery actions in 2006 and 2007 included continued monitoring of over 65 breeding sites each year, discovery of 7 new breeding sites, maintenance and breeding of a captive broodstock population, and continued research into disease dynamics, population modeling, genetic relationships, and translocation methodologies.

**Current legal status**

As of November 2008, the boreal toad remains a state listed endangered species in Colorado and New Mexico, as well as a protected species in Wyoming. During 2006, the New Mexico Department of Game and Fish implemented a recovery plan for the toad within that state (New Mexico Department of Game and Fish, 2006).

Federal status of the Southern Rocky Mountain Population (SRMP) of boreal toads has not changed since the “not warranted” decision announced by the US Fish & Wildlife Service on September 29th, 2005.

**Taxonomy & genetics**

Research into the genetics of the SRMP continues at both Florida Gulf Coast University with Dr. Anna Goebel and the US Geological Service with Dr. John Switzer. It is hoped that this work will both enlighten the taxonomic discussions and ensure that management within the SRMP, such as reintroductions, will maintain remaining the natural diversity.
Recovery team & recovery efforts
In late 1994, the Colorado Division of Wildlife worked with other agencies to form the Boreal Toad Recovery Team. This team has been instrumental in the on-going management and recovery activities for boreal toads in the Southern Rocky Mountain region. The team consists of representatives from those agencies and organizations that have signed the Conservation Agreement, members of the Technical Advisory Group, and other interested individuals. The current team members are listed below.

Recovery Team Agency Representatives
Colorado Division of Wildlife, Tina Jackson, Colorado Springs, CO
New Mexico Game & Fish Department, Charlie Painter, Santa Fe, NM
Wyoming Game & Fish Department, Zack Walker, Laramie, WY
US Fish & Wildlife Service, Terry Ireland, Grand Junction, CO
USGS/Biological Resources Division, Erin Muths, Fort Collins, CO
US Forest Service, Region 2, Doreen Sumerlin, Granby, CO
US Forest Service, Region 3, Donna Storch, Taos, NM
National Park Service, Rocky Mountain National Park, Mary Kay Watry, Estes Park, CO
Bureau of Land Management, Jay Thompson, Lakewood, CO
Environmental Protection Agency, Ed Stearns, Denver, CO

Technical Advisory Group
Paul Bartelt, Waldorf College, Forest City, IA
Ron Beiswaenger, University of Wyoming, Laramie, WY
Cynthia Carey, University of Colorado, Boulder, CO
Steve Corn, USGS/Biological Resources Division, Missoula, MT
Anna Goebel, Florida Gulf Coast University, Fort Myers, FL
Mary Jennings, US Fish & Wildlife Service, Cheyenne, WY
Don Kennedy, Denver Water Board, Denver, CO
Brad Lambert, Colorado Natural History Program, Fort Collins, CO
Lauren Livo, University of Colorado, Boulder, CO
Kevin Thompson, Colorado Division of Wildlife, Montrose, CO
**Breeding Site Monitoring**

The majority of known breeding sites are monitored each year for the presence of boreal toads, including all age classes, breeding activity and any other factors that may impact the future success of the toad populations in the area. These activities are performed by numerous individuals from many different agencies.

In 2006, 77 breeding sites (41 populations) were known to exist, 65 of those sites were monitored. There are numerous reasons for not monitoring the other 12 sites, including the inability to access sites located on private land, the failure to enlist personnel to cover the monitoring, and previous inactivity of the sites. The number of active sites fell slightly in 2006 with the total reaching 40. The change in number of active sites is often misunderstood; the total number of active sites must be compared with the previous year but also take into consideration the number of new sites that were located. In 2006, 5 new sites were located. The 2006 results maintain the designation of 1 population as viable (Cottonwood Creek, Chaffee County, Colorado). The White Rock Mountain population is no longer viable with the positive disease findings of one site within that population in 2006.

In 2007, 80 breeding sites (44 populations) were known to exist, 69 of those sites were monitored. The total number of active sites remained steady at 40 in 2007. Three new sites were located in 2007. The 2007 numbers maintain the designation of 1 population as viable (Cottonwood Creek, Chaffee County, Colorado).

During breeding site monitoring, swabs are taken, when possible, to test for Bd presence at each site. To date 22 sites have tested positive, 35 sites have tested negative, and 22 sites have not been tested. Research is still on-going to develop an environmental test for Bd, which will help determine disease presence without the need to locate and capture one-year old and older animals.

A table summarizing the population and site numbers can be found in Appendix I. The monitoring and disease testing history of each site can be found in Appendix II.

**Surveys**

Each summer, agency personnel and private individuals survey areas of potential boreal toad habitat and follow-up on reports of boreal toads. It has been difficult to quantify this effort on a yearly basis as many of these surveys go unreported. The one number that can be reported
as an indication of the amount of effort and success these surveys produce is how many new sightings and breeding locations are recorded each year.

In 2006, over 70 site surveys were reported and 5 new breeding sites were located:

- Campground Lift Pond, PI05, Pitkin County
- Buzzard Creek, ME01, Mesa County
- Rough and Tumbling West, PA02, Park County
- Grizzly Reservoir, PI04, Pitkin County
- Homestake Reservoir, PI06, Pitkin County

In 2007, 2 new breeding sites were located:

- South Fork, GR07, Grand County
- Cow Creek, GU06, Gunnison County

Future plans include the continued surveying of new and potential sites as well as follow up on any reports of boreal toads from around the state. It is requested that individuals participating in these efforts report their activities so more accurate information can be provided to the Recovery Team and in these updates.

**Research**

In 2006 and 2007, research focused on a number of different questions vital to the recovery and management of boreal toads in Southern Rocky Mountain region. Some highlights of the work that occurred include continued mark/recapture work in the largest known population in the state, follow up on the largest translocation effort to be studied, and development of a technique to non-invasively identify individual animals in captivity. Updates on many of the specific research projects can be found in Appendix VI.

Future research plans include the continuation of on-going disease and field studies, as well as developing a further understanding of the possibility of disease resistance developing in wild populations, development of a habitat model to identify areas of potential unknown populations, and further refinement of translocation and breeding protocols and procedures.
**Habitat Management**

As in the recovery of any wildlife species, the Boreal Toad Conservation Plan and Agreement (Loeffler, 2001) calls for the protection, management, and improvement of habitat for boreal toads. The main focus of this work is on boreal toad breeding habitat, including shallow ponds and wetlands. Upland habitat and movement corridors have also been addressed in some portions of the species range. The majority of boreal toad habitat occurs on public lands, mainly the US Forest Service and Rocky Mountain National Park.

In 2006 and 2007, specific habitat management projects included the continuation of the Crooked/Pole Project in Grand County and the initiation of a project to develop a breeding site at Grizzly Reservoir in Pitkin County. The Crooked/Pole Project has created 34 breeding ponds since 2000 in cooperation with private landowners and the local municipalities. (Horstman, 2007) The population using these ponds has tested positive for Bd but continues to maintain stable numbers (as well as show increases in some years). The Grizzly Reservoir Project is attempting to recreate a breeding site that had been lost in the development of the Grizzly Reservoir. Tadpoles were found in a small drainage ditch at the site in August of 2006. It was determined that the drainage ditch was not meeting the habitat requirements of these animals and a more appropriate location needed to be built to ensure the continued use of this location. CDOW and USFS cooperated on the design and construction of the site in 2007. The formal project is expected to be completed in 2008.

Future plans for habitat management and improvement include determining the extent habitat may be playing a role in the continued declines of this species, developing a model to determine areas of appropriate habitat that should receive additional survey effort, and continuing to make habitat improvements in areas that present the opportunities.

**Translocations**

Translocations into historic and created habitats are currently seen as an important aspect of boreal toad recovery in the Southern Rocky Mountain Population. In 2006, planning continued for future translocation projects and 2 small tadpole releases occurred. A small number of tadpoles were released at the Grand Mesa site, following up on the previous 3 years of releases at this location. The Zimmerman Lake translocation site also received 2,500 tadpoles in 2006 to determine the disease status of the site. Attempts will be made to recapture these animals in 2007 for disease testing. Plans were finalized for the Rocky Mountain National Park.
release that was expected to begin in 2007. Plans also continued to move forward for the future release of animals into appropriate habitat in New Mexico.

In 2007, 53 animals were observed from the 2006 release at the Zimmerman Lake site, which represents a minimum recruitment of 2.1%, which is significantly higher than the minimum recruitment seen at the Grand Mesa release site. All Bd swabs tested negative for disease presence, providing encouragement for the future success of this translocation project. Translocations were also planned to begin at a location in Rocky Mountain National Park in 2007. Tadpoles were not released at the site due to issues with captive broodstock animals, including the loss of some adults during their hibernation period and the inability to produce eggs from remain adults. This was a disappointment for all personnel involved but provided an additional year of surveying and preparation at the release site.

Future plans include releasing animals at the Rocky Mountain National Park site, the Zimmerman Lake site, and identified locations in historical boreal toad range in New Mexico. Additional release sites need to be identified and surveyed in the near future to continue moving the translocation aspect of toad recovery forward.

**Captive Information**

The Native Aquatic Species Restoration Facility (NASRF) maintains a large captive population of boreal toads for reintroduction and research purposes. As of January 2008, 677 individual toads were housed at NASRF. These animals represent 63 separate lots (egg masses) from 21 breeding sites. In 2006 and 2007, toads were also housed at various zoos and research facilities, including the Cheyenne Mountain Zoo (Colorado Springs, CO), the Denver Zoo (Denver, CO), the Mississippi River Museum and Aquarium (Debuque, IA), and the University of Colorado at Boulder (Boulder, CO).

**Conclusion**

The recovery of boreal toads in Colorado and the Southern Rocky Mountains continues to be a slow process due to the nature of the threats they face. The discovery of an additional 7 breeding sites and the continued viable status of 2 populations are important results from the 2006 and 2007 field seasons. But the future of the boreal toad recovery program rests on the ability of the involved management agencies to successful establish new breeding sites in
currently unoccupied areas and to determine the possibility of toads to persist in light of the significant disease threats they face in the wild.
### Appendix I – Viability Summary Table

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Population (Sites)</th>
<th>Breeding Populations (Sites)</th>
<th>Recruitment Populations (Sites)</th>
<th>Populations (Sites) with 20+ adults &amp; 4+ egg masses</th>
<th>Populations (Sites) Positive for Bd</th>
<th>Viable Populations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>*</td>
<td>* (6)</td>
<td>* (2)</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>1994</td>
<td>*</td>
<td>5 (10)</td>
<td>2+ (3)</td>
<td>2</td>
<td>**</td>
<td>*</td>
</tr>
<tr>
<td>1995</td>
<td>*</td>
<td>12 (20)</td>
<td>2+ (3)</td>
<td>4</td>
<td>**</td>
<td>*</td>
</tr>
<tr>
<td>1996</td>
<td>*</td>
<td>20 (28)</td>
<td>11 (12)</td>
<td>5</td>
<td>**</td>
<td>*</td>
</tr>
<tr>
<td>1997</td>
<td>* (37)</td>
<td>19 (30)</td>
<td>9+ (10)</td>
<td>5 (9)</td>
<td>**</td>
<td>3</td>
</tr>
<tr>
<td>1998</td>
<td>26 (40)</td>
<td>16 (24)</td>
<td>5+ (9)</td>
<td>6 (11)</td>
<td>**</td>
<td>5</td>
</tr>
<tr>
<td>1999</td>
<td>29 (50)</td>
<td>18 (35)</td>
<td>10 (14)</td>
<td>4 (8)</td>
<td>**</td>
<td>6</td>
</tr>
<tr>
<td>2000</td>
<td>30 (56)</td>
<td>18 (33)</td>
<td>13 (13)</td>
<td>6 (8)</td>
<td>**</td>
<td>1</td>
</tr>
<tr>
<td>2001</td>
<td>32 (59)</td>
<td>22 (38)</td>
<td>15 (24)</td>
<td>5 (9)</td>
<td>**</td>
<td>1</td>
</tr>
<tr>
<td>2002</td>
<td>32 (60)</td>
<td>24 (38)</td>
<td>13 (19)</td>
<td>7 (10)</td>
<td>6 (9)</td>
<td>1</td>
</tr>
<tr>
<td>2003</td>
<td>32 (63)</td>
<td>22 (38)</td>
<td>15 (19)</td>
<td>4 (9)</td>
<td>8 (10)</td>
<td>1</td>
</tr>
<tr>
<td>2004</td>
<td>37 (69)</td>
<td>24 (37)</td>
<td>16 (22)</td>
<td>5 (10)</td>
<td>11 (13)</td>
<td>1</td>
</tr>
<tr>
<td>2005</td>
<td>39 (71)</td>
<td>24 (41)</td>
<td>18 (24)</td>
<td>5 (10)</td>
<td>13 (16)</td>
<td>2</td>
</tr>
<tr>
<td>2006</td>
<td>41 (77)</td>
<td>26 (40)</td>
<td>14 (19)</td>
<td>3 (6)</td>
<td>14 (17)</td>
<td>1</td>
</tr>
<tr>
<td>2007</td>
<td>44 (80)</td>
<td>25 (40)</td>
<td>***</td>
<td>2 (9)</td>
<td>19 (22)</td>
<td>1</td>
</tr>
</tbody>
</table>

* Pre-1997 data is unavailable for some fields.
** Bd testing did not begin until 2001.
*** 2007 recruitment cannot be determined until 2008.
Appendix II - Breeding Site Reports

BO01 - Lost Lake

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>0/1/0</td>
<td>No</td>
<td>2(M,A)</td>
<td>Toadlets introduced</td>
</tr>
<tr>
<td>1997</td>
<td>0/1/1</td>
<td>No</td>
<td>3(M,1,A)</td>
<td>Toadlets introduced**</td>
</tr>
<tr>
<td>1998</td>
<td>0/2/0</td>
<td>No</td>
<td>3(1,2,A)</td>
<td>No breeding observed</td>
</tr>
<tr>
<td>1999</td>
<td>0/0/0</td>
<td>No</td>
<td>None seen</td>
<td>Minimal surveys done</td>
</tr>
<tr>
<td>2000</td>
<td>0/0/0</td>
<td>No</td>
<td>None seen</td>
<td>Monitoring adequate</td>
</tr>
<tr>
<td>2001</td>
<td>0/0/0</td>
<td>No</td>
<td>None seen</td>
<td>Monitoring adequate</td>
</tr>
<tr>
<td>2002</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Monitoring adequate</td>
</tr>
<tr>
<td>2003</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Site visited 3 times</td>
</tr>
<tr>
<td>2004</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Site visited 2 times</td>
</tr>
<tr>
<td>2005</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Site visited 2 times</td>
</tr>
<tr>
<td>2006</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None Seen</td>
<td>Site visited once</td>
</tr>
<tr>
<td>2007</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None Seen</td>
<td></td>
</tr>
</tbody>
</table>

*PCR test results were chytrid negative for samples from 5 groups of sentinel tadpoles placed at Lost Lake in 2001.

**Tadpoles observed, possibly from mating of a resident female and a translocated male toad.

Bd Testing

Site not tested

Comments

This is an experimental reintroduction site. This site no longer receives priority monitoring as it appears the 1996/1997 reintroduction has failed.
## CC01 - Vintage

### Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>?/?/?</td>
<td>Unk</td>
<td>Multiple</td>
<td>Little data available</td>
</tr>
<tr>
<td>1995</td>
<td>3/2/2</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Prob. few metamorphs</td>
</tr>
<tr>
<td>1996</td>
<td>1/1/1</td>
<td>No</td>
<td>1(A)</td>
<td>No production</td>
</tr>
<tr>
<td>1997</td>
<td>1/1/1</td>
<td>No</td>
<td>1(A)</td>
<td>Eggs froze</td>
</tr>
<tr>
<td>1998</td>
<td>3/0/0</td>
<td>No</td>
<td>1(A)</td>
<td>No breeding observed</td>
</tr>
<tr>
<td>1999</td>
<td>3/0/0</td>
<td>No</td>
<td>1(A)</td>
<td>No breeding observed</td>
</tr>
<tr>
<td>2000</td>
<td>0/0/0</td>
<td>No</td>
<td>None seen</td>
<td>Minimal monitoring</td>
</tr>
<tr>
<td>2001</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Minimal early monitoring</td>
</tr>
<tr>
<td>2002</td>
<td></td>
<td></td>
<td></td>
<td>Not monitored</td>
</tr>
<tr>
<td>2003</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>No evidence of breeding</td>
</tr>
<tr>
<td>2004</td>
<td></td>
<td></td>
<td></td>
<td>Not monitored</td>
</tr>
<tr>
<td>2005</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>No evidence of breeding</td>
</tr>
<tr>
<td>2006</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Site is drying</td>
</tr>
<tr>
<td>2007</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Site is dry</td>
</tr>
</tbody>
</table>

### Bd Testing

Site not tested

### Comments

This site appears to have failed due to a loss of appropriate habitat.
CC02 - Urad/Henderson

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>131/19/19</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>142/18/18</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Few metamorphs</td>
</tr>
<tr>
<td>1997</td>
<td>167/33/23</td>
<td>Yes</td>
<td>4+(M,1,S,A)</td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>203/107/55</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Many metamorphs</td>
</tr>
<tr>
<td>1999</td>
<td>141/60/60</td>
<td>Unk</td>
<td>4(M,1,S,A)</td>
<td>Bd mortality</td>
</tr>
<tr>
<td>2000</td>
<td>34/34/34</td>
<td>Yes</td>
<td>2(M,A)</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>14/14/14</td>
<td>Unk</td>
<td>3(M,1,A)</td>
<td>Some egg mortality*</td>
</tr>
<tr>
<td>2002</td>
<td>25/22/22</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Several sites dry**</td>
</tr>
<tr>
<td>2003</td>
<td>15/15/15</td>
<td>Yes</td>
<td>1(A)</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>10/16/16</td>
<td>Yes</td>
<td>3(M,1,A)</td>
<td>Several sites dried up</td>
</tr>
<tr>
<td>2005</td>
<td>2/12/12</td>
<td>Yes</td>
<td>2(M,A)</td>
<td>Poor hatching success</td>
</tr>
<tr>
<td>2006</td>
<td>2/1/4</td>
<td>Yes</td>
<td>4 (M,1,S,A)</td>
<td>Some water level issues</td>
</tr>
<tr>
<td>2007</td>
<td>2/2/6</td>
<td>Unk</td>
<td>3(M,1,A)</td>
<td>Some Sandpiper predation</td>
</tr>
</tbody>
</table>

*Egg mass mortality due to a water fungus observed at the Hesbo site; other sites had good egg mass survival.

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>17</td>
<td>Positive</td>
<td></td>
</tr>
</tbody>
</table>

Comments

This site is on private property and includes numerous ponds in the Urad Valley. Monitoring of the site is very intense and includes radio tracking and water testing.
CC03 - Herman Gulch

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>?/?/?</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Breeding observed</td>
</tr>
<tr>
<td>1994</td>
<td>11/11/11</td>
<td>Unk</td>
<td>2(M,A)</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>52/12/12</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>Good production</td>
</tr>
<tr>
<td>1996</td>
<td>20/12/12</td>
<td>No</td>
<td>1(A)</td>
<td>Poor larvae survival</td>
</tr>
<tr>
<td>1997</td>
<td>19/10/10</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>Many metamorphs</td>
</tr>
<tr>
<td>1998</td>
<td>10/10/10</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Few metamorphs seen</td>
</tr>
<tr>
<td>1999</td>
<td>11/11/11</td>
<td>Yes</td>
<td>1(A)</td>
<td>High egg mortality</td>
</tr>
<tr>
<td>2000</td>
<td>9/5/5</td>
<td>Unk</td>
<td>3(1,S,A)</td>
<td>No metamorphs seen</td>
</tr>
<tr>
<td>2001</td>
<td>2/2/4</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>&lt;50 metamorphs</td>
</tr>
<tr>
<td>2002</td>
<td>0/1/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>No evidence of breeding</td>
</tr>
<tr>
<td>2003</td>
<td>1/1/1</td>
<td>Yes</td>
<td>1(M)</td>
<td>&lt;50 metamorphs</td>
</tr>
<tr>
<td>2004</td>
<td>4/4/4</td>
<td>Unk</td>
<td>2(1,A)</td>
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</tr>
<tr>
<td>2005</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Site visited once</td>
</tr>
<tr>
<td>2007</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Surveyed all ponds at site</td>
</tr>
</tbody>
</table>

Bd Testing

Site not tested

Comments

No site specific comments.
CC04 - Mount Bethel

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>Yes</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Many metamorphs</td>
</tr>
<tr>
<td>1994</td>
<td>Yes</td>
<td>Unk</td>
<td>2(M,A)</td>
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<tr>
<td>1995</td>
<td>4/1/1</td>
<td>No</td>
<td>2(S,A)</td>
<td>Few, if any, metamorphs</td>
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<tr>
<td>1996</td>
<td>3/3/3</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Few metamorphs</td>
</tr>
<tr>
<td>1997</td>
<td>9/1/1</td>
<td>Unk</td>
<td>2(M,A)</td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>11/3/3</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>36+ metamorphs seen</td>
</tr>
<tr>
<td>1999</td>
<td>23/1/1</td>
<td>Yes</td>
<td>2(M,A)</td>
<td>500+ metamorphs seen</td>
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<tr>
<td>2000</td>
<td>29/3/3</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Many metamorphs seen</td>
</tr>
<tr>
<td>2001</td>
<td>28/6/5</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>500+ metamorphs seen</td>
</tr>
<tr>
<td>2002</td>
<td>16/4/4</td>
<td>Yes</td>
<td>3(M,1,A)</td>
<td>Metamorphosis early</td>
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<tr>
<td>2003</td>
<td>7/7/7</td>
<td>Unk</td>
<td>3(M,1,A)</td>
<td>&lt;50 metamorphs</td>
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<tr>
<td>2004</td>
<td>68/8/8</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>&lt;50 metamorphs</td>
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<tr>
<td>2005</td>
<td>33/6/6</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Tested Bd positive</td>
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<tr>
<td>2006</td>
<td>5/0/7</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Early breeding</td>
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<tr>
<td>2007</td>
<td>1/1/1</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Dytiscid beetles present</td>
</tr>
</tbody>
</table>

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>20</td>
<td>Positive (5 or 25%)</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>5</td>
<td>Positive (5 or 100%)</td>
<td>All results triple positive</td>
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</table>

Comments

No site specific comments.
CC05 - Bakerville

**Site Monitoring**

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>1/1/1</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Limited data</td>
</tr>
<tr>
<td>1995</td>
<td>Unk</td>
<td>Unk</td>
<td>Unk</td>
<td>Site not monitored</td>
</tr>
<tr>
<td>1996</td>
<td>0/0/0</td>
<td>No</td>
<td>None seen</td>
<td></td>
</tr>
<tr>
<td>1997</td>
<td>Unk</td>
<td>Unk</td>
<td>Unk</td>
<td>Site not monitored</td>
</tr>
<tr>
<td>1998</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Inadequate monitoring</td>
</tr>
<tr>
<td>1999</td>
<td>0/1/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>Inadequate monitoring</td>
</tr>
<tr>
<td>2000</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Monitoring adequate</td>
</tr>
<tr>
<td>2001</td>
<td>3/0/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>Inadequate monitoring</td>
</tr>
<tr>
<td>2002</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>1/1/1</td>
<td>Unk</td>
<td>1(A)</td>
<td>Few tadpoles found</td>
</tr>
<tr>
<td>2004</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Site visited once</td>
</tr>
<tr>
<td>2007</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Habitat looks good</td>
</tr>
</tbody>
</table>

**Bd Testing**

Site not tested

**Comments**

Only breeding observed at site was in 1994 and 2003.
### Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>?/?/0</td>
<td>Unk</td>
<td>Multiple</td>
<td>First survey of site</td>
</tr>
<tr>
<td>1994</td>
<td>?/?/0</td>
<td>Unk</td>
<td>Multiple</td>
<td>No metamorphs</td>
</tr>
<tr>
<td>1995</td>
<td>2/0/0</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>No breeding observed</td>
</tr>
<tr>
<td>1996</td>
<td>5/0/0</td>
<td>No</td>
<td>1(A)</td>
<td>No breeding observed</td>
</tr>
<tr>
<td>1997</td>
<td>0/0/0</td>
<td>No</td>
<td>None seen</td>
<td>Inadequate monitoring</td>
</tr>
<tr>
<td>1998</td>
<td>1/1/0</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>Monitoring marginal</td>
</tr>
<tr>
<td>1999</td>
<td>0/0/0</td>
<td>Yes</td>
<td>1(S)</td>
<td>41 sub-adults seen</td>
</tr>
<tr>
<td>2000</td>
<td>0/0/0</td>
<td>Unk</td>
<td>2(1,S)</td>
<td>Many sub-adults seen</td>
</tr>
<tr>
<td>2001</td>
<td>0/0/0</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>65 sub-adults, 7 adults</td>
</tr>
<tr>
<td>2002</td>
<td></td>
<td></td>
<td></td>
<td>Site not monitored</td>
</tr>
<tr>
<td>2003</td>
<td></td>
<td></td>
<td></td>
<td>Site not monitored</td>
</tr>
<tr>
<td>2004</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>0/0/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>9 un-sexed adults seen</td>
</tr>
<tr>
<td>2006</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Site visited twice</td>
</tr>
<tr>
<td>2007</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Poor visibility during visit</td>
</tr>
</tbody>
</table>

### Bd Testing

Site not tested

### Comments

Breeding site used in the 1990’s apparently not being used at present, and location of current breeding site unknown.
CC07 - Otter Mountain

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>1/1/1</td>
<td>Unk</td>
<td></td>
<td>200 tadpoles seen</td>
</tr>
<tr>
<td>2004</td>
<td>2/2/2</td>
<td>Unk</td>
<td>1(A)</td>
<td>50 tadpoles seen</td>
</tr>
<tr>
<td>2005</td>
<td>0/0/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>1 adult seen</td>
</tr>
<tr>
<td>2006</td>
<td>2/2/2</td>
<td>Unk</td>
<td>1(A)</td>
<td>5 adults seen</td>
</tr>
<tr>
<td>2007</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Road construction in area</td>
</tr>
</tbody>
</table>

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>4</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>

Comments
Population may be moving between multiple breeding localities as this location was found while looking for animals from previous known site nearby.
CF01 - Collegiate Peaks Campground

**Site Monitoring**

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>1/1/1</td>
<td>Yes</td>
<td>1(A)</td>
<td>Reproduction presumed</td>
</tr>
<tr>
<td>1994</td>
<td>1/1/1</td>
<td>Unk</td>
<td>4(1,2,3,A)</td>
<td>Larvae observed</td>
</tr>
<tr>
<td>1995</td>
<td>11/5/5</td>
<td>Unk</td>
<td>3+(M,S,A)</td>
<td>Sub-adults not aged</td>
</tr>
<tr>
<td>1996</td>
<td>13/5/5</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>Few metamorphs</td>
</tr>
<tr>
<td>1997</td>
<td>10/8/6</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Numerous metamorphs</td>
</tr>
<tr>
<td>1998</td>
<td>38/7/7</td>
<td>Yes</td>
<td>2(M,A)</td>
<td>1st year of PIT tagging</td>
</tr>
<tr>
<td>1999</td>
<td>24/3/3</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>4 one-year olds seen</td>
</tr>
<tr>
<td>2000</td>
<td>6/6/3</td>
<td>Unk</td>
<td>3(M,1,A)</td>
<td>1 one-year old seen</td>
</tr>
<tr>
<td>2001</td>
<td>12/6/6</td>
<td>Yes</td>
<td>3(M,S,A)</td>
<td>Numerous metamorphs</td>
</tr>
<tr>
<td>2002</td>
<td>21/4/3</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>About 200 metamorphs</td>
</tr>
<tr>
<td>2003</td>
<td>23/5/5</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>~3000 eggs removed</td>
</tr>
<tr>
<td>2004</td>
<td>18/9/9</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>~7000 eggs removed</td>
</tr>
<tr>
<td>2005</td>
<td>41/5/5</td>
<td>Yes</td>
<td>3(1,S,A)</td>
<td>4 egg masses desiccated</td>
</tr>
<tr>
<td>2006</td>
<td>39/4/4</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Early breeding season</td>
</tr>
<tr>
<td>2007</td>
<td>57/6/6</td>
<td>Unk</td>
<td>3(M,1,A)</td>
<td>Early breeding season</td>
</tr>
</tbody>
</table>

**Bd Testing**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>8</td>
<td>Negative</td>
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</tr>
<tr>
<td>2005</td>
<td>20</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>20</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>20</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>

**Comments**

Site receives some disturbance from area recreation. Colorado Natural Heritage Program personnel have conducted a mark recapture study in this population since 1998. Adult numbers are based on these study results.
## Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>5/5/5</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>Probably metamorphs</td>
</tr>
<tr>
<td>1995</td>
<td>16/10/3</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>Sub-adults not aged</td>
</tr>
<tr>
<td>1996</td>
<td>4/4/4</td>
<td>Yes</td>
<td>3(M,S,A)</td>
<td>Metamorphs present</td>
</tr>
<tr>
<td>1997</td>
<td>10/4/4</td>
<td>Yes</td>
<td>3(1,S,A)</td>
<td>Few, if any, metamorphs</td>
</tr>
<tr>
<td>1998</td>
<td>55/22/22</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>1st year of PIT tagging</td>
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<tr>
<td>1999</td>
<td>63/18/16</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Good production</td>
</tr>
<tr>
<td>2000</td>
<td>58/23/23</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Good production</td>
</tr>
<tr>
<td>2001</td>
<td>52/22/22</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Numerous metamorphs</td>
</tr>
<tr>
<td>2002</td>
<td>27/13/13</td>
<td>Unk</td>
<td>4(M,1,S,A)</td>
<td>Only 1 metamorph seen</td>
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<td>2003</td>
<td>33/22/14</td>
<td>Yes</td>
<td>3(M,S,A)</td>
<td>Slow to develop</td>
</tr>
<tr>
<td>2004</td>
<td>21/12/12</td>
<td>Yes</td>
<td>3(M,S,A)</td>
<td>~8000 eggs removed</td>
</tr>
<tr>
<td>2005</td>
<td>41/19/14</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>~4000 eggs removed</td>
</tr>
<tr>
<td>2006</td>
<td>50/16/9</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Good production</td>
</tr>
<tr>
<td>2007</td>
<td>45/12/8</td>
<td>Unk</td>
<td>4(M,1,S,A)</td>
<td>Productive year</td>
</tr>
</tbody>
</table>

## Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>20</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>20</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>21</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>

## Comments

Colorado Natural Heritage Program personnel have conducted a mark recapture study in this population since 1998. Adult numbers are based on these study results.
CF03 - Hartenstein Lake

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>5/?/?</td>
<td>Unk</td>
<td>1(A)</td>
<td>Limited data</td>
</tr>
<tr>
<td>1995</td>
<td>29/6/6</td>
<td>Unk</td>
<td>1(M,A)</td>
<td>Few metamorphs seen</td>
</tr>
<tr>
<td>1996</td>
<td>10/2/2</td>
<td>Yes</td>
<td>2(M,A)</td>
<td>Metamorphs presumed</td>
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<tr>
<td>1997</td>
<td>12/5/5</td>
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<td>2(M,1,A)</td>
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<td>1998</td>
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<td>64/10/9</td>
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<td>2(M,A)</td>
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<td>69/5/5</td>
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<td>2(S,A)</td>
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<td>24/3/3</td>
<td>Yes</td>
<td>3(1,S,A)</td>
<td>Metamorphs presumed</td>
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<td>2005</td>
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<td>3(M,S,A)</td>
<td>Poor hatching</td>
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<td>2006</td>
<td>28/6/6</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>Good survival at Outlet pond</td>
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<td>2007</td>
<td>29/20/20</td>
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<td>3(M,S,A)</td>
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Bd Testing

<table>
<thead>
<tr>
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<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
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<td>2007</td>
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Comments

Colorado Natural Heritage Program personnel have conducted a mark recapture study in this population since 1998. Adult numbers are based on these study results.
## Site Monitoring

<table>
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<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
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<tbody>
<tr>
<td>1995</td>
<td>24/3/3</td>
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<td>3(M,S,A)</td>
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<td>1996</td>
<td>12/4/4</td>
<td>Yes</td>
<td>2(M,A)</td>
<td>Good production</td>
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<td>1997</td>
<td>26/3/3</td>
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<td>35/7/7</td>
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<td>4(M,1,S,A)</td>
<td>Numerous metamorphs</td>
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<td>2002</td>
<td>26/5/5</td>
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<td>4(M,1,S,A)</td>
<td>Low water levels*</td>
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<td>4(M,1,S,A)</td>
<td>&gt;500 metamorphs</td>
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<td>79/5/4</td>
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<td>2006</td>
<td>76/3/3</td>
<td>Yes</td>
<td>3(M,1,A)</td>
<td>Early breeding season</td>
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<td>2007</td>
<td>117/3/4</td>
<td>Unk</td>
<td>3(M,1,A)</td>
<td>Highest adult male count recorded</td>
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</table>

*In 2002, in addition to adults caught and gender determined, approximately 15 additional adults seen but not captured; few metamorphs observed.

## Bd Testing

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<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
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<td>2007</td>
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## Comments

Colorado Natural Heritage Program personnel have conducted a mark recapture study in this population since 1998. Adult numbers are based on these study results.
Site Monitoring

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<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
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<td>2(S,A)</td>
<td>Metamorphs unlikely</td>
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<td>1996</td>
<td>4/4/4</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>Few metamorphs</td>
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<tr>
<td>1997</td>
<td>2/2/2</td>
<td>Unk</td>
<td>3(M,2,A)</td>
<td>Fair metamorphosis</td>
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<td>1998</td>
<td>0/1/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>No breeding observed</td>
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<td>1999</td>
<td>3/2/2</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Snake predation</td>
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<td>0/0/0</td>
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<td>None seen</td>
<td>Monitoring adequate</td>
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<td>2001</td>
<td>1/2/1</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>5 metamorphs seen</td>
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<td>2002</td>
<td>2/3/1</td>
<td>Unk</td>
<td>1(A)</td>
<td>Tadpoles disappeared</td>
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<td>2003</td>
<td>1/1/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>No evidence of breeding</td>
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<tr>
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<td>None seen</td>
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<td>2005</td>
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<td>Possible predation loss</td>
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<td>1/0/0</td>
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<td>2007</td>
<td>2/2/2</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Poor tadpole survival</td>
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Bd Testing

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Comments

No site specific comments.
CF06 - Kroenke Lake

Site Monitoring

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<td>1996</td>
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<td>1997</td>
<td>9/2/2</td>
<td>Unk</td>
<td>1(A)</td>
<td>Metamorphs unlikely</td>
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<td>1998</td>
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<td>Unk</td>
<td>1(A)</td>
<td>Metamorphs unlikely</td>
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<td>1999</td>
<td>6/3/3</td>
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<td>1(A)</td>
<td>No night surveys</td>
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<td>2(S,A)</td>
<td>One sub-adult seen</td>
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<td>2001</td>
<td>9/1/1</td>
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<td>3(M,S,A)</td>
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<td>Yes</td>
<td>2(M,A)</td>
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<td>Likely many metamorphs</td>
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<td>2(M,A)</td>
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<td>2005</td>
<td>5/3/3</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Likely many metamorphs</td>
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<td>2006</td>
<td>8/3/3</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Good hatching and survival</td>
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<td>2007</td>
<td>3/3/3</td>
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<td>2(M,A)</td>
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Bd Testing

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<th>Number</th>
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<th>Comments</th>
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Comments

No site specific comments.
CF07 - Fourmile Creek

Site Monitoring

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<td>1(A)</td>
<td>No breeding observed</td>
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<td>1996</td>
<td>2/2/2</td>
<td>Yes</td>
<td>2(M,A)</td>
<td>Numerous metamorphs</td>
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<td>1997</td>
<td>3/3/3</td>
<td>Yes</td>
<td>4(M,1,2,A)</td>
<td>Good production</td>
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<tr>
<td>1998</td>
<td>1/1/1</td>
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<td>4(M,1,S,A)</td>
<td>Late egg clutch</td>
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<td>1999</td>
<td>6/3/2</td>
<td>Unk</td>
<td>2(S,A)</td>
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<td>1/0/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>Monitoring adequate</td>
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<td>2(M,A)</td>
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<td>2002</td>
<td>1/2/1</td>
<td>Unk</td>
<td>2(1,A)</td>
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<td>2003</td>
<td>10/3/3</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>Likely many metamorphs</td>
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<td>2004</td>
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<td>1(A)</td>
<td>Likely metamorphs</td>
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<td>3(M,1,A)</td>
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<td>6/6/6</td>
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<td>3(M,1,A)</td>
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<td>5/5/5</td>
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<td>2(1,A)</td>
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Bd Testing

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Comments

No site specific comments.
CF08 - Morgan's Gulch

Site Monitoring

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<th>M/F/Egg Masses</th>
<th>Recruitment</th>
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<td>Many metamorphs</td>
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<td>24/1/1</td>
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<td>4(M,1,S,A)</td>
<td>Eggs late season</td>
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<td>40/3/3</td>
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<td>4(M,1,S,A)</td>
<td>One egg mass not viable</td>
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<td>17/5/5</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>Few or no metamorphs</td>
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<td>12/5/5</td>
<td>Yes</td>
<td>3(M,S,A)</td>
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<td>2002</td>
<td>10/0/0</td>
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<td>2(S,A)</td>
<td>No breeding observed, Pond dried</td>
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<td>2003</td>
<td>21/7/7</td>
<td>Yes</td>
<td>2(S,A)</td>
<td>Likely desiccation loss</td>
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<td>2004</td>
<td>7/2/2</td>
<td>Yes</td>
<td>1(A)</td>
<td>Likely desiccation loss</td>
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<td>36/1/1</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>Likely desiccation loss</td>
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<td>37/2/2</td>
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<td>3(M,S,A)</td>
<td>Poor hatching success</td>
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<td>2007</td>
<td>42/5/5</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>4 egg masses lost to desiccation</td>
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*Pond dried by mid-June in 2002.

Bd Testing

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<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
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<td>2006</td>
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<td>2007</td>
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Comments

Site experiences early season drying and water level issues. Colorado Natural Heritage Program personnel have conducted a mark recapture study in this population since 1998. Adult numbers are based on these study results.
CF09 - Sayre's Gulch

Site Monitoring

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<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
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<th>Comments</th>
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<td>1(A)</td>
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<td>34/2/2</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>Metamorphs few, if any</td>
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<td>1999</td>
<td>4/4/2</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>Larvae lost to mallards</td>
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<td>8/5/5</td>
<td>Unk</td>
<td>2(S,A)</td>
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<td>13/5/5</td>
<td>Yes</td>
<td>2(S,A)</td>
<td>Larvae apparently lost*</td>
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<td>21/6/6</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
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<td>4(M,1,S,A)</td>
<td>Likely many metamorphs</td>
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<tr>
<td>2004</td>
<td>13/6/6</td>
<td>Yes</td>
<td>2(1,A)</td>
<td>Likely desiccation loss</td>
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<td>23/5/5</td>
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<td>7/7/7</td>
<td>Unk</td>
<td>3(M,1,A)</td>
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</tbody>
</table>

*Observation of 1 one year old toadlet in 2002 indicates at least some survival of tadpoles from 2001.

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (Studies # Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>12</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>6</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>20</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>20</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>7</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>

Comments

Most larvae apparently lost to mallard and/or dytiscid predation in 1999 and 2000; the same may have occurred in 2001.
## Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>2/2/2</td>
<td>Yes</td>
<td>2(M,A)</td>
<td>Excellent production</td>
</tr>
<tr>
<td>1999</td>
<td>9/9/9</td>
<td>Yes</td>
<td>3(M,1,A)</td>
<td>Good production</td>
</tr>
<tr>
<td>2000</td>
<td>19/9/9</td>
<td>Yes</td>
<td>3(M,1,A)</td>
<td>Good production</td>
</tr>
<tr>
<td>2001</td>
<td>26/7/7</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Numerous metamorphs</td>
</tr>
<tr>
<td>2002</td>
<td>14/5/5</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Numerous metamorphs</td>
</tr>
<tr>
<td>2003</td>
<td>6/6/6</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Numerous metamorphs</td>
</tr>
<tr>
<td>2004</td>
<td>9/5/5</td>
<td>Yes</td>
<td>3(M,1,A)</td>
<td>Numerous metamorphs</td>
</tr>
<tr>
<td>2005</td>
<td>5/5/5</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Very productive year</td>
</tr>
<tr>
<td>2006</td>
<td>12/4/4</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Very productive year</td>
</tr>
<tr>
<td>2007</td>
<td>12/12/12</td>
<td>Unk</td>
<td>3(M,1,A)</td>
<td>Very productive year</td>
</tr>
</tbody>
</table>

### Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>11</td>
<td>Negative</td>
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<td>2006</td>
<td>14</td>
<td>Negative</td>
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<tr>
<td>2007</td>
<td>18</td>
<td>Negative</td>
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</tr>
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</table>

### Comments

Colorado Natural Heritage Program personnel have conducted a mark recapture study in this population since 1998. Adult numbers are based on these study results.
CF11 - Rainbow Lake

**Site Monitoring**

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>4/3/3</td>
<td>Unk</td>
<td>1(A)</td>
<td>Larvae lost to mallards</td>
</tr>
<tr>
<td>2000</td>
<td>1/1/1</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>One sub-adult seen</td>
</tr>
<tr>
<td>2001</td>
<td>2/1/1</td>
<td>Yes</td>
<td>1(A)</td>
<td>Tadpoles disappeared*</td>
</tr>
<tr>
<td>2002</td>
<td>3/2/2</td>
<td>Unk</td>
<td>2(1,A)</td>
<td>Tadpoles disappeared</td>
</tr>
<tr>
<td>2003</td>
<td>1/1/1</td>
<td>Unk</td>
<td>1(A)</td>
<td>Few tadpoles found</td>
</tr>
<tr>
<td>2004</td>
<td>1/0/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>No evidence of breeding</td>
</tr>
<tr>
<td>2005</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>No evidence of breeding</td>
</tr>
<tr>
<td>2006</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>No evidence of breeding</td>
</tr>
<tr>
<td>2007</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>No evidence of breeding</td>
</tr>
</tbody>
</table>

*Larvae may have been preyed on by mallards and gartersnakes, but at least one from 2001 survived as a one year old toadlet in 2002.

**Bd Testing**

Site not tested

**Comments**

Colorado Natural Heritage Program personnel have conducted a mark recapture study in this population since 1998. Adult numbers are based on these study results. This site is on private property and subject to considerable recreational use. Site also does not appear to be very good boreal toad habitat and may only receive breeding adults sporadically.
Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>13/1/1</td>
<td>Unk</td>
<td>4(M,1,S,A)</td>
<td>8 one-year olds seen</td>
</tr>
<tr>
<td>2000</td>
<td>9/1/1</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>Few metamorphs seen</td>
</tr>
<tr>
<td>2001</td>
<td>11/4/4</td>
<td>Yes</td>
<td>3(M,S,A)</td>
<td>100 metamorphs seen</td>
</tr>
<tr>
<td>2002</td>
<td>14/3/3</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>15 metamorphs seen</td>
</tr>
<tr>
<td>2003</td>
<td>53/5/3</td>
<td>Yes</td>
<td>3(1,S,A)</td>
<td>Likely many metamorphs</td>
</tr>
<tr>
<td>2004</td>
<td>30/3/3</td>
<td>Yes</td>
<td>3(M,1,A)</td>
<td>~1000 eggs removed</td>
</tr>
<tr>
<td>2005</td>
<td>33/6/3</td>
<td>Yes</td>
<td>3(1,S,A)</td>
<td>Likely some metamorphs</td>
</tr>
<tr>
<td>2006</td>
<td>44/4/4</td>
<td>Unk</td>
<td>3(1,S,A)</td>
<td>Poor hatching success &amp; survival</td>
</tr>
<tr>
<td>2007</td>
<td>39/6/6</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>Poor hatching success &amp; survival</td>
</tr>
</tbody>
</table>

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>4</td>
<td>Negative</td>
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<tr>
<td>2005</td>
<td>16</td>
<td>Negative</td>
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<td>2006</td>
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<tr>
<td>2007</td>
<td>21</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>

Comments

Colorado Natural Heritage Program personnel have conducted a mark recapture study in this population since 1998. Adult numbers are based on these study results.
CF13 - Denny Creek West

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>5/2/2</td>
<td>Unk</td>
<td>1(M,1,A)</td>
<td>5 metamorphs seen</td>
</tr>
<tr>
<td>2000</td>
<td>1/0/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>Minimal monitoring</td>
</tr>
<tr>
<td>2001</td>
<td>3/0/0</td>
<td>No</td>
<td>1(A)</td>
<td>Adequate monitoring</td>
</tr>
<tr>
<td>2002</td>
<td>3/3/3</td>
<td>Unk</td>
<td>3(1,S,A)</td>
<td>Metamorphosis possible*</td>
</tr>
<tr>
<td>2003</td>
<td>2/2/2</td>
<td>Yes</td>
<td>2(M,A)</td>
<td>Adequate monitoring</td>
</tr>
<tr>
<td>2004</td>
<td>2/3/1</td>
<td>Yes</td>
<td>2(1,A)</td>
<td>Likely desiccation loss</td>
</tr>
<tr>
<td>2005</td>
<td>3/1/1</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>High water levels</td>
</tr>
<tr>
<td>2006</td>
<td>2/2/1</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>Good hatching &amp; tadpole survival</td>
</tr>
<tr>
<td>2007</td>
<td>11/2/2</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Poor hatching and tadpole survival</td>
</tr>
</tbody>
</table>

*Five one year olds were observed in 2002 despite no breeding observed at this site in 2001; successful breeding in 2001 may have been overlooked or it is possible that the toadlets were from the Hartenstein or Denny Creek sites. No metamorphs were observed in 2002, but it is possible some were produced.

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>4</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>4</td>
<td>Negative</td>
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</tr>
<tr>
<td>2006</td>
<td>6</td>
<td>Negative</td>
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</tr>
<tr>
<td>2007</td>
<td>12</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>

Comments

Colorado Natural Heritage Program personnel have conducted a mark recapture study in this population since 1998. Adult numbers are based on these study results.
CF14 - Denny Creek South

**Site Monitoring**

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>1/1/1</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>4 sub-adults seen</td>
</tr>
<tr>
<td>2000</td>
<td>1/0/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>Dried up mid-summer</td>
</tr>
<tr>
<td>2001</td>
<td>2/2/2</td>
<td>No</td>
<td>1(A)</td>
<td>Egg masses desiccated</td>
</tr>
<tr>
<td>2002</td>
<td>0/0/0</td>
<td>No</td>
<td>None seen</td>
<td>Site dry</td>
</tr>
<tr>
<td>2003</td>
<td>0/1/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>Site dry</td>
</tr>
<tr>
<td>2004</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Site dry most of season</td>
</tr>
<tr>
<td>2005</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Site dry</td>
</tr>
<tr>
<td>2006</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Site dry</td>
</tr>
<tr>
<td>2007</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>No evidence of breeding</td>
</tr>
</tbody>
</table>

**Bd Testing**

Site not tested

**Comments**

This site is marginal habitat and subject to desiccation.
CF15 - Holywater Beaver Ponds

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>?/?/?</td>
<td>Yes</td>
<td>1(M)</td>
<td>About 50 metamorphs</td>
</tr>
<tr>
<td>2003</td>
<td>5/1/1</td>
<td>Yes</td>
<td>2(1,A)</td>
<td>Some apparent egg loss</td>
</tr>
<tr>
<td>2004</td>
<td>1/0/0</td>
<td>Yes</td>
<td>3(1,S,A)</td>
<td>No evidence of breeding</td>
</tr>
<tr>
<td>2005</td>
<td>1/0/0</td>
<td>Unk</td>
<td>3(1,S,A)</td>
<td>No evidence of breeding</td>
</tr>
<tr>
<td>2006</td>
<td>3/0/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>No evidence of breeding</td>
</tr>
<tr>
<td>2007</td>
<td>2/0/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>No evidence of breeding</td>
</tr>
</tbody>
</table>

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>1</td>
<td>Negative</td>
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</tr>
<tr>
<td>2005</td>
<td>4</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>3</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>

Comments

Site was discovered on July 3, 2002, when metamorphs were found. Colorado Natural Heritage Program personnel have conducted a mark recapture study in this population since 1998. Adult numbers are based on these study results.
Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>4/0/1</td>
<td>Unk</td>
<td>1(A)</td>
<td>Discovered 8/2/2006</td>
</tr>
<tr>
<td>2007</td>
<td>5/1/1</td>
<td>Unk</td>
<td>1(A)</td>
<td>Site dried mid-season</td>
</tr>
</tbody>
</table>

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>4</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>13</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>

Comments

Site is located at 12,050 feet in elevation, well above timberline.
EA01 - Holy Cross City

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>1/1/1</td>
<td>Unk</td>
<td>1(A)</td>
<td>Predation &amp; late season</td>
</tr>
<tr>
<td>1997</td>
<td>1/1/1</td>
<td>Unk</td>
<td>1(A)</td>
<td>Recruitment unlikely</td>
</tr>
<tr>
<td>1998</td>
<td>2/2/2</td>
<td>Unk</td>
<td>1(A)</td>
<td>Inadequate monitoring</td>
</tr>
<tr>
<td>1999</td>
<td>2/0/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>Inadequate monitoring</td>
</tr>
<tr>
<td>2000</td>
<td>1/0/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>Inadequate monitoring</td>
</tr>
<tr>
<td>2001</td>
<td>1/1/1</td>
<td>Unk</td>
<td>None seen</td>
<td>5 visits to site</td>
</tr>
<tr>
<td>2002</td>
<td>2/1/1</td>
<td>Unk</td>
<td>1(A)</td>
<td>Breeding pond dried</td>
</tr>
<tr>
<td>2003</td>
<td>2/1/1</td>
<td>Unk</td>
<td>1(A)</td>
<td>5 visits to site</td>
</tr>
<tr>
<td>2004</td>
<td>1/0/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>No evidence of breeding</td>
</tr>
<tr>
<td>2005</td>
<td>1/0/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>No evidence of breeding</td>
</tr>
<tr>
<td>2006</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>No evidence of breeding</td>
</tr>
<tr>
<td>2007</td>
<td>1/0/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>No evidence of breeding</td>
</tr>
</tbody>
</table>

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
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</tr>
</tbody>
</table>

Comments

No site specific comments.
EA02 - East Lake Creek

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
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<td>1996</td>
<td>1/1/1</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>Site found 8/13/96</td>
</tr>
<tr>
<td>1997</td>
<td>Unk</td>
<td>Yes</td>
<td>Unk</td>
<td>Site not monitored</td>
</tr>
<tr>
<td>1998</td>
<td>3/0/0</td>
<td>Yes</td>
<td>2(1,A)</td>
<td>Inadequate monitoring</td>
</tr>
<tr>
<td>1999</td>
<td>4/4/4</td>
<td>Yes</td>
<td>3(M,1,A)</td>
<td>No night survey done</td>
</tr>
<tr>
<td>2000</td>
<td>2/2/2</td>
<td>Unk</td>
<td>3(1,S,A)</td>
<td>Minimal monitoring</td>
</tr>
<tr>
<td>2001</td>
<td>1/0/0</td>
<td>Yes</td>
<td>1(A)</td>
<td>Only one adult male seen*</td>
</tr>
<tr>
<td>2002</td>
<td>2/2/2</td>
<td>Yes</td>
<td>3(1,S,A)</td>
<td>14 adults seen (not sexed)</td>
</tr>
<tr>
<td>2003</td>
<td>2/2/2</td>
<td>Yes</td>
<td>3(M,S,A)</td>
<td>Likely many metamorphs</td>
</tr>
<tr>
<td>2004</td>
<td>2/2/2</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>16/1/1</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>5/0/1</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Tadpoles on first visit</td>
</tr>
<tr>
<td>2007</td>
<td>8/1/1</td>
<td>Unk</td>
<td>3(1,S,A)</td>
<td>Tadpoles on first visit</td>
</tr>
</tbody>
</table>

*Successful breeding in 2001 assumed due to 2 one year olds observed in 2002.

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>3</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>20</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>20</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>19</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>

Comments
There are two closely associated breeding ponds at this site.
### EA03 - East Vail

#### Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>3/1/1</td>
<td>Yes</td>
<td>3(M,S,A)</td>
<td>Site found late July.</td>
</tr>
<tr>
<td>2000</td>
<td>8/2/1</td>
<td>Unk</td>
<td>3(M,1,A)</td>
<td>Many metamorphs.</td>
</tr>
<tr>
<td>2001</td>
<td>32/4/3</td>
<td>Yes</td>
<td>3(M,S,A)</td>
<td>15 metamorphs seen</td>
</tr>
<tr>
<td>2002</td>
<td>7/1/1</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Many sub-adults</td>
</tr>
<tr>
<td>2003</td>
<td>4/1/1</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>50-100 metamorphs seen</td>
</tr>
<tr>
<td>2004</td>
<td>5/1/1</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>300+ metamorphs seen</td>
</tr>
<tr>
<td>2005</td>
<td>8/2/2</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>500+ metamorphs seen</td>
</tr>
<tr>
<td>2006</td>
<td>6/1/1</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>High water levels</td>
</tr>
<tr>
<td>2007</td>
<td>2/2/2</td>
<td>Unk</td>
<td>4(M,1,S,A)</td>
<td>High water levels</td>
</tr>
</tbody>
</table>

#### Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>8</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>9</td>
<td>Positive (1 of 9)</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>11</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>

### Comments

This site is near a bike path and surrounded by development.
EA04 - Strawberry Lakes

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>1/1/1</td>
<td>Unk</td>
<td>1(A)</td>
<td>100-500 tadpoles</td>
</tr>
<tr>
<td>2004</td>
<td>1/1/1</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>100-500 tadpoles</td>
</tr>
<tr>
<td>2005</td>
<td>0/2/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>Likely metamorphs</td>
</tr>
<tr>
<td>2006</td>
<td>Yes</td>
<td></td>
<td></td>
<td>Monitoring report not received</td>
</tr>
<tr>
<td>2007</td>
<td>3/1/2</td>
<td>Unk</td>
<td>2(1,A)</td>
<td></td>
</tr>
</tbody>
</table>

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>14</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>

Comments

No site specific comments.
GR01 - Jim Creek

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>5/1/?</td>
<td>Unk</td>
<td>3+(S,A)</td>
<td>Substantial population</td>
</tr>
<tr>
<td>1996</td>
<td>?/?/0</td>
<td>Unk</td>
<td>3+(S,A)</td>
<td>Substantial population</td>
</tr>
<tr>
<td>1997</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None observed</td>
<td>Monitoring inadequate</td>
</tr>
<tr>
<td>1998</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None observed</td>
<td>Monitoring inadequate</td>
</tr>
<tr>
<td>1999</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None observed</td>
<td>No night survey done</td>
</tr>
<tr>
<td>2000</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None observed</td>
<td>Monitoring adequate</td>
</tr>
<tr>
<td>2001</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None observed</td>
<td>No night survey done</td>
</tr>
<tr>
<td>2002</td>
<td></td>
<td></td>
<td></td>
<td>Not monitored</td>
</tr>
<tr>
<td>2003</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None observed</td>
<td>Site visited 7 times</td>
</tr>
<tr>
<td>2004</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None observed</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td></td>
<td></td>
<td></td>
<td>Not monitored</td>
</tr>
<tr>
<td>2006</td>
<td></td>
<td></td>
<td></td>
<td>Monitoring report not received</td>
</tr>
<tr>
<td>2007</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Possible water temperature issue</td>
</tr>
</tbody>
</table>

Bd Testing

Site not tested

Comments

Population indicates breeding pre-1996, but no actual breeding site found.
GR02 - Pole Creek

**Site Monitoring**

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>5/3/3</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Numerous metamorphs</td>
</tr>
<tr>
<td>1996</td>
<td>3/3/3</td>
<td>Yes</td>
<td>2(M,A)</td>
<td>Few metamorphs</td>
</tr>
<tr>
<td>1997</td>
<td>10/4/2</td>
<td>No</td>
<td>2(1,A)</td>
<td>Few, if any, metamorphs</td>
</tr>
<tr>
<td>1998</td>
<td>5/2/2</td>
<td>Yes*</td>
<td>2(M,A)</td>
<td>Monitoring marginal</td>
</tr>
<tr>
<td>1999</td>
<td>5/5/5</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Metamorphs at #4</td>
</tr>
<tr>
<td>2000</td>
<td>6/2/2</td>
<td>Yes</td>
<td>3(M,S,A)</td>
<td>One clutch desiccated</td>
</tr>
<tr>
<td>2001</td>
<td>9/7/7</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>&gt;500 metamorphs</td>
</tr>
<tr>
<td>2002</td>
<td>14/6/6</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Metamorphs present**</td>
</tr>
<tr>
<td>2003</td>
<td>7/2/2</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>&gt;500 metamorphs</td>
</tr>
<tr>
<td>2004</td>
<td>2/2/2</td>
<td>Yes</td>
<td>3(M,S,A)</td>
<td>&gt;150 metamorphs</td>
</tr>
<tr>
<td>2005</td>
<td>34/8/8</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>&gt;3000 metamorphs</td>
</tr>
<tr>
<td>2006</td>
<td>5/5/5</td>
<td>Yes</td>
<td>3(M,1,A)</td>
<td>35 adults seen total</td>
</tr>
<tr>
<td>2007</td>
<td>12/4/3</td>
<td>Unk</td>
<td>3(1,S,A)</td>
<td>&gt;3000 metamorphs</td>
</tr>
</tbody>
</table>

**Metamorphs sampled on 9/23/02 were chytrid-positive.

**Bd Testing**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>7</td>
<td>Positive (7 of 7)</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>9</td>
<td>Positive</td>
<td></td>
</tr>
</tbody>
</table>

**Comments**

This locality is on Pole Creek Golf Course, near holes #4 and #15. As of 2007, 34 boreal toad ponds have been built in this area (Horstman, 2007). Egg masses were deposited in 2 ponds in 2007.
GR03 - Vasquez Creek

### Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>1/1/1</td>
<td>Yes*</td>
<td>1(A)</td>
<td>Found late in season</td>
</tr>
<tr>
<td>2000</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Monitoring adequate</td>
</tr>
<tr>
<td>2001</td>
<td>0/0/0</td>
<td>Unk</td>
<td>1(S)</td>
<td>One sub-adult seen*</td>
</tr>
<tr>
<td>2002</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>One site visit</td>
</tr>
<tr>
<td>2003</td>
<td></td>
<td></td>
<td></td>
<td>Site not monitored</td>
</tr>
<tr>
<td>2004</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>0/0/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>1 adult seen</td>
</tr>
<tr>
<td>2006</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Investigating habitat improvements</td>
</tr>
<tr>
<td>2007</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Area around traditional site surveyed</td>
</tr>
</tbody>
</table>

* 16 toadlets from 1999 clutch were captive reared and released in Vasquez Creek drainage in 2000; the sub-adult observed in 2001 was observed at the release site. No toads were observed at the 1999 breeding site.

### Bd Testing

Site not tested

### Comments

No site specific comments.
GR04 - McQueary Lake

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>2/3/3</td>
<td>Yes</td>
<td>2(1,A)</td>
<td>No metamorphs observed</td>
</tr>
<tr>
<td>2002</td>
<td>8/6/6</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>&lt;50 metamorphs seen</td>
</tr>
<tr>
<td>2003</td>
<td>2/2/2</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>Desiccation &amp; predation</td>
</tr>
<tr>
<td>2004</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Possible adult sighting</td>
</tr>
<tr>
<td>2007</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>One site visit</td>
</tr>
</tbody>
</table>

Bd Testing

Site not tested

Comments

Site is difficult to access and thus receives minimal monitoring.
GR05 - Upper Williams Fork

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>2/2/2</td>
<td>Yes</td>
<td>3(M,1,A)</td>
<td>Metamorphs observed</td>
</tr>
<tr>
<td>2002</td>
<td>1/1/1</td>
<td>Yes</td>
<td>3(1,S,A)</td>
<td>No metamorphs seen</td>
</tr>
<tr>
<td>2003</td>
<td>1/2/1</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>&lt;50 metamorphs</td>
</tr>
<tr>
<td>2004</td>
<td>2/2/2</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Cold water temps</td>
</tr>
<tr>
<td>2005</td>
<td>2/1/1</td>
<td>Unk</td>
<td>2(1,S,A)</td>
<td>Metamorphs possible</td>
</tr>
<tr>
<td>2006</td>
<td>2/0/1</td>
<td>Yes</td>
<td>2(M,A)</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>2/1/1</td>
<td>Unk</td>
<td>3(M,1,A)</td>
<td>3 site visits</td>
</tr>
</tbody>
</table>

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>11</td>
<td>Positive (2 of 11)</td>
<td></td>
</tr>
</tbody>
</table>

Comments

No site specific comments.
GR06 - Big Meadow

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>1/1/0</td>
<td>Yes</td>
<td>3(M, 1,A)</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>2/2/2</td>
<td>Yes</td>
<td>2(1,A)</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>0/0/2</td>
<td>Unk</td>
<td>1(S)</td>
<td>Pond dried</td>
</tr>
<tr>
<td>2007</td>
<td>1/1/2</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>Large numbers of tadpoles</td>
</tr>
</tbody>
</table>

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>1</td>
<td>Positive (1 of 1)</td>
<td></td>
</tr>
</tbody>
</table>

Comments

No site specific comments.
GR07 – South Fork

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>0/0/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>Site found 9/11/2007</td>
</tr>
</tbody>
</table>

Bd Testing

Site not tested

Comments

No site specific comments.
GU01 - Triangle Pass

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>3/3/3</td>
<td>Unk</td>
<td>1(A)</td>
<td>Metamorphs unlikely</td>
</tr>
<tr>
<td>1994</td>
<td>Unk</td>
<td>Unk</td>
<td>Unk</td>
<td>No data</td>
</tr>
<tr>
<td>1995</td>
<td>1/1/1</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>Metamorphs unlikely</td>
</tr>
<tr>
<td>1996</td>
<td>Unk</td>
<td>Yes</td>
<td>Unk</td>
<td>No monitoring</td>
</tr>
<tr>
<td>1997</td>
<td>2/2/2</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Many metamorphs</td>
</tr>
<tr>
<td>1998</td>
<td>17/5/5+</td>
<td>Unk</td>
<td>4(M,1,2,A)</td>
<td>Many metamorphs</td>
</tr>
<tr>
<td>1999</td>
<td>19/5/4</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>No night survey done</td>
</tr>
<tr>
<td>2000</td>
<td>13/13/13</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>One sub-adult seen</td>
</tr>
<tr>
<td>2001</td>
<td>18/14/11</td>
<td>Yes</td>
<td>2(M,A)</td>
<td>No night survey done</td>
</tr>
<tr>
<td>2002</td>
<td>16/17/16</td>
<td>Yes</td>
<td>3(1,S,A)</td>
<td>No visits after 7/25/02</td>
</tr>
<tr>
<td>2003</td>
<td>32/14/14</td>
<td>Unk</td>
<td>4(M,1,S,A)</td>
<td>Numerous metamorphs</td>
</tr>
<tr>
<td>2004</td>
<td>33/10/10</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Diving beetle predation</td>
</tr>
<tr>
<td>2005</td>
<td>8/1/1</td>
<td>Yes</td>
<td>1(A)</td>
<td>Locality snowed in</td>
</tr>
<tr>
<td>2006</td>
<td>8/2/13</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>Snow on first visit</td>
</tr>
<tr>
<td>2007</td>
<td>40/8/17</td>
<td>Unk</td>
<td>1(A)</td>
<td>Early season snow at site</td>
</tr>
</tbody>
</table>

*This locality has also been referred to as "White Rock Basin".*

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>4</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>19</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>20</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>

*This locality has also been referred to as “White Rock Basin”.*
GU02 - West Brush Creek

**Site Monitoring**

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>1/1/1</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>&lt;50 metamorphs seen</td>
</tr>
<tr>
<td>2000</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Inadequate monitoring</td>
</tr>
<tr>
<td>2001</td>
<td>0/1/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>Inadequate monitoring</td>
</tr>
<tr>
<td>2002</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>One site visit</td>
</tr>
<tr>
<td>2003</td>
<td>1/1/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>One site visit</td>
</tr>
<tr>
<td>2004</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
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</table>

**Bd Testing**

Site not tested

**Comments**

No site specific comments.
GU03 - Magdalene Gulch

**Site Monitoring**

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>1999</td>
<td>1/1/1</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Site found late in season</td>
</tr>
<tr>
<td>2000</td>
<td>2/1/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>Adequate monitoring</td>
</tr>
<tr>
<td>2001</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Inadequate monitoring</td>
</tr>
<tr>
<td>2002</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>One site visit</td>
</tr>
<tr>
<td>2003</td>
<td>0/0/0</td>
<td>Yes</td>
<td>None seen</td>
<td>Inadequate monitoring</td>
</tr>
<tr>
<td>2004</td>
<td>7/7/7</td>
<td>Yes</td>
<td>2(M,1)</td>
<td>Numerous metamorphs</td>
</tr>
<tr>
<td>2005</td>
<td>7/7/7</td>
<td>Unk</td>
<td>2(1,A)</td>
<td>Late snow at site</td>
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<tr>
<td>2006</td>
<td>1/0/1</td>
<td>Yes</td>
<td>1(A)</td>
<td>Numerous tadpoles</td>
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<tr>
<td>2007</td>
<td>6/2/5</td>
<td>Unk</td>
<td>3(M,1,A)</td>
<td>Some egg masses lost to cold weather</td>
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</table>

**Bd Testing**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
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<tbody>
<tr>
<td>2005</td>
<td>2</td>
<td>Negative</td>
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<tr>
<td>2006</td>
<td>1</td>
<td>Negative</td>
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<tr>
<td>2007</td>
<td>7</td>
<td>Negative</td>
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**Comments**

No site specific comments.
GU04 - Brush Creek

**Site Monitoring**

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>3/3/3</td>
<td>Yes</td>
<td>4(1,2,S,A)</td>
<td>Minimal monitoring</td>
</tr>
<tr>
<td>2001</td>
<td>6/1/1</td>
<td>Unk</td>
<td>3(1,S,A)</td>
<td>Minimal monitoring</td>
</tr>
<tr>
<td>2002</td>
<td>23/5/1</td>
<td>Yes</td>
<td>2(S,A)</td>
<td>Minimal monitoring</td>
</tr>
<tr>
<td>2003</td>
<td>7/2/1</td>
<td>Yes</td>
<td>1(A)</td>
<td>Minimal monitoring</td>
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<tr>
<td>2004</td>
<td>27/11/11</td>
<td>Yes</td>
<td>3(1,S,A)</td>
<td>Possible predation loss</td>
</tr>
<tr>
<td>2005</td>
<td>10/10/10</td>
<td>Yes</td>
<td>2(M,A)</td>
<td>New breeding pond found</td>
</tr>
<tr>
<td>2006</td>
<td>9/4/8</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Breeding in 5 ponds</td>
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<tr>
<td>2007</td>
<td>3/1/6</td>
<td>Unk</td>
<td>4(M,1,S,A)</td>
<td>Breeding in 2 ponds</td>
</tr>
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</table>

**Bd Testing**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>8</td>
<td>Negative</td>
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<tr>
<td>2005</td>
<td>22</td>
<td>Negative</td>
<td></td>
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<tr>
<td>2006</td>
<td>20</td>
<td>Positive (16 of 20)</td>
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<tr>
<td>2007</td>
<td>15</td>
<td>Positive</td>
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</table>

**Comments**

No site specific comments.
GU05 - Upper Taylor River

### Site Monitoring

<table>
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<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>2/0/0</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Site found post egg hatch</td>
</tr>
<tr>
<td>2005</td>
<td>1/1/1</td>
<td>Unk</td>
<td>3(1,S,A)</td>
<td>Significant snow at site</td>
</tr>
<tr>
<td>2006</td>
<td>4/2/0</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>No evidence of breeding</td>
</tr>
<tr>
<td>2007</td>
<td>8/1/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>No evidence of breeding</td>
</tr>
</tbody>
</table>

### Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>5</td>
<td>Negative</td>
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<tr>
<td>2006</td>
<td>16</td>
<td>Negative</td>
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</tr>
<tr>
<td>2007</td>
<td>16</td>
<td>Negative</td>
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### Comments

No site specific comments.
GU06 – Cow Creek

Site Monitoring

<table>
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<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>2/1/4</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Site found 7/20/2007</td>
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</table>

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>4</td>
<td>Positive (4 of 4)</td>
<td></td>
</tr>
</tbody>
</table>

Comments

This site is on the Gunnison County side of Cottonwood Pass. There is much concern about the positive disease result from this site due the proximity to the Cottonwood Creek population.
HI01 - West Trout Creek

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>2/2/2</td>
<td>Unk</td>
<td>2(M, A)</td>
<td>Site found mid-season</td>
</tr>
<tr>
<td>2001</td>
<td>4/4/4</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Minimal monitoring</td>
</tr>
<tr>
<td>2002</td>
<td>1/1/1</td>
<td>Yes</td>
<td>2(1, A)</td>
<td>1 visit, 6 1-yr-olds seen</td>
</tr>
<tr>
<td>2003</td>
<td>5/5/5</td>
<td>Yes</td>
<td>3(1,M,A)</td>
<td>100-200 metamorphs</td>
</tr>
<tr>
<td>2004</td>
<td>9/4/4</td>
<td>Yes</td>
<td>3(M,S,A)</td>
<td>Good reproduction</td>
</tr>
<tr>
<td>2005</td>
<td>0/0/0</td>
<td>Yes</td>
<td>3(M,1,S)</td>
<td>Excellent reproduction</td>
</tr>
<tr>
<td>2006</td>
<td>0/0/10</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>25 adults seen, none sexed</td>
</tr>
<tr>
<td>2007</td>
<td>4/1/0</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>Larvae seen</td>
</tr>
</tbody>
</table>

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>7</td>
<td>Negative</td>
<td></td>
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</tbody>
</table>

Comments

No site specific comments.
JA01 - Spike Lake

### Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>?/?/?</td>
<td>Unk</td>
<td>I(M)</td>
<td>Two visits after discovery</td>
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<td>2002</td>
<td>?/?/?</td>
<td>Unk</td>
<td>?</td>
<td>Site info not provided</td>
</tr>
<tr>
<td>2003</td>
<td>0/0/0</td>
<td>Unk</td>
<td>none seen</td>
<td>Not monitored</td>
</tr>
<tr>
<td>2004</td>
<td></td>
<td></td>
<td></td>
<td>Access difficult</td>
</tr>
<tr>
<td>2005</td>
<td>2/2/2</td>
<td>Unk</td>
<td>I(A)</td>
<td>Monitoring report not received</td>
</tr>
<tr>
<td>2006</td>
<td></td>
<td></td>
<td></td>
<td>Monitoring report not received</td>
</tr>
<tr>
<td>2007</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Bd Testing

Site not tested

### Comments

This breeding locality was discovered in 2001 comments. In 2002 tadpoles were collected for broodstock at NASRF.
JA02 - Twisty Park

**Site Monitoring**

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td></td>
<td></td>
<td></td>
<td>Site discovered, not monitored</td>
</tr>
</tbody>
</table>

**Bd Testing**

Site not tested

**Comments**

Site is located on private land and will not be monitored.
JA03 - Muddy Pass Lake

**Site Monitoring**

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>2/2/2</td>
<td>Yes</td>
<td>2(M,A)</td>
<td>Site discovered 6/20/05</td>
</tr>
<tr>
<td>2006</td>
<td>0/0/0</td>
<td>Unk</td>
<td>2(1,S)</td>
<td>No breeding observed</td>
</tr>
<tr>
<td>2007</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>No breeding observed</td>
</tr>
</tbody>
</table>

**Bd Testing**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>16</td>
<td>Positive (2 of 16)</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>15</td>
<td>Positive (12 of 15)</td>
<td></td>
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</tbody>
</table>

**Comments**

No site specific comments.
LR01 - Lost Lake

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>?/?/22</td>
<td>Unk</td>
<td>1(A)</td>
<td>Incomplete data</td>
</tr>
<tr>
<td>1991</td>
<td>206/28/15</td>
<td>Unk</td>
<td>1(A)</td>
<td>No data on sub-adults</td>
</tr>
<tr>
<td>1992</td>
<td>143/23/23</td>
<td>Unk</td>
<td>1(A)</td>
<td>No data on sub-adults</td>
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<tr>
<td>1993</td>
<td>77/10/?</td>
<td>Unk</td>
<td>1(A)</td>
<td>Incomplete data</td>
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<td>1994</td>
<td>110/35/35</td>
<td>Unk</td>
<td>1(A)</td>
<td>No data on sub-adults</td>
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<td>1995</td>
<td>122/32/32</td>
<td>Yes*</td>
<td>1(A)</td>
<td>No data on sub-adults</td>
</tr>
<tr>
<td>1996</td>
<td>43/15/15</td>
<td>No</td>
<td>1(A)</td>
<td>No data on sub-adults</td>
</tr>
<tr>
<td>1997</td>
<td>112/15/15+</td>
<td>No</td>
<td>3(M,2*,A)</td>
<td>15 to 20 egg masses</td>
</tr>
<tr>
<td>1998</td>
<td>106/12/12</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>150+ Metamorphs seen</td>
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<tr>
<td>1999</td>
<td>10/10/10</td>
<td>Unk</td>
<td>1(A)</td>
<td>Metamorphs possible</td>
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<tr>
<td>2000</td>
<td>3/3/3</td>
<td>Unk</td>
<td>1(A)</td>
<td>Positive for chytrid</td>
</tr>
<tr>
<td>2001</td>
<td>0/3/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>Only females observed</td>
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<tr>
<td>2002</td>
<td>0/1/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>One female observed</td>
</tr>
<tr>
<td>2003</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Surveys adequate</td>
</tr>
<tr>
<td>2004</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Juvenile toads found</td>
</tr>
<tr>
<td>2005</td>
<td>3/3/3</td>
<td>Unk</td>
<td>1(A)</td>
<td>Larvae seen</td>
</tr>
<tr>
<td>2006</td>
<td>0/0/0</td>
<td>Unk</td>
<td></td>
<td>Larvae seen</td>
</tr>
<tr>
<td>2007</td>
<td>2/0/0</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>No breeding observed</td>
</tr>
</tbody>
</table>


Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>?</td>
<td>Positive</td>
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<tr>
<td>2005</td>
<td>2</td>
<td>Positive (2 of 2)</td>
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</tbody>
</table>

Comments

No site specific comments.
LR02 - Kettle Tarn

**Site Monitoring**

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>?/?/13</td>
<td>Unk</td>
<td>1(A)</td>
<td>Incomplete data</td>
</tr>
<tr>
<td>1991</td>
<td>21+/23/23</td>
<td>Unk</td>
<td>1(A)</td>
<td>No data on sub-adults</td>
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<tr>
<td>1992</td>
<td>63/18/18</td>
<td>Unk</td>
<td>1(A)</td>
<td>No data on sub-adults</td>
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<tr>
<td>1993</td>
<td>54/25/25</td>
<td>Unk</td>
<td>2(M,A)</td>
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<td>1994</td>
<td>120/21/21</td>
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<td>210/24/24</td>
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<td>1996</td>
<td>29/13/8</td>
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<td>3(M,2,A)</td>
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<td>1997</td>
<td>15/11/0</td>
<td>No</td>
<td>1(A)</td>
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<tr>
<td>1998</td>
<td>18/13/10</td>
<td>Unk</td>
<td>1(A)</td>
<td></td>
</tr>
<tr>
<td>1999</td>
<td>15/8/2</td>
<td>Yes*</td>
<td>1(A)</td>
<td>No metamorphs seen</td>
</tr>
<tr>
<td>2000</td>
<td>13/5/3</td>
<td>Unk</td>
<td>2(1,A)</td>
<td>One 1 year old seen*</td>
</tr>
<tr>
<td>2001</td>
<td>2/4/3</td>
<td>Yes</td>
<td>3(M,S,A)</td>
<td>Metamorphs observed*</td>
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<tr>
<td>2002</td>
<td>2/2/2</td>
<td>Yes</td>
<td>3(M,1,A)</td>
<td>See note**</td>
</tr>
<tr>
<td>2003</td>
<td>3/3/3</td>
<td>Yes</td>
<td>3(M,1,A)</td>
<td>500+ metamorphs</td>
</tr>
<tr>
<td>2004</td>
<td>2/2/2</td>
<td>Unk</td>
<td>3(1,S,A)</td>
<td>Site dry by end of July</td>
</tr>
<tr>
<td>2005</td>
<td>0/1/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>Good water levels</td>
</tr>
<tr>
<td>2006</td>
<td>0/3/1</td>
<td>Unk</td>
<td>1(A)</td>
<td>Desiccation loss</td>
</tr>
<tr>
<td>2007</td>
<td>0/1/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>Site dry by mid June</td>
</tr>
</tbody>
</table>

* Metamorphs observed, but number not estimated in monitoring form.

** Tadpoles from NASRF released at site; it is unknown whether metamorphs observed in 2002 derived from naturally produced clutches or from these released tadpoles.

** Bd Testing**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>1</td>
<td>Positive (1 of 1)</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>1</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>

** Comments**

Site has experienced some water level issues.
LR03 - Spruce Lake

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>Unk</td>
<td>Yes</td>
<td>Unk</td>
<td>Reproduction presumed</td>
</tr>
<tr>
<td>1997</td>
<td>3/1/?</td>
<td>Unk</td>
<td>3(1,S,A)</td>
<td>Limited monitoring</td>
</tr>
<tr>
<td>1998</td>
<td>9/3/1</td>
<td>Unk</td>
<td>1(A)</td>
<td>Inadequate monitoring</td>
</tr>
<tr>
<td>1999</td>
<td>9/3/1</td>
<td>Yes</td>
<td>2(S,A)</td>
<td>Inadequate monitoring</td>
</tr>
<tr>
<td>2000</td>
<td>10/4/2</td>
<td>Unk</td>
<td>3(M,1,A)</td>
<td>Three 1 year olds seen</td>
</tr>
<tr>
<td>2001</td>
<td>10/2/2</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>Larvae observed*</td>
</tr>
<tr>
<td>2002</td>
<td>15/3/3</td>
<td>Unk</td>
<td>1(A)</td>
<td>No metamorphs observed</td>
</tr>
<tr>
<td>2003</td>
<td>12/1/1</td>
<td>Unk</td>
<td>1(A)</td>
<td>No larvae observed</td>
</tr>
<tr>
<td>2004</td>
<td>10/2/2</td>
<td>Unk</td>
<td>1(A)</td>
<td>No larvae observed</td>
</tr>
<tr>
<td>2005</td>
<td>7/5/5</td>
<td>Unk</td>
<td>1(A)</td>
<td>Larvae observed</td>
</tr>
<tr>
<td>2006</td>
<td>7/1/3</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Eggs collected from site</td>
</tr>
<tr>
<td>2007</td>
<td>13/3/15</td>
<td>Unk</td>
<td>1(A)</td>
<td>Larvae observed</td>
</tr>
</tbody>
</table>

*Last site visit June 20, prior to time of metamorphosis.

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>12</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>8</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>1</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>

Comments

No site specific comments.
LR04 - Glacier Basin

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>1/1/0</td>
<td>Unk</td>
<td>1(A)</td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>1/1/1</td>
<td>Yes</td>
<td>1(A)</td>
<td>Transplant site</td>
</tr>
<tr>
<td>1997</td>
<td>0/1/0</td>
<td>No</td>
<td>2(1,A)</td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>3/0/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>No breeding activity seen</td>
</tr>
<tr>
<td>1999</td>
<td>3/0/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>No night survey done</td>
</tr>
<tr>
<td>2000</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Monitoring adequate</td>
</tr>
<tr>
<td>2001</td>
<td></td>
<td></td>
<td></td>
<td>Not monitored</td>
</tr>
</tbody>
</table>

This site will no longer be regularly monitored after 2000. Translocation appears unsuccessful (Muths et al. 2001).

Bd Testing

Site not tested

Comments

This site will no longer be regularly monitored after 2000. Translocation appears unsuccessful (Muths et al. 2001).
LR05 - Twin Lake

**Site Monitoring**

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>1/1/1</td>
<td>Unk</td>
<td>1(A)</td>
<td>Tadpoles observed</td>
</tr>
<tr>
<td>1999</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Site disturbed*</td>
</tr>
<tr>
<td>2000</td>
<td>0/0/0</td>
<td>Yes</td>
<td>None seen</td>
<td>Low water</td>
</tr>
<tr>
<td>2001</td>
<td>3/2/2</td>
<td>Yes</td>
<td>3(1,S,A)</td>
<td>No metamorphs seen</td>
</tr>
<tr>
<td>2002</td>
<td>1/1/1</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>No metamorphs seen</td>
</tr>
<tr>
<td>2003</td>
<td>0/0/0</td>
<td>Unk</td>
<td>0</td>
<td>Site disturbed</td>
</tr>
<tr>
<td>2004</td>
<td></td>
<td></td>
<td></td>
<td>Not monitored</td>
</tr>
<tr>
<td>2005</td>
<td></td>
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<td></td>
<td>Not monitored</td>
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<tr>
<td>2006</td>
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<td>Not monitored</td>
</tr>
<tr>
<td>2007</td>
<td></td>
<td></td>
<td></td>
<td>Not monitored</td>
</tr>
</tbody>
</table>

* In 1999, there was temporary disturbance at this site due to testing of reconstructed dam.

**Bd Testing**

Site not tested

**Comments**

In 1999, there was temporary disturbance at this site due to testing of reconstructed dam.
## LR06 - Trout Creek

### Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>2/2/2</td>
<td>Yes</td>
<td>1(A)</td>
<td>Site found 6/22/2004</td>
</tr>
<tr>
<td>2005</td>
<td>0/0/0</td>
<td>Yes</td>
<td>None seen</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>0/0/3</td>
<td>Unk</td>
<td>3(1,S,M)</td>
<td>Good year at site</td>
</tr>
<tr>
<td>2007</td>
<td></td>
<td></td>
<td></td>
<td>Monitoring report not received</td>
</tr>
</tbody>
</table>

### Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>1</td>
<td>Negative</td>
<td></td>
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<tr>
<td>2006</td>
<td>11</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>12</td>
<td>Positive (1 of 12)</td>
<td>Suspicious result</td>
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</table>

### Comments

No site specific comments.
LR07 - Panhandle Creek

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>3/2/0</td>
<td>Yes</td>
<td>2(S,A)</td>
<td>Exact site not found</td>
</tr>
<tr>
<td>2005</td>
<td>0/0/0</td>
<td>Yes</td>
<td>None seen</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>5/0/1</td>
<td>Unk</td>
<td>4(M,1,S,A)</td>
<td>Exact site located</td>
</tr>
<tr>
<td>2007</td>
<td></td>
<td></td>
<td></td>
<td>Monitoring report not received</td>
</tr>
</tbody>
</table>

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>10</td>
<td>Negative</td>
<td></td>
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</tbody>
</table>

Comments

No site specific comments.
LR08 – Fay Lakes Area

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>4/4/0</td>
<td>Yes</td>
<td>2(M,A)</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>2/2/2</td>
<td>Yes</td>
<td>2(1,A)</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>3/2/0</td>
<td>Yes</td>
<td>3(M,1,A)</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>6/2/3</td>
<td>Unk</td>
<td>3(1,S,A)</td>
<td>Eggs collected for NASRF</td>
</tr>
</tbody>
</table>

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>4</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>8</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>

Comments

This site has also been known as Ypsilon Lake.
ME01 - Buzzard Creek

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>0/0/0</td>
<td>Yes</td>
<td>1(M)</td>
<td>Site discovered on 7/15/2006</td>
</tr>
<tr>
<td>2007</td>
<td>0/0/0</td>
<td>Unk</td>
<td>2(M,1)</td>
<td>Tadpoles and metamorphs seen</td>
</tr>
</tbody>
</table>

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>20</td>
<td>Positive</td>
<td></td>
</tr>
</tbody>
</table>

Comments

Site is along route of potential extensive pipeline construction.
MI01 - Jumper Creek

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>3/0/?</td>
<td>Unk</td>
<td>1(A)</td>
<td>1st toad observation</td>
</tr>
<tr>
<td>1995</td>
<td>Unk</td>
<td>Unk</td>
<td>Unk</td>
<td>Breeding likely</td>
</tr>
<tr>
<td>1996</td>
<td>4/2/1+</td>
<td>Yes</td>
<td>2(M,A)</td>
<td>Breeding observed</td>
</tr>
<tr>
<td>1997</td>
<td>8/3/3</td>
<td>Yes</td>
<td>3(M,1,A)</td>
<td>Many metamorphs</td>
</tr>
<tr>
<td>1998</td>
<td>7/1/2</td>
<td>Unk</td>
<td>4(M,1,S,A)</td>
<td></td>
</tr>
<tr>
<td>1999</td>
<td>3/2/2</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>&lt;50 metamorphs seen</td>
</tr>
<tr>
<td>2000</td>
<td>4/2/2</td>
<td>Yes</td>
<td>1(A)</td>
<td>Site dessicated</td>
</tr>
<tr>
<td>2001</td>
<td>4/1/1</td>
<td>Yes</td>
<td>3(M,1,A)</td>
<td>&lt;50 metamorphs seen</td>
</tr>
<tr>
<td>2002</td>
<td>0/0/0</td>
<td>Yes</td>
<td>1(1)</td>
<td>Site dry; 3 1-yr-olds seen</td>
</tr>
<tr>
<td>2003</td>
<td>1/1/1</td>
<td>Unk</td>
<td>2(1,A)</td>
<td>Possible desiccation loss</td>
</tr>
<tr>
<td>2004</td>
<td>1/1/1</td>
<td>Unk</td>
<td>1(A)</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>1/1/0</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Site filling w/vegetation</td>
</tr>
<tr>
<td>2006</td>
<td>0/0/1</td>
<td>Yes</td>
<td>1(M)</td>
<td>Low productivity</td>
</tr>
<tr>
<td>2007</td>
<td>0/0/0</td>
<td>Unk</td>
<td>1(1)</td>
<td>Site not very productive</td>
</tr>
</tbody>
</table>

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>10</td>
<td>Positive (8 of 10)</td>
<td></td>
</tr>
</tbody>
</table>

Comments

Low water levels exacerbated by encroaching vegetation are degrading the habitat potential of this site.
MI02 - Trout Creek

**Site Monitoring**

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>1/1/1 (See note)</td>
<td>No</td>
<td>None seen</td>
<td>Tadpoles observed</td>
</tr>
<tr>
<td>1997</td>
<td>0/0/0</td>
<td>No</td>
<td>None seen</td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>0/0/0</td>
<td>No</td>
<td>None seen</td>
<td></td>
</tr>
<tr>
<td>1999</td>
<td>0/0/0</td>
<td>No</td>
<td>None seen</td>
<td>Only one site visit</td>
</tr>
<tr>
<td>2000</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Minimal monitoring</td>
</tr>
<tr>
<td>2001</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Minimal monitoring</td>
</tr>
<tr>
<td>2002</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Minimal monitoring</td>
</tr>
<tr>
<td>2003</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td></td>
<td></td>
<td></td>
<td>Not monitored</td>
</tr>
<tr>
<td>2005</td>
<td></td>
<td></td>
<td></td>
<td>Not monitored</td>
</tr>
<tr>
<td>2006</td>
<td></td>
<td></td>
<td></td>
<td>Not monitored</td>
</tr>
<tr>
<td>2007</td>
<td></td>
<td></td>
<td></td>
<td>Not monitored</td>
</tr>
</tbody>
</table>

NOTE: This site is questionable. 1996 observations may have been result of unauthorized transplant from Jumper Creek. No eggs, tadpoles, or toads have been observed during minimal monitoring efforts associated with site visits to West Trout Creek.

**Bd Testing**

Site not tested

**Comments**

This site is questionable. The 1996 observations may have been the result of an unauthorized transplant from the Jumper Creek site. This site is along the route to the West Trout Creek site and has received minimal monitoring as crews are passing by. Site will no longer be officially monitored.
MI03 - Roaring Fork Pond

### Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>1/1/1</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Site found late season</td>
</tr>
<tr>
<td>2001</td>
<td>3/0/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>Minimal monitoring</td>
</tr>
<tr>
<td>2002</td>
<td>1/1/1</td>
<td>Yes</td>
<td>None seen</td>
<td>One egg mass; 2 visits</td>
</tr>
<tr>
<td>2003</td>
<td>3/0/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>No evidence of breeding</td>
</tr>
<tr>
<td>2004</td>
<td>1/0/0</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>No evidence of breeding</td>
</tr>
<tr>
<td>2005</td>
<td></td>
<td></td>
<td></td>
<td>Not monitored</td>
</tr>
<tr>
<td>2006</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td></td>
</tr>
</tbody>
</table>

Previously listed as Boots Pond; renamed here to conform to a CDOW database of pond names and NASRF records.

### Bd Testing

Site not tested

### Comments

This site was previously listed as Boots Pond. Renamed here to conform to CDOW database of pond names and NASRF records.
PA01 - Rough and Tumbling Creek

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>2/2/2</td>
<td>Unk</td>
<td>1(A)</td>
<td>Site discovered 7/28/04</td>
</tr>
<tr>
<td>2005</td>
<td>2/2/2</td>
<td>Unk</td>
<td>1(A)</td>
<td>Likely many metamorphs</td>
</tr>
<tr>
<td>2006</td>
<td>1/1/1</td>
<td>Unk</td>
<td>1(A)</td>
<td>Water level low throughout season</td>
</tr>
<tr>
<td>2007</td>
<td>1/1/1</td>
<td>Unk</td>
<td>1(A)</td>
<td>Poor tadpole hatching &amp; survival</td>
</tr>
</tbody>
</table>

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>2</td>
<td>Negative</td>
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<tr>
<td>2006</td>
<td>1</td>
<td>Negative</td>
<td></td>
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</tbody>
</table>

Comments

No site specific comments.
PA02 - Rough and Tumbling West

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>1/0/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>Site discovered 8/10/2006</td>
</tr>
<tr>
<td>2007</td>
<td>2/2/2</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>Good tadpole hatching &amp; survival</td>
</tr>
</tbody>
</table>

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>1</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>

Comments

No site specific comments.
PI01 - Conundrum Creek

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>3/1/1</td>
<td>Yes</td>
<td>2+(S,A)</td>
<td>Minimal monitoring</td>
</tr>
<tr>
<td>1996</td>
<td>1/1/1</td>
<td>Unk</td>
<td>2+(S,A)</td>
<td>Many metamorphs</td>
</tr>
<tr>
<td>1997</td>
<td>2/2/2</td>
<td>Unk</td>
<td>2(2,A)</td>
<td>Poor production</td>
</tr>
<tr>
<td>1998</td>
<td>2/2/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>Inadequate monitoring</td>
</tr>
<tr>
<td>1999</td>
<td>0/0/0</td>
<td>Unk</td>
<td>Unk</td>
<td>Site not monitored</td>
</tr>
<tr>
<td>2000</td>
<td>2/2/2</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Adequate monitoring</td>
</tr>
<tr>
<td>2001</td>
<td>3/9/3</td>
<td>Yes</td>
<td>2(M,A)</td>
<td>100 metamorphs seen</td>
</tr>
<tr>
<td>2002</td>
<td>1/1/1</td>
<td>Unk</td>
<td>2(M,1)</td>
<td>Many metamorphs*</td>
</tr>
<tr>
<td>2003</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>One site visit</td>
</tr>
<tr>
<td>2006</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>One site visit</td>
</tr>
<tr>
<td>2007</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td></td>
</tr>
</tbody>
</table>

*No adults seen during many site visits, but at least one egg mass produced, resulting in hundreds of metamorphs.

Bd Testing

Site not tested

Comments

No site specific comments.
PI02 - East Maroon Creek

**Site Monitoring**

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>3/3/3</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Several ponds at site</td>
</tr>
<tr>
<td>2001</td>
<td>3/3/3</td>
<td>Yes</td>
<td>3(1,S,M)</td>
<td>Adults not observed</td>
</tr>
<tr>
<td>2002</td>
<td>3/3/3</td>
<td>Yes</td>
<td>4(1,M,S,A)</td>
<td>Breeding in 2 ponds</td>
</tr>
<tr>
<td>2003</td>
<td>3/3/3</td>
<td>Yes</td>
<td>3(M,S,A)</td>
<td>Numerous metamorphs</td>
</tr>
<tr>
<td>2004</td>
<td>7/1/1</td>
<td>Yes</td>
<td>3(1,S,A)</td>
<td>Possible metamorphs</td>
</tr>
<tr>
<td>2005</td>
<td>2/2/2</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Breeding in 2 ponds</td>
</tr>
<tr>
<td>2006</td>
<td>2/2/2</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Good year</td>
</tr>
<tr>
<td>2007</td>
<td>2/2/5</td>
<td>Unk</td>
<td>4(M,1,S,A)</td>
<td></td>
</tr>
</tbody>
</table>

In 2001, about 3 egg masses deposited although adults were not observed; 16 sub-adults and about 50 metamorphs seen.

**Bd Testing**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>4</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>3</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>8</td>
<td>Negative</td>
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<tr>
<td>2006</td>
<td>20</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>11</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>

**Comments**

No site specific comments.
PI03 - Lincoln Creek

**Site Monitoring**

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>0/0/0</td>
<td>Unk</td>
<td>1(M)</td>
<td>Site found 9/9/2005</td>
</tr>
<tr>
<td>2006</td>
<td>0/0/1</td>
<td>Unk</td>
<td>1(M)</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>2/0/0</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Some issues with drying at site</td>
</tr>
</tbody>
</table>

**Bd Testing**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>3</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>

**Comments**

No site specific comments.
**PI04 – Norman & Louise Barker Pond (Grizzly Reservoir)**

**Site Monitoring**

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>0/0/0</td>
<td>Unk</td>
<td></td>
<td>Site discovered 8/21/06</td>
</tr>
<tr>
<td>2007</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>New pond constructed in fall</td>
</tr>
</tbody>
</table>

**Bd Testing**

Site not tested

**Comments**

At discovery, site contained tadpoles in a shallow, flowing drainage ditch with little to no food. USFS and CDOW developed plans to restore a small pond in the location of a previous wetland. Pond constructed and revegetated in 2007. Site was originally named Grizzly Reservoir but changed to honor caretaker at site who was instrumental in site improvements.
PI05 – Campground Lift Ponds

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>0/1/0</td>
<td>Yes</td>
<td>3(1,S,A)</td>
<td>Site discovered 8/1/2006</td>
</tr>
<tr>
<td>2007</td>
<td>3/1/0</td>
<td>Unk</td>
<td>4(M,1,A)</td>
<td>Eggs hatched by first visit</td>
</tr>
</tbody>
</table>

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>2</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>14</td>
<td>Positive</td>
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</table>

Comments

No site specific comments.
PI06 - Homestake Reservoir

**Site Monitoring**

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>Unk</td>
<td></td>
<td></td>
<td>Site found</td>
</tr>
<tr>
<td>2007</td>
<td>4/0/2</td>
<td>Unk</td>
<td>1(A)</td>
<td>Access issues at site</td>
</tr>
</tbody>
</table>

**Bd Testing**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>4</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>4</td>
<td>Negative</td>
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</table>

**Comments**

Site is difficult to access.
### Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>0/0/0</td>
<td>Yes</td>
<td>2(2,3)</td>
<td>Numerous sub-adults</td>
</tr>
<tr>
<td>1996</td>
<td>1/1/1</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>Larvae seen</td>
</tr>
<tr>
<td>1997</td>
<td>1/0/0</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>Toads along Elkhead Cr.</td>
</tr>
<tr>
<td>1998</td>
<td>0/0/0</td>
<td>No</td>
<td>1(S)</td>
<td>Inadequate Monitoring</td>
</tr>
<tr>
<td>1999</td>
<td>0/0/0</td>
<td>No</td>
<td>None seen</td>
<td>Monitoring adequate</td>
</tr>
<tr>
<td>2000</td>
<td>0/0/0</td>
<td>No</td>
<td>None seen</td>
<td>Monitoring adequate</td>
</tr>
<tr>
<td>2001</td>
<td>0/0/0</td>
<td>No</td>
<td>None seen</td>
<td>Monitoring inadequate</td>
</tr>
<tr>
<td>2002</td>
<td></td>
<td></td>
<td></td>
<td>Not monitored</td>
</tr>
<tr>
<td>2003</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Site visited once</td>
</tr>
<tr>
<td>2004</td>
<td></td>
<td></td>
<td></td>
<td>Not monitored</td>
</tr>
<tr>
<td>2005</td>
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<tr>
<td>2006</td>
<td></td>
<td></td>
<td></td>
<td>Not monitored</td>
</tr>
<tr>
<td>2007</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td></td>
</tr>
</tbody>
</table>

### Bd Testing

Site not tested

### Comments

No site specific comments.
## Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>1/1/1</td>
<td>Unk</td>
<td>3 (M,2,A)</td>
<td>Nine metamorphs seen</td>
</tr>
<tr>
<td>1997</td>
<td>1/1/1</td>
<td>Yes</td>
<td>2 (M,A)</td>
<td>Numerous metamorphs</td>
</tr>
<tr>
<td>1998</td>
<td>0/0/0</td>
<td>No</td>
<td>1(1)</td>
<td>Inadequate monitoring</td>
</tr>
<tr>
<td>1999</td>
<td>1/1/0</td>
<td>Yes</td>
<td>1(A)</td>
<td>One female toad seen</td>
</tr>
<tr>
<td>2000</td>
<td>0/0/0</td>
<td>Unk</td>
<td>1(1)</td>
<td>One yearling toad seen</td>
</tr>
<tr>
<td>2001</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Inadequate monitoring</td>
</tr>
<tr>
<td>2002</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Inadequate monitoring</td>
</tr>
<tr>
<td>2003</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Site visited 3 times</td>
</tr>
<tr>
<td>2004</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Site visited once</td>
</tr>
<tr>
<td>2005</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Site visited once</td>
</tr>
<tr>
<td>2006</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Site visited once</td>
</tr>
<tr>
<td>2007</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td></td>
</tr>
</tbody>
</table>

### Bd Testing

Site not tested

### Comments

In 2004, stream net surveys were done in the area around this site.
RO03 - Diamond Park

**Site Monitoring**

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>1/1/1</td>
<td>Yes</td>
<td>2 (M,A)</td>
<td>20 metamorphs seen</td>
</tr>
<tr>
<td>1997</td>
<td>1/1/1</td>
<td>Yes</td>
<td>3 (M,1,A)</td>
<td>Few metamorphs seen</td>
</tr>
<tr>
<td>1998</td>
<td>0/1/0</td>
<td>No</td>
<td>1 (1,A)</td>
<td>Inadequate monitoring</td>
</tr>
<tr>
<td>1999</td>
<td>0/2/0</td>
<td>No</td>
<td>1(A)</td>
<td>Only two toads seen</td>
</tr>
<tr>
<td>2000</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Site visited three times</td>
</tr>
<tr>
<td>2001</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Inadequate monitoring</td>
</tr>
<tr>
<td>2002</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>One site visit</td>
</tr>
<tr>
<td>2003</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Site visited twice</td>
</tr>
<tr>
<td>2004</td>
<td></td>
<td></td>
<td></td>
<td>Site not monitored</td>
</tr>
<tr>
<td>2005</td>
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<td></td>
<td>Site not monitored</td>
</tr>
<tr>
<td>2006</td>
<td></td>
<td></td>
<td></td>
<td>Site not monitored</td>
</tr>
<tr>
<td>2007</td>
<td></td>
<td></td>
<td></td>
<td>Monitoring report not received</td>
</tr>
</tbody>
</table>

**Bd Testing**

Site not tested

**Comments**

No site specific comments.
### Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>0/1/0</td>
<td>Unk</td>
<td>3(1,S,A)</td>
<td>Numerous 1 year olds</td>
</tr>
<tr>
<td>2000</td>
<td>2/2/2</td>
<td>Unk</td>
<td>3(M,2,A)</td>
<td>Approx. 400 metamorphs</td>
</tr>
<tr>
<td>2001</td>
<td>2/1/1</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>&gt;50 metamorphs</td>
</tr>
<tr>
<td>2002</td>
<td>1/1/1</td>
<td>Yes</td>
<td>3(1,S,A)</td>
<td>Site dried by August visit</td>
</tr>
<tr>
<td>2003</td>
<td>3/2/1</td>
<td>Yes</td>
<td>2(M,A)</td>
<td>&lt;50 metamorphs</td>
</tr>
<tr>
<td>2004</td>
<td>1/1/1</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>1000+ metamorphs</td>
</tr>
<tr>
<td>2005</td>
<td>1/1/1</td>
<td>Yes</td>
<td>3(M,S,A)</td>
<td>Numerous sub-adults</td>
</tr>
<tr>
<td>2006</td>
<td>0/0/0</td>
<td>Yes</td>
<td>3(M,1,S)</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>0/0/0</td>
<td>Unk</td>
<td>1(1)</td>
<td>Numerous one-year olds/sub-adults</td>
</tr>
</tbody>
</table>

### Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>5</td>
<td>Positive (5 of 5)</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>25</td>
<td>Positive (10 of 25)</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>10</td>
<td>Positive</td>
<td></td>
</tr>
</tbody>
</table>

**Comments**

Site has been fenced to exclude sheep.
### Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>10/2/2</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Site found late July.</td>
</tr>
<tr>
<td>2000</td>
<td>7/3/3</td>
<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>&lt;50 metamorphs seen.</td>
</tr>
<tr>
<td>2001</td>
<td>29/10/1</td>
<td>Unk</td>
<td>4(M,1,S,A)</td>
<td>Three site visits</td>
</tr>
<tr>
<td>2002</td>
<td>15/1/1</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>Three site visits</td>
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<td>3(M,1,A)</td>
<td>Three site visits</td>
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<td>2006</td>
<td>27/9/4</td>
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<td>4(M,1,S,A)</td>
<td>Egg masses in 4 ponds</td>
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<td>Larvae seen</td>
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### Bd Testing

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**Comments**

No site specific comments.
RO06 - Upper Buck Mountain

Site Monitoring

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<th>Comments</th>
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<tr>
<td>2000</td>
<td>9/4/4</td>
<td>Yes</td>
<td>3 (M,S,A)</td>
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<td>Yes</td>
<td>4(M,1,S,A)</td>
<td>Est. 100-500 metamorphs</td>
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<td>3(1,S,A)</td>
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<td>Est. 50-100 Metamorphs</td>
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<td>2/1/1</td>
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<td>4(M,1,S,A)</td>
<td>500-1000 Metamorphs</td>
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<td>2005</td>
<td>11/15/6</td>
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Bd Testing

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Comments

No site specific comments.
SU01 - Cucumber Gulch

Site Monitoring

<table>
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<tr>
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<th>M/F/Egg Masses</th>
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<th>Age Classes</th>
<th>Comments</th>
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<tbody>
<tr>
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<td>3+(M,S,A)</td>
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<td>1996</td>
<td>?/?/0</td>
<td>No</td>
<td>2(S,A)</td>
<td>No breeding observed</td>
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<td>1997</td>
<td>2/1/1</td>
<td>No</td>
<td>1(A)</td>
<td>Recruitment doubtful</td>
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<tr>
<td>1998</td>
<td>1/0/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>Monitoring minimal</td>
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<tr>
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<td>1/1/1</td>
<td>Unk</td>
<td>1(A)</td>
<td>No metamorphs seen</td>
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<tr>
<td>2000</td>
<td>0/1/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>Monitoring adequate</td>
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<tr>
<td>2001</td>
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<td>None seen</td>
<td>Monitoring adequate</td>
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<td>2002</td>
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<td>None seen</td>
<td>5 site visits by CNHP</td>
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<td>0/0/0</td>
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<td>None seen</td>
<td>1 site visit, access issues</td>
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<td>2005</td>
<td>1/1/0</td>
<td>Unk</td>
<td>1(A)</td>
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<tr>
<td>2006</td>
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<td>Not monitored</td>
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<tr>
<td>2007</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
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</table>

Bd Testing

Site not tested

Comments

Site is an extensive beaver complex that is difficult to monitor. Site receives recreational pressure from neighboring properties.
SU02 - Montezuma

### Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>7/1/1</td>
<td>No</td>
<td>2(S,A)</td>
<td>Breeding unsuccessful</td>
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<td>1996</td>
<td>9/?/0</td>
<td>No</td>
<td>1(A)</td>
<td>No breeding observed.</td>
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<td>1997</td>
<td>1/1/1</td>
<td>Unk</td>
<td>1(A)</td>
<td>New site, vs. '95 &amp; '96</td>
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<tr>
<td>1998</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Monitoring inadequate</td>
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<tr>
<td>1999</td>
<td>3/1/1</td>
<td>Unk</td>
<td>1(A)</td>
<td>Tadpoles observed</td>
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<tr>
<td>2000</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>No access to property*</td>
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<tr>
<td>2001</td>
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<td>Not monitored</td>
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<tr>
<td>2002</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>2 site visits</td>
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<td>2003</td>
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<td></td>
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<td>Not monitored</td>
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<td>2007</td>
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<td>Monitoring report not received</td>
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### Bd Testing

Site not tested

### Comments

Site is on private property and permission for ongoing access is being pursued.
SU03 - Peru Creek

Site Monitoring

<table>
<thead>
<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
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<tbody>
<tr>
<td>1996</td>
<td>1/1/1</td>
<td>Yes</td>
<td>3(M,S,A)</td>
<td>May be &gt; 3 age classes</td>
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<td>1997</td>
<td>6/2/2</td>
<td>Unk</td>
<td>4(M,1,S,A)</td>
<td>Good metamorphosis</td>
</tr>
<tr>
<td>1998</td>
<td>3/1/1</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Monitoring inadequate</td>
</tr>
<tr>
<td>1999</td>
<td>14/1/1</td>
<td>Unk</td>
<td>1(A)</td>
<td>Monitoring minimal</td>
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<td>2000</td>
<td>19/1/1</td>
<td>Yes</td>
<td>1(A)</td>
<td>Tadpoles seen</td>
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<td>2001</td>
<td>29/1/1</td>
<td>Unk</td>
<td>2(1,A)</td>
<td>Inadequate monitoring</td>
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<td>2002</td>
<td>2/1/1</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>&gt;500 metamorphs</td>
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<td>2003</td>
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<td>Not monitored</td>
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<tr>
<td>2004</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Low water levels</td>
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<tr>
<td>2005</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
<td>Low water levels</td>
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<td>2006</td>
<td>0/0/0</td>
<td>Unk</td>
<td>None seen</td>
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<tr>
<td>2007</td>
<td>0/1/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>Water levels still good</td>
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</table>

Disturbance from construction was observed in the wetland area, but not the breeding pond itself, on 6/15/01. Monitoring in 2001 did not occur around the time that metamorphosis would be expected.

Bd Testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
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Comments

No site specific comments.
SU04 - Upper North Tenmile

Site Monitoring

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<th>Recruitment</th>
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<th>Comments</th>
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<td>6/6/6</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>Few, if any, metamorphs</td>
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<td>1996</td>
<td>17/6/6</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>Good production</td>
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<td>1997</td>
<td>13/3/3</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Limited metamorphosis</td>
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<td>1998</td>
<td>18/3/1</td>
<td>Yes</td>
<td>2(S,A)</td>
<td>Inadequate monitoring</td>
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<tr>
<td>1999</td>
<td>2/3/3</td>
<td>Unk</td>
<td>4(M,1,S,A)</td>
<td>Inadequate monitoring</td>
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<td>2000</td>
<td>7/4/4</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>Metamorphs likely</td>
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<td>2001</td>
<td>8/2/2</td>
<td>Yes</td>
<td>1(A)</td>
<td>Larvae disappeared</td>
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<td>2002</td>
<td>8/8/8</td>
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<td>1(A)</td>
<td>No larvae/metamorphosis</td>
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<td>2004</td>
<td>5/1/1</td>
<td>Yes</td>
<td>2(S,A)</td>
<td>Late egg deposition</td>
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<tr>
<td>2005</td>
<td>2/2/2</td>
<td>Unk</td>
<td>2(1,A)</td>
<td>Poor hatching success</td>
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<td>2006</td>
<td>0/1/0</td>
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<td>1(A)</td>
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<td>2007</td>
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<td>Unk</td>
<td>1(A)</td>
<td>Poor tadpole survival</td>
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Bd Testing

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Comments

No site specific comments.
SU05 - Lower North Tenmile

Site Monitoring

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<th>Comments</th>
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<td>Yes</td>
<td>2(M,A)</td>
<td>Few metamorphs</td>
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<td>1/2/1</td>
<td>Unk</td>
<td>2(1,A)</td>
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<td>1998</td>
<td>5/5/5</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>Inadequate monitoring</td>
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<td>1999</td>
<td>3/2/1</td>
<td>Unk</td>
<td>1(A)</td>
<td>Inadequate monitoring</td>
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<td>2000</td>
<td>5/3/2</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>Monitoring adequate</td>
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<td>2001</td>
<td>3/4/3</td>
<td>Yes</td>
<td>2(M,A)</td>
<td>100 metamorphs seen</td>
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<td>2002</td>
<td>2/2/2</td>
<td>Yes</td>
<td>3(M,1,A)</td>
<td>No night survey</td>
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<td>2003</td>
<td>2/2/2</td>
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<td>2(1,A)</td>
<td>Likely many metamorphs</td>
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<tr>
<td>2004</td>
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<td>1(A)</td>
<td>Likely many metamorphs</td>
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<td>3(M,1,A)</td>
<td>Likely many metamorphs</td>
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<td>2/0/0</td>
<td>Unk</td>
<td>2(S,1)</td>
<td>No evidence of breeding</td>
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<td>No evidence of breeding</td>
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Bd Testing

<table>
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<th>Comments</th>
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Comments

No site specific comments.
SU06 - Upper North Fork of Snake River

Site Monitoring

<table>
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<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
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<tbody>
<tr>
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<td>1/2/1</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>1st survey mid-July</td>
</tr>
<tr>
<td>1999</td>
<td>1/1/1</td>
<td>Unk</td>
<td>2(S,A)</td>
<td>Some tadpoles seen</td>
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<td>1/1/1</td>
<td>Unk</td>
<td>2(M,A)</td>
<td>10-20 metamorphs seen</td>
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<td>2001</td>
<td>1/1/1</td>
<td>Yes</td>
<td>2(1,A)</td>
<td>Inadequate monitoring</td>
</tr>
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<td>2002</td>
<td>1/2/1</td>
<td>Unk</td>
<td>2(1,A)</td>
<td>Inadequate monitoring</td>
</tr>
<tr>
<td>2003</td>
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<td>Not monitored</td>
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<tr>
<td>2004</td>
<td>16/0/0</td>
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<td>1(A)</td>
<td>Site visited 3 times</td>
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<td>20/0/0</td>
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<td>1(A)</td>
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<td>2006</td>
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<tr>
<td>2007</td>
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<td>Unk</td>
<td>None seen</td>
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One male, one female, and 13 additional toads observed 5/24/01; About 100 tadpoles and 23 yearlings observed 7/20/01.

Bd Testing

<table>
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<tr>
<th>Year</th>
<th>Number</th>
<th>Results (# Positive or % Positive)</th>
<th>Comments</th>
</tr>
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<tbody>
<tr>
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<td>2004</td>
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Comments

No site specific comments.
SU07 - Lower North Fork of Snake River

**Site Monitoring**

<table>
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<tr>
<th>Year</th>
<th>M/F/Egg Masses</th>
<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
</tr>
</thead>
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<tr>
<td>1998</td>
<td>1/2/1</td>
<td>Unk</td>
<td>3(M,S,A)</td>
<td>1st survey mid-July</td>
</tr>
<tr>
<td>1999</td>
<td>1/2/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>No breeding observed</td>
</tr>
<tr>
<td>2000</td>
<td>1/1/0</td>
<td>Unk</td>
<td>1(A)</td>
<td>No breeding observed</td>
</tr>
<tr>
<td>2001</td>
<td>1/0/0</td>
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<td>No evidence of breeding</td>
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<tr>
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**Bd Testing**

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**Comments**

No site specific comments.
SU08 - Straight Creek

### Site Monitoring

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<th>Recruitment</th>
<th>Age Classes</th>
<th>Comments</th>
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<td>2006</td>
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<tr>
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### Bd Testing

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<th>Number</th>
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### Comments

No site specific comments.
## Site Monitoring

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<th>Comments</th>
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<td>One female toad seen*</td>
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<td>One female toad seen*</td>
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<td>One male toad seen</td>
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*Two of the three female toads found in 2000 were placed in captivity at the Sybille Wildlife Research Station; the female toads seen in 2001 and 2002 were not taken into captivity.

### Bd Testing

Site not tested

### Comments

This site is the source stock used for reintroductions at Lake Owen.
## Appendix III - Sites by Population

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<tr>
<td>Breckenridge</td>
<td>Cucumber Gulch</td>
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<td>Brown’s Creek</td>
<td>Brown’s Creek</td>
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<tr>
<td>Buffalo Peaks</td>
<td>Fourmile Creek</td>
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<td>Rough and Tumbling West</td>
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<td>Urad/Henderson</td>
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## Appendix IV - Sites by Mountain Range

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<td>Site Name</td>
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<td>Straight Creek (SU08)</td>
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<td>McQueary Lake (GR04)</td>
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<td>Williams Fork River (GR05)</td>
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<td>Vasquez Creek</td>
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<td>Winter Park</td>
<td>Jim Creek (GR01)</td>
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<td>North Tenmile Creek</td>
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<td>Buffalo Peaks</td>
<td>Fourmile Creek (CF07)</td>
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<td>Rough and Tumbling Creek (PA01)</td>
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<td>Rough and Tumbling West (PA02)</td>
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<td>Diamond Park (RO03)</td>
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<td>Twisty Park (JA02)</td>
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<td>San Juan Mountains</td>
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<td>Roaring Fork Pond (Boot’s Pond) (MI03)</td>
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<td>Strawberry Lakes (EA04)</td>
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<td>Holywater Beaver Ponds (CF15)</td>
<td>Homestake Reservoir (PI06)</td>
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<td>Texas Creek</td>
<td>Magdalene Gulch (GU03)</td>
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Appendix V - Research Updates

Effect of contrasting population exposure to *Batrachochytrium dendrobatidis* (naïve vs. experienced) and its effect on survival of boreal toad (*Bufo boreas*), Cindy Carey and Lauren J. Livo, University of Colorado at Boulder

Boreal toad populations in Colorado have a variety of exposure histories to the amphibian pathogen *Batrachochytrium dendrobatidis* (referred to hereafter as *Bd*). For some populations, such as those in the Urad Valley (Clear Creek County, Colorado), exposure to this pathogen has been continuous since 1999, while the Buck Mountain population (Routt County, Colorado) has been exposed to *Bd* since 2004. In contrast, the Denny Creek (Chaffee County, Colorado) population has no known exposure to *Bd* to date.

This experiment was designed to test whether prior exposure of boreal toad populations to *Bd* influenced survival of toadlets after exposure to *Bd*. In June, 2005, I collected egg samples from 2 (Buck Mountain) or 4 (Urad Valley and Denny Creek) individual clutches at breeding areas. These 10 lots of toadlets were reared at the Native Aquatic Species Restoration Facility for this experiment. An effort was made to maintain the same number of toadlets for each lot, as density affects growth rates and toadlet size. In January 2006, 20 toadlets from each lot were transferred to the University; after some mortality in transit, 75% of the remaining 194 toadlets were randomly assigned to exposure groups and the remaining 25% served as controls.

In the exposure groups, toadlets were housed individually for 24 hours in a solution containing an estimated 1 million *Bd* zoospores, while control toadlets were housed for 24 hours in a solution that lacked *Bd* zoospores but was otherwise identical. After this exposure period, all toadlets were housed individually in plastic containers holding 20 ml of 20% Holtfreter’s solution.

Although all the toadlets exposed to *Bd* eventually died, there were significant differences in survival among the toadlets associated with their geographic origin. In particular, *Bd*-exposed toadlets from Denny Creek (a site without prior exposure to *Bd*) survived significantly fewer days than *Bd*-exposed toadlets from Urad and Buck Mountain (Logrank test Chi-square = 48.947, DF = 2, P < 0.0001).
These results suggest that boreal toads at sites at which \( Bd \) is present have undergone selection for characteristics that permit them to survive for a longer time compared to boreal toads from sites where this pathogen has not invaded.

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Variation in zoospore production over the course of infection with \( Batrachochytrium dendrobatidis \), Cindy Carey and Lauren J. Livo, University of Colorado at Boulder

Previous exposure experiments suggest that amphibians infected with \( Batrachochytrium dendrobatidis \) (\( Bd \)) succumb after the fungus exceeds some threshold density of infection on the skin of the affected amphibian (Carey et al., 2006). The experiment described here was designed to determine how \( Bd \) zoospore production varied over the course of infection.

We exposed boreal toads (\( Bufo boreas \)) and Woodhouse’s toads (\( Bufo woodhousii \)) in individual containers to a solution containing an estimated 1 million \( Bd \) zoospores. After this exposure period, all toads were housed individually in plastic containers holding 20 ml of 20% Holtfreter’s solution.

\( Bd \) zoospores were collected weekly from each toad by placing the toad in a clean plastic container with 10 ml of Holtfreter’s solution for 15 minutes, then decanting the liquid into individual tubes for quantitative polymerase chain reaction (qPCR) analysis.

Boreal toad mass ranged from 1.3 to 26.8 g (mean = 11.6 ± 3.0 S.E. g, \( N = 11 \)), and there was a highly significant correlation between boreal toad mass and the number of days survived (\( R = 0.743, N = 11, P = 0.0068 \)). In contrast, the Woodhouse’s toads were larger, ranging from 12.3 to 68.5 g (mean = 23.9 ± 5.8 S.E. g, \( N = 9 \)), and there was no significant correlation between mass and the number of days survived (\( R = 0.472, N = 9, P = 0.2093 \)).

Zoospore production, estimated from qPCR, rose from initially low values to very high values. For 9 of the 11 boreal toads, and 5 of the 9 Woodhouse’s toads, the maximum number of zoospores was produced during the toad’s final sampling episode (at or within a week of the toad’s death). The table below shows the mean and range of zoospores produced at the maximum rates recorded for both species of toad in this study.
<table>
<thead>
<tr>
<th>Species</th>
<th>Mean zoospores produced per day</th>
<th>Range of zoospore production per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boreal toad</td>
<td>10,980,567</td>
<td>32,544 to 30,470,496</td>
</tr>
<tr>
<td>Woodhouse’s toad</td>
<td>8,131,744</td>
<td>178,848 to 9,947,616</td>
</tr>
</tbody>
</table>

Models of infection dynamics in individuals and populations require information on disease progression and its association with zoospore production rates. This study provides baseline information for modeling these processes.

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**Boreal toad and mountain yellow-legged frog susceptibility to* Batrachochytrium dendrobatidis**, Cindy Carey and Lauren J. Livo, University of Colorado at Boulder

Boreal toads (*Bufo boreas*) and mountain yellow-legged frogs (*Rana muscosa*) are high elevation anuran species that have both proven to be susceptible to population declines associated with the pathogenic chytrid fungus, *Batrachochytrium dendrobatidis* (*Bd*). In this experiment, we used a strain of *Bd* isolated from boreal toads in Colorado and a strain of *Bd* isolated from yellow-legged frogs in California and challenged groups of each anuran species with either 1 million zoospores of the toad *Bd*, 1 million zoospores of the frog *Bd*, or a sham solution that contained no *Bd* (controls).

Most of the controls of both anuran species survived throughout the experiment. Of the anurans exposed to *Bd*, boreal toads died much more rapidly than yellow-legged frogs, although this may be an effect of the greater mass of the frogs compared to the toads.

Further, boreal toads died significantly faster when exposed to the strain of *Bd* isolated from boreal toads than when exposed to the strain of *Bd* isolated from yellow-legged frogs (Logrank test, Chi-square = 11.890, DF = 1, P < 0.0006). There was no significant difference in survival time for yellow-legged frogs exposed to toad *Bd* versus frog *Bd* (Logrank test, Chi-square = 1.148, DF = 1, P = 0.2840).

This experiment demonstrates that variation in the pathogenicity of *Bd* depends not only on the identity of the *Bd* isolate, but also on the anuran species that is challenged by it.

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The effects of environmental factors on chytridiomycosis in a tropical anuran, Cindy Carey and Lauren J. Livo, University of Colorado at Boulder

*Atelopus zeteki* is a tropical anuran native to Panama that has experienced population declines attributed to chytridiomycosis. We exposed individual *Atelopus* to a range of dosages of the amphibian chytrid fungus *Batrachochytrium dendrobatidis* (*Bd*) and maintained the anurans at either a relatively cool temperature (17°C) or a warm temperature (23°C). In some groups, *Atelopus* were housed in individual small, round containers where the entire floor was covered in liquid (wet conditions), versus in individual large rectangular containers that were tilted so that liquid was available to the animals at one end, but the remainder of the container floor was dry (dry conditions).

We observed that the *Bd* dosage affected the survival time of the animals, with animals exposed to low doses surviving longer than animals exposed to high doses.

Both temperature (cool versus warm) and conditions (wet versus dry) affected survival as well. At 17°C, *Atelopus* exposed to 1 million zoospores and held in dry conditions survived longer than those held in wet conditions. At 23°C, the outcome was reversed, with *Atelopus* exposed to 1 million zoospores and held in wet conditions surviving longer than those held in dry conditions.

**Acknowledgements:** We thank Kevin Rogers, Tina Jackson, and the staff of the Native Aquatic Species Restoration Facility for facilitating these studies. Cheryl J. Briggs and Vance T. Vredenburg collaborated on the *Bufo boreas/Rana muscosa* study. The Baltimore Zoo provided surplus *Atelopus zeteki* for these studies. Cassia Rye and Heidi Bustamante assisted with animal care and sample collection.

**Literature cited**


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This last summer was the 8th summer of focused inventory and monitoring for the Boreal toad in Colorado by The Colorado Natural Heritage Program (CNHP). Along with the 8 years of our inventory data CNHP also compiles location data for the toad going as far back as 1902 and some of the post-1998 data is from other sources then CNHP inventory and monitoring. The Boreal toad data currently has 969 spatially distinct positive records (there are only 131 element occurrences when the 8 km separation distance combines records into sub-populations). Because CNHP has been a major part of this data collection effort we also have negative data. There are 797 spatially distinct negative records. Even after all this inventory effort we are still finding new occupied habitat and breeding sites. This past summer 5 new breeding sites were found. With more to discover about the Boreal toad CNHP has begun a spatial distribution modeling effort to refine the data we have into predictive GIS surfaces that may be utilized to adapt our inventory methodology or the management of the species.

For the purpose of the Boreal toad distribution model the spatially distinct data was clipped out with 2 sets of dependent binomial variables attributed to the points, one for breeding/non-breeding, and the other for occupied/unoccupied sites. A general linear model (GLM) was used with both actual negative data and pseudo-absence data generated from random points within Colorado counties that have Boreal toad records. The environmental covariates chosen were; elevation, aspect, slope, distance to river, stream or creek, distance to major highway, and landcover. Climate data was available, but at a 1 km resolution (unlike the rest of the grids that are 30 meter resolution) these covariates were left out for the first runs of these models so as not to cut the resolution of the resulting surfaces. Climate data such as frost free days and annual precipitation may be worth exploring in the future when the resolution improves or we run a coarse scale model.

The environmental covariate values were added to the data points using Hawth’s point intersect tool in ArcGIS then converted into a text file to load into the Statistical Program R. In R the GLM and stepwiseAIC functions were run to find the environmental variables with the best fit to the toad data. Elevation, slope, and distance to river where chosen as the covariates that best explain the toad data. From the best fitting models, the coefficients from each grid cell in Colorado were then exported back to ArcGIS as a text file and converted to a probability surface.
The values from the probability surface were then intersected back to the original data points to test the model and create a receiver operating characteristic (ROC) plot and find the best probability cutoff values for the data surface created. The next step for this winters modeling effort is to refine the GLM with a general additive model (GAM) and run the data through a binary regression tree (CART) model and weigh the results with the GLM. Potential uses for this model by CNHP as well as others include; targeted (informed or refined) inventory locating potential and isolated populations which could help prioritize field inventory, establish better estimates of species distribution, coarse scale conservation planning (emphasis on coarse as this has the potential for misuse), and informing taxonomic revisions. Most importantly we plan to use this product during the 2007 field season to refine our targeted inventory areas to increase the probability of finding new populations of the Boreal toad in Colorado.

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Chaffee County mark-recapture study 2006, Brad Lambert, CNHP, Ft. Collins, CO

In 2006 we continued a mark-recapture study in the Cottonwood Creek drainage in Chaffee County. The following breeding sites were monitored with multiple visits to collect data on the adult populations for the study: Collegiate Peaks Campground, Denny Creek, South Cottonwood, South Cottonwood West, Morgan’s Gulch, Rainbow Lake, Hartenstein Lake, Holywater beaver ponds and Middle Cottonwood Creek. The purpose of this study is to collect baseline data for evaluating population size and trends, and to detect toad movement between breeding sites.

At each site adult toads within the study area were collected in individual zip lock bags and were processed on site after the area was surveyed. The majority of adult toads were captured early in the spring during the breeding season. Avid PIT (Passive Integrated Transponders) tags were used to individually mark toads. Only toads weighing more than 20g were marked. The protocol outlined in the Boreal Toad Conservation Plan and Agreement was followed for marking toads. An incision was made with sterile scissors and the PIT-tag was inserted on the dorsal side, horizontal to the toad’s mid-dorsal line. The entry wound was sealed with New Skin Liquid Antiseptic Bandage. The toads were weighed with an Acculab 0-250g
electronic scale and measured snout to vent length with dial calipers. The toads were then released near the point of capture.

Since 1998, 1,111 adult males and 310 adult females have been tagged in the Middle Cottonwood Creek and South Cottonwood Creek drainages. In 2006 there were 133 new males with 188 recaptured individuals and 13 new females with 13 recaptured individuals. Adult captures continue to be high at the Collegiate and Denny Creek sites and at the South Cottonwood Creek sites. There has been no apparent decline in the Cottonwood Creek metapopulation since this study began, although breeding success and adult high counts have fluctuated from year to year at several breeding sites. Rainbow Lake and the Holywater Beaver Ponds site have both shown no evidence of breeding since 2003 with low numbers of adults. The long term viability of these breeding sites are of concern, but also might just be marginal sites on the edge of the more robust core sites along Middle Cottonwood Creek.

The data reveals that, although rare, there is movement by toads along the Middle Cottonwood Creek sites and between the South Cottonwood Creek and South Cottonwood Creek West sites. There have been two documented movements between the Middle Cottonwood Creek and the South Cottonwood Creek drainages. One adult male was tagged at Collegiate Peaks Campground in 1999 and was recaptured in 2002 at the South Cottonwood Creek site approximately 7 km away and another adult male tagged at the Denny Creek site in 2004 was recaptured in 2006 at the South Cottonwood Creek site approximately 8 km away. Eleven adult males have been recaptured every year since this project began (1998 – 2006) and one female tagged in 1998 was recaptured in 2006. Given that there were adults at the time they were tagged in 1998 they are at least 10 years old now.

Currently, the data from the 1998-2006 are being analyzed to look at year to year population estimates.

**Representative publications with this data:**


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BACKGROUND AND JUSTIFICATION:

*Bufo boreas* is distributed across much of the western U.S. and western Canada (Fig. 1). It is locally common, but rapid losses and declines of many populations, even in relatively pristine environments, have caused concern. Southern Rocky Mountain (SRM) populations of *B. boreas* in Colorado, Wyoming and New Mexico have undergone a drastic decline since the 1970s due principally to a chytrid fungus (*Batrachochytrium dendrobatidis*). For resource managers to effectively address the decline of this species a conservation strategy that preserves genetic variation at all levels of diversity must be adopted. The initial stages of this process must be to identify species boundaries and intraspecific management units. Heritable genetic information offers an objective means of depicting these units and provides an evolutionary framework from which to develop and evaluate conservation priorities.

A recent genetic analysis of *Bufo boreas* mitochondrial DNA (mtDNA) control region sequence data identified at least five separate clades that may warrant management consideration (Goebel 2003). These results also indicate that *B. boreas* may be more than one species, a result consistent with other phylogenetic analyses of the *B. boreas* species group which includes *B. canorus*, *B. exsul* and *B. nelsoni* (Goebel 2005; Pauly et al. 2004; Graybeal 1993). Of particular interest is evidence that the SRM mountain population of *B. boreas* may be a distinct evolutionary lineage. In order to resolve relationships within the *B. boreas* species group, both at the inter-specific and intra-specific levels, a phylogeographic analysis with increased sampling of this group must be undertaken. For this study, mitochondrial DNA sequence data from the control region, as well as microsatellite genotype data from 15 loci are being collected and analyzed for populations from throughout the range of *B. boreas* as well as other members of the *B. boreas* species group. The use of microsatellite DNA markers in the present study will provide a robust survey of the nuclear DNA variation for this species complex. The usage of microsatellite genotype data along with mitochondrial control region sequence data will allow for accurate identification of genetic diversity from the species level to fine scale population structure.
PRELIMINARY FINDINGS:

Sampling to date includes 1117 individuals from 193 collection sites throughout the range of *Bufo boreas* and *B. nelsoni* (Figure 1). In addition to these samples, curators at the Museum of Vertebrate Zoology, University of California, Berkeley, have agreed to supply tissue of 10 *B. exsul* and 15 *B. canorus* from their collections for this study. DNA has been extracted from 1117 samples, including 1109 *B. boreas* and 8 *B. nelsoni* to date.

**Mitochondrial DNA Sequence Data**

A portion of the mitochondrial control region, 473 base pairs in length, has been sequenced in 522 individuals (514 *B. boreas*, 8 *Bufo nelsoni*) thus far. Preliminary analysis of the control region data using the statistical parsimony algorithm implemented by TCS resulted in four major unconnected networks of *B. boreas* and *B. nelsoni* haplotypes (Figure 2): Group A comprised of individuals from Colorado, Utah, southern Wyoming and southeastern Idaho; Group B comprised of individuals from northwestern Wyoming, Montana, northern Idaho, Washington, Oregon, and California; Group C comprised of individuals from southern California and *B. nelsoni*; Group D comprised of individuals from southern Utah. The four major networks are unconnected as the number of inferred haplotype changes between them is greater than the 95% confidence limit of statistical parsimony. This indicates a relatively high level of divergence between these groups. A preliminary phylogenetic analysis of the control region DNA sequence data with parsimony using a heuristic search in PAUP* resulted in 10 most parsimonious trees at 226 steps. The strict consensus of these 10 trees with bootstrap support is shown in Figure 4. Major relationships of the clades recovered were: the southern Utah *B. boreas* haplotype (D) sister to the *B. boreas* clade (A) from southeast WY, southeast ID, and UT; a clade (B) of *B. boreas* from northern WY, MT, ID, WA, OR and CA, sister to A and D; and a haplotype (C) found in both *B. nelsoni* and southern CA B. boreas sister to A, B and D.

**Microsatellite DNA Genotype Data**

In addition to sequencing the control region for a subset of samples, all individuals are being genotyped at 15 polymorphic microsatellite DNA loci. At this point the findings are too preliminary to provide detailed results. The markers are sufficiently variable to provide good estimates of population structure within the A and B clades.

**Conclusions**
The mitochondrial control region data provides strong evidence for populations of *B. boreas* from Colorado, southern Wyoming, Utah and southern Idaho (clade A) being a distinct lineage. Within this evolutionary lineage, populations referred to as the SRM populations, Colorado and southern Wyoming, do not appear to be significantly differentiated from Utah and southern Idaho populations at the mitochondrial control region examined. Data is currently being collected from 15 microsatellite loci that will help delineate populations, relationships among populations, and demographic histories within the major lineages recovered with the mitochondrial sequence data.
Figure 1. Map of sampling localities and distributions of *Bufo boreas*, *B. canorus*, *B. exsul* and *B. nelsoni*. 
Figure 2. Map of sampling localities and four networks of *Bufo boreas* and *B. canorus* haplotypes. The distributions of haplotypes recovered in each of the major haplotype networks are outlined in red and labeled A-D.
Figure 3. Haplotype network A resulting from TCS analysis of mitochondrial control region sequences of 522 individuals. The size of each ellipse/square representing a haplotype is proportional to the number of samples with that haplotype. Collection localities from which each haplotype was observed are labeled.
Figure 4. Haplotype networks B, C, and D, resulting from TCS analysis of mitochondrial control region sequences of 522 individuals. The size of each ellipse/square representing a haplotype is proportional to the number of samples with that haplotype.
Figure 5. Strict consensus of 10 most parsimonious trees resulting from a heuristic search of search of 43 control region haplotypes. Numbers above branches support resulting from 1000 bootstrap replicates. The tree is rooted with three outgroup taxa haplotypes from *B. americanus* and *B. fowleri*.

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Repatriation of boreal toads *Bufo boreas* (*Anaxyrus boreas*) on the Grand Mesa, Colorado, Kevin Thompson, Colorado Division of Wildlife

Previous research updates on this repatriation effort described the release protocols and numbers of animals involved. Although releases were scheduled to be concluded in 2005, about 2300 additional tadpoles were released in 2006 at a single pond within the Kannah Creek study area. These animals were released directly to the pond since previous research had indicated there was no advantage of any release method among those tried (wild release, pen-reared and then released, or released as toadlets).

Since the oldest released toads were age four in 2007 we hoped that the population would contain some sexually mature animals. Consequently we scheduled considerable survey effort during the summer of 2007 to try to find evidence of boreal toad breeding. Surveys commenced on June 4 and concluded on September 4, and were conducted at least weekly during June. Not all potential breeding sites were visited on each survey, and effort was concentrated within the Kannah Creek valley where ponds 1 – 4 are located. With the exception of the first occasion, all toads captured were photographed to capture an image of their unique belly pattern. These photos were tied to Bd swab sample numbers, and initial swab sample numbers became the individual identification number of each toad captured. Physical comparison of photographs later allowed us to determine which toads had been recaptured versus which were new captures.

Overall, about 84.5 hours of survey time were logged at the Kannah Creek study site. Although toads were found, all were age 1 juvenile survivors of the 2006 tadpole plant. Fourteen individual toads were identified based on belly photos. Five of the toads were re-captured on one or more occasions. All toad captures occurred in the immediate vicinity of Pond 4 where the tadpoles were released.

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Photographic identification of boreal toads *Bufo boreas* (*Anaxyrus boreas*) and development of a computer program for identifying toads based on photos, Kevin Thompson, Colorado Division of Wildlife

Boreal toads exhibit unique coloration patterns in the ventral region. Other animals that have unique patterns have been individually identified by those patterns for research purposes, including penguins, sharks, polar bears, and several species of amphibians. In some instances,
such identification was made by computer aided image processing or pattern recognition software. The ability to accomplish identification in such a fashion would have great utility at NASRF because previous research showed that the brood animals housed there shed PIT tags at unacceptably high rates, compromising our ability to track toads and their offspring in the hatchery. Such tracking could become increasingly important if wild populations of boreal toads continue to decline. It could also prove useful in the field as an alternative to current marking methods for the purpose of mark-recapture studies, given the reasonable assumption that toads will never lose the mark comprised of their unique spotting pattern.

During 2007 all adult toads at NASRF were photographed and assigned an individual identification number. Individual numbers include the lot number of the toad and, for mature toads, a letter code denoting sex. A first photograph was taken with identification information visible in the background on a dry erase whiteboard. Additional photographs were taken with a closer perspective to maximize pattern visibility. The best close up photograph of each toad was incorporated into PowerPoint slides at six photographs per portrait-oriented letter size page, printed in color by lots, and laminated to preserve the images. Two sets were provided to NASRF, one for the files and one for floor use in identifying toads. They have proven useful to hatchery staff, so we plan to continue this effort for newer lots of toads as they grow.

On the field front, collaboration was initiated with Carlos Anderson, a PhD student at Michigan State University. Mr. Anderson developed and used a software program to identify individual polar bears based on whisker spot patterns during his M.S. research at the University of Central Florida. We provided him with pairs of photographs from field and hatchery toads to allow him to modify his polar bear software for use with boreal toad belly patterns. After modifications, the program was able to discriminate toads with a high degree of accuracy. Using the best quality photo comparisons (photos taken in May and in December), only 2 of 32 toads weren't identified correctly. Moreover, only 3 of 992 comparisons of different toads resulted in a score that would ordinarily indicate a match. Therefore the accuracy of the system on this test set was 93.75% and the probability of false positives was 0.3%.

A technician has begun entering all of the NASRF toads into the program with reference photographs. Once that process is complete, the system will be tested with unidentified photographs to determine its accuracy with a much larger dataset.

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Batrachochytrium dendrobatidis – looking for environmental test subjects, Kevin Thompson, Colorado Division of Wildlife

Previous research has explored the utility of several items to test environmentally for Bd in areas where there are no amphibians to test. Items tested included a number of insect species, fathead minnows, and cotton swabs baited with keratin. None of these items proved reliable. In 2007 we collected simultaneous Pseudacris triseriata belly swabs and replicate samples of mosquito pupae and larvae. Mosquito aquatic stages were proposed as a potential carrier of Bd, and their ubiquitous presence in amphibian habitats would fit with the expansion of Bd in numerous areas around the world. While the chorus frog samples routinely exhibited a high proportion of individuals testing positive, only two mosquito samples yielded a positive signal. Both positive samples came from the same site and near the end of the three-week trial. We intend to try this test again in 2008, using fewer mosquitoes per sample (less DNA material for the testing lab to deal with) and also including filtered water samples as described by Kirshtein et al. (2007).

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Chaffee County mark-recapture study 2007, Brad Lambert and Chris Gaughan, CNHP, Ft. Collins, CO

In 2007 we continued a mark-recapture study in the Middle and South Cottonwood Creek drainages in Chaffee County that began in 1998. The following breeding sites were monitored with multiple visits to collect data on the adult populations for the study: Collegiate Peaks Campground, Denny Creek, Denny Creek West, Middle Cottonwood Creek, Rainbow Lake, Hartenstein Lake, Holywater Beaver Ponds, South Cottonwood Creek, South Cottonwood West and Morgans Gulch. The purpose of this study is to collect baseline data for evaluating population size, survival, movement and other demographic parameters.

At each site adult toads within the study area were collected by hand or with a dip net, placed in individual zip lock bags, and processed on site after the breeding area was surveyed. Avid PIT (Passive Integrated Transponders) tags were inserted subcutaneously to individually mark adult (> 20g) toads. The protocol outlined in the Boreal Toad Conservation Plan and
Agreement was followed for marking toads. An incision was made with sterile scissors and the PIT-tag was inserted on the dorsal side, horizontal to the toad’s mid-dorsal line. The entry wound was sealed with New Skin Liquid Antiseptic Bandage. Toads were weighed with an electronic scale and snout to vent length was measured using dial calipers. Toads were released near the point of capture after processing.

Since 1998, 1,317 adult males and 307 adult females have been tagged in the Middle Cottonwood Creek and South Cottonwood Creek drainages. Adult captures and recaptures continue to be high at the Collegiate and Denny Creek sites and at the South Cottonwood Creek sites when compared to other sites in Chaffee County. There has been no apparent decline in the Cottonwood Creek metapopulation since this study began, although breeding success and adult high counts have fluctuated from year to year at several breeding sites. Rainbow Lake and the Holywater Beaver Ponds site have both shown no evidence of breeding since 2003 with low numbers of adults. The long term viability of these breeding sites are of concern, but also might just be marginal sites on the edge of the more robust core sites along Middle Cottonwood Creek.

Of the 409 (371M/38F) individuals captured in the 2007 field season 210 (179M/31F) were new captures this year. To date 1624 (1317M/307F) toads have been marked. At the Collegiate Peaks Campground 61 (58M/3F) toads were captured this year, 5 male toads had immigrated from Middle Cottonwood. Denny Creek West had 10 (9M/1F) toads caught in 2007, 1 male emigrated from Hartenstein Lake. South Cottonwood West had 8 (5M/3F) captures, one male had immigrated from South Cottonwood and one male immigrated from Morgan’s Gulch, the first time we have documented movement between Morgan’s Gulch and the South Cottonwood Creek sites. Hartenstein Lake had 59 (52M/7F) captures, Denny Creek had 57 (46M/11F) captures, Middle Cottonwood had 40 (39M/1F) captures, Morgan’s Gulch had 44 (42M/2F) captures, and South Cottonwood had 131 (121M/10F) captures this year.

Sixteen males marked in 1998 were recaptured in the summer of 2007 and two females have been recorded over an eight year period (Table 1). This longevity data is also displayed graphically in Figure 1. During the course of the study the highest number of captures for one male is 27 (1998-2007 at Collegiate) however over 95% of the toads have been captured no more than ten times and the highest number of recaptures for a female is five.
Table 1. **Numbers of years marked toads have been recaptured over all sites and all years.**

<table>
<thead>
<tr>
<th>Years known to be alive</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown (Single Capture)</td>
<td>508</td>
<td>225</td>
<td>733</td>
</tr>
<tr>
<td>&lt;1 year</td>
<td>177</td>
<td>30</td>
<td>207</td>
</tr>
<tr>
<td>1 year</td>
<td>200</td>
<td>10</td>
<td>210</td>
</tr>
<tr>
<td>2 years</td>
<td>115</td>
<td>17</td>
<td>132</td>
</tr>
<tr>
<td>3 years</td>
<td>90</td>
<td>6</td>
<td>96</td>
</tr>
<tr>
<td>4 years</td>
<td>51</td>
<td>8</td>
<td>59</td>
</tr>
<tr>
<td>5 years</td>
<td>48</td>
<td>2</td>
<td>50</td>
</tr>
<tr>
<td>6 years</td>
<td>32</td>
<td>5</td>
<td>37</td>
</tr>
<tr>
<td>7 years</td>
<td>50</td>
<td>2</td>
<td>52</td>
</tr>
<tr>
<td>8 years</td>
<td>30</td>
<td>2</td>
<td>32</td>
</tr>
<tr>
<td>9 years</td>
<td>16</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Totals</td>
<td>1317</td>
<td>307</td>
<td>1624</td>
</tr>
</tbody>
</table>

Figure 1. **The number of day’s that individual marked toads are known to have survived.**

![Days survived](image-url)
Another analysis was to examine correlations between weather variables and the probability of survival of adult males at three sites in Chaffee County (Scherer et al. 2008). Analysis from mark-recapture data collected at the Denny Creek, South Cottonwood Creek and Collegiate Campground sites from 1998 – 2004 found that minimum daily winter air temperatures were positively correlated with survival at these sites with site and population characteristics playing an important role in determining the magnitude. In addition, differences in water depth, soil characteristics, and availability and quality of hibernacula may affect the relationship between survival and winter temperature. The Collegiate Campground site had lower survival then Denny Creek and South Cottonwood Creek (Figure 2), possibly due to its proximity to a high traffic road. There was weak evidence for the probability of survival being positively correlated with snow depth and negatively correlated with precipitation prior to winter.

Figure 2. **Survival estimates from three breeding sites in Chaffee County 1998 – 2004**

(From: Scherer et al. 2008).

![Survival estimates from three breeding sites in Chaffee County 1998 – 2004](image)

**Survival and Population Estimates**

We analyzed the mark-recapture data collected since 1998 in Program MARK (White and Burnham 1999). For all but three sites sample sizes were too small to provide meaningful estimates for all years. Data collected from the South Cottonwood Creek (CF-05), Denny Creek (CF-02), and Collegiate Peaks Campground (CF-01) breeding sites were analyzed using a robust
design model structure. We modeled population parameters using our knowledge of the biology of the species. The most parsimonious models were chosen using Akaike’s Information Criterion (Burnham and Anderson 1998). The model that explained the most variability in the data was one that modeled survival different for both sexes, temporary movement parameters as constant and equal, and capture and recapture probabilities equal for each time period and sex specific. Survival is estimated by gender and site in this model (Figure 3 and Table 2).

Figure 3. **Survival estimates for male and female boreal toads at three breeding sites in the Cottonwood Creek drainage (1998 – 2007).**

Table 2. **Survival estimates for male and female boreal toads at three breeding sites in the Cottonwood Creek drainage.**

<table>
<thead>
<tr>
<th>Overall survival (1998-2007)</th>
<th>Estimate</th>
<th>SE</th>
<th>LCI</th>
<th>UCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Cottonwood Male</td>
<td>0.699094</td>
<td>0.020996</td>
<td>0.656415</td>
<td>0.738583</td>
</tr>
<tr>
<td>Denny Creek Male</td>
<td>0.782738</td>
<td>0.019232</td>
<td>0.742698</td>
<td>0.818073</td>
</tr>
<tr>
<td>Collegiate Male</td>
<td>0.598018</td>
<td>0.031435</td>
<td>0.53517</td>
<td>0.657803</td>
</tr>
<tr>
<td>South Cottonwood Female</td>
<td>0.754252</td>
<td>0.217339</td>
<td>0.235633</td>
<td>0.968312</td>
</tr>
<tr>
<td>Denny Creek Female</td>
<td>0.77533</td>
<td>0.059352</td>
<td>0.638955</td>
<td>0.870623</td>
</tr>
<tr>
<td>Collegiate Female</td>
<td>0.532286</td>
<td>0.129944</td>
<td>0.290347</td>
<td>0.75994</td>
</tr>
</tbody>
</table>
Population size estimates are often difficult parameters to estimate and therefore we present the following results from the model with the caveat that there is most likely some bias in the estimate (Thompson 2004). Also, due to a lack of data for males at South Cottonwood in 1999 population estimates are left blank. Data for most years and locations for females did not produce reliable results and therefore not presented; however it is assumed that breeding site high counts presented in the previous section most accurately represent the number of females. Despite these difficulties the general trend presented in these population models has utility for managing the species and their habitat (Figure 4).

Figure 4. Male boreal toad population estimates from three Cottonwood Creek breeding sites.

![Graph showing population estimates for three sites over time.](image)

The general patterns presented in the model results show three major points. First and foremost is a high probability that the survival rate at the Collegiate site is lower than those at Denny Creek and South Cottonwood. Possible reasons for the lower survival rate at Collegiate could be the close proximity of this site to a large campground and high traffic road. With educational signs at the dirt pull off and campsite management there may be ways to improve survival rates at the Collegiate site.

Another reason might be lack of extensive wetlands at Collegiate unlike the South Cottonwood Creek and Denny Creek sites. These wetland areas may be an important component in summer foraging. Toads at Collegiate may have to travel farther after the breeding season to access associated resources. Adult males are more commonly found after the breeding season at
the South Cottonwood Creek and Denny Creek sites, where as, at the Collegiate site adults are rarely found after the spring breeding.

The third most notable point is a possible drainage wide decline in toad population during 2001 and 2002 followed by possible population increases since that low period at South Cottonwood and Collegiate and a more stable population at Denny Creek. Along with a lower survival rate the Collegiate site appears to have a smaller population size than the other two sites we have consistent data for. Environmental conditions such as precipitation and winter severity are possible factors.

References:

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Rocky Mountain National Park – Research update 2007, Erin Muths, USGS

Northfork capture-recapture project

We have made multiple breeding season, night time visits to the two known breeding sites in this drainage since the late 1980s and witnessed a severe decline in the mid to late 1990s. Since the decline, there have been a number of years when no toads were seen, some years when a few animals (3 – 5) were observed and a couple of years where 1-2 egg masses were laid and metamorphs were produced (2003). In 2007, we observed one female at Kettle Tarn and two males were captured at Lost Lake. We have swabbed captured animals to test for Bd and have found that the amphibian chytrid is still present at these sites. While modeling analysis is difficult with such low numbers, these data are important because they document a. the potential recovery of these populations, b. immigration of animals into this drainage, or c. the return of temporary emigrants to their natal pond.

Assistance with ROMO reintroduction of boreal toads to west side of park

We have assisted the park in choosing and assessing potential reintroduction sites, testing surrogate amphibians and the environment (water) for the amphibian chytrid fungus, and

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planning the release and monitoring of tadpoles and adults. Due to issues at the hatchery, only a few tadpoles were released but a release of tadpoles and adults is planned for 2008.

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Appendix VII – References and Literature Cited


