9-30-2007


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ANNUAL PROGRESS REPORT
Annual Period Ending September 30, 2007

University of Nevada, Las Vegas
Cooperative Agreement Number: H8R07060001
Task Agreement Number: J8R07060012

Monitoring and Evaluation of Sensitive Wildlife at
Lake Mead National Recreation Area

EXECUTIVE SUMMARY

Project 1. Relict Leopard Frog Monitoring, Management, and Research
- Diurnal and nocturnal surveys completed at all natural and translocation sites during the spring – the most striking finding was the lack of frogs observed at Rogers Springs and lower Blue Point despite repeated survey efforts.
- Relict leopard frog annual translocation effort completed – a total of 1365 late stage tadpoles and 592 post-metamorphic frogs from the head-start facilities were released at existing translocation sites.
- Mark-recapture effort at Rogers Spring abandoned because of the lack of frogs; assistance provided for a mark-recapture study at upper Blue Point Spring.
- Potential translocation sites within Gold Butte assessed during site visits; one site targeted for potential attempt in 2008.
- Coordination and assistance provided to UNLV research efforts on habitat improvements at Blue Point and Rogers Springs, and with proposed US Fish and Wildlife Service (FWS) actions to construct a tadpole rearing facility and artificial habitat at the Willow Beach National Fish Hatchery.
- Relict Leopard Frog Conservation Team meeting held and support provided.
- Annual report for efforts in 2006 produced and accepted by National Park Service (NPS).

Project 2. Bald Eagle Winter Monitoring and Evaluation
- Formal guidelines and field protocols document produced and accepted by NPS.
- Bald eagle count completed using new protocols. Totals were: 87 bald eagles (30 adults and 57 immature), one immature golden eagle, and four unidentified eagles.
- Annual report was produced and accepted by NPS.

Project 3. Peregrine Falcon Monitoring and Evaluation
- Conducted 146 active and passive surveys at 39 peregrine falcon sites.
- Breeding behavior seen at 21 peregrine territories (13 along Lake Mead and 8 along Lake Mohave) and an additional 4 sites contained single adults.
- A total of 44 adults and 22 successful young were detected.
- A total of 36 exploratory survey sessions at 17 sites resulted in the detection of 4 previously undocumented sites (1 on Lake Mead and 3 on Lake Mohave).
- Draft annual report summarizing activity on this project submitted to NPS.

Project 4. Assessment of Six Covered and Three Evaluation Bird Species
- Conducted 19 point count surveys during spring of 2007.
- Field component of a pilot project completed to assess double observer method for point count surveys.
- Completed data management and summary from point count surveys performed in 2006.
- Conducted surveys for southwest willow flycatchers at two sites on Lake Mohave – no breeding pairs detected.
- Finished field data collection for research to determine regional distribution and habitat selection by cryptic thrasher species – 52 randomly distributed points and additional 11 incidental sightings in the past year.
-Began analysis of habitat selection for regional populations of thrasher species.
- Draft annual report summarizing activity on this project submitted to NPS.
- Technical requirements of the Multiple Species Habitat Conservation Project (MSHCP) to be initiated later this year will require substantial modifications of methodology and associated products.

**Project 5. Desert Tortoise Monitoring and Management**

- Eleven construction projects monitored for compliance actions, none incurred illegal work zone violations.
- All 11 projects received inspections of equipment and vehicles, with 74 vehicles inspected and 17 initial failures (later passed after washing).
- Surveys for rare plants were conducted on 4 projects.
- Tortoise clearance surveys were performed for 5 projects.
- Twenty tortoise education classes were given to 59 contract workers.
- Three active tortoise monitors were coordinated for work on the Northshore Road reconstruction project, and active monitoring also occurred on 4 other projects.
- Twenty-one days were spent supervising topsoil procedures on a 15-acre-restoration area associated with the Northshore Road reconstruction, and direction and oversight given for the placement and treatment of several hundred boulders.
- Draft report summarizing soil and boulder placement protocols for LMNRA submitted to NPS.

**Project 6. Shorebird Monitoring on Lakes Mead and Mohave**

- A total of 86 monthly surveys were conducted at 7 intensively monitored sites on Lakes Mead and Mohave, as well as numerous incidental sightings recorded.
- An additional 10 surveys conducted at 2 exploratory sites on Lake Mohave during the winter months.
- A total of 60,037 individual aquatic birds, shorebirds, and raptors tallied this year (51,277 on Lake Mead and 8,760 on Lake Mohave), with 11 new species documented.
- Discovered and monitored two successful breeding colonies of snowy plovers on the Overton Arm.
- Draft annual report summarizing activity on this project submitted to NPS.

**Project 7. Desert Bighorn Sheep Habitat Use Monitoring in Relation to Highway Development.**

- Approximately 2275 data locations processed.
- Tabular and illustrative products produced for use by NPS, Nevada Department of Wildlife (NDOW), and the Federal Highway Administration (FHWA).
- Ongoing problems with malfunctioning satellite collars identified.

**Student Participation and Professional Hiring**

- High school intern hired to work part-time.
- Undergraduate assistant hired and completed term this year.
- Ph.D. student hired part-time to assist with Relict Leopard Frog surveys.
- Professional bird expert hired and completed 3-month-term assisting with bird surveys.
- Research assistant hired on field aspects of Relict Leopard Frog conservation.
- Compliance actions under this task agreement completed; term completed for research assistant on compliance monitoring.
PROGRAM ACTIVITIES

The task agreement was awarded to the University of Nevada, Las Vegas (UNLV) by the National Park Service (NPS), Lake Mead National Recreation Area (LMNRA) on October 1, 2006. The research, monitoring, and management activities are a collaborative effort, but UNLV Public Lands Institute (PLI) personnel primarily conduct much of this work. The following information summarizes activities that have occurred toward meeting products in the statement of work for the annual period ending September 30, 2007. Note that the wording for the product statements below (italicized font) has been abbreviated from that within the task agreement. The identification of ‘Phases’ follows usage in the task agreement with Phase I referencing first year products (the period covered by this report), Phase II referencing second year products, and Phases I & II referring to products that would be delivered each year.

Student Opportunities and Hiring Activity

Several students worked for periods of time under this task agreement. Dane Gerace, a high school intern, continues to assist part-time with wildlife research and monitoring efforts. Matthew Graham, a Ph.D. student at UNLV who was hired in late May, continues his part-time (10% effort) assistance, primarily working on field surveys for relict leopard. CJ Calvo, an undergraduate student, completed about 2 semesters (part-time) under this task agreement.

Professional hires included Dorothy Crowe, a professional bird expert, who was hired for 3 months to assist with songbird surveys, and Dana Drake, hired in October 2006 as research assistance on relict leopard frog conservation. Dona LeNoue completed her term in August 2007 as the research assistant conducting desert tortoise compliance. Compliance activity was completed this year as a component under this task agreement as planned.

Project 1. Relict Leopard Frog Monitoring, Management and Research

All scheduled products described for Relict Leopard Frog monitoring, management and research were completed during this annual period. Activities on this project are best reported at the end of each annual year (as called for in the task agreement) as translocations efforts and monitoring surveys begin in early spring and end with final monitoring surveys in late fall. A final report dated April 2007 for project activities during 2006 (covering actions conducted under the current task agreement and an earlier task agreement) was accepted by the LMNRA wildlife chief, Mr. Ross Haley. The citation for this report follows:


The following information summarizes annual activities. The most startling observation, during this time was the lack of Relict Leopard Frogs seen during surveys at both Rogers and lower Blue Point Springs. This was despite several searches of these sites (reported below). Only once before in 2006 have we failed to document adult frogs on surveys at these sites. A general decline within the Northshore springs complex was further evidenced by the low numbers of adult frogs at upper Blue Point Spring in which current surveys only return counts in the low single digits. A mark-
recapture estimate conducted under a separate project returned an estimate considerably lower than any previous estimate of this population. The decline is most likely linked to habitat changes caused by reductions of burro use of these springs following burro capture and removals. The density and height of emergent vegetation has visibly increased throughout these systems and little open habitat favored by adults Relict Leopard Frogs remain. We cannot rule out that a disease process may also be a factor. Several years ago, emaciated and potentially diseased adults were observed at Blue Point Spring, but none was collected for assessment. The decline in habitat quality was in progress when these emaciated frogs were observed, thus the most parsimonious explanation is that the decline in habitat stressed adult animals, and subsequently increased susceptibility and spread of disease.

**Phases I and II**

1. **Experimental translocation program for the Relict Leopard Frogs** – Seven egg masses were collected from Bighorn Sheep Spring in 2007. Rearing of 1095 tadpoles from three egg masses collected in February was coordinated with the USFWS Willow Beach Fish Hatchery, Lake Mohave. Four additional egg masses were collected in March and the 1058 tadpoles that hatched from those egg masses were reared at the LMNRA laboratory head-start facility (Table 1).

Table 1. Egg mass collection data for Relict Leopard Frog translocation program Spring 2007.

<table>
<thead>
<tr>
<th>Collection Date</th>
<th>Collection Site</th>
<th>Egg Masses Collected (n)</th>
<th>Tadpoles Hatched (n)</th>
<th>Rearing Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td>06 February 07</td>
<td>Bighorn Sheep Spring</td>
<td>1</td>
<td>520</td>
<td>USFWS Hatchery</td>
</tr>
<tr>
<td>20 February 07</td>
<td>Bighorn Sheep Spring</td>
<td>2</td>
<td>575</td>
<td>USFWS Hatchery</td>
</tr>
<tr>
<td>10 March 07</td>
<td>Bighorn Sheep Spring</td>
<td>4</td>
<td>1058</td>
<td>LAME facility</td>
</tr>
</tbody>
</table>

A total of 1365 late stage tadpoles and 592 post-metamorphic frogs from the head-start facilities were released at existing translocation sites (Table 2). No translocations were conducted at Sugarloaf Spring because of a lack of persistent water during the summer of 2006.

Table 2. Tadpole and post-metamorphic frog release data for Relict Leopard Frog translocation program during 2007.

<table>
<thead>
<tr>
<th>Date</th>
<th>Translocation Site</th>
<th>Tadpoles Released (n)</th>
<th>Frogs Released (n)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/19/07</td>
<td>Goldstrike Canyon</td>
<td>250</td>
<td>0</td>
<td>250</td>
</tr>
<tr>
<td>4/25/07</td>
<td>Grapevine, AZ</td>
<td>820</td>
<td>0</td>
<td>820</td>
</tr>
<tr>
<td>4/22/07</td>
<td>Lower Grapevine Spring, NV</td>
<td>295</td>
<td>250</td>
<td>545</td>
</tr>
<tr>
<td>4/25/07</td>
<td>Tassi Spring</td>
<td>0</td>
<td>226</td>
<td>226</td>
</tr>
<tr>
<td>5/5/07</td>
<td>Pupfish Spring</td>
<td>0</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>5/16/07</td>
<td>Red Rock Spring</td>
<td>0</td>
<td>78</td>
<td>78</td>
</tr>
</tbody>
</table>

Quagga mussels were found in the external raceways at the Willow Beach Fish Hatchery this spring, raising concerns over potential contamination of the tadpole rearing area there. The raceways in which the tadpoles are currently reared at the site are filled with isolated well water that is sand and UV filtered, and located in a quarantine area. There is no contact or shared equipment with the outdoor raceways. All equipment used at this site was isolated from use at other sites or facilities. Dechlorinated water from the LMNRA laboratory head-start facility was
used to transport frogs and tadpoles reared at the Willow Beach facility to decrease potential of quagga mussel transmission during translocations. In collaboration with biologists at Nevada Department of Wildlife (NDOW), protocols were reviewed to further reduce the potential for transportation of quagga mussels to the Relict Leopard Frog sites. Written protocols for prevention of quagga mussel transmission to translocation sites have been developed and will be reviewed by the Relict Leopard Frog Conservation Team (RLFCT) at the fall meeting.

The PLI research assistant on this project, Ms. Drake, met with the new Willow Beach Hatchery manager Marc Olsen, the assistant hatchery manager John Scott, and representatives from the Clark County Multiple Species Habitat Conservation Plan (MSHCP) on June 6, 2007 to discuss the plans for the new tadpole rearing facility and habitat construction at the Willow Beach Hatchery. This project was approved for funding two years ago, when there was a different hatchery manager and cost estimates. Mr. Olsen is reviewing the proposal and obtaining new cost estimates for the project to determine whether to pursue the project.

2. Potential sites for translocations – Following discussions at the RLFCT meeting in November 2006, the principle investigator on this project, Dr. Jaeger, Ms. Drake, and BLM wildlife biologist Marc Maynard conducted reconnaissance visits to 13 potential springs within the Gold Butte area on March 27-28, 2007. Many of the spring sites were dry or otherwise unsuitable for translocation of the Relict Leopard Frog. On July 9, 2007, Ms. Drake and Mr. Maynard revisited four of the sites that had the greatest potential for translocation to assess summer water conditions. It was decided that Quail Spring would be pursued for compliance and approval for translocations, with the aim of using the site for translocation in 2008.

3. Monitoring surveys of all translocation sites conducted at least twice per year – Diurnal and nocturnal visual encounter surveys (VES) were conducted at all but one of the existing experimental sites (six sites total). The exception was Sugarloaf Spring that did not have standing water in summer 2006 and no frogs encountered during a subsequent survey in the fall. Adults, larvae and egg masses of Relict Leopard Frogs were observed at Goldstrike, Pupfish and Red Rock this year, while all but egg masses were seen at Grapevine, AZ, and lower Grapevine, NV (Table 3). Only post-metamorphic frogs were seen at Tassi Spring, although this site only received its first frogs last summer.


<table>
<thead>
<tr>
<th>Site</th>
<th>Number of surveys</th>
<th>Number of surveys</th>
<th>Adults</th>
<th>Larvae</th>
<th>Egg Masses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nocturnal</td>
<td>Diurnal</td>
<td>Adults</td>
<td>Larvae</td>
<td>Egg Masses</td>
</tr>
<tr>
<td>Goldstrike Canyon</td>
<td>1</td>
<td>4</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Grapevine, AZ</td>
<td>1</td>
<td>3</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Lower Grapevine, NV</td>
<td>1</td>
<td>2</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Pupfish Refuge</td>
<td>1</td>
<td>4</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Red Rock Spring</td>
<td>1</td>
<td>2</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Tassi Spring</td>
<td>1</td>
<td>1</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

4. Monitoring surveys of all natural sites will be conducted at least twice per year – Diurnal and nocturnal visual encounter surveys (VES) were conducted at all natural Relict Leopard Frog sites and one previously inaccessible site and its side channel in the Black Canyon (nine sites total; see 2006 annual report for summary of new sites). At these 9 sites, adult Relict Leopard Frogs were observed at 7 sites, larvae (tadpoles) at 5 sites, and egg masses at 6 sites (Table 4). No Relict
Leopard Frogs of any developmental stage were seen at Rogers Spring or Lower Blue Point Spring, despite repeated surveys of these sites \( (n = 3 \text{ and } 5, \text{ respectively}) \). Additional surveys have been conducted this summer after heavy rains at sites in the Black Canyon to better understand the seasonality of and cues for breeding of Relict Leopard Frogs. Fall nocturnal surveys are scheduled to begin in October.


<table>
<thead>
<tr>
<th>Site</th>
<th>Number of surveys</th>
<th>Adults</th>
<th>Larvae</th>
<th>Egg Masses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nocturnal</td>
<td>Diurnal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northshore Complex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blue Point Spring Upper</td>
<td>4</td>
<td>5</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Blue Point Spring Lower</td>
<td>3</td>
<td>2</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Rogers Spring</td>
<td>3</td>
<td>0</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Black Canyon</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bighorn Sheep Spring</td>
<td>1</td>
<td>7</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Black Canyon Spring</td>
<td>1</td>
<td>6</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Black Canyon Spring Side</td>
<td>1</td>
<td>2</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Boy Scout Canyon</td>
<td>1</td>
<td>3</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Dawn’s Canyon</td>
<td>1</td>
<td>3</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Salt Cedar Canyon</td>
<td>1</td>
<td>2</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

5. **Small-scale habitat management** – No small-scale habitat management work was undertaken during this annual period, but assistance was provided on larger-scale experimental habitat modifications at Rogers and Blue Point Springs (more information is provided on Page 7).

6. **Exotic vegetation control activities by collaborators** – PLI personnel conducted site reconnaissance with leaders of the NPS Exotic Plant Management Team (EPMT) at three of the Black Canyon sites (Bighorn Sheep Spring, Salt Cedar Spring, and Black Canyon Spring) on January 17, 2007. PLI personnel accompanied the full EPMT crew into the Black Canyon sites on February 6, 2007 to instruct crew members in frog, egg and tadpole identification and to mark pools inhabited by tadpoles, frogs and egg masses to be avoided during plant removal. Dr. Jaeger conducted site reconnaissance with leaders of the NPS EPMT on June 6, 2007 to discuss vegetation management via burning at the sites in the Northshore springs complex.

7. **Coordinate semi-annual meetings of the Relict Leopard Frog Conservation Team (RLFCT) and insure the development of RLFCT annual work plans and annual reports** – A meeting of the RLFCT was held on April 18, 2007 at LNMRA Headquarters. The meeting was organized by Mr. Haley and Ms. Drake, and attended by Dr. Jaeger. Ms. Drake worked with RLFCT members and Dr. Jaeger to complete and finalize the 2006 final report and develop the 2007 work plan. Meeting minutes have been completed to be shared with the RLFCT for review.

8. **Assist with scheduled habitat research projects at Blue Point and Rogers Springs** – Ms. Drake assisted Dr. Jaeger in coordinating and conducting habitat manipulation experiments and monitoring at Blue Point and Rogers Springs during February 2007. Habitat modifications and associated vegetation monitoring under the direction of Dr. Jaeger were conducted by UNLV students, PLI research assistants, Nevada Conservation Corps teams, with some assistance from NPS exotic plant members. Ms. Drake, Dr. Jaeger, Mike Burrell from NDOW, and an American
Conservation Experience crew constructed a fish-free breeding pond at upper Blue Point Spring on February 22, 2007. An NPS archeology team member monitored the construction.

**Phase I**

**1. Mark-recapture study of the frog population at Rogers Spring** – This project began in April 2007, after nocturnal temperatures were conducive to successful frog surveys. Several surveys have been conducted (summarized above) but no leopard frogs have been seen this year at Rogers Spring. Ms. Drake has assisted Dr. Jaeger and UNLV graduate student Mr. Graham, on a mark-recapture study at upper Blue Point Spring conducted as a separate MSHCP project.

**Project 2. Bald Eagle Winter Monitoring and Evaluation**

All scheduled products for this project were completed during this annual period.

**Phases I and II**

**1. Yearly winter counts of bald eagles on Lakes Mead and Mojave coordinated and conducted** – The annual bald eagle count was performed on Lakes Mead and Mojave during January, 2007. The count methodology was modified this year from previous years in an effort to improve accuracy of the count as detailed in the standard operating protocol (SOP), which was provided to each crew member participating in this year’s count (see citation below). The 2007 count followed the guidelines set forth by the SOP: (1) assigning trained Lead Observers and Data Recorders to each survey route; (2) tracking individual survey routes using GPS units; (3) utilizing the newly improved eagle identification guides, data sheets, and standard route maps; (4) keeping all boat operators within the maximum boat speed of 15mph while performing the surveys; and (5) following adjustments made to two of the survey routes to allow for more even coverage by crews. In addition, as described in the SOP and final report, multiple surveys of the Overton route were performed in an effort to evaluate variation in numbers of eagles counted during the sampling period and to help discern fluctuations in arrival and departure dates of bald eagles.

The total official count for 2007 was 87 bald eagles, (30 adults and 57 immature), 1 immature golden eagle, and 4 unidentified eagles. Total survey effort used toward the official count was 65 hours. Inclement weather required a substantial increase in effort and time to successfully complete all surveys this year. Because some survey attempts had to be aborted or were considered inadequate due to poor conditions, actual time spent was 96.4 hours. All the data collected during the count were entered into a geodatabase in ArcGIS by the count coordinator. To ensure that the data was entered completely and correctly (quality assurance), a member of the LMNRA data management team reexamined the data and database for discrepancies prior to final acceptance.

**Phase I**

**1. Protocols and a written manual will be developed to improve quality control of data collected** – This deliverable was completed and the developed guideline and field count protocols (essentially, standard operating procedures) were used for the annual midwinter bald eagle count in January 2007. The 2007 document will be updated prior to the count in 2008, incorporating insights gained from the implementation of these protocols during the count this quarter. The citation for this document follows:

2. An annual report will be prepared by September 30, 2007 – The report summarizing the 2007 midwinter bald eagle count was written and submitted to Mr. Haley on February 16, 2007. The citation follows:


**Project 3. Peregrine Falcon Monitoring and Evaluation**

All scheduled products for this project were completed during this annual period.

**Phases I and II**

1. **Yearly monitoring activities** – Monitoring activities have been completed for this year with a total of 146 active and passive surveys conducted at 39 peregrine falcon sites. Breeding behavior was seen at 21 peregrine territories (13 along Lake Mead and 8 along Lake Mohave) and an additional 4 sites contained single adults. This documents a further increase in the number of documented territories at LMNRA. A total of 36 exploratory survey sessions at 17 sites resulted in the detection of 4 previously undocumented sites (1 on Lake Mead and 3 on Lake Mohave). A total of 44 adults and 22 successful young were counted.

2. **Evaluation of survey protocols** – Active (baited) and passive surveys were conducted in 2007 and a detailed discussion and comparison of these methods were provided in the 2007 annual report, which is cited below in the Phase I section.

**Phase I**

1. **An annual report will be prepared by September 30, 2007** – A draft version of the annual report detailing peregrine falcon monitoring in 2007 and providing assessments of methods and results was submitted to Mr. Haley on September 18, 2007 for comments and review. The citation follows:


**Phase II**

1. **Conceptual model and predictive GIS-based habitat map** – Initial work on Phase II projects have already been conducted. The PLI research assistant, Joe Barnes, continued a literature search and review of peregrine falcon natural history, behavior, breeding success, and habitat use to develop a conceptual model and predictive habitat model (these deliverables are due during the
second year of this task agreement). The ongoing literature review is being used to develop an electronic database of literature on the subject, as well as a database containing a summary of all sources for future reference. Mr. Barnes has coordinated with Mr. Mark Sappington (NPS, LMNRA, GIS Specialist) and Ms. Stacey Provencal (NPS data management personnel, formerly with UNLV Harry Reid Center,) on preliminary efforts to develop a predictive GIS-based habitat map for peregrines within LMNRA. A preliminary model was used to target some passive exploratory surveys conducted this year.

**Project 4. Assessment of Six Covered and Three Evaluation Bird Species**

All scheduled products for this project have been completed this year on time or ahead of the Phase II schedule as in the case of initial field sampling for thrasher species. During this next year, Resource Management at LMNRA will implement a long-delayed MSHCP project to conduct historical and current assessment of MSHCP covered and evaluation bird species. In discussions with Clark County project managers and contracting officers, the NPS has accepted a series of technical requirements that will require modification in research and monitoring efforts over the next several years. One major change will require that point count surveys be replaced by intensive area searches. The changes in emphasis are discussed in the ‘Future Direction and Recommendations’ section of the annual report, which is cited on Page 10.

**Phases I and II**

1. **Annual point count surveys as part of regional bird survey efforts** – PLI personnel conducted 19 point count surveys during spring of 2007. In addition, the field component of the pilot project was completed to assess a double observer method to improve information from point count surveys. Data management from point count surveys performed in 2006 was also completed this year and a summary of these data are also provided in the annual report.

2. **Annual surveys for southwestern willow flycatchers** – Call-broadcast surveys were conducted at two sites on Lake Mohave using a standardized survey protocol, Waterwheel Cove and Rockefeller Cove. Willow flycatchers were detected at both sites, but no breeding was confirmed.

3. **Research to develop habitat assessments and predictive models for cryptic thrasher species** – The PLI research assistant on this project, Ms. Dawn Fletcher, working with GIS staff at LMNRA, particularly Mr. Joe Hutcheson (UNLV Harry Reid Center), have begun the process of migrating GIS data into a form usable in statistical programs. PLI personnel have begun working with a UNLV biostatistician, Dr. Cheryl Vanier, to analyze the data within a logistic regression analysis approach. Preliminary assessments of vegetation data have been completed.

**Phase I**

1. **Description of conceptual models for the targeted thrasher species** – The conceptual models for the targeted thrasher species were previously completed and submitted to Clark County as requested by NPS.

2. **Completion of a randomized sampling design for countywide thrasher surveys** – A randomized sampling design for countywide thrasher surveys was completed and used to guide targeted surveys across Clark County. A discussion of the sampling design is provided in the annual report.
3. **Conducted field efforts using call broadcast surveys for targeted thrashers** – PLI personnel have been performing call-broadcast surveys for targeted thrasher species since early 2005. During this year, 52 randomly distributed points were surveyed and an additional 11 incidental sightings made. Since 2005, 451 unique, randomly distributed points across Clark County have been surveyed for this project, and an additional 87 non-random, incidental sightings made. Based on discussions with science advisors on this project (see acknowledgment section in the annual report for names), initial field data collection has been completed and emphasis refocused on analysis. If analyses are definitive, this would fulfill the *Phase II* objective of completing targeted thrasher surveys.

4. **Vegetation assessment protocols will be developed and surveys initiated** – A consensus was reached by the science advisors on this project to assess the basic vegetation observations collected at each site during surveys for use in the logistic regressions. All vegetation data has been recently entered into the vegetation database and quality assured. Initial assessments of vegetation data in relationship to thrasher presence/absence have been conducted.

5. **An annual report will be prepared by September 30, 2007** – A draft version of the annual report detailing songbird monitoring in 2007, including southwestern willow flycatcher and thrasher research activities, was submitted to Mr. Haley on September 21, 2007 for comments and review. The citation follows:


**Project 5. Desert Tortoise Monitoring and Management**

**Phases I & II**

1. **Coordinate with FWS to determine population survey methodologies, conduct population monitoring surveys, and report** – In consultation with Mr. Haley, it was decided that no tortoise population surveys would be conducted this year, and MSHCP funding for this project has not yet been secured by the NPS. At the request of the NPS, technical field assistance was provided by PLI research assistants who devoted several days this quarter to assisting LMNRA fire crews in monitoring a burn within tortoise habitat.

**Phase I**

2. **Compliance monitoring** – The desert tortoise (*Gopherus agassizii*) is federally listed as threatened species, with declines in populations principally attributed to human activities (e.g., urban development, off-road vehicle use, cattle grazing) and to an upper respiratory tract disease, suspected of being an emergent disease. In 1995, a long-term habitat conservation plan was implemented to mitigate detrimental impacts on tortoise habitat, primarily on federal lands (i.e., Desert Conservation Plan approved in 1995 and subsequently the Clark County Multiple Species Conservation Plan approved in 2000). The NPS has agreed to manage protected lands within LMNRA to conserve desert tortoise habitat. Nevertheless, the growing human population in the Las Vegas region has increased disturbances associated with various construction and maintenance activities (e.g., road improvements, utility corridors) at LMNRA. Mitigation measures and monitoring during construction projects are required under the legal framework outlined above and
intended to ensure that these various activities do not negatively impact tortoise populations or habitats.

Herein, we report on monitoring activities for compliance measures aimed at protecting desert tortoises and habitat associated with construction and other disturbances within LMNRA over the last year, as conducted by a PLI research assistant, Dona LeNoue, under this cooperative task agreement. An additional draft report, which met a deliverable stipulated for this project under the task agreement, was submitted on August 6, 2007 to the LMNRA compliance officer, Mike Boyles, for review and comment. This draft report summarized soil and boulder placement protocols for LMNRA. The report citation follows:

LeNoue, D. 2007. Desert Tortoise and Desert Tortoise Habitat Field Protocols during Construction Projects within Lake Mead National Recreation Area. Unpublished cooperative report produced by the University of Nevada, Public Lands Institute for the National Park Service, Lake Mead National Recreation Area, Boulder City, NV.

Construction Projects within Lake Mead National Recreation Area

During the year ending on September 30, 2007, there were 11 projects within LMNRA, usually with 2 to 5 of these projects active at any one time. These projects ranged in duration from 2 days to 16 months. A summary of each project follows.

Northshore Road/Lake Mead Boulevard Reconstruction: This 16-month-project began in January 2006 and ended April 2007, and involved all 3 miles of Lake Mead Boulevard (within the boundaries of LMNRA), and about 10 miles of Northshore Road (from mile 0.5 to mile 4 and mile 21 through mile 27). The work involved tearing up and widening the existing 50-year-old roads, and, in some places, realigning the existing roadway onto previously untouched desert. This project was finished a month ahead of schedule. Reconstruction of this roadway has been occurring in 3-to-13 mile phases since the 1980s, with several years in between phases as highway funds were allocated. The Federal Highways Administration (FHWA) had engineers and inspectors on site daily to oversee contract and design specifications.

Lake Mead Intake #3: This project was associated with the water extraction infrastructure managed by the Southern Nevada Water Authority (SNWA), and involved test drilling into the lake bottom and occasional drilling on land, to determine the viability of installing a third water supply intake pipe and a pumping station on Saddle Island. The field work began in January 2006 and wound down in March and April, 2007. The plan is for the intake pipe to run from SNWA water treatment plant located on the west shore of Lake Mead (adjacent to Saddle Island), and run west/northwest across desert and through the River Mountains to Las Vegas. Actual installation of the pipe is tentatively scheduled to begin 2008. SNWA funded this project and is required to follow NPS policies for minimal impacts on federal lands.

Underground Utilities Surveying: Basic Power had two surveyors come into the west side of the Park in October 2006 to designate a feasible route for underground utilities in reference to the future Lake Mead #3 Intake project. Their work took 3 days.

Las Vegas Wash Dikes: This Bureau of Reclamation project lasted two months, from mid-May to mid-July, 2007. Its purpose was to renovate one of three concrete dikes that had been built in 2002 directly into constantly running water within Las Vegas Wash where the wash enters Lake Mead. The purpose of these structures was to reduce silt deposits being carried into Lake Mead. Several years after initial construction, severe erosion occurred under dike #3, leaving a large hole under it.
Concrete was poured under this dike to thwart the erosion. Additionally, 30,000 tons of boulders were placed on the banks and bottom of the wash as an erosion control measure. The work done on this project is considered a short term fix, as erosion will continue.

Low Water Dredging: Dredging of Lake Mead to allow public boat launching at Callville Bay Marina and at the South Cove remote launching area were required in 2007 because of the more than 100 foot vertical drop in the lake level over the last several years. Heavy equipment was brought in by the contractor to shovel away lake bottom along the launch and dock areas. Additionally, some boat ramps were extended. The Callville Bay Marina was dredged in April, a two day project, and the dredging at South Cove occurred in May. Extending the launch ramps continued into July.

Pabco Water Pump: The Pabco gypsum plant located just outside the northern boundary of LMNRA has in-ground water lines running from Lake Mead 5 miles across desert to the plant. The pump is located on a barge near Government Wash. A new water pump needed to be installed in October 2006, a two day project.

Power Pole Maintenance: Nevada Power maintains lines though LMNRA, and maintenance, repairs and installations usually are necessary every couple of years. In November 2006, monitoring was required for 2 days for maintenance actions on power poles. This occurred on the west side of the Park, a couple of miles from the Visitor Center.

Test Drilling at Willow Beach: As part of the Willow Beach redevelopment project, geotechnical test drilling was conducted at Willow Beach for a day in October 2006. This was done to determine placement of future underground utilities.

Test Boring along Northshore Road: In July/August 2007, 4 days of drilling was conducted along the Northshore Road at the Echo Wash bridge, and the Fire Cove turn off. This test boring was done for the next phase of the Northshore Road reconstruction/bridge building scheduled to occur Jan. 2008.

Test Boring along Highway 93: The project started in July 2007 and was expected to last 3 or 4 months (past the current reporting date). The Arizona Department of Transportation is conducting test bores on the Arizona side of Lake Mead, along Highway 93 beginning near Hoover Dam and ending at mile 17. Boring will be done at various spots (approximately 180 bore holes) along the 17-mile stretch. This test boring will provide information for the eventual widening of Highway 93.

**Responsibilities**

All contractor personnel performing work at LMNRA are required to comply with NPS and LMNRA policy and procedures (NEPA mitigation) concerning impact on vegetation, wildlife, soils, water, air and cultural/historical sites. This includes and adherence to Desert Tortoise mandates from the United States Fish and Wildlife Service. Responsibilities of the UNLV research assistant, Dona LeNoue, working under this task agreement included: on site monitoring of contractor compliance with appropriate policies, procedures, and specific project stipulations; on site communication with contract workers regarding compliance actions and violations; educating contract workers regarding their legal obligations to desert tortoise conservation; and communication of finding to appropriate NPS personnel responsible for compliance oversight. Actions by the PLI research assistant included rare plant and tortoise clearance surveys within clearance limits/right of ways, ensuring adherence to soil storage and rehabilitation instructions,
conducting equipment inspections for weed and invasive species mitigation, and coordinating contract monitors.

**Actions**

**Rare Plant Surveys:** Surveys for threatened plants were conducted for the Power Pole Maintenance project and for all three test drilling projects. These surveys, often conducted along with tortoise clearance (see below), covered about 0.5 acre each for the Nevada Power pole maintenance and Willow Beach drilling projects, about 1 acre associated with the test boring along the Northshore Road, and over broad areas sporadically along 16 miles associated with test boring along Highway 93. No threatened plants were found in or near any of the work sites. Several Bear Paw Poppy populations had been previously found in 2005 along the Northshore Road reconstruction project outside of the work zones on Lake Mead Boulevard and near mile 25 Northshore Road. These areas were flagged for identification purposes and consistently monitored until April 2007. No impacts were noted to any of these sites.

**Equipment Inspections:** As part of the efforts to prevent non-native plant seeds from being deposited within the Park, especially in recently disturbed areas, all heavy equipment, trucks, office trailers, and pickups were inspected before being allowed to work on project sites. LMNRA policy reads that if a clump of dirt the size of a pencil eraser is found anywhere in, on or under a vehicle, the vehicle must be rejected and not allowed on the work site until it is cleaned up (done outside of LMNRA). A total of 74 vehicles including backhoes, trackhoes, bulldozers, water trucks, loaders, drilling rigs, cranes, dump trucks, rollers, graders, pulverizers, trailers, and pickups were inspected in the last year (about half of these vehicles were connected with the Northshore Road reconstruction project). Approximately, 17 of these vehicles were initially rejected but eventually passed after cleaning by the contractors/company, although a few required a second cleaning before being passed.

**Clearance Limits/Right of Way enforcement:** Monitoring to assure that equipment, vehicles, and actions did not go outside of the designated work zone occurred on all projects except the four that took place on the water (the Lake Mead Intake Pipe #3, Pabco Water Pump installation and the two dredging projects). On six occasions, workers requested permission to go outside work zones limits. Permission was granted in these instances with the condition that the workers perform soil mitigation on the impacted area. No violations were reported.

**Soils Rehabilitation:** The PLI research assistant has had primary responsibility to instruct and monitor soil storage and rehabilitation on the Northshore Road reconstruction and the Nevada Power Power Pole Maintenance project. Workers were required to obliterate their footprints and equipment tracks with the back-side of a rake in several areas either outside or inside of their work zone limits. The areas involved about 4 acres on the Northshore Road project and 0.5 acre with on the Nevada Power project. On the Northshore Road project, soil decompaction was also performed on one acre and involved ripping into the soil to a one foot depth using large ripper claws.

**Tortoise Surveys:** Tortoise and tortoise burrow surveys were conducted immediately (1 to 24 hours) before project start up on all projects within tortoise habitats. These surveys required tortoise clearance along clearance limits/right of ways or at drill sites within several hundred feet around each area. Tortoises, scat, or burrows were documented. No tortoises were observed at any of these sites. During the time frame of this annual report, five projects start ups required initial tortoise clearance. The survey performed on the Las Vegas Wash dikes project covered two acres. The Nevada Power pole maintenance and Willow Beach test drilling projects were 1 acre each. The test boring along Northshore Road required a survey of several hundred feet from each site of
the road (work zone) over approximately 0.5 mile (approximate 1 acre), and the Highway 93 boring project required similar surveys conducted near each bore site spread over a distance of 16 miles.

Tortoise education classes: No contract workers were allowed on work sites at LMNRA until they had received a 20 minute tortoise training class. This class informed them of their personal responsibilities and penalties associated with harming tortoises and on procedures they should follow upon discovering a tortoise. A total of 20 desert tortoise education classes were conducted; 59 workers attended.

Tortoise monitoring: Monitoring for tortoise involves constantly walking the area in and near work zones, no matter the weather or terrain, in search of tortoises that may enter a work area. This includes checking under vehicles/heavy equipment that have been parked for more than 15 minutes prior to again moving that vehicle.

Three tortoise monitors were contracted to monitor both sides of the work zone for 13 miles along the Northshore Road reconstruction project. The UNLV research assistant coordinated and oversaw their daily monitoring activities to ensure effective monitoring. Nevada Power provided an on-site monitor for its pole maintenance project. Other projects for which active monitoring was provided were: the Las Vegas Wash dikes project, the Willow Beach drilling project, the Northshore Road test boring project, and the Highway 93 test boring drilling.

No tortoise or scat was found on the Northshore Road project, although two tortoise burrows were known to be near that project well outside of the work zone. These burrows did not appear active during the project duration. No tortoises or burrows were observed during the other projects. Monitoring for all wildlife occurred during tortoise monitoring.

Topsoil Management for Habitat Restoration: Habitat recovery for desert tortoise and all desert wildlife is dependent on correct topsoil management. Topsoil management was required only on the Northshore Road reconstruction project, involving approximately 15 acres where an old roadway was eliminated, and on slopes associated with new road cut. Twenty-one days were spent on topsoil management supervision by the PLI research assistant with instruction given to contractors on the 6 stages of topsoil management specific to this project listed below:

1. Topsoil removal at a depth of 2 to 4 inches. Topsoil removal took place on slopes that would be cut into, and where existing road was removed but would not be replaced at its same location. Topsoil removal was done by bulldozer or loader.
2. Topsoil stockpiling, in which the topsoil is saved for 6 to 18 months until it can be replaced. Topsoil was replaced at the same slope it had been removed from.
3. Slope contouring for erosion purposes. This created an uneven surface on the slope faces where topsoil was to be replaced.
4. Topsoil replacement. Replacing topsoil at the correct depth and by proper procedure.
5. Crusting, in which an erosion defiant crust on the topsoil is formed by using a mist spray from the water truck. The precise amount of water was used to form a crust, but not to create run off.
6. Staining. A weathering agent stain (Permeon) was sprayed on the topsoil and associated rocks in order to create coloring that would most closely match the nearby untouched desert.

The Northshore Road reconstruction project also included boulder placement, involving several hundred boulders of one to two tons each. Boulders were placed about 4 feet (over 1 m) apart at the
edge of topsoil replacement areas to prevent the public from driving onto the newly replaced

topsoil. Boulders were also placed in spots parallel with Lake Mead Boulevard to prevent off-road
driving onto the adjacent open desert. The irregular placement of boulders occurred over
approximately 2 miles or road. Four days were spent supervising the contractor on boulder
placement, including marking the ground for exact boulder placement and correct boulder washing
in preparation for staining with Permeon.

**Project 6. Shorebird Monitoring on Lakes Mead and Mohave**

All scheduled products for this project have been completed this year.

**Phases I and II**

1. **Monthly inventory and monitoring surveys** – Ongoing monthly surveys were conducted at 7
intensively monitored sites on Lakes Mead and Mohave for a total of 86 surveys. An additional 10
surveys were conducted at 2 additional sites on Lake Mohave during the winter months. During
this year, a total of 60,037 individual aquatic birds, shorebirds, and raptors were counted with
51,277 of these on Lake Mead and 8,760 on Lake Mohave. Eleven new species of aquatic or
shoreline bird were added to the inventory list for LMNRA.

During a scheduled survey at the Muddy River site, a breeding colony of snowy plovers was
discovered along the Overton Arm. This was the first observation of snowy plovers breeding on
Lake Mead and represents a large range expansion (greater than 300 miles) from previously known
breeding ranges. Snowy plovers are listed as a Nevada Species of Concern and the Pacific Coast
population is federally listed as threatened under the Endangered Species Act. Subsequent
exploratory shoreline surveys resulted in the discovery of an additional smaller breeding colony.
Monitoring surveys of these sites documented successful breeding.

2. **Water Grab samples** – No water samples were requested.

**Phase I**

1. **An annual report will be prepared by September 30, 2007** – A draft annual report that
summarizes aquatic and shorebird surveys and observations was submitted to Mr. Haley on
September 26, 2007 for review and comments. The citation follows:

   Barnes J. 2007. Inventory and Monitoring of Shoreline and Aquatic Bird Species on Lakes
   Lands Institute, University of Nevada, Las Vegas for the National Park Service, Lake Mead
   National Recreation Area, Boulder City, NV. 15 p.

**Project 7. Desert Bighorn Sheep Habitat Use Monitoring in Relation to Highway
Development.**

This project represents an ongoing FHWA-funded project to monitor desert bighorn sheep in the
vicinity of the Hoover Dam Bypass project and to assess whether and how sheep movements are
being affected by construction activities. GPS collars were deployed on 20 individual sheep. This
provides a running accumulation of sheep locations and requires weekly downloading via satellite
for analysis in a GIS. PLI personnel have been providing assistance in the form of data processing and stewardship, as well as field support.

**Phases I and II**

1. **GPS location data from collars on sheep will be downloaded weekly and converted into a format recognized by ArcGIS** – A total of approximately 2275 data locations were processed during this task agreement (since September 12, 2006). Data in the form of transmitted signals from 4 to 15 radio collars were received during any particular downloads; on occasions Argos failed to send information. All data received were uploaded into the program Argos Data Converter T03 (Telonics, Inc.) and then exported to an Excel spreadsheet and converted into a useable format for ArcGIS. In ArcGIS, data were quality assured to remove extraneous information or to filter out bad fixes. Data were then checked to identify sheep deaths or collar malfunctions.

Currently there are a number of collars that appear to be malfunctioning (possibly because of the battery life being tested on an unprecedented long project). For example, data will not be received on a particular collar for months, or the same data will be received week after week. This has made it difficult to determine the status of the sheep. The collars have been deployed for almost four years, and currently data is being received only on approximately 4 to 5 sheep. Telonics, the company that manufactured the collars, was contacted in an attempt to troubleshoot these problems. According to the company, problems with satellite collars could be assessed based on the signal that the radio collars are transmitting. For example, radio collars normally have a particular cadence for a live animal as opposed to one that has died. If a collar remains motionless for greater than 12 hours, then the tempo of the signal transferred from the radio collar speeds up. Apparently, the satellite collar is linked to the radio collar, and radio signals from malfunctioning satellite collars sound differently. In an effort to determine how the satellite collars might be malfunctioning, in the past, several field days were spent in an attempt to locate these sheep and evaluate the rhythm of the signal given off by the radio collars. Unfortunately, in the field no difference could be determined between the sound of the radio signal from a normal functioning satellite collar and one that was no longer was working correctly. At this time, these problems have not been resolved.

2. **Field retrieval of collars will be attempted on all dead animals** – There were no bighorn sheep deaths confirmed during this annual period.

**Phase II**

1. **Provide technical assistance for project assessments and report** – As requested by Mr. Haley, PLI personnel working with Mr. Hutcheson provided summary information on this project to be used in an NPS presentation. These data included:
   (1) total number of fixes collected for each collar/sheep from the beginning of the study to the end of February (when the data was requested);
   (2) range of dates for which each collar has been collecting data;
   (3) number of times each collared sheep crossed Highway 93;
   (4) home range area estimates;
   (5) maps depicting each collared sheep’s home range over the duration of study as represented by minimum convex polygons.

These tabular and illustrative products were presented by Mr. Haley at an interagency planning meeting on March 8, 2007. In addition, further GIS data were processed and compiled for NDOW in their effort to determine detection rates of helicopter surveys. Over the past year, illustrative products were also generated to support the ongoing FHWA study of construction impacts on
bighorn sheep in the vicinity of the Hoover Dam Bypass. Ms. Fletcher worked with Mr. Hutcheson
to create the following illustrative maps towards fulfilling these requests:
(1) distributions of ewes for December 2005 - February 2006 and June - December 2006;
(2) documented ewes crossing Highway 93 from June - December 2006;
(3) distribution of collared rams from June - December 2006;
(4) rams crossing Highway 93 from June - December 2006;
(5) minimum convex polygons (home ranges) of all collared sheep from June - December
2006.

Other Synergistic Activities

Meetings Attended and Personal Development – The following information comprises
professional meetings, formal local meetings, and substantial trainings attended by PLI personnel
during this quarter. Technical training for specific software, emergency medical refresher courses,
etc. are not listed herein. The meetings listed also do not include the multiple and varied informal
meetings conducted during this quarter between PLI and NPS personnel or with other
collaborators.

Dawn Fletcher and Joe Barnes attended the Partners in Flight Meeting, November 15, 2006.
Enterprise Library, Las Vegas, NV.
Dana Drake and Jef Jaeger attended the Relict Leopard Frog Conservation Team, November 27,
2006. LMNRA, Boulder City, NV.
Dawn Fletcher and Joe Barnes attended the Lower Colorado River Terrestrial and Riparian Biology
Dana Drake successfully completed the Motorboat Operator Certification Course, March 12-16,
2007. LMNRA, Boulder City, NV.
Dana Drake coordinated and Jef Jaeger attended the Relict Leopard Frog Conservation Team
meeting, April 18, 2007. LMNRA, Boulder City, NV.
Joe Barnes completed over 30 hours of field training at the Raptor Field Techniques Workshop,
June 12-16, 2007. Linwood Springs Research Station in Stevens Point, WI.
Jef Jaeger was the local committee co-chair and Dana Drake provided meeting assistance for the
UNLV (85+ in attendance), Las Vegas, NV.
Dawn Fletcher attended the Great Basin Bird Observatory anniversary and Breeding Bird Atlas
Dana Drake participated in the 3rd Annual Hellbender Symposium, 11-13 June 2007. Wheeling,
WV.
Jef Jaeger and Dana Drake participated in the Joint Meeting of Ichthyologists and Herpetologists,
11-16 July 2007. St. Louis, MO.
Joe Barnes attended the 2007 Annual Meeting of the Raptor Research Foundation in conjunction
Fogelsville, PA.
Dawn Fletcher, Joe Barnes, and Jef Jaeger attended the 32nd Annual Meeting of the Western
Field Ornithologists, September 27-28, 2007. Sams Town Hotel and Casino, Las
Vegas, NV.
Dawn Fletcher successfully continued her course work and research towards an M.S. degree in
biological sciences at UNLV.

Professional Presentations, Publications, and Public Outreach – The following comprise
professional dissemination of information by individuals associated with this task agreement
(identified by underlining), but does not necessarily reflect efforts directly covered by this task agreement.

Professional Presentations

Barnes J. Peregrine falcons within Lake Mead National Recreation Area. Guest lecture to undergraduate class, Humans and the Environment (ENS 100), December 7, 2006. UNLV, Las Vegas, NV.

Barnes J. Falcons in the Sky. Public presentation organized by the NPS Interpretive Division, February, 13, 2007. Boulder City Public Library, Boulder City, NV.


Barnes J. Shorebirds and aquatic birds of Lakes Mead and Mohave: Over three years of inventory and monitoring. Presentation given at the 32nd Annual Meeting of the Western Field Ornithologists, September 28, 2007. Sam’s Town Hotel and Casino, Las Vegas, NV.

Fletcher D, and Hutcheson J. Distribution and site selection of the Le Conte's, Crissal, and Bendire's Thrashers across the eastern Mojave Desert. Presentation given at the 32nd Annual Meeting of the Western Field Ornithologists, September 28, 2007. Sam’s Town Hotel and Casino, Las Vegas, NV.

Publications


Submitted by:  

Margaret N. Rees, Principal Investigator  

Date  

09/30/2007