

Amargosa River Expert BioBlitz

April 7-9th, 2017

Final Report



Photo credit: Janine Knapp

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I. Introduction and Context: Amargosa Watershed Conservation

The Amargosa River and associated wetland areas are found near the center of the Mojave Desert Ecoregion, and cross the border from the Nevada desert, into California. This exceptional cluster of aquatic habitats contains one of the most outstanding suites of endemic and imperiled species in the world. Because it is far from the rapid urban development areas of Las Vegas and Victorville/Hesperia, the Amargosa River Watershed has not undergone large-scale land conversion. However, dropping water levels caused by the pumping of groundwater for agricultural use, along with pressures to develop lands for residential or industrial uses, constitute significant threats to biodiversity in this region.

Since the early 1970s, The Nature Conservancy has worked in partnership with the Bureau of Land Management to protect the biodiversity found within the Amargosa River Watershed. These efforts have included land acquisition, restoration, scientific study, and conservation-focused management of lands along the Amargosa River. The Bureau of Land Management designated the vicinity as an Area of Critical Environmental Concern in 1983. In 2009, Congress designated a 26-mile stretch of the Amargosa in California as a Wild and Scenic River, and in 2016, the completion of the Desert Renewable Energy and Conservation Plan's Land Use Planning Amendment designates most the lands surrounding the California portion of the river as California Desert National Conservation Lands.

With these protections comes a need to effectively inform the conservation management of these lands, and that in turn requires knowledge gained through scientific inquiry. While we recognize that a select suite of ongoing research and surveys involving several agencies, institutions, and organizations is currently underway along the Amargosa River, we also have a need to continue to foster a comprehensive, multi-taxon understanding of the unique biodiversity of this place. We've arranged for a BioBlitz to explore this area to gain additional information about the suite of organisms that occupy the Amargosa Canyon area. This short-term, high intensity survey effort will involve a broad suite of experts skilled in the identification of plants, animals, and natural communities and resources.

As of 2017, most the high-quality, riparian and spring-fed habitats along the Amargosa River in California are now in public ownership, and are being managed for biodiversity values. Still, the elements of biodiversity found within these habitats depend on the presence of springs, seeps, and river flow for their survival. Because the Amargosa River is fed by alluvial and deep groundwater aquifers, it is subject to excessive groundwater pumping within the surrounding region, including the communities and businesses located near and around the towns of Pahrump and Amargosa Valley, Nevada. In order to ensure that the biodiversity of the Amargosa River is maintained, we must ensure the sustainable and continued natural expression of groundwater as seeps and springs and river base flow within this region.

The 2017 Amargosa River Expert BioBlitz was timed to occur 45 years after the original 1972 multi-taxon surveys conducted by various entities and documented by the Desert Pupfish Preservation Committee (DPPC 1972). This will give us an opportunity to compare findings across time, and see if any changes have occurred in the species present in this location.

II. What is an *Expert BioBlitz*?

We organized a 48-hour intensive “Expert BioBlitz” (also referred to in this document as just “BioBlitz”) to explore a 26-mile stretch of the Amargosa River that has a Wild and Scenic designation. We involved a broad suite of individuals skilled in the identification of plants, animals, natural communities and features, and conservation and stewardship issues.

A “BioBlitz” is a term referring to a rapid biological survey of a property. It originated from a survey effort conducted in Kenilworth Park and Aquatic Gardens in Washington D.C. in 1996. Typically, individuals representing a variety of biological interests are involved in a BioBlitz, and as many species from as many taxonomic groups as possible are counted during a 24-hour period. A BioBlitz allows for the rapid recording of species occurrences during a brief period of time, and it is not meant to result in a complete or exhaustive inventory of natural resources for any particular site. According to Droege (2004), “the name and concept of the BioBlitz is not registered, not copyrighted, not trademarked, and not a government thing. It’s an idea that can be used, adapted, and modified by any group, who should freely use the name BioBlitz for their own purposes”.

The Nature Conservancy has been working with partners to adapt BioBlitzes to better meet the needs of conservation. The most fundamental modification involves the general purpose of the event. BioBlitzes are often conducted by entities with education as part of their mission, and are explicitly used as an educational and public engagement tool (Lundmark 2003). The focus of a BioBlitz can shift from education and outreach to a focus primarily on conservation needs by involving participants who are collaborative, field-ready scientists. We use the term “Expert BioBlitz” to refer to rapid, field-based survey efforts within a specific geographic area that involve a team of professional scientists and conservation practitioners working collaboratively to (1) generate conservation-relevant data on taxa and/or other resources, (2) enhance research capacity, and (3) build working partnerships focused on conservation concerns.

III. Goals for the BioBlitz

The goals for this Expert BioBlitz were three-fold: First, to bring a group of experts to an under-resourced area to help collect information that could guide management planning along the Wild reach of the Wild and Scenic Amargosa River. Second, to conduct an additional test of the “Expert BioBlitz” method with scientists as a rapid-response, high return-on-investment method for the collection of high-quality survey data on properties that are prioritized for conservation. Third, to build a community of desert-interested scientists that work well together and that could be called upon to bring their taxonomic expertise to a variety of geographies to serve The Nature Conservancy and the Bureau of Land Management’s needs for gathering of reliable and up-to-date information about resources on the ground.

IV. Participants

The following individuals participated in the 2017 Expert BioBlitz. The decision was made not to make this a public event involving large numbers of novice naturalists, but instead to invite

carefully selected experts to represent the main taxonomic groups of interest. Therefore, the invitation list was restricted to a handful of well-trusted individuals, most of whom were scientists who had worked with The Nature Conservancy and/or the Bureau of Land Management in the past.

The information about the affiliation of participants is provided above for identification purposes only, and does not imply that the organizations or institutions listed below endorse the findings listed in this report, nor that these entities materially supported the generation of these data.

#	Name	Affiliation	Area of Expertise
1	Alison Cercy	Amargosa Conservancy	Conservation
2	Andy Kleinhesselink	University of California, Los Angeles	Plant Ecology
3	Andy Zdon	Partner Engineering and Science	Hydrology/Geohydrology
4	Bill Christian	The Nature Conservancy	Conservation
5	Bree Putman	Natural History Museum of Los Angeles Co.	Herpetology
6	Brenna Vredevelde	Tierra Data, Inc.	Environmental Planning
7	Brian Brown	Natural History Museum of Los Angeles Co.	Entomology: Diptera
8	Brooke Brand	The Nature Conservancy	Generalist
9	Celia Demers	Amargosa Conservancy	Conservation
10	Chris Otahal	Bureau of Land Management	Wildlife Biology
11	Daniel Cooper	Cooper Ecological Monitoring, Inc.	Ornithology
12	Erica Brand	The Nature Conservancy	Conservation
13	Estella Hernandez	Natural History Museum of Los Angeles Co.	Entomology
14	Giar-Ann Kung	Natural History Museum of Los Angeles Co.	Entomology: Diptera
15	Greg Pauly	Natural History Museum of Los Angeles Co.	Herpetology
16	Jane Li	Natural History Museum of Los Angeles Co.	GIS
17	Janine Knapp	The Nature Conservancy	Conservation
18	Jeffrey Cole	Pasadena City College	Entomology: Orthoptera
19	John Randall	The Nature Conservancy	Botany/Conservation
20	Kevin Guadalupe	Nevada Department of Wildlife	Ichthyology/Herpetology
21	Leonard Warren	The Nature Conservancy	Ornithology
22	Lesley Randall	San Diego Botanic Garden	Botany
23	Loraine Washburn	Rancho Santa Ana Botanic Garden	Botany
24	Mare Nazaire	Rancho Santa Ana Botanic Garden	Botany
25	Mark Herr	Tejon Ranch Conservancy	Herpetology
26	Miguel Ordeñana	Natural History Museum of Los Angeles Co.	Mammalogy: Bats/Carnivores
27	Naomi Fraga	Rancho Santa Ana Botanic Garden	Botany
28	Rhyan Schicker	Amargosa Conservancy	Conservation
29	Sam Scherneck	Amargosa Conservancy	Conservation
30	Sarah De Groot	Rancho Santa Ana Botanic Garden	Botany
31	Sophie Parker	The Nature Conservancy	Soil Ecology/Conservation
32	Susan North	The Nature Conservancy	Stewardship
33	Tasya Herskovitz	private consultant	Botany
34	Tayna Henderson	Amargosa Conservancy	Conservation
35	Weiping Xie	Natural History Museum of Los Angeles Co.	Entomology: Carabidae
36	Will Chatfield-Taylor	Olsson Associates	Ornithology/Entomology



Figure 1. About half of the BioBlitz participants during an early morning bird walk. Photo credit: Janine Knapp.

V. Methods

a. Origination of the BioBlitz

On May 9th, 2015, Nature Conservancy staff (Sophie Parker, Zachary Principe, and John Randall) organized and participated in a BioBlitz in the Tehachapi region in California. Preparations leading up to this first BioBlitz allowed Nature Conservancy staff to include individuals from institutions and organizations that had close ties with The Nature Conservancy in other geographies. For example, Brian Brown, Greg Pauly, and Stevie Kennedy-Gold from the Natural History Museum of Los Angeles County had worked with Sophie Parker, John Randall, and Brian Cohen on The Nature Conservancy's Urban Conservation Program in Greater Los Angeles, while Naomi Fraga had visited The Nature Conservancy's properties in the Amargosa River in the past with Bill Christian and Sophie Parker, and had completed floristic surveys for Sophie Parker on Nature Conservancy lands along the Santa Clara River. These external partners proved to be important participants in the Tehachapi BioBlitz. The following year (2016), Sophie Parker and Patrick Donnelly of the Amargosa Conservancy co-organized a Chicago Valley Bio Archaeo-Blitz (Parker et al. 2016), and invited many of the same participants from the Tehachapi BioBlitz to attend. Given the success of the Chicago Valley Bio-Archaeo-Blitz, Sophie Parker worked with Chris Otahal of the Bureau of Land Management to co-organize a third BioBlitz with this group, the second to take place in the Amargosa River Watershed. We call this 2017 effort the Amargosa River Expert BioBlitz.

b. Preparation and Reconnaissance

Nature Conservancy scientist Sophie Parker and Bureau of Land Management wildlife biologist Chris Otahal worked collaboratively to organize the 2017 Amargosa River BioBlitz. Because both Sophie and Chris had visited the site for the BioBlitz many times, they made the decision to forgo a formal reconnaissance trip. A project site was established on iNaturalist for the collection and storage of data. This site can be found here: <https://www.inaturalist.org/projects/2017-amargosa-river-bioblitz>. In addition, data and photo-sharing post-bioblitz was facilitated using BOX, a cloud-based file sharing system.

c. BioBlitz Logistics

This Expert BioBlitz officially took place at China Ranch and along the Wild and Scenic designated portions of the Amargosa River from 5:00 pm on Friday, April 7th, 2017 until 5:00 pm on Sunday, April 9th, 2017. While the site was available to be surveyed by different groups throughout this 48-hour period, there was not complete coverage during all hours by all groups. Most the group began their surveys starting at 7:00 am on Saturday, April 8th, 2017, and ended their surveys midday on Sunday, April 9th, 2017, with two major exceptions. Members of the botanical team conducted surveys over the course of several weeks; these surveys began before the start of the BioBlitz, and continued after its completion. In addition, members of the herpetological team began conducting nighttime surveys on Thursday, April 6th, 2016.



Figure 2. Field orientation on Saturday morning, April 8th, 2017. Photo credit: Erica Brand.

The BioBlitz was headquartered at China Ranch, with the generous support of landowner and host, Brian Brown. Participants attended three organized events the weekend of the BioBlitz: a Friday night reception, a Saturday morning field orientation, and a Saturday dinner. The Nature Conservancy and the Bureau of Land Management organized these events, and The Nature Conservancy covered the costs of food and beverages for participants. The Friday night reception allowed the scientists attending the event to hear from land owners and conservation leaders from the local community, including Brian Brown from China Ranch Date Farm. They were also introduced to the work and leaders of the Amargosa Conservancy and The Nature Conservancy. The Saturday morning field orientation allowed participants to understand rules for the access and

use of the China Ranch private property and Bureau of Land Management Wild and Scenic Amargosa River lands, get introduced to the property, and become oriented to the various habitat types found in the field.

In addition to surveying China Ranch and the Wild and Scenic portions of the Amargosa River, the BioBlitz participants made incidental observations in the communities of Shoshone Village, and Tecopa Hot Springs, and surrounding areas during the weekend. These observations are included on the iNaturalist site, and all results accrued by survey teams associated with this BioBlitz in this year are included in this report.

d. Methods Used by Each Group

A brief description of the methods used to collect data for each of the taxonomic groups follows. More detailed information about data collection is included in the appendices.

i. Plants, Fungi, and Soil Biological Crusts

Eleven individuals walked along the Amargosa River and nearby areas and searched for plants and fungi using the naked eye. One individual searched for soil biological crusts. Botanists from the Ranch Santa Ana Botanic Garden visited all areas currently designated as “Wild” and “Scenic” along the Amargosa River (see map in Appendix A), from the area just south of the town of Shoshone, downstream to the area just north of Dumont Dunes. Other individuals



Figure 3. Sarah Groot and Naomi Fraga from the botanical survey team scout for rare plants at the hanging gardens along the Wild Section of the Amargosa River south of Tecopa, CA. Photo credit: Janine Knapp.

focused on particular sites in or adjacent to the Wild and Scenic designation, including China Ranch and the portion of Willow Creek north of the confluence with the Amargosa River. An effort was made to search all major habitats with a special focus on potential habitat for rare plants. Photographs were taken and GPS used to document the locations of various plant and fungi taxa. An estimate of population size was recorded for all rare plant populations that were encountered. CNDDDB forms were completed and submitted for the rare plants.

ii. Arthropods

Sampling involved the efforts of eight participants using Malaise traps, searching bare ground for insects and nests, and collecting insects and spiders using hand-held nets. Malaise traps (tent-like structures with a bottle of alcohol on top that continually samples flying insects) were installed in two locations on China Ranch on April 7th, 2017, and samples were collected weekly until May 20, 2017. Identification of organisms occurred off site, after the conclusion of the BioBlitz.



Figure 4. Entomologists Brian Brown, Will Chatfield-Taylor, Giar-Ann Kung, and Jeffrey Cole sort and pin specimens in the field. Photo credit: Janine Knapp.

iii. Reptiles and Amphibians

Surveys involved six participants conducting visual-encounter surveys for reptiles and amphibians throughout the study area. Areas with three-dimensional structure, whether from man-made structures or surrounding woody vegetation, were especially closely examined because these are preferred habitats for lizards. Photographs were taken and iNaturalist used to document the locations of herpetofauna.

iv. Aquatic Mollusks and Fish

One participant visually inspected water bodies with the naked eye, and used a small dip net to spot survey for aquatic mollusks at spring sites within the study area. The iNaturalist app was used to document locations of mollusks and fish.

v. Birds

Four participants walked along the riparian portions of the study area and searched trees, shrubs, and open areas for birds using binoculars, the naked eye, and their ears. The ebird app was used to document locations of birds.

vi. Mammals

Incidental observations of mammals and mammal sign (scat, footprints, etc.) were recorded by one mammalogist and by several other participants as they searched for other organisms. In addition, bat detectors were deployed at two locations at China Ranch. A GPS and iNaturalist were used to document the locations of mammals and mammal sign observed at the site.

VI. Results

a. Results of Data Collection

The total number of taxa recorded on China Ranch, along the Wild and Scenic portions of the Amargosa River, and in surrounding areas as part of this BioBlitz was 376. This included 121 plant taxa, one (1) fungal taxon, one (1) soil biological crust (lichen) taxon, 152 arthropod taxa, two (2) mollusk taxa, three (3) fish taxa, five (5) amphibian taxa, nine (9) reptile taxa, 66 bird taxa, and sixteen (16) mammal taxa. A total of 267 observations were recorded during this event using iNaturalist, and an additional 430 individual bird observations were recorded using ebird. Many more observations were recorded manually. Detailed species lists and other information about the taxa documented during this BioBlitz is provided in the Appendices.



Figure 5. Herpetologist Bree Putman holds a California Kingsnake found near the trailhead at China Ranch. Photo credit: Janine Knapp.

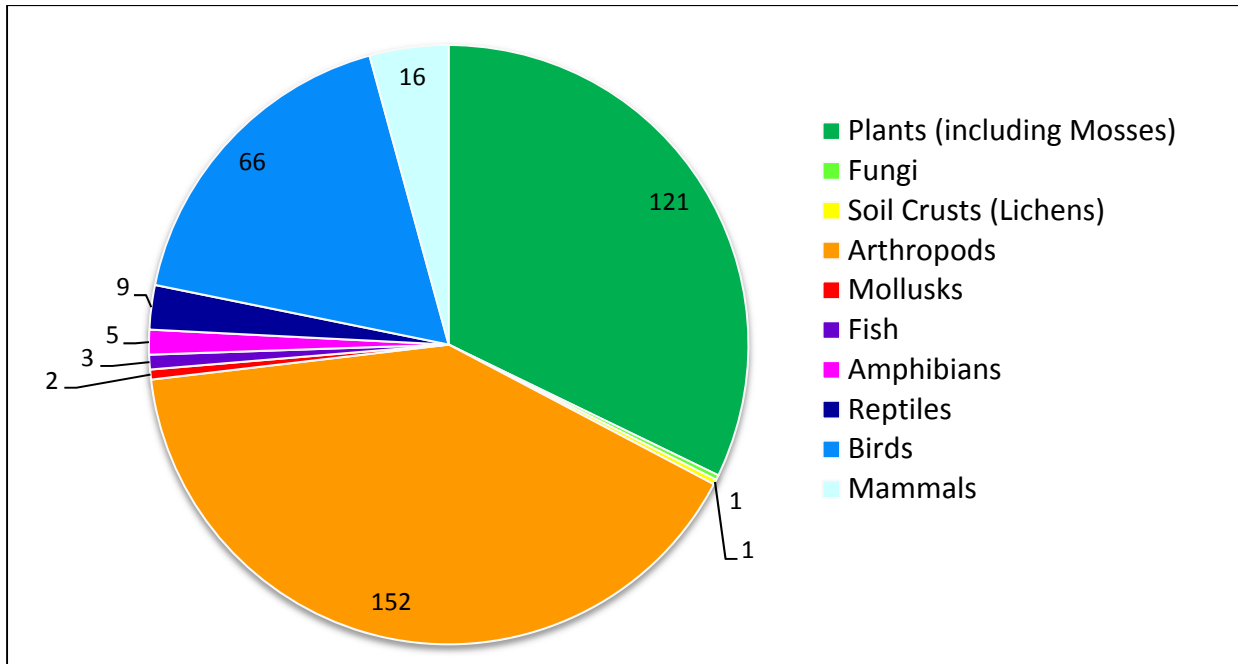


Figure 6. Number of taxa observed during the 2017 BioBlitz by taxonomic group.

b. Comparison of Findings with 1972 Study

Table 2. Differences in number of taxa recorded along the Amargosa River during the 2017 Amargosa River Expert BioBlitz vs. 1972 survey efforts. Some taxa observed in 1972 were not seen in 2017. Conversely, some taxa seen in 2017 were not found in 1972. Therefore, the “Difference” represented below is the difference in the *number* of taxa observed in the two years. For example, there were actually 74 plant taxa observed in 2017 that were not seen in 1972, even though the difference in the number of taxa observed in the two years was only 42.

	1972	2017	Difference	Notes
Fungi	0	1	1	No initial 1972 surveys were conducted for this taxonomic group.
Soil Crust Lichen	0	1	1	No initial 1972 surveys were conducted for this taxonomic group.
Plants	79	121	42	Initial surveys were conducted March 18-19, 1972; it is noted that these initial surveys were conducted in the fourth year of a dry period, and there were few flowing plants.
Arthropods	2	152	150	
Mollusks	0	2	2	
Fish	2	3	1	
Amphibians	3	5	2	
Reptiles	6	9	3	
Birds	104	66	-38	Initial surveys were conducted October 16-17, 1971; March 18-19, 1972; and April 4-5 and 14-16, 1972.
Mammals	15	16	1	Initial surveys were conducted March 18-19, 1972 and April 15-16, 1972.
Total	211	376	165	

c. Participant Involvement and Costs

A total of 36 individuals representing 14 institutions, organizations, and other entities were involved as participants in this BioBlitz.

The total expenses for this event borne by The Nature Conservancy, not including staff time by employees, amounted to \$10,816.26 (see “Costs and Funding” section below for more detailed information). A portion of the cost of holding this event was borne by participants, or was donated in kind by Brian Brown of China Ranch. Given that 376 taxa were recorded during this effort, the return on investment for The Nature Conservancy in holding this event is high, at about \$28.77 per taxon documented.

VII. Challenges and Recommendations

a. Coordination of Fieldwork

Fieldwork coordination for a BioBlitz embodies several challenges, including: (1) the need to schedule field visits during times that are most likely to yield opportunities to observe and identify organisms onsite, (2) remoteness of field locations and lack of access to food and other amenities, and (3) the potential for inclement weather.

As observed during the 2016 Chicago Valley BioBlitz (Parker et al. 2016), phenological differences between taxonomic groups may present a problem when it comes to choosing a single field day or set of days for a BioBlitz to occur. In Southern California, phenology of plants is closely tied to rainfall and temperatures, which are difficult to predict ahead of time. In scheduling the Amargosa River BioBlitz, the weekend for the event was selected six months in advance, with the hopes that it would best capture an active time of year for most organisms, and allow for good participation by individuals from various organizations and institutions.



Figure 7. Image capture from iNaturalist project site, showing occurrence data collected during the BioBlitz.

Another approach would have been to have several field days scattered throughout the year, and involve various constellations of individuals at each separate event. The downsides of this approach would have been extra coordination duties and resources required for staff running the BioBlitzes, and the loss of the sense of community formed during the shared experience for the whole group. Therefore, we decided to employ a single weekend event for this BioBlitz. Remoteness of field locations and lack of access to a variety of choices for food and other amenities was a challenge faced during the Chicago Valley Bio-Archaeo-Blitz (Parker et al. 2016), and the length of time spent having meals during that event was a frustration for some participants. Therefore, we elected to provide dinners during this event, and have individuals make their own plans for meals during the day. This option allowed the group to have greater flexibility, and cut down on time waiting for prepared food to be served.

As for inclement weather, detailed preparatory information was provided to participants, including warnings of the weather conditions 24 hours in advance of the start of the BioBlitz. While the group did encounter windy and cold conditions, we were, in general, fortunate with the weather, and did not have to rearrange or cancel our field time.

b. Ensuring Coverage

It can be a challenge to ensure comprehensive survey coverage during a BioBlitz. There are at least three elements of coverage that must be considered: (1) taxonomic coverage, (2) geographic coverage, and (3) temporal coverage. Temporal coverage is discussed above under “Coordination of Fieldwork”. The challenges of taxonomic and geographic coverage are addressed below.

By working with an institution that has experts in numerous fields, BioBlitz organizers can easily invite specialists representing multiple taxonomic groups. At the Amargosa River Expert BioBlitz, the Natural History Museum of Los Angeles County served this role, and Rancho Santa Ana Botanic Garden filled the botanical gap in the museum staff. Other researchers were included on an ad-hoc basis.

Knowing how many individuals with similar expertise to include in a BioBlitz can be a challenge, and will depend on the territory to be covered and ability of those individuals to work cohesively as a team. Given the large size of the area to be surveyed during the Amargosa BioBlitz, we took the “more-the-merrier” approach. However, we made it clear that this was a by-invitation-only event, geared towards scientific experts, and we assigned “group leaders” for the two taxonomic groups for which there was the most interest: Herpetology and Botany. Assigning group leaders also allows taxonomic experts to estimate how many people might be needed within a specific geographic area to get good coverage. Ensuring good geographic coverage of the area of interest was another challenge that we anticipated in the planning of this BioBlitz, as individuals can tend to gravitate towards locations that are easier to reach. To ensure good geographic coverage of survey efforts, the leaders of the Herpetology and Botany groups developed survey plans for each day ahead of time, and divided their efforts in a way that maximized coverage. For the floristic surveys, botanists from the Rancho Santa Ana Botanic

Garden used data collection programs with GPS-enabled tracking that allowed them to see which portions of the property they had surveyed, and target other areas for additional survey work.

c. Collection Impacts

The motivation for some BioBlitz participants, particularly those who are curators, may be to add to the collections at their institutions. Establishing guidelines for collection, and encouraging participants to adhere to these guidelines, is an important part of organizing a BioBlitz. During the Amargosa BioBlitz, organizers anticipated and managed the desire for specimen collection on BLM and privately owned lands. Participants were informed of the rules for collection, and made aware of the important differences between what was acceptable on public vs. private property. Botanical collections were made for inclusion in the herbarium at the Rancho Santa Ana Botanic Garden, and herpetological and entomological specimens were collected for inclusion in the Natural History Museum of Los Angeles County's collections. All other observations were non-collections based.

d. Building Long-term Relationships with BioBlitz Participants

After the BioBlitz is complete, it is essential that the organizers gain access to the data collected during the event. Having a good relationship with BioBlitz participants helps facilitate data transfer, and allows for a complete accounting of resources encountered during the event. Many of the participants in the Amargosa River Expert BioBlitz were also present at the Chicago Valley Bio-Archaeo-Blitz and the Tehachapi BioBlitz, so their willingness to participate in these types of events has been tested and reaffirmed. By sharing the outcomes of these events and remaining involved in various other projects with these parties, The Nature Conservancy would like to continue to foster these good relationships with external scientists over time. By seeking out information about what the scientist participant community can gain from participating in a BioBlitz, and what their expectations might be, we can better plan and prepare for a mutually-beneficial outcome. In addition to sharing this report and including several of the key participants as authors, there may be opportunities for more formal publication of the BioBlitz results, which is one potential outcome that could benefit both The Nature Conservancy and other parties participating in the BioBlitz.

This year, BioBlitz organizers released a short, anonymous survey to query the group about various aspects of the BioBlitz to better elicit feedback on what the group enjoyed, what they disliked, what worked, and what didn't. Thirteen individuals, constituting about one-third of BioBlitz participants, contributed to the survey. The answers to the portions of the survey that can be tabulated numerically were as follows:

- (1) The timing for this BioBlitz was...
 - Too late in the year: 0% (0)
 - Just at the right time of year: 76.92% (10)
 - Too early in the year: 23.08% (3)

(2) The schedule of events during this BioBlitz was...

- Not enough action for me: 0% (0)
- Just right: 100% (13)
- Way too jam-packed: 0% (0)

(3) The organization of this BioBlitz was...

- Overkill. I like to have a less rigid agenda and fewer rules to follow: 0% (0)
- Just right: 92.31% (12)
- Not enough structure for me; I felt like I didn't know what I should do during this event: 7.69% (1)

(4) I would attend a future BioBlitz organized by TNC and/or BLM...

- Definitely: 84.62% (11)
- Probably: 15.38% (2)
- Maybe: 0% (0)
- Probably not: 0% (0)
- Definitely not: 0% (0)

(5) Here are some places where we are considering holding a future desert* BioBlitz. Please indicate your interest in attending a similar event in these potential future locations (or suggest others):

Location	I would definitely go there! Count me in!	I would probably go.	I might go, but I'm not super excited about it and it would depend on my schedule and other factors.	I probably wouldn't go, unless there is a pretty big incentive to do so.	I definitely wouldn't go.
Afton Canyon	50% (6)	41.67% (5)	8.33% (1)	0% (0)	0% (0)
Shoshone Village	50% (6)	33.33 (4)	8.33% (1)	8.33% (1)	0% (0)
Ash Meadows	50% (6)	25% (3)	16.67% (2)	8.33% (1)	0% (0)
Santa Clara River	33.33 (4)	33.33 (4)	25% (3)	0% (0)	8.33% (1)

Only 12 of the 13 respondents answered this question. Rows total 100%.

*It should be noted that a Santa Clara River BioBlitz organized by The Nature Conservancy would not be located within the desert. This was an inaccuracy in the survey text.

e. Inclusion of Children

BioBlitz events are sometimes organized to involve children and families, with the goal of increasing science literacy and public engagement. In contrast, the Amargosa River BioBlitz included primarily adult experts, and the invitation list was restricted to small group of well-trusted individuals. However, one of the participants during the Amargosa River BioBlitz was a seven-year old child. While our event was not geared towards children, we discovered that judicious inclusion of this one, very well-behaved and field-ready child allowed for survey work to occur unimpeded while providing a set of eyes closer to the ground. This facilitated discoveries that otherwise would not have been made.

f. Costs and Funding

While many individuals are happy to donate their *time* to participate in a BioBlitz, travel costs can be considerable and a barrier to participation for some. Following the recommendations made by participants during the 2016 Chicago Valley Bio-Archaeo-Blitz, and conclusions presented in the report from that effort (Parker et al. 2016), The Nature Conservancy secured funding to defray some costs for participants during the 2017 Amargosa River BioBlitz. This helped incentivize participation, especially for participants with limited budgets and no access to research and travel funds.

The total cost borne by The Nature Conservancy to hold this event was \$10,816.26. This total includes partial reimbursements for transportation, lodging, and meal expenses by participants. Several participants elected to self-fund portions of these expenditures as part of their volunteer contribution to this event. For example, while some participants sought reimbursement for transportation costs, they did not seek reimbursement for meals. While the estimated per-person travel cost for the Chicago Valley Bio-Archaeo-Blitz was about \$370.00, the actual cost for the Amargosa River Expert BioBlitz as borne by The Nature Conservancy was only \$300.45 per person. Therefore, the true costs of this event are only partially known, and may likely be closer to the estimate made for the Chicago Valley Bio-Archaeo-Blitz of about \$370.00 per participant.

Except for some of the botanical work, which the Rancho Santa Ana Botanic Garden completed under contract for The Nature Conservancy, all field time was donated to the Amargosa River Expert BioBlitz on a volunteer basis. Each participant contributed about 16 hours of field time during the BioBlitz. Given that services provided by subject experts conducting surveys of this



Figure 8. Children can provide a different, and valuable, perspective during a BioBlitz. Photo credit: Erica Brand.

nature are typically valued at between \$50.00 and \$100.00 per hour, this amounts to an estimated total of the equivalent of about \$40,000 in volunteer labor utilized during the BioBlitz. Time spent in transit is not included as part of the calculation of volunteer field time contributed to this BioBlitz, and was estimated to be approximately 540 hours for the group, or 15 hours per participant.

The total reimbursed by The Nature Conservancy for transportation was \$2,357.39, or \$65.48 per participant. However, the true cost of transportation was much higher than that reimbursed by The Nature Conservancy. The distances traveled by this group were far, as the majority of participants were traveling from the Los Angeles and San Diego areas. In addition to air travel, parking, and car rental costs (totaling \$1,031.98), an estimated total of 6,789 vehicle miles were traveled by the group to complete this BioBlitz; this includes travel to and from the home institution for each individual or group carpooling to the BioBlitz, and repeated trips to/from the field site from each participant's place of lodging. At \$0.535 per mile, this would be a total of \$3,632.33 for our group. Therefore, an estimate of the true transportation costs for the group should be closer to \$4,664.31, or about \$129.56 per participant, suggesting that participants covered about 50% of the real cost of travel out-of-pocket, without being reimbursed.

Food expenses were a significant cost at this event. The Nature Conservancy directly reimbursed \$214.86 to cover the cost of meals for participants. In addition, The Nature Conservancy provided dinner and beverages free of charge to the group on Friday and Saturday evening, at a cost of \$1708.39. The total covered by The Nature Conservancy for food was \$1923.25, or \$53.42 per person. Participants bore some additional meal costs without seeking reimbursement as well.

The total reimbursed by The Nature Conservancy for lodging was \$2,009.66, or \$55.82 per participant. Several participants opted to share rooms, camp for free at China Ranch, or stay with friends; all of these options helped defray lodging costs for this event.

Overall lodging costs, travel time, and vehicle miles traveled were kept low by the fact that 16.6% of the participants (6 individuals) lived locally, and several BioBlitz participants shared lodging over the weekend. The costs incurred by certain individuals were significantly higher than the average, given long distances travelled.

This breakdown of estimated and actual costs does not include Nature Conservancy staff time to organize and execute the BioBlitz, time spent in the lab processing samples or analyzing data, report preparation, or any other preparatory or post-BioBlitz activity. Including these items could easily add an additional \$20,000 to \$30,000 in additional costs.

VIII. Conclusions

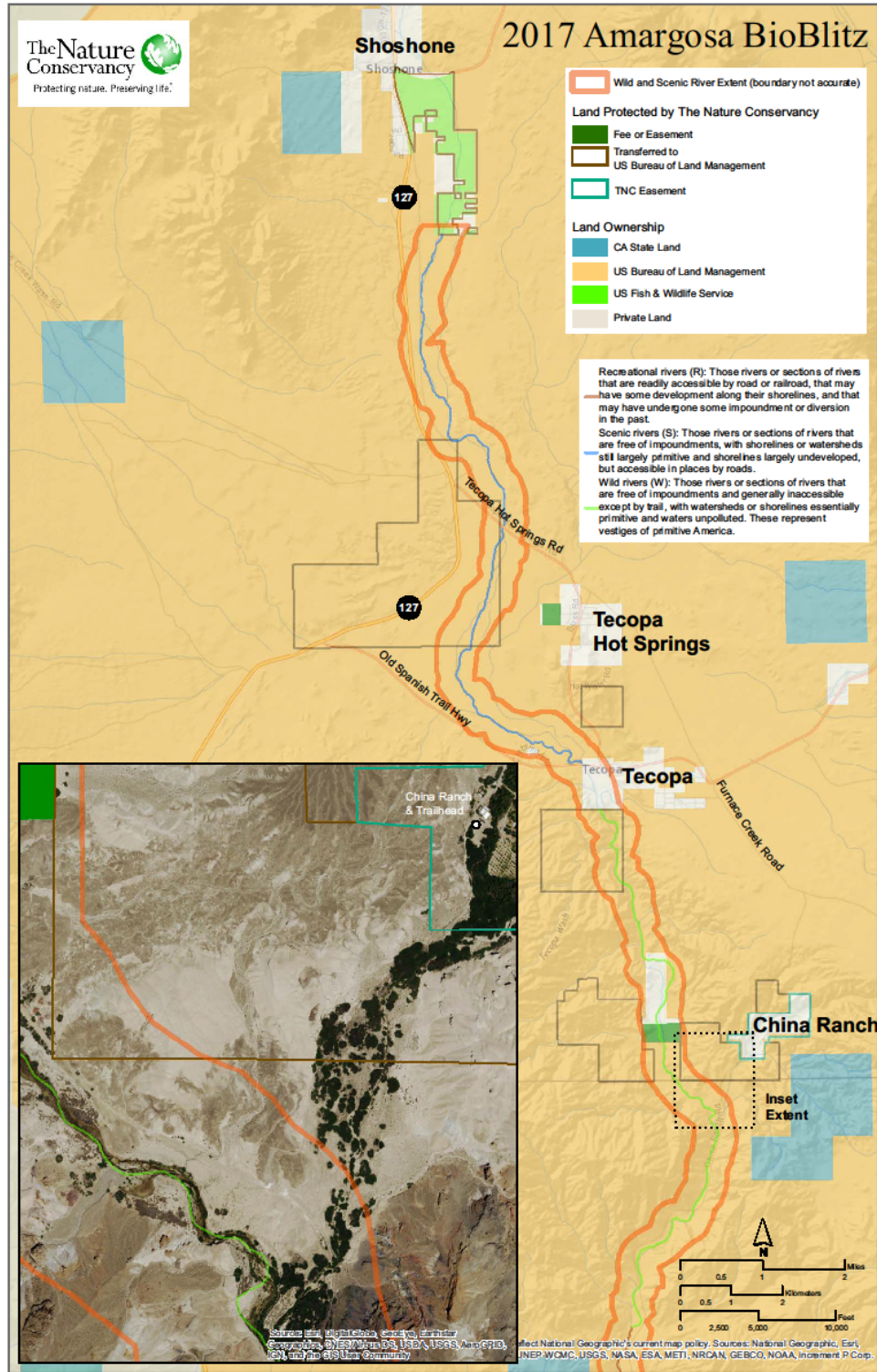
The shorthand goals for the Amargosa River BioBlitz were to collect conservation-relevant information, to continue testing out the Expert BioBlitz model, and to foster a community of BioBlitz-ready scientists that could be called upon in the future. Through the organization and execution of this event, The Nature Conservancy and the Bureau of Land Management have accomplished the goal of bringing a diverse group of experts to an under-resourced area of the

Mojave Desert to help collect information that will help management efforts. By holding this Biolitz, we have developed a deeper understanding of many of the challenges and opportunities inherent in executing a BioBlitz with scientist participants. Tested solutions for addressing some of these challenges are documented in this report, and will help enable the successful organization and execution of future Expert BioBlitz events in Amargosa River Watershed and beyond.

IX. References

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Appendix A. Map



Appendix B. Plants

All observations in 2017 were made by Naomi Fraga and Sarah DeGroot.

- Number of taxa found in 1972: 80
- Number of taxa found during the 2017 BioBlitz: 121
- Number of taxa found between 2012 and 2017 that were not found during the BioBlitz: 73
- Number of taxa found both in 1972 and between 2012 and 2017: 52
- Number of taxa found in 1972 but not found between 2012 and 2017: 27 (many questionable as to identification, see below)
- Number of taxa found between 2012 and 2017 that were not found in 1972: 74
- Number of sensitive species: 7

Taxon Name text (black = found both in 1972 and between 2012 and 2017, red = found only in 1972, blue = vouchered specimens found only between 2012 and 2017, green = found between 2012 and 2017 but not during BioBlitz, bold = sensitive species).

Family	Taxon Name	Common Name	Lifeform	Non-native	Notes
Agavaceae	<i>Hesperocallis undulata</i>	desert lily	Perennial herb		
Amaranthaceae	<i>Amaranthus fimbriatus</i>	fringed amaranth	Annual		Per Naomi Fraga: could have been present, but it responds to summer rain so would not be present in spring when the 1972 surveys occurred.
Amaranthaceae	<i>Endolepis covillei</i>	Coville's orach	Annual		
Amaranthaceae	<i>Monolepis spathulata</i>	beaver povertyweed	Annual		
Amaranthaceae	<i>Nitrophila mohavensis</i>	Amargosa niterwort	Perennial herb		
Amaranthaceae	<i>Nitrophila occidentalis</i>	western nitrophila	Perennial herb		Mis-named <i>Nitraria occidentalis</i> in 1972
Amaranthaceae	<i>Suaeda nigra</i>	bush seepweed	Small shrub		Formerly <i>Suaeda fruticosa</i>
Amaranthaceae	<i>Tidestromia oblongifolia</i>	honeysweet	Annual		
Apiaceae	<i>Apium graveolens</i>	celery	Annual or biennial	1	
Apocynaceae	<i>Apocynum cannabinum</i>	Indianhemp	Perennial herb		

Family	Taxon Name	Common Name	Lifeform	Non-native	Notes
Araliaceae	<i>Hydrocotyle verticillata</i>	whorles marsh pennywort	Perennial herb		
Arecaceae	<i>Phoenix dactylifera</i>	date palm	Tree	1	Cultivated
Asteraceae	<i>Almutaster pauciflorus</i>		Perennial herb		
Asteraceae	<i>Ambrosia dumosa</i>	burrobush	Small shrub		Formerly <i>Franseria dumosa</i>
Asteraceae	<i>Ambrosia salsola</i>	cheesebush	Small shrub		
Asteraceae	<i>Amphipappus fremontii</i>	chaffbush	Small shrub		
Asteraceae	<i>Atrichoseris platyphylla</i>	gravel ghost, parachute plant	Annual		
Asteraceae	<i>Baccharis salicifolia</i>	mule-fat	Large shrub		Formerly <i>Baccharis viminea</i>
Asteraceae	<i>Baccharis salicina</i>	willow baccharis	Small shrub		
Asteraceae	<i>Baccharis sarothroides</i>	broom baccharis	Large shrub		Per Naomi Fraga: a southern species in California (SD and Imperial Counties), not known from this region, so it is probably <i>Baccharis salicina</i> instead.
Asteraceae	<i>Baccharis sergiloides</i>	squaw water weed	Large shrub		
Asteraceae	<i>Bebbia juncea var. aspera</i>	rough sweetbush	Shrub		
Asteraceae	<i>Chaenactis carphoclinia</i>	pebble pincushion	Annual		
Asteraceae	<i>Chaenactis fremontii</i>	Fremont's pincushion	Annual		
Asteraceae	<i>Chaenactis stevioides</i>	desert pincushion	Annual		
Asteraceae	<i>Cirsium mohavense</i>	Mojave thistle	Biennial herb		
Asteraceae	<i>Crepis runcinata subsp. hallii</i>	Hall's hawksbear	Perennial herb		
Asteraceae	<i>Encelia farinosa</i>	brittlebush	Small shrub		
Asteraceae	<i>Encelia frutescens</i>	rayless encelia	Small shrub		
Asteraceae	<i>Encelia virginensis</i>	Virgin River Encelia	Small shrub		
Asteraceae	<i>Ericameria albida</i>	white rabbitbrush	Shrub		
Asteraceae	<i>Ericameria copperi</i>	Cooper's goldenbush	Shrub		
Asteraceae	<i>Ericameria paniculata</i>	Black-banded RabbitBrush	Small shrub		
Asteraceae	<i>Eriophyllum wallacei</i>	Wallace's woolly daisy	Annual		

Family	Taxon Name	Common Name	Lifeform	Non-native	Notes
Asteraceae	<i>Euphrosyne acerosa</i>	copperwort	Shrub		
Asteraceae	<i>Geraea canescens</i>	desert gold	Annual		
Asteraceae	<i>Helianthus sp.</i>	sunflower	Annual		<i>Helianthus annuus</i> subsp. <i>jaegeri</i> observed in 2017
Asteraceae	<i>Isocoma acradenia</i> var. <i>acradenia</i>	alkali goldenbush	Small shrub		
Asteraceae	<i>Leptosyne calliopsidea</i>	leafy-stemmed coreopsis	Annual		Formerly <i>Coreopsis calliopsidea</i> ; per Naomi Fraga, this would be a range extension if it were there, as this is a west Mojave/central valley plant. This record is highly suspect.
Asteraceae	<i>Leucosyris carnosa</i>	shrubby alkali aster	Suffruticose perennial		
Asteraceae	<i>Malacothrix coulteri</i>	snake's head	Annual		
Asteraceae	<i>Malacothrix glabrata</i>	smooth desert dandelion	Annual		
Asteraceae	<i>Monoptilon bellidiforme</i>	small desert star	Annual		
Asteraceae	<i>Monoptilon bellioides</i>	desert star	Annual		
Asteraceae	<i>Palafoxia arida</i> var. <i>arida</i>	Spanish needle	Annual		
Asteraceae	<i>Perityle emoryi</i>	Emory's rock daisy	Annual or biennial		
Asteraceae	<i>Peucephyllum schottii</i>	Pigmycedar, Schott's pygmycedar, desert pine, Desert fir	Small shrub		
Asteraceae	<i>Pleurocoronis pluriseta</i>	arrowleaf	Small shrub		Formerly <i>Hofmeisteria pluriseta</i> ; per Naomi Fraga: it is possible that this occurs at the site.
Asteraceae	<i>Pluchea odorata</i>	sweetscent	Small shrub		
Asteraceae	<i>Pluchea sericea</i>	arrow weed	Large shrub		
Asteraceae	<i>Prenanthes exiguua</i>	bright white, Thorny skeleton plant	Annual		
Asteraceae	<i>Psathyrotes ramosissima</i>	velvet turtleback	Annual		

Family	Taxon Name	Common Name	Lifeform	Non-native	Notes
Asteraceae	<i>Rafinesquia neomexicana</i>	California chicory, New Mexico plumseed, desert chicory	Annual		
Asteraceae	<i>Senecio douglasii</i> var. <i>monoensis</i>	Mono ragwort	Shrub		
Asteraceae	<i>Senecio mohavensis</i>	Mojave groundsel	Annual		
Asteraceae	<i>Solidago confinis</i>	southern goldenrod	Perennial herb		
Asteraceae	<i>Solidago velutina</i> subsp. <i>californica</i>	rock goldenrod	Perennial herb		Formerly <i>Solidago californica</i> ; per Naomi Fraga: not known from region, could be mis-identification of <i>Solidago confinis</i> .
Asteraceae	<i>Stephanomeria parryi</i>	Parry's wirelettuce	Perennial herb		
Asteraceae	<i>Stephanomeria pauciflora</i>	desert straw, wire lettuce	Suffruticose perennial		
Asteraceae	<i>Stylocline intertexta</i>	tangled neststraw	Annual		
Boraginaceae	<i>Cryptantha angustifolia</i>	narrow leaved forget me not	Annual		
Boraginaceae	<i>Cryptantha barbiger</i>	bearded cryptantha, Bearded Forget me not	Annual		
Boraginaceae	<i>Cryptantha dumetorum</i>	bush loving cryptantha	Annual		
Boraginaceae	<i>Cryptantha maritima</i>	white haired forget me not	Annual		
Boraginaceae	<i>Cryptantha micrantha</i>	redroot cryptantha	Annual		
Boraginaceae	<i>Cryptantha nevadensis</i> var. <i>nevadensis</i>	Nevada cryptantha	Annual		
Boraginaceae	<i>Cryptantha utahensis</i>	scented cryptantha	Annual		
Boraginaceae	<i>Heliotropium curassavicum</i>	heliotrope	Perennial herb		
Boraginaceae	<i>Johnstonella costata</i>	ribbed forget me not	Annual		<i>Cryptantha costata</i>
Boraginaceae	<i>Pectocarya</i> sp.	sombseed	annual		
Boraginaceae	<i>Phacelia calthifolia</i>	calthaleaf phacelia	Annual		
Boraginaceae	<i>Phacelia crenulata</i> var. <i>ambigua</i>	purplestem phacelia	Annual		

Family	Taxon Name	Common Name	Lifeform	Non-native	Notes
Boraginaceae	<i>Phacelia ivesiana</i>	Ive's phacelia	Annual		
Boraginaceae	<i>Phacelia pachyphylla</i>	thick-leaved phacelia	Annual		Per Naomi Fraga: it is possible this occurs in the area.
Boraginaceae	<i>Plagiobothrys jonesii</i>	Mojave popcornflower	Annual		
Brassicaceae	<i>Brassica tournefortii</i>	Sahara mustard	Annual	1	
Brassicaceae	<i>Caulanthus lasiophyllus</i>	California mustard	Annual		
Brassicaceae	<i>Descurainia pinnata</i>	yellow tansy mustard	Annual		
Brassicaceae	<i>Draba cuneifolia</i>	wedgeleaf draba	Annual		
Brassicaceae	<i>Lepidium dictyotum</i>	alkali pepperweed	Annual		
Brassicaceae	<i>Lepidium flavum</i>	yellow pepperweed	Annual		
Brassicaceae	<i>Lepidium fremontii</i>	desert pepperweed	Small shrub		
Brassicaceae	<i>Lepidium lasiocarpum</i>	shaggyfruit pepperweed	Annual		
Brassicaceae	<i>Lepidium perfoliatum</i>	clasping pepperweed	Annual		
Brassicaceae	<i>Sisymbrium irio</i>	London rocket	Annual	1	
Brassicaceae	<i>Strigosella africana</i>	African mustard	Annual	1	
Cactaceae	<i>Echinocactus polycephalus</i>	cottontop cactus	Succulent shrub		
Cactaceae	<i>Mammillaria sp.</i>	fishhook cactus	Succulent shrub		
Cactaceae	<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail pricklypear	Succulent shrub		
Cactaceae	<i>Sclerocactus johnsonii</i>	Johnson's fishhook cactus	Succulent shrub		
Campanulaceae	<i>Nemacladus sp.</i>	sigmoid thread plant, small flowered nemacladus	Annual		
Campanulaceae	<i>Nemacladus tenuis</i> var. <i>aliformis</i>	thread plant	Annual		
Capparaceae	<i>Oxystylis lutea</i>	spiny caper	Annual		
Caryophyllaceae	<i>Achyronychia cooperi</i>	frost mat	Annual		
Casurinaceae	<i>Casuarina equisetifolia</i>	Australian Pine	Tree	1	

Family	Taxon Name	Common Name	Lifeform	Non-native	Notes
Characeae	<i>Chara sp.</i>	algae	Algae		Per Naomi Fraga: not a flowering plant, but it is possible that it occurs at the site.
Chenopodiaceae	<i>Allenrolfea occidentalis</i>	pickleweed	Small shrub		Per Naomi Fraga: it is possible this occurs at the site.
Chenopodiaceae	<i>Atriplex canescens</i> subsp. <i>canescens</i>	fourwing saltbush	Small shrub		
Chenopodiaceae	<i>Atriplex confertifolia</i>	shadscale saltbush	Small shrub		
Chenopodiaceae	<i>Atriplex elegans</i> var. <i>fasciculata</i>	wheelscale saltbush	Annual		
Chenopodiaceae	<i>Atriplex hymenelytra</i>	desert holly	Small shrub		
Chenopodiaceae	<i>Atriplex lentiformis</i>	quail bush	Large shrub		
Chenopodiaceae	<i>Atriplex lentiformis</i> subsp. <i>lentiformis</i>	quail bush	Large shrub		
Chenopodiaceae	<i>Atriplex parryi</i>	parry saltbrush	Small shrub		
Chenopodiaceae	<i>Atriplex polycarpa</i>	cattle saltbush	Small shrub		
Chenopodiaceae	<i>Atriplex serenana</i> var. <i>serenana</i>	cattle saltbush	Annual		
Chenopodiaceae	<i>Atriplex torreyi</i>	Torry's saltbush	Large shrub		
Chenopodiaceae	<i>Bassia hyssopifolia</i>	five horn bassia	Annual	1	Per Naomi Fraga: could be mis-identified, and could be a <i>Kochia</i> .
Chenopodiaceae	<i>Kochia americana</i>	rusty molly	Perennial herb		
Chenopodiaceae	<i>Kochia californica</i>	green molly	Perennial herb		
Chenopodiaceae	<i>Monolepis spathulata</i>	beaver povertyweed	Annual		
Chenopodiaceae	<i>Salsola kali</i>	Russian thistle	Small shrub	1	Per Naomi Fraga: could be mis-identified, and could be <i>Salsola tragus</i> .
Chenopodiaceae	<i>Salsola tragus</i>	tumbleweed	Annual	1	
Chenopodiaceae	<i>Stutzia covillei</i>	bush seepweed	Small shrub		
Cleomaceae	<i>Cleomella brevipes</i>	stinkweed	Annual		
Cleomaceae	<i>Cleomella obtusifolia</i>	Mojave cleomella	Annual		

Family	Taxon Name	Common Name	Lifeform	Non-native	Notes
Cleomaceae	<i>Oxystylis lutea</i>	spiny caper	Annual		
Convolvulaceae	<i>Calystegia longipes</i>	Paiute morning glory	Liana		
Convolvulaceae	<i>Calystegia sepium</i> subsp. <i>limnophila</i>	marsh morning glory	Liana		
Convolvulaceae	<i>Cressa truxillensis</i> var. <i>vallicola</i>	alkali weed	Perennial herb		
Convolvulaceae	<i>Cuscuta denticulata</i>	desert dodder	Annual		
Convolvulaceae	<i>Cuscuta indecora</i>	alfalfa dodder	Annual		
Cyperaceae	<i>Bolboschoenus maritimus</i>	alkali bullrush	Perennial herb		
Cyperaceae	<i>Cladium californicum</i>	California saw grass	Perennial herb		Formerly <i>Cladium mariscus</i>
Cyperaceae	<i>Cyperus laevigatus</i>	smooth cyperus	Perennial herb		
Cyperaceae	<i>Eleocharis</i> sp.	beautiful spikerush	Annual		Mis-named <i>Heliocharis parissii</i> in 1972 survey
Cyperaceae	<i>Schoenoplectus americanus</i>	three square bulrush	Perennial herb		
Cyperaceae	<i>Schoenoplectus maritimus</i>	alkali bullrush	Perennial herb		
Ephedraceae	<i>Ephedra funerea</i>	Death Valley ephedra	Shrub		
Ephedraceae	<i>Ephedra viridis</i>	Mormon tea	Small shrub		Per Naomi Fraga: likely mis-identified, as only <i>E. funerea</i> and <i>E. trifurca</i> have been seen in the area.
Euphorbiaceae	<i>Croton californicus</i>	California croton	Suffruticose perennial		
Euphorbiaceae	<i>Euphorbia albomarginata</i>	white-margin euphorbia	Perennial herb		Per Naomi Fraga: it is possible that this occurs at the site.
Euphorbiaceae	<i>Euphorbia micromera</i>	Sonoran sandmat	Annual		
Fabaceae	<i>Alhagi maurorum</i>	camel thorn	Shrub	1	
Fabaceae	<i>Dalea mollissima</i>	downy dalea	Perennial herb		
Fabaceae	<i>Glycyrrhiza lepidota</i>	wild licorice	Perennial herb		Per Naomi Fraga: this may be mis-identified, as the closest known

Family	Taxon Name	Common Name	Lifeform	Non-native	Notes
					occurrence is along the 395 corridor.
Fabaceae	<i>Lupinus shockleyi</i>	purple desert lupine	Annual		
Fabaceae	<i>Prosopis glandulosa</i> var. <i>torreyana</i>	honey mesquite	Large shrub		formerly <i>Prosopis juliflora</i>
Fabaceae	<i>Prosopis pubescens</i>	screw bean mesquite	Tree		
Fabaceae	<i>Senegalia greggii</i>	catclaw	Large shrub		Formerly <i>Acacia greggii</i> ; per Naomi Fraga: not known from the area, could have been a mis-identified <i>Prosopis</i> .
Gentianaceae	<i>Zeltnera exaltata</i>	centaury	Annual		
Gentianaceae	<i>Zeltnera venusta</i>	charming centaury	Annual		
Iridaceae	<i>Sisyrinchium halophilum</i>	Nevada blue eyed grass	Perennial herb		Individuals of the genus <i>Sisyrinchium</i> were vouchered in the 1970s, but not included on the plant list of the 1972 report.
Juncaceae	<i>Juncus balticus</i>	wire rush	Perennial herb		
Juncaceae	<i>Juncus cooperi</i>	Cooper's rush	Perennial herb		
Juncaceae	<i>Juncus xiphioides</i>	iris-leaved rush	Perennial herb		Per Naomi Fraga: it is possible this occurs at the site.
Juncaginaceae	<i>Triglochin concinna</i> var. <i>debilis</i>	arrowgrass	Perennial herb		
Juncaginaceae	<i>Triglochin maritima</i>	arrowgrass	Perennial herb		
Lamiaceae	<i>Salvia columbariae</i>	chia	Annual		Per Naomi Fraga: it is possible this occurs at the site.
Lamiaceae	<i>Salvia funerea</i>	Death Valley sage	Shrub		
Loasaceae	<i>Eucnide urens</i>	desert rocknettle	Suffruticose perennial		
Loasaceae	<i>Mentzelia</i> sp.	Veatch's blazingstar	Annual		
Loasaceae	<i>Petalonyx thurberi</i>	sand paper plant	Perennial herb		
Lythraceae	<i>Lythrum californicum</i>	California loosestrife	Perennial herb		

Family	Taxon Name	Common Name	Lifeform	Non-native	Notes
Malvaceae	<i>Eremalche rotundifolia</i>	desert five spot	Annual		Formerly <i>Malvastrum rotundifolium</i>
Malvaceae	<i>Sphaeralcea ambigua</i>	desert mallow	Perennial herb		Per Naomi Fraga: it is possible this occurs at the site.
Montiaceae	<i>Cistanthe ambigua</i>	desert red maids	Annual		
Moraceae	<i>Ficus sp.</i>	fig	Tree	1	Cultivated
Nyctaginaceae	<i>Abronia pogonantha</i>	Mohave sand verbena	Annual		
Nyctaginaceae	<i>Abronia villosa</i>	sand verbena	Annual		
Onagraceae	<i>Chylismia brevipes</i> subsp. <i>brevipes</i>	golden suncup	Annual		
Onagraceae	<i>Chylismia brevipes</i> subsp. <i>brevipes</i> X <i>Chylismia claviformis</i>	hybrid suncup	Annual		
Onagraceae	<i>Chylismia claviformis</i>	brow-eyed primrose	Annual, Perennial herb		Formerly <i>Oenothera clavaeformis</i>
Onagraceae	<i>Chylismia munzii</i>	Munz's suncup	Annual		
Onagraceae	<i>Eremothera boothi</i> subsp. <i>desertorum</i>	Booth's evening primrose	Annual		
Onagraceae	<i>Eremothera refracta</i>	narrow leaves primrose	Annual		
Orobanchaceae	<i>Chloropyron tecopense</i>	Tecopa bird's beak	Annual		
Papaveraceae	<i>Argemone munita</i>	prickly poppy	Perennial herb		Per Naomi Fraga: it is possible that this occurs at the site.
Papaveraceae	<i>Eschscholzia californica</i>	California poppy	Annual		
Papaveraceae	<i>Eschscholzia glyptosperma</i>	desert poppy	Annual		
Plantaginaceae	<i>Plantago ovata</i> var. <i>fastigiata</i>	desert plantain	Annual		
Poaceae	<i>Andropogon glomeratus</i>	bushy bluestem	Perennial herb		
Poaceae	<i>Andropogon virginicus</i>	beardgrass	Perennial herb	1	Per Naomi Fraga: this is probably a mis-identification, and is more likely <i>Andropogon glomeratus</i> . It

Family	Taxon Name	Common Name	Lifeform	Non-native	Notes
					would be out of its bioregional distribution here.
Poaceae	<i>Aristida adscensionis</i>	sixweeks threawn	Annual		
Poaceae	<i>Arundo donax</i>	giant reed grass	Perennial herb		
Poaceae	<i>Bromus berterianus</i>	Chilean chess	Annual	1	
Poaceae	<i>Bromus madritensis</i> subsp. <i>rubens</i>	red brome	Annual	1	
Poaceae	<i>Cynodon dactylon</i>	Bremuda grass	Perennial herb	1	
Poaceae	<i>Dasyochloa pulchella</i>	fluff grass	Perennial herb		
Poaceae	<i>Distichlis spicata</i>	saltgrass	Perennial herb		
Poaceae	<i>Festuca bromoides</i>	brome fescue	Annual	1	
Poaceae	<i>Festuca octoflora</i>	sixweeks grass	Annual		
Poaceae	<i>Hilaria rigida</i>	galleta grass	Perennial grass		Per Naomi Fraga: it is possible this occurs at the site.
Poaceae	<i>Hordeum</i> sp.	smooth barley	Annual	1	
Poaceae	<i>Muhlenbergia asperifolia</i>	scratchgrass	Perennial herb		
Poaceae	<i>Panicum antidotale</i>	blue panicum	Perennial herb	1	
Poaceae	<i>Phragmites australis</i>	common reed	Perennial herb		Formerly <i>Phragmites communis</i>
Poaceae	<i>Polypogon monspeliensis</i>	annual beard grass	Annual	1	
Poaceae	<i>Schismus arabicus</i>	common Mediterranean grass	Annual	1	
Poaceae	<i>Schismus barbatus</i>	common Mediterranean grass	Annual	1	
Poaceae	<i>Sporobolus airoides</i>	Alkali sacaton	Perennial herb		
Polemoniaceae	<i>Aliciella latifolia</i> subsp. <i>latifolia</i>	broad leaf gilia	Annual		
Polemoniaceae	<i>Aliciella leptomeria</i>	sand aliciella	Annual		
Polemoniaceae	<i>Gilia cana</i> subsp. <i>speciformis</i>	showy gilia	Annual		
Polemoniaceae	<i>Gilia latiflora</i> subsp. <i>latiflora</i>	holly leaf gilia	Annual		
Polemoniaceae	<i>Gilia transmontana</i>		Annual		

Family	Taxon Name	Common Name	Lifeform	Non-native	Notes
Polemoniaceae	<i>Langloisia setosissima</i> subsp. <i>punctata</i>	lilac sunbonnet	Annual		
Polemoniaceae	<i>Linanthus demissus</i>	desert linanthus	Annual		
Polemoniaceae	<i>Linanthus jonesii</i>	Jones' linanthus	Annual		
Polygonaceae	<i>Chorizanthe brevicornu</i> var. <i>brevicornu</i>	brittle spineflower	Annual		
Polygonaceae	<i>Chorizanthe corrugata</i>	wrinkled spineflower	Annual		
Polygonaceae	<i>Chorizanthe rigida</i>	devil's spineflower, rigid spiny herb	Annual		
Polygonaceae	<i>Eriogonum deflexum</i>	flat topped buckwheat	Annual		
Polygonaceae	<i>Eriogonum inflatum</i>	desert trumpet	Perennial herb		
Polygonaceae	<i>Eriogonum maculatum</i>	spotted buckwheat	Annual		
Polygonaceae	<i>Eriogonum panamintense</i>	red-root buckwheat	Perennial herb, shrub		Formerly <i>Eriogonum racemosum</i> var. <i>desertum</i> ; this is unlikely to occur at the site and is probably a misidentification. This taxon is restricted to Panamint, White and Inyo Mtns. It is known from the Kingstons too, but only at high elevations (at 7300 ft).
Polygonaceae	<i>Eriogonum pusillum</i>	yellow turbans	Annual		
Polygonaceae	<i>Eriogonum reniforme</i>	kidney leaf buckwheat	Annual		
Polygonaceae	<i>Eriogonum</i> sp.	buckwheat	Annual		
Polygonaceae	<i>Eriogonum thomasii</i>	Thomas' buckwheat	Annual		
Polygonaceae	<i>Eriogonum trichopes</i>	little desert trumpet	Annual		
Polygonaceae	<i>Polygonum argyrocoleon</i>	silversheath knotweed	Annual	1	
Resedaceae	<i>Oligomeris linifolia</i>	lineleaf whitepuff	Annual		
Salicaceae	<i>Populus fremontii</i>	cottonwood	Tree		
Salicaceae	<i>Salix exigua</i>	narrowleaf willow	Large shrub		
Salicaceae	<i>Salix gooddingii</i>	Goodding's black willow	Tree		

Family	Taxon Name	Common Name	Lifeform	Non-native	Notes
Saururaceae	<i>Anemopsis californica</i>	yerba mansa	Perennial herb		
Plantaginaceae	<i>Mohavea breviflora</i>	golden desert snapdragon	Annual		
Simaroubaceae	<i>Castela emoryi</i>	crucifixion thorn	Large shrub		Formerly <i>Holocantha emori</i> ; per Naomi Fraga: This is a rare and very restricted taxon. Not known from Inyo County, and not likely to occur here.
Solanaceae	<i>Datura wrightii</i>	western jimsonweed	Perennial herb		Formerly <i>Datura meteloides</i>
Tamaricaceae	<i>Tamarix aphylla</i>	athel tamarisk	Tree	1	Cultivated
Tamaricaceae	<i>Tamarix chinensis</i> X <i>Tamarix ramosissima</i>	saltcedar, tamarisk	Tree	1	Also known as <i>Tamarix petandra</i>
Tamaricaceae	<i>Tamarix gallica</i>	tamarisk	Tree	1	Per Naomi Fraga: not known from this bio-region. This is probably a misidentified <i>Tamarix chinensis</i> X <i>Tamarix ramosissima</i> .
Typhaceae	<i>Typha</i> sp.	narrowleaf cattail	Perennial herb		
Viscaceae	<i>Phoradendron californicum</i>	mesquite mistletoe, desert mistletoe	Parasitic perennial herb		
Vitaceae	<i>Vitis girdiana</i>	desert wild grape	Liana		
Zygophyllaceae	<i>Larrea tridentata</i>	creosote bush	Large shrub		Mistakenly identified as <i>Larrea divaricata</i> in 1972.

Appendix C. Arthropods

Names of observers are as follows: Will Chatfield-Taylor (WC), Sophie Parker (SP), Bree Putman (BP), Greg Pauly (GP), Jeffrey Cole (JC), Andy Kleinhesselink (AK), Jane Li (JL), Miguel Ordeñana (MO), Erica Brand (EB), Kevin Guadalupe (KG), Loraine Washburn (LW), Weiping Xie (WX), Dan Cooper (DC), Brian Brown (BB).

#	Order	Family	Genus and Species	Common Name	WC	SP	BP	GP	JC	AK	JL	MO	EB	KG	LW	WX	DC	BB	Sum of Obs.
Sum					35	11	7	2	31	7	2	1	1	3	3	27	2	55	187
1	Araneae		<i>unknown</i>	wolf spider			1			1									2
2	Araneae	Theridiidae	<i>Latrodectus hesperus</i>	Western Black Widow			1												1
3	Blattodea	Blattidae	<i>Periplaneta</i>	Periplaneta					1										1
4	Blattodea	Termitoidae	<i>unknown</i>	termite					1										1
5	Coleoptera	Anobiidae	<i>Tricorynus sp.</i>	wood boring beetle												1			1
6	Coleoptera	Anobiidae (subfamily: Ptinidae)	<i>Ptinus verticalis</i> <i>LeConte, 1859</i>	spider beetle												1			1
7	Coleoptera	Bostrichidae	<i>Xyloblaptus quadrispinosus</i> <i>(LeConte, 1866)</i>	auger beetle												1			1
8	Coleoptera	Buprestidae	<i>Chrysobothris sp.</i>	jewel beetle	1														1
9	Coleoptera	Carabidae	<i>Agonum decorum</i>	ground beetle	1														1 [†]
10	Coleoptera	Carabidae	<i>Bembidion impotens</i>	ground beetle	1														1 [†]
11	Coleoptera	Carabidae	<i>Bembidion perspicuum</i>	ground beetle	1														1 [†]
12	Coleoptera	Carabidae	<i>Bembidion sp.</i>	ground beetle												1			1
13	Coleoptera	Carabidae	<i>Brachinus mexicanus</i> Dejean, <i>1831</i>	bombardier beetle												1			1
14	Coleoptera	Carabidae	<i>Brachinus sp.</i>	ground beetle	1														1
15	Coleoptera	Carabidae	<i>Cymindis punctigera</i>	ground beetle	1														1 [†]

#	Order	Family	Genus and Species	Common Name	WC	SP	BP	GP	JC	AK	JL	MO	EB	KG	LW	WX	DC	BB	Sum of Obs.
16	Coleoptera	Carabidae	<i>Platynus brunneomarginatum</i> <i>Mannerheim, 1843</i>	ground beetle												1			1
17	Coleoptera	Carabidae	<i>Tachys sp.</i>	ground beetle												1			1
18	Coleoptera	Cerambycidae	<i>Neoclytus tenuiscriptus</i>	longhorn beetle	1														1
19	Coleoptera	Chrysomelidae	<i>Altica sp.</i>	flea beetle	1														1
20	Coleoptera	Chrysomelidae	<i>Altica sp. 1</i>	flea beetle												1			1
21	Coleoptera	Chrysomelidae	<i>Altica sp. 2</i>	flea beetle												1			1
22	Coleoptera	Chrysomelidae	<i>Lema daturaphila</i> <i>Kogan & Goeden, 1970</i>	Three-lined Potato Beetle					1							1			2
23	Coleoptera	Chrysomelidae	<i>Pteleon brevicornis</i>	leaf beetle	1														1*
24	Coleoptera	Cleridae	<i>Cymatodera vulgivaga</i>	checkered beetle	1														1
25	Coleoptera	Cleridae	<i>Phyllobaenus nr. discoideus</i> (<i>LeConte, 1852</i>)	checkered beetle												1			1
26	Coleoptera	Cleridae	<i>Trichodes ornatus</i> (<i>Linsley & MacSwain, 1943</i>)	Ornate Checkered Beetle	1	2										1			4
27	Coleoptera	Coccinellidae	<i>Coccinella septempunctata</i> (<i>Linnaeus, 1758</i>)	seven-spot lady beetle	1	1										1			3
28	Coleoptera	Coccinellidae	<i>Hippodamia convergens</i> <i>Guerin-Meneville, 1842</i>	convergent lady beetle	1	1										1			3
29	Coleoptera	Curculionidae	<i>Ophryastes sp.</i>	broad-nosed weevils					1										1
30	Coleoptera	Dermestidae	<i>Anthrenus sp.</i>	skin beetle	1														1
31	Coleoptera	Dermestidae	<i>Anthrenus verbasci</i> (<i>Linnaeus, 1767</i>)	skin beetle												1			1
32	Coleoptera	Elateridae	<i>Aeolus livens</i> (<i>LeConte, 1853</i>)	click beetle												1			1

#	Order	Family	Genus and Species	Common Name	WC	SP	BP	GP	JC	AK	JL	MO	EB	KG	LW	WX	DC	BB	Sum of Obs.
33	Coleoptera	Elateridae	<i>Melanotus sp.</i>	click beetle	1														1
34	Coleoptera	Latridiidae	<i>Corticaria sp. 1</i>	minute brown scavenger beetle												1			1
35	Coleoptera	Latridiidae	<i>Corticaria sp. 2</i>	minute brown scavenger beetle												1			1
36	Coleoptera	Meloidae	<i>Cysteodemus armatus</i> LeConte, 1851	Inflated Beetle	1	1		1	1						1	1			5
37	Coleoptera	Meloidae	<i>Eupompha schwarzi</i> Wellman, 1909	blister beetle	1	1											1		3
38	Coleoptera	Meloidae	<i>Lytta magister</i> Horn, 1870	Master Blister Beetle			1							1	1	1			4
39	Coleoptera	Meloidae	<i>Pleuropasta mirabilis</i>	Pleuropasta mirabilis										1	1				2
40	Coleoptera	Melyridae	<i>Dasytes sp.</i>	soft wing flower beetle												1			1
41	Coleoptera	Melyridae	<i>Eschatocrepis ssp. Desertus</i>	flower beetle	1														1
42	Coleoptera	Nitidulidae	<i>Carpophilus pallipennis</i> (Say, 1823)	sap beetle												1			1
43	Coleoptera	Nitidulidae	<i>Nitops pallipennis</i>	cactus sap beetle	1														1
44	Coleoptera	Oedemeridae	<i>Oxacis sp.</i>	false blister beetle												1			1
45	Coleoptera	Scarabaeidae	<i>Cremastocheilus quadratus</i>	scarab beetle	1														1
46	Coleoptera	Scarabaeidae	<i>Diplotaxis sp.</i>	scarab beetle	1														1
47	Coleoptera	Staphylinidae	<i>Staphylinidae sp. 2</i>	rove beetle	1														1
48	Coleoptera	Staphylinidae	<i>Zyras sp.</i>	rove beetle	1														1
49	Coleoptera	Tenebrionidae	<i>Blapstinus sp.</i>	darkling beetle												1			1*
50	Coleoptera	Tenebrionidae	<i>Eleodes armatus</i> LeConte, 1851	armored stink beetle	1					1						1			3
51	Coleoptera	Tenebrionidae	<i>Stenomorpha sp.</i>	darkling beetle	1														1

#	Order	Family	Genus and Species	Common Name	WC	SP	BP	GP	JC	AK	JL	MO	EB	KG	LW	WX	DC	BB	Sum of Obs.
52	Coleoptera	Tenebrionidae	<i>Trichoton sordidum</i> (LeConte, 1851)	darkling beetle												1			1
53	Coleoptera	Tenebrionidae	unknown (Tribe <i>Edrotini</i>)	darkling beetle	1														1
54	Dermaptera	Labiduridae	<i>Labidura riparia</i>	Shore Earwig					1										1
55	Diptera	Agromyzidae	<i>Cerodontia</i>	leaf-miner fly														1	1
56	Diptera	Anthomyiidae	unknown	muscoidea fly														1	1
57	Diptera	Anthomyzidae	unknown	fly														1	1
58	Diptera	Apsilocephalidae	<i>Apsilocephala</i>	fly														1	1
59	Diptera	Asteiidae	<i>Astiosoma</i>	acalyprate fly														1	1
60	Diptera	Aulacigastridae	<i>Aulacigaster</i>	sap fly														1	1
61	Diptera	Bombyliidae	unknown	bee fly														1	1
62	Diptera	Cecidomyiidae	unknown	gall midge														1	1
63	Diptera	Ceratopogonidae	unknown	biting midges														1	1
64	Diptera	Chironomidae	unknown	nonbiting midge														1	1
65	Diptera	Chloropidae	unknown	grass fly														1	1
66	Diptera	Chyromyidae	<i>Gymnochiromyia</i>	acalyprate fly														1	1
67	Diptera	Culicidae	unknown	mosquito														1	1
68	Diptera	Dolichopodidae	unknown	long-legged flies														1	1
69	Diptera	Drosophilidae	<i>Drosophila</i>	fruit fly														1	1
70	Diptera	Drosophilidae	<i>Scaptomyza</i>	fruit fly														1	1
71	Diptera	Empididae	unknown	dagger fly														1	1
72	Diptera	Ephydriidae	<i>Scatella</i>	shore fly														1	1
73	Diptera	Fanniidae	unknown	muscoidea fly														1	1
74	Diptera	Heleomyzidae	<i>Pseudoleria</i>	sun fly														1	1
75	Diptera	Heleomyzidae	<i>Trixoscelis</i>	sun fly														1	1
76	Diptera	Hybotidae	unknown	dance fly														1	1
77	Diptera	Keroplastidae	<i>Macrocera</i>	fungus gnat														1	1
78	Diptera	Lauxaniidae	<i>Minettia</i>	acalyprate fly														1	1
79	Diptera	Lonchaeidae	unknown	lance fly														1	1
80	Diptera	Muscidae	unknown	house fly														1	1
81	Diptera	Mycetophilidae	<i>Acnemia</i>	fungus gnat														1	1

#	Order	Family	Genus and Species	Common Name	WC	SP	BP	GP	JC	AK	JL	MO	EB	KG	LW	WX	DC	BB	Sum of Obs.
82	Diptera	Phoridae	Megaselia agarici	phorid fly														1	1
83	Diptera	Phoridae	Megaselia basispinata	phorid fly														1	1
84	Diptera	Phoridae	Megaselia halterata	mushroom phorid														1	1
85	Diptera	Phoridae	Megaselia Ilca	phorid fly														1	1
86	Diptera	Phoridae	Megaselia sidneyae	phorid fly														1	1
87	Diptera	Phoridae	Megaselia sp. 1	phorid fly														1	1
88	Diptera	Phoridae	Megaselia sp. 2	phorid fly														1	1
89	Diptera	Phoridae	Megaselia sp. 3	phorid fly														1	1
90	Diptera	Phoridae	Megaselia tecticauda	phorid fly														1	1
91	Diptera	Phoridae	Phalacrotophora halictorum	phorid fly														1	1
92	Diptera	Phoridae	Pseudacteon	phorid fly														1	1
93	Diptera	Pipunculidae	Eudorylas	big-headed fly														1	1
94	Diptera	Psychodidae	unknown	drain fly														1	1
95	Diptera	Sarcophagidae	unknown	flesh fly						1									1
96	Diptera	Scathophagidae	unknown	dung fly														1	1
97	Diptera	Scenopinidae	unknown	window fly														1	1
98	Diptera	Sciaridae	unknown	dark-winged fungus gnat														1	1
99	Diptera	Sepsidae	unknown	black scavenger fly														1	1
100	Diptera	Simuliidae	unknown	black fly														1	1
101	Diptera	Sphaeroceridae	unknown	small dung fly														1	1
102	Diptera	Syrphidae	Paragus	hoverfly														1	1
103	Diptera	Syrphidae	<i>Syrphidae sp. 1</i>	hover fly	1														1
104	Diptera	Tachinidae	Gymnosoma	tachina fly														1	1
105	Diptera	Tethinidae	Masoniella	acalyptrate fly														1	1
106	Diptera	Therevidae	Pherocera	stiletto fly														1	1
107	Diptera	Tiipulidae	unknown #1	crane fly														1	1
108	Diptera	Tiipulidae	unknown #2	crane fly														1	1
109	Diptera	Tiipulidae	unknown #3	crane fly														1	1

#	Order	Family	Genus and Species	Common Name	WC	SP	BP	GP	JC	AK	JL	MO	EB	KG	LW	WX	DC	BB	Sum of Obs.
110	Diptera	Ulidiidae	<i>unknown</i>	picture-winged fly														1	1
111	Diptera	<i>unknown</i>	<i>unknown</i>	unknown - new family														1	1
112	Ephemeroptera		<i>unknown</i>	mayfly	1				1										2
113	Hemiptera	Naucoridae	<i>Ambrysus sp.</i>	creeping water bug					1										1
114	Hemiptera	Pentatomidae	<i>Chlorochroa sayi</i>	Say's Stink Bug					1										1
115	Hymenoptera	Apidae	<i>Apis mellifera</i>	honey bee		1													1
116	Hymenoptera	Crabronidae	<i>Crabronidae sp. 1</i>	wasp	1														1+
117	Hymenoptera	Formicidae	<i>unknown #1</i>	ant #1		1													1
118	Hymenoptera	Formicidae	<i>unknown #2</i>	ant #2		1													1
119	Hymenoptera	Formicidae	<i>unknown #3</i>	ant #3		1													1
120	Hymenoptera	Formicidae	<i>unknown #4</i>	ant #4							1								1
121	Hymenoptera	Sphoridae	<i>Ammophila sp.</i>	sand wasp	1														1
122	Lepidoptera	Lycaenidae	<i>Brephidium exilis</i>	Western Pygmy Blue	1	1				2									4
123	Lepidoptera	Lycaenidae	<i>Lycaenidae sp. 1</i>	copper butterfly	1														1
124	Lepidoptera	Nymphalidae	<i>Vanessa cardui</i>	painted lady butterfly													1		1
125	Lepidoptera	Pieridae	<i>Pieridae sp. 1</i>	butterfly	1														1
126	Mantodea	Mantidae	<i>Litaneutria minor</i>	Agile ground mantis					1										1
127	Odonta	Aeshnidae	<i>Anax walsinghami</i>	Giant Darner					1										1
128	Odonta	Aeshnidae	<i>Rhionaeschna multicolor</i>	Blue-eyed Darner					1			1							2
129	Odonta	Coenagrionidae	<i>Argia vivida</i>	Vivid Dancer					1								1		2
130	Odonta	Coenagrionidae	<i>Enallagma civile</i>	Familiar Bluet					1										1
131	Odonta	Coenagrionidae	<i>Ischnura barberi</i>	Desert Forktail					1										1
132	Odonta	Libellulidae	<i>Libellula saturata</i>	Flame Skimmer					1										1
133	Odonta	Libellulidae	<i>Pantala hymenaea</i>	Spot-winged Glider					1										1
134	Odonta	Libellulidae	<i>Sympetrum corruptum</i>	Variiegated Meadowhawk					1										1
135	Odonta	Libellulidae	<i>Tramea onusta</i>	Red Saddlebags					1										1
136	Opiliones	Phalangioidea	<i>unknown</i>	Phalangioidea (Harvestman)			1												1
137	Opiliones	Sclerosomatidae	<i>Eurybunus sp.</i>	Eurybunus									1						1
138	Orthoptera	Acrididae	<i>Anconia integra</i>	Alkali Grasshopper					1										1

#	Order	Family	Genus and Species	Common Name	WC	SP	BP	GP	JC	AK	JL	MO	EB	KG	LW	WX	DC	BB	Sum of Obs.
139	Orthoptera	Acrididae	<i>Cibolacris parviceps</i>	Cream Grasshopper					1										1
140	Orthoptera	Acrididae	<i>Trimerotropis pallidipennis</i>	Pallid-winged Grasshopper					1		1								2
141	Orthoptera	Acrididae	<i>Tytthotyle maculata</i>	Furnace Heat Lubber					1										1
142	Orthoptera	Gryllidae	<i>Acheta domesticus</i>	European House Cricket					1										1
143	Orthoptera	Gryllidae	<i>Gryllus</i>	Gryllus					1										1
144	Orthoptera	Gryllidae	<i>Gryllus vocalis</i>	Vocal Field Cricket					1										1
145	Orthoptera	Gryllidae	<i>Miogryllus lineatus</i>	Miogryllus lineatus					1										1
146	Orthoptera	Gryllidae	<i>Neonemobius mormonius</i>	Mormon Cricket					1										1
147	Orthoptera	Tettigoniidae	<i>Capnobotes fuliginosus</i>	Sooty Longwing					1										1
148	Scorpiones		<i>unknown</i>	scorpion			1	1	1	1									4
149	Scorpiones	Caraboctonidae	<i>Hadrurus</i>	Giant Hairy Scorpions						1									1
150	Scorpiones	Caraboctonidae	<i>Hadrurus arizonensis</i>	Desert Hairy Scorpion			1							1					2
151	Solifugae		<i>unknown</i>	windscorpion			1		1										2
152	Trichoptera		<i>unknown</i>	caddisfly	1														1

†Identified by Peter Messer

‡Unknown to family, genus, and species

*tentative

Appendix D. Aquatic Mollusks and Fish

#	Genus and Species	Common Name	Kevin Guadalupe	Loraine Washburn	Chris Otahal	Dan Cooper	Number of Obs.	Notes
1	<i>Carassius auratus</i>	Goldfish	1				1	
2	<i>Cyprinodon nevadensis ssp. amargosae</i>	Amargosa Pupfish	2	1	1		4	
3	<i>Rhinichthys osculus ssp.</i>	Amargosa Canyon Speckled Dace				1	1	
4	<i>Pyrgulopsis sanchezi</i>	Mud Snail	2				2	Pyrgulopsis sanchezi at Shoshone spring; Tecopa specimens currently being ID'd
5	<i>Physa sp.</i>	Bladder Snail	1				1	

Appendix E. Reptiles and Amphibians

Names of observers are as follows: Andy Kleinhesselink (AK), Brenna Vredeveld (BV), Bree Putman (BP), Chris Otahal (CO), Greg Pauly (GP), Jane Li (JL), Kevin Guadalupe (KG), Mark Herr (MH), Miguel Ordeñana (MO), and Sophie Parker (SP).

#	Date Observed	Scientific Name	Common Name	AK	BP	BV	CO	GP	JL	KG	MH	MO	SP	Total Obs.
1	4/8/2017	<i>Anaxyrus sp.</i>	North American Toad									1		1
2	4/8/2017	<i>Anaxyrus boreas</i>	Western Toad							2				2
3	4/6/2017	<i>Anaxyrus punctatus</i>	Red-spotted Toad		7	1		6						14
4	4/9/2017	<i>Anaxyrus woodhousii</i>	Woodhouse's Toad	1	5			8		1			1	16
5	4/9/2017	<i>Lithobates catesbeianus</i>	American Bullfrog					1					1	2
6	4/6/2017	<i>Pseudacris hypochondriaca</i>	Baja California Treefrog					1						1
7	4/8/2017	<i>Aspidoscelis tigris</i>	Western Whiptail					1			1			2
8	4/9/2017	<i>Callisaurus draconoides</i>	Zebra-tailed Lizard	1	1			2	1					5
9	4/9/2017	<i>Coleonyx variegatus</i>	Western Banded Gecko								1			1
10	4/9/2017	<i>Coleonyx variegatus variegatus</i>	Desert Banded Gecko	1					1					2
11	4/8/2017	<i>Coluber flagellum</i>	Coachwhip					1		1			1	3
12	4/7/2017	<i>Crotalus cerastes</i>	Sidewinder		1									1
13	4/8/2017	<i>Dipsosaurus dorsalis</i>	Desert Iguana		1					1	1			3
14	4/8/2017	<i>Lampropeltis californiae</i>	California King Snake					1						1
15	4/9/2017	<i>Pituophis catenifer deserticola</i>	Great Basin Gopher Snake				1							1
16	4/6/2017	<i>Rena humilis</i>	Western Blind Snake		1									1
17	4/8/2017	<i>Uta stansburiana</i>	Common Side-blotched Lizard	1	1	1		4			2		1	10
Sum				4	17	2	1	25	2	5	5	1	4	66

Appendix F. Birds

Observations reported by Dan Cooper, and concurrently observed by Leonard Warren.

#	Common Name	Scientific Name	China Ranch 4/7/17	China Ranch 4/8/17	China Ranch to Amargosa River 4/8/17	Tecopa Marsh 4/8/17	Shoshone Village 4/8/17	Tecopa Wastewater Ponds 4/8/17	State Section 16 4/9/17	Grimshaw Lake 4/9/17	Sum of Obs.
			20 taxa	39 taxa	11 taxa	3 taxa	1 taxon	8 taxa	24 taxa	4 taxa	66 taxa
Hawks, Eagles, and other Diurnal Birds of Prey (Order Accipitriformes)											
• Hawks, Eagles, Kites, Harriers, and Old World Vultures (Family Accipitridae)											
1	Cooper's Hawk	<i>Accipiter cooperii</i>	1	1					1		3
2	Red-tailed Hawk	<i>Buteo jamaicensis</i>	1	1							2
3	Swainson's Hawk	<i>Buteo swainsoni</i>		2							2
4	Northern Harrier	<i>Circus hudsonius</i>							3		3
Waterfowl (Order Anseriformes)											
• Ducks, Geese, and Swans (Family Anatidae)											
5	American Wigeon	<i>Anas americana</i>						2			2
6	Northern Shoveler	<i>Anas clypeata</i>						1			1
7	Green-winged Teal	<i>Anas crecca</i>						8			8
8	Cinnamon Teal	<i>Anas cyanoptera</i>						72			72
9	Mallard	<i>Anas platyrhynchos</i>						3		3	6
10	Gadwall	<i>Anas strepera</i>						4			4
11	Ruddy Duck	<i>Oxyura jamaicensis</i>						1	1		2
Swifts and Humingbirds (Order Apodiformes)											
• Swifts (Family Apodidae)											
12	Vaux's Swift	<i>Chaetura vauxi</i>			1						1
• Hummingbirds (Family Trochilidae)											

#	Common Name	Scientific Name	China Ranch 4/7/17	China Ranch 4/8/17	China Ranch to Amargosa River 4/8/17	Tecopa Marsh 4/8/17	Shoshone Village 4/8/17	Tecopa Wastewater Ponds 4/8/17	State Section 16 4/9/17	Grimshaw Lake 4/9/17	Sum of Obs.
13	Anna's Hummingbird	<i>Calypte anna</i>	1	3							4
14	Costa's Hummingbird	<i>Calypte costae</i>		1							1
15	Rufous Hummingbird	<i>Selasphorus rufus</i>		1							1
New World Vultures (Order Cathartiformes)											
• Vultures and Condors											
16	Turkey Vulture	<i>Cathartes aura</i>	10	20							30
Shorebirds, Gulls, and Alcids (Order Charadriiformes)											
• Avocets and Stilts (Family Recurvirostridae)											
17	American Avocet	<i>Recurvirostra americana</i>				6					6
18	Black-necked Stilt	<i>Himantopus mexicanus</i>				1					1
• Sandpipers (Family Scolopacidae)											
19	Western Sandpiper	<i>Calidris mauri</i>				8					8
Pigeons and Doves (Order Columbiformes)											
• Pigeons and Doves (Family Columbidae)											
20	Eurasian Collard-Dove	<i>Streptopelia decaocto</i>	1	1							2
21	Mourning Dove	<i>Zenaida macroura</i>	2	4					1		7
Falcons and Caracaras (Order Falconiformes)											
• Falcons (Family Falconidae)											
22	Prairie Falcon	<i>Falco mexicanus</i>		1							1
23	Peregrine Falcon	<i>Falco peregrinus</i>	1								1
24	American Kestrel	<i>Falco sparverius</i>	1	2						1	4
Gallinaceous Birds (Order Galliformes)											
• New World Quails (Family Odontophoridae)											
25	Gambel's Quail	<i>Callipepla gambelii</i>	2	3					1		6
Perching Birds (Order Passeriformes)											

#	Common Name	Scientific Name	China Ranch 4/7/17	China Ranch 4/8/17	China Ranch to Amargosa River 4/8/17	Tecopa Marsh 4/8/17	Shoshone Village 4/8/17	Tecopa Wastewater Ponds 4/8/17	State Section 16 4/9/17	Grimshaw Lake 4/9/17	Sum of Obs.
• Ravens and Crows (Family Corvidae)											
26	Common Raven	<i>Corvus corax</i>	2	4					1		7
• Grosbeaks, Buntings, and Sparrows (Family Emberizidae)											
27	Song Sparrow	<i>Melospiza melodia</i>	1						3		4
28	White-crowned Sparrow	<i>Zonotrichia leucophrys</i>		1					4		5
• Finches (Family Fringillidae)											
29	House Finch	<i>Haemorhous mexicanus</i>	X	4							4
30	Lesser Goldfinch	<i>Spinus psaltria</i>		4	1						5
• Swallows (Family Hirundinidae)											
31	Barn Swallow	<i>Hirundo rustica</i>							1		1
32	Cliff Swallow	<i>Petrochelidon pyrrhonota</i>			4				1		5
33	Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	4	10	8				1		23
34	Tree Swallow	<i>Tachycineta bicolor</i>			2						2
35	Violet-green Swallow	<i>Tachycineta thalassina</i>		70							70
• Icterids (Family Icteridae)											
36	Hooded Oriole	<i>Icterus cucullatus</i>	1								1
• Shrikes (Family Laniidae)											
37	Loggerhead Shrike	<i>Lanius ludovicianus</i>								1	1
• Mimids (Family Mimidae)											
38	Northern Mockingbird	<i>Mimus polyglottos</i>		2							2
39	Crissal Thrasher	<i>Toxostoma crissale</i>							1		1
• New World Warblers (Family Parulidae)											
40	Wilson's Warbler	<i>Cardellina pusilla</i>		1							1
41	Common Yellowthroat	<i>Geothlypis trichas</i>		2					5		7
42	Lucy's Warbler	<i>Oreothlypis luciae</i>	1	14	2				1		18

#	Common Name	Scientific Name	China Ranch 4/7/17	China Ranch 4/8/17	China Ranch to Amargosa River 4/8/17	Tecopa Marsh 4/8/17	Shoshone Village 4/8/17	Tecopa Wastewater Ponds 4/8/17	State Section 16 4/9/17	Grimshaw Lake 4/9/17	Sum of Obs.
43	Yellow-rumped Warbler (Audubon's)	<i>Setophaga coronata auduboni</i>	2	6	1				1		10
44	Yellow Warbler	<i>Setophaga petechia</i>		10					3		13
• Old World Sparrows (Family Passeridae)											
45	House Sparrow	<i>Passer domesticus</i>					4				4
• Gnatcatchers (Family Polioptilidae)											
46	Black-tailed Gnatcatcher	<i>Polioptila melanura</i>	1	1					1		3
47	Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>		1							1
• Silky Flycatchers (Family Ptilionotidae)											
48	Phainopepla	<i>Phainopepla nitens</i>		8	1						9
• Kinglets (Family Regulidae)											
49	Ruby-crowned Kinglet	<i>Regulus calendula</i>		2	1						3
• Penduline Tits (Family Remizidae)											
50	Verdin	<i>Auriparus flaviceps</i>	2	6	2				1		11
• Wrens (Family Troglodytidae)											
51	Rock Wren	<i>Salpinctes obsoletus</i>		1					1		2
52	Bewick's Wren	<i>Thryomanes bewickii</i>		5							5
• Tyrant Flycatchers and Becards (Family Tyrannidae)											
53	Hammond's Flycatcher	<i>Empidonax hammondii</i>		1							1
54	Dusky Flycatcher	<i>Empidonax oberholseri</i>		1							1
55	Gray Flycatcher	<i>Empidonax wrightii</i>		2							2
56	Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>	1	6							7
57	Black Phoebe	<i>Sayornis nigricans</i>		1							1
58	Say's Phoebe	<i>Sayornis saya</i>							1		1
59	yellow-bellied kingbird sp.	<i>Tyrannus sp.</i>							1		1

#	Common Name	Scientific Name	China Ranch 4/7/17	China Ranch 4/8/17	China Ranch to Amargosa River 4/8/17	Tecopa Marsh 4/8/17	Shoshone Village 4/8/17	Tecopa Wastewater Ponds 4/8/17	State Section 16 4/9/17	Grimshaw Lake 4/9/17	Sum of Obs.
• Vireos (Family Vireonidae)											
60	Bell's Viero	<i>Vireo bellii</i>		9	2						11
61	Cassin's Vireo	<i>Vireo cassinii</i>		1							1
Pelicans and Allies (Order Pelecaniformes)											
• Herons (Family Ardeidae)											
62	Great Blue Heron	<i>Ardea herodias</i>							1		1
63	Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>							1		1
Woodpeckers and Relatives (Order Piciformes)											
• Woodpeckers and Sapsuckers (Family Picidae)											
64	Ladder-backed Woodpecker	<i>Picoides scalaris</i>	1								1
Grebes (Order Podicipediformes)											
• Grebes (Family Podicipedidae)											
65	Eared Grebe	<i>Podiceps nigricollis</i>						3		1	4
66	Pied-billed Grebe	<i>Podilymbus podiceps</i>							1		1
Sum			36	213	25	15	4	94	37	6	430

1. China Ranch Date Farm, Inyo, California, US

Apr 7, 2017 5:00 PM

Protocol: Incidental

Comments: Bioblitz orientation

20 species

Gambel's Quail (*Callipepla gambelii*) 2

Turkey Vulture (*Cathartes aura*) 10

Cooper's Hawk (*Accipiter cooperii*) 1

Red-tailed Hawk (*Buteo jamaicensis*) 1

Eurasian Collared-Dove (*Streptopelia decaocto*) 1

Mourning Dove (*Zenaida macroura*) 2

Anna's Hummingbird (*Calypte anna*) 1

Ladder-backed Woodpecker (*Picoides scalaris*) 1

American Kestrel (*Falco sparverius*) 1

Peregrine Falcon (*Falco peregrinus*) 1 Large dark falcon with thick-set wings circling above HQ, later seen chasing birds down stream channel. Seen earlier up by pond no. of HQ (other observers).

Ash-throated Flycatcher (*Myiarchus cinerascens*) 1

Common Raven (*Corvus corax*) 2

Northern Rough-winged Swallow (*Stelgidopteryx serripennis*) 4

Verdin (*Auriparus flaviceps*) 2

Black-tailed Gnatcatcher (*Polioptila melanura*) 1

Lucy's Warbler (*Oreothlypis luciae*) 1

Yellow-rumped Warbler (Audubon's) (*Setophaga coronata auduboni*) 2

Song Sparrow (*Melospiza melodia*) 1

Hooded Oriole (*Icterus cucullatus*) 1

House Finch (*Haemorhous mexicanus*) X

View this checklist online at <http://ebird.org/ebird/view/checklist/S35852750>

2. China Ranch Date Farm, Inyo, California, US

Apr 8, 2017 7:40 AM - 10:40 AM

Protocol: Traveling

1.0 mile(s)

Comments: Bioblitz birding w/ Len Warren, Andy Zdon, and Ryann Schicker

39 species

Gambel's Quail (*Callipepla gambelii*) 3

Turkey Vulture (*Cathartes aura*) 20

Cooper's Hawk (*Accipiter cooperii*) 1 Incubating (female?) in cottonwood just north of HQ along creek

Swainson's Hawk (*Buteo swainsoni*) 2 Two adults cruising north fairly high before start of walk (7:30), appeared to be coming off roost (multiple TUVU had roosted in area)

Red-tailed Hawk (*Buteo jamaicensis*) 1

Eurasian Collared-Dove (*Streptopelia decaocto*) 1
 Mourning Dove (*Zenaida macroura*) 4
 Anna's Hummingbird (*Calypte anna*) 3
 Costa's Hummingbird (*Calypte costae*) 1
 Rufous Hummingbird (*Selasphorus rufus*) 1 ad male at feeder
 American Kestrel (*Falco sparverius*) 2 pr
 Prairie Falcon (*Falco mexicanus*) 1
 Hammond's Flycatcher (*Empidonax hammondii*) 1 Studied at length. Long primaries. Bright "week" call.
 Gray Flycatcher (*Empidonax wrightii*) 2 whit call, dropping tail
 Dusky Flycatcher (*Empidonax oberholseri*) 1 Studied at length. Grayish head/white throat ruled out PSFL. Mostly pale lower mandible on med. bill. Primary proj. distinctly short, giving long-tailed look. Occ. flicked tail (upward). Calling (dull "whit") note.
 Black Phoebe (*Sayornis nigricans*) 1
 Ash-throated Flycatcher (*Myiarchus cinerascens*) 6
 Bell's Vireo (*Vireo bellii*) 9 Not rare at site; est. 200 young produced each year now, per Len Warren. Birds singing from mesquite/willow along creek.
 Cassin's Vireo (*Vireo cassinii*) 1 singing near pond no. of HQ
 Common Raven (*Corvus corax*) 4
 Northern Rough-winged Swallow (*Stelgidopteryx serripennis*) 10
 Violet-green Swallow (*Tachycineta thalassina*) 70 incl. flock of 60 coming to water at small pond c. 0.5 mi. north of HQ
 Verdin (*Auriparus flaviceps*) 6
 Rock Wren (*Salpinctes obsoletus*) 1
 Bewick's Wren (*Thryomanes bewickii*) 5
 Blue-gray Gnatcatcher (*Polioptila caerulea*) 1 singing from mesquite in wash c. .25 mi. above pond
 Black-tailed Gnatcatcher (*Polioptila melanura*) 1
 Ruby-crowned Kinglet (*Regulus calendula*) 2
 Northern Mockingbird (*Mimus polyglottos*) 2
 Phainopepla (*Phainopepla nitens*) 8
 Lucy's Warbler (*Oreothlypis luciae*) 14 most singing
 Common Yellowthroat (*Geothlypis trichas*) 2
 Yellow Warbler (*Setophaga petechia*) 10 singing males
 Yellow-rumped Warbler (Audubon's) (*Setophaga coronata auduboni*) 6
 Wilson's Warbler (*Cardellina pusilla*) 1
 White-crowned Sparrow (*Zonotrichia leucophrys*) 2
 Song Sparrow (*Melospiza melodia*) 1
 House Finch (*Haemorhous mexicanus*) 4
 Lesser Goldfinch (*Spinus psaltria*) 4

View this checklist online at <http://ebird.org/ebird/view/checklist/S35852719>

3. China Ranch Date Farm, Inyo, California, US

Apr 8, 2017 11:20 AM - 1:30 PM

Protocol: Traveling

1.5 mile(s)

Comments: Hiked down to Amargosa River with Ryann Schicker and back roughly the same way. Windy.

11 species

Vaux's Swift (*Chaetura vauxi*) 1

Bell's Vireo (*Vireo bellii*) 2 singing from mesquite

Northern Rough-winged Swallow (*Stelgidopteryx serripennis*) 8

Tree Swallow (*Tachycineta bicolor*) 2

Cliff Swallow (*Petrochelidon pyrrhonota*) 4

Verdin (*Auriparus flaviceps*) 2

Ruby-crowned Kinglet (*Regulus calendula*) 1

Phainopepla (*Phainopepla nitens*) 1

Lucy's Warbler (*Oreothlypis luciae*) 2

Yellow-rumped Warbler (Audubon's) (*Setophaga coronata auduboni*) 1

Lesser Goldfinch (*Spinus psaltria*) 1

View this checklist online at <http://ebird.org/ebird/view/checklist/S35852812>

4. Tecopa Marsh, Inyo, California, US

Apr 8, 2017 6:30 PM - 6:35 PM

Protocol: Stationary

Comments: w/ Brian Brown

3 species

Black-necked Stilt (*Himantopus mexicanus*) 1

American Avocet (*Recurvirostra americana*) 6 3 pr

Western Sandpiper (*Calidris mauri*) 8 peeps way out in puddle; hard to ID but looked best for WESA (pale whitish below)

View this checklist online at <http://ebird.org/ebird/view/checklist/S35853034>

5. Shoshone Village, Inyo, California, US

Apr 8, 2017 8:00 PM

Protocol: Incidental

1 species

House Sparrow (*Passer domesticus*) 4 feeding and displaying in lights of gas station

View this checklist online at <http://ebird.org/ebird/view/checklist/S35852769>

6. Tecopa WTP, Inyo, California, US = "water treatment ponds", across from the campground/RV park/ "hotel"

Apr 9, 2017 6:10 AM - 6:15 AM

Protocol: Stationary

Comments: Quick scan of 2 ponds

8 species

Gadwall (*Anas strepera*) 4
American Wigeon (*Anas americana*) 2
Mallard (*Anas platyrhynchos*) 3
Cinnamon Teal (*Anas cyanoptera*) 72 careful count; many appeared paired.
Northern Shoveler (*Anas clypeata*) 1
Green-winged Teal (*Anas crecca*) 8
Ruddy Duck (*Oxyura jamaicensis*) 1
Eared Grebe (*Podiceps nigricollis*) 3

View this checklist online at <http://ebird.org/ebird/view/checklist/S35852995>

7. Amargosa Canyon, Inyo, California, US

Apr 9, 2017 7:30 AM - 11:00 AM

Protocol: Traveling

2.0 mile(s)

Comments: Bioblitz; very windy and hard to hear

23 species (+1 other taxa)

Ruddy Duck (*Oxyura jamaicensis*) 1
Gambel's Quail (*Callipepla gambelii*) 1
Pied-billed Grebe (*Podilymbus podiceps*) 1 1-2 calling from reed-lined pond
Great Blue Heron (*Ardea herodias*) 1
Black-crowned Night-Heron (*Nycticorax nycticorax*) 1
Northern Harrier (*Circus cyaneus*) 3 incl. "skydancing" adult on slope above river
Cooper's Hawk (*Accipiter cooperii*) 1
Mourning Dove (*Zenaida macroura*) 1 + 7 f/o
Say's Phoebe (*Sayornis saya*) 1
yellow-bellied kingbird sp. (*Tyrannus* sp. (yellow-bellied)) 1 one seen briefly in flight
appeared to be CAKI, but holding off on ID. Heading south w/ swallows (in high winds)
Common Raven (*Corvus corax*) 2 Nest on cliff on ledge across river
Northern Rough-winged Swallow (*Stelgidopteryx serripennis*) 1
Barn Swallow (*Hirundo rustica*) 1
Cliff Swallow (*Petrochelidon pyrrhonota*) 1
Verdin (*Auriparus flaviceps*) 1
Rock Wren (*Salpinctes obsoletus*) 1
Black-tailed Gnatcatcher (*Polioptila melanura*) 1
Crissal Thrasher (*Toxostoma crissale*) 1 singing weakly along river
Lucy's Warbler (*Oreothlypis luciae*) 1
Common Yellowthroat (*Geothlypis trichas*) 5
Yellow Warbler (*Setophaga petechia*) 3
Yellow-rumped Warbler (Audubon's) (*Setophaga coronata auduboni*) 1
White-crowned Sparrow (*Zonotrichia leucophrys*) 4
Song Sparrow (*Melospiza melodia*) 3

View this checklist online at <http://ebird.org/ebird/view/checklist/S35852910>

8. Grimshaw Lake, Inyo, California, US

Apr 9, 2017 11:00 AM

Protocol: Incidental

4 species

Mallard (*Anas platyrhynchos*) 3

Eared Grebe (*Podiceps nigricollis*) 1

American Kestrel (*Falco sparverius*) 1

Loggerhead Shrike (*Lanius ludovicianus*) 1 perched on wire along road, singing

View this checklist online at <http://ebird.org/ebird/view/checklist/S35853060>

Appendix G. Mammals

Observations reported by Miguel Ordeñana, Natural History Museum of Los Angeles County, and others.

#	Family	Genus and Species	Common Name	Observer						Notes
				Erica Brand	Miguel Ordeñana	Andy Kleinhesselink	Sophie Parker	Mark Herr	# of Obs.	
1	Canidae	<i>Canis latrans</i>	Coyote		2		1		3	Tracks and Photo
2	Procyonidae	<i>Procyon lotor</i>	Common Raccoon			1			1	
3	unknown	unknown	Carnivore		4				4	Tracks
4	Leporidae	<i>Lepus californicus</i>	Black-tailed Jackrabbit	1					1	
5	Leporidae	<i>Sylvilagus audubonii</i>	Desert Cottontail				1		1	
6	Cricetidae	<i>Neotoma lepida</i>	Desert Woodrat		1			1	2	
7	Heteromyidae	unknown	Kangaroo Rats and Pocket Mice					1	1	
8	Sciuridae	<i>Ammospermophilus leucurus</i>	White-tailed Antelope Squirrel	1					1	
9	Vespertilionidae	<i>Myotis californicus</i>	California myotis		372				372	Diagnostic echolocation recordings
10	Vespertilionidae	<i>Myotis yumanensis</i>	Yuma myotis		702				702	
11	Molossidae	<i>Tadarida brasiliensis</i>	Mexican free-tailed bat		9331				9331	
12	Vespertilionidae	<i>Eptesicus fuscus</i>	Big brown bat		14				14	
13	Vespertilionidae	<i>Lasiurus cinereus</i>	Hoary bat		143				143	
14	Vespertilionidae	<i>Antrozous pallidus</i>	Pallid bat		3				3	
15	Vespertilionidae	<i>Parastrellus hesperus</i>	Canyon bat/Western pipistrelle		56				56	
16	Vespertilionidae	<i>Myotis thysanodes</i>	Fringed myotis		41				41	

The location of the bat detector devices is shown in the figure below.



The reservoir detector (35°48'17.92"N, 116°11'2.20"W) remained deployed both nights (April 7 and 8, 2017), but the Amargosa River detector was use at site 1 (35°47'54.60"N, 116°11'44.22"W) during the first night (April 7, 2017) and site 2 (35°47'51.34"N, 116°11'44.53"W) during the second night (April 8, 2017).

All species were detected at both locations except for *Antrozous pallidus*. The reservoir was the only location where *Antrozous pallidus* was detected. However, the reservoir had nearly double the bat passes for each species. Based on the survey, the reservoir seems to support more bat activity even though species richness is relatively the same at both sites.