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2000-2011 Las Vegas Wash Invertebrate Inventory



May 2012



SOUTHERN NEVADA
WATER AUTHORITY

Las Vegas Wash
Coordination
Committee



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Las Vegas Wash Project Coordination Team**

Prepared for:

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ABSTRACT

This report summarizes invertebrates that have been identified along the Las Vegas Wash (Wash) within the Clark County Wetlands Park from 2000 through 2011 and is a synthesis of past and present invertebrate studies. Benthic macroinvertebrates have been monitored regularly since 2000 to evaluate water quality improvements resulting from channel stabilization activities (i.e. weir installation). Benthic macroinvertebrate data from 2000 to 2003 and new data from 2011 were compiled and included in this report. A total of 114 additional species were documented to occur along the Wash beyond those reported in the 2010 report. As new data become available, periodic updates will be prepared so that there is an accurate record of invertebrate occurrence along the Wash. Documenting occurrence is a preliminary but necessary step towards meeting the goals of the Las Vegas Wash Wildlife Monitoring Plan and the Las Vegas Wash Comprehensive Adaptive Management Plan.

ACKNOWLEDGEMENTS

I would like to thank those that have helped in better understanding this important animal group at the Las Vegas Wash (Wash). Specifically, Mark Nelson has provided a substantial amount of the documentation on many of the groups described in this document. Becky Blasius provided records of benthic macroinvertebrates from 2000-2003 that were absent in the previous report. Bruce Lund and his volunteers have provided important additional knowledge to Odonata occurring along the Wash. Nick Rice has assisted me in the collection of many of the insects described as being collected by the Wash team in 2011. I would also like to thank Keiba Crear and Seth Shanahan for their support in gaining a better understanding of this rarely documented group and for reviewing this document. Patty Emery also provided important reviews, as well as editing, that help make this a better document. Finally, I would like to thank the Las Vegas Wash Coordination Committee and its Research and Environmental Monitoring Study Team for their support of research along the Wash and providing a forum where a better understanding of the Wash's ecosystem is encouraged.

Las Vegas Wash Invertebrate Inventory, 2000-2010

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1.0 INTRODUCTION

The Las Vegas Wash (Wash) is currently undergoing significant changes in terms of physiognomy and ecology. The ongoing project to control erosion and improve ecological functions of the system has resulted in substantial changes in wildlife along the channel. Bradley and Niles (1973) documented many of the plants and wildlife found along the Wash in the early 1970s when the importance of this ecosystem began to get noticed. This provided a baseline for which species were present after the Wash flows had increased significantly but erosion had yet to dramatically alter the channel. After erosion control and ecological improvements began in 2000, many surveys were conducted along the Wash to catalog species occurrence (Shanahan 2005a and 2005b, O'Farrell and Shanahan 2006, Rice 2007, Van Dooremolen 2010, Eckberg 2012). These recent studies, along with Bradley and Niles (1973), documented plants, mammals, fish, reptiles, amphibians, and birds along the Wash. The first inventory of invertebrates along the Wash described species identified from 2000-2010 (Eckberg 2010). This report updates the 2010 report by including species identified in 2011, as well as those overlooked in the previous report.

There have been few studies (Wiesenborn 2005, Nelson 2009a, Nelson 2009b, Eckberg and Foster 2011) performed at the Wash specifically to document invertebrates. However, those studies that have been done provide a starting point in understanding the types of invertebrate species found in Wash habitats. There are no known studies documenting invertebrate species along the Wash prior to 2000, when the Las Vegas Wash Coordination Committee's Comprehensive Adaptive Management Plan was published.

1.1 Importance of Invertebrates

Many view invertebrates as pests or vermin and that control of them is necessary (Kim 1993). The exceptions, like many other animal groups, are those that are aesthetically pleasing or economically beneficial, such as butterflies or honeybees in the case of insects. Invertebrates have not been taken seriously by policy makers or even scientists involved in ecological conservation (McNaughton 1989, Hafernik 1992). Therefore, invertebrate conservation has not been given due consideration and adequate understanding of them is lacking.

Insects occupy a wide variety of important niches in how ecosystems function. They are plant pollinators, filters of contaminants and nutrients, recyclers of dead or dying plant material, decomposers of plant and animal waste, predators of other insects, and provide a food source to hundreds of higher trophic level species, just to name a few. Insects however, are also one of the least known groups of animals on the planet. There are over a million known species of insects, making this group half of the world's known animals; this group is believed to have between six and ten million species (Chapman 2006) meaning only one-tenth to one-sixth of the insects have been described.

1.2 Purpose and Need

The purpose of this report is to assemble a comprehensive inventory of invertebrates along the Wash. Combining information gathered in baseline invertebrate studies and recent research at the Wash will hopefully prove useful to future researchers. This information is much needed. By looking at the Wash invertebrate community as a whole, policy-makers can gain a better

understanding of what impact specific projects have on invertebrates and their ecosystem services.

A more specific need is knowledge of the status of insects that may directly have a negative impact on other ecological components at the Wash. One species of current concern is the tamarisk leaf beetle (*Diorhabda carinulata*). This beetle has been introduced in the upper Colorado River basin to control salt cedar, and populations are moving south at a fast pace (Figure 1). There is concern that the defoliation of salt cedar by these beetles will leave birds, including the federally endangered southwestern willow flycatcher (*Empidonax traillii extimus*), vulnerable to predation and habitat loss. As of November 2011, there were documented sightings of tamarisk leaf beetle at the confluence of the Virgin and Muddy Rivers into Lake Mead but not at the Wash (pers. observation).

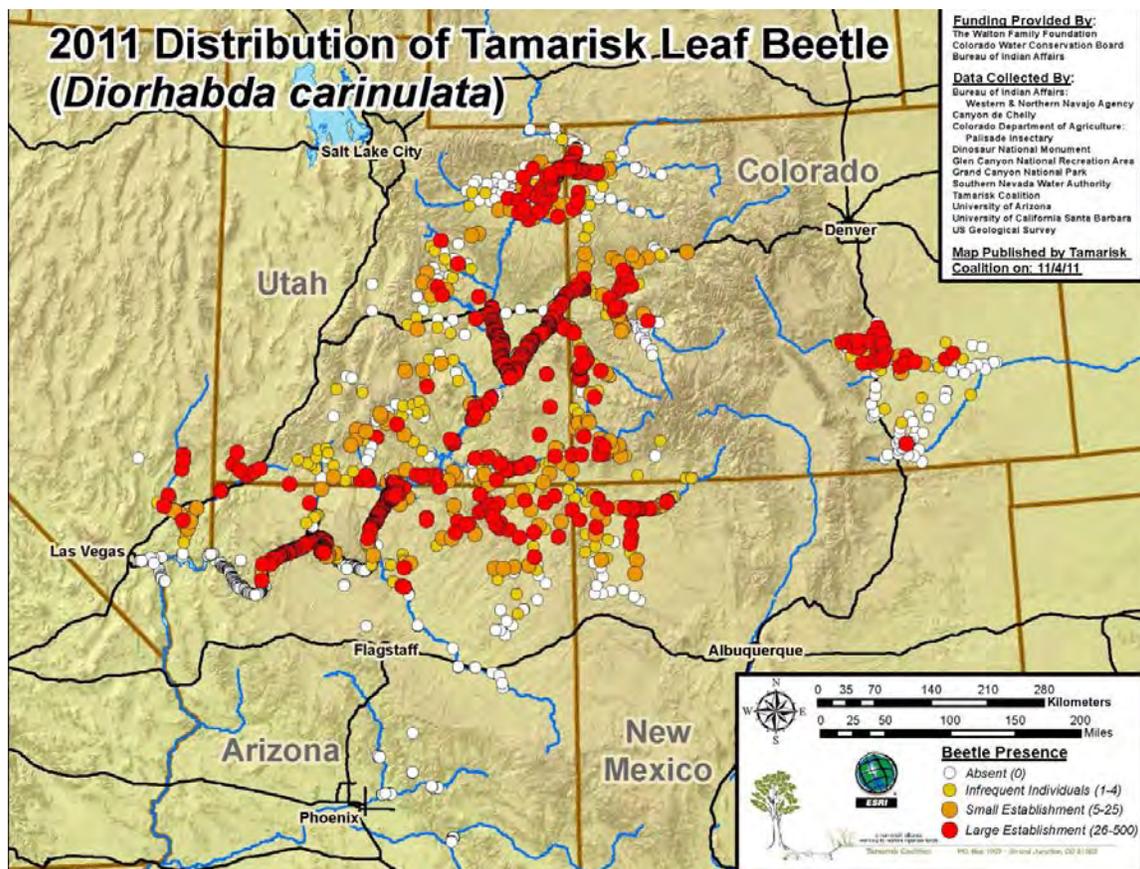


Figure 1. Tamarisk leaf beetle distribution across the Colorado River basin, 2011. (Map courtesy of the Tamarisk Coalition).

2.0 MATERIALS AND METHODS

A list of invertebrate species was compiled from three primary sources: (1) species that were documented by groups other than the Las Vegas Wash Project Coordination Team (Wash Team), (2) species that were directly observed or collected by the Wash Team during invertebrate-specific studies, and (3) species that were directly observed or collected by the Wash Team while



□ Clark County Wetlands Park and private property boundaries



For planning purposes only
Prepared by the Southern Nevada Water Authority
Aerial Image taken July, 2010

Figure 2. Clark County Wetlands Park and private property boundaries.

conducting other activities. All of these projects primarily took place within the boundaries of the Clark County Wetlands Park (CCWP; Figure 2).

2.1 Literature Review

In addition to the literature reviewed for the 2000-2010 Invertebrate Inventory Report (Eckberg 2011), the bat foraging survey conducted by Eckberg and Foster (2011) was finalized in March of 2011. However, the majority of the species information included in this 2010 survey was already included in the previous report.

2.2 Other Data Sources

In addition to sources cited in the previous report (Eckberg 2011), additional invertebrate data were acquired from surveys of benthic macroinvertebrates along the Wash from 2000-2003 (conducted by SNWA staff) that was not previously published. Also, a survey of Odonates commenced in 2011 as part of the “US Fish and Wildlife Southern Nevada Odonate Refuge Survey,” headed by Bruce Lund was used and also included the CCWP. Preliminary data of species not previously collected along the Wash were included in this report. A new report of the annual benthic macroinvertebrate surveys of the Wash and its tributaries done by Mark Nelson of the Bureau of Reclamation (Nelson 2011) was published but no new species were identified beyond those in previous reports.

3.0 RESULTS AND DISCUSSION

Combining the invertebrates that were detected in the various reports and other sources by the end of 2011 has resulted in at least 373 species found along the Wash (Appendix A), up from 259 in 2010. This makes invertebrates the animal group with the largest number of identified species of any group along the Wash and more identified species than all other animal groups combined. The term “at least” is used because many invertebrates collected were not able to be identified to the species level; in fact, some could only be identified to phylum. This means that there may be many species within a specific group collected but not identified at a lower taxonomic level. In addition to the increase in total species, many more individuals had further clarification of their taxonomic status. For example, many species that were previously only described to family or genus were described to a lower taxonomic level in 2011. The number of new contributions to the invertebrate inventory of the Wash by sources used in 2011 is displayed in Table 1. There may be some overlap with those collected by multiple sources.

Taxonomic Level	Source		
	2000-2003 unpublished benthic surveys ¹	Lund et al. Odonate survey ²	Wash team ²
Phylum	1	1	1
Class	9	1	2
Order	14	1	10
Family	33	3	53
Genus	70	4	85

¹Includes species previously described in the 2010 invertebrate inventory report

²Only those individuals not described in the 2010 invertebrate inventory report are included

Table 1. 2011 contributions to the Las Vegas Wash invertebrate inventory by publishing source.

The invertebrates identified through 2011 represent 7 phyla, 13 classes, 31 orders, and 157 families. The majority are in the phylum Arthropoda, which includes all true insects. These numbers include one additional phylum, class, and order as well as 27 new families from 2010 numbers. Overall, a wide variety of invertebrates inhabiting the Wash have been identified in all habitat types matching the wide variety of ecotypes found in the area.

Only new taxonomic and species information is described in the following sections. Detailed information on all Wash invertebrates can be found in the 2010 report (Eckberg 2011).

3.1 Phylum – Arthropoda

3.1.1 Class – Arachnida

3.1.1.1 Order – Actinedida

The order Actinedida was not previously described along the Wash. Two specimens were collected in two distinct families in 2011. Both families collected, Eriophyidae and Erythraeidae, are commonly known as mites. Eriophyidae are plant parasites and the specimen collected was identified to be in the genus *Aculus*. Genera in this species is known to cause galls on Goodding's willow (Figure 3; *Salix gooddingii*), a common riparian tree along the Wash. The Erythraeidae specimen was not identified past the family level. Species in this family of mites are parasites of various arthropods.



Figure 3. Galls on the leaves of a Goodding's willow caused by a mite (*Aculus*).

3.1.1.2 Order – Araneae

Twelve species were either newly added or had their taxonomic level described to a lower level in the Araneae order in 2011. *Metepeira*, a genus that was described in 2010, had two species described in 2011; *M. arizonica* and *M. foxi*. Like all species in the order Araneae, these are orb weavers and they use their web to ensnare prey. Another new species identified was the Western spotted orb weaver (*Neoscona oaxacensis*; Figure 4). Both species of *Metepeira* and the Western spotted orb weaver are in the family Araneidae.



Figure 4. The Western spotted orb weaver (*Neoscona oaxacensis*) and its web.

Another spider family that had specimens collected that were able to be described to a lower taxonomic order was Salticidae or jumping spiders. In 2010, a single genus represented this family, *Habronattus*. In 2011, a specimen was identified to be *Habronattus hirsutus*, while another jumping spider, *Salticus palpalis*, was also identified. Salticidae is the largest family of spiders. As their name suggests, they are active hunters jumping on their prey and do not use a web to catch their food.

3.1.1.3 Order – Scorpiones

The only scorpion identified at the Wash so far is the Arizona hairy scorpion (*Hadrurus arizonensis*).

3.1.1.4 Order – Solifugae

There are about 200 species of windscorpions in North America; one has been identified at the Wash - *Eremobates*.

3.1.2 Class – Branchiopoda

Branchiopoda is a class of crustaceans. A single specimen in the order Diplostraca was identified in benthic macroinvertebrate surveys conducted from 2000-2003 along the Wash.

3.1.2.1 Order – Diplostraca

The single species collected along the Wash in the order Diplostraca is *Daphnia pulex*. This species is the most common water flea in the world. Found in almost all bodies of water, this small crustacean feeds on bacteria, small detritus, and very small algae particles, thus making it an important species in terms of water quality. They are also a food source for many aquatic vertebrates and invertebrates.

3.1.3 Class – Entognatha

3.1.3.1 Order - Collembola

The order Collembola is made up of springtail species and is the only represented member of the class Entognatha from the Wash. No specimen has been classified below the order taxonomic level.

3.1.4 Class – Insecta

Insects are arthropods that have an external skeleton, a three-part body, three pairs of jointed legs, compound eyes, and two antennae. They are among the most diverse group of animals and represent more than half of all known living organisms. At the Wash, they are by far the majority of invertebrates described to date. There are currently 30 orders of insects in the world, of which 14 had specimens found at the Wash.

3.1.4.1 Order – Coleoptera

Beetles are the order that have the largest number of known species along the Wash. In 2011, this order included 62 individual species representing 23 different families, an increase of 26 and 4 respectively, from those reported in the 2010 report. Four of the new species were additions made by incorporating the 2000-2003 benthic macroinvertebrate data. The remaining new species were collected and identified by the Wash Team.

The family with the most individuals in both 2010 and 2011 is Coccinellidae, lady beetles. An additional four species were identified in 2011 bringing the total to 11. These typically brightly colored species are easily distinguishable from each other, which may explain their relatively high abundance among known species. New species include the cactus lady beetle (*Chilocorus cacti*) and the purple scale destroyer (*Rhyzobius lophanthae*). While the cactus lady beetle can be found on prickly pear cactus (*Opuntia* sp.), as the name infers, it can also be found on various

tree species as well. Both the cactus lady beetle and the purple scale destroyer feed on scales of various types throughout the Wash.

The second largest family within the order is Chrysomelidae or leaf beetles, with six species. All leaf beetles are phytophagous (feeding on plants) with the adults being quite conspicuous and easy to collect and identify. In 2010, there was only one species identified in this family, the three-lined potato beetle (*Lema daturaphila*); it can be found feeding on sacred datura (*Datura wrightii*). Newly identified species in 2011 include two scripted leaf beetles (*Pachybrachis jacobyi* [Figure 5] and *P. thoracicus*) and the Prosopis seed beetle (*Neltumius arizonensis*). These three species all feed on plant material, with the scripted leaf beetles likely feeding on willows, and as the name suggests, the Prosopis seed beetle feeds on mesquite (*Prosopis glandulosa* var. *torreyana* and *P. pubescens*) seeds.



Figure 5. A scripted leaf beetle (*Pachybrachis jacobyi*).

3.1.4.2 Order – Dictyoptera

The order Dictyoptera is a new classification, combining the three orders Blattodea (cockroaches), Mantodea (mantids), and Isoptera (termites). These former orders, now suborders, were combined due to their shared ovipositor, a reproductive organ used to lay eggs.

Cockroaches and mantids have been documented to occur along the Wash. There has yet to be a termite specimen collected.

There have been four cockroaches and one mantid found along the Wash. The cockroach *Phyllodromica trivittata* was the only new species documented in 2011. This species is native to the Mediterranean region and recently introduced in California with few being found in Nevada, most likely unknowingly transported here.

3.1.4.3 Order – Diptera

True flies are insects in the order Diptera. There have been 61 individuals from 22 different families identified, making it the second most abundant order in terms of species along the Wash. There were just 36 species and 18 families in 2010. The dramatic increase is primarily due to the additional benthic surveys from 2000-2003. Many species of midges (family Chironomidae) were documented during this survey, 21 of which were not included in the 2010 report. Additional contributions to this order from the 2000-2003 surveys include three new species of shore flies (family Ephydriidae) and four new species of soldier flies (family Stratiomyidae).

Some of the nine new contributions to the species list include a robber fly (*Efferia*), two syrphid flies (*Eristalis* [Figure 6] and *Allograpta*), and a picture-winged fly (*Euxesta*). A few individual bot flies (family Oestridae) were discovered during the small mammal survey in 2010 (Foster and Eckberg 2011). While the species wasn't confirmed at the time, after research, there is only one genus that parasitizes rodents - the rodent and lagomorphs bot fly (*Cuterebra*). Another species whose presence was known previously but research had not been done to confirm its identity was the creosote gall midge (*Asphondylia auripila*). Creosote bush (*Larrea tridentata*) is a common species along the Wash, and only this species creates the regularly observed galls.

3.1.4.4 Order – Embioptera

The order Embioptera is commonly known as webspinners because species in this order are able to spin silk from their front legs. Nelson (2009a) identified individuals from this order in exotic plant species dominated areas using sticky-trap sampling. Identification has not been made below the order level.

3.1.4.5 Order – Ephemeroptera

The order Ephemeroptera includes species known as mayflies. New species included in the 2011 inventory are the one prong-gilled mayfly (*Paraleptophlebia*), a specimen in the family Heptageniidae (stream mayflies), and one small minnow mayfly (*Centroptilum*), all of which were collected as part of the 2000-2003 benthic survey.

3.1.4.6 Order – Hemiptera

The order Hemiptera is known as true bugs. As currently described, it is a combination of what were historically two separate orders - Homoptera and Heteroptera. Fifteen new species were added to those known in 2010. One additional species, a backswimmer (*Notonecta*) had its family (Notonectidae) described in the previous report from collections done by Nelson (2010). Collections from the 2000-2003 benthic survey provided the lower taxonomic level. Fifteen new species were collected by the Wash team in 2011. New species include two leafhoppers

(*Ceratagallia* and *Empoasca*) and two plant bugs (*Lygus elisus* and *Neurocolpus*), which all feed on plant material. Two assassin bugs were identified (*Sinea diadema* and *Zelus renardii*), which are both predators of other insects.



Figure 6. A syrphid fly (*Eristalis*) feeding on a seep willow (*Baccharis salicifolia*).

Four new stink bugs (family Pentatomidae) were identified in 2011. They include the predatory stink bug (*Perillus splendidus*), which as the name suggests is a predator of other insects, unlike most stink bugs that feed on plants. Another stink bug, the Bagrada bug (*Bagrada hilaris*), is of importance for its impact on vegetation. The Bagrada bug is causing significant damage to crops throughout the United States including those in the cabbage and mustard families. Tall whitetop (*Lepidium latifolium*), a noxious weed found throughout the Wash, is in the mustard family and has been observed with numerous Bagrada bugs feeding on them (Figure 7). This species may prove to be a potential biocontrol agent.

3.1.4.7 Order – Hymenoptera

The Hymenoptera order includes wasps, bees, and ants, and includes over 130,000 recognized species around the world. There have been 35 species identified in 2011, up from 17 in 2010. One of the largest increases was ants, in the family Formicidae. Five new species of ants were identified in 2011, making the total number of species seven. No other Hymenopteran family

has more known species or more new species in 2011. One new ant species is the Southern fire ant (*Solenopsis xyloni*), native to the southern parts of the United States as opposed to the invasive red imported fire ant (*Solenopsis invicta*). The red imported fire ant has been identified in Clark County, Nevada, but as of 2011, not along the Wash.



Figure 7. Mating Bagrada bugs (*Bagrada hilaris*) on tall whitetop (*Lepidium latifolium*).

Additional Hymenopteran species identified in 2011 include two new species determined to be in the family Mutillidae, velvet ants; *Dasymutilla satanas* and *Pseudomethoca bequaerti*. In addition to these new species, a male *Dasymutilla gloriosa* was captured and identified. This is of note due to the distinct differences in morphology in this species.

Two new genera of sweat bees (family Halictidae) were identified in 2011, including *Sphecodes*. Species in the genus *Sphecodes* are known to be cleptoparasites, usually of others in the subfamily Halictinae. Adult females will enter the underground dens of other females, destroy the egg of the host and replace it with their own.

The family Apidae includes cuckoo, carpenter, digger, bumble, and honey bees; three new genera were described in 2011. These include a digger bee (*Centris* sp. [Figure 8]), a mallow bee (*Diadasia* sp.), and a cuckoo bee (*Nomada* sp.).



Figure 8. Male digger bee (*Centris*) nectaring from a creosote bush (*Larrea tridentata*).

3.1.4.8 Order – Isopoda

One species has been documented in the Isopoda (pillbugs) order along the Wash, the woodlouse (*Armadillidium vulgare*). It was described in the 2010 report but no new species were detected in 2011.

3.1.4.9 Order – Lepidoptera

Only one addition to the Lepidoptera order (moths and butterflies) was made in 2011. A larva of a geometrid moth (Figure 9; family Geometridae) was collected and identified. Although the specimen could not be identified past the family level, it marked the first geometrid moth specimen along the Wash. This brings the total known families to 11 and species to 45.

3.1.4.10 Order – Neuroptera

The order Neuroptera includes insects known as net-winged insects such as lacewings, mantidflies, and antlions. There have been specimens collected from four different families of

Neuroptera at the Wash so far. All were described in the 2010 report and no new specimens were identified in 2011.



Figure 9. Moth caterpillar from the family Geometridae.

3.1.4.11 Order – Odonata

The order Odonata (dragonflies and damselflies) is a well described order at the Wash having 6 families, 21 genera, and 30 individuals identified to the species level. This is an increase of 8 genera and 10 species from the 2010 report. Like Lepidoptera, this order is well studied and identification tools are more readily available making recognition of newly collected specimens easier. Many of the new species identified in 2011 came from an effort by Bruce Lund and others working on identifying Odonates in the Desert National Wildlife Complex and at the CCWP. Species identified by this group were primarily within the Nature Preserve and the Mitigation Ponds within the CCWP.

The largest number of Odonata identified is in the family Libellulidae (skimmers) with a total of 16 species, up from nine in 2010. New species identified in 2011 include the pale-faced clubskimmer (*Brechmorhoga medax*), blue dasher (*Pachydiplax longipennis* [Figure 10]), and Mexican amberwing (*Perithemis intensa*).

The second most abundant family identified is Coenagrionidae (narrow-winged damselflies). Eleven species are currently known to inhabit the Wash, up from seven in the previous year. Three of the new species came from records of benthic macroinvertebrate work in the early 2000s; the fourth new species, the desert forktail (*Ischnura barberi*), was identified by the Wash Team.

3.1.4.12 Order – Orthoptera

Orthoptera is an order of insects including grasshoppers, crickets, and locusts. Two new species in this order were identified in 2011. Both species would be expected in the Wash habitat but occupy very different habitats. The green bird grasshopper (*Schistocerca shoshone*) is commonly found in riparian habitat along streambeds in desert regions, while the alkali grasshopper (Figure 11; *Anconia integra*) is found in upland areas dominated by plants in the family Chenopodiaceae, such as *Atriplex*. The green bird grasshopper was photographed by a visitor to the CCWP and posted to BugGuide (www.bugguide.net), whereas the alkali grasshopper was photographed and identified by the Wash Team.



Figure 10. Blue dasher dragonfly (*Pachydiplax longipennis*).

3.1.4.13 Order – Thysanoptera

Individuals in the order Thysanoptera are known as thrips. Nelson (2009a) provided documentation of this order at the Wash and they have been collected by the Wash Team. However, no identification has been made below the order level.

3.1.4.14 Order – Trichoptera

Six new genera of caddisflies were added to the inventory of invertebrates along the Wash after incorporating benthic macroinvertebrate work. These include specimens in two families not previously reported. *Micrasema* is found in the family Brachycentridae (humpless casemaker caddisflies) and *Ecclisomyia* and *Limnephilus* are in the family Limnephilidae (northern caddisflies). In addition to these new genera, a previously reported genus *Smicridea* had a specimen further identified to species, *Smicridea dispar*.



Figure 11. Alkali grasshopper (*Anconia integra*) on desert saltbush (*Atriplex polycarpa*).

3.1.5 Class – Malacostraca

One new species was added to the list of known invertebrates within the class Malacostraca from benthic macroinvertebrate work, the signal crayfish (*Pacifastacus leniusculus*). The signal crayfish is native to western North America but not Nevada. It was likely introduced for food and sport in the early 1900s.

3.1.6 Class – Maxillopoda

As in 2010, no individuals in the class Maxillopoda were identified past the class taxonomic level.

3.1.7 Class – Ostracoda

There are no new specimens to report in the class Ostracoda. No specimens have been identified below the class taxonomic level.

3.2 Phylum – Annelida

Individuals in the Annelida phylum are segmented worms. All of the annelids identified at the Wash to date are in the class Clitellata. Three new genera have been added to the list of known species based in benthic macroinvertebrate work in the early 2000s, with one being identified to the species level. The common name for all three are Oligochaete worms; *Dero*, *Limnodrilus hoffmeisteri*, and *Pristina*.

3.3 Phylum – Bryozoa

There are no new identifications made in the Bryozoa phylum along the Wash. There have been no identifications below the phylum taxonomic level.

3.4 Phylum – Mollusca

One new addition to known Mollusks along the Wash was made from benthic macroinvertebrate work. A new family Pisidiidae or Peaclams is the second family identified in the class Bivalvia.

3.5 Phylum – Nemata

The Nemata phylum is a new addition to the known Wash invertebrates. Identified in benthic macroinvertebrate work by SNWA, a single family was catalogued, Mermithidae or nematode worms. Nematode worms are in the class Adenophorea and order Mermithida.

3.6 Phylum – Nemertea

There are no new individuals identified in the phylum nemertea. *Prostoma* remains the only genus identified.

3.7 Phylum - Platyhelminthes

No new identifications have been made in the phylum platyhelminthes. The flatworm *Dugesia* is the only specimen collected in this phylum.

4.0 CONCLUSIONS

The studies that have collected invertebrate information along the Wash have increased the overall understanding of what species inhabit the ecosystem there. The species identified to date have been found in a wide variety of habitats and provide many ecological functions in these areas.

Incorporating information from benthic macroinvertebrate surveys from 2000 to 2003 has dramatically increased the knowledge of the aquatic species found in the Wash. In addition to the work by Mark Nelson at the Bureau of Reclamation (Nelson 2009b, Nelson 2010), this is likely the best described group of invertebrates. Work in 2010 by those working with Bruce Lund also contributed to our understanding of aquatic invertebrates with additional species of Odonata being described.

Terrestrial species are less well described along the Wash within the CCWP. The majority of species have come from collections and identification from the Wash Team and are not part of a specific sampling effort. Only a small number of studies have directly targeted these species; Eckberg and Foster (2011), Wiesenborn (2005), Nelson (2009a), and a current study looking at tamarisk feeding invertebrates. There are still multiple microhabitats and plant communities within the CCWP that have yet to have any invertebrate collection performed.

5.0 RECOMMENDATIONS

While there are more known invertebrates along the Wash than all other animal groups combined, it is likely that only a fraction have been identified. As was recommended in the previous report, additional monitoring should be conducted. Primarily inventory techniques that require minimal resources in terms of staff time and equipment should be used to increase the knowledge of species found at the Wash and within the CCWP. Future monitoring and

incidental collections should focus on and document specific microhabitats to best understand the habitat of newly identified insects.

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Appendix A
Invertebrates documented at the Las Vegas Wash

Specimens identified to any taxonomic level already described to a lower taxonomic level are excluded from this list

Phylum	Class	Order	Family	Family Common Name	Genus	Scientific Name	Common Name
					Cycloneda	Cycloneda polita	Western blood-red lady beetle
					Hippodamia	Hippodamia convergens	Convergent lady beetle
						Hippodamia sinuata crotchii	Sinuate lady beetle
					Olla	Olla v-nigrum	Ashy gray lady beetle
					Psyllobora	Psyllobora vigintimaculata	Twenty-spotted lady beetle
					Rhyzobius	Rhyzobius lopanthae	Purple scale destroyer
					Scymnus	Scymnus sp.	Lady beetle
					Stethorus	Stethorus sp. nr. punctum	Spider mite destroyer
			Nitidulidae	Sap-feeding Beetles	Cybocephalus	Cybocephalus californicus	Sap feeding beetle
			Brentidae	Straight-snouted Weevils			
			Curculionidae	Snout and Bark Beetles	Sibinia	Sibinia fulva	Weevil
						Sibinia transversa	Weevil
					Cylindrocopturus	Cylindrocopturus mammillatus	Weevil
					Ophryastes	Ophryastes geminatus	Desert weevil
					Coniatus	Coniatus splendidulus	Splendid tamarisk weevil
			Anthicidae	Antlike Flower Beetles	Ischyropalpus	Ischyropalpus sp. nr. bipartitus	Antlike flower beetle
			Meloidae	Blister beetles	Eupompha	Eupompha schwarzi	Blister beetle
					Lytta	Lytta stygica	Blister beetle
			Mordellidae	Tumbling Flower Beetles	Modellistena	Modellistena sp.	Tumbling flower beetle
			Tenebrionidae	Darkling Beetles	Eleodes	Eleodes sp.	Desert stink beetle
			Buprestidae	Metallic Wood-boring Beetle	Chrysobothris	Chrysobothris femorata	Metallic wood-boring beetle
					Gyascutus	Gyascutus planicosta planicosta	Metallic wood-boring beetle
					Prasinalia	Prasinalia cuneata	Metallic wood-boring beetle
					Acmaeodera	Acmaeodera gibbula	Metallic wood-boring beetle
			Elmidae	Riffle Beetles	Optioservus	Optioservus sp.	Riffle beetle
					Heterlimnius	Heterlimnius sp.	Riffle beetle
					Zaitzevia	Zaitzevia sp.	Riffle beetle
			Lampyridae	Fireflies	Pyropyga	Pyropyga nigricans	Firefly
			Scarabaeidae	Scarab Beetles	Diplotaxis	Diplotaxis knausii	Scarab beetle
					Phyllophaga	Phyllophaga sp.	May beetle
			Hydrophilidae	Water Scavenger Beetles	Berosus	Berosus sp.	Water scavenger beetle
					Enochrus	Enochrus sp.	Water scavenger beetle
					Tropisternus	Tropisternus sp.	Water scavenger beetle
			Hydraenidae	Minute moss beetles	Hydraena	Hydraena sp.	Minute moss beetle
			Staphylinidae	Rove Beetles			Rove beetle
			Blattellidae	Wood Cockroaches	Blattella	Blattella germanica	German cockroach
			Blattidae	Cockroaches	Blatta	Blatta orientalis	Oriental cockroach
					Periplaneta	Periplaneta americana	American cockroach
					Phyllodromica	Phyllodromica trivittata	Cockroach
			Mantidae	Mantids	Iris	Iris oratoria	Mediterranean mantis
			Asilidae	Robber Flies	Efferia	Efferia sp.	Robber fly
			Bombyliidae	Bee Flies	Neodiplocampta	Neodiplocampta sp.	Bee fly
					Anastoechus	Anastoechus melanohalteralis	Bee fly
			Agromyzidae	Leaf Miner Flies	Liriomyza	Liriomyza sp.	Leaf miner fly
			Calliphoridae	Blow flies	Lucilia	Lucilia sp.	Blow fly
			Dolichopodidae	Longlegged Flies			Longlegged fly
			Empididae	Dance Flies	Hemerodromia	Hemerodromia sp.	Dance fly
			Ephydriidae	Shore Flies	Ephydra	Ephydra sp.	Shore fly
					Notiphila	Notiphila sp.	Shore fly
					Brachydeutera	Brachydeutera sp.	Shore fly
					Clanoneurum	Clanoneurum americanum	Shore fly
			Muscidae	House Flies	Limnophora	Limnophora sp.	House fly
			Oestridae	Bot Flies	Cuterebra	Cuterebra sp.	Rodent and lagomorph bot fly
			Sciomyzidae	Marsh Flies	Sepedon	Sepedon sp.	Marsh fly
			Syrphidae	Syrphid Flies	Eristalis	Eristalis sp.	Syrphid fly
					Copestylum	Copestylum sexmaculatum	Syrphid fly
					Allograptia	Allograptia sp.	Syrphid fly
			Tachinidae	Tachina Flies			Tachina fly
			Ulidiidae	Picture-winged Flies	Euxesta	Euxesta sp.	Picture-winged fly

Specimens identified to any taxonomic level already described to a lower taxonomic level are excluded from this list

Phylum	Class	Order	Family	Family Common Name	Genus	Scientific Name	Common Name
			Stratiomyidae	Soldier Flies	Nemotelus	Nemotelus sp.	Soldier fly
					Caloparyphus	Caloparyphus sp.	Soldier fly
					Euparyphus	Euparyphus sp.	Soldier fly
					Odontomyia	Odontomyia sp.	Soldier fly
					Stratiomys	Stratiomys sp.	Soldier fly
			Tabanidae	Horse and Deer Flies			Horse and deer fly
			Cecidomyiidae	Gall Midges	Asphondylia	Asphondylia auripila	Creosote gall midge
			Ceratopogonidae	Biting Midges	Bezzia/Probezzia	Bezzia/Probezzia sp.	Biting midge
					Culicoides	Culicoides sp.	Biting midge
					Dasyhelea	Dasyhelea sp.	Biting midge
			Chironomidae	Midges	Chironomus	Chironomus sp.	Midge
					Cryptochironomus	Cryptochironomus sp.	Midge
					Dicrotendipes	Dicrotendipes sp.	Midge
					Glyptotendipes	Glyptotendipes sp.	Midge
					Goeldichironomus	Goeldichironomus sp.	Midge
					Microtendipes	Microtendipes sp.	Midge
					Parachironomus	Parachironomus sp.	Midge
					Paratendipes	Paratendipes sp.	Midge
					Polypedilum	Polypedilum sp.	Midge
					Saetheria	Saetheria sp.	Midge
					Xestochironomus	Xestochironomus sp.	Midge
					Pseudochironomus	Pseudochironomus sp.	Midge
					Cladotanytarsus	Cladotanytarsus sp.	Midge
					Nimbocera	Nimbocera sp.	Midge
					Paratanytarsus	Paratanytarsus sp.	Midge
					Rheotanytarsus	Rheotanytarsus sp.	Midge
					Tanytarsus	Tanytarsus sp.	Midge
					Corynoneura	Corynoneura sp.	Midge
					Cricotopus	Cricotopus bicinctus	Midge
					Endotribelos	Endotribelos sp.	Midge
					Limnophyes	Limnophyes sp.	Midge
					Nanocladius	Nanocladius sp.	Midge
					Orthocladius	Orthocladius annectens	Midge
					Parametriocnemus	Parametriocnemus sp.	Midge
					Paraphaenocladius	Paraphaenocladius sp.	Midge
					Thienemanniella	Thienemanniella sp.	Midge
					Ablabesmyia	Ablabesmyia sp.	Midge
					Labrundinia	Labrundinia sp.	Midge
					Paramerina	Paramerina sp.	Midge
					Pentaneura	Pentaneura sp.	Midge
					Procladius	Procladius sp.	Midge
					Tanypus	Tanypus sp.	Midge
			Culicidae	Mosquitoes	Anopheles	Anopheles franciscanus	Mosquito
						Anopheles freeborni	Western malaria mosquito
					Aedes	Aedes vexans	Inland floodwater mosquito
					Culex	Culex erythrothorax	Tule mosquito
						Culex quinquefasciatus	Southern house mosquito
						Culex tarsalis	Encephalitis mosquito
					Culiseta	Culiseta inornata	Winter marsh mosquito
			Simuliidae	Black Flies	Simulium	Simulium sp.	Black fly
			Psychodidae	Moth Flies and Sand Flies	Pericoma	Pericoma sp.	Moth flies and sand flies
			Tipulidae	Crane Flies	Erioptera	Erioptera sp.	Tipule
					Ormosia	Ormosia sp.	Tipule
					Antocha	Antocha sp.	Tipule
					Limonia	Limonia sp.	Limoniid crane fly
							Webspinners
	Embioptera		Leptophlebiidae	Prong-gilled mayflies	Paraleptophlebia	Paraleptophlebia sp.	Prong-gilled mayfly
	Ephemeroptera		Caenidae	Small Squaregilled Mayflies	Caenis	Caenis sp.	Small squaregilled mayfly
			Heptageniidae	Stream Mayflies			Stream mayfly

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Phylum	Class	Order	Family	Family Common Name	Genus	Scientific Name	Common Name
			Baetidae	Small Minnow Mayflies	Baetis	Baetis sp.	Small minnow mayfly
					Callibaetis	Callibaetis sp.	Small minnow mayfly
					Camelobaetidius	Camelobaetidius musseri	Small minnow mayfly
					Centroptilum	Centroptilum sp.	Small minnow mayfly
					Fallceon	Fallceon quilleri	Small minnow mayfly
					Siphonurus	Siphonurus sp.	Primitive minnow mayfly
		Hemiptera	Siphonuridae	Primitive Minnow Mayflies	Diceroprocta	Diceroprocta apache	Apache cicada
			Cicadidae	Cicadas	Homalodisca	Homalodisca liturata	Smoketree sharpshooter
			Cicadellidae	Leafhoppers	Exitianus	Exitianus exitiosus	Gray lawn leafhopper
					Opsius	Opsius stactogalus	Tamarix leafhopper
					Ceratagallia	Ceratagallia sp.	Leafhopper
					Empoasca	Empoasca sp.	Leafhopper
			Cixiidae	Cixiid Planthoppers	Oecleus	Oecleus sp.	Cixiid planthopper
			Flatidae	Flatid Planthoppers	Ormenis	Ormenis saucia	Flatid planthopper
			Anthocoridae	Minute Pirate Bugs	Orius	Orius sp.	Minute pirate bug
			Nabidae	Damsel Bugs	Nabis	Nabis sp.	Damsel bug
			Miridae	Plant Bugs	Lygus	Lygus elisus	Pale legume bug
					Neurocolpus	Neurocolpus sp.	Clouded plant bug
					Phytocoris	Phytocoris sp.	Plant bug
					Trigonotylus	Trigonotylus caelestialium	Rice leaf bug
					Atomoscelis	Atomoscelis onustus	Plant bugs
			Reduviidae	Assassin Bugs	Sinea	Sinea diadema	Assassin bug
					Zelus	Zelus renardii	Leafhopper assassin bug
					Rasahus	Rasahus thoracicus	Western corsair
					Microvelia	Microvelia sp.	Small water striders
			Veliidae	Small Water Striders			Water treaders
			Mesoveliidae	Water Treaders			Shore bug
			Saldidae	Shore Bugs			Water boatmen
			Corixidae	Water Boatmen	Trichocorixa	Trichocorixa sp.	Backswimmers
			Notonectidae	Backswimmers	Notonecta	Notonecta sp.	Hyaline grass bug
			Rhopalidae	Scentless Plant Bugs	Liorhyssus	Liorhyssus hyalinus	Stilt bug
			Berytidae	Stilt Bugs	Pronotacantha	Pronotacantha annulata	Western big-eyed bug
			Geocoridae	Big-eyed Bugs	Geocoris	Geocoris pallens	Seed ug
			Lygaeidae	Seed Bug	Xyonysius	Xyonysius californicus	Seed ug
					Nysius	Nysius sp.	Predatory stink bug
			Pentatomidae	Stink Bugs	Perillus	Perillus splendidus	Rough stink bug
					Brochymena	Brochymena sulcata	Say's stink bug
					Chlorochroa	Chlorochroa sayi	Uhler's stink bug
						Chlorochroa uhleri	Stink bug
					Euschistus	Euschistus sp.	Bagrada bug
					Bagrada	Bagrada hilaris	Aphid
			Aphididae	Aphids			Chionaspis scale
			Diaspididae	Armored Scale Insects	Chionaspis	Chionaspis sp.	Mining bee
			Andrenidae	Mining Bees	Andrena	Andrena sp.	Honey bee
			Apidae	Cuckoo,Carpenter,Digger,Bumble, and Honey Bees	Apis	Apis Mellifera	Digger bee
					Centris	Centris sp.	Mallow bee
					Diadasia	Diadasia sp.	Cuckoo bee
					Nomada	Nomada sp.	Square-headed wasp
			Crabronidae	Crabronid Wasps			Metallic green bee
			Halictidae	Sweat Bees	Agapostemon	Agapostemon sp.	Sweat bee
					Lasioglossum	Lasioglossum sp.	Sweat bee
					Sphecodes	Sphecodes sp.	Thread-waisted wasp
			Sphecidae	Thread-waisted Wasps			Bethylid wasp
			Bethylidae	Bethylid Wasps	Goniozus	Goniozus sp.	Dryinid
			Dryinidae	Dryinids	Gonatopus	Gonatopus sp.	Bi-colored pyramid ant
			Formicidae	Ants	Dorymyrmex	Dorymyrmex bicolor	Odororous house ant
					Tapinoma	Tapinoma sessile	Ant
					Formica	Formica xerophila	Ant
					Leptothorax	Leptothorax sp.	Ant
					Pogonomyrmex	Pogonomyrmex rugosus	Rough harvester ant

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Phylum	Class	Order	Family	Family Common Name	Genus	Scientific Name	Common Name
			Mutillidae	Velvet Ants	Messor	Messor pergandei	Smooth harvester ant
					Solenopsis	Solenopsis xyloni	Southern fire ant
					Dasymutilla	Dasymutilla bioculata	Velvet ant
						Dasymutilla gloriosa	Velvet ant
						Dasymutilla satanas	Velvet ant
					Pseudomethoca	Pseudomethoca bequaerti	Velvet ant
			Pompilidae	Spider Wasps	Pepsis	Pepsis chrysothemis	Tarantula hawk
			Vespidae	Yellowjackets, Paper Wasps, and Hornets	Eumenes	Eumenes sp.	Potter wasp
					Polistes	Polistes fuscatus aurifer	Paper wasp
			Ceraphronidae	Ceraphronid Wasps	Ceraphron	Ceraphron sp.	Ceraphron
			Encyrtidae	Encyrtid Wasps			Encyrtid wasp
			Eulophidae	Chalcidoid Wasps	Miotropis	Miotropis sp.	Miotropis
			Mymaridae	Fairyflies	Polynema	Polynema saga	Fairyfly
			Pteromalidae	Pteromalids	Pachyneuron	Pachyneuron sp.	Pteromalid
					Pteromalus	Pteromalus sp.	Pteromalid
			Trichogrammatidae	Chalcidoid Wasps	Ufens	Ufens sp.	Ufens
			Scelionidae	Scelionid Wasps	Telenomus	Telenomus sp.	Telenomus
Isopoda			Armadillidiidae	Pillbugs	Armadillidium	Armadillidium vulgare	Woodlouse
Lepidoptera			Sphingidae	Sphinx moths	Hyles	Hyles lineata	White-lined sphinx
					Pachysphinx	Pachysphinx occidentalis	Western poplar sphinx
					Manduca	Manduca quinquemaculata	Five-spotted hawk moth
			Geometridae	Geometrid moths			Geometrid moth
			Hesperiidae	Skippers	Hylephila	Hylephila phyleus	Fiery skipper
					Ochlodes	Ochlodes yuma	Yuma skipper
					Lerodea	Lerodea eufala	Eufala skipper
					Hesperopsis	Hesperopsis alpheus	Saltbush sootywing
						Hesperopsis libya	Mojave sootywing
					Erynnis	Erynnis funeralis	Funeral duskywing
					Heliopetes	Heliopetes ericetorum	Northern white skipper
					Pyrgus	Pyrgus communis	Common checkered-skipper
						Pyrgus scriptura	Small checkered-skipper
			Erebidae	Moths	Notarctia	Notarctia proxima	Mexican tiger moth
			Noctuidae	Owlet moths	Ponometia	Ponometia elegantula	Arizona bird dropping moth
					Schinia	Schinia deserticola	Hodges #11134.2
					Trichocosmia	Trichocosmia inornata	Hodges #10219
					Noctua	Noctua pronuba	Large yellow underwing
					Spaelotis	Spaelotis bicava	Hodges #10926.1
			Lycaenidae	Blues, coppers, hairstreaks, and harvesters	Brephidium	Brephidium exilis	Western pygmy-blue butterfly
					Echinargus	Echinargus isola	Reakirt's blue butterfly
					Hemiargus	Hemiargus ceraunus	Ceraunus blue
					Leptotes	Leptotes marina	Marine blue
					Plebejus	Plebejus acmon	Acmon blue
					Strymon	Strymon melinus	Grey hairstreak
			Nymphalidae	Brushfooted butterflies	Danaus	Danaus gilippus	Queen butterfly
						Danaus plexippus	Monarch
					Libytheana	Libytheana carinenta	Snout butterfly
					Junonia	Junonia coenia	Buckeye
					Nymphalis	Nymphalis antiopa	Mourning cloak
						Nymphalis californica	California tortoiseshell
					Vanessa	Vanessa atalanta	Red admiral
						Vanessa cardui	Painted lady
			Papilionidae	Swallowtails and parnassins	Papilio	Papilio polyxenes	Black swallowtail
						Papilio polyxenes coloro	Desert black swallowtail
						Papilio zelicaon	Anise swallowtail
			Pieridae	Whites, sulphurs and yellows	Eurema	Abaeis nicippe	Sleepy orange
					Colias	Colias eurytheme	Orange sulphur
					Nathalis	Nathalis iole	Dainty sulphur
					Zerene	Zerene cesonia	Southern dogface
					Pieris	Pieris rapae	Cabbage white

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Phylum	Class	Order	Family	Family Common Name	Genus	Scientific Name	Common Name
			Riodinidae	Metalmarks	Pontia	Pontia protodice	Checkered white
			Crambidae	Crambid Snout Moths	Apodemia	Apodemia mormo	Mormon metalmark
					Petrophila	Petrophila jaiscalis	Hodges #4775
					Lygropia	Lygropia octonalis	Eight-barrred lygropia
		Neuroptera	Coniopterygidae	Dustywings			Dustywings
			Chrysopidae	Green Lacewings			Green lacewings
			Hemerobiidae	Brown Lacewings			Brown lacewing
			Myrmeleontidae	Antlions	Myrmeleon	Myrmeleon sp.	Antlion
		Odonata	Aeshnidae	Darners	Anax	Anax junius	Common green darner
					Rhionaeschna	Rhionaeschna multicolor	Blue-eyed darner
			Corduliidae	Emeralds			Emerald
			Gomphidae	Clubtails	Erpetogomphus	Erpetogomphus compositus	White-belted ringtail
					Ophiogomphus	Ophiogomphus sp.	Snaketail
					Progomphus	Progomphus borealis	Gray sanddragon
			Libellulidae	Skimmers	Brechmorhoga	Brechmorhoga mendax	Pale-faced clubskimmer
					Dythemis	Dythemis sp.	Setwing
					Erythemis	Erythemis collocata	Western pondhawk
					Libellula	Libellula comanche	Comanche skimmer
						Libellula composita	Bleached skimmer
						Libellula luctuosa	Widow skimmer
						Libellula saturata	Flame skimmer
					Macrothemis	Macrothemis sp.	Skimmer
					Orthemis	Orthemis ferruginea	Roseate skimmer
					Pachydiplax	Pachydiplax longipennis	Blue dasher
					Pantala	Pantala hymenaea	Spot-winged glider
					Perithemis	Perithemis intensa	Mexican amberwing
					Pseudoleon	Pseudoleon superbus	Filigree skimmer
					Sympetrum	Sympetrum corruptum	Variigated meadowhawk
					Tramea	Tramea lacerata	Black saddlebags
						Tramea onusta	Red saddlebags
			Calopterygidae	Broad-winged damselflies	Hetaerina	Hetaerina americana	American rubyspot
			Coenagrionidae	Narrow-winged damselflies	Argia	Argia alberta	Paiute dancer
						Argia moesta	Powdered dancer
						Argia sedula	Blue-ringed dancer
						Argia vivida	Vivid dancer
					Enallagma	Enallagma basidens	Double-striped bluet
						Enallagma carunculatum	Tule bluet
						Enallagma civile	Familiar bluet
					Ischnura	Ischnura barberi	Desert forktail
						Ischnura cervula	Pacific forktail
						Ischnura denticollis	Black-fronted forktail
						Ischnura ramburii	Rambur's forktail
		Orthoptera	Acrididae	Short-horned Grasshoppers	Schistocerca	Schistocerca shoshone	Green bird grasshopper
					Leptysma	Leptysma marginicollis hebardei	Cattail toothpick grasshopper
					Melanoplus	Melanoplus yarrowii	Yarrow's spur-throat grasshopper
					Anconia	Anconia integra	Alkali grasshopper
					Trimerotropis	Trimerotropis pallidipennis	Pallid-winged grasshopper
			Gryllidae	True Crickets	Miogryllus	Miogryllus lineatus	Western striped cricket
			Tettigoniidae	Katydids	Neoconocephalus	Neoconocephalus triops	Broad-tipped conehead
					Microcentrum	Microcentrum sp.	Angle-wing katydid
		Thysanoptera					Thrips
		Trichoptera	Glossosomatidae	Little Black Caddisflies	Glossosoma	Glossosoma sp.	Little black caddisfly
					Culoptila	Culoptila sp.	Little black caddisfly
			Hydropsychidae	Netspinning Caddisflies	Hydropsyche	Hydropsyche sp.	Netspinning caddisfly
					Smicridea	Smicridea dispar	Netspinning caddisfly
			Hydroptillidae	Microcaddisflies	Hydroptila	Hydroptila sp.	Microcaddisfly
					Oxyethira	Oxyethira sp.	Microcaddisfly
			Leptoceridae	Longhorned Caddisflies	Nectopsyche	Nectopsyche sp.	White miller
			Brachycentridae	Humpless Casemaker Caddisflies	Micrasema	Micrasema sp.	Humpless casemaker caddisfly

Specimens identified to any taxonomic level already described to a lower taxonomic level are excluded from this list

Phylum	Class	Order	Family	Family Common Name	Genus	Scientific Name	Common Name
			Limnephilidae	Northern caddisflies	Ecclisomyia	Ecclisomyia sp.	Northern caddisfly
					Limnephilus	Limnephilus sp.	Northern caddisfly
	Malacostraca	Amphipoda	Crangonyctidae	Amphipods	Crangonyx	Crangonyx sp.	Amphipod
			Hyalellidae	Amphipods	Hyalella	Hyalella sp.	Amphipod
		Decapoda	Astacidae	Crayfishes	Pacifastacus	Pacifastacus leniusculus	Signal crayfish
			Cambaridae	Crayfish and crayfishes	Procambarus	Procambarus clarkii	Red swamp crayfish
	Maxillopoda						Maxillopods
	Ostracoda						Seed shrimp
Bryozoa							Moss animal
Mollusca	Bivalvia	Veneroida	Corbiculidae	Basket Clams	Corbicula	Corbicula fluminea	Asian clam
			Pisidiidae	Peaclams			Peaclam
	Gastropoda	Basommatophora	Ancylidae	Limpets			Limpet
			Lymnaeidae	Freshwater Snails	Fossaria	Fossaria sp.	Freshwater snail
			Physidae	Bladder Snails	Physa	Physa sp.	Bladder snail
					Physella	Physella sp.	Bladder snail
Nemata	Adenophorea	Neotaenioglossa	Thiaridae	Swamp Ceriths	Melanoides	Melanoides tuberculatus	Red-rimmed melania
		Mermithida	Mermithidae	Nematode worms			Nematode worm
Nemertea	Enopla	Hoploneurtea	Tetrastemmatidae	Ribbon worms	Prostoma	Prostoma sp.	Freshwater nemertean
Platyhelminthes	Tubellaria	Tricladida	Planariidae	Flatworms	Dugesia	Dugesia sp.	Flatworm