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# THE DRAGONFLIES AND DAMSELFLIES (ODONATA) OF UTAH

Alan R. Myrup[1] and Richard W. Baumann[2]

ABSTRACT.—An updated faunal list containing 94 species of Odonata (60 Anisoptera and 34 Zygoptera) for Utah is presented. Of the 95 Odonata species recorded in past publications as being from Utah, 8 have been removed from the Utah Odonata list, while 7 new state records have been added. Explanations for their removal are provided in the species accounts. The 7 ecoregions found in Utah are briefly described along with their wetland habitats and odonate species. Geographical distribution data by county, drainage, and ecoregion are provided for each species along with information regarding elevation range, flight season, and habitat preferences in Utah. Specific comments relevant to the distribution and abundance of each species are provided. Distribution maps illustrate collection locations against a background of county boundaries and topography. State conservation rankings using methods described by NatureServe are recommended.

RESUMEN.—Presentamos una lista de la fauna del estado de Utah actualizada, que contiene 94 especies de odonatos (60 libélulas y 34 zigópteros). Ocho especies de odonatos fueron eliminadas de la lista de 95 especies documentadas en publicaciones previas de Utah y agregamos siete nuevos registros del estado. Las explicaciones pertinentes respecto a la eliminación de tales especies se encuentran en el informe. Cada una de las siete eco-regiones que se encontraron en Utah están brevemente descritas junto con sus humedales y las especies de odonatos. La información de la distribución geográfica por condado, desagüe y eco-región están provistas para cada especie junto con la información relativa a su rango de elevación, la temporada de vuelo y sus preferencias de hábitats en Utah. También proporcionamos comentarios específicos y relevantes de la distribución y abundancia de cada especie. Los mapas de distribución ilustran los sitios de colecta junto con los límites del condado y su topografía. Recomendamos las clasificaciones de conservación estatales utilizando los métodos descritos por NatureServe.

ACRONYMS: NP – National Park, NPS – National Park Service, NWR – National Wildlife Refuge, UDWR – Utah Division of Wildlife Resources, USDA – United States Department of Agriculture, USFWS – United States Fish and Wildlife Service, WMA – Waterfowl Management Area.

Dragonflies and damselflies (Odonata) are highly visible organisms living in wetlands and other aquatic habitats that are particularly impacted as human populations increase. Along with birds, dragonflies and damselflies are becoming "poster organisms" for the conservation of these habitats. Understanding the distribution of organisms such as dragonflies and damselflies is essential to their conservation and the preservation of their habitats.

Prior to this research, the distribution of dragonflies (Anisoptera) in the state of Utah was not well known. Previous research on Utah dragonflies provided some data on their distribution but primarily focused on which species were present (Brown 1934) and on describing the dragonfly nymphs within the state (Musser 1962). Provonsha (1975) focused on the distribution of damselflies (Zygoptera) in Utah and so they are better known than the dragonflies, although some areas of the state, particularly mountain ranges, were not well covered. Donnelly (2004a, 2004b, 2004c) gathered information from literature sources and collection records, then created distribution dot maps for each odonate species in North America, which added much to the understanding of odonate distribution in Utah. However, Donnelly did not incorporate records from several regional university collections which contained unpublished records and unidentified specimens, nor did he conduct any new distribution studies within the state.

As part of the Utah Natural Heritage Program, state conservation rankings for Utah Odonata were calculated by the Utah Division of Wildlife Resources (UDWR) using only the available literature data. As a result, these rankings are incomplete and out of date and do not reflect the current conservation status of the Odonata of Utah.

The purpose of this research is to create a more complete and updated picture of the

[1]Science Department, Timpview High School, Provo, UT 84604. E-mail: alanmy@comcast.net
[2]Department of Biology, Monte L. Bean Life Science Museum, Brigham Young University, Provo, UT 84602. E-mail: richard_baumann@byu.edu

distribution of Odonata within the state of Utah and to recalculate the conservation rankings to better reflect the current status of each species. Data on flight seasons, habitat preferences, and other observations also provide information relevant to the distributions. This research will provide stakeholders such as landowners and government agencies with valuable information regarding Odonata when considering land use, ecosystem management, and conservation proposals.

## History of Odonata Research in Utah

The earliest records of Odonata in Utah are from specimens collected by Cyrus Thomas, an entomologist for the Hayden survey expeditions to Yellowstone in 1871. These expeditions began in Ogden, Utah, where Hayden gathered his equipment and survey team in May and June of 1871 (Hayden 1873). Hagen (1874) reported 5 species of Odonata from Ogden, Utah, from the Hayden expeditions: *Epitheca semicircularis* (*Somatochlora semicircularis*), *Libellula 4-maculata* (*Libellula quadrimaculata*), *Libellula pulchella*, *Mesothemis simplicicollis* (*Erythemis collocata*?), and *Gomphus* sp. Hagen (1875) added *Aeschna interna* (*Aeshna interrupta*) from Utah, also collected during the Hayden survey expeditions.

During the summer of 1875, J.D. Putnam collected 13 species of Odonata in the vicinity of Spring Lake, Utah Lake, and the surrounding Wasatch Mountains (Putnam 1876). From this list, 7 more species were added to the Utah state list including *Aeschna constricta* (*Aeshna palmata*?), *A. californica* (*Rhionaeschna californica*), *Plathemis subornata, Libellula forensis, L. saturata, L. composita,* and *Diplax flavibasis* (*Diplax flavicosta*?) (Ries 1963).

In October of 1899, at a meeting of the American Entomological Society, Calvert exhibited 32 specimens of Odonata representing 15 different species collected by Henry Skinner in the Wasatch Mountains of Utah (Calvert 1899). Only 5 species are listed by name in the publication. Two species were new additions to the Utah list: *Ophigomphus occidentis* and *Enallagma calverti* (*E. boreale*).

Calvert (1908) contains records for 10 different species taken from various locations in Utah. New additions included *Enallagma cyathigerum* (*E. annexum*), *Amphiagrion saucium* (*A. abbreviatum*), *Ischnura perparva*, *Aeshna multicolor* (*Rhionaeschna multicolor*), and *Libellula nodisticta*.

Muttkowski (1910) listed *Aeshna californica* (*Rhionaeschna californica*), *A. palmata, Somatochlora semicircularis, Plathemis subornata,* and *Ophiogomphus occidentis* from Utah. All of these were previously reported.

Needham and Christenson (1927) added *Aeschna occidentalis* (*Aeshna umbrosa*), *Anax junius, Sympetrum rubicundulum* (likely *S. internum*), and *Lestes uncatus* (*Lestes dryas*). Byers (1927) described a new species as *Enallagma culicinorum* (*Enallagma anna*), and Walker (1933) identified a nymph and an exuvia of *Ophiogomphus severus* from 2 locations.

Woodbury (1933) published a list of Odonata from Zion National Park produced by Vasco M. Tanner that contained 7 species: *Hetaerina americana, Archilestes grandis, Cordulegaster diadema, Libellula nodisticta, L. saturata, Erythemis collocata,* and *Sympetrum corruptum.*

Brown (1934) published the first list of Utah Odonata with 67 species (40 Anisoptera, 27 Zygoptera) belonging to 24 genera. According to Brown, prior to this list, there were published records for 32 species from Utah.

Ahrens (1938) collected 22 species of Odonata from areas in southern Utah. He listed 5 species as new for Utah: *Anax walsinghami, Brechmorhoga mendax, Hyponeura lugens* (*Argia lugens*), *Ischnura damula,* and *I. demorsa.* One other species, *Erpetogomphus compositus,* was not listed as "new" by Ahrens, although no earlier published records have been found.

Larsen (1952), in his master's thesis "The Dragonflies (Anisoptera) of Utah," listed 44 species of dragonflies, of which he stated, 7 were new for Utah: *Anax walsinghami* and *Erpetogomphus compositus* (both earlier recorded by Ahrens 1938), *Ophiogomphus bison, Libellula auripennis, Paltothemis lineatipes, Pantala hymenaea,* and *P. flavescens.* Larsen added several new county records and distribution locations to our knowledge of Utah Anisoptera. He also described a rather interesting method for collecting high-flying dragonflies, using "dust shot" fired from a .22 caliber rifle.

Musser (1961) reported collecting one exuvia and one adult of *Oplonaeschna armata* at Weeping Rock in Zion Canyon and nymphs of *Brechmorhoga mendax* in the Santa Clara

River at Veyo, Washington County, Utah. The record for *O. armata* was the first to be reported from Utah, while *B. mendax* had previously been reported by Ahrens (1938).

Musser (1962) published "Dragonfly Nymphs of Utah" which provided detailed descriptions of the dragonfly larvae found in Utah. Specimens came from areas of the state missing in earlier publications, increasing the list of known Anisoptera in Utah to 55 species as well as adding to our knowledge of their distribution within the state.

The first comprehensive study of the distribution of Utah damselflies (Zygoptera) was published by Provonsha (1975). This publication provided a fairly thorough coverage of the state and brought the known species of damselflies in Utah to 33. Since Provonsha (1975), only 2 other damselfly species, *Argia hinei* and *Lestes alacer*, have been added to the state list. Johnson (2004) and Bailowitz and Stevens (2006) both published *A. hinei* as a new state record for Utah from different locations in southern Utah. In August 1993, Boris Kondratieff collected *A. hinei* from Canyonlands National Park, Utah, but it was not identified until 2011. Johnson (2004) also collected 12 other odonate species along the Virgin River, including *Argia moesta*, a new Washington County record. *Lestes alacer* was collected in 2015 and is first reported in this publication.

Abbott (2002) reported *Aeshna persephone* from the Grand Staircase–Escalante National Monument from specimens sent to him by Riley Nelson of Brigham Young University. These specimens represented a new state record for Utah and a northward range extension for the species.

Donnelly (2004a, 2004b, 2004c) produced a nationwide dot map project for all Odonata known in the United States, illustrating their county distribution. This major publication included records from the literature as well as records from many other collections and individuals. Included were 53 species of Anisoptera and 32 species of Zygoptera from the state of Utah.

Vinson and Dinger (2008) reported collecting nymphs in the Grand Staircase–Escalante National Monument from the following genera: *Archilestes*, *Anax*, *Cordulegaster*, *Enallagma*, *Erpetogomphus*, *Gomphus*, and *Ischnura*. However, none were identified to species.

Paulson (2009) published "Dragonflies and Damselflies of the West" with updated Utah collection data to 2007 from the Brigham Young University Collection (BYUC), Provo, Utah.

## METHODS

### Data Sources

The following sources provided collection data or specimens examined by the authors:

ANSP, Academy of Natural Sciences Collection, Drexel University, Philadelphia, Pennsylvania
BYUC, Brigham Young University Collection, Provo, Utah
CSUC, Colorado State University Collection, Fort Collins, Colorado
DSUC, Dixie State University Collection, St. George, Utah
NAMC, National Aquatic Monitoring Center, Utah State University, Logan, Utah
PERC, Purdue Entomological Research Collection, Lafayette, Indiana
UMMZ, University of Michigan Museum of Zoology, Ann Arbor, Michigan
USNM, United States National Museum, Smithsonian Institution, Washington, DC
USUC, Utah State University Collection, Logan, Utah
UUIC, University of Utah Insect Collection, Salt Lake City, Utah
ZNPC, Zion National Park Arthropod Collection, Northern Arizona University, Flagstaff, Arizona

Many of the records from the BYUC, DSUC, USUC, and UUIC were identified by the authors.

Records were also obtained from Odonata Central (Abbott 2012–2015), an online community resource for the distribution and identification of Odonata. The North American Dot Map Project (Donnelly 2004a, 2004b, 2004c) provided the initial county-level records in the site. Since 2004, users are able to submit their photos and species observations which are vetted by regional experts. Within the species accounts, references to records taken from OdonataCentral are listed in the following manner: OC #432014 (the number referring to the specific catalogued record on www.OdonataCentral.org). Most of the records obtained during this research have also been added to OdonataCentral.

Photographic data were obtained from the following web resources, when photos of

specimens were identifiable and data were provided: Amazing Nature (Davis 2013a), Wild Utah (Davis 2013b), and iNaturalist (Bedell and Loarie 2013). All known literature sources regarding Odonata from the state of Utah were reviewed for distribution data.

The majority of new records came from extensive field collecting of adults throughout the state of Utah from 2005 to 2015 primarily by the authors as well as by Seth Bybee, Shawn Clark, Robert Larsen, and Robert Mower. New specimens collected as a result of this study were placed in the BYUC. Specimens were injected and soaked in 100% acetone for 12–24 hours to aid in preservation and color retention and then allowed to dry. Dried specimens were then placed in polypropylene sleeves with 3 × 5-inch data cards in card catalog boxes and stored in metal cabinets. Specimens used for DNA sequencing were placed in 100% ethanol in vials (damselflies) and Whirl-Paks (dragonflies) and stored in freezers at −80 °C.

### Species Identifications

For newly collected specimens, nearly all identifications were made by the authors. John Abbott, Kathy Biggs, Sidney Dunkle, Oliver Flint, Rosser Garrison, Jim Johnson, Robert Larsen, and Dennis Paulson also aided in identifying Utah odonate specimens. References used for identifications include the following: Abbott (2005), Biggs (2004), Dunkle (2000), Manolis (2003), Needham et al. (2000), Paulson (2009), and Westfall and May (2006).

For photographs of each species, we recommend the references listed above and Biggs (2015) and Odonata Central (Abbott 2012–2015). This online resource contains identification pages and photographs of the species found in North America, including Utah.

### Collection and Storage of Data

For new collection records, locations were obtained using a handheld Garmin Etrex GPS unit (datum WGS 84, decimal degrees). For museum collection and literature records, the data available were used to estimate coordinates using Google Earth (2009–2015). Where records contained only the county and not an exact location, county centers were used for coordinates. Readings were also converted to Universal Transverse Mercator (UTM) coordinates using Boulter GPS Coordinate Converter (Boulter 2012–2015). Records were stored in a Microsoft Excel database. The data were then transferred into mapping software (ESRI 2012–2015) where dot maps were created for each species illustrating collection locations and county boundaries on a background of topography. Dot maps were also temporarily overlaid with ecoregion boundaries to determine collection locations by ecoregion.

### Conservation Rankings

Recommendations for new conservation rankings were calculated using methods described by NatureServe (Faber-Langendoen et al. 2009, Master et al. 2009). Range extent, number of element occurrences, area of occupancy, percent area with good viability, and overall threat impact were determined using ArcGIS and collection data stored in Excel. Note that although a species may have a state rank of S1, its Utah range may be at the fringes of its overall range and may have a much higher national and global rank.

## GEOGRAPHY AND ECOREGIONS OF UTAH AND THEIR ODONATA

Utah is the 13th largest state covering 136,659 $km^2$ (84,916 $mi^2$), 3% of which is covered by water, mainly by the Great Salt Lake. Elevations range from 670 m (2200 ft) in the Beaver Dam Wash in the southwestern corner of the state to over 4115 m (13,500 ft) in the Uinta Mountains of northeastern Utah (Fisher 1987). Utah is the second driest state in the nation, with 31 cm (12.22 in.) average annual precipitation (National Climatic Data Center 2013). Sixty-seven percent of the land is owned by the federal government and managed by the Bureau of Land Management, USDA Forest Service (national forests), and the Department of the Interior (national parks and monuments); 7% by the state of Utah (state parks and forests); and 4% by Native American reservations, leaving only 22% that is privately owned.

Most of Utah is within the boundaries of 3 Level III ecoregions (Central Basin and Range, Colorado Plateau, and the Wasatch and Uinta Mountains), with 4 other Level III ecoregions (Mojave Basin and Range, Northern Basin and Range, Southern Rockies, and Wyoming Basin) entering Utah at the corners of the state (Woods et al. 2001). Ecoregions

are identified as areas of general similarity in ecosystems and environmental resources including many biotic and abiotic phenomena such as geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology (Woods et al. 2001). They are subdivided into a hierarchy of 4 levels using Roman numerals, with Level I being the coarsest level. One of the primary purposes for identifying ecoregions is to provide information to aid public and private entities in managing ecosystems (Woods et al. 2001). For the purposes of this study, Level III ecoregions have been chosen to aid in understanding the distribution of Odonata in Utah. The 7 Level III ecoregions found in Utah are described along with their wetland habitats and associated Odonata. Throughout this document, names of specific rivers and other locations are occasionally accompanied by county names in parentheses to clarify locations.

### Central Basin and Range

(Photos, page 9)

The Central Basin and Range ecoregion is the second largest ecoregion in the state, covering nearly all of western Utah including the major population centers along the Wasatch Front. This arid ecoregion ranges in elevation from 1280 m (4200 ft) in the lower basins to over 3658 m (12,000 ft) in the mountains and receives 10–102 cm (4–40 inches) precipitation annually. The vast, dry salt basins are separated by many steep, north–south-running fault-block mountain ranges. Internally drained with no outlet to the oceans, most of this ecoregion in Utah below 1585 m (5200 ft) was once covered with the waters of the Pleistocene Lake Bonneville (Woods et al. 2001). As temperature and precipitation patterns changed, the lake receded approximately 13,000 to 12,000 years ago (Link et al. 1999) to its present remnants including the Great Salt Lake, Utah Lake, Sevier Lake, and a few low lying areas that occasionally form ephemeral lakes in the spring during wet years. As a result, much of this ecoregion would not have been colonized by odonates until after that time period.

Wetlands surrounding these lakes provide much lentic habitat for odonates including a federal wildlife refuge, Bear River Migratory Bird Refuge (Box Elder), and many state wildlife refuges such as Clear Lake Waterfowl Management Area (Millard), Farmington Bay Waterfowl Management Area (Davis), Ogden Bay Waterfowl Management Area (Weber), and Powell Slough Waterfowl Management Area (Utah). In the vast desert areas, scattered springs such as Blue Lake, Horseshoe Springs and Timpie Springs (Tooele), Fish Springs National Wildlife Refuge (Juab), Gandy Hot Springs and Meadow Warm Springs (Millard), and Goshen Warm Springs (Utah) act as oases for wildlife including odonates. Many of these wetlands are characterized by higher alkaline and saline conditions than other areas of Utah and these conditions directly affect the Odonate species found there. Common odonate species which appear to tolerate these conditions include *Anax junius, Rhionaeschna californica, R. multicolor, Erythemis collocata, Libellula composita, L. nodisticta, L. saturata, Plathemis subornata, Sympetrum costiferum, S. semicinctum, Tramea lacerata, Lestes congener, Argia alberta, Enallagma carunculatum, E. civile, E. clausum, Ischnura barberi,* and *I. denticollis.* Many other species can be found at marshes, ponds, and other wetlands throughout this ecoregion.

Larger rivers and small perennial streams that drain from the nearby mountains provide lotic habitat for odonates in their lower reaches, along with a few small spring runs. Principal rivers include the Bear, Beaver, Jordan, Ogden, Provo, Sevier, Spanish Fork, and Weber Rivers. The Bear and Sevier Rivers are the longest, with less of an elevation gradient than the other rivers, meandering over much of their length leaving oxbow ponds and backwaters scattered along their route. Most of these rivers have been diverted or dammed, creating reservoirs at several locations along their length to provide water for drinking, irrigation, and hydroelectric power. Nearly all of Utah's wetlands have been altered, reduced, or even lost as a result, affecting the populations of organisms that are dependent on them. Species found in the lotic habitats described above include *Aeshna palmata, A. umbrosa, Erpetogomphus compositus, Gomphus externus, Ophiogomphus morrisoni, O. severus, Stylurus olivaceus, Macromia magnifica, Calopteryx aequabilis, Hetaerina americana, Archilestes grandis, Argia emma, A. moesta, A. vivida,* and *Enallagma anna*.

## Colorado Plateau

(Photos, page 10)

The Colorado Plateau is the largest ecoregion in the state, covering nearly all of eastern Utah. It is an "uplifted, eroded, and deeply dissected tableland of benches, mesas, buttes, cliffs and deep canyons" (Woods et al. 2001). Several national parks (Arches, Canyonlands, Capital Reef, and Zion) and national monuments (Dinosaur, Grand Staircase–Escalante, and Natural Bridges), as well as the Glen Canyon National Recreation Area surrounding Lake Powell are found there. The area is sparsely populated with few towns: Moab, Price, and Vernal being the largest. This arid ecoregion, which ranges in elevation from 975 m (3200 ft) in the deepest canyons to over 3048 m (10,000 ft) on the highest escarpments, receives 13–76 cm (5–30 inches) precipitation annually (Woods et al. 2001).

The Colorado River and its major tributaries (Dirty Devil, Duchesne, Escalante, Fremont, Green, Price, San Juan, San Rafael, White, and the upper reaches of the Virgin River) make up the bulk of lotic wetland habitat for odonates. Some of these riparian habitats are found in deep canyon lands accessible only by boat, by off-road vehicles, or on foot. Many miles of riparian habitat along the Green and Colorado Rivers have been submerged under 2 large reservoirs: Flaming Gorge in 1962 and Lake Powell in 1964. Flaming Gorge Dam on the Green River has created a tailwater habitat with greatly altered water temperatures, sediment loads, and seasonal volume fluctuations. These changes, in turn, have affected the macroinvertebrate fauna of the river (Vinson 2001). The Glen Canyon Dam and Lake Powell have created a significant barrier essentially blocking the movement of southwestern lotic odonate species migrating up the Colorado River corridor from the south. Isolated colonies of more southern species cut off by the dam and lake might possibly be found in the tributaries to Lake Powell, such as isolated colonies of *Argia hinei* found in Bowns Canyon in 2004 (Bailowitz and Stevens 2006, Stevens and Bailowitz 2009) and *Argia lugens* found in Cow Canyon off the Escalante River arm of the lake by J.F. MacDonald in 1997.

The Colorado, Green, San Juan, and White Rivers of the Colorado Plateau are some of the largest rivers in Utah with bottom substrates consisting of large stretches of silt and sand. Some of the species that have been found along these rivers include *Erpetogomphus compositus, Stylurus intricatus, Macromia magnifica, Hetaerina americana,* and *Argia moesta.* Smaller tributaries, many in isolated desert canyons, contain several species of odonates including *Aeshna persephone, A. umbrosa, Oplonaeschna armata, Erpetogomphus compositus, Ophiogomphus severus, Progomphus borealis, Cordulegaster dorsalis, C. diadema, Brechmorhoga mendax, Paltothemis lineatipes, Hetaerina vulnerata, Archilestes grandis, Argia emma, A. hinei, A. lugens,* and *Enallagma anna.*

Larger lentic habitat for odonates is provided by Brown's Park Waterfowl Management Area, Ouray National Wildlife Refuge, Pariette Wetlands, and Stewart Lake Waterfowl Management Area found along the Green River; the Scott Matheson Wetlands Preserve found along the Colorado River; Desert Lake Waterfowl Management Area in Emery County and Pelican Lake in Uintah County. A few smaller reservoirs, ranch ponds, and springs scattered throughout the ecoregion provide smaller lentic habitat. However, as with the Central Basin and Range, one can travel very long distances without ever encountering any wetland habitat in this high-desert ecoregion. Species found in these lentic habitats include *Aeshna palmata, Rhionaeschna multicolor, Erythemis collocata, Libellula composita, L. forensis, L. luctuosa, L. pulchella, L. saturata, Pachydiplax longipennis, Sympetrum obtrusum, S. semicinctum, Tramea lacerata, Lestes alacer, L. congener, L. unguiculatus, E. boreale, E. carunculatum, E. civile, Ischnura damula,* and *I. demorsa.* There are vast areas, particularly the canyons in the southern portion of this ecoregion, that have not been surveyed for odonates.

## Mojave Basin and Range

(Photos, page 11)

The Mojave Basin and Range ecoregion, located primarily in southern California and southern Nevada, extends into the southwest corner of Utah. With the lowest elevations in the state at 671 m (2200 ft) and an annual precipitation of 15–41 cm (6–16 inches), this warm, dry ecoregion contains fascinating flora and fauna found nowhere else in Utah. Principle lotic habitats for odonates are found along

the Virgin River and its tributaries, including Ash Creek, Beaver Dam Wash, East Fork Virgin River, LaVerkin Creek, Leeds Creek, Mill Creek, North Creek, and the Santa Clara River. Many of these tributaries are subject to periodic severe flash flooding during storms that scour their habitat. With the growing population in the St. George area and water a precious commodity, along with the need for flood control, many of these streams are at risk of alteration and habitat loss which greatly affects their odonate populations. The few lentic habitats that exist in this dry, sandy desert ecoregion include ranch ponds, golf course ponds, small reservoirs, and backwaters of streams. Washington County, the heart of this ecoregion in Utah, has more odonate species (63) than any other county in the state. Several, with more southern affinities, are found nowhere else in Utah. Some of the species that characterize this ecoregion include *Aeshna persephone, Anax walsinghami, Erpetogomphus compositus, Progomphus borealis, Stylurus intricatus, Brechmorhoga mendax, Libellula comanche, L. luctuosa, L. saturata, Tramea lacerata, T. onusta, Hetaerina vulnerata, Archilestes grandis, Argia hinei, A. lugens, A. nahuana, A. sedula, Enallagma praevarum,* and *Telebasis salva*. A few species such as *Libellula croceipennis, Orthemis ferruginea,* and *Perithemis intensa* have occasionally migrated up the Virgin River corridor into Utah but have not established permanent populations.

### Northern Basin and Range

(Photos, page 12)

Located primarily in southeastern Oregon, northern Nevada, and southern Idaho, the Northern Basin and Range extends southward into the northwestern corner of Utah. Its flora and fauna have more northern affinities similar to that found in the Columbia Plateau (Woods et al. 2001). The key land feature within this ecoregion is the Raft River Mountains ranging from 1646 m (5400 ft) at the bases to 3029 m (9940 ft) on Bull Mountain. This mountain range contains a few high-elevation ponds, lakes, and perennial streams. Odonate collections have not been done in the higher elevations of this remote mountain range. The Raft River, which flows northward into the Snake River in Idaho, contains a good population of *Calopteryx aequabilis.* Only one other population of this damselfly (lower Ogden and Weber Rivers) is currently known from Utah. Other odonates recorded from the Raft River include *Aeshna palmata, A. umbrosa, Ophiogomphus severus, Libellula quadrimaculata, Sympetrum danae, S. pallipes, S. semicinctum, Lestes congener, Amphiagrion abbreviatum, Argia emma, A. vivida, Enallagma anna, E. boreale,* and *Ischnura perparva.*

### Southern Rockies

(Photos, page 13)

Because of their flora and fauna, 2 small mountain ranges in southeastern Utah, the LaSal Mountains near Moab and the Abajo Mountains near Monticello, are classified as part of the Southern Rockies ecoregion primarily located in the mountains of Colorado and northern New Mexico (Woods et al. 2001). Standing like tall laccolithic islands amid the Colorado Plateau, these 2 mountain ranges have an elevation range of 2286–3505 m (7500–11,500 ft) and receive 41–102 cm (16–40 in.) annual precipitation. The LaSal Mountains have a few high mountain lakes, sedge ponds, and reservoirs where several species of odonates have been collected, such as *Aeshna interrupta, A. palmata, Somatochlora semicircularis, Libellula quadrimaculata, Lestes disjunctus, L. dryas, Coenagrion resolutum*, and *Enallagma boreale.* The Abajo Mountains also have a few lakes, ponds, marshes, and springs where *Aeshna interrupta, A. palmata, Libellula quadrimaculata, Lestes dryas, Amphiagrion abbreviatum, Enallagma annexum, E. boreale,* and *Ischnura damula* have been found. Many areas in these 2 mountain ranges have not been visited by odonate researchers.

### Wasatch and Uinta Mountains

(Photos, page 14)

The Wasatch and Uinta Mountains ecoregion runs from north to south down the center of the state. Beginning in the north with the Wasatch Range, it transitions into the Wasatch Plateau, Sevier Plateau, and Pahvant Range of central Utah, runs south through the Tushar Mountains, Aquarius Plateau, and Boulder Mountains ending with the Paunsaugunt Plateau, Markagunt Plateau, Kolob Terrace, and Pine Valley Mountains of southern Utah as well as the isolated Henry Mountains to the southeast. The Uinta Mountains of northeastern Utah run west to east from

Kamas, Utah, to the Green River near the Colorado border, a distance of over 160 km (100 miles). This high montane ecoregion ranges in elevation from approximately 1500 m (4920 ft) in the valleys to over 4100 m (13,450 ft) atop the highest peaks of the Uinta Mountains. Precipitation ranges 41–127 cm (16–50 inches) annually, much of which comes from winter snowfall and summer thunderstorms.

The steep Wasatch Mountains of northern Utah are cut by clear, cold, steep gradient streams, with few wetlands capable of sustaining odonate populations except where they flow through the mountain valleys of the Wasatch backcountry and where backwaters of streams and beaver dams provide odonate habitat. Farm ponds within these valleys also contain some species, while a few high mountain lakes scattered throughout the range provide a more boreal-like setting for odonates, particularly in the upper reaches of the Cottonwood Canyons just east of Salt Lake City. The mitigated wetlands built along the Provo River below Jordanelle Dam are of particular interest and contain many species of odonates. Common odonate species found in the Wasatch Mountains include *Aeshna interrupta, A. palmata, A. umbrosa, Cordulia shurtleffii, Somatochlora semicircularis, Leucorrhinia intacta, Libellula forensis, L. quadrimaculata, Sympetrum danae, S. internum, S. madidum, S. obtrusum, S. pallipes, Lestes disjunctus, L. dryas, Amphiagrion abbreviatum, Coenagrion resolutum, Enallagma annexum, E. boreale, Ischnura cervula,* and *I. perparva*.

The Wasatch Plateau of central Utah, with its more rounded top, contains more ponds, lakes, and other wetlands than the Wasatch Mountains. Typical species include *Aeshna interrupta, A. palmata, A. umbrosa, Cordulia shurtleffii, Somatochlora semicircularis, Leucorrhinia intacta, L. proxima, Libellula forensis, L. quadrimaculata, Sympetrum danae, S. internum, S. pallipes, Lestes disjunctus, L. dryas, Amphiagrion abbreviatum, Coenagrion resolutum, Enallagma annexum, E. boreale, Ischnura cervula,* and *I. perparva.*

The mountains of southern Utah are of varied origin and therefore differ in the type, quality, and quantity of odonate habitat available. The Boulder Mountains and Aquarius Plateau are of particular interest. This area has elevations above 3048 m (10,000 ft) and yet is quite flat on top with many lakes scattered throughout, allowing for the southward range extension of several boreal and montane odonates such as *Leucorrhinia hudsonica, Somatochlora semicircularis,* and *Coenagrion resolutum.* The Markagunt Plateau east of Cedar City and the Pine Valley Mountains north of St. George are near the borders of 4 ecoregions and therefore contain an interesting mix of species such as *Somatochlora semicircularis, Cordulegaster dorsalis, Aeshna interrupta, A. palmata, A. persephone, Oplonaeschna armata, Paltothemis lineatipes, Sympetrum internum, Hetaerina vulnerata, Archilestes grandis,* and *Argia hinei.*

The Uinta Mountains in northeastern Utah are the highest in the state, with several peaks above 4000 m (13,123 ft) This highly glaciated mountain range with its U-shaped canyons, high basins, and cirques contains hundreds of ponds, lakes, bogs, and sedge wetlands that provide excellent habitat for at least 25 recorded species of odonates including the following boreal species found nowhere else in Utah: *Aeshna eremita, A. juncea, A. sitchensis, Somatochlora hudsonica,* and *Leucorrhinia borealis.* Other species found here include *Cordulia shurtleffii, Somatochlora semicircularis, Leucorrhinia hudsonica, L. intacta, L. proxima, Sympetrum madidum, Lestes disjunctus, L. dryas, L. unquiculatus,* and *Coenagrion resolutum.*

### Wyoming Basin

(Photos, page 15)

The Wyoming Basin enters northeastern Utah in Daggett, Rich, and Summit Counties. This ecoregion, found in the rain shadow of mountains to the west and south, receives very little precipitation, averaging only 25–41 cm (10–16 inches) annually. It consists of wide, open valleys and sagebrush steppe ranging in elevation from 1615 to 2347 m (5300–7700 ft; Woods et al. 2001). Winter temperatures in this ecoregion are consistently some of the coldest in the state, often −29 °C to −35 °C (−20 °F to −30 °F).

In this ecoregion, the Bear River, which drains off the north slope of the Uinta Mountains, winds its way through portions of Utah, Wyoming, and Idaho on its journey to the Great Salt Lake in the Great Basin. The wide floodplain of the Bear River contains many wetlands, backwaters, and oxbows filled with

## Central Basin and Range Ecoregion

**Goshen Warm Springs, Utah County, Utah.** Species include *Rhionaeschna californica, R. multicolor, Erythemis collocata, Leucorrhinia intacta, Libellula composita, L. nodisticta, L. saturata, Pachydiplax longipennis, Plathemis subornata, Sympetrum semicinctum, Hetaerina americana, Argia alberta, A. vivida, Enallagma anna, E. civile, E. carunculatum, E. clausum, Ischnura cervula, I. denticollis, Lestes congener,* and *L. dryas.* Photo: Alan R. Myrup.

**Sevier River below Yuba Dam, Juab County, Utah.** Species include *Gomphus externus, Erythemis collocata, Libellula forensis, L. pulchella, L. saturata, Sympetrum corruptum, S. costiferum, S. semicinctum, Hetaerina americana, Lestes congener, Amphiagrion abbreviatum, Argia alberta, A. emma, Ischnura cervula,* and *I. perparva.* Photo: Alan R. Myrup.

# Colorado Plateau Ecoregion

**Desert Lake, Emery County, Utah.** Species include *Aeshna interrupta, A. palmata, Anax junius, Ophiogomphus severus, Erythemis collocata, Libellula composita, L. forensis, L. luctuosa, L. quadrimaculata, Sympetrum corruptum, S. costiferum, S. semicinctum, Tramea lacerata, Hetaerina americana, Archilestes grandis, Lestes congener, Amphiagrion abbreviatum, Argia emma, A. vivida, Enallagma annexum, E. boreale, E. carunculatum, E. civile, E. clausum, Ischnura cervula,* and *I. perparva.* Photo: Alan R. Myrup.

**White River, Uintah County, Utah.** Species include *Ophiogomphus severus, Stylurus intricatus, Sympetrum pallipes, Hetaerina americana, Argia emma, A. moesta, Enallagma boreale, E. carunculatum,* and *Lestes congener.* Photo: Alan R. Myrup.

# Mojave Basin and Range Ecoregion

**Lytle Ranch Preserve, Beaver Dam Wash, Washington County, Utah.** Photo: Alan R. Myrup.

**Beaver Dam Wash near Lytle Ranch, Washington County, Utah.** Species include *Anax junius, A. walsinghami, Rhionaeschna multicolor, Erpetogomphus compositus, Progomphus borealis, Brechmorhoga mendax, Erythemis collocata, Libellula comanche, L. forensis, L. pulchella, L. saturata, Orthemis ferruginea, Pachydiplax longipennis, Perithemis intensa, Plathemis subornata, Sympetrum corruptum, Tramea lacerata,* and *T. onusta.* Photo: Alan R. Myrup.

# Northern Basin and Range Ecoregion

**Raft River Narrows, Box Elder County, Utah.** Species include *Aeshna palmata, A. umbrosa, Ophiogomphus severus, Libellula quadrimaculata, Sympetrum danae, S. pallipes, Calopteryx aequabilis, Lestes congener, Amphiagrion abbreviatum, Argia emma, A. vivida, Enallagma anna, E. boreale,* and *Ischnura perparva.* Photo: Alan R. Myrup.

**Raft River, Box Elder County, Utah.** The remote Raft River Mountains (background) are located in northwestern Box Elder County. The Raft River (foreground) flows northward into the Snake River in southern Idaho. Photo: Alan R. Myrup.

## Southern Rockies Ecoregion

**LaSal Mountains east of Moab, Utah.** Mount Tomasaki (background). Flooded sedge meadow (foreground) is typical habitat over which *Somatochlora semicircularis* can be found. Photo: Alan R. Myrup.

**LaSal Mountains east of Moab, Utah.** Reverse view of the same meadow as in previous photo. Species include *Aeshna interrupta, A. palmata, Somatochlora semicircularis, Libellula quadrimaculata, Lestes congener, L. dryas, Coenagrion resolutum,* and *Enallagma boreale.* Photo: Alan R. Myrup.

## Wasatch and Uinta Mountains Ecoregion

**Lilypad pond near Teapot Lake (SR 150), Uinta Mountains, Summit County, Utah.** Species from ponds such as these include *Aeshna eremita, A. juncea, A. palmata, A. sitchensis, Cordulia shurtleffii, Somatochlora semicircularis, Leucorrhinia borealis, L. hudsonica, Libellula quadrimaculata, Coenagrion resolutum,* and *Enallagma annexum.* Photo: Alan R. Myrup.

**Jordanelle Wetlands below Jordanelle Dam, north of Heber, Utah.** Provo River is visible, along with mitigated wetlands. Species include *Aeshna interrupta, A. palmata, Anax junius, Rhionaeschna californica, R. multicolor, Erythemis collocata, Leucorrhinia intacta, Libellula forensis, L. quadrimaculata, Sympetrum costiferum, S. danae, S. internum, S. pallipes, Lestes dryas, L. disjunctus, Amphiagrion abbreviatum, Argia vivida, Coenagrion resolutum, Enallagma annexum, Ischnura cervula,* and *I. perparva.* Photo: Alan R. Myrup.

# Wyoming Basin Ecoregion

**Bear River, near Randolph, Rich County, Utah.** The meandering Bear River with old river channels and oxbow ponds. Photo: Alan R. Myrup.

**Oxbow pond, near Woodruff, Rich County, Utah.** The oxbow pond is in an old river channel filled with sedges and submergent vegetation. Typical species include *Aeshna interrupta, Leucorrhinia intacta, Libellula forensis, L. quadrimaculata, Sympetrum corruptum, S. costiferum, S. danae, S. internum, S. madidum, S. pallipes, Lestes dryas, L. unguiculatus, Amphiagrion abbreviatum, Enallagma anna, E. annexum, E. boreale, E. carunculatum, Ischnura cervula,* and *I. perparva.* Photo: Alan R. Myrup.

sedges, rushes, cattails, and other marsh grasses adjacent to the main river. This small portion of the Wyoming Basin is characterized by 7 species of *Sympetrum*, 4 species of *Lestes*, 6 species of *Enallagma* and 3 species of *Ischnura*, all of which can be abundant at times. The abundance of *Sympetrum* and *Lestes* species implies that many of these wetlands are ephemeral in nature, drying up by the end of each season. Other species common to the Bear River flood plain include *Aeshna interrupta*, *A. palmata*, *Leucorrhinia intacta*, *Libellula pulchella*, *L. quadrimaculata*, and *Amphiagrion abbreviatum*. Similar wetlands also exist around the shores of Bear Lake and along streams that flow out of the north slope of the Uinta Mountains into Wyoming where they merge and eventually flow into the Green River. Along the Green River below Flaming Gorge Dam, the Brown's Park Waterfowl Management Area contains lentic wetlands for odonates on both sides of the river. Although this area is part of the Wyoming Basin ecoregion, many of the odonates found there are also found in the northern portion of the Colorado Plateau ecoregion.

## SPECIES ACCOUNTS

The criteria used to describe the distribution of each species are explained below.

SPECIES NAME.—The species name, author, and common name are listed (Paulson and Dunkle 2011). A complete faunal list of Utah dragonflies (Anisoptera) is found in Appendix 1 (Needham et al. 2000), and a complete faunal list of Utah damselflies (Zygoptera) is found in Appendix 2 (Westfall and May 2006).

COUNTY RECORDS.—The number of counties where the species has been recorded out of Utah's 29 counties is given along with the county names. For those with 23 or more county records, the counties for which there are no records are listed. A county records table is provided in Appendix 3, and a county map is provided in Appendix 4.

ELEVATION RANGE.—Based on collection records, the range of elevation from the lowest record to the highest is given. Records out of the typical elevation range are noted.

FLIGHT SEASON.—Data from adult collection records were used to show the flight season, from the earliest season record to the latest season record. For species that have a significant number of records, the number of records for each month is listed. Although collection bias exists, these records provide useful information about species' abundance during the various months of their flight season.

U.S. RANGE.—Generally, only the range within the United States is described, although Canada and Mexico are occasionally included. Sources include Abbott (2012–2015), Donnelly (2004a, 2004b, 2004c), and Paulson (2009). This information enhances our understanding of the distribution of odonates in Utah in relation to population centers that may be found elsewhere.

UTAH RANGE.—A general description of the known range in Utah is provided for each species. Outlier records may be noted. Collection bias exists, as many remote areas of the state have not been sampled adequately. Map numbers are also given for the associated species maps in Appendix 5.

ECOREGIONS.—For each species, the ecoregions for which there are records are listed. These unique ecological and geological regions can affect how species are distributed (see ecoregion descriptions for further details). A table of species found in each ecoregion and an ecoregion map are given in Appendixes 6 and 7, respectively.

DRAINAGES.—The drainages for which there are records are listed including many small creeks and springs. However, this section does not provide exact locations where voucher specimens have been collected. A Utah river drainage map showing the major rivers of the state is provided in Appendix 8.

HABITAT.—The types of habitats in Utah in which each species has been found are listed and described. These may not necessarily match habitats where species are found in other states.

COMMENTS.—Significant and/or interesting information for each species is described, particularly in reference to its distribution.

RANK.—The official Global (G), National (N), and State (S) conservation rankings for each species as described by NatureServe (2012–2015) are listed. New recommended state rankings based on the results of this study are also listed. A conservation rankings chart containing descriptions of each rank and a table of the rankings of Odonata species found in Utah are provided in Appendixes 9 and 10, respectively.

## ANSIOPTERA

(60 Species; see Appendix 1 for a list of Anisoptera species in Utah)

### Family Aeshnidae (4 Genera, 13 Species)

*Aeshna constricta* Say
Lance-tipped Darner

COUNTY RECORDS.—(2 of 29) Box Elder, Weber.

ELEVATION RANGE.—1289–1302 m (4230–4270 ft).

FLIGHT SEASON.—24 Aug–29 Aug (2 records only).

U.S. RANGE.—Northern half of U.S., especially in the east; scattered records in the west; very few records south of Colorado, Kansas, and Missouri.

UTAH RANGE.—Map 1. Northern Utah.

ECOREGIONS.—Central Basin and Range.

DRAINAGES.—Bear River, Weber River.

HABITAT.—Lower elevation marshes, ephemeral wetlands (Paulson 2009).

COMMENTS.—There are only 6 Utah records purported to be *Aeshna constricta.* The most recent specimen (OC #136236) was collected in 1983 by S.W. Dunkle at Corinne (Box Elder). Another *A. constricta,* collected at Farr West (Weber) in the early 1930s (Brown 1934), is housed at the UMMZ and has been confirmed as that species. The 4 other Utah records for *A. constricta* (Putnam 1876, Calvert 1908) are possibly *Aeshna palmata,* which was considered a synonym of *A. constricta* before Walker (1912) revised the genus (D. Paulson personal communication). One Salt Lake County specimen cited by Calvert (1908) is currently housed in the ANSP under *A. palmata;* the location of the other Salt Lake County specimen is unknown. The Utah County record (Putnam 1876) is most likely *A. palmata* due to its collection location (2438 m) in Summit (Santaquin) Canyon. The Beaver Canyon (Beaver) specimen (Calvert 1908) has not been located for confirmation but is also from a higher elevation area in southern Utah where *A. palmata* is currently common. With no new records since 1983, *A. constricta* appears to be rare in Utah and is possibly extirpated from the state. The most probable locations to find this species in Utah are the low-elevation marshes in Box Elder, Cache, and Weber Counties in mid- to late summer.

RANK.—G5, N5, SH; recommended SH.

***Aeshna eremita*** Photo: Alan R. Myrup

*Aeshna eremita*
Scudder Lake Darner

COUNTY RECORDS.—(7 of 29) Cache, Daggett, Duchesne, Summit, Uintah, Utah, Wasatch.

ELEVATION RANGE.—2621–3223 m (8600–10,575 ft). One nymph record from Cache County was found at 1707 m (Musser 1962).

FLIGHT SEASON.—29 Jun–5 Sep; records by month: Jun (1), Jul (8), Aug (10), Sep (1).

U.S. RANGE.—Alaska, across Canada, south through the Great Lakes and northeastern U.S.; south down the Rockies to Colorado and northeastern Utah.

UTAH RANGE—Map 2. The high basins of the Uinta Mountains in northeastern Utah.

ECOREGIONS.—Wasatch and Uinta Mountains.

DRAINAGES.—Ashley Creek, (Uintah), Beaver Creek (Daggett), Blacks Fork (Summit), East Fork Smiths Fork (Summit), Henrys Fork (Summit), Provo River, Rock Creek (Duchesne), Sheep Creek (Daggett), West Fork Bear River (Summit), Whiterocks River.

HABITAT.—High mountain ponds and lakes.

COMMENTS.—*Aeshna eremita* is a large robust darner that patrols the shorelines of high mountain ponds and lakes in the Uinta Mountains of northeastern Utah. Although the geographical and elevation ranges of *A. eremita* are restricted in Utah, the species is often found in good numbers and is likely widespread throughout the Uinta Mountains. The Wasatch County record for Hourglass Lake listed in Musser (1962) is incorrect, as Hourglass Lake is located in Summit County. However, *A. eremita* has since been recorded from at least one location in Wasatch County. Although the Utah County record is a correct

identification, no collection date is given and the location reads only "Provo, Utah," which is doubtful. The nymph record collected by Musser (1962) at Dry Lake in Cache County (elevation 1707 m) is an unusual outlier. Utah State University students have collected at this location for many years, but no adults of *A. eremita* have been found there.

RANK.—G5, N4, SH; recommended S4.

### *Aeshna interrupta* Walker
### Variable Darner

COUNTY RECORDS.—(27 of 29) all counties except Juab and Millard.

ELEVATION RANGE.—1280–3200 m (4200–10,500 ft). One nymph record from Washington County was found at 853 m (Musser 1962).

FLIGHT SEASON.—1 Jun–3 Oct; records by month: Jun (10), Jul (49), Aug (51), Sep (18), Oct (1).

U.S. RANGE.—Alaska, Canada, northern U.S., south through the Rockies to Arizona and New Mexico, and south to central California.

UTAH RANGE.—Map 3. Widespread throughout Utah, especially in the mountains and mountain valleys.

ECOREGIONS.—All 7 ecoregions in Utah.

DRAINAGES.—American Fork Creek, Ashley Creek and Dry Fork (Uintah), Bear River, Beaver and Carter Creek (Daggett), Beaver River, Big Cottonwood Creek (Salt Lake), Blacksmiths Fork, City Springs in St. George [nymph record] (Washington), Clear Creek (Raft River Mountains, Box Elder), Daniels Creek (Wasatch), Deep Creek (Washington), Desert Lake WMA (Emery), Duchesne River, Duck Creek (Kane), Ephraim Canyon Creek (Sanpete), Escalante River (upper tributaries), Farmington Creek, Geyser Creek (San Juan), Great Salt Lake watershed, Green River, Hobble Creek (Utah), Hobble Creek—tributary of the Strawberry River (Wasatch), Indian Creek (San Juan), Kolob Creek (Washington), Lake Fork River (Duchesne), Little West Fork (Wasatch), Logan River, Mill Creek (Grand), North Creek (Garfield), Oak Creek (Sanpete), Parowan Creek, Payson Creek, Pleasant Creek (Garfield), Polk Creek (Wayne), Price River, Provo River, Sevier River, Soapstone Creek (Wasatch), Soldier Creek (Utah), South Willow Creek (Tooele), Taylor Creek in Zion NP, Weber River, West Fork Bear River (Summit), West Fork Duchesne River, Whiterocks River.

***Aeshna interrupta*** Photo: Alan R. Myrup

HABITAT.—Marshes, ponds, slow-moving streams and stream backwaters in valleys and canyons; ponds and lakes in the mountains.

COMMENTS.—*Aeshna interrupta* is a common species that ranges throughout Utah at a wide range of elevations and a variety of wetlands. However, most records are from clear, unpolluted waters in the mountains and mountain valleys. It has not been found in the desert areas of the Great Basin. Adults usually appear earlier in the season than *Aeshna palmata* at a given location.

RANK.—G5, N5, S3; recommended S5.

### *Aeshna juncea* (Linnaeus)
### Sedge Darner

COUNTY RECORDS.—(5 of 29) Daggett, Duchesne, Summit, Uintah, Wasatch.

ELEVATION RANGE.—2621–3207 m (8600–10,520 ft).

FLIGHT SEASON.—29 Jun–5 Sep.

U.S. RANGE.—Alaska, Canada, and extreme northeastern U.S.; south through the Cascades to Oregon and south through the Rockies to Utah, Colorado, and northern New Mexico.

UTAH RANGE.—Map 4. Scattered populations throughout the Uinta Mountains of northeastern Utah.

ECOREGIONS.—Wasatch and Uinta Mountains.

DRAINAGES.—Upper reaches of Ashley Creek (Uintah), Beaver Creek and Sheep Creek (Daggett), Burnt Fork (Summit), Provo River, Whiterocks River.

HABITAT.—High mountain bogs and sedge ponds, less common at larger, deeper lakes, even when lined with sedges.

COMMENTS.—*Aeshna juncea* is one of several boreal dragonflies whose Utah distribution is limited to the higher elevations of the Uinta Mountains in northeastern Utah. It appears to be less common and more local than *Aeshna eremita.* However, there are many areas where this species may exist in the Uinta Mountains Wilderness Area that are not accessible except by horse or on foot and that have not yet been investigated. This beautifully jeweled darner has a reduced abdominal mosaic pattern of pale blue and green spots against a dark brown background that creates a stunning contrast of dark and light.

RANK.—G5, N4, SNR; recommended S3.

### *Aeshna palmata* Hagen
### Paddle-tailed Darner

COUNTY RECORDS.—(28 of 29) All counties except Tooele.

ELEVATION RANGE.—1299–3235 m (4262–10,614 ft).

FLIGHT SEASON.—25 May–23 Oct; records by month: May (1), Jun (0), Jul (56), Aug (82), Sep (83), Oct (20).

U.S. RANGE.—Southern coastal Alaska, western Canada, and U.S. to southern California, northern Arizona, and New Mexico.

UTAH RANGE.—Map 5. Widespread throughout Utah, less common in the Great Basin Desert.

ECOREGIONS.—All 7 ecoregions found in Utah.

DRAINAGES.—American Fork Creek, Bear Lake watershed, Bear River, Beaver Creek (Daggett), Beaver River, Big Cottonwood Creek (Salt Lake), Blacks Fork (Summit), Box Creek (Piute), Cottonwood Creek (Duchesne), Coyote Wash (Uintah), Currant Creek (Wasatch), Deer Creek (Garfield), Desert Lake WMA (Emery), Diamond Fork Creek (Utah), Duchesne River, Duck Creek (Kane), East Canyon Creek (Summit), Echo Creek (Summit), Farmington Creek, Fish Creek (Carbon), Fremont River, Great Basin springs, Great Salt Lake watershed, Green River, Huntington Creek (Emery), Indian Creek (San Juan), Jordan River, Kolob Creek (Washington), Lake Fork River (Duchesne), Logan River, Mammoth Creek (Garfield), Mill Creek (Grand), North Creek (Garfield), Oak Creek (Millard), Oak Creek (Sanpete), Ogden River, Otter Creek (Piute), Parowan Creek, Payson Creek, Price River, Provo River, Quail Creek, Raft River, Rock Creek (Duchesne), Salt Creek (Juab), San Pitch River (Sanpete), Sevier River, Silver Creek (Summit), Soapstone Creek (Wasatch), Spanish Fork River, Uinta River (Duchesne), Utah Lake watershed, West Fork Duchesne River, Weber River, Willow Creek (Sevier), Woodruff Creek (Rich).

***Aeshna palmata*** Photo: Jim T. Johnson

HABITAT.—Ponds, springs, marshes, lakes, streams, oxbows, canyons.

COMMENTS.—*Aeshna palmata* tolerates a wide range of habitats and elevations, from valley marshes to high mountain lakes as well as streams of varying types. It is the most common and widespread mosaic darner found throughout Utah from midsummer to late fall. It is often seen in late summer, hawking in canyons and forming evening swarms in open

meadows, parks, and neighborhoods, crisscrossing over lawns and streets. High-mountain specimens from the western end of the Uinta Mountains have narrower pale lateral thoracic stripes than specimens from other populations in Utah. The Tooele County record listed in Musser (1962) as "Deep Springs at Callao" is actually located in Juab County. Like *Aeshna interrupta*, *A. palmata* appears to avoid the more alkaline/saline wetlands of the Great Basin Desert.

RANK.—G5, N5, S3; recommended S5.

### *Aeshna persephone* Donnelly
### Persephone's Darner

COUNTY RECORDS.—(2 of 29) Kane, Washington.

ELEVATION RANGE.—975–2125 m (3200–6970 ft).

FLIGHT SEASON.—8 Aug–10 Oct.

U.S. RANGE.—Southern Utah, Arizona, New Mexico, and south into Mexico.

UTAH RANGE.—Map 6. Extreme southern Utah.

ECOREGIONS.—Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains.

DRAINAGES.—Drip Tank Wash (Kane), East Fork Virgin River, Leeds Creek, Pleasant Grove Creek (Kane), Quail Creek, Taylor Creek and Weeping Rock Creek in Zion NP.

HABITAT.—Southwest canyons with permanent streams and streamside vegetation.

COMMENTS.—Southern Utah is at the northern edge of the known range for *Aeshna persephone*. Records exist for *A. persephone* in the Grand Staircase National Monument and Zion National Park, as well as in a few neighboring canyons including Leeds Canyon and Red Cliffs Recreation Area (BLM). Although uncommon at most locations, this large mosaic darner is relatively common in September along Taylor Creek in the Kolob Canyon area of Zion National Park (Myrup 2012). Its preferred habitat (wooded, desert canyon streams) is a scarce commodity in Utah. With the increase in the human population in southwestern Utah and the growing need for water, habitats for this species outside of the national parks could be threatened in the future. Fortunately, due to their natural state and inaccessibility, many of the streams in the Virgin River drainage (266 km or 165.5 river miles) have been designated "Wild and Scenic Rivers" by the Omnibus Public Lands Management Act of 2009 (111th United States Congress 2009) and therefore have some protection.

***Aeshna sitchensis*** Photo: Dennis Paulson

RANK.—G3, N2, SNR; recommended S1.

### *Aeshna sitchensis* Hagen
### Zigzag Darner

COUNTY RECORDS.—(5 of 29) Daggett, Duchesne, Summit, Uintah, Wasatch.

ELEVATION RANGE.—2835–3245 m (9300–10,645 ft).

FLIGHT SEASON.—29 Jun–5 Sep; records by month: Jun (2), Jul (1), Aug (6), Sep (5).

U.S. RANGE.—Alaska, across Canada, through northern Minnesota, Michigan, and Maine; down the Cascades to Oregon and the Rockies to northern Utah.

UTAH RANGE.—Map 7. Scattered populations are found in the Uinta Mountains of northeastern Utah.

ECOREGIONS.—Wasatch and Uinta Mountains.

DRAINAGES.—The upper reaches of Ashley Creek (Uintah), Duchesne River, Provo River, Sheep Creek (Daggett), and Whiterocks River.

HABITAT.—High-elevation bogs, ponds, and wet meadows.

COMMENTS.—*Aeshna sitchensis* is the smallest member of the family Aeshnidae in Utah. The Uinta Mountains of northeastern Utah hold the southernmost populations of this species. Although local in distribution, it can be quite common at a given location. It perches horizontally on logs or bare areas on the ground in boggy meadows, unlike most darners which typically hang vertically. Mating pairs leave the meadows and retire to the nearby forests.

RANK.—G5, N3, SH; recommended S3.

*Aeshna umbrosa* Walker
Shadow Darner

COUNTY RECORDS.—(22 of 29) Beaver, Box Elder, Cache, Carbon, Daggett, Davis, Duchesne, Garfield, Grand, Juab, Kane, Morgan, Salt Lake, San Juan, Sanpete, Sevier, Summit, Uintah, Utah, Wasatch, Washington, Weber.

ELEVATION RANGE.—969–2344 m (3179–7690 ft). One nymph record at 3079 m (10,102 ft).

FLIGHT SEASON.—23 Jul–20 Oct; records by month: Jul (3), Aug (10), Sep (20), Oct (6).

U.S. RANGE.—Widespread throughout the U.S. except the extreme south.

UTAH RANGE.—Map 8. Widespread at low to moderate elevations throughout Utah.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Northern Basin and Range, Wasatch and Uinta Mountains.

DRAINAGES.—Ashley Creek (Uintah), Bear River, Beaver Creek (Summit), Beaver River, Big Cottonwood Creek (Salt Lake), Blacksmiths Fork River, Clear Creek (Sevier), Colorado River tributaries, Duchesne River, Fish Creek (Carbon), Great Salt Lake watershed, Logan River, Ogden River, Provo River, Raft River, Salt Creek (Juab), San Pitch River (Sanpete), Spanish Fork River, Utah Lake watershed, Weber River.

HABITAT.—Some records from larger rivers, most from smaller streams, often with shaded areas and ponds; also found hawking in open areas near streams.

COMMENTS.—*Aeshna umbrosa* is less common than *Aeshna palmata*, flying in late summer and fall. They can be found patrolling very low and meticulously along the edges of small shaded streams. They occasionally fly with other mosaic darners in evening feeding swarms. Several nymph records from Musser (1962) are from small tributaries of the Colorado River that are now covered with the waters of Lake Powell. The upper reaches of these tributaries may still hold populations of *A. umbrosa.* Other southern Utah nymph records from Musser (1962) have not been duplicated with adult records due to little collecting in these areas in late August and September when adults would be flying. Some populations along the Wasatch Front have been affected by urbanization and loss of habitat due to the piping of waterways and the alteration of streams to prevent erosion. *Aeshna umbrosa* can be distinguished from *A. palmata* by its pairs of pale blue spots on the ventral surface of abdominal segments 4–7 and the pale tan color on the posterior portion of the head. *Aeshna palmata* lacks pale blue spots on the ventral surface and is black on the posterior portion of the head.

RANK.—G5, N5, S3; recommended S3.

*Anax junius* (Drury)
Common Green Darner

COUNTY RECORDS.—(27 of 29) all counties except Daggett and Rich.

ELEVATION RANGE.—785–2640 m (2575–8860 ft).

FLIGHT SEASON.—1 May–10 Nov; records by month: May (6), Jun (25), Jul (33), Aug (28), Sep (28), Oct (1), Nov (1).

U.S. RANGE.—Widespread throughout the U.S.

UTAH RANGE.—Map 9. Widespread throughout Utah, primarily at lower elevations.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains.

DRAINAGES.—Ash Creek (Washington), Bear River, Beaver Dam Wash, Beaver River, Blacksmiths Fork, Calf Creek (Garfield), Chicken Creek (Juab), Colorado River, Cottonwood Creek (Duchesne), Desert Lake WMA (Emery), Duchesne River, Escalante River, Fremont River, Great Basin springs, Great Salt Lake watershed, Green River, Indian Creek (San Juan), Jordan River, Kanab Creek, Logan River, Nine Mile Creek (Carbon), Price River, Provo River, Quail Creek, Round Valley Creek (Millard), San Pitch River (Sanpete), Santa Clara River, Sevier River, Spanish Fork River, Thistle Creek

***Anax junius*** Photo: Jim T. Johnson

(Utah), Utah Lake watershed, Virgin River, Weber River.

HABITAT.—Valley wetlands, midelevation lakes.

COMMENTS.—*Anax junius*, although widespread throughout the state, is not usually found in large numbers at any given location. It is more common at lower elevations at a variety of lakes, streams, marshes, ponds, and springs, as well as in evening swarms away from water. There are a few records from higher elevations. Early season records may be migrants that enter the state from the south each spring, while local breeding populations emerge later (Paulson 2009). With its large, robust, green thorax and sky-blue abdomen, *A. junius* stands out among the more common mosaic darners in evening swarms. In a swarm of 10–20 darners, only 1 or 2 are likely to be *Anax junius*, prompting one of the authors, as a child, to call them the kings and queens of the swarm.

RANK.—G5, N5, S3; recommended S5.

### *Anax walsinghami* McLachlan
### Giant Darner

COUNTY RECORDS.—(6 of 29) Grand, Juab, San Juan, Sevier, Tooele, Washington.

ELEVATION RANGE.—762–1634 m (2500–5360 ft).

FLIGHT SEASON.—17 May–2 Sep.

U.S. RANGE.—Scattered populations in southwestern U.S., California to western Texas.

UTAH RANGE.—Map 10. Populations in southwestern Utah (Washington), Fish Springs NWR (Juab); single records elsewhere.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range.

DRAINAGES.—Beaver Dam Wash, Fish Springs (Juab), North Creek (Washington), Quail Creek, Santa Clara River (Washington), Virgin River.

HABITAT.—Springs, ponds, permanent desert streams.

COMMENTS.—*Anax walsinghami* is the largest dragonfly in North America, a stunning sight for first-time viewers. Although usually found in small numbers, Fish Springs National Wildlife Refuge (Juab) and Lytle Ranch Preserve in the Beaver Dam Wash (Washington) are locations where it can be found consistently. Recent sightings (not mapped) by the authors are from the Santa Clara River below Gunlock Reservoir (2010) and the right fork of North Creek (Zion NP, 2011) where several were observed. Literature records listed for Fish Springs, Tooele County (Musser 1962), should be corrected to Juab County, as Fish Springs NWR is entirely within Juab County (Jay Banta, personal communication, U.S. Fish and Wildlife

Service, Fish Springs NWR 2007). However, there is one Tooele County nymph record (Skull Valley) for this species. The nymph record for Grand County is from a location where habitat no longer exists. The nymph record for San Juan County (Lake Canyon) is now under the waters of Lake Powell. The many tributaries of the Colorado River buried under Lake Powell hold potential habitat where this species may have existed in the past. Fortunately, there are areas where this species gains some protection from potential human impact, such as Fish Springs National Wildlife Refuge, Lytle Ranch Preserve, and Zion National Park.

RANK.—G5, N5, SH; recommended S2.

*Oplonaeschna armata* (Hagen)
Riffle Darner

COUNTY RECORDS.—(2 of 29) Iron, Washington.

ELEVATION RANGE.—1326–2652 m (4350–8700 ft).

FLIGHT SEASON.—10 Jul–12 Aug.

U.S. RANGE.—Arizona, New Mexico, California.

UTAH RANGE.—Map 11. Southwestern Utah including Zion NP.

ECOREGIONS.—Colorado Plateau, Wasatch and Uinta Mountains.

DRAINAGES.—Bowery Creek and Spring Creek (Iron), Taylor Creek and Weeping Rock Creek in Zion NP.

HABITAT.—Desert canyons with permanent streams in southwestern Utah.

COMMENTS.—Southern Utah is at the northern edge of the range of *Oplonaeschna armata,* where it can be found patrolling along small wooded desert-canyon streams just above the surface, methodically searching the edges of streamside vegetation. Zion National Park holds populations in at least 2 streams, including Weeping Rock Creek in Zion Canyon and Taylor Creek in the Kolob Canyon area. Other streams in Zion National Park may also hold populations but have not been sampled. The restricted habitat of *O. armata* and *Aeshna persephone* leaves their populations vulnerable as the human population increases in southwestern Utah and the need for water increases. Fortunately, due to their natural state and inaccessibility, many of the streams in the Virgin River drainage (266 km, or 165.5 river miles) have been designated "Wild and Scenic Rivers" by the Omnibus Public Lands Management Act of 2009 (111th United States Congress 2009) and therefore have some protection.

RANK.—G4, N4, S1; recommended S1.

*Rhionaeschna californica* (Calvert)
California Darner

COUNTY RECORDS.—(19 of 29) Beaver, Box Elder, Cache, Davis, Duchesne, Grand, Juab, Millard, Morgan, Salt Lake, San Juan, Sanpete, Sevier, Summit, Tooele, Uintah, Utah, Wasatch, Weber.

ELEVATION RANGE.—1280–2292 m (4200–7520 ft).

FLIGHT SEASON.—15 Apr–30 Jul; records by month: Apr (3), May (26), Jun (48), Jul (20), Aug (0).

U.S. RANGE.—Northwestern U.S., south through California, west to Montana, down through Idaho, Wyoming, Utah, and Colorado.

UTAH RANGE.—Map 12. Northern and central Utah.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Wasatch and Uinta Mountains.

DRAINAGES.—Bear River, Beaver River, Bennie Creek (Utah), Diamond Fork Creek (Utah), Duchesne River, Farmington Creek, Great Basin springs, Great Salt Lake watershed, Green River (Uintah), Jordan River, Logan River, Maple Canyon Creek (Utah), Ogden River, Payson Creek, Provo River, San Pitch River, Sevier River, Spanish Fork River, Thistle Creek (Utah), Weber River.

HABITAT.—Ponds, marshes, springs, wetlands adjacent to rivers.

COMMENTS.—The California Darner is quite common in spring at most valley wetlands from the northern half of the state south to central Utah including the Great Basin, Sevier River Valley, and the Uintah Basin. It appears to be less common on the Colorado Plateau, and there are no records from the higher Wyoming Basin areas in Utah. *Rhionaeschna californica* is 1 of 3 dragonflies that emerges early in the season in northern Utah, along with *Leucorrhinia intacta* and *Libellula quadrimaculata.* It can often be found hawking in the afternoon in warmer south- and west-facing canyons during late April and May.

RANK.—G5, N5, SH; recommended S4.

***Rhionaeschna multicolor*** Photo: Nicky Davis

*Rhionaeschna multicolor* (Hagen)
Blue-eyed Darner

COUNTY RECORDS.—(28 of 29) all counties except Rich.

ELEVATION RANGE.—785–2649 m (2575–8690 ft).

FLIGHT SEASON.—28 Apr–24 Oct; records by month: Apr (1), May (5), Jun (44), Jul (73), Aug (40), Sep (14), Oct (1).

U.S. RANGE.—Western U.S., east to Kansas, Iowa, and Texas.

UTAH RANGE.—Map 13. Widespread throughout Utah.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains, Wyoming Basin.

DRAINAGES.—Bear River, Beaver Dam Wash, Beaver River, Calf Creek (Garfield), Chicken Creek (Juab), Colorado River, Coyote Gulch (Kane), Desert Lake WMA (Emery), Duchesne River, Escalante River, Farmington Creek, Fremont River, Great Basin springs, Great Salt Lake watershed, Green River, Indian Creek (San Juan), Johnson Creek (San Juan), Kanab Creek, Logan River, Mill Creek (Salt Lake), Oak Creek (Millard), Ogden River, Parowan Creek, Payson Creek, Price River, Provo River, Salt Creek (Juab), Sevier River, Sheep Creek (Kane), South Willow Creek (Tooele), Spanish Fork River, Utah Lake watershed, Virgin River, Weber River.

HABITAT.—Primarily valley wetlands of various types including ponds, lakes, springs, marshes, and streams; occasionally higher elevation ponds and lakes.

COMMENTS.—*Rhionaeschna multicolor* is one of Utah's most common and widespread darners at lower-elevation wetlands, including the widely scattered wetlands of the Great Basin which *Aeshna palmata* and *A. interrupta* seem to avoid. Although it does not have the large elevation ranges of *A. palmata* and *A. interrupta*, it does have an extended flight season beginning earlier in the season (late spring) and lasting into fall. *Rhionaeschna multicolor* is often observed far from water, flying in city neighborhoods and nearby canyons. Its habitat is similar to *Rhionaeschna californica*, but it typically flies later at a given location. One example comes from Maple Canyon east of Springville (Utah Co.), where *R. californica* was found hawking in swarms on 30 May 2012; on 20 June 2012, large numbers of *R. multicolor* were found swarming at the same location.

RANK.—G5, N5, S3; recommended S5.

Family Gomphidae (5 Genera, 8 Species)

*Erpetogomphus compositus* Hagen in Selys
White-belted Ringtail

COUNTY RECORDS.—(10 of 29) Emery, Garfield, Juab, Kane, Millard, Salt Lake, Tooele, Uintah, Washington, Wayne.

ELEVATION RANGE.—786–1628 m (2580–5340 ft).

FLIGHT SEASON.—9 Jun–6 Oct; records by month: Jun (4), Jul (11), Aug (12), Sep (8), Oct (7).

U.S. RANGE.—Southwestern U.S., from Texas to California, north to extreme western

***Erpetogomphus compositus*** Photo: Alan R. Myrup

Colorado, Utah, Nevada, southwestern Idaho, Oregon, and Washington.

UTAH RANGE.—Map 14. Desert springs in the Great Basin, scattered populations throughout Utah, mainly in lower elevation streams and rivers.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range.

DRAINAGES.—Ash Creek (Washington), Beaver Dam Wash, Calf Creek (Garfield), Coyote Gulch (Kane), Fremont River, Great Basin springs, Green River, Jordan River, Kanab Creek, Leeds Creek (Washington), North Creek (Washington), Santa Clara River, Virgin River.

HABITAT.—Lower-elevation rocky, gravelly, sandy to muddy bottomed streams and rivers, desert springs, and spring runs.

COMMENTS.—*Erpetogomphus compositus* is likely more widespread in Utah than the records indicate. Other possible locations include isolated Great Basin desert springs in Beaver and Iron Counties and along the Colorado and Green Rivers and their tributaries in Carbon, Emery, Grand, and San Juan Counties. Many of these areas are in deep canyons more accessible by river boats. The Box Elder County record listed by Donnelly (2004) and on Odonata Central (OC#189382; Abbott 2012–2015) comes from Musser (1962). Musser listed Box Elder County under her "distribution" section but did not list a location in her "specimens examined" section with the other records, as was her typical pattern. Although *E. compositus* likely exists in Box Elder County possibly along the Bear River or Malad River, the record has been removed until a confirmation can be made. This brightly patterned dragonfly typically perches horizontally on rocks, gravel beds, or debris in the middle of the stream or along the edges. Females are more likely to be found away from the stream.

RANK.—G5, N5, SH; recommended S4.

### *Gomphus externus* Hagen in Selys
### Plains Clubtail

COUNTY RECORDS.—(6 of 29) Box Elder, Juab, Millard, Salt Lake, Tooele, Utah.

ELEVATION RANGE.—1292–1524 m (4238–5000 ft).

FLIGHT SEASON.—21 May–14 Sep.

U.S. RANGE.—The Great Plains from Montana to Ohio, south to Kentucky, Arkansas, Texas, and New Mexico; southern Idaho to central Utah.

UTAH RANGE.—Map 15. Northern to central Utah.

ECOREGIONS.—Central Basin and Range.

DRAINAGES.—Bear River (Box Elder), Currant Creek below Mona Reservoir (Juab), Deseret Land and Livestock Ranch and Horseshoe Springs (Tooele), Gandy Hot Springs (Millard), Jordan River, Malad River, Sevier River below Yuba Dam.

HABITAT.—Low-elevation, slow-moving, sandy to muddy bottomed streams and rivers, desert springs, and spring runs.

COMMENTS.—*Gomphus externus* is uncommon and local in its distribution mainly along slow, sandy to muddy bottomed rivers along the Wasatch Front or at desert springs in the Great Basin. Three of these locations are just below the dams at Sevier Bridge Reservoir (Juab), Mona Reservoir (Juab), and the Jordan River inlet from Utah Lake (Utah) where they appear to be more concentrated than at other locations. These bright, sulfur-tipped clubtails perch horizontally on flat surfaces such as rocks and sandbars along streams. They can be quite wary and difficult to approach. All *G. externus* specimens in the BYUC were recently reexamined and verified following the discovery of *Gomphus lynnae* in New Mexico.

RANK.—G5, N5, SH; recommended S3.

### *Ophiogomphus morrisoni* Selys
### Great Basin Snaketail

COUNTY RECORDS.—(3 of 29) Beaver, Sevier, Utah.

ELEVATION RANGE.—1384–2125 m (4540–6971 ft).

FLIGHT SEASON.—7–29 Jun.

U.S. RANGE.—A narrow line from west central Oregon, south along the eastern border of California, and extending eastward into northern Nevada and west central Utah.

UTAH RANGE.—Map 16. West central Utah.

ECOREGIONS.—Central Basin and Range, Wasatch and Uinta Mountains.

DRAINAGES.—Beaver River, Otter Creek, Provo River.

HABITAT.—Gravel to rocky bottomed streams.

COMMENTS.—This species is a recent addition to the Utah species list. The first discovery was made by Troy Hibbitts who photographed it on 7 June 2015 along the Beaver River below Minersville Reservoir, and it was vetted by Dennis Paulson (OC #432014). In August 2015, at the request of the authors, 2 older specimens from the USNM were examined and identified by Oliver Flint as *Ophiogomphus morrisoni.* One of these is also from Beaver County, while the other is from Provo, Utah. Upon the discovery of these 3 specimens, the authors conducted a search for possible misidentifications among the similar *O. severus* specimens in the BYUC and found another *O. morrisoni* collected near Otter Creek (Sevier) by Robert Mower on 27 June 2013. Interestingly, this specimen is not from the Central Basin and Range ecoregion but rather from the Wasatch and Uinta Mountains ecoregion. A search of these areas from mid-June to early July may turn up more locations for this species.

RANK.—G4, N4, SNR; recommended S1.

### *Ophiogomphus occidentis* Hagen
### Sinuous Snaketail

COUNTY RECORDS.—(3 of 29) Juab, Salt Lake, Washington.

ELEVATION RANGE.—1302–1524 m (4270–5000 ft).

FLIGHT SEASON.—Adult flight season unknown.

U.S. RANGE.—Washington to northern California and western Nevada, east to northern Idaho and western Montana.

UTAH RANGE.—Map 17. Literature records for Washington and Salt Lake Counties (Larsen 1952) and Juab County (Musser 1962).

ECOREGIONS.—Central Basin and Range.

DRAINAGES.—Jordan River, Sevier River, Virgin River.

HABITAT.—Locations in Utah are lowland, muddy bottomed streams.

COMMENTS.—All Utah records for *Ophiogomphus occidentis* are from the literature (Calvert 1899, Larsen 1952, Musser 1962 [nymph], Muttkowski 1910), and the specimens have not been located for verification. No recent records have been obtained from Utah.

RANK.—G4, N4, SH; recommended SH.

### *Ophiogomphus severus* Hagen
### Pale Snaketail

COUNTY RECORDS.—(20 of 29) Box Elder, Cache, Carbon, Daggett, Duchesne, Emery, Garfield, Iron, Juab, Kane, Piute, Salt Lake, Sanpete, Sevier, Summit, Tooele, Uintah, Utah, Washington, Wayne.

ELEVATION RANGE.—1014–2317 m (3325–7600 ft).

FLIGHT SEASON.—28 May–15 Sep; records by month: May (1), Jun (25), Jul (42), Aug (14), Sep (1).

U.S. RANGE.—Washington to northern California; west to South Dakota, Nebraska, Kansas, and New Mexico.

UTAH RANGE.—Map 18. Statewide where habitat is found.

***Ophiogomphus severus*** Photo: Alan R. Myrup

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Northern Basin and Range, Wasatch and Uinta Mountains.

DRAINAGES.—Bear River, Calf Creek (Garfield), Clear Creek (Sevier), Desert Lake WMA (Emery), Echo Creek (Summit), Escalante River, Fremont River, Huntington Creek (Emery), Leeds Creek (Washington), Neffs Canyon (Salt Lake), Nine Mile Creek (Carbon), Pine Creek (Garfield), Price River, Provo River, Raft River, Red Creek (Duchesne), Red Creek (Iron), Sand Creek (Wayne), San Pitch River, San Rafael River, Santa Clara River, Sevier River, Spanish Fork River, White River (Uintah), Willow Creek (Uintah).

HABITAT.—Smaller sandy to rocky bottomed streams, occasionally larger rivers.

COMMENTS.—*Ophiogomphus severus* is the most common and wide-ranging member of the family Gomphidae in Utah. It is typically found in smaller low to midelevation, sandy to rocky bottomed streams, although it can also be found along larger rivers. Further search of this habitat type throughout the state during late June and July should reveal additional populations. All Daggett County records are nymphs taken by Musser (1962) from small tributaries of the Green River that are now under the waters of Flaming Gorge Reservoir. However, there is habitat farther upstream in these small creeks where populations may still exist. Nymph records from Salt Lake County (Musser 1962) have not been repeated. Some of these records came from canals or small creeks where habitat has been greatly altered (urbanization, channelization, or piping) and may no longer be able to support the nymphs. One adult record exists from Salt Lake County; the specimen was taken from Neffs Canyon by John Richards in 1980.

RANK.—G5, N5, S3; recommended S4.

*Progomphus borealis* McLachlan in Selys
Gray Sanddragon
(Photo, page 28)

COUNTY RECORDS.—(3 of 29) Kane, San Juan, Washington.

ELEVATION RANGE.—792–1611 m (2600–5285 ft).

FLIGHT SEASON.—14 Jun–13 Aug.

U.S. RANGE.—California, Arizona, east to Texas; extreme southern Nevada and Utah; one record in northern Nevada and one in southwest Idaho.

UTAH RANGE.—Map 19. Extreme southern Utah.

ECOREGIONS.—Colorado Plateau, Mojave Basin and Range.

DRAINAGES.—Ash Creek (Washington), Beaver Dam Wash, Kanab Creek (Kane), Leeds Creek, North Creek (Washington), Santa Clara River, Virgin River, West Canyon (San Juan).

HABITAT.—Sandy to rocky bottomed desert streams.

COMMENTS.—Adults have been taken from several tributaries of the Virgin River in Washington County, including streams in Zion National Park. Nymphs were taken from Kanab Creek in late July 2012 leaving meandering trails in the sandy-bottomed stream. The San Juan County record is from a tributary of the Colorado River in the Glen Canyon National Recreation Area (Musser 1959) now submerged under Lake Powell. This is a southern species which ranges north into southern Utah. *Progomphus borealis* usually flies earlier than *Erpetogomphus compositus* at a given location, but their flight seasons can overlap.

RANK.—G5, N4, SH; recommended S3.

*Stylurus intricatus* (Hagen) in Selys
Brimstone Clubtail

COUNTY RECORDS.—(6 of 29) Daggett, Garfield, Grand, San Juan, Uintah, Washington.

ELEVATION RANGE.—1036–1766 m (3400–5795 ft).

FLIGHT SEASON.—13 Jul–27 Oct.

U.S. RANGE.—Nevada, east to Iowa and Missouri, southern California, east to Arizona, New Mexico, and west Texas.

***Progomphus borealis*** Photo: Alan R. Myrup

UTAH RANGE.—Map 20. Eastern and southwestern Utah.

ECOREGIONS.—Colorado Plateau, Mojave Basin and Range, Wyoming Basin.

DRAINAGES.—Colorado River, Green River, Santa Clara River, White River.

HABITAT.—"Rivers having coarse to fine-grained sandy bottoms relatively free of large debris seem to be the preferred habitat of the nymphs." (Musser 1962).

COMMENTS.—Literature records from Daggett, Garfield, and San Juan Counties are from studies done in areas now submerged under Flaming Gorge Reservoir on the Green River (Musser 1960) and Lake Powell on the Colorado River (Musser 1959, 1962). Although *Stylurus intricatus* is uncommon, there is much habitat that has not been sampled in the deep, remote canyons of the Green, White and Colorado Rivers of the Colorado Plateau, accessible only by whitewater river boats. More recent records are from the Santa Clara River (Washington) and the White River (Uintah). Along the White River south of Bonanza (Uintah), males were observed making short runs just above the riffles then returning to hanging perches in streamside vegetation. Females were observed in nearby riparian vegetation away from the water's edge.

RANK.—G4, N4, SH; recommended S1.

*Stylurus olivaceus* (Selys)
Olive Clubtail

COUNTY RECORDS.—(2 of 29) Sevier, Salt Lake.

ELEVATION RANGE.—1289–1585 m (4230–5200 ft).

FLIGHT SEASON.—20 Jul–13 Aug.

U.S. RANGE.—Washington to central California, east to Nevada, Idaho, and Utah.

UTAH RANGE.—Map 21. Northern to central Utah.

ECOREGIONS.—Central Basin and Range.

DRAINAGES.—Jordan River, Sevier River.

HABITAT.—Rivers with muddy bottom substrates. Nymphs were taken from several streams and canals in the Salt Lake Valley (Musser 1962).

COMMENTS.—The lower Jordan River in Salt Lake County appears to have a thriving population of *Stylurus olivaceus* in an urban setting. There is only one record (3 nymphs) from Sevier County (Musser 1962). However, recent sightings have occurred along the Sevier River in Marysvale Canyon (Sevier) and below Piute Reservoir (Piute), but no vouchers or photographs were taken. Adults hang vertically in trees and shrubs along slow-moving, muddy-bottomed rivers making them difficult to find with their pale gray-green coloration. They occasionally fly over streams just above the surface of the water.

RANK.—G4, N4, SH; recommended S1.

***Stylurus olivaceus*** Photo: Nicky Davis

Family Cordulegastridae (1 Genus, 2 Species)

*Cordulegaster diadema* Selys
Apache Spiketail

COUNTY RECORDS.—(1 of 29) Washington.

ELEVATION RANGE.—1334–1545 m (4375–5070 ft).

FLIGHT SEASON.—2 Aug–30 Oct.

U.S. RANGE.—Extreme southwestern Utah, Arizona, extreme southwestern New Mexico into Mexico.

UTAH RANGE.—Map 22. Southwestern Utah (Zion NP).

ECOREGIONS.—Colorado Plateau.

DRAINAGES.—North Creek, Virgin River.

HABITAT.—Permanent desert canyon streams.

COMMENTS.—In Utah, *Cordulegaster diadema* appears to be restricted to Zion National Park which is the northern end of its known range. All collected specimens have come from the small stream below Weeping Rock in Zion Canyon. There are also 2 photo records: one from the Emerald Pools trail in Zion Canyon (Bedell and Loarie 2013) and another from the "Subway" on the Left Fork of North Creek (Davis 2013a). Interestingly, both *Cordulegaster* species found in Utah have been observed from Weeping Rock Creek, with only *C. dorsalis* present on 12 Aug 2011 and only *C. diadema* on 24 Sept 2011.

RANK.—G4, N2N3, SH; recommended S1.

*Cordulegaster dorsalis* Hagen in Selys
Pacific Spiketail

COUNTY RECORDS.—(11 of 29) Daggett, Garfield, Iron, Juab, Millard, Salt Lake, Sevier, Utah, Wasatch, Washington, Weber.

ELEVATION RANGE.—1326–2027 m (4350–6650 ft).

FLIGHT SEASON.—15 May–12 Sep.

U.S. RANGE.—Western U.S., east to western Montana, western Colorado, and northern New Mexico.

UTAH RANGE.—Map 23. Central mountains from northern to southern Utah, particularly on the Great Basin side; also in Crouse Creek (Daggett).

ECOREGIONS.—Colorado Plateau, Wasatch and Uinta Mountains.

DRAINAGES.—Bennie Creek (Utah), Calf Creek, Henrieville Creek and Sand Creek in the Grand Staircase–Escalante National Monument (Garfield), Chalk Creek (Millard), City Creek (Salt Lake), Clear Creek (Sevier), Corner Canyon Creek (Salt Lake), Crouse Creek (Daggett), Dry Canyon and School House Springs (Utah), Leeds Creek (Washington), Maple Grove Campground springs (Millard), Ogden River (Weber), Pigeon Creek (Juab), Pine Creek near Midway (Wasatch), Red Butte Creek (Salt Lake), Spring Creek (Iron), Taylor Creek and Virgin River in Zion NP.

HABITAT.—Small rocky to sandy bottomed, permanent canyon streams and springs at low to midelevations.

COMMENTS.—Large size, bold abdominal pattern of yellow on black, and sky blue eyes make both *Cordulegaster* species a spectacular sight. These 2 species can be distinguished by examining the paired dorsal yellow abdominal

***Cordulegaster dorsalis deserticola*** Photo: Jim T. Johnson

***Macromia magnifica*** Photo: Jim T. Johnson

spots on *C. dorsalis* in contrast to yellow abdominal rings on *C. diadema. Cordulegaster dorsalis* is much more widespread in Utah than *C. diadema.* It can be found in small local populations at permanent canyon streams and springs throughout the central mountain ranges and along the Colorado border. Most of these localities could easily be negatively impacted as the human need for water increases. Adults patrol long beats along streams and nearby canyon roads. There have also been sightings of this species in both Beaver (Alan Myrup, 2008) and Grand Counties (Kathy Biggs, 2011), but these have not been plotted on the species map, as no photographs or vouchers were taken.

RANK.—G5, N5, SH; recommended S3.

Family Macromiidae (1 Genus, 1 Species)

*Macromia magnifica* McLachlan in Selys
Western River Cruiser

COUNTY RECORDS.—(4 of 29) Sevier, Tooele, Uintah, Utah.

ELEVATION RANGE.—1292–1524 m (4240–5000 ft).

FLIGHT SEASON.—9 Jun–13 Jul.

U.S. RANGE.—Western U.S., east to Idaho, Nevada, and Utah.

UTAH RANGE.—Map 24. Scattered populations in northern and central Utah.

ECOREGIONS.—Central Basin and Range, Colorado Plateau.

DRAINAGES.—Goshen Warm Springs (Utah), Green River (Uintah), Horseshoe Springs (Tooele), Sevier River (Sevier).

HABITAT.—Rivers with sandy to muddy bottoms, spring runs.

COMMENTS.—*Macromia magnifica* is one of the rarest dragonflies in Utah, with records from only 4 locations. Two records are from small spring runs in the Central Basin and Range ecoregion while the other 2 are from sandy to muddy bottomed rivers: the Sevier River near Salina and the Green River near Split Mountain Gorge in Dinosaur National Monument (Myrup 2007). Another possible location is the Bear River in Cache County where one possible sighting occurred.

RANK.—G5, N5, SNR; recommended S1.

Family Corduliidae (2 Genera, 3 Species)

*Cordulia shurtleffii* Scudder
American Emerald

COUNTY RECORDS.—(8 of 29) Cache, Daggett, Duchesne, Emery, Sanpete, Summit, Uintah, Wasatch.

ELEVATION RANGE.—2353–3152 m (7720–10,340 ft).

FLIGHT SEASON.—17 Jun–10 Aug.

U.S. RANGE.—Alaska across Canada to Newfoundland. In the West, south to central California and down the Rockies to Colorado

***Cordulia shurtleffii*** Photo: Jim T. Johnson

and Utah, absent from the Great Basin and the Great Plains in the U.S. In the East, from Minnesota to Maine, south down the Appalachians to North Carolina.

UTAH RANGE.—Map 25. Wasatch and Uinta Mountains, Wasatch Plateau.

ECOREGIONS.—Wasatch and Uinta Mountains.

DRAINAGES.—Ashley Creek (Uintah), Blacks Fork (Summit), Carter Creek (Daggett), Duchesne River, Hayden Fork (Summit), Logan River, Lowery Water at Potters Pond (Emery), Provo River, Seely Creek at Petes Hole (Sanpete), Soapstone Creek (Wasatch), Uinta River (Duchesne), West Fork Bear River (Summit), West Fork Duchesne River (Wasatch), Whiterocks River.

HABITAT.—High mountain ponds, bogs, river backwaters, lakes, and small reservoirs.

COMMENTS.—*Cordulia shurtleffii* can be abundant at a given location, although it is not as widespread in Utah as *Somatochlora semicircularis* with which it often shares the same habitat. *Cordulia shurtleffii* is abundant at Tony Grove Lake in Logan Canyon as well as many areas throughout the Uinta Mountains, while curiously limited to a few areas (Potters Ponds and Soup Bowl) on the Wasatch Plateau. It is more likely to be found at man-made reservoirs than *Somatochlora semicircularis*. Adults of *C. shurtleffii* emerge earlier than adults of *S. semicircularis* at a given location, although their flight periods can overlap. Individuals of this species patrol pond edges at about knee- to waist-high, stopping to hover every few feet and appearing to stare down the observer with their stunning, bright electric-green eyes.

RANK.—G5, N5, S2; recommended S4.

### *Somatochlora hudsonica* (Hagen) in Selys
### Hudsonian Emerald

COUNTY RECORDS.—(3 of 29) Daggett, Duchesne, Summit.

ELEVATION RANGE.—3101–3109 m (10,175–10,200 ft).

FLIGHT SEASON.—11 Jul–7 Aug.

U.S. RANGE.—Alaska, east to the Hudson Bay, and south down the Rockies through Montana and Wyoming to Colorado and northeastern Utah.

UTAH RANGE.—Map 26. The north slope of the Uinta Mountains in the Spirit Lake area of Daggett and Summit Counties.

ECOREGIONS.—Wasatch and Uinta Mountains.

DRAINAGES.—Sheep Creek (Daggett and Summit), Whiterocks River (Duchesne).

HABITAT.—High mountain sedge and bog ponds, slower portions of streams.

COMMENTS.—*Somatochlora hudsonica* was first discovered in Utah in 2007 from the Spirit Lake area at the northeast end of the Uinta Mountains (Myrup 2008). It has been collected at 3 separate locations during 4 different years. One location is a small bog in a meadow just east of the Spirit Lake dam. Another is less than a mile away along a small creek entering Spirit Lake from the west. In 2013, it was collected for the first time on the south slope on the Uinta Mountains in the upper Whiterocks River drainage in large bog ponds southwest of Chepeta Lake. The area needs further study to determine the species' breeding locations and range in Utah. Due to the paucity of collection records, *S. hudsonica* has been designated a sensitive species by the Rocky Mountain Region of the USDA Forest Service (Packauskas 2005). The Sheep Creek drainage, where this species has been found, was poisoned with rotenone during September 2012 by the UDWR in order to remove nonnative trout and subsequently reintroduce native Colorado River cutthroat trout. The UDWR was notified about this sensitive species and its known locations in the Sheep Creek drainage prior to the treatment. According to the UDWR, the small bog near

***Somatochlora semicircularis*** Photo: Alan R. Myrup

Spirit Lake was not to be treated because it was not connected to the river system, while the stream entering Spirit Lake was to receive treatment. The effects on aquatic insect larvae from this treatment are unknown.

RANK.—G5, N2N3, SU; recommended S1.

*Somatochlora semicircularis* (Selys)
Mountain Emerald

COUNTY RECORDS.—(17 of 29) Beaver, Daggett, Duchesne, Emery, Garfield, Grand, Iron, Salt Lake, San Juan, Sanpete, Sevier, Summit, Uintah, Utah, Wasatch, Wayne, Weber.

ELEVATION RANGE.—2515–3387 m (8250–11,112 ft).

FLIGHT SEASON.—13 Jun–5 Sep.

U.S. RANGE.—Southern Alaska; south down the Rockies through Idaho and Montana to Colorado, Utah, and northern New Mexico; Washington, south down the Cascades and Sierra Nevada Mountains to central California and western Nevada.

UTAH RANGE.—Map 27. Many of Utah's mountain ranges including the Uinta Mountains, Wasatch Mountains, Wasatch Plateau, Boulder Mountains, LaSal Mountains, Tushar Mountains, Markagunt Plateau and the Fish Lake area.

ECOREGIONS.—Southern Rockies, Wasatch and Uinta Mountains.

DRAINAGES.—Ashley Creek (Uintah), Beaver River, Big Cottonwood Creek (Salt Lake), Blacks Fork (Summit), Carter Creek (Daggett), Duchesne River, East Fork Smiths Fork (Summit), Geyser Creek (San Juan), Hayden Fork (Summit), Little West Fork (Wasatch), Lowery Water at Potters Pond (Emery), Mill Creek (Grand), Miller Flat Creek (Sanpete and Emery), Parowan Creek, Pine Creek (Garfield), Pine Creek (Wayne), Provo River, Seven Mile Creek (Sevier), Sheep Creek (Daggett), Soapstone Creek (Wasatch), Uinta River (Duchesne), Weber River, West Fork Bear River (Summit), Whiterocks River.

HABITAT.—High mountain sedge ponds, sedge-lined lakes, old abandoned beaver ponds with sedges.

COMMENTS.—*Somatochlora semicircularis* is widespread throughout the higher elevations of many of Utah's mountain ranges where its habitat exists. Large metapopulations occur in the Uinta Mountains, Boulder

***Somatochlora semicircularis*** Photo: Alan R. Myrup

Mountains, and the Wasatch Plateau where nearly every body of water with sedges, including small puddles, seems to have a population. It is more local in other mountain ranges, where its habitat is sparse. The Utah and Weber County records are historical and their exact locations are unknown. Interestingly, this dragonfly often inhabits small wet depressions and shallow ponds filled with sedges while seemingly ignoring nearby man-made ponds and lakes, even when they appear to have a similar habitat. *Somatochlora semicircularis* will often approach an observer from downwind, slowly moving closer, hovering, then moving closer again, perhaps riding the currents like a trout behind a rock in a stream, taking insects kicked up by the observer.

RANK.—G5, N5, SH; recommended S4.

## Family Libellulidae (12 Genera, 33 Species)

### *Brechmorhoga mendax* (Hagen)
### Pale-faced Clubskimmer

COUNTY RECORDS.—(2 of 29) Kane, Washington.

ELEVATION RANGE.—834–1676 m (2735–5500 ft).

FLIGHT SEASON.—15 Jun–9 Oct.

U.S. RANGE.—California, southwest U.S. from California to Arkansas.

UTAH RANGE.—Map 28. Southwest Utah.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range.

DRAINAGES.—Beaver Dam Wash, East Fork Virgin River, Mill Creek, Quail Creek, Santa Clara River, Virgin River.

HABITAT.—Desert streams with sandy to gravelly bottoms.

COMMENTS.—*Brechmorhoga mendax* is a southern species extending north into southwestern Utah where it is uncommon and local in distribution, with records from only 7 locations, most in Washington County. Beaver Dam Wash, East Fork Virgin River, and the Virgin River are the best places to find this species. Individuals patrol very low over desert streams with sandy to gravelly bottoms, occasionally perching horizontally on exposed gravel beds. They occasionally patrol at higher heights, similar to darners.

RANK.—G5, N5, SH; recommended S1.

### *Erythemis collocata* (Hagen)
### Western Pondhawk

COUNTY RECORDS.—(23 of 29) all counties except Daggett, Summit, Rich, Carbon, Duchesne, and Garfield.

ELEVATION RANGE.—762–1981 m (2500–6500 ft).

FLIGHT SEASON.—15 May–18 Sep; records by month: May (7), Jun (54), Jul (80), Aug (38), Sep (6).

U.S. RANGE.—Western U.S.; east to western Montana and Wyoming, Colorado, New Mexico, and western Texas.

UTAH RANGE.—Map 29. Widespread throughout the state except the extreme northeast and northwest.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains.

DRAINAGES.—Bear River, Beaver River, Castle Creek (Grand), Colorado River, Coyote Gulch (Kane), Desert Lake WMA (Emery), Diamond Fork Creek (Utah), Great Basin springs and marshes, Great Salt Lake watershed, Green River, Indian Creek (San Juan), Jordan River, Kanab Creek, Malad River, North Creek (Washington), Ogden River, Otter Creek (Piute), Parowan Creek, Payson Creek, Provo River, Rush Lake (Iron), San Pitch River, Santa Clara River, Sevier River, Spanish Fork River, Uinta River (Uintah), Utah Lake watershed, Virgin River, Weber River.

HABITAT.—Valley wetlands, marshes, ponds, slow streams, spring runs.

***Erythemis collocata*** Photo: Dennis Paulson

COMMENTS.—*Erythemis collocata* is common and widespread at low-elevation wetlands throughout the state including desert areas of the Great Basin and Colorado Plateau. No voucher specimens have been taken in the Wyoming Basin ecoregion (Rich, Summit, and Daggett) in Utah. However, the species has been observed in the Browns Park area along the Green River in Daggett County. Chalky-blue pruinose males can be quite common in late June and early July at marshes and ponds, patrolling low over algae mats and along pond borders. Lime-green females are often found in weedy areas adjacent to wetlands. A hovering female will lay her eggs by dipping her abdomen into algae mats and floating vegetation while the male flies back and forth over her chasing off any intruding males.

RANK.—G5, N5, S3; recommended S5.

### *Leucorrhinia borealis* Hagen
Boreal Whiteface

COUNTY RECORDS.—(5 of 29) Daggett, Duchesne, Summit, Uintah, Wasatch.

ELEVATION RANGE.—2641–3101 m (8666–10,175 ft). One specimen was collected from the cold wetlands below Jordanelle Reservoir at 1753 m (5750 ft).

FLIGHT SEASON.—17 Jun–1 Aug.

U.S. RANGE.—Alaska, western Canada, south through the Rocky Mountains to Utah and northern New Mexico.

UTAH RANGE.—Map 30. Uinta Mountains of northeastern Utah, south to Current Creek Peak.

ECOREGIONS.—Wasatch and Uinta Mountains.

DRAINAGES.—Big Brush Creek (Uintah), Blacks Fork (Summit), East Fork Smiths Fork (Summit), Hayden Fork (Summit), Henrys Fork (Summit), Little West Fork (Wasatch), Provo River (Wasatch), Sheep Creek (Daggett), Uinta River (Duchesne).

HABITAT.—Mountain bogs, sedge ponds, and old beaver ponds at high elevations.

COMMENTS.—*Leucorrhinia borealis*, the largest of the 4 *Leucorrhinia* species in Utah, can be found in scattered populations throughout the Uinta Mountains of northeastern Utah. The species often shares habitat with *L. hudsonica* at bog ponds and wet meadows. Although it appears to be less common than *L. hudsonica*, there are undoubtedly many more populations throughout the remote regions of the Uinta Mountains than records indicate. In 2015, a new population was discovered near Currant Creek Peak in the mountains southeast of Heber, Utah.

RANK.—G5, N4?, SH; recommended S3.

### *Leucorrhinia hudsonica* (Selys)
Hudsonian Whiteface

COUNTY RECORDS.—(7 of 29) Daggett, Duchesne, Garfield, Summit, Wasatch, Wayne, Uintah.

*Leucorrhinia hudsonica* Photo: Alan R. Myrup

ELEVATION RANGE.—2452–3197 m (8046–10,490 ft).

FLIGHT SEASON.—14 Jun–5 Sep.

U.S. RANGE.—Alaska, Canada, northern U.S., south, down the Sierra Nevada, Rocky and Appalachian mountain ranges.

UTAH RANGE.—Map 31. Northeastern Utah, south to Currant Creek Peak, Aquarius Plateau and Boulder Mountain of south central Utah.

ECOREGIONS.—Wasatch and Uinta Mountains.

DRAINAGES.—Ashley Creek (Uintah), Blacks Fork (Summit), Duchesne River (Duchesne), East Fork Bear River (Summit), East Fork Smiths Fork (Summit), Hayden Fork (Summit), Henrys Fork (Summit), Little West Fork (Wasatch), Ostler Fork (Summit), Pine Creek (Garfield), Provo River, Rock Creek (Duchesne), Sheep Creek (Daggett), Steep Creek (Garfield), Uinta River (Duchesne), Whiterocks River.

HABITAT.—High-elevation bogs, sedge ponds and lakes.

COMMENTS.—Most records for *Leucorrhinia hudsonica*, the smallest of the 4 *Leucorrhinia* species in Utah, are scattered throughout the Uinta Mountains of northeastern Utah, where the species can be quite abundant in boggy meadows. A recent record (June 2000) exists from Posey Lake on the Aquarius Plateau in south central Utah (Garfield). One other specimen from the BYU collection was collected on Steep Creek, high up on Boulder Mountain by V.M. Tanner likely in the 1930s. There are also 2 other specimens in the BYU collection collected by Tanner: one labeled "Torrey" and the other, "Notom 1936." These 2 small towns in Wayne County are just north and west of Boulder Mountain. Tanner sometimes listed the nearest town as references on his specimen labels, making it likely that the specimens were collected at higher elevations on Boulder Mountain. A search of the higher forested lakes and ponds atop the Aquarius Plateau and on the eastern flank of Boulder Mountain may reveal more populations of *L. hudsonica*.

RANK.—G5, N5, SH; recommended S3.

### *Leucorrhinia intacta* (Hagen)
### Dot-tailed Whiteface

COUNTY RECORDS.—(18 of 29) Box Elder, Cache, Carbon, Daggett, Duchesne, Garfield, Juab, Kane, Morgan, Piute, Rich, Sanpete, Sevier, Summit, Uintah, Utah, Wasatch, Weber.

ELEVATION RANGE.—1294–2944 m (4245–9657 ft).

FLIGHT SEASON.—14 May–12 Sep; records by month: May (4), Jun (24), Jul (26), Aug (2), Sep (1).

U.S. RANGE.—Map 32. Northern two-thirds of U.S.

UTAH RANGE.—Northern Utah, south through the central mountain ranges.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Wasatch and Uinta Mountains, Wyoming Basin.

DRAINAGES.—Ashley Creek (Uintah), Bear Lake watershed, Bear River, Carter Creek (Daggett), Blacks Fork (Summit), Cherry Creek (Juab), Diamond Fork Creek (Utah), Duchesne River, Green River, Logan River, Mantua Reservoir (Box Elder), Payson Creek, Price River, Provo River, San Pitch River, Sevier River, Soapstone Creek (Wasatch), Spanish Fork River, Uinta River, Utah Lake watershed, Weber River.

HABITAT.—Ponds, springs, lakes, stream backwaters preferably with submergent vegetation.

COMMENTS.—*Leucorrhinia intacta* is the most widespread of the 4 species of *Leucorrhinia* in the state. Unlike other *Leucorrhinia* in Utah, *L. intacta* is not limited to higher elevations but is often found at lower elevations, which has contributed to its wider distribution. Although it is more common in the northern counties, it has been found at higher elevations as far south as Garfield County. There is also one dot map record (Donnelly 2004b) from Kane County, but the exact location is unknown. There are no records from the urban counties of Davis and Salt Lake. *Leucorrhinia intacta* is 1 of 3 species of dragonflies that emerges in early May in northern Utah along with *Libellula quadrimaculata* and *Rhionaeschna californica*.

RANK.—G5, N5, SH; recommended S4.

### *Leucorrhinia proxima* Calvert
Belted Whiteface

COUNTY RECORDS.—(4 of 29) Sanpete, Summit, Uintah, Wasatch.

ELEVATION RANGE.—2652–2853 m (8700–9360 ft).

FLIGHT SEASON.—22 Jun–26 Aug.

U.S. RANGE.—Alaska, Canada, south down the Cascades to northern California and Rockies to Colorado and Utah, Great Lakes region and northeast U.S.

UTAH RANGE.—Map 33. Uinta Mountains, Duchesne Ridge, Wasatch Plateau.

ECOREGIONS.—Wasatch and Uinta Mountains.

DRAINAGES.—Blacks Fork (Summit), Cottonwood Creek (Sanpete), East Fork Smiths Fork (Summit), Henrys Fork (Summit), Scad Valley Creek (Sanpete), West Fork Bear River (Summit), West Fork Duchesne River (Wasatch), Whiterocks River (Uintah).

HABITAT.—Ponds and small lakes with submergent vegetation in forested areas.

COMMENTS.—*Leucorrhinia proxima* is the least common *Leucorrhinia* species in the state, with records from only 8 drainages. However, the species is quite abundant at Lyman Lake (Summit) and at 2 ponds (1 man-made) in upper Ephraim Canyon (Sanpete). One location is at a small lake in the Scad Valley Creek drainage in Sanpete County within 200 m of the Emery County line. A new location was discovered at Heart Lake along the Duchesne Ridge in 2013. Its distribution is puzzling, with individuals occurring only at specific ponds and small lakes amid what appears to be widespread habitat throughout both the Uinta Mountains and the Wasatch Plateau. Water bodies containing submergent vegetation may be the preferred habitat that causes this unusual distribution.

RANK.—G5, N5, SH; recommended S3.

### *Libellula comanche* Calvert
Comanche Skimmer

COUNTY RECORDS.—(3 of 29) Iron, Juab, Washington.

ELEVATION RANGE.—846–1414 m (2775–4640 ft).

FLIGHT SEASON.—3 Jun–13 Aug.

U.S. RANGE.—California and western Nevada, south and west through southwest Utah, Arizona, New Mexico, and Texas; isolated records in southern Idaho and Oregon.

UTAH RANGE.—Map 34. Southwestern Utah, Baker Hot Springs (Juab), Enoch (Iron).

ECOREGIONS.—Central Basin and Range, Mojave Basin and Range.

DRAINAGES.—Baker Hot Springs, Beaver Dam Wash, Virgin River.

HABITAT.—Desert streams, ponds, springs, hot springs in north.

COMMENTS.—*Libellula comanche* is a species of the southwestern U.S. whose range extends northward into the southwestern corner of Utah. It is uncommon and very local in its distribution in Utah, with nearly all records coming from Washington County. Populations currently exist at Lytle Ranch in the Beaver Dam Wash and at Green Springs in the middle of Green Springs Golf Course in the city of

Washington. Baker Hot Springs (Juab), with its year-round warm temperatures, harbors a population that extends the range northward across 180 miles of desert. One record, collected at a pond in Enoch, Iron County, has not been duplicated even after several attempts. It is our opinion that there is not an established population there.

RANK.—G5, N5, S1; recommended S2.

*Libellula composita* (Hagen)
Bleached Skimmer

COUNTY RECORDS.—(10 of 29) Box Elder, Cache, Emery, Juab, Millard, Salt Lake, Sanpete, Tooele, Uintah, Utah.

ELEVATION RANGE.—1288–1981 m (4225–6500 ft).

FLIGHT SEASON.—9 Jun–11 Sep; records by month: Jun (17), Jul (19), Aug (6), Sep (1)

U.S. RANGE.—The Great Basin (California, Oregon, Nevada, and Utah), east to Colorado, Oklahoma, and Texas.

UTAH RANGE.—Map 35. Great Basin Desert in western Utah and upper Colorado Plateau in eastern Utah.

ECOREGIONS.—Central Basin and Range, Colorado Plateau.

DRAINAGES.—Bear River (Box Elder, Cache), Blue Lake WMA (Tooele), Fish Springs NWR (Juab), Great Basin springs and wetlands, Great Salt Lake watershed, Green River at Sheppard Bottom (Ouray NWR), Price River (Desert Lake WMA), Sevier River, Utah Lake watershed.

HABITAT.—Alkaline/saline marshes and other wetlands, desert springs.

COMMENTS.—*Libellula composita* prefers desert springs and shallow alkaline/saline wetlands of the Great Basin. There are large populations at several state and federally managed wetlands such as Bear River National Migratory Bird Refuge (Box Elder), Clear Lake Waterfowl Management Area (Millard), and Fish Springs National Wildlife Refuge (Juab) where good habitat is maintained. During this study, populations of *L. composita* were also located in the Colorado Plateau ecoregion at Ouray National Wildlife Refuge (Uintah) and Desert Lake Waterfowl Management Area (Emery) where the species is abundant. Tandem pairs are a common sight but difficult to catch with their swift, direct flight.

RANK.—G3G4, N3N4, S2; recommended S4.

*Libellula croceipennis* Selys
Neon Skimmer

COUNTY RECORDS.—(2 of 29) Iron, Washington.

ELEVATION RANGE.—844–1814 m (2770–5950 ft).

FLIGHT SEASON.—15–27 Jul.

U.S. RANGE.—Southwest U.S. from California to Texas.

UTAH RANGE.—Map 36. Southwestern Utah.

ECOREGIONS.—Central Basin and Range, Mojave Basin and Range.

DRAINAGES.—Beaver Dam Wash, pond at Heritage Park, Parowan.

HABITAT.—Springs, streams, ponds (Paulson 2009).

COMMENTS.—Only 2 specimens of this species have been collected in Utah: one from Lytle Ranch in the Beaver Dam Wash in 2015 and one from a very small pond at Heritage Park in Parowan, Utah, in 2003. This species may occasionally move up the Virgin River corridor into Utah but has not established any lasting populations.

Rank.—G5, N4, SU; recommended S1.

*Libellula forensis* Hagen
Eight-spotted Skimmer

COUNTY RECORDS.—All counties.

ELEVATION RANGE.—846–2524 m (2775–8282 ft).

FLIGHT SEASON.—15 May–8 Sep; records by month: May (6), Jun (55), Jul (57), Aug (21), Sep (2).

U.S. RANGE.—Western U.S., east to the Dakotas, Colorado, and New Mexico.

UTAH RANGE.—Map 37. Statewide, mostly at lower elevations.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains, Wyoming Basin.

DRAINAGES.—Bear Lake watershed, Bear River, Beaver Dam Wash, Beaver River, Castle Creek (Grand), Colorado River, Crouse Creek and Willow Creek (Daggett), Desert Lake WMA (Emery), Diamond Fork Creek (Utah), Dirty Devil River (Wayne), Duchesne River, Farmington Creek (Davis), Great Basin wetlands, Great Salt Lake watershed, Green River, Indian Creek (San Juan), Jordan River, Kanab Creek, Ogden River, Payson Creek, Price River, Provo River, San Pitch River, Sevier River, Uinta River, Utah Lake watershed, Weber River.

***Libellula forensis*** Photo: Alan R. Myrup

HABITAT.—Marshes, ponds, springs, lakes, canals, slow streams, and stream backwaters.

COMMENTS.—*Libellula forensis*, an exclusively western species with a stronghold in Utah, is one of the most common and widespread *Libellula* species in the state. It can be found at a wide variety of wetlands from low to high elevations up to 2500 m (8200 ft), unlike the similar *L. pulchella* with which it often flies at low elevations. Both species have black wing patches: *L. pulchella* with twelve, 3 on each wing including the wingtips, while *L. forensis* has 8, lacking the 4 at the wingtips.

RANK.—G5, N5, S2; recommended S5.

### *Libellula luctuosa* Burmeister
### Widow Skimmer

COUNTY RECORDS.—(9 of 29) Duchesne, Carbon, Emery, Grand, Piute, San Juan, Uintah, Wasatch, Washington.

ELEVATION RANGE.—785–1823 m (2575–5982 ft).

FLIGHT SEASON.—20 May–16 Sep.

U.S. RANGE.—Washington, south through southern California, east through Arizona to Florida; widespread throughout the Midwest and eastern U.S.; absent from Idaho, Montana, and much of Wyoming and Nevada.

UTAH RANGE.—Map 38. Eastern and southern Utah, Jordanelle wetlands (Wasatch).

ECOREGIONS.—Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains.

DRAINAGES.—Castle Creek (Grand), Colorado River, Cottonwood Creek (Duchesne), Desert Lake WMA (Emery), Green River, Indian Creek (San Juan), Provo River (Wasatch), Sevier River (Piute), Soldier Creek (Carbon), Uinta River (Uintah), Virgin River.

HABITAT.—Ponds, springs, marshes, wetlands adjacent to rivers.

COMMENTS.—*Libellula luctuosa* was first collected in Utah by Andrew Barnum in 1992 in St. George, Washington County, and the speciman was placed in the DSUC but not identified until 2011. In 2001, another specimen was collected in Arches National Park and placed in the BYUC where it was identified in 2007. Earlier Utah odonate researchers (Brown 1934, Larsen 1952, Musser 1962) did not record this species from Utah. *Libellula luctuosa* is likely a newcomer to the state and has spread throughout the Colorado Plateau and Mojave Basin and Range ecoregions, where many new records have been obtained. It has likely used the Colorado, Green, and Virgin Rivers as corridors for its northward

***Libellula pulchella*** Photo: Alan R. Myrup

expansion. At several locations in Emery, Grand, and San Juan Counties, it is now one of the dominant dragonflies. The latest finds have been at the Jordanelle Wetlands along the Provo River in Wasatch County (2011) and at a pond below Piute Reservoir along the Sevier River in Piute County (2012), both in the Wasatch and Uinta Mountains ecoregion. These 2 records, the first from the Great Basin drainage, are significant, as they require a jump over mountain ranges that separate the Great Basin from the Colorado Plateau. *Libellula luctuosa* will likely continue to spread throughout the Great Basin and the rest of the state in future years. How this newcomer will affect other *Libellula* species is unknown.

RANK.—G5, N5, SU; recommended S3.

### *Libellula nodisticta* Hagen
### Hoary Skimmer

COUNTY RECORDS.—(11 of 29) Beaver, Box Elder, Juab, Kane, Millard, Sevier, Tooele, Utah, Wasatch, Washington, Wayne.

ELEVATION RANGE.—1326–2103 m (4350–6900 ft).

FLIGHT SEASON.—29 May–6 Oct.

U.S. RANGE.—Southern Oregon, south through California and Nevada, Utah, Arizona, southern Colorado, and New Mexico.

UTAH RANGE.—Map 39. Western Utah, Kanab Creek, Fremont River.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Wasatch and Uinta Mountains.

DRAINAGES.—East Hickman Creek (Tooele), Fremont River (Wayne), Great Basin springs and streams, Kanab Creek (Kane), Provo River, Santa Clara River, Sevier River (Sevier), Virgin River.

HABITAT.—Springs, marshes, wetlands along rivers.

COMMENTS.—*Libellula nodisticta* can be found in scattered populations primarily at springs in the Central Basin and Range ecoregion where it seems to be present in some years and absent in others. It is uncommon and always a pleasant surprise when observed. Specimens have also been collected at an oxbow pond along the Sevier River near Richfield (Sevier). The highest elevation record is from Bicknell Bottoms Wildlife Management Area (Wayne) of the Colorado Plateau ecoregion.

RANK.—G4, N4, S1; recommended S3.

### *Libellula pulchella* Drury
### Twelve-spotted Skimmer

COUNTY RECORDS.—All counties.

ELEVATION RANGE.—785–1962 m (2575–6436 ft).

FLIGHT SEASON.—30 Apr–26 Sep; records by month: Apr (1), May (2), Jun (58), Jul (85), Aug (34), Sep (3).

U.S. RANGE.—Widespread throughout the U.S.

UTAH RANGE.—Map 40. Widespread throughout Utah at lower elevations.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains, Wyoming Basin.

DRAINAGES.—Bear Lake watershed, Bear River, Beaver Dam Wash, Beaver River, Castle Creek (Grand), Colorado River, Cottonwood Creek (Duchesne), Diamond Fork Creek (Utah), Duchesne River, Escalante River, Great Basin springs and wetlands, Great Salt Lake watershed, Green River, Jordan River, Logan River, Ogden River, Price River, Provo River, Red Creek (Iron), Sevier River, Spanish Fork River, Uinta River, Utah Lake watershed, Virgin River, Weber River.

HABITAT.—Wetlands along streams, marshes, springs, ponds, lakes.

COMMENTS.—*Libellula pulchella* is a common, highly visible species that is widespread throughout the state at lower-elevation wetlands. It often flies with other *Libellula* species, patrolling the edges of ponds and marshes and competing for perch sites. Late June through July appears to be the time of greatest abundance at most locations. *Libellula pulchella* (twelve-spotted skimmer) can be separated from *Libellula forensis* (eight-spotted skimmer) by its black wingtips which are not found on *L. forensis.*

RANK.—G5, N5, S2; recommended S5.

### *Libellula quadrimaculata* Linnaeus
### Four-spotted Skimmer

COUNTY RECORDS.—All counties.

ELEVATION RANGE.—1273–3170 m (4175 ft–10,400 ft).

FLIGHT SEASON.—9 Apr–10 Oct; records by month: Apr (4), May (42), Jun (97), Jul (95), Aug (19), Sep (2), Oct (1).

U.S. RANGE.—Alaska, Canada, western U.S., east to New Mexico, Colorado, and Nebraska, across the Great Lakes region and through the northeastern U.S.; missing from the southeastern U.S.

UTAH RANGE.—Map 41. Statewide.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Northern Basin and Range, Southern Rockies, Wasatch and Uinta Mountains, Wyoming Basin.

DRAINAGES.—American Fork Creek, Ashley Creek (Uintah), Bear Creek (Iron), Bear Lake watershed, Bear River, Beaver Creek (Summit), Beaver River, Big Cottonwood Creek (Salt Lake), Blacksmiths Fork (Cache), Castle Creek (Grand), Colorado River, Crystal Creek

***Libellula quadrimaculata*** Photo: Alan R. Myrup

(Washington), Deep Creek (Wasatch), Desert Lake WMA (Emery), Diamond Fork Creek (Utah), Duchesne River, East Canyon Creek (Morgan), East Fork Sevier River, East Fork Virgin River (Kane), Ephraim Creek (Sanpete), Escalante River (Garfield), Farmington Creek (Davis), Great Basin springs, Great Salt Lake watershed, Henrieville Creek (Garfield), Henrys Fork (Summit), Hobble Creek—tributary of the Strawberry River (Wasatch), Huntington Creek (Emery), Indian Creek (San Juan), Lake Fork River (Duchesne), Little Bear River (Cache), Little West Fork (Wasatch), Logan River, Mill Creek (Grand), North Creek (Washington), Ogden River, Otter Creek, Parowan Creek (Iron), Payson Creek, Provo River, Raft River, Rock Creek (Duchesne), San Pitch River (Sanpete), Santa Clara River (Washington), Scad Valley Creek (Sanpete), Seely Creek (Sanpete), Seven Mile Creek (Sevier), Sevier River, Silver Creek (Summit), Soapstone Creek (Wasatch), Spanish Fork River, Steep Creek (Garfield), Uinta River (Duchesne), Utah Lake watershed, Weber River, West Fork Duchesne River, Whiterocks River (Duchesne).

HABITAT.—Wide variety of habitats including lowland marshes and wetlands, ponds, springs, high mountain bogs and lakes, stream backwaters.

COMMENTS.—*Libellula quadrimaculata* is the most common and widespread *Libellula* species in Utah and is found in every county at a wide variety of wetlands at both low and high elevations. It is one of Utah's early season dragonflies, emerging in late April in the valleys then gradually fading in numbers by the middle of July. As the season progresses into July and August, it can be found at

progressively higher elevations up to 3050 m (10,000 ft) flying with other boreal dragonflies. It is holarctic in its distribution and is found in North America, Europe, and Asia. *Libellula quadrimaculata,* which means four-spotted dragonfly, was one of several dragonflies named by the Swedish scientist Carl Linnaeus, the father of modern taxonomy, in his *Systema Naturae* (10th edition) (Linnaeus 1758), which was the earliest publication accepted for the scientific names of animals. One other holarctic dragonfly found in Utah, *Aeshna juncea,* was also named by Linnaeus.

RANK.—G5, N5, S2; recommended S5.

***Libellula saturata*** Photo: Alan R. Myrup

*Libellula saturata* Uhler
Flame Skimmer

COUNTY RECORDS.—(23 of 29) all counties except Cache, Carbon, Morgan, Rich, Summit, Uintah.

ELEVATION RANGE.—785–1981 m (2575–6500 ft).

FLIGHT SEASON.—29 Apr–9 Oct; records by month: Apr (4), May (16), Jun (49), Jul (79), Aug (29), Sep (29), Oct (9).

U.S. RANGE.—Southwest U.S. from California to Texas; north to Oregon, Idaho, and Montana; east to Colorado and southern Kansas; Wyoming (Yellowstone NP).

UTAH RANGE.—Map 42. Central to southern Utah; hot springs farther north.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains, Wyoming Basin.

DRAINAGES.—Beaver Dam Wash, Beaver River, Calf Creek and Hall Creek (Garfield), Castle Creek (Grand), Colorado River, Crystal Hot Springs (Box Elder), Duchesne River, East Fork Sevier River, East Fork Virgin River, Escalante River, Great Basin springs, Great Salt Lake watershed, Green River, Indian Creek (San Juan), Jordan River, Leeds Creek (Washington), Midway Hot Springs (Wasatch), Ogden River, Red Creek (Iron), Santa Clara River, Sevier River, Sheep Creek and Paria River (Kane), Utah Lake watershed, Virgin River, Weber River, Willow Creek (Daggett).

HABITAT.—Slow streams, ponds, lake margins, marshes, springs, hot springs at lower elevations.

COMMENTS.—The bright fiery-orange flame skimmer leaves a lasting impression on even the most casual observer. It is a dragonfly of the Southwest that has extended its range northward by its use of permanent springs which do not freeze in winter. It is widespread throughout much of the state but is most common in southern Utah. This species can be found at ponds (including urban and golf course ponds), springs, slow streams, and stream backwaters. Flame skimmers occasionally wander away from wetlands and show up in suburban yards.

RANK.—G5, N5, S3; recommended S4.

*Orthemis ferruginea* (Fabricius)
Roseate Skimmer

COUNTY RECORDS.—(2 of 29) Iron, Washington.

ELEVATION RANGE.—785–1542 m (2575–5058 ft).

FLIGHT SEASON.—20 Jul–Aug?

U.S. RANGE.—Southern U.S.

UTAH RANGE.—Map 43. Extreme southwestern Utah.

ECOREGIONS.—Central Basin and Range, Mojave Basin and Range.

DRAINAGES.—Virgin River.

HABITAT.—Muddy bottomed marshes, ponds, canals, and slow streams (Paulson 2009).

COMMENTS.—There are only 3 known Utah records for *Orthemis ferruginea:* 2 from the Mojave Basin and Range ecoregion (Washington), St. George and the Beaver Dam Wash (2015); and 1 from the Central Basin and Range (Iron), at Heritage Park in Parowan (2003). One individual was observed at the lower Hobble Creek WMA near Utah Lake in September 2015, 180 miles farther north than any previously known location. The mild winter and early spring in 2015 seems to have brought several species with more southern

***Pachydiplax longipennis*** Photo: Alan R. Myrup

attributes farther north than other more typical years. *Orthemis ferruginea* does not appear to be a resident species in Utah, although it may occasionally wander up the Virgin River from Nevada and Arizona and establish populations for short periods.

RANK.—G5, N5, S1; recommended S1.

*Pachydiplax longipennis* (Burmeister)
Blue Dasher

COUNTY RECORDS.—(18 of 29) Box Elder, Cache, Davis, Duchesne, Emery, Grand, Iron, Juab, Kane, Millard, San Juan, Salt Lake, Tooele, Uintah, Utah, Wasatch, Washington, Weber.

ELEVATION RANGE.—785–1692 m (2575–5550 ft).

FLIGHT SEASON.—29 Apr–30 Sep.

U.S. RANGE.—Widespread in U.S., except the Rockies and upper Great Plains.

UTAH RANGE.—Map 44. Eastern Utah along the Colorado River, southwestern Utah, scattered springs in the Great Basin, wetlands and springs along the Wasatch Front.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains.

DRAINAGES.—Bear River, Beaver Dam Wash, Castle Creek (Grand), Colorado River, Duchesne River, Great Basin springs, Great Salt Lake watershed, Green River, Provo River, Recapture Creek (San Juan), Sevier River (Millard), Utah Lake watershed, Virgin River, Weber River.

HABITAT.—Lowland valley marshes, springs, backwater wetlands along streams.

COMMENTS.—*Pachydiplax longipennis* is far more widespread, particularly in northern Utah, than indicated in earlier publications, where only 3 county records were listed (Brown 1934, Larsen 1952, Musser 1962). Whether this finding is a result of more thorough collecting or a recent northward range expansion is unknown. New locations include springs in the Great Basin, Utah Lake watershed, Great Salt Lake watershed, and areas along the Colorado and Green Rivers in eastern Utah as far north as the Uintah Basin. *Pachydiplax longipennis* can be quite abundant at some locations in Utah, far outnumbering other dragonfly species. Perched individuals, with wings "cocked" downward, appear ready to spring into flight at the slightest provocation. A white face and a touch of gold at the wing bases help to separate *P. longipennis* from the slightly larger but similar *Erythemis collocata*, both of which show a flat, blue-gray pruinescence on the body.

RANK.—G5, N5, S1; recommended S4.

*Paltothemis lineatipes* Karsch
Red Rock Skimmer

COUNTY RECORDS.—(4 of 29) Garfield, Kane, San Juan, Washington.

ELEVATION RANGE.—846–1961 m (2775–6435 ft).

FLIGHT SEASON.—16 Jun–29 Sep.

U.S. RANGE.—Southwest U.S. from central California west to Texas; 1 location in Oregon.

***Paltothemis lineatipes*** Photo: Alan R. Myrup

UTAH RANGE.—Map 45. Southern Utah.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range.

DRAINAGES.—Beaver Dam Wash, Calf Creek and Pine Creek (Garfield), East Fork Virgin River (Kane), Indian Creek (San Juan), Leeds Creek and Quail Creek, North Creek, Taylor Creek and Virgin River in Zion NP.

HABITAT.—Small, rocky, desert canyon streams in southern Utah.

COMMENTS.—*Paltothemis lineatipes* patrols up and down rocky desert canyon streams at about knee to ankle height, occasionally perching on rocks in the middle of the stream. The species' narrow habitat preference/tolerance makes it vulnerable as human consumption of water increases in southern Utah. Fortunately, it is common in several streams of Zion National Park where the habitat is protected. Due to their natural state and inaccessibility, many streams in the Virgin River drainage where this species exists have been designated "Wild and Scenic Rivers" by the Omnibus Public Lands Management Act of 2009 (111th United States Congress 2009). There is one record from Wasatch County for this species on the Northern Prairie Wildlife Research Center web site distribution map. The source is not given. It is possible that this northern record may be a misidentification of the somewhat similar *Libellula saturata*, which can be found at several hot springs in Wasatch County.

RANK.—G5, N5, SH; recommended S2.

*Pantala flavescens* (Fabricius)
Wandering Glider

COUNTY RECORDS.—(13 of 29) Duchesne, Emery, Garfield, Grand, Iron, Juab, Kane, Millard, San Juan, Sanpete, Utah, Washington, Wayne.

ELEVATION RANGE.—796–1635 m (2610–5365 ft).

FLIGHT SEASON.—13 May–24 Aug.

U.S. RANGE.—Map 46. Common in California, southern U.S., Midwest, and eastern U.S.; less common northward.

UTAH RANGE.—Southern Utah; occasionally found further north.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains.

DRAINAGES.—Colorado River, Diamond Fork Creek (Utah), Dirty Devil River, Great Basin springs and marshes, Green River, North Creek (Washington), San Juan River, Santa Clara River, Sevier River, Utah Lake watershed, Virgin River.

HABITAT.—Ponds, marshes, temporary wetlands, streams, open canyons.

COMMENTS.—*Pantala flavescens*, found worldwide in warmer climates, is more common in southern Utah but appears to wander northward in some years. It may be unable to establish permanent populations in northern Utah, likely due to cold winter temperatures. Wandering gliders drift with the wind currents, feeding on air plankton. Occasionally

they ride the currents downwind from animals, perhaps picking up small insects disturbed from the undergrowth.

RANK.—G5, N5, S1; recommended S4.

*Pantala hymenaea* (Say)
Spot-winged Glider

COUNTY RECORDS.—(11 of 29) Garfield, Grand, Iron, Kane, Salt Lake, San Juan, Sanpete, Sevier, Utah, Washington, Wayne.

ELEVATION RANGE.—1143–2652 m (3750–8700 ft).

FLIGHT SEASON.—5 Jun–7 Aug.

U.S. RANGE.—Widespread in U.S., except Rockies and upper Great Plains.

UTAH RANGE.—Map 47. Southern Utah; occasionally found farther north.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains.

DRAINAGES.—Colorado River, Dirty Devil River, Escalante River, Green River, Jordan River, Natural Bridges National Monument (San Juan), North Creek (Washington), Santa Clara River, Sevier River, Utah Lake watershed, Virgin River.

HABITAT.—Ponds, marshes, temporary wetlands, streams, open canyons.

COMMENTS.—*Pantala hymenaea* appears to have more permanently established populations in southern Utah than its relative *Pantala flavescens*. Like *P. flavescens*, *P. hymenaea* occasionally wanders northward but may be unable to establish populations in northern Utah due to the cold winter temperatures.

RANK.—G5, N5, S2 (recommended, S4).

*Perithemis intensa* Kirby
Mexican Amberwing

COUNTY RECORDS.—(1 of 29) Washington.

ELEVATION RANGE.—846 m (2775 ft).

FLIGHT SEASON.—9 Aug 1985.

U.S. RANGE.—Southern California, Arizona, and New Mexico, north along Colorado River to southern Nevada and southwestern Utah.

UTAH RANGE.—Map 48. Extreme southwestern Utah; Lytle Ranch, Beaver Dam Wash.

ECOREGIONS.—Mojave Basin and Range.

DRAINAGES.—Beaver Dam Wash.

HABITAT.—"Mud-bottomed lakes, ponds, ditches and pools in streams and rivers, mostly in open areas but also with wooded banks" (Paulson 2009).

COMMENTS.—One specimen of *Perithemis intensa* was collected in 1985 by G. Baird at Lytle Ranch in the Beaver Dam Wash (Myrup 2007). One sighting occurred on 15 July 2015 at a pond in St. George. At present, this species does not appear to have any established populations in the state, although it may occasionally move up the Virgin River from Arizona and Nevada.

RANK.—G5, N4, SU; recommended S1.

*Plathemis lydia* (Drury)
Common Whitetail

COUNTY RECORDS.—(1 of 29) Cache.

ELEVATION RANGE.—1350 m (4430 ft).

FLIGHT SEASON.—26 Jun–13 Jul (2 records only).

U.S. RANGE.—Widespread in the U.S., rare in Nevada and Utah.

UTAH RANGE.—Map 49. Extreme northern Utah.

ECOREGIONS.—Central Basin and Range.

DRAINAGES.—Bear River.

HABITAT.—Marshes, valley wetlands, oxbows.

COMMENTS.—*Plathemis lydia* has only been found at one location in Utah. The location is in northern Cache County near the town of Trenton, close to the Idaho border at a small wetland along the Bear River. There appears to be an established population at this site, with specimens collected there in both 2007 and 2013. It is puzzling that this species is so rare in Utah while abundant in much of the U.S., including neighboring states. It appears to be replaced by the similar *Plathemis subornata* throughout the Central Basin and Range ecoregion.

RANK.—G5, N5, S1; recommended S1.

*Plathemis subornata* Hagen
Desert Whitetail

COUNTY RECORDS.—(13 of 29) Beaver, Box Elder, Cache, Davis, Juab, Millard, Salt Lake, Sanpete, Sevier, Tooele, Utah, Washington, Weber.

ELEVATION RANGE.—768–1981 m (2520–6500 ft).

FLIGHT SEASON.—20 May–7 Aug.

U.S. RANGE.—Southern Oregon, south through southern California, east to western Kansas, Oklahoma, and Texas.

UTAH RANGE.—Map 50. Western Utah in the Great Basin.

***Plathemis subornata,*** ♂ Photo: Alan R. Myrup

***Plathemis subornata,*** ♀ Photo: Alan R. Myrup

ECOREGIONS.—Central Basin and Range, Mojave Basin and Range.

DRAINAGES.—Bear River, Beaver Dam Wash, Beaver River, Great Basin wetlands, Great Salt Lake watershed, Sevier River, Utah Lake watershed, Virgin River.

HABITAT.—Alkaline wetlands, marshes, springs, stream backwaters.

COMMENTS.—*Plathemis subornata* thrives at desert springs and alkaline/saline wetlands of the Central Basin and Range ecoregion, along with *Libellula composita, Argia alberta, Enallagma clausum,* and *Ischnura barberi.* Populations are also found along the Sevier River in Sanpete and Sevier County.

RANK.—G4, N4, S3; recommended S4.

*Sympetrum corruptum* (Hagen)
Variegated Meadowhawk

COUNTY RECORDS.—All counties.

ELEVATION RANGE.—785–2652 m (2575–8700 ft).

FLIGHT SEASON.—8 Apr–14 Nov; records by month: Apr (4), May (25), Jun (59), Jul (97), Aug (78), Sep (47), Oct (46), Nov (8).

U.S. RANGE.—Widespread in U.S., less common in the East.

UTAH RANGE.—Map 51. Widespread throughout Utah.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Northern Basin and Range, Wasatch and Uinta Mountains, Wyoming Basin.

DRAINAGES.—Bear River, Beaver Dam Wash, Beaver River, Calf Creek (Garfield), Colorado River and tributaries, Desert Lake WMA (Emery), Dirty Devil River, Duchesne River, Escalante River, Great Basin wetlands, Great Salt Lake watershed, Green River and tributaries, Jordan River, Malad River, Maple Seep (Kane), Ogden River, Otter Creek, Pariette Wetlands (Uintah), Price River, Provo River, Quail Creek, San Pitch River, Santa Clara River, Sevier River, Spanish Fork River, Strawberry River, Utah Lake watershed, Virgin River, Weber River.

HABITAT.—Valley wetlands including ponds, marshes, springs, lakes, slow streams, fields, and canyons.

COMMENTS.—*Sympetrum corruptum*, with its wandering nature, can be found throughout the state from April to November usually at lower elevations but occasionally high in the mountains. Worn specimens that are older and darker are found early in the season and are likely migrants from the south. Fresh brightly patterned specimens, raised locally, usually appear later in the season. It is unknown whether any overwinter in Utah in some life stage. *Sympetrum corruptum* is the largest *Sympetrum* species in Utah and also the most wary.

RANK.—G5, N5, S4; recommended S5.

***Sympetrum corruptum*** Photo: Dennis Paulson

*Sympetrum costiferum* (Hagen)
Saffron-winged Meadowhawk

COUNTY RECORDS.—(21 of 29) Beaver, Box Elder, Cache, Davis, Duchesne, Emery, Juab, Millard, Morgan, Piute, Rich, Salt Lake, Sanpete, Sevier, Summit, Tooele, Uintah, Utah, Wasatch, Wayne, Weber.

ELEVATION RANGE.—1280–2701 m (4200–8860 ft).

FLIGHT SEASON.—25 Jun–22 Oct; records by month: Jun (1), Jul (8), Aug (16), Sep (24), Oct (3).

U.S. RANGE.—Northern half of the U.S.

UTAH RANGE.—Map 52. Northern Utah, south to Beaver and Marysvale (Piute), unrecorded from southern Utah.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Wasatch and Uinta Mountains, Wyoming Basin.

DRAINAGES.—Bear Lake watershed, Bear River, Beaver River, Desert Lake WMA (Emery), Duchesne River, Great Basin wetlands, Great Salt Lake watershed, Logan River, Pariette Wetlands (Uintah), Provo River, Sevier River, Utah Lake watershed, Weber River.

HABITAT.—Valley wetlands, lakes, marshes, ponds, springs, slow streams, open fields.

COMMENTS.—*Sympetrum costiferum* flies late in the season, with the majority of records in August and September. Although there are records from the Pariette Wetlands (Uintah) and Desert Lake WMA (Emery) of the Colorado Plateau ecoregion, this species is more common from the Wasatch Front westward into the Central Basin and Range ecoregion. Its soft orange-red costal and subcostal wing veins, black-lined red pterostigma, and unmarked deep red to brown thorax of mature males are distinctive.

RANK.—G5, N5, S2; recommended S4.

*Sympetrum danae* (Sulzer)
Black Meadowhawk

COUNTY RECORDS.—(23 of 29) all counties except Davis, Grand, Juab, San Juan, Tooele, Weber.

ELEVATION RANGE.—1347–3101 m (4418–10,175 ft).

FLIGHT SEASON.—30 Jun–8 Oct; records by month: Jun (2), Jul (14), Aug (26), Sep (22), Oct (4).

U.S. RANGE.—Southern Alaska, Canada, northern U.S., western U.S.; south to northern Arizona and New Mexico.

UTAH RANGE.—Map 53. Northern Utah; south down the central mountains and mountain valleys.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Northern Basin and Range, Wasatch and Uinta Mountains, Wyoming Basin.

DRAINAGES.—Ashley Creek (Uintah), Bear Lake watershed, Bear River, Beaver River, Big Cottonwood Creek (Salt Lake), Currant Creek (Wasatch), Duchesne River, Fremont River, Lake Fork River (Duchesne), Little Bear River, Mammoth Creek (Garfield), Otter Creek, Provo River, Raft River, San Pitch River (Sanpete), Sevier River, Sheep Creek (Daggett), Sheep Creek (Kane), Spanish Fork River, Weber River, West Fork Duchesne River.

HABITAT.—Wetlands along streams, ponds, mountain valley wetlands and meadows, sedge marshes.

COMMENTS.—*Sympetrum danae* is common in wetland meadows and along streams at midelevations and mountain valleys of the Wasatch and Uinta Mountains ecoregion but is absent from much of the Great Basin and Colorado Plateau. The flight period of *S. danae* typically begins later than *Sympetrum internum,* although they often fly together. They emerge in large numbers at some locations such as the wetlands below Jordanelle Reservoir (Wasatch) and farmlands north of Kamas (Summit). The record for Salt Lake County is a photographic record (Davis 2013a) taken at Silver Lake in Big Cottonwood Canyon.

RANK.—G5, N5, S2; recommended S4.

*Sympetrum internum* Montgomery
Cherry-faced Meadowhawk

COUNTY RECORDS.—(16 of 29) Cache, Carbon, Daggett, Garfield, Grand, Juab, Kane, Millard, Morgan, Piute, Rich, Sanpete, Sevier, Summit, Utah, Wasatch.

ELEVATION RANGE.—1347–2861 m (4418–9385 ft).

FLIGHT SEASON.—26 Jun–27 Sep; records by month: Jun (3), Jul (31), Aug (20), Sep (5).

U.S. RANGE.—Southern Alaska, Canada, northern two-thirds of U.S., absent from the southern U.S.

UTAH RANGE.—Map 54. Central mountains and mountain valleys from northern to southern Utah, extending down the Sevier River in the Great Basin near Delta, Sheep Creek Drainage (northeastern Uinta Mountains), Warner Lake (LaSal Mountains).

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Southern Rockies, Wasatch and Uinta Mountains, Wyoming Basin.

DRAINAGES.—Bear River, Bear Lake watershed, Duck Creek (Kane), East Fork Sevier River, upper Mill Creek (Grand), Price River, Provo River, San Pitch River, Sevier River, Sheep Creek (Daggett), Utah Lake watershed, Weber River, West Fork Bear River (Summit).

HABITAT.—Mountain valley meadows and wetlands, slow streams and oxbows, sedge marshes.

COMMENTS.—*Sympetrum internum* is our earliest emerging *Sympetrum;* and like *Sympetrum danae,* it can be quite abundant, emerging in large numbers at many mountain valley locations. This small bright-red dragonfly can be found in wet meadows and along small streams flowing through pastures. It is the dominant dragonfly along the meandering Bear River and oxbow ponds in Rich County in the Wyoming Basin ecoregion. Habitat for this species is decreasing in some areas along the Wasatch Front as water use is altered and farmland is converted into housing projects.

RANK.—G5, N5, SNR, recommended S4.

*Sympetrum madidum* (Hagen)
Red-veined Meadowhawk

COUNTY RECORDS.—(6 of 29) Cache, Daggett, Rich, Summit, Utah, Wasatch.

ELEVATION RANGE.—1902–2621 m (4440–9150 ft).

FLIGHT SEASON.—19 Jun–10 Aug.

U.S. RANGE.—Northwest U.S., south to southern California; east to Minnesota across northern Nevada, Utah, and Colorado.

UTAH RANGE.—Map 55. Northeastern Utah.

ECOREGIONS.—Wasatch and Uinta Mountains, Wyoming Basin.

DRAINAGES.—Bear River, Provo River, Sheep Creek (Daggett), West Fork Bear River.

HABITAT.—Sedge-filled wetlands, usually at mid- to high elevations, oxbows along streams, some areas that may dry up later in the season.

COMMENTS.—The first indication that *Sympetrum madidum* might be found in Utah comes from Putnum (1876), where he lists several species collected in the vicinity of Spring Lake (Utah) including *Diplax flavibasis*. Ries (1963) believed that the name *D. flavibasis*, which has no taxonomic standing, was

***Sympetrum pallipes*** Photo: Nicky Davis

mistaken for *Diplax flavicosta*, a synonym of *S. madidum* (Hagen 1890). Unless the original specimen can be located, the identity will remain a mystery. The first documented record for *S. madidum* in Utah comes from Midway Reservoir in July 2008 at a small shallow sedge pond high in the Wasatch Mountains. The identification was confirmed by Dennis Paulson. This species has since been found in several other locations in Utah including the oxbow wetlands along Bear River in Cache and Rich Counties and in sedge ponds on the north slope of the Uinta Mountains in Summit and Daggett Counties. At some locations, it is quite abundant, such as the sedge wetlands near Sheep Creek Lake in Daggett County. Now that its habitat in Utah is better understood, a search of similar habitats, particularly on the north slope of the Uinta Mountains should yield more populations.

RANK.—G4, N4, SU; recommended S3.

### *Sympetrum obtrusum* (Hagen)
### White-faced Meadowhawk

COUNTY RECORDS.—(9 of 29) Cache, Duchesne, Juab, Morgan, Salt Lake, Summit, Uintah, Utah, Weber.

ELEVATION RANGE.—1302–1676 m (4270–5500 ft).

FLIGHT SEASON.—26 Jun–12 Sep; records by month: Jun (2), Jul (9), Aug (12), Sep (3).

U.S. RANGE.—Northern two-thirds of U.S., south to New Mexico.

UTAH RANGE.—Map 56. Scattered populations in northern Utah, south to Juab County, Uintah Basin.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Wasatch and Uinta Mountains.

DRAINAGES.—Bear River, Burraston Ponds and Currant Creek (Juab), Duchesne River, Green River, Jordan River, Lake Fork River (Duchesne), Provo River, Uinta River, Utah Lake watershed, Weber River.

HABITAT.—Wet meadows and marshes in valleys, ponds, wetlands along streams.

COMMENTS.—*Sympetrum obtrusum* is usually found in smaller numbers than *Sympetrum internum* with which it sometimes flies. It lives in similar habitats as *S. internum* but appears to be more restricted to lower-elevation valleys in northern Utah and does not range as far south. It is abundant at Stewart Lake WMA along the Green River near Jensen (Uintah).

RANK.—G5, N5, SH; recommended S4.

### *Sympetrum pallipes* (Hagen)
### Striped Meadowhawk

COUNTY RECORDS.—(27 of 29) all counties except Daggett and Morgan.

ELEVATION RANGE.—869–3208 m (2850–10,525 ft).

FLIGHT SEASON.—8 Jun–12 Oct; records by month: Jun (12), Jul (48), Aug (30), Sep (28), Oct (4).

U.S. RANGE.—Western U.S., east to the western edge of the Dakotas, Nebraska, Colorado, and Texas.

UTAH RANGE.—Map 57. Widespread throughout Utah.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Northern Basin and Range, Wasatch and Uinta Mountains, Wyoming Basin.

DRAINAGES.—Bear River, Beaver River, Burraston Ponds (Juab), Colorado River, Duchesne River, Duck Creek (Kane), Fremont River, Great Basin wetlands, Great Salt Lake watershed, Green River, Lake Fork River (Duchesne), Mammoth Creek (Garfield), Otter Creek, Pariette Wetlands (Uintah), Pine Creek (Wayne), Polk Creek (Wayne), Price River, Provo River, Raft River, Red Creek (Iron), San Pitch River, Sevier River, Spanish Fork River, Utah Lake watershed, Virgin River, Weber River.

HABITAT.—Valley wetlands, slow streams and stream backwaters, ponds and sedge marshes at higher elevations.

COMMENTS.—*Sympetrum pallipes* is our most versatile *Sympetrum* species and is found throughout the state at a wide range of elevations and habitats making it difficult to pinpoint any preferred habitat. It has the highest elevation records (3208 m [10,525 ft]) of any *Sympetrum* species in Utah, rivaled only by *S. danae,* and yet can also be found at alkaline/saline marshes in the Great Basin Desert. Although quite common, *S. pallipes* usually does not emerge in large numbers like some of the other *Sympetrum* species.

RANK.—G5, N5, S2; recommended S5.

*Sympetrum semicinctum* (Say)
Band-winged Meadowhawk

COUNTY RECORDS.—(27 of 29) all counties except Iron and Rich.

ELEVATION RANGE.—1209–2560 m (3967–8400 ft). Only 9 records out of 307 are above 1830 m.

FLIGHT SEASON.—4 Jun–20 Oct; records by month: Jun (15), Jul (106), Aug (71), Sep (42), Oct (6).

U.S. RANGE.—Most of the U.S.; missing from the southeastern U.S.

UTAH RANGE.—Map 58. Widespread throughout the valleys of Utah.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Northern Basin and Range, Wasatch and Uinta Mountains, Wyoming Basin.

DRAINAGES.—Bear River, Beaver River, Calf Creek (Garfield), Cherry Creek (Juab),

***Sympetrum semicinctum*** Photo: Jim T. Johnson

Colorado River, Desert Lake WMA (Emery), Dirty Devil River, Duchesne River, Great Basin wetlands, Great Salt Lake watershed, Green River, Indian Creek (San Juan), Jordan River, Logan River, Ogden River, Pariette Wetlands (Uintah), Price River, Provo River, San Pitch River, Sevier River, Sheep Creek (Kane), Utah Lake watershed, Weber River.

HABITAT.—Lower-elevation valleys, ponds, springs, marshes, fields, farmland, backwater areas along streams.

COMMENTS.—*Sympetrum semicinctum* is one of the most abundant dragonflies, with dozens observed at a given location during their peak flight time in July. Although Rich County harbors abundant populations of 6 of the 8 *Sympetrum* species found in Utah, it is 1 of 2 counties where *Sympetrum semicinctum* has not been found. This may be due to the higher elevations and very cold winter temperatures experienced in the Utah portion of the Wyoming Basin ecoregion. Although the species is generally restricted to lowland habitats in Utah, there are a few records from higher elevations where individuals may have been blown higher into the mountains. *Sympetrum semicinctum* was formerly known as *Sympetrum occidentale;* recent DNA studies support combining *S. occidentale* with *S. semicinctum* (Pilgrim and von Dohlen 2007).

RANK.—G5, N5, S3; recommended S5.

*Tramea lacerata* Hagen
Black Saddlebags

COUNTY RECORDS.—(21 of 29) Beaver, Box Elder, Carbon, Davis, Emery, Garfield, Grand, Iron, Juab, Kane, Millard, Piute, Salt Lake, San Juan, Sanpete, Sevier, Tooele, Uintah, Utah, Washington, Weber.

*Tramea lacerata* Photo: Jim T. Johnson

ELEVATION RANGE.—846–1894 m (2775–6213 ft).

FLIGHT SEASON.—30 Apr–11 Oct.

U.S. RANGE.—Widespread across the U.S. except the extreme north, northern Great Plains, and Rocky Mountains.

UTAH RANGE.—Map 59. Southern and western Utah, Sevier River Valley, eastern Utah along the Colorado and Green Rivers, Anderson Reservoir (Carbon), Desert Lake WMA (Emery).

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains.

DRAINAGES.—Bear River, Beaver Dam Wash, Beaver River, Colorado River, Duchesne River, East Fork Virgin River, Great Basin wetlands, Great Salt Lake watershed, Green River, Indian Creek (San Juan), Jordan River, Kanab Creek, Payson Creek, Price River, San Pitch River, Sevier River, Spanish Fork River, Utah Lake watershed, Virgin River.

HABITAT.—Springs, marshes, ponds, at lower elevations.

COMMENTS.—Although never very common, *Tramea lacerata* is widely scattered at lower-elevation springs, ponds, and marshes throughout much of Utah, except in southern Utah where it is found in greater numbers. Earlier studies of Utah dragonflies (Brown 1934, Larsen 1952, Musser 1962) do not contain many northern Utah records of this species. However, during this study many records were obtained from scattered locations in the north. It is unknown whether these northern records are the result of a northward range expansion or the result of incomplete surveying during past studies. Northern records may also be a result of migrating adults, although some appear to be from local resident populations. Unlike many dragonflies that patrol the edges of ponds and marshes, *T. lacerata* often glides high over ponds and nearby terrain, taking small insects from the air. A flick of their broad wings allows them to dart upward out of range at the slightest flinch of a collector's net. The "black saddlebags" at the wing bases give this dragonfly the strange appearance of flying on short, stubby black wings.

RANK.—G5, N5, S1; recommended S4.

### *Tramea onusta* Hagen
### Red Saddlebags

COUNTY RECORDS.—(12 of 29) Beaver, Carbon, Iron, Juab, Kane, Millard, Piute, Salt Lake, Sevier, Tooele, Utah, Washington.

ELEVATION RANGE.—846–1823 m (2775–5982 ft).

FLIGHT SEASON.—27 May–23 Jul.

U.S. RANGE.—Southern half of the U.S., northward up the Mississippi and Ohio Rivers in the Midwest.

UTAH RANGE.—Map 60. Southern Utah, northward to Salt Lake, Tooele, and Utah County.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains.

DRAINAGES.—Beaver Dam Wash, Beaver River, Clear Lake WMA (Millard), Great Salt Lake watershed, Price River, Sevier River, Timpie Springs (Tooele), Utah Lake watershed, Virgin River.

HABITAT.—Lower-elevation ponds, springs, marshes, stream backwaters.

COMMENTS.—*Tramea onusta* is generally found at ponds and marshes in southern Utah. It is less common than *Tramea lacerata* and less likely to migrate northward each year. However, in 2015, after a record warm winter, many were observed early in the season at more northern locations than in other years. Whether more individuals moved northward in 2015 or more of the previous year's offspring survived the winter in some life stage is unknown. A glance at the distribution map gives the impression that the species is more common and widespread in the Central Basin and Range than on the Colorado Plateau. However, in 2015, *T. onusta* was observed in Emery, Grand, and San Juan Counties of the Colorado Plateau ecoregion, but no voucher specimens were collected or photographed. The Juab County record is a photo record (Davis 2013b).

RANK.—G5, N5, S1; recommended S3.

## ZYGOPTERA

(34 species; see Appendix 2 for a list of Zygoptera species in Utah)

### Family Calopterygidae (2 Genera, 3 Species)

#### *Calopteryx aequabilis* Say
River Jewelwing

COUNTY RECORDS.—(4 of 29) Box Elder, Cache, Utah, Weber.

ELEVATION RANGE.—1280–1789 m (4200–5870 ft).

FLIGHT SEASON.—8 May–16 Aug.

U.S. RANGE.—Northern U.S.

UTAH RANGE.—Map 61. Goshen (Utah), Logan River (Cache), lower Ogden and Weber Rivers (Weber), Raft River in extreme northwestern Utah (Box Elder).

ECOREGIONS.—Central Basin and Range, Northern Basin and Range.

DRAINAGES.—Goshen Warm Springs (Utah), Logan River, Ogden River, Raft River, Weber River.

***Calopteryx aequabilis*** Photo: Jim T. Johnson

HABITAT.—Low-elevation streams with streamside trees and shrubs.

COMMENTS.—When sunlight hits this large bright metallic-green damselfly, it attracts even the most casual observers. The interplay between dancing males competing for perches overhanging the stream is a sight worth watching. The stable Raft River population of extreme northwestern Utah (Box Elder) is isolated from human populations. The only possible threat at this location may be possible damage to streamside vegetation and degradation of water quality from grazing livestock in the area. The small population along the lower Weber and Ogden Rivers is likely diminishing due to encroaching housing and industry, which could affect its future especially if streamside vegetation is removed. Habitat for this species has likely been degraded or lost over the past 60 years since the first records were obtained, reducing this population to its current vulnerable state. The Cache County record is from 1951, while the Utah County record is from 1969. There are no recent records from these 2 counties.

RANK.—G5, N5, SH; recommended S1.

#### *Hetaerina americana* (Fabricius)
American Rubyspot

COUNTY RECORDS.—(21 of 29) Beaver, Box Elder, Carbon, Duchesne, Emery, Garfield, Grand, Juab, Kane, Millard, Piute, Salt Lake, San Juan, Sanpete, Sevier, Tooele, Uintah, Utah, Wasatch, Washington, Wayne.

ELEVATION RANGE.—783–2295 m (2570–7530 ft).

FLIGHT SEASON.—23 Feb–30 Oct; records by month: Feb (1), Mar (2), Apr (11), May (11), Jun (29), Jul (53), Aug (51), Sep (34), Oct (19).

***Hetaerina americana*** Photo: Alan R. Myrup

U.S. RANGE.—Widespread in the U.S. except Washington, Idaho, and western Wyoming; more common in the south.

UTAH RANGE.—Map 62. Widespread in Utah except in the far northern counties.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains.

DRAINAGES.—Beaver Dam Wash, Beaver River, Calf Creek (Garfield), Castle Creek (Grand), Colorado River, Currant Creek (Juab), Deer Creek (Garfield), Desert Lake WMA (Emery), Duchesne River, Escalante River, Fremont River, Great Basin springs, Green River, Huntington Creek (Emery), Jordan River, Kanab Creek, Mill Creek (Washington), Price River, Sand Creek (Garfield), San Juan River, San Pitch River (Sanpete), San Rafael River, Sevier River, Spanish Fork River, Utah Lake watershed, Virgin River, White River, Willow Creek (Uintah).

HABITAT.—Sandy to muddy bottomed lower-elevation streams, large or small; occasionally small rocky streams, springs, and spring runs.

COMMENTS.—This beautiful ruby-spotted damselfly is common and widespread throughout much of the state except in the northern counties. On the map for this species, a "literature record" dot was placed in Box Elder County at the approximate location found on Provonsha's maps (1975), since no exact location data was recorded in his notes. This is the only extreme northern Utah record. Robert Larsen also reported this species from Iron County, although the record has not been verified. Males perch on rocks, debris jams, or vegetation overhanging the water, occasionally darting out after other males that intrude on their territory where they dance in circles like prize fighters in the ring.

RANK.—G5, N5, S3; recommended S5.

*Hetaerina vulnerata* Hagen in Selys
Canyon Rubyspot

COUNTY RECORDS.—(3 of 29) Iron, Kane, Washington.

ELEVATION RANGE.—1006–1829 m (3300–6000 ft).

FLIGHT SEASON.—27 Mar–21 Nov.

U.S. RANGE.—Desert southwest including Arizona, western New Mexico, extreme southern Nevada, and southwestern Utah; south into Mexico.

UTAH RANGE.—Map 63. Desert canyon streams in southwestern Utah.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains.

DRAINAGES.—Ash Creek, Coal Creek (Iron), East Fork Virgin River, Leeds Creek, Quail Creek, Santa Clara River, Virgin River tributaries in Zion NP.

HABITAT.—Small sandy to rocky bottomed canyon streams usually lined with trees and shrubs.

COMMENTS.—*Hetaerina vulnerata* is generally restricted to small wooded, permanent canyon streams, a rare habitat which it shares with *Aeshna persephone, Oplonaeschna armata, Cordulegaster diadema, Paltothemis lineatipes,* and *Argia lugens.* It is quite common in many of the small permanent streams in Zion National Park. Park visitors can enjoy these ruby-spotted beauties dancing along Weeping Rock Creek in Zion Canyon. Habitat for this damselfly outside protected areas may be threatened as human water consumption increases. During his study of damselflies in Utah, Provonsha (1975) did not find *Hetaerina americana* and *H. vulnerata* together, suggesting their populations may be isolated ecologically.

RANK.—G5, N4, S1; recommended S2.

Family Lestidae (2 Genera, 6 Species)

*Archilestes grandis* (Rambur)
Great Spreadwing

COUNTY RECORDS.—(16 of 29) Beaver, Carbon, Emery, Garfield, Grand, Iron, Juab, Kane, Millard, Piute, Salt Lake, San Juan, Sanpete, Sevier, Utah, Washington.

ELEVATION RANGE.—771–1990 m (2530–6530 ft).

FLIGHT SEASON.—6 Jul–20 Nov; records by month: Jul (5), Aug (16), Sep (47), Oct (22), Nov (6).

***Archilestes grandis*** Photo: Jim T. Johnson

U.S. RANGE.—Widespread in the U.S. except the far northern states and the Southeast.

UTAH RANGE.—Map 64. Mostly southern Utah, north to Salt Lake County.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains.

DRAINAGES.—Beaver Dam Wash, Beaver River, Calf Creek (Garfield), Coal Creek and Red Creek (Iron), Colorado River, Corner Canyon Creek (Salt Lake), Cottonwood Creek (Emery), Desert Lake WMA (Emery), Price River, Provo River, San Pitch River (Sanpete), Sevier River, Utah Lake watershed, Virgin River and its tributaries.

HABITAT.—A variety of springs, streams, and rivers with sandy to rocky bottoms.

COMMENTS.—The range of *Archilestes grandis* appears to be expanding northward in Utah. Until 2002, all records for this very large late-season damselfly were from south central to southern Utah. For many years biology students from Timpview High School, Provo, Utah, and entomology students from Brigham Young University never collected *A. grandis* in northern Utah. The first specimen from Utah County came in 2002; the next in 2006. Each year thereafter, the number of specimens collected in Utah County gradually increased until 8–12 were collected every year from 2009 to 2012. The number of locations in Utah County where this species is found has also increased. Currently, this northern range expansion has now reached Salt Lake County. The cause of this expansion is unknown. One possible explanation is that anthropogenic changes to water resources causing water to be diverted and farm ponds to be created has provided a series of "stepping stones" through desert regions. Another explanation is the gradual warming trend in Utah (NOAA 2015) which may allow *A. grandis* larvae to survive the winter farther north and complete their life cycle.

RANK.—G5, N5, S2; recommended S4.

### *Lestes alacer* Hagen
### Plateau Spreadwing

COUNTY RECORDS.—(1 of 29) San Juan.

ELEVATION RANGE.—4898 ft.

FLIGHT SEASON.—24 July 2015.

U.S. RANGE.—Southeastern Utah and Colorado; Arizona to Oklahoma, south into Mexico.

UTAH RANGE.—Map 65. Southeastern Utah (San Juan).

ECOREGIONS.—Colorado Plateau.

DRAINAGES.—Recapture Creek.

HABITAT.—A small shallow pond made to capture drainage water, lined with short, sparse emergent vegetation. "Permanent or temporary ponds and seep springs with emergent vegetation, from lowlands well up into the mountains. Tolerant of saline conditions." (Paulson 2009).

COMMENTS.—*Lestes alacer* was first collected in Utah on 24 July 2015 at a small shallow pond about 15 miles south of Blanding on SR 262 (Hovenweep Road). Dozens of individuals were seen around the edges of the pond in the low weeds and emergent vegetation. Seven were obtained as voucher specimens. Preliminary identifications were made by the authors, and specimens were sent to Dennis Paulson and John Abbott. Both confirmed them as *L. alacer*, a new state record for Utah.

RANK.—G5, N4, SNR; recommended S1.

### *Lestes congener* Hagen
### Spotted Spreadwing

COUNTY RECORDS.—All counties.

ELEVATION RANGE.—1087–3194 m (3565–10,480 ft). Only 3 of 185 records are above 2438 m (8000 ft).

FLIGHT SEASON.—1 Jun–6 Nov; records by month: Jun (16), Jul (36), Aug (66), Sep (59), Oct (10), Nov (2).

U.S. RANGE.—Widespread throughout the U.S. except the Southeast (Texas to Florida).

UTAH RANGE.—Map 66. Statewide, mostly at lower elevations.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Northern Basin and Range, Southern Rockies, Wasatch and Uinta Mountains, and the Wyoming Basin.

DRAINAGES.—American Fork Creek, Ashley Creek (Uintah), Bear Lake watershed, Bear River, Beaver River, Boulder Creek (Garfield), Chalk Creek (Summit), Colorado River, Corn Creek (Millard), Cottonwood Creek (Emery), Currant Creek (Juab), Desert Lake WMA (Emery), Diamond Fork Creek (Utah), Dry Gulch Creek (Duchesne), Duchesne River, East Fork Sevier River, Great Basin wetlands, Great Salt Lake watershed, Green River, Hobble Creek (Utah), Huntington Creek (Emery), Jordan River, Kays Creek (Davis), Little Bear River, Logan River, North Creek (Beaver), Otter Creek, Pariette Wetlands (Uintah), Parowan Creek, Price River, Provo River, Raft River, Round Valley Creek (Millard), San Pitch River (Sanpete), Santa Clara River, Sevier River, Sheep Creek (Kane), Soldier Creek (Carbon), Spanish Fork River, Utah Lake watershed, Virgin River, Weber River, White River (Uintah), White River (Utah).

HABITAT.—A variety of valley wetlands, marshes, springs, ponds, lakes, ditches, and stream backwaters; rarely found higher in the mountains at ponds and lakes.

COMMENTS.—*Lestes congener* is the most common and widespread spreadwing damselfly in Utah. It is found at a variety of lower-elevation wetlands including ephemeral wetlands that usually dry up in late summer and alkaline/saline wetlands in desert regions. They emerge in large swarms in late June along the dikes at Bear River National Migratory Bird Refuge bordering the north end of the Great Salt Lake.

RANK.—G5, N5, S4; recommended S5.

### *Lestes disjunctus* Selys
### Northern Spreadwing

COUNTY RECORDS.—(20 of 29) Beaver, Daggett, Davis, Duchesne, Emery, Garfield, Grand, Iron, Kane, Millard, Morgan, Rich, Salt Lake, Sanpete, Sevier, Summit, Uintah, Utah, Wasatch, Wayne.

ELEVATION RANGE.—1433–2835 m (4700–9300 ft).

***Lestes disjunctus*** Photo: Dennis Paulson

FLIGHT SEASON.—1 Jul–16 Sep; records by month: Jul (30), Aug (23), Sep (2).

U.S. RANGE.—Northern U.S. from central California to West Virginia; south in the Rockies to northern Arizona and New Mexico.

UTAH RANGE.—Map 67. The central mountain ranges from northern to southern Utah, Uinta Mountains of northeastern Utah, LaSal Mountains.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Southern Rockies, Wasatch and Uinta Mountains, Wyoming Basin.

DRAINAGES.—Ashley Creek (Uintah), Bear River, Beaver Creek (Daggett), Beaver River, Big Brush Creek (Uintah), Big Cottonwood Creek (Salt Lake), Big Lake on Aquarius Plateau (Garfield), Blacks Fork River (Summit), Carter Creek (Daggett), Colorado River higher-elevation tributaries, Dry Gulch Creek (Duchesne), Duchesne River, Duck Creek (Kane), East Fork Smiths Fork (Summit), East Fork Virgin River (Kane), Farmington Creek (Davis), Hobble Creek—tributary of the Strawberry River (Wasatch), Huntington Creek (Emery), Lake Fork River (Duchesne), Little West Fork (Wasatch), Lost Creek tributary of Burnt Fork (Summit), Mill Creek (Grand), Parowan Creek, Payson Creek, Polk Creek (Wayne), Provo River, Rock Creek (Duchesne), Sevier River, Soldier Creek (Utah), Weber River, West Fork Duchesne River (Duchesne), White River (Utah).

HABITAT.—A variety of mountain marshes, sedge ponds, lakes, stream backwaters, and beaver ponds.

COMMENTS.—*Lestes disjunctus* is often found at shallow sedge ponds and wet depressions in the mountains and occasionally at mountain lakes throughout the state. It is less likely to be found at lower elevations, unlike

*Lestes dryas* which flies at both lower and higher elevations. Both *L. disjunctus* and *L. dryas* fly at many of the same mountain habitats, with *L. dryas* emerging earlier in the season and *L. disjunctus* appearing later. There are several mountain areas that have not yet been surveyed late in the season where *L. disjunctus* may occur. The Carbon County record found in Provonsha (1975) is likely from Utah County and therefore not included here.

RANK.—G5, N5, S2; recommended S4.

### *Lestes dryas* Kirby
### Emerald Spreadwing

COUNTY RECORDS.—All counties.

ELEVATION RANGE.—1280–3237 m (4200–10,620 ft).

FLIGHT SEASON.—20 May–3 Sep; records by month: May (3), Jun (30), Jul (57), Aug (27), Sep (1).

U.S. RANGE.—Northern U.S.; south down the Rockies to northern Arizona and New Mexico.

UTAH RANGE.—Map 68. Statewide, except in the lower Virgin River area around St. George.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Southern Rockies, Wasatch and Uinta Mountains, and Wyoming Basin.

DRAINAGES.—Ashley Creek (Uintah), Bear River, Beaver Creek (Daggett), Beaver River, Big Brush Creek (Uintah), Big Cottonwood Creek (Salt Lake), Big Lake on Aquarius Plateau (Garfield), Blacks Fork River (Summit), Blue Creek tributary of the Left Fork of North Fork Virgin River (Washington), Carter Creek (Daggett), Castle Creek (Grand), Dalton Springs (San Juan), Dry Gulch Creek (Duchesne), Duchesne River, Duck Creek (Kane), East Fork Blacks Fork (Summit), East Fork Smiths Fork (Summit), Fifth Water Creek (Utah), Fremont River, Great Basin springs and wetlands, Great Salt Lake watershed, Fremont River (upper tributaries), Hobble Creek—tributary of the Strawberry River (Wasatch), Huntington Creek, Jordan River, Lake Creek (Wasatch), Little West Fork (Wasatch), Lost Creek (Morgan), Lost Creek tributary of Burnt Fork (Summit), Parowan Creek, Payson Creek, Pine Creek (Wayne), Polk Creek (Wayne), Price River, Provo River, Red Creek (Duchesne), San Pitch River (Sanpete), Scad Valley Creek (Emery), Seven Mile Creek (Sevier), Sevier River, Soapstone Creek (Wasatch), Soldier Creek (Carbon), Spanish Fork River, Uinta River (Uintah), Utah Lake watershed, Weber River, West Fork Bear River (Summit), West Fork Duchesne River (Wasatch), Whiterocks River (Uintah).

***Lestes dryas*** Photo: Jim T. Johnson

HABITAT.—A variety of valley wetlands, both permanent and temporary, including marshes, ponds, shallow lakes, ditches, canals, and flooded backwaters of streams, as well as higher-elevation sedge marshes, ponds, and flooded lake edges.

COMMENTS.—*Lestes dryas* is a beautiful emerald-green spreadwing that emerges by the hundreds at many locations. This is the first spreadwing to emerge each year in Utah, beginning in late May at lower elevations, then later at higher elevations. It has the greatest elevation range of any spreadwing in Utah, which contributes to its widespread distribution throughout the state.

RANK.—G5, N5, S2; recommended S5.

### *Lestes unguiculatus* Hagen
### Lyre-tipped Spreadwing

COUNTY RECORDS.—(8 of 29) Cache, Daggett, Duchesne, Rich, Uintah, Utah, Wasatch, Weber.

ELEVATION RANGE.—1291–2621 m (4235–8600 ft).

FLIGHT SEASON.—19 Jul–5 Oct; one record on 15 April 1905.

U.S. RANGE.—Northern two-thirds of U.S.

UTAH RANGE.—Map 69. Northern Utah and the Uinta Basin.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Wasatch and Uinta Mountains, and Wyoming Basin.

DRAINAGES.—Bear River, Beaver Creek (Daggett), Blacksmiths Fork (Cache), Dry

Gulch Creek (Duchesne), Duchesne River, Green River, Provo River, Spanish Fork River, Uinta River, Weber River.

HABITAT.—Valley wetlands including marshes, slow streams, larger rivers and ponds, sedge marshes in the mountains.

COMMENTS.—The range of *Lestes unguiculatus* is restricted to northern Utah and the Uinta Basin. It is often found with other spreadwings but usually in lesser numbers. However, at several locations in the Uinta Basin it can be abundant. With the aid of a hand lens, this beautiful spreadwing can be identified by its lyre-tipped paraprocts.

RANK.—G5, N5, SH; recommended S4.

***Amphiagrion abbreviatum*** Photo: Nicky Davis

Family Coenagrionidae (6 Genera, 25 Species)

*Amphiagrion abbreviatum* (Selys)
Western Red Damsel

COUNTY RECORDS.—All counties.

ELEVATION RANGE.—1170–2778 m (3840–9115 ft).

FLIGHT SEASON.—26 Apr–4 Oct; records by month: Mar (1), Apr (2), May (42), Jun (74), Jul (61), Aug (9), Sep (1), Oct (1).

U.S. RANGE.—Western U.S., east to eastern Montana, Wyoming, Colorado, and New Mexico.

UTAH RANGE.—Map 70. Statewide except extreme southwest Utah.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Northern Basin and Range, Southern Rockies, Wasatch and Uinta Mountains, Wyoming Basin.

DRAINAGES.—American Fork Creek, Ashley Creek, Bear Creek (Iron), Bear Lake watershed, Bear River, Beaver River, Big Cottonwood Creek (Salt Lake), Blacksmiths Fork (Cache), Calf Creek (Garfield), Clover Creek (Tooele), Cotton Thomas Creek (Box Elder), Cottonwood Creek (Emery), Dalton Springs (San Juan), Deer Creek (Garfield), Desert Lake WMA (Emery), Dry Gulch Creek (Duchesne), Duchesne River, East Canyon Creek (Morgan), East Fork Sevier River, East Fork Virgin River (Garfield), Enterprise Creek (Washington), Escalante River, Fifth Water Creek (Utah), Fremont River, Great Basin wetlands, Great Salt Lake watershed, Green River, Grouse Creek (Box Elder), Hobble Creek (Utah), Hobble Creek—tributary of the Strawberry River (Wasatch), Huntington Creek, Indian Creek (San Juan), Jones Hole Creek (Uintah), Kanab Creek, Logan River, Long Birch Creek (Box Elder), Mammoth Creek (Garfield), Mill Creek (Weber), Montez Creek (Uintah), Nine Mile Creek (Carbon), North Creek (Beaver), Ogden River, Otter Creek, Payson Creek, Price River, Provo River, Raft River, Red Creek (Duchesne), Sand Creek (Wayne), San Pitch River (Sanpete), Santa Clara River, Sevier River, Sheep Creek (Kane), Silver Creek (Summit), Spanish Fork River, Utah Lake watershed, Virgin River, Wahweap Creek (Kane), Wallsburg Creek (Wasatch), Weber River, West Fork Duchesne River, White River (Utah), Willow Creek (Daggett).

HABITAT.—Springs, seeps, slow streams and stream backwaters, pond and lake edges, and many other wetlands, preferably with short, thick shoreline vegetation.

COMMENTS.—*Amphiagrion abbreviatum* is common and widespread throughout the state at a variety of wetlands where they tend to stay low down in the vegetation among the watercress, spike rushes, and sedges. They also have a large elevation range, emerging at lower elevations in spring and at higher elevations later in the summer. This small hairy, red and black damselfly is the only red damselfly throughout most of the state, except in extreme southwestern Utah where the fiery orange-red *Telebasis salva* can be found.

RANK.—G5, N5, S5; recommended S5.

*Argia alberta* Kennedy
Paiute Dancer

COUNTY RECORDS.—(16 of 29) Box Elder, Davis, Emery, Garfield, Grand, Juab, Kane,

***Argia emma*** Photo: Jim T. Johnson

Millard, San Juan, Sanpete, Sevier, Tooele, Utah, Wasatch, Washington, Weber.

ELEVATION RANGE.—853–1887 m (2800–6190 ft).

FLIGHT SEASON.—1 May–30 Oct.

U.S. RANGE.—Iowa, Missouri, and Oklahoma; west to Oregon and California; south to Arizona and Texas.

UTAH RANGE.—Map 71. Western Utah, east central and southern Utah.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains.

DRAINAGES.—Bear River, Calf Creek (Garfield), Colorado River, Escalante River, Desert Lake WMA (Emery), Great Basin wetlands, Great Salt Lake watershed, Midway Hot Springs (Wasatch), Paria River (Garfield), San Juan River, Sevier River, Sheep Creek (Kane), Utah Lake.

HABITAT.—Slow-moving desert streams, desert springs, and spring runs.

COMMENTS.—*Argia alberta* is a small bright blue-violet dancer that typically inhabits the widely scattered springs, spring runs, and backwaters of slow-moving desert streams of the Great Basin in western Utah and the Colorado Plateau in eastern Utah. Unlike other *Argia* species in Utah, *A. alberta* is not necessarily tied to stream habitat. Without careful examination, it can be mistaken for other damselfly species such as *Argia nahuana* or possibly even *Enallagma* species.

RANK.—G4, N4, S2; recommended S4.

### *Argia emma* Kennedy
### Emma's Dancer

COUNTY RECORDS.—(16 of 29) Box Elder, Cache, Carbon, Duchesne, Emery, Juab, Kane, Millard, Piute, Salt Lake, Sanpete, Sevier, Uintah, Utah, Wayne, Weber.

ELEVATION RANGE.—1280–1981 m (4200–6500 ft).

FLIGHT SEASON.—12 May–12 Aug; records by month: May (1), Jun (11), Jul (23), Aug (12).

U.S. RANGE.—Washington to Montana and Nebraska; south to Central California and Colorado.

UTAH RANGE.—Map 72. Northern to south central Utah.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Northern Basin and Range, Wasatch and Uinta Mountains.

DRAINAGES.—Ashley Creek, Bear River, Desert Lake WMA (Emery), Duchesne River, Jordan River, Malad River, Ogden River, Price River, Raft River, Red Creek (Duchesne), Sand Creek (Wayne), San Rafael River, Sevier River, Sheep Creek (Kane), Weber River, White River (Uintah), Willow Creek (Uintah).

HABITAT.—Small, sandy to rocky bottomed streams as well as larger slow-moving rivers.

COMMENTS.—*Argia emma* is a northern species that extends south into Utah. It appears to be restricted to low to midelevation sandy to rocky bottomed streams mostly in the northern half of the state, with one record as far south as the Grand Staircase–Escalante National Monument in Kane County. This purple-colored dancer is often found with the more common and widespread *Argia vivida*.

RANK.—G5, N5, S3; recommended S4.

### *Argia hinei* Kennedy
### Lavender Dancer

COUNTY RECORDS.—(3 of 29) Kane, San Juan, Washington.

ELEVATION RANGE.—930–1545 m (3050–5070 ft).

*Argia lugens* Photo: Alan R. Myrup

FLIGHT SEASON.—21 Jul–5 Oct.

U.S. RANGE.—Southwest U.S., from southern California to southwestern Texas.

UTAH RANGE.—Map 73. Southern Utah.

ECOREGIONS.—Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains.

DRAINAGES.—Bowns Canyon Creek off Lake Powell (Kane), Leeds Creek, Peekaboo Springs in Lost Canyon (San Juan), Virgin River, Weeping Rock Creek in Zion NP.

HABITAT.—Small- to medium-sized streams with sandy to rocky bottoms, springs.

COMMENTS.—A fairly recent discovery for Utah (Johnson 2004, Bailowitz and Stevens 2006), *Argia hinei* has now been found at 5 different locations in Utah including Zion National Park. However, 2 specimens collected much earlier (Aug 1993) by Boris Kondratieff at Peekaboo Springs in Canyonlands National Park (San Juan) were recently discovered in the Colorado State Collection and identified in 2011. Southern Utah appears to be the northern boundary of this southwestern species.

RANK.—G4, N4, SNR; recommended S1.

*Argia lugens* (Hagen)
Sooty Dancer

COUNTY RECORDS.—(2 of 29) Kane, Washington.

ELEVATION RANGE.—846–1661 m (2775–5450 ft).

FLIGHT SEASON.—16 Jun–5 Oct.

U.S. RANGE.—Mainly southwestern U.S.; southern Oregon, south through California, east through southern Utah and Colorado to southwestern Texas; isolated records from Nebraska and South Dakota; no Nevada records.

UTAH RANGE.—Map 74. Extreme southern Utah.

ECOREGIONS.—Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains.

DRAINAGES.—Colorado River tributary in Glen Canyon (Kane), East Fork Virgin River, LaVerkin Creek, Leeds Creek, Virgin River including its tributaries in Zion NP.

HABITAT.—Small- to medium-sized desert canyon streams with sandy to rocky substrates.

COMMENTS.—*Argia lugens* is one of the largest dancers in Utah, rivaled only by *Argia moesta.* Mature males are easily identified by their dark body covered with a sooty pruinescence and smoky-colored wings. This species is one of several dancers limited to streams of southern Utah. The sooty dancer is the dominant damselfly at some streams in Zion National Park. Nine specimens located in the CSUC were collected in 1997 by J.F. MacDonald off the Excalante River arm of Lake Powell in Cow Canyon (Kane) and identified by B. & I. Prather in 2004. This population of *A. lugens* appears to be isolated from other populations by the building of the Glen Canyon Dam and the formation of Lake Powell.

RANK.—G5, N5, SH; recommended S2.

*Argia moesta* (Hagen)
Powdered Dancer

COUNTY RECORDS.—(7 of 29) Emery, Grand, Juab, Millard, San Juan, Uintah, Washington.

ELEVATION RANGE.—930–1509 m (3050–4950 ft).

FLIGHT SEASON.—14 Jun–5 Oct.

U.S. RANGE.—Eastern U.S., west to eastern Colorado, south across New Mexico to southern California, northwest into Montana.

UTAH RANGE.—Map 75. Southern Utah; north up the Colorado and Green Rivers and

*Argia nahuana* Photo: Alan R. Myrup

their tributaries to Jensen (Uintah); Virgin River and its tributaries, along the Sevier River from the top of Leamington Canyon, southwest to Delta (Juab, Millard).

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range.

DRAINAGES.—Colorado River, East Fork Virgin River, Green River, LaVerkin Creek, McElmo Creek (San Juan), Negro Bill Creek (Grand), North Creek (Washington), Price River, San Juan River, San Rafael River, Sevier River, Virgin River, White River (Uintah).

HABITAT.—Medium to large rivers with muddy to sandy bottoms.

COMMENTS.—*Argia moesta* can be abundant at times along the Colorado and Green Rivers, swarming the shoreline vegetation beyond the river's edge. It is very likely that this species is also found in deep remote canyons such as Cataract, Labyrinth, and Desolation Canyons in Garfield, Wayne, and Carbon Counties which border the west bank of the Colorado and Green Rivers. During this study, new populations of *A. moesta* were discovered for the first time in the Central Basin and Range ecoregion along the lower Sevier River in Juab and Millard Counties.

RANK.—G5, N5, SH; recommended S4.

*Argia nahuana* Calvert
Aztec Dancer

COUNTY RECORDS.—(2 of 29) Millard, Washington.

ELEVATION RANGE.—808–1509 m (2650–4950 ft).

FLIGHT SEASON.—15 Apr–16 Oct.

U.S. RANGE.—Southern Oregon, south through California, Nevada, and southwestern Utah; east through Arizona to east Texas; north through eastern Colorado, Kansas, and Nebraska.

UTAH RANGE.—Map 76. Extreme southwestern Utah, Gandy Hot Springs (Millard).

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range.

DRAINAGES.—Ash Creek, Beaver Dam Wash, Gandy Hot Springs (Millard), Leeds Creek, Magotsu Creek, Mill Creek, Santa Clara River, Virgin River.

HABITAT.—Small sandy to rocky bottomed streams, often with emergent vegetation such as watercress and rushes; springs; hot springs.

COMMENTS.—*Argia nahuana* is a common dancer at the streams and springs in Washington County in southwestern Utah. Only one record is known from Utah outside of Washington County far to the north at Gandy Hot Springs in extreme western Millard County. These small blue dancers can easily be mistaken for *Enallagma* species (Bluets). The very similar *Argia agrioides* (California Dancer) has not been confirmed from Utah but is found in nearby Nevada and Arizona.

RANK.—G5, N5, SH; recommended S3.

*Argia sedula* (Hagen)
Blue-ringed Dancer

COUNTY RECORDS.—(2 of 29) Kane, Washington.

ELEVATION RANGE.—783–1780 m (2570–5840 ft).

FLIGHT SEASON.—14 Apr–5 Oct; records by month: Apr (1), Jun (6), Jul (2), Aug (0), Sep (0), Oct (1).

U.S. RANGE.—East central U.S., west to Colorado; Florida to California; north to central Nevada and southwestern Utah.

***Argia vivida*** Photo: Alan R. Myrup

UTAH RANGE.—Map 77. Extreme southwestern Utah.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range.

DRAINAGES.—East Fork Virgin River, Kanab Creek (Kane), LaVerkin Creek, Mill Creek, North Creek, Santa Clara River, Virgin River.

HABITAT.—Small sandy to rocky-bottomed streams lined with small spike rushes; springs.

COMMENTS.—*Argia sedula* is an uncommon damselfly found in small numbers at only 8 locations in the Virgin River drainage and one location north of Kanab (Kane). Only 4 of these locations appear to be stable habitat. Most records are from June.

RANK.—G5, N5, SH; recommended S1.

### *Argia vivida* Hagen in Selys
### Vivid Dancer

COUNTY RECORDS.—(25 of 29) all counties except Cache, Morgan, Piute, and Rich.

ELEVATION RANGE.—762–2387 m (2500–7830 ft).

FLIGHT SEASON.—27 Mar–7 Nov; records by month: Mar (3), Apr (4), May (37), Jun (87), Jul (126), Aug (57), Sep (38), Oct (6), Nov (1).

U.S. RANGE.—Western U.S., east to eastern Montana and New Mexico.

UTAH RANGE.—Map 78. Widespread throughout Utah.

ECOREGIONS.—All 7 ecoregions found in Utah.

DRAINAGES.—Ash Creek (Washington), Ashley Creek (Uintah), Beaver Dam Wash, Beaver River, Bennie Creek (Utah), Big Spring Creek (San Juan), Calf Creek (Garfield), Castle Creek (Grand), Cherry Creek (Juab), Cottonwood Creek (Emery), Currant Creek (Juab), Deer Creek (Garfield), Desert Lake WMA (Emery), Diamond Fork River (Utah), Duchesne River, East Fork Sevier River, East Fork Virgin River, Echo Creek (Summit), Escalante River (Garfield), Great Basin springs and streams, Great Salt Lake watershed, Henrieville Creek (Garfield), Hobble Creek (Utah), Huntington Creek, Indian Creek (San Juan), Jordan River, Kanab Creek (Kane), Last Chance Creek (Kane), LaVerkin Creek, Leeds Creek, Magotsu Creek, Mill Creek (Grand), Mill Creek (Washington), Negro Bill Creek (Grand), Paria River (Kane), Parowan Creek (Iron), Pine Creek (Garfield), Pleasant Creek (Wayne), Price River, Provo River, Quail Creek, Raft River, Red Creek (Duchesne), Red Creek (Iron), Sand Creek (Garfield), Sand Creek (Wayne), San Pitch River (Sanpete), Santa Clara River, Sevier River, Sheep Creek (Kane), Silver Creek (Summit), Soldier Creek (Utah), Utah Lake watershed, Virgin River and its tributaries in Zion NP, Weber River, Willow Creek (Daggett).

HABITAT.—A variety of stream habitats from small, sandy to rocky bottomed streams to large rivers with muddy bottoms, springs, spring runs.

COMMENTS.—This bright purple-blue damselfly is Utah's most common and widespread dancer found at a variety of stream habitats from low to midelevations throughout the state. Records exist from spring through fall. Like most dancers, they perch horizontally on rocks, branches, and stream debris, with wings held over the abdomen.

RANK.—G5, N5, S5; recommended S5.

### *Coenagrion resolutum* (Hagen in Selys)
### Taiga Bluet

COUNTY RECORDS.—(17 of 29) Beaver, Daggett, Davis, Duchesne, Emery, Garfield,

***Coenagrion resolutum*** Photo: Jim T. Johnson

Grand, Kane, Salt Lake, San Juan, Sanpete, Sevier, Summit, Uintah, Utah, Wasatch, Wayne.

ELEVATION RANGE.—1696–3357 m (5565–11,012 ft) Only 3 records below 2134 m (7000 ft).

FLIGHT SEASON.—13 Jun–23 Aug.

U.S. RANGE.—Alaska, Canada, northern U.S.; south, down the Sierra Nevada Mountains to northern California, and down the Rockies to northern Arizona and New Mexico.

UTAH RANGE.—Map 79. Mountain ranges from northern to southern Utah, northeastern Utah (Uinta Mountains), and southeastern Utah (LaSal Mountains).

ECOREGIONS.—Southern Rockies, Wasatch and Uinta Mountains.

DRAINAGES.—Upper reaches of the following: Ashley Creek (Uintah), Beaver Creek (Daggett), Beaver River, Big Brush Creek (Uintah), Big Cottonwood Creek (Salt Lake), Big Lake on Aquarius Plateau (Garfield), Blacks Fork Creek (Summit), Deep Creek (Wasatch), Duchesne River, Duck Creek (Kane), East Fork Sevier River (Garfield), East Fork Smiths Fork (Summit), Farmington Creek, Geyser Creek (San Juan), Hayden Fork (Summit), Henrys Fork (Summit), Hobble Creek—tributary of the Strawberry River (Wasatch), Lake Creek (Wasatch), Little West Fork (Wasatch), Mill Creek (Grand), North Creek (Garfield), Otter Creek (Sevier), Pine Creek (Wayne), Provo River, Rock Creek (Duchesne), Scad Valley Creek (Emery), Seven Mile Creek (Sevier), Sevier River, Sheep Creek (Daggett), Soldier Creek (Utah), Weber River, West Fork Bear River (Summit), West Fork Duchesne River, Whiterocks River.

HABITAT.—High mountain sedge ponds and lakes, bog ponds, stream backwaters, beaver dams.

COMMENTS.—*Coenagrion resolutum*, along with *Enallagma annexum* and *Enallagma boreale*, are Utah's highest-elevation damselflies, with records over 3350 m (11,000 ft). Although *C. resolutum* is common within its own habitat, it is less widespread and more restricted to the higher elevations than the 2 *Enallagma* species, which are often found at lower elevations. These beautiful pastel blue and green damselflies fly low among the sedges that line ponds and lakes. The black "U" on the dorsal surface of abdominal segment 2 is distinctive.

RANK.—G5, N5, SH; recommended S4.

### *Enallagma anna* Williamson
### River Bluet

COUNTY RECORDS.—(19 of 29) Beaver, Box Elder, Cache, Daggett, Duchesne, Garfield, Juab, Morgan, Piute, Rich, Salt Lake, Sevier, Summit, Tooele, Uintah, Utah, Wasatch, Wayne, Weber.

ELEVATION RANGE.—1280–2211 m (4200–7255 ft).

FLIGHT SEASON.—30 Apr–7 Oct; records by month: Apr (1), May (7), Jun (22), Jul (33), Aug (9), Sep (10), Oct (1).

U.S. RANGE.—Oregon to Wisconsin, south to Arizona, New Mexico, and California.

UTAH RANGE.—Map 80. Northern Utah, south to Beaver and Wayne Counties.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Northern Basin and Range, Wasatch and Uinta Mountains, Wyoming Basin.

DRAINAGES.—Bear River, Beaver River, Cherry Creek (Juab), Cotton Thomas Creek (Box Elder), Deep Creek (Box Elder), Dry Gulch Creek (Duchesne), Duchesne River, Echo Creek (Summit), Fifth Water Creek (Utah), Fremont River, Great Salt Lake watershed, Horseshoe Springs (Tooele), Jones Hole Creek (Uintah), Jordan River, Logan River, Malad River, North Creek (Beaver), Ogden River, Otter Creek, Provo River, Raft River, Sevier River, Silver Creek (Summit), Timpie Springs (Tooele), Uinta River, Weber River, Willow Creek (Daggett).

HABITAT.—A variety of small- and medium-sized streams with muddy, sandy, and rocky bottoms at low to midelevations, also springs and spring runs.

*Enallagma anna* Photo: Jim T. Johnson

COMMENTS.—*Enallagma anna* is a common species found in stream habitats of northern Utah and south to central Utah. It is one of 2 *Enallagma* species in Utah that prefers lotic habitats rather than lentic ones. The other, *Enallagma praevarum*, replaces *E. anna* in southern Utah. At Timpie Springs in Tooele County, *E. anna* can be found in large numbers. As with all *Enallagma* species, recognition of the unique structures of the caudal appendages aids in identifying the males.

RANK.—G5, N5, S3; recommended S4.

### *Enallagma annexum* (Hagen)
### Northern Bluet

COUNTY RECORDS.—(26 of 29) all counties except Millard, Piute, and Tooele.

ELEVATION RANGE.—1071–3170 m (3515–10,400 ft).

FLIGHT SEASON.—24 Mar–26 Sep; records by month: Mar (1), Apr (0), May (8), Jun (82), Jul (130), Aug (55), Sep (6).

U.S. RANGE.—Alaska, Canada, northern U.S.; south in the west to southern California, Arizona, and New Mexico.

UTAH RANGE.—Map 81. Widespread throughout Utah, except the Great Basin Desert.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Southern Rockies, Wasatch and Uinta Mountains, Wyoming Basin.

DRAINAGES.—American Fork Creek, Ashley Creek (Uintah), Bear Lake watershed, Bear River, Beaver Creek (Daggett), Beaver Creek (Summit), Beaver River, Big Brush Creek (Uintah), Big Cottonwood Creek (Salt Lake), Big Spring Creek (San Juan), Blacks Fork (Summit), Calf Creek (Garfield), Carter Creek (Daggett), Colorado River, Coop Creek (Wasatch), Cottonwood Creek (Emery), Coyote Wash (Uintah), Currant Creek (Wasatch), Deep Creek (Wasatch), Desert Lake WMA (Emery), Diamond Fork Creek (Utah), Dry Gulch Creek (Duchesne), Duchesne River, East Fork Sevier River (Garfield), East Fork Smiths Fork (Summit), East Fork Virgin River, Escalante River, Farmington Creek, Fifth Water Creek (Utah), Fremont River, Gooseberry Creek (Sanpete), Gordon Creek (Carbon), Great Salt Lake watershed, Green River, Hayden Fork (Summit), Henrys Fork (Summit), Hobble Creek (Utah), Hobble Creek—tributary of the Strawberry River (Wasatch), Huntington Creek (Emery), Indian Creek (San Juan), Kolob Creek (Washington), Lake Creek (Wasatch), Lake Fork River (Duchesne), Leeds Creek, Logan River, Lost Creek (Morgan), Mill Creek (Grand), Montez Creek (Uintah), Monticello Lake (San Juan), Negro Bill Creek (Grand), North Creek (Washington), Oak Creek (Sanpete), Ogden River, Parowan Creek, Payson Creek, Pine Creek in Zion NP, Posey Lake (Garfield), Price River, Provo River, Quail Creek, Raft River, Red Creek (Duchesne), Red Creek (Iron), Rock Creek (Duchesne), Salt Creek (Juab), Scad Valley Creek (Emery), Seely Creek (Sanpete), Seven Mile Creek (Wayne), Sevier River, Sheep Creek (Daggett), Silver Creek (Summit), Smith and Morehouse Creek (Summit), Soapstone Creek (Wasatch), Soldier Creek (Carbon), Soldier Creek (Utah), Spanish Fork River, Uinta River, Utah Lake watershed, Weber River (Morgan), Weeping Rock Creek in Zion NP, West Fork Bear River (Summit), West Fork Duchesne River (Wasatch), West Fork Whiterocks River (Duchesne), Whiterocks River, Willow Creek (Daggett), Willow Creek (Sanpete), Wolf Creek (Wasatch), Woodruff Creek (Rich).

***Enallagma boreale*** Photo: Nicky Davis

HABITAT.—A broad range of springs, ponds, lakes, and stream backwaters at a wide range of elevations.

COMMENTS.—*Enallagma annexum* is the first *Enallagma* species to emerge each spring and one of the most common and widespread in Utah, except in the desert wetland areas of the Great Basin where it appears to be absent. It can be found early in the season at a variety of wetlands on the valley floors and later at higher elevations in the mountains at ponds and lakes. Individuals often emerge in large numbers at a given location, especially at Posey Lake on the Aquarius Plateau where the lake surface and nearby vegetation literally turn blue from a covering of thousands of damselflies. The brook trout in the lake go into a feeding frenzy each morning as the larvae swim to the surface in search of emergent vegetation to crawl upon out of the water in order to emerge into adults. *Enallagma annexum* was formerly included with the Palearctic species *Enallagma cyathigerum* (Turgeon et al. 2005).

RANK.—G5, N5, S4; recommended S5.

*Enallagma boreale* (Selys)
Boreal Bluet

COUNTY RECORDS.—All counties.

ELEVATION RANGE.—1291–3357 m (4235–11,012 ft).

FLIGHT SEASON.—23 May–25 Sep; records by month: May (5), Jun (75), Jul (77), Aug (29), Sep (4).

U.S. RANGE.—Alaska; south to southern California, Arizona, and New Mexico in the west; northern U.S., south to Nebraska and West Virginia.

UTAH RANGE.—Map 82. Widespread throughout Utah except extreme southwestern Utah.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Northern Basin and Range, Southern Rockies, Wasatch and Uinta Mountains, Wyoming Basin.

DRAINAGES.—Bear Lake watershed, Bear River, Beaver River, Big Lake on Aquarius Plateau (Garfield), Blue Creek (Washington), Bowery Creek (Iron), Burraston Ponds (Juab), Cherry Creek (Juab), Clear Creek (Sevier), Clover Creek (Tooele), Cottonwood Creek (Emery), Coyote Wash (Uintah), Cyclone and Posey Lakes (Garfield), Deep Creek (Wasatch), Desert Lake WMA (Emery), Diamond Fork Creek (Utah), Duchesne River, Duck Creek (Kane), East Fork Sevier River (Garfield), East Fork Virgin River (Kane), Ephraim Creek (Sanpete), Fremont River (Wayne), Foy Lake (San Juan), Geyser Creek (San Juan), Great Basin wetlands, Great Salt Lake watershed, Green River, Hall Creek in Capital Reef NP, Henrieville Creek (Garfield), Huntington Creek (Emery), Ivie Creek (Millard), Johnson Creek (San Juan), Jordan River, Kanab Creek (Kane), Kanarraville Creek (Iron), Kolob Creek (Washington), Mammoth Creek (Garfield), Mill Creek (Grand), Montez Creek (Uintah), North Creek (Beaver), North Creek (Garfield), North Willow Creek (Tooele), Little Bear River (Cache), Little Pine Creek (Washington), Oak Creek (Garfield), Oak Creek (Sanpete), Otter Creek, Parowan Creek, Pine

Creek (Wayne), Polk Creek (Wayne), Price River, Raft River, Red Creek (Duchesne), Red Creek (Iron), Round Valley Creek (Millard), San Pitch River (Sanpete), Santa Clara River, Seven Mile Creek (Sevier), Sevier River, Soldier Creek (Carbon), Soldier Creek (Utah), South Willow Creek (Tooele), Steep Creek (Garfield), Trout Creek (Juab), Weber River, White River (Uintah), White River (Utah), Willow Creek (Sevier).

HABITAT.—Springs, marshes, ponds, lakes, stream backwaters.

COMMENTS.—*Enallagma boreale* is the most common and widespread bluet in Utah, tolerating a wide variety of habitats and conditions at a wide range of elevations. It is one of 4 damselflies found above 3050 m (10,000 ft), along with *Enallagma annexum, Coenagrion resolutum,* and occasionally *Lestes dryas*. *Enallagma boreale* and *E. annexum* fly together at some locations in the mountains, while at other locations only one or the other is present. Interestingly, *E. boreale* has been found in lowland slightly alkaline/saline wetlands where *E. annexum* is absent, such as Desert Lake WMA (Emery) and Quichapa Lake, west of Cedar City (Iron). Although both *E. annexum* and *E. boreale* are widespread throughout the state, *E. annexum* is more common in the northern mountains, while *E. boreale* is more common in the southern mountains.

RANK.—G5, N5, S4; recommended S5.

### *Enallagma carunculatum* Morse
### Tule Bluet

COUNTY RECORDS.—(27 of 29) all counties except Summit and Wayne.

ELEVATION RANGE.—948–2515 m (3110–8250 ft). Only 2 records above 2134 m (7000 ft).

FLIGHT SEASON.—26 Apr–24 Oct; records by month: Apr (1), May (10), Jun (73), Jul (94), Aug (56), Sep (34), Oct (3).

U.S. RANGE.—Widespread throughout the U.S. except the Southeast.

UTAH RANGE.—Map 83. Widespread throughout Utah at lower elevations.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains, Wyoming Basin.

DRAINAGES.—Bear Lake watershed, Bear River, Beaver River, Burraston Ponds (Juab), Castle Creek (Grand), Cherry Creek (Juab), Clear Creek (Sevier), Clover Creek (Tooele), Currant Creek (Juab), Desert Lake WMA (Emery), Duchesne River, East Fork Sevier River (Garfield), East Fork Virgin River (Kane), Escalante River, Great Basin wetlands, Great Salt Lake watershed, Green River, Huntington Creek (Emery), Indian Creek (San Juan), Jordan River, Kanab Creek (Kane), Little Bear River (Cache), Malad River, Montez Creek (Uintah), Ogden River, Otter Creek (Piute), Panguitch Creek, Pariette Wetlands (Uintah), Parowan Creek (Iron), Provo River, Round Valley Creek (Millard), Salt Creek (Juab), San Pitch River (Sanpete), Santa Clara River, Sevier River, Trout Creek (Juab), Utah Lake watershed, Weber River, White River (Uintah).

HABITAT.—Springs, marshes, ponds, lakes, backwaters of streams and rivers.

COMMENTS.—*Enallagma carunculatum* is widespread in valley wetlands, particularly those of the Central Basin and Range ecoregion where it is often the dominant damselfly. Similar to *E. clausum*, *E. carunculatum* appears to be more tolerant of alkaline/saline conditions than most damselflies. Although it can be found from spring until fall, it is more common in late spring and early summer.

RANK.—G5, N5, S4; recommended S5.

### *Enallagma civile* (Hagen)
### Familiar Bluet

COUNTY RECORDS.—(20 of 29) Beaver, Box Elder, Carbon, Emery, Garfield, Grand, Iron, Juab, Kane, Millard, Piute, Salt Lake, San Juan, Sanpete, Sevier, Tooele, Uintah, Utah, Washington, Wayne.

ELEVATION RANGE.—701–1984 m (2300–6510 ft).

FLIGHT SEASON.—23 Feb–7 Nov; records by month: Feb (2), Mar (1), Apr (2), May (11), Jun (41), Jul (29), Aug (18), Sep (3), Oct (11), Nov (2).

U.S. RANGE.—Widespread throughout the U.S. except the Northwest.

UTAH RANGE.—Map 84. Scattered throughout Utah at lower elevations; missing from counties with mostly higher elevations, especially in northern Utah.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains.

DRAINAGES.—Ash Creek (Washington), Bear River, Beaver Dam Wash, Beaver River, Castle Creek (Grand), Clear Lake WMA (Millard), Clover Creek (Tooele), Colorado River,

Currant Creek (Juab), Desert Lake WMA (Emery), East Fork Virgin River (Washington), Escalante River (Garfield), Fish Springs (Juab), Fremont River, Great Basin wetlands, Great Salt Lake watershed, Green River, Jordan River, Malad River, McElmo Creek (San Juan), North Creek (Washington), Pack Creek (San Juan), Pariette Wetlands (Uintah), Price River, Quail Creek, San Juan River, Santa Clara River, Sevier River, Utah Lake watershed, Virgin River.

HABITAT.—Marshes, ponds, springs, slow streams, and stream backwaters.

COMMENTS.—*Enallagma civile* can be found in local populations at lower elevations throughout much of Utah. There are fewer populations in the northern counties. Early and late-season records come from extreme southwestern Utah and warm springs farther north. *Enallagma civile* is abundant at Goshen Warm Springs (Utah) where it is the dominant bluet (*Enallagma*).

RANK.—G5, N5, S3; recommended S4.

### *Enallagma clausum*
### Morse Alkali Bluet

COUNTY RECORDS.—(22 of 29) Beaver, Box Elder, Cache, Davis, Duchesne, Emery, Garfield, Iron, Juab, Millard, Morgan, Piute, Rich, Salt Lake, Sanpete, Sevier, Tooele, Uintah, Utah, Wasatch, Washington, Weber.

ELEVATION RANGE.—1280–2323 m (4200–7620 ft). Only 3 records exist over 1829 m (6000 ft).

FLIGHT SEASON.—27 Apr–5 Oct; records by month: Apr (1), May (3), Jun (26), Jul (24), Aug (14), Sep (2), Oct (2).

U.S. RANGE.—Washington to Minnesota, south through Colorado, New Mexico, Utah, Nevada, and California.

UTAH RANGE.—Map 85. Western Utah, Uintah Basin, Desert Lake (Emery), Grand Staircase–Escalante National Monument (Garfield).

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Wasatch and Uinta Mountains, Wyoming Basin.

DRAINAGES.—Bear Lake watershed, Bear River, Clover Creek (Tooele), Currant Creek (Juab), Desert Lake WMA (Emery), East Canyon Creek (Morgan), Great Basin wetlands, Great Salt Lake watershed, Green River, Jordan River, Little Pine Creek (Washington), Otter Creek, Provo River, Sevier River, Strawberry River, Trout Creek (Juab), Trout Creek (Wasatch), Utah Lake watershed, Weber River, Willow Creek (Sevier).

HABITAT.—Lowlands in alkali marshes, springs, ponds, lakes, slow streams, and oxbows.

COMMENTS.—*Enallagma clausum* can be found at alkaline/saline wetlands of the Central Basin and Range and Colorado Plateau ecoregions including areas such as Desert Lake Wildlife Management Area (Emery) and the Grand Staircase–Escalante National Monument (Garfield). It is often found with *Enallagma carunculatum*, another bluet that seems to tolerate these wetlands. Occasionally it is found with *Enallagma civile* at springs.

RANK.—G5, N5, S3; recommended S4.

### *Enallagma ebrium* (Hagen)
### Marsh Bluet

COUNTY RECORDS.—(4 of 29) Cache, Garfield, Rich, Weber.

ELEVATION RANGE.—1291–1814 m (4235–5950 ft).

FLIGHT SEASON.—26 Jun–24 Aug.

U.S. RANGE.—Northern one-third of U.S.

UTAH RANGE.—Map 86. Extreme northern Utah and Garfield County.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Wyoming Basin.

DRAINAGES.—Bear Lake watershed (Rich), Bear River (Cache), Calf Creek (Garfield), Weber River (Weber).

HABITAT.—Valley lowlands in marshes, ponds, and river oxbows.

COMMENTS.—*Enallagma ebrium*, a northern species, is uncommon in Utah and is known from only 5 locations. Four of the 5 records are from extreme northern Utah. The Calf Creek record, a female collected in the year 2000 from the Grand Staircase–Escalante National Monument, was identified by John Abbott and appears to be a southern range extension in the western United States.

RANK.—G5, N5, SH; recommended S2.

### *Enallagma praevarum* (Hagen)
### Arroyo Bluet

COUNTY RECORDS.—(3 of 29) Garfield, Kane, Washington.

ELEVATION RANGE.—846–1737 m (2775–5700 ft).

FLIGHT SEASON.—13 May–30 Oct.

U.S. RANGE.—California, across southern Nevada, southern Utah, Arizona, New Mexico

*Ischnura barberi* Photo: Nicky Davis

to west Texas; east of the Rockies, Montana south to west central Texas.

UTAH RANGE.—Map 87. Southwestern Utah.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains.

DRAINAGES.—Ash Creek (Washington), Beaver Dam Wash, Calf Creek (Garfield), East Fork Virgin River (Kane), Little Pine Creek (Washington), Mill Creek (Washington), North Creek (Washington), Pine Creek in Zion NP, Quail Creek, Santa Clara River, Virgin River, Weeping Rock Creek in Zion NP.

HABITAT.—Desert springs, permanent desert streams with sandy to rocky substrates.

COMMENTS.—*Enallagma praevarum* is a southern species that appears to replace *E. anna* in southern Utah. No range overlap of the 2 species has been observed in Utah. Like *Enallagma anna, E. praevarum* prefers small streams and spring runs. Caudal appendages of the 2 species are similar in appearance, with extended cerci. However, in *E. praevarum*, the cerci are slightly shorter than those of *E. anna*. All records except 2 are from Washington County.

RANK.—G5, N5, SH; recommended S4.

### *Ischnura barberi* Currie
### Desert Forktail

COUNTY RECORDS.—(8 of 29) Beaver, Box Elder, Cache, Millard, Salt Lake, Tooele, Washington, Weber.

ELEVATION RANGE.—701–1441 m (2300–4728 ft).

FLIGHT SEASON.—28 May–5 Oct.

U.S. RANGE.—Southern Oregon, south through California, Nevada, and Utah; Arizona, west to Texas, Oklahoma, and Kansas.

UTAH RANGE.—Map 88. Western Utah.

ECOREGIONS.—Central Basin and Range, Mojave Basin and Range.

DRAINAGES.—Bear River, Beaver Dam Wash, Beaver River, Crystal Hot Springs (Box Elder), Great Basin wetlands, Great Salt Lake watershed, Sevier River, Timpie Springs (Tooele), Virgin River, Weber River.

HABITAT.—Marshes, ponds, springs, spring runs, and slow streams.

COMMENTS.—With its large size and orange abdomen, *Ischnura barberi* cannot be mistaken for any other *Ischnura* in Utah. It is commonly found along shoreline vegetation at alkaline/saline wetlands and desert springs of the Great Basin. At most locations, it is widely dispersed and few in number. However, the species is common at ponds along the freeway (I-80) near Saltair in Salt Lake County and is the dominant damselfly at ponds below Crystal Hot Springs in Box Elder County.

RANK.—G4, N4, S2; recommended S3.

### *Ischnura cervula* Selys
### Pacific Forktail

COUNTY RECORDS.—(27 of 29) all counties except Grand and San Juan.

ELEVATION RANGE.—850–2661 m (2790–8730 ft). Only 7 records exist above 2134 m (7000 ft).

FLIGHT SEASON.—23 Feb–18 Oct; records by month: Feb (1), Mar (0), Apr (5), May (30), Jun (75), Jul (79), Aug (43), Sep (12), Oct (1).

U.S. RANGE.—Western U.S., Washington to eastern Montana; south to southern Arizona and New Mexico.

UTAH RANGE.—Map 89. Widespread throughout Utah except in the southeastern region.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range,

*Ischnura cervula* Photo: Nicky Davis

Wasatch and Uinta Mountains, Wyoming Basin.

DRAINAGES.—Ashley Creek (Uintah), Bear Lake watershed, Bear River, Beaver River, Big Cottonwood Creek (Salt Lake), Blacksmiths Fork (Cache), Cherry Creek (Juab), Clover Creek (Tooele), Cottonwood Creek (Emery), Dry Gulch Creek (Duchesne), Duchesne River, Fremont River, Great Basin wetlands, Great Salt Lake watershed, Green River, Jordan River, LaVerkin Creek (Washington), Little Bear River (Cache), Little Pine Creek (Washington), Logan River, Montez Creek (Uintah), Ogden River, Otter Creek, Parowan Creek, Payson Creek, Price River, Provo River, Rock Creek (Duchesne), Round Valley Creek (Millard), San Pitch River, Santa Clara River, Sevier River, Silver Creek (Summit), Spanish Fork River, Uinta River (Duchesne), Utah Lake watershed, Weber River, Willow Creek (Daggett), Willow Creek (Wasatch).

HABITAT.—Ponds, lakes, springs, marshes, slow streams, backwaters of streams.

COMMENTS.—*Ischnura cervula* is common and widespread throughout the state except in southeastern Utah where it appears to be replaced by the very similar *Ischnura damula.* It tolerates a variety of habitats and has a fairly large elevation range. It is often the first damselfly to appear in the spring in northern Utah. This species stays low in vegetation along the shoreline making it difficult to observe even though it is quite abundant at times.

RANK.—G5, N5, S3; recommended S5.

### *Ischnura damula* Calvert
### Plains Forktail

COUNTY RECORDS.—(8 of 29) Emery, Garfield, Grand, Kane, San Juan, Tooele, Washington, Wayne.

ELEVATION RANGE.—1180–2621 m (3870–8600 ft).

FLIGHT SEASON.—14 May–4 Sep.

U.S. RANGE.—Montana to North Dakota, south to Arizona and west Texas.

UTAH RANGE.—Map 90. East central to southern Utah, Tooele County.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Southern Rockies, Wasatch and Uinta Mountains.

DRAINAGES.—Calf Creek (Garfield), Castle Creek (Grand), Colorado River, Deer Creek (Garfield), Dirty Devil River (Wayne), East Fork Sevier River (Garfield), East Fork Virgin River (Kane), Escalante River, Fish Creek (San Juan), Green River, Indian Creek (San Juan), Kanab Creek, Leeds Creek (Washington), Pack Creek (San Juan), Sheep Creek (Kane), Timpie Springs (Tooele).

HABITAT.—Ponds, springs, small streams with vegetation.

COMMENTS.—*Ischnura damula* is common in southeastern Utah, replacing the similar *Ischnura cervula* at similar habitats at low elevations. It is also found at higher elevations in the Abajo Mountains west of Monticello at Monticello Lake and Foy Lake, both above 2500 m (8200 ft). Like all *Ischnura*, this species usually stays low in shoreline vegetation. Both *I. damula* and *I. cervula* can be found together at Green River State Park. The outlier records for this species in Tooele County (Provonsha 1975) far to the north are puzzling and have not been duplicated. The original specimens were not studied by the authors of this paper.

RANK.—G5, N5, SH; recommended S4.

### *Ischnura demorsa* (Hagen)
### Mexican Forktail

COUNTY RECORDS.—(2 of 29) Garfield, San Juan.

ELEVATION RANGE.—1494–1795 m (4900–5890 ft).

FLIGHT SEASON.—16 Jun–2 Aug.

U.S. RANGE.—Southwest U.S., north to Colorado and Nebraska.

UTAH RANGE.—Map 91. Southern Utah.

ECOREGIONS.—Colorado Plateau.

DRAINAGES.—Bryce Canyon (Garfield), Calf Creek (Garfield), McCracken Spring (San Juan), Recapture Creek (San Juan).

HABITAT.—Springs, ponds, and small desert creeks.

COMMENTS.—Ahrens (1938) was the first to collect *Ischnura demorsa* in Utah, taking 1 male and 2 females in the vicinity of Bryce Canyon on 14 August 1936 (exact location unknown). Provonsha (1975) reported this species from McCracken Spring in San Juan County. A new location was discovered in 2015 at a small cattle pond south of Blanding in the Recapture Creek drainage. A more thorough search in southeastern Utah may turn up more populations. Males of this forktail, with their small green-striped thorax, can be mistaken for *Ischnura perparva* without examination of the paraprocts. In *I. demorsa*, the upper projection is much longer than the lower, while in *I. perparva* both forks are generally equal in length (Paulson 2009).

RANK.—G5, N5, SH; recommended S1.

### *Ischnura denticollis* (Burmeister)
### Black-fronted Forktail

COUNTY RECORDS.—(16 of 29) Beaver, Box Elder, Cache, Davis, Garfield, Juab, Kane, Millard, Rich, Salt Lake, San Juan, Tooele, Utah, Wasatch, Washington, Weber.

ELEVATION RANGE.—762–1726 m (2500–5662 ft).

FLIGHT SEASON.—7 Apr–7 Nov; records by month: Apr (6), May (14), Jun (39), Jul (22), Aug (13), Sep (18), Oct (6), Nov (3).

U.S. RANGE.—Oregon and southwestern Idaho, south to southern California; east to Kansas, Oklahoma, and Texas.

UTAH RANGE.—Map 92. The Great Basin in western Utah and scattered locations in southern Utah.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains, Wyoming Basin.

DRAINAGES.—Bear River, Beaver Dam Wash, Beaver River, Escalante River (Garfield), Fish Springs (Juab), Goshen Warm Springs (Utah), Great Basin wetlands, Great Salt Lake watershed, Kanab Creek (Kane), Midway Hot Springs (Wasatch), Mill Creek (Washington), Quail Creek, San Juan River, Santa Clara River, Sevier River (Millard), Utah Lake watershed, Virgin River.

HABITAT.—Desert springs, spring runs, small streams, desert marshes.

COMMENTS.—*Ischnura denticollis* is our smallest forktail. It has a velvet, black front to the thorax, sometimes with a gold, iridescent sheen and sides that are a pastel blue-green. They are typically found at scattered desert springs in the Central Basin and Range Ecoregion. Farther south, in the Mojave Basin and Range Ecoregion and the southern portion of the Colorado Plateau Ecoregion, they can also be found at small streams as well as springs. The only record from the Wasatch and Uinta Mountains comes from hot springs at Midway in Wasatch County. The literature record (Provonsha 1975) from the Wyoming Basin (Rich) has not been repeated. Like other forktails, they stay low in the shoreline vegetation. This habit, along with their small size, makes them difficult to observe even though they can be quite common.

RANK.—G5, N5, S3; recommended S4.

### *Ischnura perparva* McLachlan
### Western Forktail

COUNTY RECORDS.—All counties.

ELEVATION RANGE.—1128–2587 m (3700–8486 ft).

FLIGHT SEASON.—19 Apr–18 Oct; records by month: Apr (2), May (24), Jun (99), Jul (109), Aug (64), Sep (20), Oct (5).

U.S. RANGE.—Western U.S., east to the Dakotas, Iowa, and Kansas.

UTAH RANGE.—Map 93. Widespread throughout Utah at low to midelevations; missing from St. George area.

ECOREGIONS.—Central Basin and Range, Colorado Plateau, Northern Basin and Range, Wasatch and Uinta Mountains, Wyoming Basin.

DRAINAGES.—American Fork Creek, Ashley Creek (Uintah), Bear Lake watershed, Bear River, Beaver Creek (Summit), Beaver River, Big Cottonwood Creek (Salt Lake), Burraston Ponds (Juab), Calf Creek (Garfield), Castle Creek (Grand), Chalk Creek (Summit), Cherry Creek (Juab), Clover Creek (Tooele), Cotton

***Ischnura perparva*** Photo: Jim T. Johnson

Creek (Box Elder), Cottonwood Creek (Emery), Currant Creek (Juab), Currant Creek (Wasatch), Deep Creek (Wasatch), Deer Creek (Garfield), Desert Lake WMA (Emery), Diamond Fork Creek (Utah), Duchesne River, East Fork Sevier River (Garfield), East Fork Virgin River (Kane), Echo Creek (Summit), Escalante River, Fifth Water Creek (Utah), Fish Creek (San Juan), Fremont River, Great Basin watershed, Great Salt Lake wetlands, Green River, Henrieville Creek (Garfield), Hobble Creek (Utah), Huntington Creek (Emery), Indian Creek (San Juan), Jones Hole Creek (Uintah), Jordan River, Kanarraville Creek (Iron), Lake Fork River (Duchesne), Little Bear River (Cache), Little Pine Creek (Washington), Logan River, Long Creek (Box Elder), Lost Creek (Morgan), Magotsu Creek (Washington), Malad River, Mammoth Creek (Garfield), Montez Creek (Uintah), Nine Mile Creek (Carbon), North Creek (Beaver), Ogden River, Otter Creek, Parowan Creek, Price River, Provo River, Raft River, Red Creek (Duchesne), Rock Creek (Duchesne), Round Valley Creek (Millard), San Pitch River (Sanpete), Santa Clara River, Sevier River, Silver Creek (Summit), Smith and Morehouse Creek (Summit), Soldier Creek (Carbon), Uinta River, Utah Lake watershed, Wallsburg Creek (Wasatch), Weber River, West Fork Duchesne River (Duchesne), Willow Creek (Daggett), Willow Creek (Uintah).

HABITAT.—Springs, ponds, lakes, slow streams with vegetation, stream backwaters and oxbows.

COMMENTS.—*Ischnura perparva* is the most common and widespread forktail in Utah. However, it is absent from the lowest-elevation areas near St. George and the higher mountain elevations throughout the state. Females, with their gray-blue pruinescence, are more easily observed than the slender males which blend in with the low-vegetation sedges and spike rushes where they spend much of their time.

RANK.—G5, N5, S5; recommended S5.

*Telebasis salva* (Hagen)
Desert Firetail

COUNTY RECORDS.—(2 of 29) Kane, Washington.

ELEVATION RANGE.—785–1780 m (2575–5840 ft).

FLIGHT SEASON.—15 Jun–16 Oct.

U.S. RANGE.—Desert southwest, from Texas and Oklahoma west to California.

UTAH RANGE.—Map 94. Southwestern Utah.

ECOREGIONS.—Colorado Plateau, Mojave Basin and Range, Wasatch and Uinta Mountains.

DRAINAGES.—Beaver Dam Wash, Boiler Springs, Green Springs, Kanab Creek, Quail Creek, Santa Clara River, Virgin River.

HABITAT.—Springs, ponds, algae mats, slow desert streams.

COMMENTS.—This bright fiery red-orange damselfly stays low in vegetation or perches on algae mats at ponds and springs. Provonsha (1975) was aware of only 3 records of *Telebasis salva* from Utah, all from one location in St. George. Because this particular location was disturbed during the building of a golf course, he speculated that the species may no longer be present in Utah. Since that time, 7 locations have been documented, including one from the Colorado Plateau ecoregion in Kane County. Most of these new locations were from unidentified specimens found in the BYUC. Four of the 7 are within urban areas that are subject to changes in the quality of their habitat. One specimen was taken in 2006, south of Leeds Canyon, high enough in elevation (4400 ft) to be within the Wasatch and Uinta Mountains ecoregion. The most recent record (2012) is from Green Springs, which is located on the Green Springs Golf Course in Washington City.

RANK.—G5, N5, SH; recommended S2.

## SPECIES WITH UNCERTAINTY

*Aeshna walkeri* Kennedy
Walker's Darner

COUNTY RECORDS.—(1 of 29). Possibly Wayne or Garfield.

U.S. RANGE.—Oregon, south to southern California.

UTAH RANGE.—Possibly south central Utah (Capital Reef NP).

ECOREGIONS.—Colorado Plateau.

HABITAT.—Ephemeral pools.

COMMENTS.—Anderson, et al. (1999) listed nymphs of *Aeshna walkeri* as being collected from tinajas (ephemeral pools) in Capital Reef National Park. The exact location is not given. The nymph specimens are housed in the Cornell University collection (Peckarsky personal communication). The known range for *Aeshna*

*walkeri* is from extreme southern Washington to southern California. Further verification is needed before *A. walkeri* is added to the Utah species list.

RANK.—G4, N4, SNR; recommended SU.

*Epiaeschna heros* (Fabricius)
Swamp Darner

COUNTY RECORDS.—(1 of 29). Possibly Wayne or Garfield.

U.S. RANGE.—Eastern U.S. from Maine to Florida, west to Wisconsin, Iowa, Kansas, Oklahoma, and east Texas.

UTAH RANGE.—Possibly south central Utah (Capital Reef NP).

ECOREGIONS.—Colorado Plateau.

HABITAT.—Ephemeral pools.

COMMENTS.—Anderson et al. (1999) listed nymphs of *Anax epiashna* (*Epiaeschna heros*?) as being collected from tinajas (ephemeral pools) in Capital Reef National Park. The exact location is not given. The nymph specimens are housed in the Cornell University collection (Peckarsky personal communication). The known range for *E. heros* is the eastern U.S. extending west to Kansas, Oklahoma, and Texas. Further verification is needed before *E. heros* is added to the Utah species list.

RANK.—G5, N4, SNR; recommended SU.

*Ophiogomphus bison* Selys
Bison Snaketail

COUNTY RECORDS.—(1 of 29) Washington (Larsen 1952).

ELEVATION RANGE.—792 m (2600 ft).

FLIGHT SEASON.—No data.

U.S. RANGE.—Southwestern Oregon to central California; one record in western Nevada.

UTAH RANGE.—One record listed by Larsen (1952) from St. George in southwestern Utah.

ECOREGIONS.—Mojave Basin and Range.

DRAINAGES.—Virgin River.

HABITAT.—"Swift rocky streams bordered by willows, mostly in forested habitats, from lowlands to well up in mountains." (Paulson 2009).

COMMENTS.—There is only one reference to *Ophiogomphus bison* (Larsen 1952) in Utah (St. George, Washington County). This specimen was not found during a search of the UUIC, and its location is unknown. Because of the inability to verify the identity of the specimen along with the location being far from its known range, *Ophiogomphus bison* has been removed from the state list until further information can confirm it for Utah.

RANK.—G4, N4, SNR; recommended SU.

*Ladona julia* (Uhler)
Chalk-fronted Corporal

COUNTY RECORDS.—Location unknown.

U.S. RANGE.—Northeastern U.S. south to West Virginia, west to Minnesota; Washington south to northern California, east to northern Idaho and western Montana.

UTAH RANGE.—Unknown.

HABITAT.—"Wooded and open lakes and ponds, especially associated with acid waters of bog lakes" (Paulson 2009).

COMMENTS.—Musser (1962) reported a single adult specimen collected from the state recorded in Kormondy (1960) and located in the UMMZ labeled "Utah:#58, E. M. Legard, 1"; no locality is given. No other records exist for this species in Utah. The nearest known populations are in northern Idaho. This species does not appear to be a current resident of the state. Due to the lack of a specific collection location within the state, this species has been removed from the Utah list until further study verifies its existence in Utah.

RANK.—G5, N5, SNR; recommended SU.

*Libellula auripennis* Burmeister
Golden-winged Skimmer

COUNTY RECORDS.—(1 of 29) Washington.

ELEVATION RANGE.—800 m (2625 ft).

FLIGHT SEASON.—Unknown.

U.S. RANGE.—Southeastern U.S. north to Massachusetts, west to east Texas and Oklahoma; a few scattered records from Ohio, Iowa, and Nebraska.

UTAH RANGE.—Washington County.

ECOREGIONS.—Mojave Basin and Range.

DRAINAGES.—Virgin River.

HABITAT.—"Open ponds and lakes with much shore vegetation, also shallow ponds with tall grasses scattered throughout." (Paulson 2009)

COMMENTS.—Larsen (1952) listed this species from Washington County. However, according to Robert Larsen (son of W.P. Larsen 1952), the plates in Larsen (1952) illustrating the wings of *Libellula auripennis* and *Paltothemis lineatipes* were accidentally switched. Robert Larsen also provided the collection location for the "*Libellula auripennis*" specimen as the old Virgin River bridge,

Washington Fields, Washington County, Utah. Since the nearest known populations of this species are in east Texas, it is doubtful that *L. auripennis* is a resident species in Utah. At best, it is a onetime anomaly. No other records are known from Utah. This species has been removed from the Utah list.

RANK.—G5, N5, SNR; recommended SU.

*Sympetrum rubicundulum* (Say)
Ruby Meadowhawk

COUNTY RECORDS.—None verified from Utah.

U.S. RANGE.—Northeastern U.S. south to North Carolina and Tennessee, west to eastern Wyoming and Colorado. Currently, there are no verified populations in Utah.

COMMENTS.—Needham and Christenson (1927) reported *Sympetrum rubicundulum* from Cache County. This early record may have been *Sympetrum internum*, a common species in Cache Valley where students from Utah State University have collected for many years without finding any specimens of *S. rubicundulum*. One specimen from Piute County housed in the Utah State University collection was originally identified as *S. rubicundulum*. After study by the authors, this specimen's identity was changed to *S. internum*. There are no valid *S. rubicundulum* records from Utah.

RANK.—G5, N5, SH; recommended SU.

*Calopteryx maculata (*Beauvois)
Ebony Jewelwing

COUNTY RECORDS.—(1 of 29) Sanpete?

U.S. RANGE.—Eastern U.S.

HABITAT.—Small slow-flowing, canopy-covered streams (Abbott 2005).

COMMENTS.—There are several specimens of *Calopteryx maculata* located in the UUIC. These specimens were originally labeled with only color codes on pins which matched color codes written in a notebook with date and location information. This notebook covered years of collecting, and many colors were used more than once. It is our opinion that these specimens are mislabeled. The location given is Island Lake, Sanpete County, a high mountain lake over 3050 m (10,000 ft) in elevation—not typical habitat for this species of damselfly. The nearest populations are in Kansas and Nebraska.

RANK.—G5, N5, SNR; recommended SU.

*Argia agrioides* Calvert
California Dancer

COUNTY RECORDS.—(1 of 29) Washington.

U.S. RANGE.—Central Oregon south through California, southern Nevada, and Arizona.

HABITAT.—"Shallow sandy and rocky streams in open with moderate current and beds of vegetation such as watercress" (Paulson 2009).

COMMENTS.—C.J.D. Brown listed *Argia agrioides* as a new Utah record in his 1934 publication of Utah Odonata. The collection location for this record is St. George, Washington County, Utah, on 5 June, by Tom Spalding. Brown indicated that the male record is located in the UMMZ. Ahrens (1938) reported collecting this species on 14 Aug 1936 at Washington, Utah. He corresponded with C.J.D. Brown in Utah for help with identifying Utah specimens. It is important to note that the very similar *Argia nahuana*, which is common in Washington County, was not listed by Brown in his 1934 publication. These 2 older records have not been located for verification, and it is possible that they were specimens of *A. nahuana*. Provonsha (1975) did not include *A. agrioides* in his survey of the Zygoptera of Utah for reasons unknown. One specimen in the BYUC from Salt Lake County was misidentified as *A. agrioides;* and upon further examination, the identification was changed to *Argia alberta.* No other records of this species have been reported from Utah. Since documented records for *A. agrioides* have been found in nearby Clark County, Nevada, all specimens of the very similar *A. nahuana* collected in Utah should be examined with care and considered as possible *A. agrioides* specimens. However, at present there is not enough information to include *A. agrioides* on the Utah species list.

*Argia fumipennis* (Burmeister)
Variable Dancer

COUNTY RECORDS.—Unknown, possibly Washington County.

ELEVATION RANGE.—Unknown.

FLIGHT SEASON.—Unknown.

U.S. RANGE.—East of the Rocky Mountains, mid- to southern Arizona.

UTAH RANGE.—Extreme southwestern Utah?

ECOREGIONS.—Mojave Basin and Range?

DRAINAGES.—Virgin River?

HABITAT.—"Wide habitat choice, from small streams and ditches with much vegetation to open sandy lake shores" (Paulson 2009).

COMMENTS.—Provonsha (1975) recorded one specimen of *Argia fumipennis* from the UMMZ labeled "Utah E. M. Legard #55." Although no location data was given, Provonsha speculated that it was likely collected in the lower Sonoran region of Washington County. Recently, Mark O'Brien, University of Michigan collections manager, was unable to locate this specimen in the UMMZ for confirmation of its identification. No other records are known from Utah. Until further records with complete location data are obtained, this species has been removed from the Utah species list. Researchers should continue to look for *A. fumipennis* in southwestern Utah as Provonsha suggests, since there are records to the south in Arizona.

RANK.—G5, N5, SNR; recommended SU.

*Argia munda* Calvert
Apache Dancer

COMMENTS.—Robert Larsen (Roswell, NM) initially reported collecting *Argia munda* from Heritage Park, Parowan, Iron County, Utah, in July 2003. The specimens were sent to Rosser Garrison for confirmation and were identified as *Argia vivida* (Robert Larsen personal communication). There are no known records of this species from Utah.

*Argia plana* Calvert
Springwater Dancer

COMMENTS.—Robert Larsen also initially reported collecting *Argia plana* from Quail Creek, south of Leeds, Washington County, Utah, in July of 2003. These specimens were also sent to Rosser Garrison and identified as *Argia vivida* (Robert Larsen personal communication). There are no known records of this species from Utah.

## SUMMARY

As a result of this study, 94 species of Odonata belonging to 9 families and 35 genera are currently listed for Utah. The family species totals are Aeshnidae (13), Gomphidae (8), Cordulegastridae (2) Macromiidae (1), Corduliidae (3), Libellulidae (33), Calopterygidae (3), Lestidae (6), and Coenagrionidae (25). There are no endemic species of Odonata known from Utah.

During this study, 484 new county records were obtained, bringing the Utah total to 1227 county records, averaging 42.3 species per county and 13.1 county records per species (Appendix 3). Washington County contains the most recorded species (63), while Rich County has the least (26). Washington County is within the boundaries of 4 different ecoregions which contributes to its high number of odonate species.

During a search of the BYUC, the authors identified several hundred previously unidentified specimens which included many new county records and 2 new state records: *Perithemis intensa,* collected in 1985 by G.I. Baird at Lytle Ranch in the Beaver Dam Wash, Washington County (Myrup 2007), and *Libellula luctuosa,* collected in 2001 by A.Z. Taylor in Arches National Park, Grand County. Also, a specimen of *Libellula luctuosa* collected in St. George, Washington County, by A.H. Barnum in 1992 was identified in the Dixie State University collection in 2011. New locations for rare species such as *Macromia magnifica* (Uintah), *Aeshna persephone* (Washington), and *Telebasis salva* (Washington) were also identified from the BYUC.

From 2005 to 2015, the authors collected in all counties of the state, adding several thousand Utah collection records which are housed in the BYUC. Five new state records were obtained: *Plathemis lydia* collected in 2007 near the Bear River in Cache County, *Somatochlora hudsonica* (Myrup 2008) from the Uinta Mountains of northeastern Utah in Daggett County, *Sympetrum madidum* from Midway Reservoir in Wasatch County during 2008, *Ophiogomphus morrisoni* collected in 2013 along Otter Creek in Sevier County, and *Lestes alacer* from a small stock tank in San Juan County in 2015.

As a result of this study, a total of 7 new state records have been added to the Utah species list.

Eight species from previous publications have been removed from the Utah species list including *Aeshna walkeri* and *Anax epiashna* (*Epiaeschna heros*) (Anderson et al. 1999), *Argia agrioides* (Brown 1934, Ahrens 1938), *Argia fumipennis* (Provonsha 1975), *Libellula auripennis* and *Ophiogomphus bison* (Larsen 1952), *Ladona julia* (Kormondy 1960), and

*Sympetrum rubicundulum* (Needham and Christenson 1927). Specific reasons for their removal are given in the species accounts. Specimens of *Calopteryx maculata*, *Argia munda*, and *Argia plana* have also been recorded as being from Utah, but they have been left off the Utah species list due to either mislabeling or misidentification.

Nine species have been found in all 29 counties: *Libellula forensis*, *L. pulchella*, *L. quadrimaculata*, *Sympetrum corruptum*, *Lestes congener*, *L. dryas*, *Amphiagrion abbreviatum*, *Enallagma boreale*, and *Ischnura perparva*. Ten more have been found in 25 or more counties: *Aeshna interrupta*, *A. palmata*, *Anax junius*, *Rhionaeschna multicolor*, *Sympetrum pallipes*, *S. semicinctum*, *Argia vivida*, *Enallagma annexum*, *E. carunculatum*, and *Ischnura cervula* (Appendix 3). Only 3 species are found in all 7 ecoregions: *Aeshna interrupta*, *A. palmata*, and *Argia vivida* (Appendix 5).

The known ranges of many species in Utah have expanded significantly with the accumulation of many new county records. In the list that follows, the number of new county records is in parentheses following the species name: *Aeshna interrupta* (11), *A. juncea* (4), *A. umbrosa* (8), *Anax junius* (13), *Rhionaeschna californica* (12), *R. multicolor* (14), *Erpetogomphus compositus* (8), *Cordulegaster dorsalis* (7), *Somatochlora semicircularis* (10), *Leucorrhinia intacta* (14), *Libellula composita* (5), *L. forensis* (14), *L. nodisticta* (6), *L. pulchella* (12), *L. quadrimaculata* (13), *L. saturata* (8), *Pachydiplax longipennis*, (14), *Sympetrum corruptum* (9), *S. costiferum* (9), *S. danae* (13), *S. internum* (10), *S. obtrusum* (4), *S. semicinctum* (10), *S. pallipes* (14), *Pantala flavescens* (8), *P. hymenaea* (5), *Tramea lacerata* (13), *T. onusta* (9), *Archilestes grandis* (11), *Lestes disjunctus* (9), *L. dryas* (18), *Argia alberta* (7), *Coenagrion resolutum* (9), *Enallagma carunculatum* (8), *E. civile* (6), *E. clausum* (7), and *Ischnura cervula* (8).

One specific example illustrating the increase in the number of county records as a result of this study is the increase in county records for the montane damselfly species *Coenagrion resolutum*. Provonsha (1975) sampled many different habitats throughout the state, obtaining dozens of damselfly records. However, higher-elevation habitats in the various mountain ranges were not as thoroughly covered by Provonsha. As these areas were surveyed, the number of county records for *Coenagrion resolutum* more than doubled, expanding from 8 to 17.

Most of the previous records for the northern montane species *Somatochlora semicircularis* came from the Uinta Mountains of northeastern Utah, with 2 or 3 scattered historical records in other mountain ranges. This species has now been found to be widespread (17 counties) throughout mountain ranges across the state where its habitat exists, including as far south as Brian Head in Iron County, 350 km (218 miles) south of the Uinta Mountains. Large metapopulations have been found in the Uinta Mountains of northeastern Utah, the Wasatch Plateau of central Utah and Boulder Mountain, and the Aquarius Plateau of south central Utah.

*Cordulia shurtleffii*, *Leucorrhinia proxima*, and *L. hudsonica* were previously only known from northern Utah, mainly the Uinta Mountains. A search of university collections and recent collecting for this study have revealed populations much farther south on the Wasatch Plateau (*C. shurtleffii*, *Leucorrhinia proxima*) and Boulder Mountain and the Aquarius Plateau of south central Utah (*L. hudsonica*).

Prior to 2002, most collection records for *Archilestes grandis* were from southern Utah, with a few records from south central Utah. Since 2002, voucher specimens have been collected in 11 more counties farther north than in the past, with Salt Lake County being the current northern extension of its range. Many of these new records are coming from areas thoroughly sampled for many years in the past with no previous *A. grandis* records. The reason for this recent northward range expansion is unknown. One possible explanation is that anthropogenic changes to water resources causing water to be diverted and farm ponds to be created have provided a series of "stepping stones" through desert regions. Another explanation is the gradual warming trend in Utah (NOAA 2015) which may allow *A. grandis* larvae to survive the winter in locations farther north.

*Pachydiplax longipennis* and *Tramea lacerata*, previously known only from southern Utah, have had their known ranges extended northward almost to the Idaho border in Box Elder County, as a result of this study. *Tramea onusta*, also considered a southern Utah species, has now been found as far north as

Juab, Millard, Salt Lake, and Utah Counties. The range extension of these 3 species is likely due to the more thorough collecting done during this study. Another possible explanation is that the ranges of these species expand northward during warm years and recede during cold years. It is also possible that these species have become established in permanent springs with stable temperatures in the north, then they expand into other areas from these refuges during warmer years. A warm Utah winter in 2014–2015 accompanied by an early spring may have contributed to larger numbers of *Tramea onusta* found throughout northern Utah during summer 2015.

Previous records for *Argia moesta* came from the Colorado and San Juan River regions of southeastern Utah. New records have shown the species to be much farther north along the Green and White Rivers (Uintah) as well as in other areas such as the Virgin River drainage in Washington County and, most surprisingly, the lower Sevier River in Juab and Millard Counties of the Central Basin and Range ecoregion.

Previous records for *Libellula composita* in Utah came from the Central Basin and Range and Mojave Basin and Range ecoregions. New populations have now been found at Ouray National Wildlife Refuge and Desert Lake Wildlife Management Area where they are abundant. These new areas are significant because they are both from the Colorado Plateau ecoregion, separated from the Great Basin by the Wasatch Mountains and Wasatch Plateau.

Donnelly (2004b) published one record for *Macromia magnifica* from the Sevier River, Sevier County, Utah. Three other locations have been added for this rare Utah dragonfly: Dinosaur National Monument at Split Mountain Gorge along the Green River (Uintah), Goshen Warm Springs (Utah), and Horseshoe Springs (Tooele). It is likely more widespread along the upper Green River and possibly the lower Yampa River in Colorado. There is also one possible sighting of this species along the Bear River in Cache County.

Earlier researchers (Brown 1934, Larsen 1952, Musser 1962) did not find *Libellula luctuosa* in Utah even though they collected in areas where the species is currently found. During this study, 2 unidentified specimens of *L. luctuosa* were located in university collections: one in the BYUC from 2001 and one in the DSUC from 1992. During this study, new specimens were obtained from 9 counties, primarily from the Colorado Plateau and Mojave Basin and Range ecoregions. At some locations in San Juan and Grand Counties, it is one of the dominant dragonflies. Recent records have come from the Jordanelle Wetlands along the Provo River in Wasatch County (2011) and at a pond below Piute Reservoir along the Sevier River in Piute County (2012), both in the Wasatch and Uinta Mountains ecoregion. These 2 records are the first from the Great Basin drainage. This species appears to be a newcomer to Utah, likely using the Colorado, Green, and Virgin Rivers as corridors for extending its range northward. The species will likely continue its spread throughout the state, eventually reaching the Central Basin and Range Ecoregion.

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APPENDIX 1. Faunal list of Utah dragonflies, suborder Anisoptera (60 species), 1 September 2015.

**Family Aeshnidae (13 species)**
*Aeshna constricta* Say 1839
*Aeshna eremita* Scudder 1866
*Aeshna interrupta* Walker 1908
*Aeshna juncea* (Linnaeus) 1758
*Aeshna palmata* Hagen 1856
*Aeshna persephone* Donnelly 1961
*Aeshna sitchensis* Hagen 1861
*Aeshna umbrosa* Walker 1908
*Anax junius* (Drury) 1770
*Anax walsinghami* McLachlan 1882
*Oplonaeschna armata* (Hagen) 1861
*Rhionaeschna californica* (Calvert) 1895
*Rhionaeschna multicolor* (Hagen) 1861

**Family Gomphidae (8 species)**
*Erpetogomphus compositus* Hagen in Selys 1858
*Gomphus externus* Hagen in Selys 1858
*Ophiogomphus morrisoni* Selys 1879
*Ophiogomphus occidentis* Hagen 1883
*Ophiogomphus severus* Hagen 1874
*Progomphus borealis* McLachlan in Selys 1873
*Stylurus intricatus* (Hagen) in Selys 1858
*Stylurus olivaceus* (Selys) 1873

**Family Cordulegastridae (2 species)**
*Cordulegaster diadema* Selys 1868
*Cordulegaster dorsalis* Hagen in Selys 1858

**Family Macromiidae (1 species)**
*Macromia magnifica* McLachlan in Selys 1874

**Family Corduliidae (3 species)**
*Cordulia shurtleffii* Scudder 1861
*Somatochlora hudsonica* (Hagen) in Selys 1871
*Somatochlora semicircularis* (Selys) 1871

**Family Libellulidae (33 species)**
*Brechmorhoga mendax* (Hagen) 1861
*Erythemis collocata* (Hagen) 1861
*Leucorrhinia borealis* Hagen 1890
*Leucorrhinia hudsonica* (Selys) 1850
*Leucorrhinia intacta* (Hagen) 1861
*Leucorrhinia proxima* Calvert 1890
*Libellula comanche* Calvert 1907
*Libellula composita* (Hagen) 1873
*Libellula croceipennis* Selys 1868
*Libellula forensis* Hagen 1861
*Libellula luctuosa* Burmeister 1839
*Libellula nodisticta* Hagen 1861
*Libellula pulchella* Drury 1770
*Libellula quadrimaculata* Linnaeus 1758
*Libellula saturata* Uhler 1857
*Orthemis ferruginea* (Fabricius) 1775
*Pachydiplax longipennis* (Burmeister) 1839
*Paltothemis lineatipes* Karsch 1890
*Pantala flavescens* (Fabricius) 1798
*Pantala hymenaea* (Say) 1839
*Perithemis intensa* Kirby 1889

APPENDIX 1. Continued.

*Plathemis lydia* (Drury) 1770
*Plathemis subornata* Hagen 1861
*Sympetrum corruptum* (Hagen) 1861
*Sympetrum costiferum* (Hagen) 1861
*Sympetrum danae* (Sulzer) 1776
*Sympetrum internum* Montgomery 1911
*Sympetrum madidum* (Hagen) 1861
*Sympetrum obtrusum* (Hagen) 1867
*Sympetrum pallipes* (Hagen) 1874
*Sympetrum semicinctum* (Say) 1839
*Tramea lacerata* Hagen 1861
*Tramea onusta* Hagen 1861

APPENDIX 2. Faunal list of Utah damselflies, suborder Zygoptera (34 species), 1 September 2015.

**Family Calopterygidae (3 species)**
*Calopteryx aequabilis* Say 1839
*Hetaerina americana* (Fabricius) 1798
*Hetaerina vulnerata* Hagen in Selys 1853

**Family Lestidae (6 species)**
*Archilestes grandis* (Rambur) 1842
*Lestes alacer* Hagen 1861
*Lestes congener* Hagen 1861
*Lestes disjunctus* Selys 1862
*Lestes dryas* Kirby 1890
*Lestes unquiculatus* Hagen 1861

**Family Coenagrionidae (25 species)**
*Amphiagrion abbreviatum* (Selys) 1876
*Argia alberta* Kennedy 1918
*Argia emma* Kennedy 1915
*Argia hinei* Kennedy 1918
*Argia lugens* (Hagen) 1861
*Argia moesta* (Hagen) 1861
*Argia nahuana* Calvert 1902
*Argia sedula* (Hagen) 1861
*Argia vivida* Hagen in Selys 1865
*Coenagrion resolutum* (Hagen in Selys) 1876
*Enallagma anna* Williamson 1900
*Enallagma annexum* (Hagen) 1861
*Enallagma boreale* (Selys) 1875
*Enallagma carunculatum* Morse 1895
*Enallagma civile* (Hagen) 1861
*Enallagma clausum* Morse 1895
*Enallagma ebrium* (Hagen) 1861
*Enallagma praevarum* (Hagen) 1861
*Ischnura barberi* Currie 1903
*Ischnura cervula* Selys 1876
*Ischnura damula* Calvert 1902
*Ischnura demorsa* (Hagen) 1861
*Ischnura denticollis* (Burmeister) 1839
*Ischnura perparva* McLachlan in Selys 1876
*Telebasis salva* (Hagen) 1861

APPENDIX 3. Species of Odonata in Utah by county.

| Species | Counties | Beaver | Box Elder | Cache | Carbon | Daggett | Davis | Duchesne | Emery | Garfield | Grand | Iron | Juab | Kane | Millard | Morgan | Piute | Rich | Salt Lake | San Juan | Sanpete | Sevier | Summit | Tooele | Uintah | Utah | Wasatch | Washington | Wayne | Weber |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Aeshna constricta* | 2 | | • | | | | | | | | | | | | | | | | | | | | | | | | | | | • |
| *Aeshna eremita* | 7 | | | • | | • | | • | | | | | | | | | | | | | | | • | | • | • | • | | | |
| *Aeshna interrupta* | 27 | • | • | • | • | • | • | • | • | • | • | • | | • | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| *Aeshna juncea* | 5 | | | | | • | | • | | | | | | | | | | | | | | | • | | • | | • | | | |
| *Aeshna palmata* | 28 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | • | • | • | • | • | • |
| *Aeshna persephone* | 2 | | | | | | | | | | | | | • | | | | | | | | | | | | | | • | | |
| *Aeshna sitchensis* | 5 | | | | | • | | • | | | | | | | | | | | | | | | • | | • | | • | | | |
| *Aeshna umbrosa* | 22 | • | • | • | • | • | • | • | | • | • | | • | • | | • | | | • | • | • | • | • | | • | • | • | • | | • |
| *Anax junius* | 27 | • | • | • | • | | • | • | • | • | • | • | • | • | • | • | • | | • | • | • | • | • | • | • | • | • | • | • | • |
| *Anax walsinghami* | 6 | | | | | | | | | | • | | • | | | | | | | • | | • | | • | | | | • | | |
| *Oplonaeschna armata* | 2 | | | | | | | | | | | • | | | | | | | | | | | | | | | | • | | |
| *Rhionaeschna californica* | 19 | • | • | • | | | • | • | | | • | | • | | • | • | | | • | • | • | • | • | • | • | • | • | | | • |
| *Rhionaeschna multicolor* | 28 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | • | • | • | • | • | • | • | • | • | • | • | • |
| *Erpetogomphus compositus* | 10 | | | | | | | | • | • | | | • | • | • | | | | • | | | | | • | • | | | • | • | |
| *Gomphus externus* | 6 | | • | | | | | | | | | | • | | • | | | | • | | | | | • | | • | | | | |
| *Ophiogomphus morrisoni* | 3 | • | | | | | | | | | | | | | | | | | | | | • | | | | • | | | | |
| *Ophiogomphus occidentis* | 3 | | | | | | | | | | | | • | | | | | | • | | | | | | | | | • | | |
| *Ophiogomphus severus* | 20 | | • | • | • | • | | • | • | • | | • | • | • | | | • | | • | | • | • | • | • | • | • | | • | • | |
| *Progomphus borealis* | 3 | | | | | | | | | | | | | • | | | | | | • | | | | | | | | • | | |
| *Stylurus intricatus* | 6 | | | | | • | | | | • | • | | | | | | | | | • | | | | | • | | | • | | |
| *Stylurus olivaceus* | 2 | | | | | | | | | | | | | | | | | | • | | | • | | | | | | | | |
| *Cordulegaster diadema* | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | • | | |
| *Cordulegaster dorsalis* | 11 | | | | | • | | | | • | | • | • | | • | | | | • | | | • | | | | • | • | • | | • |
| *Macromia magnifica* | 4 | | | | | | | | | | | | | | | | | | | | | • | | • | • | • | | | | |
| *Cordulia shurtleffii* | 8 | | | • | | • | | • | • | | | | | | | | | | | | • | | • | | • | | • | | | |
| *Somatochlora hudsonica* | 3 | | | | | • | | • | | | | | | | | | | | | | | | • | | | | | | | |
| *Somatochlora semicircularis* | 17 | • | | | | • | | • | • | • | • | • | | | | | | | • | • | • | • | • | | • | • | • | | • | • |
| *Brechmorhoga mendax* | 2 | | | | | | | | | | | | | • | | | | | | | | | | | | | | • | | |
| *Erythemis collocata* | 23 | • | • | • | | | • | | • | | • | • | • | • | • | • | • | | • | • | • | • | | • | • | • | • | • | • | • |
| *Leucorrhinia borealis* | 5 | | | | | • | | • | | | | | | | | | | | | | | | • | | • | | • | | | |
| *Leucorrhinia hudsonica* | 7 | | | | | • | | • | | • | | | | | | | | | | | | | • | | • | | • | | • | |
| *Leucorrhinia intacta* | 18 | | • | • | • | • | | • | | • | | | • | • | | • | • | • | | | • | • | • | | • | • | • | | | • |
| *Leucorrhinia proxima* | 4 | | | | | | | | | | | | | | | | | | | | • | | • | | • | | • | | | |
| *Libellula comanche* | 3 | | | | | | | | | | | • | • | | | | | | | | | | | | | | | • | | |
| *Libellula composita* | 10 | | • | • | | | | | • | | | | • | | • | | | | • | | • | | | • | • | • | | | | |
| *Libellula croceipennis* | 2 | | | | | | | | | | | • | | | | | | | | | | | | | | | | • | | |
| *Libellula forensis* | 29 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |

APPENDIX 3. Continued.

| Species | Counties | Beaver | Box Elder | Cache | Carbon | Daggett | Davis | Duchesne | Emery | Garfield | Grand | Iron | Juab | Kane | Millard | Morgan | Piute | Rich | Salt Lake | San Juan | Sanpete | Sevier | Summit | Tooele | Uintah | Utah | Wasatch | Washington | Wayne | Weber |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Libellula luctuosa* | 9 | | | | • | | | • | • | | • | | | | | | • | | | • | | | | • | | • | • | • | | |
| *Libellula nodisticta* | 11 | • | • | | | | | | | | | | | • | • | • | | | | | | • | | • | | • | • | • | • | |
| *Libellula pulchella* | 29 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| *Libellula quadrimaculata* | 29 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| *Libellula saturata* | 23 | • | • | | | • | • | • | • | • | • | • | • | • | • | | • | | • | • | • | • | | • | | • | • | • | • | • |
| *Orthemis ferruginea* | 2 | | | | | | | | | | | • | | | | | | | | | | | | | | | | • | | |
| *Pachydiplax longipennis* | 18 | | • | • | | | • | • | • | | • | • | • | • | • | | | | • | • | | | | • | • | • | • | • | | • |
| *Paltothemis lineatipes* | 4 | | | | | | | | | • | | | | • | | | | | | • | | | | | | | | • | | |
| *Pantala flavescens* | 13 | | | | | | | • | • | • | • | • | • | • | • | | | | | • | • | | | | | • | | • | • | |
| *Pantala hymenaea* | 11 | | | | | | | | | • | • | • | | • | | | | | • | • | • | • | | | | • | | • | • | |
| *Perithemis intensa* | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | • | | |
| *Plathemis lydia* | 1 | | | • | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Plathemis subornata* | 13 | • | • | • | | | • | | | | | | • | | • | | | | • | | • | • | | • | | • | | • | | • |
| *Sympetrum corruptum* | 29 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| *Sympetrum costiferum* | 21 | • | • | • | | | • | • | • | | | | • | | • | • | • | • | • | | • | • | • | • | • | • | • | | • | • |
| *Sympetrum danae* | 23 | • | • | • | • | • | | • | • | • | | • | | • | • | • | • | • | • | | • | • | • | | • | • | • | • | • | |
| *Sympetrum internum* | 16 | | | • | • | • | | | | • | • | | • | • | • | • | • | • | | | • | • | • | | | • | • | | | |
| *Sympetrum madidum* | 6 | | | • | | • | | | | | | | | | | | | • | | | | | • | | | • | • | | | |
| *Sympetrum obtrusum* | 9 | | | • | | | | • | | | | | • | | | • | | | • | | | | • | | • | • | | | | • |
| *Sympetrum pallipes* | 27 | • | • | • | • | | • | • | • | • | • | • | • | • | • | | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| *Sympetrum semicinctum* | 27 | • | • | • | • | • | • | • | • | • | • | | • | • | • | • | • | | • | • | • | • | • | • | • | • | • | • | • | • |
| *Tramea lacerata* | 21 | • | • | | • | | • | | • | • | • | • | • | • | • | | • | | • | • | • | • | | • | • | • | | • | | • |
| *Tramea onusta* | 12 | • | | | • | | | | | | | • | • | • | • | | • | | • | | | • | | • | | • | | • | | |
| *Calopteryx aequabilis* | 4 | | • | • | | | | | | | | | | | | | | | | | | | | | | • | | | | • |
| *Hetaerina americana* | 21 | • | • | | • | | | • | • | • | • | | • | • | • | | • | | • | • | • | • | | • | • | • | • | • | • | |
| *Hetaerina vulnerata* | 3 | | | | | | | | | | | • | | • | | | | | | | | | | | | | | • | | |
| *Archilestes grandis* | 16 | • | | | • | | | | • | • | • | • | • | • | • | | • | | • | • | • | • | | | | • | | • | | |
| *Lestes alacer* | 1 | | | | | | | | | | | | | | | | | | | • | | | | | | | | | | |
| *Lestes congener* | 29 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| *Lestes disjunctus* | 20 | • | | | | • | • | • | • | • | • | • | | • | • | • | | • | • | | • | • | • | | • | • | • | | • | |
| *Lestes dryas* | 29 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| *Lestes unguiculatus* | 8 | | | • | | • | | • | | | | | | | | | | • | | | | | | | • | • | • | | | • |
| *Amphiagrion abbreviatum* | 29 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| *Argia alberta* | 16 | | • | | | | • | | • | • | • | | • | • | • | | | | | • | • | • | | • | | • | • | • | | • |
| *Argia emma* | 16 | | • | • | • | | | • | • | | | | • | • | • | | • | | • | | • | • | | | • | • | | | • | • |
| *Argia hinei* | 3 | | | | | | | | | | | | | • | | | | | | • | | | | | | | | • | | |
| *Argia lugens* | 2 | | | | | | | | | | | | | • | | | | | | | | | | | | | | • | | |

APPENDIX 3. Continued

| Species | Counties | Beaver | Box Elder | Cache | Carbon | Daggett | Davis | Duchesne | Emery | Garfield | Grand | Iron | Juab | Kane | Millard | Morgan | Piute | Rich | Salt Lake | San Juan | Sanpete | Sevier | Summit | Tooele | Uintah | Utah | Wasatch | Washington | Wayne | Weber |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Argia moesta* | 7 | | | | | | | | • | | • | | • | | • | | | | | • | | | | | • | | | • | | |
| *Argia nahuana* | 2 | | | | | | | | | | | | | | • | | | | | | | | | | | | | • | | |
| *Argia sedula* | 2 | | | | | | | | | | | | | • | | | | | | | | | | | | | | • | | |
| *Argia vivida* | 25 | • | • | | • | • | • | • | • | • | • | • | • | • | • | | | | • | • | • | • | • | • | • | • | • | • | • | • |
| *Coenagrion resolutum* | 17 | • | | | | • | • | • | • | • | • | | | • | | | | | • | • | • | • | • | | • | • | • | | • | |
| *Enallagma anna* | 19 | • | • | • | | • | | • | | • | | | • | | | • | • | • | • | | | • | • | • | • | • | • | | • | • |
| *Enallagma annexum* | 26 | • | • | • | • | • | • | • | • | • | • | • | • | • | | • | | • | • | • | • | • | • | | • | • | • | • | • | • |
| *Enallagma boreale* | 29 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| *Enallagma carunculatum* | 27 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | • | • | • | • | • | | • |
| *Enallagma civile* | 20 | • | • | | • | | | | • | • | • | • | • | • | • | | • | | • | • | • | • | | • | • | • | | • | • | |
| *Enallagma clausum* | 22 | • | • | • | | | • | • | • | • | | • | • | | • | • | • | • | • | | • | • | | • | • | • | • | • | | • |
| *Enallagma ebrium* | 4 | | | • | | | | | | • | | | | | | | | • | | | | | | | | | | | | • |
| *Enallagma praevarum* | 3 | | | | | | | | | • | | | | • | | | | | | | | | | | | | | • | | |
| *Ischnura barberi* | 8 | • | • | • | | | | | | | | | | | • | | | | • | | | | | • | | | | • | | • |
| *Ischnura cervula* | 27 | • | • | • | • | • | • | • | • | • | | • | • | • | • | • | • | • | • | | • | • | • | • | • | • | • | • | • | • |
| *Ischnura damula* | 8 | | | | | | | | • | • | • | | | • | | | | | | • | | | | • | | | | • | • | |
| *Ischnura demorsa* | 2 | | | | | | | | | • | | | | | | | | | | • | | | | | | | | | | |
| *Ischnura denticollis* | 16 | • | • | • | | | • | | | • | | | • | • | • | | | • | • | • | | | | • | | • | • | • | | • |
| *Ischnura perparva* | 29 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| *Telebasis salva* | 2 | | | | | | | | | | | | | • | | | | | | | | | | | | | | • | | |


APPENDIX 4. Utah County Map. Used by permission. Copyright © 2013 Esri. All rights reserved.

APPENDIX 5. Species maps for Odonata of Utah. All underlying maps of Utah used by permission [Copyright © 2013 Esri. All rights reserved.]

Each species has a separate distribution map illustrating collection locations as dots against a background of county boundaries and topography. The symbol (•) represents records verified by the authors. The symbol (⦿) represents records taken from literature sources. The symbol (◎) represents a literature record with only a county location and is placed at the county center or if not at county center, then it is a literature dot map record placed at an estimated location.

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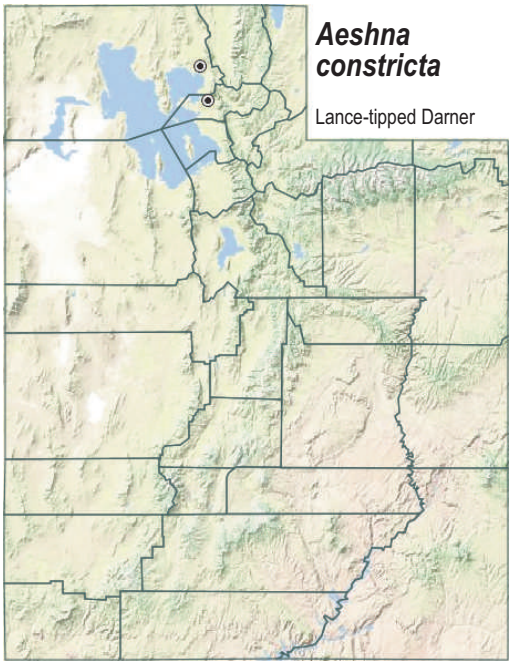


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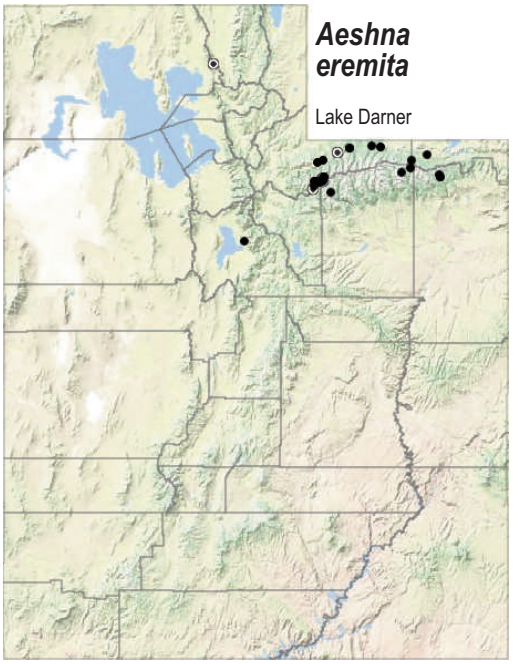


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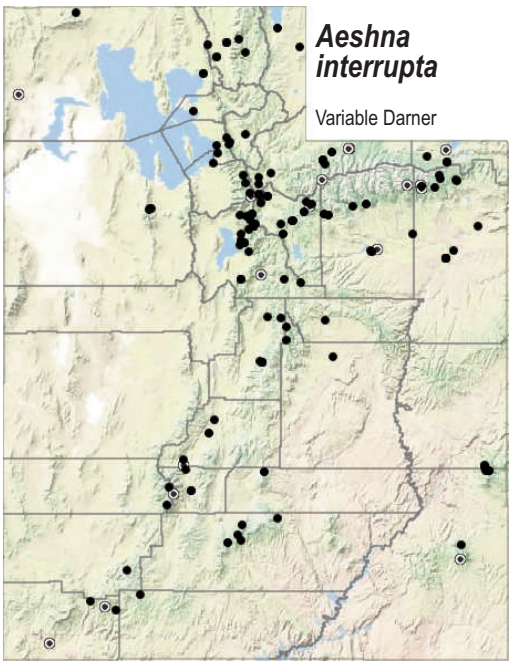


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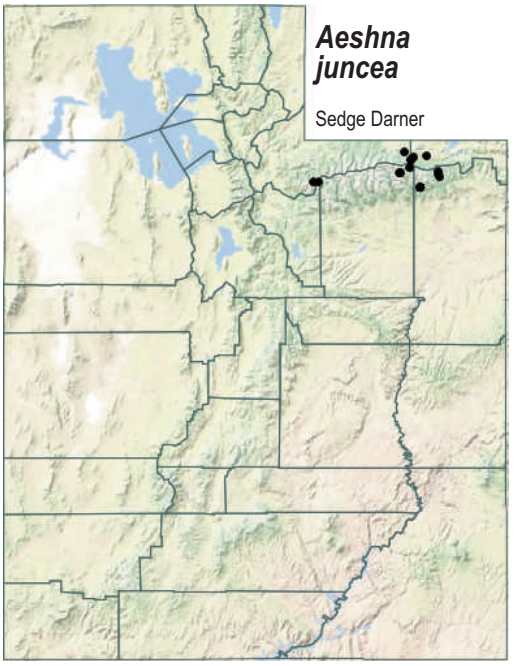


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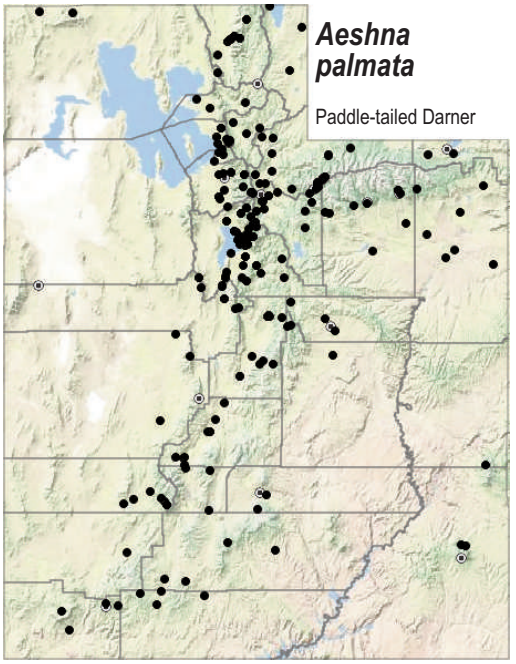


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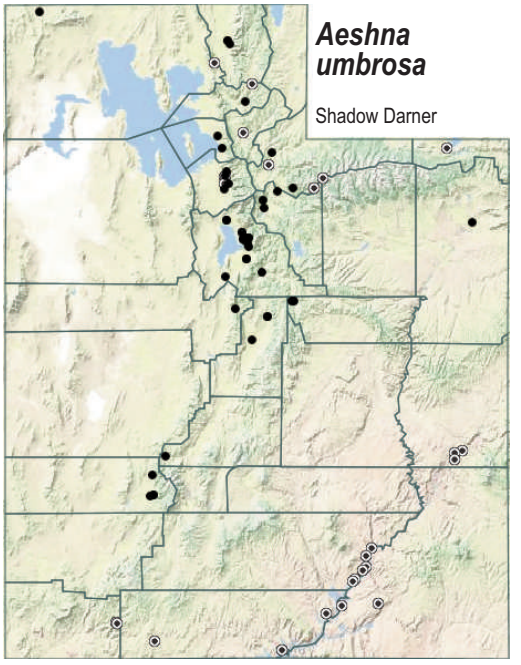


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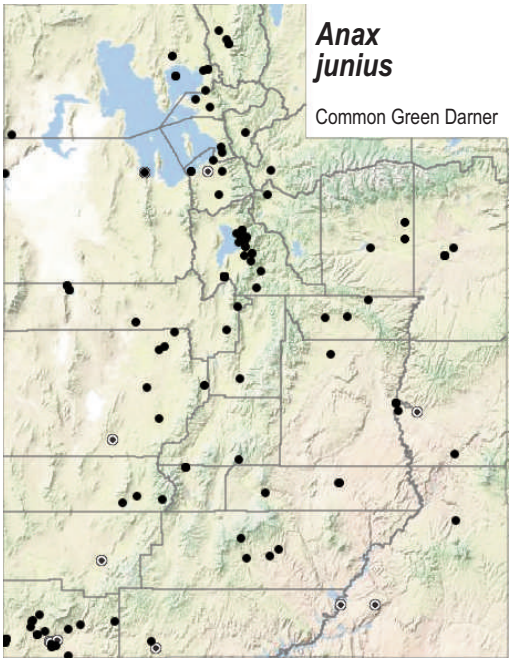


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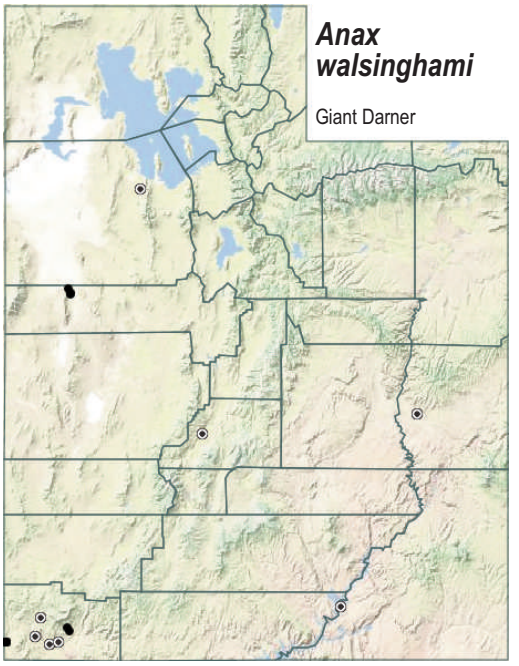


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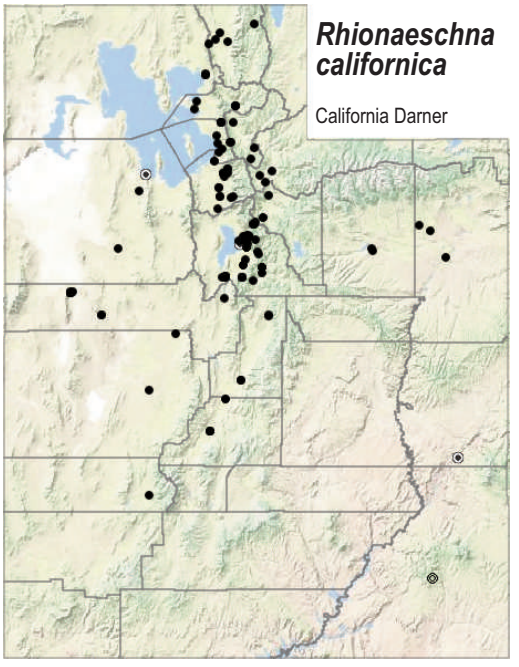


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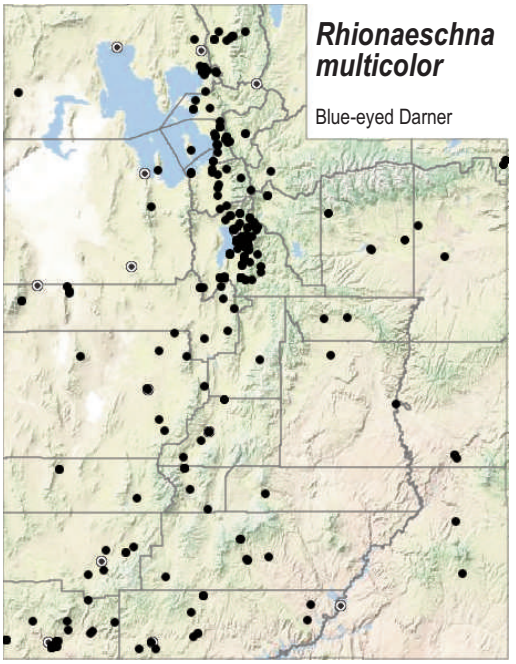


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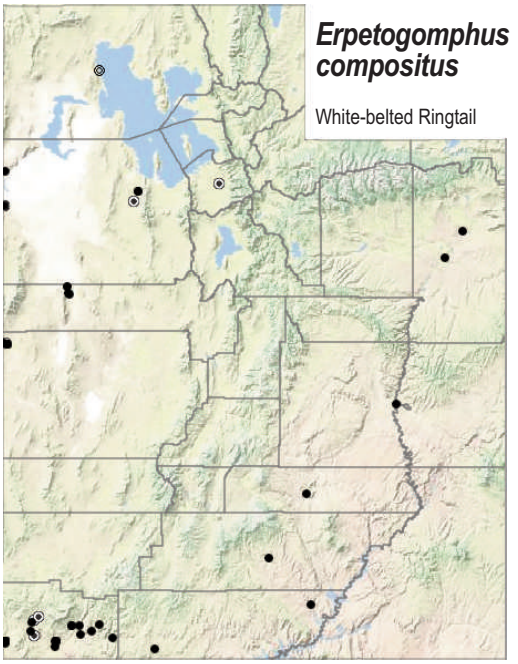


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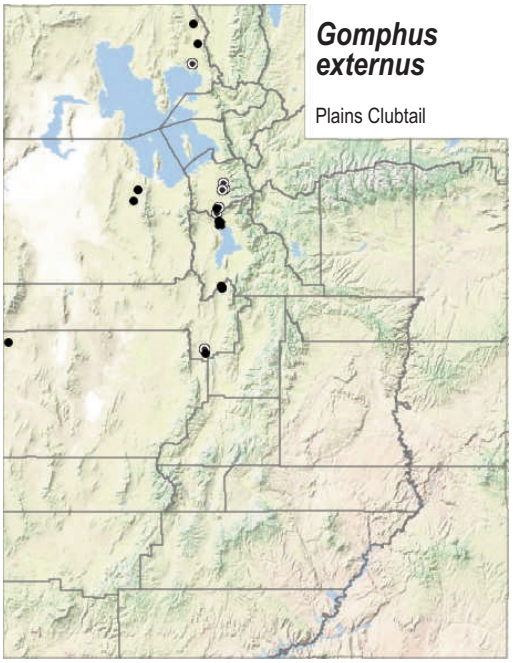


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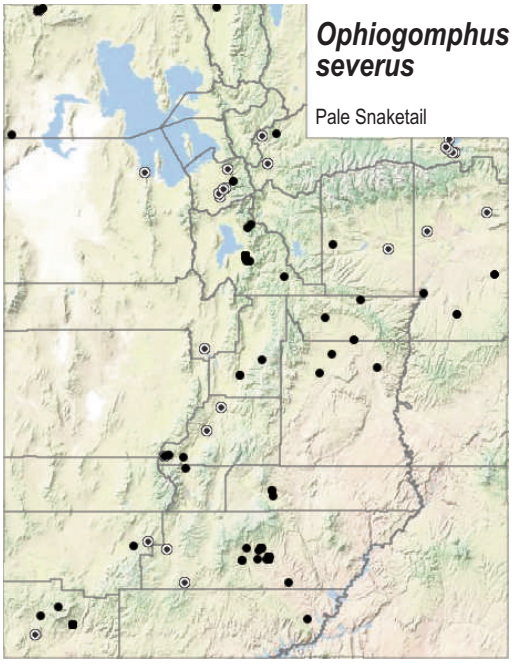
Map 17. *Ophiogomphus occidentis*, Sinuous Snaketail. (Page 26.)




Map 18. *Ophiogomphus severus*, Pale Snaketail. (Page 26.)


Map 19. *Progomphus borealis*, Gray Sanddragon. (Page 27.)

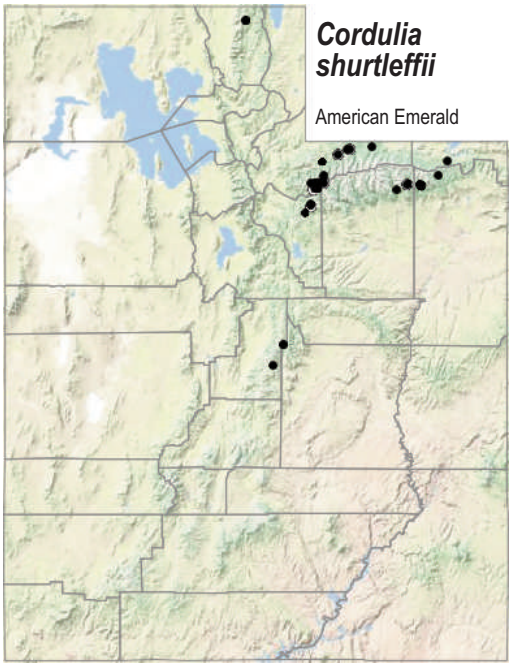

Map 20. *Stylurus intricatus*, Brimstone Clubtail. (Page 27.)


Map 21. *Stylurus olivaceus,* Olive Clubtail. (Page 28.)


Map 22. *Cordulegaster diadema,* Apache Spiketail. (Page 29.)

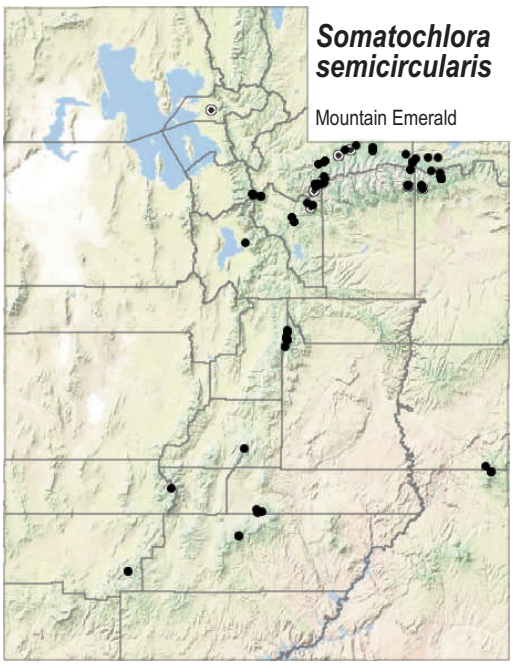

Map 23. *Cordulegaster dorsalis,* Pacific Spiketail. (Page 29.)


Map 24. *Macromia magnifica,* Western River Cruiser. (Page 30.)



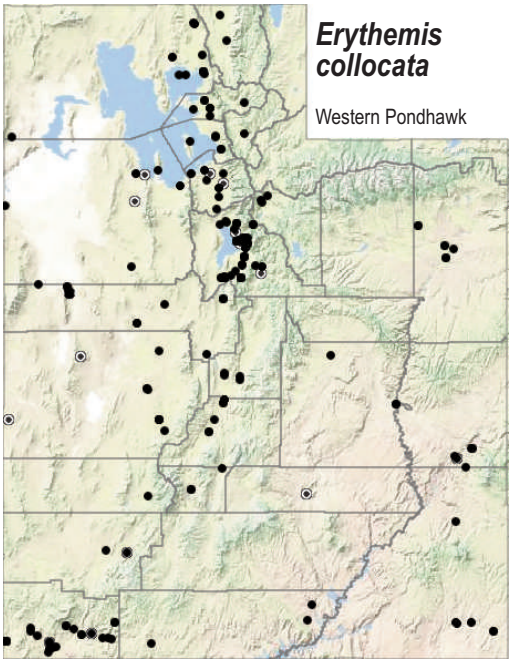

Map 25. *Cordulia shurtleffii,* American Emerald. (Page 30.)


Map 26. *Somatochlora hudsonica,* Hudsonian Emerald. (Page 31.)

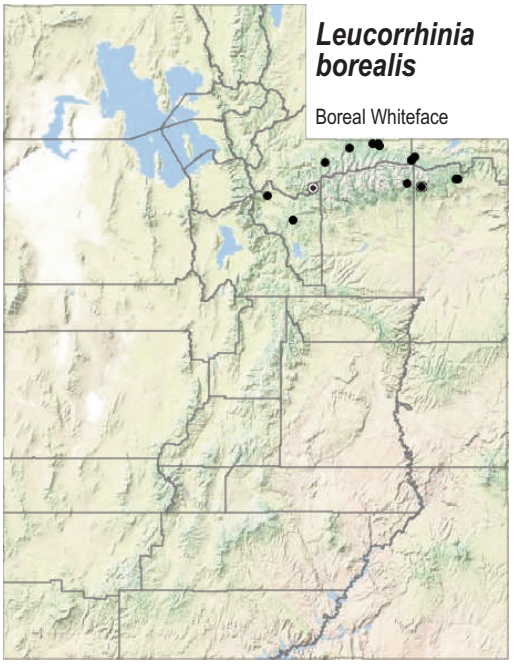



Map 27. *Somatochlora semicircularis,* Mountain Emerald. (Page 32.)

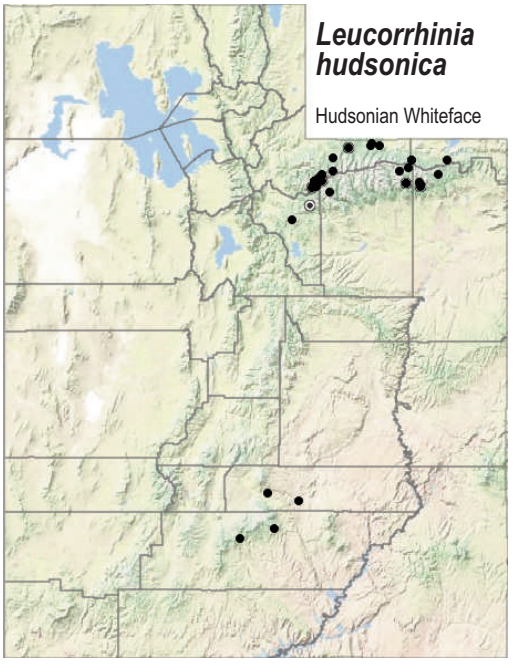

Map 28. *Brechmorhoga mendax,* Pale-faced Clubskimmer. (Page 33.)



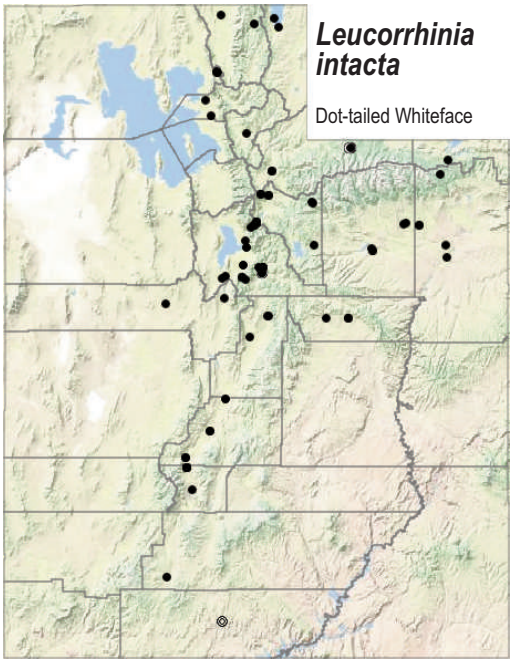

Map 29. *Erythemis collocata,* Western Pondhawk. (Page 33.)




Map 30. *Leucorrhinia borealis,* Boreal Whiteface. (Page 34.)



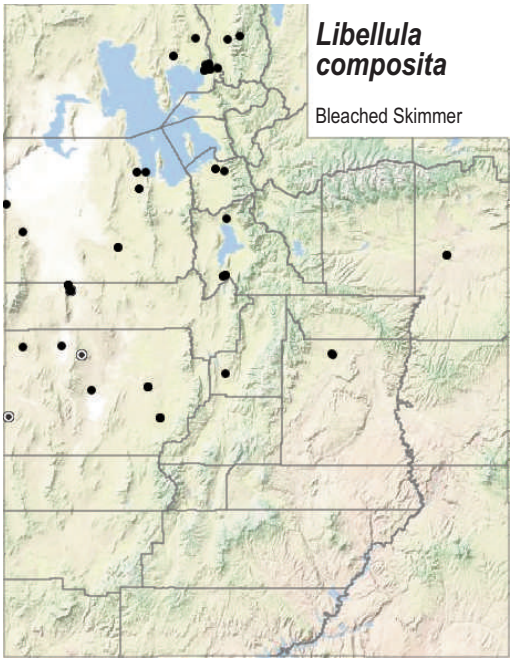

Map 31. *Leucorrhinia hudsonica,* Hudsonian Whiteface. (Page 34.)




Map 32. *Leucorrhinia intacta,* Dot-tailed Whiteface. (Page 35.)

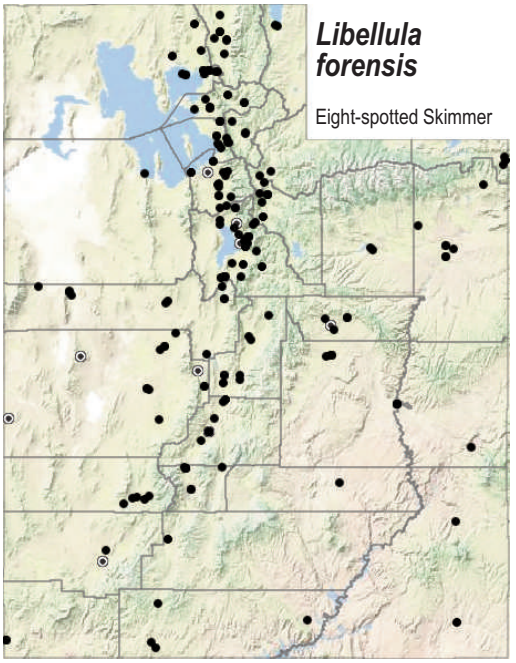

Map 33. *Leucorrhinia proxima,* Belted Whiteface. (Page 36.)


Map 34. *Libellula comanche,* Comanche Skimmer. (Page 36.)

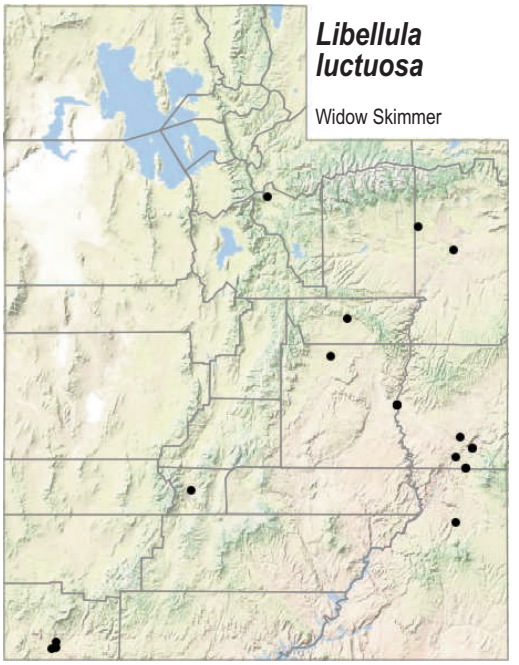



Map 35. *Libellula composita,* Bleached Skimmer. (Page 37.)

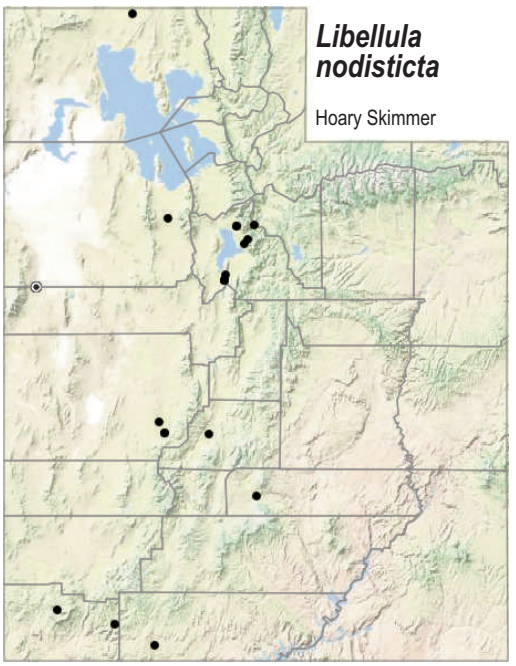

Map 36. *Libellula croceipennis,* Neon Skimmer. (Page 37.)



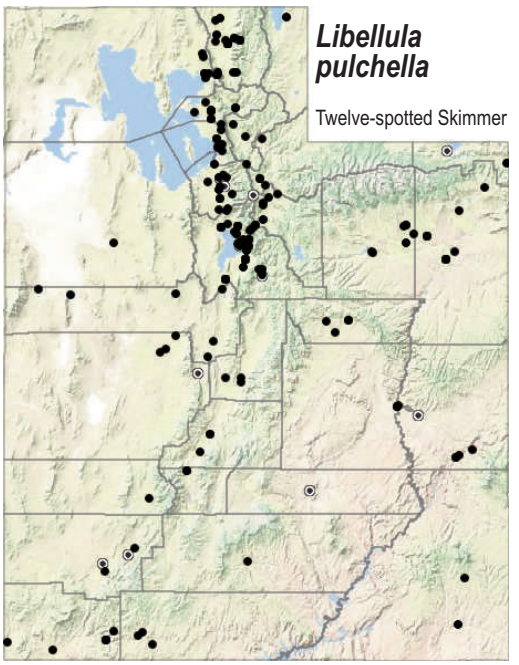

Map 37. *Libellula forensis*, Eight-spotted Skimmer.
(Page 37.)



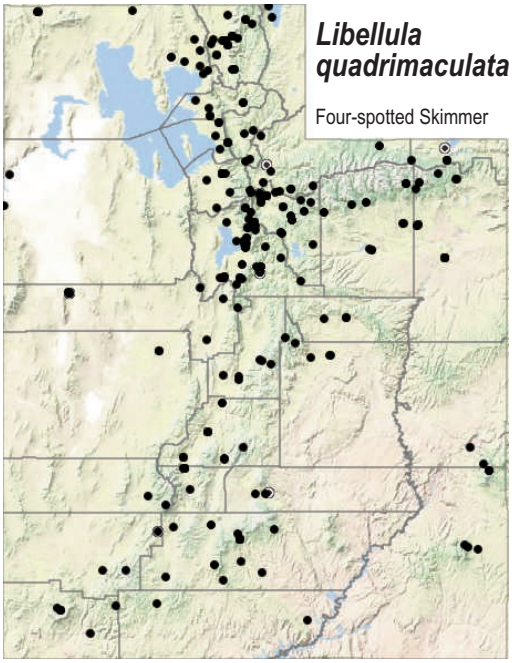

Map 38. *Libellula luctuosa*, Widow Skimmer.
(Page 38.)



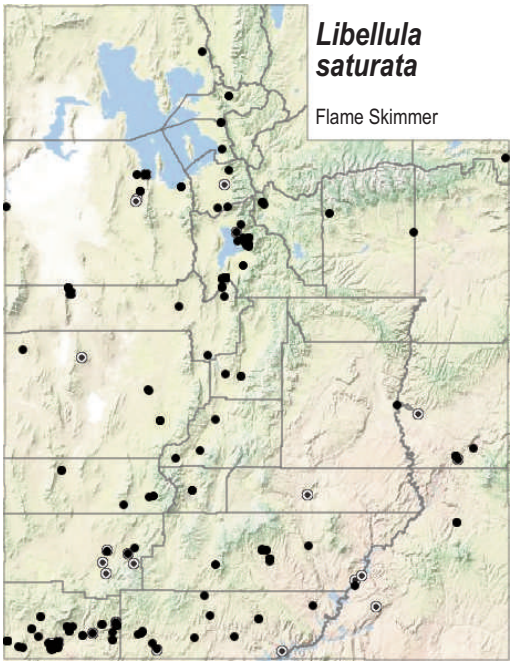

Map 39. *Libellula nodisticta*, Hoary Skimmer.
(Page 39.)




Map 40. *Libellula pulchella*, Twelve-spotted Skimmer.
(Page 39.)

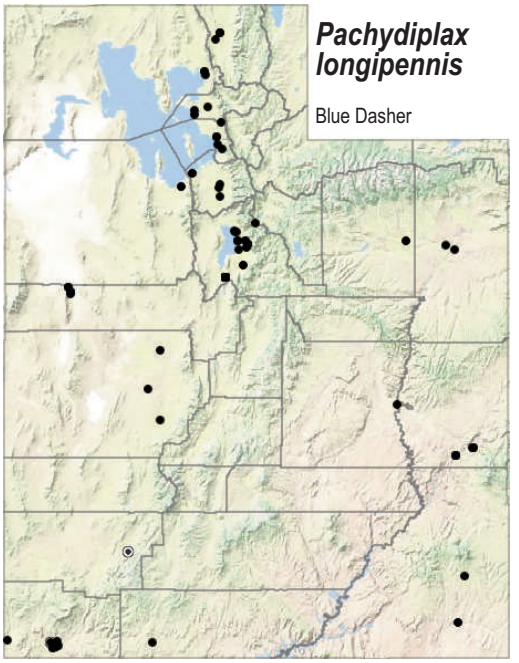



Map 41. *Libellula quadrimaculata,* Four-spotted Skimmer. (Page 40.)

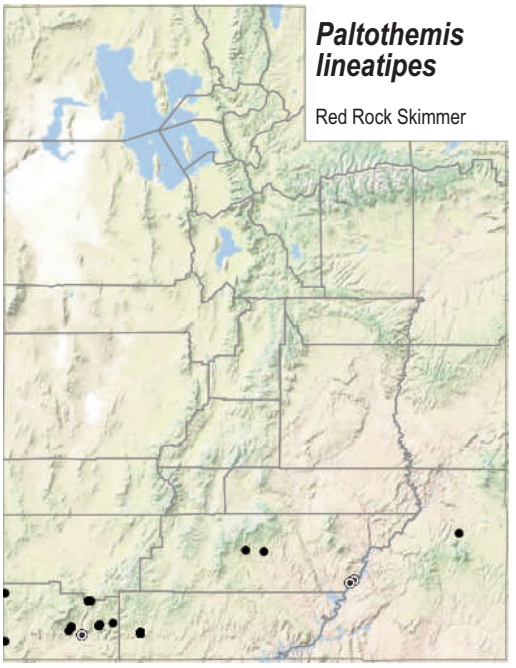



Map 42. *Libellula saturata,* Flame Skimmer. (Page 41.)


Map 43. *Orthemis ferruginea,* Roseate Skimmer. (Page 41.)

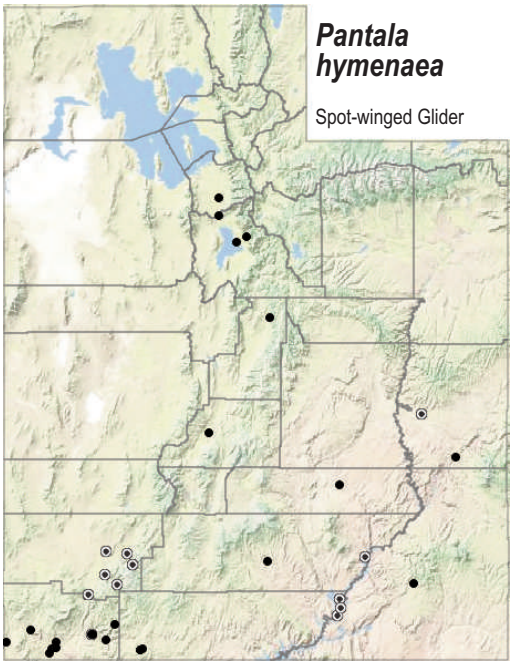



Map 44. *Pachydiplax longipennis,* Blue Dasher. (Page 42.)




Map 45. *Paltothemis lineatipes*, Red Rock Skimmer. (Page 42.)

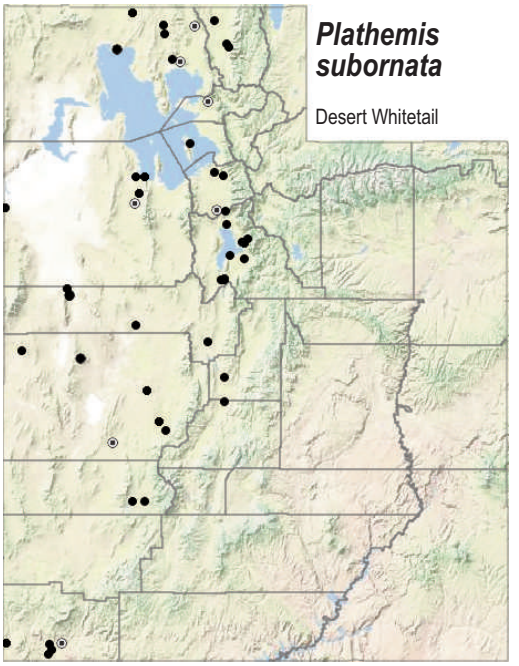

Map 46. *Pantala flavescens*, Wandering Glider. (Page 43.)



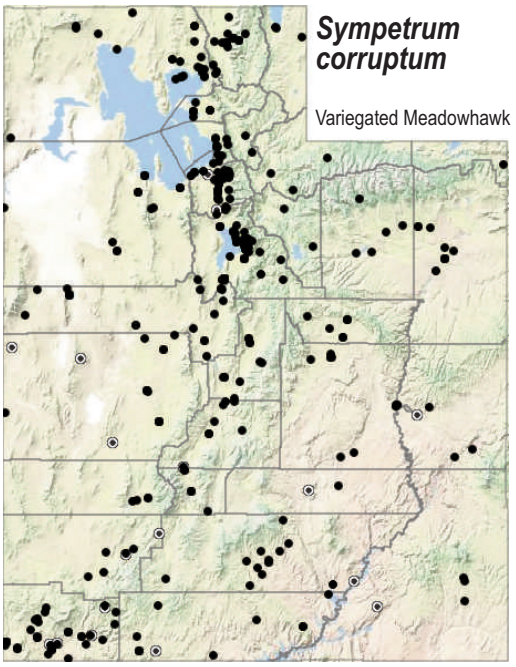

Map 47. *Pantala hymenaea*, Spot-winged Glider. (Page 44.)


Map 48. *Perithemis intensa*, Mexican Amberwing. (Page 44.)

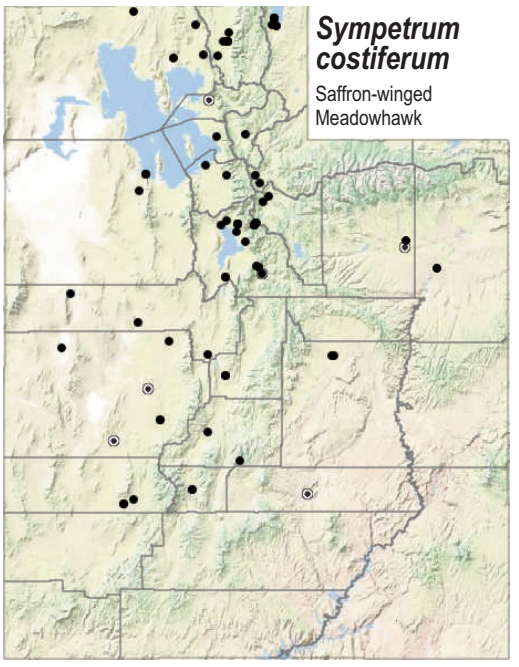

Map 49. *Plathemis lydia,* Common Whitetail. (Page 44.)



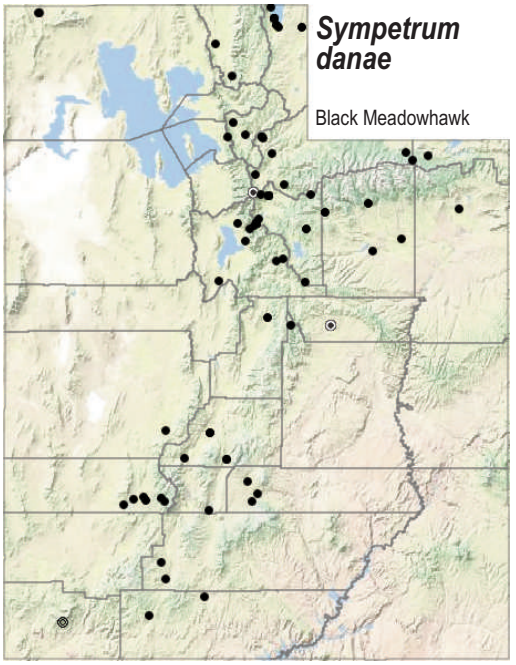

Map 50. *Plathemis subornata,* Desert Whitetail. (Page 44.)



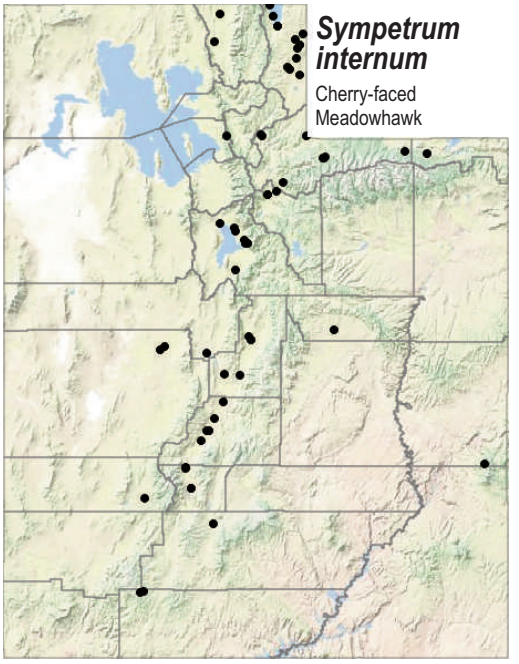

Map 51. *Sympetrum corruptum,* Variegated Meadowhawk. (Page 45.)




Map 52. *Sympetrum costiferum,* Saffron-winged Meadowhawk. (Page 46.)

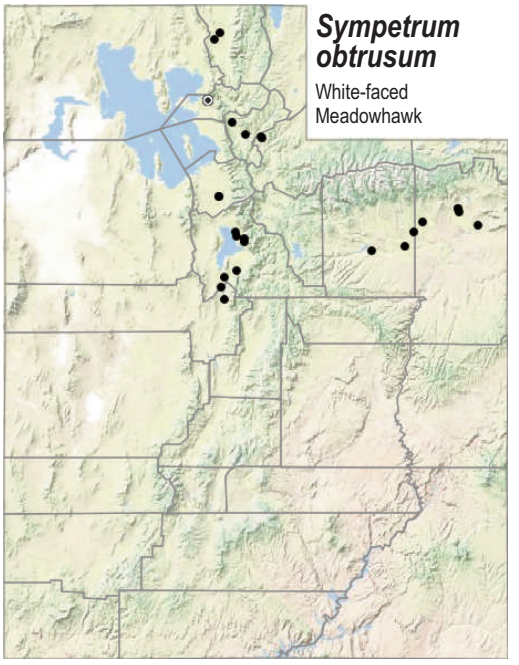



Map 53. *Sympetrum danae*, Black Meadowhawk. (Page 46.)

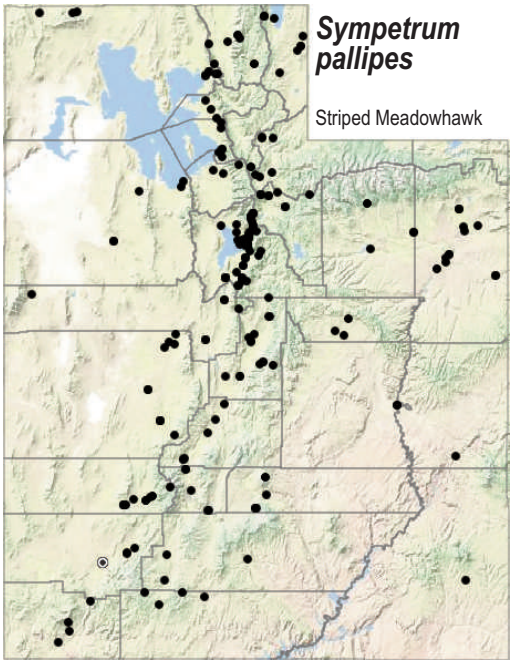



Map 54. *Sympetrum internum*, Cherry-faced Meadowhawk. (Page 47.)

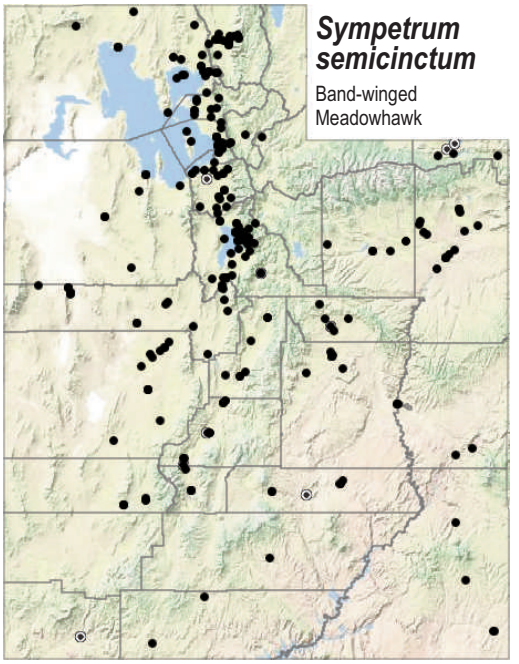

Map 55. *Sympetrum madidum*, Red-veined Meadowhawk. (Page 47.)



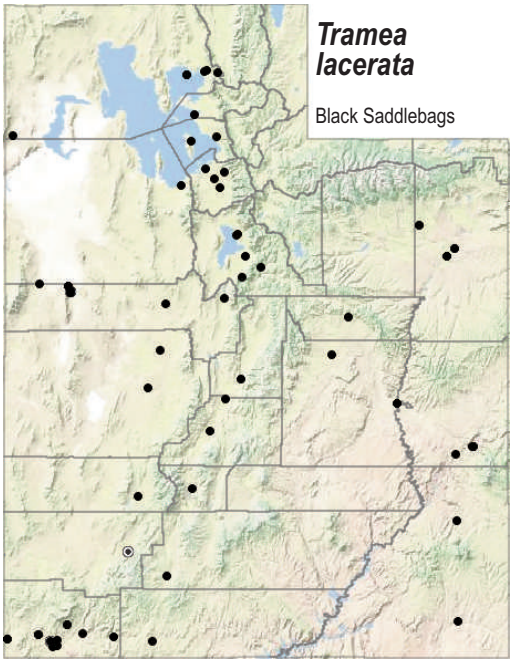

Map 56. *Sympetrum obtrusum*, White-faced Meadowhawk. (Page 48.)



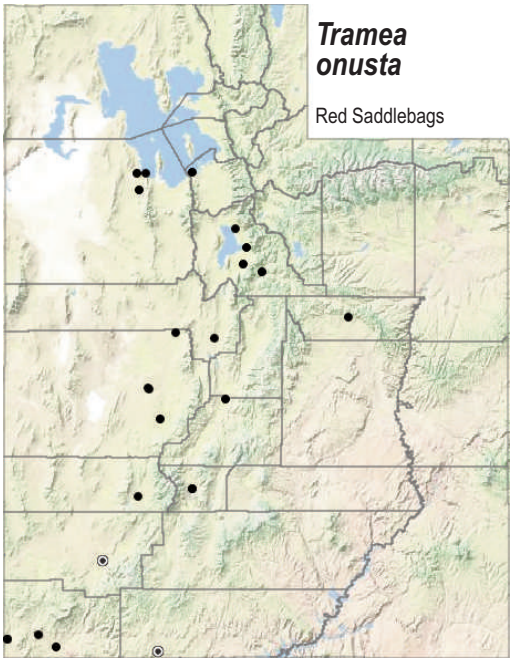

Map 57. *Sympetrum pallipes,* Striped Meadowhawk. (Page 48.)




Map 58. *Sympetrum semicinctum,* Band-winged Meadowhawk. (Page 49.)

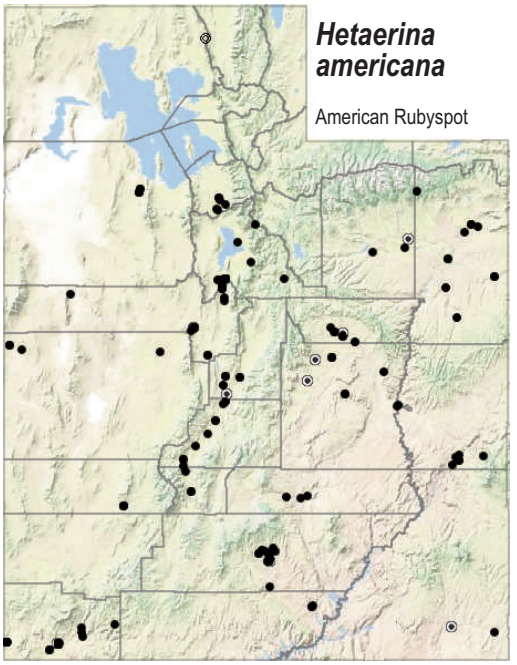



Map 59. *Tramea lacerata,* Black Saddlebags. (Page 49.)



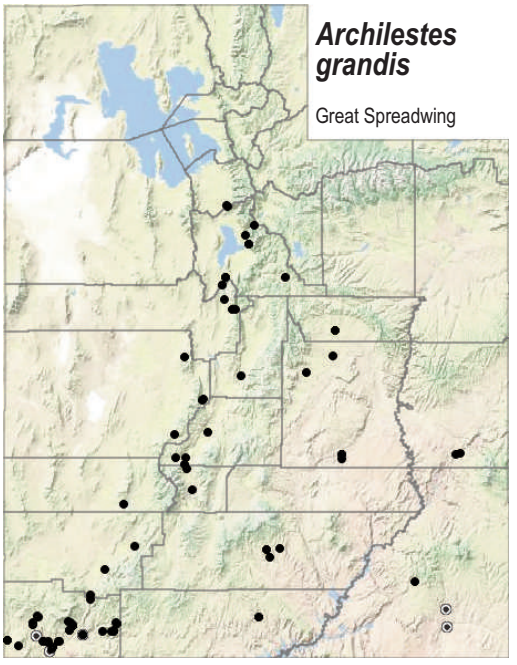

Map 60. *Tramea onusta,* Red Saddlebags. (Page 50.)


Map 61. *Calopteryx aequabilis,* River Jewelwing. (Page 51.)



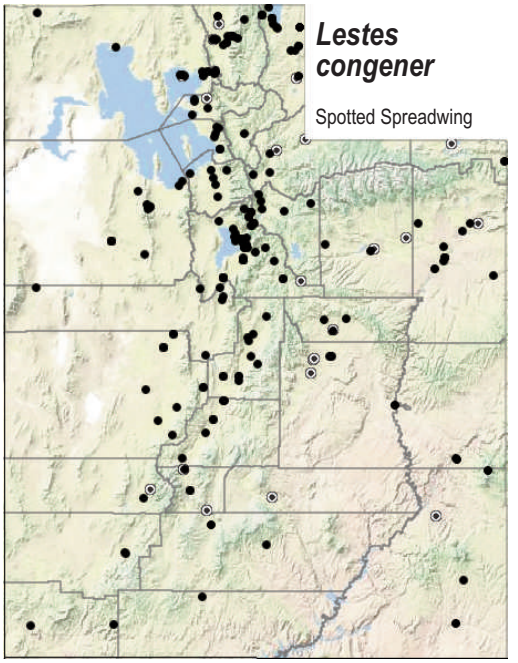

Map 62. *Hetaerina americana,* American Rubyspot. (Page 51.)


Map 63. *Hetaerina vulnerata,* Canyon Rubyspot. (Page 52.)

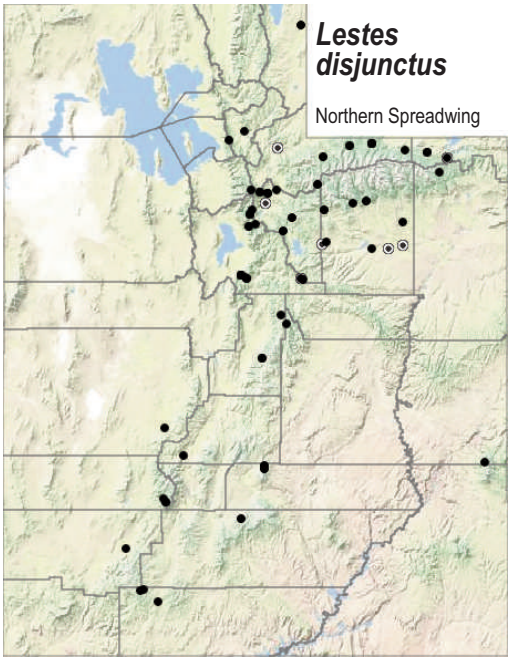



Map 64. *Archilestes grandis,* Great Spreadwing. (Page 52.)

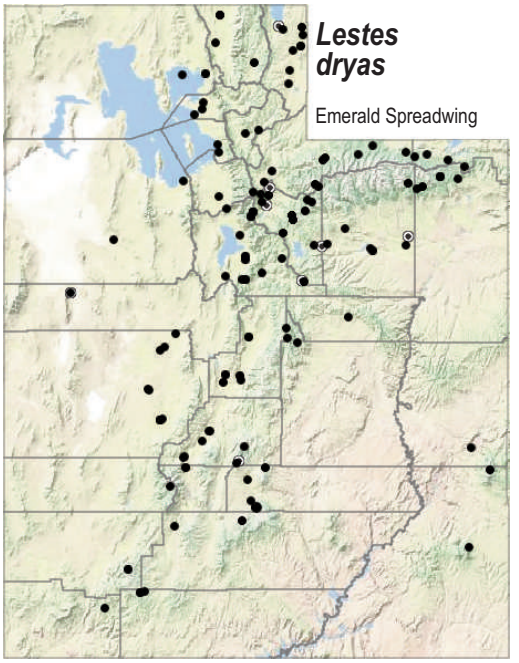

Map 65. *Lestes alacer,* Plateau Spreadwing. (Page 53.)



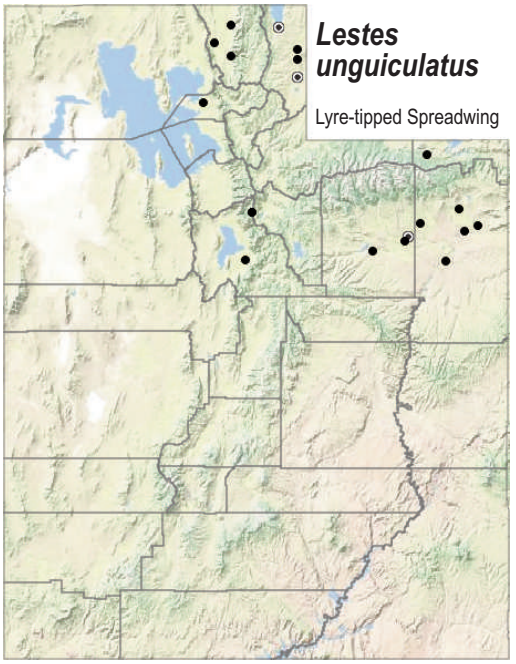

Map 66. *Lestes congener,* Spotted Spreadwing. (Page 53.)



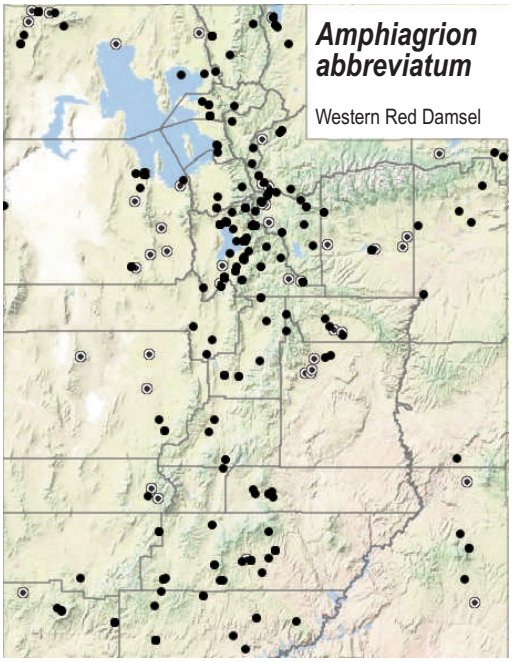

Map 67. *Lestes disjunctus,* Northern Spreadwing. (Page 54.)



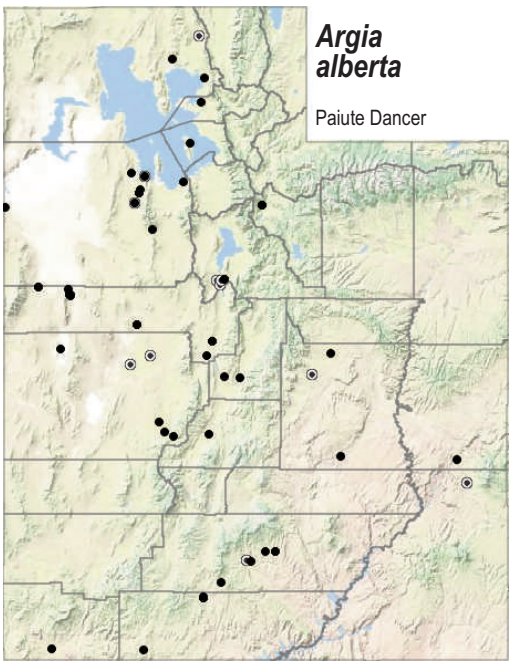

Map 68. *Lestes dryas,* Emerald Spreadwing. (Page 55.)



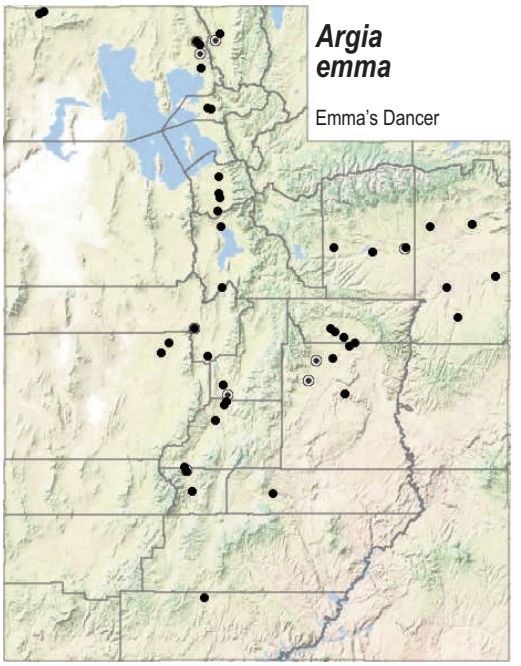

Map 69. *Lestes unguiculatus,* Lyre-tipped Spreadwing. (Page 55.)




Map 70. *Amphiagrion abbreviatum,* Western Red Damsel. (Page 56.)



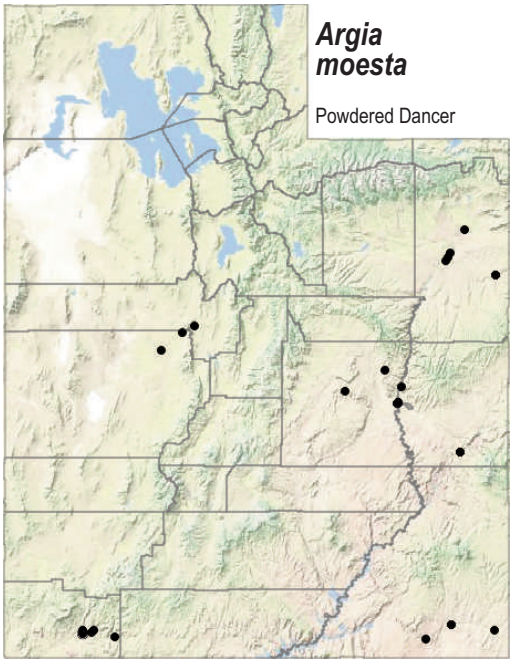

Map 71. *Argia alberta,* Paiute Dancer. (Page 56.)




Map 72. *Argia emma,* Emma's Dancer. (Page 57.)


Map 73. *Argia hinei,* Lavender Dancer.
(Page 57.)


Map 74. *Argia lugens,* Sooty Dancer.
(Page 58.)




Map 75. *Argia moesta,* Powdered Dancer.
(Page 58.)


Map 76. *Argia nahuana,* Aztec Dancer.
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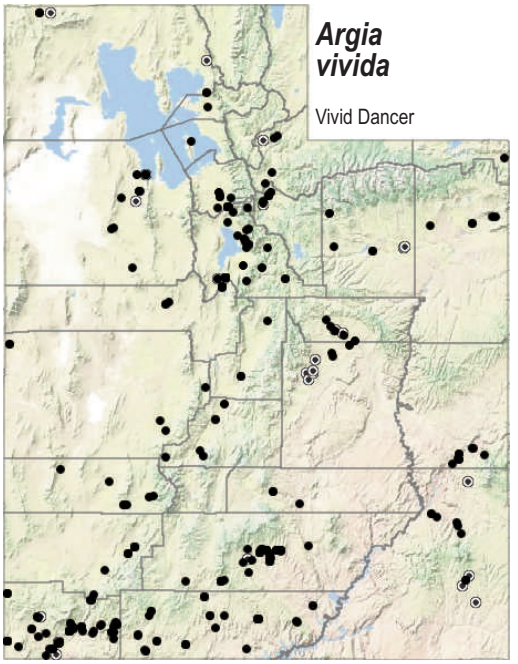
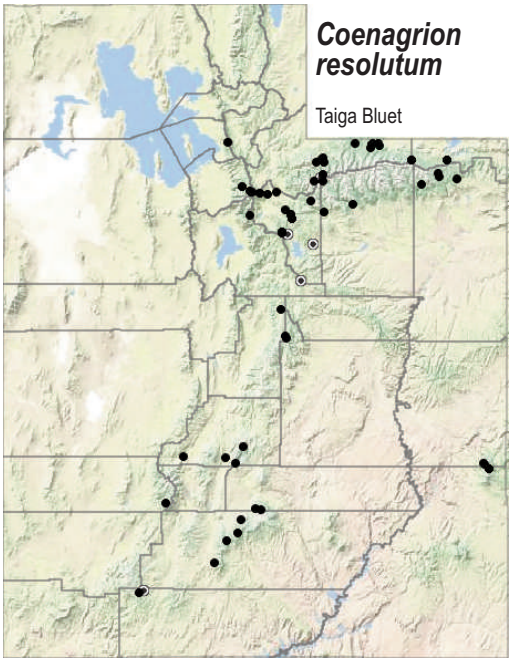
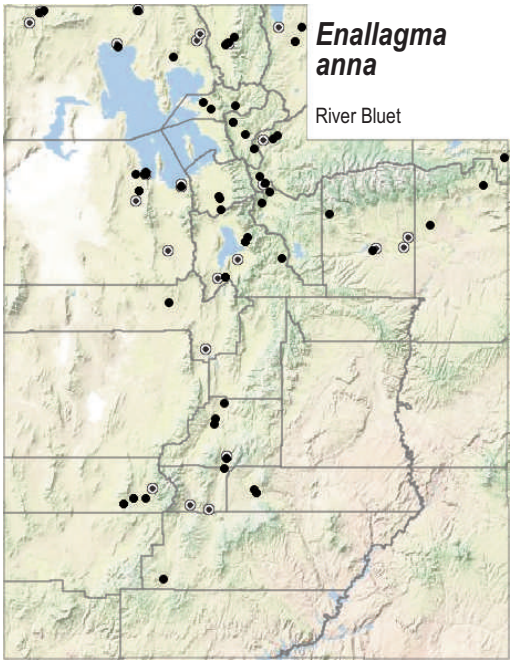
Map 77. *Argia sedula,* Blue-ringed Dancer.
(Page 59.)



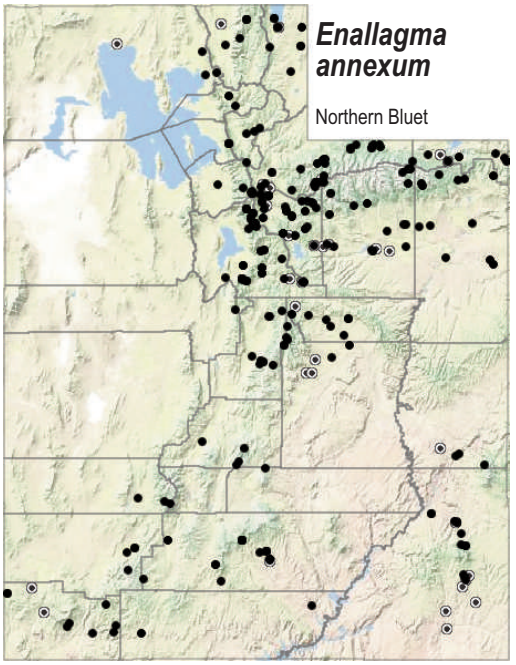

Map 78. *Argia vivida,* Vivid Dancer.
(Page 60.)



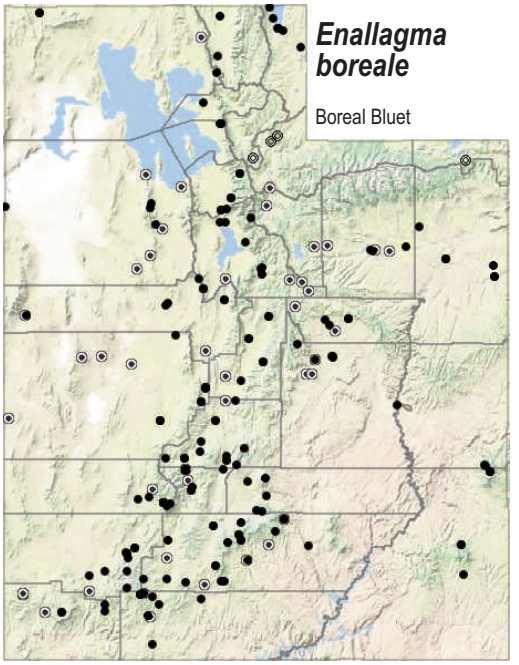

Map 79. *Coenagrion resolutum,* Taiga Bluet.
(Page 60.)



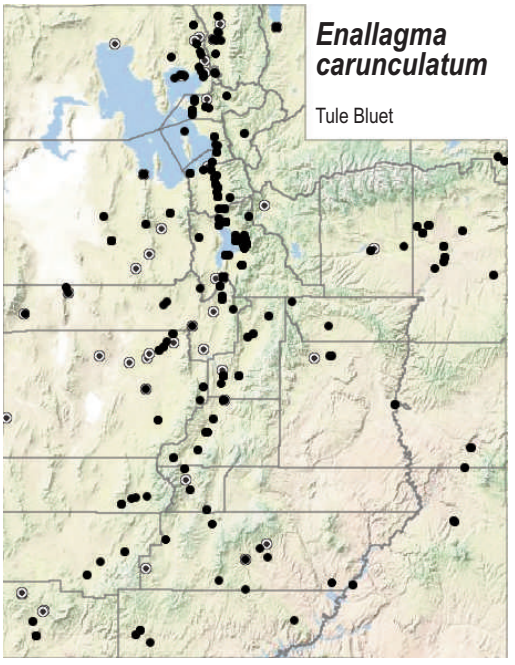

Map 80. *Enallagma anna,* River Bluet.
(Page 61.)



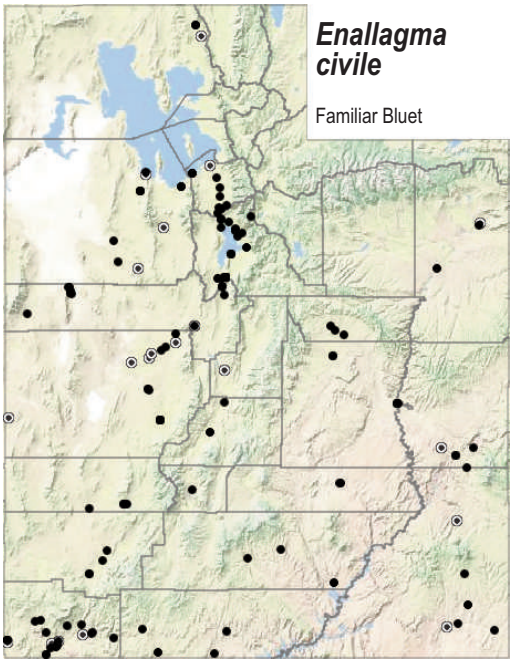

Map 81. *Enallagma annexum,* Northern Bluet.
(Page 62.)



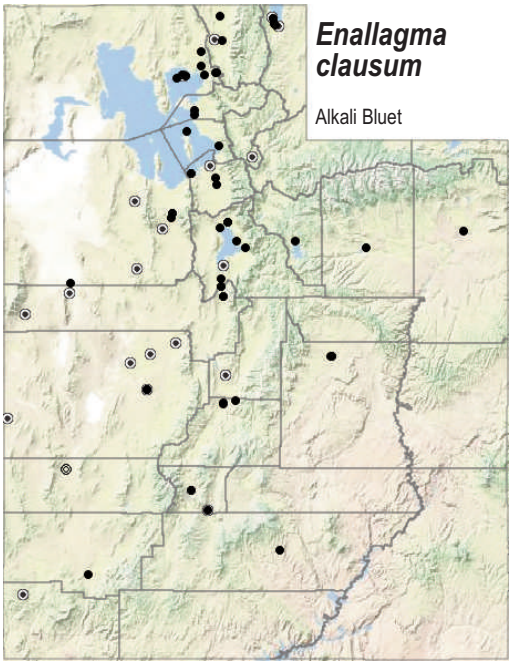

Map 82. *Enallagma boreale,* Boreal Bluet.
(Page 63.)




Map 83. *Enallagma carunculatum,* Tule Bluet.
(Page 64.)



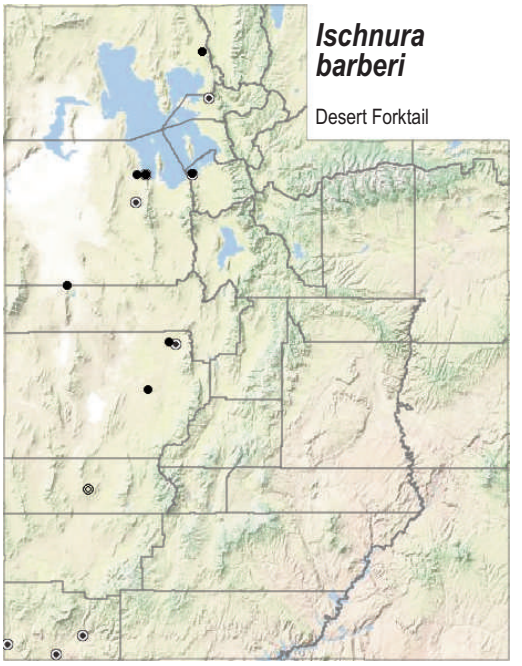

Map 84. *Enallagma civile,* Familiar Bluet.
(Page 64.)



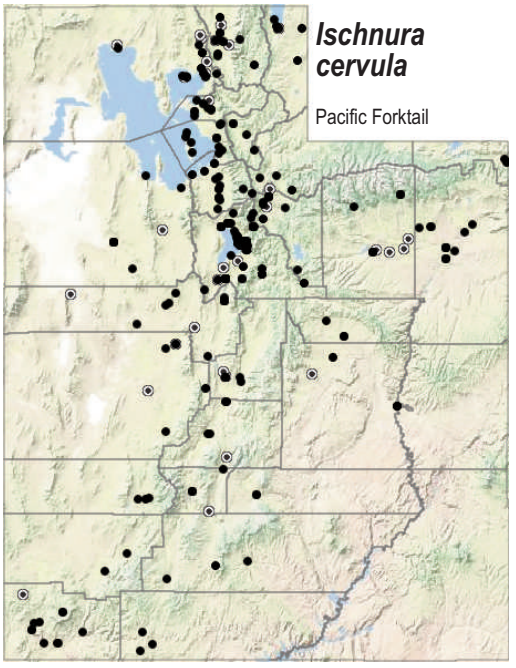

Map 85. *Enallagma clausum*, Alkali Bluet.
(Page 65.)


Map 86. *Enallagma ebrium*, Marsh Bluet.
(Page 65.)

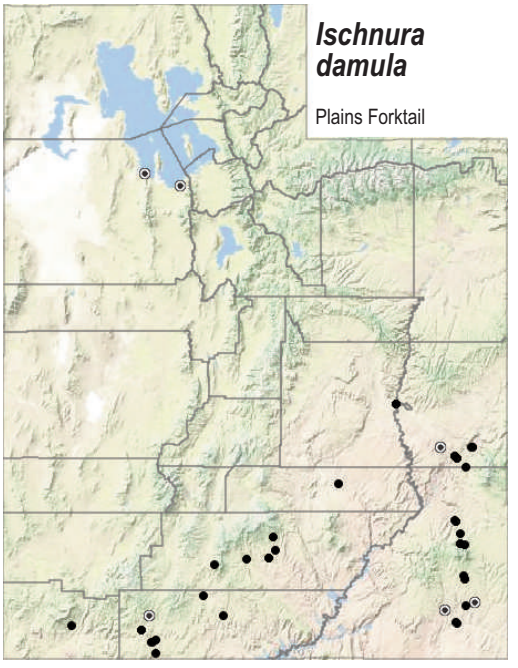

Map 87. *Enallagma praevarum*, Arroyo Bluet.
(Page 65.)




Map 88. *Ischnura barberi*, Desert Forktail.
(Page 66.)

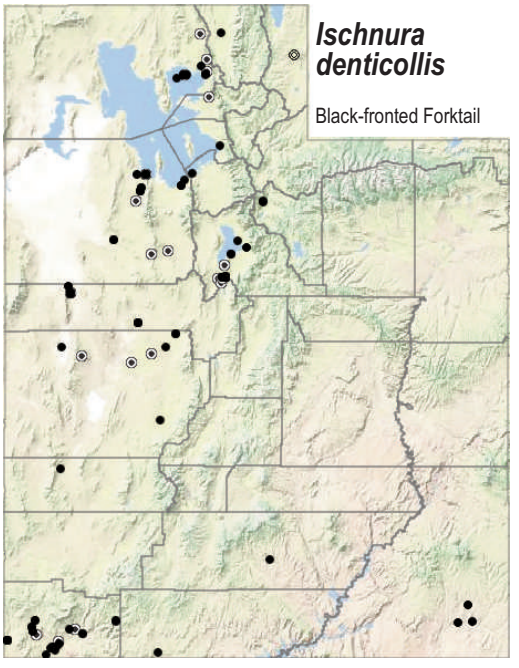



Map 89. *Ischnura cervula,* Pacific Forktail.
(Page 66.)

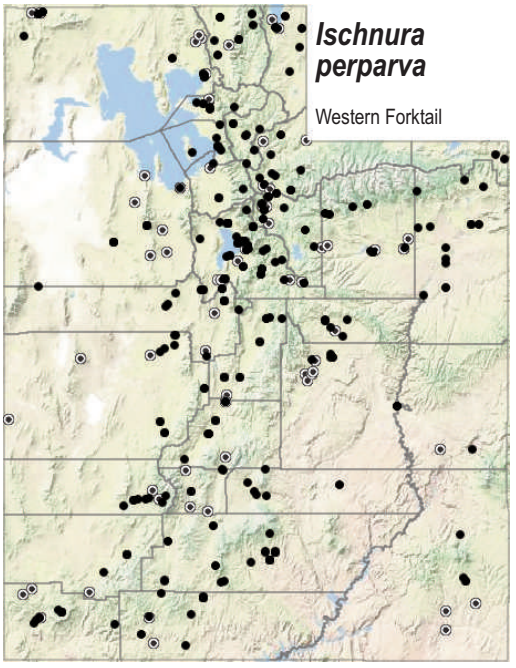



Map 90. *Ischnura damula,* Plains Forktail.
(Page 67.)


Map 91. *Ischnura demorsa,* Mexican Forktail.
(Page 67.)




Map 92. *Ischnura denticollis,* Black-fronted Forktail.
(Page 68.)




Map 93. *Ischnura perparva,* Western Forktail.
(Page 68.)

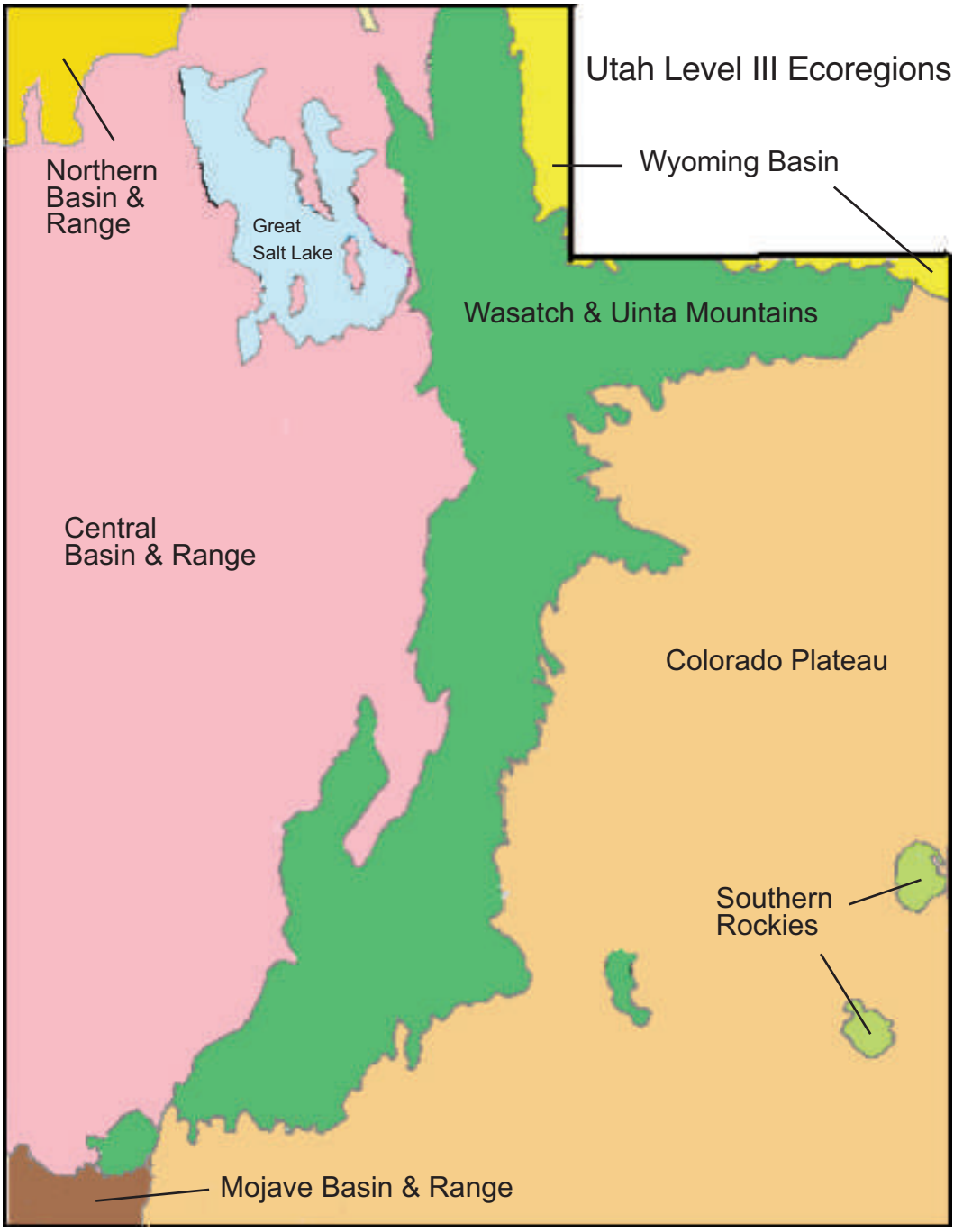

Map 94. *Telebasis salva,* Desert Firetail.
(Page 69.)

APPENDIX 6. Species by ecoregion.

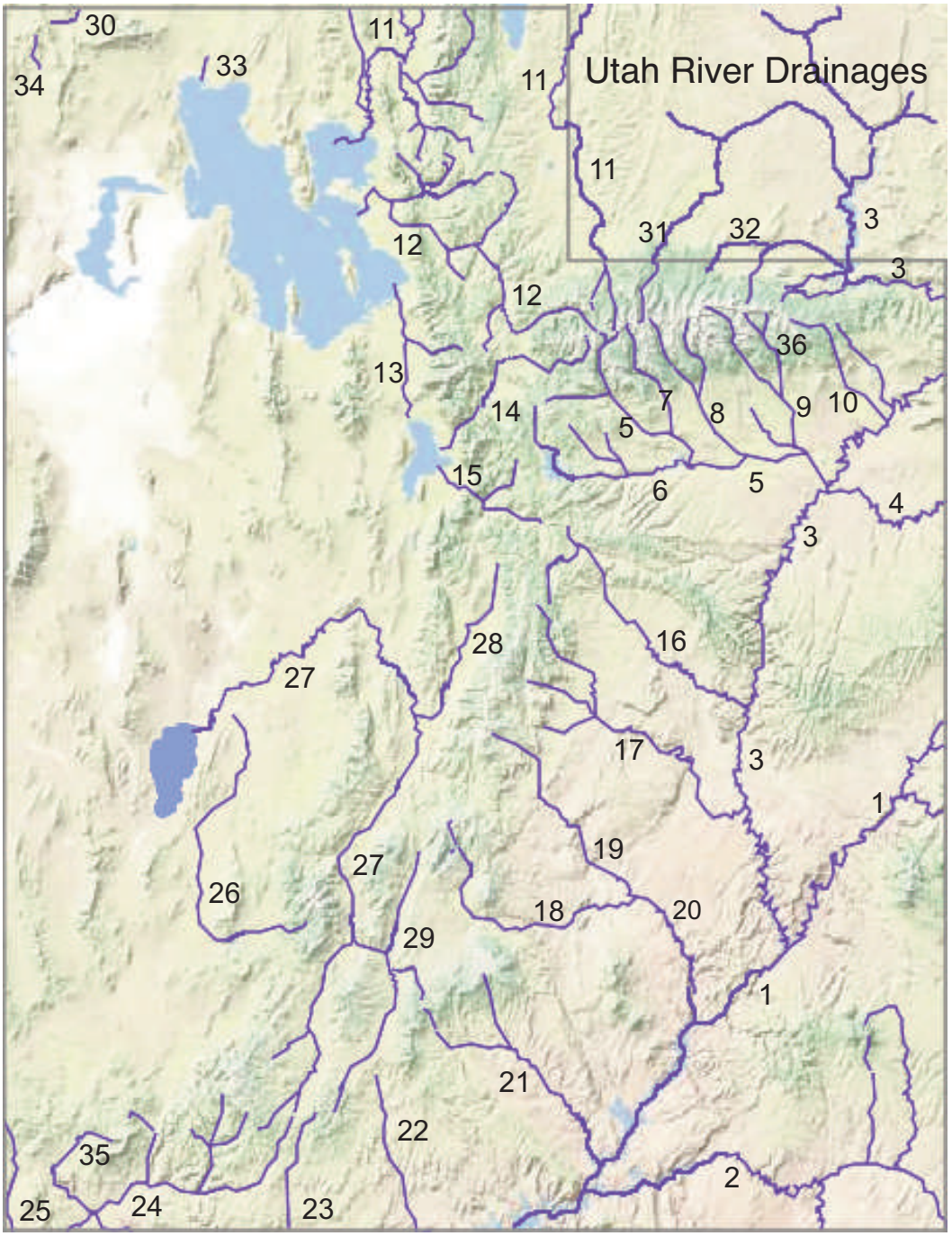
| Species | Central Basin & Range | Colorado Plateau | Mojave Basin & Range | Northern Basin & Range | Southern Rockies | Wasatch & Uinta Mountains | Wyoming Basin |
|---|---|---|---|---|---|---|---|
| *Aeshna constricta* | • | | | | | | |
| *Aeshna eremita* | | | | | | • | |
| *Aeshna interrupta* | • | • | • | • | • | • | • |
| *Aeshna juncea* | | | | | | • | |
| *Aeshna palmata* | • | • | • | • | • | • | • |
| *Aeshna persephone* | | • | • | | | • | |
| *Aeshna sitchensis* | | | | | | • | |
| *Aeshna umbrosa* | • | • | • | • | | • | |
| *Anax junius* | • | • | • | | | • | |
| *Anax walsinghami* | • | • | • | | | | |
| *Oplonaeschna armata* | | • | | | | • | |
| *Rhionaeschna californica* | • | • | | | | • | |
| *Rhionaeschna multicolor* | • | • | • | | | • | • |
| *Erpetogomphus compositus* | • | • | • | | | | |
| *Gomphus externus* | • | | | | | | |
| *Ophiogomphus morrisoni* | • | | | | | • | |
| *Ophiogomphus occidentis* | • | | | | | | |
| *Ophiogomphus severus* | • | • | • | • | | • | |
| *Progomphus borealis* | | • | • | | | | |
| *Stylurus intricatus* | | • | • | | | | • |
| *Stylurus olivaceus* | • | | | | | | |
| *Cordulegaster diadema* | | • | | | | | |
| *Cordulegaster dorsalis* | | • | | | | • | |
| *Macromia magnifica* | • | • | | | | | |
| *Cordulia shurtleffii* | | | | | | • | |
| *Somatochlora hudsonica* | | | | | | • | |
| *Somatochlora semicircularis* | | | | | • | • | |
| *Brechmorhoga mendax* | • | • | • | | | | |
| *Erythemis collocata* | • | • | • | | | • | |
| *Leucorrhinia borealis* | | | | | | • | |
| *Leucorrhinia hudsonica* | | | | | | • | |
| *Leucorrhinia intacta* | • | • | | | | • | • |
| *Leucorrhinia proxima* | | | | | | • | |
| *Libellula comanche* | • | | • | | | | |
| *Libellula composita* | • | • | | | | | |
| *Libellula croceipennis* | • | | • | | | | |
| *Libellula forensis* | • | • | • | | | • | • |
| *Libellula luctuosa* | | • | • | | | • | |
| *Libellula nodisticta* | • | • | | | | • | |
| *Libellula pulchella* | • | • | • | | | • | • |
| *Libellula quadrimaculata* | • | • | | • | • | • | • |
| *Libellula saturata* | • | • | • | | | • | • |
| *Orthemis ferruginea* | • | | • | | | | |
| *Pachydiplax longipennis* | • | • | • | | | • | |
| *Paltothemis lineatipes* | • | • | • | | | | |
| *Pantala flavescens* | • | • | • | | | • | |
| *Pantala hymenaea* | • | • | • | | | • | |
| *Perithemis intensa* | | | • | | | | |
| *Plathemis lydia* | • | | | | | | |
| *Plathemis subornata* | • | | • | | | | |
| *Sympetrum corruptum* | • | • | • | • | | • | • |
| *Sympetrum costiferum* | • | • | | | | • | • |
| *Sympetrum danae* | • | • | | • | | • | • |

APPENDIX 6. Continued.

| Species | Central Basin & Range | Colorado Plateau | Mojave Basin & Range | Northern Basin & Range | Southern Rockies | Wasatch & Uinta Mountains | Wyoming Basin |
|---|---|---|---|---|---|---|---|
| *Sympetrum internum* | • | • | | | • | • | • |
| *Sympetrum madidum* | | | | | | • | • |
| *Sympetrum obtrusum* | • | • | | | | • | |
| *Sympetrum pallipes* | • | • | • | • | | • | • |
| *Sympetrum semicinctum* | • | • | • | • | | • | • |
| *Tramea lacerata* | • | • | • | | | • | |
| *Tramea onusta* | • | • | • | | | • | |
| *Calopteryx aequabilis* | • | | | • | | | |
| *Hetaerina americana* | • | • | • | | | • | |
| *Hetaerina vulnerata* | • | • | • | | | • | |
| *Archilestes grandis* | • | • | • | | | • | |
| *Lestes alacer* | | • | | | | | |
| *Lestes congener* | • | • | | • | • | • | • |
| *Lestes disjunctus* | • | • | | | • | • | • |
| *Lestes dryas* | • | • | | | • | • | • |
| *Lestes unguiculatus* | • | • | | | | • | • |
| *Amphiagrion abbreviatum* | • | • | | • | • | • | • |
| *Argia alberta* | • | • | • | | | • | |
| *Argia emma* | • | • | | • | | • | |
| *Argia hinei* | | • | • | | | • | |
| *Argia lugens* | | • | • | | | • | |
| *Argia moesta* | • | • | • | | | | |
| *Argia nahuana* | • | • | • | | | | |
| *Argia sedula* | • | • | • | | | | |
| *Argia vivida* | • | • | • | • | • | • | • |
| *Coenagrion resolutum* | | | | | • | • | |
| *Enallagma anna* | • | • | | • | | • | • |
| *Enallagma annexum* | • | • | | | • | • | • |
| *Enallagma boreale* | • | • | | • | • | • | • |
| *Enallagma carunculatum* | • | • | • | | | • | • |
| *Enallagma civile* | • | • | • | | | • | |
| *Enallagma clausum* | • | • | | | | • | • |
| *Enallagma ebrium* | • | • | | | | | • |
| *Enallagma praevarum* | • | • | • | | | • | |
| *Ischnura barberi* | • | | • | | | | |
| *Ischnura cervula* | • | • | • | | | • | • |
| *Ischnura damula* | • | • | | | • | • | |
| *Ischnura demorsa* | | • | | | | | |
| *Ischnura denticollis* | • | • | • | | | • | • |
| *Ischnura perparva* | • | • | | • | | • | • |
| *Telebasis salva* | | • | • | | | • | |




APPENDIX 7. Utah Level III Ecoregions Map. Used by permission. Copyright © 2013 Esri. All rights reserved.




APPENDIX 8. Utah River Drainages Map. Used by permission. Copyright © 2013 Esri. All rights reserved.

**Key to Utah River Drainages Map:** Ashley Creek (10), Bear River (11), Beaver Dam Wash (25), Beaver River (26), Blacks Fork (31), Colorado River (1), Dirty Devil River (20), Duchesne River (5), Escalante River (21), Fremont River (18), Green River (3), Grouse Creek (34), Henrys Fork (32), Jordan River (13), Kanab Creek (23), Lake Fork River (8), Locomotive Springs (33), Muddy River (19), Otter Creek (29), Paria River (22), Price River (16), Provo River (14), Raft River (30), Rock Creek (7), San Juan River (2), San Pitch River (28), San Rafael River (17), Santa Clara River (35), Sevier River (27), Spanish Fork River (15), Strawberry River (6), Uinta River (9), Virgin River (24), Weber River (12), White River (4), Whiterocks River (36).

APPENDIX 9. NatureServe subnational conservation rankings (Faber-Langendoen et al. 2009, Master et al. 2009).

| Rank | Definition | Description |
|---|---|---|
| SU | Unrankable | Currently unrankable due to lack of information or due to substantially conflicting information about status or trends. |
| SNR | Unranked | Subnational conservation status not yet assessed. |
| SX | Presumed extirpated | Species is believed to be extirpated from the state. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered. |
| SH | Possibly extirpated | Known from only historical records but still some hope of rediscovery. There is evidence that the species may no longer be present in the jurisdiction, but not enough to state this with certainty. Examples of such evidence include (1) that a species has not been documented in approximately 20–40 years despite some searching or some evidence of significant habitat loss or degradation; (2) that a species has been searched for unsuccessfully, but not thoroughly enough to presume that it is no longer present in the jurisdiction. |
| S1 | Critically imperiled | Critically imperiled in the jurisdiction because of extreme rarity or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the jurisdiction. |
| S2 | Imperiled | Imperiled in the jurisdiction because of rarity due to very restricted range, very few populations or occurrences, steep declines, or other factors making it very vulnerable to extirpation from the jurisdiction. |
| S3 | Vulnerable | Vulnerable in the jurisdiction due to a restricted range, relatively few populations or occurrences, recent and widespread declines, or other factors making it vulnerable to extirpation. |
| S4 | Apparently secure | Uncommon but not rare; some cause for long term concern due to declines or other factors. |
| S5 | Secure | Common, widespread, and abundant in the jurisdiction. |
| S#S# | Range rank | A numeric range rank (e.g., S2S3 or S1S3) is used to indicate any range of uncertainty about the status of the species or ecosystem. Ranges cannot skip more than 2 ranks (e.g., SU is used rather than S1S4). |

APPENDIX 10. State species conservation rankings. See Appendix 9 for conservation rankings.

| Species | Global | National | State | Recommended |
|---|---|---|---|---|
| *Aeshna constricta* | G5 | N5 | SH | SH |
| *Aeshna eremita* | G5 | N4 | SH | S4 |
| *Aeshna interrupta* | G5 | N5 | S3 | S5 |
| *Aeshna juncea* | G5 | N4 | SNR | S3 |
| *Aeshna palmata* | G5 | N5 | S3 | S5 |
| *Aeshna persephone* | G3 | N2 | SNR | S1 |
| *Aeshna sitchensis* | G5 | N3 | SH | S3 |
| *Aeshna umbrosa* | G5 | N5 | S3 | S3 |
| *Anax junius* | G5 | N5 | S3 | S5 |
| *Anax walsinghami* | G5 | N5 | SH | S2 |
| *Oplonaeschna armata* | G4 | N4 | S1 | S1 |
| *Rhionaeschna californica* | G5 | N5 | SH | S4 |
| *Rhionaeschna multicolor* | G5 | N5 | S3 | S5 |
| *Erpetogomphus compositus* | G5 | N5 | SH | S4 |
| *Gomphus externus* | G5 | N5 | SH | S3 |
| *Ophiogomphus morrisoni* | G4 | N4 | SNR | S1 |
| *Ophiogomphus occidentis* | G4 | N4 | SH | SH |
| *Ophiogomphus severus* | G5 | N5 | S3 | S4 |
| *Progomphus borealis* | G5 | N4 | SH | S3 |
| *Stylurus intricatus* | G4 | N4 | SH | S1 |
| *Stylurus olivaceus* | G4 | N4 | SH | S1 |
| *Cordulegaster diadema* | G4 | N2N3 | SH | S1 |
| *Cordulegaster dorsalis* | G5 | N5 | SH | S3 |
| *Macromia magnifica* | G5 | N5 | SNR | S1 |
| *Cordulia shurtleffii* | G5 | N5 | S2 | S4 |
| *Somatochlora hudsonica* | G5 | N2N3 | SU | S1 |
| *Somatochlora semicircularis* | G5 | N5 | SH | S4 |
| *Brechmorhoga mendax* | G5 | N5 | SH | S1 |
| *Erythemis collocata* | G5 | N5 | S3 | S5 |
| *Leucorrhinia borealis* | G5 | N4? | SH | S3 |
| *Leucorrhinia hudsonica* | G5 | N5 | SH | S3 |
| *Leucorrhinia intacta* | G5 | N5 | SH | S4 |
| *Leucorrhinia proxima* | G5 | N5 | SH | S3 |
| *Libellula comanche* | G5 | N5 | S1 | S2 |
| *Libellula composita* | G3G4 | N3N4 | S2 | S4 |
| *Libellula croceipennis* | G5 | N4 | SU | S1 |
| *Libellula forensis* | G5 | N5 | S2 | S5 |
| *Libellula luctuosa* | G5 | N5 | SU | S3 |
| *Libellula nodisticta* | G4 | N4 | S1 | S3 |
| *Libellula pulchella* | G5 | N5 | S2 | S5 |
| *Libellula quadrimaculata* | G5 | N5 | S2 | S5 |
| *Libellula saturata* | G5 | N5 | S3 | S4 |
| *Orthemis ferruginea* | G5 | N5 | S1 | S1 |
| *Pachydiplax longipennis* | G5 | N5 | S1 | S4 |
| *Paltothemis lineatipes* | G5 | N5 | SH | S2 |
| *Pantala flavescens* | G5 | N5 | S1 | S4 |
| *Pantala hymenaea* | G5 | N5 | S2 | S4 |
| *Perithemis intensa* | G5 | N4 | SU | S1 |
| *Plathemis lydia* | G5 | N5 | S1 | S1 |
| *Plathemis subornata* | G4 | N4 | S3 | S4 |
| *Sympetrum corruptum* | G5 | N5 | S4 | S5 |
| *Sympetrum costiferum* | G5 | N5 | S2 | S4 |
| *Sympetrum danae* | G5 | N5 | S2 | S4 |
| *Sympetrum internum* | G5 | N5 | SNR | S4 |
| *Sympetrum madidum* | G4 | N4 | SU | S3 |
| *Sympetrum obtrusum* | G5 | N5 | SH | S4 |
| *Sympetrum pallipes* | G5 | N5 | S2 | S5 |
| *Sympetrum semicinctum* | G5 | N5 | S3 | S5 |
| *Tramea lacerata* | G5 | N5 | S1 | S4 |
| *Tramea onusta* | G5 | N5 | S1 | S3 |
| *Calopteryx aequabilis* | G5 | N5 | SH | S1 |
| *Hetaerina americana* | G5 | N5 | S3 | S5 |
| *Hetaerina vulnerata* | G5 | N4 | S1 | S2 |

APPENDIX 10. Continued.

| Species | Global | National | State | Recommended |
|---|---|---|---|---|
| *Archilestes grandis* | G5 | N5 | S2 | S4 |
| *Lestes alacer* | G5 | N4 | SNR | S1 |
| *Lestes congener* | G5 | N5 | S4 | S5 |
| *Lestes disjunctus* | G5 | N5 | S2 | S4 |
| *Lestes dryas* | G5 | N5 | S2 | S5 |
| *Lestes unguiculatus* | G5 | N5 | SH | S4 |
| *Amphiagrion abbreviatum* | G5 | N5 | S5 | S5 |
| *Argia alberta* | G4 | N4 | S2 | S4 |
| *Argia emma* | G5 | N5 | S3 | S4 |
| *Argia hinei* | G4 | N4 | SNR | S1 |
| *Argia lugens* | G5 | N5 | SH | S2 |
| *Argia moesta* | G5 | N5 | SH | S4 |
| *Argia nahuana* | G5 | N5 | SH | S3 |
| *Argia sedula* | G5 | N5 | SH | S1 |
| *Argia vivida* | G5 | N5 | S5 | S5 |
| *Coenagrion resolutum* | G5 | N5 | SH | S4 |
| *Enallagma anna* | G5 | N5 | S3 | S4 |
| *Enallagma annexum* | G5 | N5 | S4 | S5 |
| *Enallagma boreale* | G5 | N5 | S4 | S5 |
| *Enallagma carunculatum* | G5 | N5 | S4 | S5 |
| *Enallagma civile* | G5 | N5 | S3 | S4 |
| *Enallagma clausum* | G5 | N5 | S3 | S4 |
| *Enallagma ebrium* | G5 | N5 | SH | S2 |
| *Enallagma praevarum* | G5 | N5 | SH | S4 |
| *Ischnura barberi* | G4 | N4 | S2 | S3 |
| *Ischnura cervula* | G5 | N5 | S3 | S5 |
| *Ischnura damula* | G5 | N5 | SH | S4 |
| *Ischnura demorsa* | G5 | N5 | SH | S1 |
| *Ischnura denticollis* | G5 | N5 | S3 | S4 |
| *Ischnura perparva* | G5 | N5 | S5 | S5 |
| *Telebasis salva* | G5 | N5 | SH | S2 |