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THE DRAGONFLIES OF WASHINGTON

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'THE DRAGONFLIES OF WASHINGTON

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ABSTRACT

Seventy-five species of Odonata are listed from Washington. County records, seasonal occurrence, and preferred habitats are given for each species. Publications that include Washington records are listed in a brief history of research on the state's fauna, and the distributional patterns of Washington species are outlined. As a very broad generality, southern species occur in the Columbia Basin,

northern species in the mountains. The most widespread species in the state are distributed either widely in the West or across the continent. There are few Northwest endemics, and the state has a depauperate odonate fauna compared with similar latitudes in the East, perhaps because of widespread aridity in the West during glacial periods.

HISTORY OF RESEARCH

The history of Washington odonatology began with the description of *Libellula julia* from Fort Steilacoom, Pierce County, by Uhler (1857). Only two other species have been described from the state - *Argia emma* from Satus Creek, Yakima County (Kennedy 1915), and *Gomphus lynnae* from the Yakima River, Benton County (Paulson 1983).

The first odonatologist who visited the state was H. A. Hagen, who passed through briefly in 1882 (Hagen 1889, 1890). A few specimens collected by T. Kincaid, O. Johnson, R. Osburn, and R. Pässler in the Puget Sound and Yakima areas around the turn of the century were reported (Calvert 1895, 1899, 1901-1908; Osburn 1905; Ris 1911; Williamson 1900), but no substantive work in the state was done until C. H. Kennedy collected in Yakima County from 1910-1913 (Kennedy 1913, 1915; Ris 1916). No statewide collections were attempted until the present author arrived in 1967 (Paulson 1970, 1983, 1989, 1992; Paulson and Garrison 1977). The state still has been visited by few other field workers (Donnelly 1991, Valley 1993).

The only other publications that exist for the state's odonate fauna are systematic studies that cite Washington specimens (Bennefield 1965; Calvert

1956; Garrison 1984; Kennedy 1918; Muttkowski 1911; Needham 1904; Walker 1912, 1925, 1951, 1952), biological studies carried out within the state (Cook and Antonelli 1969; Paulson 1974; Paulson and Cannings 1980; Svihla 1958, 1959, 1960, 1967), and casual mention in other papers (Whitehouse 1941).

The present paper lists 75 species presently known to occur in Washington. Distributional and seasonal records are based on 6,731 specimens of Odonata from Washington in the author's collection (hundreds of specimens from these same collections that were deposited in the Florida State Collection of Arthropods are not included in this total) and specimens examined at Washington State University, the University of California at Berkeley, the California Academy of Sciences, and the Los Angeles County Museum of Natural History, as well as records from the literature.

WASHINGTON ODONATA HABITATS

The state varies greatly in precipitation. Because the north-south oriented mountain ranges intercept the moisture-laden prevailing southwesterly winds, the western lowlands and west sides of the ranges are quite wet (up to 250 cm annual rainfall on western slopes of the Olympics and Cascades), the eastern lowlands and east sides of the mountain ranges considerably drier (down to 25 cm in the

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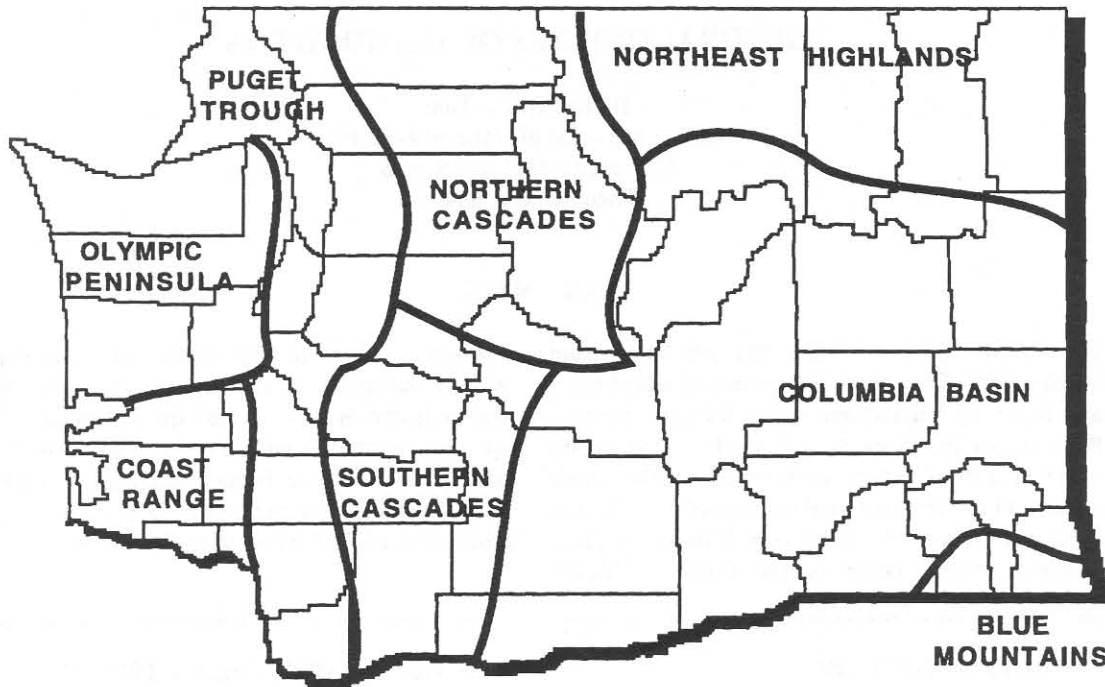


Fig. 1 Washington physiographic regions

Columbia Basin). Terrestrial plant communities vary accordingly, from lush temperate rain forest in the west to sagebrush steppe in the east. Much of the state is forested, only the Columbia Basin and areas above treeline not so.

Aquatic habitats, of course, provide the opportunity for odonate diversity, and they are abundant on both sides of the state. To some degree they vary independent of terrestrial biomes, so a cattail-fringed pond in the wet-forest region supports many of the same species that breed in a similar pond in the open steppe. The eastern lowlands are slightly richer in resident species than the western lowlands (59 vs. 53), primarily because numerous species of southern origin are restricted to the Columbia Basin.

The wet parts of the state are abundantly supplied with streams and rivers, although for the most part they are poor in odonate species, especially compared with similar environments at the same latitude in eastern North America. No species occurs on the larger, slower rivers. Many of the streams are swift, and low dragonfly diversity may be caused by periodic flooding and scouring in this rainy climate. A few streams and small rivers in areas of very low relief, for example the Black River in Thurston County, support an abundance of individuals if not species of lotic origin. Lotic

habitats east of the Cascades support a richer odonate fauna, perhaps because flooding is less common in this region of lower precipitation. Several species occur on large, slow rivers.

Both lowlands and mountains are abundantly supplied with lakes (7,938 listed in Wolcott 1973) and ponds. Lentic habitats include acidic bog ponds in both mountains and lowlands, with a characteristic boreal fauna; alkaline and highly productive lakes and ponds of the Columbia Basin with a fauna of southern affinities and the highest densities of Odonata that I have ever observed; and many water bodies of intermediate pH. The large natural lakes (e.g., Crescent, Chelan) are quite poor for Odonata, with no distinctive species, and the many reservoirs occupying dammed valleys are even poorer because of varying water levels. However, the shallow edges of the large man-made reservoirs of the Columbia Basin now support a diverse and abundant fauna.

ZOOGEOGRAPHY OF WASHINGTON ODONATA

The state falls within several biotic regions (Fig. 1): the Pacific Northwest Coast (the coastal lowlands, low Coast Range, and Puget Trough), the Great Basin (the Columbia Basin), and the Western Cordillera (all the state's mountain ranges) (Fig. 1).

Although the Northwest Coast, with its cool climate and wet summers, is far from optimal for Odonata, several species are endemic to the region: *Ischnura erratica*, *Tanypteryx hageni*, *Gomphus kurilis*, and *Octogomphus specularis*. Three of the four occur in the wet coastal belt, with only *T. hageni* restricted to higher elevations. *Cordulegaster dorsalis* probably had its origins in this region, although it ranges farther east than the other species. Of these species, all but the *Ischnura* are scarce, perhaps because so much of the region features summer weather that is marginal for adult odonate activity.

Numerous species that are restricted to but widespread throughout the West, in both wet and dry regions, are among the most common odonates in all lowland parts of Washington. Examples include *Amphiagrion abbreviatum*, *Ischnura cervula*, *I. perparva*, *Aeshna californica*, *A. multicolor*, *A. palmata*, *Erythemis collocata*, *Libellula forensis*, *Sympetrum madidum*, and *S. pallipes*. Other widespread western species are more characteristic of drier regions such as the Great Basin, are less numerous in the state, and occur primarily in the Columbia Basin. Examples include *Argia emma*, *A. vivida*, *Enallagma clausum*, *Macromia magnifica*, *Erpetogomphus compositus*, *Ophiogomphus occidentis*, *O. severus*, *Stylurus olivaceus*, and *Sympetrum occidentale*. Note most of the species in this group are stream species.

Many species of Odonata occur transcontinentally in North America. In Washington, these can be divided into three groups. One group is of more southerly distribution, widespread in the United States and extending slightly to substantially north into Canada. Species of this group (those asterisked are uncommon to rare west of the Cascades) include *Calopteryx aequabilis*, *Lestes congener*, *L. disjunctus*, *L. unguiculatus**, *Enallagma carunculatum*, *Aeshna constricta**, *A. umbrosa*, *Anax junius*, *Leucorrhinia intacta*, *Libellula julia*, *L. lydia*, *L. pulchella**, *Pachydiplax longipennis*, *Sympetrum corruptum*, *S. costiferum*, *S. vicinum*, and *Tramea lacerata**. Populations of *A. junius*, *S. corruptum*, and *T. lacerata* may be at least partially migratory in the state.

Other species, although similarly widespread, seem of northern origin because they extend southward in the western United States mostly at higher elevations. Most species of this group are widespread in the state, some with substantial

elevation range, although only a few of them are at present known from the Blue Mountains. The group includes *Lestes dryas*, *Coenagrion resolutum*, *Enallagma boreale*, *E. cyathigerum*, *Nehalennia irene*, *Aeshna canadensis*, *A. eremita*, *A. interrupta*, *Cordulia shurtleffi*, *Epitheca spinigera*, *Leucorrhinia hudsonica*, *Libellula quadrimaculata*, *Sympetrum danae*, *S. internum*, and *S. obtrusum*. A few species are difficult to allocate between this group and the preceding one.

Finally, a group of distinctly northern origins occurs only in the Cascades and Northeast Highlands in Washington (the Blue Mountains lack high-elevation lakes, and the high elevations of the Olympic Mountains have never been sampled for dragonflies). This group includes *Aeshna juncea*, *A. sitchensis*, *Somatochlora albicincta*, *S. minor**, *S. semicircularis*, *S. walshii**, *Leucorrhinia glacialis**, and *L. proxima**. Asterisked (*) species are known from one locality each in the western lowlands, which is not surprising as all are known from Vancouver Island (Cannings and Stuart 1977). Of this group, *A. sitchensis* is the most restricted species, and its presence at high-elevation lakes in two counties prompts the expectation that other boreal species may yet be found in the state. In fact, two (*Aeshna subarctica*, *Leucorrhinia borealis*) occur in British Columbia within 50 km of the border (Cannings and Stuart 1977, R. and S. Cannings, Pers. Comm.).

One anomalous group can be considered of eastern origin. Its species are all uncommon and local in Washington and generally uncommon in the West in comparison with their common and widespread occurrence in eastern North America. This group includes *Enallagma ebrium*, *Aeshna tuberculifera*, *Gomphus graslinellus*, and *Epitheca canis*.

Several species are even more difficult to categorize. *Gomphus lynnae* is a Northwest endemic, known so far from only south-central Washington and north-central Oregon. *Sympetrum illotum* is an anomaly, and is almost restricted to the Pacific coastal area north of Mexico but then spreads south throughout the length of the main Cordillera of North and South America. *Pantala flavescens* is surely only a migrant from farther south, with no breeding population in the state; this may also be true for *P. hymenaea*.

A few species seem especially widely distributed and are common from Columbia Basin marshes to

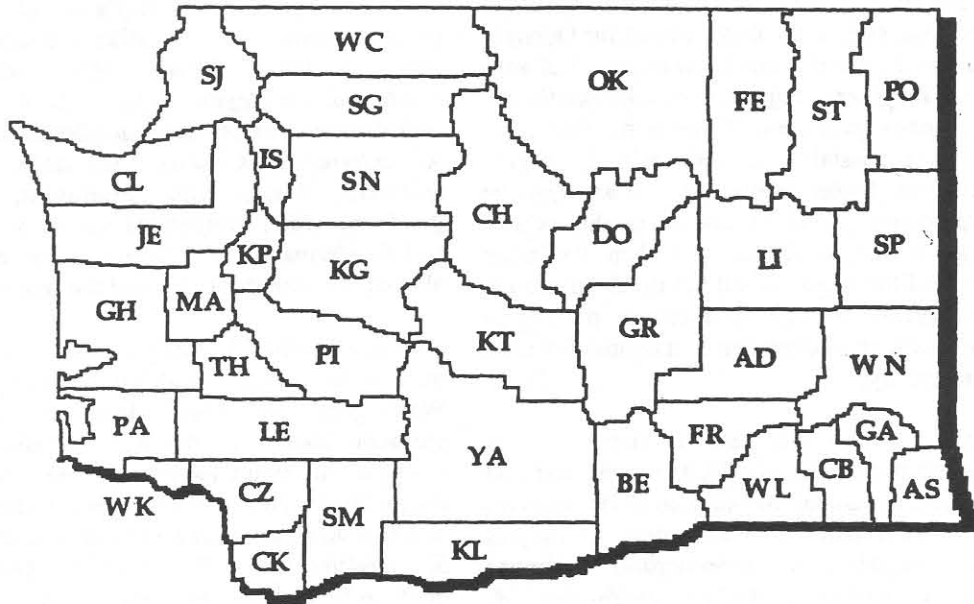


Fig. 2 Washington Counties

Adams AD	Douglas DO	King KG	Pacific PA	Stevens ST
Asotin AS	Ferry FE	Kitsap KP	Pend Oreille PO	Thurston TH
Benton BE	Franklin FR	Kittitas KT	Pierce PI	Wahkiakum WK
Chelan CH	Garfield GA	Klickitat KL	San Juan SJ	Walla Walla WL
Clallam CL	Grant GR	Lewis LE	Skagit SG	Whatcom WC
Clark CK	Grays Harbor GH	Lincoln LI	Skamania SM	Whitman WN
Columbia CB	Island IS	Mason MA	Snohomish SN	Yakima YA
Cowlitz CZ	Jefferson JE	Okanogan OK	Spokane SP	

alpine lakes: *Lestes congener*, *L. disjunctus*, *Enallagma boreale*, *Aeshna interrupta*, *A. palmata*, and *Sympetrum danae*.

One of the most distinctive features of the fauna is its paucity in comparison with areas at the same latitude in eastern North America. For example, 175 species are known to occur in New York (Donnelly 1992), over twice as many as in Washington. There have always, even during glacial periods, been habitat corridors between eastern North America and Mexico, so populations of dragonflies could move southward and northward with glacial advance and retreat. The aridity of the West could have acted as a barrier to such movements, reducing a fauna endemic to the wet Northwest to a few relict species such as *Tanypteryx hageni*. On the other hand, the freshwater fish fauna of the coastal Pacific Northwest comprises primarily stream species (many of them anadromous), and the endemic amphibians are primarily associated with streams, so the region may never have supported a rich fauna

of pond species. At present it appears that the dragonflies west of the Cascades include a depauperate stream fauna and a pond fauna made up of later immigrants from farther south and east.

DISTRIBUTION WITHIN THE STATE

Distributions are shown on county outline maps (see Fig. 2 for county names), and county records are listed by their two-letter codes. Easily recognized species have been recorded from some counties by my sight records only; these are on file. There are 50 such records, representing 4.6% of a total of 1101 county records. Otherwise, all records are based on specimens examined or literature records. Some distributions are further explained under the species accounts.

There is still much to be learned about the distribution of many species. Only a single species, *Ischnura cervula*, has been recorded from every county, while there is a good chance that about 25 species in fact occur in every county. While the outline of distribution is known fairly well, there

species recorded from each county increased from 21.3 to 28.3 (of 75), while the average number of counties from which each species has been recorded increased from 11.1 to 14.7 (of 39).

The lowlands west of Cascades are considered "western lowlands", those east of Cascades "eastern lowlands"; "throughout lowlands" refers to both sides of state. "Wooded lowlands" indicates forested parts of the state east of the Cascades crest from about 2000-3000 ft. in elevation. The "Columbia Basin" is the unwooded, central part of the state from about 700-2000 ft. in elevation. "Mountains" are more than 3000 ft. in elevation and are divided into Olympics, Cascades (a north-south range that splits the state into western and eastern portions), Northeast (including Okanogan Highlands, Selkirk range, and others), and Blue Mountains. County distributions are current through 1996.

County records (Fig. 2) are listed for each species in progression from northwest to southeast across the state. The abbreviations are here listed alphabetically: AD - Adams, AS - Asotin, BE - Benton, CB - Columbia, CH - Chelan, CK - Clark, CL - Clallam, CZ - Cowlitz, DO - Douglas, FE - Ferry, FR - Franklin, GA - Garfield, GH - Grays Harbor, GR - Grant, IS - Island, JE - Jefferson, KG - King, KL - Klickitat, KP - Kitsap, KT - Kittitas, LE - Lewis, LI - Lincoln, MA - Mason, OK - Okanogan, PA - Pacific, PI - Pierce, PO - Pend Oreille, SG - Skagit, SJ - San Juan, SM - Skamania, SN - Snohomish, SP - Spokane, ST - Stevens, TH - Thurston, WC - Whatcom, WK - Wahkiakum, WL - Walla Walla, WN - Whitman, YA - Yakima.

FLIGHT SEASONS

The dates shown are the earliest and latest on record; it must be borne in mind that flight seasons vary from year to year, and the most common species are the best documented. The earliest date may have been associated with a year with an especially warm or early spring and the latest date with a different year, for example with an especially warm fall or late onset of winter. Nevertheless, a large number of the extreme dates are associated with recent thorough field work. The average length of the flight season for all species combined was extended by 15 days from field work in 1995 and 1996. Extreme flight dates are current through 1996.

ZYGOPTERA

CALOPTERYGIDAE

Calopteryx aequabilis Say. 9 Jun-2 Sep. GH, KG, PI, TH, LE, YA, KL, GR, BE, ST, WL, CB. Locally common in lowlands up to 2200 ft., mostly southern part of state, much more common east. Small rivers and streams with abundant rootlets projecting into water. The northernmost population at Camas Creek, Stevens County, is in a rather cooler environment than the others. Washington populations were recognized by Kennedy (1915) as a distinct subspecies (*C. a. yakima* Hagen), but I feel a more complete study of geographic variation in this species is needed before the formal recognition of subspecies is justified.

LESTIDAE

Archilestes californica McLachlan. 23 Jul-22 Oct. CK, KT, YA, GR, AD, WN. Locally common in eastern lowlands (700-1900 ft.), also one locality west (Amboy, Clark County). Slow streams, in open country but bordered by willows, and some lakes associated with these streams.

Lestes congener Hagen. 4 Jul-15 Nov. CL, GH, SJ, SP, MA, WC, SG, SN, KG, PI, TH, LE, CZ, CK, SM, OK, KT, YA, DO, GR, BE, ST, PO, LI, SP, AD, WN, FR, AS. Common throughout lowlands and to 5800 ft. in mountains. Ponds and lakes, often larger water bodies than inhabited by others of genus. This is the last zygopteran species to fly in the autumn.

Lestes disjunctus Selys. 26 Jun-21 Oct. GH, SJ, KP, MA, WC, SG, SN, KG, PI, TH, LE, CZ, CK, SM, OK, CH, KT, YA, KL, GR, FE, ST, PO, SP, WN, CB, AS. Common throughout lowlands and to 5800 ft. in mountains. Ponds and lakes.

Lestes dryas Kirby. 4 Jun-12 Sep. SJ, KG, PI, LE, SM, OK, CH, KT, YA, DO, GR, ST, PO, SP. Locally distributed throughout lowlands but more common in mountains, up to 5800 ft. Ponds, often temporary, with dense marsh vegetation.

Lestes forcipatus Rambur (?). Two females from 2.7 mi W Amboy, Clark County, are tentatively assigned to this species, not otherwise reported west of eastern Montana (Bick and Hornuff 1974). They were collected on 10 August 1974 but not recognized as distinct until 1996. They are identical structurally to specimens of *forcipatus*

from eastern North America but are a bit more heavily marked. Collection of males will be necessary to confirm the identity.

Lestes unguiculatus Hagen. 8 Jun-14 Sep. SG, PI, CK, OK, CH, KT, YA, KL, DO, GR, PO, SP, GA, AS. Common in eastern lowlands, rarely in mountains up to 6500 ft., local west. Ponds, often temporary, with dense marsh vegetation.

COENAGRIONIDAE

Amphiagrion abbreviatum (Selys). 28 Apr-22 Sep. CL, JE, MA, WC, SN, KG, PI, LE, SM, OK, CH, KT, YA, KL, DO, GR, BE, FE, ST, PO, SP, AD, WN, FR, CB, GA, AS. In small numbers throughout lowlands and to 3700 ft. in mountains. Marshy ponds, sloughs and edge of slow streams, typically in dense sedges.

Argia emma Kennedy. 8 Jun-7 Sep. OK, YA, KL, DO, GR, BE, ST, SP, AD, WN, FR, WL, CB, GA, AS. Common in eastern lowlands (1000-2200 ft.); probably occurs on Fraser River drainage in northern Whatcom County, as common just across the border in British Columbia (Walker and Ricker 1938). Rivers and streams, with or without rocks.

Argia vivida Hagen. 17 Mar-22 Oct. PI, OK, CH, KT, YA, KL, DO, GR, BE, SP, AD, WN, FR, WL, CB, GA, AS. Common throughout eastern lowlands (700-2100 ft.); one record from west side of Cascades southeast of Greenwater, Pierce County, at 2800 ft. Springs, seeps, and streams, typically smaller and with more vegetation than those preferred by *A. emma*.

Coenagrion resolutum (Selys). 9 Jun-12 Aug. OK, CH, KT, YA, ST, PO. Cascades and Northeast Highlands (2000-5700 ft.). Dense sedge marshes.

Enallagma boreale Selys. 15 Apr-22 Oct. CL, JE, SJ, KP, MA, WC, SG, SN, KG, PI, TH, CZ, CK, SM, OK, CH, KT, YA, KL, DO, GR, BE, FE, ST, PO, LI, SP, AD, WN, CB, AS. Common from alkaline ponds in Columbia Basin steppe to boreal lakes in mountains to 5800 ft.; much less common around Blue Mountains and in western lowlands. Ponds and lakes, usually with marsh vegetation. This is the most abundant odonate in some parts of the state, emerging by the tens of thousands from eutrophic ponds in the Columbia Basin. It is found with *E. cyathigerum* at many localities, but only one species occurs at many others. It is apparently

lacking from the slow streams where *cyathigerum* is common.

Enallagma carunculatum Morse. 5 May-18 Oct. CL, GH, PA, SJ, IS, KP, MA, WC, SG, SN, KG, PI, TH, LE, WK, CZ, CK, OK, CH, KT, YA, KL, DO, GR, BE, FE, ST, LI, SP, AD, WN, FR, WL, CB, GA, AS. Common throughout lowlands to 2300 ft. Ponds and lakes, usually with marsh vegetation; often abundant at large lakes with beds of cattails and tules, habitats shunned by *E. boreale* and *E. cyathigerum*.

Enallagma clausum Morse. 10 Jun-19 Sep. YA, GR, WN. Very local in Columbia Basin. Appears to be limited to alkaline ponds and lakes. Especially abundant at Soap Lake, Grant County (1000 ft.).

Enallagma cyathigerum (Charpentier). 5 May-14 Oct. CL, JE, GH, PA, SJ, IS, KP, MA, WC, SG, SN, KG, PI, TH, LE, CZ, CK, OK, CH, KT, YA, KL, DO, BE, FE, ST, PO, SP, WN, WL, CB, GA, AS. Common throughout lowlands, except center of Columbia Basin, and in mountains to 4200 ft. It is less common than *E. boreale* east of the Cascades and more common in the western lowlands. Ponds, lakes, and slow streams.

Enallagma ebrium (Hagen). 20 Jun-28 Sep. OK, FE, ST, PO, SP. Locally common in lowlands and mountains (1100-3400 ft.) in northern tier of counties east of Cascades. Ponds, typically with *E. boreale* and *E. cyathigerum*.

Ischnura cervula Selys. 29 Apr-26 Oct. All counties. Common throughout lowlands and in mountains to 5800 ft.; the most ubiquitous odonate in the state. Marshy edges of lakes, ponds and slow streams, the only species typically found in the middle of dense cattail and bulrush beds. It is easily established in small city ponds.

Ischnura erratica Calvert. 21 Apr-15 Sep. CL, GH, PA, KP, MA, WC, SN, KG, PI, TH, LE, CZ, CK, SM, KT, YA. Locally common in western lowlands, also local on east side of Cascades to 3700 ft. Ponds, especially beaver ponds. This is primarily a spring species, with very few records after July.

Ischnura perparva Selys. 4 May-21 Oct. CL, JE, GH, SJ, IS, KP, MA, WC, SG, SN, KG, PI, TH, LE, WK, CZ, CK, SM, OK, CH, KT, YA, KL, DO, GR, BE, FE, ST, PO, LI, SP, AD, WN, FR, WL,

CB, GA, AS. Common throughout lowlands and in mountains to 5800 ft., but often less so than *I. cervula*. Marshy edge of lakes, ponds and slow streams, much more common in latter than *I. cervula*.

Nehalennia irene (Hagen). 17 Jun-7 Aug. OK, CH, ST, PO. Cascades and Northeast Highlands (2000-4200 ft.). Dense sedge marshes.

ANISOPTERA

PETALURIDAE

Tanypteryx hageni (Selys). 15 Jun-4 Sep. CL, JE, MA, WC, SN, KG, PI, CH. Olympic and Cascades mountains (2500-5200 ft.). Seeps on hillsides, larvae in burrows.

AESHNIDAE

Aeshna californica Calvert. 1 Apr-20 Aug. CL, GH, PA, SJ, IS, KP, MA, WC, SG, SN, KG, PI, TH, LE, WK, CZ, CK, SM, OK, CH, KT, YA, DO, GR, BE, FE, ST, PO, LI, SP, AD, WN, FR, WL, CB. Common throughout lowlands and to 5800 ft. in mountains. Ponds and lakes. *A. californica* is typically the first dragonfly to fly in spring.

Aeshna canadensis Walker. 19 Jul-12 Oct. SJ, MA, WC, SG, SN, KG, FE, ST, PO. Local throughout lowlands of northern half of state and to 3400 ft. in mountains. Ponds and lakes.

Aeshna constricta Say. 9 Jul-28 Sep. TH, CK, OK, YA, KL, DO, SP, WN. Locally common in eastern lowlands (1000-2200 ft.), two records west. Ponds, including temporary ones smaller than those frequented by other *Aeshna*.

Aeshna eremita Scudder. 8 Jul-8 Oct. JE, KP, WC, SN, KG, ST, PO. Local throughout lowlands of northern half of state and to 4200 ft. in mountains. Lakes.

Aeshna interrupta Walker. 3 Jul-20 Oct. CL, IS, KP, MA, WC, SG, SN, KG, CZ, SM, OK, CH, KT, YA, KL, DO, GR, FE, ST, PO, SP, WN, AS. Common throughout eastern lowlands, locally common in western lowlands and to 6000 ft. in mountains. Ponds and lakes, also common away from water. West of the Cascades, most specimens have interrupted lateral stripes, corresponding to *A. i. interrupta*; east of the Cascades, most have narrow, continuous stripes, corresponding to *A. i.*

interna Walker. However, at several localities where I have found the species common in and west of the Cascades, specimens show the complete variation between these two types, and I hesitate in giving them formal recognition.

Aeshna juncea (Linnaeus). 12 Jul-8 Oct. WC, SG, KI, PI, CZ, SM, OK, CH, KT, YA, PO. Cascades and mountains to east (2200-5800 ft.). Ponds and small lakes.

Aeshna multicolor Hagen. 15 May-23 Oct. JE, GH, SJ, IS, KP, MA, WC, SG, SN, KI, PI, TH, LE, CK, OK, YA, DO, GR, BE, LI, SP, AD, WN, FR, WL, CB, GA, AS. Common throughout lowlands and to 4200 ft. in mountains. Ponds and lakes, also common away from water.

Aeshna palmata Hagen. 11 Jul-1 Nov. CL, JE, GH, PA, SJ, IS, KP, MA, WC, SG, SN, KG, PI, TH, LE, CZ, CK, SM, OK, CH, KT, YA, KL, DO, GR, FE, ST, PO, LI, SP, WN, WL, CB. Common throughout lowlands and to 5800 ft. in mountains. Ponds and lakes, also common away from water.

Aeshna sitchensis Hagen. 7 Aug-9 Sep. Known so far only from Long Swamp, 6000 ft., and Roger Lake, 5800 ft., in Okanogan County, and Bunchgrass Meadows, 5000 ft., in Pend Oreille County. Sedge meadows (fens).

Aeshna tuberculifera Walker. 22 Jul-1 Sep. Known from two localities (Long Marsh, Mason County; McLane Creek, near Tumwater, Thurston County) in western lowlands and two localities (Hande Creek, 3300 ft., and Twin Lakes, 3700 ft., in Stevens County) in Northeast Highlands. Ponds and lakes, apparently associated with bog conditions.

Aeshna umbrosa Walker. 17 Jun-14 Nov. CL, GH, PA, SJ, IS, KP, MA, WC, SG, SN, KG, PI, TH, CZ, CK, SM, CH, KT, YA, KL, GR, BE, ST, PO, LI, SP, WN, WL. Common throughout lowlands and to 4100 ft. in mountains. Ponds, lakes and slow streams. Along with *Sympetrum vicinum*, this is the last anisopteran of the autumn.

Anax junius (Drury). 29 May-26 Oct. GH, SJ, IS, KP, MA, WC, SG, SN, KG, PI, TH, CZ, CK, SM, OK, KT, YA, KL, GR, BE, SP, AD, FR, WL, CB, AS. Fairly common throughout lowlands and to 3500 ft. in mountains. Ponds, lakes and slow streams. At least some populations appear to follow the seasonal strategy described from eastern North

America (Walker 1958), with spring immigrants from the south and fall emigration of their offspring back to the south (poorly documented in this region, however).

GOMPHIDAE

Erpetogomphus compositus Hagen. 3-17 Aug. GR, BE. Local in southern part of Columbia Basin (1000 ft.); known only from Crab Creek, Grant County, and the Yakima River, Benton County. Streams and rivers.

Gomphus graslinellus Walsh. 19 Jun-8 Jul. ST, SP. So far known only from northeast corner (2200-3300 ft.), but probably more widespread. Lakes and streams.

Gomphus kurilis Hagen. 2-14 Jul. Known from old collections from Seattle, King County, 14 July 1901 (Osburn 1905) and 2 July 1933 (DRP collection, formerly in Burke Museum, University of Washington). This species has not been found in the last three decades with considerable search, but it seems unlikely to be extirpated from state. In streams in Oregon and California.

Gomphus lynnae Paulson. 2 Jun-18 Aug. Fairly common at the Yakima River Horn, north of Benton City, Benton County (1000 ft.), and probably more widespread. The river is open, shallow, and muddy, with occasional gravelly rapids.

Octogomphus specularis (Hagen). 7 Jul-7 Aug. GH, MA, TH. Locally distributed in western lowlands to 300 ft., known from few localities but surely more widespread. Wooded streams and small rivers.

Ophiogomphus occidentis Hagen. 24 May-17 Aug. GH, KG, OK, YA, GR, BE, PO, SP, WN, GA. Throughout eastern lowlands and to 4000 ft. in mountains but known only from Chehalis River, Grays Harbor County, west except for a 1901 record from Seattle, King County (Osburn 1905). Streams and rivers.

Ophiogomphus severus Hagen. 8 Jun-24 Aug. GH, TH, YA, GR, ST, WL. Throughout eastern lowlands and to 3300 ft. in mountains but known only from Chehalis River drainage in Thurston and Grays Harbor counties west. Columbia Basin specimens are paler ("*O. s. severus*") than those from wetter parts of the state ("*O. s. montanus*"). Streams and rivers.

Stylurus olivaceus (Selys). [*Gomphus olivaceus*] 8 Jul-23 Sep. YA, GR, BE, WN. Columbia Basin (1000-2500 ft.). Sandy streams and rivers. There is also an old record from Seattle, based on exuviae and originally considered *Gomphus sobrinus* (= *G. kurilis*) (Needham 1904), then reidentified as "near" *S. olivaceus* (Kennedy 1917). The record needs confirmation, as the species seems unlikely to occur west of the Cascades.

CORDULEGASTRIDAE

Cordulegaster dorsalis Hagen. 2 Jul-29 Aug. KG, LE, SM, KL, AS. Local and mostly uncommon in western lowlands to 2000 ft., also from southeast slope of Cascades and Grande Ronde River drainage below Blue Mountains in Asotin County; surely more widespread. Small streams.

MACROMIIDAE

Macromia magnifica McLachlan. 20 Jun-24 Aug. KG, YA, GR, BE, PO, SP, AD, WL. Locally common throughout eastern lowlands (1000-2300 ft.). Sandy streams and rivers. Darker individuals, previously called *Macromia rickeri*, are common just over the border at Cultus Lake, British Columbia (Walker and Ricker 1938), and probably occur in western Washington; an old specimen from Seattle (Kennedy 1915) has not been located.

CORDULIIDAE

Cordulia shurtleffi Scudder. 22 May-9 Sep. MA, WC, SG, SN, KG, PI, TH, CK, SM, OK, KT, YA, ST, PO, SP. Locally common throughout wooded lowlands and to 5800 ft. in mountains; absent from Columbia Basin and not known from Blue Mountains. Ponds and lakes.

Epithecica canis (McLachlan). 5 May-21 Jul. GH, WC, KG, TH. Few known sites in western lowlands, larvae and exuviae more commonly found than adults. Larvae in ponds in stream drainages, males seen in patrol flight over long pools in slow-flowing Black River, Thurston County.

Epithecica spinigera (Selys). [*Tetragoneuria spinigera*] 10 May-21 Jul. PA, MA, WC, SG, KG, TH, CK, OK, FE, ST, PO, SP, FR. Locally common in forested lowlands and up to 4200 ft. in mountains. The species is not known from the Blue Mountains, but one specimen was taken over sagebrush in the southeastern part of the Columbia

Basin. Ponds and lakes, mostly seen away from water.

Somatochlora albicincta (Burmeister). 21 Jul-8 Oct. JE, WC, SG, SN, KG, PI, LE, CZ, SM, OK, CH, KT, YA. Olympic and Cascades mountains, 2200-5800 ft. elevation; a single lowland (700 ft.) locality west, at Cedar Ponds Lake, Snohomish County. Ponds and lakes, males more commonly over open water than other *Somatochlora*. The lowland specimen has a HW length of 34 mm, while all other males vary from 30-32.5 mm, mean 31.1, N=27. Most specimens from the state are of a size typical of the species, while that from Cedar Ponds Lake is similar in size to the population of larger individuals that characterizes the Pacific region of British Columbia (Walker and Corbet 1975).

Somatochlora minor Calvert. 8 Jul-13 Aug. KG, ST, PO. Northeast Highlands (3300-5000 ft.) and, surprisingly, one western lowland (600 ft.) locality, on Stossel Creek, King County. Small slow-flowing streams through sedge meadows, in or away from forest. Specimens from the King County population (HW mean 33.8, range 33.5-34, Abd. mean 34.7, range 34-36, N=3) are considerably larger than those from the interior (HW mean 30.7, range 29-32, N=13; Abd. mean 31.3, range 29-32.5, N=6), paralleling the situation in *S. albicincta*.

Somatochlora semicircularis (Selys). 3 Jun-15 Oct. GH, WC, SG, KG, PI, LE, CZ, SM, OK, CH, KT, YA, FE, ST, PO. Throughout mountains (1700-5800 ft.) except Blue Mountains; one specimen found floating in Grays Harbor at sea level. Bogs and fens.

Somatochlora walshii (Scudder). 8 Jul-2 Sep. KG, CZ, SM, KT, ST. Local in Northeast Highlands and Cascades (2500-3500 ft.), one lowland (600 ft.) locality west, on Langendorfer Lake, King County. Open sedge meadows, typically with small streams flowing through them; females have been found on streams through forest. As in the other two *Somatochlora* species with lowland populations, the lowland specimens are larger (King County HW 31, 33, Abd. 32.5; mountain HW 29, 30, 30.5, Abd. 29.5, 30).

LIBELLULIDAE

Erythemis collocata (Hagen). 19 May-19 Sep. SJ, MA, SG, KG, PI, TH, WK, CK, SM, OK, YA, KL, DO, GR, BE, SP, AD, FR, WL, CB, AS. Common

in eastern lowlands up to 2200 ft., more local but widespread west. Ponds and marshy lake borders.

Leucorrhinia glacialis Hagen. 9 Jun-12 Aug. MA, OK, KT, PO. Locally common in northern Cascades and Northeast Highlands up to 5800 ft. and, surprisingly, one lowland (300 ft.) record west, at Howell Lake, Mason County. Ponds and lake borders with dense emergent vegetation.

Leucorrhinia hudsonica (Selys). 24 May-8 Oct. CL, MA, WC, SN, KG, PI, LE, SM, OK, CH, KT, YA, FE, ST, PO, SP. Locally common in wooded lowlands and up to 6600 ft. in mountains. Ponds and bogs with dense emergent vegetation.

Leucorrhinia intacta (Hagen). 22 May-18 Aug. KP, MA, WC, SG, SN, KG, PI, TH, LE, CZ, CK, OK, KT, YA, KL, DO, GR, FE, ST, PO, SP. Common throughout lowlands and up to 4200 ft. in mountains; not known from Blue Mountains. Ponds and lake edges.

Leucorrhinia proxima Calvert. 17 Jun-9 Sep. KG, OK, FE, ST, PO. Northeast corner of state (2200-5800 ft.) and, surprisingly, one lowland (600 ft.) locality west, at Langendorfer Lake, King County. Ponds and lake borders with abundant emergent vegetation; habitat preference seems identical to that of the similar *L. glacialis*.

Libellula forensis Hagen. 28 Apr-25 Sep. JE, GH, PA, SJ, IS, KP, MA, WC, SG, SN, KG, PI, TH, LE, WK, CZ, CK, OK, KT, YA, KL, DO, GR, BE, FE, ST, PO, LI, SP, AD, WN, FR, WL, CB, GA, AS. Common throughout lowlands to 2300 ft. Ponds and lakes of most kinds.

Libellula julia Uhler. [*Ladona julia*] 28 May-15 Aug. KP, MA, WC, SN, KG, PI, TH, ST, PO, SP. Locally common throughout wooded lowlands north and west and up to 3400 ft. in mountains. Lakes, ponds, and bogs.

Libellula luctuosa Burmeister. 31 Aug-8 Sep, but doubtless much more extended. First seen at Lacamas Lake, Clark County, 31 August 1996, specimen collected there 1 September by Jim Johnson. These and others seen there and at nearby Ridgefield National Wildlife Refuge are the only records from the state, and perhaps the species is a relatively new arrival from the Willamette Valley of Oregon.

Libellula lydia Drury. 6 May-2 Oct. CL, JE, GH, KP, MA, SG, SN, KG, PI, TH, WK, CK, SM, OK, KT, YA, KL, GR, ST, PO, SP, AD, WN, FR, WL, CB, GA, AS. Common throughout lowlands and up to 3400 ft. in mountains. Lakes and ponds, ubiquitous.

Libellula pulchella Drury. 6 May-17 Sep. SN, TH, CK, OK, CH, YA, DO, GR, BE, FE, PO, SP, AD, WN, FR, WL, CB, AS. Common throughout eastern lowlands and up to 3400 ft. in mountains; few records west (including sight record from Snohomish County) but not in established populations. Ponds and lakes.

Libellula quadrimaculata Linnaeus. 4 May-28 Sep. JE, GH, PA, SJ, IS, KP, MA, WC, SG, SN, KG, PI, TH, LE, CZ, CK, SM, OK, KT, YA, GR, BE, FE, ST, PO, SP, CB. Common throughout lowlands and up to 4200 ft. in mountains. Ponds and lakes, typically with abundant emergent vegetation.

Pachydiplax longipennis (Burmeister). 13 Jun-22 Sep. MA, SG, SN, KG, PI, TH, WK, CZ, CK, YA, GR, BE, SP, AD, FR, WL, CB. Locally common in lowlands to 2200 ft., more common in southern part of state. Ponds and lakes with abundant emergent vegetation.

Pantala flavescens (Fabricius). Vagrant, with a single close-range sight record at Potholes Reservoir, Grant County, 21 June 1992.

Pantala hymenaea (Say). 21 Jun-3 Sep. GH, SN, KG, PI, GR, BE; specimens only from last county. Rare but seen regularly and possibly has bred in Benton County in the southern Columbia Basin (1000 ft.); occasional fall visitor west, especially along coast.

Sympetrum corruptum (Hagen). 17 May-3 Nov. GH, IS, MA, WC, SG, SN, KG, PI, CK, SM, OK, YA, KL, DO, GR, BE, ST, PO, LI, SP, AD, FR, WL, AS. Common throughout lowlands (to 2200 ft.), not seen breeding in mountains (but common in July at Bumping Lake, Yakima County, at 3300 ft. [Kennedy 1913]); in migration to 5800 ft. Breeds at open ponds and lakes, typically rather eutrophic ones. The species may be seen anywhere, especially along the coast, during infrequently observed mass movements in August and September.

Sympetrum costiferum (Hagen). 21 Jun-8 Nov. IS, KP, MA, WC, SG, SN, KG, CZ, OK, KT, YA, KL, DO, GR, PO, SP, AD, FR, CB. Common throughout lowlands and up to 5800 ft. in mountains. Open ponds and lakes. *S. costiferum* is as common as *S. vicinum* late in the season but disappears slightly earlier.

Sympetrum danae (Sulzer). 11 Jul-26 Oct. KG, CZ, OK, KT, YA, GR, PO, SP. Locally common in eastern lowlands and up to 5800 ft. in mountains. Ponds and lakes with emergent vegetation.

Sympetrum illotum (Hagen). 24 May-2 Oct. JE, GH, PA, SJ, IS, KP, MA, WC, SG, SN, KG, PI, TH, LE, CK, YA, KL, WL, CB. Common throughout western lowlands and local on south edge of state on east side of Cascades and up to 2300 ft. on lower slopes of Blue Mountains. Ponds and lakes. It is common in spring, mostly disappears by late August, then reappears, presumably as a small emergence of a second brood, in September.

Sympetrum internum Montgomery. 4 Jul-29 Sep. WC, SN, OK, CH, KT, YA, DO, GR, FE, LI, SP. Locally common in eastern lowlands and sparingly higher (1000-5800 ft.); few records west may be of wandering individuals. Ponds and lakes with associated meadows.

Sympetrum madidum (Hagen). 5 Jun-1 Sep. GH, SJ, MA, SG, SN, KG, TH, OK, YA, KL, DO, ST, SP. Local and uncommon throughout lowlands up to 2000 ft. Breeding habitat not known but may be slow streams; usually encountered away from water.

Sympetrum obtrusum (Hagen). 24 Jun-8 Oct. MA, WC, SG, SN, KG, CK, SM, OK, CH, KT, YA, DO, FE, ST, PO, LI, SP. Common throughout lowlands and up to 4200 ft. in mountains; not known from Blue Mountains. Ponds and lakes with associated meadows. *S. obtrusum* is more often found in forested areas than the very similar *S. internum*.

Sympetrum occidentale Bartenev. 18 Jun-14 Oct. WC, PI, CK, OK, KT, YA, DO, GR, BE, AD, FR, WL. Common throughout eastern lowlands, especially Columbia Basin, to 2500 ft.; three records west presumably of wandering individuals. Ponds and lakes, many individuals foraging and in tandem pairs far from water. All specimens from Washington are typical of the subspecies *S. o. occidentale*.

Sympetrum pallipes (Hagen). 3 Jul-2 Nov. All counties but WK, BE, AD, FR. Common throughout lowlands and up to 4000 ft. in mountains. Ponds and lakes with associated meadows.

Sympetrum vicinum (Hagen). 16 Jul-19 Nov. GH, KP, MA, WC, SG, SN, KG, PI, TH, CK, OK, KT, YA, SP, CB. Locally common in forested lowlands north and west and up to 2300 ft. at edge of Blue Mountains. Ponds and lakes with dense emergent vegetation. As elsewhere in its range, this is the latest-flying dragonfly in Washington.

Tramea lacerata Hagen. 21 Jun-19 Sep. GH, SJ, TH, CK, DO, GR, BE, SP, AD, FR, WL, GA, AS. Locally common in southeastern lowlands up to 2000 ft. There were two records of wandering individuals west of the Cascades before 1996, then an invasion in that year produced numerous sightings in Clark County (J. Johnson, Pers. Comm.) and two at one pond in Thurston County (specimens from both). Ponds and lakes.

ACKNOWLEDGMENTS

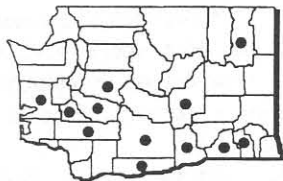
I would like to thank especially Lynn Erckmann, who helped me collect thousands of specimens during my first five years in the state; and David Nunnallee and Clifford Anderson, who rekindled my enthusiasm for this survey and furnished many significant recent records. I have been accompanied in the field and/or received specimens from many other people in addition, especially Don Frechin, Robert Furrer, Robert Gorton, Sue Hills, Molly Hukari, Janet Kime, Larry Little, Roger Long, Eileen O'Connor, Ian Paulsen, Elisabeth Schäublin, Netta Smith, Charles Turner, and Idie Ulsh.

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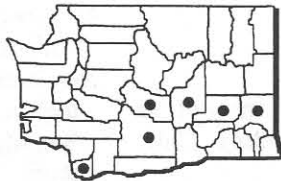
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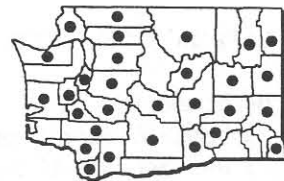
WASHINGTON ODONATA -- COUNTY RECORDS



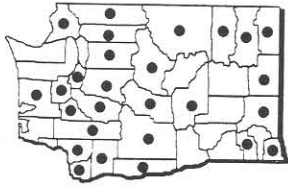
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River Jewelwing



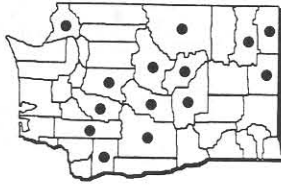
Archilestes californica
California Spreadwing



Lestes congener
Spotted Spreadwing



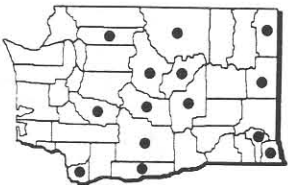
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Common Spreadwing



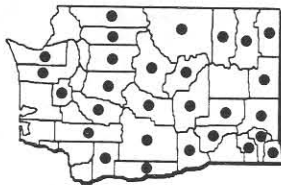
Lestes dryas
Emerald Spreadwing



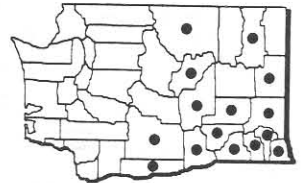
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Sweetflag Spreadwing



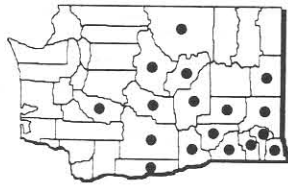
Lestes unguiculatus
Lyre-tipped Spreadwing



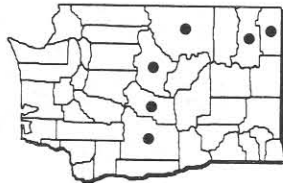
Amphiagrion abbreviatum
Western Red Damsel



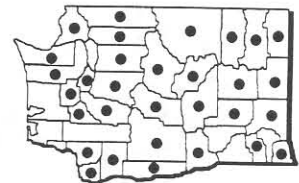
Argia emma
Emma's Dancer



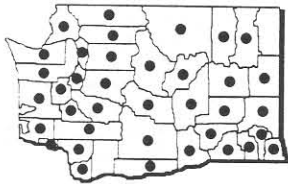
Argia vivida
Vivid Dancer



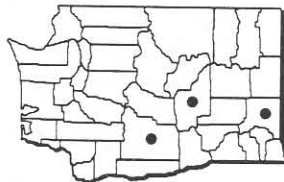
Coenagrion resolutum
Taiga Bluet



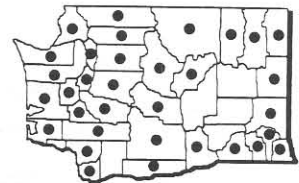
Enallagma boreale
Boreal Bluet



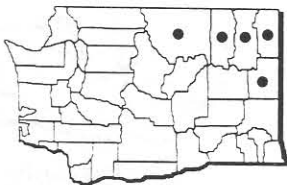
Enallagma carunculatum
Tule Bluet



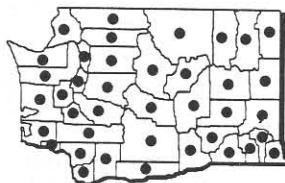
Enallagma clausum
Alkali Bluet



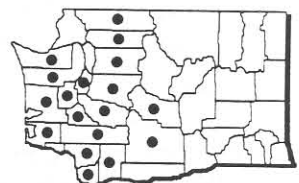
Enallagma cyathigerum
Northern Bluet



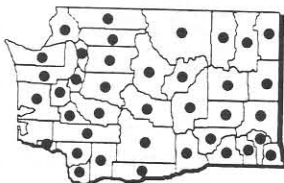
Enallagma ebrium
Marsh Bluet



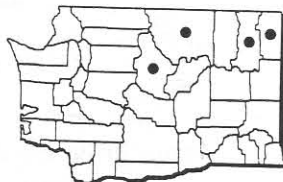
Ischnura ceroula
Pacific Forktail



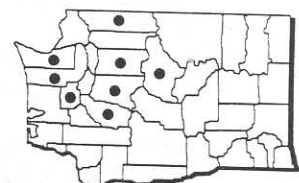
Ischnura erratica
Swift Forktail



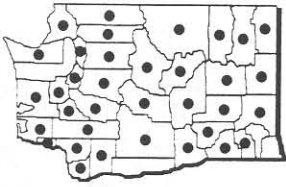
Ischnura perparva
Western Forktail



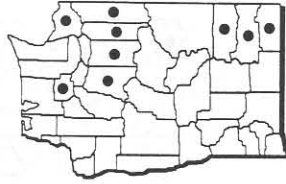
Nehalennia irene
Sedge Sprite



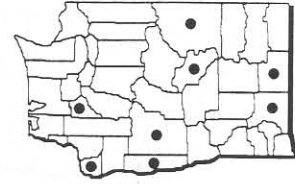
Tanypteryx hageni
Black Petaltail



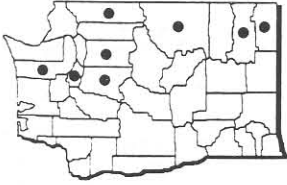
Aeshna californica
California Darner



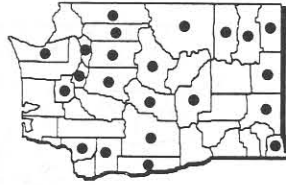
Aeshna canadensis
Canada Darner



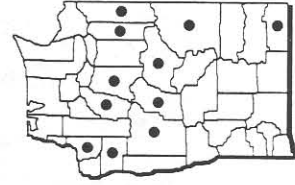
Aeshna constricta
Lance-tipped Darner



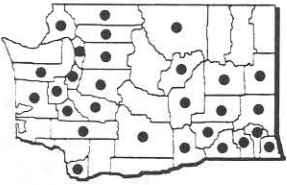
Aeshna eremita
Lake Darner



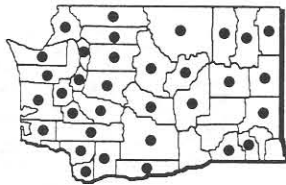
Aeshna interrupta
Variable Darner



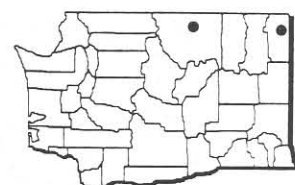
Aeshna juncea
Sedge Darner



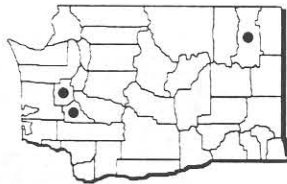
Aeshna multicolor
Blue-eyed Darner



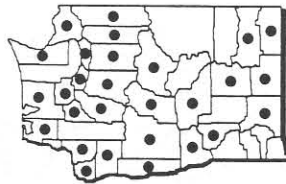
Aeshna palmata
Paddle-tailed Darner



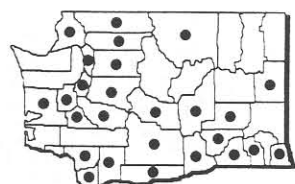
Aeshna sitchensis
Zigzag Darner



Aeshna tuberculifera
Black-tipped Darner



Aeshna umbrosa
Shadow Darner



Anax junius
Common Green Darner



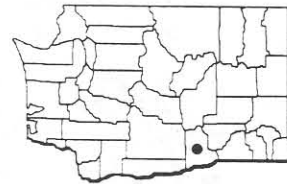
Erpetogomphus compositus
White-belted Ringtail



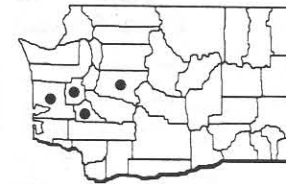
Gomphus graslinellus
Pronghorn Clubtail



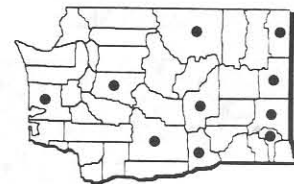
Gomphus kurilis
Pacific Clubtail



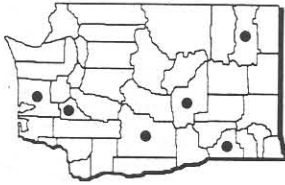
Gomphus lynnae
Columbia Clubtail



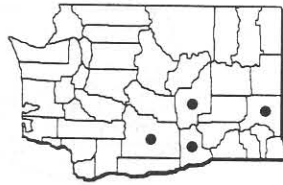
Octogomphus specularis
Grappletail



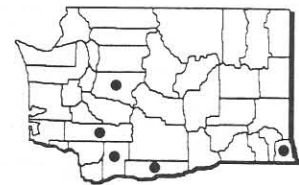
Ophiogomphus occidentis
Sinuous Snaketail



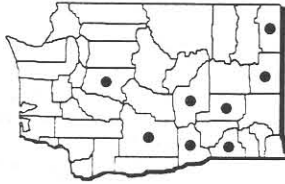
Ophiogomphus severus
Pale Snaketail



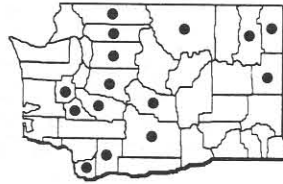
Stylurus olivaceus
Olive Clubtail



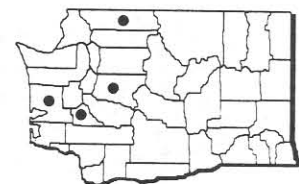
Cordulegaster dorsalis
Pacific Spiketail



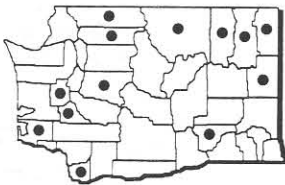
Macromia magnifica
Western River Cruiser



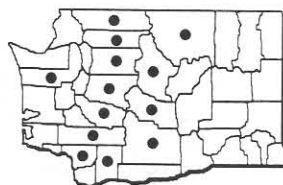
Cordulia shurtleffi
American Emerald



Epiptera canis
Beaverpond Baskettail



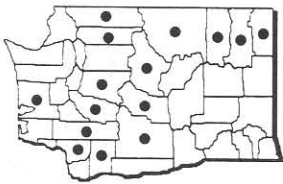
Epiptera spinigera
Spiny Baskettail



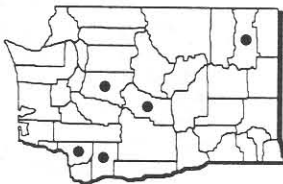
Somatochlora albicincta
Ringed Emerald



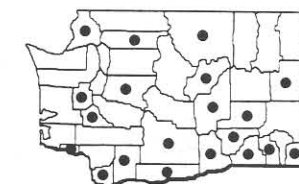
Somatochlora minor
Ocellated Emerald



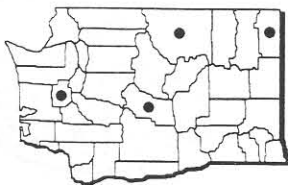
Somatochlora semicircularis
Mountain Emerald



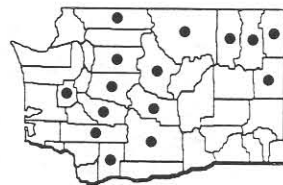
Somatochlora walshii
Brush-tipped Emerald



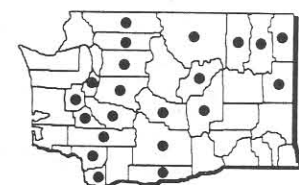
Erythemis collocata
Western Pondhawk



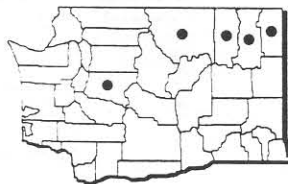
Leucorrhinia glacialis
Crimson-ringed Whiteface



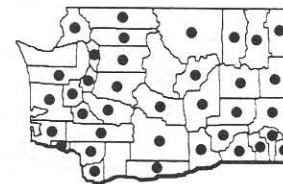
Leucorrhinia hudsonica
Hudsonian Whiteface



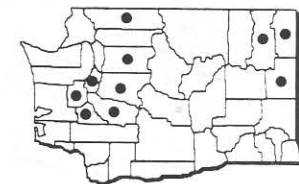
Leucorrhinia intacta
Dot-tailed Whiteface



Leucorrhinia proxima
Red-waisted Whiteface



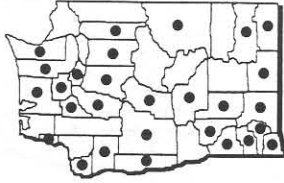
Libellula forensis
Eight-spotted Skimmer



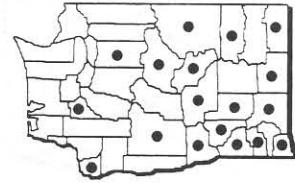
Libellula julia
Chalk-fronted Corporal



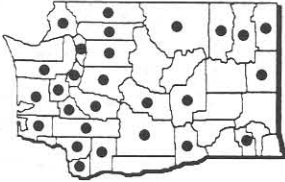
Libellula luctuosa
Widow Skimmer



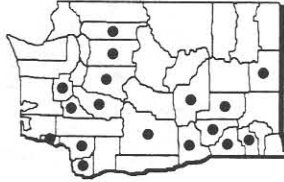
Libellula lydia
Common Whitetail



Libellula pulchella
Twelve-spotted Skimmer



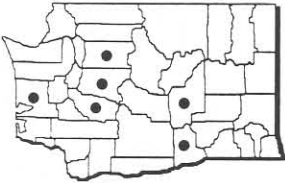
Libellula quadrimaculata
Four-spotted Skimmer



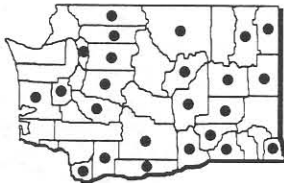
Pachydiplax longipennis
Blue Dasher



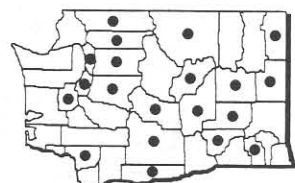
Pantala flavescens
Wandering Glider



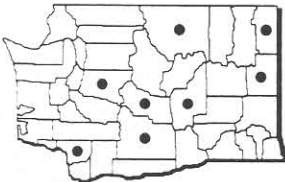
Pantala hymenaea
Spot-winged Glider



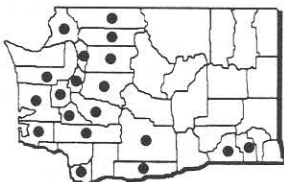
Sympetrum corruptum
Variegated Meadowhawk



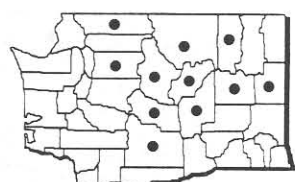
Sympetrum costiferum
Saffron-winged Meadowhawk



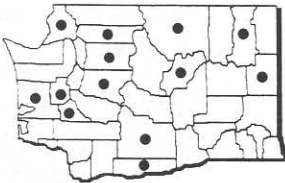
Sympetrum danae
Black Meadowhawk



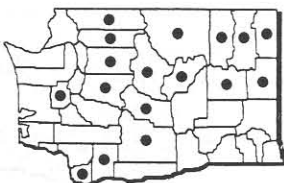
Sympetrum illotum
Cardinal Meadowhawk



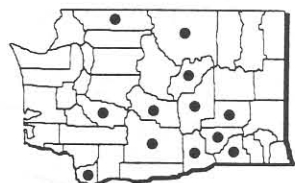
Sympetrum internum
Cherry-faced Meadowhawk



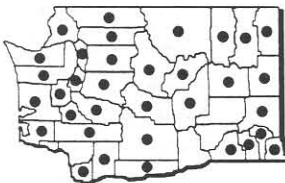
Sympetrum madidum
Red-veined Meadowhawk



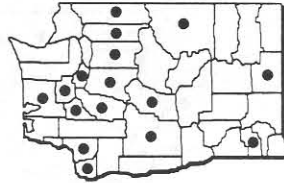
Sympetrum obtrusum
White-faced Meadowhawk



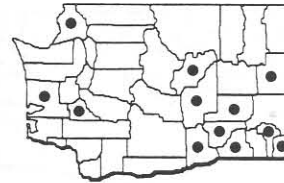
Sympetrum occidentale
Western Meadowhawk



Sympetrum pallipes
Striped Meadowhawk



Sympetrum vicinum
Yellow-legged Meadowhawk



Tramea lacerata
Black Saddlebags

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