**Systematic Review of the Dragonfly Fauna of Northern British Columbia**

These descriptions were produced as the appendix for the final report for the Habitat Conservation Trust Fund; a major funding agency for the project: “Dragonflies of Conservation Concern in Northern British Columbia”.

Descriptions are minimal and limited to information that helps separate species. A photograph of each species is included, except for *Somatochlora septentrionalis*, which we have not yet photographed.

Global range and distribution in British Columbia are summarized. Maps 1-4 show BC distribution based on the collections of the Royal BC Museum and Spencer Entomological Museum, University of BC. Map 1 is the basic distribution map. Map 2 separates records made before 1996 and those made from 1996 to 2004. This highlights the effectiveness of intensive surveys in improving our understanding of dragonfly distribution in BC. Map 3 shows species distribution and the relative abundance of collection records in each 1/50,000 NTS map sheet in BC. Map 4 shows the same, except the number of localities in each map sheet, rather than total specimen records, is shown. Each map also presents a histogram of collection records of adult dragonflies graphed in 10-day periods throughout the year. These represent the known flight period of the species.

The Biology Section contains other relevant information about the species, such as its abundance, preferred habitat and behaviour. Preferred habitats are outlined generally and some examples of typical site associations are given (MacKenzie and Moran 2004); see Appendix 5 for details. The flight period is an estimate of the length of time adults can be seen throughout BC, and is often longer than the flight period in any one location. This estimate is based on museum specimen records, reliable sight records, records from nearby states and provinces, and extrapolations from these records and other biological clues. The graphs on the species distribution maps give the flight period based only on specimen records.

For the nine species of conservation concern, a brief outline of management and protection considerations is given.

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**Appendix 3. Checklist of the Dragonflies of Northern British Columbia and their Faunal Elements.**

Sixty-four species are known from the region defined here as Northern British Columbia (north of latitude 52º) At least four additional species probably occur in the region; these are marked (*). The total of 68 species represents 78% of the provincial fauna. As of December 2004, nine of this total of 68 dragonfly species are considered rare and potentially threatened and are marked (**); see also Table 1 and Appendix 5. These species are tracked by the BC Conservation Data Centre. The first column lists the scientific name of the families and species, the second gives the English names, and the third indicates the faunal element of the species. The faunal elements, which categorize the species' range types, are defined below.

| **Order Odonata**<br>**Suborder Zygoptera** | **Dragonflies**<br>**Damselflies** | **Faunal Element** |
|---|---|---|
| **Family Lestidae**<br>(5 species recorded) | **Spreadwings** | |
| *Lestes congener* Hagen | Spotted Spreadwing | Widespread |
| *Lestes disjunctus* Selys | Northern Spreadwing | Widespread |
| *Lestes dryas* Kirby | Emerald Spreadwing | (H) Widespread |
| *Lestes forcipatus* Rambur | Sweetflag Spreadwing | Austral |
| *Lestes unguiculatus* Hagen | Lyre-tipped Spreadwing | Widespread |
| | | |
| **Family Coenagrionidae**<br>(14 species recorded, 1 additional expected) | **Pond Damsels** | |
| *Amphiagrion abbreviatum* (Selys) | Western Red Damsel | Western |
| *Coenagrion angulatum* Walker(**) | Prairie Bluet | Western |
| *Coenagrion interrogatum* (Hagen) | Subarctic Bluet | Northern Boreal |
| *Coenagrion resolutum* (Hagen) | Taiga Bluet | Widespread Boreal |
| *Enallagma boreale* Selys | Boreal Bluet | Widespread Boreal |
| *Enallagma carunculatum* Morse | Tule Bluet | Austral |
| *Enallagma civile* (Hagen) (*/**) | Familiar Bluet | Austral |
| *Enallagma clausum* Morse | Alkali Bluet | Western |
| *Enallagma cyathigerum* (Charpentier) | Northern Bluet | (H) Widespread Boreal |
| *Enallagma ebrium* (Hagen) | Marsh Bluet | Transition |
| *Enallagma hageni* (Walsh) (**) | Hagen's Bluet | Transition |
| *Ischnura cervula* Selys | Pacific Forktail | Cordilleran |
| *Ischnura damula* Calvert (**) | Plains Forktail | Western |
| *Ischnura perparva* Selys | Western Forktail | Western |
| *Nehalennia irene* (Hagen) | Sedge Sprite | Southern Boreal |

| | | |
|---|---|---|
| **Suborder Anisoptera**<br>**Family Aeshnidae**<br>(13 species recorded) | **Dragonflies**<br>**Darners** | |
| *Aeshna canadensis* Walker | Canada Darner | Transition |
| *Aeshna eremita* Scudder | Lake Darner | Widespread Boreal |
| *Aeshna interrupta* Walker | Variable Darner | Southern Boreal |
| *Aeshna juncea* (Linnaeus) | Sedge Darner | (H) Widespread Boreal |
| *Aeshna palmata* Hagen | Paddle-tailed Darner | Cordilleran |
| *Aeshna septentrionalis* Burmeister | Azure Darner | Northern Boreal |
| *Aeshna sitchensis* Hagen | Zigzag Darner | Widespread Boreal |
| *Aeshna subarctica* Walker | Subarctic Darner | (H) Widespread Boreal |
| *Aeshna tuberculifera* Walker | Black-tailed Darner | Transition |
| *Aeshna umbrosa* Walker | Shadow Darner | Transition |
| *Anax junius* (Drury) | Common Green Darner | Austral (also in parts of Asia and the Pacific Islands) |
| *Rhionaeschna californica* Calvert | California Darner | Cordilleran |
| *Rhionaeschna multicolor* Hagen | Blue-eyed Darner | Western |
| | | |
| **Family Petaluridae**<br>(1 species recorded) | **Petaltails** | |
| *Tanypteryx hageni* (Selys) (**) | Black Petaltail | Cordilleran |
| | | |
| **Family Gomphidae**<br>(2 species recorded) | **Clubtails** | |
| *Ophiogomphus colubrinus* Selys | Boreal Snaketail | Southern Boreal |
| *Ophiogomphus severus* Hagen | Pale Snaketail | Western |
| | | |
| **Family Cordulegastridae**<br>(1 species expected) | **Spiketails** | |
| *Cordulegaster dorsalis* Hagen (*) | Pacific Spiketail | Cordilleran |
| | | |
| **Family Corduliidae**<br>(15 species recorded) | **Emeralds** | |
| *Cordulia shurtleffi* Scudder | American Emerald | Widespread Boreal |
| *Epitheca canis* MacLachlan (**) | Beaverpond Baskettail | Transition |
| *Epitheca spinigera* (Selys) | Spiny Baskettail | Transition |
| *Somatochlora albicincta* (Burmeister) | Ringed Emerald | Widespread Boreal |
| *Somatochlora brevicincta* Robert (**) | Quebec Emerald | Southern Boreal |
| *Somatochlora cingulata* (Selys) | Lake Emerald | Southern Boreal |
| *Somatochlora forcipata* (Scudder) (**) | Forcipate Emerald | Transition |
| *Somatochlora franklini* Selys | Delicate Emerald | Widespread Boreal |
| *Somatochlora hudsonica* (Selys) | Hudsonian Emerald | Western Boreal |

| | | |
|---|---|---|
| *Somatochlora kennedyi* Walker (**) | Kennedy's Emerald | Southern Boreal |
| *Somatochlora minor* Calvert | Ocellated Emerald | Southern Boreal |
| *Somatochlora semicircularis* (Selys) | Mountain Emerald | Cordilleran |
| *Somatochlora septentrionalis* (Hagen) | Muskeg Emerald | Northern Boreal |
| *Somatochlora walshii* (Scudder) | Brush-tipped Emerald | Southern Boreal |
| *Somatochlora whitehousei* Walker | Whitehouse's Emerald | Widespread Boreal |
| | | |
| **Family Libellulidae**<br>(14 species recorded, 2 additional expected) | **Skimmers** | |
| *Ladona julia* Uhler | Chalk-fronted Corporal | Transition |
| *Leucorrhinia borealis* Hagen | Boreal Whiteface | Western Boreal |
| *Leucorrhinia glacialis* Hagen | Crimson-ringed Whiteface | Transition |
| *Leucorrhinia hudsonica* (Selys) | Hudsonian Whiteface | Widespread Boreal |
| *Leucorrhinia intacta* (Hagen) | Dot-tailed Whiteface | Transition |
| *Leucorrhinia patricia* Walker | Canada Whiteface | Northern Boreal |
| *Leucorrhinia proxima* Calvert | Belted Whiteface | Southern Boreal |
| *Libellula quadrimaculata* Linnaeus | Four-spotted Skimmer | (H) Widespread |
| *Sympetrum corruptum* (Hagen) (*) | Variegated Meadowhawk | Widespread (also in far eastern Russia) |
| *Sympetrum costiferum* (Hagen) | Saffron-winged Meadowhawk | Transition |
| *Sympetrum danae* (Sulzer) | Black Meadowhawk | (H) Widespread Boreal |
| *Sympetrum internum* Montogomery | Cherry-faced Meadowhawk | Transition |
| *Sympetrum madidum* (Hagen) | Red-veined Meadowhawk | Western |
| *Sympetrum obtrusum* (Hagen) | White-faced Meadowhawk | Transition |
| *Sympetrum occidentale* Bartenev (*) | Western Meadowhawk | Western |
| *Sympetrum pallipes* (Hagen) | Striped Meadowhawk | Western |

**Faunal Elements**

Dragonfly species may be grouped with others that share similar distributions to form what can be termed faunal elements. The majority of the 68 species known or expected from northern British Columbia are restricted to North America (Nearctic Region), although six are Holarctic (H), and are defined here as species with transcontinental ranges in both North America and Eurasia. Two species (*Anax junius* and *Sympetrum corruptum*) are known from eastern Asia but do not have holarctic distributions. This section describes the Nearctic faunal elements found in the North (species with holarctic distributions are also assigned to a North American faunal element. The faunal elements are:

**1. Boreal** (28 species, 41%). Species occurring in the northern spruce (*Picea*) forests, across the boreal zone from treeline to the southern margin. In general, these species

range from the Atlantic Provinces across the northern New England states, Quebec, northern Ontario, parts of the northern tier of mid-western states, the Prairie Provinces north of the Great Plains, and northern British Columbia, often ranging considerably southward in the higher mountains and plateaux of the western Cordillera. These species can be further subdivided into:

> **i. Widespread Boreal** (13 species, 19%). With ranges as described above. *Coenagrion resolutum, Enallagma boreale, E. cyathigerum* (also Holarctic), *Aeshna eremita, A. juncea* (also Holarctic), *A. sitchensis, A. subarctica* (also Holarctic), *Cordulia shurtleffi, Somatochlora albicincta, S. franklini, S. whitehousei, Leucorrhinia hudsonica, Sympetrum danae* (also Holarctic).
>
> **ii. Northern Boreal** (4 species, 6%). Species that are common near the northern treeline, but that are virtually absent from the northern contiguous United States and from the southeastern Atlantic Provinces, and do not extend far south into the Cordillera. These species are *Coenagrion interrogatum, Aeshna septentrionalis, Somatochlora septentrionalis* and *Leucorrhinia patricia*.
>
> **iii. Southern Boreal** (9 species, 13%). Species that are uncommon north of 60º N in the West and absent near the Arctic treeline in the East, but range far down the Cordillera and/or into the southeastern Atlantic Provinces and New England states. Some (e.g. *Aeshna interrupta*) are common on the Great Plains. *Nehalennia irene, Aeshna interrupta, Ophiogomphus colubrinus, Somatochlora brevicincta, S. cingulata, S. kennedyi, S. minor, S. walshii* and *Leucorrhinia proxima*.
>
> **iv. Western Boreal** (2 species, 3%). Species not found east of Hudson Bay: *Somatochlora hudsonica* and *Leucorrhinia borealis*.

**2. Transition** (14 species, 20%). Species generally most common in the southern boreal forests and adjacent montane forests in the West, and mixed and deciduous forests in the East. *Enallagma ebrium, E. hageni, Aeshna canadensis, A. tuberculifera, A. umbrosa, Epitheca canis, E. spinigera, Somatochlora forcipata, Leucorrhinia glacialis, L. intacta, Ladona julia, Sympetrum costiferum, S. internum, S. obtrusum.*

**3. Cordilleran** (6 species, 9%). Species confined to the western mountains and their intervening valleys and plateaux. *Ischnura cervula, Rhionaeschna californica, Aeshna palmata, Tanypteryx hageni, Cordulegaster dorsalis, Somatochlora semicircularis*.

**4. Western** (10 species, 15%). Species confined to west of the 100th meridian but otherwise ranging widely in North America. *Amphiagrion abbreviatum, Coenagrion angulatum, Enallagma clausum, Ischnura damula, I. perparva, Rhionaeschna multicolor, Ophiogomphus severus, S. madidum, S. occidentale, S. pallipes*.

**5. Austral** (4 species, 6%). Species ranging across the continent south of the boreal forests, often extending into Transition areas, but with most of the range in the United

States. *Lestes forcipatus*, *Enallagma carunculatum*, *E. civile*, *Anax junius* (also in parts of Asia and the Pacific Islands).

**6. Widespread** (6 species, 9%). Species with broad distributions in North America, from north to south and east to west, overlapping several of the other elements listed. These species range into boreal regions to varying degrees. *Lestes congener*, *L. disjunctus*, *L. unguiculatus*, *L. dryas* (also Holarctic), *Libellula quadrimaculata* (also Holarctic) and *Sympetrum corruptum* (also in parts of Asia).

## Appendix 4. Dragonfly Habitats in Northern British Columbia

There are a wide variety of aquatic habitats available to dragonflies in Northern British Columbia. A general overview is presented below, with a few of the distinctive dragonfly species associated with each. Typical site associations are also given in each species account (Appendix 2). The wetland site association classification used is that of MacKenzie and Moran (2004). Dragonfly associations are much broader than plant site associations, largely because dragonflies (in both adult and larval stages) appear to react to the structure of plants and plant communities rather than plant species.

Some species, such as *Libellula quadrimaculata*, have such wide tolerances that almost any standing freshwater body half a square metre or larger in any habitat is adequate for breeding. On the other hand, *Aeshna subarctica* requires submerged moss for larval habitat. And although it requires peatlands of a certain structure (peatlands characterized by shallow pools supporting short sedges, such as *Carex limosa* and *C. livida*), *Aeshna sitchensis* apparently does not discriminate if the pond is in an acid coastal bog dominated by *Sphagnum* mosses and ericaceous shrubs with *Carex livida* in the pools (Wb52) or if the habitat is a neutral interior fen with a *Drepanocladus* moss mat, shrubby willows and *Carex limosa* in the pools (Wf08). In this case the plant lists from the two places will be radically different, but the dragonfly community will show much less variability. For this reason, at least, the occurrence of any dragonfly species overlaps many of the wetland site associations described in MacKenzie and Moran (2004) and the following discussion is kept relatively general and only the more common and obvious site associations are mentioned.

### 1. Large lakes (wave-washed shores with little vegetation)

Many northern lakes, such as Fraser, Purden and Moberly lakes, to name only a few, have wave-washed shores with little aquatic vegetation. In some sheltered situations, sparse stands of bulrushes (*Schoenoplectus acutus*, Wm06) or horsetails (*Equisetum fluviatile*, Wm02) may occur. The dragonflies associated with this habitat are: *Enallagma carunculatum* (in bulrush beds), *E. ebrium*, *Aeshna umbrosa*, *Ophiogomphus severus* and *Somatochlora cingulata*. In larger, deeper lakes, such as Atlin, Babine and Stuart lakes, the waters are colder and less productive, and dragonflies are restricted to shallow waters in sheltered bays, where the fauna resembles that found in small lakes and ponds.

Tatlayoko Lake, Chilcotin. A large lake with little aquatic vegetation. Photo: Robert A. Cannings

**2. Small lakes and ponds with floating, but little emergent, vegetation)**

A wide variety of small lakes and ponds are present in the North. Those lacking emergent vegetation of any significance often support *Nuphar lutea -- Utricularia macrorhiza* communities. Yellow pond-lily ecosystems occur on a variety of sites from deep (5 m) lakes with gravel bottoms to shallow, acidic, peat-degradation pools in coastal bogs (MacKenzie and Moran 2004). In lake habitats, a diverse array of Odonata occurs: *Enallagma ebrium, Aeshna canadensis, A. eremita, A. palmata, A. tuberculifera, A. umbrosa, Cordulia shurtleffi, Somatochlora albicincta, S. cingulata, Leucorrhinia glacialis, L. hudsonica, L. proxima, Ladona julia* and *Sympetrum obtrusum.*

Mitten Lake, Kispiox. A small lake with *Nuphar lutea* association. Photo: Gord Hutchings

**3. Saline lakes**

These salty lakes occur primarily in grasslands and open forests on the plateaus of the Chilcotin and Cariboo. Site associations in the saline meadows adjacent to the lakes and ponds include *Juncus balticus* (Wm07) marshes, *Distichlis spicata* var. *stricta* (Gs01), *Puccinellia nuttalliana – Hordeum jubatum* (Gs02) and *Carex praegracilis* (Gs03) associations. Some dragonfly species are able to live in this unusual habitat despite the often high salinity, and their life histories enable them to take advantage of the ephemeral nature of the shallower lakes and ponds: *Enallama boreale, E. clausum, Lestes congener, L. unguiculatus, Sympetrum internum, S. corruptum* and *S. costiferum.* These species are not restricted to this habitat.

Rock Lake, Riske Creek, Chilcotin. A saline lake. Photo: Robert A. Cannings

**4. Ephemeral ponds (temporary ponds)**

In addition to some saline ponds that may disappear during hot weather, fresher ephemeral waters in the southern parts of the study area support the following species: *Lestes dryas, L. unguiculatus, Sympetrum internum, S. madidum* and *S. pallipes.* Some of these species overwinter as eggs in the dry pond basin. These habitats may represent a wide range of site associations, e.g., *Schoenplectus acutus* (Wm06), *Eleocharis palustris* (Wm04), and *Juncus balticus* (Wm07) marshes.

Grassland pond near Rock Lake, Riske Creek, Chilcotin. Such ponds often dry completely in summer. Photo: Robert A. Cannings

**5. Cattail/bulrush marshes (including margins of lakes, streams and ponds)**

Marshes are permanently to seasonally flooded non-tidal mineral wetlands dominated by emergent grass-like vegetation. Low species diversity is typical with strong dominance by one or two aggressive species that spread vegetatively (MacKenzie and Moran 2004). Tall stands of cattails *(Typha)* and bulrushes *(Shoenoplectus)* are most common in nutrient-rich, warm waters at lower elevations having warm, dry summers. They are most common in the southern parts of the region. *Typha latifolia* marshes are designated Wm05; *Schoenplectus acutus* ones are Wm06. Species associated with these habitats are: *Lestes congener, L. disjunctus, L. dryas, L. forcipatus, L. unguiculatus, Coenagrion angulatum, Enallagma carunculatum, E. cyathigerum, Ischnura cervula, I. perparva, Aeshna canadensis, A. interrupta, A. palmata, Anax junius, Rhionaeschna californica, R. multicolor, Leucorrhinia intacta, Libellula quadrimaculata, Sympetrum costiferum, S. danae, S. internum, S. obtrusum* and *S. pallipes.*

Blackburn Lake, Fort St. James. *Typha* marsh. Photo: Robert A. Cannings, RBCM


Pond near Como Lake, Atlin. *Schoenoplectus* marsh. Photo: Gord Hutchings.

**6. Sedge marshes**

*Carex utriculata – Carex aquatilis* marshes (Wm01) represent the most common and widespread marsh association in BC. This community is frequent on sites inundated by shallow low-energy floodwaters that have some drawdown in the late season. They include flooded beaver ponds, lake margins and floodplains. This association is found on mineral soils rather than on peat (the fen equivalent, Wf01); in general, Wm01 is more deeply flooded, has a more dynamic hydrology and has a higher cover of *C. utriculata* (MacKenzie and Moran 2004). The *Equisteum fluviatile – Carex utriculata* association (Wm02) is similar and occurs more on lake margins and floodplains where there is more water movement. Some swamp associations such as Ws02, Ws04, Ws05 and Ws06 also may be related. Typical species in these habitats are: *Lestes congener, L. disjunctus, L. dryas, L. forcipatus, Coenagrion resolutum, Enallagma boreale, E. cyathigerum, Nehalennia irene, Aeshna canadensis, A. interrupta, A. juncea, A. palmata, Epitheca canus , E. spinigera, Somatochlora semicircularis, S. hudsonica, Libellula quadrimaculata, Leucorrhinia borealis, L. hudsonica, Sympetrum internum* and *S. obtrusum.* Other types of sedge marshes have similar dragonfly faunas.

Lake at head of Yahwa Creek, Mackenzie. *Carex utriculata – Carex aquatilis* marsh. Andrew Harcombe and Tim Vogt collecting *Aeshna juncea.* Photo: Robert A. Cannings.

**7. Small peatland ponds with aquatic moss**

Peatlands are poorly drained wetlands where decaying moss and other vegetation accumulates as peat. Bogs are nutrient-poor peatlands where ericaceous shrubs and hummock-forming *Sphagnum mosses* form distinctive communities adapted to highly acid and oxygen-poor soils. The rooting zone is isolated from mineral-enriched groundwater (MacKenzie and Moran). Fens are nutrient-medium peatlands dominated by non-ericacious shrubs, sedges and brown mosses, where mineral-bearing groundwater is within the rooting zone. A few examples of site associations are *Carex limosa – Menyanthes trifoliata – Sphagnum* bogs (Wb13), *Ledum groenlandicum – Kalmia microphylla – Sphagnum* bogs (Wb50), *Juniperus communis – Trichoporum cespitosum – Rhacomitrium lanuginosum* bogs (Wb52), *Betula nana – Menyanthes trifoliata – Carex limosa* fens (Wf07) and *Carex limosa – Menyanthes*

Heckman Pass, western Chilcotin. Peatland ponds with submerged and floating aquatic moss. Photo: Robert A. Cannings.

*trifoliata – Drepanocladus* fens (Wf08).
Standing, open water occurs in many of these habitats; in these ponds and pools, especially if there is floating and submerged moss, a special group of dragonflies may occur along with species having wider ecological tolerances: *Coenagrion interrogatum, A. septentrionalis, A. subarctica, Somatochlora kennedyi, S. septentrionalis, Leucorrhinia patricia*. A few of the more important specific peatland types are summarized below.

**8. Water Sedge-Beaked Sedge fens**
Sedges (*Carex*) form dense stands in water-saturated areas or around many lakes and ponds. The most common site association type is Wf01 (*Carex aquatilis -- Carex utriculata* fens). It occurs from low to subalpine elevations on sites that are annually inundated by shallow, low-energy flood waters. They occupy wetter zones in larger peatlands but also form extensive pure meadow-like basins (MacKenzie and Moran 2004). Some swamp associations such as Ws02, Ws04, Ws05 and Ws06 also may be related. Some dragonfly species associated with this habitat are *Lestes congener, L. disjunctus, L. dryas, L. forcipatus, Coenagrion resolutum, Enallagma boreale, E. cyathigerum, Nehalennia irene, Aeshna interrupta, A. juncea, A. palmata, Somatochlora semicircularis, S. hudsonica, Libellula quadrimaculata, Leucorrhinia borealis, L. hudsonica, Sympetrum internum* and *S. obtrusum.*

*Carex aquatilis -- Carex utriculata* fen Fen near Takla Landing. Andrew Harcombe collecting. Photo: Robert A. Cannings.

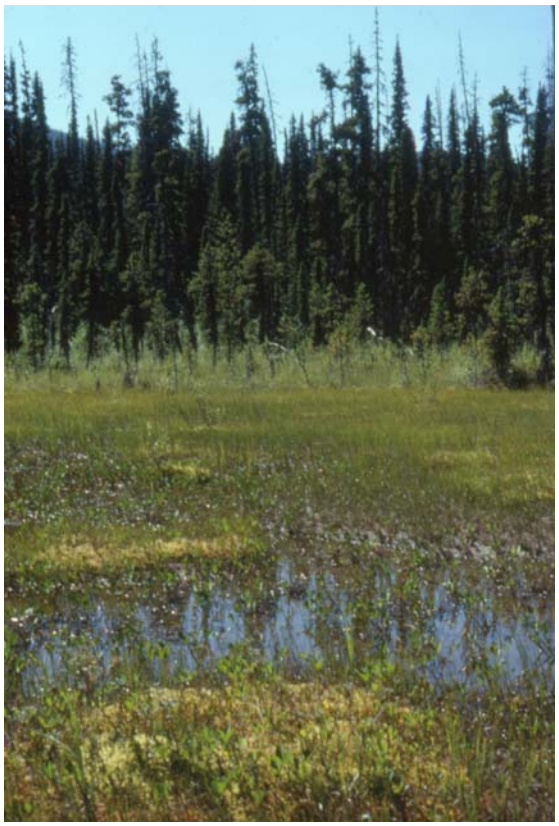
**9. Slender Sedge fens**
Common on peat flats surrounding small lakes and ponds or in infilled basins. Prolonged shallow surface flooding is typical. Common associations are Wf05 (*Carex lasiocarpa – Drepanocladus aduncus* fens) and Wf06 (*Carex lasiocarpa – Menyanthes trifoliata* fens). Shrubs such as *Salix pedicellaris, S. candida* and *Betula nana* can occur.
Wf06 has less flooding and greater peat saturation than Wf05; the former almost always occurs as a floating mat adjacent to a lake or pond. This habitat supports a diverse species list, including *Lestes disjunctus, Coenagrion interrogatum, C. resolutum, Nehalennia irene, Aeshna juncea, Aeshna subarctica, Leucorrhinia hudsonica, L. proxima* and *Sympetrum obtrusum.* Along the open edge of the water body, or in associated pools, *A. septentrionalis, A. subarctica, A. tuberculifera, Somatochlora kennedyi, S. septentrionalis, Leucorrhinia patricia,* among others, may occur.

*Carex lasiocarpa* fen at Bear Lake, north of Prince George. Photo: Robert A. Cannings.

**10. Shallow sedge/moss fens: *Betula nana – Menyanthes trifoliata – Carex limosa* (Wf07) and *Carex limosa – Menyanthes trifoliata – Drepanocladus* (Wf08) associations**
Peatlands affected by flowing water, evenly vegetated with low sedges and shallowly flooded or dotted with shallow pools only a few centimetres deep. *Carex limosa* rooted in shallow water is the constant characteristic of Wf08, which is typical of patterned fens host a particular assemblage of species: *Lestes disjunctus, L. congener, L. forcipatus,*

*Enallagma boreale, Coenagrion resolutum, Nehalennia irene, Aeshna septentrionalis, A. sitchensis, A. tuberculifera, Somatochlora brevicincta, S. franklini, S. kennedyi, S. semicircularis* and *S. whitehousei, Leucorrhinia hudsonica and Sympetrum danae*. Widspread species and those noted in #9 above may also occur.

Patterned fen at Williams Creek Ecological Reserve, Terrace. Photo: Robert A. Cannings.



Fen near Takla Landing. Photo: Robert A. Cannings.

**11. Outer Coastal bogs**

Bogs on the outer coastal lowlands form a blanket mire complex on level or sloping terrain. Hypermaritime climate, high precipitation and humidity and mineral poor bedrock produce. The *Pinus contorta – Empetrum nigrum – Sphagnum austinii* site association (Wb51) and *Juniperus communis – Trichoporum cespitosum – Rhacomitrium lanuginosum* (Wb52) association are typical and are perhaps the most important for Odonata. Stunted *Pinus contorta, Chamaecyparis nootkatensis* and Thuja plicata are common; shrubs such as *Empetrum nigrum, Myrica gale, Ledum groenlandicum* and *Juniperus communis* are common. Ponds and pools usually have firm, peaty margins. *Lestes disjunctus, Enallagma boreale, Aeshna interrupta, Aeshna sitchensis, Cordulia shurtleffii, Somatochlora albicincta, Leucorrhinia hudsonica, Libellula quadrimaculata* and *Sympetrum danae* are typical species.

Tow Hill Bog, Graham Island, Queen Charlotte Islands. A coastal *Sphagnum* bog. Photo: Robert A. Cannings.

**12. Streams**

Odonata are not normally found in the cold streams of mountainous areas. The following species, when living in flowing waters, are generally restricted to rather warm, slow streams or montane streams that drain lake basins, beaver ponds or peatlands: *Ophiogomphus colubrinus, Ophiogomphus severus* and *Aeshna umbrosa.* The latter two species also live in lakes. *Somatochlora minor* inhabits small montane streams and *S. walshii* lives in streams or slowly flowing water in peatlands. Yet to be found in the region, but to be looked for, *Cordulegaster dorsalis* is found in many warm streams draining lakes on the west side of the Coast Mountains south of 52º. It is known from coastal Alaska and from spring-fed streams in the southern Interior.

Tezzeron Creek, Fort St. James. Andrew Harcombe hunting *Ophiogomphus colubrinus*. Photo: Robert A. Cannings.

**13. Springs and shallow seeps**

Some of the more uncommon species of Odonata are associated with small springs and shallow seeps. *Amphiagrion abbreviatum* is known from only one locality in the region in such habitats. In the northern fringes of its range, *Ischnura damula* is normally restricted to warm springs, such as Liard River Hot Springs. *Somatochlora forcipata* is apparently restricted to spring-fed streamlets through sloping fens. Potential habitat occurs in subalpine fens such as *Salix barclayi – Carex aquatilis – Aulacomnium palustre* (Wf04) and *Eriophorum angustifolium – Caltha leptosepala* (Wf12*). Tanypteryx hageni* larvae burrow in seepage areas in coastal fen associations such as *Eriophorum angustifolium – Sphagnum* (Wf50).

Liard River Hot Springs. Photo: Robert A. Cannings.

**Site Association Information** (taken from MacKenzie and Moran, 2004)

| Ecosystem Type | Association Code | Site Association Name |
|---|---|---|
| Saline associations at grassland ponds | Gs01 | *Distichlis spicata* var. *stricta* (Alkali saltgrass) |
| | Gs02 | *Puccinellia nuttalliana – Hordeum jubatum* (Nuttall's alkaligrass - Foxtail barley) |
| | Gs03 | *Carex praegracilis* (Field sedge) |
| Bogs | Wb12 | *Scheuchzeria palustris – Sphagnum* (Scheuchzeria – Peat-moss) |
| | Wb13 | *Carex limosa – Menyanthes trifoliata – Sphagnum* spp. (Shore sedge - Buckbean - Peat-moss) |
| | Wb50 | *Ledum groenlandicum – Kalmia microphylla – Sphagnum* spp. (Labrador Tea – Bog-laurel - Peat-moss) |
| | Wb51 | *Pinus contorta – Empetrum nigrum – Sphagnum austinii* (Shore pine – Black crowberry – Tough peat-moss) |
| | Wb52 | *Juniperus communis – Trichoporum cespitosum – Rhacomitrium lanuginosum* (Common juniper – Tufted clubrush – Hoary rock-moss) |
| Fens | Wf01 | *Carex aquatilis* -- *Carex utriculata* (Water sedge – Beaked Sedge) |
| | Wf02 | *Betula nana – Carex aquatilis* (Scrub birch – Water sedge) |
| | Wf03 | *Carex aquatilis – Sphagnum* (Water Sedge – Peat-moss) |
| | Wf04 | *Salix barclayi – Carex aquatilis – Aulacomnium palustre* (Barclay's willow – Water sedge – Glow moss) |
| | Wf05 | *Carex lasiocarpa – Drepanocladus aduncus* (Slender sedge – Common hook-moss) |
| | Wf07 | *Betula nana – Menyanthes trifoliata – Carex limosa* fens (Scrub birch – Buckbean – Shore sedge) |
| | Wf08 | *Carex limosa – Menyanthes trifoliata – Drepanocladus* spp. (Shore sedge – Buckbean – Hook moss) |
| | Wf09 | *Eleocharis quinqueflora – Drepanocladus* (Few-flowered spike-rush – Hook moss) |
| | Wf10 | *Trichophorum alpinum – Scorpidium revolvens* (Hudson Bay clubrush – Red hook-moss) |
| | Wf12 | *Eriophorum angustifolium – Caltha leptosepala* (Narrow-leaved cotton-grass – Marsh-marigold) |
| | Wf50 | *Eriophorum angustifolium – Sphagnum* spp. (Narrow-leaved cotton-grass – Peat-moss) |

| Ecosystem Type | Association Code | Site Association Name |
|---|---|---|
| Marshes | Wm01 | *Carex utriculata – Carex aquatilis* (Beaked sedge – Water sedge) |
| | Wm02 | *Equisetum fluviatile - Carex utriculata* (Swamp horsetail – Beaked sedge) |
| | Wm05 | *Typha latifolia* (Cattail) |
| | Wm04 | *Eleocharis palustris* (Common spike-rush) |
| | Wm06 | *Schoenoplectus acutus* (Great bulrush) |
| | Wm07 | *Juncus balticus* (Baltic rush) |
| Swamps | Ws02 | *Alnus incana – Spiraea douglasii – Carex sitchensis* (Mountain alder – Pink spirea – Sitka sedge) |
| | Ws04 | *Salix drummondiana – Carex utriculata* (Drummond's willow – Beaked sedge) |
| | Ws05 | *Salix maccalliana – Carex utriculata* (MacCalla's willow – Beaked sedge) |
| | Ws06 | *Salix sitchensis – Carex sitchensis* (Sitka willow – Sitka sedge) |