WILDLIFE IN BRITISH COLUMBIA AT RISK

Rare Dragonflies of British Columbia

British Columbia is home to 87 species of dragonflies; 23 of these are considered rare or potentially at risk.

BRITISH COLUMBIA
Ministry of Sustainable Resource Management
Ministry of Water, Land and Air Protection

Even though dragonflies are predominantly a tropical group, and even though they are one of the smaller insect orders, British Columbia is home to 87 species, roughly 40 percent of the Canadian total. Twenty-three species are considered rare or potentially at risk and have been placed on the provincial Red and Blue lists. In this brochure we look at the nine Red-listed species.

Introducing dragonflies

The insect order Odonata (Greek for "toothed jaws") contains the groups of insects known as the dragonflies and damselflies; however, we also use the name "dragonflies" to refer to the whole order. The Odonata is a small order of about 5000 named species and 23 families worldwide. The Odonata and their ancestors are some of the most ancient of insects. Fossil records go back to more than 300 million years ago, predating dinosaurs by more than 100 million years and birds by some 150 million. Dragonflies have many primitive features, but also possess many specializations that reflect their aerial and predatory lifestyle. The order is divided into two suborders in British Columbia: the damselflies or Zygoptera ("joined wings") and the true dragonflies or Anisoptera ("unequal wings"). Damselflies are slimmer, usually smaller and fly more slowly than dragonflies. At rest, their equal-sized wings are usually held together above the body. Dragonflies are robust and often fast-flying. Their hindwings are broader than their forewings and, when perched, they hold their wings out away from the body.

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Dragonflies live in and around most types of fresh water. Ponds and marshes rich in aquatic vegetation support the most species. The aquatic larvae are predacious and are armed with an enormous hinged labium (sort of a lower lip), which is used as an extendible grasping tool for capturing prey. Larvae are voracious, eating small aquatic insects, crustaceans and even fish. Larvae can be divided into three categories according to their feeding strategy: climbers stalk through vegetation; sprawlers ambush prey while sitting on bottom sediments or debris; and burrowers wait under cover of sand and mud. After 10 to 15 moults, the full-grown larva crawls out of the water up a plant stalk or some other support. The skin on its back splits open and the adult dragonfly squeezes out. The newly-emerged dragonfly pumps blood into its wing veins and the wings expand. Gradually the body hardens, and after an hour or so the dragonfly can fly. It leaves behind the empty larval skin, or exuvia.

Adults are aerial, visually oriented predators: they are large, strong-flying insects with huge eyes, strong mandibles and spiny legs. They prey on a wide range of flying insects, which are usually captured in flight. Adults are often colourfully patterned and exhibit a wide variety of behaviours. Mature males patrol the breeding habitats, aggressively searching for mates and may, like birds, defend a territory against other males.

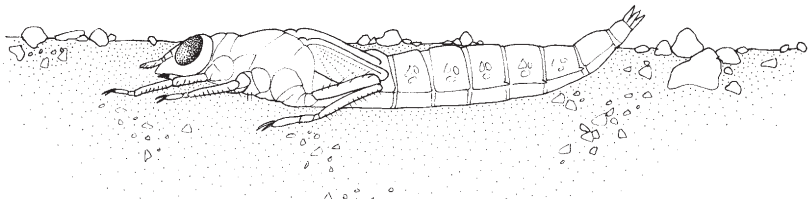
When a male is ready to mate, he grasps a female by the front of the thorax (damselflies) or by the top of the head (dragonflies) with the claspers at the tip of his abdomen. The female loops the end of her abdomen up to the base of the male's abdomen, where the sperm is stored and transferred. The Odonata are the only insects that mate in this "wheel position."

The female lays the eggs once they are fertilized. All damselflies and some dragonflies (mainly the darners in the family Aeshnidae) have a knifelike egg-laying structure, called an ovipositor, at the tip of the abdomen. They lay their eggs in plant tissue of various sorts. In many species, the male often retains his hold on the female while she lays her eggs, guarding her from other males who may attempt to mate with her. Some female damselflies actually crawl below the water surface to escape the attentions of males, remaining there for over an hour to lay their eggs. They can take a film of air down with them, trapped in the hairs on their body. Species lacking ovipositors usually just dip the tip of the abdomen into the water and wash off the eggs, which then sink to the bottom.

The most serious stress on dragonfly populations has been the elimination or alteration of their freshwater habitats.

For many of the damselflies and some dragonflies in the province, the life cycle takes about a year. Spreadwing damselflies (*Lestes*) and some meadowhawks (*Sypetrum*) overwinter as eggs, hatch in the spring and emerge as adults in the summer. Others overwinter as larvae and emerge the following spring or summer, and some, under certain conditions, will overwinter two years. The larval stages can last four or five years for the larger dragonflies, such as darners

(*Aeshna*) or emeralds (*Somatochlora*), many of which live in cold mountain or northern waters where summers are short. In British Columbia, adult dragonflies live for about one to two months.



The larva of the Olive Clubtail burrows in the sand and silt of rivers and lakes in the warmest valleys of the southern interior.

Where do they live in British Columbia?

Different dragonfly species have different habitat requirements. Some tolerate only a narrow range of conditions, whereas others live in a wide range of ecosystems. Some key habitat types in British Columbia that have distinctive dragonfly faunas are: large, warm lakes; small lakes and ponds with floating vegetation; alkaline (saline) lakes; cattail and bulrush marshes; sedge marshes; warm creeks and rivers (e.g., those that drain lakes); small springs and seeps; temporary ponds; bog and fen ponds; and shallow sedge-moss fens. (Bogs are acidic peatlands low in nutrients and dominated by sphagnum mosses. Fens are richer, less acidic peatlands dominated by sedges, grasses and non-sphagnum mosses.)

Why are dragonflies at risk?

The most serious stress on dragonfly populations has been the elimination or alteration of their freshwater habitats. Most destructive has been the draining and filling of marshes. Many of the richest marshes and ponds are associated with flat floodplains, and these wetlands are often sacrificed to road and railway construction, commercial and residential development and intensive agriculture. For example, only about 15 percent of Okanagan Valley wetlands remain and most of those left have been significantly altered by water flow changes. The channelling and dyking of the Okanagan River for most of its length between Penticton and Osoyoos Lake has eliminated much habitat for a number of Red- and Blue-listed species.

Large hydroelectric and flood-control dams have destroyed many lowland wetlands in the province – 175 000 hectares flooded in the Peace River system, 91 000 ha in the Nechako system and 102 000 ha in the Columbia system. These reservoirs have eliminated populations of almost all dragonfly species on the provincial list. Dams not only inundate wetlands, lakes and streams upstream, but also completely alter the natural flow regime downstream. Since Montana's Libby Dam eliminated the spring freshet of the Kootenay River through the Creston Valley, the large marshes that remain along the river are now artificially maintained in a series of dyked impoundments. These are drained periodically and their dragonfly communities are undoubtedly different from those that existed before the dam was built.

Hundreds of smaller, high-elevation dams built to supply water to lowland communities have flooded peatlands, ponds, shallow lakes and slow streams. They have eliminated the dragonflies of these diverse ecosystems, replacing them with a few of the more common, ubiquitous species characteristic of montane lakeshores.

Many natural lakeshores have been destroyed, mostly for housing and swimming beaches, reducing the habitat available for many lake dwelling dragonflies, particularly in the warm southern valleys.

Humans almost always modify hot springs. In British Columbia, the Vivid Dancer, *Argia vivida*, is largely restricted to the outlet streams of hot springs. The small populations are vulnerable and this damselfly has almost certainly been extirpated from some developed springs, such as those at Radium.

Many species breeding in small, often temporary ponds or spring-fed streams in grasslands and dry forest have been adversely affected by cattle that trample and pollute these habitats. The Vivid Dancer is especially vulnerable to these effects, since outside of hot springs it is known from only a handful of tiny, spring-fed streams in Interior rangelands, all of which are potentially affected by the activities of cattle or horses.

Logging and associated road building can result in streams with less stable flows, warmer water temperatures and higher silt loads, all of which negatively affect dragonfly larvae. Logging has also likely affected the community structure in peatlands, marshes and lakes, especially at higher elevations.

Fish are major predators of dragonfly larvae, so the energetic programs to release sport fish into a large number of lakes in British Columbia (many originally fish-free) must have had a significant effect on both the abundance of Odonata and the composition of the communities in these lakes. The poisoning of aquatic communities to preparelakes for sport fish introductions in past years also likely had a significant impact on dragonfly populations.

Detailed and focussed inventories of species and their habitats are urgently needed.

The aquatic communities of many systems that historically contained fish

have also been altered by the purposeful or accidental introduction of non-native fish species. Some of these species not only eat many dragonfly larvae, but also alter the habitat structure. For example, carp were introduced into the mainstem lakes of the Okanagan in 1917 and subsequently destroyed or reduced much of the native aquatic vegetation.

Climate change will drastically affect present Odonata distributions as lowland water bodies dry and water generally becomes scarcer. A significant component of the dragonfly fauna of the province lives in grassland ponds and marshes and small lakes in the lowlands, many of which will probably disappear in any drying trend. The extensive dragonfly populations in montane and northern peatlands will have similar problems.

Red-listed dragonflies in British Columbia

River Jewelwing

Calopteryx aequabilis

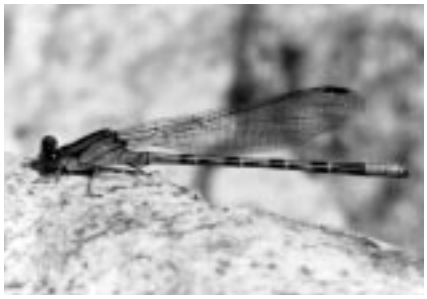
The jewelwings are the largest and most spectacular damselflies in Canada. The River Jewelwing is British Columbia's only representative of the family. It has a metallic green body with blue reflections, broad wings darkened at the tips, and long, black legs with impressive spines. The River Jewelwing is mostly found in eastern North America, but there are a few western populations. It is known only from one site in the province: Christina Creek at the outlet of Christina Lake. Because this species requires warm, slow-moving streams, it probably will not be found in many other localities in the region. Adults fly with a dancing, butterfly-like flight and perform striking courtship displays. Females lay eggs in floating mats of vegetation. The stiff, elongate larvae cling to aquatic plants, roots and woody debris.

Netta Smith photo

Vivid Dancer

Argia vivida

The Vivid Dancer is a large, bright blue damselfly of the mountains of western North America. In southern British Columbia it is associated with warm or hot springs from Meager Creek in the southern Coast Range east to the Rocky Mountains. Because of the large number of hot springs in the Kootenays, the bulk of the province's population lives there. Adults perch frequently on stones or on the ground near the water, and the females, when laying eggs in underwater vegetation, often submerge for long periods. The larvae live in the streams and pools draining the springs. Humans almost always develop, divert or otherwise modify hot springs, and the Vivid Dancer's small populations are threatened by these habitat changes.



George Doerksen photo, Royal BC Museum

Familiar Bluet

Enallagma civile

The Familiar Bluet is a wide-ranging North American damselfly found from southern Canada south to South America and the Caribbean. In British Columbia, however, it is apparently exceedingly rare, known only from Bridge Lake in the southern Cariboo region. Logically, this record probably represents part of a larger population stretching eastward, but the species is otherwise unknown in Canada west of Saskatchewan; surveys in the intervening territory have failed to find it. It is adept at colonizing new habitats such as cattle ponds and flooded gravel pits, and has spread significantly northwestward in North America in recent years.

Dennis Paulson photo

Plains Forktail

Ischnura damula

The Plains Forktail is a small damselfly of the Great Plains, the American Southwest and the eastern slope of the Rocky Mountains. Males are blue, green and black. However, it is known from only a single locality in British Columbia – Liard River Hot Springs in the far northeast. Perhaps it was more widespread in the northern part of its range seven or eight thousand years ago when the climate was warmer, but with

George Doerksen photo, Royal BC Museum

climatic cooling its populations have shrunk in the region, today holding out only at this one thermal spring.

Grappletail

Octogomphus specularis

The Grappletail is a yellow and black dragonfly that ranges from the extreme south coast of British Columbia south

George Doerksen photo, Royal BC Museum

to Baja California. The almost all-black abdomen, the broad pale stripe along the middle of the top of the thorax and the strikingly broad, spiny tip to the male's abdomen all make this an unusual western gomphid dragonfly. In British Columbia it lives only along streams flowing swiftly out of warm lakes nestled in the hills bordering the lower Fraser Valley. The larvae live among stones and boulders in creek riffles and pools. Adults perch on stones along the stream or on tree branches away from water.

Olive Clubtail

Stylurus olivaceus

A dragonfly of western valleys and plateaus in North America, the Olive Clubtail is known in British Columbia only from the Thompson-Okanagan and Boundary regions. It lives along

Dennis Paulson photo

sandy or muddy edged rivers or lakeshores in hot, dry areas, where the larvae burrow in the substrate. Adults fly out over the water and land along the shore or, more commonly, on trees and shrubs near the water. Its worst enemy is the modification of riverbanks and beaches. The channelling of the Okanagan River in the 1950s probably seriously reduced its numbers.

Quebec Emerald

Somatochlora brevicincta

For years since its discovery in the 1950s, the Quebec Emerald was only known from remote fens in central Quebec. In the 1990s, dragonfly surveys found it in scattered localities in eastern

Sid Dunkle photo

Canada and Maine, and in 2000 it was discovered unexpectedly far to the west in British Columbia. It flies in small numbers around mossy, slightly acidic pools in a handful of localities from the Cariboo and Rocky Mountains near McBride, north to the Nechako Plateau and Omineca Mountains. Probably it is a rare inhabitant of mossy fens right across the southern boreal forest of North America.

Forcipate Emerald

Somatochlora forcipata

The Forcipate Emerald is mostly known as an uncommon dweller of spring-fed streams in the forests of eastern Canada and northeastern United States. However, it also lives in the Rocky Mountains of Alberta and British Columbia. First discovered in British Columbia in Yoho National Park in 1998, it is known from several sites in the central Rockies and on the Nechako Plateau. In the Rockies, the Forcipate Emerald breeds in shallow, spring-fed streamlets, often only

Blair Nikula photo

20 to 30 centimetres wide, trickling through subalpine hillside fens, or in tiny pools associated with flowing groundwater in such situations.

Kennedy's Emerald

Somatochlora kennedyi

Better known in eastern Canada and the northeastern United States than in the West, Kennedy's Emerald is uncommon throughout its range. Most western collections are from the Yukon, but there is a single record from the Fort Nelson

Robert A. Cannings photo

area in northeastern British Columbia. In the West, this is a species that prefers to breed in shallow, moss-bottomed pools in sedge-dominated fens.

What can we do?

First, we must discover more about our rare dragonflies – where exactly they are and what sort of habitats they need. Detailed and focussed

inventories of species and their habitats are urgently needed. It is critical to study the exact habitat requirements of each species and then to protect, conserve and, where possible, increase the number of suitable habitats. The habitat requirements of some dragonflies are narrow and these are obviously the species that are most at risk. Other species are wide-ranging in their needs and will survive in many habitats.

The important collections of specimens in museums, such as the Royal British Columbia Museum and the Spencer Entomological Museum at the University of British Columbia, have been examined and their information recorded in databases. In conjunction with museums, the British Columbia Conservation Data Centre keeps track of this information in the same way it manages data on rare vertebrates, plants and ecosystems.

Education is vital. Dragonfly conservation will not be supported if no one appreciates these insects. Thankfully, more and more naturalists are becoming excited about studying dragonflies because of their colourful beauty and fascinating behaviour. New information and publications will encourage this.

But even before all the information is available, we must act quickly to protect the natural communities that still remain home for dragonflies. Small ponds, marshes, springs and streams in British Columbia's southern valleys sustain some of the rarest of our species. These habitats are among the first to disappear in the expansion of housing, industrial and agricultural developments. Even sensitive aquatic habitats in remote areas can be drastically affected by industrial activity. Suitable sites are disappearing faster than new ones are being formed and, until that trend is reversed, there is continuing cause for concern.

What can we do as individuals? We can get involved with local naturalist organizations to learn more about the natural world in our neighbourhoods. We can encourage all levels of government to protect aquatic ecosystems on public land. We can get involved in public processes to develop land use plans and regulations that preserve, rather than destroy, natural diversity. And we can maintain and create natural habitats on our own property and encourage others to do the same.

Dragonfly conservation means habitat conservation. Here one of the last remnants of the once extensive Penticton Marsh is being filled.
Steve Cannings photo

Rob Cannings standing at a small spring-fed streamlet near Ross Lake, Yoho National Park, breeding habitat of the rare Forcipate Emerald.
Syd Cannings photo

FOR MORE INFORMATION ON RARE DRAGONFLIES, CONTACT:

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Ministry of Sustainable Resource Management
PO Box 9993, Stn. Prov. Govt.
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cdcdata@victoria1.gov.bc.ca
http://srmwww.gov.bc.ca/cdc

FOR INFORMATION ON WHAT YOU CAN DO TO RESTORE, PRESERVE OR IMPROVE WILDLIFE HABITAT, CONTACT:

Naturescape British Columbia
PO Box 9354, Stn. Prov. Govt.
Victoria, British Columbia, V8W 9M1
http://www.hctf.ca/nature.htm

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