Determining the Status of British Columbia's Dragonflies

LEAH R. RAMSAY[1] AND ROBERT A. CANNINGS[2]

[1]British Columbia Conservation Data Centre, Ministry of Sustainable Resource Management, 395 Waterfront Crescent, Box 9358, Stn Prov Govt, Victoria, BC, V8W 9M2, Canada, email leah.ramsay@gems4.gov.bc.ca
[2]Royal British Columbia Museum, 675 Belleville Street, Victoria, BC, V8W 9W2, Canada

Abstract: To demonstrate how inventory provides information for assigning conservation status ranks, we looked at the changes in these ranks over a nine-year period. Preliminary conservation status ranks were assigned to British Columbia's dragonflies and damselflies (Class Insecta: Order Odonata) in 1993. Subsequently, we focused inventory efforts on the species considered to be at risk in order to more accurately determine their status. From 1996 to 2003, concentrated surveys were conducted throughout much of the province. During these surveys, known ranges of many species were extended, knowledge of habitat requirements increased, and five new species were confirmed for the province. Many of the targeted species were more abundant than previously thought, and their conservation ranks were changed accordingly. Others were found only rarely or not at all. Ranking poorly known species is challenging, particularly if samples are small or habitats are difficult to access. By increasing our knowledge of these species and their requirements, we can assign them more accurate ranks, thus ensuring that conservation efforts will target the species and habitats that truly require them.

Key Words: Odonata, odonates, dragonflies, damselflies, species at risk, inventory, distribution, status, British Columbia

Introduction

A goal of the British Columbia (B.C.) Conservation Data Centre (CDC) is to portray, as accurately as possible, the status of species and habitats in B.C. The first stage in this process is to draw up lists of all species in the province and give each species a numerical value indicating its conservation status rank. The ranks are based on weighted criteria as determined by NatureServe, an organization which represents an international network of agencies (known as Natural Heritage Programs or Conservation Data Centres) operating in the United States, Canada, and Latin America that are documenting biological diversity. These agencies are a source for information about rare and endangered species and threatened ecosystems, and procedures for determining the status of these species and ecosystems. The criteria used by NatureServe are the number of populations, the number of individuals, population trends (long and short term), threats (broken down into scope, severity, and immediacy), distribution (broken down into total range and area of occupancy), environmental specificity, and intrinsic vulnerability. Each species is assigned an 'S' (sub-national or provincial) rank ranging from 1 (most at risk) to 5 (secure)

(NatureServe 2003). British Columbia's Red and Blue Lists are based on S ranks. S1, S1S2, S1S3, and S2 are Red List ranks; S2S3, S3, and S3S4 are Blue List ranks. All others ranks are on the Yellow List.

The dragonflies and damselflies (Order Odonata) comprise a relatively well-known order of insects that breed in a wide variety of aquatic habitats. Some species are specialists which use discrete habitats; others are generalists that are able to survive in a wide variety of environments. In British Columbia, wetland habitats have been, and continue to be, altered, lost, or destroyed because of urban development, agriculture, and resource extraction (Stevens et. al. 1995). Estimates indicate that 65–80% of B.C.'s wetlands have been altered or destroyed, depending on the region. Odonata are considered a priority for inventory for several reasons (Scudder 1996). Unlike most invertebrates, they can be relatively easily identified, even in the field in many cases. They are upper level predators in the invertebrate food chain and have often been identified as indicators of ecosystem health (Walker and Corbet 1975; Carle 1979; Takamura et. al. 1991; Clarke and Samways 1996; Trevino 1997; Corbet 1999). Many species are habitat-specific, and their presence can be used to characterize healthy wetlands of all sorts. Within the constraints of weather, Odonata surveys are well suited for long-term monitoring programs. Finally, because they are large, colorful, diurnal creatures with interesting behaviors, Odonata are excellent subjects for nature interpretation programs and public education programs about aquatic ecosystems in general.

In 1993, the CDC ranked British Columbia's odonates (82 species at that time) with respect to their known conservation status; however, although the Odonata are among the best known of insects, detailed knowledge of species distributions, relative abundances, and habitat preferences or requirements was very limited, particularly for the less common species. The main sources of information were Cannings and Stuart (1977), records gathered by collectors over the years (specimens housed in the Royal British Columbia Museum), Whitehouse's (1941) notes, and habitat descriptions from more general guides or references (e.g., Walker 1953). Beginning in 1996, a series of surveys was initiated throughout British Columbia to improve scientific knowledge about the Odonata, to gather information for use in wetland management and conservation planning, and to enable more accurate species ranking.

Methods

Between 1996 and 2003, Odonata surveys were conducted throughout much of British Columbia. Staff from the CDC and the Royal British Columbia Museum organized these surveys; government staff, contractors, and volunteer naturalists participated in a number of teams each year. The sites visited were chosen based on historical records, recommendations by local biologists and naturalists, and examination of topographical maps and air photographs, and by scouting the region by vehicle, and in a few cases, by helicopter.

Study Areas

1996: Lower Mainland and southern Vancouver Island (Hutchings 1997)
1997: Okanagan (Cannings 1998) and northeastern B.C. (Peace River-Fort Nelson)
1998: East Kootenays
1999: West Kootenays (Cannings et. al. 2000)
2000: the region east and south of Prince George—i.e., the western slopes of the Rockies from Tête Jaune Cache north to Pine Pass, south to the northeastern Chilcotin Plateau (Nazko area) and the northern Cariboo Mountains (Likely, Quesnel Lake)
2001: Vanderhoof-Omineca-Williston region
2002: North Tweedsmuir-Babine-Bulkley-Skeena region
2003: northwest, including the Highway 37 corridor, the Atlin area, Skagway Highway, and the Haines Road

To maximize the chances of recording all species present in an area, we surveyed throughout the odonate flying season, and key sites were visited several times. Some early- or late-flying species have been under represented in earlier collections because entomologists collect primarily in mid-summer. At each site, we collected voucher specimens of each species observed. We collected adults using aerial nets and estimated relative abundance for each species at a site. Adult voucher specimens were killed with ethyl acetate and fixed in acetone for 8–24 hours, and then dried and stored in glassine envelopes until accessioned by the Royal British Columbia Museum. We collected larvae in dip nets and preserved them in 70% ethanol. We identified specimens by using Walker (1953, 1958), Walker and Corbet (1975), Cannings and Stuart (1977), Westfall and May (1996), Cannings (1996, 2002a) and Paulson (1998), and by comparing the specimens to material in the Royal British Columbia Museum and the Spencer Entomological Museum at the University of British Columbia. We described the habitat for each site where specimens were collected by recording wetland type, dominant vegetation, water and air temperature, pH, and amount of disturbance.

Criteria used for conservation rank assessments for 1995 were number of element occurrences, population size, trend (of population, range, or number of occurrences), threats, and protection. The 2004 assessments separated threats into severity, scope, and immediacy; the trends were divided into long and short term, and environmental specificity and intrinsic vulnerability were added. The criteria were only used when the relevant information was known.

Results

We collected 83 of the province's 87 species from over 1480 sites; however, we recorded 85 species during the past eight years, leaving only two (*Pantala hymenaea,* an accidental species observed only once, and *Enallagma civile*, collected only once before) unrecorded during this period. We added five new species to the provincial species list (Cannings et al., in press) and

collected approximately 20,000 specimens for the Royal British Columbia Museum. We also changed the conservation status ranks of 23 species; thus, in 2004, the Red and Blue Lists for British Columbia contain 21 species (Appendix 1), and the provincial list stands at 87 species.

New Species

Somatochlora kennedyi Walker was known from Loon Lake in the Yukon Territory, 3 km north of the British Columbia border (Cannings et. al. 1991), and from the southern Northwest Territories (Walker and Corbet 1975); therefore, it was a target species during the 1997 survey in the northeast. We found and collected only one, a female flying near a sedge fen near Andy Bailey Provincial Park southeast of Fort Nelson (Kenner 2000). Since then, this emerald has been collected in a variety of habitats and several other localities across the northern half of the province.

Edmund Walker collected *Somatochlora forcipata* (Scudder) in the 1920s at Boom Creek, Alberta, about 3 km from the B.C.-Alberta border in Banff National Park (Walker and Corbet 1975). For decades this was the only record west of Manitoba. In 1998, by focusing on sites that matched Walker's descriptions of this species' habitat—small, spring-fed boggy streams "following a devious course" in "glades in spruce forests" (Walker and Corbet 1975), we discovered three breeding localities in British Columbia, two in Yoho National Park and one in Kootenay National Park. Subsequently, we found the species in three additional locations in central B.C.

In 1997, *Lestes forcipatus* Rambur was discovered in Washington State, the first record west of Montana (Paulson 1997). In Canada, it was not known west of Saskatchewan (Walker 1953). In 1998, we located it in the Bluewater Creek area in the Rocky Mountain Trench north of Golden. *L. forcipatus* is very similar to the widespread and abundant *L. disjunctus* Selys, and although females are readily separated, the males of the two species are almost indistinguishable (Simaika and Cannings 2004). Examination of specimens in the Royal British Columbia Museum showed that *L. forcipatus* had been collected previously, but because often only the males are collected, specimens had been misidentified as *L. disjunctus*. *L. forcipatus,* it turns out, is relatively widespread in southern and central British Columbia, although it is rarely as abundant as other *Lestes* at any site.

We discovered *Calopteryx aequabilis* Say at Christina Creek in the Boundary region in 1998. Previously, it was known from Stevens County, about 100 km to the south in Washington State. It is a striking species and requires a warm stream habitat, hence, it is unlikely that it occurs in many other locations in British Columbia.

Somatochlora brevicincta Robert was one of the most surprising discoveries; previously, it was known from only a few locations in Quebec, Maine, and the Atlantic provinces. After its initial discovery on Bell Mountain near McBride in 2000, we collected it at another nine locations, all along the eastern margin of the Rocky Mountains.

List Changes

We changed the rank of 23 species (26.4%)—20 are now less at risk and 3 are considered more at risk (Table 1). These numbers include changes made to conservation status ranks of species that were unknown in the province before the surveys. These were initially listed in higher risk categories than they are now after further inventory.

Table 1. Changes in the conservation status of British Columbia Odonata between 1995 and 2004.

Scientific name	*English name*	*1995*	*2000*	*2004*	*Rank change*
Lestes forcipatus Rambur	Sweetflag spreadwing	unknown	S3	S4	+2.0
Coenagrion angulatum Walker	Prairie bluet	S1S2	S4	S3S4	+2.0
Coenagrion interrogatum (Hagen)	Subarctic bluet	S4	S4	S4S5	+0.5
Ischnura erratica Calvert	Swift forktail	S3?	S4	S4	+0.5
Nehalennia irene (Hagen)	Sedge sprite	S4	S5	S5	+1.0
Aeshna constricta Say	Lance-tipped darner	S2S3	S2S3	S2	-0.5
Aeshna septentrionalis Burmeister	Azure darner	S4S5	S3S4	S4	+0.5
Aeshna tuberculifera Walker	Black-tipped darner	S2S3	S3	S4	+1.5
Gomphus graslinellus Walsh	Pronghorn clubtail	S2	S2	S2S3	+0.5
Ophiogomphus colubrinus Selys	Boreal snaketail	S3?	S3?	S4	+0.5
Stylurus olivaceus (Selys)	Olive clubtail	S2	S2	S1S2	-0.5
Epitheca canis MacLachlan	Beaverpond baskettail	S2S3	S2S3	S3	+0.5
Somatochlora brevicincta Robert	Quebec emerald	unknown	S1	S3	+2.0
Somatochlora cingulata (Selys)	Lake emerald	S2S3	S3	S4	+1.5
Somatochlora forcipata (Scudder)	Forcipate emerald	unknown	S1S2	S2S3	+1.0
Somatochlora franklini (Selys)	Delicate emerald	S4S5	S4S5	S5	+0.5
Somatochlora hudsonica (Selys)	Hudsonian emerald	S5	S4S5	S4S5	-0.5
Somatochlora kennedyi Walker	Kennedy's emerald	unknown	S1S2	S3S4	+2.0
Somatochlora septentrionalis (Hagen)	Muskeg emerald	S3S4	S3?	S4	+0.5
Somatochlora whitehousei Walker	Whitehouse's emerald	S4	S4	S5	+1.0
Erythemis collocata (Hagen)	Western pondhawk	S2S3	S2	S3	+0.5
Leucorrhinia patricia Walker	Canada whiteface	S3S4	S3?	S4	+0.5
Pachydiplax longipennis (Burmeister)	Blue dasher	S2S3	S2S3	S3S4	+1.0

Other Knowledge

In addition to increasing our knowledge of the habitats and distributions of the species of Odonata that were considered to be at risk, we learned much more about the habitat needs, status, and behavior of the more common species. For example, *Somatachlora walshii* (Scudder) was originally known from only half a dozen locations scattered throughout the southern half of the province. It is now clear that this species is widespread across the southern two-thirds of the province and that it inhabits many spring-fed wetlands that contain slow-moving water. *Nehalennia irene* (Hagen), another example of an early-flying species missed by mid-summer entomologists, is now known from the northeast portion of the province, Vancouver Island, and the Columbia Basin. When *The Dragonflies of British Columbia* was published in 1977 (Cannings and Stuart), this tiny iridescent damselfly had only been found in the interior of the province and no further north than Terrace. Our data also indicate that *N. irene* has a longer flying season than previously known. Additionally, we had always assumed that *Aeshna subarctica* was more common than the scanty records indicated; our surveys confirmed this. We recorded it at many sites from peatlands in the Columbia-Kootenays and northern British Columbia. And finally, even though *Somatochlora minor* was known from the southern Yukon (Cannings et. al. 1991), it had been found only in British Columbia south of 52° N. We now have several records from as far north as Fort Nelson.

Discussion

We performed these surveys on a relatively small scale. Usually three to five individuals or teams examined an area for a limited amount of time over a single flight season; however, even with this limited amount of effort (there are many areas left unsurveyed, localities to revisit, and species to look for), the surveys have produced a much more defensible Red and Blue List than previously existed.

We were able to visit some key sites repeatedly and obtained a good estimate of the relative abundance of each species as well as accurate species lists for those sites. These baseline data can be used to monitor populations at these sites. Our data are also useful in monitoring individual species over a number of sites.

When the assemblages of Odonata and their habitats are associated, one can begin to predict species occurrence in particular habitats within a certain geographical range. Such predictions can be applied to rare as well as common species. The reverse is also true—certain dragonfly species can be used to predict wetland types. For example, the presence of *Argia vivida* is a sure sign of spring-fed waters. Dragonfly populations used in conjunction with vegetation type can predict and define the presence of rare ecosystems.

The fostering of interest about the Odonata amongst amateurs is a less tangible but beneficial result of our surveys. We held dragonfly collection workshops and field trips for local naturalists. These, along with slide shows, lectures, and informal information sessions encouraged local

participation. The results of the surveys were assembled to help produce a new pictorial field guide, *Introducing the Dragonflies of British Columbia and the Yukon* (Cannings 2002a). A 'Species at Risk' brochure was also produced which highlighted the Odonata that were red-listed in British Columbia at the time of printing (Cannings 2002b). These publications make it easier and more rewarding for naturalists to identify dragonflies and damselflies in the field; they also encourage and allow naturalists to provide reliable information about the group throughout their region. We need more students of Odonata: because of British Columbia's large size and the seasonality of the odonates, the recruitment of enthusiastic, well-informed amateurs is essential to furthering our understanding of dragonflies and damselflies in the province.

Our results highlight the value of intensive, targeted surveys and illustrate the dynamic nature of the conservation status rank lists. A common question posed by wildlife or land managers and policy makers is, "How can we reduce the number of species on tracked or 'at risk' lists?" Undertaking inventories that are focused on particular species is the most straightforward way to answer the question. Intensive collecting often reveals that many species appear rare only because they are poorly sampled. In the course of establishing species' distributions and numbers during inventories, other criteria that are used to establish conservation status ranks can be determined, including habitat or threats. The resulting lists can then be used to focus efforts and resources on those species or habitats that are truly at risk, either by addressing the threats or considering recovery planning. This is, of course, true for not only the Odonata but for all taxa. Inventories not only fill key gaps in our knowledge, they also focus future studies on species and regions for which there is still a lack of information.

Acknowledgments

All of these surveys were cooperative efforts funded by a variety of sources and involving several agencies and many volunteers. Financial support and aid in kind came from the Habitat Conservation Trust Fund, the Royal British Columbia Museum, the British Columbia Ministries of Sustainable Resource Management and Water, Land and Air Protection (formerly Ministry of Environment, Lands and Parks), Parks Canada, the Columbia Basin Trust through The Living Landscapes project of the Royal British Columbia Museum, and Forest Renewal British Columbia. Principal investigators were Leah Ramsay, Robert Cannings, Sydney Cannings, and Gord Hutchings. Additional collectors are too numerous to list, but several people did participate year after year including Mike Badry, David Fraser, Andrew Harcombe, Ian Hatter, and Leah Westereng. BC Parks and Parks Canada provided collecting permits, Dennis Paulson helped with advice and identifications, and David Blades (Royal British Columbia Museum) helped with database management. Many others enthusiastically swung nets, pointed out wonderful wetlands, and provided access to areas.

References

Cannings, R.A. 1996. The blue darners: dragonflies of the genus *Aeshna* in British Columbia. Cordillera **3**(1):28–38.

Cannings, R.A. 2002a. Introducing the dragonflies of British Columbia and the Yukon. Royal British Columbia Museum, Victoria, British Columbia. 96 pp.

Cannings, R.A. 2002b. Rare dragonflies of British Columbia. British Columbia Ministry of Environment, Lands and Parks, and Ministry of Sustainable Resource Management, Victoria, British Columbia. 6 pp.

Cannings, R.A., S.G. Cannings, and L.R. Ramsay. 2000. The dragonflies (Insecta: Odonata) of the Columbia Basin, British Columbia: field surveys, collections development and public education. Royal British Columbia Museum, Victoria, British Columbia. 287 pp. Available from http://livinglandscapes.bc.ca/cbasin/www_dragon/pdf/dragonflies4.pdf (accessed 17 February 2004).

Cannings, R.A., S.G. Cannings, L.R. Ramsay, and G.E. Hutchings. In press. Four species of Odonata new to British Columbia, Canada. Notulae Odonatologicae **6**(5).

Cannings, R.A., and K.M. Stuart. 1977. The dragonflies of British Columbia. Handbook No. 35. British Columbia Provincial Museum, Victoria, British Columbia. 254 pp.

Cannings, R.J. 1998. A survey of rare dragonflies and damselflies (Odonata) in the Okanagan and Similkameen Valleys. Unpublished report submitted to the British Columbia Ministry of Environment, Lands and Parks, Victoria, British Columbia. 19 pp.

Cannings, S.G., R.A. Cannings, and R.J. Cannings. 1991. Distribution of the dragonflies (Insecta: Odonata) of the Yukon Territory, Canada with notes on ecology and behaviour. Contributions to Natural Science, Number 13. Royal British Columbia Museum, Victoria, British Columbia. 27 pp.

Carle, F.L. 1979. Environmental monitoring potential of the Odonata, with a list of rare and endangered Anisoptera of Virginia, United States. Odonatologica **8**:319–323.

Clark, T.E., and M.J. Samways. 1996. Dragonflies (Odonata) as indicators of biotope quality in the Krüger National Park, South Africa. Journal of Applied Ecology **33**:1001–1012.

Corbet, P.S. 1999. Dragonflies: behavior and ecology of Odonata. Cornell University Press, Ithaca, New York.

Dragonfly Society of the Americas. 2004. The Odonata of North America. Online checklist available from http://www.ups.edu/biology/museum/NAdragons.html (accessed 7 February 2005).

Hutchings, G. 1997. Status of dragonflies of conservation concern in the Georgia Depression Ecoregion. Unpublished report submitted to the British Columbia Ministry of Environment, Lands and Parks, Victoria, British Columbia. 22 pp.

Kenner, R.D. 2000. *Somatochlora kennedyi* (Odonata: Corduliidae): a new species for British Columbia, with notes on geographical variation in size and wing venation. Journal of the Entomological Society of British Columbia **97**:47–49.

NatureServe. 2003. NatureServe Explorer: an online encyclopedia of life [web application]. Version 4.2. NatureServe, Arlington, Virginia. Available from http://www.natureserve.org/explorer (accessed 17 February 2004).

Paulson, D. 1997. Washington Odonata inventory. Argia **9**(2):16–17.

Paulson, D. 1998. Field key to adult Washington dragonflies (Odonata). Avaliable from http://www.ups.edu/biology/museum/WAODkey.html (accessed 17 February 2004).

Scudder, G.G.E. 1996. Terrestrial and freshwater invertebrates of British Columbia: priorities for inventory and descriptive research. Working Paper 09/1996. Research Branch, British Columbia Ministry of Environment, Lands and Parks. Victoria, British Columbia.

Simaika, J.P., and R.A. Cannings. 2004. *Lestes disjunctus* Selys and *L. forcipatus* Rambur (Odonata: Lestidae): some solutions for identification. Journal of the Entomological Society of British Columbia **101**:101–109.

Stevens, V.F., F. Backhouse, and A. Eriksson. 1995. Riparian management in British Columbia: an important step towards maintaining biodiversity. Working Paper 13/1995. Research Branch, British Columbia Ministry of Forests, and Habitat Protection Branch, British Columbia Ministry of Environment, Lands and Parks, Victoria, British Columbia.

Takamura K., S. Hatakeyama, and H. Shiraishi. 1991. Odonate larvae as an indicator of pesticide contamination. Applied Entomology and Zoology **26**:321–326.

Trevino, J. 1997. Dragonfly naiads as an indicator of water quality. Technical Note No. 99. Watershed Protection Techniques **2**:533–535.

Walker, E.M. 1953. The Odonata of Canada and Alaska. Vol. 1. University of Toronto Press, Toronto, Ontario. 292 pp.

Walker, E.M. 1958. The Odonata of Canada and Alaska. Vol. 2. University of Toronto Press, Toronto, Ontario. 318 pp.

Walker, E.M., and P.S. Corbet. 1975. The Odonata of Canada and Alaska. Vol. 3. University of Toronto Press, Toronto, Ontario. 307 pp.

Westfall, M.J., and M.L. May. 1996. Damselflies of North America. Scientific Publishers, Gainesville, Florida. 650 pp.

Whitehouse, F.C. 1941. British Columbia dragonflies (Odonata), with notes on distribution and habits. American Midland Naturalist **26**:488–557.

Appendix 1. List of the dragonflies (Odonata) of British Columbia and their conservation ranks (December 2004). Scientific and English names are based on the list of Odonata of North America (Dragonfly Society of the Americas 2004).

Scientific name	*English name*	*Global rank*	*Prov. rank*	*List*
FAMILY CALOPTERYGIDAE				
Calopteryx aequabilis	River jewelwing	G5	S1	Red
FAMILY LESTIDAE				
Lestes congener	Spotted spreadwing	G5	S5	Yellow
Lestes disjunctus	Northern spreadwing	G5	S5	Yellow
Lestes dryas	Emerald spreadwing	G5	S5	Yellow
Lestes forcipatus	Sweetflag spreadwing	G5	S4	Yellow
Lestes unguiculatus	Lyre-tipped spreadwing	G5	S5	Yellow
FAMILY COENAGRIONIDAE				
Amphiagrion abbreviatum	Western red damsel	G5	S4	Yellow
Argia emma	Emma's dancer	G5	S3S4	Blue
Argia vivida	Vivid dancer	G5	S2	Red
Coenagrion angulatum	Prairie bluet	G5	S3S4	Blue
Coenagrion interrogatum	Subarctic bluet	G5	S4S5	Yellow
Coenagrion resolutum	Taiga bluet	G5	S5	Yellow
Enallagma boreale	Boreal bluet	G5	S5	Yellow
Enallagma carunculatum	Tule bluet	G5	S5	Yellow
Enallagma civile	Familiar bluet	G5	S1	Red
Enallagma clausum	Alkali bluet	G5	S4	Yellow
Enallagma cyathigerum	Northern bluet	G5	S5	Yellow
Enallagma ebrium	Marsh bluet	G5	S5	Yellow
Enallagma hageni	Hagen's bluet	G5	S3S4	Blue
Ischnura cervula	Pacific forktail	G5	S5	Yellow
Ischnura damula	Plains forktail	G5	S1	Red
Ischnura erratica	Swift forktail	G4	S4	Yellow
Ischnura perparva	Western forktail	G5	S5	Yellow
Nehalennia irene	Sedge sprite	G5	S5	Yellow
FAMILY AESHNIDAE				
Aeshna canadensis	Canada darner	G5	S5	Yellow
Aeshna constricta	Lance-tipped darner	G5	S2	Red
Aeshna eremita	Lake darner	G5	S5	Yellow
Aeshna interrupta	Variable darner	G5	S5	Yellow
Aeshna juncea	Sedge darner	G5	S5	Yellow
Aeshna palmata	Paddle-tailed darner	G5	S5	Yellow
Aeshna septentrionalis	Azure darner	G5	S4	Yellow
Aeshna sitchensis	Zigzag darner	G5	S5	Yellow

Appendix 1. List of the dragonflies (Odonata) of British Columbia and their conservation ranks (December 2004) (cont'd).

Scientific name	*English name*	*Global rank*	*Prov. rank*	*List*
Aeshna subarctica	Subarctic darner	G5	S5	Yellow
Aeshna tuberculifera	Black-tipped darner	G4	S4	Yellow
Aeshna umbrosa	Shadow darner	G5	S5	Yellow
Anax junius	Common green darner	G5	S5	Yellow
Rhionaeschna californica	California darner	G5	S5	Yellow
Rhionaeschna multicolor	Blue-eyed darner	G5	S5	Yellow
FAMILY GOMPHIDAE				
Gomphus graslinellus	Pronghorn clubtail	G5	S2S3	Blue
Octogomphus specularis	Grappletail	G4	S2	Red
Ophiogomphus colubrinus	Boreal snaketail	G5	S4	Yellow
Ophiogomphus occidentis	Sinuous snaketail	G4	S4	Yellow
Ophiogomphus severus	Pale snaketail	G5	S5	Yellow
Stylurus olivaceus	Olive clubtail	G4	S1S2	Red
FAMILY PETALURIDAE				
Tanypteryx hageni	Black petaltail	G3	S2S3	Blue
FAMILY CORDULEGASTRIDAE				
Cordulegaster dorsalis	Pacific spiketail	G5	S5	Yellow
FAMILY MACROMIIDAE				
Macromia magnifica	Western river cruiser	G4	S3	Blue
FAMILY CORDULIIDAE				
Cordulia shurtleffii	American emerald	G5	S5	Yellow
Epitheca canis	Beaverpond baskettail	G5	S3	Blue
Epitheca spinigera	Spiny baskettail	G5	S5	Yellow
Somatochlora albicincta	Ringed emerald	G5	S5	Yellow
Somatochlora brevicincta	Quebec emerald	G3	S3	Blue
Somatochlora cingulata	Lake emerald	G5	S4	Yellow
Somatochlora forcipata	Forcipate emerald	G5	S2S3	Blue
Somatochlora franklini	Delicate emerald	G5	S5	Yellow
Somatochlora hudsonica	Hudsonian emerald	G5	S4S5	Yellow
Somatochlora kennedyi	Kennedy's emerald	G5	S3S4	Blue
Somatochlora minor	Ocellated emerald	G5	S5	Yellow
Somatochlora semicircularis	Mountain emerald	G5	S5	Yellow
Somatochlora septentrionalis	Muskeg emerald	G5	S4	Yellow
Somatochlora walshii	Brush-tipped emerald	G5	S4	Yellow
Somatochlora whitehousei	Whitehouse's emerald	G5	S5	Yellow
FAMILY LIBELLULIDAE				
Erythemis collocata	Western pondhawk	G5	S3	Blue
Ladona julia	Chalk-fronted skimmer	G5	S5	Yellow
Leucorrhinia borealis	Boreal whiteface	G5	S5	Yellow

Appendix 1. List of the dragonflies (Odonata) of British Columbia and their conservation ranks (December 2004) (cont'd).

Scientific name	*English name*	*Global rank*	*Prov. rank*	*List*
Leucorrhinia glacialis	Crimson-ringed whiteface	G5	S5	Yellow
Leucorrhinia hudsonica	Hudsonian whiteface	G5	S5	Yellow
Leucorrhinia intacta	Dot-tailed whiteface	G5	S5	Yellow
Leucorrhinia patricia	Canada whiteface	G4	S4	Yellow
Leucorrhinia proxima	Belted whiteface	G5	S5	Yellow
Libellula forensis	Eight-spotted skimmer	G5	S5	Yellow
Libellula pulchella	Twelve-spotted skimmer	G5	S3	Blue
Libellula quadrimaculata	Four-spotted skimmer	G5	S5	Yellow
Pachydiplax longipennis	Blue dasher	G5	S3S4	Blue
Pantala hymenaea	Spot-winged glider	G5	SA	Accidental
Plathemis lydia	Common whitetail	G5	S4	Yellow
Sympetrum corruptum	Variegated meadowhawk	G5	S5	Yellow
Sympetrum costiferum	Saffron-winged meadowhawk	G5	S5	Yellow
Sympetrum danae	Black meadowhawk	G5	S5	Yellow
Sympetrum illotum	Cardinal meadowfly	G5	S4	Yellow
Sympetrum internum	Cherry-faced meadowhawk	G5	S5	Yellow
Sympetrum madidum	Red-veined meadowhawk	G4	S4	Yellow
Sympetrum obtrusum	White-faced meadowhawk	G5	S5	Yellow
Sympetrum occidentale	Western meadowhawk	G?Q	S5	Yellow
Sympetrum pallipes	Striped meadowhawk	G5	S5	Yellow
Sympetrum vicinum	Autumn meadowhawk	G5	S3S4	Blue
Tramea lacerata	Black saddlebags	G5	SZN	Yellow