

**Protected Aquatic Insects of Latvia –  
*Leucorrhinia albifrons* (BURMEISTER, 1839) and *L. caudalis*  
(CHARPENTIER, 1840) (Odonata: Libellulidae)**

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KALNIŅŠ M. 2008. PROTECTED AQUATIC INSECTS OF LATVIA – *LEUCORRHINIA ALBIFRONS* (BURMEISTER, 1839) AND *LEUCORRHINIA CAUDALIS* (CHARPENTIER, 1840) (ODONATA: LIBELLULIDAE). - *Latvijas entomologs*, 45: 5-13.

**Abstract:** The Eastern White-faced Darter *Leucorrhinia albifrons* (BURMEISTER, 1839) and Dainty White-faced Darter *L. caudalis* (CHARPENTIER, 1840) are protected by the Regulations of Cabinet of Ministry in Latvia. Both species can be found in most European countries. Published data, collections, data collected during the project „*Analysis of the Specially Protected Nature Territories in Latvia and Establishing of EMERALD/Natura 2000 Network*” and material collected by Latvian entomologists have all been used in the analysis of the distribution of this species. The distribution of *L. albifrons* and *L. caudalis* were mapped using a basic grid of 5x5 km squares in the Baltic grid system. In total, *L. albifrons* is recorded from 96 squares and *L. caudalis* - from 80 squares in Latvia. The most known localities are concentrated in central and northern Latvia. The majority of localities of *L. albifrons* in Latvia has been recorded in natural eutrophic the Lakes with *Magnopotamion* or *Hydrocharition* – type vegetation and in natural dystrophic the Lakes and ponds, in active raised bogs or transition mires. Other *L. albifrons* habitats are polytrophic the Lakes and polytrophic oxbow the Lakes with *Magnopotamion* or *Hydrocharition* type vegetation, hard oligo-mesotrophic the Lakes with benthic vegetation of *Chara* spp. The majority of localities of *L. caudalis* in Latvia has been recorded in natural eutrophic the Lakes with *Magnopotamion* or *Hydrocharition* – type vegetation, polytrophic the Lakes and polytrophic oxbow the Lakes with *Magnopotamion* or *Hydrocharition* type vegetation. Other *L. albifrons* habitats are hard oligo-mesotrophic the Lakes with benthic vegetation of *Chara* spp., natural dystrophic the Lakes and ponds, in active raised bogs or transition mires.

**Key words:** Odonata, Libellulidae, *Leucorrhinia albifrons*, *Leucorrhinia caudalis*, protected species, habitats, distribution, Latvia.

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### Introduction

The aim of this paper is to summarize available information of the distribution and characteristic habitats Eastern White-faced Darter *Leucorrhinia albifrons* and Dainty White-faced Darter *Leucorrhinia caudalis* in Latvia. Both species are protected in Latvia (Regulations... 2000), but data were not summarized and the species protection status has not been assessed. *L. albifrons* can be found in most European countries – Austria, Belarus, Czech Republic, Estonia, Finland, France, Germany, Latvia, Lithuania, The Netherlands, Norway, Poland, Sweden, Switzerland, The Ukraine and Russia (Central, Southern and Northern part of Europe), but it is absent from Great Britain as well. It is also distributed in the Asian part of Russia – Western Siberia (Askew

1998, Dijkstra 2006). Isolated extinct populations are known from France, Czech Republic, Slovakia and Denmark (Dijkstra 2006). *L. caudalis* can be found in most European countries – Austria, Belarus, Belgium, Bulgaria, Bosnia and Herzegovina, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Latvia, Lithuania, Luxembourg, The Netherlands, Norway, Poland, Romania, Serbia, Slovakia, Slovenia, Sweden, Switzerland, The Ukraine and Russia (Central, Southern and Northern part of Europe), but it is absent from Great Britain. The species is distributed also in the Asian part of Russia – Western Siberia (Askew 1998, Dijkstra 2006). An isolated extinct population is known from the Czech Republic (Dijkstra 2006). Both species are protected in the majority of European countries following the

Bern Convention (Bern Convention... 1979) and EU directives (Council... 1992).

*L. albifrons* has been first mentioned for Latvia by E. Ozols (1936) without concrete locality. Later, the species was found all over Latvia – the Lake Sīvers, the Lake Engure, the Lake Alaukstas, the Lake Pape, the Lake Gauratas, the Lake Koruļu etc. (Bērziņš 1938, Grigulis 1953, Spuris 1952, 1953, 1960, 1963, 1964, 1990). *L. caudalis* has been first mentioned in Latvia by B. Bērziņš (1942) from different places all over Latvia. Later the species was recorded from the Lake Engure, the Lake Pērkoņu, the Lake Alaukstas, the Lake Papes, the Lake Pulgosnis, the Lake Lubānas, the Lake Lielaucis etc. (Grigulis 1953, Spuris 1943, 1952, 1953, 1960, 1963, 1964, 1974, 1990, 1992). Z. Spuris (1956) summarized all known data about both species until 1956. Some remarks about confirmed localities and distribution have been made in several recent papers (Hydrobiological... 1999; Kalniņš 2001, 2006; Inberga-Petrovska 2003).

## Methods

Published data, the collections of the Department of Zoology and Animal Ecology of the Faculty of Biology of the University of Latvia, collections of the Institute of Biology of the University of Latvia, collections of the Natural History Museum of Latvia, the data collected during the project „*Analysis of the Specially Protected Nature Territories in Latvia and Establishing of EMERALD/Natura 2000 Network*” in 2001-2002 and material collected by Latvian entomologists up to 2007 have been used in the analysis of the distribution and habitat preference. Data on dragonflies were collected by using a hydrobiological net or entomological net, or by direct observations. The material was collected from 1998 to 2007. Both historical and recent data, totally 169 records of *L. albifrons* and 145 records of *L. caudalis*, were included in a Microsoft Office Access database hold by the author.

Distribution of *L. albifrons* was mapped using a basic grid of 5x5 km squares in the Baltic grid system on a Transverse Mercator projection (TM-1993) of Latvia. The current map is based on 1:50 000 scale satellite maps

available for Latvia, published in 1999-2000 by State Land Service of the Republic of Latvia. This map is divided at 1x1 km (= 1 km<sup>2</sup>) squares and the border of 5x5 km squares coincide with the every fifth km line. Totally, the terrestrial territory of Latvia is divided into 2785 squares (some squares are not complete). The distribution maps of *L. albifrons* and *L. caudalis* were prepared based on data in own database.

The typological classification of water bodies and description of vegetation was based on Kabucis (2000), Cimdiņš (2001), Internet resources (www.ezeri.lv 2007), and observations made by the author (oxbow the Lakes).

**Explanations:** Distr. – district; env. – environment; NP – National Park; NR – nature reserve; PPNT – particularly protected nature territory; vill. – village; num. – numerous; ad. – adult; lv. – larvae; ex. - exuvie. The number of specimens and development stage (adult or unknown) is given in brackets after the date of collection.

## Results

A list of localities of the *L. albifrons* arranged by administrative districts.

**Alūksne Distr.**, Veclaicene PPNT, the Lake Koruļu 11.07.1963 (ad.) and the Lake Mazais Paikis 20.06.1964 (ad.) (Spuris 1964); the Mire Baltais PPNT, 25.06.2002 (2 ad.), leg. M.Kalniņš; Korneti-Peļļi PPNT, the Lake Kalekaura, 25.06.2002 (1 ad.), leg. M.Kalniņš; the Mire Lepuru PPNT, S part, 25.06.2002 (ad.), leg. M.Kalniņš; Korneti-Peļļi PPNT, the Lake Raipala, W part, 16.06.2003 (ad.), leg. V.Spuņģis; the Lake Meistars near Mārkalne, 03.08.2005 (counted 20 ad. on all lake), leg. M.Kalniņš; the Lake Sīļu near Mārkalne, 04.08.2005 (1 ad.), leg. M.Kalniņš; the Lake Tubuļa near Mārkalne, 04.08.2005 (3 ad.), leg. M.Kalniņš.

**Balvi Distr.**, the Mire Orlovas (Ērgļu) PPNT, 08.07.2001 (ad.), leg. A. Karpa.

**Cēsis Distr.**, the Lake Alauksta, 14.07.1954 (ad.); Gauja NP, the Lake Ratnieku and in numerous small bog lakes in Sudas bog, 15.06.1960 (ad.); the Lake Zobols, 20.06.1961 (ad.), (Spuris 1963); the Lake Alauksta, Gauja NP, Sudas bog, (Spuris 1956); Gauja NP,

Gulbjusalas bog, the Lake Melnezers, 10.08.1999 (ad.), leg. S.Inberga; Gauja NP the oxbow lake Titmaņu near Līgatne, 16.06.2002 (num. ad.), 04.06.2005 (2 ad.), 18.06.2005 (1 ad.), 28.05.2006 (1 ad.), including teneral specimens, leg. M.Kalniņš; Gauja NP, Sudas bog, 14.06.2003 (ad.), leg. V.Spuņģis; Gauja NP, Sudas bog, Purgaiļu dzelmes (small bog lakes), 15.07.2004 (1 ad.), leg. M.Kalniņš; the Lake Vārnezers near Vecpiebalga, 07.08.2005 (2 ad.), leg. M.Kalniņš.

**Daugavpils Distr.**, the Lake Sventes PPNT, SW part near Riekstiņi, 30.06.2002 (1 ad.), leg. R.Cibuļskis.

**Dobele Distr.**, Vīķu marsh in the Lake Lielaucis S part, (Spuris 1952); the Lake Gauratas, the Lake Lielaucis (Spuris 1956).

**Jēkabpils Distr.**, the Lake Piksteres, (Spuris 1953, 1956); the Mire Nomavas PPNT, the Lake Nomavas N part, 04.07.2002 (ad.), leg. R.Cibuļskis.

**Jelgava Distr.**, Zaļenieki (Spuris 1956).

**Jūrmala city**, Jaundubulti, forest, gardens (Spuris 1963); Melluži, 16.06.1930 (1 ad.), leg. J.Muskars (collection of Natural History Museum of Latvia).

**Krāslava Distr.**, the Lake Sīvers, 15.06.1938 (ad.) (Bērziņš 1938); the Lake Mazais Ožuhņu, the Lake Ojatu, the Lake Skaists, the Lake Sīvers, the Lake Jodu, the Lake Drīdzis, the Mire Bleideļu near the Lake Sīvers (Spuris 1956).

**Liepāja Distr.**, the Lake Pape, 15.06.1958 (1 ad.), (Spuris 1963); the Lake Tosmāre PPNT, 30.06.2001 (ad.), leg. E.Dreijers; the Lake Tāšu PPNT, E bank near Vīnkalni and Krasti vill., 22.06.2002 (ad.), leg. V.Spuņģis; the Lake Liepājas PPNT, Vītiņu meadows, 27.06.2003 (ad.), leg. V.Spuņģis;

**Limbaži Distr.**, Pirtsmeža mire PPNT, 20.06.2001 (ad.), leg. V.Spuņģis; Lielpurvs PPNT, W part, 27.06.2001 (ad.), leg. V.Spuņģis; the Mire Laugas, the Lake Višezers PPNT, 23.07.2001 (2 ad.), leg. M.Kalniņš; the Lake Grabatiņš, 31.07.2005 (counted 25 ad. in all lake), leg. M.Kalniņš; Ainažu env., quarry S from Šalkas, 21.06.2007 (2 ex.), leg. M.Kalniņš; quarry N from Šalkas, 21.06.2007 (1 ex.), leg. M.Kalniņš.

**Ludza Distr.**, Cucuri, S from Rundāni, 06.08.2005 (fragments), leg. R.Bernard.

**Madona Distr.**, the Lake Julsēnu, 01.07.1961 (ad.), the Lake Grīvu, 16.07.1961 (ad.), the Lake Ērgļu (Vecmuižas), 24.08.1962 (1 ad.), (Spuris 1963); Teiči NR, the Lake Kurtavas, 14.07.1964 (ad.), (Spuris 1964); Teiči NR, the Lake Kurtavas near Bārbaļu pussala, 22.06.1997 (10 ad.), the Lake Vaboles, 25.06.1997 (ad.), the Lake Murmastienes, 25.08.1997 (6 ex.), the Lake Lisiņš, 26.08.1997 (ad.), the Lake Islienais, 11.06.-27.06.1997, 20.08.-03.09.1997 (ad.), the Lake Mindaugas, 11.06.-27.06.1997, 20.08.-03.09.1997 (ad.), the Lake Sildu, 11.06.-27.06.1997, 20.08.-03.09.1997 (ad.), (Matthes & Matthes 1997); Krustkalni NR, 15.06.2001 (1 ad.), leg. G.Akmentiņš; Driksnas sils PPNT, mire near lake, 28.06.2004 (1 ad.), leg. G.Akmentiņš; the Mire Palšu PPNT, SW part, 11.07.2001 (num. ad.), leg. M.Kalniņš; Kraukļu quarry near Cesvaine 23.06.2002 (2 ad.), leg. M.Kalniņš.

**Ogre Distr.**, the Lake Lobes (Viskaļu), 17.06.1957 (ad.), (Spuris 1963); the Lake Selēku 3 km N from Ikšķīle, 12.07.1988 (1 ad.), (Spuris 1990).

**Rēzekne Distr.**, Kvapāni vill., near forest, 15.06.1957 (Spuris 1963).

**Rīga Distr.**, the Lake Aklais, the Lake Līņu, the Lake Lilastes, the Lake Vidus, the Lake Lielais Baltezers, the Lake Lielais Jūgu, the Lake Slokas, the Lake Buļļu PPNT, (Spuris 1953, 1956); Ķemeri between Ķemeri and Ķemeru tīrelis, the Lake Langstiņu, the Lake Laveru near Carnikava, the Lake Sudrabezers, the Lake Sunīšu near Upesciems, Rīga, Ulbroka, Varkaļi near the Lake Babītes, (Spuris 1956); the Lake Laveru near Carnikava, 22.06.1955 (Spuris 1963); Rīga, 13.06.1937 (1 ad.), leg. J.Muskars (collection of Natural History Museum of Latvia); the Lake Buļlezers PPNT, 15.07.2001 (1 ad.), leg. M.Kalniņš; the Mire Dzelves-Kroņa PPNT, N part near Dzelves, 23.07.2001 (2 ad. in copula), leg. M.Kalniņš; the Lake Ummis PPNT, 23.07.2001 (2 ad.), leg. M.Kalniņš; the Lake Ummeru, N part, 29.07.2001 (4 ad.), leg. M.Kalniņš; the Lake Babīte, NW part, near Spuņciems, 12.08.2001 (ad.), leg. S.Inberga; Ķemeru tīrelis PPNT, 04.06.2002 (1 ad.), leg. V.Spuņģis; Mazie Kangari PPNT, the Mire Buļļu SW part, 08.06.2003 (ad.), leg. V.Spuņģis; Ķemeri NP, the Mire Labais 02.06.2006 (num. ad. and teneral specimens),

leg. Z.Pīpkalēja; Ķemeri NP, ponds S from the Lake Lilijezers, 11.06.2006 (70 ad. on 200 m, ad. and teneral specimens), leg. M.Kalniņš; Cenas tīrelis PPNT, the Lake Skaists, 15.06.2007 (20 ad.), leg. M.Kalniņš; Cenas tīrelis PPNT, 02.07.2007 (1 ad.), leg. A.Klepers.

**Talsi Distr.**, the Lake Sirdsezers (Sukturu), 08.08.1960 (ad.), (Spuris 1963); the Lake Engure PPNT near Lielsala island, 16.05.1958 (20 lv/m<sup>2</sup>), 03.07.1958 (101 lv/m<sup>2</sup>), 25.07.1958 (13 lv/m<sup>2</sup>), 13.08.1958 (109 lv/m<sup>2</sup>), 16.09.1958 (289 lv/m<sup>2</sup>), 11.06.1959 (8 lv/m<sup>2</sup>), 12.06.1959 (17 lv/m<sup>2</sup>), 27.06.1959 (57 lv/m<sup>2</sup>), 16.07.1959 (37 lv/m<sup>2</sup>), 12.08.1959 (45 lv/m<sup>2</sup>), 10.09.1959 (83 lv/m<sup>2</sup>) on *Chara aspera* and *Chara intermedia*, but not all specimens were *L. albifrons* (Spuris 1960); Talsu pauguraine PPNT, the Lake Mācītājmājas, the Lake Bezdibeņezers, 07.06.2002 (num. in both lakes, ad.), leg. V.Spuņģis; Šlītere NP, the Lakes Pēterezeri, 17.07.2005 (20 ad.), 23.07.2006 (8 ad.), 30.05.2007 (40 ad.), leg. M.Kalniņš; Šlītere env. Kāppurplavu peat quarry, 30.05.2007 (75 ad., 7 ex.), leg. M.Kalniņš.

**Tukums Distr.**, Līgciems, 26.06.1953 (1 ad.), (Grigulis 1953); the Lake Engure PPNT, (Spuris 1953, 1956, 1960, Hydrobiological...1999); the Lake Engure PPNT, near the Ornithological Field station of Institute of Biology, 07.06.1999 (ad.), 12.06.1999 (4-10 ad.), 19.06.1999 (11-50 ad.), 26.06.1999 (11-50 ad.), 07.07.1999 (51-100 ad.), 17.07.1999 (4-10 ad.), 24.07.1999 (ad.), 30.07.1999 (1-3 ad.) 07.08.1999 (1-3 ad.) (Inberga-Petrovska 2003); Ķemeri NP, the Lake Gārgaļu, 11.06.2006 (12 ad. including teneral specimens, 8 ex.), leg. M.Kalniņš; Ķemeri NP, the Lake Gārgaļu and adjacent territories, 18.07.2007 (133 ad.), leg. M.Kalniņš.

**Valka Distr.**, the Mire Sedas PPNT, in several places, 07-08.06.2001 (num. ad. and teneral specimens), leg. M.Kalniņš, V.Spuņģis; Ziemeļgauja PPNT, the oxbow lake in Zemā sala, 18.06.2001 (num. ad.); the Mire Kārķu PPNT, 18.06.2002 (num. ad.), leg. M.Kalniņš; the Mire Purgaiļu, lake, 02.08.2005 (15 ad. in all lake) M.Kalniņš.

**Valmiera Distr.**, quarry near Vidusburtnieks PPNT, 26.06.2005 (1 ad.), leg. M.Kalniņš.

**Ventspils Distr.**, Ance bogs and forests PPNT, the Lake Puterezers, 01.07.2001 (num. ad.), leg. V.Spuņģis; the Mire Klāņu PPNT, 18.06.2005

(1 ad.), leg. V.Spuņģis.

Two localities previously mentioned in literature, were unable find on maps - the Lake Bojartu, 07.07.1960 (ad.) (Spuris 1963) and the Lake Salaku (Spuris 1956). The data on presence of dragonflies are known from 669 squares (5x5 km) of 2785. *L. albifrons* is recorded from 96 squares (Figure 1), thus covering 3.4 % on the territory of Latvia.

A list of localities of the *L. caudalis* arranged by administrative districts.

**Aizkraukle Distr.**, the Lake Odzes, 16.06.1957 (ad.), (Spuris 1963).

**Alūksne Distr.**, Veclaicene PPNT, the Lake Klotiņu, 11.07.1963 (ad.), (Spuris 1964).

**Balvi Distr.**, the Lake Pērķoņu near Balvi, 12.07.1956 (ad.), (Spuris 1963).

**Cēsis Distr.**, Cēsis, 10.06.1940 (1 ad.), (Spuris 1943); the Lake Alaukstis, 14.07.1954, 09.06.1957 (ad.); the Lake Tauns near Vecpiebalga, 10.06.1957 (ad.); the Lake Zobols, 20.06.1961 (ad.), (Spuris 1963); the Lake Alaukstis, Cēsis env., (Spuris 1956); the Lake Leimaņu, rivulet 1 km from the lake near Lūķēni, 02.06.1990 (3 ad.), the Lake Buļezers, S from the Lake Leimaņu near Lūķēni, 03.06.1990 (1 ad.), the lake with marshy banks (Spuris 1992); Gauja NP, the Lake Driškins, 10.08.1999 (ad.), leg. S.Inberga; Gauja NP the oxbow lake Tītmaņu near Līgatne, 18.06.2005 (1 ad.), 28.05.2006 (6 ad.), including teneral specimens, leg. M.Kalniņš; Gauja NP, oxbow near Amata the River entry, 05.07.2003 (num. ad.), oxbow Rakstu mazā, 05.07.2003 (num. ad.), leg. M.Kalniņš.

**Dobele Distr.**, Vīķu marsh in the Lake Lielaucis S part, 06.07.1950 (Spuris 1952); the Lake Lielaucis, marshy banks, 24.-25.05.1950 (Spuris 1952, 1956).

**Gulbene Distr.**, the Mire Lielais Mārku PPNT, SW part near the Lake Ušuru, 26.06.2002 (ad.), leg. K.Vilks.

**Jēkabpils Distr.**, the Lake Piksteres, (Spuris 1953, 1956); the Lake Silabebru PPNT, 10.07.2001 (1 ad.), leg. G.Akmentiņš.

**Krāslava Distr.**, the Lake Mazais Ožuhņu, (Spuris 1953); the Lake Ata (Ota), the Lake Aulejas, the River Dubna in Aulejas parish, the Lake Mazais Ožuhņu, the Lake Ojatu, the Lake Plaudīša, the Lake Sīvers, the Lake Drīdzis, the

Mire Bleideļu near the Lake Sīvers (Spuris 1956).

**Liepāja Distr.**, Liepāja, (Spuris 1956); the Lake Pape, 24.05.1957, 15.06.1958 (ad.), (Spuris 1963); the Lake Tāšu PPNT, E bank near Vīnkalni and Krasti vill., 22.06.2002 (ad.), leg. V.Spuņģis.

**Limbaži Distr.**, the Lake Limbažu Dūņezers, (Spuris 1956); the Lake Limbažu Dūņezers, 06.07.1955 (ad.), (Spuris 1963); Augstroze PPNT, 13.06.2001 (ad.), leg. V.Spuņģis; Lielpurvs PPNT, W part, 27.06.2001 (ad.), leg. V.Spuņģis.

**Madona Distr.**, the Lake Ērgļu (Vecmuižas), the Lake Pekšēnu, (Spuris 1956); the Lake Pekšēnu, 30.06.1955 (ad.), the Lake Pulgosnis, 29.06.1961 (ad.), the Lake Vidus, 03.07.1961 (ad.), the Lake Linu (between the Lakes Dinišku and Vidus), 04.07.1961 (ad.), the Lake Ērgļu (Vecmuižas), 29.06.1955 (ad.), 24.08.1962 (1 ad.), (Spuris 1963).

**Ogre Distr.**, the Lake Lobes (Viskaļu), 17.06.1957 (ad.), (Spuris 1963); the Lake Selēku 3 km N from Ikšķīle, 10.06.1988 (1 ad.), 12.07.1988 (1 ad.), (Spuris 1990); the Lake Kaparāmura (Spuris 1953, 1956). Currently the Lake Kaparāmura is dehumidified ([www.ezeri.lv](http://www.ezeri.lv) 2007).

**Rēzekne Distr.**, the Lake Feimaņu (Spuris 1956); the Lake Lubāna near the River Rēzekne entry, 12.06.1957 (ad.), the Lake Lielķivliņu (Gaigalava, Lielais Kiuriņš), 13.06.1957 (ad.), Kvpāni vill., near forest, 15.06.1957 (Spuris 1963); the Mire Tīrumnieku PPNT, near the Lake Teirumnīku S part, 27.07.2002 (ad.), leg. G.Akmentiņš.

**Rīga Distr.**, the Lake Līņu, the Lake Vidus, the Lake Vidus, the Lake Lielais Baltezers, the Lake Lielais Jūgu, the Lake Sudrabezers, (Spuris 1953); Gauja oxbows near Inčukalns, the Lake Līņu, the Lake Lielais Baltezers, the Lake Lielais Jūgu, the Lake Lilaste, the Lake Laveru near Carnikava, the River Mazā Jugla near Cekule station, the Lake Sekšu, the Lake Sudrabezers, Rīga, Ulbroka, the Lake Vidus, (Spuris 1956); the Lake Dzirnezers, 21.07.1956, the Lake Laveru near Carnikava, 22.06.1955, 23.05.1959 (Spuris 1963); Sigulda, Saulstaru oxbow, 02.06.1971 (2 teneral), Sigulda, Vikmestes pound, 09.06.1971 (3 ad.) (Spuris 1974); Rīga, 15.06.1938 (1 ad.), Rīga,

Vecmīlgrāvis 12.06.1966 (1 ad.), leg. J.Muskars (collection of Natural History Museum of Latvia); the Lake Babīte, SW part, near Gātes pļavas, 12.08.2001 (ad.), leg. S.Inberga; Ķemeri NP, the Mire Labais 02.06.2006 (num. ad. and teneral specimens), leg. M.Kalniņš; Ķemeri NP, ponds S from the Lake Lilijezers, 11.06.2006 (5 ad. on 200 m, ad. and teneral specimens), leg. M.Kalniņš; Rīga, Mangaļsala, near Daugava the River entry, 07.06.2007 (3 ad.), leg. M.Kalniņš.

**Talsi Distr.**, the Lake Engures, Lielā sala, 01.06.1958 (54 ad.), (Spuris 1960); the Lake Mācītājmuižas S, 06.06.1960 (ad.) the Lake Engure, NW bank, 19.06.1960 (ad.), (Spuris 1963); the Lake Engure PPNT near Lielsala island, 16.05.1958 (33 lv/m<sup>2</sup>), 03.07.1958 (42 lv/m<sup>2</sup>), 13.08.1958 (10 lv/m<sup>2</sup>), 16.09.1958 (11 lv/m<sup>2</sup>), 27.06.1959 (10 lv/m<sup>2</sup>), 12.08.1959 (48 lv/m<sup>2</sup>), 10.09.1959 (50 lv/m<sup>2</sup>), on *Chara aspera* and *Chara intermedia* (Spuris 1960); Talsu pauguraine PPNT, the Lake Mācītājmājas, the Lake Sirdsezers, 07.06.2002 (num. in both lakes, ad.), leg. V.Spuņģis; Slītere NP, the Lakes Pēterezeri, 23.07.2006 (3 ex.), 30.05.2007 (1 ad., 3 ex.), leg. M.Kalniņš.

**Tukums Distr.**, Līgciems, 26.06.1953 (1 ad.), (Grigulis 1953); the Lake Engure, 01.01.1958 (frequently) (Spuris 1960); Dzīrnavu pond on Pūres rivulet before entry in the River Abava, 09.06.1956 (ad.) (Spuris 1963); the Lake Engure PPNT, (Hydrobiological...1999); the Lake Engure PPNT, near the Ornithological Field station of Institute of Biology, 29.05.1999 (1-3 ad.), 07.06.1999 (4-10 ad.), 12.06.1999 (11-50 ad.), 19.06.1999 (11-50 ad.), 26.06.1999 (ad.), 07.07.1999 (51-100 ad.), 17.07.1999 (4-10 ad.), 24.07.1999 (1-3 ad.), 30.07.1999 (4-10 ad.) 07.08.1999 (1-3 ad.) (Inberga-Petrovska 2003).

**Valka Distr.**, the Mire Sedas PPNT, in several places, 07-08.06.2001 (num. ad. and teneral specimens), leg. M.Kalniņš, V.Spuņģis; Ziemeļgauja PPNT, the oxbow Lakes: NW from Vadži, near Kaķi, near Starkas, near Zvejnieki, 25.06.2004 (num. ad.), near Zemā sala, 20.06.2001 (num. ad.), 25.06.2004 (8 ad.), near Maltuve, the Lake Dibenu, the Lake Zāļu, the oxbow Lake near Zīle, 26.06.2004 (num. ad.), the oxbow Lake near Tilikas, the oxbow Lake near Ūdensmaisi, 04.07.2006 (num. ad.), leg. M.Kalniņš.

**Valmiera Distr.**, Valmiera (Spuris 1956); the

Mire Vīķvēnu PPNT, 12.06.2001 (1 ad.), leg. V.Spunģis.

**Ventspils Distr.**, Ance bogs and forests PPNT, Austerlunka, 01.07.2001 (num. ad.), leg. V.Spunģis; Raķupe PPNT, the River Raķupe valley near cemetery S from Kuikas, 08.07.2006 (3 ad.), leg. D.Telnov.

Two localities previously mentioned in literature, were unable find on maps - the Lake Kūku (NE from the Lake Bojartu), 08.07.1960 (ad.) (Spuris 1963) and the Lake Salaku (Spuris 1956). The data on presence of dragonflies are known from 669 squares (5x5 km) of 2785. *L. caudalis* is recorded from 80 squares (Figure 2), thus covering 2.9 % on the territory of Latvia.

### Discussion

Based on assessments made until 2001 by author, populations of *L. albifrons* and *L. caudalis* occur on 30-50 localities in Latvia. As the types of habitats, such as eutrophic lakes and oxbow lakes, where the both species have been found, are widespread in Latvia and the environmental conditions of the historically known localities have not changed significantly (www.ezeri.lv 2007, Cimdiņš 2001), these species probably occur in larger number of localities.

The majority of the recent localities are situated in the central and the northern part of Latvia. This is partially a result of the frequency of visiting. Data of 53 squares for *L. albifrons* and 29 squares for *L. caudalis* were gathered during the last decade. This is a result of focused studies of protected nature territories during the project „Analysis of the Specially Protected Nature Territories in Latvia and Establishing of EMERALD/Natura 2000 Network” and the author’s studies in the oxbow lakes of the River Gauja. Totally *L. albifrons* and *L. caudalis* found in 137 localities, 39 (28 %) of them these species are common.

Further analyses shows, that another *Leucorrhinia* species, the Large White-faced Darter *L. pectoralis*, is strongly connected with oxbow lakes (Kalniņš 2007). Similar analysis on *L. albifrons* and *L. caudalis* show, that these species are more or less related with oxbow

lakes. So far, *L. albifrons* was found in one oxbow lake along the River Gauja inside the Gauja NP and in one oxbow lake along the River Gauja inside the Ziemeļgauja PPNT. *L. caudalis* was found in five oxbow lakes along the River Gauja inside the Gauja NP and in 10 oxbow lakes along the River Gauja inside the Ziemeļgauja PPNT. Approximately 350-400 oxbows are estimated to occur along The River Gauja from Gaujiena to the estuary (stretch length about 250 km). Based on data on the species distribution and habitat requirements, it is estimated that *L. caudalis* micropopulations may be found in ca. 1/4 of all oxbow lakes inside the Gauja NP (about 20-30 oxbow lakes) and in ca. 1/2 of all oxbow lakes inside the Ziemeļgauja PPNT (about 30-40 oxbow lakes), but *L. albifrons* only in few oxbow lakes.

According to Dijkstra (2006) the *L. albifrons* inhabits a wide selection of lakes, especially shallow ones in forests with abundant floating and emergent vegetation. Although it is confined to mesotrophic lakes in the periphery of its range. Elsewhere, it is also occurs in rather acidic, oligotrophic or eutrophic waters. The majority of localities of *L. albifrons* in Latvia has been recorded in natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* – type vegetation (ca. 34 localities) and in natural dystrophic lakes and ponds, in active raised bogs or transition mires (ca. 34 localities). Other *L. albifrons* habitats are polytrophic lakes ca. 7 localities) and polytrophic oxbow lakes with *Magnopotamion* or *Hydrocharition* type vegetation (2 localities), hard oligo-mesotrophic lakes with benthic vegetation of *Chara* spp. (4 localities). Only in a few cases species have been observed in gravel quarries (5 localities), peat quarries (1 locality) and oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoëto-Nanojuncetea* (2 localities).

According to Dijkstra (2006) the *L. caudalis* prefers pools and lakes, often in forests (but not shaded), with moderate nutrient levels and rich (especially aquatic) vegetation. In the periphery of its range, often found in oxbows and fishponds. The majority of localities of *L. caudalis* in Latvia includes natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* – type vegetation (ca. 42

localities), polytrophic lakes (2 localities) and polytrophic oxbow lakes with *Magnopotamion* or *Hydrocharition* type vegetation (15 localities). Other *L. albifrons* habitats are hard oligo-mesotrophic lakes with benthic vegetation of *Chara* spp. (3 localities), natural dystrophic lakes and ponds, in active raised bogs or transition mires (7 localities). Most oxbow lakes inspected by the author have dense vegetation with high diversity of aquatic plants species, with stands of Water soldier *Stratiotes aloides*.

The studies made in the Lake Engure in 1999 (Inberga-Petrovska 2003) and in Tītmaņu the oxbow lake in 2005 (Kalniņš 2006) and recent data showed, that the flight season of the *L. albifrons* is mainly from mid June to late July, rarely in late May and early August, but of the *L. caudalis* mainly in June and July, rarely in late May and early August (in general longer than *L. albifrons*).

### Acknowledgements

I am grateful to my colleagues S. Inberga-Petrovska (The Entomological Society of Latvia, Rīga), A. Karpa (Institute of Biology, University of Latvia, Salaspils), G. Akmentiņš (Teiči Nature Reserve, Ļaudona), R. Cibulskis (Daugavpils University, Daugavpils), A. Klepers (Latvian Fund for Nature, Rīga), Z. Pīpkalēja (Rīga) for collecting or photographing dragonflies, J. Dreimanis (Natural History Museum of Latvia, Rīga) for assistance in review of museum collections, Dr. R. Bernard (Adam Mickiewicz University, Poland) for organizing expedition and to V. Spuņģis (Faculty of Biology, University of Latvia, Rīga) for valuable suggestions in preparing of the final version of this manuscript.

### Kopsavilkums

Raibgalvas purvuspāre *Leucorrhinia albifrons* (BURMEISTER, 1839) un resnvēdera purvuspāre *Leucorrhinia caudalis* (CHARPENTIER, 1840) ir īpaši aizsargājamas kukaiņu sugas Latvijā. Abas sugas ir sastopamas lielākajā daļā Eiropas valstu. Datu analizē izmantoti publicētie dati, kolekciju materiāli, projekta "Latvijas īpaši aizsargājamo teritoriju sistēmas saskaņošana ar EMERALD/NATURA

2000 aizsargājamo teritoriju tīklu" dati un Latvijas entomologu ievāktais materiāls. *L. albifrons* un *L. caudalis* izplatības attēlošanai izmantots 5x5 km kvadrātu tīkls Baltijas koordinātu sistēmā. Pašlaik *L. albifrons* konstatēta 96 kvadrātos, bet *L. caudalis* 80 kvadrātos. Vairums atradņu atrodas Latvijas centrālajā un ziemeļu daļā. Lielākā daļa *L. albifrons* atradņu konstatēta dabīgos eitrofos ezeros ar iegrimušo ūdensaugu un peldaugu augāju un distrofos ezeros, arī augstajos un pārejas purvos un citās distrofās ūdenstilpnēs. Citi *L. albifrons* apdzīvotie biotopi ir politrofī ezeri un politrofās vecupes ar iegrimušo ūdensaugu un peldaugu augāju, mezotrofās ūdenstilpnes ar bentisku mieturaļģu augāju. Lielākā daļa *L. caudalis* atradņu konstatēta dabīgos eitrofos ezeros ar iegrimušo ūdensaugu un peldaugu augāju, politrofās vecupēs ar iegrimušo ūdensaugu un peldaugu augāju. Citi *L. albifrons* apdzīvotie biotopi ir mezotrofās ūdenstilpnes ar bentisku mieturaļģu augāju, distrofos ezeros, arī augstajos un pārejas purvos un citās distrofās ūdenstilpnēs.

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Received: January 2, 2008.



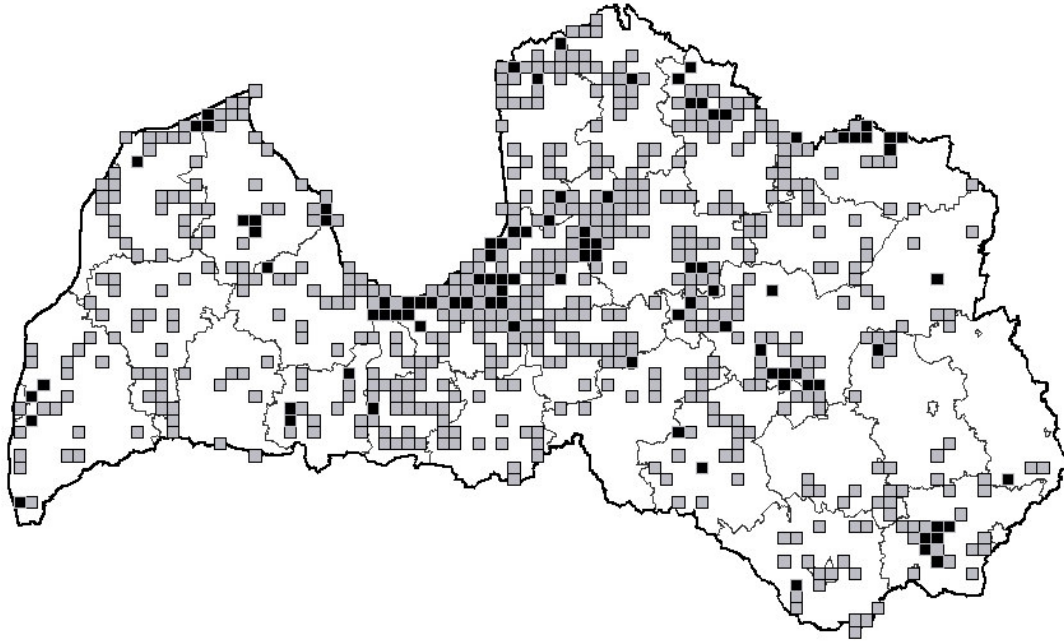


Figure 1. A distribution of *Leucorrhinia albifrons* in Latvia (black squares), and all dragonfly records (grey squares) until December 2007.

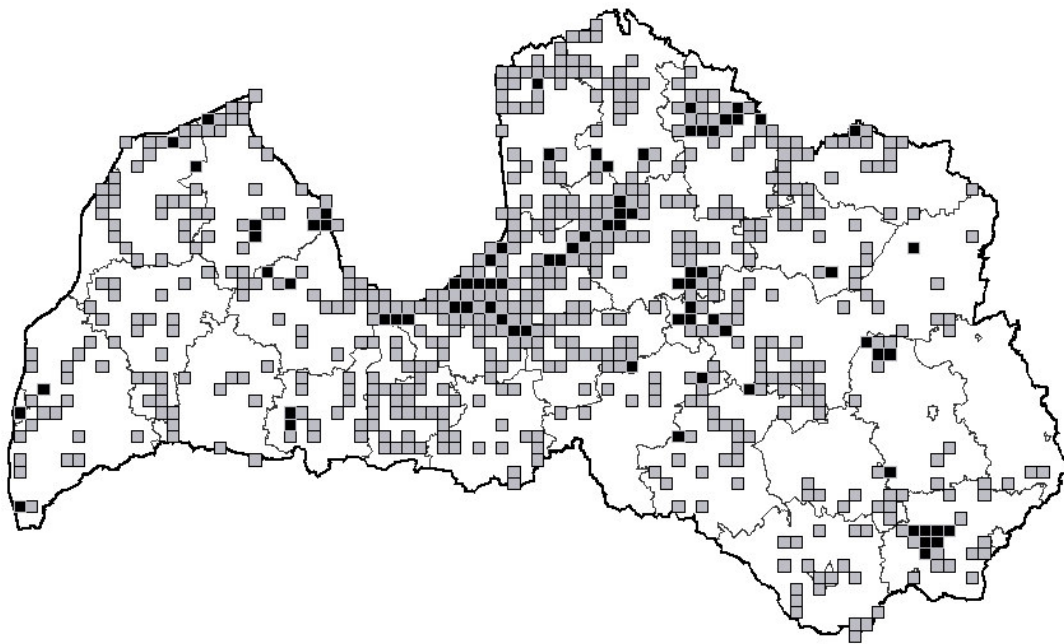


Figure 2. A distribution of *Leucorrhinia caudalis* in Latvia (black squares), and all dragonfly records (grey squares) until December 2007.