# The diving beetles (Coleoptera, Dytiscidae) of Sakhalin – an annotated checklist

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Nilsson, A.N. & Kholin, S.: The diving beetles (Coleoptera, Dytiscidae) of Sakhalin - an annotated checklist. [Sakhalins dykarskalbaggar (Coleoptera, Dytiscidae) - en kommenterad artlista.] - Ent. Tidskr. 115(3):143-156. Uppsala, Sweden 1994. ISSN 0013-886x.

A list of 36 species of diving water beetles (Dytiscidae) recorded from the North Pacific island of Sakhalin in the Far East of Russia is given. The records were based on own collections, museum material, or literature information. The Sakhalin records of two of the species not examined by us are regarded as doubtful and three literature records as erroneous. For each species all known localities are listed and assigned to one of 15 districts. Information on habitats and general distributions are also given. The following species are recorded from Sakhalin for the first time: *Hydroporus fuscipennis* Schaum, *H. acutangulus* Thomson, *H. uenoi* Nakane, *H. tristis* (Paykull), *H. breviusculus* Poppius, *H. laticollis* Zimmermann, *Agabus matsumotoi* M.Satô & Nilsson, *A. aequalis* Sharp, *A. erichsoni* Gemminger & Harold, *Ilybius poppiusi* Zaitzev, and *Colymbetes tolli* Zaitzev. The Sakhalin fauna is most similar to the fauna of Hokkaido, with 26 species known from both islands.

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## Introduction

The first records of Dytiscidae from Sakhalin were published by Zaitzev (1905, 1908) based on material collected by Suprunenko. A relatively rich material was collected between 1905-1946, when South Sakhalin (Karafuto, south of 50°N latitude) belonged to Japan, and reported on by Matsumura (1911), Kamiya (1932, 1934, 1938a-b, 1940) and Takizawa (1933). A few additional records from North Sakhalin were published by Zaitzev (1953). A more comprehensive list of Sakhalin Dytiscidae was not given until Lafer's (1989) treatment of the fauna of the Far East of Russia.

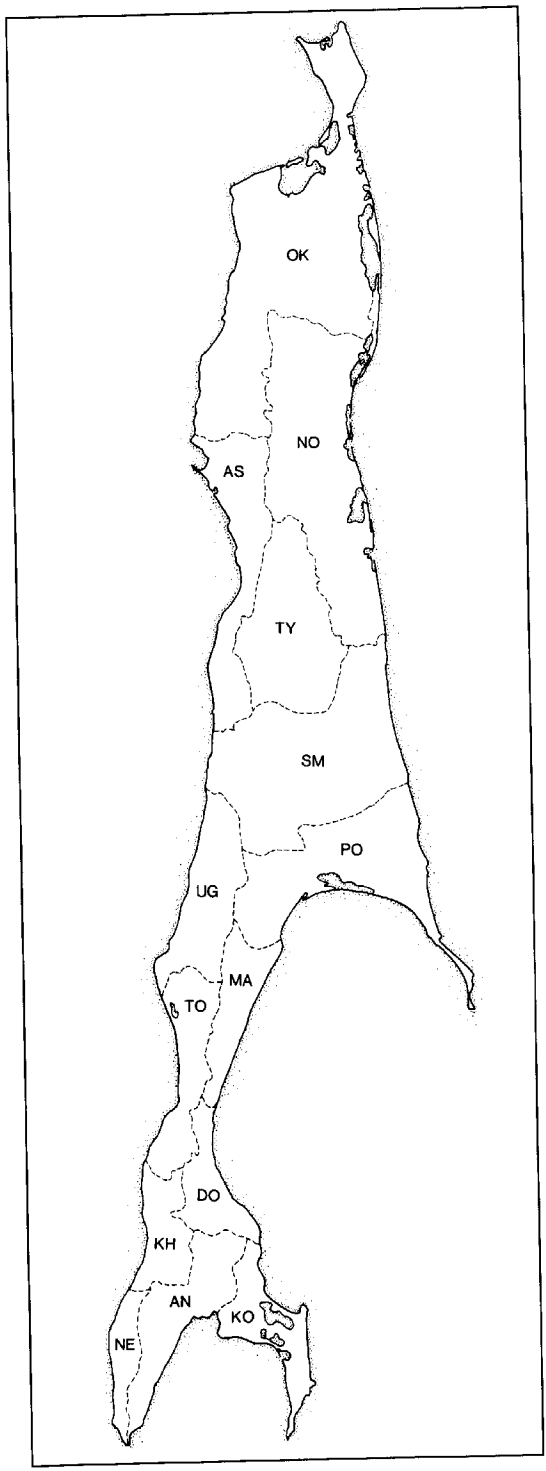
In order to get a better picture of the Sakhalin fauna we have now revised all previous records available. Moreover, we have collected a rich material of Dytiscidae on Sakhalin, including 11 species not previously known from the island.

## Geography, climate and nature

Sakhalin is one of the largest islands of the North Pacific. It covers a total area of 76,400 km$^2$. It is about 950 km long and is situated between 141°38' and 144°55'N along the eastern coast of Asia. In the north, Sakhalin is separated from the continent by the 7.5 km wide Nevelskoy Channel. South Sakhalin is separated from Hokkaido by the 37.5 km wide Laperuz Passage.

Geomorphologically, Sakhalin consists of two longitudinal middle altitude mountain ridges that reaches elevations of 1000 to 1300 m a.s.l (maximum 1609 m). Extensive lowlands are found in the northern part, and in the south along the coasts and also between the ridges (Figs 1-3).

The Sakhalin climate is moderately maritime and affected by the monsoons, i.e. with cool and long winters and rainy summers. The pronounced latitudinal extension, the complex topography,




and the different temperature regimes of the surrounding seas create a variety of climatic conditions. Generally, the east coast has a colder climate than the west coast due to effects from different ocean currents, i.e. the cold Sakhalin Current and the warm Tsushima Current, respectively.

Sakhalin has a rich system of permanent rivers and small streams, with chiefly clear water. Small lakes are found chiefly in plains and lowlands. Isolated lagoons are characteristic for the sea shores.

Extensive areas of peat bogs and wetlands have developed on the north plain. In the south these biotopes are restricted to coastal lowlands, especially adjacent to river outlets.

Most of Sakhalin is covered with coniferous forest (taiga), representing three major types. The northern taiga is dominated by *Larix cajanderi* Mayr and *Pinus pumila* (Pall.) Regel. In the central parts, the forests are formed chiefly by *Picea ajanensis* (Lindl & Gord.) Fisch. ex Carr. and *Abies sakhalinensis* Fr. Schmidt. To the south the taiga is partly replaced by deciduous forest and elements of the south flora.

## Material and methods

This study is based on own collections in combination with the examination of literature records and museum collections, chiefly in the Institute of Biology and Pedology, Vladivostok. We collected together on Sakhalin on 18-24 June 1993 and the junior author collected alone in September the same year. We spent most of our time in the Kholmsk District, visiting also the Korsakov and Aniva Districts briefly. All records cited below without reference to any other collector or collection refer to our own material, and the number of specimens are given within parenthesis. This material will be split between the Vladivostok Institute and coll. Nilsson, Umeå. We have chosen not to cite the Sakhalin records given in Kamiya (1938b) as they are identical with those in Kamiya (1938a).

The administrative districts of Sakhalin are abbreviated as follows (Fig. 1): KO= Korsakov,

*Fig. 1. Map of Sakhalin showing division and coding of districts.*

*Karta över Sakhalin med distriktsindelning och använda förkortningar.*

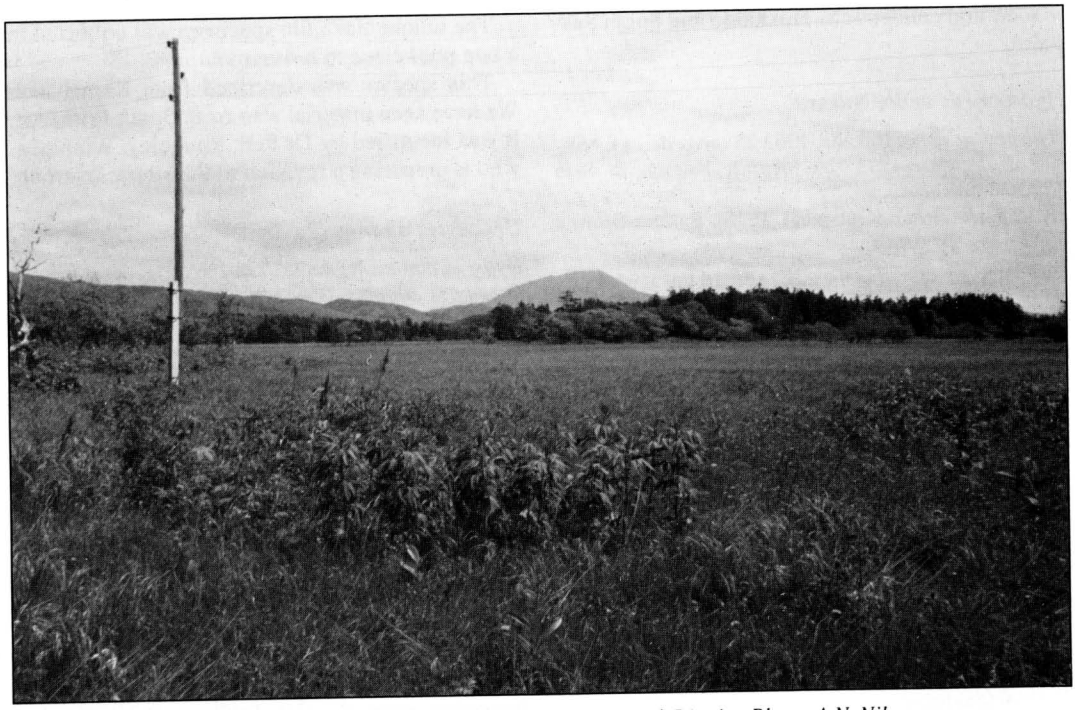


*Fig. 3. Coastal plain with extensive bogs near Cape Slepikowsky, Kholmsk District. Photo: A.N. Nilsson.*

*Kustslätt med vidsträckta myrområden nära Kap Slepikowsky, Kholmsk-distriktet. Ett tiotal dykararter förekom i små vattenfyllda gropar i myrkanten. I området har lövgrodan* ***Hyla japonica*** *sin enda kända förekomst på Sakhalin och vi påträffade den i ett vattenhål kantat av vitmossa.*

KO: Okhotskoye (Kamiya 1938a). KH: Pyatirechye, Tiobut River 25.vi.93 (6). MA: Porechye, Lesnaya River (IBPV).

We collected this species among gravel in more slowly flowing water in a river. It is known from Korea, Sakhalin, Hokkaido, Honshu and the Kuril Island of Kunashir.

*Platambus pictipennis* (Sharp)

*Agabus pictipennis* Sharp, 1873:49 (orig. descr.).
*Platambus pictipennis* (Sharp, 1873): Kamiya 1932:20, 1934:5 (Sakhalin); Kamiya 1938a:31 (Kimunai); Brancucci 1988:184 (Nowoalexandrowsk); Lafer 1989:248 (key, Sakhalin).

AN: Novo-Aleksandrovsk (Brancucci 1988). KH: Kholmsk 14.ix.1993 (1). DO: Dolinsk 25.ix.1993 leg. V.Kuznetzov (AN). PO: Poronai River (Kamiya 1938a); Pritornaya River (trib. to Nerpichya River) (IBPV). SM: Langeri River (IBPV).

Our single specimen of *P. pictipennis* was collected in a small stream. This species is known from Sakhalin and Japan (from Hokkaido to Kyushu). An old record is known from Korea.

*Agabus congener* (Thunberg)

*Dytiscus congener* Thunberg, 1794:75 (orig. descr.).
*Gaurodytes congener* (Thunberg, 1794): Lafer 1989:247 (key).
*Agabus congener* (Thunberg, 1794): Nilsson 1990:153 (key).

KO: Okhotskoye 20.vi.93 (15); NW of Lake Tunaycha 20.vi.93 (2); 13 km W of Okhotskoye 20.vi.93 (1). KH: Kostromskoye 18-24.vi.93 (2), 8.ix.93 (1); Pionery 23.vi.93 (20), 9.ix.93 (5), 17.ix.93 (2).

This species was most abundant in temporary *Carex*-fens. Occasional specimens were collected in various ponds.

The *Agabus congener* complex includes several forms of unknown taxonomic status. The situation in the Far East has never been analysed in detail,

A widespread Palearctic species that occurs also in Primorye and Hokkaido.

*Hygrotus impressopunctatus* (Schaller)

*Dytiscus impressopunctatus* Schaller, 1783:312 (orig. descr.).
*Coelambus impressopunctatus* (Schaller, 1783): Takizawa 1933:172 (Toyohara, Ikusagawa); Kamiya 1934:3, 1940:139 (Sakhalin), 1938a:17 (Konuma, Kashiho); Lafer 1989:236 (key, Sakhalin).

KO: 13 km W of Okhotskoye 20.vi.93 (4). AN: Yuzhno-Sakhalinsk; Dalneye (Takizawa 1933); Novo-Aleksandrovsk (IBPV). KH: Kostromskoye 18-24.vi.93 & 8.ix.93 (20); Pionery 9.ix.93 (1); Kholmsk 10.ix.93 (1). DO: Starodubskoye (IBPV). MA: Makarov; Zaozernoye (IBPV).

We collected this species in various ponds, from permanent detritus ponds to temporary rainwater pools with sand-bottom.

Common on Sakhalin north to MA. A widespread Holarctic species known also from Primorye and Hokkaido.

*Hydroporus fuscipennis* Schaum

*Hydroporus puberulus* Mannerheim, 1853:163 (orig. descr.); preocc. by LeConte, 1850.
*Hydroporus fuscipennis* Schaum in Schaum & Kiesenwetter, 1868:64 (replacement name for *Hydroporus puberulus* Mannerheim, 1853, nec *LeConte*, 1850); Nilsson & Larson 1984:123 (syn.); Nilsson & Satô 1993:88 (Pionery).
*Hydroporus criniticoxis* Larson, 1975:301 (orig. descr.).

AN: 15 km E of Aniva 20.vi.93 (1). KH: Kostromskoye 18-24.vi.93 (3), 8.ix.93 (1); Pionery 22-23.vi.93 (22), 9-17.ix.93 (4).

This species was chiefly collected in larger *Carex*-fens (Fig. 4), and a few specimens were taken in bog pools. A Holarctic species that is transcontinental in North America. The Palearctic range extends from Germany, Austria and Fennoscandia via northern Russia to Kamchatka, Sakhalin and Hokkaido. We have also seen one specimen from Primorye (Vladivostok, Sputnik Station 6.x.93 leg. S.Kholin).

*Hydroporus acutangulus* Thomson

*Hydroporus acutangulus* Thomson, 1856:202 (orig. descr.).

NO: Nogliki, upper reaches of Dagi River 23-25.ix.93 (2) V.N. Kuznetzov.

This species is seemingly confined to North Sakhalin. Our single record was from a small bog pool in larch-lichen-moss forest.

*Hydroporus acutangulus* belongs to a Holarctic complex of forms or species that needs to be revised. The two Sakhalin males studied have a distinctly shorter penis than material from northern Sweden. A male from Primorye (Ussuriyski Pres. IBPV) examined agrees in penis shape with the Sakhalin material.

*Hydroporus morio* Aubé

*Hydroporus morio* Aubé, 1838:307 + pl. 36:1 (orig. descr.); Nilsson & Nakane 1993:421 (syn., Shikuka).
*Hydroporus watanabei* Takizawa, 1933:174 (orig. descr.).

PO: Vladimirovo (EIM); Poronaysk (Nilsson & Nakane 1993). NO: Nogliki, upper reaches of Dagi River 23-25.ix.93 (1) V.N. Kuznetzov.

This species is seemingly confined to the north half of Sakhalin, south to PO.

The world distribution is northern circumboreal and it is known also from the Magadan Prov and from Hokkaido.

*Hydroporus submuticus* Thomson

*Hydroporus submuticus* Thomson, 1874:537 (orig. descr.); Nilsson & Nakane 1993:421 (syn.).
*Hydroporus konoi* Nakane, 1963:25 (orig. descr.).

DO: Anna River, 20 km SE of Dolinsk (IBPV).

The only record of this species known from Sakhalin is from 28.vii.1977, when it was collected by G. Lafer in a small pool on rock near the mouth of the Anna River.

This northern Palearctic species is known also from Primorye and Hokkaido.

*Hydroporus saghaliensis* Takizawa

*Hydroporus saghaliensis* Takizawa, 1933:173 (orig. descr., Ikusagawa); Kamiya 1934:4 (Sakhalin), 1938a:19 (Konuma); Nilsson & Nakane 1993:424 (descr.); Nilsson & Satô 1993:91 (faun.).
*Hydroporus saghalienus* Takizawa: Gschwendtner 1939:34 (descr.) incorrect subsequent spelling; Zaitzev 1953:166 (descr.); Lafer 1989:240 (key).

AN: Dalneye (EIM).

This species is on Sakhalin only known from the holotype, collected at Dalneye. Kamiya's (1938a) record from Novo-Aleksandrovsk is doubtful.

Outside Sakhalin, *H. saghaliensis* is only known from Hokkaido (Nilsson & Satô 1993). It

is seemingly endemic to Hokkaido and South Sakhalin.

*Hydroporus uenoi* Nakane

*Hydroporus uenoi* Nakane, 1963:25 (orig. descr.); Nilsson & Nakane 1993:424 (descr.); Nilsson & Satô 1993:92 (Sakhalin).
*Hydroporus striola* (Gyllenhal, 1826): Balfour-Browne 1947:439 (misident.).

KO: Okhotskoye 20.vi.93 (40). AN: 15 km E of Aniva 20.vi.93 (2). KH: Kholmsk 20.viii.92 (5), 21-24.vi.93 (20), 8-10.ix.93 (2); Kostromskoye 19-24.vi.93 (17), 8.ix.93 (2); Pionery 17-22.vi.93 (4).

We collected this species in various ponds, fens and bogs. It occurs chiefly among dense vegetation.

Together with *H. ijimai* Nilsson & Nakane, this species form a complex that is known from NE China, Primorye, South Sakhalin, South Kurils, Hokkaido and Honshu.

*Hydroporus tristis* (Paykull)

*Dytiscus tristis* Paykull, 1798:232 (orig. descr.).
*Hydroporus tristis* (Paykull, 1798): Nilsson & Satô 1993:90 (Sakhalin).

KO: NW of Lake Tunaycha 20.vi.93 (7). KH: Kostromskoye 19.vi.93 (27); Pionery 22.vi.93 (1).

This species was chiefly collected among *Sphagnum* moss in bog pools. The distribution of *H. tristis* is Holarctic, and it is known from the Magadan Prov. and Hokkaido.

*Hydroporus breviusculus* Poppius

*Hydroporus striola* var. *breviusculus* Poppius, 1905:14 (orig. descr.).
*Hydroporus breviusculus* Poppius, 1905: Zaitzev 1953:159 (descr., status); Lafer 1989:240 (key).

AN: 15 km E of Aniva 20.vi.1993 (33).

On Sakhalin known only from AN, where it was collected among floating *Drepanocladus* moss in a pond close to a rivermouth.

This East Palearctic species is known from Yakutia, Amur Region, Khabarovsk Terr., Primorye and Sakhalin in Russia.

*Hydroporus laticollis* Zimmermann

*Hydroporus laticollis* Zimmermann, 1922:20 (orig. descr.); Lafer 1989:240 (key).

AN: 15 km E of Aniva 20.vi.1993 (1).

The unique Sakhalin specimen was collected in a bog pool close to a rivermouth.

This species was described from Kamchatka. We have seen material also from South Primorye. It was identified by Dr R.E. Roughley, Winnipeg, who is preparing a revision of the *sibiricus*-group.

*Oreodytes alpinus* (Paykull)

*Dytiscus alpinus* Paykull, 1798:226 (orig. descr.).
*Oreodytes alpinus* (Paykull, 1798): Lafer 1989:241 (key, Sakhalin).

MA: Makarov (IBPV).

The only record of this species from Sakhalin dates back to 1932. Habitat preferences of European populations suggest that it was collected in a larger river on sand-bottom.

This northern Palearctic species is known from Primorye to Kamchatka in the Far East.

*Oreodytes sanmarkii* (C.R. Sahlberg)

*Hyphydrus sanmarkii* C.R. Sahlberg, 1826:172 (orig. descr.).
*Hyphydrus rivalis* Gyllenhal, 1827:384 (orig. descr.).
*Deronectes sanmarki* (C.R. Sahlberg, 1826): Kamiya 1938a:24 (Kimunai).
*Oreodytes rivalis* (Gyllenhal, 1827): Lafer 1989:242 (key, Sakhalin).

KH: Pyatirechye, Tiobut River 25.vi.93 (24); Kholmsk 14.ix.93 (2). DO: Firsovo (IBPV). DO: Anna River, 20 km SE of Dolinsk (IBPV). PO: Poronai River (Kamiya 1938a).

We collected this rheophilous species among gravel in more slowly running water in a river, and in a smaller stream.

This Holarctic species is known from Primorye and Hokkaido. Four females from Honshu (Daibosatsu Mts., 2.ix.1987, leg. T. Abe) in coll. Nilsson differ from other Palearctic specimens in the much coarser punctation on the metasternum and metacoxal plates. The taxonomic status of the Japanese populations of *O. sanmarkii* needs reevaluation.

*Nebrioporus simplicipes* (Sharp)

*Deronectes simplicipes* Sharp, 1884:442 (orig. descr.); Kamiya 1938a:23 (Tomunai).
*Potamonectes simplicipes* (Sharp, 1884): Lafer 1989:242 (key, Sakhalin).
*Nebrioporus simplicipes* (Sharp, 1884): Nilsson & Angus 1992:288 (class.).

*Fig. 2. Coastal plain with small oxbow lakes at Cape Slepikowsky, Kholmsk District. Photo: A.N. Nilsson.*

*Kuststlätt med små korvsjöar och dammar nära Kap Slepikowsky, Kholmsk-distriktet. Cirka 15 dykararter påträffades i området. Salamander-larver sågs i några dammar och under en stock i vattenkanten låg ett vuxet exemplar av* ***Salamandrella keyserlingi****, Sakhalins enda art.*

AN= Aniva, NE= Nevelsk, KH= Kholmsk, DO= Dolinsk, TO= Tomari, MA= Makarov, UG= Uglegorsk, PO= Poronaysk, SM= Smirnykh, AS= Aleksandrovsk-Sakhalinskiy, TY= Tymovsk, NO= Nogliki, and OK= Okha district. The general description of Sakhalin is based on Atlas of Sakhalin Region (1967).

Collections are abbreviated as: CWW= coll. G. Wewalka, Wien, EIM= Entomological Institute, Hokkaido University, IBPV= Institute of Biology and Pedology, Vladivostok.

We here give the current Russian names of the Japanese localities cited from the literature: Esutoru= Uglegorsk, Hoegawa= unknown river, Horo= Dudino, Horonaigawa= Poronai River, Ikusagawa= Dalneye, Kashiho= Zaozernoye, Kimunai= Poronai River, Konuma= Novo-Aleksandrovsk, Maoka= Kholmsk, Minakishi= Podorozhnaya, Naifuchi= Ust-Dolinka, 10 km N of Starodubskoye, Nokoro= Vladimirovo, Sakaihama= Starodubskoye, Shikuka= Poronaysk, Shiritori (-ru)= Makarov, Solowiyofka= Solovyovka, Tomunai= Okhotskoye, Toyohara= Yuzhno-Sakhalinsk.

## List of species

*Hygrotus inaequalis* (Fabricius)

*Dytiscus inaequalis* Fabricius, 1777:239 (orig. descr.).
*Hygrotus inaequalis* (Fabricius, 1777): Lafer 1989:235 (key, Sakhalin).

KH: Kostromskoye 18.vi.93 & 8.ix.93; Pionery 23.vi.93 & 9.ix.93; totally ca. 150 inds.

This species was abundant in two ponds each near Kostromskoye and Pionery, respectively. All four ponds were sun-exposed and situated among coastal sand-dunes. The ponds had more or less well-developed marginal erect vegetation and the bottom was covered with fine detritus.

On Sakhalin known only from the coast of KH.

*Fig. 4. The junior author at residual pool in large* ***Carex*** *fen near Pionery, Kholmsk District. Teneral specimens of* ***Hydroporus fuscipennis*** *were abundant in the pool. Photo: A.N. Nilsson.*

*S. Kholin markerar en resterande pöl i stort starrkärr nära Pionery i Kholmsk-distriktet. Nykläckta ex av* ***Hydroporus fuscipennis*** *var vanliga i pölen. Denna holarktiska art finns spridd över hela Sverige.*

chiefly due to the scanty material available. The correspondence between material of *A. congener* from Fennoscandia and Sakhalin is fairly good. We have seen very few specimens from Hokkaido, but suggest that they are conspecific with the Sakhalin population. Some females from Mt. Daisetsu are narrow and coarsely sculptured, thus very similar to *A. thomsoni* (J.Sahlberg). We have also Sakhalin females that show this tendency.

A series from Primorye (Ussuriyski Pres.) average somewhat smaller than the Sakhalin specimens, and have somewhat shorter male protarsal claws.

### *Agabus matsumotoi* M.Satô & Nilsson

*Agabus matsumotoi* Satô & Nilsson, 1990:193 (orig. descr.).

AN: Yuzhno-Sakhalinsk (vi.1971, leg. Dolin, CWW). KH: Kholmsk 14.ix.93 (3).

We collected this species in a small shaded pond adjacent to a stream. It lives in backwaters of streams on Hokkaido (M. Satô pers. comm.).

This rare species is seemingly endemic to Hokkaido and South Sakhalin.

### *Agabus japonicus* Sharp

*Agabus japonicus* Sharp, 1873:50 (orig. descr.); Kamiya 1932:20, 1934:6 (Sakhalin); Kamiya 1938a:35 (Konuma, Shikuka).
*Gaurodytes japonicus* (Sharp, 1873): Lafer 1989:247 (key, Sakhalin).

AN: Novo-Aleksandrovsk (IBPV). NE: Shebunino (IBPV). KO: Okhotskoye 20.vi.93 (2); 13 km W of Okhotskoye 20.vi.93 (6). KH: Kholmsk 21.vi.93 (16), 9-10.x.93 (6); Kostromskoye 8.ix.93 (1); Pionery 22.vi.93 (2). DO: Dolinsk 10.ix.93 (3) V.N. Kuznetsov. NO: Nogliki, upper reaches of Dagi River 23-25.ix.93 (2) V.N. Kuznetsov.

This species is seemingly widespread on Sakhalin, where it occurs in various ponds and fens. *Agabus japonicus* belongs to a very difficult com-

plex of species or forms that is distributed in Primorye, Korea, China and throughout Japan.

*Agabus aequalis* Sharp

*Agabus aequalis* Sharp, 1882:501 (orig. descr.).
AN: Kirillovo (IBPV).

The only specimens known from Sakhalin were collected in a coastal bog at Kirillovo near Aniva (23.vii.1993 (3), leg. V. Kuznetzov) (G. Lafer, pers. comm.).

This East Palearctic species is known from Transbaikalia, Primorye and South Sakhalin.

*Agabus coxalis* Sharp

*Agabus coxalis* Sharp, 1882:535 (orig. descr.).
*Gaurodytes coxalis* (Sharp, 1882): Zaitzev 1953:269 (key, Sakhalin); Lafer 1989:246 (key, Sakhalin).

We know this species from Sakhalin only by Zaitzev's (1953) record without detailed locality information. *Agabus coxalis* is probably confined to the northern part of the island.

*Agabus conspicuus* Sharp

*Agabus conspicuus* Sharp, 1873:48 (orig. descr.).
*Gaurodytes conspicuus* (Sharp, 1873): Lafer 1989:246 (key, South Sakhalin).

KO: Beregovoye (IBPV); 13 km W Okhotskoye 20.vi.93 (1). NE: Kuznetzovo (IBPV). KH: Kholmsk 21.vi.93 (2); Kostromskoye 8.ix.93 (1). DO: Dolinsk 10.ix.93 (3) V.N. Kuznetzov (21).

We collected this species in larger ponds with various development of vegetation. *Agabus conspicuus* occurs throughout Japan, on South Sakhalin, South Kurils, and in Korea.

*Agabus labiatus* (Brahm)

*Dytiscus labiatus* Brahm, 1790:27 (orig. descr.).
*Eriglenus labiatus* (Brahm, 1790): Zaitzev 1953:268 (key, Sakhalin); Lafer 1989:248 (key, Sakhalin).

We know this species from Sakhalin only by Zaitzev's (1953) record without detailed locality information. *Agabus labiatus* is probably confined to the northern part of the island.

*Agabus opacus* Aubé

*Agabus opacus* Aubé in Dejean, 1837:173 (orig. descr.).
*Gaurodytes opacus* (Aubé, 1837): Lafer 1989:244 (key, Sakhalin).
*Agabus sharpi* Jacobson, 1908:430 (replacement name); Larson & Nilsson 1985:124 (syn.).
*Agabus sachalinensis* Kamiya, 1938a:37 (orig. descr., Horo, Konuma).

AN: Novo-Aleksandrovsk (IBPV). DO: Dudino (Kamiya 1938a); Dolinsk 10.ix.93 (3) V.N. Kuznetzov. SM: Smirnykh (IBPV).

In North Europe, this species prefers temporary forest pools. The world distribution is northern Holarctic. It is known in the Far East from Primorye to Magadan Prov.

*Agabus erichsoni* Gemminger & Harold

*Agabus nigroaeneus* (Marsham) sensu Erichson, 1837: 157, 158 (misident.).
*Agabus erichsoni* Gemminger & Harold, 1868: 454 (replacement name); Fery & Nilsson 1993:101 (key, distr., syn.).
*Gaurodytes nigroaeneus* (Erichson, 1837); Zaitsev 1953:236 (descr., distr.); Lafer 1989:245 (key).

KH: Pionery 22.vi.93 (1).

The unique male known from Sakhalin was collected in wheel-track pools on a wet meadow surrounded by coastal forest.

This widespread Holarctic species is known also from Primorye and Hokkaido.

*Ilybius apicalis* Sharp

*Ilybius apicalis* Sharp, 1873:51 (orig. descr.); Kamiya 1932:20 (Sakhalin); Lafer 1989:249 (key, South Sakhalin).

AN: 5 km W Aniva 25.viii.1993 leg. Pütz & Wrase (1) (AN). NE: Shebunino (IBPV). KH: Kholmsk 21.vi.93 (14); Kostromskoye 18-24.vi.93 (7), 8.ix.93 (3); Pionery 23.vi.93 (2), 9.ix.93 (1). DO: Dolinsk 10.ix.93 (1) V.N. Kuznetzov.

We collected this species in larger ponds with various development of vegetation.

*Ilybius apicalis* occurs in Korea, Primorye, South Sakhalin, South Kurils, throughout Japan, and in China south to Taiwan.

*Ilybius poppiusi* Zaitzev

*Ilybius poppiusi* Zaitzev, 1906:208 (orig. descr.); Satô & Nilsson 1988:126 (distr.); Lafer 1989:249 (key).

AN: 15 km W of Aniva 20.vi.93 (4). KH: Kostromskoye 18-24.vi.93 (12), 8-9.ix.93 (6); Pionery 9.ix.93 (1).

We collected this species in ponds with dense marginal vegetation, frequently with *Drepanocladus* moss.

*Ilybius poppiusi* is widespread in East Siberia

and the Far East of Russia including Primorye, and also recorded from Mongolia, North China and Hokkaido.

*Ilybius nakanei* Nilsson

*Ilybius ater* (De Geer, 1774): Matsumura 1911:112 (misident., Solowiyofka); Kamiya 1932:15, 1934:6, 1940:139 (misident., Sakhalin); Kamiya 1938a:40 (Hoegawa, Shiritori, Tomunai); Lafer 1989:249 (key, Sakhalin).
*Ilybius crassus* Thomson, 1856: Lafer 1989:249 (misident., Sakhalin).
*Ilybius nakanei* Nilsson, 1994:58 (orig. descr.).

KO: Solovyovka (Matsumura 1911); Okhotskoye (Kamiya 1938). KH: Kholmsk 21.vi.93 (3), 10-14.ix.93 (3); Pionery 22.vi.93 (1), 9.ix.93 (1). DO: Dudino (IBPV). MA: Makarov (Kamiya 1938a).

We collected this species chiefly in shallow or shaded ponds with seeping water, frequently near streams. It seems to prefer colder water than *I. apicalis* or *I. poppiusi*.

*Ilybius nakanei* is seemingly endemic to South Sakhalin and Hokkaido.

*Rhantus suturalis* (MacLeay)

*Colymbetes suturalis* MacLeay, 1825:31 (orig. descr.).
*Colymbetes pulverosus* Stephens, 1828:69 (orig. descr.).
*Rhantus pulverosus* (Stephens, 1828): Kamiya 1932:16, 1934:6, 1940:139 (Sakhalin); Kamiya 1938a:42 (Shikuka, Maoka); Lafer 1989:250 (key, South Sakhalin).

KO: Lake Busse (IBPV); 13 km W of Okhotskoye 20.vi.93 (3). KH: Kholmsk (IBPV); Kostromskoye 24.vi.93 (1). DO: Dolinsk 10.ix.93 (1) V.N. Kuznetzov; Firsovo (IBPV). PO: Poronaysk (Kamiya 1938a).

Both our records of this species are from larger ponds with sparse vegetation.

This species is widely distributed in the Palearctic, Oriental and Australian Regions. It is known from Primorye and Hokkaido, and is on Sakhalin seemingly confined to the south half.

[*Rhantus erraticus* Sharp]

*Rhantus erraticus* Sharp, 1884:446 (orig. descr.); Kamiya 1932:20 (Sakhalin).

We have not seen any specimens of *R. erraticus* from Sakhalin, and the single literature record (Kamiya 1932) is viewed as erroneous and was deleted by Kamiya in his own copy of this work (M. Satô in litt.). Moreover, Kamiya (1934) did not record this species from Sakhalin. This Japanese species is confined to Hokkaido and Honshu.

*Rhantus notaticollis* (Aubé)

*Colymbetes notaticollis* Aubé, 1837:107 (orig. descr.).
*Rhantus exsoletus* (Forster, 1771): Kamiya 1938a:42 (misident., Konuma), 1940:139 (misident., Sakhalin).
*Rhantus notaticollis* (Aubé, 1837): Lafer 1989:250 (Sakhalin).

AN: Novo-Aleksandrovsk (IBPV). KH: Kostromskoye 18-24.vi.93 (7); Pionery 23.vi.93 (1), 9.ix.93 (2).

Two males of this species from Sakhalin in IBPV from Japanese collections were misidentified by Kamiya as *R. exsoletus*, and later identified as *R. notaticollis* by G. Lafer. We collected this species in five different ponds among coastal sand-dunes.

This widespread Palearctic species is known also from Primorye and Hokkaido.

*Colymbetes tolli* Zaitzev

*Colymbetes dolabratus* (Paykull, 1798): Lafer 1989:250 (in part, misident., Sakhalin).
*Colymbetes dahuricus* Aubé, 1837: Kamiya 1938a:44 (Shiritoru, Horonaigawa), 1940:139 (Sakhalin).
*Colymbetes tolli* Zaitzev, 1906:209 (orig. descr.).

AN: Novo-Aleksandrovsk (IBPV). KH: Kostromskoye 8.ix.93 (1). MA: Makarov (Kamiya 1938a). PO: Poronai River (Kamiya 1938a).

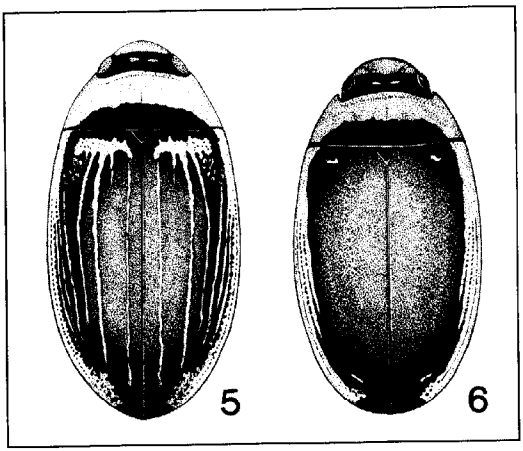
Our only specimen was collected in a large pond with sparse marginal vegetation close to the seashore. A female of this species in IBPV was misidentified as *C. dolabratus* (Saghalien Cent. Exp. Sta. Konuma 11.vi.1938). The *C. dahuricus* of Kamiya (1938a-b, 1940) is identical with *C. tolli* as evidenced by his habitus drawings.

As only two females from Sakhalin were studied, our identification is tentative. *C. tolli* was described from Yakutia. Most likely the species occurring on Sakhalin is identical with the "*Colymbetes* sp." recorded from Hokkaido and Honshu (Mori & Kitayama 1993). If not identical with *C. tolli* this is an undescribed species, as suggested by Dr M. Satô (pers. comm.).

*Colymbetes dahuricus* Aubé

*Colymbetes dahuricus* Aubé, 1837:99 (orig. descr.); Zaitzev 1905:17 (W coast of Sakhalin); Lafer 1989:250 (Sakhalin).

Of this species, we have only seen one female from Sakhalin (Saghalien Central Experimental Station 28.v.1936 leg. M. Yoshikura IBPV). This northern Holarctic species is widespread in East




*Figs 5-6. **Hydaticus aruspex**, typical dorsal colour-pattern of female. -5. Sakhalin. -6. Primorye.*

*Typisk ryggteckning hos honor av **Hydaticus aruspex** från Sakhalin (5) och Primorye (6). Flertalet svenska honor har ljusa längsgående ränder på täckvingarna och en geografisk variation i de båda formernas proportionella förekomst har påvisats i Nordamerika.*

Siberia and in the Far East of Russia, including Primorye.

[*Eretes sticticus* (Linnaeus)]

*Dytiscus sticticus* Linnaeus, 1767:666 (orig. descr.).
*Eretes sticticus* (Linnaeus, 1767): Kamiya 1932:16, 1934:7 (Sakhalin).

We have not seen any specimens of *E. sticticus* from Sakhalin, and the two literature records (Kamiya 1932, 1934) are viewed as erroneous as this species was not listed from Sakhalin in Kamiya's (1938a-b, 1940) later works. This species is more or less kosmopolitic at lower latitudes.

*Hydaticus aruspex* Clark

*Hydaticus aruspex* Clark, 1864:212 (orig. descr.); Nilsson 1981:104 (syn.).
*Hydaticus laevipennis* Thomson, 1867:88 (orig. descr.).
*Hydaticus stagnalis* (Fabricius, 1787): Kamiya 1938a:50 (misident., Esutoru).
*Hydaticus transversalis* (Pontoppidan, 1763): Kamiya 1938a:50 (misident., Esutoru).

KO: NW of Lake Tunaycha 20.vi.93 (2). KH: Kholmsk 21.vi.93 (1); Kostromskoye 18-19.vi.93 (6); Pionery 22.vi.93 (3). UG: Uglegorsk (Kamiya 1938a).

We collected this species in various ponds, fens and bog-pools, always among dense vegetation. Our Sakhalin males have chiefly fasciate elytra, but the non-fasciate and vittate morphs were also found. All Sakhalin females have vittate elytra and lack dorsal rugosity. The few Primorye specimens seen are all non-fasciate, and the females lack rugosity (Figs 5-6).

This widespread Holarctic species is known also from Hokkaido.

[*Graphoderus zonatus* (Hoppe)]

*Dytiscus zonatus* Hoppe, 1795:33 (orig. descr.).
*Graphoderus zonatus* (Hoppe, 1795): Kamiya 1938a:53 (Sakaihama, Naifuchi), 1940:139 (Sakhalin).

DO: Starodubskoye; Ust-Dolinka (Kamiya 1938a).

We have not been able to verify Kamiya's (1938a) record of this species from Sakhalin. Most likely it is correct as this widespread Palearctic species is known from both Primorye and Hokkaido.

*Acilius sulcatus* (Linnaeus)

*Dytiscus sulcatus* Linnaeus, 1758:412 (orig. descr.).
*Acilius sulcatus* (Linnaeus, 1758): Kamiya 1932:17, 1934:8 (Sakhalin); Kamiya 1938a:55 (Minakishi); Lafer 1989:252 (key, Sakhalin).

KO: Beregovoye; Lake Busse, S of Ozerskiy (IBPV); Podorozhnaya (Kamiya 1938a). AN: Yuzhno-Sakhalinsk (IBPV). NE: Kuznetzovo (IBPV). KH: Kholmsk (IBPV); Kostromskoye 24.vi.93 (7). DO: Naiba River (IBPV).

We collected adults of this species in one large pond with sparse marginal vegetation near the seashore. This widespread Palearctic species is known also from Primorye, but not from Japan.

*Dytiscus dauricus* Gebler

*Dytiscus marginalis* Linnaeus, 1758: Kamiya 1932:20, 1934:8, 1940:139 (misident., Sakhalin); Kamiya 1938a:56 (misident., Tomunai, Naifuchi).
*Dytiscus dauricus* Gebler, 1832:29 (orig. descr.); Roughley 1990:483 (syn., map, Sakhalin).
*Dytiscus czerskii* Zaitzev, 1953: Lafer 1989:252 (in part, Sakhalin).
*Dytiscus obscurus* Gschwendtner, 1922:93 (orig. descr.); Lafer 1989:253 (key, Sakhalin).

KO: Okhotskoye (Kamiya 1938a); 13 km W of Okhotskoye 20.vi.93 (5). NE: Kuznetsovo (IBPV). KH: Pionery 22-23.vi.93 (5). DO: Firsovo; Uglezavodsk (IBPV); Ust-Dolinka (Kamiya 1938a). ?: Kamyshovyi Mt. Range (IBPV).

*Fig. 7. Small dam in forest stream near Kostromskoye, Kholmsk District. Photo: A.N. Nilsson.*

*Liten damm i skogsbäck nära Kostromskoye, Kholmsk-distriktet. Bäckar av denna typ med kallt och klart vatten är mycket vanliga på Sakhalin. De är vanligen svåra att undersöka genom sina branta bankar och överhängande vegetation. I pölar i anslutning till bäckarna förekommer bl a den sällsynta* ***Agabus matsumotoi.***

We collected adults of *D. dauricus* in large ponds and small lakes with sparse to dense marginal vegetation.

This Holarctic species is widespread in the East Palearctic. It is known both from Primorye and Hokkaido. Kamiya's (1932, 1934, 1938a, 1940) Sakhalin records of *D. marginalis* are viewed as erroneous. One male in IBPV collected by M. Yoshikura and identified as *D. marginalis* is in fact *D. dauricus*. Moreover, these two species were never separated in Kamiya's works (T. Nakane in litt.).

[*Cybister japonicus* Sharp]

*Cybister japonicus* Sharp, 1873:45 (orig. descr.); Zaitzev 1908:65 (Sakhalin).

According to Zaitzev (1908) one specimen was collected on Sakhalin by Suprunenko. This species is distributed from Primorye to China and throughout Japan. As all Suprunenko's specimens were without locality labels and some of them were collected in Primorye, the record of *C. japonicus* from Sakhalin may be wrong (G. Lafer, pers. comm.).

## Discussion

We have recorded 36 dytiscid species from Sakhalin, of which two should be considered as doubtful. No doubt, the Sakhalin fauna includes several additional species that not yet have been found. Especially the northern districts have been very poorly collected.

About half of the Sakhalin species are widely distributed in the Palearctic or Holarctic Regions (Tab. 1), with boreal affinities. The wide distributional range of many species is illustrated by the occurrence of 19 of the Sakhalin species also in NW Europe and Sweden. Five species classified as East Palearctic occur in East Siberia or

*Tab. 1. Distribution and habitat preferences of the species of Dytiscidae recorded from Sakhalin. Species known only from doubtful records within parenthesis. Regions coded as: (SK) South Kurils, (HK) Hokkaido, (HN) Honshu, (KO) Korea, (PR) Primorye, (KH) Khabarovsk Terr., (MA) Magadan Prov., and (KA) Kamchatka.*

*Utbredning och habitatval hos Sakhalins dykare. Tveksamma arter är satta inom parentes. Regioner har förkortats som: (SK) Södra Kurilerna, (HK) Hokkaido, (HN) Honshu, (KO) Korea, (PR) Primorye, (KH) Chabarovsk-territoriet, (MA) Magadan-provinsen och (KA) Kamtjatka.*

| | | Occurrence | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Distribution & species | Habitat | SK | HK | HN | KO | PR | KH | MA | KA |
| Kosmopolitic | | | | | | | | | |
| *Rhantus suturalis* | Lentic | X | X | X | X | X | | | |
| Holarctic | | | | | | | | | |
| *Hygrotus impressopunctatus* | Lentic | X | X | | | X | X | | |
| *Hydroporus fuscipennis* | Lentic | | X | | | X | | X | X |
| *Hydroporus morio* | Lentic | | X | | | | X | X | X |
| *Hydroporus tristis* | Lentic | | X | | | | | X | |
| *Oreodytes sanmarkii* | Lotic | | X | ? | | X | X | X | X |
| *Agabus coxalis* | Lentic | | | | | | X | X | X |
| *Agabus opacus* | Lentic | | | | | X | X | X | |
| *Agabus erichsoni* | Lentic | | X | | | X | X | | X |
| *Colymbetes dahuricus* | Lentic | | | | | X | X | X | X |
| *Hydaticus aruspex* | Lentic | | X | | | X | X | | |
| *Dytiscus dauricus* | Lentic | X | X | X | | X | X | X | |
| Palearctic | | | | | | | | | |
| *Hygrotus inaequalis* | Lentic | | X | | | X | X | X | |
| *Hydroporus ? acutangulus* | Lentic | | | | | X | | | |
| *Hydroporus submuticus* | Lentic | | X | | | X | | X | |
| *Oreodytes alpinus* | Lotic | | | | | X | X | X | X |
| *Agabus congener* | Lentic | | X | | | X | X | | |
| *Agabus labiatus* | Lentic | | | | | | X | | |
| *Rhantus notaticollis* | Lentic | | X | | | X | X | X | X |
| *(Graphoderus zonatus)* | Lentic | | X | | | X | X | X | |
| *Acilius sulcatus* | Lentic | | | | | X | | | |
| East Palearctic | | | | | | | | | |
| *Hydroporus breviusculus* | Lentic | | | | | X | X | | |
| *Hydroporus laticollis* | Lentic | | | | | X | | | X |
| *Agabus aequalis* | Lentic | | | | | X | | | |
| *Ilybius poppiusi* | Lentic | | X | | | X | X | | |
| *Colymbetes tolli* | Lentic | | X | X | | | | | |
| East Asiatic | | | | | | | | | |
| *Agabus japonicus* | Lentic | | X | X | X | X | | | |
| *Ilybius apicalis* | Lentic | X | X | X | X | X | | | |
| *(Cybister japonicus)* | Lentic | | X | X | X | X | | | |
| Ussurian-Japanese | | | | | | | | | |
| *Hydroporus uenoi* | Lentic | X | X | X | | X | | | |
| Japanese | | | | | | | | | |
| *Hydroporus saghaliensis* | ? | | X | | | | | | |
| *Nebrioporus simplicipes* | Lotic | X | X | X | X | | | | |
| *Platambus pictipennis* | Lotic | | X | X | X | | | | |
| *Agabus matsumotoi* | Lotic | | X | | | | | | |
| *Agabus conspicuus* | Lentic | X | X | X | X | | | | |
| *Ilybius nakanei* | Lotic | | X | | | | | | |
| No. of shared species | | 7 | 26 | 11 | 7 | 25 | 17 | 13 | 9 |

Transbaikalia. About ten of the Sakhalin species represent the Japanese element, of which four species also occur on the continent north to Primorye.

Sakhalin shares most species with Hokkaido (26 species) and Primorye (25 species), whereas the faunal similarity on the continent decreases sharply both north- and southwards from Primorye (Tab. 1).

A rough classification of habitat preferences into lentic or lotic shows that a large majority of Sakhalin Dytiscidae prefer stagnant waters as ponds, fens or bogs (Tab. 1). The high proportion of lentic species contrasts with the extreme richness of lotic habitats on Sakhalin (Fig. 7). A high proportion of the lotic species belong to the Japanese element.

No species of Dytiscidae is endemic to Sakhalin. The three species *Hydroporus saghaliensis*, *Agabus matsumotoi*, and *Ilybius nakanei* are seemingly endemic to Hokkaido plus South Sakhalin.

## Acknowledgements

We thank Dr G. Lafer, Vladivostok, Prof. T. Nakane, Chiba, and Prof. M. Satô, Nagoya, for valuable help and information. Prof. S. Takagi, Sapporo, is thanked for the loan of specimens. The Royal Swedish Academy of Sciences and The Russian Academy of Sciences are thanked for financing the senior author's visit at the Institute of Biology & Pedology, Vladivostok.

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## Sammanfattning

I uppsatsen listas alla arter av dykarskalbaggar kända från ön Sakhalin i norra Stilla havet utanför Rysslands östkust. Författarna har själva insamlat huvuddelen av materialet, men hänvisar även till museimaterial och litteraturuppgifter. Ca hälften av Sakhalins 36 arter är vitt spridda inom Palaearktis eller Holarktis, och hela 18 arter återfinns även i den svenska faunan. Sakhalins fauna liknar mycket den från ön Hokkaido i norra Japan och 26 arter är gemensamma. Ingen art är endemisk för Sakhalin, men tre arter tycks vara endemiska för Hokkaido plus södra Sakhalin. Genom sin bergighet är Sakhalin mycket rik på små och medelstora vattendrag. Sjöar förekommer däremot mycket sparsamt. På kustslätten återfinns några stora våtmarkskomplex, varav flera nu förvandlats till jordbruksmark.