



Trichoptera in the Faroe Islands

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Abstract

In this paper the literature on Trichoptera in the Faroe Islands is reviewed and occurrence of species in recent research on freshwater insects is added. The first record of Trichoptera dates from 1782, without any recognisable species. Today, 20 species are known from the islands, but their frequency of occurrence differs between the Northern Islands and the other islands. A difference in topography of the island groups has previously been hypothesized as an explanation, and data presented in this paper support this hypothesis.

Key words: Caddisfly, natural history, Faroes, checklist, biogeography

Introduction

The Faroe Islands are situated at 62°N, 7°W and consist of 18 small islands (Fig. 1) and numerous islets and skerries. The total land area is 1399 km². The islands range in size from 0.8 km² to 374.3 km² (Hagstova Føroya 2018). Mountains constitute an essential part of the Faroese landscape, with several of them reaching higher than 800 m a.s.l. and the highest is 880 m a.s.l. Particularly the six so-called Northern Islands are very mountainous (Rutherford & Taylor 1982). The most dominant vegetation type in the Faroes is grassland, which is heavily grazed by sheep (Fosaa 2001). The bedrock is basalt, mostly impermeable to water. This means that the retention time of precipitation is short and the discharge fluctuates accordingly, with some streams and ponds drying out during summer (Hansen & Gíslason 2010). The Faroes freshwater insect fauna is depauperate, with an absence of Plecoptera, Ephemeroptera, and Odonata: The most species-rich group of aquatic insects is Chironomidae (Diptera) with 72 species (Hrafnadóttir 2005), but other groups are represented by fewer species, e.g., Trichoptera 20 (this paper) and Simuliidae (Diptera) 2 (Pedersen 1971).

Historical overview

The first record of caddisflies in the Faroes dates from 1782 when J.-C. Svabo (1959) produced several manuscripts describing the fauna and flora of the Faroes Islands. The manuscripts were accessible in the Royal Library, Copenhagen, until their publication in 1959. In one section, he listed invertebrates, and among them ‘*phalæna*’ and ‘*phryganea nebulosa*’. It is not possible to state which species or taxa were intended. However, he also gave the easily identified vernacular name ‘Hexmævur’ which refers to Trichoptera.

A century later the first four recognizable species are recorded in *Faunula Insectorum Faeroeensis* by H.J. Hansen (1881), who had received material collected in 1862–1869 by A. Berg: *Rhyacophila dorsalis* (Curtis 1834), *Plectrocnemia conspersa* (Curtis 1834), *Limnephilus griseus* (Linnaeus 1758), and *L. sparsus* Curtis 1834.

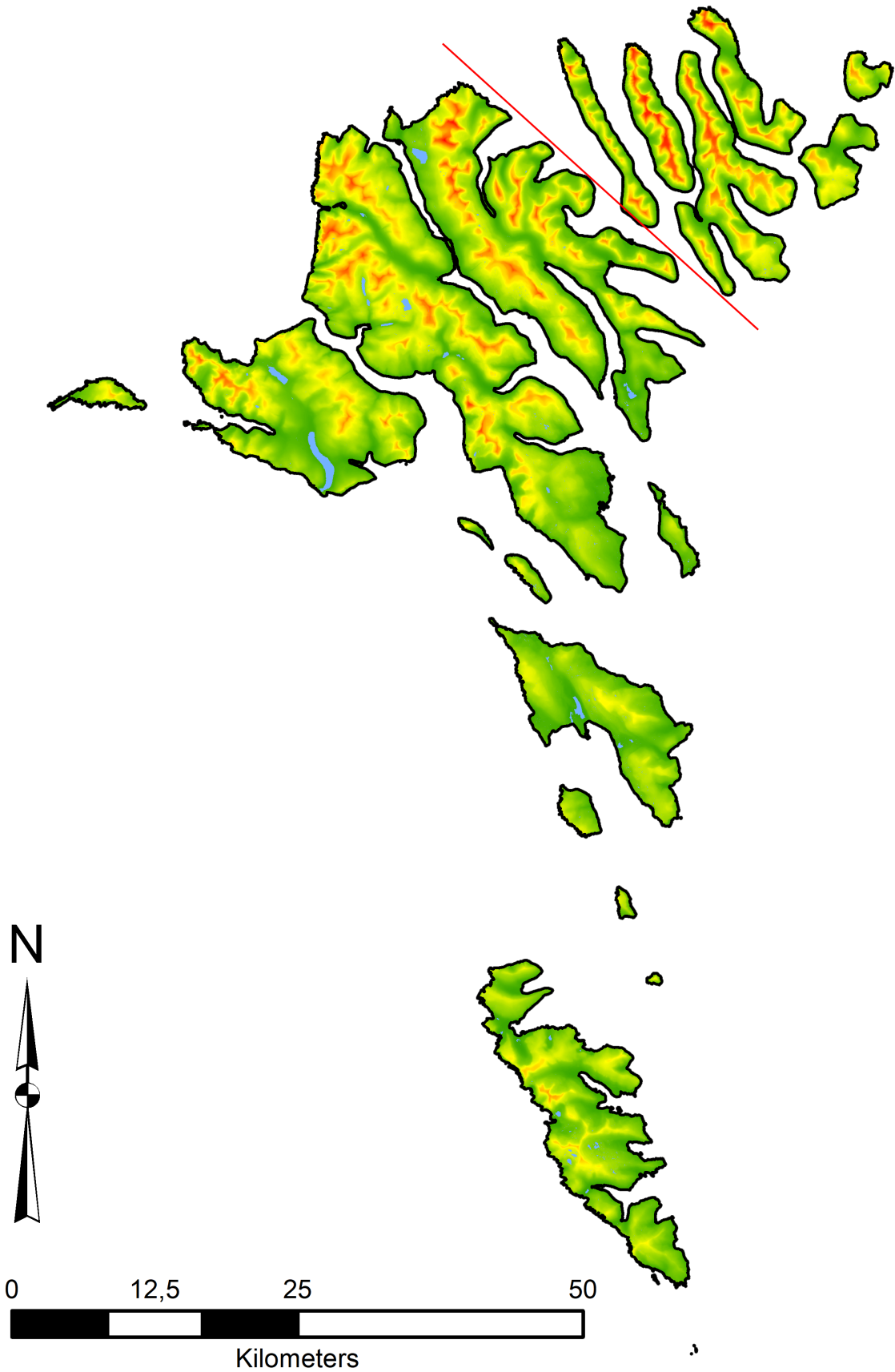


FIGURE 1. The Faroe Islands. “The Northern Islands” is the collective name for the six islands northeast of the line. Colours reflect the altitude from green at sea level to red at 800 m a.s.l.

During the late 1800s and early 1900s some insect collections were conducted in the Faroes. In 1889 and 1890 P.B. Mason and F.A. Walker, respectively, made short stopovers in the Faroes on their way to Iceland and collected insects, but no new species were added to the Faroese species list (McLachlan 1889; Walker 1890a, 1890b). A few years later the Danish botanists C.H. Ostenfeld and E. Warming also collected insects in the Faroes, and one new record of Trichoptera species *Potamophylax cingulatus* (Stephens 1837) was recorded by J.C. Nielsen (1908) (as '*Anabolia areata* Kol.' which Henriksen (1928) corrected to '*Stenophylax latipennis* Curti.' which, in turn, later authors (Andersen & Wiberg-Larsen 1987; Solem & Gullefors 1996) reported as the syn. *latipennis* auct., nec (Curtis, 1834).

Caddisfly collection trips were made by A. Japha in 1906 and A.v. Klinckowström in 1910 and 1915, and by K.v. Rosen and A. Dampf in 1912. This material was identified by Ulmer (1913, 1921, 1925) who added nine new species to the Faroese list: *Limnephilus affinis* Curtis 1834, *L. marmoratus* Curtis 1834, *L. vittatus* (Fabricius 1798), *Tinodes waeneri* (Linnaeus 1758), *Mesophylax impunctatus* McLachlan 1884, *Halesus radiatus* (Curtis 1834), *Polycentropus flavomaculatus* (Pictet 1834), and *Agrypnia obsoleta* (Hagen 1864). He also recorded an uncertain *Oxyethira flavicornis* (Pictet 1834) (as its syn. *O. costalis* Eaton, 1873 et auctt., nec (Curtis, 1834)), but only the genus can be assigned with certainty (Andersen & Wiberg-Larsen 1987).

In 1922 *Limnephilus rhombicus* (Linnaeus 1758) was found as a sub-fossil in peat (Jessen & Rasmussen 1922) and was also later found extant (Henriksen 1928).

In 1923 the Danish Natural History Society planned a zoological investigation of the Faroes, and in autumn 1924 a young zoologist, H. Lemche, started the insect sampling. K. Stephensen and I.P. Kryger collected insects in early spring 1925 and in summer of 1926, Kryger and Lemche were joined by R. Spärck. During this sampling trip they visited all the 18 islands of the Faroes. K.L. Henriksen collated and reviewed all the material published to that date, as well as the results from this three-year collection effort. This resulted in a chapter of the seminal work *The Zoology of the Faroes* in which Henriksen (1928) listed 17 species of Trichoptera, including two newly recorded species: *Hydroptila tineoides* Dalman 1819 and *Apatania muliebris* McLachlan 1866, which was misidentified as *Apatania zonella* Zetterstedt (as its syn. *A. arctica* Boheman 1865) (A. Nielsen 1969). He stated, interestingly, that half of the Trichoptera species recorded for the Faroes do not occur in the Northern Islands (Fig. 1).

Shire *et al.* (1964) recorded two species for the first time: *Plectrocnemia geniculata* McLachlan 1871 and *Tinodes maclachlani* Kimmins 1966. *Limnephilus ignavus* McLachlan 1865 was added to the list of recorded species in the Faroes by Andersen *et al.* (1992). Thus, 20 species are known from the Faroes. Although the number of species in the Faroes is low, the dominant species in the Faroes are also dominant in similar habitats in Norway.

The subspecies *Apatania muliebris kolteriana* A. Nielsen 1969, was established with the island of Koltur in the Faroes as type locality (A. Nielsen 1969). However, this and other *A. muliebris* subspecies have been questioned or refuted (Andersen & Wiberg-Larsen 1987; Malicky 2005; Solem 1985).

Abundance and flight periods of Trichoptera were studied by T. Andersen *et al.* (1992). They concluded that the flight periods were similar those of the British Isles and west Norway.

Are the Northern Islands different?

Henriksen (1928) stated that half of the Trichoptera species did not occur on the Northern Islands. Shire *et al.* (1964) exclusively sampled Trichoptera and found that the Northern Islands were not markedly different in their Trichopteran fauna; they concluded that the Faroe Islands are not markedly different biogeographically and that the occurrence of a species of caddisfly on a given island depends on whether suitable larval habitats exist on the island. Hansen & Gislason (2010) found geographical differences between the Northern Islands and the other islands, however, pointing to different hydrological regimes and possibly different freshwater invertebrate communities.

Material and methods

The data provided by Hansen & Gíslason (2010) were revisited. The Northern Islands have 290 catchments larger than 0.1 km² and the other islands have 915. The catchments in the Northern Islands have a mean relief ratio of 0.51 ± 0.131 (mean \pm SD), whereas the other islands have a mean relief ratio of 0.30 ± 0.179 , which is significantly lower (2-sided t-test: $t = -17.94$, $p < 0.001$) (Fig. 2). In addition, the catchments in the Northern Islands have an average size of 0.46 ± 0.597 km² (mean \pm SD), whereas catchments in the other islands are significantly larger at 0.99 ± 2.534 km² (2-sided t-test: $t = 5.84$, $p < 0.001$).

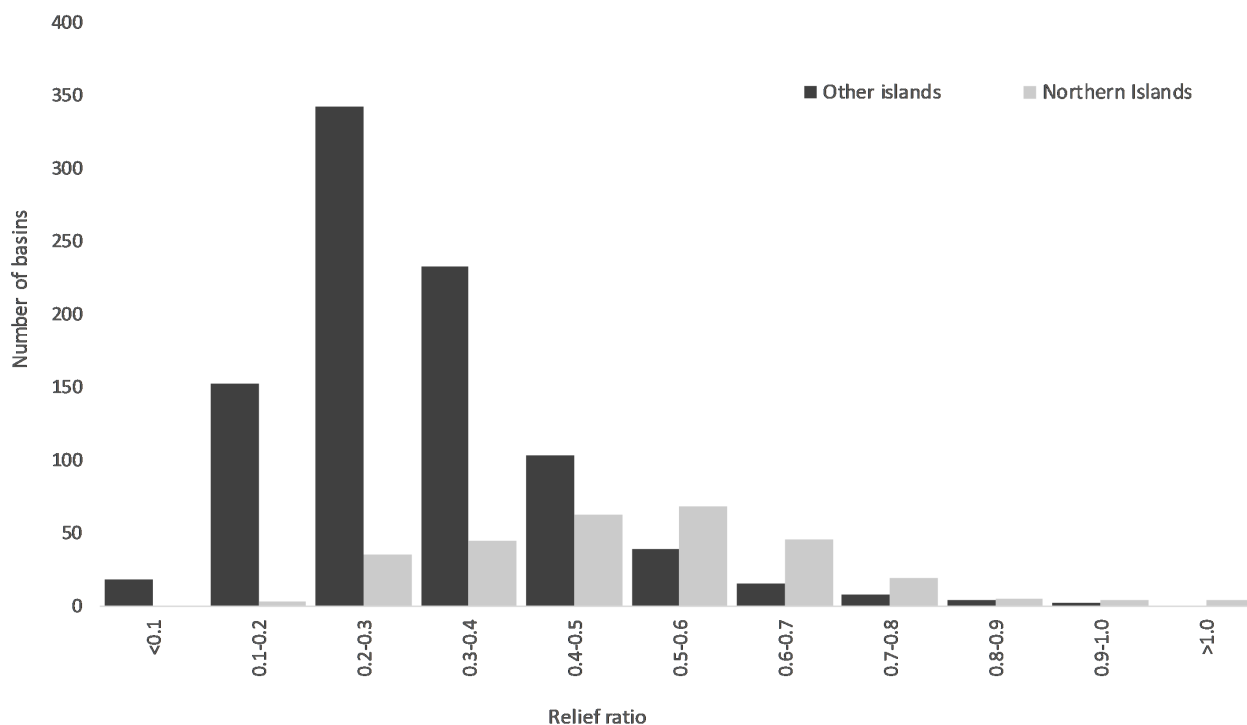


FIGURE 2. Number of catchments in the Northern Islands and the other islands, grouped by relief ratio (i.e., the ratio between altitude difference and catchment length).

In 2007 to 2010 Trichoptera larvae were collected in 29 streams using a 0.14 x 0.14 m Surber sampler with a net mesh size of 200 μ m (Surber 1937). This resulted in 198 larvae that were identified to species-level, aided by the keys by Wallace *et al.* (1990) and Edington and Hildrew (1981). Seven species were found: *T. waeneri*, *R. dorsalis*, *P. cingulatus*, *P. flavomaculatus*, *P. conspersa*, *L. sparsus*, and *H. tineoides*.

One stream had to be omitted from further analysis because 63 individuals of *Hydroptila tineoides* larvae were found in it, which is an unusually high number for Faroese streams.

Numbers of Trichoptera larvae obtained in each stream were standardised (individuals x Surber samples⁻¹) to accommodate varying sampling effort between streams. Streams were separated into two groups based upon catchment size. The two size-groups were separated at half the distance between the two mean catchment sizes, which is 0.73 km².

Results

Species composition varied between catchment size groups (Fig. 3), although differences were not statistically significant (Adonis, ANOVA-like permutation test, F Model = 1.513, $p = 0.181$). Four of seven species found in our study, *P. conspersa*, *P. cingulatus*, *T. waeneri*, and *R. dorsalis*, were found in small catchments, and all seven were found in larger basins. This reflects Henriksen's (1928) statement that only half the species were found in the Northern Islands. However, our result can also be reconciled with those of Shire *et al.* (1964) who demonstrated that collecting a wider range of habitats and catchment sizes will recover the same species in both the Northern Islands and the other islands.

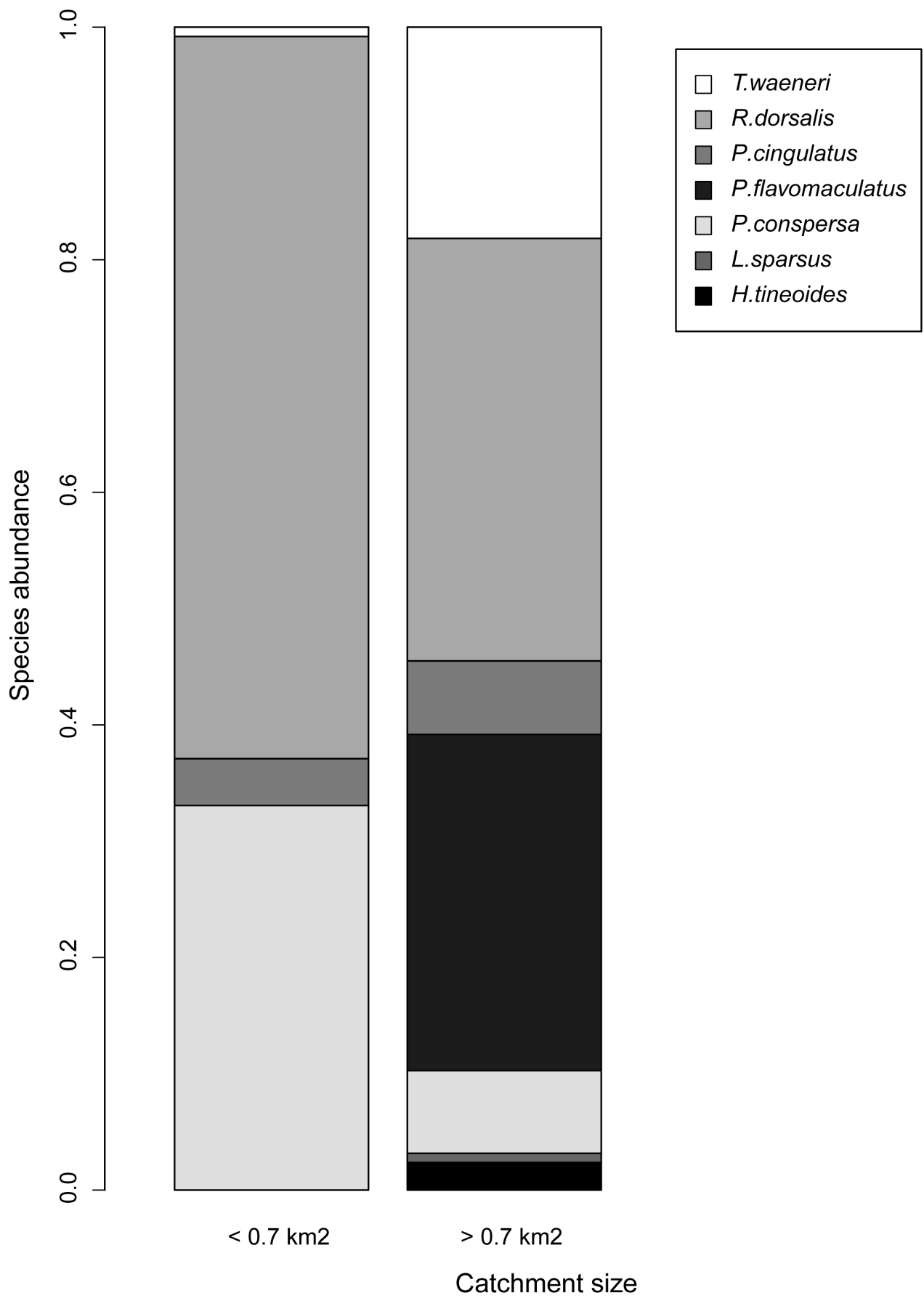


FIGURE 3. Species composition in catchments smaller than 0.73 km² and larger than 0.73 km².

This observation should only be taken as a simple demonstration of how the topography led Henriksen (1928) and Shire *et al.* (1964) to different conclusions. It was not possible to directly compare samples from the Northern Islands and the southern islands since only two streams were sampled from the Northern Islands. Furthermore, care should be taken when comparing these results as the standardised number of individuals per stream in the small catchments size-group is 1.26 but 6.37 in the large catchments size-group.

TABLE 1. List of Trichoptera species occurring in the Faroe Islands, including first published record of species, previously reported names, and prevalence. The list is based on literature reviewed and recent sampling.

Species list	First record	Prevalence
Polycentropodidae		
<i>Plectrocnemia conspersa</i> (Curtis 1834)	Hansen 1881	Abundant
<i>P. geniculata</i> McLachlan 1871	Shire <i>et al.</i> 1964	Rare
<i>Polycentropus flavomaculatus</i> (Pictet 1834)	Ulmer 1925	Abundant
Psychomyiidae		
<i>Tinodes waeneri</i> (Linnaeus 1758)	Ulmer 1925	Abundant
<i>T. maclachlani</i> Kimmins 1966	Shire <i>et al.</i> 1964	Rare
reported as ' <i>Tinodes aureola</i> ' by Nielsen (1975)		
reported as ' <i>Tinodes pusillus</i> Mcl.' by Shire <i>et al.</i> (1964)		
Hydroptilidae		
<i>Hydroptila tineoides</i> Dalman 1819	Henriksen 1928	Rare
reported as ' <i>Hydroptila femoralis</i> Eaton' by Henriksen (1928)		
<i>Oxyethira flavicornis</i> (Pictet 1834)?	Ulmer 1925	Rare
reported as ' <i>Oxyethira</i> sp. (<i>costalis</i> Curt. ?)' by Ulmer (1925)		
Rhyacophilidae		
<i>Rhyacophila dorsalis</i> (Curtis 1834)	Hansen 1881	Abundant
Apataniidae		
<i>Apatania muliebris</i> McLachlan 1866	Henriksen 1928	Common
reported as ' <i>A. m. kolteriana</i> n. subsp.' by Nielsen (1969)		
reported as ' <i>Apatania arctica</i> Boheman' by Henriksen (1928)		
reported as ' <i>Apatania zonella</i> Zett.' by Nielsen (1969)		
Limnephilidae		
<i>Limnephilus affinis</i> Curtis 1834	Ulmer 1925	Common
<i>L. griseus</i> (Linnaeus 1758)	Hansen 1881	Common
<i>L. marmoratus</i> Curtis 1834	Ulmer 1925	Common
<i>L. rhombicus</i> (Linnaeus 1758)	Jessen & Rasmussen 1922	Common
<i>L. sparsus</i> Curtis 1834	Hansen 1881	Abundant
<i>L. vittatus</i> (Fabricius 1798)	Ulmer 1925	Abundant
<i>L. ignavus</i> McLachlan 1865	Andersen <i>et al.</i> 1992	Rare
<i>Potamophylax cingulatus</i> (Stephens 1837)	Ulmer 1921	Abundant
reported as ' <i>Anabolia areata</i> Kol.' by Nielsen (1908)		
reported as ' <i>Stenophylax latipennis</i> Curt.' by Ulmer (1921)		
<i>Mesophylax impunctatus</i> McLachlan 1884	Ulmer 1925	Rare
<i>Halesus radiatus</i> (Curtis 1834)	Ulmer 1925	Rare
Phryganeidae		
<i>Agrypnia obsoleta</i> (Hagen 1864)	Ulmer 1925	Abundant

Conclusion

By reviewing existing literature, we conclude that 20 species can be found in the Faroe Islands (Table 1). Overall differences in abundance patterns may be explained by catchment sizes and topography (e.g., relief ratio), and this can explain the difference in observed deviances in abundance of species between the Northern Islands and the other islands.

The number of Faroe Island species is higher than in Iceland, with its 12 species (Gíslason & Pálsson this volume), but fewer than in Shetland and the Orkney Islands, with 37 and 71 species, respectively (Gíslason & Pálsson this volume). This reflects the distance between the Faroe Islands and Britain or the mainland of Europe, which are the probable sources of species that may have migrated to the islands. This is in accordance with the theory of island biogeography (MacArthur & Wilson 1967).

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