

## Coastal Marine Flora in Northern Hokkaido and Southern Sakhalin along the Coast of the Sea of Japan

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**Abstract.** Littoral zone flora of Northern Hokkaido and Southern Sakhalin along the coast of the Sea of Japan was surveyed from June to August 2013 using scuba diving. Thirty seven species are recorded in Yablonev, 44 species from Bogdanovitch, 18 species in Wakkanai and 11 species in Tomamae.

**Key words:** algae, flora, Hokkaido, Sakhalin, species diversity

### Introduction

Marine flora in Northern Hokkaido and Southern Sakhalin has previously been researched, with species occurrence and scientific names listed (Kawai *et al.*, 2007; Tokida, 1934, 1954). Although both areas are a short distance apart (approximately 42 km), algae species occurrences are different (Taniguchi, 1987). Marine floras have geographical variation worldwide (Feldman, 1937; Chihara, 1975), ratio of occurrence species in Chlorophyceae and Phaeophyceae differs from northern area to southern area of Japanese archipelago (Segawa, 1956; Nakahara and Masuda, 1971). Areas of kelp grounds were decreasing in recent year in southern Sakhalin and northern Hokkaido (Kawai *et al.*, 2014), but

flora of both areas has not been reported recently. Previous methods of surveying marine macroalgae for reports has been by hand, limited to beach or intertidal zone (Tokida, 1934, 1954), researches of flora in littoral zone from southern Sakhalin using scuba diving has not been reported. This study uses scuba diving to detail flora in the littoral zone of southern Sakhalin and northern Hokkaido.

### Material and Methods

Southern Sakhalin scuba diving surveys were conducted in Yablonev (15th August 2013) and Bogdanovitch (14th August 2013). Northern Hokkaido scuba diving surveys were conducted in Wakkanai (28th June 2013) and Tomamae (13th June 2013), off the coast of Sea of Japan

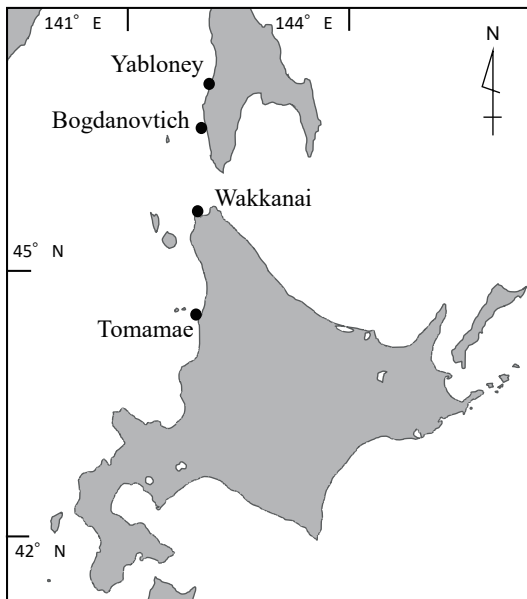


Figure 1. Map showing sampling sites.

(Fig. 1). Major bottom quality of each sampling point was bed rock or boulder with diameter of over 1 m, depth of the sampling point was gradient from 0 m to 10 m in depth. Algae were collected randomly from the sea bottom.

## Results and Discussion

In total, 75 species were found in our survey: 37 species were recorded in Yabloney and 44 species in Bogdanovitch from South Sakhalin, 18 species in Wakkanai and 11 species in Tomamae from Northern Hokkaido. Scientific names of the species in each locality are listed in order of species based on Yoshida *et al.* (2015) (Table 1). Total 12 species were commonly found in Hokkaido and Sakhalin, while 63 species were collected in Sakhalin or Hokkaido. 16.0 % of the total species number were shared in both areas, and 84 % of the total occurred in either of the two areas. Although the southern tip of Sakhalin and the northern terminal of Hokkaido faces each other with a short distance, species occurrences were largely different between

Sakhalin and Hokkaido, supporting the previous study (Taniguchi, 1987).

In the present study, 13 species of Chlorophyceae and 22 species of Phaeophyceae were listed from Sakhalin and Hokkaido (Table 1). The ratio of the species number of Chlorophyceae to the species number of Phaeophyceae was 0.59 (13 Chlorophyceae/22 Phaeophyceae) in Sakhalin and Hokkaido, 1.25 (10 C / 8 P) in Yabloney, 0.69 (9 C / 13 P) in Bogdanovitch, 0 (0 C / 8 P) in Wakkanai and 0.50 (2 C / 4P) in Tomamae. Kaneko and Niihara (1970) reported that the ratio of Chlorophyceae to Phaeophyceae was 0.6 in Rishiri Island which is located in the northern terminal of Japanese Archipelago. The ratio in Rishiri Island is close to the ratio (0.59) of Chlorophyceae to Phaeophyceae in Sakhalin and Hokkaido.

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Table 1. List of sea grass and algae from south Sakhalin Island and northern Hokkaido

	Yablony	Bogdanovitch	Wakkanai	Tomamae
<b>Zosteraceae</b>				
<i>Phyllospadix iwatensis</i> Makino	+	+		+
<b>Cyanophyceae</b>				
<i>Rivularia</i> sp.		+		
<b>Chlorophyceae</b>				
<i>Ulva clathrata</i> (Roth) C. Agardh	+			
<i>U. compressa</i> Linnaeus	+			
<i>U. fenestrata</i> Postels et Ruprecht	+	+		
<i>U. linza</i> Linnaeus				
<i>U. pertusa</i> Kjellman	+	+		+
<i>U. prolifera</i> O.F. Müller	+			
<i>Ulvaria splendens</i> (Ruprecht) Vinogradova		+		
<i>Chaetomorpha moniligera</i> Kjellman	+	+		
<i>Cladophora speciosa</i> Sakai	+			
<i>C. stimpsonii</i> Harvey	+			
<i>Rhizoclonium riparium</i> (Roth) Harvey		+		
<i>Codium yezoense</i> (Tokida) Vinogradova		+		
<i>Bryopsis hypnoides</i> Lamouroux	+	+		
<b>Phaeophyceae</b>				
<i>Melanosiphon intestinalis</i> (Saunders) Wynne				+
<i>Coilodesme cystoseirae</i> (Ruprecht) Setchell et Gardner		+		
<i>Analipus japonicus</i> (Harvey) Wynne		+		
<i>Dictyopteris divaricata</i> (Okamura) Okamura			+	+
<i>Dictyosiphon foeniculaceus</i> (Hudson) Greville		+		
<i>Ralfsia fungiformis</i> (Gunnerus) Setchell et Gardner	+			
<i>Sphaerotrichia divaricata</i> (C. Agardh) Kylin	+	+		
<i>Phaeophysema sphaerocephala</i> (Yamada) Tanaka, Uwai et Kawai	+			
<i>Punctaria latifolia</i> Greville			+	
<i>P. plantaginea</i> (Roth) Greville		+		
<i>Desmarestia japonica</i> Kawai, Hanyuda, Mueller, Yang, Peters et Kuepper		+	+	
<i>Desmarestia viridis</i> (Müller) Lamouroux			+	+
<i>Costaria costata</i> (C. Agardh) De A. Saunders **		+	+	
<i>Saccharina coriacea</i> (Miyabe) Lane, Mayes, Druehl et Saunders	+			
<i>S. japonica</i> (Areschoug) Lane, Mayes, Druehl et G.W. Saunders **	+	+	+	
<i>S. sacchalinesis</i> (Miyake) Yotsukura et Druehl	+			
<i>Coccophora langsdorfii</i> (Turner) Greville			+	
<i>Sargassum boreale</i> Yoshida et Horiguchi	+	+		
<i>S. confusum</i> Yendo	+	+	+	+
<i>S. miyabei</i> Yendo		+		
<i>Stephanocystis geminata</i> (C. Agardh) Draisma, Ballesteros, F. Rousseau et T. Thibaut		+		
<i>Stephanocystis hakodatensis</i> (Yendo) Fensholt		+		+
<b>Rhodophyceae</b>				
<i>Palmaria palmata</i> (Linnaeus) Kuntze	+	+		
<i>P. stenogona</i> (Perestenko) Perestenko		+		
<i>Alatocladia modesta</i> (Yendo) Johansen		+		
<i>Bossiella compressa</i> N. Kloczcova		+		
<i>Coralina officinalis</i> Linnaeus	+	+		
<i>Masakiella bossiellae</i> (N. Kloczcova) Guiry et Selivanova	+			
<i>Pneophyllum zostericolum</i> (Foslie) N. Kloczcova	+			
<i>Bonnemaisonia hamifera</i> Hariot			+	
<i>Masudaphycus irregularis</i> (Yamada) Lindstrom		+		
<i>Neodilsea longissima</i> (Masuda) Lindstrom		+		
<i>N. yendoana</i> Tokida	+	+		
<i>Chondrus nipponicus</i> Yendo				+
<i>C. pinnulatus</i> (Harvey) Okamura	+	+		
<i>C. yendoi</i> Yamada et Mikami		+		
<i>Mazzaella cornucopiae</i> (Postels et Ruprecht) Hommersand		+		
<i>M. japonica</i> (Mikami) Hommersand	+		+	

Table 1. (continued)

	Yablony	Bogdanovitch	Wakkanai	Tomamae
<i>Polyopes lancifolius</i> (Harvey) Kawaguchi et Wang			+	
<i>Tichocarpus crinitus</i> (Gmelin) Ruprecht		+		
<i>Sparlingia pertusa</i> (Postels et Ruprecht) Saunders, Strachan et Kraft	+			
<i>Antithamnion densum</i> (Suhr) Howe	+			
<i>Ceramium kondoi</i> Yendo		+	+	+
<i>C. japonicum</i> Okamura		+		
<i>Neoptilota asplenioides</i> (Esper) Kylin ex Scagel, Garbary, Golden et Hawkes		+		
<i>Ptilota filicina</i> J. Agardh	+	+		
<i>P. serrata</i> Kützing		+		
<i>Acrosorium yendoi</i> Yamada			+	
<i>Congregatocarpus aleuticus</i> (Wynne) Perestenko	+			
<i>C. kurilensis</i> (Ruprecht) Wynne		+		
<i>Chondria crassicaulis</i> Harvey			+	
<i>Laurencia nipponica</i> Yamada	+	+	+	
<i>Neorhodomela aculeata</i> (Perestenko) Masuda	+	+	+	+
<i>Neosiphonia harveyi</i> (Bailey) Kim et al.	+			
<i>Odonthalia corymbifera</i> (Gmelin) J. Agardh	+			
<i>Polysiphonia morrowii</i> Harv.	+	+	+	
<i>Rhodomela teres</i> (Perestenko) Masuda	+	+		
<i>Symphycloadia latiuscula</i> (Harvey) Yamada			+	+
<i>S. latiuscula</i> (Harvey) Yamada			+	+

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#### 北海道北部および南サハリン日本海沿岸における フローラ

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北海道北部および南サハリン日本海沿岸の漸深帯におけるフローラは2013年7~8月に調査された。サハリンのヤブロニーでは37種、ボグダノビッチでは44種、稚内では18種、苫前では11種の海藻類が記録された。