



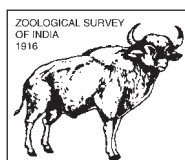
Occasional Paper No. 370

**DIVERSITY OF REEF ASSOCIATED
MACROFAUNA
OF RUTLAND ISLAND,
ANDAMAN AND NICOBAR ISLANDS**

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**Zoological Survey of India
Kolkata**

(ii)

CITATION

Raghunathan, C. 2015. Diversity of Reef Associated Macrofauna of Rutland Island, Andaman and Nicobar Islands. *Rec. zool. Surv. India, Occasional Paper No.*, **370** : 1-152 (Published by the Director, *Zool. Surv. India*, Kolkata)

Published : January, 2015

ISBN 978-81-8171-399-5

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PRICE

India Rs. 1130.00

Foreign \$ 55; £ 38

Published at the Publication Division by the Director, Zoological Survey of India, M-Block, New Alipore, Kolkata-700 053 and printed at Calcutta Repro Graphics, Kolkata-700 006.

**RECORDS OF THE
ZOOLOGICAL SURVEY OF INDIA
OCCASIONAL PAPER**

No. 370	2015	1-152
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INTRODUCTION

Andaman and Nicobar Islands represent a cluster of beaded mountain chain of 572 islands, islets and outcrops, distributed in 800 km long stretch. The geographical attributes configured these islands with Andaman and Nicobar as two major groups separated by a wide turbulent 10° Channel. Rutland Island is one of the largest islands of Labyrinth group of islands in South Andaman. It lies at the southern region of Andaman group separated by Duncan Passage from Little Andaman Island. The island is located in between Lat. 11°28' to 11°20'N and Long. 92°35' to 92°45'E with a total area of 137.2 sq km. and around 60 km long coastline across the Macpherson Strait from South Andaman and also separated from Cinque Island by Manners Strait. Mount Ford is the highest peak in Rutland Island with 435m height. The orientation of mountain and its formation has given rise to convoluted coastline, inlets and bays around this island. There are lots of variations in the slope pattern of this island and its continental shelf regions such as central portion is in between 0°-10°, south western is in between 10°-20°, south eastern is in between 10°-40°, southern is in between 0°-20°, north western is in between 10°-20° whereas north eastern is in between 25°-80°. The island is a treasure-trove of biodiversity in both terrestrial and marine aspects. The diversification and differentiation of physical and climatic variables contributed a lot to develop the ecological niche for the sustainable development of biological diversity of these islands. Rutland Island is characterized with the presence of a variety of coastal ecosystem supported by large bay, sandy and muddy beaches, creeks, rocky areas, mangrove swamps and foremostly a wide variety of coral reefs. The sea around the islands encounters a great deal of marine organisms with the base of coral reefs as the building blocks. A living coral reef ecosystem is one of the most glorious and fantastic sights on our planet (Rao, 2010). They are most popularly known as the baseline animals for the construction of undersea ecological pyramids of Andaman Sea (Whitaker, 1985). They are a key part of the natural heritage with a good deal of productivity. The scleractinians corals of these Andaman and Nicobar Islands are well distributed as fringing reef pattern (Venkataraman *et al.*, 2003). The fringing reefs of Rutland Island extensively sustain wide ecological avenues for the other reef associated faunal components such as molluscs, echinoderms, polyclads, crustaceans, sponges, fishes etc. The western areas of this island fall under Mahatma Gandhi Marine National Park. The present study was made to assess the diversity of scleractinian corals and associated faunal communities around the continental shelf regions of Rutland Island.

History

The Rutland Island was known as the habitat for the indigenous group of Andamanese

tribe *i.e.* Jangli. The inhabitation of those people in this area commonly named them as Rutland Jarawa as they were thought to be close to the Jarawa population of South Andaman. They used to stay much of the interior areas of Rutland Island during mid 19th century. In 1907, the last documentation was made on them. However, presently there is no report of that indigenous tribal population.

Population

A total of 37 islands of Andaman & Nicobar Islands are inhabited by indigenous, local and immigrants population, among them 24 islands belong to Andaman group and 13 islands belong to Nicobar group. Being one of the seventh inhabited islands under Port Blair Tahsil, Rutland Island is the domicile of 688 persons *i.e.* 410 males and 278 females according to the census of 2001. The entire population is distributed in four major areas of this island such as 12 people in R.M. Point area, 506 people in Bada Khari area, 166 people in Rutland areas, 108 people in Bamboo Nallah and Kichad Nallah areas.

Climate

The geographical location of Andaman and Nicobar Islands is the primer controller of climatic features of these areas. The climate of the Andaman and Nicobar Islands shows tropical weather with moderated sea breezes. Atmosphere temperature ranges from 23°C to 31°C daily throughout the year. The annual rainfall of these islands is about 300cm brought mainly by the southwest monsoon, which blows from May through September, and by the tropical cyclones that follow in October and November. Rutland Island is one of the major islands of Andaman group of islands share the aforesaid climatic condition.

STUDY AREAS

The study was carried out at entire coastal reef areas of Rutland Island. A total of ten stations were selected based on the availability of reef areas to carry out the undersea faunal surveys (Table 1 and Fig. 1).

Table 1. Coordinates of the study areas

Sl. No.	Study areas	Coordinates	
		Latitude	Longitude
1.	Station-1	11°22.520'N	092°35.110'E
2.	Station-2	11°24.275'N	092°36.267'E
3.	Station-3	11°26.109'N	092°36.449'E

Table 1. contd.

Sl. No.	Study areas	Coordinates	
		Latitude	Longitude
4.	Station-4	11°29.202'N	092°36.536'E
5.	Station-5	11°30.180'N	092°39.026'E
6.	Station-6	11°28.051'N	092°40.569'E
7.	Station-7	11°25.510'N	092°41.214'E
8.	Station-8	11°24.281'N	092°39.560'E
9.	Station-9	11°22.434'N	092°41.498'E
10.	Station-10	11°21.006'N	092°39.091'E

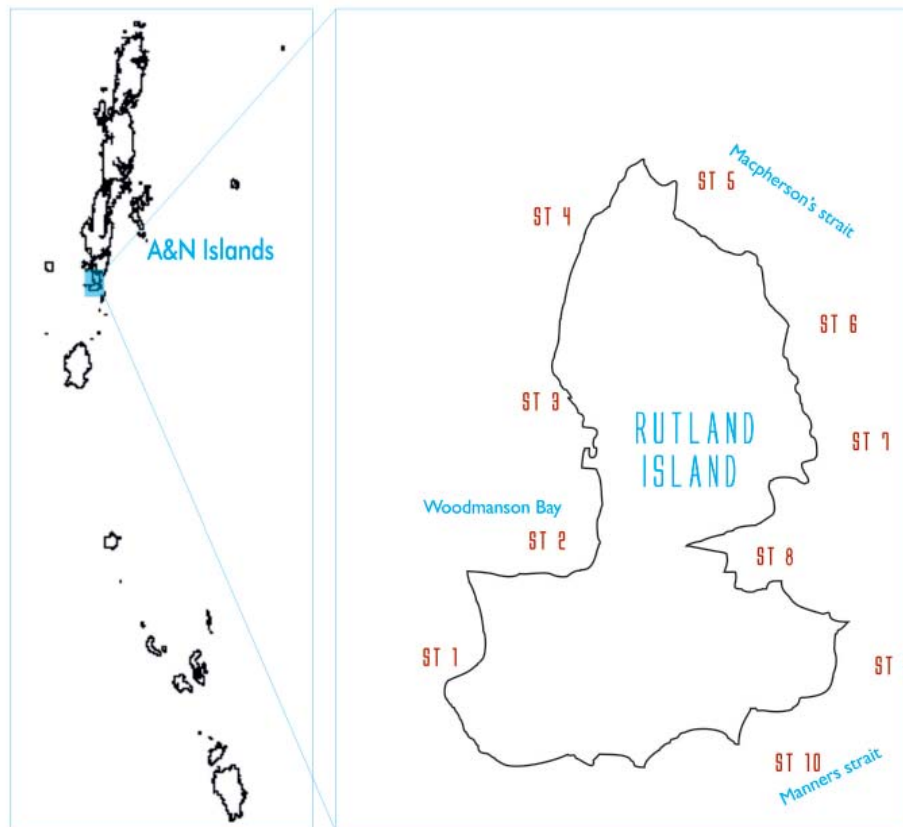


Fig. 1. Map showing the areas surveyed in Rutland Island

MATERIAL AND METHODS

Extensive surveys were made on entire sub-tidal region along reef areas of Rutland Island during the period of 2008-2013 by Self-Contained Breathing Apparatus (SCUBA) diving and snorkeling. The physico-chemical parameters of seawater were recorded from the ten study areas. Surface seawater temperature was measured using standard mercury thermometer. The salinity was recorded at all the places of study by using hand-held Refractometer, Model ERMA, Japan. The seawater pH was measured soon after collection of water sample using Portable Water Quality Analyzer, Model SYSTRONICS Water Analyzer 371. The transparency of seawater column was measured by using Secchi disc from surface of sea to assess the depth of light penetration. The seawater turbidity was measured by Turbidity Meter Model EUTECH Instruments ECTN100IR, Singapore.

Corals and other associated faunal communities

The diversity of corals and their associated faunal communities were carried out at reef area using primarily Manta Tow survey (Done *et al.*, 1982) in shallow reef areas. Photography and videography was made on the most of the faunal components for the proper identification besides specimen sampling. The assessment of live corals and associated fauna has been done by randomly laying out 20m long Line Intercept Transects (LITs) following English *et al.* (1994). Digitization of individual species was made by underwater camera (Sony-Cyber Shot, Model-T900, marine pack, 12.1 megapixels). Species individual of corals were identified in conjunction with Veron and Pichon (1976, 1979, 1982), Veron *et al.* (1977) Veron and Wallace (1984), Veron (2000) and Wallace (1999). Health of coral reefs were studied simultaneously as bleaching was seen during May and June 2010.

Decapod crustaceans viz. brachyuran crabs, shrimp and lobsters; echinoderms, molluscs and sponges were also collected from 10 study sites of Rutland Island during the study period. Generally, hand picking method was adopted for the collection of crabs in the intertidal and sub-tidal zones. Crabs were identified by following Chhapgar (1957); Tsune Sakai (1976) while shrimps and lobsters were identified by following Poupin and Juncker (2010). Identification of Echinoderms was made in conjunction with the key characters of Clarke and Rowe (1971); Sastry (2005 and 2007). Molluscs were identified and categorized with the help of Rao (2000 and 2003). Opisthobranchs were recorded in comparison with Ramakrishna *et al.* (2010) and Gosliner *et al.* (2008). Polyclads were identified following the publications of Newman and Cannon (2003 and 2005). Fishes were identified in conjunction with Allen *et al.* (2003).

Statistical Analysis

The Shannon-Weaner Index (H') (Shannon and Weaner, 1964) of all the faunal components was evaluated using following formula.

$$H' = -\sum p_i \ln p_i$$

Where, p_i = Proportion of number of individual of a particular species and total number of individual of all the species, H' = Diversity of a theoretically infinite population.

Simpson's Diversity Index (Simpson, 1949) is one of the truthful indices to calculate the species diversity of any study site. It has been applied to calculate the species diversity of corals and their associated fauna at different stations in Rutland Island.

The formula for the Simpson Index as follows.

$$D = 1 - \sum_{i=1}^S \frac{n_i(n_i - 1)}{N(N - 1)}$$

Where S is the number of species, N is the total percentage cover or total number of organisms and n is the percentage cover of a species or number of organisms of a species. In this form, D ranges from 1 to 0, with 1 representing infinite diversity and 0 representing no diversity.

Evenness of a community was described by the Pielou's Evenness Index (J') (Pielou, 1966). The formula of the index is given below.

$$J' = H' / H'_{\max}$$

Where H' is the number derived from the Shannon diversity.

Menhinick Diversity Index (Menhinick, 1964) was calculated by using of the formula given below.

$$d = S / \sqrt{N}$$

Where, S = Total number of species, and N = Total number of individuals.

Margalef's Community Index (Margalef, 1968) was calculated by using the following formula.

$$d = S - 1 / \log N$$

Where, S = Total number of species, and N = Total number of individuals.

Berger-Parker Diversity Index (Berger and Parker, 1970) was calculated by the following formula.

$$d = N_{\max} / N$$

Fisher Alpha Diversity Index (Fisher, 1925) was also calculated.

Similarity Index is the simple measure of the extent to which two habitats species in common. The Sørensen Index, also known as Sørensen's similarity coefficient, is

a statistic used for comparing the similarity of two samples (Sorensen, 1948). It has been formulated as below

$$QS = (2C/A + B)$$

Where, *A* and *B* are the species numbers in samples *A* and *B*, respectively, and *C* is the number of species shared by the two samples. This expression is easily extended to abundance instead of incidence of species. This quantitative version of the Sørensen index is also known as Czekanowski Index.

RESULTS

The diversity of marine faunal communities was assessed in ten selected reef areas at Rutland Island during the period of study.

Physico-chemical parameters

Physico-chemical parameters are most important parameters to depict the ecological status of any environment. These variables of seawater were measured and tabulated. The mean surface seawater temperature of the study sites ranged from 26.5 to 28.0°C while salinity ranged in between 32.90 and 33.80 ppt. The concentration of hydrogen ions (pH) varied between stations and it was 7.3 at Station-5 to 7.7 at Station-9. The transparency in terms of penetration of light in the seawater column was measured at all the places and it ranged from 7 to 10 m. The turbidity of seawater was also measured by Nudson Turbidity Unit (NTU) and it was found minimum (730) at Station-5 and maximum (870) at Station-8. The intertidal exposure during low tide at the surveyed area ranged from 10 to 40 m at Station-7 to Station-2 respectively (Table 2).

Table 2. Physico-chemical parameters in seawater at study areas in Rutland Island

Sl. No.	Area	Temp. (°C)	Salinity (ppt)	pH	Transparency (m)	Turbidity (NTU)	Intertidal exposure (m)
1.	St.-1	27.5	33.41	7.5	9.2	740	30
2.	St.-2	27.5	33.18	7.6	10.0	760	40
3.	St.-3	27.0	33.70	7.5	7.5	800	35
4.	St.-4	26.5	32.90	7.4	7.5	810	30
5.	St.-5	26.5	33.52	7.3	9.0	730	25
6.	St.-6	27.0	33.46	7.5	8.0	750	20
7.	St.-7	27.5	33.61	7.4	9.5	850	10
8.	St.-8	28.0	33.48	7.6	10.0	870	30
9.	St. -9	28.0	33.80	7.7	7.0	810	25
10.	St. -10	28.0	33.16	7.6	7.0	790	20

Sponges

A total of 31 species of sponges belonging to 25 genera and 20 families were reported from the ten study areas of Rutland Island during the surveys (Table 3 and Plate 1-2). A maximum of 16 species belonging to 15 genera and 12 families were observed from Station-5 whereas the minimum of 6 species under 5 genera and 5 families were encountered at Station-6.

Table 3. Sponges of Rutland Island

Sl. No.	Species	St.-1	St.-2	St.-3	St.-4	St.-5	St.-6	St.-7	St.-8	St.-9	St.-10
	Family: PLAKINIDAE Schulze, 1880										
	Genus: <i>Plakortis</i> Schulze, 1880										
1	<i>Plakortis simplex</i> Schulze, 1880	-	-	+	-	+	-	+	-	+	-
	Family: TETILLIDAE Sollas, 1886										
	Genus: <i>Paratetilla</i> Dendy, 1905										
2	<i>Paratetilla bacca</i> (Selenka, 1867)	+	+	-	-	-	+	-	-	-	+
	Family: ANCORINIDAE Schmidt, 1870										
	Genus: <i>Rhabdastrella</i> Thiele, 1903										
3	<i>Rhabdastrella globostellata</i> (Carter, 1883)	-	-	-	+	+	-	+	+	-	-
	Genus: <i>Ecionemia</i> Bowerbank, 1864										
4	<i>Ecionemia acervus</i> Bowerbank, 1864	+	-	+	-	+	-	-	-	-	-
	Family: CLIONAIDAE D'Orbigny, 1851										
	Genus: <i>Cliona</i> Grant, 1826										
5	<i>Cliona varians</i> (Duchassaing & Michelotti, 1864)	-	+	-	-	-	+	-	-	-	+
6	<i>Cliona ensifera</i> Sollas, 1878	-	-	-	-	+	-	-	-	-	+
	Genus: <i>Spheciospongia</i> Marshall, 1892										
7	<i>Spheciospongia vagabunda</i> (Ridley, 1884)	+	-	-	+	-	-	+	-	-	+
	Family: SPIRASTRELLIDAE Ridley & Dendy, 1886										
	Genus: <i>Spirastrella</i> Schmidt, 1868										
8	<i>Spirastrella cunctatrix</i> Schmidt, 1868	-	-	-	-	+	-	-	-	+	-

Table 3. contd.

Sl. No.	Species	St.-1	St.-2	St.-3	St.-4	St.-5	St.-6	St.-7	St.-8	St.-9	St.-10
	Family: TETHYIDAE Gray, 1848										
	Genus: <i>Stellitethya</i> Sara, 1994										
9	<i>Stellitethya repens</i> (Schmidt, 1870)	+	-	+	-	+	-	-	-	-	+
	Family: MICROCIONIDAE Carter, 1875										
	Genus: <i>Clathria</i> Schmidt, 1862										
10	<i>Clathria (Thalysias) vulpine</i> (Lamarck, 1814)	+	+	-	-	-	-	-	-	-	-
11	<i>Clathria (Thalysias) cervicornis</i> (Thiele, 1903)	+	-	-	+	+	+	-	-	-	-
	Family: CRAMBEIDAE Levi, 1963										
	Genus: <i>Monanchora</i> Carter, 1883										
12	<i>Monanchora arbuscula</i> (Duchassaing & Michelotti, 1864)	+	-	+	-	-	-	+	-	+	-
	Family: CRELLIDAE Dendy, 1922										
	Genus: <i>Crella</i> Gray, 1867										
13	<i>Crella (Grayella) cyathophora</i> Carter, 1869	-	+	-	-	-	-	-	-	-	-
	Family: IOTROCHOTIDAE										
	Genus: <i>Iotrochota</i> Ridley, 1884										
14	<i>Iotrochota baculifera</i> Ridley, 1884	-	+	-	-	+	-	+	-	-	-
	Family: TEDANIDAE Ridley & Dendy, 1886										
	Genus: <i>Tedania</i> Gray, 1867										
15	<i>Tedania (Tedania) anhelans</i> (Lieberkühn, 1859)	-	-	-	-	+	-	+	+	+	-
	Family: MYCALIDAE Lundbeck, 1905										
	Genus: <i>Mycale</i> Gray, 1867										
16	<i>Mycale (Aegogropila) crassissima</i> (Dendy, 1905)	-	+	-	+	-	-	-	-	-	-
	Family: ISODICTYIDAE Dendy, 1924										
	Genus: <i>Coelocarteria</i> Burton, 1934										
17	<i>Coelocarteria singaporensis</i> (Carter, 1883)	-	+	-	-		+	-	-	+	-
	Family: AXINELLIDAE Carter, 1867										
	Genus: <i>Axinella</i> Schmidt, 1862										
18	<i>Axinella acanthelloides</i> Pattanayak, 2006	+	-	+	-	+	-	-	-	-	-

Table 3. contd.

Sl. No.	Species	St-1	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
19	<i>Axinella cannabina</i> (Esper, 1794)	+	+	-	-	-	-	-	-	+	-
	Family: DICTYONELLIDAE Van Soest, Diaz & Pomponi, 1990										
	Genus: <i>Acanthella</i> Schmidt, 1862										
20	<i>Acanthella klethra</i> Pulitzer-Finali, 1982	-	-	-	+	+	-	+	-	-	-
	Genus: <i>Liosina</i> Theile, 1899										
21	<i>Liosina paradoxa</i> Thiele, 1899	-	-	-	-	-	-	-	-	-	-
	Genus: <i>Stylissa</i> Hallmann, 1914										
22	<i>Stylissa carteri</i> (Dendy, 1889)	+	-	+	-	+	-	+	+	+	+
23	<i>Stylissa massa</i> (Carter, 1887)	+	+	-	-	-	-	-	-	-	+
	Family: CALLYSPONGIDAE de Laubenfels, 1936										
	Genus: <i>Callyspongia</i> Duchassaing & Michelotti, 1864										
24	<i>Callyspongia (Toxochalina) multiformis</i> (Pulitzer-Finali, 1986)	-	-	-	-	+	-	+	-	-	-
25	<i>Callyspongia (Euplacella) australis</i> (Lendenfeld, 1887)	+	+	+	+	+	-	+	-	+	-
	Family: CHALINIDAE Gray, 1867										
	Genus: <i>Chalinula</i> Schmidt, 1868										
26	<i>Chalinula nematifera</i> (de Laubenfels, 1954)	+			+			+	+		+
	Genus: <i>Haliclona</i> Grant, 1836										
27	<i>Haliclona (Gellius) cymaeformis</i> (Esper, 1794)	+		+			+	+			+
28	<i>Haliclona (Reniera) fascigera</i> (Hentschel, 1912)		+		+	+	+	+	+		
	Family: NIPHATIDAE Van Soest, 1980										
	Genus: <i>Gelliodes</i> Ridley, 1884										
29	<i>Gelliodes fibulata</i> (Carter, 1881)	+		+			+			+	
	Family: PHLOEODICTYIDAE Carter, 1882										
	Genus: <i>Oceanapia</i> Norman, 1869										
30	<i>Oceanapia sagittaria</i> (Sollas, 1902)	+	+		+		+		+		+

Table 3. contd.

Sl. No.	Species	St.-1	St.-2	St.-3	St.-4	St.-5	St.-6	St.-7	St.-8	St.-9	St.-10
	Family: PETROSIIDAE Van Soest, 1980										
	Genus: <i>Xestospongia</i> de Laubenfels, 1932										
31	<i>Xestospongia testudinaria</i> (Lamarck, 1815)	+		+	+	+		+		+	+
	Total no. of species	16	12	10	10	16	8	15	6	10	11
	Total no. of genera	14	12	10	9	15	7	12	6	10	9
	Total no. of family	13	12	10	9	18	5	13	5	10	7

Variations in diversity, dominance, evenness, and community and equitability indices of sponges were calculated depending upon the recorded data from the ten study sites at Rutland Island. Station-5 showed maximum value of Shannon-Weaner Diversity Index (2.85) and Menhinick Diversity Index (3.52) whereas Station-8 showed the minimum of 1.77 and 1.87 respectively (Fig. 2). Equitability Index of sponges was high at Station-2 (0.99) whereas lowest was found at Station-9 (0.87). Pileou's Evenness Index was high at Station-2 (0.97) whereas low at Station-9 (0.73). Simpson's Diversity Index ranged from 0.80 at Station-8 to 0.93 at Station-5 (Fig. 3). Margalef Community Index showed highest value for Station-5 (5.34) whereas the lowest value for Station-8 (2.27). Fisher Alpha Diversity Index depicted maximum value for Station-2 (88.78) while the minimum value for Station-8 (5.57) (Fig. 4). Dominance Index was high for the sponges at Station-8 (0.19) and low at Station-5 (0.06). Berger-Parker Diversity Index presented highest values for Station-8 (0.28) while the lowest (0.1) at Station-5 (Fig. 5).

The similarity index of sponges was also calculated between ten stations of Rutland Island. Maximum species similarity (0.70) was observed between Station-5 and Station-7 whereas the minimum (0.11) between Station-6 and Station-8 (Table 4).

Table 4. Similarity Index of Sponges at ten sites of Rutland Island

	St.-2	St.-3	St.-4	St.-5	St.-6	St.-7	St.-8	St.-9	St.-10
St.-1	0.48	0.53	0.44	0.51	0.38	0.51	0.26	0.62	0.42
St.-2		0.26	0.33	0.31	0.34	0.42	0.30	0.38	0.46
St.-3			0.28	0.55	0.30	0.48	0.35	0.52	0.29
St.-4				0.53	0.47	0.53	0.44	0.41	0.35

Table 4. contd.

	St.-2	St.-3	St.-4	St.-5	St.-6	St.-7	St.-8	St.-9	St.-10
St.-5					0.41	0.70	0.38	0.56	0.55
St.-6						0.32	0.11	0.52	0.29
St.-7							0.36	0.57	0.43
St.-8								0.3	0.33
St.-9									0.33

A total of 20 families of sponges were recorded from Rutland Island. A maximum of 4 species were observed under Dictyonellidae family while most of the families represented only 1 species (Table 5). Rutland Island represented 96.87% sponge species of Andaman and Nicobar Islands among the reported 20 families out of 27 families reported from Andaman and Nicobar Islands.

Table 5. Percentage composition of different families of Sponges at Rutland Island

Sl. No	Family	No. of species at A & N Islands	No. of species at Rutland Island	% of species at Rutland Island
	Plakinidae Schulze, 1880	1	1	100
	Tetillidae Sollas, 1886	1	1	100
	Ancorinidae Schmidt, 1870	2	2	100
	Clionaidae D'Orbigny, 1851	3	3	100
	Spirastrellidae Ridley & Dendy, 1886	1	1	100
	Tethyidae Gray, 1848	1	1	100
	Microcionidae Carter, 1875	2	2	100
	Crambeidae Levi, 1963	1	1	100
	Crellidae Dendy, 1922	1	1	100
	Iotrochotidae	1	1	100

Table 5. contd.

Sl. No	Family	No. of species at A & N Islands	No. of species at Rutland Island	% of species at Rutland Island
	Tedanidae Ridley & Dendy, 1886	1	1	100
	Mycalidae Lundbeck, 1905	1	1	100
	Isodictyidae Dendy, 1924	2	1	50
	Axinellidae Carter, 1867	2	2	100
	Dictyonellidae Van Soest, Diaz & Pomponi, 1990	4	4	100
	Callyspongidae de Laubenfels, 1936	2	2	100
	Chalinidae Gray, 1867	3	1	100
	Niphatidae Van Soest, 1980	1	1	100
	Phloeodictyidae Carter, 1882	1	1	100
	Petrosiidae Van Soest, 1980	1	1	100
		32	31	96.87

Scleractinian Corals

A total of 327 species of scleractinian corals belong to 68 genera and 15 families (Table 6 and Plate 3-10) were documented during the study period. Among them the family Acroporidae is dominant as it is represented by 88 species of scleractinians followed by 82 species under Faviidae family. A maximum number of 116 species were observed at Station-1 whereas the minimum of 53 species at Station-3 (Fig. 6).

Table 6. Scleractinian Corals of Rutland Island

Sl. No.	Species	St-1	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
	Family: ACROPORIDAE Verrill, 1902										
	Genus: <i>Acropora</i> Oken, 1815										
1	<i>Acropora gemmifera</i> (Brook, 1896)	+	+		+	+				+	
2	<i>Acropora elizabethensis</i> Veron, 2002	+		+	+	+	+				
3	<i>Acropora cuneata</i> (Dana, 1846)	+							+		
4	<i>Acropora granulosa</i> (MED & H, 1860)		+	+	+	+	+	+			

Table 6. contd.

Sl. No.	Species	St-1	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
5	<i>Acropora grandis</i> (Brook, 1892)					+				+	+
6	<i>Acropora vauhani</i> Wells, 1954				+				+		
7	<i>Acropora nasuta</i> (Dana, 1846)	+	+			+					
8	<i>Acropora anthocercis</i> (Brook, 1893)	+		+							
9	<i>Acropora valenciennesi</i> (MED & H, 1860)	+	+					+			+
10	<i>Acropora divaricata</i> (Dana, 1846)			+					+		
11	<i>Acropora striata</i> (Verrill, 1866)				+	+					
12	<i>Acropora humilis</i> (Dana, 1846)					+	+				
13	<i>Acropora forskali</i> (Ehrenberg, 1834)			+						+	+
14	<i>Acropora plana</i> Nemenzo, 1967							+			
15	<i>Acropora torresiana</i> Veron, 2002									+	
16	<i>Acropora carduus</i> (Dana, 1846)							+			+
17	<i>Acropora pectinata</i> Veron, 2002			+			+		+		
18	<i>Acropora insignis</i> Nemenzo, 1967										+
19	<i>Acropora sqarrosa</i> (Ehrenberg, 1834)				+					+	
20	<i>Acropora sekiseiensis</i> Veron, 1990	+					+				
21	<i>Acropora yongei</i> Veron and Wallace, 1984					+				+	
22	<i>Acropora caroliana</i> Nemenzo, 1976	+				+	+		+		
23	<i>Acropora chesterfieldensis</i> Veron and Wallace, 1984	+									
24	<i>Acropora latistella</i> (Brook, 1891)	+			+						+
25	<i>Acropora polystoma</i> (Brook, 1892)		+					+			
26	<i>Acropora microclados</i> (Ehrenberg, 1834)	+									
27	<i>Acropora copiosa</i> Nemenzo, 1967								+		
28	<i>Acropora robusta</i> (Dana, 1846)		+			+					+
29	<i>Acropora digitifera</i> (Dana, 1846)		+				+	+			
30	<i>Acropora subuata</i> (Dana, 1846)								+		
31	<i>Acropora cophodactyla</i> (Brook, 1892)										+
32	<i>Acropora horrida</i> (Dana, 1846)					+			+	+	
33	<i>Acropora palmerae</i> Wells, 1954	+			+						+
34	<i>Acropora selago</i> (Studer, 1878)	+									
35	<i>Acropora papillare</i> Latypov, 1992	+								+	

Table 6. contd.

Sl. No.	Species	St-1	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
36	<i>Acropora elseyi</i> (Brook, 1892)		+					+			
37	<i>Acropora cerealis</i> (Dana, 1846)			+	+		+				+
38	<i>Acropora hemprichii</i> (Ehrenberg, 1834)								+		
39	<i>Acropora tenuis</i> (Dana, 1845)			+			+				
40	<i>Acropora bruggemanni</i> (Brook, 1893)						+		+		
41	<i>Acropora echinata</i> Dana, 1846			+		+			+		+
42	<i>Acropora exquisita</i> Nemenzo, 1971	+						+		+	
43	<i>Acropora variolosa</i> (Klunzinger, 1879)		+		+						
44	<i>Acropora longicyathus</i> (MED & H, 1860)					+	+				+
45	<i>Acropora massawensis</i> Marenzeller, 1906								+		
46	<i>Acropora monticulosa</i> (Bruggemann, 1879)				+				+		
47	<i>Acropora rudis</i> (Rehberg, 1892)	+		+			+				
48	<i>Acropora formosa</i> (Dana, 1846)							+			+
49	<i>Acropora tutuilensis</i> (Hoffmeister, 1925)		+				+				
50	<i>Acropora loripes</i> (Brook, 1892)	+			+					+	
51	<i>Acropora hyacinthus</i> (Dana, 1846)				+			+			
52	<i>Acropora natalensis</i> Riegl, 1995			+						+	
53	<i>Acropora secale</i> (Studer, 1878)					+		+			+
54	<i>Acropora samoensis</i> (Brook, 1891)			+		+			+		
55	<i>Acropora pinguis</i> Wells, 1950										+
56	<i>Acropora florida</i> (Dana, 1846)									+	
57	<i>Acropora palifera</i> (Lamarck, 1816)	+					+				
58	<i>Acropora cateriformis</i> (Gardiner, 1898)					+				+	
59	<i>Acropora donei</i> Veron and Wallace, 1984	+			+	+			+		
	Genus: <i>Montipora</i> de Blainville, 1830										
60	<i>Montipora verrucosa</i> (Lamarck, 1816)	+					+				
61	<i>Montipora informis</i> Bernard, 1897	+									+
62	<i>Montipora verruculosus</i> Veron, 2002		+				+	+			
63	<i>Montipora meandrina</i> (Ehrenberg, 1834)	+					+				
64	<i>Montipora florida</i> Nemenzo, 1967								+		
65	<i>Montipora vietnemensis</i> Veron, 2002		+								+
66	<i>Montipora undata</i> Bernard, 1897		+				+	+			
67	<i>Montipora turtlensis</i> Veron and Wallace, 1984				+		+		+		

Table 6. contd.

Sl. No.	Species	St-1	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
68	<i>Montipora mollis</i> Bernard, 1897										+
69	<i>Montipora hispida</i> (Dana, 1846)				+	+			+	+	
70	<i>Montipora taiwanensis</i> Veron, 2002	+									+
71	<i>Montipora verrilli</i> Vaughan, 1907	+		+							
72	<i>Montipora spumosa</i> (Lamarck, 1816)	+								+	
73	<i>Montipora peltiformis</i> Bernard, 1897		+					+			
74	<i>Montipora venosa</i> (Ehrenberg, 1834)			+	+						+
75	<i>Montipora caliculata</i> (Dana, 1846)								+		
76	<i>Montipora angulata</i> (Lamarck, 1816)	+									
77	<i>Montipora grisea</i> Bernard, 1897	+					+				+
78	<i>Montipora efflorescens</i> Bernard, 1897		+				+	+			
79	<i>Montipora effusa</i> Dana, 1846	+			+	+	+				
80	<i>Montipora monasteriata</i> (Forsk., 1775)				+	+			+		
81	<i>Montipora corbettensis</i> Veron and Wallace, 1984		+		+		+				+
82	<i>Montipora porites</i> Veron, 2002		+				+	+			
83	<i>Montipora gaimardi</i> (Bernard, 1897)								+		
	Genus: <i>Astreopora</i> de Blainville, 1830										
84	<i>Astreopora myriophthalma</i> (Lamarck, 1816)						+				+
85	<i>Astreopora suggesta</i> Wells, 1954					+			+	+	
86	<i>Astreopora incrustans</i> Bernard, 1896				+					+	
87	<i>Astreopora ocellata</i> Bernard, 1896	+									
88	<i>Astreopora listeri</i> Bernard, 1896					+				+	
	Family: POCILLOPORIDAE Gray, 1842										
	Genus: <i>Pocillopora</i> Lamarck, 1816										
89	<i>Pocillopora damicornis</i> (Linnaeus, 1758)	+		+		+			+		
90	<i>Pocillopora eydouxi</i> MED & H, 1860	+			+			+			
91	<i>Pocillopora elegans</i> Dana, 1846						+			+	
92	<i>Pocillopora woodjonesi</i> Vaughan, 1918	+						+			
93	<i>Pocillopora verrucosa</i> (Ellis and Solander, 1786)				+	+	+			+	
94	<i>Pocillopora meandrina</i> Dana, 1846	+				+			+		
95	<i>Pocillopora kelleheri</i> Veron, 2002	+									

Table 6. contd.

Sl. No.	Species	St-1	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
	Genus: <i>Stylophora</i> Schweigger, 1819										
96	<i>Stylophora pistillata</i> Esper, 1797	+									+
97	<i>Stylophora danae</i> MED & H, 1850		+		+			+			
98	<i>Stylophora subseriata</i> (Ehrenberg, 1834)						+	+			+
	Genus: <i>Seriatopora</i> Lamarck, 1816										
99	<i>Seriatopora hystrix</i> Dana, 1846			+					+		
100	<i>Seriatopora stellata</i> Quelch, 1886										+
101	<i>Seriatopora aculeata</i> Quelch, 1886									+	
	Family: OCULINIDAE Gray, 1847										
	Genus: <i>Galaxea</i> Oken, 1815										
102	<i>Galaxea fascicularis</i> (Linnaeus, 1767)	+									
103	<i>Galaxea astreata</i> (Lamarck, 1816)					+	+	+		+	
	Family: SIDERASTERIDAE Vaughan and Wells, 1943										
	Genus: <i>Psammocora</i> Dana, 1846										
104	<i>Psammocora digitata</i> MED & H, 1851	+		+		+			+		
105	<i>Psammocora profundacella</i> Gardiner, 1898	+									
106	<i>Psammocora haimeana</i> MED & H, 1851	+									+
107	<i>Psammocora obtusangula</i> (Lamarck, 1816)		+					+			
108	<i>Psammocora nierstraszi</i> Horst, 1921	+				+					
	Genus: <i>Siderastrea</i> de Blainville, 1830										
109	<i>Siderastrea radians</i> (Pallas, 1766)								+		
	Genus: <i>Coscinaraea</i> Milne Edwards and Haime, 1848										
110	<i>Coscinaraea monile</i> (Forskal, 1775)		+								+
111	<i>Coscinaraea crassa</i> Veron and Pichon, 1980		+					+			
112	<i>Coscinaraea columna</i> (Dana, 1846)								+		
	Family: AGARICIIDAE Gray, 1847										
	Genus: <i>Pachyseris</i> Milne Edwards and Haime, 1849										
113	<i>Pachyseris gemmae</i> Nemenzo, 1955			+							+
114	<i>Pachyseris rugosa</i> (Lamarck, 1801)				+	+			+	+	
115	<i>Pachyseris speciosa</i> (Dana, 1846)	+					+				+

Table 6. contd.

Sl. No.	Species	St-1	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
	Genus: <i>Gardineroseris</i> Scheer and Pillai, 1974										
116	<i>Gardineroseris planulata</i> (Dana, 1846)	+									
	Genus: <i>Pavona</i> Lamarck, 1801										
117	<i>Pavona duerdeni</i> Vaughan, 1907	+								+	
118	<i>Pavona minuta</i> Wells, 1954		+					+			
119	<i>Pavona cactus</i> (Forsk., 1775)			+	+						+
120	<i>Pavona calvus</i> (Dana, 1846)					+			+		
121	<i>Pavona venosa</i> (Ehrenberg, 1834)			+			+	+			
122	<i>Pavona decussata</i> (Dana, 1846)								+		
123	<i>Pavona diffluens</i> (Lamarck, 1816)			+					+		+
124	<i>Pavona varians</i> Verrill, 1864	+			+	+				+	
125	<i>Pavona bipartita</i> Nemenzo, 1980		+					+			
126	<i>Pavona explanulata</i> (Lamarck, 1816)	+					+				
	Genus: <i>Coeloseris</i> Vaughan, 1918										
127	<i>Coeloseris mayeri</i> Vaughan, 1918	+				+					+
	Genus: <i>Leptoseris</i> Milne Edwards and Haime, 1849										
128	<i>Leptoseris mycetoseroides</i> Wells, 1954		+			+		+			
129	<i>Leptoseris explanata</i> Yabe and Sugiyama, 1941	+		+							
130	<i>Leptoseris hawaiiensis</i> Vaughan, 1907								+		
131	<i>Leptoseris solida</i> (Quelch, 1886)		+			+	+				+
132	<i>Leptoseris cuculata</i> (Ellis and Solander, 1786)		+					+			
133	<i>Leptoseris incrustans</i> (Quelch, 1886)								+		
134	<i>Leptoseris yabei</i> (Pillai and Scheer, 1976)										+
135	<i>Leptoseris striata</i> Fenner and Veron, 2002					+			+	+	
136	<i>Leptoseris foliosa</i> Dinesen, 1980	+									+
	Family: ASTROCOENIIDAE Koby, 1890										
	Genus: <i>Stylocoeniella</i> Yabe and Sugiyama, 1935										
137	<i>Stylocoeniella guentheri</i> Bassett-Smith, 1890			+			+			+	
	Family: FUNGIIDAE Dana, 1846										
	Genus: <i>Cantharellus</i> Höksema and Best, 1984										
138	<i>Cantharellus doederleini</i> (Marenzeller, 1907)	+									

Table 6. contd.

Sl. No.	Species	St-1	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
	Genus: <i>Cycloseris</i> Milne Edwards and Haime, 1849										
139	<i>Cycloseris costulata</i> (Ortmann, 1889)				+	+		+		+	
140	<i>Cycloseris patelliformis</i> (Boschma, 1923)	+				+			+		
141	<i>Cycloseris colini</i> Veron, 2002	+					+				
142	<i>Cycloseris vauhani</i> (Boschma, 1923)	+									+
143	<i>Ctenactis echinata</i> (Pallas, 1766)		+					+			
144	<i>Ctenactis crassa</i> (Dana, 1846)	+									
145	<i>Ctenactis triangularis</i> Tamal Mondal and C. Raghunathan, 2013								+		
	Genus: <i>Fungia</i> Lamarck, 1801										
146	<i>Fungia scutaria</i> Lamarck, 1801		+								+
147	<i>Fungia paumotensis</i> Stutchbury, 1833		+					+			
148	<i>Fungia danai</i> MED & H, 1851								+		
149	<i>Fungia fungites</i> (Linnaeus, 1758)										+
150	<i>Fungia concinna</i> Verrill, 1864			+		+		+	+	+	
151	<i>Fungia scabra</i> Doderlein, 1901	+			+						+
152	<i>Fungia horrida</i> Dana, 1846	+									
153	<i>Fungia repanda</i> Dana, 1846	+				+				+	
154	<i>Fungia klunzingeri</i> Doderlein, 1901		+			+		+			
155	<i>Fungia corona</i> Doderlein, 1901			+	+						+
156	<i>Fungia granulosa</i> Klunzinger, 1879					+			+		
	Genus: <i>Sandalolitha</i> Quelch, 1884										
157	<i>Sandalolitha dentata</i> Quelch, 1884			+		+	+	+			
158	<i>Sandalolitha robusta</i> Quenelch, 1886								+		
	Genus: <i>Herpolitha</i> Eschscholtz, 1825										
159	<i>Herpolitha weberi</i> Horst, 1921			+					+		+
160	<i>Herpolitha limax</i> (Houttuyn, 1772)	+									
	Genus: <i>Polyphyllia</i> Quoy and Gaimard, 1833										
161	<i>Polyphyllia talpina</i> (Lamarck, 1801)	+					+				+
	Genus: <i>Podabacia</i> Milne Edwards and Haime, 1849										
162	<i>Podabacia lankaensis</i> Veron, 2002		+					+			

Table 6. contd.

Sl. No.	Species	St-1	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
163	<i>Podabacia crustacea</i> (Pallas, 1766)	+			+						
164	<i>Podabacia sinai</i> Veron, 2002				+	+			+		
	Genus: <i>Lithophyllon</i> Rehberg, 1892										
165	<i>Lithophyllon lobata</i> Horst, 1921		+			+					+
166	<i>Lithophyllon undulatum</i> Rehberg, 1892		+					+			
	Family: MUSSIDAE Ortmann, 1890										
	Genus: <i>Symphyllia</i> Milne Edwards and Haime, 1848										
167	<i>Symphyllia recta</i> (Dana, 1846)					+					
168	<i>Symphyllia agaricia</i> MED & H, 1849	+			+	+					+
169	<i>Symphyllia hassi</i> Pillai and Scheer, 1976		+			+		+			
170	<i>Symphyllia erythraea</i> (Klunzinger, 1879)	+		+							
171	<i>Symphyllia radians</i> MED & H, 1849								+		
172	<i>Symphyllia valenciennesii</i> MED & H, 1849		+								+
	Genus: <i>Lobophyllia</i> de Blainville, 1830										
173	<i>Lobophyllia hemprichii</i> (Ehrenberg, 1834)		+					+			
174	<i>Lobophyllia robusta</i> Yabe and Sugiyama, 1936								+		
175	<i>Lobophyllia corymbosa</i> (Forsk., 1775)						+				+
176	<i>Lobophyllia pachysepta</i> Chevalier, 1975					+			+	+	
	Genus: <i>Isophyllia</i> Milne Edwards and Haime, 1851										
177	<i>Isophyllia rigida</i> (Dana, 1846)	+									+
	Genus: <i>Australomussa</i> Veron, 1985										
178	<i>Australomussa rowleyensis</i> Veron, 1985	+									
	Genus: <i>Scolymia</i> Haime, 1852										
179	<i>Scolymia australis</i> (MED & H, 1849)					+				+	
180	<i>Scolymia cubensis</i> (Milne Edwards and Hame, 1849)	+				+	+		+		
181	<i>Scolymia vitiensis</i> Bruggemann, 1877	+			+						
	Genus: <i>Acanthastrea</i> Milne Edwards and Haime, 1848										
182	<i>Acanthastrea faviaformis</i> Veron, 2002	+									+
183	<i>Acanthastrea hemprichii</i> (Ehrenberg, 1834)		+	+				+			

Table 6. contd.

Sl. No.	Species	St-1	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
184	<i>Acanthastrea echinata</i> (Dana, 1846)	+									
185	<i>Acanthastrea regularis</i> Veron, 2002						+		+		
186	<i>Acanthastrea brevis</i> MED & H, 1849		+		+						+
187	<i>Acanthastrea maxima</i> Sheppard and Salm, 1988		+					+			
	Family: FAVIIDAE Gregory, 1900										
	Genus: <i>Favia</i> Oken, 1815										
188	<i>Favia danae</i> Verrill, 1872								+		
189	<i>Favia maxima</i> Veron and Pichon, 1977						+				+
190	<i>Favia lizardensis</i> Veron and Pichon, 1977					+			+	+	
191	<i>Favia speciosa</i> Dana, 1846	+									+
192	<i>Favia marshae</i> Veron, 2002	+									
193	<i>Favia fava</i> (Forsk., 1775)	+								+	
194	<i>Favia helianthoides</i> Wells, 1954		+					+			
195	<i>Favia rotumana</i> (Gardiner, 1899)			+	+						+
196	<i>Favia rotundata</i> (Veron and Pichon, 1977)								+		
197	<i>Favia pallida</i> (Dana, 1846)			+			+				
198	<i>Favia matthaii</i> Vaughan, 1918					+			+		
199	<i>Favia stelligera</i> (Dana, 1846)	+									
200	<i>Favia maritima</i> (Nemzeno, 1971)	+		+							+
201	<i>Favia truncatus</i> Veron, 2002		+		+	+		+			
202	<i>Favia albidus</i> Veron, 2002	+									
203	<i>Favia veroni</i> Moll and Borel-Best, 1984							+	+		
204	<i>Favia laxa</i> (Klunzinger, 1879)		+								+
	Genus: <i>Caulastrea</i> Dana, 1846										
205	<i>Caulastrea furcata</i> Dana, 1846		+				+	+			
	Genus: <i>Plesiastrea</i> Milne Edwards and Haime, 1848										
206	<i>Plesiastrea versipora</i> (Lamarck, 1816)	+									
	Genus: <i>Leptoria</i> Milne Edwards and Haime, 1848										
207	<i>Leptoria irregularis</i> Veron, 1990	+									+
208	<i>Leptoria phrygia</i> (Ellis and Solander, 1786)		+					+			

Table 6. contd.

Sl. No.	Species	St-1	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
	Genus: <i>Diploastrea</i> Matthai, 1914										
209	<i>Diploastrea heliopora</i> (Lamarck, 1816)	+					+				
	Genus: <i>Oulastrea</i> Milne Edwards and Haime, 1848										
210	<i>Oulastrea crispata</i> (Lamarck, 1816)						+		+		
	Genus: <i>Favites</i> Link, 1807										
211	<i>Favites abdita</i> (Ellis and Solander, 1786)		+								+
212	<i>Favites acuticollis</i> (Ortmann, 1889)		+		+			+			
213	<i>Favites micropentagona</i> Veron, 2002				+				+		
214	<i>Favites bestae</i> Veron, 2002			+							+
215	<i>Favites halicora</i> (Ehrenberg, 1834)					+			+	+	
216	<i>Favites chinensis</i> (Verrill, 1866)	+			+						+
217	<i>Favites flexuosa</i> (Dana, 1846)	+					+				
218	<i>Favites paraflexuosa</i> Veron, 2002					+				+	
219	<i>Favites pentagona</i> (Esper, 1794)	+				+			+		
220	<i>Favites complanata</i> (Ehrenberg, 1834)	+									
221	<i>Favites russelli</i> (Wells, 1954)	+					+				+
222	<i>Favites vasta</i> (Klunzinger, 1879)		+		+			+			
223	<i>Favites spinosa</i> (Klunzinger, 1879)	+									
	Genus: <i>Platygyra</i> Ehrenberg, 1834										
224	<i>Platygyra pini</i> Chevalier, 1975								+		
225	<i>Platygyra sinensis</i> (MED & H, 1849)		+								+
226	<i>Platygyra ryukyuensis</i> Yabe and Sugiyama, 1936		+		+			+			
227	<i>Platygyra deadalea</i> (Ellis and Solander, 1786)								+		
228	<i>Platygyra crosslandi</i> Matthai, 1928										+
229	<i>Platygyra acuta</i> Veron, 2002				+	+			+	+	
230	<i>Platygyra lamellina</i> (Ehrenberg, 1834)	+		+							+
231	<i>Platygyra verweyi</i> Wijsman-Best, 1976	+					+				
232	<i>Platygyra contorta</i> Veron, 1990	+								+	
	Genus: <i>Oulophyllia</i> Edwards and Haime, 1848										
233	<i>Oulophyllia levis</i> (Nemanzo, 1959)		+					+			

Table 6. contd.

Sl. No.	Species	St-1	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
234	<i>Oulophyllia crispa</i> (Lamarck, 1816)			+	+						+
	Genus: <i>Montastrea</i> de Blainville, 1830										
235	<i>Montastrea curta</i> (Dana, 1846)								+		
236	<i>Montastrea colemani</i> Veron, 2002			+			+				
237	<i>Montastrea annuligera</i> MED & H, 1849								+		
238	<i>Montastrea cavernosa</i> (Linnaeus, 1766)			+					+		+
239	<i>Montastrea maagnistellata</i> Chevalier, 1971	+								+	
240	<i>Montastrea salebrosa</i> (Nemenzo, 1955)		+								
241	<i>Montastrea annularis</i> (Ellis and Solander, 1786)					+	+				+
242	<i>Montastrea valenciennesi</i> (MED & H, 1860)				+				+		
	Genus: <i>Barabattoia</i> Yabe and Sugiyama, 1941										
243	<i>Barabattoia amicorum</i> (MED & H, 1830)	+									
244	<i>Barabattoia laddi</i> (Wells, 1954)	+									+
	Genus: <i>Leptastrea</i> Milne Edwards and Haime, 1848										
245	<i>Leptastrea purpurea</i> (Dana, 1846)		+		+			+			
246	<i>Leptastrea pruinosa</i> Crossland, 1952	+		+							
247	<i>Leptastrea aequalis</i> Veron, 2002					+	+		+		
248	<i>Leptastrea transversa</i> Klunzinger, 1879		+								+
	Genus: <i>Goniastrea</i> Milne Edwards and Haime, 1848										
249	<i>Goniastrea edwardsi</i> Chevalier, 1971		+					+			
250	<i>Goniastrea retiformis</i> (Lamarck, 1816)								+		
251	<i>Goniastrea pectinata</i> (Ehrenberg, 1834)										+
252	<i>Goniastrea minuta</i> Veron, 2002					+			+	+	
253	<i>Goniastrea aspera</i> Verrill, 1905	+									+
254	<i>Goniastrea palauensis</i> (Yabe and Sugiyama, 1936)			+					+		
255	<i>Goniastrea favulus</i> (Dana, 1846)							+			+
	Genus: <i>Cyphastrea</i> Milne Edwards and Haime, 1848										
256	<i>Cyphastrea japonica</i> Yabe and Sugiyama, 1932									+	

Table 6. contd.

Sl. No.	Species	St-1	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
257	<i>Cyphastrea ocellina</i> (Dana, 1864)	+									
258	<i>Cyphastrea serailia</i> (Forskal, 1775)					+	+			+	
259	<i>Cyphastrea chalcidicum</i> (Forskal, 1775)	+			+	+			+		
260	<i>Cyphastrea microphthalma</i> (Lamarck, 1816)	+		+							
261	<i>Cyphastrea agassizi</i> (Vaughan, 1907)	+									+
	Genus: <i>Colpophyllia</i> Milne Edwards and Haime, 1848										
262	<i>Colpophyllia natans</i> (Houttuyn, 1772)	+			+		+				
	Genus: <i>Echinopora</i> Lamarck, 1816										
263	<i>Echinopora pacificus</i> Veron, 1990								+		
264	<i>Echinopora fruticulosa</i> (Ehrenberg, 1834)		+								+
265	<i>Echinopora lamellosa</i> (Espp, 1795)		+		+			+			
266	<i>Echinopora forskaliana</i> (Milne Edwards and Haime, 1849)								+		
267	<i>Echinopora hirsutissima</i> MED & H, 1849										+
268	<i>Echinopora gammacea</i> Lamarck, 1816				+	+			+	+	
	Family: PECTINIIDAE Vaughan and Wells, 1943										
	Genus: <i>Echinomorpha</i> Veron, 2002										
269	<i>Echinomorpha nishihirai</i> (Veron, 1990)		+		+			+			
	Genus: <i>Oxypora</i> Saville Kent, 1871										
270	<i>Oxypora crassispinosa</i> Nemenzo, 1979	+			+						+
271	<i>Oxypora glabra</i> Nemenzo, 1959	+			+		+				
	Genus: <i>Echinophyllia</i> Klunzinger, 1879										
272	<i>Echinophyllia orpheensis</i> Veron and Pichon, 1980	+								+	
273	<i>Echinophyllia echinoporoides</i> Veron and Pichon, 1980		+					+			
274	<i>Echinophyllia aspera</i> (Ellis and Solander, 1786)			+	+						+
	Genus: <i>Mycedium</i> Oken, 1815										
275	<i>Mycedium elephantotus</i> (Pallas, 1766)					+			+		
	Genus: <i>Pectinia</i> Oken, 1815										
276	<i>Pectinia paeonia</i> (Dana, 1846)			+			+				

Table 6. contd.

Sl. No.	Species	St-1	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
277	<i>Pectinia alcicornis</i> (Saville-Kent, 1871)								+		
278	<i>Pectinia lactuca</i> (Pallas, 1766)			+					+		+
	Family:PORITIDAE Gray, 1842										
	Genus: <i>Porites</i> Link, 1807										
279	<i>Porites solida</i> (Forsk., 1775)	+	+	+	+		+	+	+	+	+
280	<i>Porites murrayensis</i> Vaughan, 1918		+								
281	<i>Porites monticulosa</i> Dana, 1846						+				+
282	<i>Porites cylindrica</i> Dana, 1846	+	+	+	+				+		
283	<i>Porites murrayensis</i> Vaughan, 1918	+									
284	<i>Porites latistella</i> (Quelch, 1886)	+									+
285	<i>Porites stephensoni</i> Crossland, 1952		+					+			
286	<i>Porites rus</i> (Forsk., 1775)	+	+	+	+		+	+	+	+	+
287	<i>Porites densa</i> Vaughan, 1918								+		
288	<i>Porites lobata</i> Dana, 1846	+	+		+		+	+		+	+
289	<i>Porites nodifera</i> Klunzinger, 1879		+					+			
	Genus: <i>Goniopora</i> de Blainville, 1830										
290	<i>Goniopora lobata</i> MED & H, 1860	+									
291	<i>Goniopora minor</i> Crossland, 1952	+									+
292	<i>Goniopora columna</i> Dana, 1846		+		+			+			
293	<i>Goniopora eclipsensis</i> Veron and Pichon, 1982	+			+	+					
294	<i>Goniopora fruticosa</i> Saville-Kent, 1893					+			+		
295	<i>Goniopora pearsoni</i> Veron, 2002		+								+
296	<i>Goniopora albiconus</i> Veron, 2002		+			+		+			
297	<i>Goniopora minuta</i> Veron, 2002			+					+		
	Genus: <i>Alveopora</i> de Blainville, 1830										
298	<i>Alveopora allingi</i> Hoeffmeister, 1925				+						+
299	<i>Alveopora gigas</i> Veron, 1985				+	+			+	+	
	Family:MERULINIDAE Verrill,1866										
	Genus: <i>Hydnophora</i> Fischer de Waldheim,1807										
300	<i>Hydnophora microconos</i> (Lamarck, 1816)	+									+
301	<i>Hydnophora exesa</i> (Pallas, 1766)									+	
302	<i>Hydnophora grandis</i> Gardiner, 1904						+	+			+
303	<i>Hydnophora rigida</i> (Dana, 1846)			+					+		

Table 6. contd.

Sl. No.	Species	St-1	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
	Genus: <i>Merulina</i> Ehrenberg, 1834										
304	<i>Merulina scabricula</i> Dana, 1846										+
305	<i>Merulina ampliata</i> (Ellis and Solander, 1786)						+			+	
	Genus: <i>Scapophyllia</i> Milne Edwards and Haime, 1848										
306	<i>Scapophyllia cylindrica</i> MED & H, 1848	+						+			
	Family: DENROPHYLLIIDAE Gray, 1847										
	Genus: <i>Turbinaria</i> Oken, 1815										
307	<i>Turbinaria reniformis</i> Bernard, 1896					+				+	
308	<i>Turbinaria peltata</i> (Esper, 1974)	+				+			+		
309	<i>Turbinaria stellulata</i> (Lamarck, 1816)	+					+				
310	<i>Turbinaria frondens</i> (Dana, 1846)	+			+					+	+
311	<i>Turbinaria radicalis</i> Bernard, 1896		+		+			+			
312	<i>Turbinaria mesenterina</i> (Lamarck, 1816)	+		+							
	Genus: <i>Dendrophyllia</i> Grey, 1847										
313	<i>Dendrophyllia robusta</i> (Bourne, 1905)						+		+		
	Genus: <i>Tubastrea</i> Lesson, 1829										
314	<i>Tubastrea coccinea</i> Lesson, 1829		+								+
315	<i>Tubastrea diaphana</i> Dana, 1846		+					+			
316	<i>Tubastrea micrantha</i> Ehrenberg, 1834								+		
	Genus: <i>Rhizopsammia</i> Verrill, 1869										
317	<i>Rhizopsammia verrilli</i> van der Horst, 1922				+	+	+	+			+
	Genus: <i>Balanophyllia</i> Wood, 1844										
318	<i>Balanophyllia merguensis</i> Duncan, 1889					+			+	+	
319	<i>Balanophyllia vanderhorsti</i> Cairns, 2001	+									+
	Family: EUPHYLLIIDAE Veron, 2002										
	Genus: <i>Physogyra</i> Quelch, 1884										
320	<i>Physogyra lichtensteini</i> (MED & H, 1851)	+								+	
	Genus: <i>Plerogyra</i> Milne-Edwards and Haime, 1848										
321	<i>Plerogyra sinuosa</i> (Dana, 1846)	+		+						+	
	Genus: <i>Catalaphyllia</i> Wells, 1971										
322	<i>Catalaphyllia jardinei</i> (Saville-Kent, 1893)		+					+			

Table 6. contd.

Sl. No.	Species	St-1	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
	Genus: <i>Euphyllia</i> Dana, 1846										
323	<i>Euphyllia glabrescens</i> (Chamisso Eysenhardt, 1821)			+	+						+
324	<i>Euphyllia paraglabrescens</i> Veron, 2002								+		
325	<i>Euphyllia ancora</i> Veron and Pichon, 1980			+			+				
326	<i>Euphyllia crispata</i> Chevalier, 1971					+			+		
	Family: CARYOPHYLLIDAE Gray, 1847										
	Genus: <i>Heterocyathus</i> Milne Edwards and Haime, 1848										
327	<i>Heterocyathus aequicostatus</i> Milne Edwards and Haime, 1848			+					+		+
	Total no. of species	116	72	53	66	73	65	68	90	55	94

The ten study areas showed variation in diversity, dominance, evenness, community and equitability indices. Shannon-Weaner Diversity Index reveals that Station-1 showed highest diversity with 4.56 whereas Station-3 showed the lowest with 3.74. The Menhinick Diversity Index implies that Station-1 was more diversified (7.03) whereas the Station-9 was least diversified (3.27) (Fig. 7). Equitability Index of scleractinian corals was maximum at Station-10 (0.97) whereas minimum was observed at Station-6 (0.91). Pileou's Evenness Index was highest at Station-9 (0.93) whereas lowest at Station-6 (0.70). Simpson's Diversity Index was highest at the Station-1 (0.987) whereas lowest at Station-6 (0.966) (Fig. 8). Margalef Community Index was highest at Station-1 (20.51) whereas the lowest at Station-9 (9.33). Fisher Alpha Diversity Index was maximum at Station-1 (76.5) while the minimum at Station-9 (20.04) (Fig. 9). Dominance Index was maximum at Stations -6 (0.033) and minimum at Station-1 (0.012). Berger-Parker Diversity Indices were highest at Station-6 (0.131) while the lowest (0.025) at Station-8 (Fig. 10).

The study areas of Rutland Island were compared for scleractinian corals to record level of similarities of corals among the ten sites. Maximum similarity index (0.51) was found in between Station-2 & Station-7 whereas the minimum (0.02) observed between Station-7 & Station-8 and Station-9 & Station-10 (Table 7).

Table 7. Similarity Index of Scleractinian corals at ten sites of Rutland Island

	St.-2	St.-3	St.-4	St.-5	St.-6	St.-7	St.-8	St. -9	St.-10
St.-1	0.07	0.14	0.19	0.15	0.22	0.07	0.12	0.11	0.28
St.-2		0.03	0.20	0.08	0.11	0.51	0.03	0.06	0.19

Table 7. *contd.*

	St.-2	St.-3	St.-4	St.-5	St.-6	St.-7	St.-8	St. -9	St.-10
St.-3			0.21	0.07	0.23	0.09	0.27	0.11	0.23
St.-4				0.27	0.18	0.23	0.17	0.13	0.22
St.-5					0.17	0.14	0.36	0.35	0.08
St.-6						0.12	0.07	0.11	0.17
St.-7							0.02	0.09	0.11
St.-8								0.20	0.06
St. -9									0.02

A total of 15 families of scleractinian corals were recorded during study period. A maximum of 88 species were observed under Acroporidae family where as the minimum of one species recorded under both Astrocoeniidae and Caryophyllidae families (Table 8). Rutland Island represented 62.40% scleractinian species of Andaman and Nicobar Islands among the 15 families out of 19 families reported from these islands.

Table 8. Percentage composition of different families of Scleractinian corals

Sl. No.	Families	Species in A & N Islands	Species at Rutland Island	Species Percentage at Rutland Island
1	Acroporidae	160	88	55.00
2	Pocilloporidae	22	13	59.09
3	Oculinidae	5	2	40.00
4	Siderastreidae	15	9	60.00
5	Agariciidae	35	24	68.57
6	Astrocoeniidae	3	1	33.33
7	Fungiidae	52	29	55.76
8	Merulinidae	9	7	77.77
9	Mussidae	28	21	75.00
10	Faviidae	91	82	90.11
11	Pectinidae	15	9	60.00
12	Poritidae	55	21	38.18
13	Dendrophylliidae	18	13	72.22
14	Euphyllidae	8	7	87.50
15	Caryophyllidae	8	1	12.50
Total		524	327	62.40

Coral species were distributed at the depth between 2m and 35m at Rutland Island. The mean density of corals in Rutland Island was assessed as 12-23 colonies/10 sq. m. A maximum of 23 colonies/ 10 sq. m was estimated at Stations-1, 5 and 8 while minimum of 12 colonies/ 10 sq. m reported at Station-3. The live coral cover in Rutland Island was estimated as 57-63%. Maximum live (63%) corals were seen at Stations- 1, 2 and 9 while the minimum (57%) was observed at Station-3. However, 50-65% of corals bleached in 2010 due to increase in sea surface temperature in Andaman Sea. Maximum of 65% bleaching was observed at Station-3 where as the minimum of 50% was found at Stations-4 and 8. Due to presence of favourable environment 28-87% recovery of corals were also observed during 2011. Maximum of 87% recovery was recorded at Station-9 while minimum of 28% recovery registered at Station-6. New recruitment of scleractinian corals was also recorded during study period (Fig. 11). A maximum 56% new recruitment was recorded at Station-6 area while the minimum (23%) of recorded at Station-1 (Table 9 and Fig. 11).

Table 9. Status of Scleractinian corals of Rutland Island

Sl. No.	Study areas	Density of colony/10m ²	Live coral percentage 2013	Bleached corals percentage 2010	Recovery percentage of corals 2011	New Recruitment percentage 2011-2013 (Colony/10m ²)
1	St.-1	23	63	52	78	23
2	St.-2	20	63	54	49	27
3	St.-3	12	57	65	83	56
4	St.-4	18	61	50	85	54
5	St.-5	23	60	58	40	24
6	St.-6	19	62	52	28	27
7	St.-7	20	60	51	64	35
8	St.-8	23	58	50	58	41
9	St. -9	22	63	60	87	32
10	St. -10	20	59	51	50	39

Gorgonians

A total of six species of gorgonians belong to five genera and five families were identified from Rutland Island. A maximum number of 5 species were encountered at Station-9 whereas minimum 3 were recorded at Stations-5 and 7 (Table 10 and Plate 11).

Table 10. Gorgonian of Rutland Island

Sl. No.	Species	St-1	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
	Order: GORGONACEA Lamouroux, 1816										
	Family: ISIDIDAE Lamouroux, 1812										
	Genus: <i>Isis</i> Linnaeus, 1758										
1	<i>Isis hippuris</i> Linnaeus, 1758	+	+		+				+	+	
	Family: GORGONIIDAE Lamouroux, 1812										
	Genus: <i>Rumphella</i> Bayer, 1955										
2	<i>Rumphella aggregate</i> (Nutting, 1910)		+	+			+			+	+
3	<i>Rumphella torta</i> Klunzinger, 1877	+	+	+			+	+		+	+
	Family: PLEXAURIDAE Gray, 1859										
	Genus: <i>Echinogorgia</i> Kolliker, 1865										
4	<i>Echinogorgia flora</i> Nutting, 1910				+	+			+	+	+
	Family: MELITHAEIDAE Gray, 1870										
	Genus: <i>Melithaea</i> Milne-Edwards, 1857										
5	<i>Melithaea ochracea</i> (Linnaeus, 1785)		+		+		+			+	
	Family: ELLISELLIDAE Gray, 1859										
	Genus: <i>Verrucella</i> Milne Edwards & Haime, 1858										
6	<i>Verrucella klunzingeri</i> Grasshoff, 2000	+		+	+	+	+	+	+		+
Total no. of species		3	4	3	4	2	4	2	3	5	4
Total no. of genera		3	3	2	4	2	3	2	3	4	3
Total no. of families		3	3	2	4	2	3	2	3	4	3

Variation in diversity, dominance, evenness, community and equitability indices of gorgonians were observed from the ten study areas of Rutland Island. Shannon-Weaner Diversity Index reveals that Station-9 showed highest diversity with 1.45 whereas Station-5 showed the lowest with 0.68. The Menhinick Diversity Index implies that Station-2 was more diversified (1.26) and the Station-5 was least diversified (0.5) (Fig. 12). Equitability Index of scleractinian corals was maximum at Station-4 (0.99) and minimum was seen at Station-2 (0.88). Pileou's Evenness Index was highest at Stations-4 and 9 (0.99) whereas lowest at Station-2 (0.84). Simpson's Diversity Index was high at the Station-9 (0.74) and low at Station-7 (0.44) (Fig.13). A Margalef Community Index maximum was at Station-9 (1.41) and minimum at Station-5 (0.36). Fisher Alpha Diversity Index was maximum at Station-2 (2.47) while the minimum at Station-5 (0.6) (Fig.14). Dominance Index was maximum at Station-7 (0.55) and minimum at Station -6(0.26). Berger-Parker Diversity Indices were highest at Station-7 (0.66) while the lowest (0.3) at Station-4 (Fig. 15).

Polyclads

A total of 10 species of polyclads belong to 3 genera under the family Pseudocerotidae were recorded from Rutland Island. A maximum of 6 species were reported from Station-7 whereas the minimum of 3 species were reported from Stations-2, 3 and 4 (Table 11 and Plate 12).

Table 11. Polyclads of Rutland Island

Sl. No.	Species	St.-1	St.-2	St.-3	St.-4	St.-5	St.-6	St.-7	St.-8	St.-9	St.-10
	Phylum: PLATYHELMINTHES Gegenbaur, 1859										
	Class: TURBELLARIA Ehrenberg, 1831 Order: POLYCLADIDA Lang, 1884 Sub-Order: <i>Cotylea</i> Lang, 1884 Family PSEUDOCEROTIDAE Genus <i>Pseudoceros</i>										
1	<i>Pseudoceros indicus</i> Newman and cannon, 2002	+	-	-	+	-	+	+	-	+	-
2	<i>Pseudoceros goslineri</i> Newman and Cannon, 1994	-	+	+	-	+	-	-	+	-	+
3	<i>Pseudoceros bifurcus</i> Prudhoe, 1989	+	-	-	-	-	+	+	-	+	+
4	<i>Pseudoceros concinnus</i> (Collingwood, 1876)	+	+	-	+	-	-	+	+	+	+
5	<i>Pseudoceros prudhoei</i> Newman and Cannon, 1994	-	-	+	-	+	-	-	+	-	-
6	<i>Pseudoceros tristriatus</i> Hayman, 1959	-	-	-	-	-	-	+	-	+	+
	Genus: <i>Pseudobiceros</i>										
7	<i>Pseudobiceros bedfordi</i> (Laidlaw, 1903)	+	-	-	+	-	+	-	+	+	-
8	<i>Pseudobiceros flavocanthus</i> Newman and Cannon, 1994	-	+	-	-	-	-	+	-	-	+
9	<i>Pseudobiceros damawan</i> Newman and Cannon, 1994	-	-	+	-	-	+	-	-	-	-
	Genus: <i>Thysanozoon</i>										
10	<i>Thysanozoon nigropapillosum</i> Hayman, 1959	-	-	-	-	-	-	+	-	-	-
	Total no. of species	4	3	3	3	2	4	6	4	5	5
	Total no. of genera	2	2	2	2	2	2	3	2	2	2

The species diversity of polyclads was calculated for ten study areas around Rutland Island. Shannon-Weaner Diversity Index was high (1.73) at Station-7 and low at Station-5 (0.69). The Menhinick Diversity Index indicated that Station-7 was more diversified (2.12) whereas the Stations-3 and 4 was least diversified (0.1.34) (Fig. 16). Equitability Index of polyclads was maximum at Station-5 (1.0) whereas minimum was found at Station-3 (0.86). Pileou's Evenness Index was high at Station-5 (1.0) whereas lowest at Stations-3 and 9 (0.86). Simpson's Diversity Index was maximum at Station-7 (0.81) and minimum at Station-5 (0. 50) (Fig. 17). Margalef Community Index showed highest value for Station-7 (2.40) and lowest value for Stations-3 and 4 (1.24). Fisher Alpha Diversity Index registered maximum value for Station-10 (14.12) while the nil value for Station-5 (Fig. 18). Dominance Index showed a maximum value for Station-5 (0.50) and minimum value for Station-7 (0.18). Berger-Parker Diversity Index recorded highest value for Station-3 (0.60) and the lowest (0.25) at Station-7 (Fig. 19).

The results of species similarity index of Polyclads recorded in different study areas of Rutland Island are depicted in Table 12. Maximum similarity index (0.88) was observed between Station-1 & Station-9 whereas the minimum (0) was noted between several stations.

Table 12. Similarity Index of Polyclads at ten sites of Rutland Island

	St. -2	St. -3	St. -4	St. -5	St.-6	St. -7	St. -8	St. -9	St. -10
St. 1	0.28	0	0.85	0	0.75	0.60	0.50	0.88	0.44
St. 2		0.33	0.33	0.40	0	0.44	0.57	0.25	0.75
St. 3			0	0.80	0.28	0	0.57	0	0.25
St. 4				0	0.57	0.44	0.57	0.75	0.25
St. 5					0	0	0.66	0	0.28
St. 6						0.40	0.25	0.66	0.22
St. 7							0.1	0.72	0.72
St. 8								0.44	0.44
St. 9									0.60

Crabs

A total of 32 species of crabs under 18 genera and 10 families were reported from Rutland Island during the study period. A maximum of 23 species were identified at Station-6 whereas the minimum of 11 species were observed from Station-4 (Table 13 and Plate 13).

Table 13. Crabs of Rutland Island

Sl. No.	Species	St-1	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
	Phylum: ARTHROPODA Latreille, 1829 Class: MALACOSTRACA Latreille, 1802 Order: DECAPODA Latreille, 1802 Infraorder BRACHYURA Linnaeus, 1758 Family: CALAPPIDAE Dana, 1852										
	Genus: <i>Calappa</i> Weber, 1795										
1	<i>Calappa calappa</i> (Linnaeus, 1758)	+	+			+	+	+			+
2	<i>Calappa hepatica</i> (Linnaeus, 1758)	+	+				+		+	+	
3	<i>Calappa philargius</i> (Linnaeus, 1758)	+	+			+	+	+			
	Family: CARPILIIDAE Ortmann, 1893										
	Genus <i>Carpilius</i> Leach in Desmarest, 1823										
4	<i>Carpilius convexus</i> (Forsk., 1775)	+	+	+	+	+	+	+	+	+	
5	<i>Carpilius maculatus</i> (Linnaeus, 1758)		+	+	+		+	+			
	Family: DOMECIIDAE Ortmann, 1893										
	Genus: <i>Domecia</i> Eydoux & Souleyet, 1842										
6	<i>Domecia glabra</i> Alcock, 1899	+	+	+			+	+		+	
7	<i>Domecia hispida</i> Eydoux and Souleyet, 1842		+	+			+	+			+
	Family: DROMIIDAE De Haan, 1833										
	Genus: <i>Cryptodromia</i> Borradaile, 1903										
8	<i>Cryptodromia tuberculata</i> Stimpson, 1858		+		+	+	+	+	+		+
	Genus: <i>Dromidiopsis</i> Borradaile, 1900										
9	<i>Dromidiopsis cranioides</i> (De Man, 1888)		+	+		+	+	+			+

Table 13. contd.

Sl. No.	Species	St-1	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
	Family: ERIPHIIDAE MacLeay, 1838										
	Genus <i>Eriphia</i> Latreille, 1817										
10	<i>Eriphia sebana</i> (Shaw and Nodder, 1803)	+	+		+	+	+			+	+
11	<i>Eriphia smithi</i> MacLeay, 1838	+	+	+		+	+	+	+		+
	Family: GRAPSIDAE MacLeay, 1838										
	Genus: <i>Grapsus</i> Lamarck, 1801										
12	<i>Grapsus albolineatus</i> (Lamarck, 1818)				+	+			+	+	+
13	<i>Grapsus grapsus</i> (Linnaeus)				+	+			+	+	
	Family: MATUTIDAE De Haan, 1833										
	Genus: <i>Ashtoret</i> Galil & Clark, 1994										
14	<i>Ashtoret lunaris</i> (Forsk., 1775)	+		+		+		+	+		+
	Genus: <i>Matuta</i> Weber, 1795										
15	<i>Matuta planipes</i> Fabricius, 1798		+		+		+		+		+
	Family PORTUNIDAE Rafinesque, 1815										
	Genus <i>Charybdis</i> De Haan, 1833										
16	<i>Charybdis lucifera</i> (Fabricius)	+	+		+		+		+		+
	Genus: <i>Portunus</i> Weber, 1795										
17	<i>Portunus sanguinolentus</i> (Herbst)	+		+	+		+		+		
18	<i>Portunus pelagicus</i> (Linnaeus)		+	+		+		+			+
19	<i>Portunus granulatus</i> (Milne Edwards)	+		+			+		+		
	Genus: <i>Scylla</i> De Haan, 1833										
20	<i>Scylla serrata</i> (Forsk.)	+	+				+	+			
	Genus: <i>Thalamita</i> Latreille, 1829										
21	<i>Thalamita integra</i> (Dana)		+	+		+		+			
22	<i>Thalamita admete</i> (Herbst)	+		+			+	+		+	
23	<i>Thalamita crenata</i> (Latreille)	+	+			+	+				+
	Family: TRAPEZIIDAE Meirs, 1886										
	Genus: <i>Trapezia</i> Latreille, 1828										
24	<i>Trapezia cymodoce</i> (Herbst, 1801)	+		+			+	+			+

Table 13. contd.

Sl. No.	Species	St-1	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
25	<i>Trapezia digitalis</i> Latreille, 1828		+	+				+		+	
26	<i>Trapezia formosa</i> Smith, 1869	+	+	+			+	+			+
	Family: XANTHIDAE MacLeay, 1838										
	Genus: <i>Atergatis</i> De Haan, 1835										
27	<i>Atergatis floridus</i> (Rumph)	+		+		+		+	+		+
	Genus <i>Pilodius</i> Dana, 1851										
28	<i>Pilodius areolatus</i> (H. Milne Edwards, 1834)		+		+	+	+		+	+	+
29	<i>Pilodius pilumnoides</i> (White, 1847)	+		+		+		+		+	
30	<i>Pilodius pugil</i> Dana, 1852	+	+				+			+	+
	Genus: <i>Platypodia</i> Bell, 1835										
31	<i>Platypodia andamania</i> Deb, 1992		+		+		+		+		
	Genus: <i>Zozymus</i> Leach, in Desmarest, 1823										
32	<i>Zozymus aeneus</i> (Linnaeus)	+		+		+		+	+	+	+
	Total no. of species	20	22	18	11	17	23	20	15	12	18
	Total no. of genera	13	14	11	9	12	14	14	12	8	14
	Total no. of families	8	9	8	7	8	9	9	8	8	9

The ten study areas showed variation in diversity, dominance, evenness, community and equitability indices. Shannon-Weaner Diversity Index was highest at Station-6 (3.09) and lowest at Station-4 (2.66). The Menhinick Diversity Index was maximum (4.0) at Station-10 whereas minimum (3.02) was found at Station- 4 (Fig. 20). Equitability Index of crabs were maximum at Stations-1, 2, 6 and 7 (0.97) whereas minimum recorded at Station-9 (0.95). Pileou's Evenness Index was ranged from 0.86 at Staion-9 to 0.92 at Station-1. Simpson's Diversity Index were maximum at Stations-1, 2, 5 and 6 (0.95) whereas minimum was at Station-4 (0.92) (Fig. 21). Margalef Community Index showed highest value for Station-10 (6.41) and lowest value for Station-4 (4.5). Fisher Alpha Diversity Index reported maximum value at Station-10 (31.47) while the minimum at Station-8 (14.93) (Fig. 22). Dominance Index calculated for Station-4 (0.076) was maximum and Station-6 (0.048) was minimum. Berger-Parker Diversity Index was high at Station-10 (0.111) and low (0.068) at Station-6 area (Fig. 23).

The species similarities of crabs at 10 study areas of Rutland Island were given in Table 14. Maximum similarity index (0.83) was calculated between Stations-3 & 7 whereas the minimum (0.17) found between Stations-3 & 4.

A total of 10 families of crabs were recorded during study periods. Of which a maximum of 8 species were observed under Portunidae family where as the minimum of each 2 species recorded under 8 families (Table 15). Rutland Island represented 30% crab species of Andaman and Nicobar Islands among the recorded 10 families.

Table 14. Similarity Index of Crabs at ten sites of Rutland Island

	St.-2	St.-3	St.-4	St.-5	St.-6	St.-7	St.-8	St. -9	St.-10
St.-1	0.51	0.62	0.31	0.54	0.72	0.62	0.50	0.52	0.55
St.-2		0.46	0.50	0.53	0.79	0.65	0.44	0.37	0.58
St.-3			0.17	0.45	0.51	0.83	0.35	0.37	0.42
St.-4				0.54	0.50	0.21	0.70	0.51	0.50
St.-5					0.41	0.6	0.65	0.63	0.73
St.-6						0.57	0.49	0.33	0.58
St.-7							0.33	0.34	0.52
St.-8								0.55	0.62
St. -9									0.47

Table 15. Percentage composition of different families of Crabs

Sl.No.	FAMILY	No. of species at A & N Islands	No. of species at Rutland Island	% of species at Rutland Island
1	Calappidae	5	3	60%
2	Carpilidae	2	2	100%
3	Domeciidae	3	2	67%
4	Dromiidae	5	2	40%
5	Eriphiidae	4	2	50%
6	Grapsidae	13	2	15%
7	Matutidae	4	2	50%
8	Portunidae	30	8	33%
9	Trapeziidae	10	3	30%
10	Xanthidae	32	6	19%
Total		108	32	30%

Shrimps

A total of 24 species of shrimps under 9 genera and 6 families were identified from Rutland Island. Among them, maximum of 13 species were found at Stations-7 and 10 whereas the minimum of 9 species were recorded at Station-4 (Table 16 and Plate 14).

Table 16. Shrimps of Rutland Island

Sl. No.	Species	St-1	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
	Family HIPPOLYTIDAE Spence Bate, 1888										
	Genus <i>Hippolysmata</i> Stimpson, 1860										
1	<i>Hippolysmata prima</i> (Borradaile)	+		+		+	+			+	
2	<i>Hippolysmata vittata</i> Stimpson		+		+			+	+		+
	Genus <i>Hippolyte</i> Leach, 1814										
3	<i>Hippolyte commensalis</i> Kemp			+		+	+		+		+
4	<i>Hippolyte ventricosa</i> H.M. Edwards	+			+			+		+	
	Genus <i>Thor</i> Kingsley, 1878										
5	<i>Thor amboinensis</i> (de Haan)	+	+	+			+		+		+
6	<i>Thor maldivensis</i> Borradaile		+	+		+		+		+	
7	<i>Thor paschalis</i> (Heller)			+			+		+		+
	Family ACANTHEPHYRIDAE Spence Bate, 1888										
	Genus <i>Acantheephyra</i> A. Milne-Edwards, 1881b										
8	<i>Acantheephyra armata</i> A.M. Edwards	+		+		+		+		+	
9	<i>Acantheephyra curtirostris</i> Wood- Mason		+		+			+	+		+
10	<i>Acantheephyra eximea</i> S.I.. Smith	+		+			+	+		+	
11	<i>Acantheephyra sanguinea</i> Wood- Mason		+		+	+			+		+

Table 16. contd.

Sl. No.	Species	St.-1	St.-2	St.-3	St.-4	St.-5	St.-6	St.-7	St.-8	St.-9	St.-10
	Family NEMATOCARCINIDAE Kingsley, 1878a										
	Genus <i>Nematocarcinus</i> A. Milne- Edwards, 1881b										
12	<i>Nematocarcinus undulatipes</i> Bate		+		+		+		+		
13	<i>Nematocarcinus tenuirostris</i> Bate	+		+		+		+			+
	Family PALAEMONIDAE Rafinesque, 1815										
	Genus <i>Anchistus</i> Borradaile, 1898										
14	<i>Anchistus inermis</i> (Forsk.)	+	+		+			+			+
15	<i>Anchistus demani</i> Kemp			+		+	+		+	+	
	Family PANDALIDAE Haworth, 1825										
	Genus <i>Chlorocurtis</i> Kemp, 1925										
16	<i>Chlorocurtis miser</i> Kemp	+	+			+		+			+
	Genus <i>Plesionika</i> Spence Bate, 1888										
17	<i>Plesionika alcocki</i> (A.R.Y. Anderson)	+		+		+	+			+	
18	<i>Plesionika bifurca</i> Alcock & Anderdson		+		+		+		+		+
19	<i>Plesionika ensis</i> (A.M. Edwards)										
20	<i>Plesionika martia</i> (A.M. Edwards)			+	+	+		+		+	
21	<i>Plesionika ocellus</i> (spence Bate)	+	+				+	+			+
	Family PASIPHAEIDAE Dana, 1852										
	Genus <i>Leptochela</i> Stimpson, 1860										
22	<i>Leptochela aculeocaudata</i> Paulson	+	+			+		+			+

Table 16. contd.

Sl. No.	Species	St.-1	St.-2	St.-3	St.-4	St.-5	St.-6	St.-7	St.-8	St.-9	St.-10
23	<i>Leptochela pugnex</i> de Man			+			+	+		+	
24	<i>Leptochela robusta</i> Stimpson	+			+	+			+		+
	Total no. of species	12	11	12	9	12	11	13	10	9	13
	Total no. of genera	9	8	8	7	9	8	9	8	7	9
	Total no. of families	6	6	6	6	6	6	6	6	5	6

Shannon-Weaner Diversity Index for shrimps was highest at Station-10 (2.5) while Station-9 showed the lowest value of 2.06. The Menhinick Diversity Index at Station-3 was more diversified (3.0) whereas Station-4 was least diversified (2.32) (Fig. 24). Equitability Index of shrimps was maximum at Stations-3, 8 and 10 (0.97) whereas minimum values were calculated for Stations-4, 7 and 9 (0.94). Pileou's Evenness Index were highest at Stations-3, 8 and 10 (0.94) whereas lowest at Station-7 and 9 (0.87). Simpson's Diversity Index was maximum at Station-10 (0.91) whereas minimum was at Station-9 (0.85) (Fig. 25). Margalef Community Index showed highest value for Station-10 (4.07) whereas the lowest value for Station-4 (2.95). Fisher Alpha Diversity Index found maximum value for Station-3 (21.81) while the minimum value for Station-6 (8.75) (Fig. 26). Dominance Index recorded a maximum value for Station-9 (0.142) and a minimum value for Station-10 (0.085). Berger-Parker Diversity Index values for Station-9 (0.214) was high and for Station-10 was low (0.105) (Fig. 27).

The study areas of Rutland Island were compared for shrimps to record the similarities and dissimilarities among stations. Maximum similarity index (0.76) was seen between Stations-3 & 9 and the minimum (0.09) was between Stations-1 & 8. However no similarity was found between Stations-9 & 10 as the results indicated zero value (Table 17).

Table 17. Similarity Index of Shrimps at ten sites of Rutland Island

	St.-2	St.-3	St.-4	St.-5	St.-6	St.-7	St.-8	St.-9	St.-10
St.-1	0.43	0.5	0.29	0.58	0.43	0.64	0.09	0.48	0.56
St.-2		0.17	0.6	0.35	0.36	0.58	0.57	0.1	0.75

Table 17. contd.

	St.-2	St.-3	St.-4	St.-5	St.-6	St.-7	St.-8	St. -9	St.-10
St.-3			0.09	0.67	0.7	0.48	0.36	0.76	0.32
St.-4				0.29	0.2	0.45	0.63	0.22	0.54
St.-5					0.35	0.48	0.36	0.57	0.5
St.-6						0.25	0.57	0.5	0.42
St.-7							0.17	0.54	0.54
St.-8								0.13	0.61
St. -9									0

A total of 6 families of shrimps were recorded during study periods. A maximum of 7 species was observed under Hippolytidae family where as the minimum 2 species were recorded under Nematocarinidae and Palaemonidae families (Table 18). Rutland Island represented 38.71% of Shrimps of Andaman and Nicobar Islands among the recorded 6 families.

Table 18. Percentage composition of different families of Shrimps

Sl. NO	FAMILY	No. of species at A & N Islands	No. of species at Rutland Island	% of species at Rutland Island
1	Hippolytidae	16	7	44
2	Acanthephyridae	4	4	100
3	Nematocarinidae	2	2	100
4	Palaemonidae	2	2	100
5	Pandalidae	30	6	20
6	Pasiphaeidae	8	3	37.5
Total		62	24	38.71

Lobsters

Four species of lobsters were recorded during the study period from Rutland Island. All these species belongs to a single genus and family. A maximum of 4 species were observed from Stations-2 and 9 whereas the minimum 1 species was seen at Station-8 (Tables 19 and Plate 15).

Table 19. Lobsters of Rutland Island

Sl. No.	Species	St.-1	St.-2	St.-3	St.-4	St.-5	St.-6	St.-7	St.-8	St.-9	St.-10
	Family PALINURIDAE Latreille, 1802										
	Genus <i>Panulirus</i> White, 1847										
1	<i>Panulirus homarus</i> (Linnaeus)	+	+		+		+	+		+	+
2	<i>Panulirus penicillatus</i> (Olivier)		+	+	+	+		+	+	+	
3	<i>Panulirus vericolor</i> (Latreille)	+	+			+	+	+		+	+
4	<i>Panulirus polyphagus</i> Herbst		+	+	+		+			+	+
Total		2	4	2	3	2	3	3	1	4	3

Molluscs

A total number of 130 species under 69 genera and 39 families were reported during the study period from the ten stations of Rutland Island. Among them, Station-1 showed maximum of 60 species under 42 genera and 30 families whereas minimum of 35 species were observed at Station-2 belonging to 25 genera and 18 families (Table 20 and Plate 16-17).

Table 20. Molluscs of Rutland Island

Sl. No.	Species	St.-1	St.-2	St.-3	St.-4	St.-5	St.-6	St.-7	St.-8	St.-9	St.-10
	Phylum MOLLUSCA Cuvier, 1795 Class: GASTROPODA Cuvier, 1795 Order: ARCHAEOGASTROPODA Thiele, 1925 Family: PATELLIDAE Rafinesque, 1815 Genus: <i>Patelloida</i> Quoy & Gaimard, 1834										
1	<i>Patelloida saccharina</i> (Linnaeus, 1758)	+	+	+	+	+	-	+	+	+	-
	Family: TROCHIDAE Rafinesque, 1815 Genus: <i>Monodonta</i> Lamarck, 1799										
2	<i>Monodonta (Monodonta) labio</i> Linnaeus, 1758	+	+	+	-	-	-	+	-	-	+
3	<i>Monodonta australis</i> (Lamarck, 1799)	-	+	-	+	+	-	+	-	-	-

Table 20. contd.

Sl. No.	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
	Genus: <i>Tectus</i> Montfort, 1810										
4	<i>Tectus fenestratus</i> (Gmelin, 1791)	+	-	-	-	+	-	+	+	+	+
	Genus: <i>Trochus</i> Linnaeus, 1758										
5	<i>Trochus niloticus</i> (Linnaeus, 1767)	+	+	+	+	+	+	+	+	-	+
6	<i>Trochus ochroleucus</i> Gmelin, 1791	-	-	-	+	-	-	+	-	-	-
	Genus: <i>Umbonium</i> Link, 1807										
7	<i>Umbonium vestiarium</i> (Linnaeus, 1758)	-	+	-	-	-	-	-	-	+	-
	Family: TURBINIDAE Ratinesque, 1815 Genus: <i>Angaria</i> Roeding, 1798										
8	<i>Angaria delphinus</i> (Reeve, 1846)	+	-	-	-	+	-	-	-	+	+
	Genus: <i>Turbo</i> Linnaeus, 1758										
9	<i>Turbo (Marmarostoma) bruneus</i> (Roeding, 1798)	+	-	-	+	-	-	-	+	-	+
10	<i>Turbo (Turbo) petholatus</i> Linnaeus, 1758	+	-	-	+	-	+	-	+	+	+
11	<i>Turbo cinerea</i> (Born, 1778)	+	-	-	+	-	-	-	+	-	-
	Family: PHASIANELLIDAE Swainson, 1840										
	Genus: <i>Phasianella</i> Lamarck, 1804										
12	<i>Phasianella variegata</i> Lamarck, 1822	+	-	-	-	-	-	-	-	+	-
	Family: NERITIDAE Rafinesque, 1815 Genus: <i>Nerita</i> Linnaeus, 1758										
13	<i>Nerita albicilla</i> Linnaeus, 1758	+	+	+	-	+	+	+	+	+	+
14	<i>Nerita maxima</i> Gmelin 1791	-	-	1	-	-	-	-	-	-	-
15	<i>Nerita polita</i> Linnaeus, 1758	+	+	+	+	+	+	+	+	+	+
16	<i>Nerita (Theliostyla) chamaeleon</i> Linnaeus, 1758	+	+	-	+	+	+	+	+	+	+
	Order: MESOGASTROPODA Thiele, 1925 Family: LITTORINIDAE Gray, 1840 Genus: <i>Littoraria</i> Griffith & Pidgeon, 1834										
17	<i>Littoraria (Littoraria) undulata</i> (Gray, 1839)	+	+	+	+	+	+	+	+	+	+

Table 20. contd.

Sl. No.	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
	Genus: <i>Littorarina</i> Ferrussac, 1822										
18	<i>Littoraria</i> (<i>Littoranopsis</i>) <i>scabrascabra</i> (Linnaeus, 1758)	+	-	+	-	+	-	+	-	+	+
	Family: MODULIDAE P. Fischer, 1884 Genus: <i>Modulus</i> Gray, 1842										
19	<i>Modulus tectum</i> (Gmelin, 1791)	+	-	+	-	-	-	+	-	+	-
	Family: CERITHIIDAE Fleming, 1822 Genus: <i>Cerithium</i> Bruguiere, 1789										
20	<i>Cerithium bifasciatabifasciata</i> (Sowerby, 1855)	+	+	+	+	+	+	+	+	+	+
21	<i>Cerithium colarium</i> (Kiener, 1841)	+	-	-	-	-	-	+	-	-	-
22	<i>Cerithium columna</i> (Sowerby, 1834)	+	-	-	+	-	-	-	-	+	-
23	<i>Cerithium lividulum</i> Risso, 1826	+	+	-	-	+	-	+	-	+	+
24	<i>Cerithium suturale</i> Philippi, 1849	-	-	-	+	-	-	-	-	-	-
	Genus: <i>Clypeomorus</i> Jousseaume, 1888										
25	<i>Clypeomorus batillariaeformis</i> Habe and Kosage, 1966	+	+	+	+	+	+	+	+	+	+
	Genus: <i>Rhinoclavis</i> Swainson, 1840										
26	<i>Rhinoclavis</i> (<i>Rhinoclavis</i>) <i>sinensis</i> (Gmelin, 1791)	+	+	+	+	+	+	+	+	+	+
27	<i>Rhinoclavis aspera</i> (Linnaeus, 1758)	-	-	-	+	-	-	-	+	-	-
	Family: POTAMIDIDAE H. Adams & A. Adams, 1854 Genus: <i>Terebralia</i> Swainson, 1840										
28	<i>Terebralia palustris</i> (Linnaeus, 1758)	+	+	-	-	+	-	-	+	-	+
	Family: STROMBIDAE Rafinesque, 1815 Genus: <i>Lambis</i> Roeding, 1798										
29	<i>Lambis</i> (<i>Lambis</i>) <i>lambis</i> (Linnaeus, 1758)	+	-	-	+	-	+	-	-	-	-
30	<i>Lambis</i> (<i>Millepes</i>) <i>scorpius</i> Linnaeus, 1758	-	-	-	-	-	-	+	-	+	+
	Genus: <i>Varicospira</i> Eames, 1952										
31	<i>Varicospira cancellata</i> (Lamarck, 1816)	-	+	-	-	-	-	-	-	-	-

Table 20 contd.

Sl. No.	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St.-6	St. -7	St.-8	St. -9	St. -10
	Genus: <i>Strombus</i> Linnaeus, 1758										
32	<i>Strombus (Canarium) labiatus</i> (Roeding, 1798)	+	+	-	+	-	+	+	+	+	-
33	<i>Strombus canarium</i> Linnaeus, 1758	+	-	+	-	+	-	-	+	+	-
34	<i>Strombus labiatusolydius</i> Duclos, 1844	-	+	-	-	-	+	-	+	-	+
35	<i>Strombus variabilis</i> Swainson, 1820	-	-	-	-	+	-	-	-	+	-
	Family: CYPRAEIDAE Rafinesque, 1815 Genus: <i>Cypraea</i> Linnaeus, 1758										
36	<i>Cypraea cribraria</i> Linnaeus, 1758	-	-	-	-	-	-	-	-	-	+
37	<i>Cypraea (Erosaria) erosa</i> (Linnaeus, 1758)	-	-	-	-	-	+	-	-	-	-
38	<i>Cypraea (Erronea) caurica</i> Linnaeus 1758	-	-	+	-	+	-	-	-	-	-
39	<i>Cypraea (Mauritia) arabica</i> Linnaeus, 1758	+	-	-	-	-	-	+	-	-	+
40	<i>Cypraea (Monetaria) moneta</i> (Linnaeus, 1758)	-	-	-	+	-	-	-	-	-	-
41	<i>Cypraea (Staphylaea) staphylaea</i> (Linnaeus, 1758)	-	-	-	-	-	+	-	-	-	-
42	<i>Cypraea carneola</i> Linnaeus, 1758	+	-	-	+	-	-	-	+	-	+
43	<i>Cypraea histrio</i> Meuschen, 1781	-	-	-	-	+	-	-	-	-	-
44	<i>Cypraea nucleus</i> (Linnaeus 1758)	-	-	+	-	-	-	-	-	-	-
	Family: OVULIDAE Fleming, 1828 Genus: <i>Phenacovolva</i> Iredale, 1930										
45	<i>Phenacovolva rosea</i> (A. Adams, 1854)	-	-	-	-	-	+	-	-	-	-
	Genus: <i>Ovula</i> Bruguiere, 1789										
46	<i>Ovula ovum</i> Linnaeus, 1758	-	-	-	-	+	-	-	-	-	-
	Family: NATICIDAE Forbes, 1838 Genus: <i>Natica</i> Scopli, 1777										
47	<i>Natica gualteriana</i> (Recluz, 1844)	+	+	+	+	+	+	+	+	+	+
48	<i>Natica onca</i> (Roeding, 1798)	-	-	-	-	+	-	-	-	+	-
	Genus: <i>Polinices</i> Montfort, 1810										
49	<i>Polinices (Polinices) flemingiana</i> (Recluz, 1844)	-	+	-	-	-	-	+	-	-	+

Table 20 contd.

Sl. No.	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
50	<i>Polinices (Mammilla) melanostomoides</i> (Quoy & Gaimard, 1833)	-	-	-	-	+	-	-	-	-	-
51	<i>Polinices sebae</i> (Recluz, 1844)	-	-	-	-	-	-	-	-	+	-
	Family: RANELLIDAE Gray, 1854 Genus: <i>Cymatium</i> Roeding, 1758										
52	<i>Cymatium (Guttarium) muricinum</i> (Röding)	-	-	-	-	-	-	-	+	-	-
53	<i>Cymatium (Monoplex) nicobaricum</i> (Röding, 1792)	-	-	-	-	-	-	-	-	-	+
	Order :NEOGASTROPODA Wenz, 1938 Family: MURICIDAE Rafinesque, 1815 Genus: <i>Chicoreus</i> Montfort, 1810										
54.	<i>Chicoreus brunneus</i> Link, 1805	+	-	+	-	+	-	-	-	+	-
55.	<i>Chicoreus ramosus</i> (Linnaeus, 1758)	-	-	-	+	-	-	-	-	-	-
	Genus: <i>Cronia</i> H. & A. Adams, 1853										
56.	<i>Cronia konkanensis</i> Melvill, 1893	+	+	+	-	+	-	+	-	+	+
	Genus: <i>Drupella</i> Thiele, 1925										
57.	<i>Drupella cornus</i> (Roeding, 1798)	-	-	-	+	-	+	-	+	-	-
	Genus: <i>Maculotriton</i> Dall, 1904										
58	<i>Maculotriton serriale</i> (Deshayes, 1830)	-	-	+	-	-	-	-	-	-	-
	Genus: <i>Morula</i> Schumacher, 1917										
59	<i>Morula granulata</i> (Duclos, 1832)	-	-	-	-	-	-	+	-	-	-
	Genus: <i>Murex</i> Linnaeus, 1758										
60	<i>Murex (Murex) trapa</i> Roeding 1798	-	-	+	-	-	-	-	+	-	-
61	<i>Murex tribulus</i> (Linnaeus, 1758)	-	-	-	+	-	+	-	-	-	+
	Genus: <i>Naquetia</i> Jousseaume, 1880										
62	<i>Naquetia capucina</i> (Roeding, 1798)	+	-	-	-	-	-	+	-	-	-
	Genus: <i>Nassa</i> Roeding, 1798										
63	<i>Nassaserta</i> (Bruguiere, 1789)	-	-	-	-	+	-	-	-	-	-
	Genus: <i>Thais</i> Roeding, 1798										
64	<i>Thais buccinea</i> (Deshayes	-	+	-	-	+	-	-	+	+	+

Table 20 contd.

Sl. No.	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
65	<i>Thais tuberosa</i> (Roding 1798)	+	-	-	+	-	+	-	+	-	+
	Family:BUCCINIDAE Rafinesque, 1815 Genus: <i>Cantharus</i> Roeding, 1798										
66	<i>Cantharus (Polia) undosus</i> Linnaeus, 1758	+	-	-	-	-	+	-	-	-	+
	Genus: <i>Colubraria</i> Schumacher, 1817										
67	<i>Colubraria muricata</i> (Lightfoot, 1776)	-	-	-	-	+	-	-	-	-	-
	Genus: <i>Engina</i> Gray, 1839										
68	<i>Engina mendicaria</i> (Linnaeus, 1758)	+	-	-	-	-	-	+	-	-	+
	Family: COLUMBELLIDAE Swainson, 1840 Genus: <i>Pyrene</i> Roeding, 1798										
69	<i>Pyrene scripta</i> (Lamarck, 1791)	+	-	+	-	-	+	-	-	-	+
	Family: NASSARIIDA Eiredale, 1916 Genus: <i>Nassarius</i> Dumeril, 1806										
70	<i>Nassarius (Plicarularia) pullus</i> (Linnaeus, 1758)	+	+	-	+	+	+	+	-	+	+
71	<i>Nassarius (Niotha) livescens</i> (Philippi, 1840)	+	-	-	+	-	-	-	+	-	-
72	<i>Nassarius globosus</i> Quoy&Gaim, 1832	+	-	+	+	-	-	-	+	-	+
73	<i>Nassarius luridus</i> Gould, 1850	-	-	+	-	+	-	-	+	-	-
74	<i>Nassarius nodifer</i> Powis, 1835	-	+	-	+	-	-	+		+	-
75	<i>Nassarius (Zeuxis) olivesius</i> (Bruguiere, 1798)	+	-	-	+	-	-	-	-	+	+
76	<i>Nassarius albescens gemmuliferus</i> (A. Adams, 1852)	+	+	+	+	+	+	+	+	+	+
77	<i>Nassarius subconstrictus</i> Sowerby 1899	-	-	+	-	-	-	-	-	-	-
78	<i>Nassarius (Niotha) albescens albescens</i> (Dunker, 1846)	+	+	+	+	-	-	+	-	+	+

Table 20 contd.

Sl. No.	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
	Family: MELONGENIDAE Gill, 1871 Genus: <i>Pugilina</i> Schumacher, 1817										
79	<i>Pugilina cochlidium</i> (Linnaeus, 1758)	+	-	+	-	-	-	-	-	-	-
	Family: FASCIOLARIIDAE Gray, 1853 Genus: <i>Pleuroploca</i> (Roeding, 1798)										
80	<i>Pleuroploca filamentosa</i> (Roeding, 1798)	+	-	+	+	-	-	-	-	-	-
81	<i>Pleuroploca trapezium</i> (Linnaeus, 1758)	-	+	-	-	-	-	-	+	-	-
	Family: OLIVIDAE Latereille, 1825 Genus: <i>Oliva</i> Bruguiere, 1789										
82	<i>Oliva sericea</i> (Roeding, 1798)	+	-	+	-	+	-	+	-	+	+
83	<i>Oliva miniacea</i> (Röding, 1798)	+	+	+	+		+		+		+
	Family: MITRIDAE Swainson, 1831 Genus: <i>Mitra</i> Lamarck, 1789										
84	<i>Mitra (Strigatella) paupercula</i> (Linnaeus, 1758)	+	-	+	-	-	-	-	+	-	+
	Genus: <i>Pterygia</i> Roeding, 1798										
85	<i>Pterygia fenestrata</i> (Lamarck, 1811)	-	+	-	-	-	-	-	-	-	-
	Genus: <i>Vexillum</i> Roeding, 1798										
86	<i>Vexillum deshayesi</i> (Reeve, 1844)	-	-	-	-	-	+	-	-	-	-
87	<i>Vexillum subdivisum</i> Gmelin, 1791	-	-	-	-	+	-	-	-	-	-
	Family: CONIDAE Rafinesque, 1815 Genus: <i>Conus</i> Linnaeus, 1758										
88	<i>Conus araneosus</i> Hwass in Bruguière, 1792	-	+	-	-	+	-	-	-	+	-
89	<i>Conus chaldaeus</i> (Röding, 1798)	+	-	-	-	-	-	-	-	-	-
90	<i>Conus coronatus</i> Gmelin, 1791	-	-	-	-	-	+	-	-	-	-
91	<i>Conus ebraeus</i> Linnaeus, 1758	+	+	+	+	+	+	+	+	+	+
92	<i>Conus eburneus</i> Hwass in Bruguiere, 1792	+	-	-	-	-	+	-	-	-	+
93	<i>Conus episcopus</i> Hwass, 1792	-	-	-	-	-	-	+	-	-	-
94	<i>Conus nobilis</i> Linnaeus 1758	-	-	+	-	-	-	-	-	-	-
95	<i>Conus pennaceus</i> Born, 1778	-	-	-	-	-	-	+	-	-	-
96	<i>Conus straitus</i> Hwass in Bruguiere, 1792	-	+	-	-	+	-	-	-	-	+

Table 20 contd.

Sl. No.	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
97	<i>Conus zonatus</i> Hwass, 1792	-	-	+	-	-	-	+	+	+	-
	Family: TURRIDAE H. Adams & A. Adams, 1853 Genus: <i>Lophiotoma</i> Casey, 1904										
98	<i>Lophiotoma (Lophiotoma) abbreviata</i> (Reeve, 1843)	+	-	+	-	-	+	-	-	-	+
99	<i>Lophiotoma acuta</i> (Perry, 1811)	-	-	-	-	+	-	-	-	-	-
	Family: TEREBRIDAE Moersch, 1521 Genus: <i>Terebra</i> Bruguiere, 1798										
100	<i>Terebra maculata</i> (Linnaeus, 1758)	-	-	-	-	+	-	-	-	-	-
101	<i>Terebra affinis</i> (Gray, 1791)	-	-	-	-	-	-	-	+	-	-
	Order: ARCHITECTONOIDEA Gray, 1850 Family: ARCHITECTONICIDAE J.E. Gray in M. E. Gray, 1850 Genus: <i>Architectonica</i> (Roeding, 1798)										
102	<i>Architectonica perspectiva</i> (Linnaeus, 1758)	-	-	+	-	-	-	-	-	-	-
	Order: CEPHALASPIDEA P. Fischer, 1883										
	Family: BULLIDAE Gray, 1827 Genus: <i>Bulla</i> Linnaeus, 1758										
103	<i>Bulla ampula</i> Linnaeus, 1758	+	-	+	-	-	+	-	-	+	+
104	<i>Bulla vernicosa</i> Gaould, 1859	-	-	-	+	-	+	-	-	-	-
	Family: HAMINOEIDAE Pilsbry, 1895 Genus: <i>Atys</i> Montfort, 1810										
105	<i>Atys naucum</i> (Linnaeus, 1758)	+	-	-	-	-	-	-	+	-	-
	Order: SYSTELLOMMATOPHORA Pilsbry, 1948 Family: ELLOBIDAE L. Pfeiffer, 1854 Genus: <i>Melampus</i> Montfort, 1810										
106	<i>Melampus (Detracia) caffer</i> Kuster, 1844	-	+	-	-	-	-	-	-	+	-

Table 20 contd.

Sl. No.	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
	Genus: <i>Pythia</i> Roeding, 1798										
107	<i>Pythia plicata</i> Gray, 1825	+	-	-	-	-	-	+	-	-	+
108	<i>Pythia scarabaeus</i> (Linnaeus, 1758)	-	-	+	-	-	+	-	-	-	-
	Class: BIVALVIA Linnaeus, 1758 Order: MYTILOIDA Ferussac, 1822 Family: PTERIIDAE Gray, 1847 Genus: <i>Pinctada</i> Roeding, 1798										
109	<i>Pinctada margaritifera</i> (Linnaeus, 1758)	-	-	-	-	-	+	-	+	-	+
	Family: PECTINIDAE Rafinesque, 1815 Genus: <i>Gloripallium</i> Iredale, 1939										
110	<i>Gloripallium pallium</i> (Linnaeus, 1758)	-	-	+	-	-	-	-	-	-	+
	Family: GRYPHAEIDAE Vialov, 1936 Genus: <i>Hyotissa</i> Stenzel, 1971										
111	<i>Hyotissa hyotis</i> (Linnaeus, 1758)	-	-	-	-	-	-	+	-	-	-
	Order: VENEROIDA Adame & Adams, 1856 Family: CHAMIDAE Lamarck, 1809 Genus: <i>Chama</i> Linnaeus, 1758										
112	<i>Chama lazarus</i> Linnaeus, 1758	-	-	+	-	-	+	-	-	+	-
	Family: CARDITIDAE Fleming, 1828 Genus: <i>Cardita</i> Bruguiere, 1792										
113	<i>Cardita variegata</i> Bruguiere, 1792	-	+	-	-	+	-	+	-	-	+
	Family: CARDIIDAE Lamarck, 1809 Genus: <i>Fulvia</i> Gray, 1853										
114	<i>Fulvia australis</i> (Sowerby, 1841)	+	-	-	-	-	-	-	+	-	-
	Genus: <i>Trachycardium</i> Moersch, 1853										
115	<i>Trachycardium elongatum</i> Bruguiere, 1792	-	-	+	-	-	-	-	-	-	-
116	<i>Trachycardium flavum</i> (Linnaeus, 1758)	-	-	-	-	-	-	+	-	-	-
	Family: TRIDACNIDAE Lamarck, 1819 Genus: <i>Hippopus</i> Lamarck, 1799										
117	<i>Hippopus hippopus</i> (Linnaeus, 1758)	-	-	+	-	-	-	-	-	+	-
	Genus: <i>Tridacna</i> Bruguiere, 1797										
118	<i>Tridacna crocea</i> Lamarck, 1819	+	-	+	-	-	-	+	-	+	+
119	<i>Tridacna squamosa</i> Lamarck, 1819	-	-	-	-	+	-	-	+	-	-

Table 20 contd.

Sl. No.	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
120	<i>Tridacna maxima</i> Roeding, 1798	-	-	-	+	-	-	-	-	+	-
	Family: TELLINIDAE De Blainville, 1924 Genus: <i>Tellina</i> Linnaeus, 1754										
121	<i>Tellina (Scutarcopagia) scobinata</i> Linnaeus, 1758	-	-	-	-	-	-	-	+	-	-
122	<i>Tellina inflata</i> Gmelin, 1791	-	-	+	-	-	-	+	-	-	+
123	<i>Tellina palatum</i> Iredale, 1929	-	-	-	-	+	+	-	+	-	-
	Family: DONACIDAE Fleming, 1828 Genus: <i>Donax</i> Linnaeus, 1758										
124	<i>Donax cuneatus</i> Linnaeus, 1758	+	-	-	-	-	-	-	+	-	-
	Family: PSAMMOBIIDAE Fleming, 1828 Genus: <i>Asaphis</i> Modeer, 1793										
125	<i>Asaphis violascens</i> (Forsk., 1838)	+	+	+	+	+	+	+	+	+	+
	Family: VENERIDAE Rafinesque, 1815 Genus: <i>Antigona</i> Schumacher, 1817										
126	<i>Antigona puerpera</i> (Linnaeus, 1932)	+	-	-	-	+	-	-	-	+	+
	Genus: <i>Pteriglypta</i> Jukes-Browne, 1914										
127	<i>Periglypta reticulate</i> Linnaeus, 1758	+	-	-	+	-	+	-	+	-	-
	Genus: <i>Ruditapes</i> Chiamanti, 1900										
128	<i>Ruditapes bruguieri</i> (Hanley, 1845)	-	+	-	-	+	-	+	-	+	+
	Genus: <i>Tapes</i> Megerle von Muehlfeld, 1811										
129	<i>Tapes variegates</i> (Sowerby, 1852)	+	-	+	-	+	-	-	+	-	+
	Class: SCAPHOPODA Bronn, 1862 Family: DENTALIIDAE Children, 1834 Genus: <i>Dentalium</i> Linnaeus, 1758										
130	<i>Dentalium octangulatum</i> Donovan	-	-	-	-	-	+	-	-	-	-
	Total no. of species	60	35	45	39	45	38	43	45	45	54
	Total no. of genera	42	25	36	25	35	30	30	32	31	39
	Total no. of families	30	18	25	18	24	25	23	26	20	27

Shannon-Weaner Diversity Index reveals that Station-1 showed highest value of species diversity (3.75) whereas Station-8 showed the lowest (3.16). The Menhinick Diversity Index implies that Station-1 was more diversified (4.74) whereas the Station-2 was least diversified (3.79) (Fig. 28). Equitability Index of molluscs was maximum at Station-2 (0.92) whereas minimum was found at Station-8 (0.83). Pileou's Evenness Index was highest at Station-2 (0.77) whereas lowest at Station-8 (0.52). Simpson's Diversity Index was maximum at Stations-1 and 3 (0.96) and minimum at Station-8 (0.90) (Fig. 29). Margalef Community Index showed highest value for Station-1 (11.63) and the lowest value for Station-2 (7.65). Fisher Alpha Diversity Index registered a maximum value for Station-1 (34.87) and a minimum value for Station-2 (22.26) (Fig. 30). Dominance Index recorded a high value for Station-8 (0.09) and low value for Stations-1 and 3 (0.03). The calculated value for Berger-Parker Diversity Index was high for Station-8 (0.26) and low (0.06) at Station-1 (Fig. 31).

The species similarity index was calculated between ten study areas of Rutland Island and results are given in Table 20. Maximum similarity index (0.71) was found between Station-1 & Station-10 whereas the minimum (0.33) was between Station-4 & Station-5 and Station-5 & Station-6.

Table 21. Similarity Index of Molluscs at ten sites of Rutland Island

	St. 2	St. 3	St. 4	St. 5	St. 6	St. 7	St. 8	St. 9	St. 10
St. 1	0.44	0.52	0.52	0.45	0.46	0.56	0.55	0.59	0.71
St. 2		0.39	0.48	0.57	0.43	0.61	0.47	0.57	0.56
St. 3			0.35	0.43	0.38	0.47	0.41	0.50	0.48
St. 4				0.33	0.54	0.43	0.57	0.45	0.43
St. 5					0.33	0.47	0.46	0.57	0.52
St. 6						0.34	0.50	0.38	0.52
St. 7							0.36	0.56	0.59
St. 8								0.37	0.48
St. 9									0.54

A total of nine orders of molluscs were recorded from Rutland Island during the study period. A maximum of 48 species was observed under the Order Neogastropoda whereas the minimum 1 species recorded under the Orders Architectonoida and Dentaliida (Table 21). Rutland Island represented a total of 11.33% molluscs of Andaman and Nicobar Islands among the nine orders out of 20 orders were reported earlier from Andaman and Nicobar Islands.

Table 22. Percentage composition of different orders of Molluscs

Sl. No.	Orders	No. of species at A & N Islands	No. of species at Rutland Island	% of species Rutland Island
1.	Archeogastropoda	116	16	13.79
2.	Mesogastropoda	273	37	13.55
3.	Neogastropoda	421	48	11.40
4.	Architectonoidea	19	1	5.26
5	Pulmonata	14	3	21.43
6.	Cephalaspidea	32	3	9.38
7.	Mytiloidea	87	3	3.45
8.	Veneroidea	177	18	10.17
9.	Dentaliida	8	1	12.50
	Total	1147	130	11.33

The density of the molluscs was recorded at all the study areas of Rutland Island. It was ranged from 14-25 ind./10 sq. m. The maximum gastropod density was 25 ind./10 sq. at Stations-3 and 7 while the minimum 14 ind./10 sq. m was estimated at Station-6 (Fig. 32).

Opisthobranchs

A total of 61 species of Opisthobranchs under 27 genera and 15 families were reported from Rutland Island. Of which a maximum of 39 species under 22 genera and 12 families were reported from Station-7 whereas the minimum 20 species was recorded from Stations-3 and 6 (Table 23 and Plate 18-19).

Table 23. Opisthobranchs of Rutland Island

Sl. No.	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St.-6	St. -7	St.- 8	St. -9	St. -10
	Phylum: MOLLUSCA Cuvier, 1795 Class: GASTROPODA Cuvier, 1795 Subclass: OPISTHOBARNCHIA Order: ANASPIDEA Fischer, 1883 Family: APLYSIIDAE Lamarck, 1809 Genus: <i>Aplysia</i> Linnaeus, 1767										
1.	<i>Aplysia parvula</i> Morch, 1863	-	-	+	-	+	-	+	+	+	+

Table 23. contd.

Sl. No.	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
	Order: CEPHALASPEDIA Fischer, 1833 Family: AGLAJIDAE Pilsbry, 1895 Genus: <i>Chelidoneura</i> A. Adams, 1850										
2.	<i>Chelidoneura punctate</i> Eliot, 1903	-	+	-	+	-	-	-	+	+	-
3.	<i>Chelidoneura sandrana</i> Rudman, 1973	+	+	-	+	-	+	+	-	+	-
	Genus: <i>Odontoglaja</i> Rudman, 1978										
4.	<i>Odontoglaja guamensis</i> Rudman, 1978	-	-	+	-	+	-	+	-	+	+
	Family: GASTROPTERIDAE Swainson, 1840 Genus: <i>Gastropteron</i> Kosse, 1813										
5.	<i>Gastropteron bicornutum</i> Baba & Tokioka, 1965	+	+	-	-	-	+	-	+	-	+
	Order: NUDIBARNCHIA Blainville, 1814 Family: FACELINIDAE Bergh, 1889 Genus: <i>Favorinus</i> M. E. Gray, 1850										
6.	<i>Favorinus mirabilis</i> Baba, 1995	-	-	+	+	-	+	+	-	+	+
	Genus: <i>Phidiana</i> Gray, 1850										
7.	<i>Phidiana indica</i> (Bergh, 1896)	+	+	-	-	+	-	+	+	-	-
	Genus: <i>Pteraeolidia</i> Bergh, 1875										
8.	<i>Pteraeolidia anthina</i> (Angas, 1864)	-	+	-	+	-	+	-	+	-	+
	Family: FLABELLINIDAE Bergh, 1881 Genus: <i>Flabellina</i> Gray, 1833										
9.	<i>Flabellina rubrolineata</i> (O' Donoghue, 1929)	-	-	+	-	+	-	+	-	+	+
	Family: TERGIPEDIDAE Bergh, 1861 Genus: <i>Trinchesia</i> Ihering, 1879										
10.	<i>Trinchesia sibogae</i> (Bergh, 1905)	+	+	-	+	-	+	+	-	+	-
	Family: CADLINIDAE Bergh, 1891 Genus: <i>Cadlinella</i> Thiele, 1931										
11.	<i>Cadlinella ornastissima</i> (Risbec, 1928)	+	-	+	-	-	+	-	+	-	+

Table 23. contd.

Sl. No.	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
	Family: ACTEONIDAE d'Orbigny, 1843 Genus: <i>Pupa</i> Roding, 1798										
12.	<i>Pupa solidula</i> (Linnaeus, 1758)	-	-	-	-	-	-	+	-	-	-
	Family: DORIDIDAE Rafinesque, 1815 Genus: <i>Hoplodoris</i> Bergh, 1880										
13.	<i>Hoplodoris estrelyado</i> Gosliner & Behrens, 1998	+	-	+	-	-	-	+	+	+	+
	Family: CHROMODORIDIDAE Bergh, 1891 Genus: <i>Chromodoris</i> Alder & Hancock, 1855										
14.	<i>Chromodoris gleniei</i> (Kelaart, 1858)	-	-	-	+	-	+	+	-	+	+
15.	<i>Chromodoris geminus</i> Rudman, 1987	+	+	-	-	-	+	-	+	+	+
16.	<i>Chromodoris albopunctata</i> (Garret, 1879)	+	-	-	-	-	-	-	-	+	-
17.	<i>Chromodoris fidelis</i> (Kelaart, 1858)	-	-	+	-	+	+	+	-	+	-
18.	<i>Chromodoris colemani</i> Rudman, 1982	+	+	-	-	+	-	-	+	+	+
19.	<i>Chromodoris geometrica</i> (Risbec, 1928)	-	-	-	+	-	+	+	-	-	-
20.	<i>Chromodoris hintuanensis</i> Gosliner and Behrens, 1998	+	+	+	-	-	-	+	-	-	-
21.	<i>Chromodoris striatella</i> Bergh, 1876	-	+	+	+	-	+	-	-	+	+
	Genus: <i>Glossodoris</i> Ehrenberg, 1831										
22.	<i>Glossodoris cincta</i> (Bergh, 1888)	-	-	-	-	-	-	+	-	+	-
23.	<i>Glossodoris rufomarginata</i> (Bergh, 1890)	+	+	-	-	-	+	-	+	-	+
24.	<i>Glossodoris atromarginata</i> (Cuvier, 1804)	+	-	-	+	+	-	+	+	+	+
	Genus: <i>Hypselodoris</i> Stimpson, 1855										
25.	<i>Hypselodoris bullockii</i> (Collingwood, 1881)	-	-	+	-	+	-	+	+	-	-
26.	<i>Hypselodoris emmae</i> Rudman, 1977	+	+	-	-	-	-	+	-	+	-
27.	<i>Hypselodoris maculosa</i> (Pease, 1871)	-	-	-	+	-	+	+	-	-	-

Table 23. contd.

Sl. No.	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St.-6	St. -7	St.- 8	St. -9	St. -10
	Genus: <i>Noumea</i> Risbec, 1928										
28.	<i>Noumea hongkongensis</i> Rudman, 1990	-	-	-	-	-	-	-	+	-	-
29.	<i>Noumea simplex</i> (Pease, 1871)	+	-	-	+	+	-	+	+	+	+
	Genus: <i>Risbecia</i> Odhner, 1934										
30.	<i>Risbecia pulchella</i> (Ruppel & Leuckart, 1828)	+	+	-	-	-	-	+	-	+	-
	Genus: <i>Thorunna</i> Bergh, 1878										
31.	<i>Thorunna africana</i> Rudman, 1984	+	-	-	+	+	-	-	-	-	-
32.	<i>Thorunna horologia</i> Rudman, 1984	-	-	-	+	-	+	+	-	-	-
33.	<i>Thorunna punicea</i> (Rudman, 1995)	-	+	-	+	+	-	-	-	-	-
	Family: DISCODORIDIDAE Bergh, 1891 Genus: <i>Halgerda</i> Bergh, 1880										
34.	<i>Halgerda stricklandi</i> Fahey & Gosliner, 1999	+	+	-	-	-	-	+	-	+	-
35.	<i>Halgerda tessellata</i> (Bergh, 1880)	-	-	-	-	-	-	+	-	-	-
	Family: GONIODORIDIDAE H. Adams & A. Adams, 1854										
	Genus: <i>Okenia</i> Menke, 1830										
36.	<i>Okenia liklik</i> Gosliner, 2004	+	+	-	-	-	-	+	-	+	-
	Family: GYMNODORIDIDAE Odhner, 1941 Genus: <i>Gymnodoris</i> Stimpson, 1855										
37.	<i>Gymnodoris citrina</i> (Bergh, 1875)	-	-	-	-	+	-	+	-	+	+
	Family: PHYLLIDIIDAE Rafinesque, 1815 Genus: <i>Phyllidia</i> Cuvier, 1797										
38.	<i>Phyllidia coelestis</i> Bergh, 1905	+	+	+	-	-	-	+	-	-	-
39.	<i>Phyllidia polkadosta</i> Brunckhorst, 1993	+	+	-	-	-	-	+	-	+	-
40.	<i>Phyllidia ocellata</i> Cuvier, 1804	+	+	+	-	+	+	-	+	-	+
41.	<i>Phyllidia varicosa</i> Lamarck, 1801	+	-	-	+	+	-	+	+	+	+

Table 23. contd.

Sl. No.	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
	Genus: <i>Fryeria</i> Gray, 1853										
42.	<i>Fryeria marindica</i> (Yonow & Hayward, 1991)	+	-	-	+	+	-	+	+	+	+
	Genus: <i>Phyllidiella</i> Bergh, 1869										
43.	<i>Phyllidiella zeylanica</i> (Kelaart, 1859)	+	-	+	+	+	-	+	-	+	+
44.	<i>Phyllidiella pustulosa</i> (Cuvier, 1804)	-	-	-	+	+	+	+	+	+	+
45.	<i>Phyllidiella rudmani</i> Bergh, 1876	+	+	-	-	-	-	+	-	+	-
46.	<i>Phyllidiella cooraburrama</i> Brunckhorst, 1993	-	-	-	-	+	+	-	-	-	+
47.	<i>Phyllidiella burni</i> Brunckhorst, 1993	+	-	+	-	-	+	-	+	-	+
48.	<i>Phyllidiella hageni</i> Fahrner and Beck, 2000	+	-	-	+	+	-	+	+	+	+
49.	<i>Phyllidiella nigra</i> (van Hasselt, 1824)	-	-	+	-	+	-	+	+	+	+
	Genus: <i>Phyllidiopsis</i> Bergh, 1876										
50.	<i>Phyllidiopsis annae</i> Brunckhorst, 1993	-	-	+	-	+	-	+	-	+	+
51.	<i>Phyllidiopsis gemmata</i> (Purvot- Fol, 1957)	+	+	-	-	-	-	+	-	+	-
52.	<i>Phyllidiopsis krempfi</i> Purvot- Fol, 1957	+	-	+	+	-	-	-	+	-	-
53.	<i>Phyllidiopsis monacha</i> (Yonow, 1986)	-	-	+	+	+	-	-	+	-	+
54.	<i>Phyllidiopsis phiphensis</i> Brunckhorst, 1993	+	+	-	-	+	-	+	-	+	-
55.	<i>Phyllidiopsis striata</i> Bergh, 1888	-	-	-	-	-	-	+	+	-	+
	Genus: <i>Reticulidia</i> Brunckhorst, 1990										
56.	<i>Reticulidia suzanneae</i> Valdes & Behrens, 2002	-	-	+	+	+	-	-	-	-	-
	Order: SACOGLOSSA (von Ihering, 1876) Family: PLAKOBRANCHIDAE Gray, 1840										
	Genus: <i>Plakobranthus</i> van Hasselt, 1824										
57.	<i>Plakobranthus ocellatus</i> van Hasselt, 1824	+	+	+	+	+	-	-	+	+	+

Table 23. *contd.*

Sl. No.	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
	Genus: <i>Thuridilla</i> Bergh, 1872										
58.	<i>Thuridilla vatae</i> (Risbec, 1928)	-	-	-	-	+	-	-	+	-	-
59.	<i>Thuridilla bayeri</i> (Marcus, 1965)	+	+	-	+	-	+	-	-	-	+
60.	<i>Thuridilla caerulea</i> (Kelaart, 1858)	+	+	-	-	-	-	+	-	+	-
61.	<i>Thuridilla moebii</i> (Bergh, 1888)	-	-	-	-	-	+	+	-	-	-
Total no. of species		33	25	19	24	26	20	40	26	35	30
Total no. of genera		20	18	13	16	17	13	22	17	21	17
Total no. of families		11	9	8	6	8	8	12	8	12	11

The data of Shannon-Weaner Diversity Index revealed that Station-7 showed higher value of species diversity with 3.58 whereas Station-3 showed the lower of 2.90. The Menhinick Diversity Index indicated that Station-7 was more diversified (5.57) whereas the Station-3 was least diversified (3.71) (Fig. 33). Equitability Index of opisthobranchs were maximum at Stations-1, 4, 6 and 9 (0.98) whereas minimum was found at Station-8 (0.95). Pileou's Evenness Index was more at Station-4 and 6 (0.95) and less at Station-8 (0.85). Simpson's Diversity Index was maximum at Stations-1, 7 and 9 (0.96) and minimum at Station-3 (0.93) (Fig. 34). Margalef Community Index showed highest value for Station-7 (9.76) whereas the lowest value for Station-3 (5.64). Fisher Alpha Diversity Index values varied from 28.48 at Station-3 to 88.56 at Station-7 (Fig. 35). Dominance Index showed a maximum value for Station-3 (0.06) and minimum value for Stations-1, 7 and 9 (0.03). Berger-Parker Diversity Indices registered high value for Station-8 (0.13) and low value (0.06) at Station-9 (Fig. 36).

Maximum similarity index (0.79) of Opisthobranchs was observed between Station-7 & Station-9 whereas the minimum (0.17) between Station-5 & Station-6 (Table 24).

Table 24. Similarity Index of Opisthobranchs at ten sites of Rutland Island

	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
St. 1	0.72	0.33	0.42	0.37	0.33	0.55	0.50	0.62	0.50
St. 2		0.22	0.32	0.23	0.40	0.43	0.31	0.54	0.32
St. 3			0.31	0.52	0.30	0.40	0.43	0.40	0.56
St. 4				0.60	0.50	0.44	0.55	0.48	0.48
St. 5					0.17	0.52	0.57	0.56	0.64

Table 24. contd.

	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
St. 6						0.33	0.34	0.29	0.52
St. 7							0.33	0.79	0.49
St. 8								0.43	0.71
St. 9									0.62

A total of 15 families of opisthobranchs were recorded from Rutland Island during study period. A maximum of 20 species was identified under Chromodorididae family where as the minimum of 1 species recorded under nine families (Table 25). Rutland Island represented a total of 35.46% Opisthobranchs of Andaman and Nicobar Islands among the 15 families.

Table 25. Species percentage of nudibranches according to the families

	Families	A & N Islands	Rutland Island	% of species at Rutland Island
1.	Aplysiidae	10	1	10.00
2.	Aglajidae	14	3	21.42
3.	Gastropteridae	5	1	20.00
4.	Facelinidae	10	3	30.00
5.	Flabellinidae	5	1	20.00
6.	Tergipedidae	2	1	50.00
7.	Cadlinidae	2	1	50.00
8.	Acteonidae	3	1	33.33
9.	Dorididae	5	1	20.00
10.	Chromodorididae	52	20	38.46
11.	Discodorididae	12	2	16.67
12.	Goniodorididae	4	1	25.00
13.	Gymnodorididae	7	1	14.28
14.	Phyllidiidae	26	19	73.07
15.	Plakobranhidae	15	5	33.33
	Total	172	61	35.46

Echinoderms

A total of 102 species of echinoderms belong to 59 genera, 35 families and 15 orders were identified from Rutland Island during the study period. Among them a maximum number of 57 species were observed at Station-6 whereas the minimum of 30 species were recorded at Station-4 (Table 26, Fig.37 and Plates 20-21).

Table 26. Echinoderms of Rutland Island

Sl. No.	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
	Class: HOLOTHUROIDEA Order: ASPIDOCHIROTIDA Family: HOLOTHURIIDAE Genus : <i>Actinopyga</i>										
1.	<i>Actinopyga mauritiana</i> (Quoy and Gaimard, 1833)	+		+		+	+	+	+		
2.	<i>Actinopyga miliaris</i> (Quoy and Gaimard, 1833)		+				+				+
3.	<i>Actinopyga lecanora</i> (Jaeger, 1833)	+	+	+	+	+		+		+	
4.	<i>Actinopyga echinites</i> (Jaeger, 1833)	+	+	+	+	+		+	+		+
	Genus: <i>Holothuria</i>										
5.	<i>Holothuria cinerescens</i> (Brandt, 1835)	+	+	+	+	+	+	+	+	+	+
6.	<i>Holothuria hilla</i> (Lesson, 1830)		+	+		+		+		+	+
7.	<i>Holothuria impatiens</i> (Forsk., 1775)	+		+	+	+		+	+		
8.	<i>Holothuria atra</i> (Jaeger, 1833)	+		+	+		+	+	+	+	
9.	<i>Holothuria pyxis</i> (Selenka, 1867)		+		+		+	+			+
10.	<i>Holothuria leucospilota</i> (Brandt, 1835)	+	+	+			+	+	+		+
11.	<i>Holothuria fuscocinerea</i> (Jaeger, 1833)	+		+	+		+		+	+	+
12.	<i>Holothuria scabra</i> (Jaeger, 1833)		+	+	+		+	+		+	+
13.	<i>Holothuria edulsi</i> (Lesson, 1830)	+		+	+	+	+	+		+	+
14.	<i>Holothuria nobilis</i> (Selenka, 1867)		+	+	+		+	+		+	
15.	<i>Holothuria coluber</i> (Semper, 1868)	+							+		+
16.	<i>Holothuria pervicax</i> (Selenka, 1867)	+	+	+	+	+	+		+	+	+
17.	<i>Holothuria arenicola</i> (Semper, 1868)	+				+	+			+	+
	Genus: <i>Bohadschia</i>										
18.	<i>Bohadschia marmorata</i> (Jaeger, 1833)	+	+	+				+			
19.	<i>Bohadschia argus</i> (Jaeger, 1833)		+		+	+		+		+	+

Table 26. contd.

Sl. No.	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St.-6	St. -7	St.- 8	St. -9	St. -10
20.	<i>Bohadschia graeffei</i> (Semper, 1868)	+	+	+			+	+		+	
	Family: LABIDODEMATIDAE Genus: <i>Labidodemas</i>										
21.	<i>Labidodemas semperianum</i> (Selenka, 1867)		+	+		+				+	
	Order: DENDROCHIROTIDA Family: CUCUMARIIDAE Genus: <i>Stolus</i>										
22.	<i>Stolus buccalis</i> (Stimpson, 1855)			+		+					+
	Family: PHYLLOPHORIDAE Genus: <i>Phyllophorus</i>										
23.	<i>Phyllophorus parvipedes</i> (H.L. Clark, 1938)	+	+				+		+		
	Family: STICHOPODIDAE Genus: <i>Thelenota</i>										
24.	<i>Thelenota ananas</i> (Jaeger, 1833)	+	+				+	+			
	Genus: <i>Stichopus</i>										
25.	<i>Stichopus chloronatus</i> (Brandt, 1835)	+		+	+	+			+	+	+
26.	<i>Stichopus variegatus</i> (Semper, 1868)		+		+		+	+	+		
27.	<i>Stichopus vastus</i> (Sluiter, 1887)	+			+		+				+
28.	<i>Stichopus horrens</i> (Selenka, 1867)		+					+			
	Order: APODIDA Family: SYNAPTIDAE Genus: <i>Synapta</i>										
29.	<i>Synapta maculata</i> (Chamisso and Eysenhardt, 1821)	+		+		+	+		+		+
	Genus: <i>Euapta</i>										
30.	<i>Euapta godreffroyi</i> (Semper, 1868)	+	+				+	+	+	+	
	Order: MOLPADIIDA Family: CAUDINIDAE Genus: <i>Acaudina</i>										
31.	<i>Acaudina molpadioides</i> (Semper, 1868)		+			+	+	+			+

Table 26. contd.

Sl. No.	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St.-6	St. -7	St.- 8	St. -9	St. -10
	Class: ASTEROIDEA Order: VALVATIDA Family: ASTERINIDAE Genus: <i>Asterina</i>										
32.	<i>Asterina sarasini</i> (de Loriol, 1897)	+	+	+		+	+	+			
33.	<i>Asterina cepheus</i> (Muller & Troschel, 1842)										
34.	<i>Asterina burtoni</i> (Gray, 1840)	+		+		+	+		+	+	+
	Family: GONIASTERIDAE Genus: <i>Stellaster</i>										
35.	<i>Stellaster equestris</i> (Tetzius, 1805)					+					
	Family: OREASTERIDAE Genus: <i>Culcita</i>										
36.	<i>Culcita novaguineae</i> (Muller and troschel, 1842)	+	+	+		+	+	+		+	+
37.	<i>Culcita schmideliana</i> (Retzius, 1805)		+		+	+	+		+		+
	Genus: <i>Choriaster</i>										
38.	<i>Choriaster granulatus</i> (Lutken, 1869)	+		+				+			
	Genus: <i>Anthenea</i>										
39.	<i>Anthenea tuberculosa</i> (Gray, 1847)		+				+				+
	Genus: <i>Protoreaster</i>										
40.	<i>Protoreaster lincki</i> (Blainvillae, 1830)	+		+		+		+			+
41.	<i>Protoreaster nodosus</i> (Linnaeus, 1758)		+		+		+		+		
	Genus: <i>Pentaceraster</i>										
42.	<i>Pentaceraster regulus</i> (Muller and Troschel, 1842)			+		+		+	+	+	+
	Family: ASTEROPSIDAE Genus: <i>Asteropsis</i>										
43.	<i>Asteropsis carinifera</i> (Lamarck ,1816)	+				+	+				
	Family- ACANTHASTERIDAE Genus: <i>Acanthaster</i>										
44.	<i>Acanthaster planci</i> (Linnaeus, 1758)		+	+				+		+	

Table 26. contd.

Sl. No.	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
	Family: OPHIDIASTERIDAE Genus: <i>Fromia</i>										
45.	<i>Fromia monilis</i> (Perrier, 1869)	+		+		+	+			+	
46.	<i>Fromia indica</i> (Perrier, 1869)	+		+			+	+			+
	Genus- <i>Linckia</i>										
47.	<i>Linckia guildingi</i> (Gray, 1840)		+	+		+			+	+	
48.	<i>Linckia laevigata</i> (Linnaeus, 1758)	+					+				
49.	<i>Linckia multifora</i> (Lamarck, 1816)	+	+	+		+		+	+		+
	Genus: <i>Nardoa</i>										
50.	<i>Nardoa tuberculata</i> (Gray, 1840)		+				+			+	
51.	<i>Nardoa galathea</i> (Lutken, 1865)			+			+	+			
	Genus: <i>Echinaster</i>										
52.	<i>Echinaster luzonicus</i> (Gray, 1840)	+		+				+			
	Order: PAXILLOSIDA Family: ASTROPECTINIDAE Genus: <i>Astropecten</i>										
53.	<i>Astropecten indicus</i> (Doderlein, 1888)	+					+				
54.	<i>Astropecten monacanthus</i> (Sladen, 1883)		+					+			
	Family: LUDIIDAE Genus: <i>Luidia</i>										
55.	<i>Luidia maculata</i> (Muller and Troschel, 1842)	+						+			+
	Class: ECHINOIDEA Order: DIADEMATOIDA Family: DIADEMATIDAE Genus: <i>Diadema</i>										
56.	<i>Diadema setosum</i> (Leske, 1778)	+		+	+		+	+	+		+
57.	<i>Diadema savignyi</i> (Michelin, 1845)		+			+		+			
	Genus: <i>Echinothrix</i>										
58.	<i>Echinothrix calamaris</i> (Pallas, 1774)	+	+		+	+			+	+	+
59.	<i>Echinothrix diadema</i> (Linnaeus, 1758)	+	+			+			+	+	+

Table 26. contd.

Sl. No.	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
	Order: ECHINOIDA Family: ECHINOMETRIDAE Genus: <i>Echinometra</i>										
60.	<i>Echinometra oblonga</i> (de Blainville, 1969)		+			+		+			
61.	<i>Echinometra mathei</i> (de Blainville, 1825)	+	+		+	+	+		+	+	+
	Genus: <i>Heterocentrotus</i>										
62.	<i>Heterocentrotus trigonarius</i> (Lamarck, 1816)			+			+			+	
	Family: ASTRICLYPEIDAE Genus: <i>Echniodiscus</i>										
63.	<i>Echniodiscus auritus</i> (Leske, 1778)	+					+			+	+
	Family: ARBACIIDAE Genus: <i>Arbacia</i>										
64.	<i>Arbacia punctulata</i> (Lamarck, 1816)		+	+				+		+	
	Order: TEMNOPLEUROIDA Family: TEMNOPLEURIDAE Genus: <i>Temnopleurus</i>										
65.	<i>Temnopleurus alexendri</i> (Bell, 1884)		+				+				
	Genus: <i>Mespilia</i>										
66.	<i>Mespilia globulus</i> (Linnaeus, 1758)			+		+			+	+	
	Genus: <i>Microcyphus</i>										
67.	<i>Microcyphus ceylanicus</i> (Mortensen, 1925)										+
	Genus: <i>Salmacis</i>										
68.	<i>Salmacis belli</i> (Doderlein, 1902)	+		+				+			+
	Family: TOXOPNEUSTIDAE Genus- <i>Tripneustes</i>										
69.	<i>Tripneustes gratilia</i> (Linnaeus, 1758)					+					
	Order: CIDAROIDA Family: CIDARIDAE Genus- <i>Prionocidaris</i>										
70.	<i>Prionocidaris verticillata</i> (Lamarck, 1816)	+			+		+			+	

Table 26. contd.

Sl. No.	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St.-6	St. -7	St.- 8	St.-9	St. -10
	Order: PHYMOSOMATOIDA Family: STOMECHINIDAE Genus- <i>Stomopneusts</i>										
71.	<i>Stomopneusts variolaris</i> (Lamarck, 1816)			+		+			+		
	Order: CLYPEASTEROIDA Family: CLYPEASTERIDAE Genus: <i>Clypeaster</i>										
72.	<i>Clypeaster humilis</i> (Leske, 1778)						+	+		+	
	Family: LAGANIDAE Genus: <i>Laganum</i>										
73.	<i>Laganum laganum</i> (Leske, 1778)			+		+	+	+	+	+	+
74.	<i>Laganum decagonale</i> (de Blainvillae, 1827)		+			+		+			
	Genus: <i>Peronalla</i>										
75.	<i>Peronalla lessueuri</i> (Valenciennes, 1841)	+		+			+	+		+	
	Family: FIBULARIIDAE Genus: <i>Echinocymas</i>										
76.	<i>Echinocymas crispus</i> (Mazetti, 1893)		+		+			+			
	Order: CIDAROIDA Family: CIDARIIDAE Genus: <i>Phyllacanthus</i>										
77.	<i>Phyllacanthus imperialis</i> (Lamarck, 1816)	+			+			+			+
	Class: CRINOIDEA Order: COMATULIDA Family: COMASTERIDAE Genus: <i>Comanthus</i>										
78.	<i>Comanthus parvicirrus</i> (Muller, 1841)	+	+	+			+	+			
	Genus: <i>Comanthina</i>										
79.	<i>Comanthina nobilis</i> (P.H.Carpenter, 1884)		+	+			+	+			
	Genus: <i>Comaster</i>										
80.	<i>Comaster schlegeli</i> (P.H.Carpenter, 1881)	+	+	+			+	+			
81.	<i>Comaster multifidus</i> (Muller, 1841)	+	+	+				+			

Table 26. contd.

Sl. No.	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St.-6	St. -7	St.-8	St. -9	St. -10
	Genus: <i>Oxycomanthus</i>										
82.	<i>Oxycomanthus benneti</i> (Muller, 1841)		+			+		+			
	Genus: <i>Comaster</i>										
83.	<i>Comaster multibrachiata</i> (P.H. Carpenter, 1888)	+		+			+				
84.	<i>Comaster multifidus</i> (Muller, 1841)	+	+					+		+	
	Family: HIMEROMETRIDAE Genus: <i>Himerometra</i>										
85.	<i>Himerometra robustipinna</i> (P. H. Carpenter, 1912)	+		+					+		+
86.	<i>Heterometra crenulata</i> (P.H. Carpenter, 1882)*			+		+	+	+	+		+
87.	<i>Heterometra philiberti</i> (Muller, 1849)		+		+					+	
	Genus: <i>Amphimetra</i>										
88.	<i>Amphimetra mollerii</i> (A.H. Clark, 1908)	+					+	+			+
	Family: MARIAMETRIDAE Genus: <i>Lamprometra</i>										
89.	<i>Lamprometra palmata</i> (Muller, 1841)		+					+			
	Family: COLOBOMETRIDAE Genus: <i>Cenometra</i>										
90.	<i>Cenometra bella</i> (Hartlaub, 1890)	+		+			+				
91.	<i>Cenometra emendatrix</i> (Bell, 1892)		+		+			+		+	
	Genus: <i>Oligometra</i>										
92.	<i>Oligometra serripinna</i> (P.H. Carpenter, 1881)	+					+				
	Family: PONTIOMETRIDAE Genus: <i>Pontiometra</i>										
93.	<i>Pontiometra andersoni</i> (P.H. Carpenter, 1889)		+					+			+
	Class: OPHIUROIDEA Order: OPHIURIDA Family: OPHIOCOMIDAE Genus: <i>Ophiocoma</i>										
94.	<i>Ophiocoma erinaceus</i> (Muller & Troschel, 1842)	+		+	+	+			+	+	+

Table 26. contd.

Sl. No.	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
95.	<i>Ophiocoma dentata</i> (Muller & Troschel, 1842)			+	+		+		+		
96.	<i>Ophiocoma valenciae</i> (Muller & Troschel, 1842)	+		+	+	+			+	+	
	Genus- <i>Ophiarthrum</i>										
97.	<i>Ophiarthrum pictum</i> (Muller & Troschel, 1842)		+				+	+			+
	Genus: <i>Ophiomastix</i>										
98.	<i>Ophiomastix annulosa</i> (Lamarck, 1816)	+	+		+		+			+	+
	Family: OPHIOTRICHIDAE Genus: <i>Macrophiothrix</i>										
99.	<i>Macrophiothrix propinqua</i> (Lyman, 1861)	+		+			+		+	+	+
100.	<i>Macrophiothrix longipeda</i> (Lamarck, 1816)				+	+			+	+	+
101.	<i>Macrophiothrix speciosa</i> (Koehler, 1898)		+				+	+			+
	Family: OPHIODERMATIDAE Genus: <i>Ophiarachna</i>										
102.	<i>Ophiarachna incrassata</i> (Lamarck, 1816)		+				+			+	
	Total no. of species	55	53	52	30	41	57	56	34	42	46

The species diversity of echinoderms was calculated using different indices. Shannon-Weaner Diversity Index was maximum (3.75) at Station-7 and minimum (3.19) at Station-8. The Menhinick Diversity Index was high (3.36) at Stations-1 and 7 and low (2.1) at Station-4 (Fig. 38). Equitability Index of echinoderms was maximum (0.94) at Station-4 and minimum (0.9) at Stations-8 and 10. Pileou's Evenness Index was highest (0.82) at Station-4 whereas lowest (0.7) at Station-10. Simpson's Diversity Index was more (0.97) at Station-7 and less (0.94) at Station-8 (Fig. 39). Margalef Community Index showed highest value for Stations-1 and 7 (9.77) while the lowest value for Stations-4 (5.45). Fisher Alpha Diversity Index registered maximum value for Stations-1 and 7 (21.17) and the minimum value at Station-4 (9.7) (Fig. 40). Dominance Index ranged from 0.02 at Station-7 to 0.05 at Station-8. The data of Berger-Parker Diversity Index values for Station-4 (1.0) was high while the (0.06) at Stations-3, 6 and 9 shown low value (0.06) (Fig. 41).

The data on the species similarity index of echinoderms is given in Table 27. Maximum similarity index (0.33) was identified between Station-1 & Station-3 whereas the minimum (0.16) in between Station-5 & Station-6.

Table 27. Similarity Index of Echinoderms at nine sites of Rutland Island

	St.-2	St.-3	St.-4	St.-5	St.-6	St.-7	St.-8	St. -9	St.-10
St.-1	0.19	0.33	0.20	0.22	0.30	0.25	0.25	0.24	0.28
St.-2		0.19	0.20	0.21	0.25	0.33	0.16	0.24	0.22
St.-3			0.18	0.27	0.27	0.30	0.27	0.27	0.24
St.-4				0.19	0.19	0.17	0.26	0.26	0.23
St.-5					0.16	0.20	0.29	0.26	0.27
St.-6						0.24	0.20	0.24	0.26
St.-7							0.21	0.19	0.23
St.-8								0.23	0.27
St. -9									0.23

A total of 5 classes of echinoderms were recorded during study period. A maximum of 31 species was observed under the Class Holothuroidea whereas the minimum of 9 species identified under Class Ophiuroidea (Table 28). Rutland Island represented 24.23% echinoderms of Andaman and Nicobar Islands.

Table 28. Percentage composition of different classes of echinoderms

Sl. No.	Class	No. of Species in A & N Islands	No. of species in Rutland	Percentage at Rutland (%)
1	Crinoidea	50	16	32.00
2	Astroidea	104	25	24.04
3	Ophiuroidea	103	9	8.74
4	Echinoidea	80	22	27.50
5	Holothuroidea	88	31	35.23
		425	103	24.23

The density of echinoderms was varied from 14-25 ind./10sq.m. The maximum density (25 ind./10sq.m.) was observed at Station-9 while the minimum (14 ind./10sq.m.) was estimated at Station-7 (Fig. 42).

Fishes

A total number of 292 species of fishes under 129 genera, 51 families and 11 orders were recorded from Rutland Island during the study period. Among them a maximum number of 183 species were reported from Station-1 whereas the minimum 80 species were observed from Station-10 (Table 29, Fig. 43 and Plates 22-25)

Table 29. Fishes of Rutland Island

Sl. No	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
	Class: CHONDRICHTHYES Sub Class: ELASMOBRANCHII Order: RAJIFORMES Family: RHINOBATIDAE (Guitarfishes) Genus: <i>Rhinobatos</i>										
1	<i>Rhinobatos granulates</i> Cuvier, 1829	+						+			
	Family: DASYATIDAE (Stingrays) Genus: <i>Dasyatis</i>										
2	<i>Dasyatis kuhlii</i> (Muller & Henle, 1841)	+		+				+			
	Class: OSTEICHTHYES SubClass: ACTINOPTERYGII Order: ANGUILLIFORMES Family: MURAENIDAE (Moray eels) Genus: <i>Gymnothorax</i>										
3	<i>Gymnothorax javanicus</i> (Bleeker, 1859)		+	+	+	+		+	+	+	+
	Order: GONORYNCHIFORMES Family: CHANIDAE (Milkfish) Genus: <i>Chanos</i>										
4	<i>Chanos chanos</i> (Forsskal, 1775)	+		+				+			
	Order: SILURIFORMES Family: PLOTOSIDAE (Eel catfishes) Genus: <i>Plotosus</i>										
5	<i>Plotosus lineatus</i> (Thunberg, 1787)	+			+					+	+

Table 29. contd.

Sl. No	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
	Order: BERYCIFORMES Family: HOLOCENTRIDAE (Squirrelfishes, soldierfishes) Genus: <i>Myripristis</i>										
6	<i>Myripristis berndti</i> Jordan and Evermann, 1903	+	+					+		+	
	Genus: <i>Sargocentron</i>										
7	<i>Sargocentron caudimaculatum</i> (Ruppell, 1838)	+	+	+			+	+		+	
8	<i>Sargocentron rubrum</i> (Forsskal, 1775)	+	+	+	+		+	+	+		
9	<i>Sargocentron spiniferum</i> (Forsskal, 1775)				+	+		+			
	Order: AULOPIFORMES Family: SYNODONTIDAE (Lizardfishes) Genus: <i>Saurida</i>										
10	<i>Saurida gracilis</i> (Quoy & Gaimard, 1824)	+	+	+				+			
	Genus: <i>Synodus</i>										
11	<i>Synodus variegates</i> (Lacepede, 1803)	+		+	+	+		+		+	
12	<i>Synodus dermatogenys</i> Fowler, 1912		+					+			
	Order: BELONIFORMES Family: BELONIDAE (Needlefishes) Genus: <i>Tylosurus</i>										
13	<i>Tylosurus crocodiles crocodiles</i> (Peron & Le Sueur, 1821)	+		+				+			
	Family: PEGASIDAE (Seamoths) Genus: <i>Pegasus</i>										
14	<i>Pegasus volitans</i> Linnaeus, 1758	+	+					+			
	Order: SYNGANATHIFORMES Family: AULOSTOMIDAE (Trumpetfishes) Genus: <i>Aulostomus</i>										
15	<i>Aulostomus chinensis</i> (Linnaeus, 1766)			+							

Table 29. contd.

Sl. No	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
	Family: FISTULARIDAE (Cornetfishes) Genus: <i>Fistularia</i>										
16	<i>Fistularia commersonii</i> Ruppell, 1838	+		+				+			
	Family SYNGNATHIDAE (Pipefishes and seahorses) Genus: <i>Corythoichthys</i>										
17	<i>Corythoichthys intestinalis</i> (Ramsay, 1881)				+	+			+		+
18	<i>Corythoichthys ocellatus</i> Herald, 1953	+		+						+	
19	<i>Corythoichthys schultzi</i> Harald, 1953			+					+	+	+
	Genus: <i>Doryhamphus</i>										
20	<i>Doryhamphus excises excises</i> Kaup, 1856				+					+	+
	Family: CENTRIACIDAE (Razerfishes) Genus: <i>Aeoliscus</i>										
21	<i>Aeoliscus strigatus</i> (Gunther, 1861)		+								
	Family: SOLENOSTOMIDAE (Ghost pipefishes) Genus: <i>Solenostomus</i>										
22	<i>Solenostomus cyanopterus</i> Bleeker, 1854	+		+	+			+	+		+
	Order: SCORPAENIFORMES Family: SCORPAENIDAE (Scorpionfishes or Rockfishes) Genus: <i>Dendrochirus</i>										
23	<i>Dendrochirus zebra</i> (Cuvier, 1829)	+		+	+					+	
	Genus: <i>Pterois</i>										
24	<i>Pterois miles</i> (Bennett, 1828)	+									
25	<i>Pterois radiata</i> Cuvier, 1829				+			+		+	
26	<i>Pterois volitans</i> (Linnaeus, 1758)	+		+	+		+	+		+	
	Family: PLATYCEPHALIDAE (Flatheads) Genus: <i>Eurycephalus</i>										
27	<i>Eurycephalus carbunculus</i> (Valenciennes, 1833)		+					+			

Table 29. contd.

Sl. No	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
	Genus: <i>Eurycephalus</i>										
28	<i>Thysanophrys chiltonae</i> Schultz, 1966	+		+				+		+	
	Order: PERCIFORMES Family: SERRANIDAE (Sra basses, groupers and fairy basslets) Genus: <i>Athaloperca</i>										
29	<i>Athaloperca rogga</i> (Forsskal, 1775)	+	+	+				+			
	Genus: <i>Anyperodon</i>										
30	<i>Anyperodon leucogrammicus</i> (Valenciennes, 1828)	+		+			+	+			
	Genus: <i>Cephalopholis</i>										
31	<i>Cephalopholis argus</i> Bloch & Schneider, 1801)	+	+	+		+	+	+	+		+
32	<i>Cephalopholis boenack</i> (Bloch, 1790	+		+	+		+	+			
33	<i>Cephalopholis miniata</i> (Forsskal, 1775)	+	+	+			+	+			
34	<i>Cephalopholis sexmaculata</i> (Ruppell, 1830)	+	+				+	+	+		
35	<i>Cephalopholis urodeta</i> (Forster, 1801)	+		+			+	+			
	Genus: <i>Cromileptes</i>										
36	<i>Cromileptes altivelis</i> (Valenciennes, 1828)	+					+	+			
	Genus: <i>Epinephelus</i>										
37	<i>Epinephelus areolatus</i> (Forsskal, 1775)					+					
38	<i>Epinephelus caeruleopunctatus</i> (Bloch, 1790)	+	+	+				+	+	+	
39	<i>Epinephelus fasciatus</i> (Forsskal, 1775)	+	+					+			+
40	<i>Epinephelus flavocaeruleus</i> (Lacepede, 1802)		+				+	+		+	
41	<i>Epinephelus longispinis</i> (Kner, 1865)			+			+	+	+		+
42	<i>Epinephelus macrospilos</i> (Bleerer, 1855)	+	+					+			
43	<i>Epinephelus malabaricus</i> (Bloch & Schneider, 1801)	+				+	+	+			
44	<i>Epinephelus merra</i> Bloch, 1793	+	+						+	+	
	Genus: <i>Plectropomus</i>										
45	<i>Plectropomus areolatus</i> (Ruppell, 1830)		+	+			+				
	Genus: <i>Pseudanthias</i>										
46	<i>Pseudanthias bimaculatus</i> (Smith, 1955)				+	+					
47	<i>Pseudanthias cooperi</i> (Regan, 1902)				+					+	+

Table 29. contd.

Sl. No	Species	St-1	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
48	<i>Pseudanthias ignitus</i> (Randall and Lubbock, 1981)	+				+				+	
49	<i>Pseudanthias hypelosoma</i> Bleeker, 1878	+	+		+						
50	<i>Pseudanthias squamipinnis</i> (Peters, 1855)			+	+				+	+	+
	Genus: <i>Variola</i>										
51	<i>Variola louti</i> (Forsskal, 1775)	+		+				+			
	Family: PSEODOCHROMIDAE (Dottybacks) Genus: <i>Ogilbyina</i>										
52	<i>Ogilbyina novaehollandiae</i> (Steindachner, 1879)	+		+	+	+		+			
	Family: PLESIOPIDAE (Roundheads) Genus: <i>Plesiops</i>										
53	<i>Plesiops corallicola</i> Bleeker, 1853	+			+	+			+	+	+
	Family: APOGONIDAE (Cardinal fishes) Genus: <i>Apogon</i>										
54	<i>Apogon angustatus</i> (Smith & Radcliffe, 1911)				+						
55	<i>Apogon aureus</i> (Lacepedae, 1802)		+	+			+		+	+	
56	<i>Apogon compressus</i> (Smith and Radcliffe, 1911)				+						+
57	<i>Apogon cookie</i> Macleay, 1881	+	+	+	+			+		+	
58	<i>Apogon cyanosoma</i> Bleeker, 1853	+		+	+	+			+		+
59	<i>Apogon fraenatus</i> Valenciennes, 1832	+	+	+	+					+	
60	<i>Apogon kallopterus</i> Bleeker, 1856		+	+			+		+		+
61	<i>Apogon lateralis</i> Valenciennes, 1832	+			+					+	
62	<i>Apogon moluccensis</i> Valenciennes, 1832	+		+	+						
63	<i>Apogon properupta</i> (Whitley, 1964)	+		+	+	+					
	Genus: <i>Cheilodipterus</i>										
64	<i>Cheilodipterus artus</i> Smith, 1961	+		+	+		+	+			
65	<i>Cheilodipterus macrodon</i> (Lacepede, 1802)	+	+	+	+					+	
66	<i>Cheilodipterus quinquelineatus</i> Cuvier, 1828	+		+			+	+	+		+
	Genus: <i>Rhabdamia</i>										
67	<i>Rhabdamia gracilis</i> (Bleeker, 1856)	+		+	+			+		+	

Table 29. contd.

Sl. No	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
	Genus: <i>Zoramia</i>										
68	<i>Zoramia leptacanthus</i> (Bleeker, 1857)	+	+		+	+		+		+	
	Family: HAEMULIDAE (Grunts) Genus: <i>Plectorhinchus</i>										
69	<i>Plectorhinchus albobittatus</i> (Ruppell, 1838)	+	+		+		+		+		
70	<i>Plectorhinchus chaetodonoides</i> Lacepede, 1801	+		+				+			
71	<i>Plectorhinchus gibbosus</i> (Lacepede, 1802)	+	+	+				+			
72	<i>Plectorhinchus orientalis</i> (Bloch, 1793)	+	+	+			+	+	+		
	Genus: <i>Pomodasys</i>										
73	<i>Pomodasys argenteus</i> (Forsskal, 1775)	+	+		+		+	+			
	Family: LUTJANIDAE Genus: <i>Aprion</i>										
74	<i>Aprion virescens</i> Valenciennes, 1830	+	+				+				
	Genus: <i>Lutjanus</i>										
75	<i>Lutjanus argentimaculatus</i> (Forsskal, 1775)	+		+				+			
76	<i>Lutjanus bengalensis</i> (Bloch, 1790)		+	+			+				
77	<i>Lutjanus bohar</i> (Forsskal, 1775)	+	+	+			+	+			
78	<i>Lutjanus decussatus</i> (Cuvier, 1828)	+	+	+		+	+	+	+		+
79	<i>Lutjanus fulviflamma</i> (Forsskal, 1775)	+		+		+	+	+			
80	<i>Lutjanus fulvus</i> (Schneider, 1801)	+	+					+			
81	<i>Lutjanus gibbus</i> (Forsskal, 1775)	+		+		+	+			+	
82	<i>Lutjanus kasmira</i> (Forsskal, 1775)		+		+			+			
83	<i>Lutjanus lutjanus</i> Bloch, 1790)	+					+				+
84	<i>Lutjanus monostigma</i> (Cuvier, 1828)		+			+	+		+		
85	<i>Lutjanus quinquelineatus</i> (Bloch, 1790)	+		+	+			+			
86	<i>Lutjanus rivulatus</i> (Cuvier, 1828)										+
87	<i>Lutjanus russelli</i> (Bleeker, 1849)		+	+			+	+			
	Genus: <i>Macolor</i>									+	
88	<i>Macolor niger</i> (Forsskal, 1775)	+	+					+			
	Genus: <i>Paracaesio</i>										
89	<i>Paracaesio xanthura</i> (Bleeker, 1869)	+					+	+			

Table 29. contd.

Sl. No	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
	Family: CAESIONIDAE (Fusiliers) Genus: <i>Caesio</i>										
90	<i>Caesio caerulaurea</i> Lacepede, 1801	+		+			+	+			
91	<i>Caesio cuning</i> (Bloch, 1791)	+	+					+			
92	<i>Caesio lunaris</i> Cuvier, 1830			+				+			
93	<i>Caesio teres</i> Seale, 1906	+	+	+			+	+			
94	<i>Caesio xanthonota</i> (Bleeker, 1853)	+		+							
	Genus: <i>Gymnoaesio</i>										
95	<i>Gymnoaesio gymnoptera</i> (Bleeker, 1853)	+		+				+			
	Genus: <i>Pterocaesio</i>										
96	<i>Pterocaesio chrysozona</i> (Cuvier, 1830)						+	+			
97	<i>Pterocaesio marri</i> Schultz, 1953	+									
98	<i>Pterocaesio pisang</i> (Bleeker, 1853)		+	+				+			
99	<i>Pterocaesio tile</i> (Cuvier, 1830)	+		+			+				
100	<i>Pterocaesio trilineata</i> Carpenter, 1987		+	+				+			
	Family: LETHRINIDAE (Emperors or scavengers) Genus: <i>Gnathodentex</i>										
101	<i>Gnathodentex aurolineatus</i> Lacepede, 1802)				+					+	
	Genus: <i>Lethrinus</i>										
102	<i>Lethrinus erythracanthus</i> Valenciennes, 1830									+	
103	<i>Lethrinus harak</i> (Forsskal, 1775)	+	+	+	+	+		+	+		
	Genus: <i>Monotaxis</i>										
104	<i>Monotaxis grandoculis</i> (Forsskal, 1775)		+	+	+	+				+	
	Family: NEMIPTERIDAE (Threadfin brems, Whiptail brems) Genus: <i>Scolopsis</i>										
105	<i>Scolopsis bilineata</i> (Bloch, 1793)	+	+	+	+	+	+	+	+		
106	<i>Scolopsis ciliates</i> (Lacepede, 1802)	+						+		+	
107	<i>Scolopsis lineatus</i> Quoy & Gaimard, 1824	+	+	+	+	+	+	+	+	+	

Table 29. contd.

Sl. No	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
	Family: KYPHOSIDAE (Sea chubs) Genus: <i>Kyphosus</i>										
108	<i>Kyphosus cinerascens</i> (Forsskal, 1775)	+		+							
	Family: EPHIPPIDAE (Spadefishes, batfishes) Genus: <i>Platax</i>										
109	<i>Platax orbicularius</i> (Forsskal, 1775)		+		+			+	+		
110	<i>Platax pinnatus</i> (Linnaeus, 1758)	+		+					+	+	
111	<i>Platax teira</i> (Forsskal, 1775) Family: MONODACTYLIDAE (Moonfishes) Genus: <i>Monodactylus</i>			+	+	+					
112	<i>Monodactylus argenteus</i> (Linnaeus, 1758)	+		+				+			
	Family: MULLIDAE (Goatfishes) Genus: <i>Mulloidichthys</i>										
113	<i>Mulloidichthys vanicolensis</i> (Valenciennes, 1831)	+		+	+	+		+		+	+
	Genus: <i>Parupeneus</i>										
114	<i>Parupeneus barberinus</i> (Lacepede, 1801)					+		+		+	
115	<i>Parupeneus bifasciatus</i> (Lacepede, 1801)	+		+	+						+
116	<i>Parupeneus cyclostomus</i> (Lacepede, 1801)	+	+	+			+		+		+
117	<i>Parupeneus indicus</i> (Shaw, 1803)	+		+	+	+		+		+	
118	<i>Parupeneus macronema</i> (Lacepede, 1801)		+			+			+	+	
119	<i>Parupeneus pleurostigma</i> (Bennett, 1831)				+		+		+	+	
	Genus: <i>Upeneus</i>										
120	<i>Upeneus tragula</i> Richardson, 1846	+		+	+	+		+	+	+	+
	Family: MALACANTHIDAE (Talifishes) Genus: <i>Malacanthus</i>										
121	<i>Malacanthus brevirostris</i> Guichenot, 1848	+		+	+			+			
122	<i>Malacanthus latovittatus</i> (Lacepede, 1801)		+	+			+				

Table 29. contd.

Sl. No	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
	Family: POMACANTHIDAE (Angelfishes) Genus: <i>Centropyge</i>										
123	<i>Centropyge eibli</i> Klausewitz, 1963	+			+	+		+	+		+
124	<i>Centropyge flavipectoralis</i> Randall and Klausewitz, 1977		+							+	
125	<i>Centropyge multispinis</i> (Playfair, 1867)	+		+				+			
	Genus: <i>Chaetodontoplus</i>										
126	<i>Chaetodontoplus mesoleucus</i> (Bloch, 1787)				+					+	
	Genus: <i>Pomacanthus</i>										
127	<i>Pomacanthus annularis</i> (Bloch, 1787)	+	+	+			+				
128	<i>Pomacanthus imperator</i> (Bloch, 1787)	+		+	+			+			+
129	<i>Pomacanthus semicirculatus</i> (Cuvier, 1831)			+	+				+		
130	<i>Pomacanthus xanthometopon</i> (Bleeker, 1853)			+				+		+	
	Genus: <i>Pygoplites</i>										
131	<i>Pygoplites diacanthus</i> (Boddaert, 1772)	+		+	+	+		+	+	+	
	Family: CHAETODONTIDAE (Butterflyfishes) Genus: <i>Chaetodon</i>										
132	<i>Chaetodon auriga</i> Forsskal, 1775	+	+	+	+	+	+	+	+		+
133	<i>Chaetodon bennetti</i> Cuvier, 1831									+	
134	<i>Chaetodon citrinellus</i> Cuvier, 1831									+	+
135	<i>Chaetodon collare</i> Bloch, 1787	+	+		+	+	+	+	+	+	
136	<i>Chaetodon decussatus</i> Cuvier, 1829	+	+	+		+	+	+			+
137	<i>Chaetodon ephippium</i> Cuvier, 1831		+		+		+			+	+
138	<i>Chaetodon falcula</i> Bloch, 1793	+			+			+	+	+	
139	<i>Chaetodon guttatissimus</i> Bennett, 1832				+	+					
140	<i>Chaetodon interruptus</i> Ahl, 1923		+	+				+		+	+
141	<i>Chaetodon kleinii</i> Bloch, 1790	+			+			+		+	+
142	<i>Chaetodon lineolatus</i> Cuvier, 1831	+	+	+	+		+			+	
143	<i>Chaetodon lunula</i> (Lacepede, 1802)	+		+	+	+	+	+	+		
144	<i>Chaetodon melannotus</i> Bloch & Schneider, 1801				+		+			+	+

Table 29. contd.

Sl. No	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
145	<i>Chaetodon meyeri</i> Bloch & Schneider, 1801	+		+	+	+		+	+		+
146	<i>Chaetodon octofasciatus</i> Bloch, 1787				+					+	+
147	<i>Chaetodon oxycephalus</i> Bleeker, 1853	+			+		+			+	
148	<i>Chaetodon plebeius</i> Cuvier, 1831	+	+	+	+	+			+	+	
149	<i>Chaetodon rafflesii</i> Bennett, 1830		+		+	+		+		+	+
150	<i>Chaetodon triangulum</i> Cuvier, 1831		+		+	+	+		+		
151	<i>Chaetodon trifascialis</i> Quoy & Gaimard, 1825	+		+	+	+		+			
152	<i>Chaetodon trifasciatus</i> Park, 1797	+		+	+			+	+	+	
153	<i>Chaetodon vagabundus</i> Linnaeus, 1758	+	+	+	+	+		+	+	+	+
	Genus: <i>Coradion</i>										
154	<i>Coradion altivelis</i> McCulloch, 1916		+					+		+	
	Genus: <i>Forcipiger</i>										
155	<i>Forcipiger flavissimus</i> Jordan & McGregor, 1898	+		+	+			+			
	Genus: <i>Hemitaurichthys</i>										
156	<i>Hemitaurichthys zoster</i> (Bennet, 1831)		+		+			+		+	
	Genus: <i>Heniochus</i>										
157	<i>Heniochus acuminatus</i> (Linnaeus, 1758)	+		+	+	+		+			
158	<i>Heniochus diphreutes</i> Jordan, 1903	+	+		+		+				
159	<i>Heniochus pleurotaenia</i> Ahl, 1923	+	+	+	+			+			
160	<i>Heniochus singularius</i> Smith & Radcliffe, 1911	+	+			+		+			
	Family: CARANGIDAE										
	(Jacks, Kingfishes)										
	Genus: <i>Caranx</i>										
161	<i>Caranx melampygus</i> Cuvier, 1833	+		+			+	+			
162	<i>Caranx sexfasciatus</i> Quoy & Gaimard, 1825		+	+							
	Family: CIRRHITIDAE										
	(Hawkfishes)										
	Genus: <i>Cirrhitichthys</i>										
163	<i>Cirrhitichthys oxycephalus</i> (Bleeker, 1855)	+	+		+		+		+		
	Genus: <i>Paracirrhites</i>										
164	<i>Paracirrhites forsteri</i> (Schneider, 1801)	+		+				+		+	

Table 29. contd.

Sl. No	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
	Family: PEMPHERIDAE (Sweepers) Genus: <i>Parapriacanthus</i>										
165	<i>Parapriacanthus ransonneti</i> Steindachner, 1870		+	+	+			+			+
	Genus: <i>Pempheris</i>										
166	<i>Pempheris vanicolensis</i> Cuvier, 1831	+		+	+		+		+	+	
	Family: POMACENTRIDAE (Damsel-fishes)										
	Genus: <i>Abudefduf</i>										
167	<i>Abudefduf bengalensis</i> (Bloch, 1787)		+	+	+		+	+			+
168	<i>Abudefduf saxatilis</i> (Linnaeus, 1758)	+	+	+	+	+			+	+	+
169	<i>Abudefduf sexfasciatus</i> Lacepede, 1801	+	+			+	+	+		+	+
170	<i>Abudefduf vaigiensis</i> (Quoy & Gaimard, 1825)		+	+	+	+	+	+	+	+	+
	Genus: <i>Amblyglyphidodon</i>										
171	<i>Amblyglyphidodon aureus</i> (Cuvier, 1830)	+	+	+	+		+				+
172	<i>Amblyglyphidodon indicus</i> Allen & Randall, 2002	+	+				+	+		+	+
173	<i>Amblyglyphidodon ternatensis</i> (Bleeker, 1853)		+	+					+		
	Genus: <i>Amphiprion</i>										
174	<i>Amphiprion akallopisos</i> Bleeker, 1853.	+	+		+	+			+		+
175	<i>Amphiprion clarkii</i> (Bennett, 1830)	+	+		+			+			
176	<i>Amphiprion ephippium</i> (Bloch, 1790)		+	+		+				+	
177	<i>Amphiprion ocellaris</i> Cuvier, 1830	+	+	+	+			+	+	+	+
	Genus: <i>Chromis</i>										
178	<i>Chromis flavicauda</i> (Gunther, 1880)			+	+						
179	<i>Chromis opercularis</i> Gunther, 1867	+	+		+	+		+	+	+	+
180	<i>Chromis ternatensis</i> (Bleeker, 1856)	+			+						+
181	<i>Chromis viridis</i> (Cuvier, 1830)			+						+	+
182	<i>Chromis xanthochira</i> (Bleeker, 1851)	+			+		+		+	+	
	Genus: <i>Chrysiptera</i>										
183	<i>Chrysiptera brownriggi</i> (Bennett, 1828)	+		+	+				+	+	+
184	<i>Chrysiptera glauca</i> (Cuvier, 1830)	+			+	+		+	+	+	+
185	<i>Chrysiptera leucopoma</i> (Cuvier, 1830)		+	+	+	+			+	+	+

Table 29. contd.

Sl. No	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
186	<i>Chrysiptera rollandi</i> (Whitley, 1961)	+			+	+			+	+	
187	<i>Chrysiptera talboti</i> (Allen, 1975)		+		+	+			+	+	+
188	<i>Chrysiptera unimaculata</i> (Cuvier, 1830)	+	+	+	+		+	+		+	+
	Genus: <i>Dascyllus</i>										
189	<i>Dascyllus aruanus</i> (Linnaeus, 1758)		+		+	+		+		+	
190	<i>Dascyllus carneus</i> Fischer, 1885				+	+		+	+		+
191	<i>Dascyllus trimaculatus</i> (Ruppell, 1829)	+	+		+		+			+	
	Genus: <i>Dischistodus</i>	+		+			+		+		+
192	<i>Dischistodus perspicillatus</i> (Cuvier, 1830)	+	+		+					+	
	Genus: <i>Neopomacentrus</i>										
193	<i>Neopomacentrus azysron</i> (Bleeker, 1877)	+		+	+			+	+	+	+
	Genus: <i>Plectroglyphidodon</i>										
194	<i>Plectroglyphidodon dickii</i> (Lienard, 1839)	+			+			+	+		+
195	<i>Plectroglyphidodon lacrymatus</i> (Quoy & Gaimard, 1825)		+		+		+		+	+	
	Genus: <i>Pomacentrus</i>			+							
196	<i>Pomacentrus alleni</i> Burgess, 1981				+	+				+	
197	<i>Pomacentrus amboinensis</i> Bleeker, 1868		+	+					+		+
198	<i>Pomacentrus bankanensis</i> Bleeker, 1853	+			+		+		+	+	+
199	<i>Pomacentrus chrysurus</i> Cuvier, 1830	+			+	+		+		+	
200	<i>Pomacentrus lepidogenys</i> Fowler and Ball, 1928		+	+	+	+		+	+	+	+
201	<i>Pomacentrus moluccensis</i> Bleeker, 1853			+	+			+	+	+	
202	<i>Pomacentrus nagasakiensis</i> Tanaka, 1917		+		+	+	+	+			
203	<i>Pomacentrus philippinus</i> Evermann and Seale, 1907	+		+		+			+	+	+
	Genus: <i>Premnas</i>										
204	<i>Premnas biaculeatus</i> (Bloch, 1790)	+		+	+					+	+
	Family: LABRIDAE (Wrasses) Genus: <i>Bodianus</i>										
205	<i>Bodianus diana</i> (Lacepede, 1801)	+	+	+	+					+	
206	<i>Bodianus mesothorax</i> (Bloch & Schneider, 1801)	+	+	+			+	+	+		

Table 29. contd.

Sl. No	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
	Genus: <i>Cheilinus</i>										
207	<i>Cheilinus fasciatus</i> (Bloch, 1791)	+	+		+	+		+		+	
208	<i>Cheilinus trilobatus</i> Lacepede, 1801	+			+		+	+			
	Genus: <i>Coris</i>										
209	<i>Coris aurilineata</i> Randall & Kuitert, 1982	+	+		+				+		
210	<i>Coris batuensis</i> (Bleeker, 1857)				+		+		+	+	
	Genus: <i>Epibulus</i>										
211	<i>Epibulus insidiator</i> (Pallas, 1770)				+	+		+			
	Genus: <i>Gomphosus</i>										
212	<i>Gomphosus caeruleus</i> Lacepede, 1801	+	+		+	+	+	+		+	
	Genus: <i>Halichoeres</i>										
213	<i>Halichoeres leucoxanthus</i> Randall and Smith, 1982			+							
214	<i>Halichoeres melanurus</i> (Bleeker, 1851)	+	+	+				+	+		+
215	<i>Halichoeres timorensis</i> (Bleeker, 1852)	+					+			+	
216	<i>Halichoeres vroliki</i> (Bleeker, 1855)		+	+	+			+		+	
	Genus: <i>Hemigymnus</i>										
217	<i>Hemigymnus fasciatus</i> (Bloch, 1792)				+						
218	<i>Hemigymnus melapterus</i> (Bloch, 1791)	+		+			+		+		
	Genus: <i>Hologymnosus</i>										
219	<i>Hologymnosus annulatus</i> (Lacepede, 1801)		+		+	+				+	
	Genus: <i>Labroides</i>										
220	<i>Labroides bicolor</i> Fowler & Bean, 1928	+		+	+			+	+	+	+
221	<i>Labroides dimidiatus</i> (Valenciennes, 1839)	+	+	+	+	+	+		+	+	+
	Genus: <i>Thalassoma</i>										
222	<i>Thalassoma hardwicke</i> (Bennett, 1830)	+			+			+		+	
223	<i>Thalassoma lunare</i> (Linnaeus, 1758)			+	+	+	+		+	+	
	Family: SCARIDAE										
	(Parrotfishes)										
	Genus: <i>Bolbomatopon</i>										
224	<i>Bolbomatopon muricatum</i> Valenciennes, 1840	+		+							
	Genus: <i>Cetoscarus</i>										
225	<i>Cetoscarus bicolor</i> (Ruppell, 1829)	+			+	+	+		+	+	

Table 29. contd.

Sl. No	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
	Genus: <i>Chlorurus</i>										
226	<i>Chlorurus sordidus</i> (Forsskal, 775)	+			+	+				+	
	Genus: <i>Scarus</i>										
227	<i>Scarus ghobban</i> Forsskal, 1775		+					+			
228	<i>Scarus globiceps</i> Valenciennes, 1840			+	+			+			
229	<i>Scarus niger</i> Forsskal, 1775	+	+	+	+		+		+		
	Family: SPHYRAENIDAE										
	(Barracudas)										
	Genus: <i>Sphyraena</i>										
230	<i>Sphyraena barracuda</i> (Walbaun, 1792)	+		+			+				
	Family: PINGUIPEDIDAE										
	(Sandperches)										
	Genus: <i>Parapercis</i>										
231	<i>Parapercis clathrata</i> Ogilby, 1911)	+			+						+
232	<i>Parapercis hexophthalma</i> (Cuvier, 1829)	+		+	+			+	+	+	
233	<i>Parapercis millepunctata</i> (Günther, 1860)		+		+	+				+	+
234	<i>Parapercis xanthozona</i> (Bleeker, 1849)	+		+				+		+	
	Family: BLENIIDAE										
	(Combtooth blennies)										
	Genus: <i>Aspidontus</i>										
235	<i>Aspidontus taeniatus</i> taeniatus (Quoy & Gaimard, 1834)	+		+	+				+		+
	Genus: <i>Ecsenius</i>										
236	<i>Ecsenius lineatus</i> Klauswitz, 1962	+		+		+		+	+	+	
237	<i>Ecsenius midas</i> Starck, 1969	+			+		+			+	
238	<i>Ecsenius stictus</i> Springer, 1988				+			+			
	Genus: <i>Exallias</i>										
239	<i>Exallias brevis</i> (Kner, 1868)			+	+	+					
	Genus: <i>Meiacanthus</i>										
240	<i>Meiacanthus smithi</i> Klauswitz, 1962	+			+					+	+
	Genus: <i>Plagiotremus</i>										
241	<i>Plagiotremus phenax</i> Smith-Vaniz, 1976		+	+	+		+		+		

Table 29. contd.

Sl. No	Species	St -1	St -2	St -3	St -4	St -5	St -6	St -7	St -8	St -9	St -10
242	<i>Plagiotremus rhinorhynchus</i> (Bleeker, 1852)			+		+			+	+	+
	Family: TRIPTERYGIIDAE										
	(Threefin blennies)										
	Genus: <i>Helcogramma</i>										
243	<i>Helcogramma striatum</i> Hansen, 1986			+	+	+			+	+	
	Genus: <i>Ucla</i>										
244	<i>Ucla xenogrammus</i> Holleman, 1993			+	+		+		+	+	
	Family: GOBIIDAE										
	(Gobies)										
	Genus: <i>Amblyeleotris</i>										
245	<i>Amblyeleotris steinitzi</i> (Klausewitz, 1974)			+	+				+	+	
	Genus: <i>Amblygobius</i>										
246	<i>Amblygobius decussates</i> (Bleeker, 1855)	+	+		+	+		+			
247	<i>Amblygobius hectori</i> (Smith, 1957)			+	+		+			+	
248	<i>Amblygobius nocturnes</i> (Herre, 1945)	+		+	+			+	+		+
249	<i>Amblygobius semicinctus</i> (Bennett, 1833)		+	+	+					+	+
	Genus: <i>Bathygobius</i>										
250	<i>Bathygobius fuscus</i> (Ruppell, 1830)	+				+				+	
	Genus: <i>Bryaninops</i>										
251	<i>Bryaninops yongei</i> (Davis & Cohen, 1968)			+	+			+			
	Genus: <i>Cryptocentru</i>										
252	<i>Cryptocentrus fasciatus</i> (Playfair and Gunther, 1867)	+			+		+		+	+	
253	<i>Cryptocentrus strigilliceus</i> (Jordan & Seale, 1906)	+	+	+	+				+		+
	Genus: <i>Ctenogobiops</i>										
254	<i>Ctenogobiops pomastictus</i> Lubbock & Polunin, 1977					+				+	
	Genus: <i>Eviota</i>										
255	<i>Eviota prasina</i> (Klunzinger, 1871)	+		+			+			+	
256	<i>Eviota sebreei</i> Jordan and Seale, 1906			+	+				+	+	+
	Genus: <i>Fusigobius</i>										
257	<i>Fusigobius neophytus</i> (Gunther, 1877)	+			+	+				+	

Table 29. contd.

Sl. No	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
258	<i>Fusigobius signipinnis</i> (Hoesé & Obika, 1988)		+	+	+				+	+	
	Genus: <i>Istigobius</i>										
259	<i>Istigobius decoratus</i> (Herre, 1927)				+			+		+	
260	<i>Istigobius ornatus</i> (Ruppell, 1830)	+			+	+					
	Genus: <i>Priolepis</i>										
261	<i>Priolepis compita</i> Winterbottom, 1985									+	
	Genus: <i>Trimma</i>										
262	<i>Trimma naudei</i> Smith, 1957	+		+	+			+			+
263	<i>Trimma striata</i> (Herre, 1945)	+		+	+				+	+	
	Genus: <i>Valenciennes</i>										
264	<i>Valenciennes puellaris</i> (Tomiyana, 1956)	+			+	+					
265	<i>Valenciennes sexguttata</i> (Valenciennes, 1837)			+	+		+		+		
	Family: ACANTHURIDAE (Surgeonfishes, Tangs, Unicornfishes) Genus: <i>Acanthurus</i>										
266	<i>Acanthurus bariene</i> Lesson, 1830		+	+	+		+	+			
267	<i>Acanthurus leucosternon</i> Bennett, 1833	+			+	+		+			
268	<i>Acanthurus nigricauda</i> Dunker & Mohr, 1929	+	+	+	+		+				
269	<i>Acanthurus triostegus</i> (Linnaeus, 1758)	+		+		+		+	+	+	+
270	<i>Acanthurus tristis</i> Randall, 1993		+		+	+	+	+		+	+
271	<i>Acanthurus xanthopterus</i> Valenciennes, 1835		+	+	+	+		+	+		
	Genus: <i>Ctenochaetus</i>										
272	<i>Ctenochaetus cyanocheilus</i> Randall & Clements, 2001	+			+		+				+
273	<i>Ctenochaetus striatus</i> (Quoy & Gaimard, 1825)	+	+		+			+		+	
	Genus: <i>Naso</i>										
274	<i>Naso brachycentron</i> (Valenciennes, 1835)	+				+	+			+	

Table 29. contd.

Sl. No	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
275	<i>Naso brevirostris</i> (Valenciennes, 1835)		+		+	+					
276	<i>Naso tuberosus</i> Lacepede, 1802					+	+	+			
	Genus: <i>Zebrasoma</i>										
277	<i>Zebrasoma desjardini</i> (Bennett, 1836)	+	+		+	+	+	+	+		+
278	<i>Zebrasoma scopas</i> (Cuvier, 1835)	+	+	+	+	+	+	+	+	+	
	Family: ZANCLIDAE (Moorish idol) Genus: <i>Zanclus</i>										
279	<i>Zanclus cornutus</i> (Linnaeus, 1758)		+	+	+	+	+	+	+	+	
	Family: SIGANIDAE (Rabbitfishes) Genus: <i>Siganus</i>										
280	<i>Siganus guttatus</i> (Bloch, 1787)	+		+				+	+		
281	<i>Siganus javus</i> (Linnaeus, 1766)		+				+	+		+	
282	<i>Siganus spinus</i> (Linnaeus, 1758)	+					+				
283	<i>Siganus virgatus</i> (Valenciennes, 1835)	+	+	+				+	+		
	Family: MICRODESMIDAE Genus: <i>Pteroeleotris</i>										
284	<i>Pteroeleotris evides</i> (Jordan & Hubbs, 1925)			+							
285	<i>Pteroeleotris microlepis</i> (Bleeker, 1856)		+					+	+	+	
	Order: TETRADONTIFORMES Family: MONOCANTHIDAE (Filefishes) Genus: <i>Oxymonacanthus</i>										
286	<i>Oxymonacanthus longirostris</i> (Bloch & Schneider, 1801)	+	+		+		+		+	+	

Table 29. contd.

Sl. No	Species	St. -1	St. -2	St. -3	St. -4	St. -5	St. -6	St. -7	St. -8	St. -9	St. -10
	Family: BALISTIDAE (Triggerfishes) Genus: <i>Balistapus</i>										
287	<i>Balistapus undulates</i> (Park, 1797)	+	+	+		+	+	+	+		+
	Genus: <i>Melichthys</i>										
288	<i>Melichthys indicus</i> Randall & Klausewitz, 1973	+	+		+	+	+				+
	Genus: <i>Odonus</i>										
289	<i>Odonus niger</i> (Ruppell, 1836)	+			+	+	+	+	+	+	
	Genus: <i>Sufflamen</i>										
290	<i>Sufflamen chrysopterus</i> (Bloch & Schneider, 1801)	+	+	+	+	+	+	+		+	
	Family: OSTRACIIDAE (Boxfishes and trunkfishes) Genus: <i>Ostracion</i>										
291	<i>Ostracion cubicus</i> Linnaeus, 1758			+	+	+	+		+		+
	Family: TERTRAODONTIDAE (Puffers) Genus: <i>Arothron</i>										
292	<i>Arothron nigropunctatus</i> (Bloch & Schneider, 1801)	+			+	+		+			
	Total no. of species	183	126	161	172	95	100	153	101	135	80

Shannon-Weaner Diversity Index for the species of fishes was highest at Station-1 (4.8) and lowest at Station-10 (3.79). The Menhinick Diversity Index indicated that Station-4 was more diversified (5.21) and Station-6 was least diversified (3.33) (Fig. 44), whereas, Equitability Index was maximum at Station-7 (0.94) and minimum at Station-10 (0.86). Pileou's Evenness index was highest at Station-7 (0.74) and lowest at Station-4 (0.51). Simpson's Diversity Index was maximum at most of the stations (0.98) and minimum at Station-10 (0.96) (Fig. 45). Margalef Community Index ranged from 12.80 at Station-10 to 24.53 at Station-1. However, Fisher Alpha Diversity Index varied between 27.44 and 57.51 at Station-10 and 4 respectively (Fig. 46). Dominance Index showed a maximum value for Station-10 (0.034) and minimum value for Station-7

(0.010). Berger-Parker Diversity Index was highest at Station-9 (0.093.) while the lowest (0.032) at Station-6 (Fig. 47).

The data on species similarity index of fishes identified from Rutland Island are given in Table 30. Maximum similarity index (0.33) was observed between Station-1 & Station-7 whereas the minimum (0.13) was between Station-6 & Station-10.

Table 30. Similarity Index of Fishes at ten sites of Rutland Island

	St-2	St-3	St-4	St-5	St-6	St-7	St-8	St-9	St-10
St.-1	0.22	0.31	0.29	0.21	0.24	0.33	0.23	0.24	0.19
St.-2		0.22	0.23	0.19	0.25	0.26	0.22	0.20	0.17
St.-3			0.25	0.17	0.21	0.29	0.24	0.21	0.19
St.-4				0.26	0.19	0.24	0.26	0.29	0.24
St.-5					0.15	0.20	0.23	0.22	0.19
St.-6						0.18	0.22	0.17	0.13
St.-7							0.18	0.21	0.15
St.-8								0.23	0.25
St. -9									0.20

A total of 51 families of fishes were recorded during study period. Of which a maximum of 38 species was observed under the Pomacentridae family whereas the minimum of 1 species was recorded under quite a number of families (Table 31). Rutland Island represented 29.70% fishes among the reported families of Andaman and Nicobar Islands.

Table 31. Percentage composition of different families of Fishes

Sl. No.	Family	No. of Species in A&N islands	No. of species in Rutland	Percentage at Rutland Island
1.	Rhinobatidae	4	1	25.00
2.	Dasyatidae	10	1	10.00
3.	Muraenidae	20	1	5.00
4.	Chanidae	1	1	100.00
5.	Plotosidae	2	1	50.00
6.	Holocentridae	16	4	25.00
7.	Synodontidae	11	3	27.27
8.	Belonidae	5	1	20.00

Table 31. *contd.*

Sl. No.	Family	No. of Species in A&N islands	No. of species in Rutland	Percentage at Rutland Island
9.	Pegasidae	2	1	50.00
10.	Aulostomidae	1	1	100.00
11.	Fistularidae	2	1	50.00
12.	Syngnathidae	26	4	15.38
13.	Centriacidae	2	1	50.00
14.	Solenostomidae	2	1	50.00
15.	Scorpaenidae	21	4	19.05
16.	Platycephalidae	9	2	22.22
17.	Serranidae	58	23	39.66
18.	Pseudochromidae	6	1	16.67
19.	Plesiopidae	4	1	25.00
20.	Apogonidae	46	15	32.61
21.	Haemulidae	18	5	27.78
22.	Lutjanidae	43	15	34.88
23.	Caesionidae	14	11	78.57
24.	Lethrinidae	22	4	18.18
25.	Nemipteridae	22	3	13.64
26.	Kyphosidae	3	1	33.33
27.	Ephippidae	5	3	60.00
28.	Monodactylidae	1	1	100.00
29.	Mullidae	17	8	47.06
30.	Malacanthidae	2	2	100.00
31.	Pomacanthidae	20	9	45.00
32.	Chaetodontidae	41	29	70.73
33.	Carangidae	46	2	4.35
34.	Cirrhitidae	5	2	40.00
35.	Pempheridae	5	2	40.00
36.	Pomacentridae	77	38	49.35
37.	Labridae	64	19	29.69
38.	Scaridae	25	6	24.00
39.	Sphyraenidae	9	1	11.11
40.	Pinguipedidae	7	4	57.14
41.	Bleniidae	58	8	13.79
42.	Tripterygiidae	5	2	40.00

Table 31. contd.

Sl. No.	Family	No. of Species in A&N islands	No. of species in Rutland	Percentage at Rutland Island
43.	Gobiidae	111	21	18.92
44.	Acanthuridae	32	13	40.63
45.	Zanclidae	1	1	100.00
46.	Siganidae	14	4	28.57
47.	Microdesmidae	7	2	28.57
48.	Monacanthidae	13	1	7.69
49.	Balistidae	19	4	21.05
50.	Ostraciidae	5	1	20.00
51.	Tetraodontidae	24	1	4.17
Total		983	292	29.70

DISCUSSION

The marine environment of Rutland Island and its shelf areas support enormous marine faunal communities. Existing conducive environment variables such as temperature, pH, salinity, transparency, turbidity etc in its optimal level ensures to maintain the rich marine biodiversity of Rutland Island. The present study reports a total of 1027 species comprised of sponges, scleractinian corals, gorgonians, polyclads, crabs, shrimps, lobsters, molluscs, opisthobranchs, echinoderms and fishes were recorded in the shelf region of Rutland Island during the period of study. The data indicates that coral reef ecosystem of Rutland Island harbours about 16.0% of total marine faunal communities reported from Andaman and Nicobar Islands.

The distributional patterns of sponges are quite flat in every regions of the world's ocean from shallow water to the greater depth with a total number of approximately 15000 species. They can grow both in the solid and soft substratum. Only 1% species of sponges are reported from freshwater habitat. A total of 451 species of sponges belonging to 3 classes, 17 orders, 65 families and 169 genera have been reported till now from Indian waters. Tikader *et al.* (1986) listed 1 species of Calcarea, 16 species of Hexatinellidae and 63 species of Demospongiae. Pattanayak (2006) describes 75 species, 48 genera, 35 families from the Andaman and Nicobar Islands with 4 new species records, 18 new locality records and 15 species endemic to the Andaman and Nicobar Islands. In 2009, Pattanayak worked on 20 species of Hexatinellida and 122 species of Demospongiae of Andaman kept as National Zoological Collections of Zoological Survey of India, Kolkata. The present study reports a total of 31 species of sponges belonging to 25 genera and 20 families from Rutland Island during the surveys. Among the ten

sites Station-5 showed maximum numerical value of Shannon-Weaner Diversity indices (2.85) and Menhinick Diversity index (3.52) whereas Station-8 showed the minimum 1.77 and 1.87 respectively. The value of the diversity index ranges from 1.77 to 2.85 with a mean density of 2.34 which is below the optimum level that indicates a moderate diversity of sponges at Rutland Island. Rutland Island represented 96.15% sponge species under reported families in Andaman & Nicobar Island.

Among India's four major reefs, Andaman and Nicobar Islands are showing maximum diversity. A total of 424 zooxanthellate and azooxanthellate coral species distributed all over the Andaman and Nicobar Islands, where India has a total of 478 species, which contributes 60% of Global coral diversity. Andaman Islands alone have 424 species (89% of India's coral diversity) and 242 species (all these species recorded in Andaman also) distributed in Nicobar groups of Islands which contributes 51% coral diversity of India. All the nineteen families were recorded from this region. Out of 89 genera reported from India, only three genera such as *Stephanocyathus*, *Flabellum* and *Cladangia* are not been recorded so far from this region. Andaman and Nicobar Islands have two endemic species namely *Deltocyathus andamanensis* and *Polycyathus andamanensis*; which are azooxanthellate in nature. Andaman and Nicobar reefs are dominated by family Acroporidae, Faviidae, Poritidae, Fungidae and Agariciidae.

Scleractinian corals are widely distributed among the world's ocean. Andaman and Nicobar Islands are most important areas according to the scleractinian diversity in comparison with the other areas of the world as it harbors 424 species of scleractinian corals under 79 genera and 17 families (Tamal *et al.*, 2012a). Rutland Island is one of the major islands in Andaman group. The presence of a total number of 327 species scleractinian corals of this island represents 62.40% of scleractinian species of these entire Andaman and Nicobar Islands. The values of species diversity indices are high above the optimal level. A total of 91 species under the family Faviidae were recorded till now from these groups of islands (Tamal *et al.*, 2012b, 2012c), whereas 90.11% species of that family can be seen among the scleractinians of this island. A total of 35 species of scleractinian corals were already reported as new record to Andaman & Nicobar Island as well as to Indian waters from this island (Tamal *et al.*, 2010, 2011a-d, 2012d-e, in press). The density of corals was assessed as 12-23 colonies/10 sq. m. and the live coral cover in Rutland Island was estimated as 57-63%. Out of this, 50-65% of corals bleached in 2010 due to increase in sea surface temperature in Andaman Sea. Due to presence of favorable environment 28-87% recovery of corals were observed during 2011. Besides, 23-56% new recruitment of scleractinian corals was also recorded during study period. The diversity and status of scleractinian corals from this island describes the importance as well as the biogenic habitat of Rutland Island for marine faunal communities.

Five major classes of of Phylum Mollusca namely Polyplacophora, Gastropoda, Scaphopoda, Bivalvia and Cephalopoda are represented in India out of seven. Against a total of 586 families of molluscs in the world, an estimated 279 families occur in the Indian region. A total number of 130 species of molluscs under 69 genera, 39 families were reported from Rutland Island. Among the ten areas, Station-1 showed maximum of 60 species under 42 genera and 30 families with maximum species diversity (4.74) whereas minimum of 35 species were observed at Station-2 belonging to 25 genera and 18 families with minimum species diversity (3.79). The species diversity of the mulluscs is above the maximum value for all the study areas which represents healthy state of molluscs at Rutland Island. Rutland Island represented a total of 11.33% molluscs of Andaman and Nicobar Islands among the 9 orders though 20 orders were already reported from Andaman and Nicobar Islands.

Nudibranchs are shell-less marine opisthobranch gastropod molluscs, which are noted for their often extraordinary colors and striking forms. Nudibranchia is the largest group in opisthobranchia with more than 3500 described species. The gills can be used for identification. Some species wave their gills as they move or feed. Nudibranchs live in marine environments from Antartica to the tropics. They dwell at virtually all depths of sea, but reach their greatest size and variation in warm, shallow waters. Most spend their adult life on the bottom. The first report on opisthobranchs from these Islands was reported by Eliot during 1910. Taxonomy and ecological approaches of opisthobranchs were made by Raghunathan *et al.* (2010), Ramakrishna *et al.* (2010) and Sreeraj *et al.* (2010) at Andaman and Nicobar Islands. A total of 62 species of opisthobranchs under 27 genera and 15 families were reported from Rutland Island. A maximum of 39 species under 22 genera and 12 families were reported from Station-7 whereas the minimum 20 species was recorded from Station-3 and Station-6 areas respectively. The species diversity indices of all the study sites showed supportive optimum value which indicates healthy status of opisthobranch diveristy at Rutland Island. This island represented a total of 35.46% opisthobranchs of Andaman and Nicobar Islands among the 15 families.

Most of the flatworms or polyclads are parasitic. Of the almost 20 000 species known, 14 000 are parasites belonging to either the class Cestoda (tapeworms) or the class Trematoda (flukes). The minority of flatworms (about 4 500 known) are free living and belong to the class Turbellaria. One taxonomic subgroup of the Turbellaria is the order Polycladida, a highly diverse group of free living flatworms. They have been known as inhabitants of tropical reefs for about 150 years. Hundreds of species are believed to occur in tropical waters, but only a small fraction has been exactly described so far. Hence polyclads are least studied faunal group globally. The study of polyclad was initiated by F.F Laidlaw in 1902 for the first time in India with the description of 15 species from Laccadive (Lakshadweep) archipelago. After this the only accounts are given by Sreeraj and Raghunathan (2011) from Andaman and Nicobar Islands and Apte and Pitale (2011)

from Lakshadweep. 39 species of flatworm under the order Polycladida are known till now in Indian scenario. Out of these 22 species are recorded from Lakshadweep and 30 are recorded from Andaman and Nicobar Islands. Present study implies a total of 10 species of polyclads under 3 genera were recorded from Rutland Island. A maximum of 6 species were reported from Station-7 whereas the minimum of 3 species were reported from Stations-2, 3 and 4. The values of the diversity indices are very low from the optimum level which depicts the low level of diversity of polyclads at Rutland Island.

Crustacean diversity of Andaman and Nicobar Islands is well studied during 20th century by many researchers. Coral reefs inhabit several commonly important crustacean fauna. In 1865, Heller revealed 14 species of hermit crabs from Nicobar Islands. Alcock (1905) further revealed that 14 species and 5 new varieties/species of hermit crabs. Reddy and Ramakrishna (1972) found the occurrence of 20 species followed by Tikader *et al.* (1986) reported 37 species lead to a total of 40 species of hermit crabs from Andaman and Nicobar Islands. Species composition of brachyuran crabs of Andaman and Nicobar Islands has been consolidated as 220 species through the reports of Sakai (1976), Kathirvel (1983), and Tikader *et al.* (1986). Present study reflects a total of 32 species of crabs under 18 genera and 10 families were reported during the study period from Rutland Island. A maximum number of 23 species were found at Station-6 whereas the minimum numbers of 11 species were observed from Station-4 area. The value of diversity index depicts the high degree of species assembly at Rutland Island. Rutland Island represented 30% crab species of Andaman and Nicobar Islands among the recorded 10 families.

The commercial value is most important avenue to make trusted study on shrimps. The value of the shrimps has been raised in a virtual level and ranked as top one. Taxonomical studies of Indian penaeid shrimps have been brought to light by the pioneering works of Milne Edwards (1834), Miers (1884), Bate (1888), Wood- Mason (1891), Wood-Mason and Alcock (1891a,b), Alcock and Anderson (1894, 1899a,b), Alcock and Macardle (1901), Alcock (1901, 1905, 1906), Nobili (1903), Alcock *et al.* (1907), Kemp (1910, 1915, 1917), De Man (1908, 1911, 1920), Kemp and Sewell (1912), Balss (1925) and Sewell (1934). A total of 24 species of shrimps under 9 genera and 6 families were identified from the studied ten sites of Rutland Island of 9 species were identified at Station-4. The values of diversity indices are just below the optimum values indicate high level of species diversity at Rutland Island. This island represented 38.71% of Shrimps of Andaman and Nicobar Islands among the recorded 6 families.

Lobsters are most commercially important marine fauna due to its food value. The taxonomical records of commercially important lobsters were carried out by Heller (1865), Henderson (1893), Thurston (1895), Alcock and Anderson (1894), Alcock (1901, 1906), Nobili (1903), Borradaile (1906), Lloyd (1907), Sewell (1913), De Man (1916), Gravely

(1927), Patil (1953), John and Kurian (1959), Satyanarayana (1961), Chhapgar and Deshmukh (1961, 1964), George and Rao (1965, 1967), George and George (1967), Radhakrishna and Ganapati (1969), Nair *et al.* (1973), Hossain (1975), Meiyappan and Kathirvel (1978), Thomas (1979), Parulekar (1981), Shanmugam and Kathirvel (1983), Mustafa (1990), Radhakrishnan *et al.* (1995), Goswamy (1992), Kathirvel and Nair (2002) and Kathirvel *et al.* (2003 and 2007). Four species of lobsters were recorded during the present study at Rutland Island. The aims of the present documentation are to create awareness on commercially important lobsters of Rutland Island to use those for the resource management.

The echinoderms comprised of 5 classes such as echinoids, crinoids, asteroids, ophiuroids and holothuroids. All the five classes are present in Andaman and Nicobar Islands. The initial work was made by Bell (1887) by listing echinoderms from the Andaman. In 1983, James dealt with sea cucumber and sea urchin resources of the Andaman and Nicobar Islands gave a list of echinoderms known from these Islands. Sastry compiled all the available published literature on 425 species of echinoderms of Andaman and Nicobar Islands as well as the materials in the National Zoological Collection of Zoological Survey of India at Kolkata and Port Blair while 649 species from India (Sastry, 2005, 2007). A total of 102 species of echinoderms belong to 59 genera, 35 families and 15 orders were recorded from Rutland Island during the study period. A maximum number of 57 species were observed at Station-6 whereas the minimum was only 30 species were found at Station-4. Shannon-Weaner Diversity Index showed maximum (3.75) at Station-7 whereas minimum (3.19) at Station-8. The values of species diversity indices are above the optimal level which implies great deal of species diversity at Rutland Island.

Taxonomical works on marine fishes was started in earlier days in Andaman and Nicobar and still have been continuing (Blyth, 1846; Day, 1870, 1875-78, 1888; Annandale and Hora, 1925; Hora, 1925; Duncker, 1925; Mukerjee, 1935; Herre, 1939, 1940; Koumans, 1940, 1953; Misra, 1950; Weber and De Beaufort, 1913-1936; De Beaufort, 1940; De Beaufort and Chapman, 1951). Here (1941) recorded a list of 490 species of fishes for the first time. Later on, discoveries of some new species and new records of fishes have been strengthen the list by many ichthyologists like Kalauswitz and Eild Eibesfeld (1959), Kalusewitz (1963), Jones *et al.* (1960), Silas and Dawson (1961), Silas and Toor (1961), Yazdani (1963) and Luther (1972). Rangarajan (1969, 1972), Menon and Rama Rao (1972), Menon and Talwar (1972, 1973), Sen (1975), Menon and Chatterjee (1974); Eschmeyer and Dor (1978); Talwar *et al.* (1982); Mehta *et al.* (1989); Mehta and Kamla Devi (1990) also contributed towards the taxonomy of fishes from Andaman and Nicobar Islands. Talwar (1990) documented a comprehensive list of 724 species of fishes from all the aquatic ecosystems of these islands, followed by a supplementary list by Kamla Devi (1991) containing 71 species of fishes. Taxonomical works also made by

Kamla Devi and Rajan (1991), Misra and Krishnan (1992), Rao *et al.* (1992a,1992b), Dhandapani and Misra (1993), Rajan (2001, 2002, 2003), Rajan *et al.* (1992a,1992b,1993), Kamla Devi *et al.* (1993, 1995), Kamla Devi and Rao (1997, 2003a,2003b, 2007), Rao *et al.* (1992, 1994, 1993a,1993b, 1997, 2000), Rao (1995, 2003), Rao and Kamla Devi (1995, 1997a, 1997b, 1998, 2004), Soundararajan and Dam Roy (2004), Remadevi *et al.* (2005) and Rajaram *et al.* (2007) on the fishes of Andaman and Nicobar Islands and documented 300 species to the ichthyofauna of the Archipelago which enriched the list of fishes to more than 1300 species. Rao (2009) summed up the list and records and a revised checklist containing 1369 species under 586 genera belonging to 175 families recorded from Andaman and Nicobar Islands was generated. There is no such report on fishes of Rutland Island exclusively. The present study implies a total number of 292 species under 129 genera, 51 families and 11 orders were recorded from reef areas of Rutland Island during the study period. A maximum of 183 species were reported from Station-1 whereas the minimum of 80 species were observed from Station-10. All the species diversity indices are higher than the theoretical optimum value level which indicates rich diversity of reef fishes at Rutland Island.

The data collected from the present study proves that the adjoining waters of Rutland Island and its shelf region harbours rich marine biodiversity. The high diversity of all marine organisms reported from Rutland Island indicates the healthy status of reef around its continental shelf region. Moreover, Rutland Island is fall under the Mahatma Gandhi Marine National Park which is protected from anthropogenic activities under the Wildlife (Protection) Act, 1972. However, earlier studies reported the occurrence of coral diseases in the national park area due to municipal discharge from the Port Blair Township. Since no earlier comprehensive studies on the diversity of marine faunal communities in the Rutland Island, the data obtained from the present study could not be compared to understand the present status. The species of different faunal groups revealed out through this study will be useful tool for the conservation and protection of these living resources. Having an enormous biodiversity in the marine realm, the Rutland Island may be declared as Marine Sanctuary for effective management practices.

ACKNOWLEDGEMENTS

Author is grateful to

1. Dr. K. Venkataraman, Director, Zoological Survey of India, Ministry of Environment, Forests and Climate Changes, Government of India for providing necessary facilities to undertake this study.
2. The Researchers of Zoological Survey of India, Port Blair for their assistance during the undersea surveys.
3. The authorities of Department of Environment and Forests, Andaman and Nicobar Administration for logistic support during the surveys.

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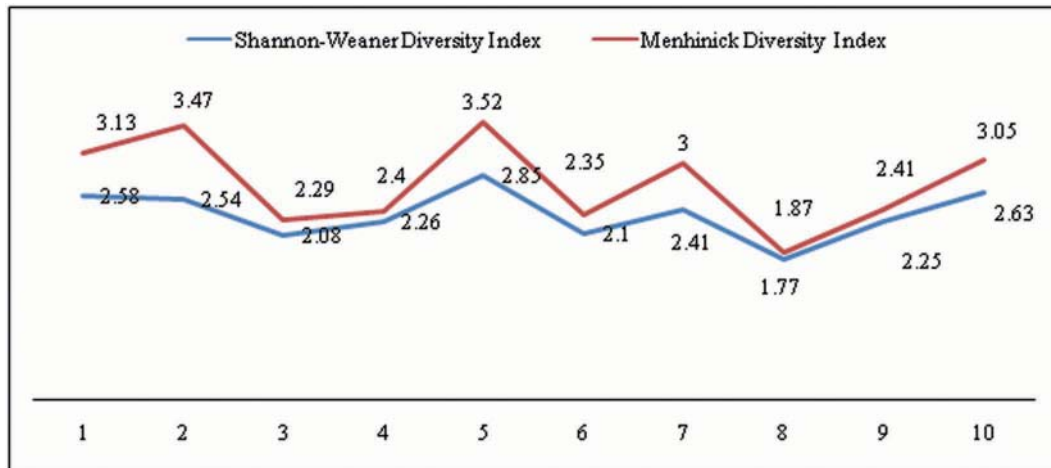


Fig. 2. Shannon-Weaver and Menhinick Diversity Indices of Sponges at Rutland Island

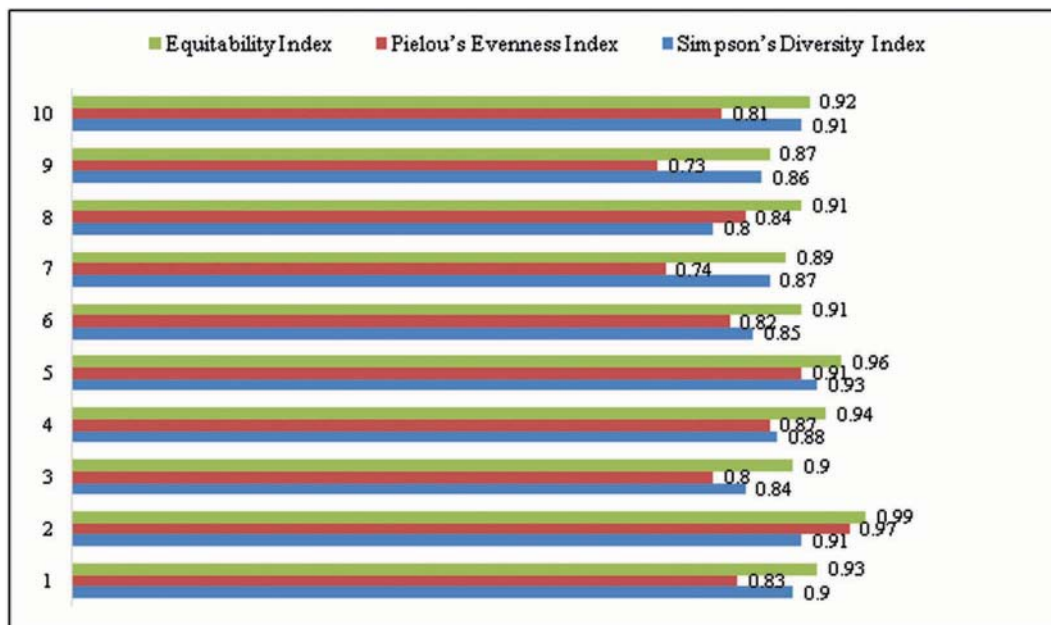


Fig. 3. Equitability, Pielou's Evenness and Simpson's Diversity Indices of Sponges at Rutland Island



Fig. 4. Margalef Community and Fisher Alpha Diversity Indices of Sponges of Rutland Island

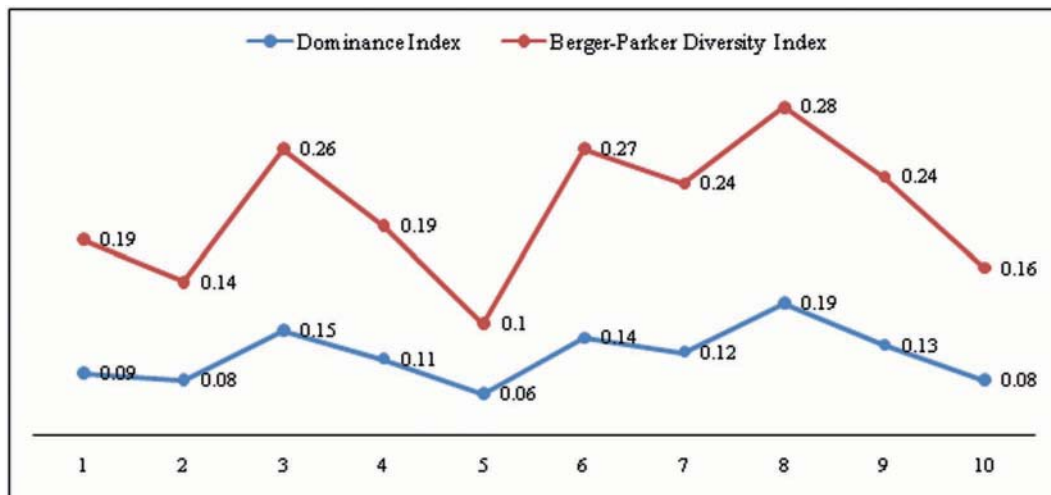


Fig. 5. Dominance and Berger-Parker Diversity Indices of Sponges of Rutland Island

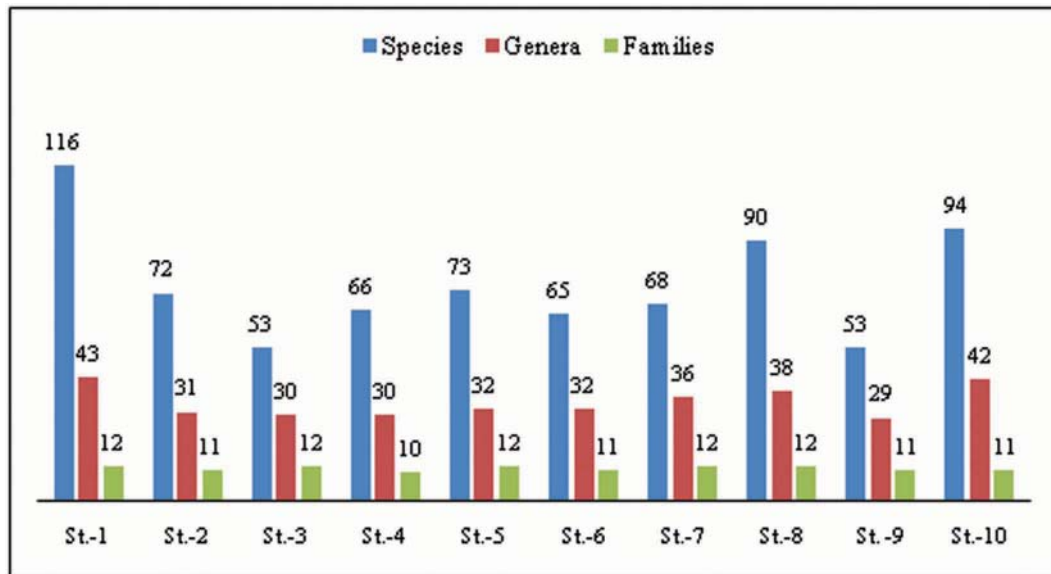


Fig. 6. Species availability of Scleractinian corals at study areas of Rutland Island

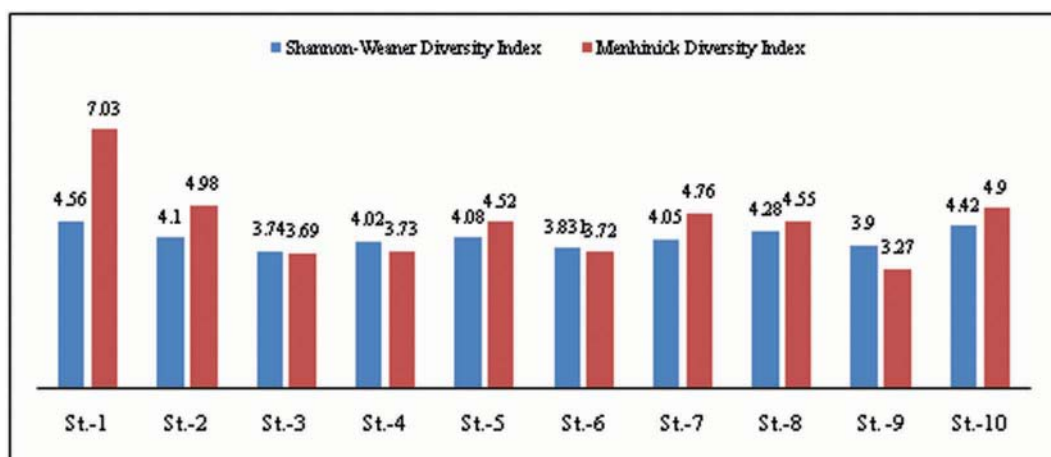


Fig. 7: Shannon-Weiner and Menhinick Diversity Indices of Scleractinian corals of Rutland Island

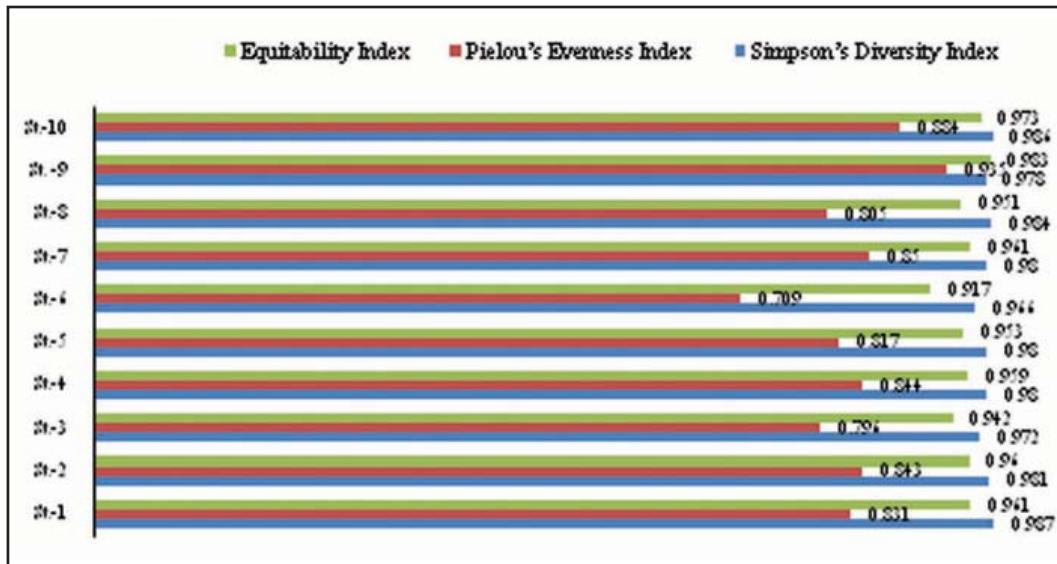


Fig. 8. Equitability, Pielou's Evenness and Simpson's Diversity Indices of Scleractinian corals at Rutland Island

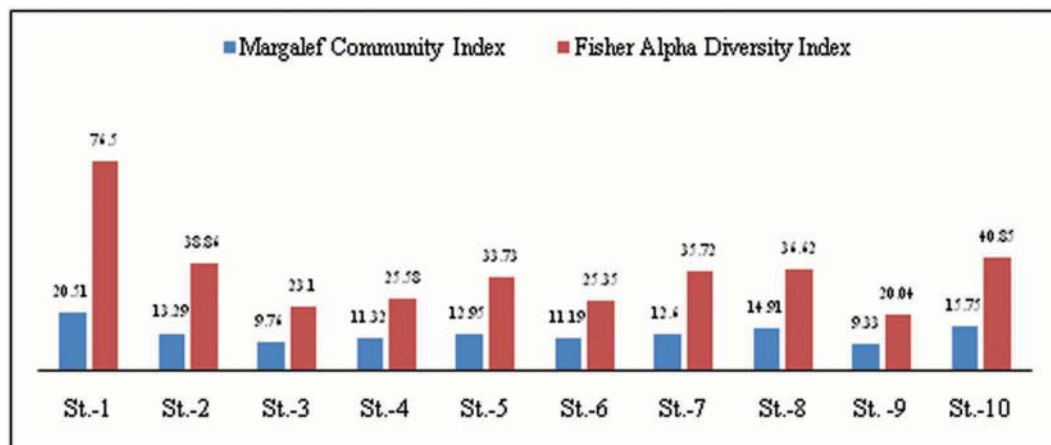


Fig. 9. Margalef Community and Fisher Alpha Diversity Indices of Scleractinian corals of Rutland Island

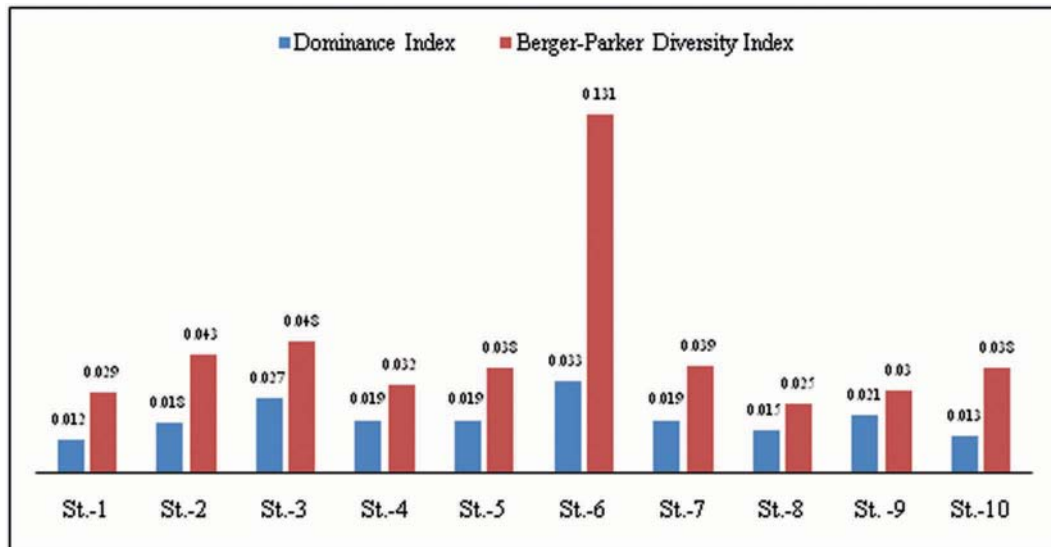


Fig. 10. Dominance and Berger-Parker Diversity Indices of Scleractinian corals of Rutland Island

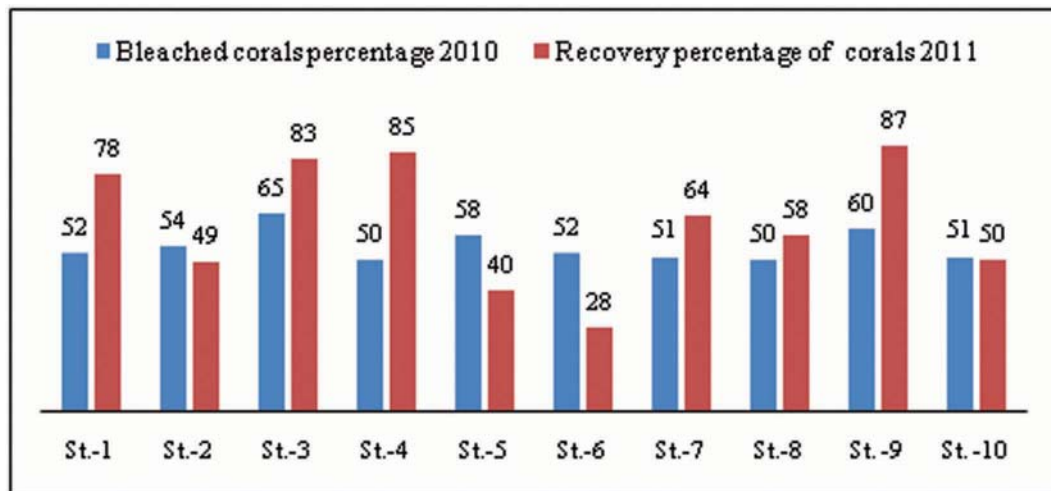


Fig. 11. Percentage of bleaching and recovery of corals at Rutland Island

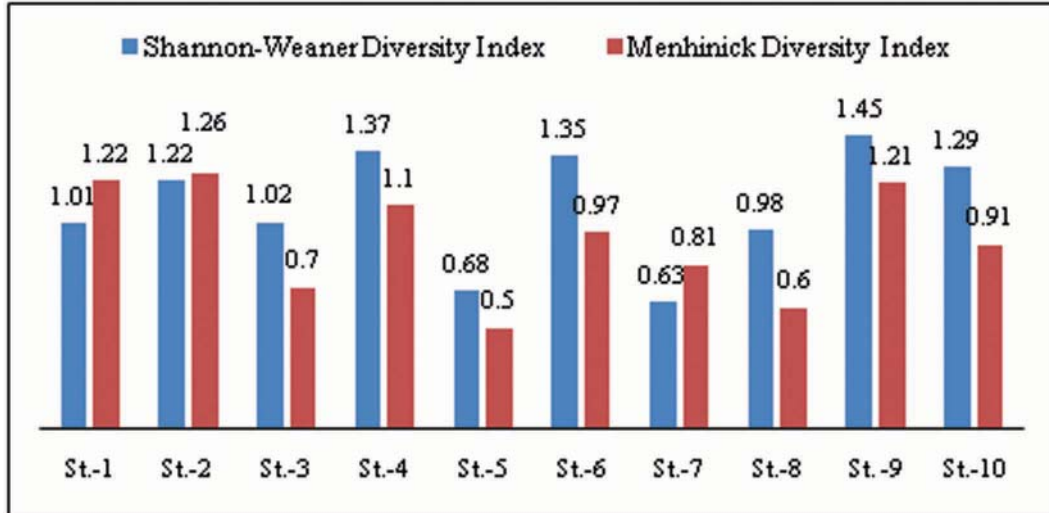


Fig. 12. Shannon-Weaver and Menhinick Diversity Indices of Gorgonians of Rutland Island

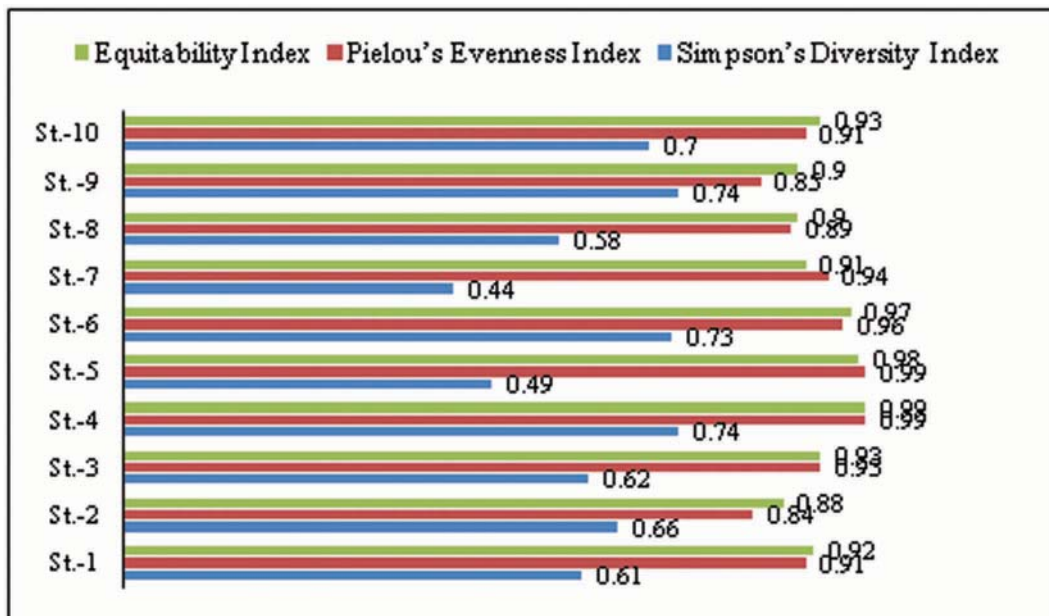


Fig. 13. Equitability, Pielou's Evenness and Simpson's Diversity Indices of Gorgonians at Rutland Island

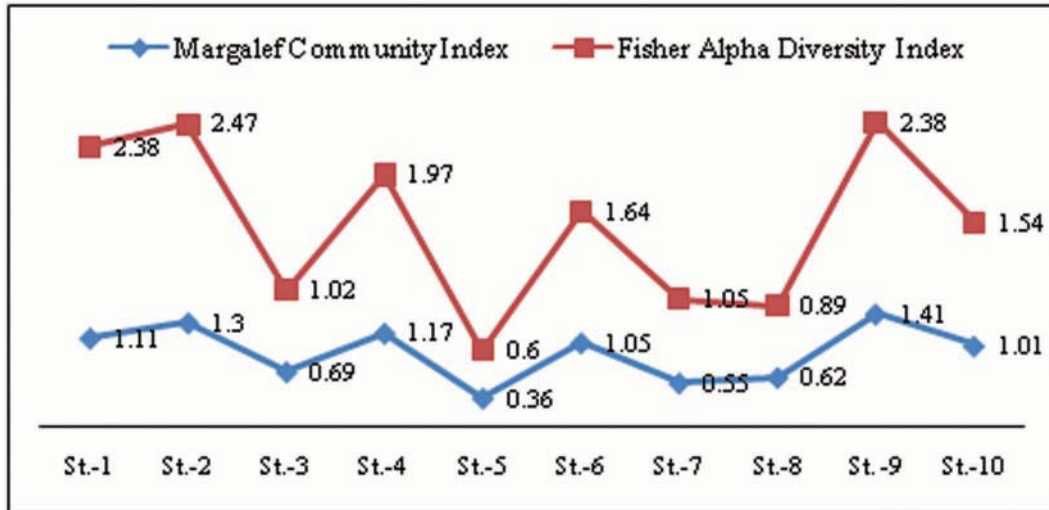


Fig. 14. Margalef Community and Fisher Alpha Diversity Indices of Gorgonians of Rutland Island

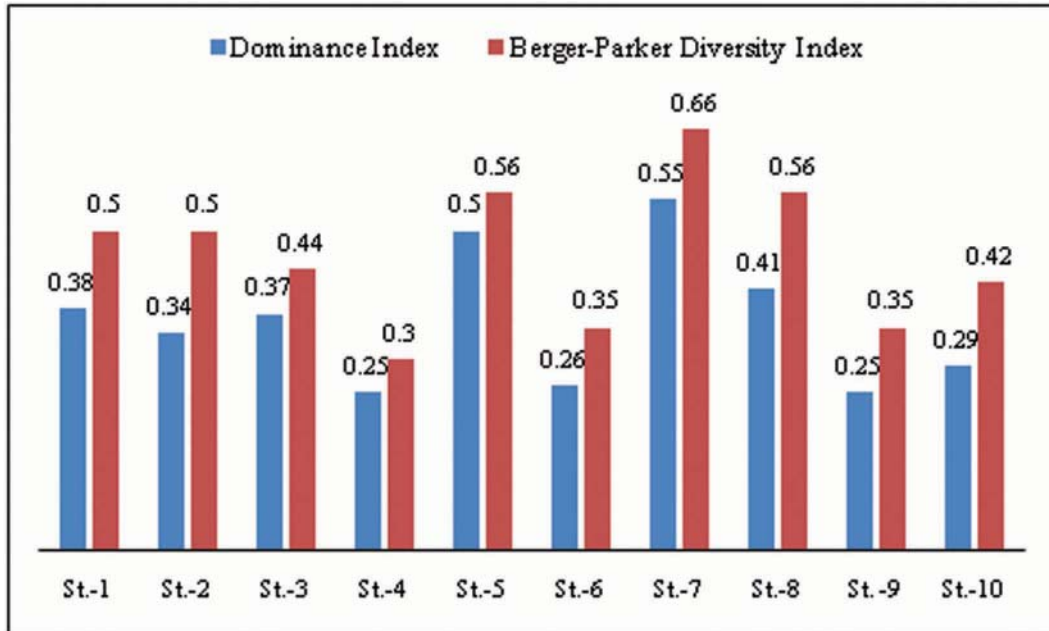


Fig. 15. Dominance and Berger-Parker Diversity Indices of Gorgonians of Rutland Island

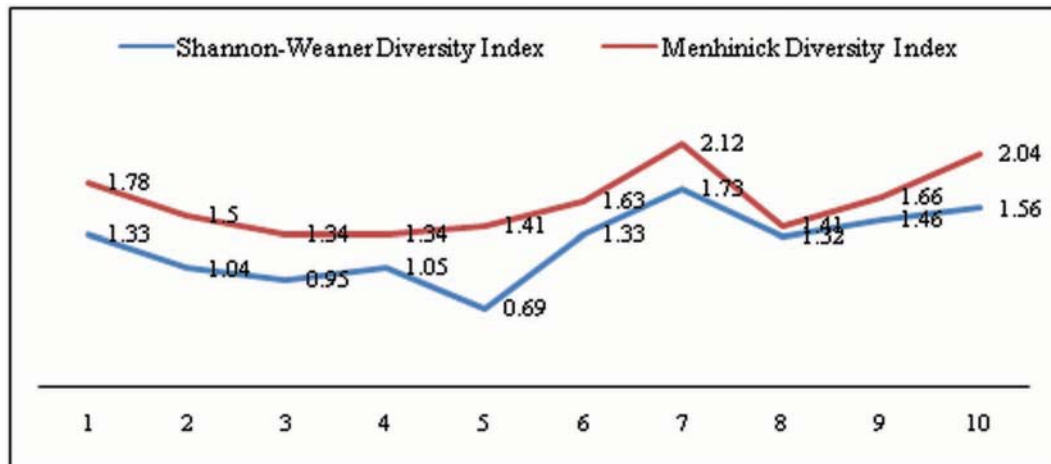


Fig. 16. Shannon-Weaver and Menhinick Diversity Indices of Polyclads of Rutland Island



Fig. 17: Equitability, Pielou's Evenness and Simpson's Diversity Indices of Polyclads at Rutland Island

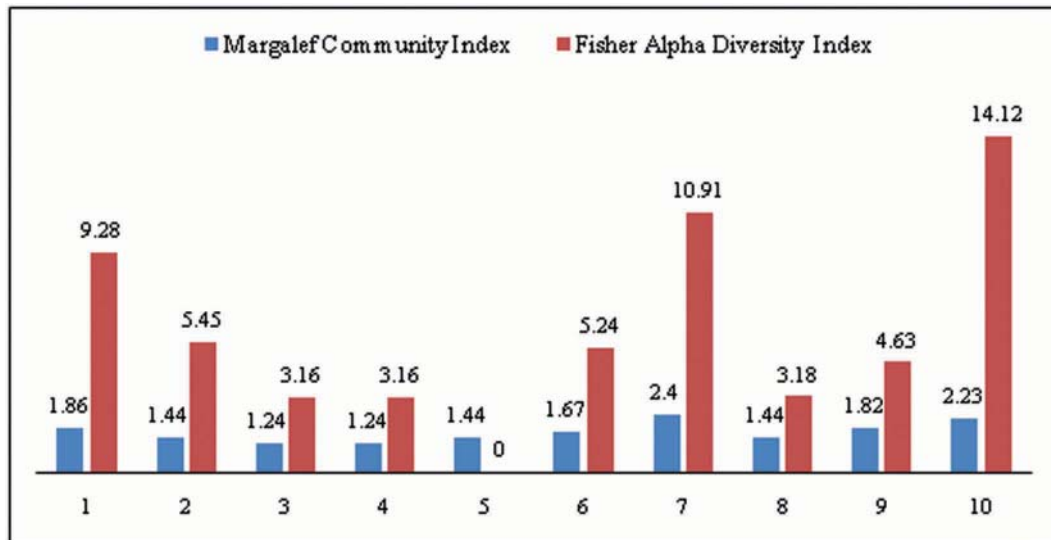


Fig. 18. Margalef Community and Fisher Alpha Diversity Indices of Polyclads of Rutland Island

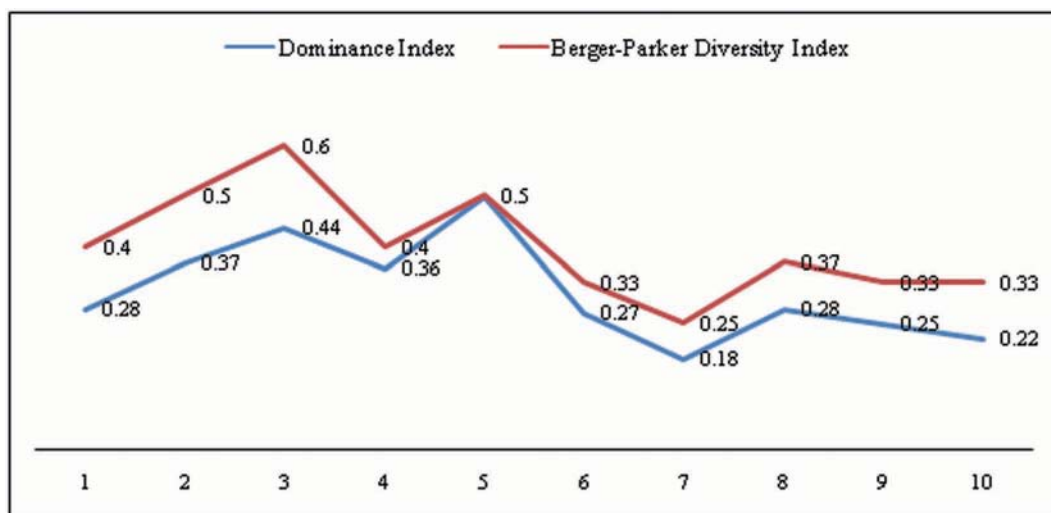


Fig. 19. Dominance and Berger-Parker Diversity Indices of Polyclads of Rutland Island

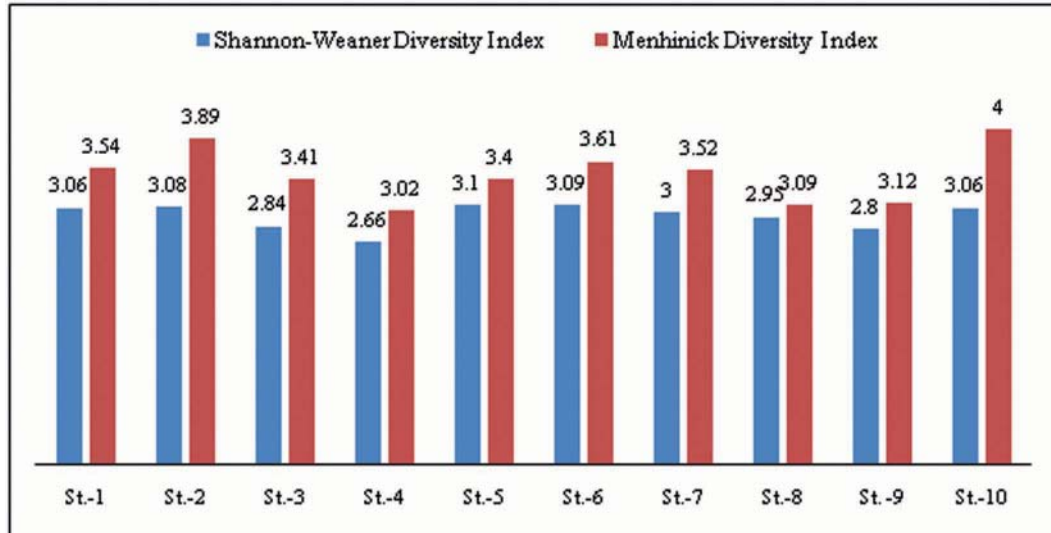


Fig. 20. Shannon-Weaner and Menhinick Diversity Indices of Crabs of Rutland Island

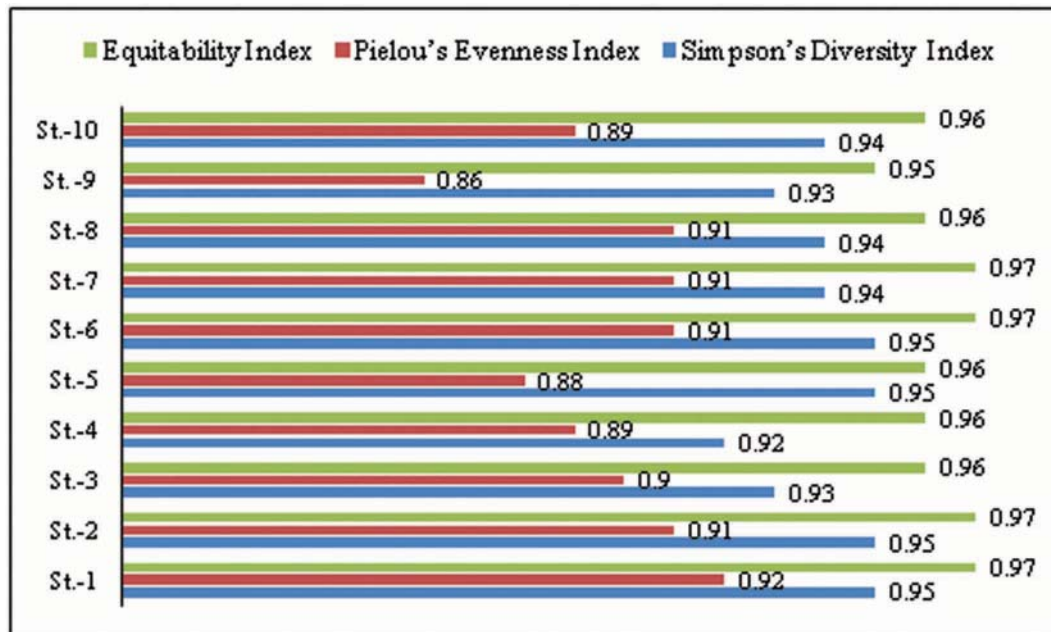


Fig. 21. Equitability, Pielou's Evenness and Simpson's Diversity Indices of Crabs at Rutland Island

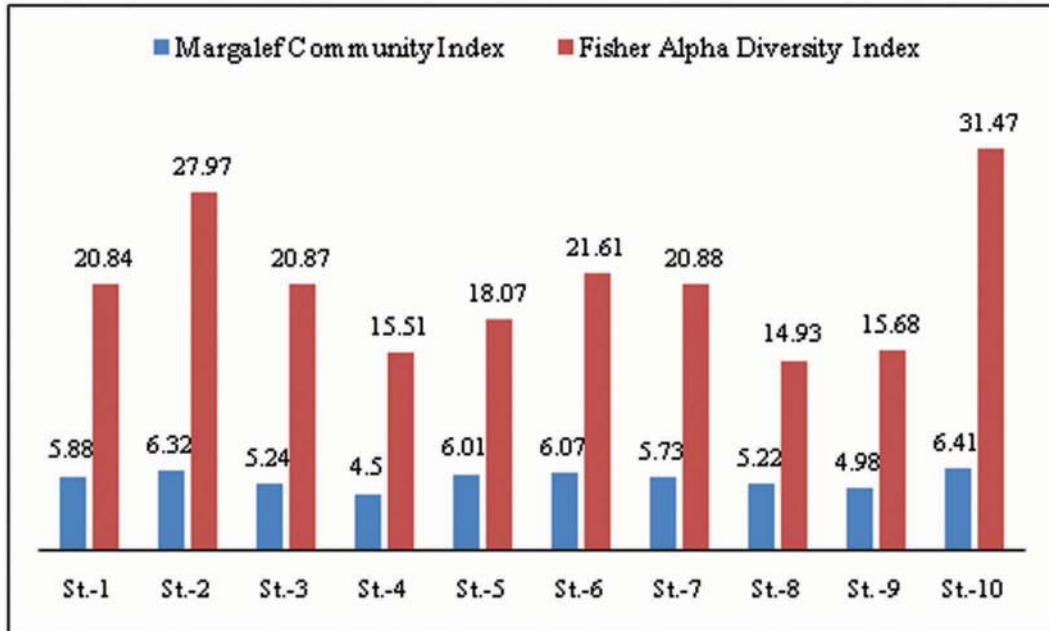


Fig. 22. Margalef Community and Fisher Alpha Diversity Indices of Crabs of Rutland Island

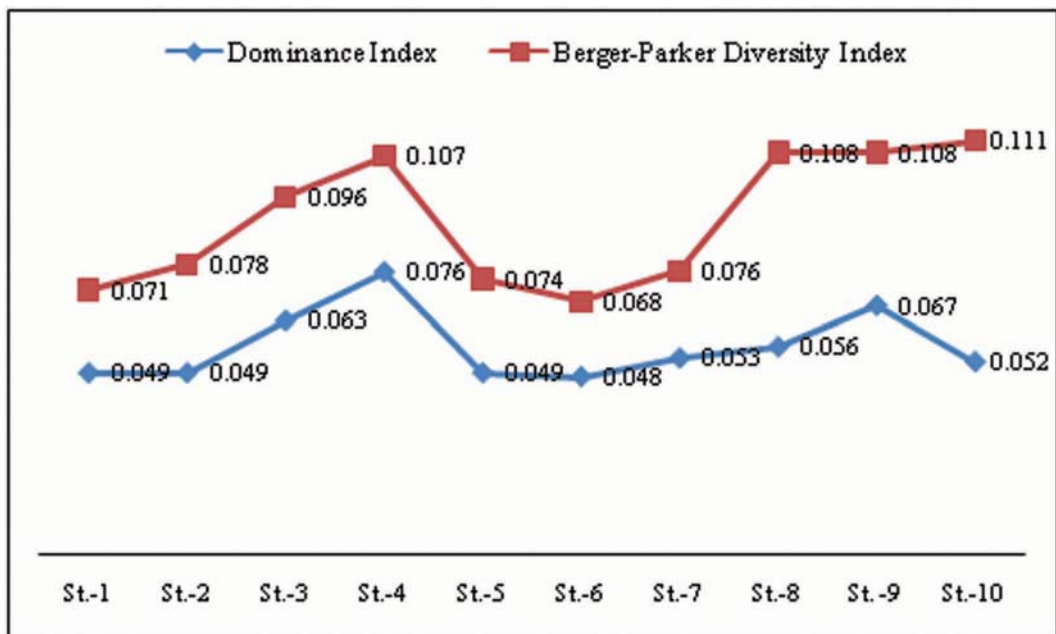


Fig. 23. Dominance and Berger-Parker Diversity Indices of crabs of Rutland Island

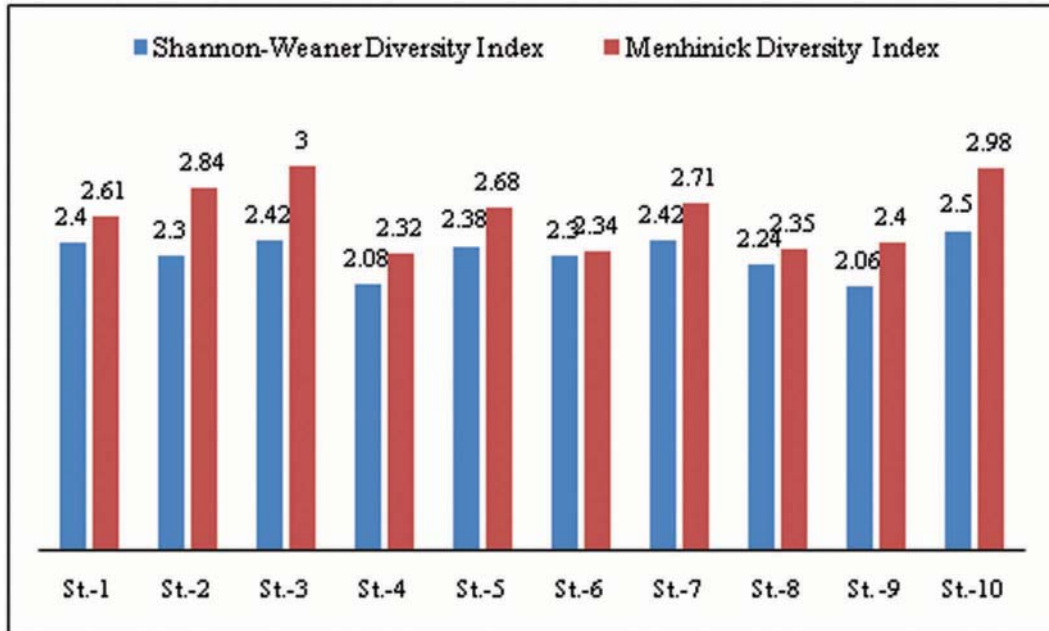


Fig. 24. Shannon-Weaver and Menhinick Diversity Indices of Shrimps of Rutland Island

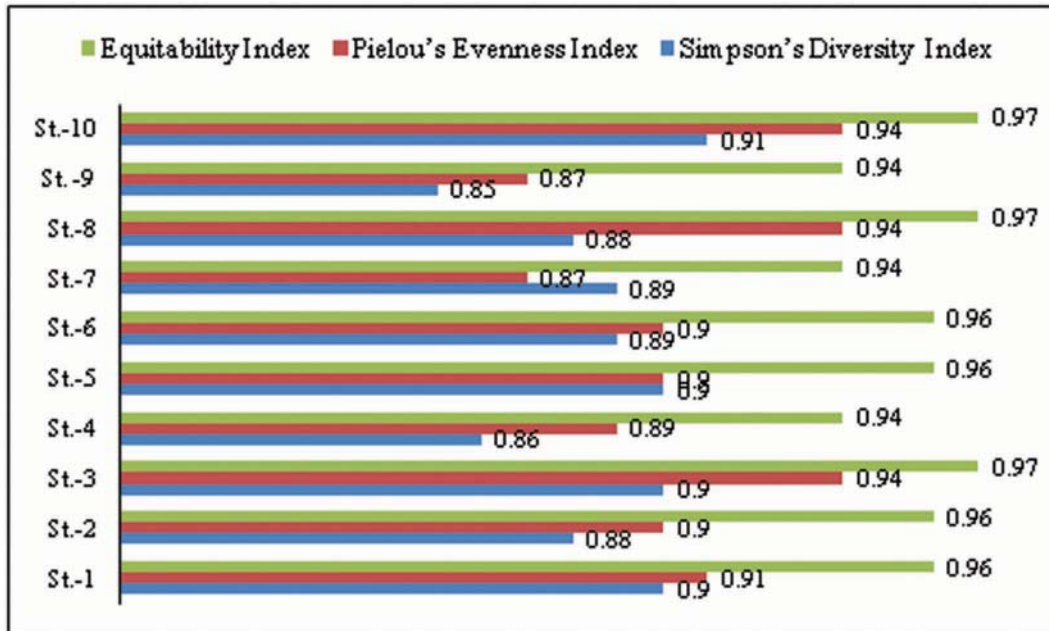


Fig.25. Equitability, Pielou's Evenness and Simpson's Diversity Indices of Shrimps at Rutland Island

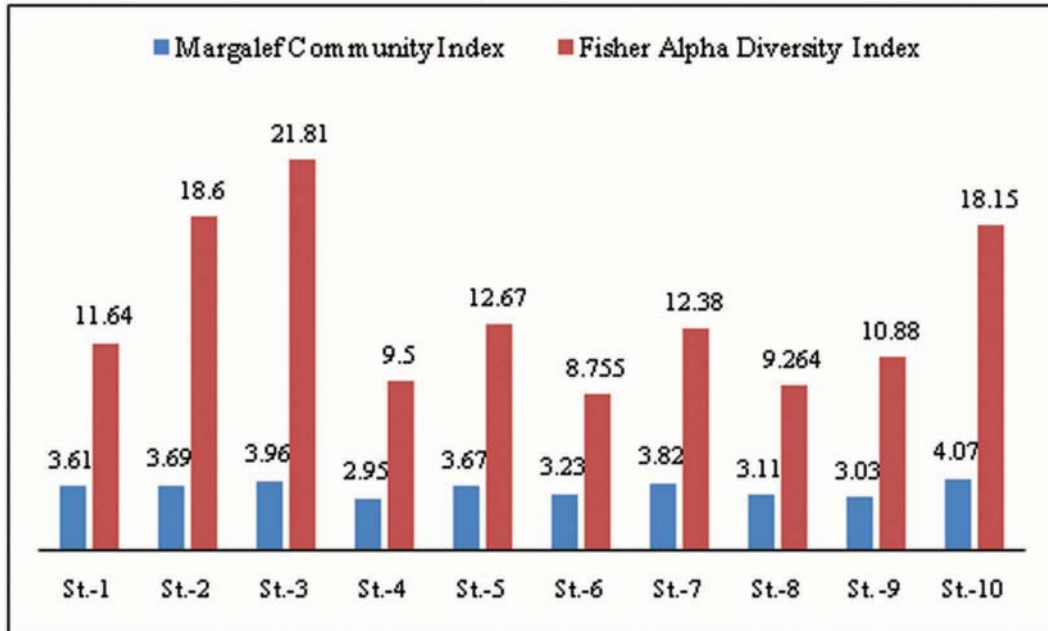


Fig. 26. Margalef Community and Fisher Alpha Diversity Indices of Shrimps of Rutland Island

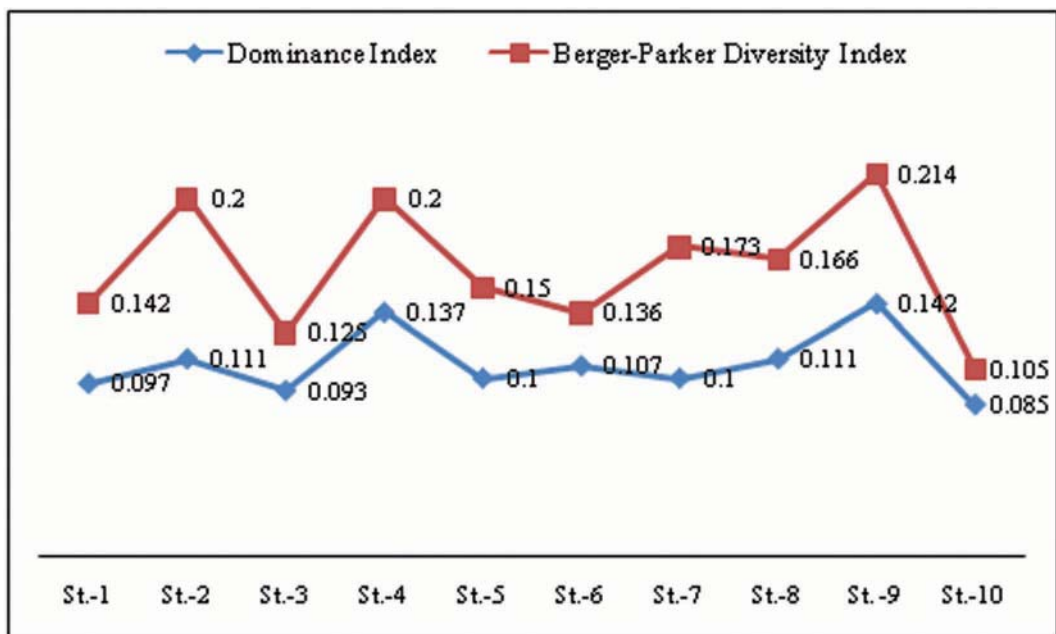


Fig. 27. Dominance and Berger-Parker Diversity Indices of Shrimps of Rutland Island

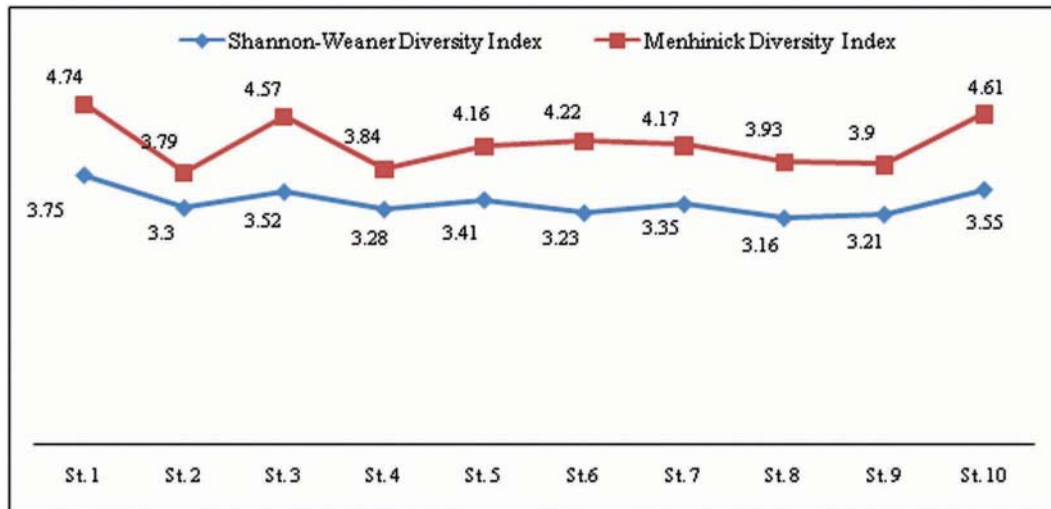


Fig. 28. Shannon-Weaver and Menhinick Diversity Indices of Molluscs of Rutland Island

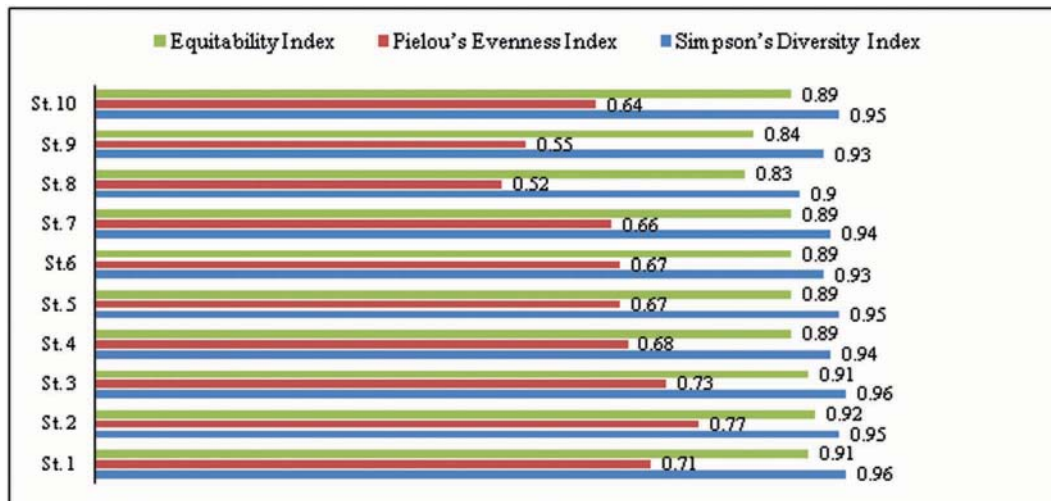


Fig. 29. Equitability, Pielou's Evenness and Simpson's Diversity Indices of Molluscs at Rutland Island

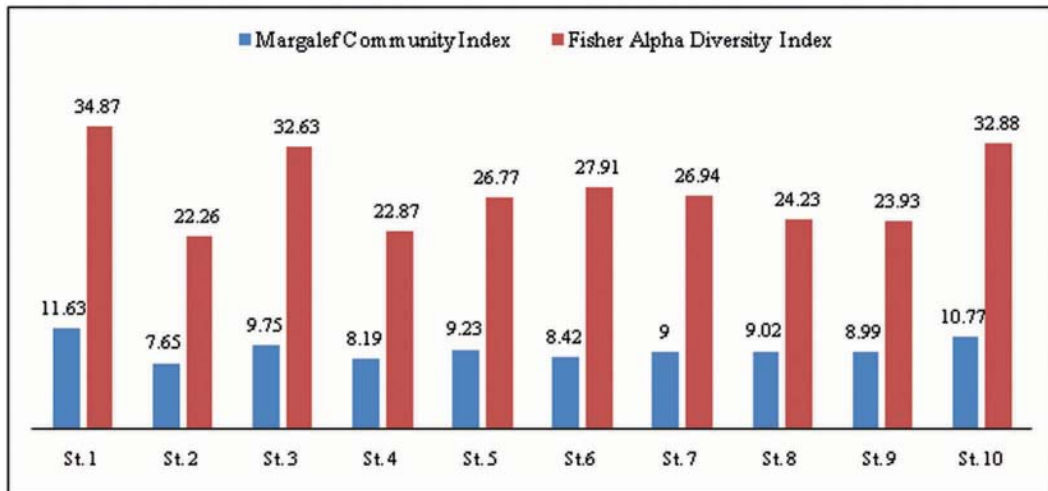


Fig. 30. Margalef Community and Fisher Alpha Diversity Indices of Molluscs of Rutland Island

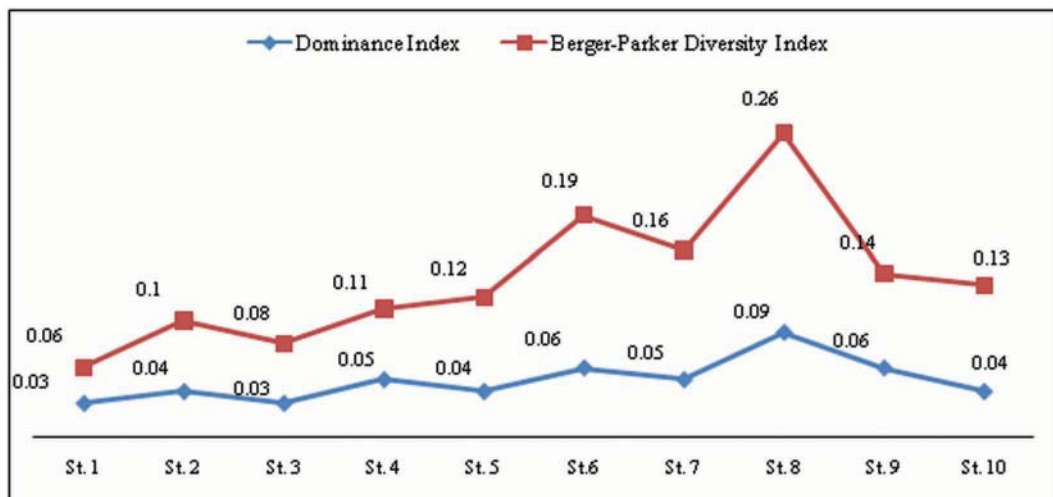


Fig. 31. Dominance and Berger-Parker Diversity Indices of Molluscs of Rutland Island

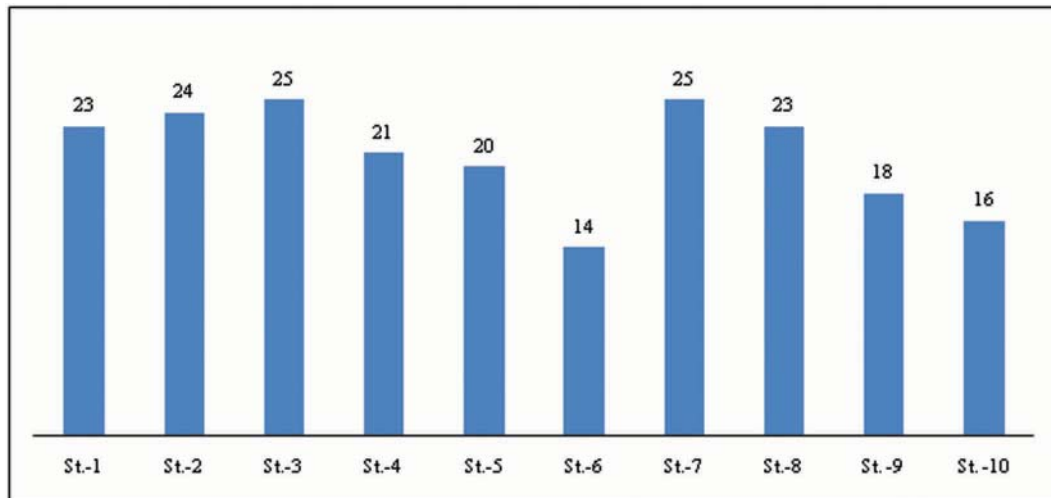


Fig. 32. Density of Molluscs at Rutland Island

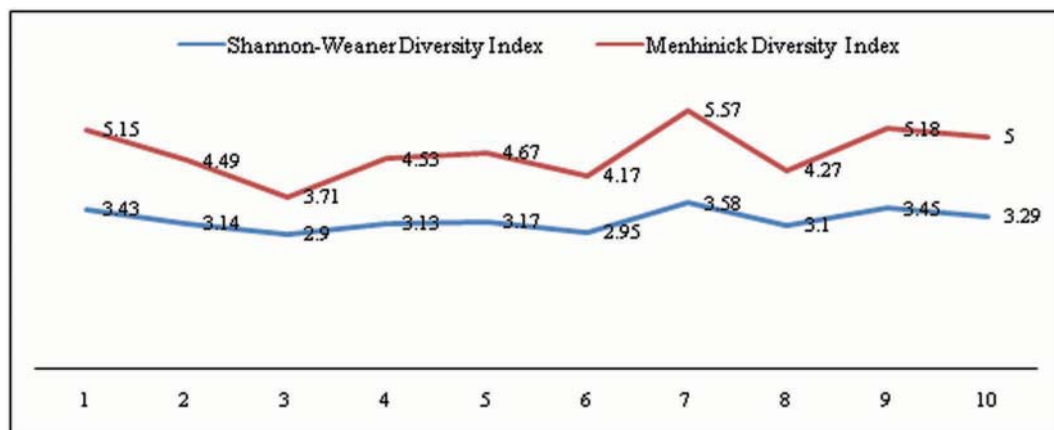


Fig. 33. Shannon-Weaver and Menhinick Diversity Indices of Opisthobranchs of Rutland Island

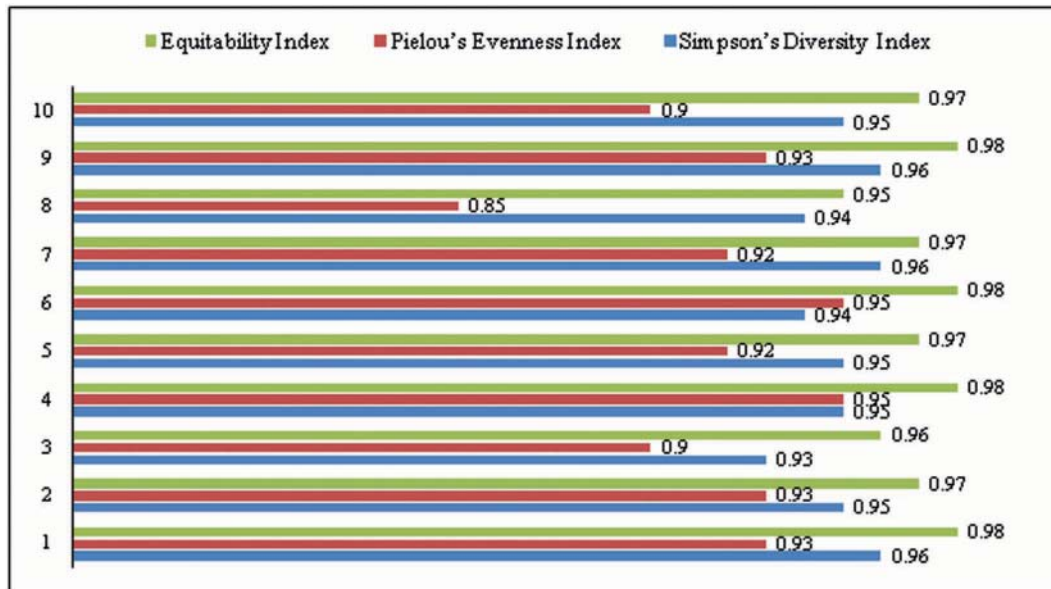


Fig. 34. Equitability, Pielou's Evenness and Simpson's Diversity Indices of Opisthobranchs at Rutland Island

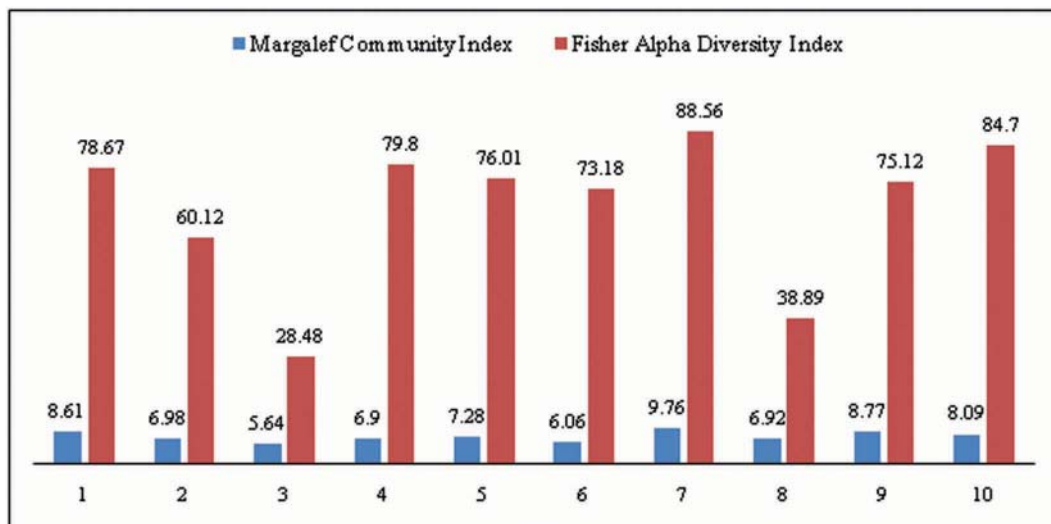


Fig. 35. Margalef Community and Fisher Alpha Diversity Indices of Opisthobranchs of Rutland Island

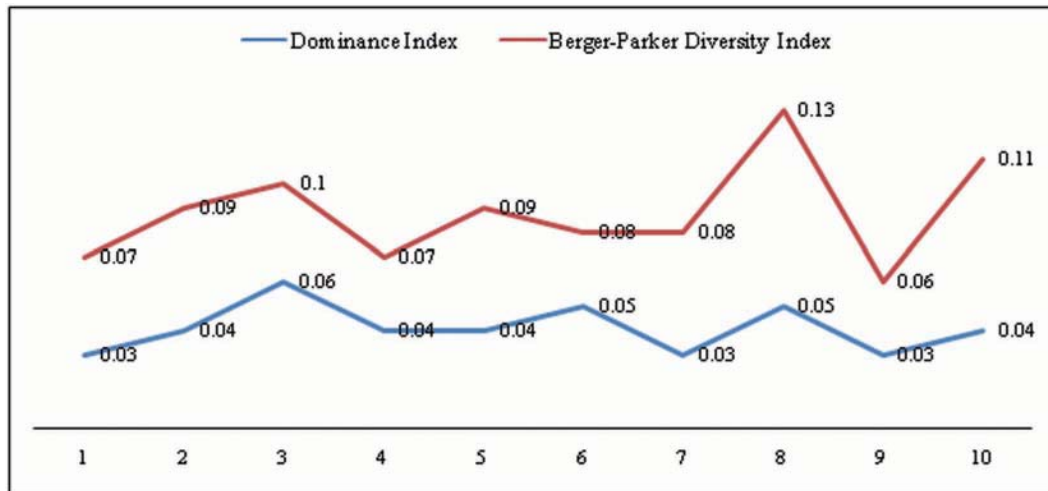


Fig. 36. Dominance and Berger-Parker Diversity Indices of Opisthobranchs of Rutland Island

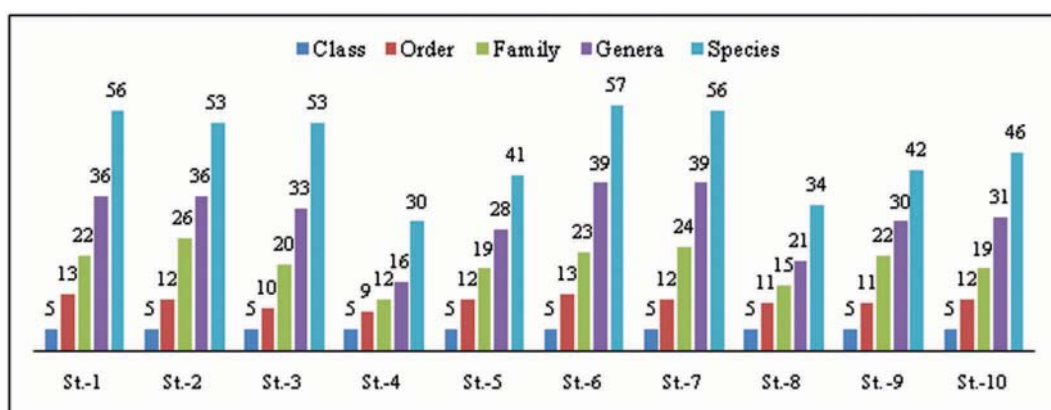


Fig. 37. Species composition of Echinoderms in study areas of Rutland Island

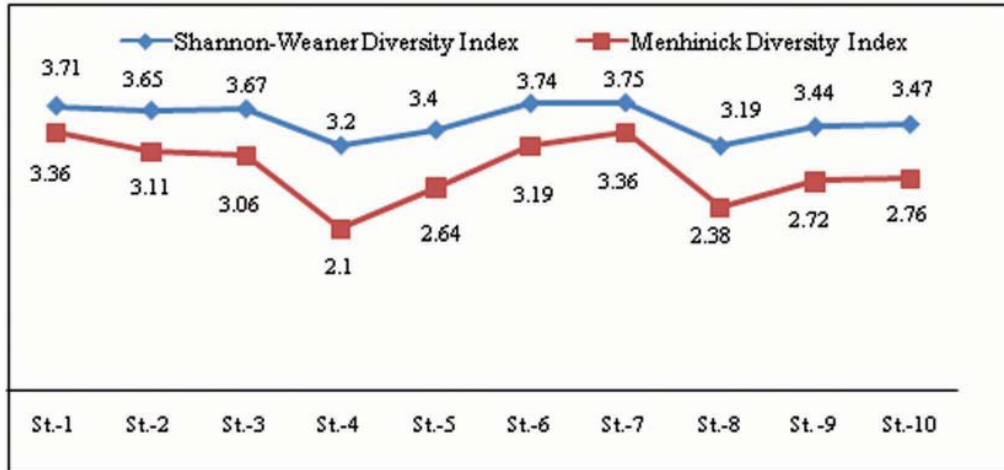


Fig. 38. Shannon-Weaner and Menhinick Diversity Indices of Echinoderms of Rutland Island

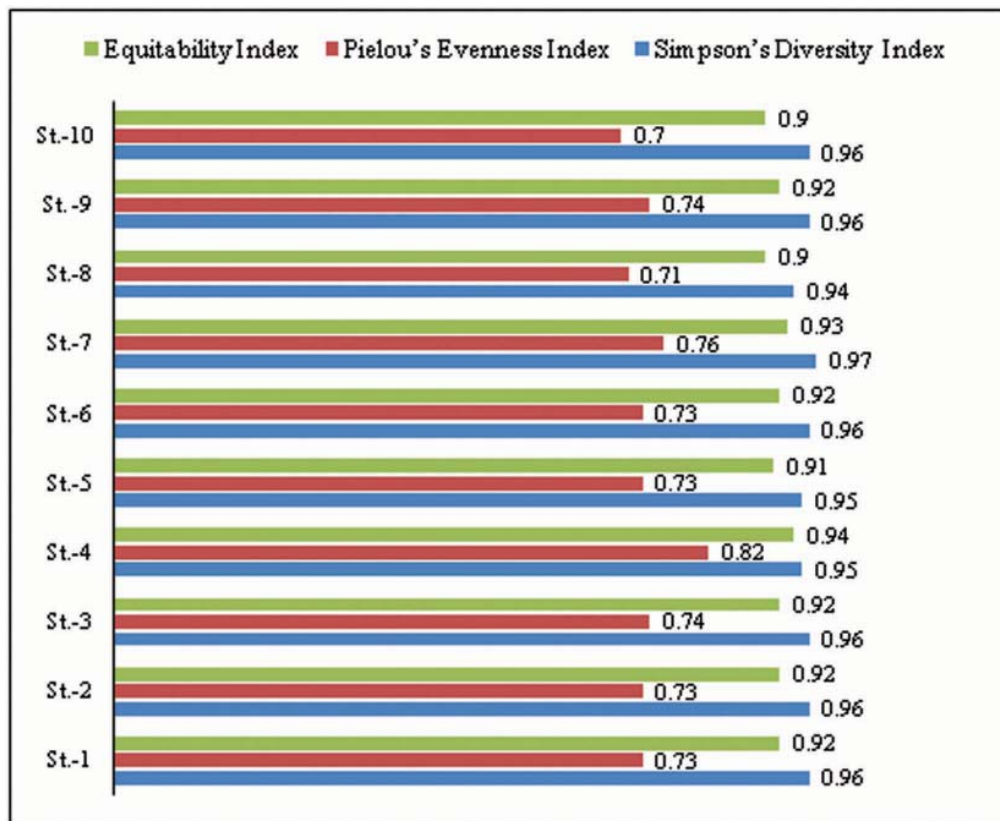


Fig. 39. Equitability, Pielou's Evenness and Simpson's Diversity Indices of Echinoderms at Rutland Island

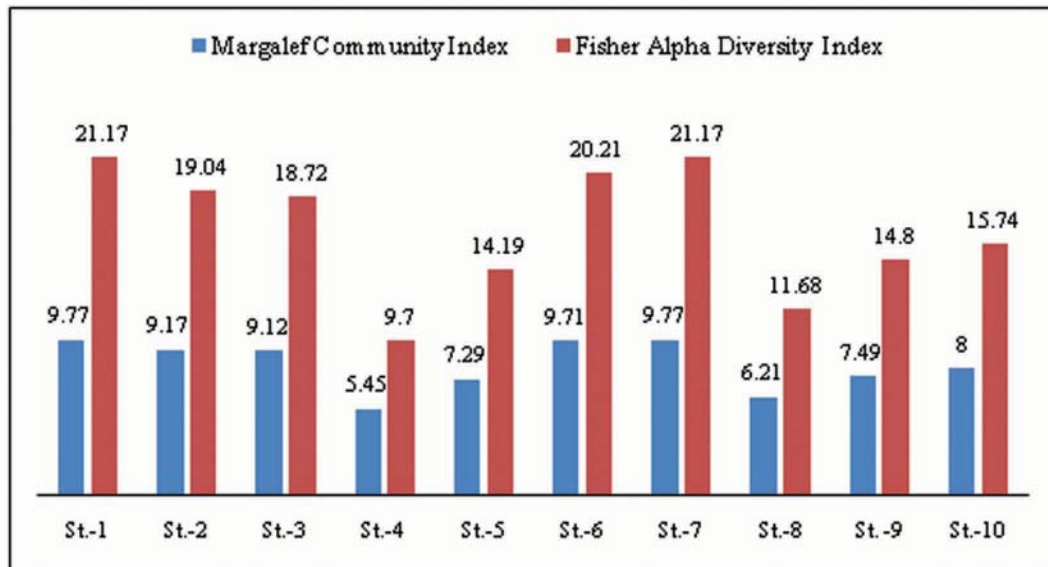


Fig. 40. Margalef Community and Fisher Alpha Diversity Indices of Echinoderms of Rutland Island

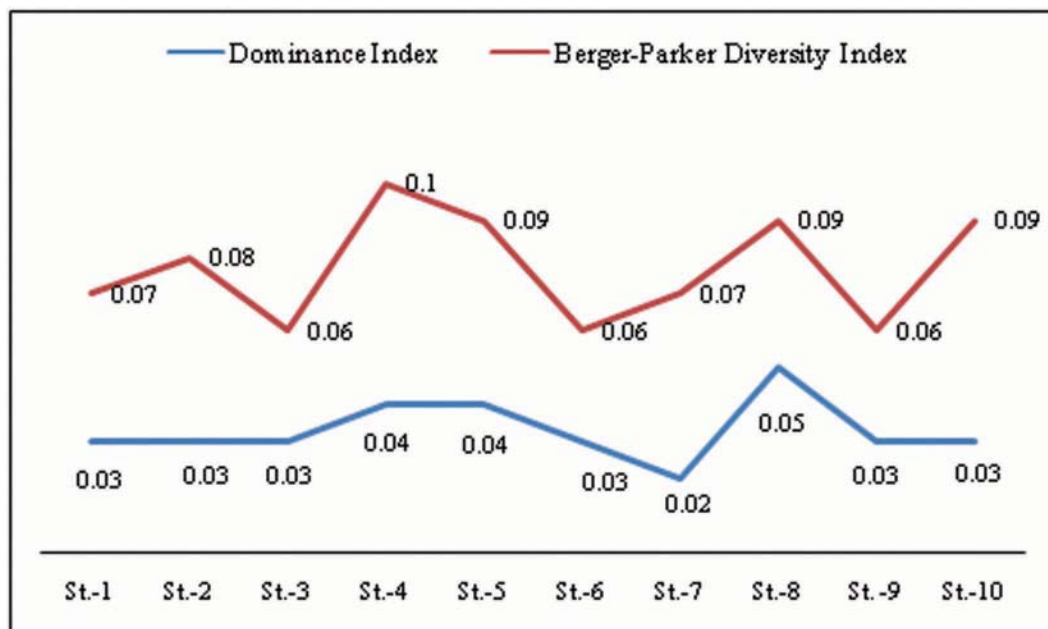


Fig.41. Dominance and Berger-Parker Diversity Indices of Echinoderms of Rutland Island

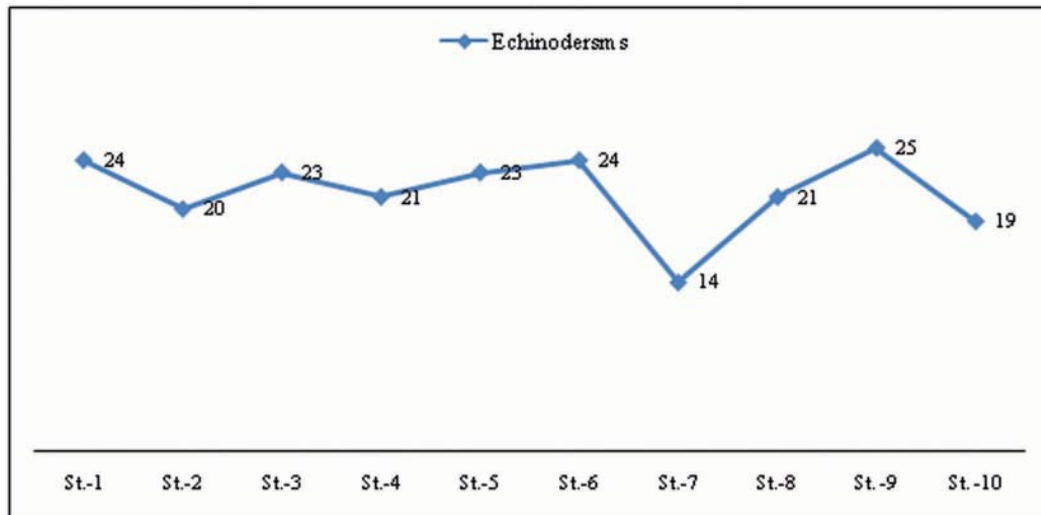


Fig. 42. Species density of Echinoderms at Rutland Island

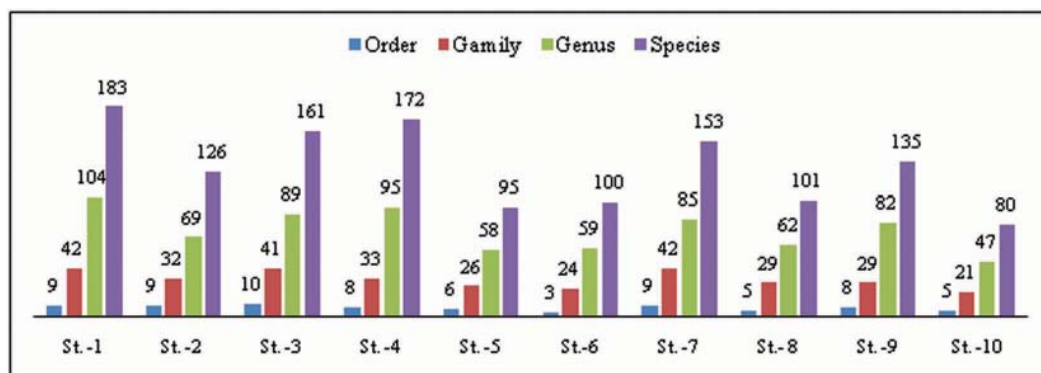


Fig. 43. Species composition of Fishes of Rutland Island

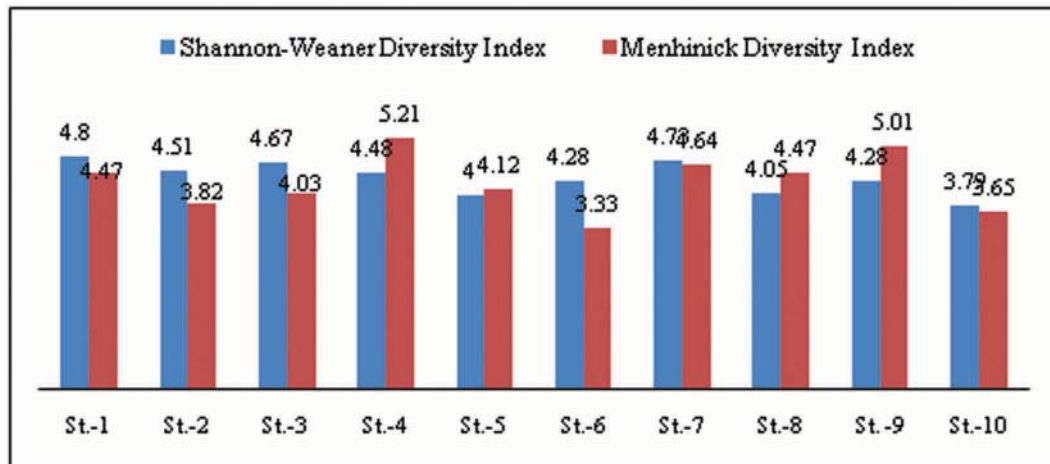


Fig. 44. Shannon-Weaner and Menhinick Diversity Indices of Fishes of Rutland Island



Fig. 45. Equitability, Pielou's Evenness and Simpson's Diversity Indices of Fishes at Rutland Island

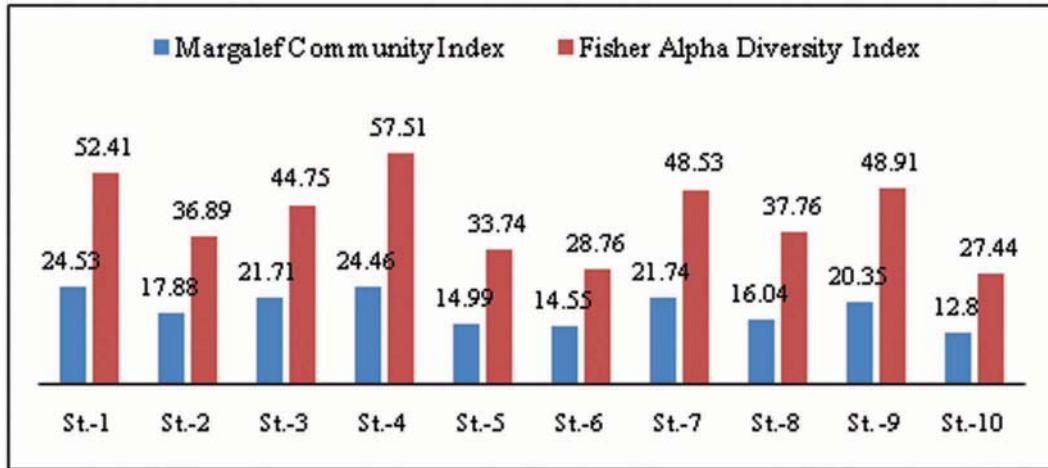


Fig. 46. Margalef Community and Fisher Alpha Diversity Indices of Fishes of Rutland Island

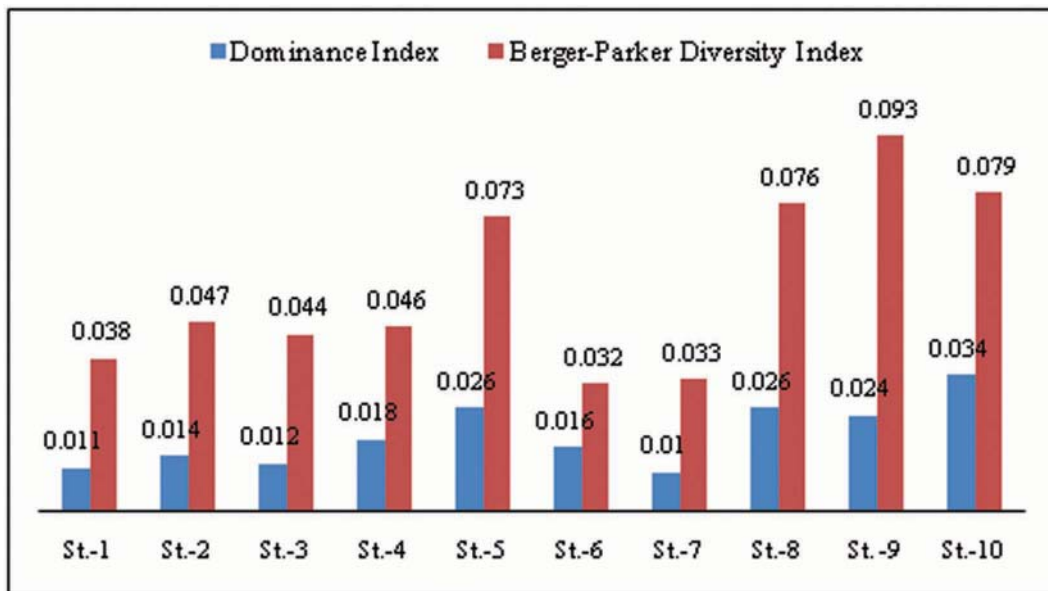


Fig. 47. Dominance and Berger-Parker Diversity Indices of fishes of Rutland Island

PLATE-1 : Sponges of Rutland Island*Ircinia strobilina* (Lamarck, 1816)*Ecionemia acervus* Bowerbank 1864*Stylissa massa* (Carter, 1887)*Carteriospongia foliascens* (Pallas, 1766)*Chalinula nematifera* (de Laubenfels, 1954)*Scopalina ruetzleri* (Wiedenmayer, 1977)

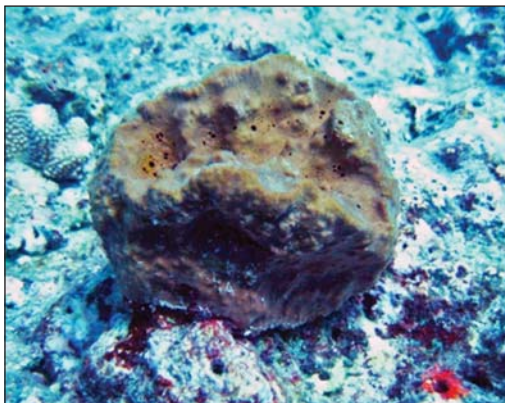
PLATE-2 : Sponges of Rutland Island



Tethya repens Schmidt, 1870



Cliona varians (Duchassaing & Michelotti, 1864)



Rhabdastrella globostellata (Carter, 1883)



Diacarnus megaspinorhabdosa Kelly-Borges & Vacelet, 1995



Gelliodes fibulata (Carter, 1881)



Xestospongia testudinaria (Lamarck, 1815)

PLATE-3 : Corals of Rutland Island



Diploastrea heliopora (Lamarck, 1816)



Favites abdita (Ehrenberg, 1834)



Favia speciosa (Dana, 1846)



Goniastrea retiformis (Lamarck, 1816)



Stylophora pistillata Esper, 1797



Acropora cytherea

PLATE-4 : Corals of Rutland Island



Pavona cactus (Forskal, 1775)



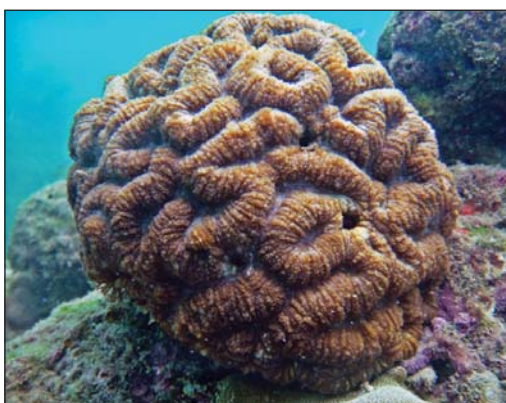
Acropora gemmifera



Acropora willisea Veron and Wallace, 1984



Acropora humilis



Symphyllia radians MED & H, 1849



Physogyra lichtensteini (MED & H, 1851)

PLATE-5 : Corals of Rutland Island



Favia rotundata (Veron and Pichon, 1777)



Platygyra ryukyuensis Yabe and Sugiyama, 1936



Scapophyllia cylindrica (Milne Edwards and Haime, 1848)



Psammocora digitata MED & H, 1851



Platygyra sinensis (MED & H, 1849)



Lobophyllia hemprichii (Ehrenberg, 1834)

PLATE-6 : Corals of Rutland Island



Acropora aspera (Dana, 1846)



Acropora cerealis (Dana, 1846)



Acropora formosa (Dana, 1846)



Acropora hyacinthus (Dana, 1846)



Acropora nasuta (Dana, 1846)



Acropora spicifera (Dana, 1846)

PLATE-7 : Corals of Rutland Island

Favia truncate Veron, 2000)



Favites complanata (Ehrenberg, 1834)



Goniastrea edwardsi (Chevalier, 1971)



Pocillopra damicornis (Linnaeus, 1758)



Porites lutea (Milne Edwards and Haime, 1860)



Porties solida (Forskal, 1775)

PLATE-8 : Corals of Rutland Island



Acanthastrea maxima Sheppard and Salm, 1988



Cantharellus doederleini (Marenzeller, 1907)



Colpophyllia natans (Houttuyn, 1772)



Echinomorpha nishihirai (Veron, 1990)



Echinophyllia orpheensis Veron and Pichon, 1980



Favia danae Verrill, 1872

PLATE-9 : Corals of Rutland Island

Favites russelli (Wells, 1954)



Isophyllia rigida (Dana, 1848)



Montastrea valenciennesi (Milne Edwards & Haime, 1848)



Psammocora nierstraszi Horst, 1921



Scolymia cubensis
(Milne Edwards & Haime, 1849)



Siderastrea radians (Pallas, 1766)

PLATE-10 : Corals of Rutland Island



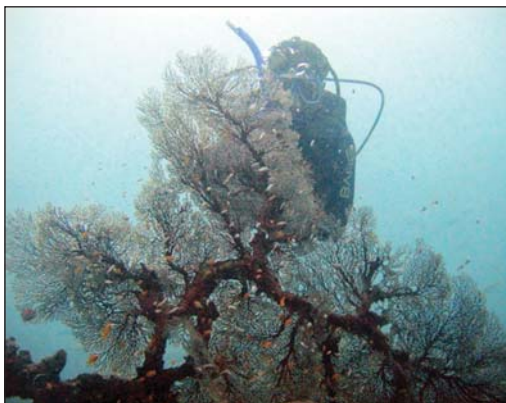
Ctenactis triangularis sp. nov.

PLATE-11 : Gorgonians of Rutland Island

Echinogorgia flora Nutting, 1910



Isis hipuris Linnaeus, 1758



Melithaea ochracea (Linnaeus, 1785)



Rumphella aggregate (Nutting, 1910)



Rumphella torta Klunzinger, 1877



Verrucella klunzingeri Grasshoff, 2000

PLATE-12 : Polyclads of Rutland Island



Pseudoceros goslineri Newman & Cannon, 1994



Pseudoceros concinnus (Collingwood, 1876)



Thysanozoon nigropapillosum (Hayman, 1959)



Pseudoceros tristriatus Hyman, 1959



Pseudobiceros damawan Newman & Cannon, 1994



Pseudobiceros bedfordi (Laidlaw, 1903)

PLATE-13 : Crabs of Rutland Island*Ashtoret lunaris* (Forskal, 1775)*Calappa philargius*
(Linnaeus, 1758)*Grapsus albolineatus*
(Lamarck, 1818)*Eriphia smithi* MacLeay, 1838*Percnon planissimum*
(Herbst, 1804)*Portunus pelagicus*
(Linnaeus, 1758)*Portunus sanguinolentus*
(Herbst, 1783)*Ozius tuberculosus*
H. Milne Edwards, 1834*Zosimus aeneus*
(Linnaeus, 1758)

PLATE-14 : Shrimp of Rutland Island



Thor amboinensis (de Man, 1888)



Rhynchocinetes durbanensis (Schenkel, 1902)



Stenopus hispidus (Olivier, 1811)



Periclimenes brevicarpalis Gordon, 1936

PLATE-15 : Lobster of Rutland Island*Panulirus homarus* (Linnaeus, 1758)

PLATE-16 : Molluses of Rutland Island



Chicoreus ramosus
(Linnaeus, 1758)



Conus nobilis Linnaeus 1758



Conus straitus
Hwass in Bruguiere, 1792



Lambis (Lambis) lambis
(Linnaeus, 1758)



Nassa sarta (Bruguiere, 1789)



Rhinoclavis (Rhinoclavis)
sinensis (Gmelin, 1791)



Strombus (Canarium) labiatus
(Roeding, 1798)



Strombus variabilis
Swainson, 1820



Terebralia palustris
(Linnaeus, 1758)

PLATE-17 : Molluses of Rutland Island

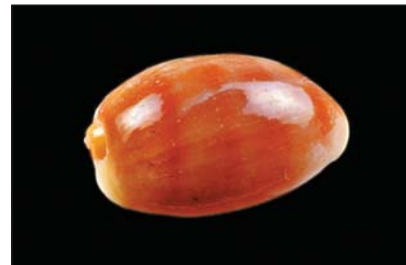
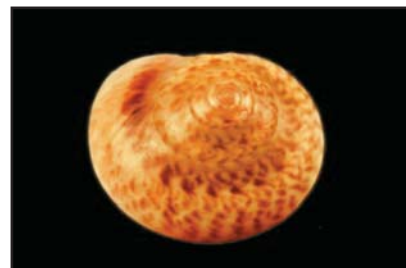
*Atys naucum* (Linnaeus, 1758)*Conus eburneus*
Hwass in Bruguiere, 1792*Cypraea (Erosaria) erosa*
(Linnaeus, 1758)*Cypraea (Mauritia) arabica*
Linnaeus, 1758*Cypraea (Monetaria) moneta*
(Linnaeus, 1758)*Cypraea carneola* Linnaeus, 1758*Natica onca* (Roeding, 1798)*Umbonium vestiarium*
(Linnaeus, 1758)

PLATE-18 : Opisthobranchs of Rutland Island



Aplysia parvula Morch, 1863



Cadlinella ornastissima (Risbec, 1928)



Chromodoris fidelis (Kelaart, 1858)



Chromodoris gleniei (Kelaart, 1858)



Halgerda tessellata (Bergh, 1880)



Noumea hongkongensis Rudman, 1990

PLATE-19 : Opisthobranchs of Rutland Island*Odontoglaja guamensis* Rudman, 1972*Phyllidia ocellata* Cuvier, 1804*Phyllidia polkadotsa* Brunckhorst, 1993*Phyllidiopsis monacha* (Yonow, 1986)*Plakobranchus ocellatus* van Hasselt, 1824*Risbecia pulchella* (Ruppel & Leuckart, 1828)

PLATE-20 : Echinoderms of Rutland Island



Ctenometra bella (Hartlaub, 1890)



Culcita noveguineae (Muller and Troschel, 1842)



Echinometra mathaei (de Blainville, 1825)



Fromia indica (Perrier, 1869)



Stephanometra indica (Smith, 1876)



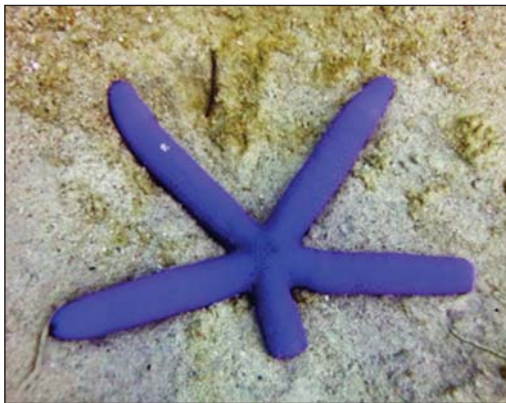
Thelenota ananas (Jaeger, 1833)

PLATE-21 : Echinoderms of Rutland Island

Holothuria (Halodeima) edulis (Lesson, 1830)



Acaudina molpadioides (Semper, 1868)



Linckia laevigata (Linnaeus, 1758)



Pearsonothuria graeffei (Semper, 1868)



Ophiomastix annulosa (Lamarck, 1816)



Stichopus vastus (Sluiter, 1887)

PLATE-22 : Fishes of Rutland Island



Amblyglypidodon aureus (Cuvier, 1830)



Anyperodon leucogrammicus (Valenciennes, 1828)



Caesio xanthonota (Bleeker, 1853)



Chaetodon trifascialis Quoy & Gaimard, 1825



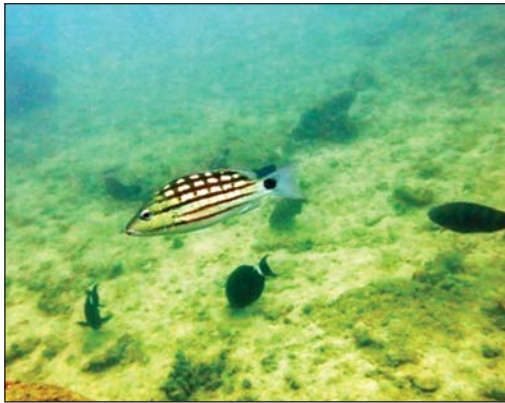
Cheilinus fasciatus (Bloch, 1791)



Coradion altivelis McCulloch, 1916

PLATE-23 : Fishes of Rutland Island*Cromileptes altivelis* (Valenciennes, 1828)*Dascyllus carneus* Fischer, 1885*Dendrochirus zebra* (Cuvier, 1829)*Epinephelus caeruleopunctatus* (Bloch, 1790)*Forcipiger flavissimus* Jordan & McGregor, 1898*Pomacanthus annularis* (Bloch, 1787)

PLATE-24 : Fishes of Rutland Island



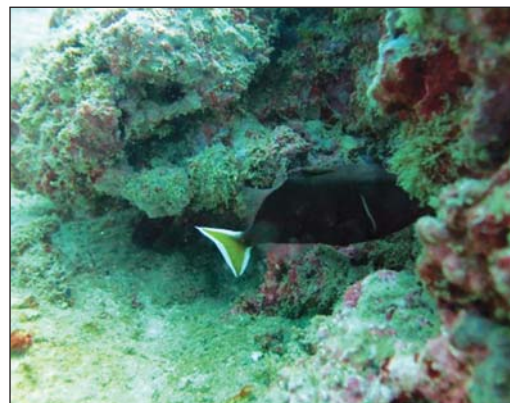
Lutjanus decussatus (Cuvier, 1828)



Pterois antennata (Bloch, 1787)



Siganus Stellatus (Forsskal, 1775)



Sufflamen chrysopterus (Bloch & Schneider, 1801)



Upeneus tragula Richardson, 1846



Siganus guttatus (Bloch, 1787)

PLATE-25 : Fishes of Rutland Island

Acanthurus leucosternon Bennett, 1833



Chaetodon collarare Bloch, 1787



Chaetodon auriga Forsskal, 1775



Heniochus diphreutes Jordan, 1903



Heniochus acuminatus (Linnaeus, 1758)



Pomacentrus moluccensis Bleeker, 1853