

ABUNDANCE OF THE NEARSHORE FISH POPULATION AT SOUTH GEORGIA (ANTARCTICA) SAMPLED BY TRAMMEL NET

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ABSTRACT. Juvenile *Notothenia rossii*, *Notothenia neglecta*, *Parachaenichthys georgianus* and *Chaenocephalus aceratus* were the most commonly occurring fish species sampled by trammel nets in the 0–90 m depth zone nearshore at South Georgia. Juvenile *N. rossii* dominated the nearshore catches both in abundance (77%) and biomass (61%). Together, the four fish species comprise 95% of all fish sampled and 97% of the total biomass caught by trammel net. There were large seasonal variations in the numbers of *N. neglecta*, *P. georgianus* and *C. aceratus* in coastal habitats at South Georgia. Only numbers of *N. rossii* remained consistently high throughout the year. Overall, the numbers of each fish species were high in summer months from November to July and reduced during the winter period from August to October.

INTRODUCTION

The abundance of the major fish species nearshore at South Georgia and their interspecific relationships is not known. *Notothenia rossii* is a common species of fish inhabiting the nearshore environment at South Georgia. Some fish species like *Parachaenichthys georgianus* are endemic to South Georgia and others such as *Chaenocephalus aceratus* show a nearshore migration at certain times of the year for the purpose of reproduction (Burchett and others, 1983). *Notothenia rossii*, however, spends only part of its life-cycle nearshore where juvenile fish of age classes 0–V inhabit the macroalgae beds in shallow waters (Burchett 1983b).

Variations in numbers of fish caught nearshore by trammel net have been discussed in relation to day and night and depth (Burchett, 1982). However, the variation between different periods of the year in the abundance of different fish species has not been investigated. This paper reports on the seasonal variations in abundance of several fish species sampled nearshore at South Georgia using trammel nets. The investigation was carried out from Grytviken, South Georgia (54° 17' S, 36° 30' W) between January 1978 and January 1980.

MATERIALS AND METHODS

Fish were sampled nearshore in King Edward Cove, South Georgia using 27-m trammel nets. The sampling techniques used to obtain the required fish species over a wide range of sizes have been described by Burchett (1983a). Regular monthly sampling was carried out during the year. Trammel nets were laid in the evening on the seabed and collected early the following morning.

RESULTS AND DISCUSSION

Relative abundance of species

Nine species of fish were commonly sampled by trammel nets in nearshore waters of less than 90 m depth. Of these, four species dominated the catches in terms of numbers and biomass. They were *Notothenia rossii* juveniles, *Parachaenichthys*

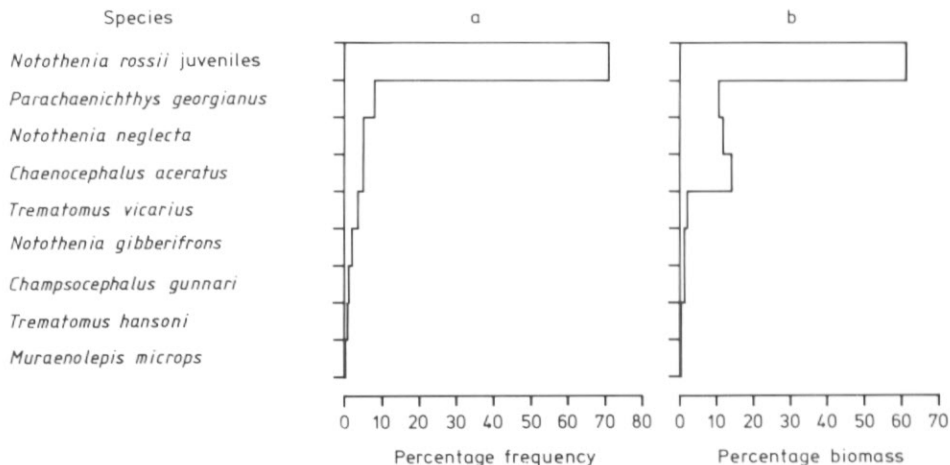


Fig. 1. Percentage frequency and percentage biomass of different fish species sampled nearshore at South Georgia by trammel net during 1978 and 1979.

georgianus, *Notothenia neglecta* and *Chaenocephalus aceratus*. The numbers and biomass of each fish species is presented in Fig. 1. The species most commonly caught in terms of numbers and biomass was *N. rossii*. *Parachaenichthys georgianus* was the second most abundant fish. However, *C. aceratus* was ranked second in terms of biomass (Fig. 1b).

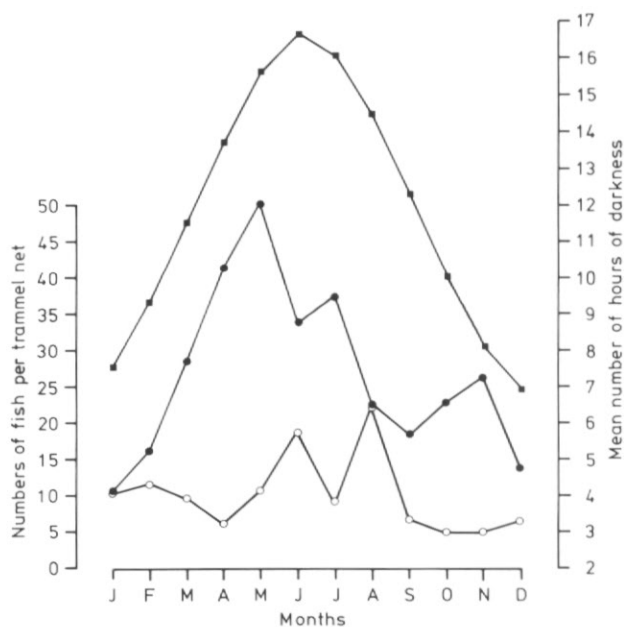


Fig. 2. The mean number of hours of darkness (from dawn to dusk) at King Edward Point (■-■) and the mean number of fish caught per trammel net each month nearshore at South Georgia during 1978 and 1979. *Notothenia rossii* (●-●) juveniles; all other species (○-○).

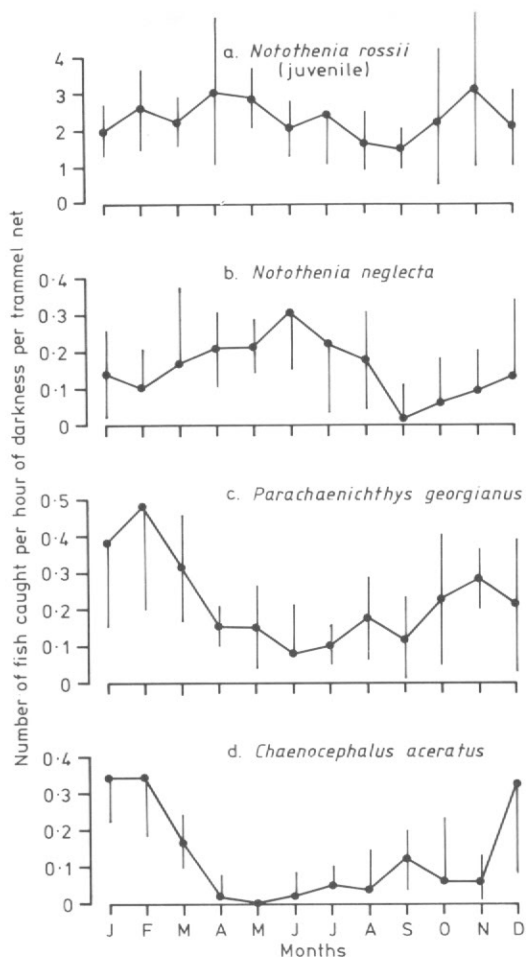


Fig. 3. Mean numbers of fish per hour of darkness per trammel net caught each month for four different species sampled nearshore at South Georgia in 1978 and 1979.

Seasonal variations in abundance

It has been established that there was a good correlation between numbers of fish caught and numbers of hours of darkness (Burchett, 1982) and variations in the number of each species caught according to the time of year were noted.

Catches of *N. rossii* reached a peak in May with an average number of specimens per trammel net of 50.4 ± 7.1 SD (15 nets) and the poorest catch of *N. rossii* occurred in December with an average of 14.0 ± 3.7 (17 nets). The annual variation in catch of *N. rossii* and of other fish species is shown in Fig. 2.

As night length increased in winter, fish were active for a longer period of time each 24 hours and thus more likely to be caught by the passive method of trammel netting. The average numbers of each species of fish caught per trammel net per hour of darkness during each month is shown in Fig. 3. The mean monthly figures for all species together demonstrated that the number of fish sampled was greatest in summer months from November to July (maximum = 3.7 in February) and least

during the period from August to October (minimum = 2.0 in September). *Notothenia rossii* made up 51% of the catch in January and 87% in April (Fig. 2). This variation is primarily caused by changes in numbers of other species caught at the same time rather than changes in the population of *N. rossii* available for capture nearshore.

In a previous study it was found that 87% of fish were caught at night and 13% during daylight (Burchett, 1982). Therefore, most of the nearshore fish species were thought to be more active by night and less active by day. This was supported by observations of fish activity made by means of SCUBA diving. The only exception was *N. neglecta* which often actively swims and feeds by day.

Juvenile *N. rossii* were present in the nearshore population all year (Fig. 3a) and recruitment to the nearshore population took place from late January to late February of each year (Burchett, 1983a). The slow decline in abundance during the winter months from July to September was likely to be the result of reduced activity or mortality, as fish were at their poorest condition during this period and in turn, poor condition is likely to be influenced by quality of food and feeding behaviour (Burchett, 1983b).

Notothenia neglecta were caught most frequently from March to August with peak abundance in June and minimum abundance in September (Fig. 3b). It was found that there were greater numbers of large specimens in pre-spawning condition present in the shallow nearshore population during March and April. For the rest of the year these large fish almost completely disappeared from the catches. This would suggest a migration of larger individuals into shallow waters during the spawning season (April and May). However the degree of activity and behaviour related to mating behaviour (as it was observed that *N. neglecta* are strongly territorial) could influence the number of fish caught.

Parachaenichthys georgianus was caught in quantity during late February and this was followed by a sharp decline in numbers in subsequent months (Fig. 3c). It is known that *P. georgianus* spawn in April (Burchett and others, 1983), so it is possible that once the fish have congregated in the shallow waters of the fjords they then move into deeper waters to spawn. Once spawning has taken place adults may become less active therefore less likely to be caught. *Parachaenichthys georgianus* is a species endemic to South Georgia and the majority of specimens sampled by trammel nets were adults.

Chaenocephalus aceratus were present in the shallow waters of less than 90 m depth during summer months from mid November to mid February (Fig. 3d). By May the adults virtually disappeared from the shallow waters and none were observed by the author while SCUBA diving. *Chaenocephalus aceratus* spawn in May (Burchett and others, 1983) and again the species may congregate in shallow waters then move into deeper waters of the fjord to spawn. Thus the most likely factors causing seasonal variation of catches are (a) the degree of night activity by the fish; (b) length of the night active period; (c) habitat preference of the fish and (d) migration and local movement.

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