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# DISTRIBUTION AND ABUNDANCE OF NEW ZEALAND FUR SEALS ON THE SNARES ISLANDS, NEW ZEALAND*

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ABSTRACT

The distribution and abundance of the New Zealand fur seal, *Arctocephalus forsteri* (Lesson), on the Snares Islands, New Zealand, were investigated during November and December 1970. Excluding pups, 1,021 seals were counted on the main island in late November, giving an amended total of 1,156 when correction factors for time of day were applied. The greatest number of seals was ashore between 1200 h and 1500 h daily.

Fur seals were widely but discontinuously distributed along the coast of the main island. Rookeries were present only on the boulder beaches of the west and south-west coasts and the South-West Promontory. Non-breeding seals aggregated on rocky headlands, points and spurs mainly on the east coast.

Breeding bulls defended territories containing, on average, three females. The first pup was seen on 30 November 1970, and pupping continued throughout December. On 30 December, when pupping appeared to have finished, 234 pups were counted on the island.

## INTRODUCTION

The New Zealand fur seal, *Arctocephalus forsteri* (Lesson) 1828, was once extremely abundant on the rocky shores of New Zealand and the sub-Antarctic islands, but during the early nineteenth century commercial sealing greatly reduced numbers over the whole range (McNab 1907). The vast herds of fur seals on the Antipodes, Auckland, and Campbell Islands were ruthlessly exploited (Turbott 1952), and on Macquarie Island the seals had been exterminated by 1820 (Bellingshausen 1831). In 1875 the New Zealand Government prohibited sealing during October-May, leaving a four month open season, and from 1894 until 1913 killing was by permit only. From 1913–16, a 3-month season was allowed, since when no fur seals have been legally killed, except on Campbell Island in 1922 and 1924, and in southern New Zealand in 1946 (Sorensen 1969). Under protection, fur seals are thought to be increasing, and current investigations are concerned with determining the magnitude and rate of the increase throughout the range.

The Snares Islands were discovered in 1791 and were known to sealers within a year. Fur seals were then abundant there, for as Falla (1948)

*University of Canterbury Snares Islands Expeditions Paper No. 11.

says; "In the days following the discovery of the islands, Snares and seals were as names almost synonymous". However, sealers rapidly reduced the population, and Simpson (1952) records that by 1810 there was scarcely a skin to be had on the Snares Islands. Three sealers marooned on the main island from 1810 to 1817 secured only 1,300 skins during that period. In January 1830, Captain Morrell of the American schooner *Antarctic* searched the Snares for seals and found none (McNab 1907), while in January 1890, Chapman (1891) spent part of a day ashore on the main island but saw only one fur seal, in the vicinity of the Boat Harbour. Chapman (1891) records that two fur seals were known by Captain Fairchild of the Government Steamship Service to live near a sealers' camp in Boat Harbour.

The recovery of the seal population on the Snares Islands is not well documented. Falla (1948 and *in* Sorensen 1969) was on the islands from 29 November to 6 December 1947, and reported that there was a healthy breeding population of not more than 3,000 animals. Richdale (no date), on the other hand, who was on the main island of Snares shortly after Falla (9 January to 26 February 1948), reported that he saw only 200 fur seals, and thought that even that number could be an overestimate. He commented on the very wild, frightened behaviour of the seals, which plunged into the sea on sight of humans. The estimates of seal numbers by Falla and Richdale differ greatly, but the discrepancy could be partly caused by Richdale's counts being made at the end of the breeding season, on the main island only, whereas Falla included Broughton Island and Western Reefs in his counts, made at the height of the season.

This paper presents the results of a study of the distribution and abundance of seals on the Snares Islands in November and December 1970. The work is a contribution to current research by the Department of Zoology, University of Canterbury, on the ecosystems of the Snares Islands. The survey and census also form a part of the Department's current research (partly financed by Marine Department) on the biology of the fur seal.

The study was carried out while I was a member of the 1970–71 University of Canterbury Snares Islands Expedition.

## THE SNARES ISLANDS

The Snares Islands (48° S, 166° E) lie about 105 km south-west of Stewart Island. They consist of the roughly triangular Main Island of about 280 ha, the smaller Broughton Island (48 ha) to the south-east of the main land mass and separated from it by a narrow channel, the Western Reefs about 4.8 km away to the south-west, and numerous rock stacks (Fig. 1).

Main Island is flanked by granite cliffs (150 m high) on the west and south, but falls to a much lower eastern coastline. There are extensive

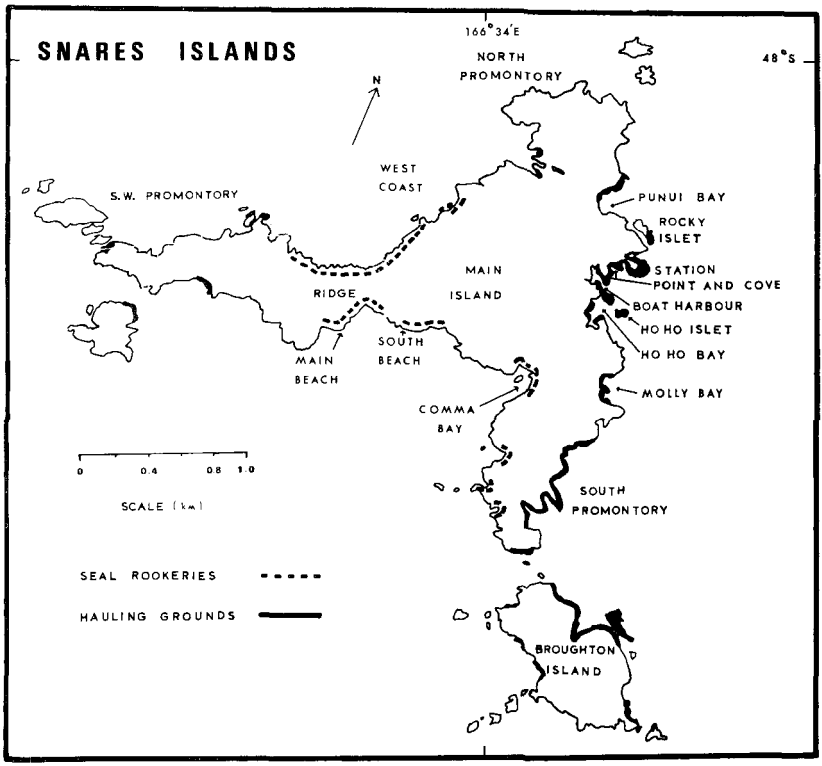


FIG. 1—The distribution of N.Z. fur seals on the Snares Islands in November-December 1970. Western Reefs are 4.8 km west of Main Island.

boulder beaches on the South-West Promontory and the west coast, and rocky coves at Comma Bay and on the western side of South Promontory. Broughton Island has a similar topography to the main island. Details of the geology of the islands are given by Fleming, Reed and Harris (1953).

The granite rock of the island is covered by a layer of vegetable mould and peat 1–6 + m in depth. The vegetation is similar on the two islands. An extensive forest of *Olearia lyalli* forms a canopy about 5 m high over the centre of the main island. Stands of *Senecio stewartiae* are present on the east coast. Meadows of *Poa tennantiana* tussock grow between the bush line and the cliff tops, and *Poa astonii* forms extensive carpets on steeper slopes and on ridges. The only shrub present is *Hebe elliptica* which forms impenetrable thickets, mainly on the east coast. Fuller accounts of the flora are given by Fineran (1964, 1969).

The climate of the islands during the summer is mild (13–16°C), with moderate rainfall (43 mm from 1 December 1970 to 28 February 1971) and prevailing winds from the north-west and, less frequently, the south-west. Easterly winds bring heavy rain and low temperatures (4°C).

## METHODS

The objectives of the research were to map the seal distribution, census the population, determine the diurnal rhythm and examine aspects of the breeding biology.

Censusing and mapping distribution was carried out between 20 November and 4 December 1970. The entire coastline of about 10 km was searched, and seals were counted from the cliff tops using 7 × 50 binoculars. The counts were made from high vantage points both because of the difficult access to seals in many places, and also to avoid disturbance. Experience showed that the advantage of a close approach to seals was negated by the disturbance caused to them. In the census no attempt was made to group adult seals by sex or age, but pups of the year were excluded.

The diurnal rhythm of non-breeding seals in the vicinity of Boat Harbour was examined on five days in December 1970 (3, 7, 11, 19, and 27). Hourly counts were made from dawn to dusk of seals hauled out on rocks visible from a set location on Station Point. The weather conditions and the state of the tide and sea were recorded periodically. Knowledge of the diurnal rhythm is needed to calculate correction factors for time of day for counts made during the census.

Selected areas occupied by breeding seals (rookeries) were observed at intervals between 1 December 1970 and 8 January 1971. Periodic counts were made (including one at 1400 hrs on each observation day) of territorial bulls, breeding females, non-breeders, sub-adults, and pups. The progress of breeding throughout the season was followed. A count of pups at all rookeries on the main island was made on 30 December when pupping appeared to have finished.

The seals on Broughton Island were counted from a dinghy on 9 December.

## DISTRIBUTION AND HABITATS

Fur seals were widely distributed along the coast of the main island (Fig. 1), but as in many places precipitous cliffs prevented hauling out, the distribution was discontinuous. Both rookeries (areas occupied by breeding seals) and hauling grounds (utilised by non-breeders) were present, but they were well separated. Breeding was confined to the west and south-west coasts of the island while the main hauling grounds were on the east coast.

Breeding took place on shores partially exposed to the prevailing westerly winds, and appeared to be restricted to a small number of the potentially suitable localities available. The main rookeries were on boulder beaches on the west coast and below the ridge on South-West Promontory, and in rocky coves on the west coast, at Comma Bay and on the western side of South Promontory (*see* Fig. 1).

The main concentrations of non-breeding seals were on rocky headlands, points and spurs on the east coast, mainly between Rocky Islet and Ho Ho Bay, and on South Promontory. Small groups of non-breeders and solitary stragglers hauled out on rocky ledges and platforms just above high tide level at many points around the island. They were also present on off-shore reefs and stacks, and some were associated with the rookeries.

Most of the seals on Broughton Island were on the sloping rocks and craggy points of the north-east coast. No rookeries were seen, but breeding could have taken place on the west coast where there are deep guts filled with massive boulders.

Breeding seals on the rookeries were restricted to the boulder beaches at the base of the cliffs, but non-breeders and sub-adults lay among the tussock, or on exposed peat scrapes adjacent to the beaches. Non-breeders on the hauling grounds lay on exposed rocks above high tide level, but also utilised sheltered rock crevices and protected coves. Many smaller seals climbed 15–20 m above the sea to rest among *Hebe* and tussock. Large bulls lay in the kelp or on sea-washed rocks on hot, fine days. At places of easy access non-breeders penetrated the *Olearia* forest and lay in the shade of the trees.

## ABUNDANCE

Details of the seal counts made on the main island during the census are given in Table 1. The counts are corrected for time of day using

TABLE 1—Counts and corrected estimates of fur seals at various locations on the coast of the main island of the Snares Islands in November and December 1970

| Location | Date | Approx. Time (h) | Number Counted | Corrected Estimate |
|---|---|---|---|---|
| Punui Bay | 20 Nov | 0930–1030 | 18 | 21 |
| North Promontory | 20 Nov | 1030–1700 | 15 | 15 |
| South West Promontory (north coast) | 22 Nov | 0900–1200 | 55 | 65 |
| South West Promontory (south coast) | 22 Nov | 1200–1700 | 122 | 153 |
| West coast | 23 Nov | 0900–1200 | 63 | 74 |
| South coast | 23 Nov | 1230–1400 | 49 | 49 |
| Comma Bay | 23 Nov | 1400–1600 | 70 | 87 |
| South Promontory (east coast) | 24 Nov | 1000–1300 | 145 | 170 |
| South Promontory (west coast) | 24 Nov | 1400–1700 | 70 | 87 |
| Boat Harbour-Molly Bay | 28 Nov | 1100–1200 | 119 | 140 |
| Boat Harbour-Rocky Islet | 4 Dec | 1200–1500 | 295 | 295 |
| TOTAL (all areas) | | | 1,021 | 1,156 |

correction factors derived from knowledge of the diurnal rhythm (*see* next section).

Altogether 1,021 seals were counted, yielding a corrected total of 1,156. More than half the seals (626 or 54%) were on the east coast, and most of the remainder (341 or 30%) on the boulder beaches of South-West Promontory. Very few seals were present on North Promontory or on South-West Promontory beyond the ridge.

On Broughton Island 115 seals were seen. Ninety were on the north-east corner of the island, ten on rock platforms on the south-east coast, and the remainder among enormous boulders in coves on the west coast.

## DIURNAL RHYTHM

Counts of seals visible from Station Point, on all five days when counts were made, were lowest in early morning and in the evening, and highest in mid-afternoon (Fig. 2). The lowest count on any one day, taken as a percentage of the highest count for that day, varied from 45% (11 December) to 56% (3 and 27 December).

On four of the five days the peak number of seals was counted between 1200 and 1500 hrs. From this it appears that census counts made during those hours probably require no correction. In the census, no counts were made before 0900 hrs, or after 1700 hrs, so correction factors are required only for the periods 0900–1200 hrs and 1500–1700 hrs.

During the five days, the lowest count for the period 0900–1200 hrs averaged 87.5% (range 73–96%) of the highest count for the day. The equivalent figure for 1500–1700 hrs is 80.8% (range 70.5–88.5%). In view of this, seals counted in the census between 0900 and 1200 hrs are considered to represent only 85% of the seals utilising the area, while counts made between 1500 and 1700 hrs are regarded as being of only 80% of the local inhabitants. These rough correction factors are applied to the counts in Table 1.

The state of the tide did not appear to influence the diurnal rhythm of the seals but, together with the weather, it affected their distribution on the rocks. Ho Ho Islet was occupied at low to mid-water in calm conditions, but was deserted during heavy seas and at high tide, when most of the rocks were awash. On Station Point, and in Station Cove, seals preferred to bask on rocks free of spray, and demonstrated this by deserting exposed rocks as the tide flowed, and re-occupying them with the ebb.

On 19 December 1970 there was a force 7 easterly wind, and heavy seas were breaking into Station Cove, over Ho Ho Islet, and onto all exposed rocks. The diurnal rhythm of the seals was not affected, but counts were low all day compared with the other four days. Observation showed that seals were sheltering on rocks in Boat Harbour, and near the bushline elsewhere, and so were not visible from the counting point.

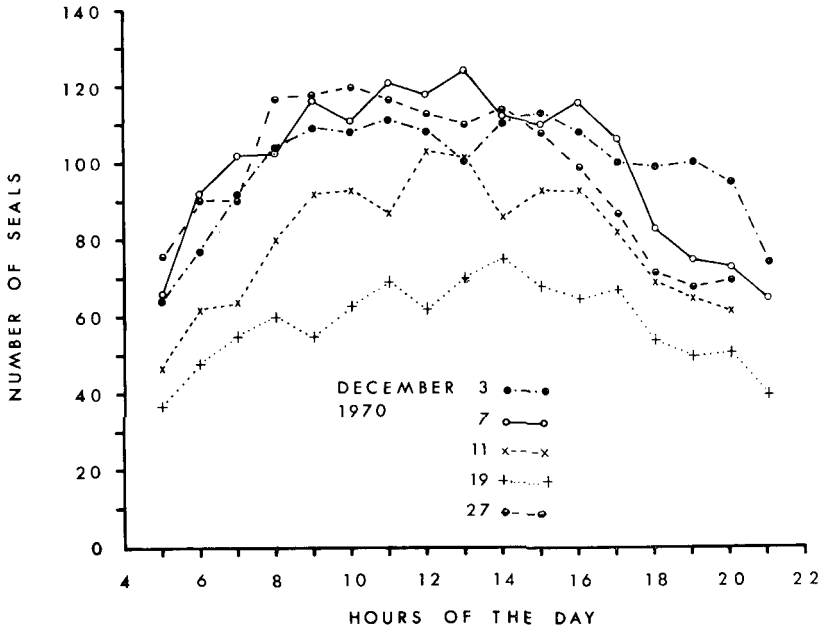


FIG. 2—Hourly changes in the number of N.Z. fur seals ashore in the vicinity of Station Point, Snares Islands, on five days in December 1970.

## NON-BREEDING SEALS

It was not possible to group non-breeding seals on the hauling grounds into sex and age classes with certainty because of the difficulty of accurately identifying them. Adult and large sub-adult males were recognisable by size and mane development, but adult females could not be clearly distinguished from young males. Sub-adults (yearlings and two-year olds) were recognisable by size from adults of either sex, but sex could not be determined without catching and examining individuals.

About half of the seals on the main hauling grounds between Ho Ho Bay and Rocky Islet were large sub-adult males. The few adult males present were probably old, post-reproductive individuals. About one-quarter of the seals were small sub-adults of unknown sex, while the remainder were either females or medium-sized sub-adult males.

Non-breeding seals associated with the rookeries appeared to be mainly males. Yearlings and breeding females were together on the beaches prior to pupping, but subsequently the yearlings moved away to nearby rocks and tussock slopes.

The non-breeders on the hauling grounds spent most of the day sleeping; occasionally, particularly on hot days, they took to the water and swam slowly around, just off-shore. The sub-adult males were often aggressive to one another, but few fights were seen.

## BREEDING

This is a general account of the breeding of the fur seal on the Snares; a fuller account, incorporating detailed observations on breeding behaviour, will be published separately. The rookery on the main beach to the south of the ridge on South-West Promontory appeared to be representative of rookeries on the island, and the following descriptions relate mainly to it. Observations and counts were also made at rookeries on the three small beaches in Comma Bay.

The breeding seals on the main rookery on South-West Promontory were mainly confined to the boulder beach, but non-breeders and yearlings (after November) occupied nearby large rocks in the sea, shelves of rock at the cliff base and adjacent tussock slopes. The rookery consisted essentially of large bulls spaced irregularly among the boulders along the length of the beach, each bull being associated with a group of females and actively defending apparently ill-defined territories against other bulls.

The organisation of the rookery and the behaviour of the seals changed with time. Counts at intervals during the breeding season of territorial bulls, non-breeders, breeding females and pups (of the year) revealed changes in the numbers and proportions of each present (Table 2). In late November and early December 1970 the main beach appeared to be divided into ten territories, and there was a high female to territorial bull ratio (6.5 : 1). In mid to late December there were up to 30 territories, most very small, and some occupied by bulls with no females. Some territories were cut off from the sea, and the occupying bulls suffered attacks from bulls in intervening territories when travelling to and from the sea. In late December and early January the number of territories occupied by bulls decreased, and the number of females ashore also fell. By 7 January few territories appeared to be vigorously defended, and occupying bulls spent a great deal of time resting in the water and sleeping.

The first pup was seen on 30 November 1970 on South Beach, Comma Bay. The first pups on the main study rookery were seen on 2 December. Most pups were born between 8 and 22 December, but they continued to appear steadily throughout December. Births appeared to have ceased by the end of December, and pups began to congregate in pods. On 30 December, 234 pups were counted on the rookeries.

Territories contained between one and eight females. The mean female to territorial bull ratio, calculated from the total counts of females and bulls on study rookeries on the dates given in Table 2, was 3.28 : 1. The average "harem" size for 48 selected bulls with clearly defined territories was 3.06 females.

Each female gave birth to only a single pup and remained in constant attendance for at least three weeks. After this time wet females were seen to approach pups from the sea.

TABLE 2—Composition of breeding aggregations of fur seals at selected localities on Snares Islands during November and December 1970

| Location | Date | Class of Animal | | | | |
|---|---|---|---|---|---|---|
| | | Territorial Bulls | Breeding Females | Females per Bull | Non-breeders | Pups |
| South West Promontory | | | | | | |
| Main Beach | 27 Nov | 10 | 65 | 6.5 | 18 | 0 |
| | 2 Dec | 9 | 66 | 7.4 | 14 | 2 |
| | 8 Dec | 30 | 80 | 2.7 | 41 | 0 |
| | 22 Dec | 28 | 69 | 2.5 | 21 | 22 |
| | 26 Dec | 25 | 98 | 3.9 | 22 | 30 |
| | 30 Dec | 18 | 66 | 3.7 | 24 | 45 |
| South Beach | 2 Dec | 3 | 12 | 4.0 | 9 | 1 |
| | 8 Dec | 6 | 18 | 3.0 | 11 | 5 |
| | 30 Dec | 8 | 19 | 2.4 | 4 | 14 |
| Comma Bay | | | | | | |
| | 6 Dec | 18 | 33 | 1.8 | 12 | 12 |
| | 30 Dec | 19 | 53 | 2.8 | 9 | 37 |

## DISCUSSION

There is increasing interest in New Zealand in the possibility of harvesting fur seals, and it is urgently necessary that an accurate assessment of the distribution, abundance and breeding potential of the species be made, so that any action taken is based on scientific knowledge. There is at present little information available.

Falla (1953) estimated that the total population of New Zealand fur seals in 1948 did not exceed 50,000 animals. There is no more recent estimate available. Turbott (1952) considered that fur seals were recovering only slowly from the sealers' onslaught, even on islands (such as the Snares, perhaps) where they had long been unmolested. In 1950 there was still no sign of re-establishment of the once enormous herds on the Auckland and Antipodes Islands (Turbott 1952).

Recently it has been suggested by, among others, Stonehouse (1965), Csordas and Ingham (1965), and Stirling (1968) that fur seal numbers are increasing. Stonehouse based his opinion on the marked increase in non-breeding fur seals on the Kaikoura Peninsula, Canterbury, between 1956 and 1964. He quotes a personal communication from Mr B. D. Bell, who counted 46 seals on the Kaikoura reefs in May 1956, and compares this figure with his own count of 427 on 11 May 1964 (almost a ten-fold increase). In non-breeding areas numbers are lowest in summer (November to January), but Stonehouse recorded an increase in seals present at Kaikoura in December from 7 in 1957 to between 60 and 150 in the 1960–64 period, which indicates an expanding

population. Stirling (1968) reached a similar conclusion from his observations that the number of small seals at Kaikoura and other non-breeding areas was increasing yearly.

Csordas and Ingham (1965) report an increase in numbers of fur seals on Macquarie Island. Between 1919 and 1948 fur seals began to visit the island in summer, and the maximum number in the original area colonised increased from 174 in 1950 to 474 in 1963. Several localities now have summer populations, and a few seals overwinter on the island. The summer visitors include immatures of both sexes and a few non-breeding adult females; the winter residents are older immatures and adult males. A few pups have been seen on the island but their fate is unknown. Fur seal numbers appear to be increasing on the Antipodes Islands also; in February 1969 there were about 1,100 present, but there was no evidence of breeding (R. H. Taylor, *in* Sorensen 1969).

These publications indicate that fur seals are increasing throughout their range, as non-breeding herds are maintained both to the north (Kaikoura and Wellington) and south (Macquarie Island) of the present breeding range. The number of fur seals on the Snares has certainly increased since 1810 when, according to Simpson (1952), there was scarcely a seal to be seen. The present total of nearly 1,200 seals on the main island in November 1970 indicates a substantial increase since 1948, if Richdale's (no date) estimate of 200 is reliable. However, if Falla's (1948 and *in* Sorensen 1969) estimate of 3,000 for the Snares (including the main island, Broughton Island, the Western Reefs and the various stacks) in November-December 1947 is correct, then there has been no increase in numbers in the last 20 years. However, whatever the situation was in the past, future counts can be compared with the census figure for 1970. There does not appear to be any physical barrier to further population increase, as apparently suitable areas for breeding are present in abundance. The large proportion of young animals in the population indicates a healthy breeding potential.

The study of diurnal rhythm furnished results similar to those obtained for the New Zealand fur seal (Stirling 1968) and the Weddell seal (Stirling 1969). Most feeding is done at night (Street 1964) and the seals haul out to sleep during the day, which could explain the rhythm observed. The diurnal rhythm of breeding seals is upset, of course, by the necessity for territorial bulls to remain on their territories for long periods, and for females with young pups to stay for suckling. Knowledge of the diurnal rhythm of a seal species ensures that counts can be made when most seals are ashore, resulting in more reliable census figures.

The present work, and that by Crawley and Brown (1971), Csordas and Ingham (1965), and Taylor (*in* Sorensen 1969), have furnished estimates of fur seal numbers on the Snares Islands, Open Bay Islands (Westland), Macquarie Island, and the Antipodes. There is now a need for similar work on the other sub-antarctic islands and on the New Zealand coast. A combination of land, aerial and marine surveys will probably be required. Current research by the Department of Zoology,

University of Canterbury (financed by Marine Department), is designed to collect data on the breeding, survival and movements of fur seals, and knowledge of these topics will allow assessments of breeding potential and rates of increase of the populations to be made.

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