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The size and status of the population of southern sea lions *Otaria flavescens* in the Falkland Islands

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Abstract

Pup production of southern sea lions in the Falkland Islands was estimated to be 80,550 (total population ca. 380,000) in 1937, but by 1965 it had fallen to around 6000; a 93% reduction in under 30 years. We describe the results of an aerial survey of part of the breeding population in 1990 and comprehensive ground counts of the entire population in 1995 and 2003. Results indicate that the decline continued. In 1995, 63 breeding and 42 non-breeding groups were found. Pup production was estimated at 2034 pups; less than 2.7% of the 1930s estimate. All known and potential sites were revisited in 2003. 2747 pups were counted at 68 breeding sites, seven of which were new since 1995. Results indicate that between 1965 and 1990 the population reached a minimum of less than 1.5% of the 1937 population. Since then, pup production has increased at a rate of 8.5% p.a. between 1990 and 1995 and at 3.8% p.a. between 1995 and 2003.

The Falklands' trajectory is similar to that of the adjacent Argentinian population. The causes of these declines are not clear. Around 44,000 sea lions were killed in the Falklands between 1935 and 1962, more than 500,000 were taken in Argentina in the same period. We present the results of a simple population model which suggests that, if sea lions migrated between the two areas, the combined hunt may explain the initial decline in the Falklands population. However, the continued decline after 1965 is as yet unexplained.

Keywords: Sea lion; O*taria flavescens*; Falkland Islands; Population; Census; Exploitation; Decline

1. Introduction

The population of southern sea lions *Otaria flavescens* in the Falkland Islands declined dramatically between the 1930s and 1960s. Boat surveys between 1934 and 1937 gave a pup production estimate of 80,550, with an associated all age population estimate of 380,000 animals (Hamilton, 1934, 1939). However, during the 1950s and 1960s, a number of sealing ventures reportedly failed due to lack of sea lions (Strange, 1979). This combined with observations by local naturalists suggested that the sea lion population had declined during and after World War II. In 1965, an aerial survey of the entire archipelago estimated pup production to be only 6000, a reduction of >90% in <30 years (Strange, 1979).

The causes of this decline were not clear. Seals throughout the Southern Ocean were subjected to severe exploitation during the 18th and 19th centuries. In the Falkland Islands, South American fur seals *Arctocephalus australis*, southern elephant seals *Mirounga leonina* and southern sea lions were hunted. By the early 1900s, fur and elephant seal numbers had declined to the point where commercial harvesting was no longer profitable, but hunting of southern sea lions continued. Approximately 40,000 were taken between 1928 and 1938, 3000 between 1949 and 1951 and 1500 between 1961 and 1962 (Strange, 1979). Exploitation at these levels, while probably a contributory factor, cannot account for the rate or extent of the observed population decline. There

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were no reports of large-scale illegal, commercial or subsistence hunting in the Falkland Islands or of mass mortality that might account for the crash and, until recently, there were no major fisheries in the region and therefore, no potential for conflict with fishing operations. However, there was a coincident and similar decline in the adjacent sea lion populations in northern Patagonia, which fell from 137,500 in 1938 to 18,400 by 1949 (Crespo and Pedraza, 1991) and a major but less well documented decline in the central Patagonian population, which fell from at least 33,000 in the 1940s to around 9000 by 1972 (Reyes et al., 1999).

The population decline, coupled with possible threats from increased fishing, increased tourism and potential oil developments, highlighted the need for a conservation strategy for sea lions in the Falkland Islands. An accurate estimate of the size, status and distribution of the population is an essential base line for developing management and conservation strategies, and assessing their effectiveness.

This paper describes the first comprehensive census of the southern sea lion breeding population since 1965. We present the results of a partial aerial survey in 1990, and of boat-based surveys of the entire Falkland Islands archipelago in 1995 and 2003. Results were compared with previous surveys to assess the status of the population. The trajectory of the adjacent Argentinian population and hunting statistics were examined to identify likely causes of the historical population decline.

2. Methods

2.1. 1990 Aerial survey

A series of aerial surveys of sections of the archipelago were carried out in 1990. Previously recorded breeding sites were covered in five flights, between 5th February and 31st March 1990. Flight dates were dictated by the availability of aircraft. Coastline between known sites was searched from a height of 60 m, at 130–200 $km\,h^{-1}$. When groups of sea lions were located, speed was reduced to ca. 100 $km\,h^{1}$. Each group was counted visually by three observers and then photographed using a 15×15 cm format camera and fine grain monochrome film.

2.2. 1995 and 2003 boat surveys

To determine the optimal timing for the boat survey, we carried out a series of daily counts at a breeding site at Seal Bay (Fig. 1) from late January to mid February 1991 and monitored the behaviour of mother pup pairs on Stick-in-the-Mud Island (Fig. 1) in January and February 1992.

The survey route included all previously reported sea lion breeding sites in the archipelago, based on previous boat and aerial surveys (Hamilton, 1934, 1939; Strange, 1979) and postal surveys of all relevant land owners.

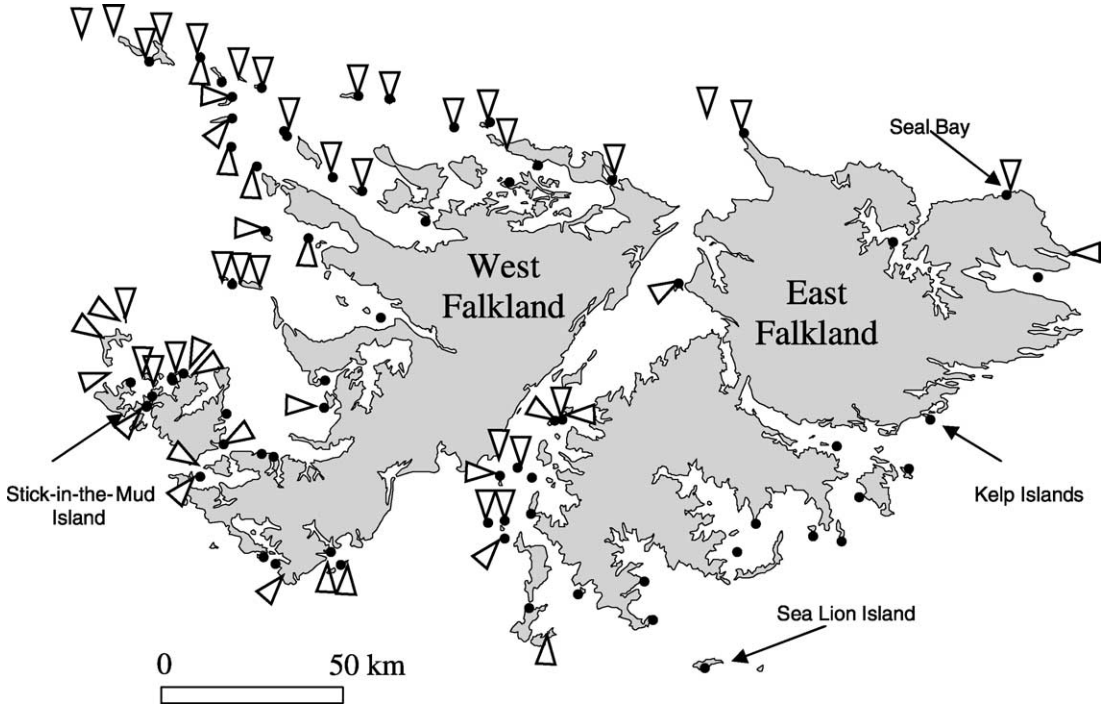

Fig. 1. Map of the Falkland Islands showing the past and present distribution of sea lions. Solid circles represent breeding groups in 1995 and 2003 and triangles represent breeding between 1934 and 1937.