COSEWIC
Assessment and Status Report

on the

Pink-footed Shearwater
Puffinus creatopus

in Canada

THREATENED
2004

COSEWIC
COMMITTEE ON THE STATUS OF
ENDANGERED WILDLIFE
IN CANADA

COSEPAC
COMITÉ SUR LA SITUATION
DES ESPÈCES EN PÉRIL
AU CANADA

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COSEWIC
Assessment Summary

Assessment Summary – May 2004

Common name
Pink-footed Shearwater

Scientific name
Puffinus creatopus

Status
Threatened

Reason for designation
This seabird breeds on only three islands off the coast of Chile, where it has suffered significant but unmeasured declines due to nest predation by introduced predators, exploitation by humans and habitat degradation. It likely incurs mortality due to incidental take by fisheries off the coast of British Columbia during the non-breeding season and would be sensitive to any offshore oil spills there.

Occurrence
British Columbia

Status history
Designated Threatened in May 2004. Assessment based on a new status report.

COSEWIC
Executive Summary

Pink-footed Shearwater
Puffinus creatopus

Species information

The Pink-footed Shearwater *Puffinus creatopus* Coues, 1864 is a stocky and rather broad-winged seabird. In flight individuals appear heavy, with laboured wingbeats. The plumage is a combination of grayish-brown upperparts, white underparts with smudgy markings, mottled underwings, and a dusky head. The iris is brown, the bill pinkish-yellow with a dusky tip, and the legs and feet are pink. Juveniles and adults are alike in plumage, as are the sexes, with no seasonal variation. There is some uncertainty surrounding the classification of the species. The Flesh-footed Shearwater (*Puffinus carneipes*) is very closely related but has an entirely dark plumage.

Distribution

The Pink-footed Shearwater occurs primarily in the eastern Pacific, breeding on three islands off the coast of Chile: Isla Mocha in Arauco Bay, and Robinson Crusoe and Santa Clara in the oceanic Juan Fernandez Archipelago. The marine range extends northwards along the coast of South and North America at least as far as the south coast of Alaska. While Pink-footed Shearwaters are known to occur in all seasons off Peru and Chile, the species is usually only found along North American coasts during the boreal spring and summer months. In Canada, the species occurs exclusively off the coast of British Columbia.

Habitat

Pink-footed Shearwaters are colonial breeders, nesting in long, twisted burrows up to a few metres long. While burrows are located in dense forest on Isla Mocha, those on Robinson Crusoe and Santa Clara are located in open terrain with grassy vegetation. In the marine environment, Pink-footed Shearwaters display a preference for travelling and foraging within one kilometre of the mainland coast during the breeding season. Throughout the species North American wintering range, a preference is shown for the biologically productive waters associated with the continental shelf.

Biology

The Pink-footed Shearwater breeds in the austral summer. Following breeding, birds move north along the western coasts of South America towards North America. The migration is indicated by the increasing numbers of Pink-footed Shearwaters along the continental shelf from the Gulf of California to British Columbia from April to early fall. In late October numbers begin to decrease as birds move back towards Chile and the breeding colonies. The diet includes sardines (*Sardinops sagax*) and anchovies (*Engraulis japonicus*), squid and crustaceans. The Pink-footed Shearwater can be either solitary or gregarious and often associates with other shearwaters throughout its range, especially Sooty (*Puffinus griseus*) and Buller's Shearwaters (*P. bulleri*).

Population sizes and trends

The breeding population of the Pink-footed Shearwater, based on rough estimates of the number of burrows in each colony, is about 60,000 individuals. While populations in the Juan Fernandez group appear to have been more or less stable over the last 15 years, populations are believed to have declined severely in the past, particularly on Robinson Crusoe. Although there is no direct evidence, populations on Isla Mocha are believed to be declining due to the effects of chick harvesting. There is currently no demographic information available for the Pink-footed Shearwater.

Limiting factors and threats

Throughout the species' wintering range in North America, Pink-footed Shearwaters prefer waters over the outer edge of the continental shelf, areas that are also heavily used by longline fisheries. Interactions between the species and the fishery are therefore highly likely throughout their range. In addition, Pink-footed Shearwaters readily follow ships, further increasing the likelihood of interactions. The abundance of the species over the seaward half of the shelf in their wintering range also leaves them particularly vulnerable to the effects of oil pollution from either illegal dumping of oily bilges as well as from oil spills. These latter threats represent the greatest risks to the continued occurrence of the species in Canada.

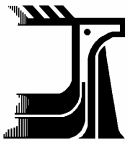
The main terrestrial threats facing the Pink-footed Shearwater are from introduced predators, human disturbance and exploitation, and habitat destruction. The importance of each of these differs between breeding locations. Coatis (*Nasua nasua*) were introduced onto Robinson Crusoe Island in the Juan Fernandez group to control rats (*Rattus rattus*), and their presence is likely the greatest threat to the population of Pink-footed Shearwaters there. Although illegal, it is estimated that approximately 20% of the annual chick production is taken by humans each year on Isla Mocha. Burrows are also regularly destroyed in order to gain access to the chicks. Seabird-fishery interactions and oil spills are also significant potential risks. During the breeding season, Pink-footed Shearwaters from Isla Mocha show a strong preference for foraging in areas that also support an extensive fishing industry.

Special significance of the species

The Pink-footed Shearwater is at risk world-wide.

Existing protection or other status designations

Status designations for the Pink-footed Shearwater include: Vulnerable listing by the World Conservation Union (IUCN); coverage by the Convention on the Conservation of Migratory Species; protection of breeding habitat in Chile; SZN ranking (regular migrant with dispersed occurrences) in British Columbia by NatureServe.



COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. On June 5, 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species and include the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal organizations (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biosystematic Partnership, chaired by the Canadian Museum of Nature), three nonjurisdictional members and the co-chairs of the species specialist and the Aboriginal Traditional Knowledge subcommittees. The committee meets to consider status reports on candidate species.

DEFINITIONS (AFTER MAY 2004)

Species	Any indigenous species, subspecies, variety, or geographically or genetically distinct population of wild fauna and flora.
Extinct (X)	A species that no longer exists.
Extirpated (XT)	A species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A species facing imminent extirpation or extinction.
Threatened (T)	A species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A species that has been evaluated and found to be not at risk.
Data Deficient (DD)***	A species for which there is insufficient scientific information to support status designation.

* Formerly described as “Vulnerable” from 1990 to 1999, or “Rare” prior to 1990.

** Formerly described as “Not In Any Category”, or “No Designation Required.”

*** Formerly described as “Indeterminate” from 1994 to 1999 or “ISIBD” (insufficient scientific information on which to base a designation) prior to 1994.

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TABLE OF CONTENTS

List of Figures

SPECIES INFORMATION

Name and classification

Puffinus creatopus Coues, 1864 is commonly known as the Pink-footed Shearwater. The French name is Puffin à pieds roses. Taxonomy is as follows:

Class: Aves
Order: Procellariiformes
Family: Procellariidae
Genus: *Puffinus*
Species: *Puffinus creatopus*

The Pink-footed Shearwater is very closely related to the Flesh-footed Shearwater (*Puffinus carneipes*), but the latter has an entirely dark plumage. Harrison (1983) notes that some consider the Pink-footed Shearwater to be a southern form of the Flesh-footed, while Bourne et al. (1992) refer to the species as *Puffinus (carneipes) creatopus*. However, the widely followed list of world bird species of Sibley and Monroe (1990) and the official North American list of bird species published by the American Ornithologists Union (AOU) (1998) both consider the two species separate, though close enough to be a superspecies.

Description

The Pink-footed Shearwater (Figure 1) is a stocky and rather broad-winged seabird. In flight, individuals appear heavy, with laboured wingbeats (Martin and Myres 1969, Sibley 2000). The plumage, described as variable by Harrison (1983), is a combination of grayish-brown upperparts, white underparts with smudgy markings, mottled underwings, and a dusky head (Harrison 1983, Sibley 2000). The iris is brown, the bill pinkish-yellow with a dusky tip, and the legs and feet are pink. Juveniles and adults are alike in plumage, as are the sexes, with no seasonal variation (Harrison 1983). Adult length averages 48 cm (19 inches), the wingspan 109 cm (43 inches) (Harrison 1983), and weight 720 g (1.6 lbs) (Sibley 2000). Its large size, pale bill and pale grey underparts differentiate it from other northern Pacific shearwaters.

DISTRIBUTION

Global range

The Pink-footed Shearwater occurs primarily in the eastern Pacific, although there are records from New Zealand and Australia, and a specimen has been collected from the Atlantic coast of Argentina (Birdlife International 2003). The species breeds on three islands off the coast of Chile: Isla Mocha in Arauco Bay, 35 km offshore (50 km^2 in area); and 600 km to the northwest on Robinson Crusoe (Más á Tierra, 93 km^2) and the very small Santa Clara in the oceanic Juan Fernandez Archipelago (AOU 1998) (Figure 2).

Figure 1. Pink-footed Shearwater *Puffinus creatopus* (photo by Greg Lasley).

Along the Chilean coast the Pink-footed Shearwater is most common north of 40-42°S (Brown et al. 1975, Guicking et al. 2001). The marine range extends northwards along the coast of South and North America at least as far as the south coast of Alaska (AOU 1998) (Figure 2), although relatively few individuals have been seen north of Vancouver Island, British Columbia (Vermeer et al. 1989). Vagrants have been recorded west to the Hawaiian and Line Islands (Harrison 1983), and into the Gulf of Alaska. While Pink-footed Shearwaters are known to occur in all seasons off Peru and Chile, the species is usually only found in the North American part of its range during the boreal spring, summer and autumn.

Canadian range

The Pink-footed Shearwater occurs exclusively off the coast of British Columbia in Canada, with the north end of Vancouver Island likely representing the northern limits of where the species regularly occurs (Vermeer et al. 1989). The Pink-footed Shearwater is considered to be British Columbia's second most numerous shearwater (Guzman and Myres 1983).

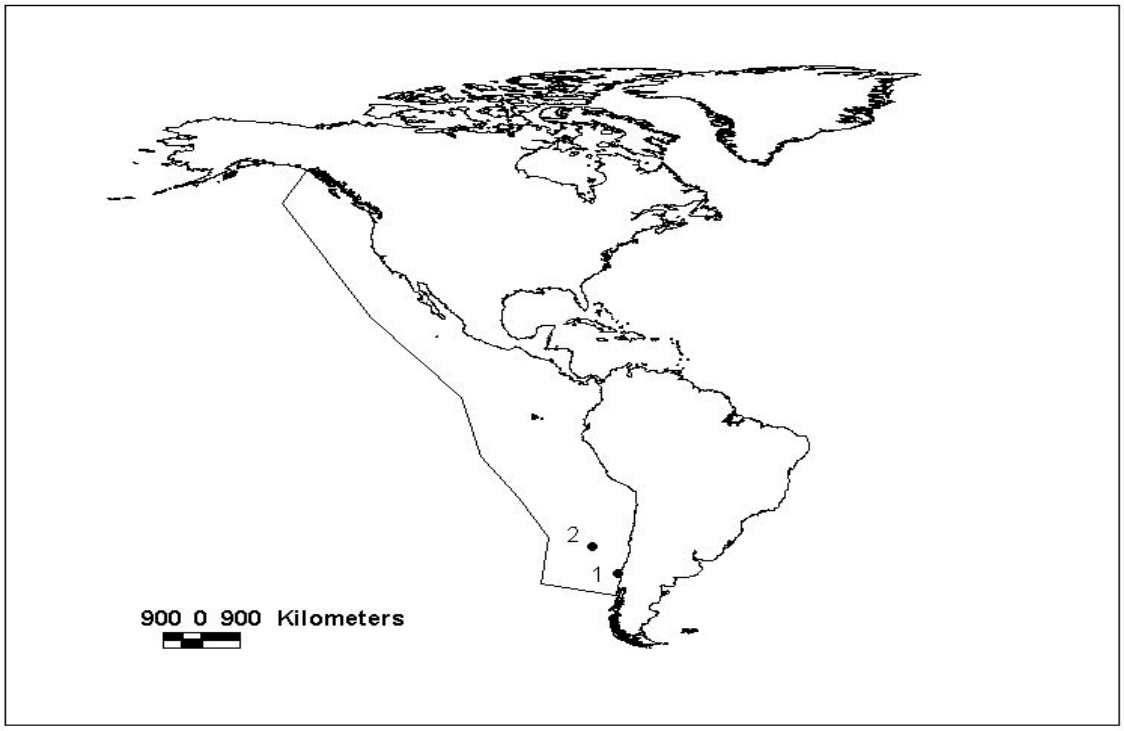

Figure 2. Global distribution of the Pink-footed Shearwater *Puffinus creatopus* (to the east of line), based on maps from Birdlife International (2003). 1 – Isla Mocha colony, 2 – Juan Fernandez colonies.

Literature on the occurrence of the Pink-footed Shearwater off the coast of British Columbia is sparse prior to the late 1960s. Martin (1942) described the species as rare off the coast of Vancouver Island; however, this was likely a function of poor offshore survey effort. During the 1940s Martin and Myres (1969) recorded the occurrence of the species off the west coast of Vancouver Island from late April through May, with numbers increasing and peaking from July and into August. Flocks of up to 20 individuals were frequently encountered during August around La Perouse and Swiftsure Banks (Martin and Myres 1969). Guzman and Myres (1983) reported concentrations of Pink-footed Shearwaters off central Vancouver Island in the spring of 1977-78; as well as large numbers off Vancouver Island, and the Olympic Peninsula, in the late fall of 1977. Sightings were concentrated around, and inside, the 90 m depth contour line. The Pink-footed Shearwater has also been recorded following Sooty Shearwaters (*Puffinus griseus*) well into Barkley Sound on the west coast of the Island (Hatler et al. 1978), and is infrequently observed in marine waters around the Queen Charlotte Islands (Haida Gwaii) in spring and summer (Harfenist et al. 2002).

Data collected since the early 1980s (Morgan et al. 1991 and Figure 3) indicates a seasonal pattern of occurrence that mirrors the results above. Numbers of Pink-footed Shearwaters increase off Vancouver Island during spring (March-May), and peak in the summer (June-July) through fall (August-October). In general, the species' distribution tends to be closely associated with the outer edge of the continental shelf (the shelf

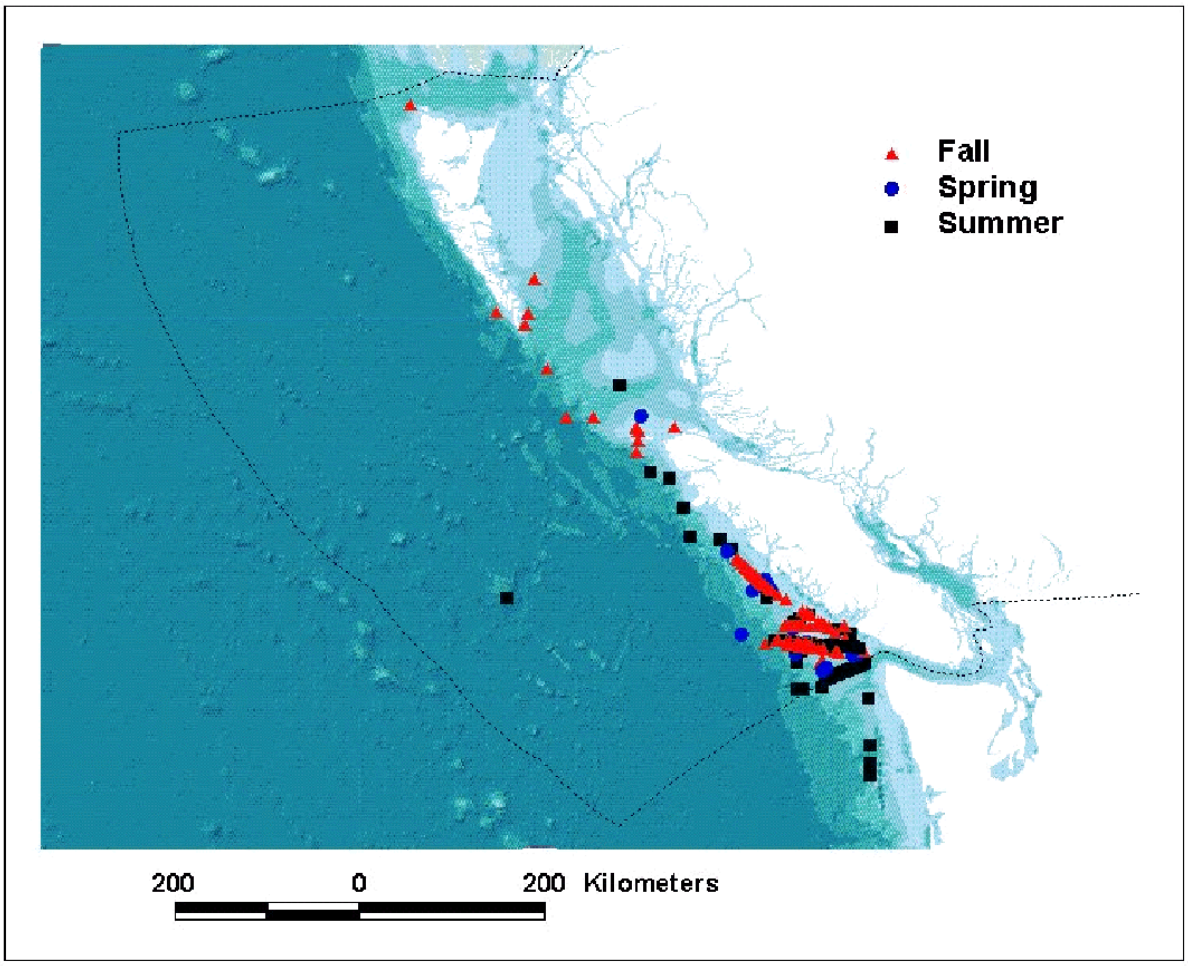

Figure 3. Seasonal sighting locations for the Pink-footed Shearwater *Puffinus creatopus* off the coast of British Columbia, Canada from 1980 through 2001. Light blue, grey and green shading indicate the continental shelf (200 m isobath) and slope areas.

being defined as waters out to the 200 m isobath) off the west coast of Vancouver Island, off the entrance of the Straight of Juan de Fuca, and during fall, off the coast of Haida Gwaii (Morgan et al. 1991 and Fig. 3). There are no winter (November-February) records for the species off the coast of British Columbia, although this may be a function of reduced survey effort during this period. Between spring and fall, there has been far more survey effort, with most occurring relatively close to the coast of British Columbia. Although there has been less survey effort beyond the shelf-break, the observed distribution of Pink-footed Shearwaters off British Columbia strongly mirrors that recorded elsewhere (see sections below). The extent of occurrence (EO) for the Pink-footed Shearwater, from the 200 m isobath to the coastline of BC (excluding east coast Vancouver Island waters, and inlets), is approximately 69,883 km^2.

At-sea survey effort has been inconsistent from year to year, on a spatial and temporal scale. All surveys are conducted from aboard 'ships-of-opportunity' (K. Morgan pers. comm. 2003), accounting for an uneven effort. As a result, it is difficult to delineate the exact range and the relative abundance of the species off the BC coast. In those marine areas where the species has not been recorded, as well as for areas that have not been surveyed, it is not possible to definitely say that the areas are not used by Pink-footed Shearwaters. Thus the Canadian area of occupancy (AO) is equivalent to the EO for this species.

On the basis of the EO and AO in Canada, and overall average density of Pink-footed Shearwaters/km^2 from at-sea surveys, it is estimated that approximately 21,000 Pink-footed Shearwaters use the defined area from June to October each year (CWS unpubl. data 2003). Although the total global population size is unknown, the estimate for BC likely represents a significant proportion of this, and highlights the importance of the waters off BC for the species during this time.

HABITAT

Habitat requirements and trends

Breeding

The Pink-footed Shearwater nests in long, twisting burrows that can penetrate a few metres underground, making it impossible to detect the actual nest chamber from the outside. On Isla Mocha, the species breeds in colonies in dense forest, from about 150 m above sea level and up into the mountain ridges (Guicking 1999, Guicking et al. 2001). The main colony is located just above a village on the east side of the island (Guicking 1999). Burrows are often destroyed by harvesters when collecting chicks (see sections below).

On Robinson Crusoe, the main Pink-footed Shearwater colony is located along a ridgeline. On Santa Clara, burrows are scattered over extensive parts of the island, with several groups of 100-300 each, but also many solitary ones (Guicking and Fiedler 2000). At both locations, burrows are located in open terrain with grassy vegetation. It is likely however, that the breeding habitat on Robinson Crusoe was once heavily forested. With active deforestation and the introduction of herbivores (including sheep, cattle, horses, donkeys, and goats) prior to and during the 20th century (Hahn and Römer 2002), many forested areas have been greatly reduced on this island (Bourne et al. 1992, Hahn and Römer 2002). Storms and periods of heavy rain tend to impact burrows in these locations to a greater extent than those in vegetated areas (Hodum and Wainstein 2002). Introduced rabbits (*Oryctoloagus cuniculus*) occur in large numbers on both Robinson Crusoe and Santa Clara, and their presence strongly contributes to the loss of vegetation and hence erosion (Bourne et al. 1992, Guicking and Fiedler 2000, Hahn and Römer 2002). There is also a suggestion that rabbits compete with Pink-footed Shearwaters for breeding burrows (Schlatter 2002, Hodum and Wainstein 2002, 2003).

Marine

Results from the satellite tracking of a small number of breeders and non-breeders from the Isla Mocha colony in 1999 indicate that Pink-footed Shearwaters show a strong preference for travelling and feeding close (within 1 km) to the mainland coast during the breeding season (Guicking et al. 2001). The study revealed a major inshore foraging area 250-300 km north of the colony, and a second potential area approximately the same distance south. The observed sites coincided with areas of high abundance of sardines and anchovies, the main component of the Pink-footed Shearwater diet during the breeding season. Associated oceanographic conditions included highly saline waters, and stable sea-surface temperatures of 14-18°C (Guicking et al. 2001). Brown et al. (1975) recorded the presence of Pink-footed Shearwaters in association with similar oceanographic conditions off Chile during the summer. Results from a satellite tracking investigation on Santa Clara, in the Juan Fernandez group, indicated foraging areas approximately 70-258 km to the northeast and southeast of the colony during the 2002 breeding season (Hodum and Wainstein 2002). In contrast, during the 2003 season, breeding adults were recorded travelling much farther distances (from 315-650 km) to the east of Santa Clara. These results indicate interannual differences in foraging behaviour, and investigations of related oceanographic and dietary factors are ongoing (Hodum and Wainstein 2003).

While few in number, possibly the result of reduced observer effort at this time, winter sightings of the Pink-footed Shearwater off the coast of Chile are also associated with sea-surface temperatures of 14-18°C (Jehl 1973). It is unknown if these sightings were of foraging individuals, or those on the wing.

Very little is known of the specific marine habitat requirements of the Pink-footed Shearwater throughout the species' winter range. In general, the post-breeding distributions of the Pink-footed Shearwater in North America appear to be positively associated with the continental shelf (Wahl 1975, Guzman and Myres 1983, Briggs et al. 1987, Vermeer et al. 1989, Morgan et al. 1991, D. Hyrenbach pers. comm. 2003), and with aspects of the California Current system (Ainley 1976, Briggs et al. 1987) which extends as far north as Triangle Island off the coast of British Columbia. In general, these areas are characterized by seasonal periods of upwelling and high biological productivity (Hay 1992).

Off the California coast, the abundance and densities of Pink-footed Shearwaters vary considerably on an annual basis (Ainley 1976, Ainley et al. 1995), and within years shifts according to the phases, and regions of influence, of the California Current system. However, the species tends to be generally associated with temperatures ranging from 14-19°C (Ainley 1976), away from the most intense upwelling (Briggs et al. 1987). The abundance of Pink-footed Shearwaters off California tends to be lower during periods of higher sea-surface temperatures, such as those observed during El Niño events (Ainley et al. 1995). Briggs et al. (1987) speculate that they may be more abundant in the second year following such periods. Ainley (1976) speculated that yearly differences in abundance of Pink-footed Shearwaters off California may be connected to (austral)

winter ocean conditions off Peru and Chile. During periods of low anchovy production off the South American coast during this time, Pink-footed Shearwaters may move in greater numbers to the California Current region (Ainley 1976).

Off Washington, the Pink-footed Shearwater occurs almost exclusively over the outer edge of the shelf (Wahl 1975). Again, as with California, the abundance of Pink-footed Shearwaters varies greatly on an annual basis, and also tends to be lower during El Niño events (Wahl and Tweit 2000). Off Vancouver Island and the Juan de Fuca Strait in Canada, the Pink-footed Shearwater is most commonly seen from approximately the outer edge of the shelf, inshore to the 90 m depth contour (Guzman and Myres 1983, Vermeer et al. 1989).

Protection/ownership

Isla Mocha and the Juan Fernandez Archipelago are under Chilean ownership and management. The Pink-footed Shearwater migrates through the waters of Chile, Peru, Ecuador, Colombia, Panama, Costa Rica, Nicaragua, Guatemala, El Salvador, Honduras, Mexico, the United States and Canada (Schlatter 2002).

BIOLOGY

General

Very little information exists on the biology of the Pink-footed Shearwater. The species is a colonial breeder, nesting in burrows generally in the forest. They normally return to land under the cover of darkness. During the non-breeding season a large proportion of the population undertakes a lengthy trans-equatorial migration, spending the northern summer and fall off the coasts of the United States and Canada.

Reproduction

The Pink-footed Shearwater breeds during the austral summer (Murphy 1936 in Guicking et al. 2001), with birds returning to the colonies during November and December (Harrison 1983). The laying of the single egg (Guicking 1999) occurs in December and January (Harrison 1983). Eggs hatch from the end of January to the beginning of February (Hodum and Wainstein 2002, 2003), and fledging takes place in May (Guicking et al. 2001). Incubation is likely shared by both parents. At hatching, one parent stays with the chick during its first days (Guicking and Fiedler 2000, Hodum and Wainstein 2002). Chicks are then left unattended, and adults are almost never found in the burrows during the day after this initial, brief brooding period, returning only at night to feed their young (Guicking 1999, Hodum and Wainstein 2002). Hodum and Wainstein (2002, 2003) estimated a hatching rate of 85% for burrows monitored on Santa Clara during the 2002 breeding season, and 78% for 2003. For successfully hatched chicks, 88% survived to day 36-46 during the 2002 season (Hodum and Wainstein 2002). For the 2003 season, and for those chicks hatched by 12 February,

Hodum and Wainstein (2003) report a chick survival rate to March 21 of 88%. Exact fledging dates, and survival until fledging have not been investigated; however, the authors report an overall breeding success rate, including unhatched eggs, of 69% for 2003 (Hodum and Wainstein 2003).

There is some evidence of extended foraging trips of up to one or even two weeks for breeding birds on Isla Mocha (Guicking et al. 2001). While the authors discuss the possibility that those prolonged absences were the result of the stress of capture, handling and tagging, similar investigations on Santa Clara provide an alternative explanation. While monitoring of individual burrows and data from satellite tagged breeders at this site indicated foraging trips of 2-4 days duration during the 2002 breeding season (Hodum and Wainstein 2002), information from these techniques during the 2003 season indicated extended foraging trips of 2-18 days (Hodum and Wainstein 2003). This suggests considerable interannual differences in foraging behaviour. This research is ongoing.

As in all shearwater species, large numbers of non-breeders (including young, prospecting birds, adults that skipped breeding that year and failed breeders of the current year) are present in the colony during the breeding season. Toward the end of the season, these individuals leave the colony before the breeders, with fledglings the last to leave (Guicking et al. 2001). Breeding biology appears to be similar between Isla Mocha and colonies in the Juan Fernandez group (Guicking and Fiedler 2000). The degree of immigration, if it occurs, between the colonies is unknown.

For the Pink-footed Shearwater in general, there is no information on sex ratio, age at first breeding, proportion of breeders in the population, individual frequency of breeding or annual breeding success.

Survival

There is currently no information available on adult, sub-adult or juvenile survival rates. The causes of natural mortality are unknown.

Physiology

Results from the Juan Fernandez group indicate that male Pink-footed Shearwaters are significantly larger than females. There is also evidence that breeding birds from Juan Fernandez are larger than those at Isla Mocha. As the former constitutes an oceanic environment, as opposed to the coastal ecosystem of Isla Mocha, the difference in morphometrics could indicate differing environmental adaptations (Guicking and Fiedler 2000).

Movements/dispersal

Following breeding, birds from Isla Mocha move north along the western coasts of South America towards North America. It is unknown whether the entire population

migrates. In addition, it is unclear if the populations from Juan Fernandez engage in the same trans-equatorial migration (Schlatter 2002).

The migration is largely indicated by the increasing presence of Pink-footed Shearwaters along the continental shelf from the Gulf of California to British Columbia, during the months of April and into November each year. Individuals have been recorded as far north as the Gulf of Alaska, and a few remain in North America during the boreal winter months (Harrison 1983). Peak numbers tend to occur in each region in September/October (Wahl 1975, Ainley 1976, Guzman and Myres 1983, Briggs et al. 1987, Vermeer et al. 1989, Hatler et al. 1978, Tershy et al. 1993). From late October numbers begin to decrease as birds move back towards Chile.

While very little is known of the species occurrence in Central America during migration, they likely move rapidly through this area. Off Costa Rica, Pink-footed Shearwaters are known to occur regularly from May-June and again from September-October (Stiles and Skutch 1989).

Nutrition and interspecific interactions

The Pink-footed Shearwater employs a number of different feeding techniques, from surface feeding, to surface plunging in pursuit of prey (Ainley and Sanger 1979, Prince and Morgan 1987, Ribic and Ainley 1988/1989). Sardine and anchovies are believed to be the main prey of breeding birds in Chile (Guicking et al. 2001), as well as that of birds over-wintering off the coast of Chile and Peru (Ainley 1976). Baltz and Morejohn (1977 in Gould 1996) found a high proportion of squid in the stomachs of five birds collected off Monterey Bay, California. This suggests a shift in diet from breeding to non-breeding distributions. Fish are also considered important, and crustaceans a minor component of the diet (Ainley and Sanger 1979, Prince and Morgan 1987).

The Pink-footed Shearwater can be either solitary or gregarious and often associates with other shearwaters throughout its range, especially Sooty and Buller's Shearwaters (Yocom 1947, Wahl 1975, Briggs et al. 1987, Guicking et al. 2001).

Behaviour

Pink-footed Shearwaters are ship-attracted (K. Morgan pers. comm. 2003) and as a result large numbers are often reported around fishing vessels (Martin and Myres 1969, Wahl 1975, Wahl and Tweit 2000).

Rafting behaviour has been noted off the Juan Fernandez colonies (Guicking and Fiedler 2000). Similarly, rafts of Pink-footed Shearwaters are often noted within the species' wintering range (K. Morgan pers. comm. 2003). This likely increases the risk of mortality from either chronic or catastrophic oiling events.

POPULATION SIZES AND TRENDS

There are currently no estimates of total population size for the Pink-footed Shearwater. However, there are crude estimates of the number of breeding pairs as derived from counts of the number of burrows in each colony.

Hodum and Wainstein (2003) estimated a minimum of 2,544 occupied burrows, or breeding pairs, on Santa Clara during the 2003 breeding season. While direct counts of the total number of burrows on Robinson Crusoe appear unfeasible (Hodum and Wainstein 2002), Hodum and Wainstein (2003) estimated between 1,325 to 2,626 occupied burrows from both full and partial censuses within three study colonies on the island. The authors note that this should not be considered an estimate of Pink-footed Shearwater population size on Robinson Crusoe as many areas with burrows have not been censused. Additionally, occupancy rates were based on those determined for Santa Clara, and were not measured directly for these burrows. Current estimates for Isla Mocha are some 25,000 burrows (Guicking 1999). Assuming that all those counted on Isla Mocha are active, the estimates from all islands combined could equate to a minimum total breeding population of 57, 738 – 60, 340 individuals.

While populations in the Juan Fernandez group appear to have been more or less stable over the past 15 years (Guicking 1999), populations are believed to have declined severely in the past, particularly those on Robinson Crusoe. These declines have been attributed primarily to coati depredation. However, although current numbers likely lie much below those prior to the introduction of coatis (Bourne et al. 1992, Guicking and Fiedler 2000), due to a lack of historic information on population sizes, or the extent of colonies, quantitative estimates of the population decline are non-existent (P. Hodum pers. comm. 2003).

Although there is no direct evidence, populations on Isla Mocha are believed to be declining, most likely due to the effects of chick harvesting (Guicking 1999). It is estimated that approximately 20% of the annual chick production is taken each year (Guicking 1999), although this is a very rough estimate (Guicking in litt.).

LIMITING FACTORS AND THREATS

With regard to Canada specifically, there have been recent discussions concerning the lifting of the current moratorium on gas and oil exploration off the coast of British Columbia. Areas that might be affected by drilling include Queen Charlotte Sound, shallow areas within Hecate Strait and off the north coast of Vancouver Island (K. Morgan pers. comm. 2003). These coincide with areas used by Pink-footed Shearwaters. Should drilling and development occur, the potential fouling of Pink-footed Shearwaters as well as detrimental impacts upon their foods, is highly likely.

The main terrestrial threats facing the Pink-footed Shearwater are from introduced predators, human disturbance and exploitation, and habitat destruction (Schlatter 1984). The importance of each of these differs between breeding locations (Guicking and Fiedler 2000).

Coatis (*Nasua nasua*), introduced to Robinson Crusoe Island during the 1930s (Inter-American Biodiversity Information Network 2003), are believed to have contributed to severe population declines of Pink-footed Shearwaters in the past (Guicking and Fiedler 2000). Although present in somewhat reduced numbers relative to their abundance prior to the 1980s (Hahn and Römer 2002), they are believed to be the greatest threat to the population of Pink-footed Shearwaters at this location (Guicking and Fiedler 2000). Feral cats (*Felis catus)* and rats (*Rattus* spp.) are also present (Bourne et al. 1992, Hahn and Römer 2002, Hodum and Wainstein 2002), and almost certainly impact colonies. Historical accounts indicate that cats have been present since the early 1700s (P. Hodum pers. comm. 2003). Hodum and Wainstein (2003), in a preliminary attempt to assess predation threats by rats, cats and coatis on Robinson Crusoe, estimated that, on average, a maximum of 6% of Pink-footed Shearwater nests in three study plots failed as a result of predation, either of the chick or an adult. Rats are also known to occur on Santa Clara, and probable rodent depredation of Pink-footed Shearwaters has also been documented from this island (Hahn and Römer 2002).

Ship (*Rattus rattus*) and Norway (*Rattus norvegicus*) rats are known to occur on Isla Mocha, where they have been observed entering burrows. Eggshell fragments have also been found on the forest floor suggesting rat depredation. Feral cats are probably present, in association with the human habitation of the island. Dogs often accompany harvesters into the forest and likely take chicks from short burrows or those sitting outside their burrows (Guicking 1999). Overall, the impacts of rats, cats and dogs on population sizes and trends are unknown (Guicking in litt. 2001, Hodum and Wainstein 2002).

Although the practice of harvesting chicks for food is illegal on Isla Mocha, they are considered a local delicacy and large numbers are harvested each year, from March to May, by the island's residents. Chick harvesting was first reported in the early 20th century, but the scale of the operation has never been determined. Currently, an estimated 3,000-5,000 chicks are harvested each year (Guicking 1999). The effect of this activity also extends beyond harvesting. While chicks in short, straight burrows can be easily harvested, burrows that are too long or twisted are usually dug open and therefore destroyed. Only those nests underneath massive root systems, or those on steep, inaccessible sites are safe from harvesters (Guicking 1999).

Schlatter (1984) also lists seabird-fishery interactions, pesticide residues, industrial wastes in the waterways, 'red-tide' incidents and oil spills as potential risks off the Chilean coast. However, no data exist to quantify their impact on population size or trends (Schlatter 1984). Becker (2000) documented elevated levels of mercury in the feathers of breeding adults from Isla Mocha. In addition and perhaps as expected, the

downy plumage of chicks from the same location also contained significant levels of the heavy metal. However, the body feathers of older chicks did not. The author suggests the contamination results from exposure during migration or wintering.

During the breeding season, Pink-footed Shearwaters from Isla Mocha show a strong preference for foraging in areas that also support an extensive fishing industry. Interaction between the species and the fishery is therefore highly likely (Guicking et al. 2001). However, there is currently no information available on the nature or extent of these interactions (Guicking et al. 2001).

Longline commercial fishing tends to be concentrated over the continental shelf of North America (Wahl 1975, J. Smith pers. comm. 2003). As previously mentioned, Pink-footed Shearwaters tend to be associated with the shelf-break in this part of their range (Fig. 3), making the risk of interaction with the fishing fleet highly likely. To date the Department of Fisheries and Oceans have recorded no incidental take of the species in Canadian waters (L. Yamanaka pers. comm. 2003). However, the potential exists for the two to overlap, both spatially and temporally, thus representing the greatest threat to the continued occurrence of the species in Canada. It should also be noted that observer effort within the fishing fleet is low. Between 1999 and 2002, only 1.5-18.5% of the hooks hauled in the halibut longline fishery were observed (Smith and Morgan, in press). Similarly, for the commerical rockfish longline fishery for the same time period, only 0.2-10.5% of the hooks hauled were observed (Smith and Morgan, in press). It is likely that bycatch of Pink-footed Shearwaters has gone unrecorded in the past, and this may continue if observer coverage remains low. As previously mentioned, Pink-footed Shearwaters are also often found with Sooty Shearwaters, a species that incurs severe mortality from fishing gear, especially in the North American Pacific (Guicking et al. 2001). By default the Pink-footed Shearwater may therefore be at high risk as well.

Fouling of Pink-footed Shearwaters by petroleum products also represents a significant potential threat in many parts of the species' marine range, including the United States and Canada. For Canada specifically, recent discussions concerning the lifting of the current moratorium on gas and oil exploration off the coast of British Columbia highlights this risk. Areas that could be affected by drilling include the shallow waters of Queen Charlotte Sound and Hecate Strait, and off the west and north coasts of Vancouver Island (K. Morgan pers. comm. 2003). On the basis of the Pink-footed Shearwater's continental shelf distribution, and their tendency to investigate all vessels (see above), the potential therefore exists for fouling through either accidental or deliberate releases of petroleum products from offshore platforms, ships or terrestrial sources. As previously mentioned, oil pollution also has the potential to seriously impact the species' foraging habitats and/or prey within Canadian waters.

SPECIAL SIGNIFICANCE OF THE SPECIES

The Pink-footed Shearwater is a globally threatened species.

EXISTING PROTECTION OR OTHER STATUS

The Pink-footed Shearwater is listed as Vulnerable under criterion D2 by the World Conservation Union (IUCN). The species is included in Appendix 1 of the Convention on the Conservation of Migratory Species of Wildlife Animals.

The Juan Fernandez Archipelago was declared a Chilean National Park in 1935, a UNESCO Biosphere Reserve in 1977, and is included in the World Heritage List (Schlatter 1984, Guicking and Fiedler 2000). In the late 1980s Isla Mocha was declared a national reserve (Reserva Nacional Isla Mocha). Both areas are managed by the Corporacion Nacional Forestal (CONAF) (Bourne et al. 1992, Guicking 1999). The status of these islands serves as indirect protection, in that the designations were made on the basis of habitat preservation in general. The current status of the Pink-footed Shearwater in Chile is 'Deficient' (Schlatter 2002).

The Pink-footed Shearwater is ranked by the Nature Conservancy as follows:

Global Heritage Status Rank: G1G2Q (20 Nov 1996)
Rounded Global Heritage Status Rank: G1

National Heritage Status Rank – United States: NZN (5 Jan 1997)
National Heritage Status Rank – Canada: NZN (22 Jan 2001)

Sub-national Heritage Status Rank – United States: Alaska (S2N), Oregon (SZN), Washington (S4N)
Sub-national Heritage Status Rank – Canada: British Columbia (SZN)

In Canada, the Pink-footed Shearwater is a regular summer visitor to the offshore waters along the west coast of Vancouver Island (Hatler et al. 1978, K. Morgan et al. 1991, H. Holmes pers. comm. 2003). The species is infrequently observed in marine waters around Haida Gwaii in spring and summer (Harfenist et al. 2002).

SUMMARY OF STATUS REPORT

The Pink-footed Shearwater *Puffinus creatopus* occurs primarily in the eastern Pacific, and breeds on three islands off the coast of Chile. The marine range extends northwards along the coast of South and North America at least as far as south-coastal Alaska. While Pink-footed Shearwaters are known to occur in all seasons off Peru and Chile, the species is usually only found in the North American part of its range during the boreal spring and summer months. The total population size is unknown. However, the breeding population on Isla Mocha is believed to be declining. While populations in the Juan Fernandez group appear to have been more or less stable over the past 15 years, populations are believed to have declined severely in the past, particularly those

on Robinson Crusoe. There is currently no demographic information available for the Pink-footed Shearwater.

The main terrestrial threats facing the Pink-footed Shearwater are from introduced predators, human disturbance and exploitation, and habitat destruction. The importance of each of these differs between breeding locations. Coatis occur on Robinson Crusoe Island in the Juan Fernandez group, and their presence is likely the greatest threat to the population of Pink-footed Shearwaters at this location. They are believed to have contributed to severe population declines in the past. Feral cats and rats are also present on Robinson Crusoe and Isla Mocha, and rats on Santa Clara. Dogs often accompany harvesters into the forest on Isla Mocha and likely take chicks from short burrows, or those sitting outside their burrows. Overall, the impacts of rats, cats and dogs on population sizes and trends are largely unknown, although preliminary research on Robinson Crusoe estimates that on average 6% of Pink-footed Shearwater nests failed in 2003 as a result of predation, either of the chick or an adult. Although illegal, it is estimated that approximately 20% of the annual chick production is taken each year on Isla Mocha. Burrows are also regularly destroyed to obtain the chicks.

Seabird-fishery interactions and oil pollution also represent extremely high potential threats, throughout the species' range. Fishing activity is known to concentrate along the continental shelf in North America, including Canada. Pink-footed Shearwaters tend to be most frequently encountered in the same area, making the risk of interaction highly likely. To date the Department of Fisheries and Oceans have recorded no incidental take of the species in Canadian waters. However, the potential exists for the two to co-occur, both spatially and temporally, thus representing the greatest threat to the continued occurrence of the species in Canada. Recent discussions concerning the lifting of the current moratorium on gas and oil exploration off the coast of British Columbia highlights this risk. Areas that could be affected by drilling include the shelf areas of Queen Charlotte Sound, shallow areas in Hecate Strait and off the west, northwest coast of Vancouver Island. On the basis of Pink-footed Shearwater distribution, abundance and behaviour off the coast of British Columbia, the potential therefore exists for interactions between the species and the oil industry that could impact the species' continued occurrence in this part of its range. A major oil spill has the potential to impact the species' habitat in the Canada also.

TECHNICAL SUMMARY

Puffinus creatopus
Pink-footed Shearwater Puffin à pieds roses
Range of Occurrence in Canada: BC, Pacific Ocean

Extent and Area Information	
• *Extent of occurrence (EO)(km²)* Area of Canadian territorial waters on Pacific Coast	approx 70,000 km²
• *Specify trend in EO*	Stable
• *Are there extreme fluctuations in EO?*	Stable
• *Area of occupancy (AO) (km²)* Area of Canadian territorial waters on Pacific Coast	approx 70,000 km² (ca. 150 km^2 on breeding grounds)
• *Specify trend in AO*	Stable
• *Are there extreme fluctuations in AO?*	may be seasonal and annual shifts in distribution within the EO, as related to oceanographic conditions
• *Number of known or inferred current locations*	Not applicable in Canadian waters; 3 breeding locations
• *Specify trend in #*	Not applicable in Canada; stable on breeding grounds
• *Are there extreme fluctuations in number of locations?*	No
• *Specify trend in area, extent or quality of habitat*	breeding habitat possibly declining (definitely impacted)
Population Information	
• *Generation time (average age of parents in the population)* *conventional estimate used by BirdLife International for most procellariids in assessments for IUCN listing (P. Hodum pers. comm. 2003)	15 years*
• *Number of mature individuals*	< 60,000
• *Total population trend:*	apparently a significant decline at one colony after coatis introduced in 1930s, another colony probably declining at present
• *% decline over the last/next 10 years or 3 generations.*	Unknown
• *Are there extreme fluctuations in number of mature individuals?*	No
• *Is the total population severely fragmented?*	No
• *Specify trend in number of populations*	
• *Are there extreme fluctuations in number of populations?*	
• *List populations with number of mature individuals in each:*	

Threats (actual or imminent threats to populations or habitats)	
- incidental mortality in fisheries - mortality in association with oil spills - on the breeding grounds the major threats are from introduced predators (Robinson Crusoe), human disturbance and exploitation (Isla Mocha)	
Rescue Effect (immigration from an outside source)	Not applicable
• *Status of outside population(s)?*	
• *Is immigration known or possible?*	
• *Would immigrants be adapted to survive in Canada?*	
• *Is there sufficient habitat for immigrants in Canada?*	
• *Is rescue from outside populations likely?*	Not applicable
Quantitative Analysis	Not done
Other Status **IUCN: Vulnerable**	

Status and Reasons for Designation

Status: Threatened	**Alpha-numeric code: D2**

Reasons for Designation:
This seabird breeds on only three islands off the coast of Chile, where it has suffered significant but unmeasured declines due to nest predation by introduced predators, exploitation by humans and habitat degradation. It likely incurs mortality due to incidental take by fisheries off the coast of British Columbia during the non-breeding season and would be sensitive to any offshore oil spills there.

Applicability of Criteria

Criterion A (Declining Total Population): Not Applicable; significant but unmeasured declines about 70 years ago (more than 3 generations)

Criterion B (Small Distribution, and Decline or Fluctuation): Endangered B2abv could apply if the breeding colonies outside Canada are considered and if declines are assumed to be ongoing, but continuing decline is only assumed at one colony.

Criterion C (Small Total Population Size and Decline): Not Applicable; population too large

Criterion D (Very Small Population or Restricted Distribution): Threatened D2 applies if breeding colonies outside Canada are considered (only 3 locations).

Criterion E (Quantitative Analysis): not done.

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Nadine's previous work history has included active participation in the conservation and management of critically endangered species in New Zealand for the Department of Conservation, seabird research and conservation in New Zealand, British Columbia and Alaska for both universities and government, and marine mammal research in New Zealand, Texas and Canada.

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