Westland Petrel
Procellaria westlandica

Puffin du Westland
Pardela de Westland

CRITICALLY ENDANGERED | ENDANGERED | **VULNERABLE** | NEAR THREATENED | LEAST CONCERN | NOT LISTED

Sometimes referred to as
Westland Black Petrel
Westland Shearwater

Photo © Tony Palliser

TAXONOMY

Order	Procellariiformes
Family	Procellariidae
Genus	*Procellaria*
Species	*P. westlandica*

Described relatively recently (Falla 1946) [1] and originally considered a subspecies of the Black Petrel, *P. parkinsoni,* the Westland Petrel *P. westlandica* is the second largest of the five *Procellaria* petrels [2].

CONSERVATION LISTINGS AND PLANS

International

- Agreement on the Conservation of Albatrosses and Petrels – Annex 1 [3]
- 2010 IUCN Red List of Threatened Species – Vulnerable (since 2000) [4]
- Convention on Migratory Species – Appendix II [5]

Australia

- *Environment Protection and Biodiversity Conservation Act 1999 (EPBC ACT)* [6]
  - Listed Migratory Species
  - Listed Marine Species
- Threat Abatement Plan 2006 for the incidental catch (or bycatch) of seabirds during oceanic longline fishing operations [7]

Chile

- National Plan of Action for reducing by-catch of seabirds in longline fisheries (PAN-AM/CHILE) [8]

New Zealand

- *New Zealand Wildlife Act 1953* [9]
- New Zealand Threat Classification System 2008 – Naturally Uncommon [10]
- Action Plan for Seabird Conservation in New Zealand; Part A: Threatened Seabirds [11]

BREEDING BIOLOGY

Procellaria westlandica is a colonial, burrow-nesting, annually breeding species. It breeds in winter with birds returning to colonies from mid February to early April [2, 12, 13]. Pre-laying exodus is thought to be *c.* 15 days [14] . Most eggs are laid in May (starting *c.* 12 May and peaking *c.* 23 May) and hatch mostly in the last half of July, with incubation taking 57 to 65 days [2, 14]. Chicks fledge from November to January at about 120-140 days old [2, 14, 15] (Table 1). Minimum age of first return to land is three and the youngest recorded age of first breeding is five years [16].

Table 1. *Breeding cycle of* P. westlandica.

	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
At colonies	■	■	■	■	■	■	■		■	■	■	■
Egg laying	■											■
Incubating	■	■	■									■
Chick provisioning			■	■	■	■	■					

BREEDING STATES

Table 2. *Distribution of the global* P. westlandica *population among Parties to the Agreement.*

	New Zealand
Breeding pairs	100%

BREEDING SITES

Procellaria westlandica is a New Zealand endemic (Table 2, Figure 1), breeding at only one site over an area of 16 square kilometres in forested hills on the west coast of South Island. The total population, including juveniles and non-breeders, was estimated at 20,000 ±5,000 individuals in 1982 (J.A. Bartle in [13]). In 2008, the breeding population was estimated to number 4,000 pairs [17] (Table 3).

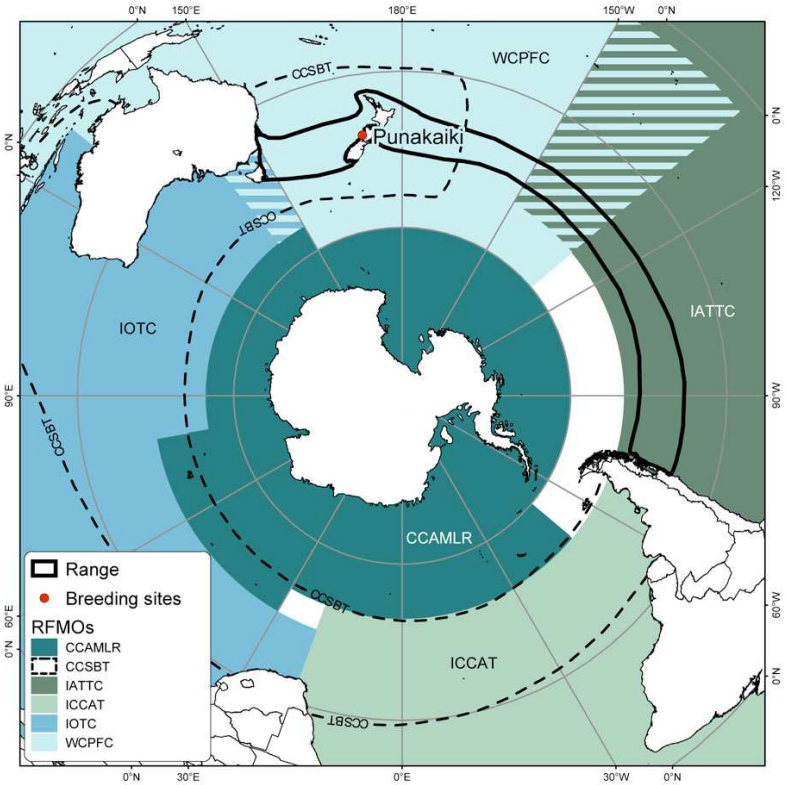

Figure 1. *Location of the single breeding sites and approximate range of* P. westlandica *with the boundaries of selected Regional Fisheries Management Organisations (RFMOs) also shown.*

CCAMLR – Commission for the Conservation of Antarctic Marine Living Resources
CCSBT - Convention for the Conservation of Southern Bluefin Tuna
IATTC - Inter-American Tropical Tuna Commission
ICCAT - International Commission for the Conservation of Atlantic Tunas
IOTC - Indian Ocean Tuna Commission
WCPFC - Western and Central Pacific Fisheries Commission

Table 3. *Monitoring methods and estimates of the population size (annual breeding pairs) for the single* P. westlandica *breeding site. See Glossary and Notes section for explanation of monitoring method codes and accuracy levels.*

Breeding site location	Jurisdiction	Years monitored	Monitoring method	Monitoring accuracy	Annual breeding pairs (last census)
Punakaiki 45° 46'S 170° 43'E	New Zealand	1954-1956, 1972, 1974, 1976, 1982, 2003-2005, 2007, 2008	C	Medium	*c.* 4,000 (2008) [17]

CONSERVATION LISTINGS AND PLANS FOR THE BREEDING SITES

International
None

New Zealand
Punakaiki

- Paparoa National Park - *National Parks Act 1980* [18]
- Specially Protected Area - *Conservation Act 1987* [19]

POPULATION TRENDS

The breeding range of *P. westlandica* is thought to have been more extensive in the past, with Holocene fossils of the species found 10 km to the north of the current distribution [20]. Jackson (1958) [12] carried out the first survey in 1955 and estimated between 3,000 adults and 3,000 pairs by counting returning birds and estimating the number of subcolonies. Best and Owen (1976) [21] however, estimated the number of occupied burrows to be less than 1,000 from a count of 818 in 1974. Based on data collected in 1982, Bartle (1993 in [13]) suggested that an average of 2,000 pairs bred in any one year. More recent surveys estimated 4,291 breeding burrows in 2003-2005, out of a total of 14,162 burrows found, including in previously unrecorded colonies [22]. Based on surveys carried out in 2007-2008 at 10 of the 26 sites visited in 2003-2005, the mean number of occupied burrows was estimated at 2,436 (95% Confidence Interval 1,205-3,666). Data collection at the remaining 16 small sites will continue in 2011, and based on the 2003-2005 counts, another 1,300 occupied burrows may exist in these areas [17]. This would confirm a global *P. westlandica* population of approximately 4,000 annual breeding pairs [17]. However, as the methodologies are not comparable between any of the past surveys, population trends are unknown.

Table 4. *Summary of population trend data for* P. westlandica *at the single breeding site.*

Location	Current monitoring	Trend years	% average change per year	Trend	% of population
Punakaiki	yes	-	-	Unknown	-

The most recent average breeding success rate of 62% between 1995 and 2002 is similar to the range recorded in *P. parkinsoni*, another New Zealand endemic [23, 24], and higher than those recorded for *P. aequinoctialis* on several subantarctic islands [25, 26, 27]. Adult survival for breeding birds is also higher than for either of the congeners [23, 25].

Table 5. *Demographic data for the single* P. westlandica *breeding site.*

Location	Mean breeding success	Juvenile survival	Adult survival (±SE)
Punakaiki	3.0%-5.7% (1970-1971) [14] 27% (1983-1989) [13] 39% (20-63%, 1976-1991) (DOC 1996 in [28]) 59% (1990-1994) (J.A. Bartle in [13]) 50% (38-63%, 1991-1996) [28] 62% (± 4 SE, 1995-2002) [16]	No data	72.6% (±17.3%,1995-2003)[1] [16] 96.5% (±3.8%, 1995-2003)[2] [16]

[1] skipped-breeders
[2] breeding birds

BREEDING SITES: THREATS

The majority of the nesting colonies (75% of known burrows) is within a Specially Protected Area, with access by permit only [22]. About 20% of known burrows are within the Dick Jackson Memorial Reserve, with the remaining 5% situated on private land [11, 22].

Table 6. *Summary of known threats causing population level changes at the breeding site of* P. westlandica. *Table based on data submitted to the ACAP Breeding Sites Working Group in 2008.*

Breeding site	Human disturbance	Human take	Natural disaster	Parasite or Pathogen	Habitat loss or degradation	Predation by alien species	Contamination
Punakaiki	No	No [a]	No	No	No [b]	No [c]	No

[a] Taking of large chicks is suspected to have occurred in the past [14].

[b] Cattle, goats and humans sometimes trample burrows, and grazing by cattle, goats and possums modifies the habitat and may lead to increased likelihood of landslips at the colonies [11, 13]. Birds also occasionally strike power lines when leaving or returning to the colony [11, 13]. Birds are known to be grounded when attracted to lights in near-by centres of habitation, this may be of more relevance for chicks at fledging than for other groups, and if foggy conditions occur during the fledging or breeding period, may be worse in some years than others. The level of mortality due to this threat is unknown. Efforts have been made with the local community to raise awareness of this issue and reduce exposed lighting.

[c] Predation by feral cats, stoats and possibly rats is known to occur, with dogs also occasionally attacking adults and chicks [11, 13]. Some stoat control efforts are in place during the breeding season [13].

FORAGING ECOLOGY AND DIET

There have been two studies on the diet of *P. westlandica*. In contrast to an earlier study where squid comprised 89.5% of items and fish 10.5% in samples collected in July 1969 [29], Freeman (1998) [30] found that the diet during chick rearing (August-October) was dominated by fish (92% of samples, 78.8 ±6.5% by weight of solids), followed by cephalopods (32% of samples, 18.7 ±6.2% by solid weight), with small amounts of Crustacea (4% of samples, 2.4 ±2.4% solid weight). Of the 12 fish families identified, Macrouridae and Myctophidae remains were the most common. Fisheries waste was the largest source of fish (80%) during the winter Hoki *Macruronus novaezelandiae* fishing season (August to mid-September), decreasing thereafter to 31%, as birds switched to capturing or scavenging of more natural prey and a wider variety of species. Histioteuthidae and Cranchiidae were the most common of the six cephalopod families identified.

MARINE DISTRIBUTION

During chick-rearing, satellite-tracking data indicate foraging principally on the continental slope off the West Coast of South Island, with one trip undertaken through Cook Strait to the Chatham Rise east of South Island [31, 32] (Figure 2).

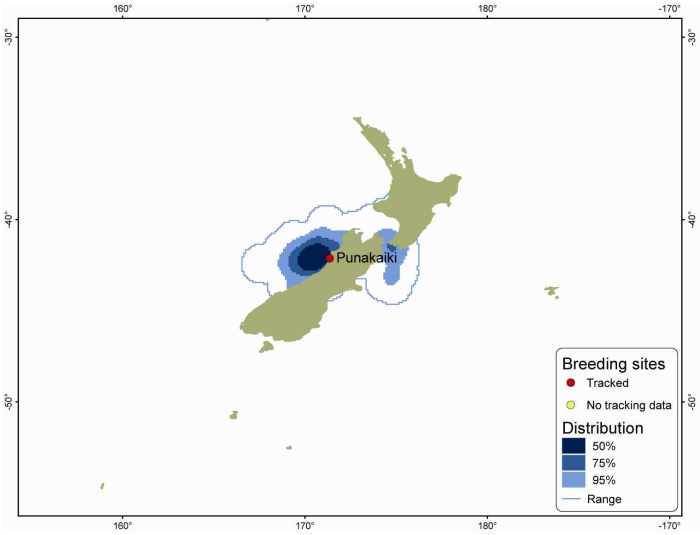

Figure 2. *Satellite-tracking data of breeding adult* P. westlandica *(Number of tracks = 20). Map based on data contributed to the BirdLife Global Procellariiform Tracking Database.*

The non-breeding range of *P. westlandica* extends east to the Humboldt Current off Chile, from 20°S to 50°S, but mostly south of 40°S, with densities highest over the continental slope [33]. Generalized additive model analyses estimated an average of 3,464 birds (95% CI 2,053-6,388) during spring/ summer in waters off Chile between 1980 and 1995 [33]. The species is also sighted off south-eastern Australia all year round, but it is considered rare in that area [2, 34].

Procellaria westlandica overlap with four Regional Fisheries Management Organisations, but principally the WCPFC, CCSBT, and the planned South Pacific Regional Fisheries Management Organisation (SPRFMO) (Figure 1; Table 7).

Table 7. *Summary of the known ACAP Range States, Regional Fisheries Management Organisations and Exclusive Economic Zones of non-ACAP countries that overlap with the marine distribution of* P. westlandica.

	Breeding and feeding range	**Foraging range only**	**Few records - outside core foraging range**
Known ACAP Range States	New Zealand	Australia Chile	Peru Argentina
Non-ACAP Exclusive Economic Zones	-	-	-
Regional Fisheries Management Organisations [1]	CCSBT WCPFC SPRFMO[2]	IATTC	-

[1] see Figure 1 and text for list of acronyms
[2] not yet in force

MARINE THREATS

As opportunistic scavengers of fishery waste [35], *P. westlandica* are vulnerable to interactions with fishing vessels and are infrequently observed killed on pelagic long-lines and trawl vessels in New Zealand waters [36, 37]. The species is also likely to overlap with longline fisheries off the coast of Chile. There is no record of *P. westlandica* bycatch in the pelagic longline swordfish fleet in the area, which operates from March to December [38], however, there have only been limited observations in this fishery. Interactions with Patagonian toothfish *Dissostichus eleginoides* vessels in the Humboldt Current System are also undocumented.

KEY GAPS IN SPECIES ASSESSMENT

Further burrow surveys in the breeding area planned for 2011 will allow more accurate population estimates for this species. The long-term monitoring of the population should continue in order to track population trends as well as annual variations in adult and juvenile survival which are at present unknown or data are limited.

Satellite and/or data logger tracking, or observations at sea of birds of different age classes and at different stages of the annual cycle is needed to determine full foraging range, overlap with fisheries and general at-sea distribution. Further study of interactions with fisheries in non-breeding foraging locations, particularly off South America, is essential to assess the degree of threat posed to the species.

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COMPILED BY

Wiesława Misiak
ACAP Secretariat

CONTRIBUTORS

Susan Waugh
BirdLife Global Seabird Programme

Mark Tasker
Vice Chair, ACAP Advisory Commitee

ACAP Bycatch Working Group
Contact: Barry Baker
barry.baker@latitude42.com.au

ACAP Breeding Sites Working Group
Contact: Richard Phillips
raphil@bas.ac.uk

ACAP Status and Trends Working Group
Contact: Rosemary Gales
Rosemary.Gales@dpiw.tas.gov.au

ACAP Taxonomy Working Group
Contact: Michael Double
Mike.Double@aad.gov.au

BirdLife International,
Global Seabird Programme
Contact: Cleo Small
Cleo.Small@rspb.org.uk
Maps: Frances Taylor
Tracking Data Contributors:
David Nicholls (Chisholm Institute), Amanda Freeman, K-J. Wilson (Lincoln University).

RECOMMENDED CITATION

Agreement on the Conservation of Albatrosses and Petrels. 2011. ACAP Species assessment: Westland Petrel *Procellaria westlandica.* Downloaded from http://www.acap.aq on 9 February 2011.

GLOSSARY AND NOTES

(i) **Years**.
The "split-year" system is used. Any count (whether breeding pairs or fledglings) made in the austral summer (e.g. of 1993/94) is reported as the second half of this split year (i.e. 1994).

The only species which present potential problems in this respect are *Diomedea* albatrosses, which lay in December-January, but whose fledglings do not depart until the following October-December. In order to keep records of each breeding season together, breeding counts from e.g. December 1993-January 1994 and productivity counts (of chicks/fledglings) of October-December 1994 are reported as 1994.

If a range of years is presented, it should be assumed that the monitoring was continuous during that time. If the years of monitoring are discontinuous, the actual years in which monitoring occurred are indicated.

(ii) Methods Rating Matrix (based on NZ rating system)

METHOD
A Counts of nesting adults (Errors here are detection errors (the probability of not detecting a bird despite its being present during a survey), the "nest-failure error" (the probability of not counting a nesting bird because the nest had failed prior to the survey, or had not laid at the time of the survey) and sampling error).
B Counts of chicks (Errors here are detection error, sampling and nest-failure error. The latter is probably harder to estimate later in the breeding season than during the incubation period, due to the tendency for egg- and chick-failures to show high interannual variability compared with breeding frequency within a species).
C Counts of nest sites (Errors here are detection error, sampling error and "occupancy error" (probability of counting a site or burrow as active despite it's not being used for nesting by birds during the season).
D Aerial-photo (Errors here are detection errors, nest-failure error, occupancy error and sampling error (error associated with counting sites from photographs), and "visual obstruction bias" - the obstruction of nest sites from view, always underestimating numbers).
E Ship- or ground- based photo (Errors here are detection error, nest-failure error, occupancy error, sampling error and "visual obstruction bias" (the obstruction of nest sites from view from low-angle photos, always underestimating numbers)
F Unknown
G Count of eggs in subsample population
H Count of chicks in subsample population and extrapolation (chicks x breeding success - no count of eggs)

RELIABILITY
1 Census with errors estimated
2 Distance-sampling of representative portions of colonies/sites with errors estimated
3 Survey of quadrats or transects of representative portions of colonies/sites with errors estimated
4 Survey of quadrats or transects without representative sampling but with errors estimated
5 Survey of quadrats or transects without representative sampling nor errors estimated
6 Unknown

(iii) Population Survey Accuracy
High Within 10% of stated figure;
Medium Within 50% of stated figure;
Low Within 100% of stated figure (eg coarsely assessed via area of occupancy and assumed density)
Unknown

(iv) Population Trend
Trend analyses were run in TRIM software using the linear trend model with stepwise selection of change points (missing values removed) with serial correlation taken into account but not overdispersion.

(v) Productivity (Breeding Success)
Defined as proportion of eggs that survive to chicks at/near time of fledging unless indicated otherwise

(vi) Juvenile Survival

defined as:

1 Survival to first return/resight;
2 Survival to x age (x specified), or
3 Survival to recruitment into breeding population
4 Other
5 Unknown

(vii) Threats

A combination of scope (proportion of population) and severity (intensity) provide a level or magnitude of threat. Both scope and severity assess not only current threat impacts but also the anticipated threat impacts over the next decade or so, assuming the continuation of current conditions and trends.

		Scope (% population affected)			
		Very High (71-100%)	High (31-70%)	Medium (11-30%)	Low (1-10%)
Severity (likely % reduction of affected population within ten years)	Very High (71-100%)	**Very High**	**High**	**Medium**	**Low**
	High (31-70%)	**High**	**High**	**Medium**	**Low**
	Medium (11-30%)	**Medium**	**Medium**	**Medium**	**Low**
	Low (1-10%)	**Low**	**Low**	**Low**	**Low**

(viii) Maps

The tracking maps shown were created from platform terminal transmitter (PTT) and global-positioning system (GPS) loggers. The tracks were sampled at hourly intervals and then used to produce kernel density distributions, which have been simplified in the maps to show the 50%, 75% and 95% utilisation distributions (i.e. where the birds spend x% of their time). The full range (i.e. 100% utilisation distribution) is also shown. Note that the smoothing parameter used to create the kernel grids was 1 degree, so the full range will show the area within 1 degree of a track. In some cases the PTTs were duty-cycled: if the off cycle was more than 24 hours it was not assumed that the bird flew in a straight line between successive on cycles, resulting in isolated 'blobs' on the distribution maps. It is important to realise that these maps can only show where tracked birds were, and blank areas on the maps do not necessarily indicate an absence of the particular species.