Agreement on the Conservation of Albatrosses and Petrels

Seventh Meeting of the Advisory Committee

La Rochelle, France, 6 - 10 May 2013

Listing of New Species – Pink-footed Shearwater, *Puffinus creatopus*

Chile

SUMMARY

The Government of Chile has advised the Secretariat of its intention to nominate the Pink-footed Shearwater, *Puffinus creatopus* for listing under Annex 1 of the Agreement. To assist Parties in their consideration of this request, the Government of Chile has provided the attached species assessment for the Pink-footed Shearwater.

RECOMMENDATION

In accordance with Article IX, 6 a) of the Agreement, the Advisory Committee is requested to provide advice to the Meeting of the Parties on the scientific and/or technical merits of listing the Pink-footed Shearwater, *Puffinus creatopus* under Annex 1 of the Agreement.

The Government of Chile has advised the Secretariat of its intention to nominate the Pink-footed Shearwater, *Puffinus creatopus* for listing under Annex 1 of the Agreement. To assist Parties in their consideration of this request, the Government of Chile has provided the attached species assessment for the Pink-footed Shearwater.

Cooper and Baker, in their assessment of candidate species for inclusion under the Agreement (AC3 Doc 18, Listing of New Species), concluded that the Pink-footed shearwater is a strong candidate for inclusion under the Agreement.

The present document was drafted in collaboration by Jorge Azocar (Instituto de Fomento Pesquero, Chile), Marcelo García (Subsecretaría de Pesca, Chile), Valentina Colodro (Oikonos), Javier Arata (Intituto Antártico Chileno), Peter Hodum (Oikonos) and Ken Morgan (Canadian Wildlife Service).

Pink-footed Shearwater

Puffinus creatopus

Fardela de Vientre Blanco

Puffin à pieds roses

Sometimes referred to as
Pardela Pata Rosada
Fardela blanca

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

TAXONOMY

Order Procellariiformes
Family Procellariidae
Genus Puffinus
Species creatopus

CONSERVATION LISTINGS AND PLANS

International

- 2012 IUCN Red List of Threatened Species –Vulnerable (since 1994).
- North American Conservation Action Plan: Pink-Footed Shearwater *Puffinus creatopus*, 2005.
- Recovery Strategy for the Short-tailed Albatross and the Pink-footed Shearwater in Canada, 2008.

Chile

- Plan Nacional para la Conservación de la Fardela de Vientre Blanco en Chile, 2007.
- National Plan of Action for reducing by-catch of seabirds in longline fisheries (PAN-AM/CHILE) 2007.
- Listed as Threatened Species (Decreto Supremo Nº 23, 2009).

BREEDING BIOLOGY

Puffinus creatopus is a philopatric colonial breeder, nesting in burrows on slopes. In the Juan Fernández Islands, most colonies are located on open grassy or sparsely vegetated slopes up to 380 m above sea level while colonies on Isla Mocha are in forested habitat up to 350 m above sea level. Pink-footed Shearwaters breed during the austral summer (Murphy 1936 in Guicking *et al*., 2001), with birds returning to the colonies during October (Hodum unpubl. data). They lay a single egg per breeding season (Guicking 1999) in late November through mid-December (Hodum unpubl. data). Eggs hatch from approximately the 20th of January through mid-February (Hodum and Wainstein 2002, 2003, 2004), and fledging takes place in May (Guicking *et al*., 2001). Incubation is shared by both parents. After hatching, the chick is attended by an adult for the first 1-3 days (Guicking and Fiedler 2000, Hodum and Wainstein 2002, 2004). 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 and 2004) and Hodum (2011) estimated a hatching rate ranging from 68-93 % for burrows monitored on Santa Clara during the 2002-2005 and 2011 breeding seasons. For successfully hatched chicks, 88% survived through the mid-chick period (late March; >40 days of age) during the 2002 and 2003 seasons (Hodum and Wainstein 2002, 2003) and 94% in 2004 (Hodum and Wainstein 2004).

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 and 73 % for 2004 (Hodum and Wainstein 2003, 2004).

Table 1. Breeding cycle of *P. creatopus* across all sites.

	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
At colonies												
Egg laying												
Hatching												
Chick rearing												

BREEDING STATES

Table 2. Distribution of the global *P. creatopus* population.

	Chile
Breeding pairs	100%

BREEDING SITES

The Pink-footed Shearwater is endemic to Chile, breeding on only three islands: Isla Mocha in Arauco Bay, 35 km offshore (50 km^2 in area); and 670 km to the northwest of Valparaíso on Isla Robinson Crusoe (Más á Tierra, 52 km^2) and Isla Santa Clara (2.21 km^2) in the oceanic Juan Fernández Archipelago.

On Isla Mocha, the species breeds in colonies in dense forest, from about 150 m above sea level to the highest mountain ridges (Guicking 1999, Guicking et al. 2001). On Robinson Crusoe, the main Pink-footed Shearwater colonies are located on slopes and along ridgelines, while 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). On both Robinson Crusoe and Santa Clara islands, burrows are located in open terrain with sparse grassy and herbaceous vegetation. The colony in Vaquería on Robinson Crusoe is partially within native forest habitat. Given the extensive deforestation that has occurred on the island, it is likely that much of the breeding habitat on Robinson Crusoe was once heavily forested.

The total global breeding population is estimated to be approximately 28,000 pairs, of which 69% breed on Isla Mocha.

Table 3. *Estimates of the size of breeding populations (breeding pairs) for each of the breeding sites of P. creatopus. Results are from unpublished data of Hodum et al. and Muñoz et al.*

Breeding site location	Jurisdiction	Years monitored	Monitoring method	Monitoring reliability	Annual breeding pairs (last census)
Isla Mocha	**Chile**	**2008-2012**	**A**		**19,440**
Total					**19,440**
% of all sites					**69%**
Juan Fernández Archipelago					
Isla Robinson Crusoe	**Chile**	**2002-2011**	**A**		**5,075**
Isla Santa Clara		**2002-2011**	**A**		**3,526**
Total					**8,601**
% of all sites					**31%**
Total					***28,041***

CONSERVATION LISTINGS AND PLANS FOR THE BREEDING SITES

Chile

Isla Robinson Crusoe

- UNESCO Biosphere Reserve (since 1977)
- National Park (since1935)

Isla Santa Clara

- UNESCO Biosphere Reserve (since 1977)
- National Park (since 1935)

Isla Mocha

- National Reserve (since 1988)

POPULATION TRENDS

Population trends are not well understood for the species. On Isla Mocha, insufficient data exist to quantitatively assess population trends. A complete census in 2008-2009 estimated a breeding population of 19,440 breeding pairs (Muñoz unpubl. data), and data from reproductive success and predation monitoring plots have been collected annually since 2010. Given the lack of complete census data from previous years, it is at present impossible to calculate a trend, but the population is believed to have declined (Guicking 1999), in part due to chick harvesting (described below) and predation by non-native mammals.

On the Juan Fernández Islands, trend data are lacking for Isla Robinson Crusoe. The most comprehensive survey to date, completed between 2003 and 2006, estimated 5,100 breeding pairs for the island (Hodum and Wainstein unpubl. data). Data on reproductive success are extremely limited. According to all documents and reports released since 1999, the Robinson Crusoe population has been "more or less stable over the past 15 years." However, insufficient data exist to quantitatively assess population trends (Guicking 1999, Commission for Environmental Cooperation 2005). The breeding activity data from Isla Santa Clara suggest that this population is stable and possibly increasing (Hodum and Wainstein, unpubl. data 2006), especially given the documented increase in breeding pairs from an estimated 2,544 in 2003 to an estimated 3,470 by 2006, following the eradication of European rabbits (*Oryctolagus cuniculus*) from the island in 2003.

BREEDING SITES: THREATS

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

Coatimundis (*Nasua nasua*), introduced to Robinson Crusoe Island during the 1930s, and feral cats (*Felis catus)* are believed to have contributed to severe population declines of Pink-footed Shearwaters in the past (Guicking and Fiedler 2000, Hodum and Wainstein 2002, 2003, 2004, Bourne et al. 1992). Although coatis are currently present in reduced numbers relative to their abundance prior to the 1980s (Hahn and Römer 2002), they continue to prey on birds in the breeding colonies. Feral cats and rats (*Rattus* spp.) are also present (Bourne et al. 1992, Hahn and Römer 2002, Hodum and Wainstein 2002, 2003, 2004), and almost certainly impact colonies. Historical accounts indicate that cats have been present since the early 1700s (P. Hodum pers. comm.). Hodum and Wainstein (2003, 2004), in a preliminary attempt to assess predation threats by rats, cats and coatis on Robinson Crusoe, estimated that, on average, a maximum of 2-4% of Pink-footed Shearwater nests in three study plots failed as a result of predation, either of the chick or an adult, with the majority of predation attributed to feral cats. Stable isotope data from rats trapped in multiple colonies on Robinson Crusoe suggest that there is minimal, if any, predation by rats on Pink-footed Shearwater chicks or eggs (Hodum et al. unpubl. data).

In addition to impacts by invasive mammalian predators, introduced grazing animals have also had documented effects on Pink-footed Shearwaters in the Juan Fernández Islands. Cattle have caused significant impacts to breeding burrows in the only remaining colony to which they still have access on Robinson Crusoe, with nearly 50% of burrows showing some type of structural damage (Gladics and Hodum 2010). A fence constructed in October 2011 now excludes cattle from the central part of that colony but does not fully protect the entire colony. European rabbits (*Oryctolagus cuniculus*), eliminated from Isla Santa Clara in 2003, are still present on Robinson Crusoe. The response of breeding Pink-footed Shearwaters on Santa

Clara following the eradication was noteworthy, with an increase in breeding pairs of nearly 40% within three years (Hodum 2007). It appears that the birds were most sensitive to disturbance by rabbits during the pre-laying period. These results suggest that the large rabbit population on Robinson Crusoe might be having significant population-level effects on breeding shearwaters.

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 present, in association with the human habitation of the island, and cat predation has been documented in the breeding colonies (Hodum et al. unpubl. data). 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, large numbers have traditionally been 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. Guicking (1999) estimated 3,000-5,000 chicks were harvested each year in the late 1990s. 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. A destroyed burrow results not only in the loss of that year's chick but also in the destruction of a breeding pair, given that shearwaters use the burrow to re-establish the pair bond at the beginning of each breeding season. Thus, breeding birds whose burrow is destroyed have to find another burrow and mate, which may cost them multiple breeding seasons. Only nests underneath massive root systems or those on steep, inaccessible slopes are safe from harvesters (Guicking 1999). Since 2010, the Corporación Nacional Forestal, the Chilean government agency that manages the Isla Mocha National Reserve, has been enforcing the ban on harvesting chicks. Although no quantitative data exist, anecdotal information from the park guards and local residents suggests that the magnitude of the harvest has dropped dramatically since the enforcement began, with total harvest levels possibly now as low as several hundred chicks per season (Herrera pers. comm.).

Extensive erosion on Robinson Crusoe and Santa Clara, in particular, annually destroys or alters a substantial number of burrows in some of the subcolonies (P. Hodum unpublished data). As described above, the loss of an active breeding burrow signifies the loss of a breeding pair, with each bird needing to find a new burrow and/or mate, a process that may result in the loss of multiple breeding seasons for those individuals.

FORAGING ECOLOGY AND DIET

Pink-footed Shearwaters both feed at the surface, where they sit on the water and pick at objects at or just below the surface, and dive to pursue prey (Ainley and Sanger 1979, Ribic and Ainley 1988), with foraging dives typically being shallow (<5 m deep; maximum recorded depth = 36 m, Hodum and Shaffer unpubl. data 2006). Diving behavior includes both plunge diving and diving from the surface (Morgan pers. obs.). The species feeds mainly on fish (~90% by frequency and mass) during the chick-rearing period (Hodum et al., unpubl. data), and stable isotope analyses of chick and breeding adult blood confirmed that the breeding season diet is dominated by forage fish (Hodum et al. unpubl. data). Limited dietary analyses suggested that Pink-footed Shearwaters prey mainly on sardines (*Strangomera bentincki*) and anchovies (*Engraulis ringens*) on the continental shelf off central Chile (Guicking et al. 2001).

MARINE DISTRIBUTION

Global range

The global distribution of the species is represented in Figure 1.

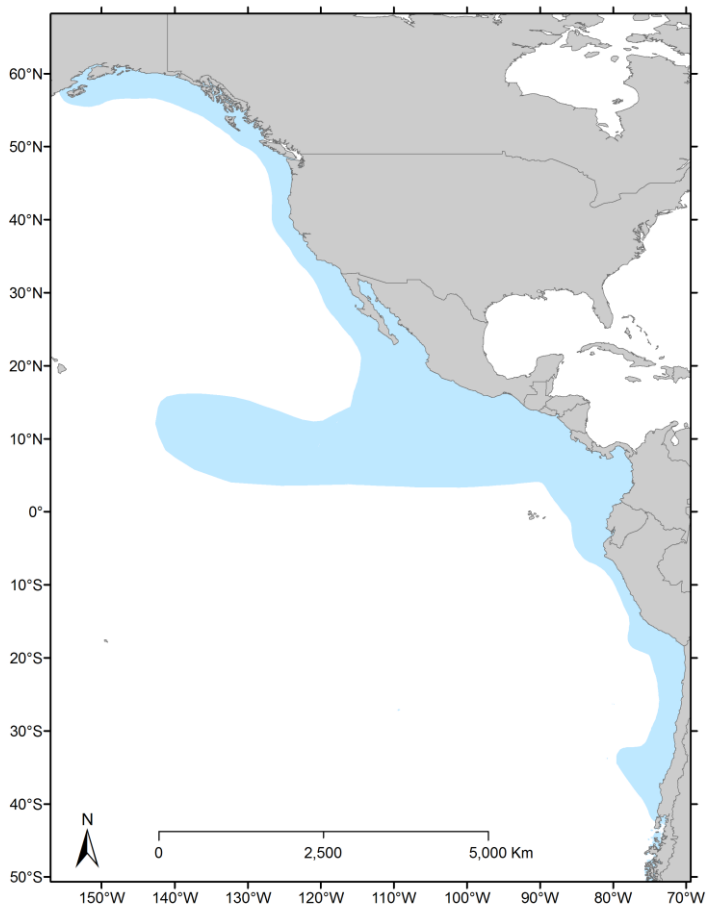

Figure 1. Global range of the Pink-footed Shearwater (Mangel et al. 2012).

Breeding

Pink-footed Shearwaters breeding on Santa Clara Island extensively exploit shelf and shelf-break waters during chick-rearing, on trips lasting 8.89±2.74 days (range: 5.29-15.24 days; N= 12). Maximum foraging trip distances from the colonies averaged 589.61±91.78 km. (Hodum et al., unpubl. data). In addition to the dominant pattern of continental shelf and shelf-break use between 34º-37ºS in the Talcahuano region, a small number of tracked birds also foraged in pelagic waters within a few hundred kilometers of the colonies (Fig. 2).

Birds travelling to the continental shelf overlap extensively with birds tracked from Mocha Island, which also appear to use the foraging area off Talcahuano (Guicking et al. 2001).

For both populations (Juan Fernández and Mocha Island), breeding birds tracked during chick-rearing (February-April) seem to concentrate primarily in the Talcahuano region (Fig. 2), an area that sustains high industrial and artisanal catches of sardines and anchovies.

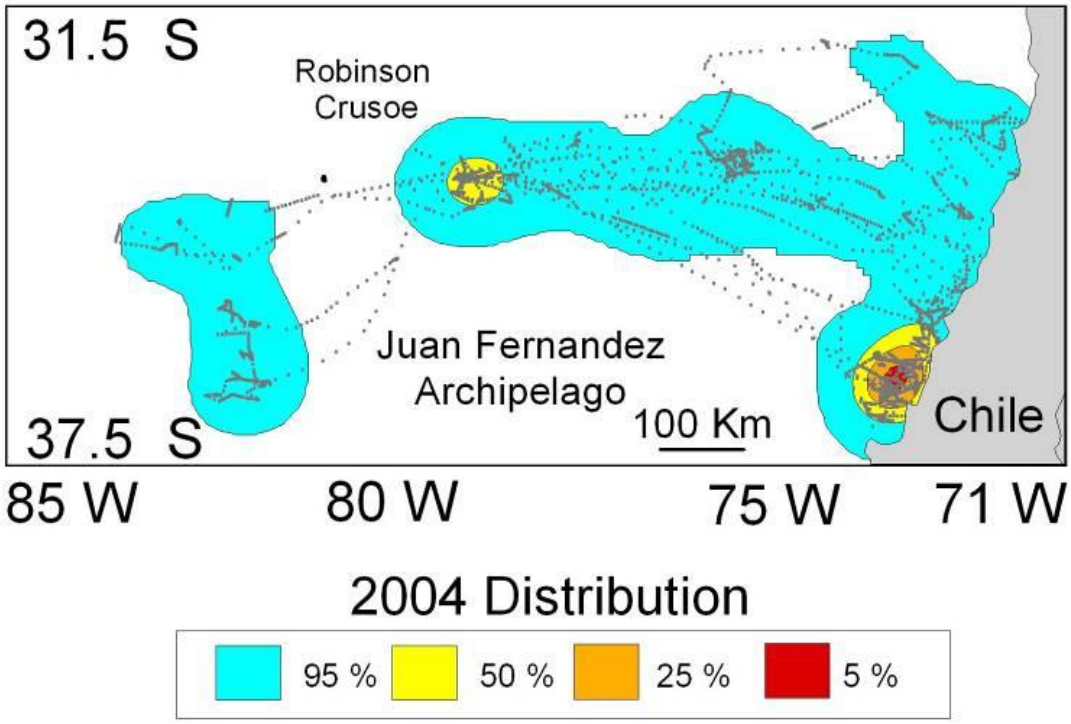

Figure 2. Foraging tracks and density plots for Pink-footed Shearwaters tracked from Santa Clara Island during the 2004 chick-rearing season (Hodum et al. unpubl. data).

Non-breeding

The Pink-footed Shearwater migrates north to its wintering grounds in Peruvian waters and off the Pacific coast of the US and Canada (Fig. 3). The migratory route during the non-breeding season largely follows the shelf and shelf-break waters off the Pacific coast of the Americas up as far as the Northeast Pacific Ocean and Gulf of Alaska, (April-November) (Harrison 1983, Guicking et al. 2001, Hodum et al. unpubl. data). Post-breeding birds tracked from Isla Mocha travelled along the coast, approximately 100 km offshore, from Chile to Peru in 16 days, covering 106-462 km per day (Guicking *et al*., 2001). Birds that winter in US and/or Canadian waters cross through the territorial waters of up to seven countries during their annual migration, indicating the importance of international conservation initiatives (Hodum et al. unpubl. data).

Migrant Pink-footed Shearwaters form monospecific flocks and also combine with Sooty Shearwaters (*Puffinus griseus*).

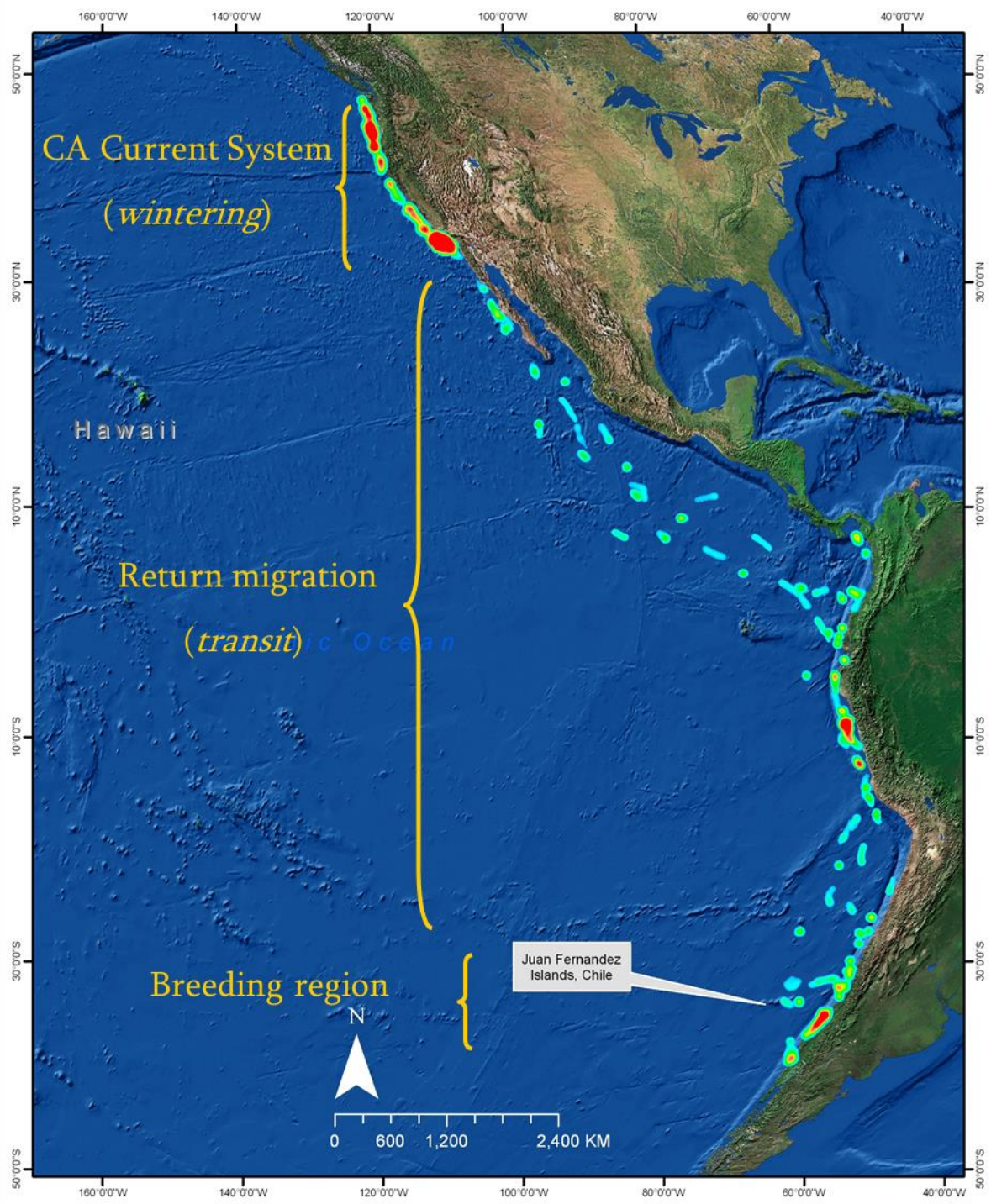

Figure 3. Migratory pattern of post-breeding Pink-footed Shearwaters tracked from their breeding colonies on Isla Santa Clara in the Juan Fernández Islands and Isla Mocha. The map represents kernel densities, with warmer colours (yellow, orange, red) representing areas of disproportionately intensive use. Wintering hotspots occur in the Humboldt Current region off central Peru and along most of the California Current off the Pacific coast of the United States up to Vancouver Island, Canada (Hodum et al. unpubl. data).

MARINE THREATS

During the breeding season, *P. creatopus* appears to forage preferentially in the continental shelf and shelf-break waters of the Bío Bío region between Isla Mocha and the waters off Talcahuano to the north (Hodum et al. unpubl. data, Guicking *et al*., 2001) (Fig. 2). This foraging hotspot overlaps spatially with a region of intensive industrial and artisanal fishing, suggesting that interactions between the species and fisheries are highly likely. Likewise, Pink-footed shearwaters spend significant time offshore the coasts of Chile, Peru, Ecuador during migration and off Mexico, USA and Canada during the

austral winter (Fig. 3).

Recent scientific observation and interview programs suggest that Pink-footed shearwaters are a frequent bycatch species in gillnet and trawl fisheries off Ecuador, Peru and Chile. BirdLife International (2013) found that the species was commonly caught in the demersal trawl fishery for common hake off south-central Chile. A parallel process, using fishermen interviews, suggests an overall mortality of c.a. 1,000 Pink-footed shearwaters annually in Chile, mainly in association with gillnet fisheries (Mangel et al. 2013).

Similarly, Mangel et al. (2013) reported an estimated bycatch of 0.004 birds per set in a single driftnet fishery off Salaverry Port, central Peru, with annual estimates in the order of 500-1000 Pink-footed shearwaters killed per year by this fishery in Peru.

Pink-footed shearwaters had been also identified as a bycatch species in the demersal longline fishery for hake off Ecuador, although the level of bycatch remain unknown (Mangel et al. 2011).

Finally, it is Important to notice that these observations are limited in the type of fisheries analyzed and there are many other fisheries operating in these countries, particularly the large purse-seine fisheries for anchovy and sardines, which impact remains unknown.

KEY GAPS IN SPECIES ASSESSMENT

For *Puffinus creatopus*, the potential interactions with artisanal and industrial fisheries are extremely poorly documented, although there are anecdotal reports of bycatch from pilot observer programs. As such, this important lack of knowledge makes it impossible at present to estimate the global rates of bycatch of the species.

The possible interactions with fisheries have drawn attention to important foraging regions and the migratory routes of the species. The Bío-Bío region has emerged as an important foraging hotspot for Pink-footed Shearwaters and is, in addition, one of the most intensively fished zones in all of Chile. It is recommended that the spatial co-occurrence between fisheries and shearwaters should be further investigated, given that spatio-temporal overlap does not necessarily mean that there is a significant bycatch.

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GLOSSARY AND NOTES

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

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).

METHOD

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 (e.g. coarsely assessed via area of occupancy and assumed density)
Unknown

(iv) Population Trend
Where calculated, 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.