



footprint
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Purbeck Seabird Survey 2015



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Front cover photo: Nick Hopper

Summary

Continuing the trend set in 2014, several species of seabird breeding on the Purbeck coast increased in numbers in 2015. This is particularly welcome as the context is often one of long-term and substantial decline. Breeding Guillemot, Razorbill and Herring Gull reached their highest numbers since monitoring began (in the 1960s for auks and 2001 for gulls). Numbers of Fulmar and Cormorant also increased, although they have not returned to the peak numbers of the 1980s, and cormorant productivity remained quite high. The breeding Shag population, which typically fluctuates, also increased following a decline over the past five years. However, Great Black-backed Gull numbers declined, reinforcing the apparently downward trend of this species. Breeding numbers of Kittiwake also declined, and no chicks are thought to have fledged at the colony. The tiny puffin colony remains stable in numbers.

Counts of breeding seabirds have been carried out on the Purbeck coast since the mid-1960s. This report presents data from the 2015 survey in the context of trends over the last 50 years. Species such as Razorbill, Guillemot and Puffin are thought to have been considerably more abundant in the first half of the 20th century, while Fulmar colonised and Kittiwake increased markedly during the second half of the 20th century. For a full discussion of previous Purbeck trends please see Lake *et al.* (2011).

Seabirds breeding on the Purbeck coast include Fulmar, Cormorant, Shag, Herring Gull, Great Black-backed Gull, Kittiwake, Guillemot, Razorbill and Puffin. None of the populations is large, and only five species currently occur west of St. Aldhelm's Head. The Guillemot population remains the biggest, with 931 individuals counted on the breeding ledges in 2015, and the Puffin population is the smallest at probably just two or three breeding pairs. There are just over 189 breeding pairs of Herring gull; all other species have populations within the ranges of about 20-85, except Great Black-backed Gull, which has a population of just nine breeding pairs.

The 2015 monitoring data show ongoing increases in the numbers of breeding Guillemot and Razorbill, although the increases were smaller than in 2014. For the second year running, counts of these species were the highest since systematic recording began in the 1960s, despite substantial declines in 2013. The count for Herring Gull was also the highest since recording began in 2001, and the rate of increase was similar to that seen in 2014. As in 2014, an increase was also seen in the number of Fulmar and Cormorant, and Cormorant productivity remained relatively high (but see text for constraints). The Fulmar and Cormorant populations are now at around 43% and 30% of their peak numbers since 1964. The Shag population recovered from its dip in 2014, although the overall trajectory for this species may still be downwards and the count is 65% of the peak in 2005. Overall, these are very welcome increases in the context of long-term and often substantial declines (see Lake *et al.* 2013 and Table 1).

In contrast, Kittiwake numbers continued to decline in 2015, with many apparently occupied nests abandoned, and productivity was zero. The small Great Black-Backed Gull population also declined in numbers to almost its lowest since recording began in 2001, mainly due to the loss of birds at

Durlston. The tiny Puffin population remains in a precarious state given the lack of sub-adults at the colony.

UK trend data for 2014 and 2015 are not yet available. Population changes in Purbeck are generally in line with national trends, although long-term declines have often started sooner or progressed more rapidly. The Purbeck trends generally show wider fluctuations (which is to some extent expected as the UK trends are averaged over many sites). The declines in the Fulmar and Kittiwake populations have been steeper than those seen nationally. Cormorants have declined steadily overall in contrast to the national trend, which shows more fluctuation. However the Shag population in Purbeck shows more variability than nationally; having increased to 2000 then declined sharply and fluctuated since. Herring Gulls also show greater fluctuations, and may be increasing, in contrast to recent UK-wide data, while Greater Black-backed Gulls show a similar decline, but again with more fluctuations. Guillemots and Razorbills increased in line with national trends, but have fluctuated more widely.

Table 1 Summary of breeding seabird population changes in Purbeck

Species	Change since 2014	Change since peak (post 1964 - note variable monitoring start dates)	Peak year	Comparable monitoring data available since:	Long term trend
Fulmar	+4 (11.7%)	-24 (-38.7)	2001	2001	Colonised in 1940s, peaked in 1980s then declined, small upturn since 2014
Cormorant	+6 (7.7%)	-237 (-74%)	1990	1964	Declined to 1960s, increased to 1990, declined again since but slight upturn of 2014 continued in 2015
Shag	+18 (72%)	-23 (-34.8%)	1992 & 2005	1964, partial	Increased rapidly in 2nd half of C20th, subsequent wide fluctuations suggest possible overall decline, but upturn in 2015
Herring gull	+21 (12.5%)	N/A	2015	2001	Considerable decline 1960s - 1980s, increase since low point in 2010
Great Black-backed Gull	-5 (35.7%)	-10 (52.6%)	2006	2001	Fluctuating decline since 2001
Kittiwake	-3 (11.5%)	-274 (-92.4%)	1982	1957	Rapidly increased throughout 1960s & 1970s, equally rapid decline, which slowed in the 2000s but continues
Guillemot	+17 (1.9%)	N/A	2015	1964	Large declines up to mid C20th, fluctuating since, with swift increase to peak in 2015 following crash in 2013
Razorbill	+6 (7.6%)	N/A	2015	1964	Large declines up to mid C20th, fluctuating widely since but peaking in 2014 and 2015
Puffin	0	-34 (91%)	1969	1964	Large declines up to mid C20th which stabilised at current level around 1990

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Acknowledgements

- 1.1 Colin Waters skippered the boat for the transect, and survey work was carried out by Nick Hopper, Neil Gartshore, Trev Haysom, Ben Wallbridge, Robin Plowman and David Brown. Ben Wallbridge co-ordinated the boat trips. The work was funded by the National Trust and Durlston Country Park.

1. Introduction

- 1.1 This report summarises the latest in a series of surveys (see Lake *et al.* 2011; Lake *et al.* 2014) of the breeding seabirds of the Purbeck Coast (Ballard Down to White Nothe). This stretch of coast is notable along the south coast of England in that it supports nine species of breeding seabird: Fulmar, Kittiwake, Cormorant, Shag, Greater Black-backed Gull, Herring Gull, Guillemot, Razorbill, and Puffin. Eight of these species are birds of conservation concern, the only exception being Cormorant. Most are amber listed; the Herring Gull is red listed (Eaton *et al.* 2009).
- 1.2 The South Dorset Coast is designated as a Site of Special Scientific Interest, Special Area of Conservation, and Jurassic Coast World Heritage Site for its wildlife and environmental interest.

2. Methods

Population census

- 2.1 Two boat trips were carried out on the 25th May and 8th June 2014. On the second trip access constraints due to MoD activity meant it was only possible to go from Old Harry Rocks by Ballard Down as far as St Aldhelm's Head. Methods follow those recommended by Walsh *et al.* (1995).
- 2.2 All observations of apparently occupied sites/nests of Fulmar, Cormorant, Shag, Kittiwake, Herring Gull and Greater Black-backed Gull were marked on enlarged photographs of the coast. Numbers of auks on known nesting ledges were counted, and records made of loafing birds. Colonies were marked on enlarged photographs as above.
- 2.3 Maximum counts are given for Ballard Down to St Aldhelm's Head, for which two counts were possible. The final figures for Kittiwakes and some of the Cormorant colonies at Ballard were taken from land-based surveys carried out for productivity monitoring (see sections 2.6 and 2.8).

Estimates of breeding Puffin numbers

- 2.4 The number of Puffins on the water and cliff ledges was noted on the boat surveys. However, surveys were undertaken during the day, when Puffin numbers tend to be at their lowest as birds are either out at sea or out of view within the breeding crevices. Records from local birders via an online discussion forum and any other records received were therefore also taken into account together with counts undertaken from the land on a voluntary basis.
- 2.5 The number of breeding pairs was estimated as in previous years (see Lake *et al.* 2011) by counting the number of birds seen arriving with fish. From the angle at which any birds carrying fish enter the coves, and given the very limited number birds present, it is possible to estimate the number of likely nest sites.

Productivity monitoring (Guillemots, Cormorants and Kittiwakes)

Cormorant productivity

2.6 Cormorant productivity was monitored at three colonies at Ballard which were visible from the cliff top. The sites were visited on 23rd May and 5th June 2015. A larger number of monitoring visits are recommended (because Cormorant breeding is asynchronous), therefore results should be interpreted cautiously. Viewpoints are described in Table 2 to facilitate relocating them accurately in future years. Note that colony numbering is consecutive and therefore differs prior to 2014.

Table 2. Locations of viewpoints for Cormorant colonies at Ballard.

Site	Grid ref. of viewpoint	Description of viewpoint
C1 Pinnacle South Cliff (part)	SZ 05095 81809 (+/-10m)	Tip of headland opposite the Pinnacle (the pointy, westernmost stack below Ballard Cliffs),
C1 Pinnacle South Cliff (part)	SZ 05212 81979 (+/-10m)	After headland opposite the Pinnacle follow coast path past large scrub patch, continue to patch of bracken - viewpoint just beyond where cliff sticks out. Extreme caution needed.
C2 South of Pinnacle	SZ 05095 81809 (+/-10m)	Tip of headland opposite the Pinnacle.

2.7 Methods followed those recommended by Walsh et al. (1995), with the exception that only two visits were possible due to funding constraints. On the first visit, each nest was mapped and numbered. The state of the nest, the nest contents, and whether a bird appeared to be incubating was noted. Where present, chicks were recorded as small, medium, large or juvenile. On the second visit the number and size of chicks was re-recorded. Well-feathered, healthy young that disappeared between visits were assumed to have fledged. Productivity was calculated as the total number of young fledged divided by the number of nests where birds were definitely or probably incubating.

Kittiwake productivity monitoring

2.8 Monitoring was carried out from Blackers Quarry as in previous years. Monitoring methods follow those of Walsh et al. 1995. All apparently occupied nests (AONs) observed on 16th June 2014 were plotted on a stitched photograph encompassing the whole cavern. The photographic record was used on the subsequent visit on 16th July 2014 to record the contents of each nest.

3. Results

Results of boat surveys

3.1 All apparently occupied nests/sites and colonies are marked in the series of photographs supplied in the accompanying photo Annex. These are largely drawn from the two boat surveys, but are supplemented with records from land-based surveys where appropriate. Summary results are presented in Table 3. All records are maximum counts of AONs or, in the case of auks, individuals. Survey sections follow those used historically, and are given in Lake *et al.* 2011.

Table 3. Breeding seabirds records on the Purbeck Coast, 2015 (2014 data in brackets for comparison). Counts are of apparently occupied nests or sites (AONs/AOSs) for all species except Guillemot, Razorbill and Puffin, for which counts are of individuals at breeding sites.

	Fulmar	Cormorant	Shag	Herring gull	Great black-backed gull	Kittiwake	Guillemot	Razorbill	Puffin
Handfast Point – Ballard Down	6 (6)	42 (35)		15 (20)	5 (4)				
Durlston Head - Lighthouse	11 (6)			8 (9)	2 (2)		337 (339)	31 (26)	
Anvil Point - Ragged Rocks	2 (4)		2 (2)	12 (9)	1 (1)		63 (45)		
Blacker's Hole - Reforn			3 (2)	10 (9)	0 (1)	23 (26)	136 (148)	38 (42)	
White Ware - Little Hedbury			11 (8)	15 (9)	0 (1)		92 (100)	0 (3)	2-3 pairs, 12 individuals (2-3, 11)
Seacombe - Winspit	3 (1)		4 (3)	56 (55)	0 (3)				
Crab Hole - Buttery Corner	11 (10)		16 (6)	12 (11)	1 (1)		288 (282)	14 (8)	
Gad Cliff - Worbarrow	3 (1)	17 (18)	4 (3)	8 (8)					
Mupe rocks - Fossil Forest				22 (15)					
Stair Hole - Scratchy Bottom	0 (6)		3 (1)	28 (16)	0 (1)				
Swyre Head - White Nothe	2 (0)	24 (24)		3 (6)					
TOTAL	38 (34)	83 (77)	43 (25)	189 (168)	9 (14)	23 (26)	931 (914)	85 (79)	2-3 (2-3)

Estimate of number of breeding Puffins

3.2 The maximum number of Puffin seen at any one time by the surveyors was 12 (there was an additional record of 15). The possible number of breeding pairs was thought to be two or three (based on the number of birds seen flying with fish into Bird Cove from the land).

Results of productivity monitoring

Cormorant productivity

3.3 Results of the Cormorant productivity monitoring are presented in Table 4 Results of Cormorant productivity monitoring in 2014 at Ballard Down. The Cormorant colonies had again fragmented, with fewer birds around South Pinnacle (where there was evidence of a rock fall on the edge of the traditional breeding site). The old site at Fault was recolonised, with small groups of birds scattered between. It was possible to monitor 24 of the 42 nests,

from which 36 chicks fledged or were judged to be near to fledging, with another seven younger birds that may have subsequently fledged. Of the monitored nests, one was abandoned, and one had been created between the two visits (and the bird was still incubating at the second visit).

- 3.4 Overall productivity was 1.5 (1.79 if medium chicks are included). This is a reduction from 2013 and 2014, but within the range of fluctuation since monitoring began in 2010. Productivity was highest at the largest of the three sites near the South Pinnacle. Results should be used with caution due to the low number of visits.

Table 4 Results of Cormorant productivity monitoring in 2014 at Ballard Down.

Colony	No. of nests monitored	Total no. of chicks observed	No. of chicks at or near to fledging (additional medium sized chicks)	Productivity - average no. of chicks per AON (including medium-sized chicks)
C1 Pinnacle South Cliff	3	4	4	1.33
C2 South of Pinnacle	6	15	12 (3)	2 (2.5)
C3 Fault	15	25	20 (4)	1.33 (1.6)

Kittiwake productivity

- 3.5 A mid-season survey on 16th June found 23 attended nests. However, seven of these were rather poorly built, and only 16 birds were incubating. Only six nests remained at the second survey on 16th July. No chicks were recorded on either visit, although fragments of shell were observed near one nest on 16th June, and the adult behaviour suggested that a chick might be present in the nest, but out of sight.

- 3.6 Overall productivity was zero.

Table 5. Apparently Occupied Nests (AONs) and results of Kittiwake productivity monitoring in 2014 at Blackers Hole.

AONs	Total no. chicks observed	Large chicks likely to fledge	Medium chicks (1/2 estimated to fledge)	Productivity (average no. of chicks per AON)
23	0	0	0	0

4. Discussion – comparison with previous years and UK trends

- 4.1 Data from 1965 onwards were compiled and discussed in Lake *et al.* 2011. Here we update the dataset with the results of the 2015 survey. Please refer to Lake *et al.* 2011 for context on each species, more information on historic records (including data constraints), and discussion of the current status of populations in relation to their historical distribution and size.
- 4.2 The UK indices of abundance (JNCC 2011)¹ used here are the same as those used in 2014 – updated data including 2014 results are not currently available.

Fulmar

After colonising Purbeck in the 1940s, fulmars increased to a peak of over 170 individuals in the 1980s. Since then numbers have declined overall despite short-term increases. This trend broadly reflects that of the UK overall, which shows a fluctuating decline. However, numbers increase slightly in 2014 and again in 2015.

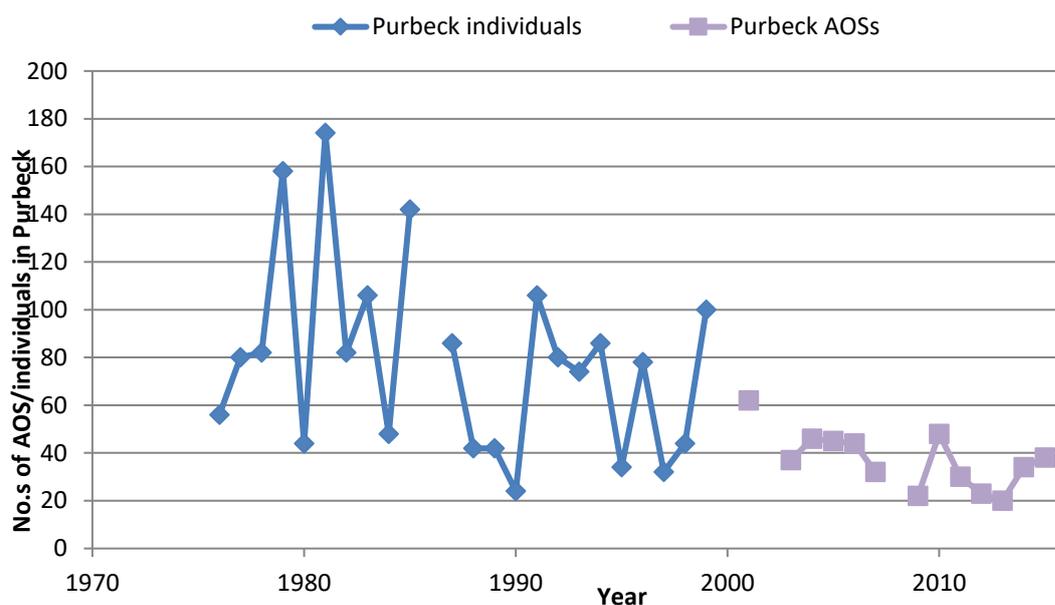


Figure 1. Changes in the numbers of individuals (Durlston Head – Buttery Corner) and, later, the numbers of apparently occupied sites (Handfast Point – White Nothe) of Fulmar.

- 4.3 Since the first record of Fulmars breeding on the Purbeck coast in 1943 (Haysom 1977), numbers increased to a peak of 174 individuals in the early 1980s. Since then, the overall

¹ The UK indices of abundance (JNCC 2011) are compiled as part of the JNCC seabirds monitoring programme and earlier surveys in 1969-70 (Operation Seafarer), 1985-88 (Seabird Colony Register) and 1998-2002 (Seabird 2000).

trend has been a decline, with peaks and troughs from year to year. However, an increase has been recorded in the last two years. The most notable increases have been at Durlston and Buttery Corner, with ongoing declines between Durlston Lighthouse and the Mile Indicator posts and west of Stair Hole (see Lake *et al.* 2011 for place names).

4.4 The Purbeck trend is similar to that of the UK as a whole (see Figure 2). A spectacular increase in the number and distribution of Fulmars in the UK and north Atlantic throughout the 20th century ceased in the last 20 years, and numbers then declined, with the suggestion of a small recent upturn. The decline in Purbeck has been steeper.

4.5 The increase in Fulmar numbers in Europe is thought to have been driven by changes in food availability due to changes in temperature in the seas and to commercial fisheries, and to a reduction in human predation (Thompson 2004). Subsequent declines in the UK have been attributed to a changes in the North Sea whitefish industry, resulting in a decrease in offal; and declines in sand eel populations in the North Sea and zooplankton in the Atlantic, possibly due to climate change. Large numbers are also caught and accidentally killed by long-line fishing in the Norwegian Sea and North Atlantic. The Fulmar is amber listed due to the decline and degree of localisation of the breeding population.

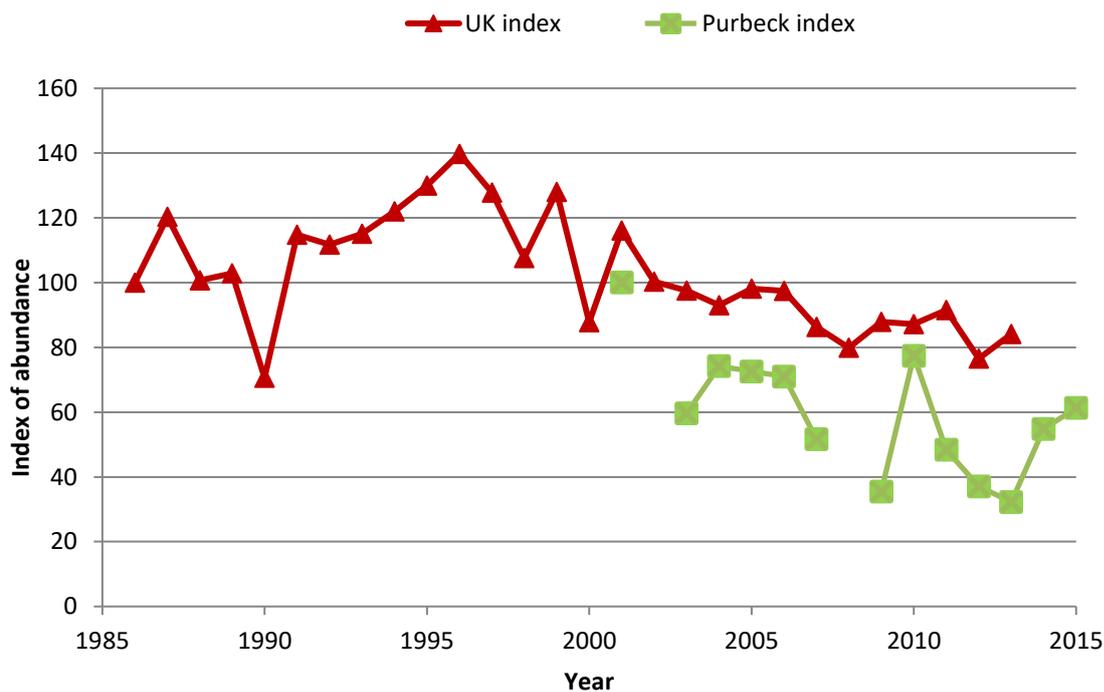


Figure 2. Changes in the UK and Purbeck indices of abundance (note differing start dates).

Cormorant

There are three main colonies of cormorant in Purbeck: Ballard, Gad Cliff and White Nothe. Overall, from the late 1960s numbers increased to a peak (320) in the early 1990s, since when a decrease of 77% resulted in a total of 73 birds in 2012, the lowest on record. The number remained at this low level in 2013, but increased a little in 2014 and 2015 and is now 83. The overall decline is more severe than that seen in England as a whole, and started earlier. Trends in abundance vary between colonies. Until 2012, the White Nothe colony showed more resilience than those at Ballard and Gad Cliff, which have declined steadily. However, both the White Nothe and Gad Cliff colonies declined by almost 50% in 2012, although both have remained steady since. Productivity has fluctuated markedly. A particularly poor year in 2012 was followed by the highest level since monitoring began in 2014 (but see data constraints below), but dropped again in 2015.

- 4.6 Cormorants declined in Purbeck throughout the 20th Century. However, the Gad Cliff colony remained fairly stable (ranging between about 80-110 AONs) until the early 1990s. It then declined steadily until 2012, since when numbers have remained low but stable. Records for the White Nothe population are patchier, but overall the colonies here have been relatively stable. In the past birds have apparently switched between the two sub-colonies present (T. Haysom, pers. comm.), and are presently only using the eastern side of Middle Bottom. In contrast to Gad Cliff and White Nothe, the number of Cormorants at Ballard leapt from 11 in 1974 to 127 in 1992, and then have declined steadily, although numbers here are still higher than in the 1970s. The location of colonies tends to change between years, although three main sites are used, with small groups sometimes scattered between them. In 2015, the main colony near South Pinnacle was smaller, possibly due to a rock fall nearby, and the site previously deserted at Fault was recolonised, with additional small colonies in similar locations as those seen in 2013.
- 4.7 After the decline of almost 50% at Gad Cliff in 2012, there was a slight increase in 2013, but numbers there have remained low. Numbers at White Nothe were maintained following the slight increase seen 2013 and 2014. At Ballard, numbers again increased slightly, although the population there is still less than a quarter of its size at the peak in 1990.

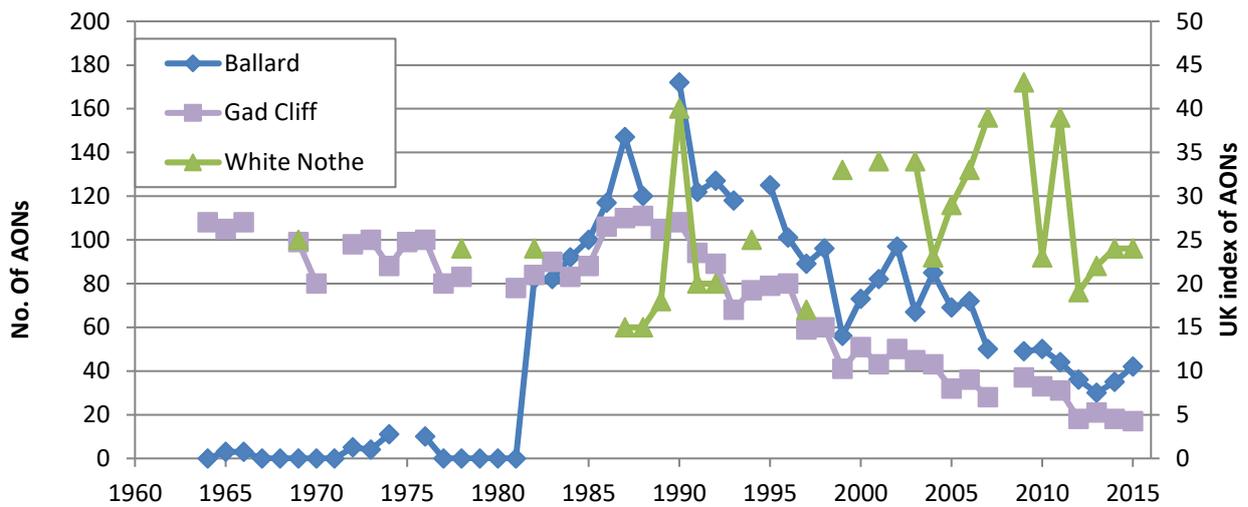


Figure 3. Numbers of apparently occupied Cormorant nests at different locations in Purbeck compared to the UK index of abundance.

- 4.8 In the UK as a whole, the abundance index for Cormorants (which includes inland as well coastal breeders – a different subspecies) increased from 1986 to 1995. Since then it has decreased, with a temporary increase in the early 2000s. Because of significant regional variation in the abundance index (declines are particularly severe in Northern Scotland), Figure 3 shows the trend for the total Purbeck population for the years in which these data are available compared to the English index of abundance. The Purbeck population decreased while the English index was still increasing, and has decreased further. The upturn in numbers nationally since 2011 has been reflected in Purbeck in 2014-5.
- 4.9 Nationally, increases in abundance up to 1995 are likely to have been facilitated by increased legal protection instigated under the Wildlife and Countryside Act 1981. Factors responsible for recent declines are likely to include increased mortality from licensed and unlicensed shooting, as well as possible changes in food availability (JNCC 2011). Poor weather during the breeding season in 2012 and early in the breeding season in 2013 may have impacted on the Purbeck population, particularly at Ballard Down.

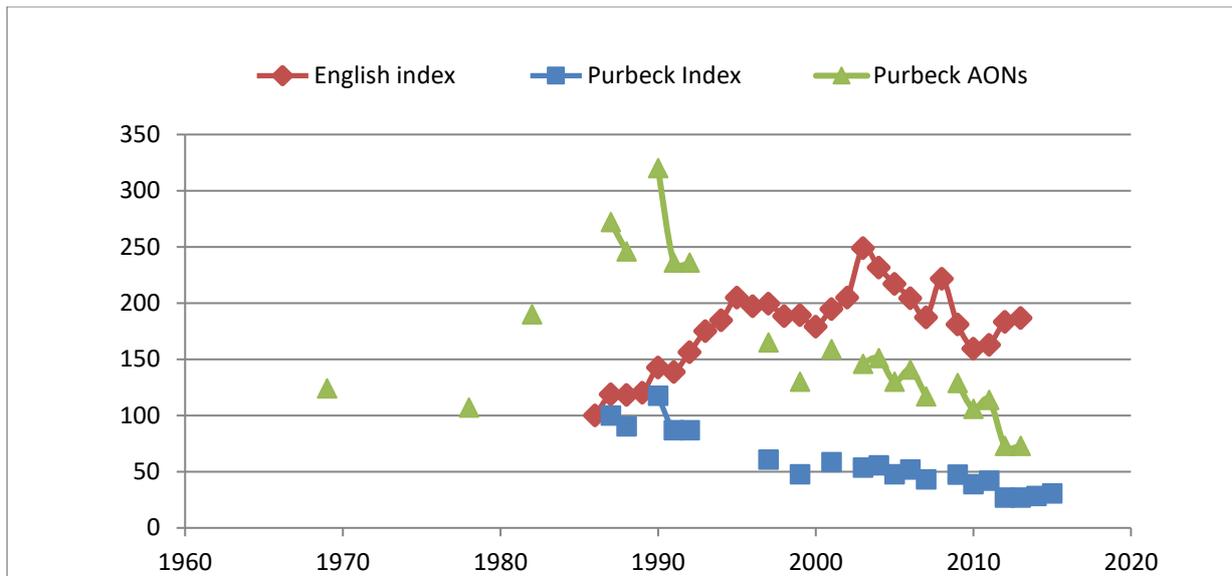


Figure 4. Total Purbeck AONs and UK indices of abundance. Only years with full data from Ballard – White Nothe have been included.

Cormorant productivity

4.10 Over the UK as a whole, productivity has declined since 1988, but has increased in the last few years. At Ballard, where productivity has been monitored since 2001, annual variability makes an overall trend less clear. Productivity reached its lowest point in 2012, but rose to its highest level at 1.8 chicks per AON in 2013 and again to 2.04 in 2014. This declined to 1.5 in 2015. It should be noted that the small number of visits undertaken in 2013-5 meant that chicks that had not yet fledged were included in the productivity calculation, which may therefore be an overestimate. The reasons for the national trends are unknown (JNCC 2011).

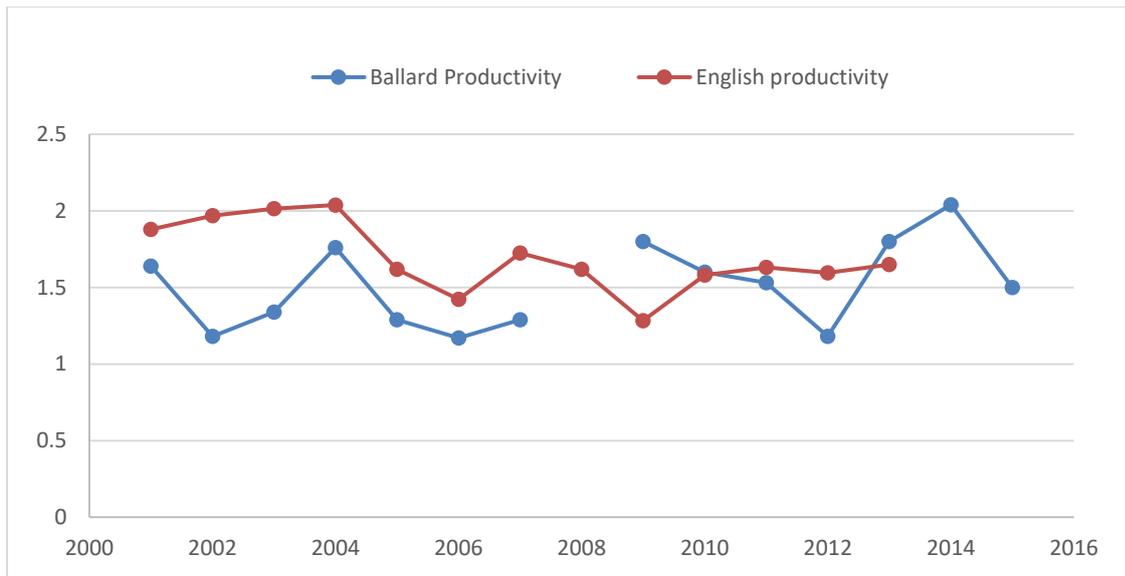


Figure 5. Productivity at Ballard compared to average UK productivity (to 2013).

Shag

The number of breeding shags appears to have increased significantly in the early 20th century until the 1970s, since when the population has remained fairly stable but with significant annual fluctuations. Following a recent steeper decline, 2015 saw a substantial upturn in numbers. UK trends indicate a long term decline (although these have been affected by slow recovery from wrecks on the east coast).

- 4.11 Shag records were sparse in Purbeck until the latter half of the 20th century. Since 1965 numbers appeared to have increased rapidly to a peak in the early 1970, as the cliffs between Crab Hole and Buttery Corner were colonised (Haysom 1993). This was followed by decline to a low point in 1980, and a gradual rise (with much variability) to a larger population size in the 1990s and 2000s. However, after 2010 the Purbeck population declined, and reached its lowest level since the 1970s in 2014. This has been followed by a considerable upturn in 2015. The decline was due to a decrease between Durlston and St. Aldhelm's Head, followed by a marked decrease west of St Aldhelm's Head. The recovery has mainly been in the area between Sutton and Buttery Corner, with smaller increases elsewhere.

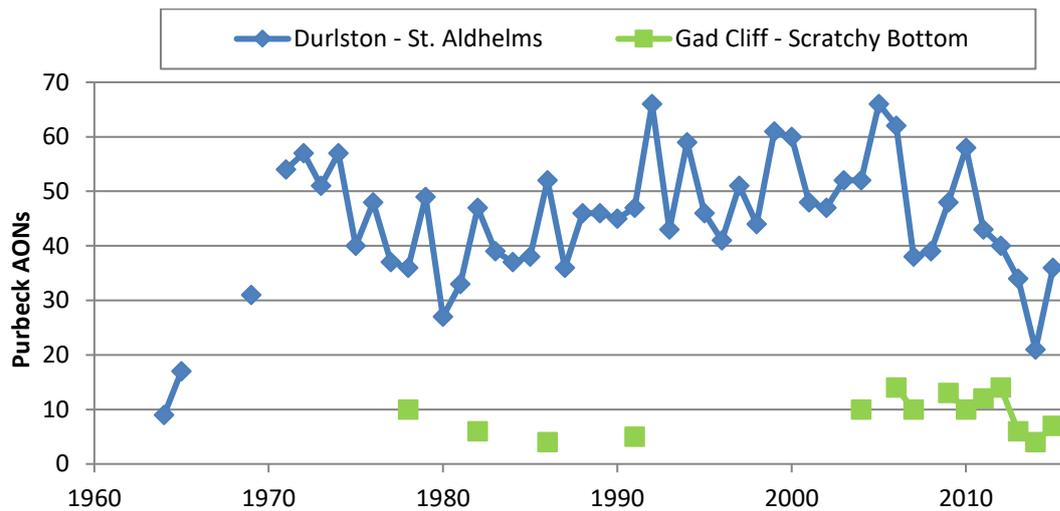


Figure 3. Changes in numbers of apparently occupied nests of Shag in two stretches of the Purbeck coast.

- 4.12 Overall, the changes in numbers of nesting Shags in Purbeck have not reflected national trends, with the population continuing to increase gradually at least until the mid-2000s, then fluctuating widely. In the UK overall, the Shag population increased slightly from the late 1960s to the mid-1980s (possibly due to increased legal protection (e.g. under the Wildlife and Countryside Act 1981) and reduced persecution (JNCC 2011)) but then gradually decreased, with an abrupt crash in 1994 and again in 2005 due to a wreck (mass mortality event) caused by food scarcity during a period of prolonged onshore gales on the east coast (Harris & Wanless 1996) (Note the initial step rise in the index up to 1987 shown in Figure 4 is due to many adults choosing not to breed in 1986, resulting in low numbers at colonies that year).
- 4.13 The tendency for adults not to breed every year may be one reason for the variability in the Purbeck population. Recent fluctuations make it unclear whether the Purbeck population may be undergoing a long-term decline in line with the UK trend – the recent upturn suggests otherwise. The Shag is amber listed due to declines in the breeding population, and the international importance of both breeding and non-breeding populations in the UK (Eaton et al 2009).

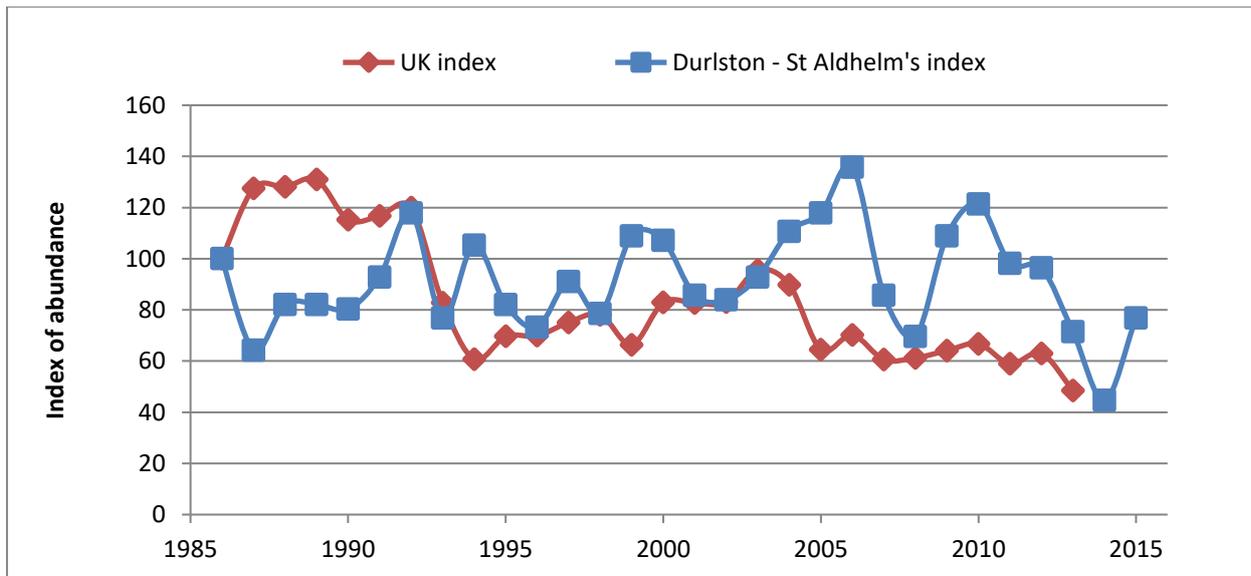


Figure 4. Changes in the Purbeck index for breeding Shag compared to the UK index (to 2013).

Herring gull

There was a marked decline in the herring gull population in Purbeck in the second half of the twentieth century, which has been more severe than the UK trend. Since 2000 fluctuations have been broadly similar to the UK trend. Following a sharp decline in 2011, numbers have continued to increase, and in 2014-5 reached the highest since systematic recording began in 2001, at about half the level recorded in 1964. There has been notable movement of birds between sections of the coastline, with declines in the east made up for by increases further west.

- 4.14 The patchy records available for Purbeck suggest a decline (77% between 1965 and 1989) considerably more severe than the national decline (43% between the late-1960s and mid-1980s). However, after 1985 numbers in Purbeck fluctuated, showing an overall rise until about 2000, and a subsequent decline, levelling out after 2001 and mirroring the overall UK trend (see Figure 6). Recovery from the sharp decline seen in 2011 was maintained in 2014 and 2015, and numbers are now the highest since systematic recording began. Nest sites tend to vary between years; numbers at Ballard continue to decline, while increases have been particularly notable along the Fossil Forest and between Stair Hole and Durdle Door, with three new nesting sites on the chalk further west.
- 4.15 The Herring Gull is red listed in the UK due to a long-term decline in the population (Eaton *et al.* 2009).

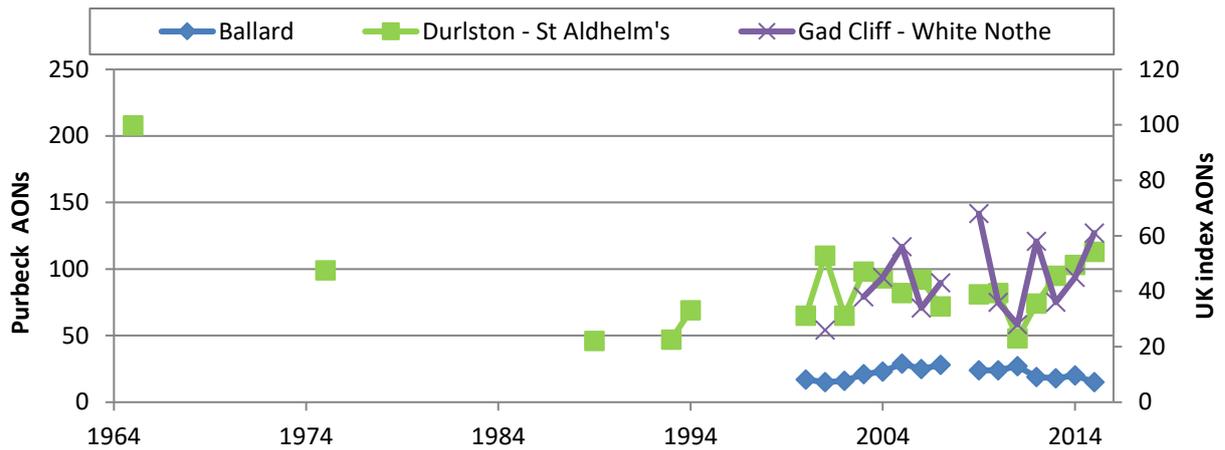


Figure 5. Variation in Herring Gull numbers in different stretches of the Purbeck coast.

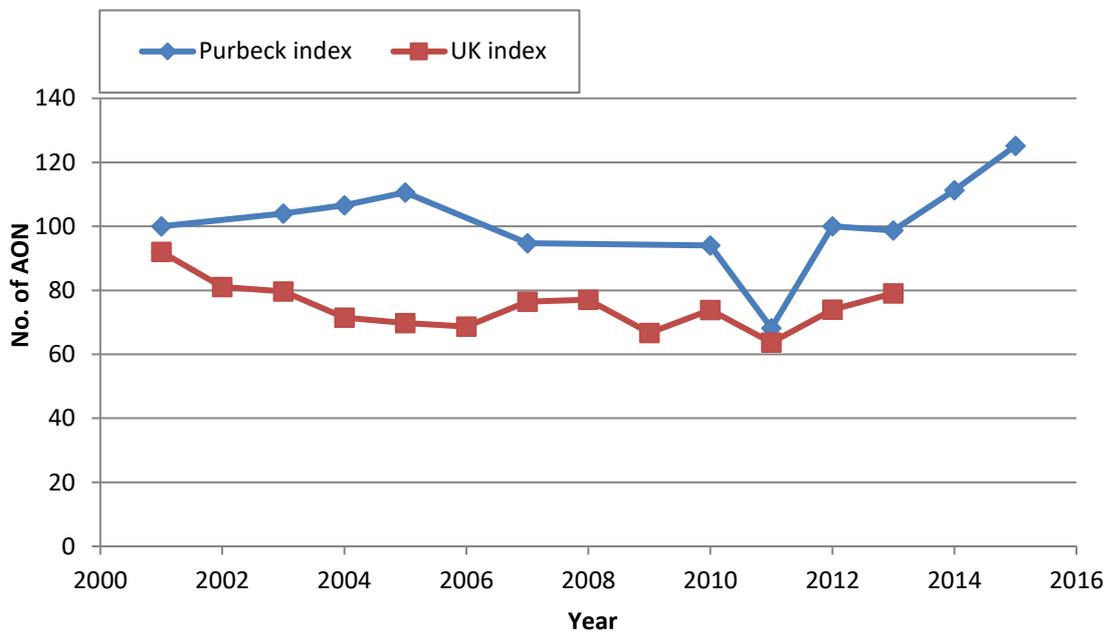


Figure 6. Purbeck and UK indices of abundance (UK monitoring started in 1986). Only years with full data from Ballard – White Nothe have been included.

Great Black-backed Gull

The Great Black-backed Gull population in Purbeck appeared to remain steady between at least the early 1990s until 2000. Since then an overall decline has mirrored that of the UK index of abundance but with wider fluctuations. The ongoing decrease at Ballard Down contrasts with an overall increase between Durlston and St. Aldhelm's Head, although numbers dropped here in 2015.

4.16 The small Purbeck population appears to have remained fairly stable to 2011, with between one and six AONs recorded between Durlston and St. Aldhelm's Head, and between eight

and twelve AONs at Ballard. A dip to four AONs at Ballard Down in 2011 was followed by an increase back up to nine pairs in 2012 and eight in 2013, but this dipped again in 2014 to four pairs, with five in 2015. Patchy records from Gad Cliff – White Nothe suggest a population of one or two pairs until 2009, with one returning in 2014 (only). Following an increase in 2014, numbers dropped again between Durlston and St. Aldhelm’s Head in 2015. Note that the large percentage changes seen in Figure 7 involve small numbers of nests.

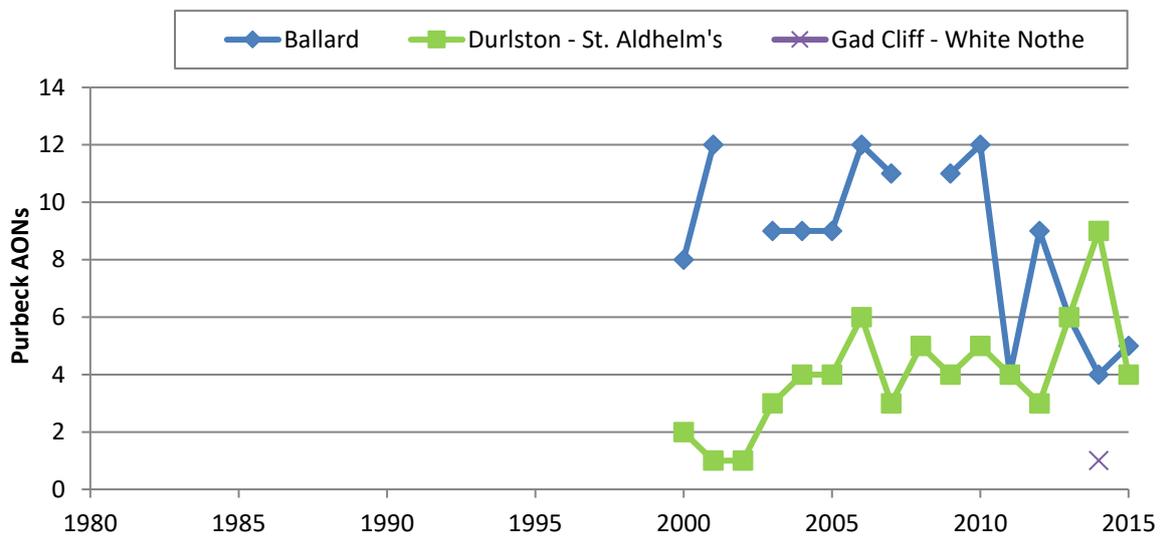


Figure 7. Numbers of apparently occupied nests at three Purbeck survey locations.

- 4.17 The 20th century saw widespread expansion of the Great Black-backed Gull breeding range and numbers. The abundance of Great Black-backed Gulls decreased a little between the first census of their numbers in 1969/70 and 2000. Between 1986 and 2010, abundance peaked in 1999 at 115% of the 1986 reference level, but has since decreased by around 20%.
- 4.18 The Purbeck trend since 2000 (when systematic surveying began) fluctuates more than the UK trend, but the overall downward UK trend appears to be reflected in Purbeck (see Figure 8).

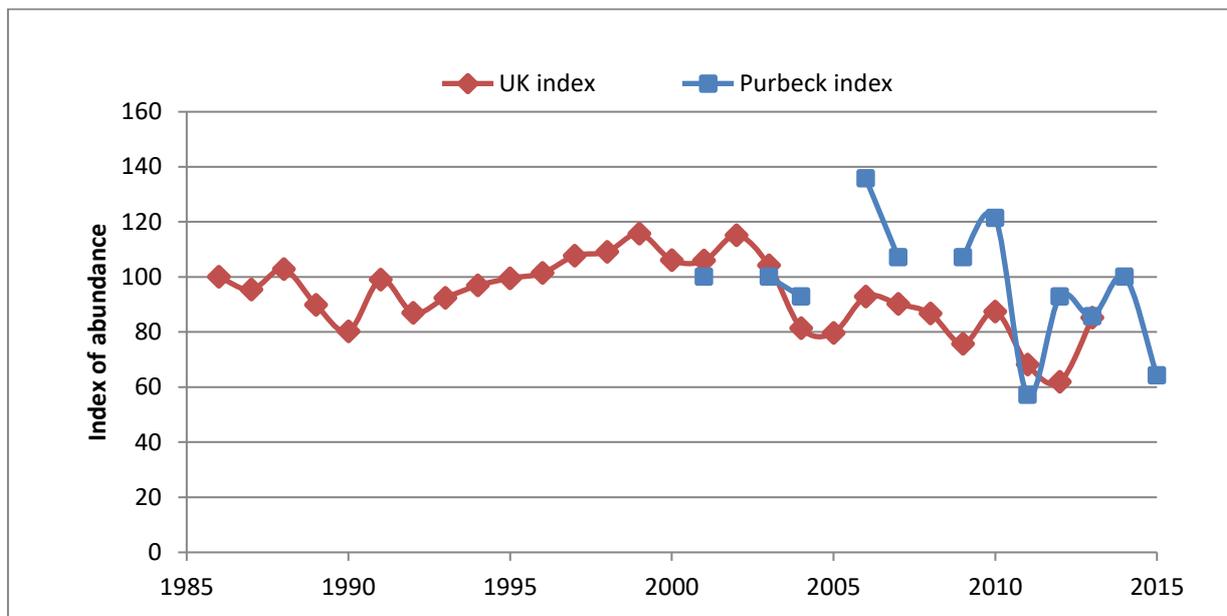


Figure 8. Purbeck and UK indices of abundance. Note the different monitoring start date. Only years with full data from Ballard – White Nothe have been included.

4.19 Great Black-backed Gulls are currently listed as amber in the Birds of Conservation Concern due to a non-breeding population decline (Eaton et al 2009).

Kittiwake

Following rapid expansion throughout the 1960s and 1970s the Kittiwake population in Purbeck has rapidly declined. Although the rate of decline has slowed in the last 10 years, in 2015 the only remaining colony, at Blackers Hole, was the smallest since the peak in the 1980s. This decline was initially more rapid than the national trend, but after a slight and short-lived increase in the mid-2000s, the rate of decline slowed a little. Kittiwake productivity remains very low compared to the national figure, although this is also declining. It seems unlikely that the Blackers Hole colony will persist in the longer term unless productivity improves substantially.

4.20 Kittiwakes are known to have been present around Durlston in the 1880s (see Lake *et al.* 2011). This site remained the only colony until the late 1960s/early 1970s, when Sutton Rock, Bird Rock, Blackers Hole and Crab Hole were colonised and the total numbers of apparently occupied nests reached 139. By 1980 the overall population peaked near 300 AONs. After this, all colonies declined rapidly, and since the mid-1990s, only the Blackers Hole colony has persisted. However it too is in overall decline (despite an brief increase in the mid-2000s) and in 2015 reached its lowest level since 1964, when the population size was increasing.

4.21 In 2015, seven of the 23 AONs recorded did not contain incubating adults at the time of the first visit. Due to the limited nature of the monitoring, it is not clear whether these nests

were in fact used, as they were abandoned and in most cases destroyed by the time of the second visit. It is likely that the numbers of pairs that successfully laid eggs was substantially lower than 23. Nest building can be delayed by 2-3 weeks in response to a scarcity of food in spring, and under such conditions a high proportion of pairs (up to 40%) may not progress to laying².

4.22 Changes in the Purbeck population mirror the UK trend (see Figure 10) although the population may have peaked earlier and the decline occurred more rapidly until it slowed in the 21st century. Kittiwakes are amber listed (Eaton et al. 2009) due to the decline and degree of localisation of the breeding population.

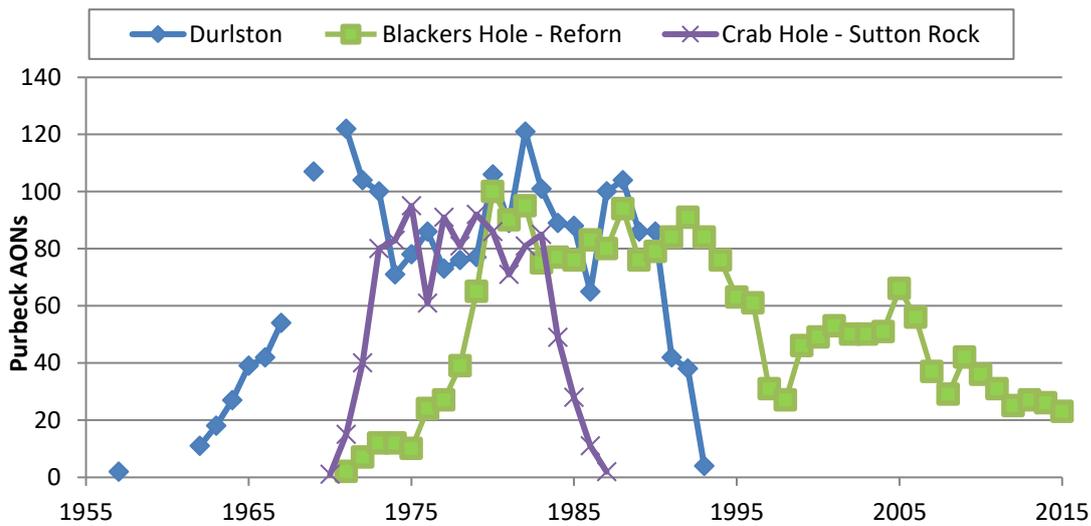


Figure 9. Changes in numbers of apparently occupied nests of Kittiwakes in Purbeck

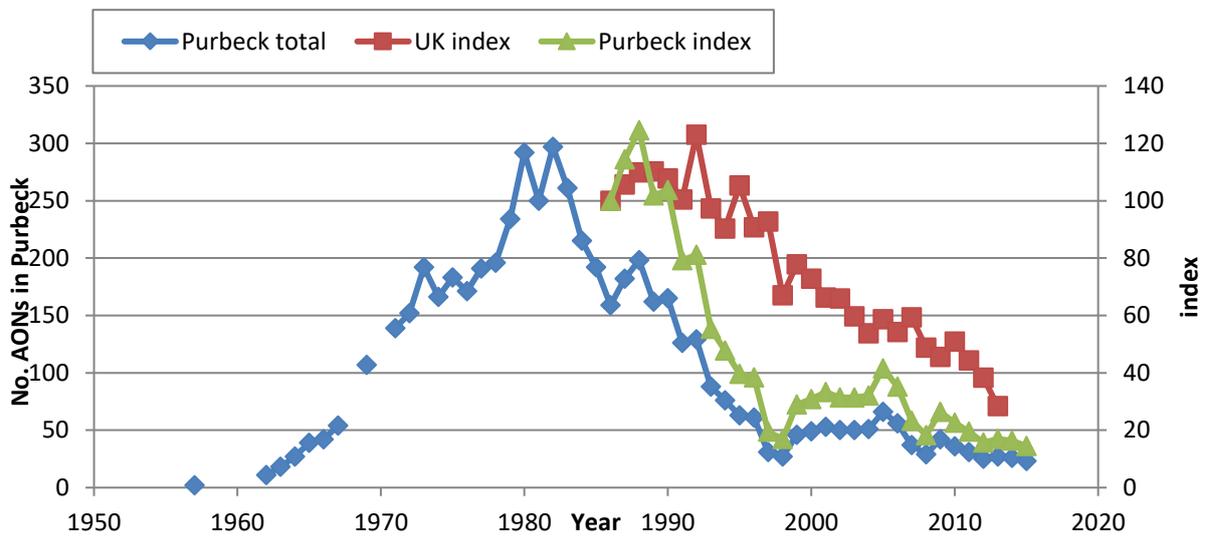


Figure 10. Changes in numbers of apparently occupied nests of Kittiwakes in Purbeck and Purbeck and UK indices of abundance from 1985.

² <http://jncc.defra.gov.uk/page-2889>

Kittiwake productivity at Blackers Hole

- 4.23 Productivity has been monitored at Blackers Hole in most years since 1991 (see Lake *et al.* 2011 for data sources). Productivity has been variable, increasing to a peak of over 1.2 in the mid-1990s (just after the demise of the two other Purbeck colonies), then following a fluctuating trend that decreased overall. Patchier data from 2004 onwards show a sharp decline until 2011, when productivity was zero. Although it increased in 2012 (in contrast to the national trend), it declined again to 0.09 in 2013 and again to 0.04 in 2014. Productivity in Purbeck was higher than the national average at its peak, but has since declined more rapidly and to a lower level.
- 4.24 Nationally, declines in productivity have been related to declines in sandeel abundance and, in some regions, are negatively correlated with surface sea temperature (Frederiksen *et al.* 2004). Kittiwakes are particularly vulnerable to food shortages as they are surface feeders, and only able to reach prey on or near the surface. National data suggest that, in order to prevent ongoing declines, breeding success would need to increase to around 1.50 chicks fledged per nest (Cook & Robinson 2010).

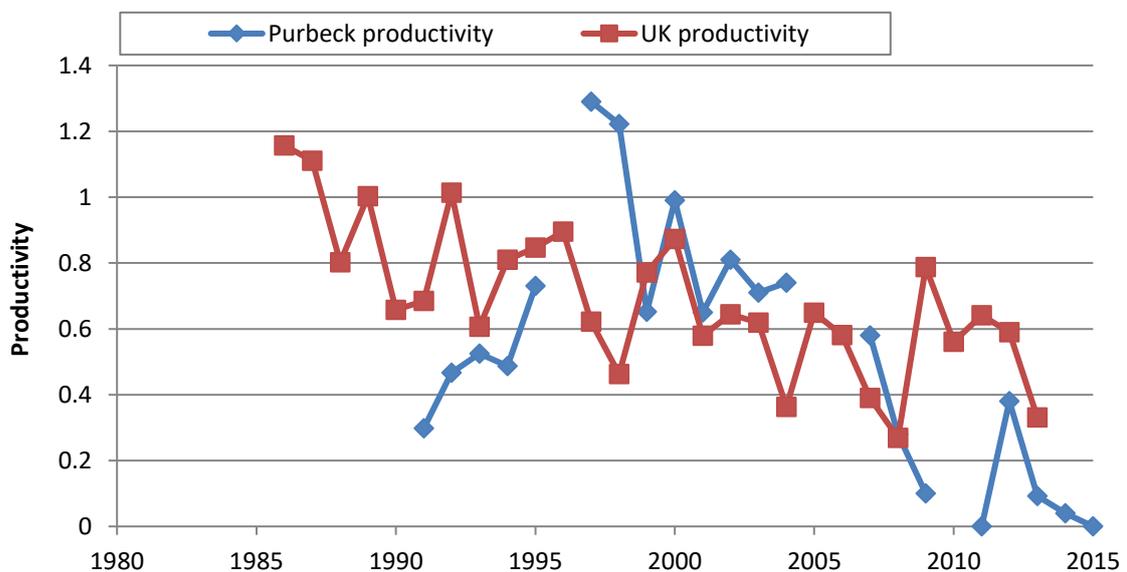


Figure 11. Productivity (expressed as total number of fledglings/total number of AONs) in Purbeck compared to the UK figure.

Guillemots

After large declines up to the mid-20th century, guillemot numbers in Purbeck stabilised in the 1970s and increased throughout the 1980s and 1990s. The Purbeck colonies have followed a similar trend to that shown by the UK index of abundance, although fluctuating more widely. Although numbers dropped severely in 2013, mainly due to a substantial decline at the Durlston colony attributed to the presence of breeding raven, increases at the other Purbeck colonies and subsequent recovery at Durlston mean that numbers have been at the highest since the mid 1960 for the past two years. Any population impacts of ongoing predation at Durlston will not be apparent for some years. It is noted that UK productivity is decreasing overall, and may lead to future declines.

4.25 The number of Guillemots in Purbeck declined from an estimated 2500-3500 in the 1930s to about one quarter of this (around 700) in the 1970s (see Lake *et al.* 2011 for more details). After this the overall population began to increase, mainly at the Durlston colony, but also between Crab Rock and Sutton Rock from the early 2000s. Since the mid-2000s, numbers at Durlston have fluctuated widely. The lowest numbers since 1960 were recorded in 2013 (144), when the sub-colony known as “Main Ledge” was entirely deserted, possibly due to heavy predation from a pair of resident Ravens. However, the numbers at Main Ledge increased again in 2014 and 2015, despite the ongoing presence of the Ravens. This, combined with increased at others site (Ragged Rocks, Blackers Hole/|Reform, Bird Cove, Sutton Rock, Bird Rock) meant that the overall population reached the highest level recorded in Purbeck at in 2015 (931 birds).

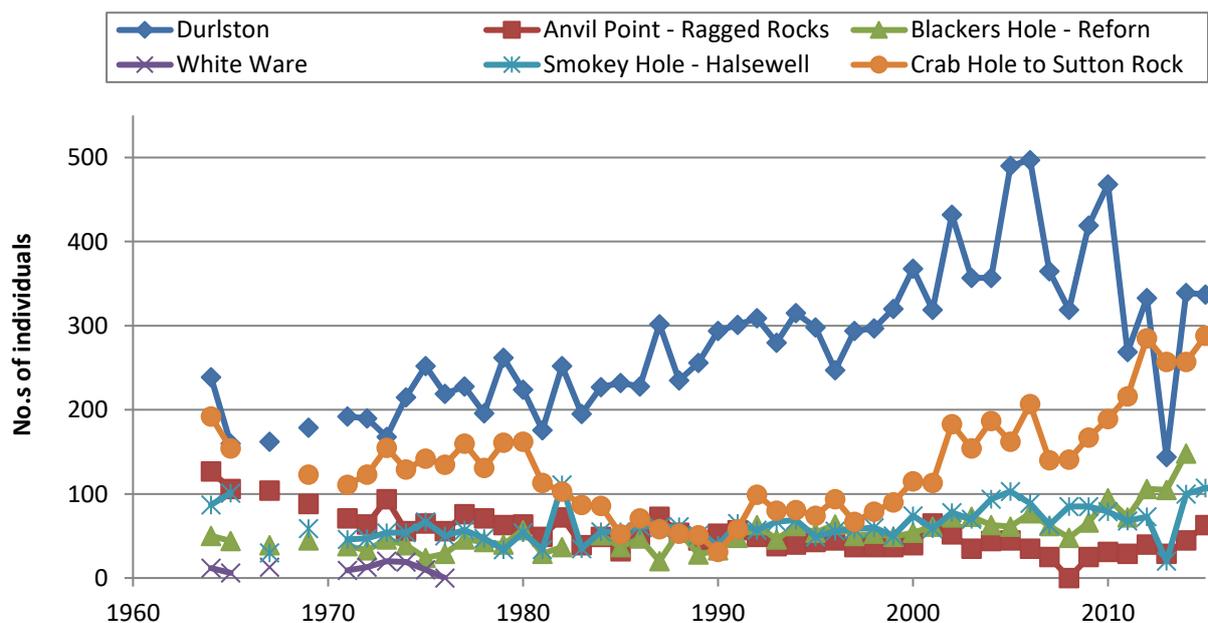


Figure 12. Changes in numbers of Guillemot individuals at breeding colonies in Purbeck since 1965.

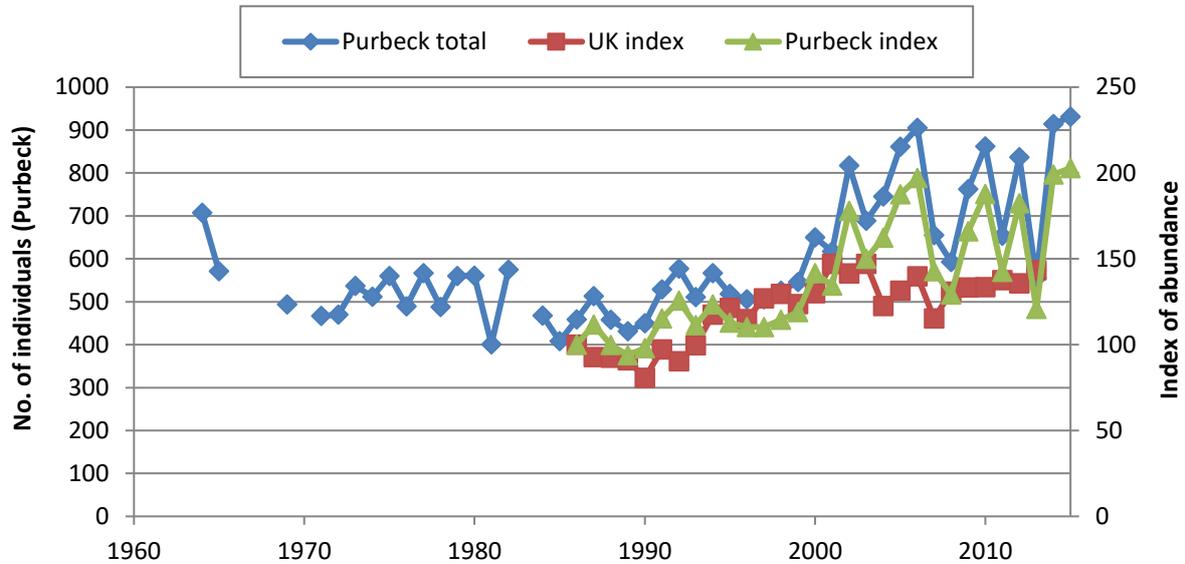


Figure 13. Changes in the total number of individuals recorded at breeding ledges in Purbeck compared to the UK index of abundance.

4.26 Changes in the Purbeck population broadly correlates with changes in the national index of abundance, which showed a considerable increase from the mid-1980s, although more recent fluctuations in Purbeck do not correlate with the relatively stable national trend over the last five years. The reasons for the national increase are not known, although the recent levelling out may be due to density-dependent effects on breeding success (with competition for space and food becoming critical). Observed low UK productivity, thought to be due to food shortages combined with low return rates at sampled colonies, suggests that future declines may be likely nationally should productivity decline further (JNCC 2011). Any population-level impact of significant predation at Durlston will not be seen for the next three years or so, as Guillemots start breeding at five years of age. Guillemot is amber listed in Birds of Conservation Concern due to its degree of localisation (Eaton *et al.* 2009).

Razorbills

Razorbills declined substantially in Purbeck between 1880 and the 1960s, when systematic counts began. The overall population continued to decline, with the loss of several colonies, until the 1970s. The remaining small population then remained fairly steady with fluctuations from the late 1980s, until increases in the 2000s brought it back up to numbers similar to those last recorded in 1965. A population crash followed, but numbers again increased (with fluctuations) until in 2014 and 2015 numbers exceeded those previously recorded. Fluctuations are greater than those seen in the UK index of abundance. A decline in the UK population is expected on the basis of poor UK productivity levels.

4.27 Razorbills were considered to be breeding on the Purbeck Coast in great numbers (more than Guillemots) in the 1880s (see Lake *et al.* 2011 for more details). By 1932, only 130 birds were recorded which fell further to 58 by 1967 and just 14 by 1970, by which time many colonies had disappeared altogether. The population then fluctuated but remained

steady overall until the late 1980s, after which two crashes, roughly a decade apart, were followed by recoveries to higher peaks. The 2015 total (84 individuals) is the highest level recorded since systematic recording began in 1964. A small new colony at Topmast in 2014 did not persist in 2015, but numbers at the main colonies (Durlston, Blackers/Reform and Crab Hole – Bird Rock) have all increased.

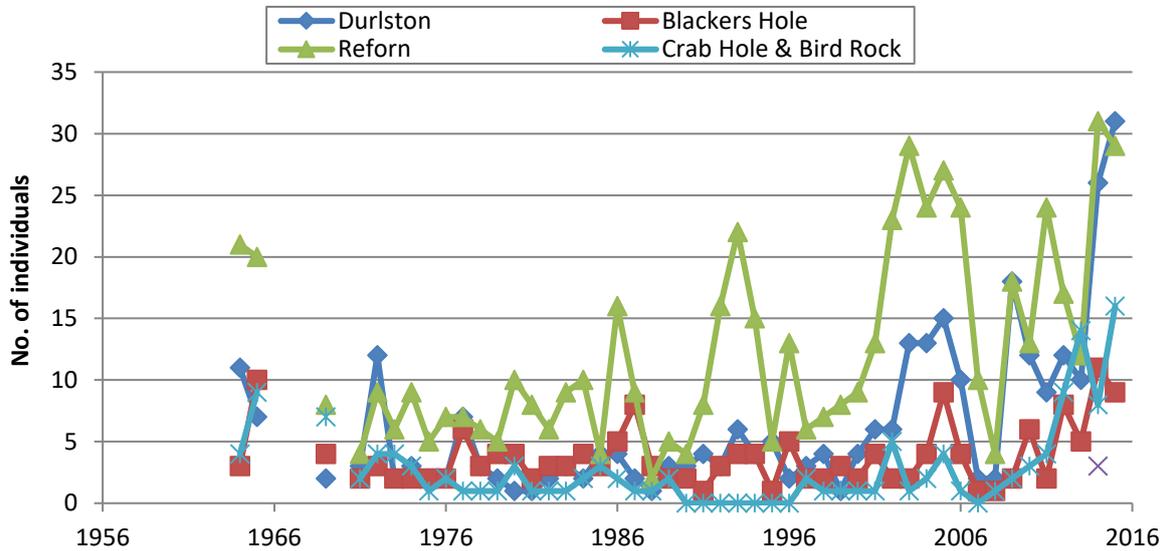


Figure 14. Changes in individual Razorbill counts at main colonies between 1965 and 2014.

- 4.28 The Purbeck population has shown large fluctuations since the 1950s (although note that the small size of the population means a small change in numbers results in a large percentage change) (see Figure 15). These fluctuations can obscure overall trends, but the 2015 figure is the highest since systematic counts began in the 1970s, and even the relatively low 2013 total was around double that of the 1980s and 1990s. However, these numbers are significantly lower than those pre-1960s.
- 4.29 This trend is broadly similar to the national trend but with much more exaggerated fluctuations, largely due to the three crashes and subsequent recoveries. As with Guillemots, it has been suggested that the levelling out seen in the UK index in the 2000s may be due to density dependent mechanisms (JNCC 2011). UK Razorbill productivity has declined steadily since 1993 (possibly due to food shortages), and unless this trend reverses, a continuing overall decline is predicted (JNCC 2011). Razorbill is amber listed in Birds of Conservation Concern due to its degree of localisation (Eaton *et al.* 2009).

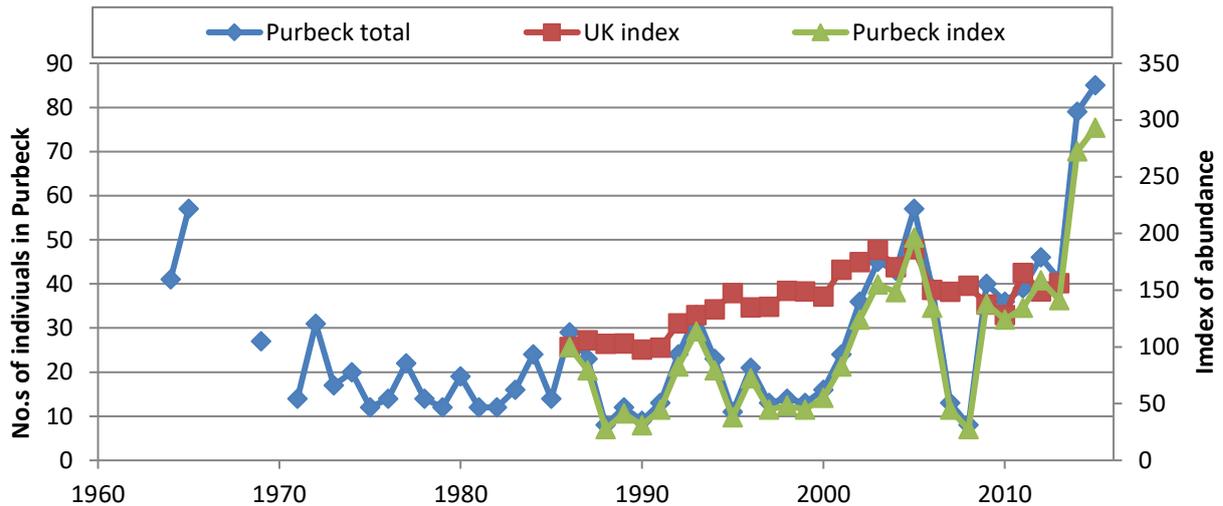


Figure 15. Changes in the counts of individual Razorbills and the UK and Purbeck indices of abundance.

Puffins

The puffin population of Purbeck declined dramatically in the 20th century. By the time the population steadied in the 1990s, the estimated number of breeding pairs was about three, and remains at about this level in 2015. In contrast, the national trend was of a significant increase in the last quarter of the 20th century. More recent national data are not available, but monitoring of a small number of large colonies has shown declines in numbers, survival and productivity.

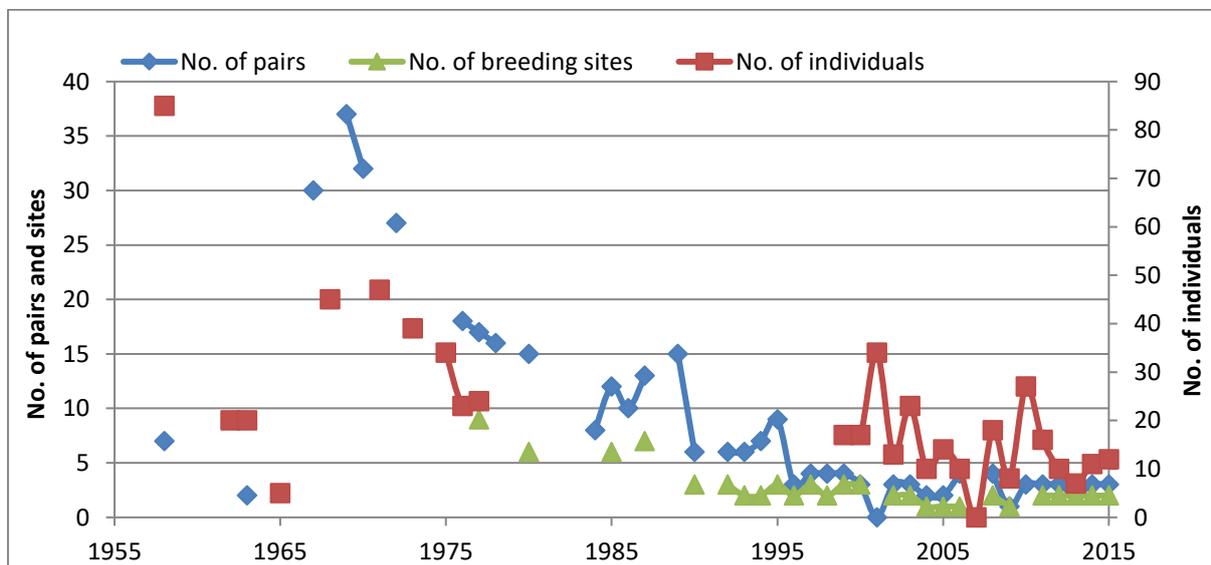


Figure 16. Numbers of individuals, breeding pairs and breeding sites in Purbeck between 1958 and 2015 (note the different scale for no. of individuals).

4.30 Puffins were thought to be abundant in Purbeck at least until 1939 (see Lake *et al.* 2011) but by 1958 there were only 85 individuals recorded, dropping to 23 in 1975. The population subsequently declined much more slowly until the mid-1990s, since when it has stabilised at around three breeding pairs. The numbers of breeding sites has correspondingly declined to two (adjacent) sites at Bird Cove and Scratch Ass Cove. No

juvenile birds have been observed in recent years and the future of this colony remains precarious.

- 4.31 The downward trend in Puffin numbers in Purbeck does not reflect the overall increase suggested by UK census returns between 1969 and 2002. However, although UK-wide data are not available for more recent years, monitoring results from two large colonies show subsequent declines. Productivity has fluctuated but appears to have been lower since the 1990s. Caution should be used in drawing wider geographical conclusions from these data. On Lundy Island, where conditions for Puffins have improved through the eradication of rats, numbers have increased from just five individuals to over 80. Puffins are amber listed due to their degree of localisation and categorisation as a species of European Conservation Concern (Easton *et al.* 2009).

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