Population status and trends of selected seabirds in northern New Zealand

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Aims of this review

- identify the breeding sites for Australasian gannet (*Morus serrator*), spotted shag (*Stictocarbo punctatus*), red-billed gull (*Larus novaehollandiae*), white-fronted tern (*Sterna striata*), and grey noddy (*Procelsterna albivitta*) in the northern half of the North Island, from Cape Egmont on the west to East Cape in the east;

- collate the available information on population numbers and any trends through time, both at individual sites and overall within this region, over at least the past 75 years;

- summarise what is known about each species' breeding biology—timing of breeding cycle, incubation shifts and length and chick rearing period—and what is known about the birds' diet during chick rearing; and

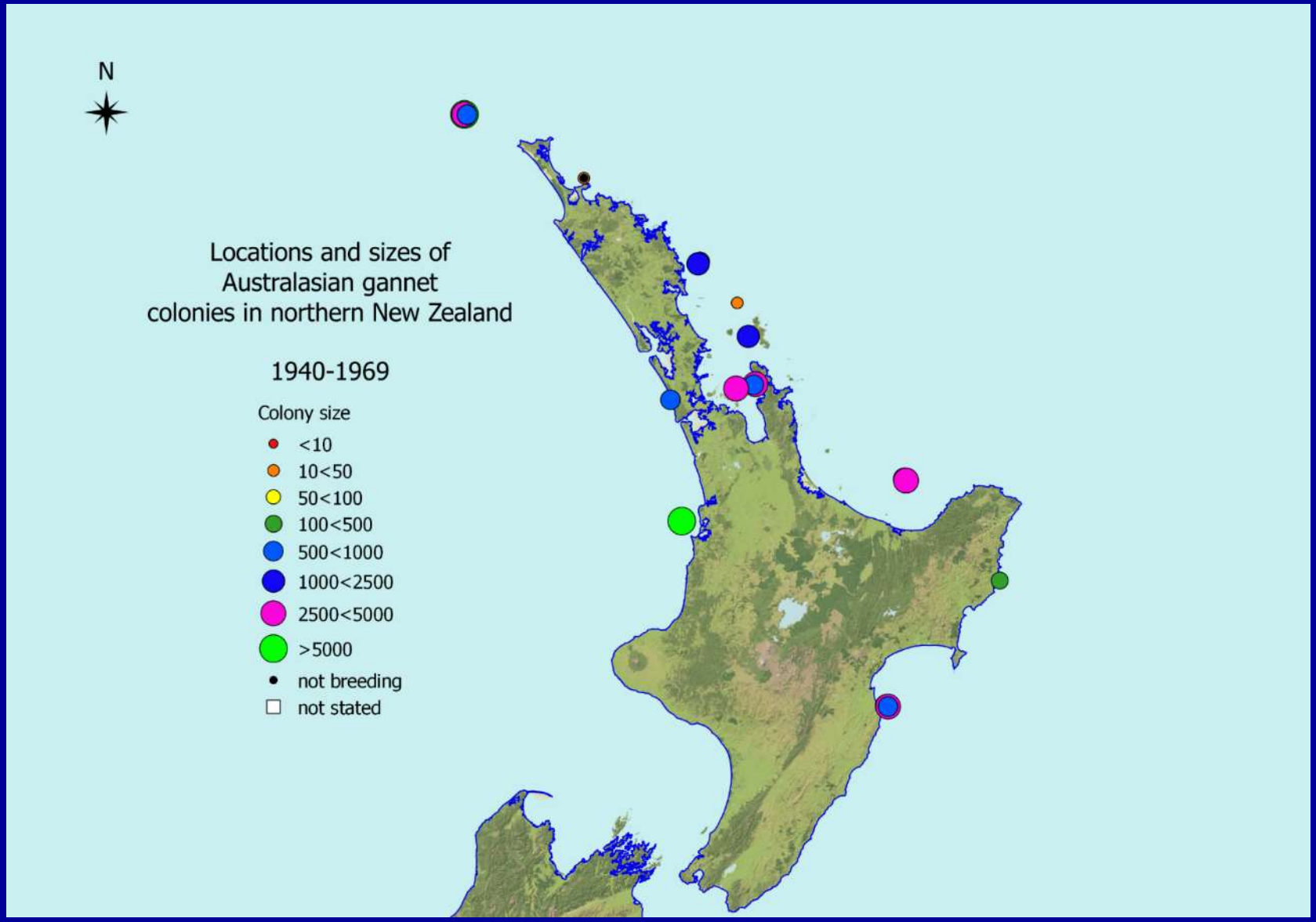
- assemble any other relevant information on the diet and foraging ecology of these species.

Sources of information

Data set	Source
Classified Summarised Notes	Published in *Notornis* 1943–2003
OSNZ News (issues 34-93)	Published by the Ornithological Society of New Zealand between 1985 and December 1999
New Zealand Bird Report 2007	Unpublished report kindly provided by D.A. Onley
OSNZ tern survey	Powlesland (1998)
Te Papa breeding seabird database	Kerry-Jane Wilson (pers. comm.)
NZ Coastal and Inland Sites IBA database	World Bird Database (Birdlife International) through Chris Gaskin / Kathryn Hand
New Zealand eBird checklists	Cornell Lab of Ornithology and Birds New Zealand
Birds New Zealand red-billed gull survey database	Birds New Zealand
Atlas of Bird Distribution in New Zealand [1969-1976]	The Ornithological Society of New Zealand (original data recorded on microfiche)
Atlas of Bird Distribution in New Zealand [1999–2004]	The Ornithological Society of New Zealand
Species accounts	Papers published in various scientific journals, primarily *Notornis*
Individual records	Kindly provided by knowledgeable observers

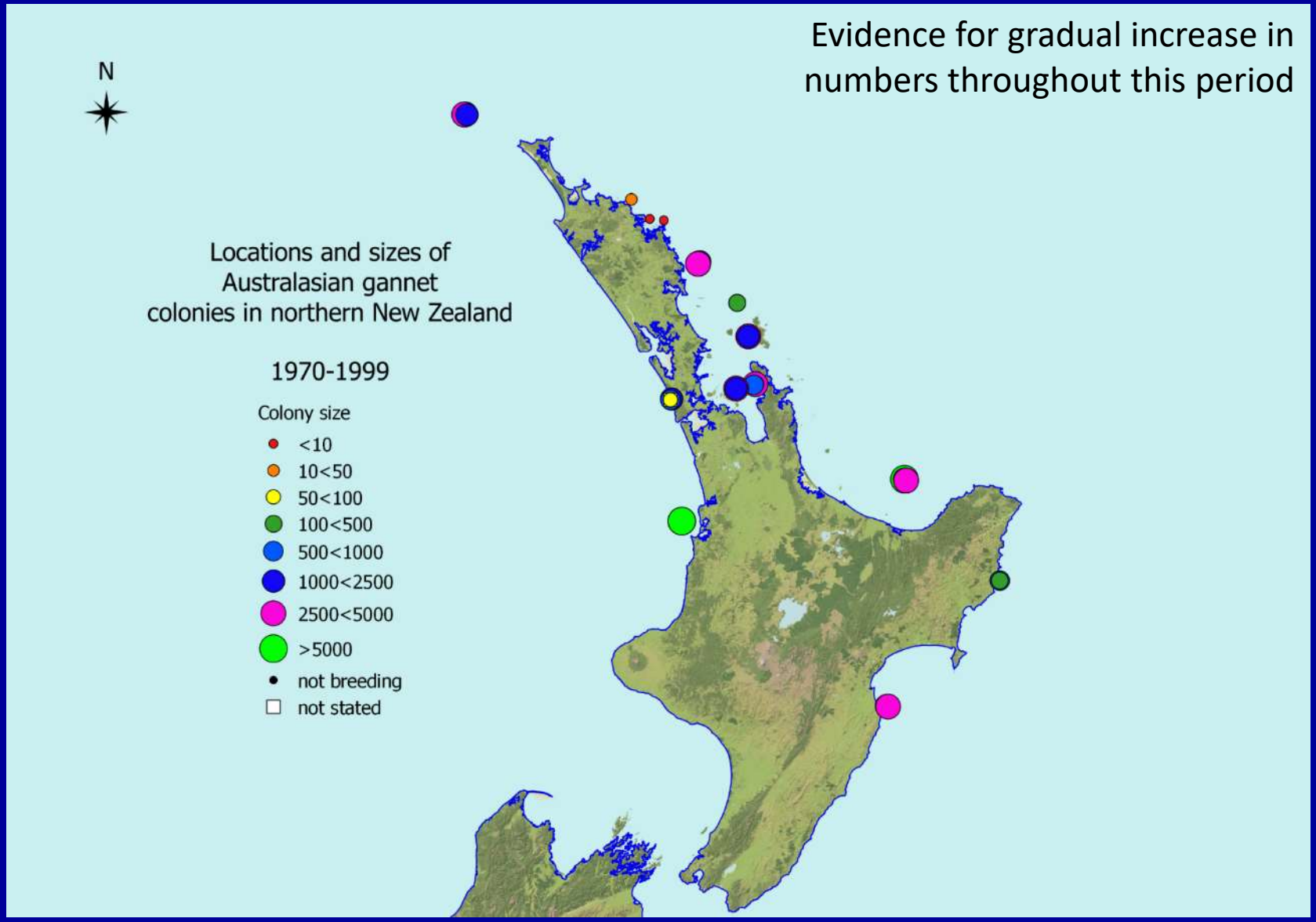
Australasian gannet (*Morus serrator*)

Location and relative sizes of Australasian gannet colonies, northern New Zealand, 1940—1969



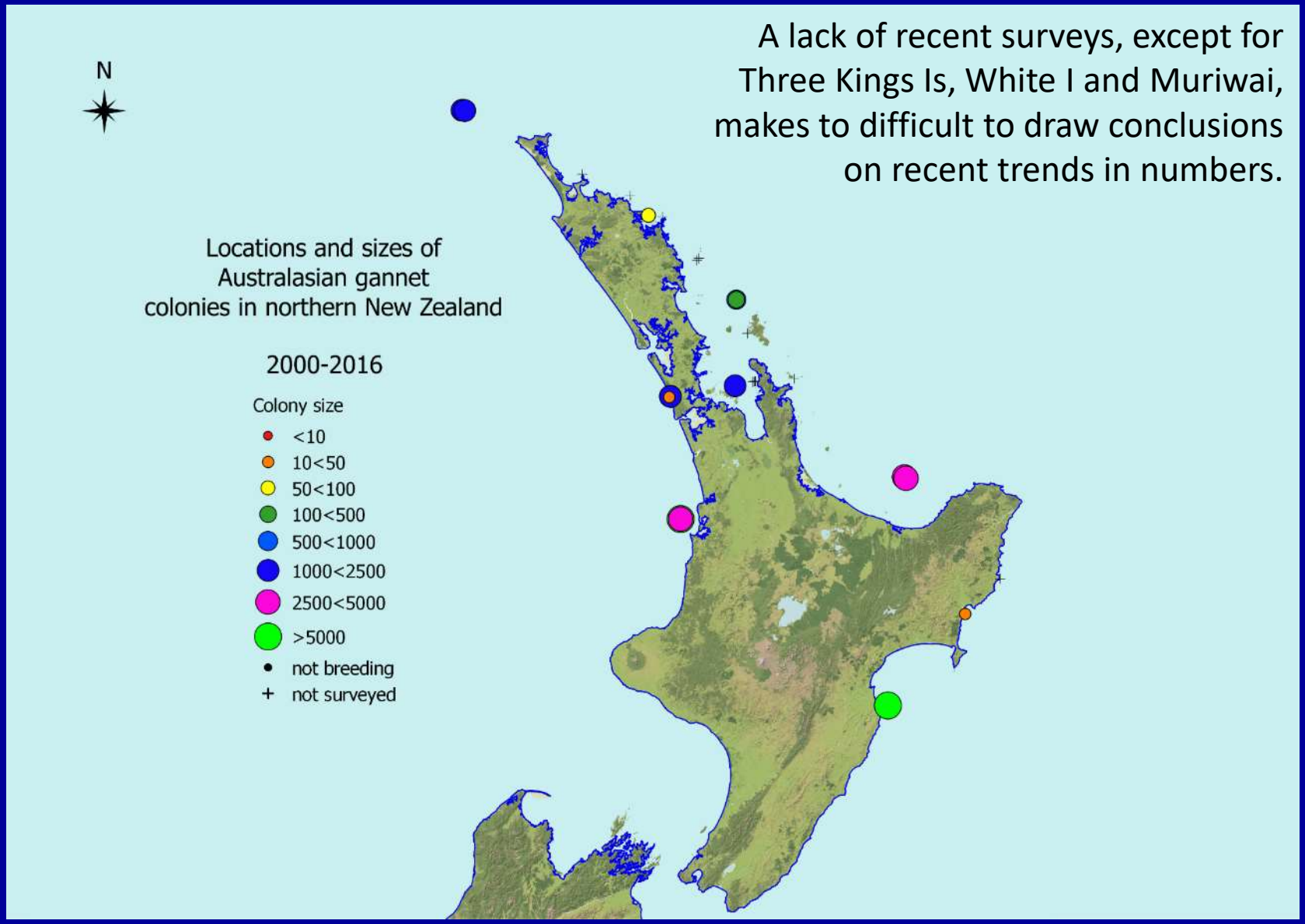
Location and relative sizes of Australasian gannet colonies, northern New Zealand, 1970—1999

Evidence for gradual increase in numbers throughout this period



Location and relative sizes of Australasian gannet colonies, northern New Zealand, 2000—2016

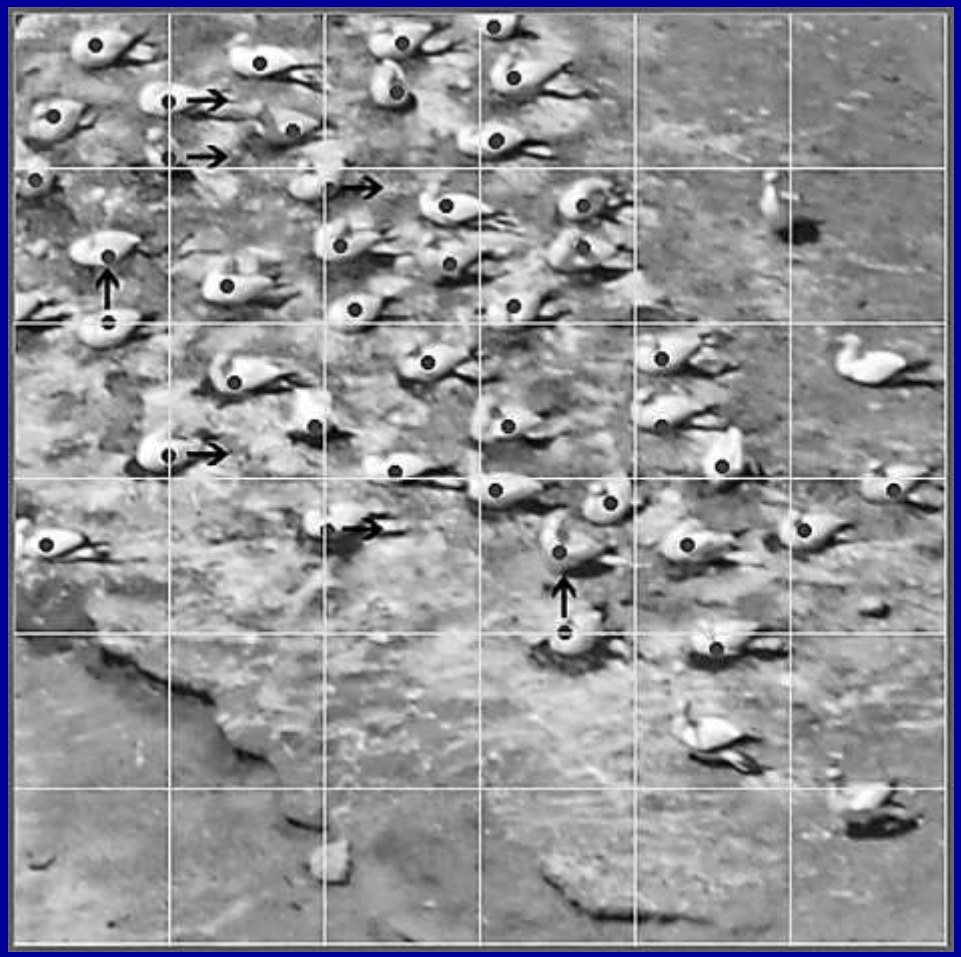
A lack of recent surveys, except for Three Kings Is, White I and Muriwai, makes to difficult to draw conclusions on recent trends in numbers.



White I, Otaketake gannet colony (3195 nests, November 2015)

Note the vacant areas on the fringes of the colony, some being recolonised by plants

Counting gannets (and other species) from digital photographs involved (1) imposing a virtual grid (size adjusted to cover up to 10 birds); (2) marking nesting birds; then (3) counting them, row by row. Arrows show into which grid those marked birds situated on a grid line are counted. Non-incubating or brooding birds are not counted.



Numbers of Australasian gannets nesting on White I. over time. All counts except those made in 1976 (in italics) are based on counts from aerial photographs. Those counted in 2015 come from an analysis of photographs taken by J. Fitter in November 2015; others come from Wodzicki *et al*. (1984).

	Nests	Comparison with previous censuses				
Location	**2015**	**1946**	**1969**	**1976**	**1980**	**2015**
Te Matawiwi / West Point	621	1254	1419		1419	621
Ohauroa (West)	620	1408	1615	*1040*	1257	1225
Ohauroa (East)	605					
Otaketake (West)	265	2565	3679	*3000*	3986	3460
Otaketake (East)	3195					
Total	5306	5227	6713	*4040*	6662	5306
Annual rate of change (%) across periods		+1.09		-0.07	-0.65	

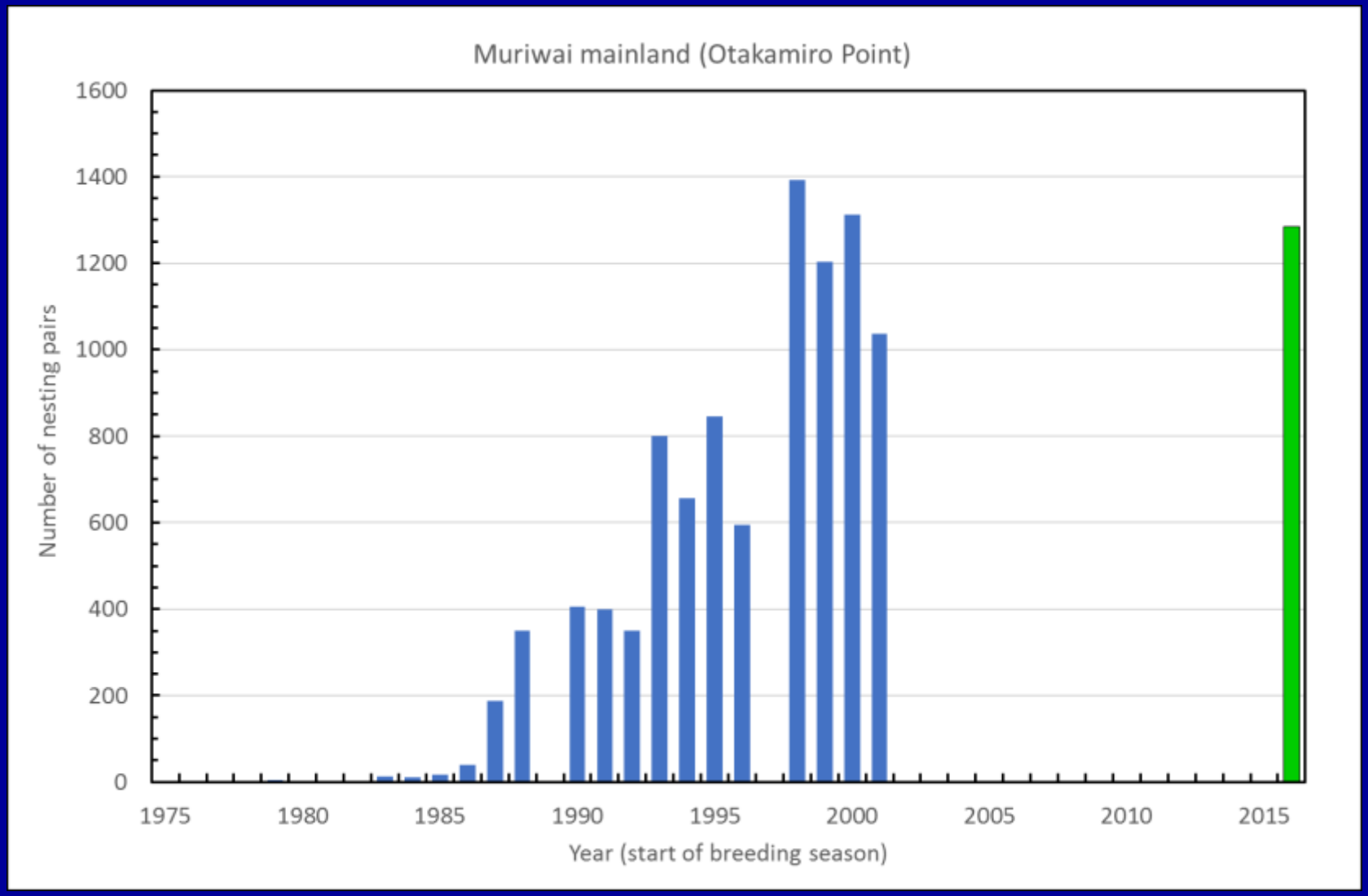
Part of the gannet colony on Arbutus Rock, Three Kings Is.
Nesting birds are marked (purple dots). Note the large unoccupied areas in the colony, many apparently being invaded by bushes.

Changes in the numbers of Australasian gannets at colonies on the Three Kings Islands over 70 years, as determined from analyses of aerial photographs. Data for 1946-47 from Fleming and Wodzicki (1952); for 1968-69 and 1980-81 from Wodzicki *et al.* (1984); and 2014-15 from an analysis of photographs taken by L. Feasey

	Nesting season			
Island	**1946-47**	**1968-69**	**1980-81**	**2014-15**
Arbutus Rock	1000	2175	2652	1651
Tutanekai Rock	300	406	402	686
Archway Rock	490	618	1530	774
Hinemoa Rock	1520	3232	4136	2245
South-west Island	824	804	1135	1046
Three Kings Is total	4134	7235	9855	6402
Annual rate of change (%) across periods		*+2.6*	*-1.3*	
		+4.9		

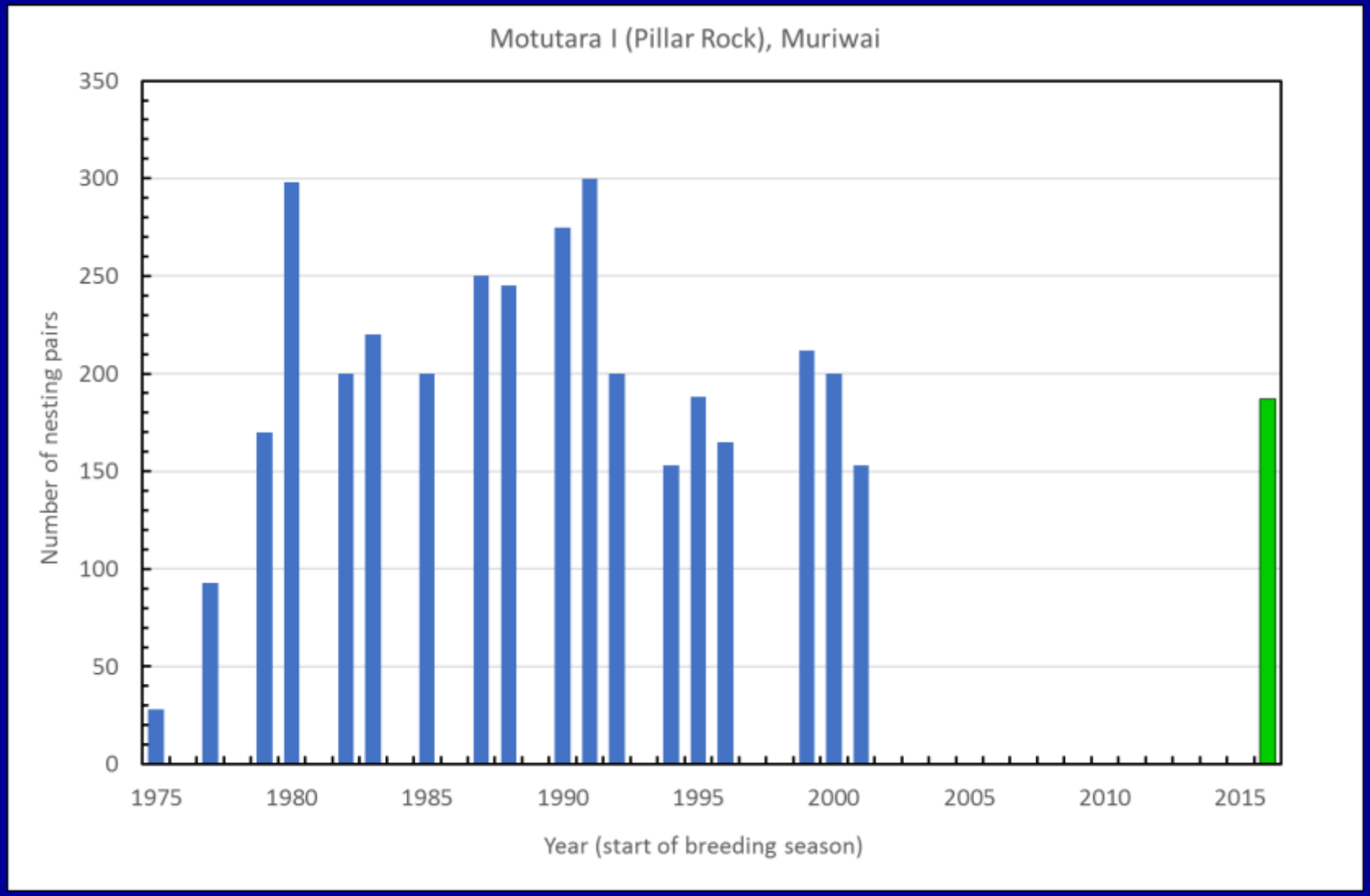
Part of the gannet colony at Otakamiro Point, Muriwai, October 2016. Nesting birds are marked. Photograph courtesy of O. Nicholson.

Numbers of Australasian gannets nesting at Otakamiro Point, Muriwai. Except for the most recent count (green), the data come from Greene (1999, 2003) and OSNZ records.



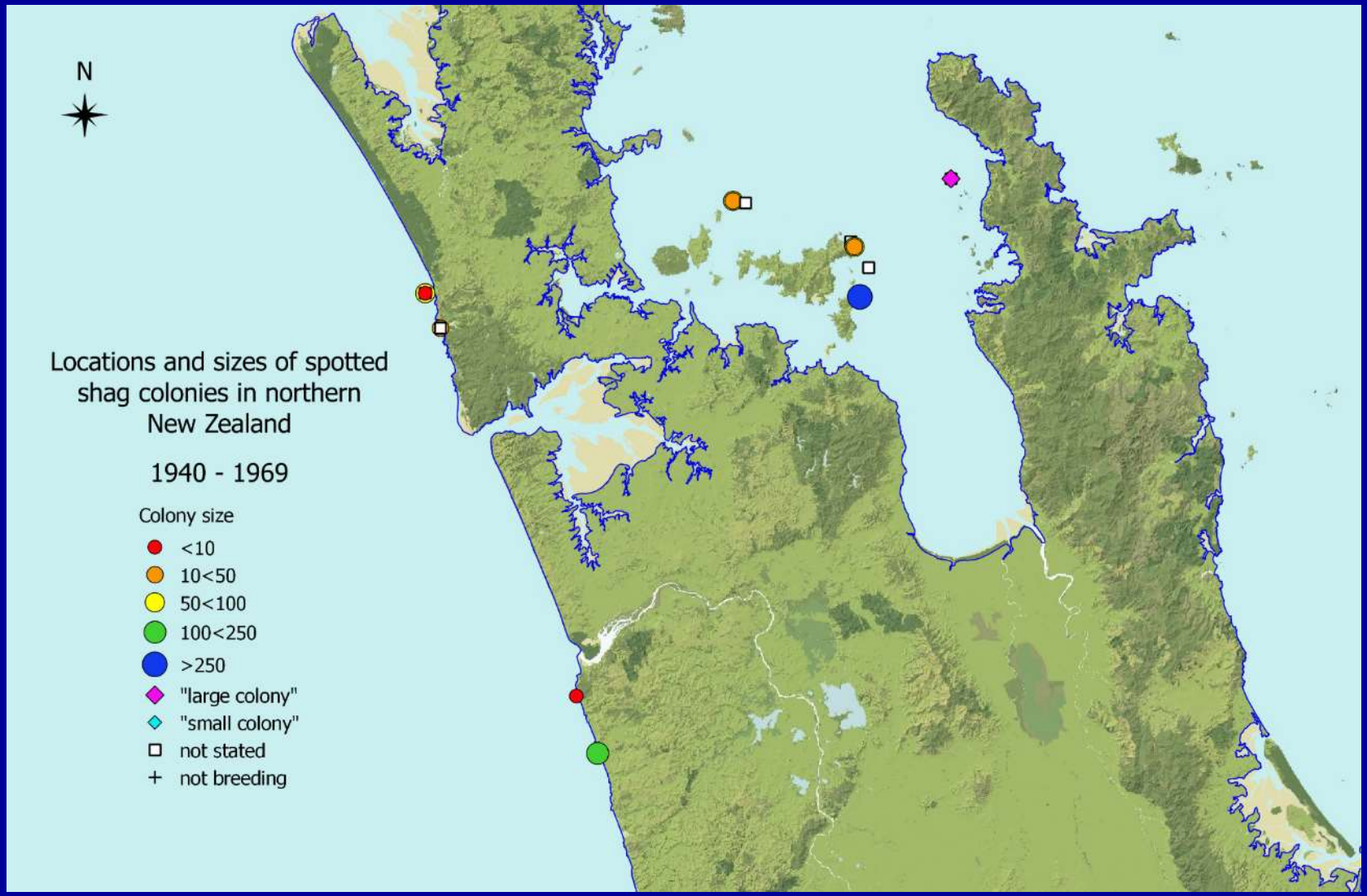
Two views of Motutara Rock, Muriwai, October 2016, showing nesting gannets (marked) and the line of division (yellow) between those counted on the left-hand image (164 nests) and the additional nesting birds visible on the right-hand image (23 nests). Photographs courtesy of O. Nicholson.

Numbers of Australasian gannets nesting on Motutara, Muriwai. Except for the most recent count (green), the others come largely from data given in Greene (2003) and OSNZ records.

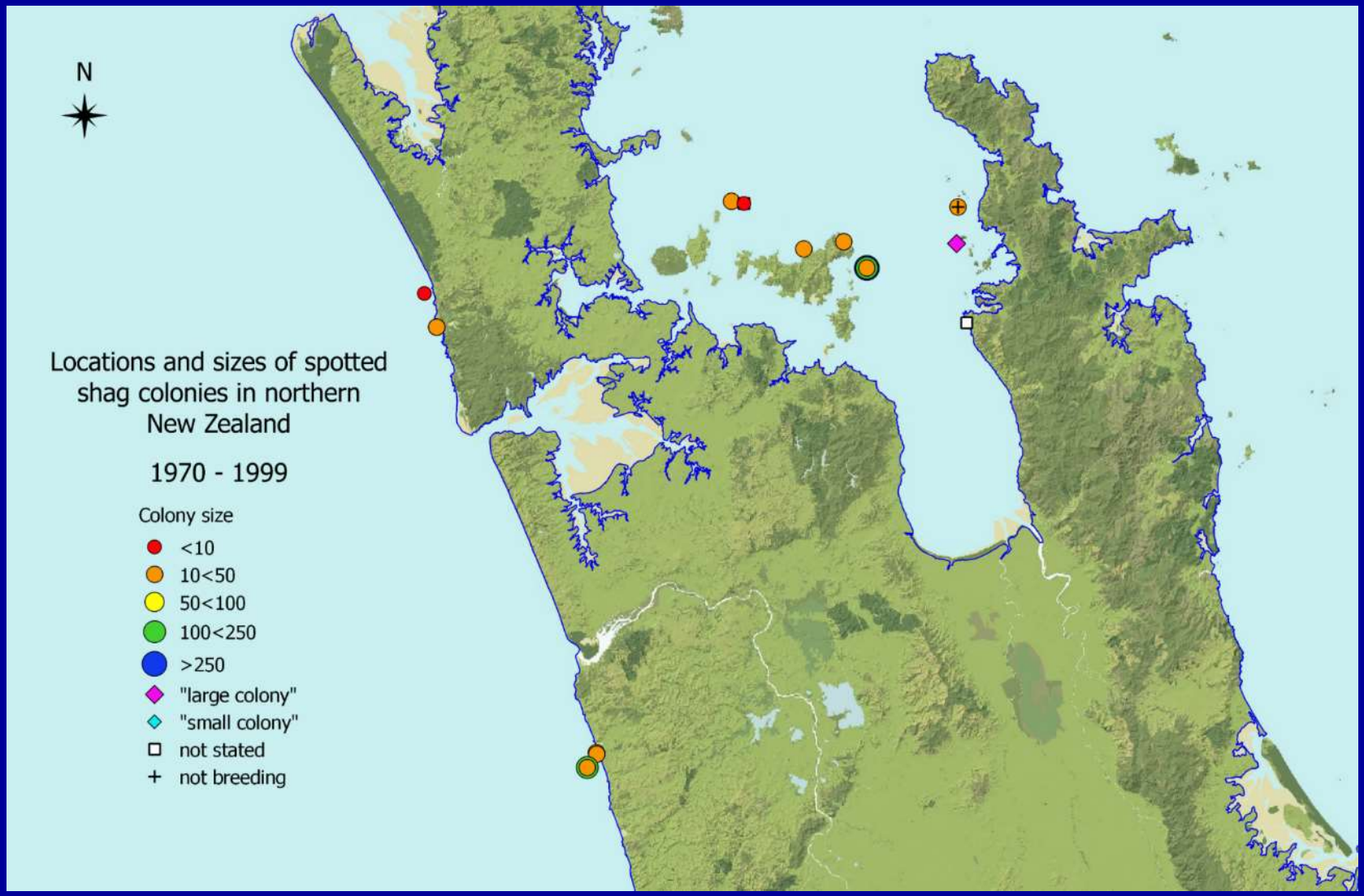


Spotted shag (*Stictocarbo punctatus)*

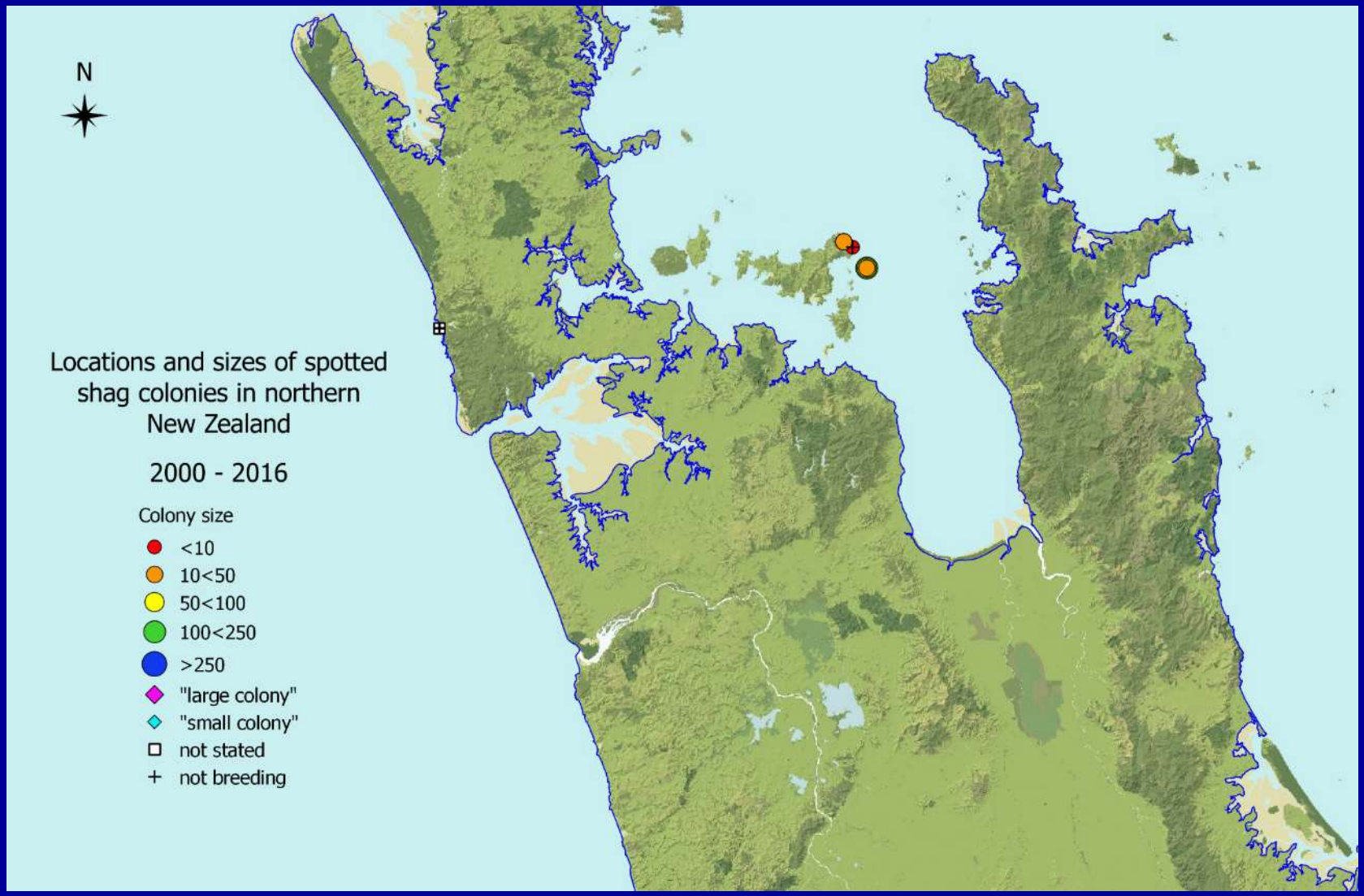
Location and relative sizes of spotted shag colonies, northern New Zealand, 1940—1969. During this period the population seemed to be recovering from earlier persecution.



Location and relative sizes of spotted shag colonies, northern New Zealand, 1970—1999. Colonies widespread in the Hauraki Gulf and two groups on the west coast, but most generally small (<50 pairs)

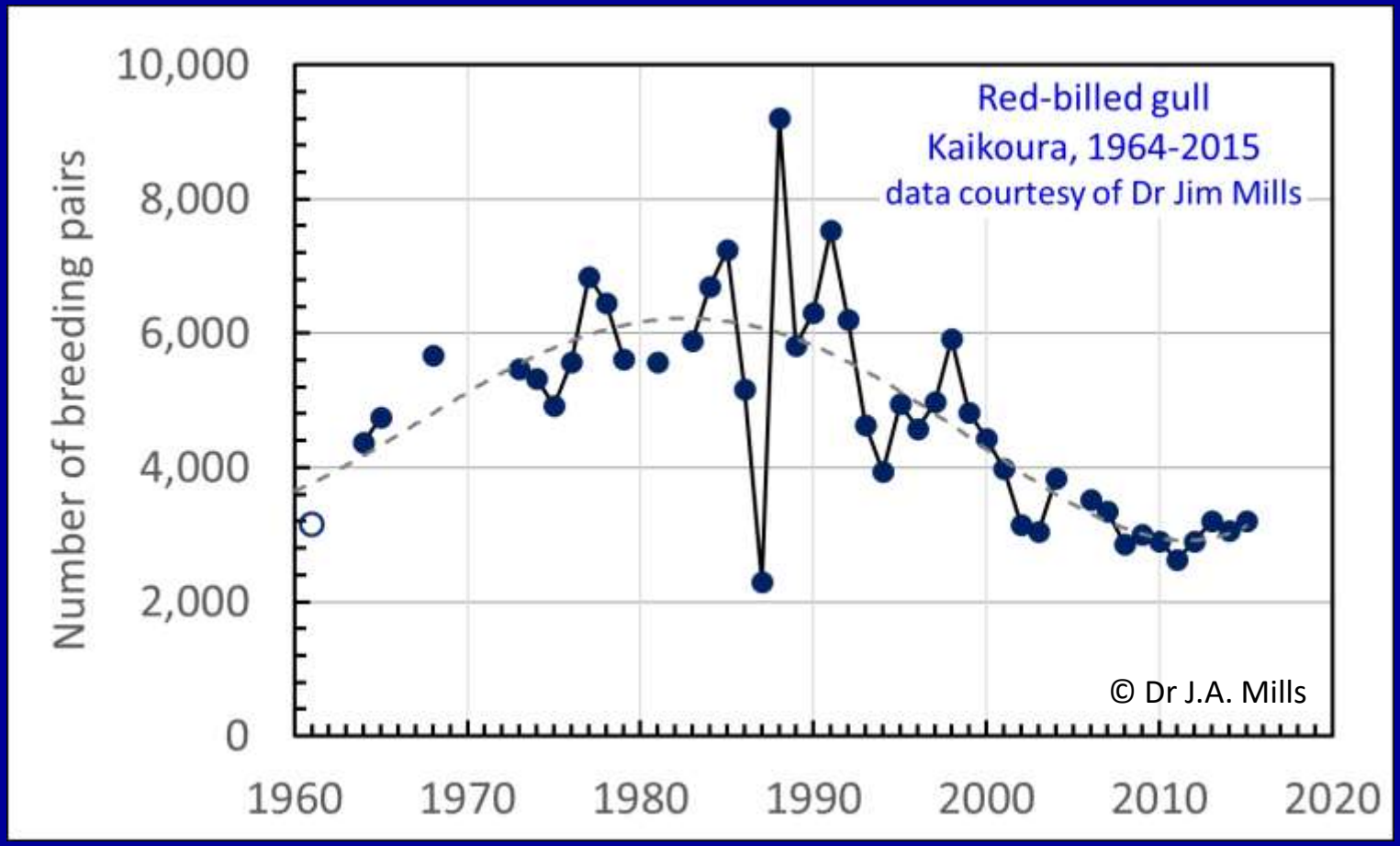


Location and relative sizes of spotted shag colonies, northern New Zealand, 2000—2016. The limited data available suggest the collapse of west coast colonies and decline of those in the Hauraki Gulf.



Red-billed gull (*Larus novaehollandiae)*

Trends in the number of red-billed gulls breeding at Kaikoura, and anecdotal reports from other historically large colonies (Three Kings Is, Mokohinau Is), have given rise to concerns that this species is declining, notwithstanding some regional increases in Otago.



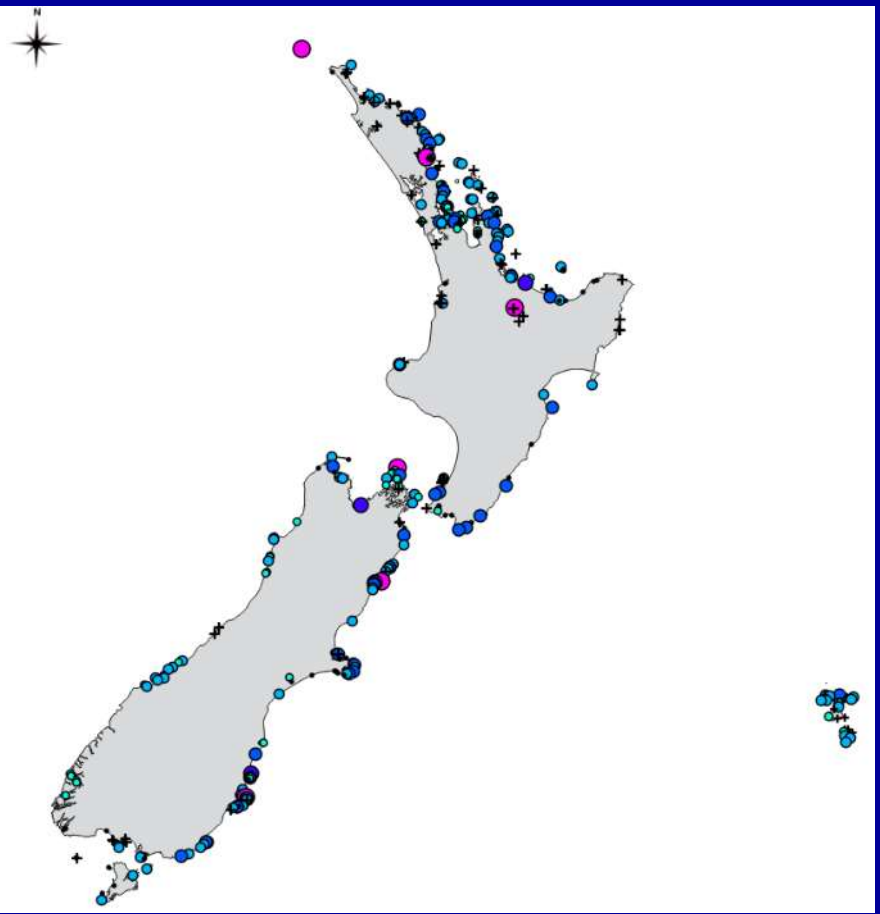
These data are unpublished and should not be cited without permission

Conservation status of the red-billed gull downgraded to Nationally Vulnerable, with a predicted decline of 50-70% over the next 30 years under present conditions.

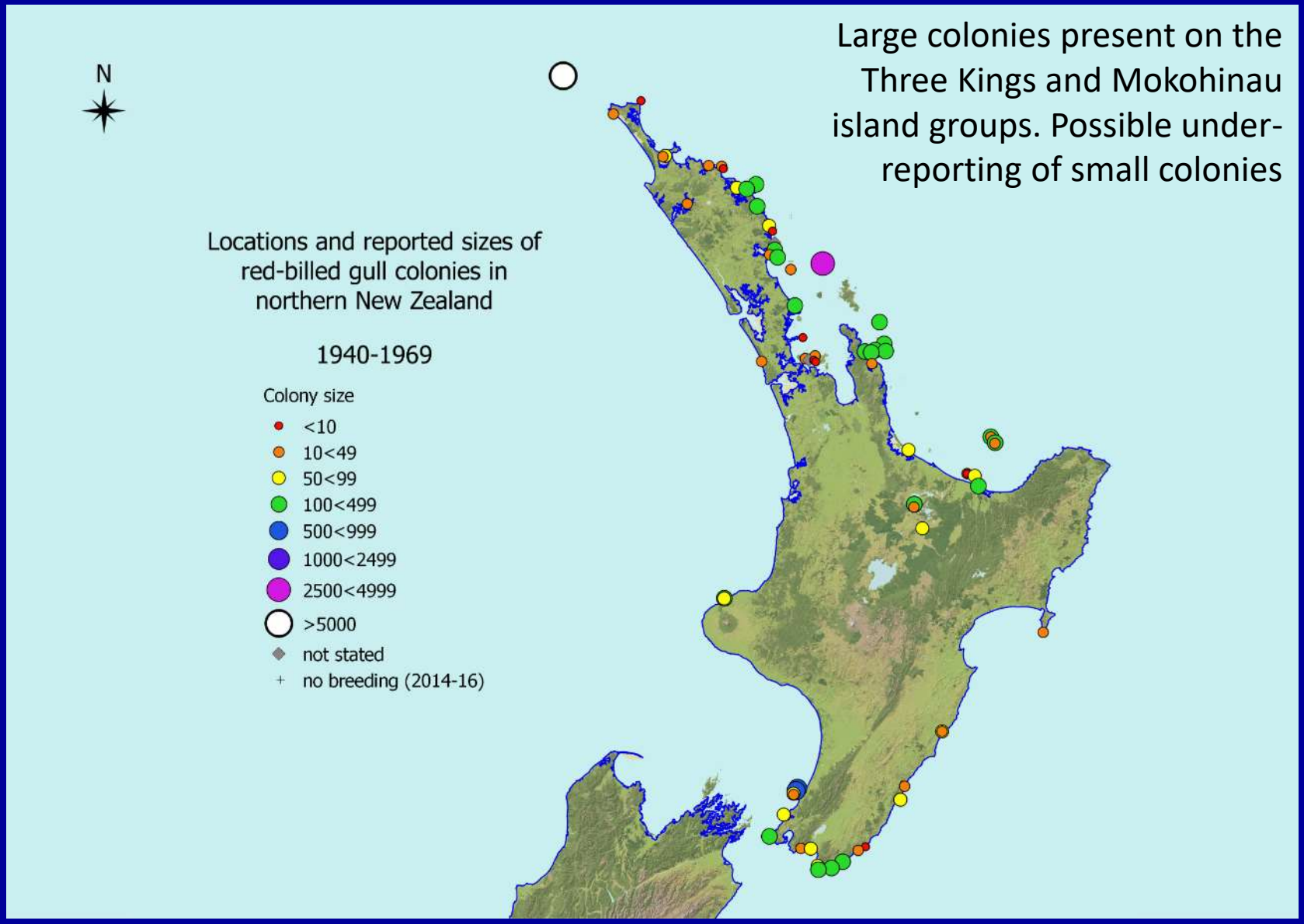
To clarify the species' current status, Birds New Zealand and the Department of Conservation collaborated in a national survey of red-billed gull colonies during 2014—2016. These data form the foundation of the present review

Report on the National Red-billed Gull Survey, 2014-2016

Peter G.H. Frost and Graeme A. Taylor

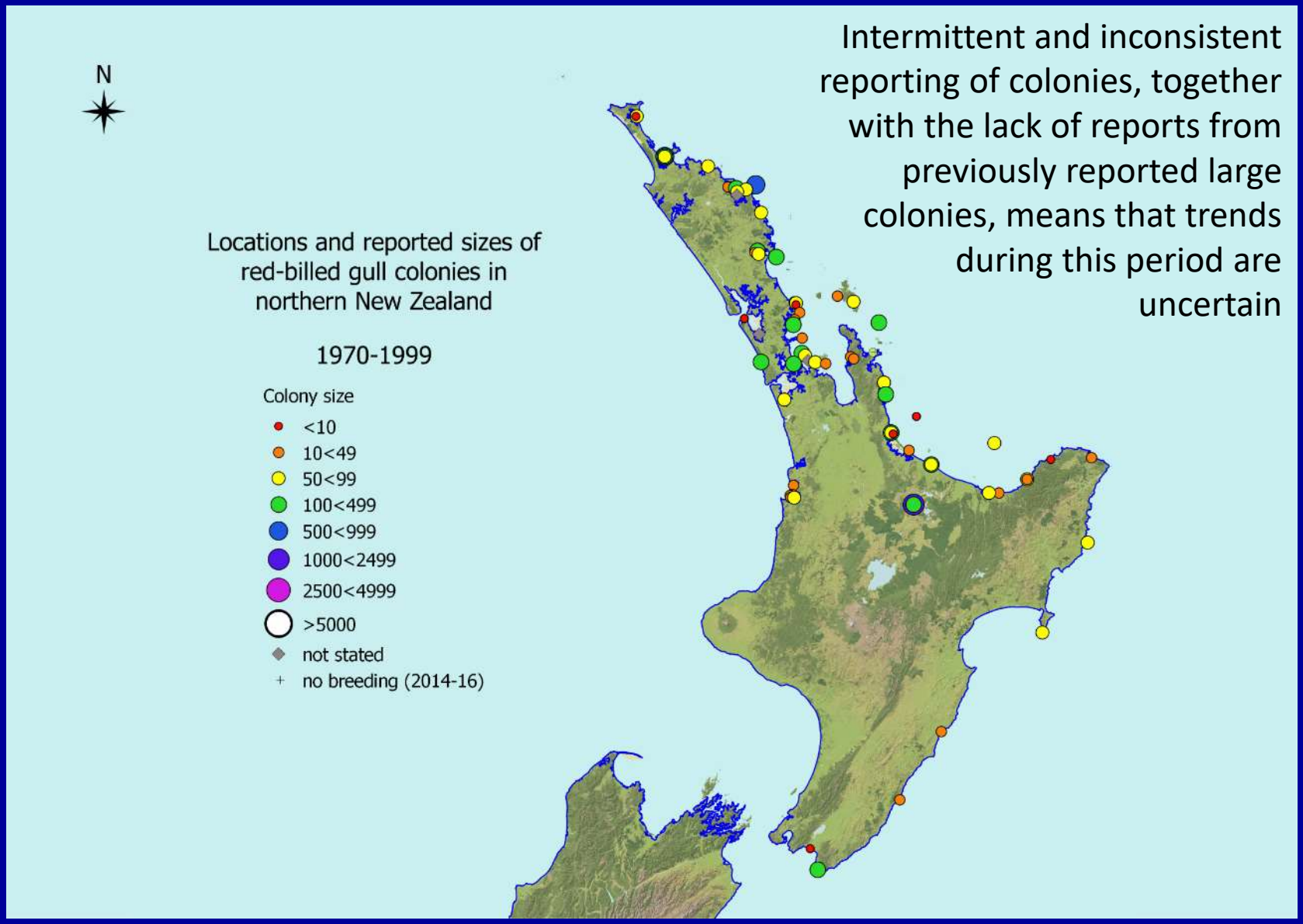


Location and relative sizes of red-billed gull colonies, northern New Zealand, 1940—1969



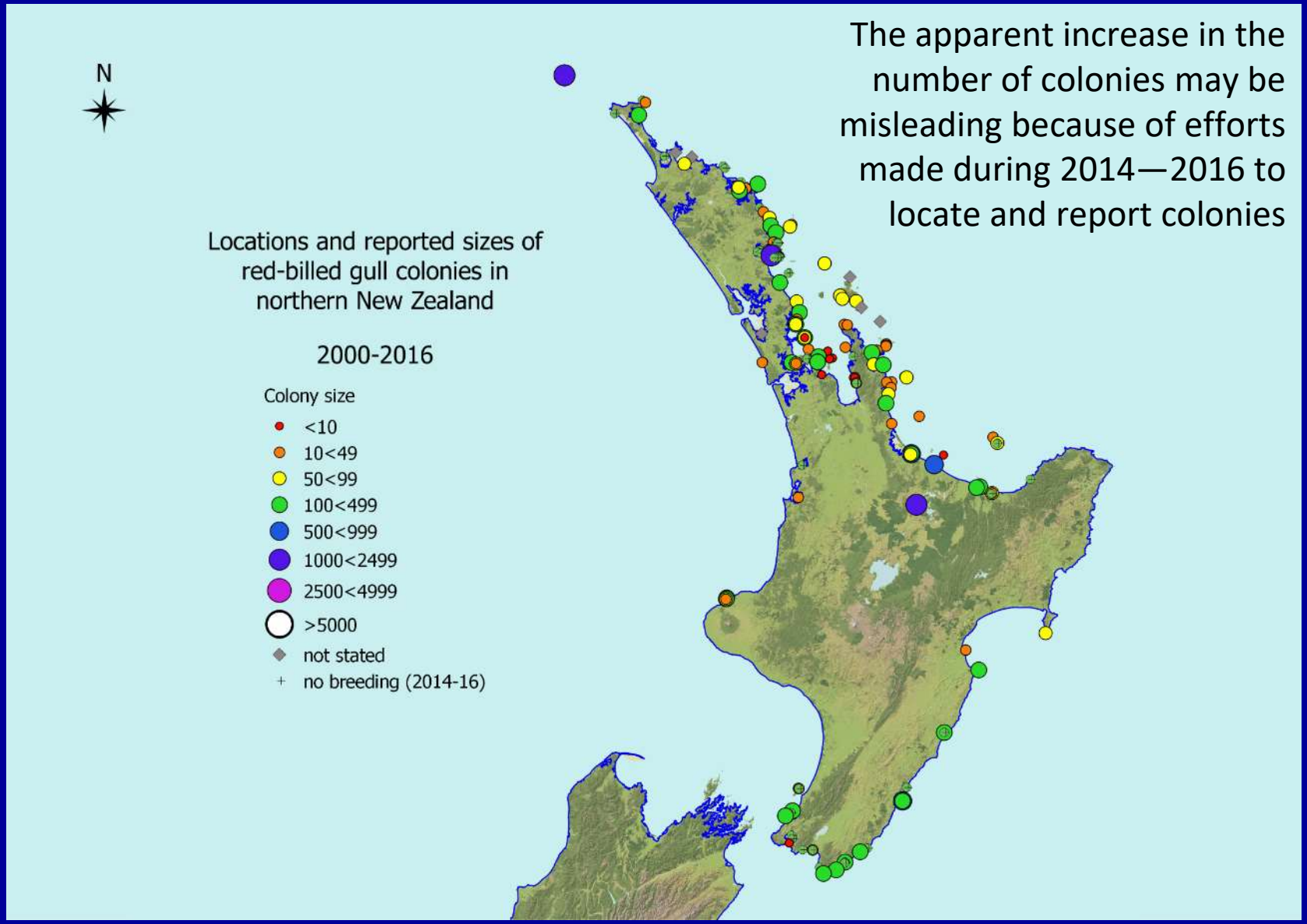
Large colonies present on the Three Kings and Mokohinau island groups. Possible under-reporting of small colonies

Location and relative sizes of red-billed gull colonies, northern New Zealand, 1970—1999



Intermittent and inconsistent reporting of colonies, together with the lack of reports from previously reported large colonies, means that trends during this period are uncertain

Location and relative sizes of red-billed gull colonies, northern New Zealand, 2000—2016



The apparent increase in the number of colonies may be misleading because of efforts made during 2014—2016 to locate and report colonies

Frequency distribution of recorded red-billed gull colony sizes across different time periods (corresponding expected values given in italics).

The data suggest that prior to 1940 there may have been more colonies over 500 nesting pairs than would be expected by chance, but this is not quite significant. More likely it reflects a tendency to report large colonies more than smaller ones.

	Colony size classes					
Period	<10	10<50	50<100	100<500	500<1000	>1000
pre-1940	3	2	3	2	3	2
	2.2	*5.2*	*3.1*	*3.6*	*0.6*	*0.4*
1940–1969	14	39	28	32	4	4
	18.0	*41.5*	*25.0*	*28.9*	*4.4*	*3.2*
1970–1999	14	31	26	19	2	1
	13.8	*31.9*	*19.2*	*22.2*	*3.4*	*2.5*
2000–2016	30	69	28	45	6	4
	27.0	*62.4*	*37.6*	*43.4*	*6.6*	*4.9*

Trends at different sites are varied:

- some colonies appear to have grown larger;
- a few have remained stable;
- many have apparently declined.

The reasons for these changes are unclear:

- predation?
- disturbance?
- changes in food availability and quality?
- sampling 'error'— under- or over-counting; surveys done in unrepresentative (poor-breeding) years

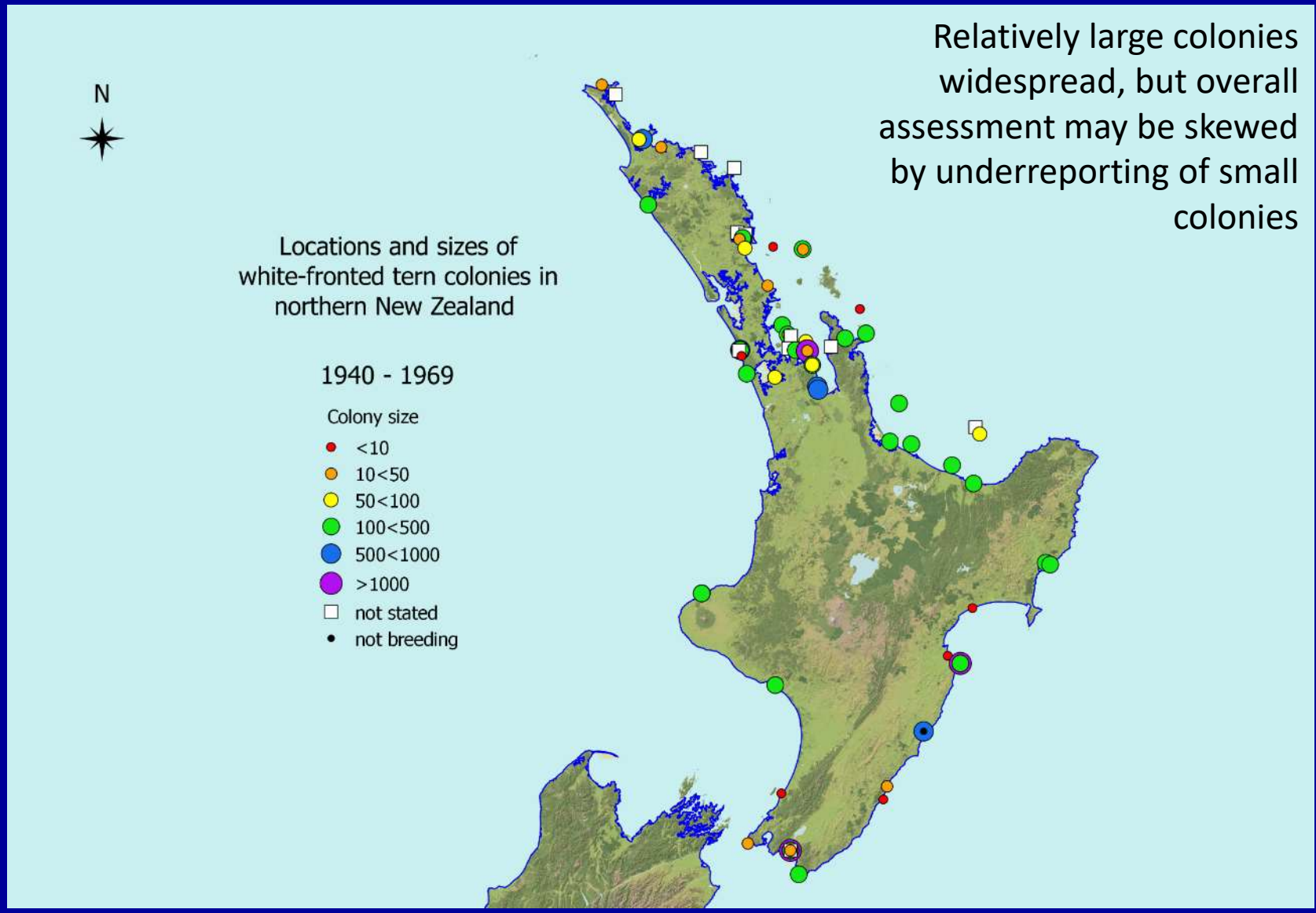
Locality	pre-1939	1940-59	1960-79	1980-99	2000-16
Increasing					
Tapeka Point	not stated		50<100		100<500
Woolley's Bay, Tutukaka			50<100		100<500
Opakau I				10<50	50<100
Kaitoke Bay islet				10<50	50<100
Goat I.				10<50	50<100
Tiritiri Matangi	50<100	<10		10<50	100<500
Koi I.		<10		50<100	100<500[1]
Hikunui Rock			10<50	100<500	50<100
Maketu Spit				50<500[2]	500<1000
No change					
Black Rocks, Moturoa			50<100	100<500	50<100
Kauotunu		100<500	100<500	not breeding	100<500
Nga Motu, New Plymouth		100<500	100<500		100<500
Cuvier I.	100<500	100<500	100<500		not stated
Declining					
Three Kings Is	"thousands"	>5000			1000<2500
Mokohinau Is	>5000	<5000[3]			50<100
Sugarloaf Rock	500<1000				50<100
Tara Rocks, Motutara				100<500	50<100
West Stack, Green I.		100<500			10<50
Volkner Rocks		100<500	10<50		10<50
Okahu Bay wavebreak				100<500	10<50
Paku, Tairua				50<100	10<50
Kawhia Harbour[4]				50<100	10<50
Otama Beach			100<500		10<50
Taiharuru Rock	500<1000				not breeding[5]
Knight I., Whangarei				100<500	not breeding[5]
White I.		50<100	100<500	50<100	not breeding[5]
Awarua Rock			100<500		not breeding[5]
Motuihe [Rock I.]		10<50			not breeding[5]
Motukaroro [Reotahi]			10<50		not breeding[5]

1 But <10 pairs breeding in some years
2 Colony expanded through the 1980s, with some fluctuations
3 1950-59: 50<100 pairs
4 Various sites
5 2015-16

White-fronted tern (*Sterna striata*)

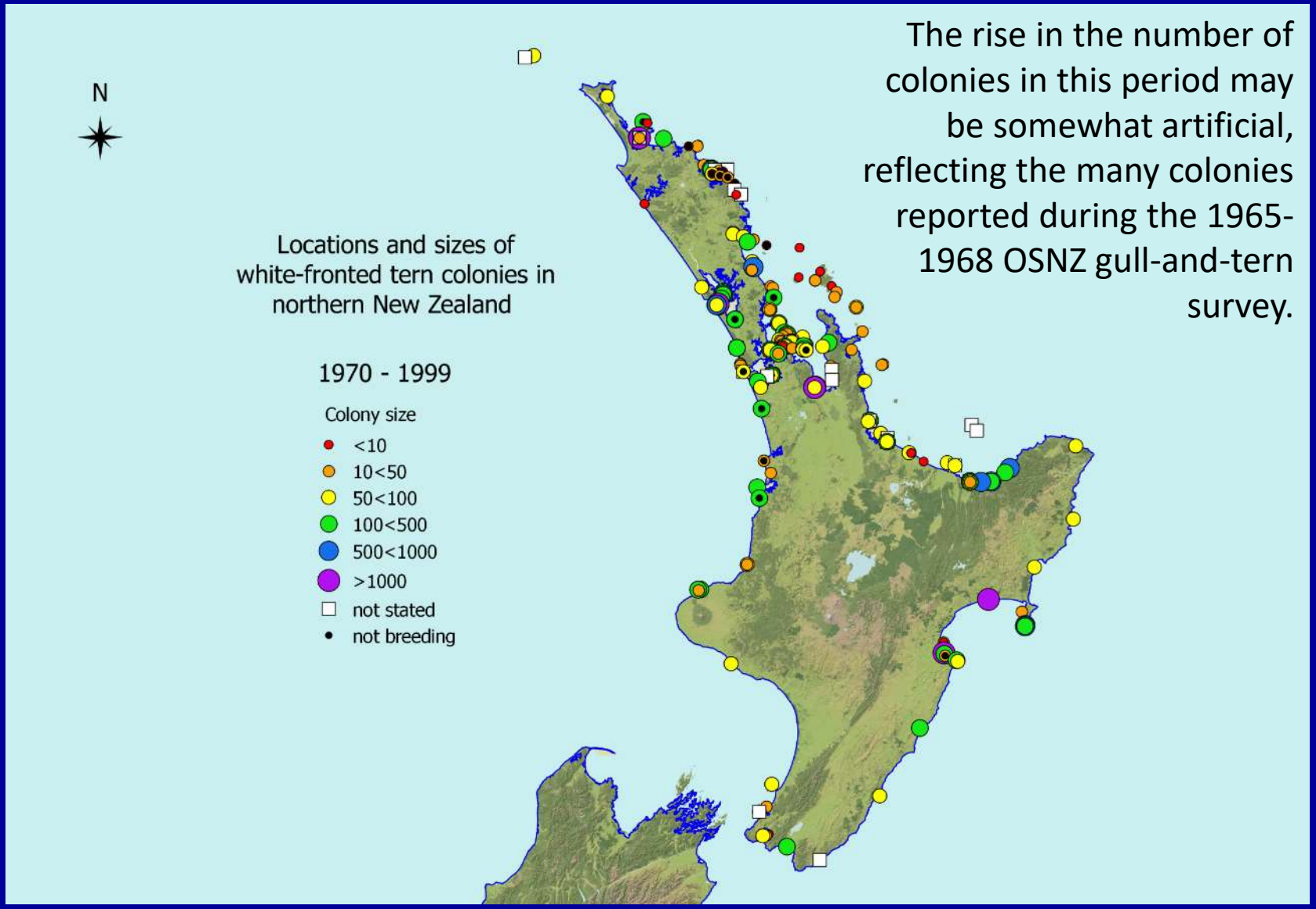
Photograph courtesy of Helen Jonas

Location and relative sizes of white-fronted tern colonies, northern New Zealand, 1940—1969



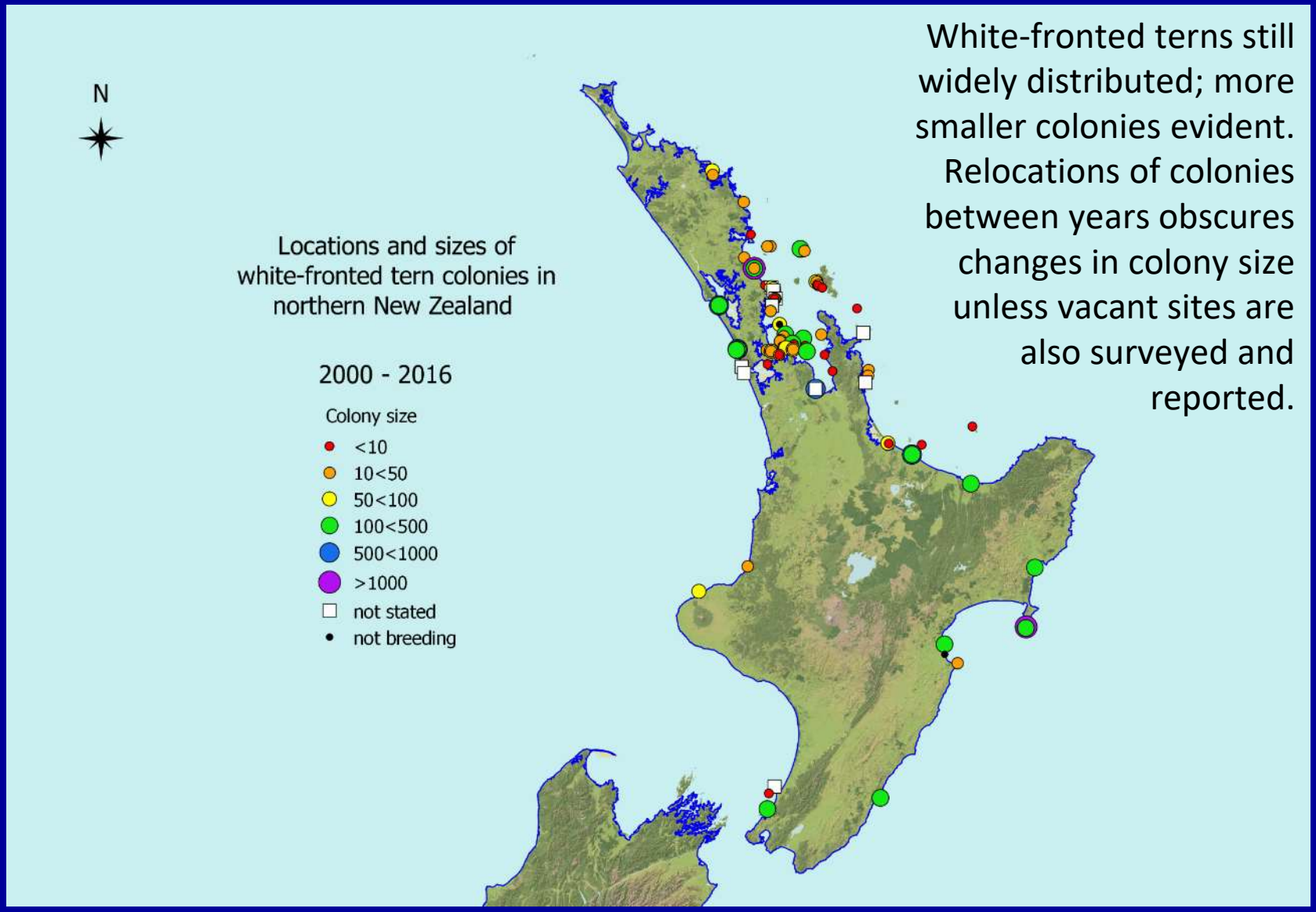
Relatively large colonies widespread, but overall assessment may be skewed by underreporting of small colonies

Location and relative sizes of white-fronted tern colonies, northern New Zealand, 1970—1999



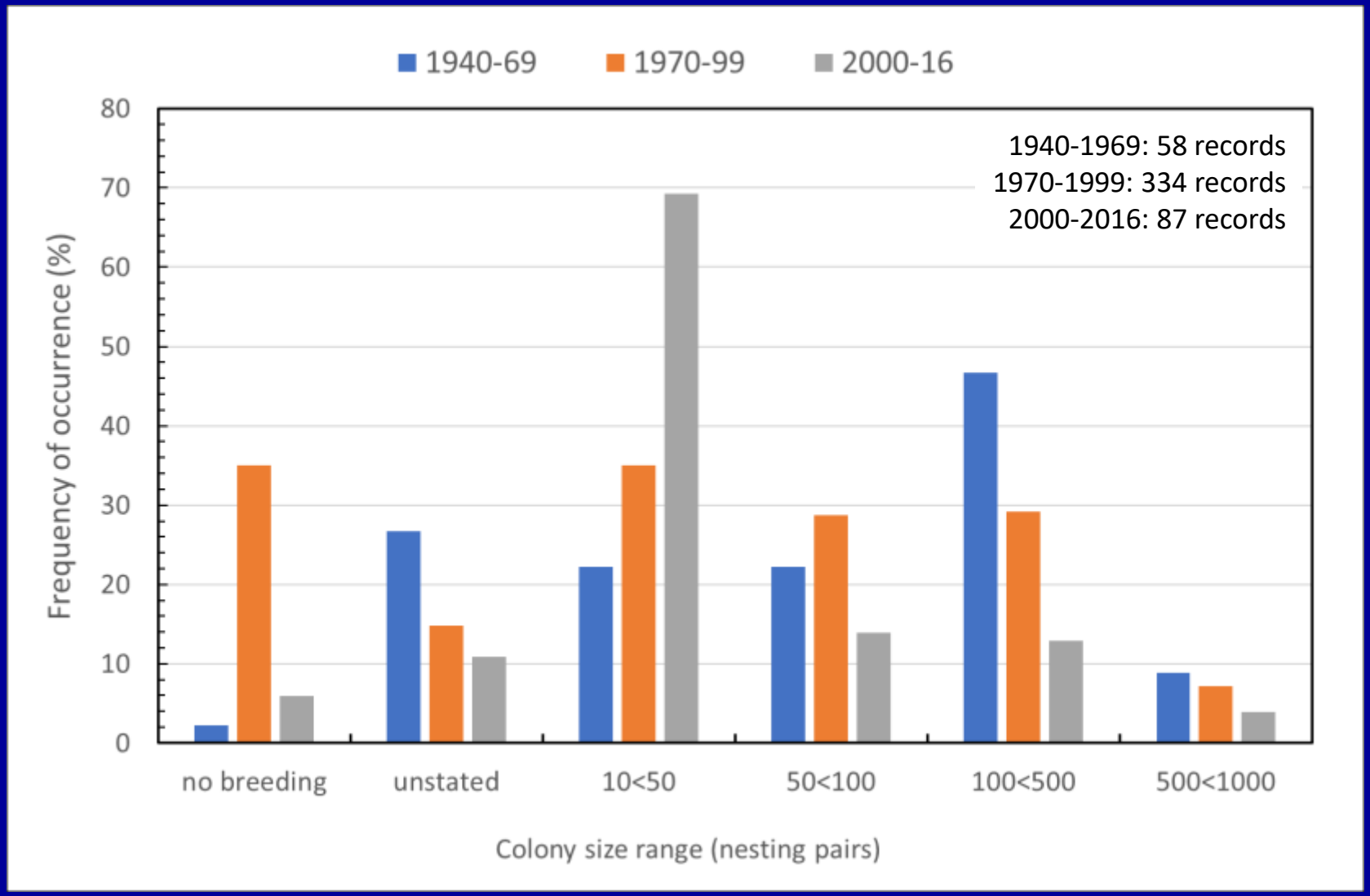
The rise in the number of colonies in this period may be somewhat artificial, reflecting the many colonies reported during the 1965-1968 OSNZ gull-and-tern survey.

Location and relative sizes of white-fronted tern colonies, northern New Zealand, 2000–2016



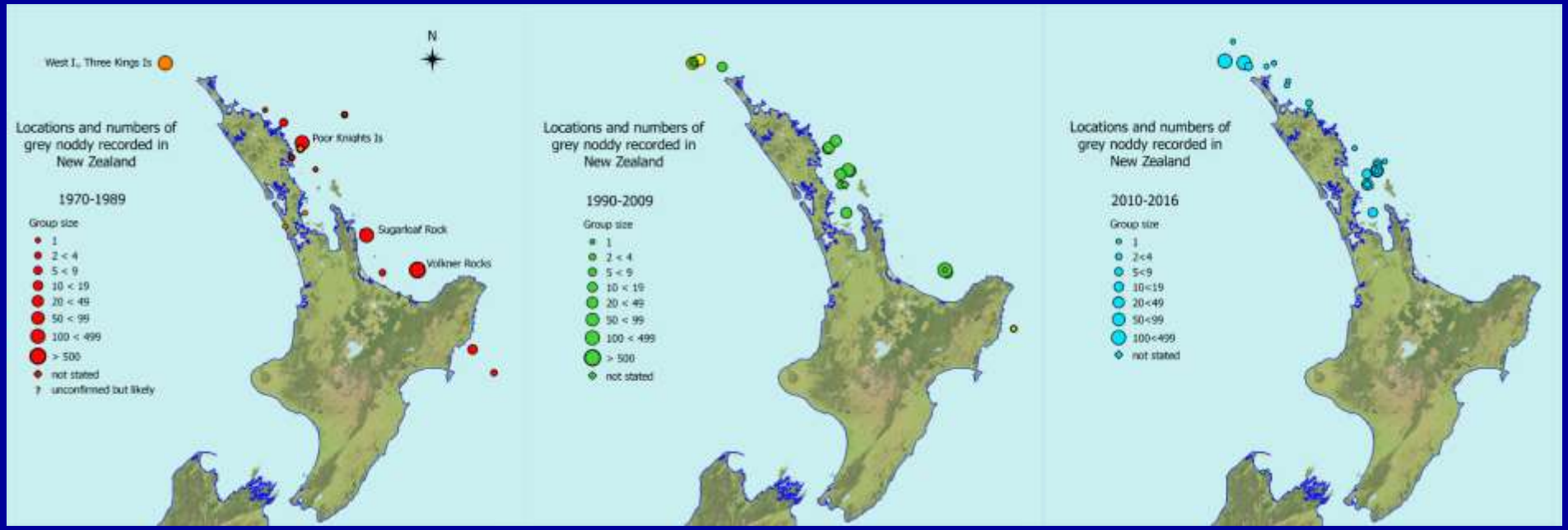
White-fronted terns still widely distributed; more smaller colonies evident. Relocations of colonies between years obscures changes in colony size unless vacant sites are also surveyed and reported.

Frequency distribution of the recorded sizes of white-fronted tern colonies over time. Note the absence of colonies of <10 breeding pairs. Large colonies have declined with time, whereas small colonies have risen.



Grey noddy (*Procelsterna albivitta*)

Grey noddy, which breeds abundantly on the Kermadec Is, was rarely recorded in New Zealand before 1970. Since then, the species has been recorded regularly. Grey noddy have bred on Volkner Rocks, and been suspected of breeding at three other sites: Sugarloaf Rock (Alderman Is); Poor Knights Is; and Three Kings Is.



Summary

- Poor data: few time-series; irregular and intermittent surveys; lack of clarity and consistency in the methods used to survey colonies and report the results
- Cannot derive any credible population trends, though there are suggestions of change (usually negative)
- Most seabirds exhibit slow-dynamics (long-lived, deferred maturity, low annual reproductive output, intermittent breeding). This complicates the interpretation of population dynamics solely from colony survey data

Recommendations

- Establish a national seabird monitoring programme
- Long-term monitoring requires institutional support
- Develop seabird population models
- Integrate seabird monitoring with other marine ecosystem programmes (including fisheries)
- Maintain a database of seabird colonies