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Project & Activities Committee

Report on the National Red-billed Gull Survey: Scoping Phase, 2014/15

Peter Frost[1] & Graeme Taylor[2]

[1] Convenor, Birds NZ Project & Activities Committee and
Science Support Service, 87 Ikitara Road, Wanganui 4500

[2] Science and Capability Group, Department of Conservation,
18-32 Manners Street, Wellington 6011

In 1965, Lou Gurr and Fred Kinsky collated and published the available information on the breeding status of the red-billed gull *Larus novaehollandiae scopulinus* in New Zealand and its sub-Antarctic islands. They concluded that "…numbers are increasing, especially in the large colonies, i.e. Nelson and Kaikoura…A conservative estimate of the total breeding population …would be something in the order of 40,000 breeding pairs…at some 166 different localities in the New Zealand region" (Gurr & Kinsky 1965: 239). From the late 1990s, however, indications emerged that the red-billed gull was declining, at least at some of the country's largest colonies (Three Kings Is, Mokohinau Is, Kaikoura Peninsular: Mills 2013), one suggested cause being changes in the distribution and abundance of the species' main food supply during the breeding season, the euphausiid (krill) *Nyctiphanes australis* (Mills et al. 2008). This apparent decline caused the Department of Conservation (DOC) in 2008 and 2013 to classify the species as Nationally Vulnerable, on account of an expected ongoing decline in numbers of 50–70%, despite its seemingly large population (Robertson et al. 2013).

At about the same time, however, red-billed gull numbers in Otago were increasing (Perriman & Lalas 2012). This raises the question of whether the species' population is repositioning, while numbers remain more-or-less constant, or if it is declining overall despite some apparent local increases as seen in Otago. More generally, however, is a question about the status of the species across New Zealand overall. Only 59 % of the sites reported by Gurr & Kinsky (1965) had been surveyed in the decade prior to 1965; 17 % were last assessed prior to 1945 (Figure 1). The reliability of many of these assessments is also questionable. Few described how the numbers were determined and so these must be considered rough estimates at best.

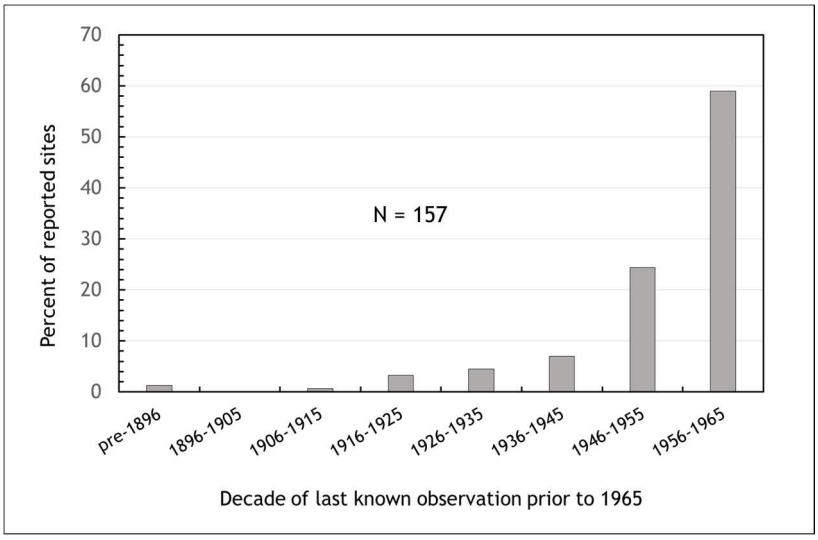

Figure 1. Frequency distribution of dates of last assessment of red-billed gull numbers at each of the breeding colonies reported by Gurr & Kinsky (1965), plotted by decade prior to 1965.

Although some red-billed gull colonies have been censused since 1965, and a few have been monitored regularly (e.g. Kaikoura: Mills et al. 2008; Otago colonies: Perriman and Lalas 2012), there has been no overall recent national assessment of the species' status. Red-billed gulls are long-lived (average life span 13 years, but can live for up to 30 years: Mills et al. 1996). Birds do not normally begin breeding until they are 3–4 years old and even then only breed successfully about every 3 years beyond that (Mills 1989). Any reductions in breeding success or survival, either through predation or failures in food supplies, will therefore take some time to become apparent through declines in the size of breeding colonies. Moreover, in most years there is a sizeable non-breeding population both at the breeding colonies and elsewhere, which can confound estimates of the size of breeding colonies if such individuals are not accounted for.

Given all the uncertainties, we need to know the current locations of red-billed gull colonies and reliable up-to-date figures on the number of breeding pairs before a more systematic monitoring programme can be established and, if necessary, appropriate conservation measures put in place. Accordingly, Birds New Zealand, together with the Department of Conservation, have initiated a two-part national survey of red-billed gull colonies over the period 2014–16. The first part, a scoping survey, was carried out during the 2014–15 breeding season. Its aim was to locate all current red-billed gull breeding colonies irrespective of their size. The second part of the study, scheduled for 2015–16, is intended to obtain more accurate estimates of the number of breeding pairs at all colonies. This report presents the results of the scoping survey.

Methods

As a starting point, those localities where Gurr and Kinsky reported red-billed gulls breeding were located and mapped on Google Earth and QGIS, an open-source geographic information system (http://www.qgis.org/en/site/). Half of the 166 listed sites on mainland New Zealand had no specific coordinates or were only allocated to a NZMS1 map sheet. In these cases, the point that most closely matched the original description of the site was identified and mapped. In a few cases, the original coordinates had been wrongly reported. The nearest suitable site, again matching the original description, where available, was identified and mapped.

This material was circulated to Birds New Zealand regional representatives, with a request that they encourage branch members to check these sites, to establish if they were still active and estimate the approximate number of breeding pairs present (order of magnitude estimates were all that was required). An article on the survey was also written for *Birds New Zealand*, the society's general interest magazine. In addition to checking previously-known sites, observers were also encouraged to look for and report any new sites that they might come across or hear about from others.

Department of Conservation field staff were also contacted by email and asked to assist. Information about the survey was posted on the Birds New Zealand and BirdingNZ.net websites (http://osnz.org.nz/node/538 and (http://www.birdingnz.net/forum/viewtopic.php?f=4&t=3896 respectively) and subsequently picked up and publicised online by various other organisations (e.g. Dune Restoration Trust of New Zealand; Federated Farmers *Friday Flash* newsletter; Forest & Bird Facebook page). Overall, 87 people, including 23 DOC staff, directly or indirectly provided inputs or expressed a willingness to assist with the survey.

The minimum information requested for each site was its geographic position (latitude/longitude or NZTM2000 coordinates, obtainable either by GPS, or from LINZ Topo50 maps, or online at http://www.topomap.co.nz/, ideally accompanied by a map or Google Earth image showing the location of the colony), together with some indication of the order-of-magnitude size of the colony (<10, 10<100, 100<1000, 1000<10,000 and >10,000 pairs).

Results

Reports were received of 162 active red-billed gull breeding colonies on mainland New Zealand, along with a further 19 on the Chatham Is. There is no apparent major national shift in the location of these colonies compared with that recorded prior to 1965 (Figures 1, 2), although some colonies are no longer active and the estimated number of breeding pairs at others has changed.

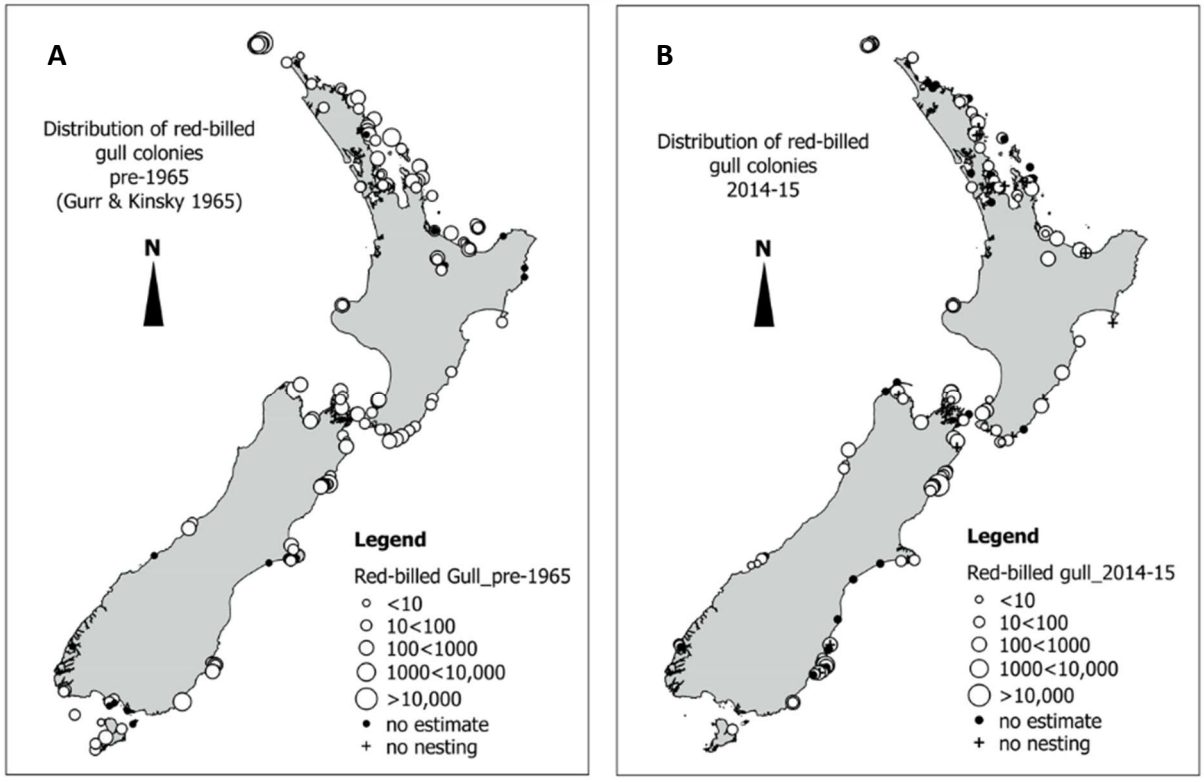

Figure 2. Location of red-billed gull colonies on mainland New Zealand prior to 1965 (A) and during the 2014–15 breeding season (B). Note that in 2014–15 more than 40 % of the sites occupied before 1965 were not checked and are therefore not shown in B.

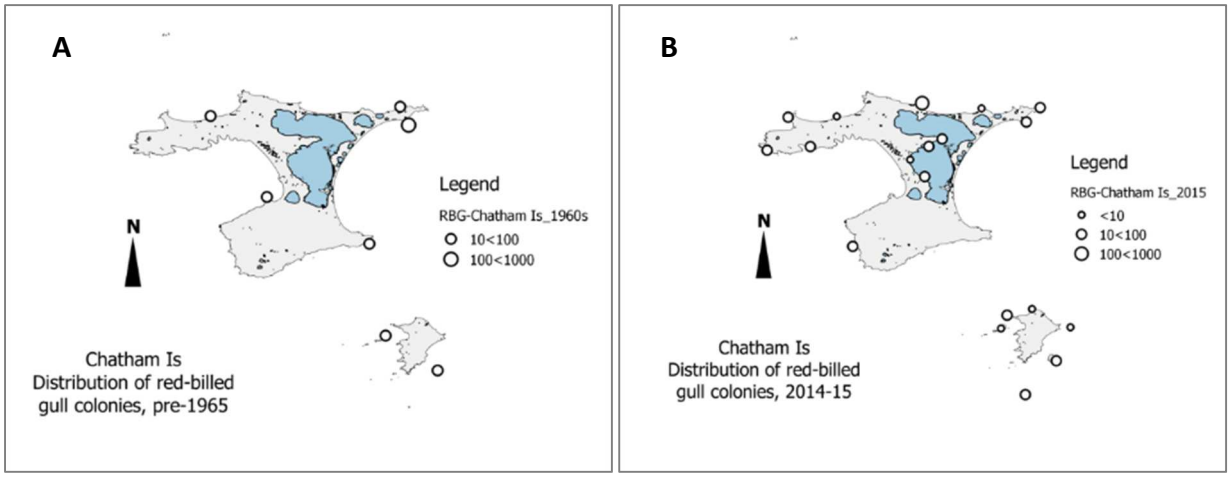

Figure 3. Location of red-billed gull colonies on the Chatham Islands prior to 1965 (A) and during the 2014–15 breeding season (B). Although the total number of breeding pairs was slightly less in 2014–15 (~600 vs ~722), the number of colonies had increased from 7 to 19 (data from Mike Bell and Tansy Bliss).

Of the mainland colonies, 46 were ones at or near sites reported by Gurr and Kinsky (1965), while 52 of the earlier sites were no longer active. Sixty-eight sites (41%) have not yet been checked (Table 1, Appendix 1). Many of these are on offshore islands, which are difficult to access without a boat and permission. Problems of access might also account for the lack of checks on some mainland sites. These difficulties were more apparent in some regions than others (Table 2).

Table 1. Current status of 166 red-billed gull breeding colonies reported by Gurr & Kinsky (1965). One site where there was uncertainty as to whether gulls were breeding or not has been omitted

Status in 2014–15	Number of sites
Active	46
Inactive	52
Not checked	68

Table 2. Present standing of the resurvey of pre-1965 red-billed gull colonies across Bird New Zealand regions. These data are preliminary, pending further discussion with the regional representatives to clarify some points

Birds New Zealand region	pre-1965	active 2014–15	inactive 2014-15	not checked
Far North	13	5	8	0
Northland	19	3	8	8
Auckland	10	3	2	5
South Auckland	10	1	4	5
Waikato	0	0	0	0
Bay of Plenty/Volcanic Plateau	23	1	0	22
Gisborne/Wairoa	3	0	1	2
Hawkes Bay	1	1	0	0
Taranaki	3	3	0	0
Wanganui	0	0	0	0
Manawatu	0	0	0	0
Wairarapa	11	3	5	3
Wellington	12	3	5	4
Nelson	6	4	2	0
Marlborough	8	3	3	2
Canterbury	18	10	7	1
West Coast	3	1	0	2
Southland	16	1	1	14
Otago	10	4	6	0
Chatham Is	7	4	3	0

No change in colony size was apparent at 10 of the colonies, while another 10 had seemingly got larger and 14 had become smaller (Table 3). This is only a coarse assessment, however, given that the size of most colonies in 2014–15 was classed only in orders of magnitude. A shift towards smaller sized colonies is also apparent when the frequency distributions of colony sizes are compared between these two time periods. The frequency of small colonies (<10 pairs) rose from 10 % to 21 %, whereas that of medium-sized colonies (100<1000 pairs) declined from 34 % to 28 %, and large colonies (1000<10,000 pairs) from around 4 % to under 1 %. Again this can only be a somewhat cursory conclusion given the broad categories of colony size (Figure 4). Any firmer conclusions must wait until after these colonies have been censused more exactly.

Table 3. Changes in the size of red-billed gull colonies (estimated number of breeding pairs) from before 1965 to 2014–15. The relative size of colonies located along the shaded diagonal has not changed. Those colonies above the diagonal (10) have apparently become bigger; those below the diagonal (14) appear to have got smaller

		Status 2014/15					
		<10	10 <100	100 <1000	1000 <10000	>10000	No estimate
Status pre-1965	<10		1	2			
	10<100	3	4	4	1		2
	100<1000	3	5	6	1		2
	1000<10000		1	1		1*	
	>10000			1			
	No estimate		4				2

* The four sites at Kaikoura were listed separately by Gurr and Kinsky (1965), when together they supported around 3160 pairs, but were assessed as one in early 2015, with >10,000 pairs thought to be present. For comparative purposes they are treated here as one colony.

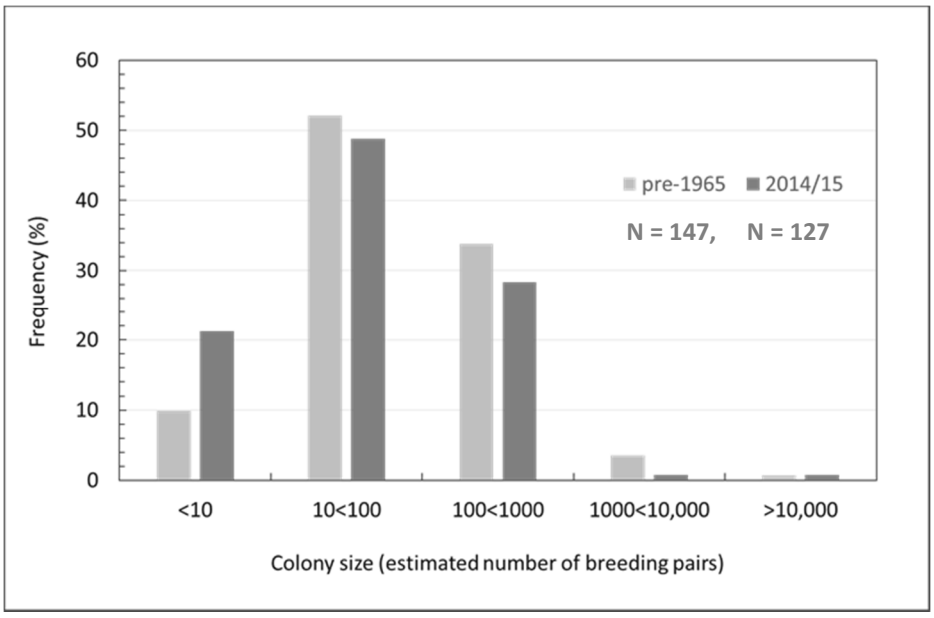

Figure 4. Changes in the frequency distribution of the size of red-billed gull colonies from before 1965 to 2014–15.

Discussion

The first phase of this survey has been partially successful. Just under 60 % of the sites reported by Gurr and Kinsky (1965) were resurveyed, of which 47 % were still active, if on balance apparently supporting somewhat fewer pairs than before. Interpreting changes in colony size at this stage is complicated because only order-of-magnitude estimates of numbers were requested (although more precise figures were sometimes provided). More importantly, it is not clear if the estimates take into account the presence of non-breeding birds at a colony, which can comprise up to 50 % of the birds present (Mills 1989). The same shortcoming almost certainly applied to the earlier estimates reported by Gurr and Kinsky (1965). It is a problem that will need to be overcome during the survey's second phase.

Reliable methods need to be adopted to ensure that the counts are as accurate as possible. A number of observers provided photographs of the colonies and these helped greatly in checking the estimates provided. Photographs also provide a permanent record of what was present at a colony on the day it was surveyed. Obviously, to be useful, photographs should encompass the whole colony (even if photographed in sections) and should have sufficient resolution to allow individual birds to be seen, categorised (incubating, sheltering chicks, nest-guarding, or loitering), and counted. A mix of landscape-level photographs, to establish the extent of a colony and key points within it, and a series of close-up photographs, ideally overlapping and covering the whole colony, would be ideal. This combination would allow direct counts of incubating birds or birds sheltering chicks across the whole colony. If close-up coverage is incomplete, then estimates of colony size can be obtained by sampling from the available close-ups and extrapolating the mean density across the whole colony. Preliminary trials with photographs supplied by some respondents suggest that this is feasible (Figure 5).

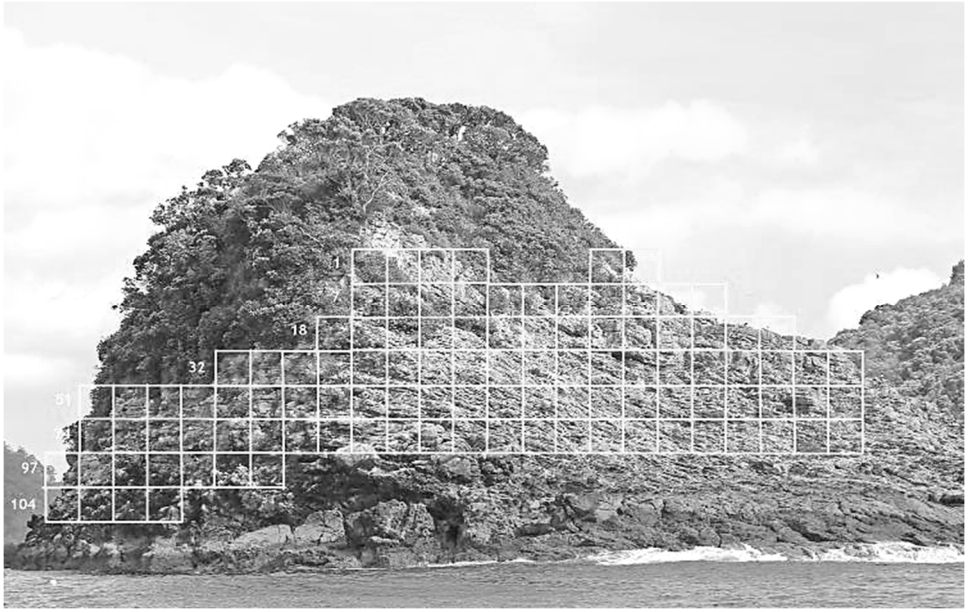

Figure 5. Red-billed gull colony on Te Karaka I. off Hahei, near Whitianga, with an overlain sampling grid of 107 squares. Direct counts of nesting gulls from the original high-resolution photograph gave an estimate of 110 breeding pairs. Bootstrap resampling of counts of nesting birds in 20 randomly selected squares, extrapolated across the whole colony, gave an estimate of 129 pairs with lower and upper 95% confidence limits of 44 and 223 respectively. Photograph courtesy of Duncan Watson.

Many of the colonies that were not surveyed are on offshore islands, which are difficult to access without a boat and permission. Similar restrictions on access might account for the lack of checks on some mainland sites. These constraints and any others will need to be better understood and addressed before the next breeding season otherwise the hope of achieving complete coverage will be compromised.

In summary, a foundation now exists to move forward to the second phase of the survey. There are still a significant number of original sites that need to be checked but assuming that the difficulties of accessing these sites can be overcome, it should be possible to check their current status and, if active, obtain reasonable estimates of the number of breeding pairs. In addition to securing permission to access sites, the other upcoming challenges are obtaining the commitment of people to survey particular sites; deciding the most appropriate means of censusing each colony and providing guideline on how best to do this; and acquiring the funds needed for this more concentrated phase, including on-land travel costs, boat and aircraft hire, and perhaps contracting specialist skills to obtain remotely-sensed imagery of hard-to-access colonies (e.g. high-resolution photography from a UAV). Anyone wanting to participate in this follow-up phase of the survey should contact Peter Frost (pghfrost@xtra.co.nz) or Graeme Taylor (gtaylor@doc.govt.nz).

Acknowledgements

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Appendix 1. List of sites reported by Gurr and Kinsky (1965) as supporting red-billed gull breeding colonies that were not surveyed in 2014–15

OSNZ Region	SITE NUMBER	LONGNAME	Latitude	Longitude
Auckland	N32	Matheson's Bay	-36.303755	174.799372
Auckland	N43	Nani I.	-36.771811	175.046932
Auckland	N44	Putiki Bay	-36.805955	175.028853
Auckland	N46	Three Sisters	-36.813558	175.031385
Auckland	N48	Oaia I. (Motutara)	-36.840726	174.410718
Bay of Plenty	N53	Mt Maunganui (a)	-37.629043	176.172145
Bay of Plenty	N54	Mt Maunganui (b)	-37.626596	176.169135
Bay of Plenty	N55	Motuotau I. (a)	-37.630934	176.193933
Bay of Plenty	N56	Motuotau I. (b)	-37.628241	176.193227
Bay of Plenty	N57	Plate I. (Motunau)	-37.662249	176.560679
Bay of Plenty	N58	White I. (East Point and North Coast)	-37.512179	177.185671
Bay of Plenty	N59	White I. (NE Point)	-37.515674	177.194268
Bay of Plenty	N60	White I. (Te Awapuia)	-37.529561	177.187402
Bay of Plenty	N61	White I. (Troup Head)	-37.526469	177.195134
Bay of Plenty	N62	White I. (Volkner Rocks; Te Paepae o Aotea)	-37.476914	177.133614
Bay of Plenty	N63	White I. (Club Rocks)	-37.535937	177.185020
Bay of Plenty	N64	Rurima Rocks	-37.830622	176.872771
Bay of Plenty	N65	Rurima Rocks (Lizard I. = Moutoki ??)	-37.831617	176.883660
Bay of Plenty	N66	Motuhora/Whale Is (NW Point)	-37.848244	176.963802
Bay of Plenty	N67	Whakatane	-37.951524	176.998030
Bay of Plenty	N68	Whakatane Heads	-37.942262	177.012781
Bay of Plenty	N69	Kohi Point (between Ohope Beach and Whakatane)	-37.939555	177.017383
Bay of Plenty	N105	Whanarua Bay	-37.673429	177.790749
Canterbury	S15	Irongate Stream	-42.278971	173.772278
Gisborne	N75	Motuoroi I.	-38.248103	178.337474
Gisborne	N76	Moutara Pt.	-38.416426	178.346532
Marlborough	S5	Bird I.	-40.991432	174.034888
Marlborough	S6	White Rocks	-41.076033	174.360086
Northland	N35	Bird Rock (N. Hauraki Gulf)	-35.902247	175.109111
Northland	N17	Whangaruru Sth.	-35.377840	174.347222
Northland	N18	Sugar Loaf	-35.566561	174.705649
Northland	N19	High Peak Rocks (Pinnacle)	-35.547094	174.724743
Northland	N29	Taranga I. (Hen I.)	-36.001913	174.698054
Northland	N30	Taranga I. (Hen I.)	-35.965837	174.744715
Northland	N31	Mokohinau I. (Burgess I.)	-35.905409	175.113612

OSNZ Region	SITE NUMBER	LONGNAME	Latitude	Longitude
South Auckland	N33	Cuvier I. (a)	-36.439861	175.786744
South Auckland	N34	Cuvier I. (b)	-36.434910	175.769249
South Auckland	N36	Green I. (Mercury I. group)	-36.646158	175.847459
South Auckland	N51	Alderman I. (Ruamhua-iti)	-36.971943	176.082967
South Auckland	N52	Alderman I. (Ruamhua-iti)	-36.976380	176.088302
Southland	S46	Preservation Inlet	-46.104090	166.709737
Southland	S47	Preservation Inlet	-46.126613	166.654693
Southland	S49	Rabbit I	-46.567816	168.330667
Southland	S50	Pourakino R.	-46.336720	167.978652
Southland	S51	Kawakaputa Bay	-46.382253	167.858321
Southland	S52	Pig I.	-46.406236	167.992015
Southland	S53	Centre I.	-46.455936	167.845233
Southland	S54	Solander I.	-46.573337	166.895915
Southland	S55	Codfish I.	-46.751991	167.593118
Southland	S56	Hazelburg Group	-46.821330	168.452388
Southland	S58	Doughboy Bay	-47.033422	167.692660
Southland	S59	Solomon I.	-47.219862	167.435710
Southland	S60	Big South Cape	-47.253880	167.381163
Southland	S61	Mokinui I. (Moggy I.)	-47.140203	167.401980
Volcanic Plateau	N71	Rotorua (Arikikapakapa golf links)	-38.159649	176.247019
Volcanic Plateau	N72	Rotorua (Roto-a-tamaheke)	-38.162552	176.259028
Volcanic Plateau	N73	Rotomahana	-38.268119	176.445705
Volcanic Plateau	N74	Waiotapu	-38.358743	176.368485
Wairarapa	N96	Glenburn Station	-41.319530	175.860926
Wairarapa	N97	Pahaoa	-41.396357	175.722068
Wairarapa	N102	White Rock	-41.568680	175.395940
Wellington	N84	Kapiti I. (Tokomapuna I.)	-40.880163	174.927111
Wellington	N85	Kapiti I. (Tohoramaurea I.)	-40.889494	174.902461
Wellington	N89	Kapiti I. (d)	-40.881222	174.900632
Wellington	N95	Cape Terawhiti	-41.285846	174.613465
West Coast	S24	Waitangitoana River	-43.122341	170.251491
West Coast	S25	Okarito	-43.220323	170.161515