Manaaki Whenua
Landcare Research

Impacts of Cyclone Gabrielle on ecosanctuaries: the good, the bad and the ugly

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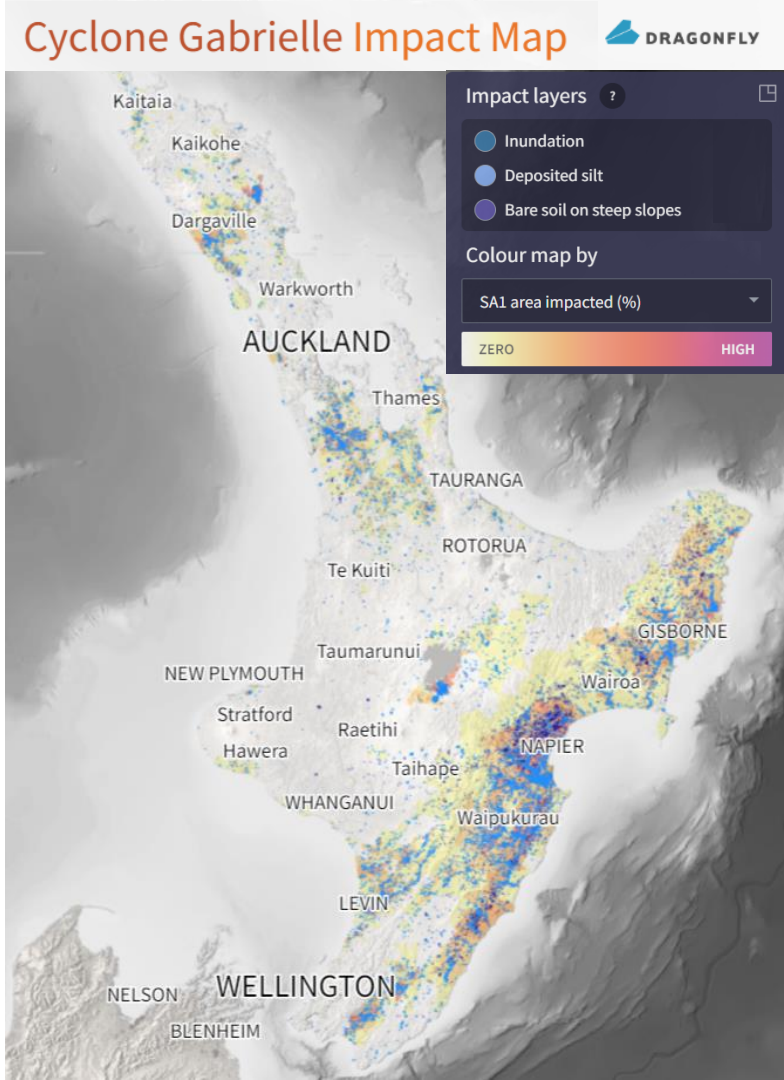
Cyclone Gabrielle

- $9-14.5 billion in damage
- Cyclones increasingly moving towards the poles (Korznikov et al. 2023)
- To safeguard hard-fought gains against future extreme weather events, we need to identify the species, ecosystems, and conservation infrastructure most at risk



What impacts did Cyclone Gabrielle have on Te Ika-a-Māui (North Island) ecosanctuaries?

EXTREME WEATHER RESEARCH PLATFORM
Te Rāngai Rangahau Āhuarangi

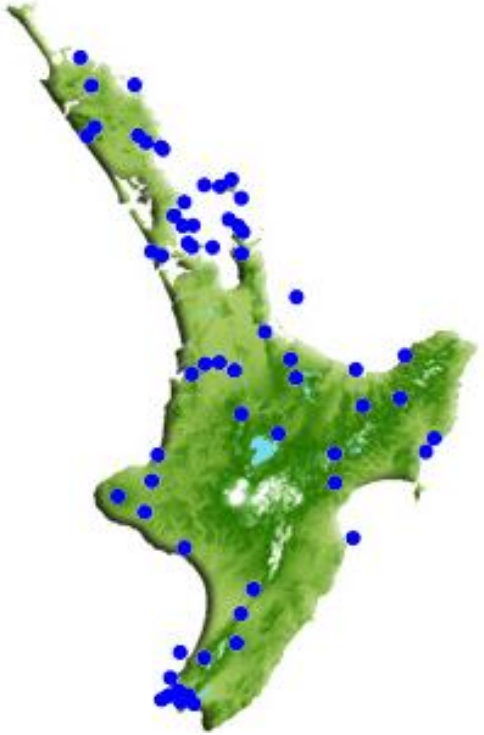
- Refuges for Aotearoa's most threatened biodiversity
- Linking communities with conservation
- Snapshot of broader conservation efforts throughout New Zealand

Interviews with representatives from North Island ecosanctuaries

- "a project larger than 25 ha implementing multi-species, pest mammal control for ecosystem recovery objectives, and with substantial community involvement" (Innes et al. 2019)

- Smaller sanctuaries with predator-proof fences also included (Burns et al. 2012)

- 43 interviews to date (of 71 identified sanctuaries)



https://www.sanctuariesnz.org/

Interview questions

- Did your ecosanctuary experience damage from:
  - Inundation?
  - Erosion?
  - Deposition?
  - Wind?

Major types of impacts on ecosanctuaries

- Inundation (40%)

Tōtara Reserve Regional Park, Pohangina

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Tāwharanui Regional Park (photo: Matt Maitland)

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Bream Head Scenic Reserve

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Opouahi Kiwi Crèche (photo: Deb Harrington)

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Mahakirau Forest Estate (photo: Sara Smerdon)

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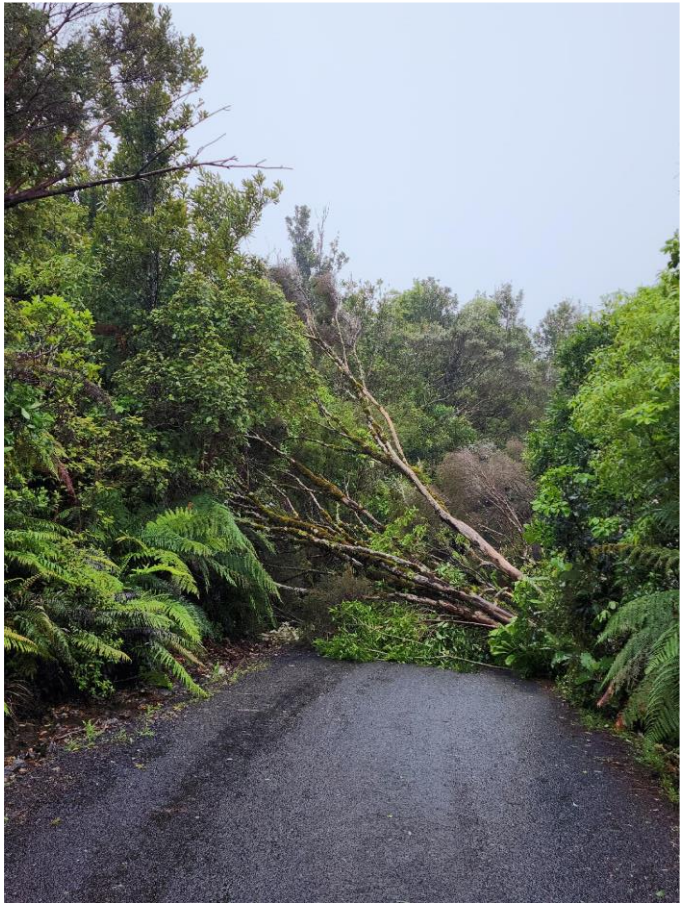
- Deposition (29%)
- Wind (74%)



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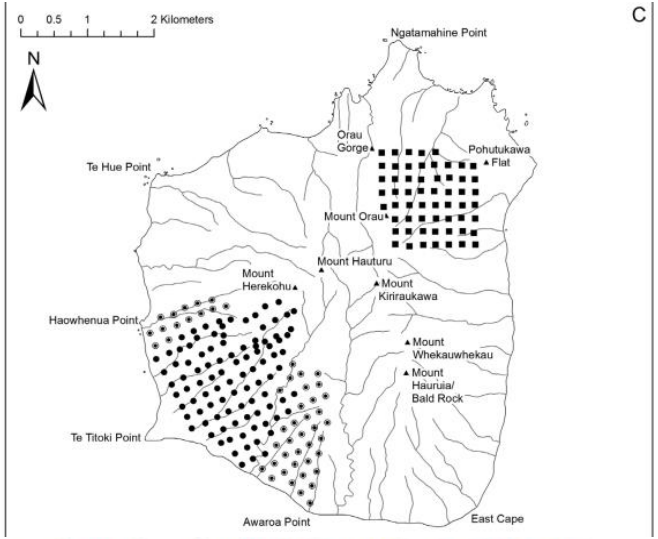


Te Hauturu-o-Toi

Little Barrier Island

Toy et al. (2018)

Table 1. Number of observations and sampling effort for hihi, tūī and tīeke, 2005–2013.

Study area	Year	Number of points	Number of point visits	Hihi		Tūī		Tīeke	
				n	E	n	E	n	E
SW	2005	98	264	57	22	61	23	38	14
	2006	98	623	172	28	206	33	101	16
	2007	98	1213	105	8.7	147	12	145	12
	2009	98	784	168	21	128	16	154	20
	2010	98	1078	80	7.4	145	13	177	16
	2011	98	1058	76	7.2	262	25	180	17
	2012	148	1555	86	5.5	87	5.6	184	12
	2013	148	1271	86	6.8	146	11	199	16

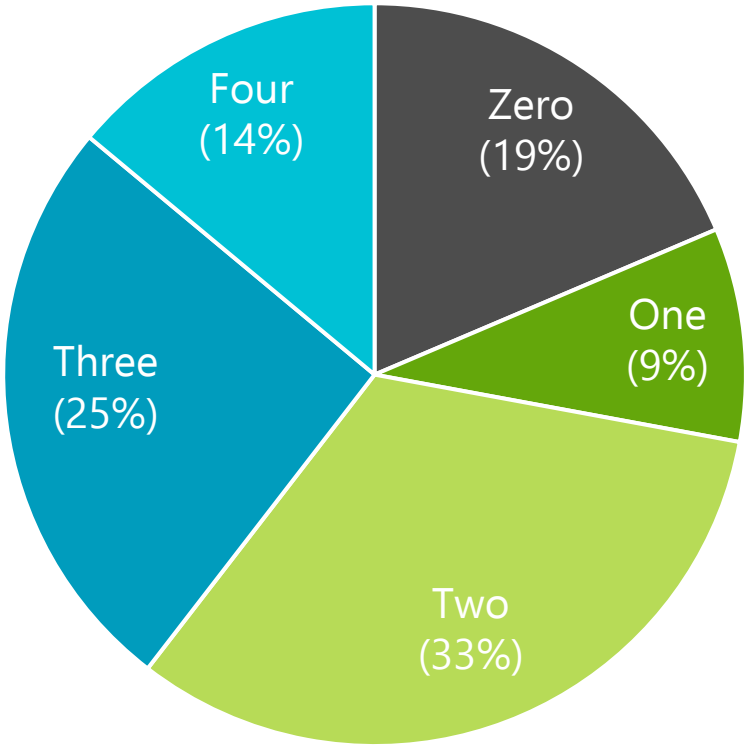
n, Number of observations; E, Encounter rate (100*n/Number of point visits)

Tiritiri Matan

Major types of impacts on ecosanctuaries

- Inundation (40%)
- Erosion (72%)
- Deposition (29%)
- Wind (74%)

How many types of impact were experienced by each ecosanctuary?



Interview questions

- Did your ecosanctuary experience any:
  - Damage to fencing?
  - Damage to other infrastructure?
  - Disruption to pest management?
  - Disruption to monitoring of native species?
  - Dead or injured wildlife?
  - Damage to restoration plantings?
  - Damage or loss of access to sites of cultural significance?

31% of ecosanctuaries with a predator-proof fence were compromised (4/13)

Opouahi Kiwi Crèche (photo: Deb Harrington)

- Five rats and possible cat scat detected at Opouahi
- Two ferrets trapped within Wairakei Golf Course

20% of ecosanctuaries with stock/ungulate fencing were affected (4/20)

- ~50% of riverside fencing damaged by flooding at Longbush Reserve
- Stock fencing affected at Mataia Restoration Project

Hawke's Bay QEII covenant (photo: Annabel Beattie)

65% of ecosanctuaries experienced impacts on infrastructure (28/43)

- Access compromised

Mahakirau Forest Estate (photo: Sara Smerdon)

65% of ecosanctuaries experienced impacts on infrastructure (28/43)

- Access compromised
- Recreational facilities damaged

Tiritiri Matangi (photo: Carl Hayson)

65% of ecosanctuaries experienced impacts on infrastructure (28/43)

- Access compromised
- Recreational facilities damaged
- Other infrastructure

Tāwharanui Regional Park (photo: Matt Maitland)

58% of ecosanctuaries experienced disruptions to pest management (25/43)

- Varying impacts on access and damage to traps, bait-stations and surveillance
- Traps constantly wet: rusting faster, heavier to move, bait decaying faster
- Sites with major impacts trapping at <50% efficiency after the storm

Mahakirau Forest Estate (photo: Sara Smerdon)

45% of ecosanctuaries experienced impacts to monitoring of native species (19/42)

Archey's frog (photo: Sara Smerdon)

- Opportunities lost due to site inaccessibility and seasonality of monitoring programme
- Missing data in long-term time series
- Volunteers and contractors less available, due to their own lives being impacted, and health and safety concerns

15% of ecosanctuaries directly observed dead or injured wildlife (6/41)

- Two of eleven North Island brown kiwi chicks died at Opouahi Kiwi Crèche
- Nine shore plovers (~3% of global population) died at Cape Sanctuary
- Beach-wrecked seabirds (e.g., grey-faced petrel, fluttering shearwater)
- Likely a major underestimate of wildlife mortality
- Reports of pest mammals showing up in unusual places, then disappearing again

41% of ecosanctuaries suffered damage to restoration plantings (12/29)

- Average restoration planting cost of $7,044 per ha (Forbes 2021)
- Damage represents a significant lost investment
- ~400 m^2 (0.04 ha) windfall of restoration plantings at Young Nick's Head

Bream Head Scenic Reserve

29% of ecosanctuaries had culturally important sites that were impacted (4/14)

- Middens damaged or washed away
- Some sites inaccessible

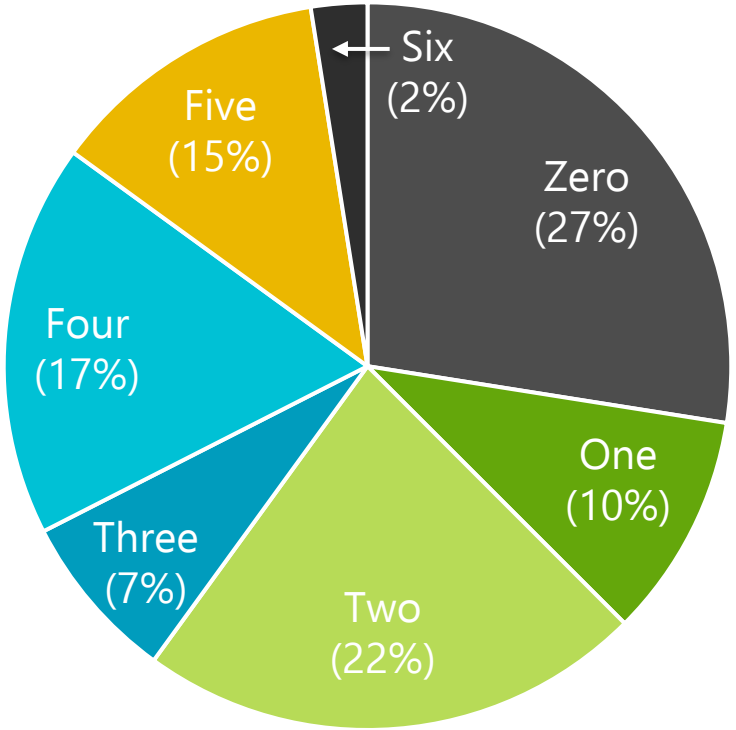
Shell midden at Whatipū
(photo: Auckland Regional Council)

- Ngāti Manuhiri (mana whenua of Te Hauturu-o-Toi, Little Barrier Island) responded to a significant discovery that followed the cyclone, which included rāhui, site visit and assessment, and cultural protocols

Types of damage to ecosanctuaries

- Infrastructure (65%)
- Pest management (58%)
- Monitoring (45%)
- Restoration plantings (41%)
- Predator-proof fences (31%)
- Cultural sites (29%)
- Other fencing (20%)
- Dead/injured wildlife (15%)

How many types of impact were experienced by each ecosanctuary?



The ugly

- Immediate and confronting impacts
- Damage to infrastructure
- Loss of threatened species

The bad

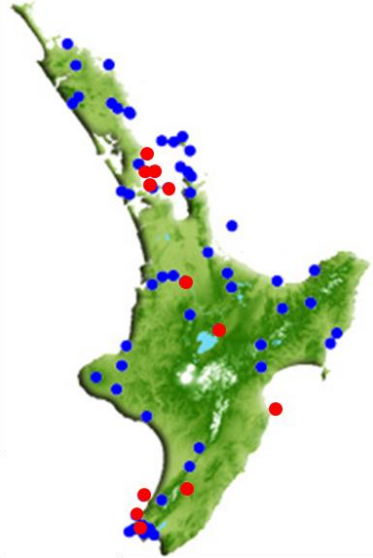
- Disrupted monitoring
- Reduced capacity for pest management
- Opportunity cost and lost investment
- <u>What can be done to better prepare for future extreme weather events?</u>

Mahakirau Forest Estate (photo: Sara Smerdon)

The good?

- <u>Despite major individual impacts, ecosanctuaries collectively weathered the storm</u>

- In-built resilience for many threatened species
  - Less known about ‘non-charismatic’ or ‘intractable’ species, which may be more at risk



- Pest numbers may decline following cyclones, offsetting disruptions to pest management

- Native forest relatively stable (McMillan et al. 2023)

Ecosanctuaries I'd still like to talk to

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- Tōtara Reserve Regional Park
- Mokoia Island
- Motuora Island
- Boundary Stream Mainland Island
- Pukenui Forest
- Turitea Reserve
- Pirongia Forest Park
- Pupu Rangi Nature Sanctuary
- Trounson Kauri Park
- Ngapukeariki Mainland Island Project
- Port Charles Rat Attack
- Puketi Forest
- Waikawau Bay Wetland Project
- Whakaangi Landcare Trust
- Aongatete Forest Restoration Project
- Ōtanewainuku Forest
- Project Island Song
- Taranaki Mounga
- Te Kauri
- Habitat Tuateawa
- Raukūmara Pae Maunga
- Rotopiko
- Puketukutuku Peninsula
- Glenfern Sanctuary and Kotuku Peninsula
- Rapanui Point
- Sanctuary Mountain Maungatautari
- Warrenheip
- Rotoroa Island

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MANAAKI WHENUA – LANDCARE RESEARCH

Ngā mihi nui

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