

THE DEEP





## Te Wai Pounamu Weather and Climate Forecasting

The ancestors of Māori who lived across the varied land and waterscapes of Te Wai Pounamu developed an extensive knowledge of local weather and climate. This understanding was based on careful observation of daily, monthly, and seasonal conditions; as well as deeper knowledge about natural linkages in the environment which can reveal much about imminent and forthcoming weather and climate conditons. Such knowledge was critical for minimising the potential for harm in a sometimes harsh and unforgiving environment.

NIWA'S Māori Environmental Research Centre - Te Kūwaha o Taihoro Nukurangi, worked with iwi from across Te Wai Pounamu to identify, revitalise and promote the use of environmental indicators to forecast local weather and climate.

This poster shows a selection of indicators used by Māori across Te Wai Pounamu to forecast weather and climate. While the indicators are of most use in their respective localities, many of them are shared by hapū and iwi in other locations. Often more than one indicator is used to forecast for the day, month, or season ahead. It is hoped this work will contribute to reconnecting youth with their environment and making the most of all available knowledge to manage the risks associated with changing weather and climate conditions.

## Weather

Weather is the day to day state of the atmosphere, varying from minutes to weeks

## Climate

Climate is the synthesis of weather, averaged over longer periods from months to years, and even centuries.

	Name	Indicator	Expected outcome	lwi / Region	Name	Indicator	Expected outcome	lwi / Region	
V	Bar-tailed godwit Kūaka	Paired Kūaka entering a burrow	Fine weather is expected the next day	Waitaha, Kāti Māmoe, Kāi Tahu, Te Taurapa o te waka	Paradise duck Pūtakitaki	Pütakitaki nesting near the river	Dry summer season ahead	Kāti Huirapa, Kāi Tahu, Arowhenua	TE
	Broad billed prion Parara	Parara arrive on the tītī mutton-birding islands during the night	Gales and heavy rainfall expected the next day	Waitaha, Kāti Māmoe, Kāi Tahu, Te Taurapa o te waka	Grey warbler Riroriro	1. The riroriro builds a nest high in the trees 2. The riroriro chooses to build a home low down among sheltering branches	Mild westerly winds will ensure a warm summer     Cold southerlies expected		
	Brown tree frog Poraka	Silence of the night is broken when Poraka are heard whistling and croaking	Rainfall the next day	Kāti Huirapa, Kāi Tahu, Arowhenua	White heron Kõtuku	The kötuku are plentiful in summer along the West Coast	Gales and a heavy winter will follow	Kāi Tahu, Te Tai Poutini	14
	Hector's dolphin Tüpoupou	Hector's dolphins are unusually excited in the wake of boats during summer	Storm on it's way, driven by a northerly	Kāti Mahaki, Makāwhio, Kāi Tahu, Tē Tai Poutini	NZ fuchsia Kõtukutuku	The leaves of the Kōtukutuku are seen dropping to the ground	Winter is on the way	Kāi Tahu, Te Tai Poutini	
	Ghost moth Takata-wairua	Ghost moths observed flying near a light source	Light, misty rain expected the next day	Kāti Huirapa, Kāi Tahu, Arowhenua	Kōhai	A mixture of blooms sticking up and down     All blooms drooping     All blooms erect	Mixed season ahead     Cooler season ahead     Warmer season ahead	Kāi Tahu, Ōtautahi	
	NZ sandfly Namunamu	Swarms of namunamu start biting aggressively	Rainfall is expected	Kāti Mahaki, Kāi Tahu, Makāwhio, Te Tai Poutini	Cabbage tree Tī kōuka	Profuse early flowering     Late flowering	Long, dry summer ahead     Wet summer expected	Kāti Huirapa, Kāi Tahu, Arowhenua	
	Kelp weather-glass Paoro-matapae- huarere	1. The glass is full of air and hard to the touch 2. The glass is spongy and soft to the touch	Fine weather ahead     Rain is imminent	Waitaha, Kāti Māmoe, Kāi Tahu, Te Taurapa o te waka	NZ flax Harakeke	Early flowering of the koladi stem (korari)	Long, dry summer is expected	Waitaha, Kāti Mamoe, Kāi Tahu, Te Taurapa o te waka	
- Collin Aug	White caps Karu huka	White caps appear within the Bluff Harbour	Westerly blowing. Stronger winds expected bringing rain from that quarter	Waitaha, Kāti Māmoe, Kāi Tahu, Te Taurapa o te waka	Sea fog Kohu moana	Sea fog rolling in from the east along the Whakaraupō     Numerous sea fog events take place	1. Cold wintery conditions are on the way 2. Colder than normal conditions for the season can be expected	Ngāti Wheke, Kāi Tahu, Rāpaki-Whakaraupō	
RI.	Mt Peel Tarahaoa	A thin 'collar' like cloud surrounds Tarahaoa / Mt Peel	Rain imminent within three days	Kāti Huirapa, Kāi Tahu, Arowhenua	New moon Marama korohiti	Fine weather during the new moon phase     Wet weather during the new moon phase	1. Fine weather expected for most of the month 2. Wet weather expected for most of the month	Kāti Huirapa, Kāi Tahu, Arowhenua	
	North-west arch Te Māuru		A southerly expected next day. The strength of the southerly depends on the height of the NWA above the mountains	Kāi Tahu, Waitaha, Ōtautahi	Crescent moon Marama ohua	Crescent moon seen lying on it's back	Drier conditions expected for that month	Waitaha, Kāti Mamoe, Kāi Tahu, Te Taurapa o te waka	
	Southerly 'honest wind' Toka	Rain with no wind before a southerly     Rain accompanied with wind before a southerly	Southerly will hang around Kaikoura     Southerly will pass through Kaikoura quickly	Kāti Kurī, Kāi Tahu, Kaikoura	Rigel Puaka	Puaka rises on the south side     Puaka rises on the north side	Sign of settled and cooler conditions ahead     Sign of settled and warmer conditions ahead	Kāi Tahu, Ōtautahi	
	Mares tails Cirrus clouds	High clouds similar to horses tails observed above the Canterbury	A shift in weather conditions due in 2-3 days	Ngāi Tūāhuriri, Kāi Tahu, Tuahiwi	Canopus Autahi	Autahi is located far apart from the Milky Way during winter	A dry summer will follow	Kāj Tahu, Ōtautahi	

This project was funded through the Vision Maturanga Science Programme as part of the Deep South National Science Challenge, It was realised through the efforts and knowledge of G. Metzger, H. Morgan, J. Stewart, T. Bradshaw, M. Pera, E. Leask, B. Thompson, D. Whaanga, C. Gilroy, T. Nicholas, R. Anglem, G. Tipa, K. Russell, T. Williams, T.W. Poharama, M. Homes, K. Russell, Tä Tipene O'Reagan, J. Hullen, R. Ngārimu, M. Wakefield, G. Haremate, A. Kipa, D. Couch, Y. Couch, A. Riwaka, T.M. Tau, M. Manawatū, R. McDonald, B. Cowan, P. Papworth, H. Russell, M. Johnson, T.R. Mason, G. Tainui, J. Hanrahan, H. Rasmussen, P. Wilson, A.S. Skipper, D.N. King and K.T. Smith
Imary references: [1] Beattie, H. (1939). Tikao Talks: Treasures from the Ancient World of the Māori. Atl. and A.W. Reed, Dunedin (2) Beattie, H. A. Anderson, et al., Eds. (1974). Traditional lifeways of the Southern Maori: the Otago University Museum ethnological project, 1920. Dunedin N.Z.,
Otago University Press in association with Otago Museum, (3) Gordon, M. (1938). Children of Tane, J. M.Dent & Sons Ltd., London and Whitcombe and Tombs, Christchurch.
Photos were kindly provided by T. Whitehead; D. Koch, M. Marshall and K. Andelan from Flickr, P. Bishop, J. Shook, E. Floris, T. Willis, Vellella, N. Sarker, R. Gendler, National can Space Administration INASAI, and D. Murray; B. Patrick from Te Ara; T. Saleh;
Aardvark from New Zealand Tramper; S. Crowe and D. Allen; C. Howell from Shipspotting; J. Stewart and N. Fitzgerald from NZ Birdsonline; P. Bendle from Terrain Net; and M.B. Cawlfield.
For further information contact – Apanui Skipper: Apanui, Skipper@niwa.co.nz.

Copies of this poster can be obtained from posters@niwa.co.nz or visit our website www.niwa.co.nz NIWA Poster Series No. 2017-4