

Ecology Field Course 2024

Ecology Degree Programme
University of Otago

From 22 January to 2 February 2024, undergraduate Ecology students carried out research projects on Rēkohu Wharekauri Chatham Island



This document contains ‘graphical abstracts’ summarising each of the 9 projects that the students have carried out in pairs.

If you have a question about any of the results and data, or an idea for a project you would like to see done by future students, please contact Dr. Travis Ingram (travis.ingram@otago.ac.nz).

For more information about the Ecology Degree Programme, visit <https://www.otago.ac.nz/ecology>

Thanks to the Hokotehi Moriori Trust and the Department of Conservation for support, and to many landowners for permission to access sites



Predicting the Health of Hoho

Leah Thompson-Looij - Louis Ferguson

There exists a knowledge gap on the forest interactions ongoing on Chatham Island, New Zealand. The study aim was to determine the habitat preferences and attempt to predict the health of *Pseudopanax chathamicus* (hoho) in relation to abiotic and biotic conditions. We sampled various tree and environmental parameters at 60 hoho trees, across two sites, Awatotara Valley and Tuku Reserve, both on the Southwestern coast of Chatham Island.

Significant relationships were found both between soil pH and disease coverage, as well as between study site and stress levels, while herbivory level was not correlated with any environmental predictors.

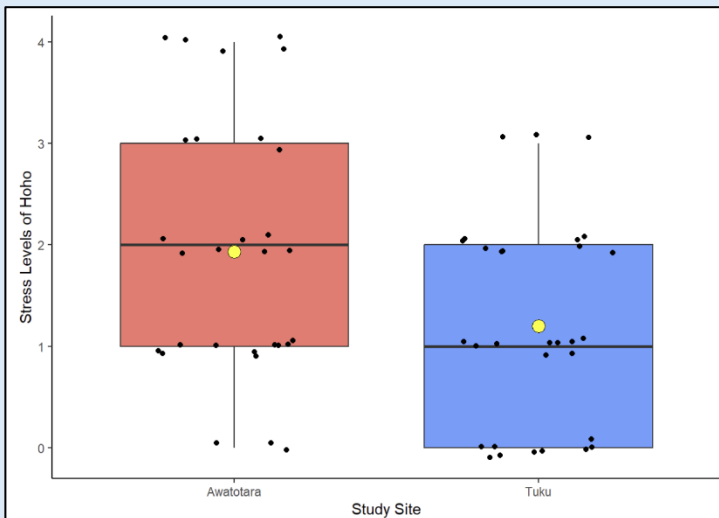


Figure 1: Difference between study site and stress levels of hoho trees (n = 60), with means shown in yellow, data sampled half from each of the two sites, Tuku Reserve and Awatotara Reserve, on Chatham Island, New Zealand, Jan 2024. ($P = 0.0169$)

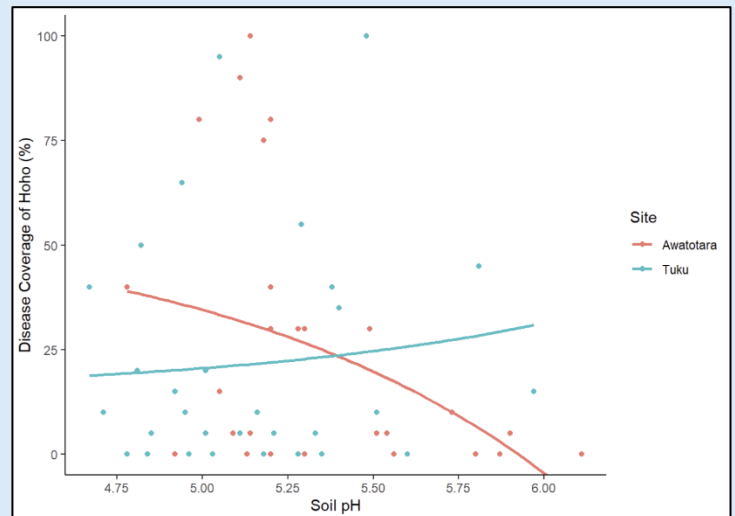
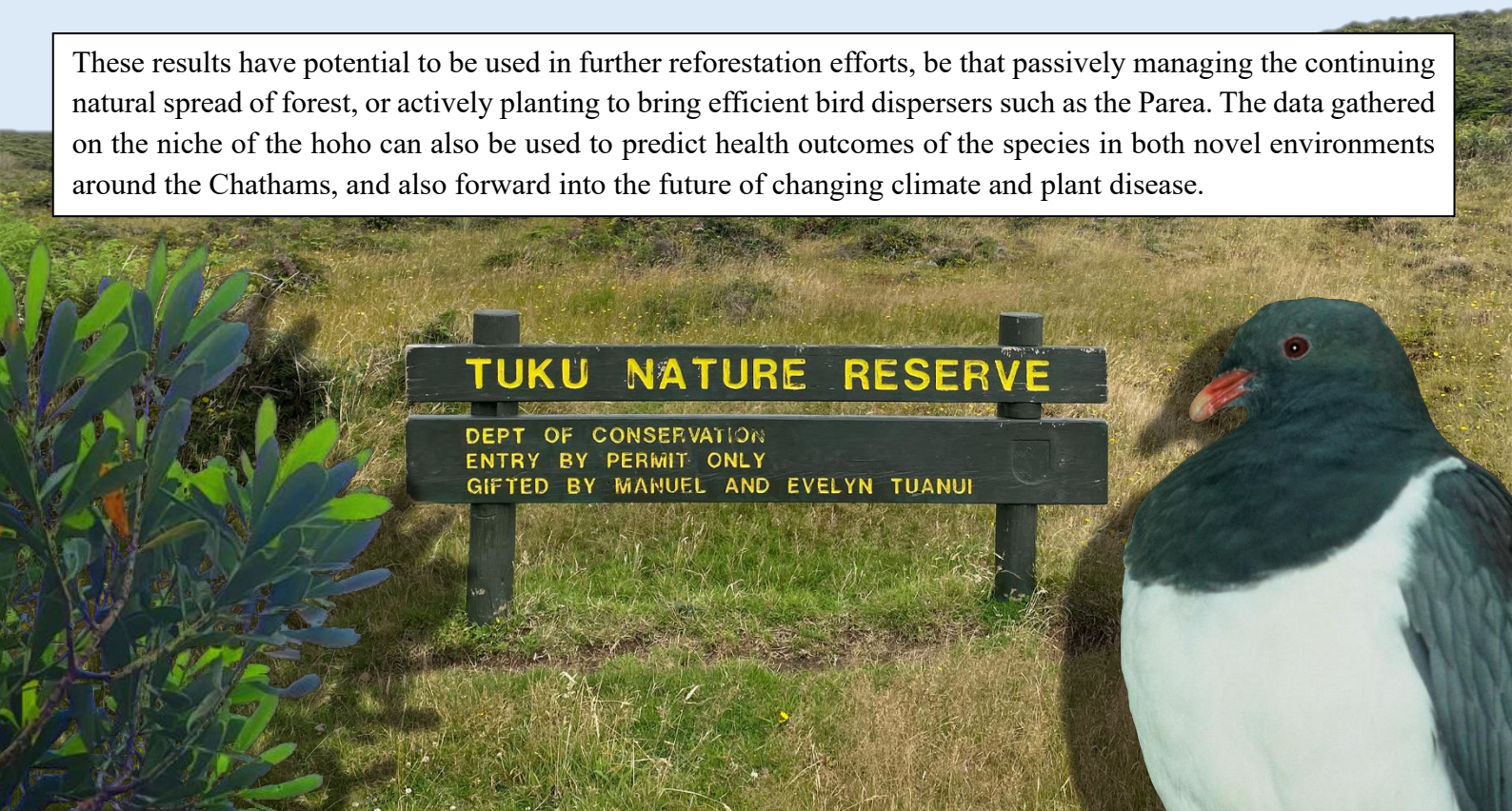
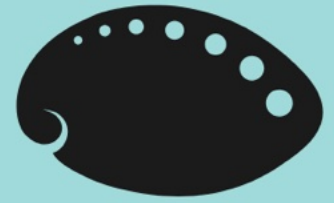


Figure 2: Effect of soil pH and disease coverage of hoho trees (n = 60), split by study site, data sampled half from each of the two sites, Tuku Reserve and Awatotara Reserve, on Chatham Island, New Zealand, Jan 2024. ($P < 2e-16$)

These results have potential to be used in further reforestation efforts, be that passively managing the continuing natural spread of forest, or actively planting to bring efficient bird dispersers such as the Parea. The data gathered on the niche of the hoho can also be used to predict health outcomes of the species in both novel environments around the Chathams, and also forward into the future of changing climate and plant disease.



HABITAT PREFERENCE OF JUVENILE AND ADULT PĀUA



CAITLIN GROSVENOR AND MIRA ODOM



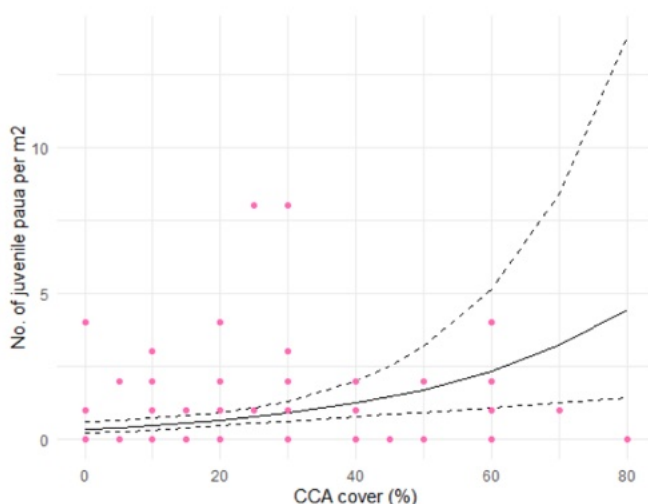
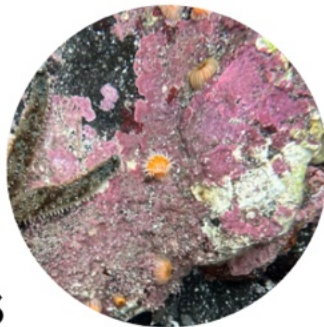
Our study looked at where juvenile and adult pāua prefer to live (their habitat preferences). We found that juveniles like areas with a lot of crustose coralline algae (CCA), while adults prefer areas with brown seaweed canopies.

Information about habitat preference is crucial for informing fisheries management and conservation efforts to improve pāua populations in Rēkohu, Wharekauri, Chatham Islands.

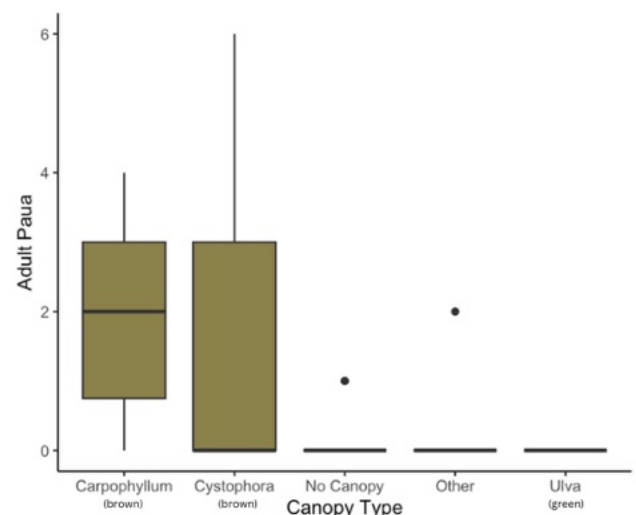
Most important habitat predictor of:



Juveniles



Adults

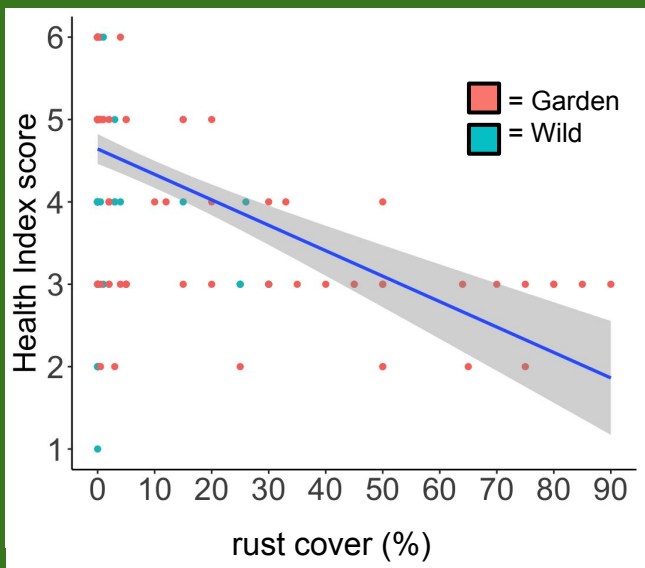


Assessing the impact of rust fungus infection on the Chatham Island forget-me-not/Kopakopa on Rēkohu/Chatham Islands.

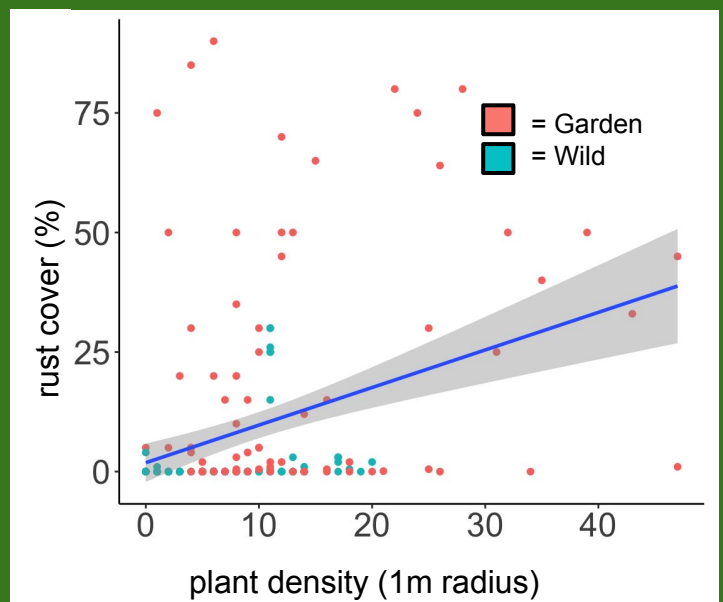
Amelia Lockhart and Lizzie Gaskell

Aim: To gain some foundational understanding of the understudied relationship between the rust fungus (*Pucciniastrum myosotidii*) and Chatham Island Forget-me-not (*Myosotidium hortensia*...

Method/study design: we visually assessed **plant health** using our Health Index (far left), visually assessed **% cover of rust infection**, measured **leaf and stem length (mm)** and counted the number of plants within 1m radius to determine **plant density**, from a mixture of coastal and garden sites at rēkohu.



Results: Plants with **increased rust cover** had **lower health scores**. Plants in **higher density patches**, and at **garden sites**, were associated with **more rust cover**.



Implications: This study contributes to the small body of knowledge surrounding this **endemic plant and rust**. We hope this study aids **conservation management** of the forget-me-not and rust fungus. Whether the rust is native or endemic will have conservation implications.

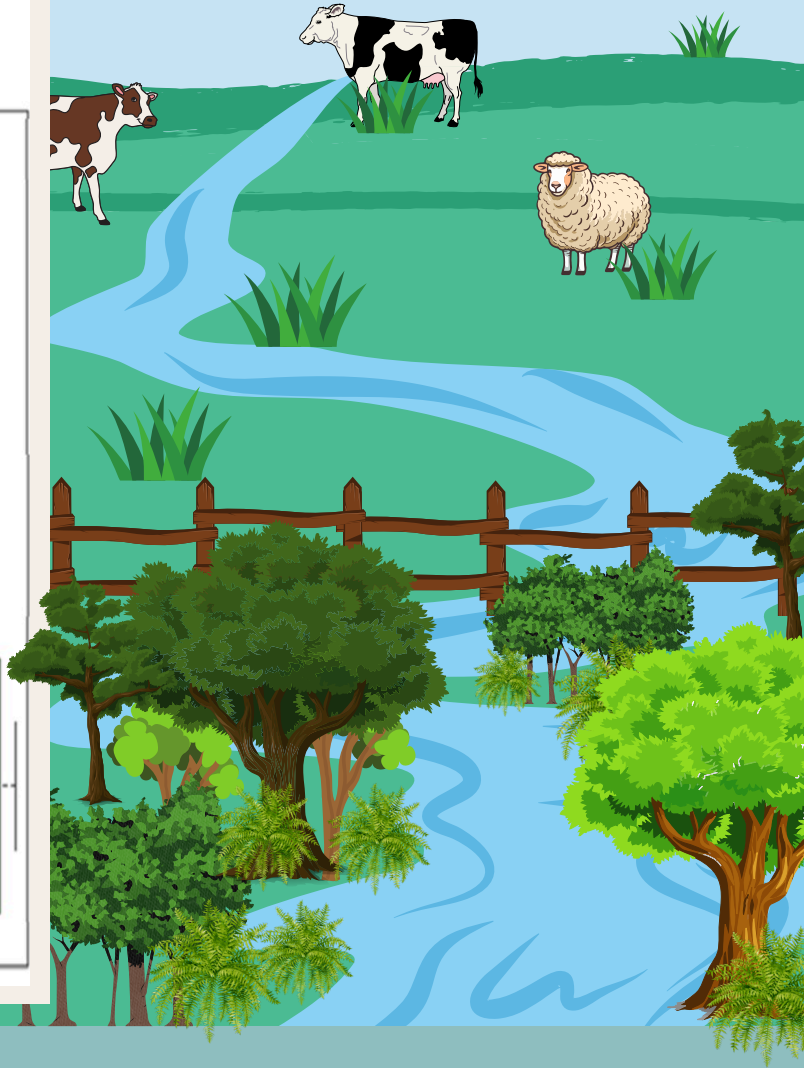
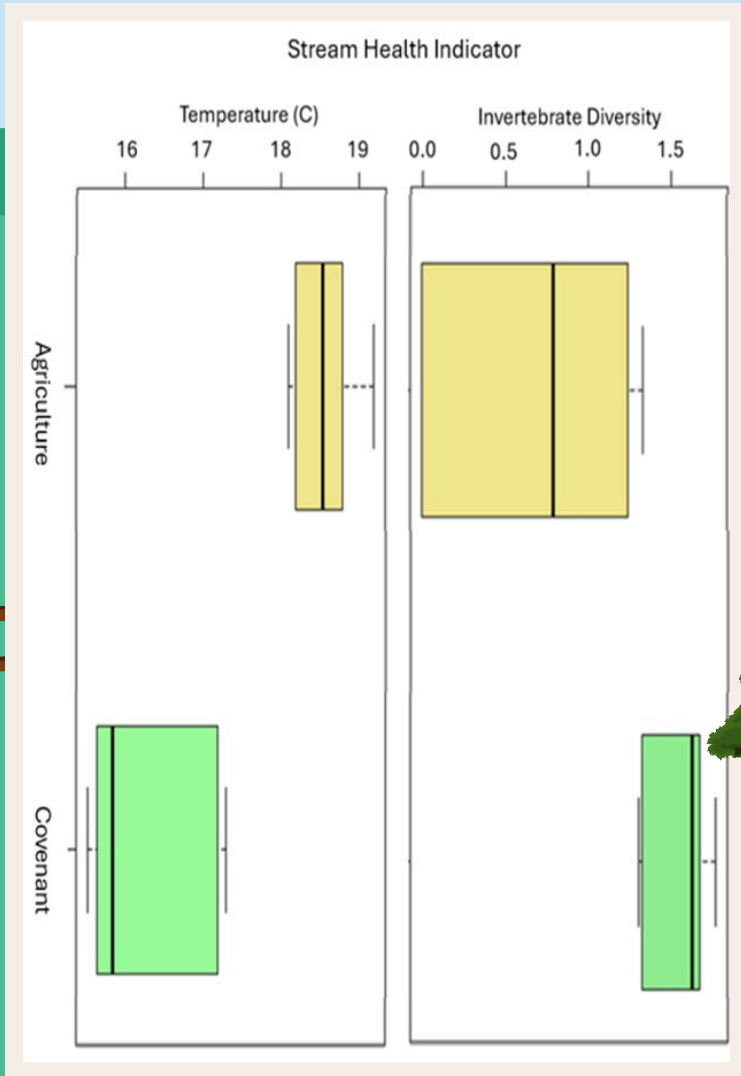


Image: rust on the underside of a Kopakopa leaf

STREAM HEALTH IN RAKAUTAHI COVENANTS

COMPARED TO AGRICULTURAL AREAS

Jasmine Scott - Nerissa Linwood



Our study used water quality indicators, such as temperature and invertebrate diversity to analyse the stream health of the Rakautahi Covenants compared with the adjacent agricultural land.

We found Covenants improved water quality and invertebrate diversity, demonstrating their success. These findings underscore the importance of expanding covenant-based conservation methods for better stream health and ecosystem preservation.

Wrangling weka: Conservation implications of weka presence in Rēkohu

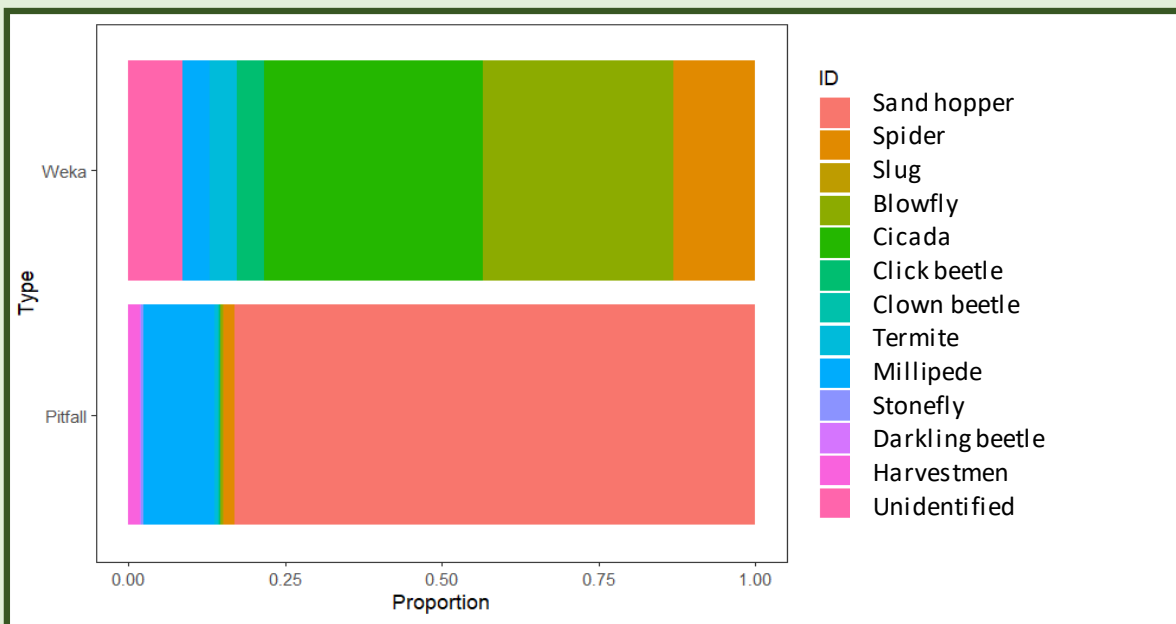
Callum Walter and Jay Barton

The indirect impact of weka on island ecosystems – especially their relationship with invertebrate communities – is an understudied field.

Our study investigated this impact by comparing weka stomach contents to invertebrate communities found in pitfall traps.



Image: Pitfall Trap Design



Results

The two invertebrate communities were converted into proportions and compared (seen in the bar graph above). We found that weka show more preference than we expected, as weka are known to be opportunistic feeders.

This preferential feeding could change invertebrate communities which could prove dangerous for rare invertebrate species, and invertebrate community stability.

It could also impact insectivorous bird species like the Chatham Island oystercatcher or black robin.



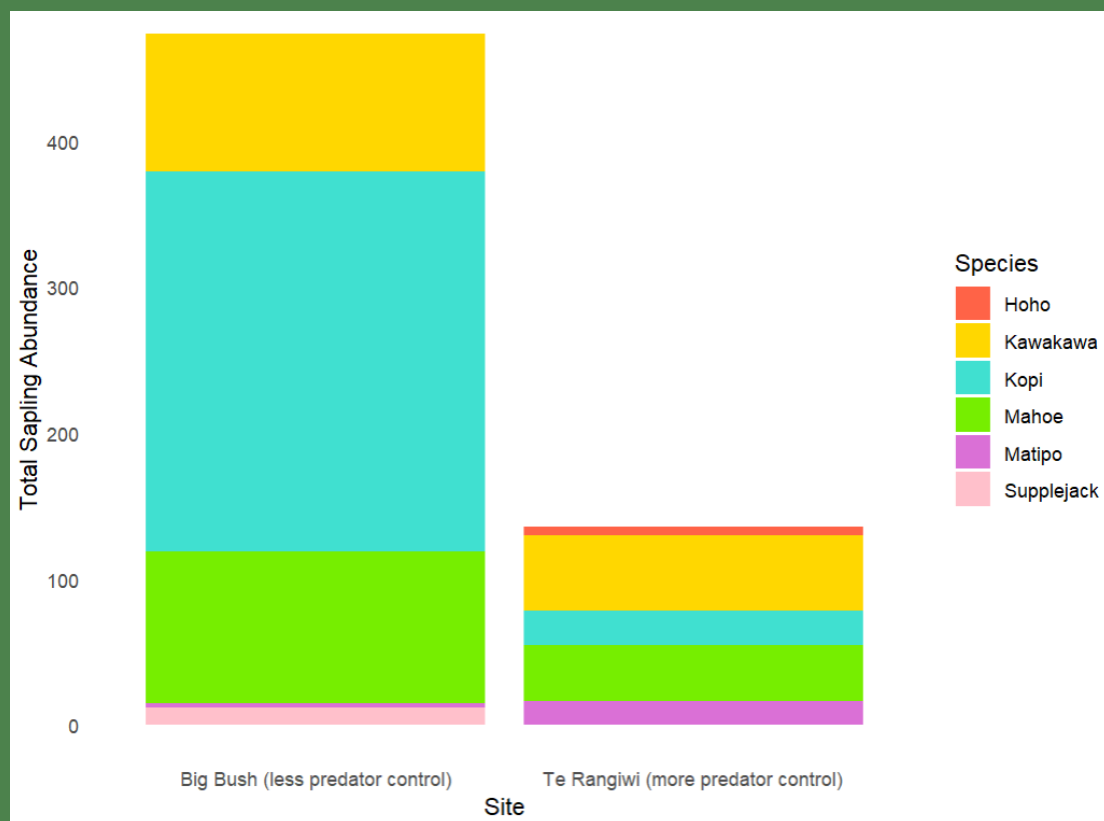
Image: © Leon Berard

Future of black robin habitat on Rēkohu

Tessa McConachie and Luka Klubien

Our study aimed to assess the effect of pest control on native forest regeneration at two potential black robin reintroduction sites; Big Bush (site without pest control) and Te Rangiwi (site with pest control).

30 samples were taken at each site with native woody saplings being identified and counted. This data was used to calculate sapling abundance, diversity and composition.



Our key finding was that there was significantly more saplings at Big Bush than Te Rangiwi suggesting that less pest control increased sapling abundance at Big Bush. However, due to confounding factors in this study, we recommend further research be conducted.



THE DISTURBANCE OF HUMANS ON THE Chatham Island Oystercatcher

Tawa Tidswell & Maia Robertson



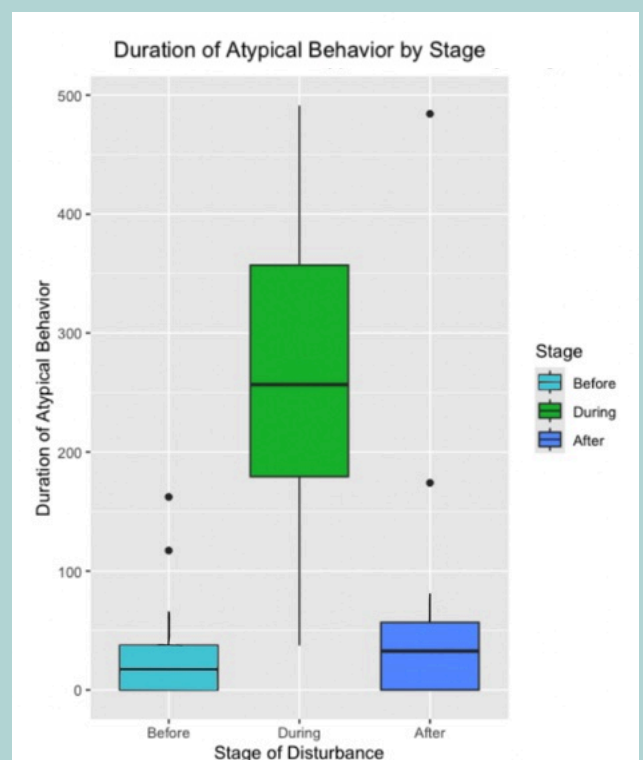
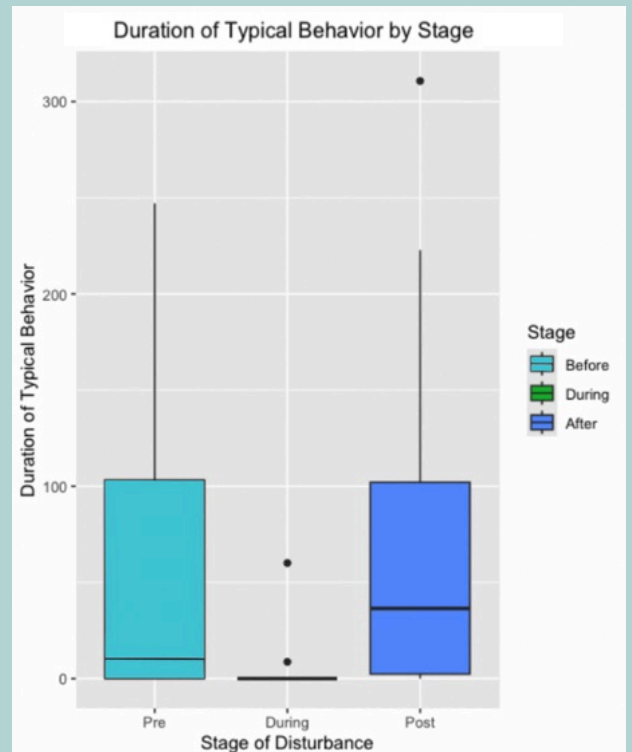
Image © Steve Pilkington

Oystercatchers/Tōrea are at risk from habitat loss, human disturbance and introduced predators. We investigated the effects of human disturbance on the parental behavior of Oystercatcher pairs.



When Oystercatcher pairs were disturbed by human presence they spent less time foraging and more time displaying defensive behaviors, which can lead to a decrease in the birds overall fitness.

This means that when the oystercatchers are disturbed by humans, they may expend more energy on atypical behaviors which could lead to a lower rate of successful fledglings for the oystercatcher chicks. A lower successful fledgling rate will eventually lead to a decline in population.



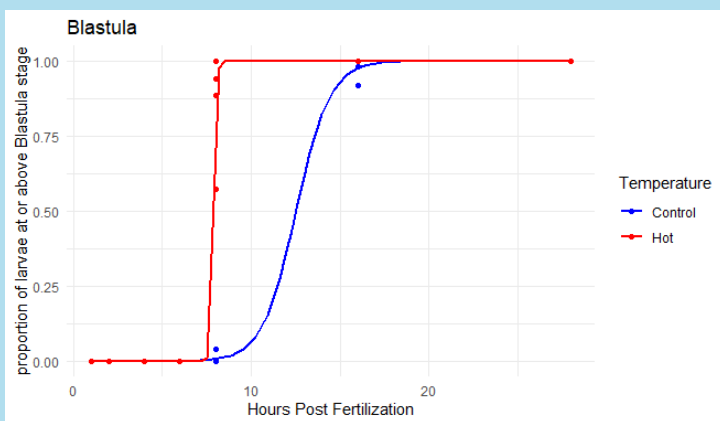
Babysitting in the heat: effect of warming temperatures on kina early larval development rate

Jemma Bezuidenhout and Owen Dabkowski

Aim/methods

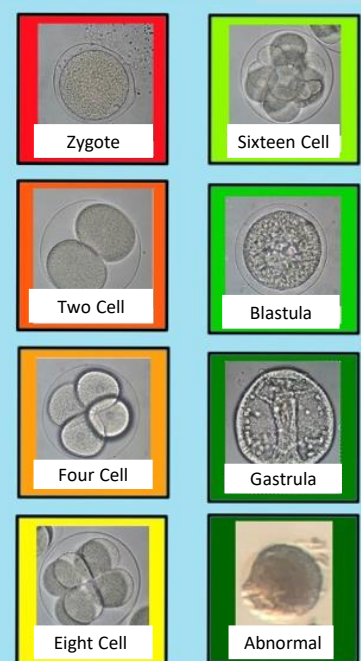
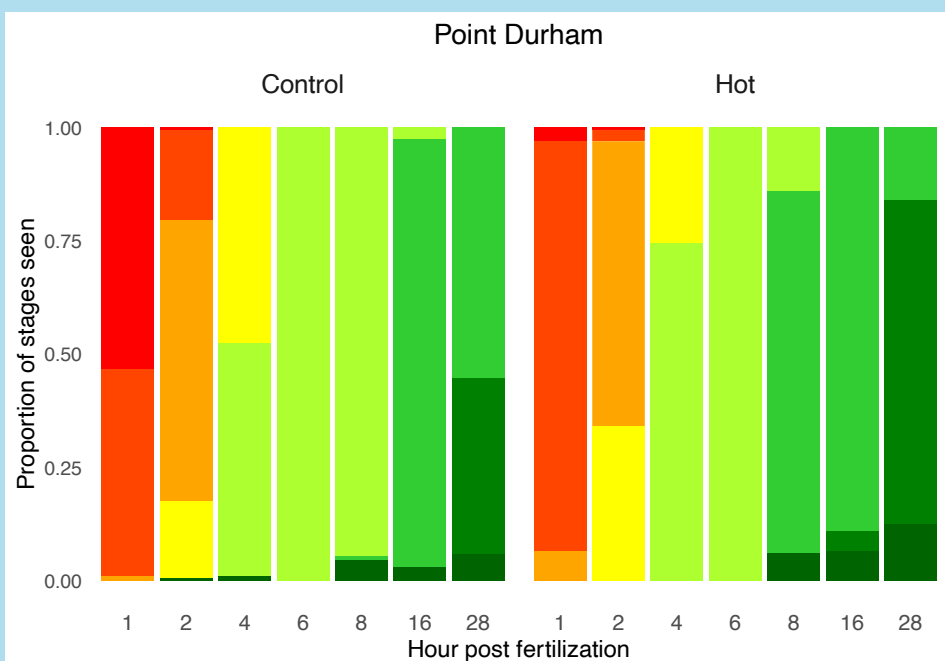
Until now, the effect of increased water temperatures on kina early larval development has not been studied on Rēkohu/ Wharekauri.

Kina were collected from two sites (Point Durham and Manukau Point) and spawned. Larvae were exposed to two different temperatures and their stage was tracked to determine development rate.



Results

We found that kina from both study locations developed faster under warmer temperatures. Similar patterns to what occurs on mainland New Zealand.



Main Conclusions

Increased development of kina will lead to population booms. These greater populations can support future fisheries pressure as well as provide more food for spiny rock lobsters, leading to a potential increase in their population. However, as grazers, kina can decimate kelp forests if left unchecked, degrading habitat for many other species. Therefore, any population growth will need to be monitored to protect the pristine coastal ecosystem of Rēkohu/ Wharekauri.

Salty snails: Potential effects of sea level rise on the New Zealand Mudsnail and coastal lake ecosystems on Rēkohu (Wharekauri, Chatham Island)

Robert Morgan and Mia Langley

Sea level rise (SLR) can increase the salinity of coastal freshwater bodies. Understanding how freshwater species are affected by salinity is important to predict how coastal freshwater ecosystems may be impacted by SLR. This study looked at how the New Zealand Mudsnail's (NZMS) activity, density, and size was impacted by salinity, we found all of these decreased with increased salinity. Our findings suggest that SLR is likely to negatively impact populations of NZMS, which could have cascading effects on coastal lake ecosystems.

