



## ADAPTING TO A CHANGING CLIMATE: CASE STUDY 33

### THREATS TO STOCKS OF TĪTĪ AND TIO IN THE SOUTH ISLAND

# TE TĪTĪ TE TIO KI RAKIURA

#### WHAT IS CLIMATE CHANGE?

Climate change is the change over time in the average (mean) state of the atmosphere over decades or longer. Climate change may be due to natural processes or external forces, or to persistent human activity that alters the composition of the atmosphere or land use. ([www.climatechange.govt.nz](http://www.climatechange.govt.nz)).



Location of Titi Islands within Ngāi Tahu ki Murihiku area

*Over time, iwi of the south of the South Island have witnessed the health and quality of their taonga species, like the Tītī (mutton birds) and the Tio (oysters) decline and through their research have identified climate change as a key factor in this.*

These species have an important place in the whakapapa and natural environment of Ngāi Tahu ki Murihiku. The harvest of Tītī from islands adjacent to Rakiura is one of the few remaining native wildlife harvests managed entirely by Māori and is of great economic, social and cultural importance. The mutton birders initiated this study to ensure that the birds remain plentiful for their mokopuna (grandchildren). The research outlines the benefits of conservation efforts both at sea and in breeding colonies ([www.otago.ac.nz/Titi/need.html](http://www.otago.ac.nz/Titi/need.html)).

#### THE IMPACTS OF CLIMATE CHANGE ON TĪTĪ AND TIO

Local iwi have noticed that the quality and health of the Tītī and Tio has declined substantially and that the decline seems to be occurring in cycles. The ability of local iwi to feed their own people, host others and create an economic benefit from their native fishery is consequently deteriorating. Mātauranga Māori relating to Tītī and Tio was also retained, connected by harvesting and management, and the knowledge passed through oral history. Finally, the iwi's relationship with their taonga species was changing as less and less of the fishery was available for harvest.

#### RESEARCH PROGRAMME – TIO

In the mid-1980s, a parasite called *Bonamia ostreae* closed the Foveaux Strait oyster fishery. *Bonamia* is an intercellular parasite that affects the blood cells of the flat oyster. The signs are yellow discolouration with extensive lesions on the gills and mantle of the oyster (Source: *International Council for the Exploration of the Sea-Marine Research Institute*; [www.ices.dk](http://www.ices.dk)). As a result, research was conducted by Ministry of Fisheries' scientists, Dr John Cranfield and Dr Mike Hine with support from Dr Bob Street. Part of the investigation involved counting the number of parasites in oysters.

The research found that the parasite was present in the fishery at all times, but would present at higher, more problematic levels at different times. As part of another body of work by Dr Street, other key factors were discovered that were of specific interest to Ngāi Tahu ki Murihiku whānau. These were:

- That the industry "just lives with it" and works around it.
- That the parasite is not a problem unless the Tio are stressed, in poor condition, and/or starving as a result of a shortage of food.

The flare up of the parasite is dependent on the health of the Tio and the primary food source for Tio is plankton. When the oysters are "big and fat" the parasite does not

thrive. However, when they are in a poor condition, the parasite takes hold and impacts negatively on the numbers of Tio.

## THE IMPACT OF EL NINO

In 1991, local iwi attended a seminar on the effects of El Nino Southern Oscillation (ENSO) events, presented by Australian environmentalist Dr Tim Flannery. He explained that when an El Nino event occurs, the volume of plankton drops in the waters around New Zealand and Australia. The fisheries subsequently become much less productive. Such events explain why the incidence of *Bonamia* has fluctuated in Tio populations throughout the late eighties until the fishery's eventual closure in 1991.

Dr Flannery raised the very grave concern that with global warming, the El Nino event would become more frequent and more intense.

The interconnected nature and success of breeding of Tio and Tītī is dependent on the availability of food – primarily plankton. South Island iwi are concerned particularly with the interdecadal pacific oscillation increasing the frequency and intensity of El Nino events. The outcome of which will see a steady decline in the numbers of Tītī, the recruitment of breeding stock, Tio and other taonga species because of a corresponding decrease in plankton.

## RESEARCH PROGRAMME – TĪTĪ

In 1995, Rakiura Māori (Stewart Island Māori) initiated a partnership with the University of Otago that focused on Tītī.

The main scientific goals of the research were to:

1. Measure whether current Tītī harvests are sustainable.
2. Determine what sets the limit of present Tītī harvest levels.
3. Evaluate the potential impacts of climate change, fisheries by-catch and pollutants.
4. Describe the diet of Tītī.
5. Test and refine population monitoring methods.
6. Compare mātauranga Māori (traditional environmental knowledge) and kaitiakitanga (environmental stewardship) with ecological science for harvest management.

The 2001 breeding season of Tītī was very successful. However, when the El Nino event began in April of that year, the Tītī chicks were “undernourished and starving”. In February 2002 the research confirmed that the El Nino event had had a significant negative effect on the Tītī population. It became clear to Rakiura Maori that the El Nino timing determines the success of the Tītī population.

Analysis of more than 20 years of harvest information from birder's diaries led to the very significant discovery of a strong link between Tītī harvest rates and ENSO weather patterns. This statistical analysis was corroborated by birders' traditional knowledge regarding long-term trends in Tītī abundance.

## OUTCOMES

This information provided the impetus for establishing a programme that could revive Tītī populations and assist them to adapt to climate change, which was negatively impacting their food source. The programme enabled Rakiura Māori to better understand the nature of climate impacts on their taonga species and to support programmes that could positively impact the health and well being of Tītī. The information gained supported their mātauranga Māori – a result of inter-generational observations of the Tītī and Tio.

Further collaborations with USA and French ecologists are focusing on tracking Tītī movements, feeding patterns and survival at sea as part of evaluating climate change impacts on Tītī numbers. Two of these collaborations have already provided rare insights into at-sea behavior of the Tītī.

Rakiura Māori have worked to understand the impacts of climate change on their taonga species using both mātauranga Māori and western science. They have created tribal policy to directly effect how they work day to day in this field. Restoration of the native stocks are a priority for the iwi and by understanding the impacts of climate change on their food source, they can better focus their efforts on the areas of the life cycle they can positively change.

Ngāi Tahu ki Murihiku have responded by including a chapter on climate change in their Iwi Environmental Plan, identifying activities and policies to address the issues that have emerged. The case study *Incorporating climate change into iwi environmental plans*, provides more information on the Ngāi Tahu ki Murihiku Iwi Environmental Plan.

### THIS IS ONE IN A SERIES OF CASE STUDIES CALLED ADAPTING TO A CHANGING CLIMATE

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- For Iwi Management Plans visit [www.mfe.govt.nz](http://www.mfe.govt.nz) or [www.qualityplanning.org.nz](http://www.qualityplanning.org.nz)
- For climate change visit [www.climatechange.govt.nz](http://www.climatechange.govt.nz)
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