

## **Restoring Seabird Nesting Colonies: the Role of Indigenous Landowners and Local Communities**

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The New Zealand bio-region has a high diversity of seabird species, yet most have been extirpated from the larger islands of New Zealand. Until recently most of the seabird conservation work in New Zealand has been carried out by the Conservation Department and its predecessor the Wildlife Service. But over the past 25 years indigenous landowners and local communities have been increasingly involved in and initiating colony restoration projects. These projects have been funded by a mix of central government and non-government sources, with significant volunteer inputs. More recently these projects have attracted international conservation funding and financial support from foreign land developers operating in New Zealand. Since 1990 Central Government conservation funding has suffered a serious decline and this is continuing. Yet the public concern for the protection and conservation of seabird nesting colonies has increased. This has led to landowners and communities taking a greater role in the management of seabird nesting colonies, where they may be able to provide a more consistent and long-term conservation solution. This paper addresses the different conservation priorities that underlie the restoration of seabird sites by Maori and Pakeha (European New Zealanders), through a number of case studies where indigenous landowners and local communities have protected and restored seabird nesting colonies. These projects are located on the mainland North and South Islands, the Chatham Islands and smaller offshore islands.

### **Distributional and behavioural patterns of albatross during the non-breeding period.**

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Albatross species are considered globally at risk and facing numerous threats in both the marine and terrestrial environment. To implement effective conservation and mitigation measures, impacts need to be evaluated on a species specific level. For my PhD thesis I am studying the distributional and behavioural patterns of three albatross taxa that breed in close proximity on two islands belonging to the Chatham Island Group: the Chatham Island albatross, *Thalassarche eremita*, Northern Buller's albatross, *T. bulleri platei* and Northern Royal albatross, *Diomedea sanfordi*. Using short-term deployment of Global Positioning System (GPS) devices and long term deployment of Global Location Sensing (GLS) loggers, I have been able to record their movements and activity during chick-rearing, migration and wintering periods. I will present first results on a multi year (2007-2009) as well as multi species comparison of the birds' spatio-temporal dynamics during the non-breeding period, showing individual and species specific migration patterns, species segregation in South American wintering areas but also the use of common "hot spots" during migration and wintering. Including climatic factors like El Niño and La Niña episodes, a variety of environmental parameters as well as fisheries distribution, I will try to determine what triggers the distributional and behavioural patterns found.

## **From pioneer planting to petrels: The first five years of seabird restoration in a community-lead project on Motuora, Hauraki Gulf.**

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In the past decades there has been a rise in the number and scope of community-led restoration projects in New Zealand. Over the same period scientists have improved our understanding of the importance of seabirds (especially burrowing species) in New Zealand terrestrial ecosystems and have developed robust seabird conservation techniques. Community groups are now in the position to be able to incorporate seabirds into restoration projects. However, the costs of seabird initiatives can be high and it is vital that information on past and present projects is shared between community groups. Here I report on the first five years of seabird restoration work on Motuora, an 80 ha island in the Hauraki Gulf. Motuora has been cleared of forest and farmed, but in 1990 the Mid-North Branch of the Royal Forest and Bird Protection Society initiated a restoration project on the island. Motuora is now jointly managed by the Motuora Restoration Society (MRS) and DOC. The restoration goals are to re-establish a thriving indigenous ecosystem that is able to provide a sanctuary for endangered species as well as a place of replenishment for Auckland's people. Although re-vegetation has been the major focus, early in the project it was recognised that seabirds would be an important component in the restored ecosystem. In 2005 annual monitoring of the grey-faced petrel (*Pterodroma macroptera gouldi*) population was initiated to determine the population trends of this species, the only remaining burrowing seabird on the island. In 2006, as pioneer planting neared completion, further attention was given to the restoration of the animal biota. The resulting document (The Motuora Native Species Restoration Plan) argued that active restoration of the seabird fauna should be undertaken. Chick transfers were recommended to establish breeding colonies on Motuora of up to six burrowing seabird species. Between 2007 and 2009 MRS undertook their first seabird translocation, transferring over 150 diving petrel (*Pelecanoides urinatrix*) chicks to Motuora. Transferred birds are now beginning to return to Motuora as breeding adults and in November 2009 the first Motuora-born diving petrel chick was banded. Lessons learnt and prospects for the future will be discussed.

## **Seabird habitat surveying and acoustic monitoring on Burgess Island, outer Hauraki Gulf**

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Burgess Island (Pokohinu) is a highly modified island, located in the outermost of the Hauraki Gulf islands. The island was formerly heavily-grazed, rat-infested and inhabited first seasonally by Maori for mutton-birding and fishing, then as a lighthouse station (1882-1980). Very little forest remained. In 1990, Burgess Is (c. 56 ha) was amongst the first of New Zealand's offshore islands to undergo aerial poisoning targeting kiore (*Rattus exulans*). With the exception of a large red-billed

gull (*Larus scopulinus*) colony and a few grey-faced petrels (*Pterodroma gouldi*) the island was largely devoid of breeding seabirds. While common diving petrels (*Pelecanoides urinatrix*) and white-faced storm petrels (*Pelagodroma marina maoriana*) were reported during the 1973 Wildlife Service biological survey it's not clear whether they were found to be breeding. Burrow counts at petrel grids established at the time of the eradication operation (1990) and surveyed in 1995 appeared to show an increase in seabird diversity. The significance of Burgess Is as a procellariiform seabird stronghold in the Gulf has become clearly evident from 2004. Six species are now confirmed breeding on the island: grey-faced petrel, white-faced storm petrel, common diving petrel, North Island little shearwater (*Puffinus assimilis haurakiensis*), fluttering shearwater (*P. gavia*) and sooty shearwater (*P. griseus*). Black-winged petrel (*Pterodroma nigripennis*) is likely to be breeding but yet to be confirmed. During October and December 2009 acoustic monitoring and burrow density counts in relation to habitat types were carried out on Burgess Is to establish baseline data for further research into seabird breeding. Acoustic monitoring will allow us to develop nocturnal 'soundscapes', assess seabird distribution on the island and study vocalisations. Environmental variables surveyed include soil depth, slope angle, elevation, vegetation height and composition, and percentage cover by plants. While preliminary results from plots and line transects confirm that most birds are concentrated on the northern headland and around the fringes, our survey set out to ground future studies into seabird/habitat preferences and impacts; the biology of small procellariiform seabirds; and the dynamics of naturally developing colonies within a changing terrestrial environment. The results of which should aid future restoration and seabird conservation projects in north-eastern New Zealand.

### **Relocating?...choose a chick translocation plan that suits your needs!**

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Are you a long-distance traveller, or do you like to stay closer to home? Do you sit down to regular meals, or enjoy the occasional big calorie feast? Do you prefer life on a wind-swept, sun-drenched cliff-top, or in a shady and sheltered forest abode? When you headed on your first overseas expedition, did you leave home in a hurry, or consider all the options before taking the plunge?

Our chick translocation services can help you relocate, but we need to know exactly how you tick as a species before we move you to your new colony site, so that we can offer the best management service to suit your needs, and ensure that you have the very best chance of fledging success and post-fledging survival.

We can offer case studies—small, sedentary cliff-nesters and large, migratory forest-dwellers—for you to compare plans.

## **Sex-specific reproductive benefit of protandric territory establishment in the Australasian gannet, *Morus serrator***

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Territorial protandry, or early season male-biased settlement at breeding sites, is widely spread across different breeding systems. While protandry is common across several avian lineages, and has been linked with increased reproductive success of earlier breeding males in terrestrial species, the selective advantage of protandry has scarcely been investigated in seabirds. We assessed patterns of seasonality in sex-ratio at the breeding site and sex-specific correlates of arrival date with reproductive success in a colonial seabird, the Australasian gannet *Morus serrator* at Cape Kidnappers, New Zealand. We found no biases in sex-ratios of adults, fledglings, or nestlings but we detected a male sex-bias during the time of territorial establishment, and a significantly higher probability of reproductive success for early settling males. In contrast, the reproductive success of females did not correlate with timing of arrival. Interannual comparisons also demonstrated male-biased breeding philopatry. Our findings provide an extensive assessment of the sex differences in reproductive correlates of protandry in gannets, and are consistent with selective advantages as suggested by indirect selection hypotheses. This study has implications for the understanding of linkages between protandry, sex differences in breeding philopatry, and mate fidelity in a long-lived seabird with obligate and extended biparental care.

### **From scratch: The feasibility of restoring seabird-based ecosystems on highly modified islands**

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Burrow-nesting petrels (Procellariiformes) once formed enormous populations on most islands and parts of mainland New Zealand, where they heavily modified terrestrial ecosystems through input of marine-sourced nutrients, their burrowing activity, and physical disturbance of ground cover, seedlings and leaf litter. Burrow-nesting seabirds were disproportionately affected by predatory mammals, but there have been few attempts to restore them to sites where they have become locally extinct. Reintroduction efforts have been hampered by the absence of practical methods to overcome the strong homing behaviour typical of petrels. Techniques developed to translocate eight species of burrow-nesting petrels of four genera are described. The outcomes of translocations of common diving petrels (*Pelecanoides urinatrix*), fairy prions (*Pachyptila turtur*) and fluttering shearwaters (*Puffinus gavia*) to Mana Island (Cook Strait, New Zealand) are presented in relation to ecological restoration goals.

## **Cross-cultural partnership for seabird conservation and restoration**

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*Mātauranga Māori* (Traditional Ecological Knowledge) and ecology have been applied in partnership since 1994 to assess the sustainability of the traditional *tītī* (muttonbird, sooty shearwater) harvests by Rakiura Māori from 35 islands adjacent to Rakiura (Stewart Island), New Zealand. Manaaki Whenua (Landcare Research) has also interfaced *mātauranga Māori* and science when working with Hauraki and Ngāti Awa since 2005 to assess the impact of rats on seabird island ecosystems and guide harvests of *oi* (grey-faced petrels) from Ruamaahua (Alderman Islands) and Moutohora (Whale Island). Lessons from these three cross-cultural partnerships have recently been brought together into a new project called *Te Hiringa Tangata* (Binding of the people) which will use *mātauranga* and science to guide restoration of coastal forest ecosystems by re-establishment of seabird breeding colonies in northern New Zealand. Our previous experience suggests that the key determinants of whether science can be applied alongside *mātauranga* for adaptive co-management are (a) a shared respect for the other's knowledge, (b) confidence in one's own knowledge, (c) an absolute commitment to vesting power in the research process with the community, (d) increased investment in communication, and (e) instigation of a much slower and culturally appropriate ecological research process. Many of the challenges and advantages of what has recently been termed 'Citizens Science' and 'Participatory Action Research' are similar to Kaupapa Māori research approaches. Much is to be gained by all cultures and stakeholder working fully and respectfully together for the 50 year long haul ahead of us – the restoration of fully functioning seabird ecosystems on mainland New Zealand.

### **Monitoring, population status and inter-seasonal distribution of Cook's petrel (*Pterodroma cookii*) breeding on Little Barrier Island, Hauturu.**

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The Cook's petrel (*Pterodroma cookii*) is a New Zealand endemic seabird breeding on Codfish Island (CDF) and Little Barrier Island (LBI) where it is a dominant component of the Hauraki Gulf seabird fauna. Monitoring of Cook's petrel on LBI began in the 1970's and by the 1990's it was apparent predation by Pacific rats (*Rattus exulans*) and feral cats (*Felis catus*) was driving population declines. Cats were eradicated from LBI in 1980 and the plight of Cook's petrel was subsequently flagged to support the eradication of Pacific rats from LBI. Following rat eradication in 2004 the breeding success of approximately 300 000 pairs of Cook's petrel increased from between 10-30% to approximately 60% in high altitude habitats where the bulk of the population breed. National and international sources suggest a rapid population expansion presenting exciting opportunities for the reestablishment of this

once common seabird in other parts of its former New Zealand range. LBI Cook's petrels are genetically distinct from their CDF counterparts exhibiting divergent foraging distributions and diets during breeding. Moreover, tracking during the non-breeding period indicates trans-hemispheric separation of the Cook's petrel breeding populations. LBI birds winter in the North–Pacific convergence and California Current systems and CDF birds winter in the Humboldt Current. Delineation of the morphologically similar LBI and CDF Cook's petrel populations as separate management units (if not sub species) appears warranted, reinforcing the importance of adequate autoecological data for sound management of seabird populations.

### **State of Auckland's Seabirds Graeme Taylor<sup>1</sup>**

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The Auckland region from the Kaipara Harbour to the Waikato River in the west and the Hauraki Gulf from the Poor Knights Islands south to Thames and out to Great Barrier Island encompass one of the richest seabird habitats on the planet. Ninety-six seabird species have been reported from this area (about a quarter of the world's seabird species). These include 25 breeding species (and two possible breeders), 22 regular visiting species, 24 rare visiting species and 24 vagrant species. Three seabird species now only breed in the Hauraki Gulf region (NZ fairy tern, black petrel and Buller's shearwater). At least four breeding species are in decline including spotted shags, blue penguins, red-billed gulls and white-fronted terns. Other threatened species include NZ fairy tern, flesh-footed shearwater, pied shags and Caspian terns. However some seabird species are making a comeback. These include Cook's petrel, Pycroft's petrel, grey-faced petrel, northern diving petrel, little shearwater, black-billed gulls and Australasian gannets.

Active research or management programmes are occurring on 16 of the breeding species at one or more sites. However for the remaining breeding species, no attempt has been made to monitor populations or carry out any basic research in the past generation (25 years), even though nearly half of New Zealand's human population lives close to Auckland. The major benefits to seabirds in the past 25 years has come from increased public awareness of the conservation needs of birds, successful pest eradications on offshore islands and increased protection of mainland breeding habitats, especially sand-spits and estuaries. Key on-going threats are introduced mammalian predators at breeding sites, interactions with commercial and recreational fisheries, human and dog disturbance of nesting birds, disease outbreaks, oil spills and global climate change. A lot more work is needed on seabirds to understand how these threats may interact with species over time. Both land and sea based monitoring projects are required to achieve better knowledge about seabird species that will improve their conservation prospects. Key problems include the lack of a census or even good estimates of breeding populations at most breeding sites. Some species have never been counted and others have counts that were made more than 25 years ago. We know very little about the seabird populations inhabiting the seas off the west coast of Auckland yet human activity in the area is intensifying or planned (tidal power stations, commercial fisheries, sand extraction etc). There is much potential in the near future to use new technology and innovations such as global tracking devices to monitor at sea movements of seabirds or use acoustic monitoring to study nesting

colonies. We have also recently developed techniques to establish new breeding colonies of seabirds and there are a lot of potential restoration sites in this region. But in the short term, species such as NZ fairy terns and NZ storm petrels are going to need a lot of community and conservation support to prevent their extinction.

**Putting Humpty together again: international collaboration and the restoration of seabird-driven ecosystems.**

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The restoration of an entire ecosystem can be conceptually and technically demanding. A multi-disciplinary international collaboration funded by the US National Science Foundation was established in 2007 to examine all aspects of the restoration of island ecosystems by focusing on seabirds and their predators under the project acronym of SEAPRE. A series of reviews undertaken by internationally recognised contributors has examined the effects and characteristics of introduced predators on seabirds and other island species; the role of seabirds in modifying soil chemistry, plant and animal communities; the characteristics of island food webs; feedback systems from islands to aquatic environments; indirect and interactive effects of introduced predators; the methods, limitations and ethical framework for eradicating introduced species; methods that assist with restoration of seabird populations and island ecosystems, and the ways that stakeholder groups can become involved in restoration activities. The reviews are collected in a volume to be published in 2011, with emphasis on common threads and specific departures across archipelagos. Patterns and processes in common included the impacts of seabird guano inputs and disturbance regimes on soil and plant nutrition, plant community composition, and aspects of consumer population dynamics and food web structure, as well as the effects of introduced predators. Departures from general trends were related to climate, seabird identity and nesting behaviour, isolation and the history of human impacts.