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Iwi and local government partnerships in biosecurity: A case study of Te Arawa Catfish Killas in response to a pest fish incursion in the Bay of Plenty, New Zealand

Lucas MacDonald and William Anaru

Abstract

Māori are the indigenous people of New Zealand and throughout the country, local government relationships with hapū (a group or family from a common ancestor) and iwi (a post-colonial term for groups of hapū who have common ancestral links or share a geographical location) are critical to the sustainable management of natural resources. Here we describe an initiative formed in response to an incursion of brown bullhead catfish (*Ameiurus nebulosus*) in Lake Rotoiti and (as of December 2018) Lake Rotorua, two of the ancestral lakes under the mana whakahaere (a self-determination and decision-making role) of Te Arawa Lakes Trust. The programme involves a full-time staff member from Te Arawa Lakes Trust working directly alongside the Bay of Plenty Regional Council to progressively contain the catfish population in Lakes Rotoiti and Rotorua. To date, this project has removed over 80,000 catfish from the lakes, generated significant research findings, engaged over 500 volunteers and delivered an educational programme to over 1500 school students across the district. This partnership approach to a biosecurity project has strengthened relationships between local government, iwi, hapū and the wider community while delivering positive environmental outcomes.

Introduction

The need for greater participation of stakeholders and communities in the management of natural resources has become widely accepted in recent years (Allen et al. 2018). Wider stakeholder engagement is crucial to capturing local knowledge, with scientific organisations and regulatory agencies no longer seen as the sole repositories of relevant knowledge and expertise (Aslin & Lockie 2013). It is widely acknowledged that indigenous peoples have traditional knowledge relevant to modern environmental management (Lambert et al. 2018). Indigenous knowledge in New Zealand is referred to as mātauranga Māori, and has an increasingly important role including protection of our biological heritage from biosecurity risks and threats (Lambert et al. 2018). The traditional Māori worldview acknowledges a natural order, built around the living and non-living and the central belief that all parts of the environment are interrelated or interdependent through the domains of Atua (a being with god-like attributes) or departmental gods (Harmsworth & Tipa 2006). Te Arawa Lakes Trust (TALT) is a key management partner in the Rotorua Te Arawa Lakes, representing 56 hapū (a group or family from a common ancestor) from the confederated tribes of Te Arawa, Ngā Pumanawa e Waru o Te Arawa, and is the legal owner of 14 of the Te Arawa Lakes under the Te Arawa Lakes Settlement Act 2006. The Bay of Plenty Regional Council (BOPRC) is a regulatory agency with multiple statutory requirements to sustainably manage natural resources in the Bay of Plenty region. BOPRC works towards the vision of "Thriving Together – mō

Figure 1. Juvenile brown bullhead catfish (*Ameiurus nebulosus*). Photograph: Bay of Plenty Regional Council.

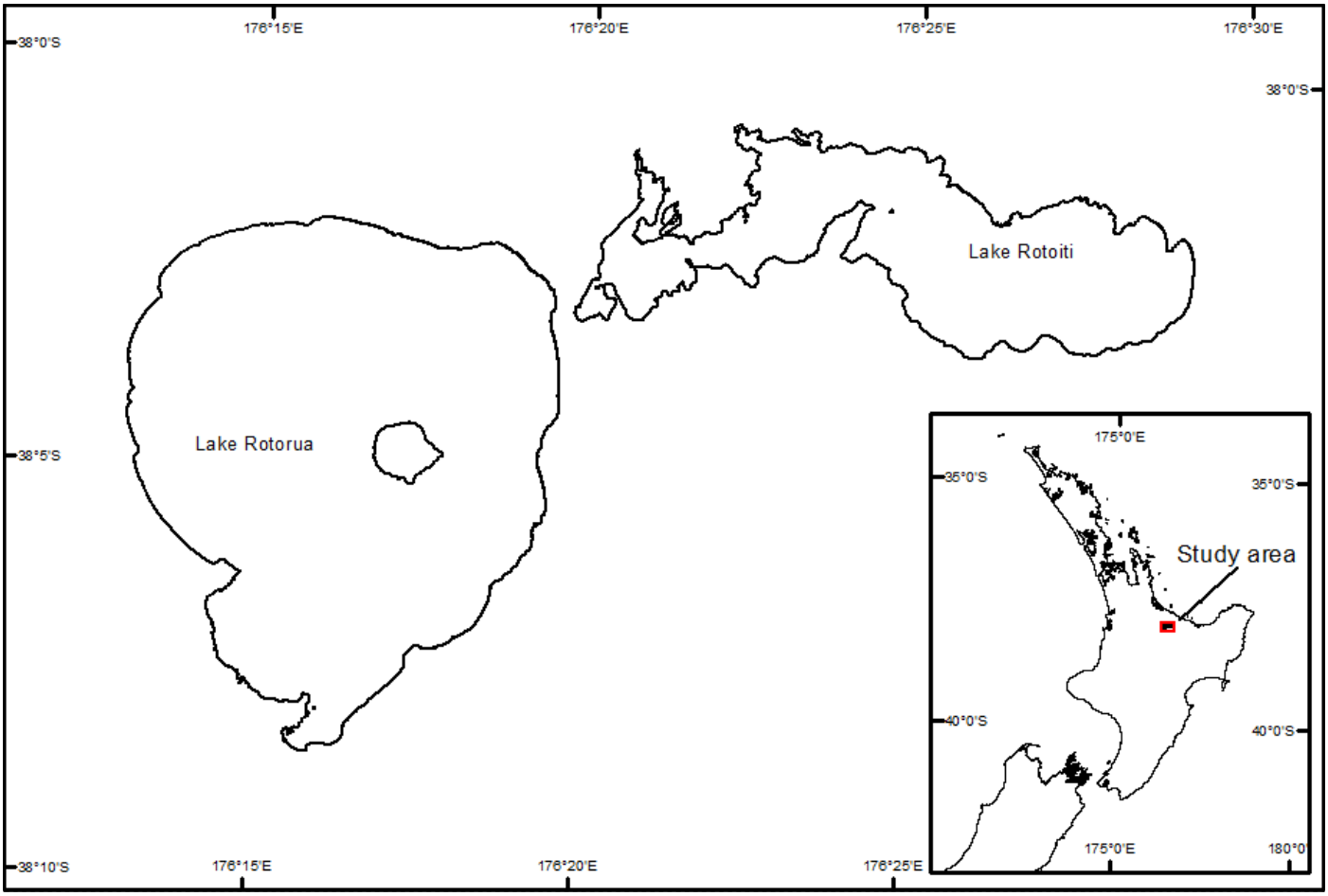

Figure 2. Lake Rotorua and Lake Rotoiti, Bay of Plenty, New Zealand. Brown bullhead catfish were discovered in Lake Rotoiti in March 2016 and Lake Rotorua in December 2018. Source: Bay of Plenty Regional Council.

te taiao, mō ngā tāngata," and focuses on delivering a healthy environment, fresh water for life, safe and resilient communities and a vibrant region. TALT's strategic goal of "Te mā o te wai e rite ana kia kite i ngā tapuwae ā te kōura" (the quality of the water is such that you can see the footsteps of the kōura) ensured that both parties' aspirations aligned when the brown bullhead catfish (*Ameiurus nebulosus*), considered a noxious, unwanted species under the Bay of Plenty Regional Pest Management Plan (RPMP), was first discovered.

The discovery of brown bullhead catfish in the Rotorua Te Arawa Lakes

Globally, the successful management of large self-sustaining pest fish populations is considered difficult (LERNZ 2015). Brown bullhead catfish (Figure 1) have been reported as having unanticipated adverse effects on native ecosystems (Froese & Pauly 2017). The first live capture of catfish in the Bay of Plenty lakes was in March 2016 by a mechanical weed harvester operating in Te Wētā Bay, Lake Rotoiti.

The live capture generated significant political and public concern around the long-term ecological, cultural and economic impacts caused by the catfish incursion and the risk of further spread to more of the Rotorua Te Arawa Lakes. Generally, impacts of *Ameiurus nebulosus* in New Zealand waterbodies occur through the combined effects of nutrient excretion, bioturbation, predation, food-web modification and interspecific aggression and competition (Dedual 2019). These direct impacts can lead to loss of macrophytes and a decline in water quality. Although difficult to quantify and not well researched, there is potential for an economic aspect to the local impact in the form of decreased tourism. To Māori, kōura (freshwater crayfish, *Paranephrops planifrons*) are a taonga (treasured) species, an important traditional food source (Hiroa 1921) and an indicator of lake health (Te Arawa Lakes Trust 2019). The proliferation of catfish within Lake Rotoiti has negatively impacted kōura populations, especially in locations where catfish are in high abundance (Francis 2019). Following the initial discovery, delimiting netting surveys using fyke nets were undertaken across Lakes Rotoiti and Rotorua, and Lake Tarawera (a high-use lake in the area), to determine the distribution of catfish. Subsequent to the delimiting survey, the Bay of Plenty Regional Council engaged a

contractor to undertake systematic fyke netting across Lake Rotoiti between September and May annually to reduce the number of catfish in high-density areas.

Management strategies for a pest fish incursion

The RPMP classification of catfish states that eradication must be attempted should the species be found in the Rotorua Te Arawa Lakes. Therefore the Bay of Plenty Regional Council established a co-management response with the Te Arawa Lakes Trust. Initially, it was proposed that BOPRC would manage the operational, research and communication components of the programme, with TALT managing the community-engagement response. This has since evolved to both parties collaborating heavily on all aspects of the programme with each party providing a unique perspective on a contemporary issue. Fundamentally, the aim of the response is to protect the unique cultural, environmental, social and economic values of the Rotorua Te Arawa Lakes and reduce the likelihood of this pest fish being introduced to other waterbodies.

Community engagement

The project Te Arawa Catfish Killas is a key component of the response. It is funded from the operational budget outlined in the RPMP and resources TALT to establish a full-time co-ordinator, managed by TALT. William Anaru (Ngāti Whakaue, Ngāti Tūwharetoa, Te Whānau-ā-Apanui), as a full-time co-ordinator, has engaged members of the community to undertake regular pest fish control and surveillance while also becoming local ambassadors for the protection of their lakes. The volunteers are from a range of backgrounds, including educational institutions (early childhood, primary, secondary and tertiary), aged-care facilities, at-risk youth and lakeside residents. Volunteers undertaking netting can contribute to and observe the temporal and spatial catch rates of catfish throughout the lakes using a custom electronic application developed by Regional Council, through ArcGIS Survey123 (Esri, Redlands, USA). The data is then analysed to determine catch rates relative to effort, which then inform contractors of where high-intensity netting should be undertaken. The second component of Te Arawa Catfish Killas is an education programme that has been delivered to over 1500 primary- and secondary-school students in both English and te reo Māori (the language spoken by the indigenous people of New Zealand and Cook Islands), within a focus on the wider biodiversity of the Rotorua Te Arawa Lakes. The work is undertaken in line with the values framework establish by Te Arawa Lakes Trust: Te Tūāpapa o ngā wai o Te Arawa – Waiora, Waiata, Waiariki (TALT n.d.). Students implement mātauranga and tikanga in a variety of ways, including performing a karakia after native fish are released back into the waterbody, and learning the history, whakapapa and kōrero of the land they are present on. Some students investigate the patterns of native species catch and how this may align with the Maramataka (the Māori calendar).

Figure 3. William Anaru of Te Arawa Lakes Trust holding a brown bullhead catfish, with Te Arawa Catfish Killas onlookers. Photograph: Te Arawa Lakes Trust.

Outcomes and discussion

Human vectors are the highest risk factor in catfish proliferation throughout the Rotorua Te Arawa Lakes. For this reason, increased awareness and community engagement are considered crucial for the generational behaviour change that is fundamental to the reduction of the long-term risk for this vector. The current operational approach is suppressing the catfish population and containing catfish within the Rotorua catchment. Ongoing investment in research initiatives ensures that long-term eradication or further suppression options are investigated, while a hands-on community-engagement

approach ensures that public support is maintained until such breakthroughs become available. The educational programme throughout schools surrounding the Rotorua Te Arawa Lakes ensures the role of kaitiaki (a person who has responsibilities for the care and protection of a specific area, specific process or area of knowledge) is passed on to the next generation. Kaitiakitanga has been enhanced, and will continue to increase for the foreseeable future, as the majority of students have not been engaged in freshwater biosecurity prior to this programme being established. By having such a large pool of volunteers and students, an increase in awareness of taonga species and pest species alike is certainly occurring, and is reflected in advocacy and awareness data that the Bay of Plenty Regional Council collects annually.

To date, the co-management approach has removed over 150,000 catfish from the Rotorua Te Arawa Lakes. Over 750 volunteers are engaged in regular fyke netting across the Rotorua Te Arawa Lakes, which has removed over 30,000 catfish. Taking into account nets set per year, the substantial effort by volunteers has contributed to an 18% decrease in catfish catch between the 2018 and 2019 seasons. Fyke netting in five other currently catfish-free lakes is undertaken by volunteers as a cost-effective surveillance tool in combination with environmental DNA surveillance. The collaborative effort ensures the community feels they are making a contribution to the care and protection of their lakes. Throughout the response, the Te Arawa Catfish Killas project has been recognised as a blueprint for a partnership approach to biosecurity, having been awarded the Department of Conservation Pihanga New Initiatives Award and the Supreme Award at the Kō Tātou Biosecurity Awards in November 2019. In May 2020, the Bay of Plenty Regional Council and Te Arawa Lakes Trust were recognised in the Society of Local Government Managers (SOLGM) Excellence Awards as winners of the Supreme Award , along with the Te Puni Kōkiri Award for Bicultural Leadership. The Te Arawa Catfish Killas project has been commended for the positive behaviour change in at-risk youth, and the educational programme has reached over 25 schools, with over 1500 students participating in lessons in the classroom. A 20% growth in this service is expected in 2020. The Te Arawa Catfish Killas project reaches over 30,000 recipients on social media and is often utilised to promote freshwater biodiversity within the Rotorua Te Arawa Lakes (Figure 3).

Overall, the approach of involving iwi and hapū in decision making, and resourcing iwi to lead projects that have previously been undertaken in-house by local or central government, has been shown here to strengthen relationships between iwi and local government. This model of managing a natural-resource issue is widely applicable globally and is shown here to be an effective and authentic way to engage with communities, incorporate tikanga (activities and processes associated with ensuring the cultural safety of oneself and the wider community), kaitiakitanga and general indigenous knowledge on contemporary issues to provide for positive environmental outcomes.

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