ABSTRACT. Centralization of fisheries management within large-scale, colonial governing bodies can remove access and management rights of Indigenous communities and deplete marine resources through a mismatch in bioecological and managerial scales. Management of pāua (blackfoot abalone, Haliotis iris) in Aotearoa New Zealand exemplifies this transition from small-scale fisheries management by tangata whenua (local Indigenous people with historical claim to the land, Māori) to central government regulation and subsequent overexploitation. Comanagement strategies have the potential to address degradation of biological and cultural diversity by returning management to local scales and authority to local people. New Zealand’s customary fisheries management legislation aims to facilitate such a devolution of management back to tangata whenua through the establishment of Taiāpure Local Fisheries and Mātaitaitai Reserves. However, local management systems can remain constrained by the wider governance structures that encompass them. These constraints are discussed in relation to a management proposal for pāua harvesting made by the East Otago Taiāpure Management Committee. The proposal aimed to return fishing practices to a customary method, providing greater protection for declining pāua populations while allowing a small harvest to continue. After a long and protracted application process, central government did not support the proposed regulation. This opposition demonstrated many of the constraints that local management committees face as they endeavor to operate within the confines of broader legal frameworks: conflicting worldviews, inequitable power sharing, perceived inferiority of Indigenous customs, requirements for conventional science, and navigation of bureaucratic processes. Insights are also drawn from another small-scale abalone fishery (ormer, Haliotis tuberculata) in the Channel Islands, for which the desired regulation has been in place for over three decades.

Key Words: abalone; comanagement; customary fisheries; Haliotis sp.; small-scale fisheries; Taiāpure Local Fisheries

INTRODUCTION

Considering the complex spatial and social structures of coastal ecosystems and communities, successful fisheries management must account for bioecological scales of the species and the sociocultural structure of the communities that rely on them (Hughes et al. 2005, Gunderson et al. 2008, Takashina and Baskett 2016, Aswani et al. 2017). Many coastal ecosystems were historically managed at fine scales utilising Indigenous knowledge adapted over generations to address local needs (Pauly 1997, Berkes et al. 2000, Turner et al. 2013). However, colonization and commercialization gave rise to top-down, large scale centralized management by national governing bodies (Pomeroy 2001), overriding Indigenous values with colonial paradigms (Pretty et al. 2009, Stephenson et al. 2014, Lyver and Tylianakis 2017). Yet central management is often mismatched against the scale of the resource, resulting in spatial subdivision for managerial purposes that cannot account for distinct biological stocks and governing agencies lacking capacity to observe, understand, and respond to fine-scale ecological events (Noble 2000, Wilson 2006, Fujita et al. 2010, Steneck and Wilson 2010). Removing authority from Indigenous communities erodes cultural identities and traditions and reduces access to culturally important places and resources (Berkes et al. 2006, Dick et al. 2012, Turner et al. 2013, Mutu 2019). Subsequently, centralized systems of fisheries management often result in the degradation of both biological and cultural diversity (Pretty et al. 2009, Lyver and Tylianakis 2017, Lyver et al. 2019). Returning power and authority to people and places has the potential to transform fisheries management (Pauly 1997), tackling overexploitation by adjusting management goals away from maximizing catch and toward long-term sustainability (Pomeroy 2001) and by returning managerial responsibility to those directly impacted by, and better able to inform, managerial decisions (Jentoft et al. 1998, Richardson 2008). Through systems of comanagement, power and responsibility are shared between central government and local communities, which offers the potential to address biological restoration and redress injustices brought upon Indigenous communities. Such biocultural conservation acknowledgments that the latter is often key to achieving the former (Gavin et al. 2015, Ogar et al. 2020).

Examples of fisheries comanagement between central governing bodies and Indigenous communities now constitute a significant volume of scientific literature alongside evidence of the biological, ecological, and social benefits such approaches can have for the restoration of biodiversity and the recognition of Indigenous rights. For example, in Canada, federal administration of large-scale commercial fisheries threatens to collapse coastal resources upon which Indigenous communities’ livelihoods and cultural values depend (Turner et al. 2013). However, collaborative management initiatives in British Columbia that incorporate First Nations’ knowledge and stewardship practices are seeking to rebuild the resilience of both social systems and biological resources, e.g., northern abalone (Halioptis kamtschatkana; Lee et al. 2019), Dungeness crab (Cancer magister; Ban et al. 2017), and geoduck (Panopea generosa; Klain et al. 2014). Broader marine conservation initiatives are also increasingly being adjusted to better recognise and account for
Indigenous rights. In Australia, where establishment of marine protected areas initially undermined Indigenous land and sea ownership, there is now better emphasis placed on comanagement of protected areas that acknowledges Indigenous rights and knowledge, promoting cross-cultural environmental decision-making (Ross et al. 2009). However, although such partnerships can provide a flexible avenue for comanagement, this flexibility can also result in unequal partnerships, which subsequently poses challenges to successful management (Berkes 2009). Considering the power imbalances that typically already exist between colonial governing bodies and Indigenous communities, these issues are often exacerbated within cross-cultural comanagement partnerships (Nicholson et al. 2019; Ogar et al. 2020).

Comanagement in New Zealand

Fisheries management in New Zealand exemplifies the transition from small-scale fisheries management by tangata whenua (local Indigenous people with historical claim to the land, Māori) to centralized regulation by a colonial government. Historically, gathering kaimoana (seafood) formed an integral part of tikanga Māori (customary practices and values). Tangata whenua managed mahinga kai (food gathering places and resources) within their rohe (tribal region), exercising kaitiakitanga (guardianship) to ensure conservative resource use and protection of the wider ecosystem through application of mātauranga Māori (Māori knowledge; Jackson 2008, Dick et al. 2012). European colonization brought disregard and disrespect for Indigenous fishing rights; colonial governments considered whenua “lacked their own fisheries management systems” (Bess 2001:27), rarely considering Indigenous methods in favour of a centralized approach (Jackson 2008, Mccarthy et al. 2014). In 1840, under Article II of the Treaty of Waitangi (an agreement signed by the British Crown and more than 500 Māori Rangatira [chiefs]), “full, exclusive and undisturbed possession of their ... fisheries” was guaranteed (Treaty of Waitangi 1840, English text). However, rights to access traditional areas and manage culturally important species continued to be undermined, reducing opportunities for food gathering, weakening community ties, destabilizing traditions, and diminishing connections with the environment (Dick et al. 2012, Turner et al. 2013). Resources were later allocated to commercial fishers via large (hundreds of kilometers) Quota Management Areas (QMAs) established in the 1980s (Lock and Leslie 2007, De Alessi 2012). The effect of this rights-based scheme across smaller spatial scales and Indigenous communities reveals a discrepancy between purported broad-scale successes and the experiences of local customary fisheries and communities (Bess 2001, Turner et al. 2013, Mccarthy et al. 2014, Mutu 2019).

Following years of struggle for customary fishing rights, investigation of breaches and injustices under the Treaty led to settlements that aimed to provide some redress. This was assisted partly by fisheries comanagement mechanisms that seek to return rangatiratanga (governance, chieftainship, self-determination) and acknowledge rights of tangata whenua. Today, access to, and a greater voice in management of, culturally important fisheries is provided through the establishment of Taiāpure Local Fisheries and Mātaitai Reserves; collectively, customary fisheries management areas (Memon et al. 2003, Jackson et al. 2018). Taiāpure are designed for estuarine or coastal areas that are significant for food, spiritual, or cultural reasons, whereas mātaitai are for areas of special significance. With average sizes of 16 km² (mātaitai) and 40 km² (taia-pure; Fisheries New Zealand 2020a) and managed by Tangata Tiaki/Kaitiaki (legislatively empowered management committees/guardians; mātaitai) or a designated empowered management committee nominated by local hapū (subtribe, kinship group; taiāpure), they have the potential to address two fundamental downfalls of large-scale central management. They facilitate a return to place by enabling reef-by-reef management and a return to people by restoring customary rights.

Kāti Huirapa Rūnaka ki Puketeraki (a hapū of Ngāi Tahu) hold mana whenua (authority) in East Otago, Te Waipounamu (South Island). Concerned about environmental degradation and depletion of taonga species (treasures, cultural keystones) under central management, Kāti Huirapa sought to reassert their rangatiratanga and better manage and protect their rohe for present and future generations (East Otago Taiāpure Management Committee 2008). In 1992, a proposal was submitted for the creation of a taiāpure, yet the establishment process proved long and complex (Fig. 1), and the application was subject to significant resistance (Jackson et al. 2018). Fifteen years passed before the East Otago Taiāpure (Fig. 2A; herein the Taiāpure) was gazetted (1999), a management committee designated (2001), and the first fishing regulation enacted (2007). Over the last two decades, however, significant achievements have been realised by the East Otago Taiāpure Management Committee (herein the Committee), including the establishment of a long-term pāua (blackfoot abalone, Haliotis iris) monitoring program, bag limit reductions for shellfish and finfish, invasive species monitoring and removal (Undaria pinnatifida), and regulations prohibiting the harvest of native kelps (Hepburn et al. 2008, Hepburn et al. 2010, Jackson et al. 2018, Fisheries New Zealand 2019).

Abalone (Haliotis sp.) management

Species that vary over small spatial scales create challenges for large-scale management (Gunderson et al. 2008, Reiss et al. 2009, Fujita et al. 2010, Takashina and Basket 2016). Abalone exhibit high variability at a reef-by-reef scale, so uniform regulations applied across distinct populations can leave them susceptible to overfishing. Coined by Prince (2005:565) as a “tyranny of scale,” this mismatch in scale has resulted in the collapse of many abalone fisheries worldwide (Prince 2004, Cook 2016). Presently, there is an emerging return to management that better correlates with biological stocks (Saunders et al. 2008, Bester-van der Merwe et al. 2011, Mejia-Ruiz et al. 2020). As a result of the community-level partnership and fine scale at which comanagement systems often operate, they are particularly well suited to sessile or sedentary shellfish species such as abalone.

In New Zealand, QMAs for pāua divide the coastline into just 12 stocks (MPI 2020), the effect of which is to apply blanket stock assumptions and managerial decisions across a large number of smaller, distinct populations (McShane and Naylor 1995, Butterworth et al. 2015). Landings for most major QMAs have declined as a result of reductions in the total allowable commercial catch (TACC) or voluntary shelving of quota and/or implementation of a higher minimum landing size by the commercial industry in response to stock depletion (MPI 2021, Pāua Industry Council 2022). Concerns about declining pāua

https://www.ecologyandsociety.org/vol27/iss4/art138/
Fig. 1. The process for establishing a Taiāpure Local Fishery, appointing a Management Committee, and introducing a regulation under Sections 174–185 Part 9 of the Fisheries Act 1996. For the East Otago Taiāpure, this process took 15 years.

Fig. 2. (A) New Zealand. Insert: The Otago coastline. The East Otago Taiāpure is indicated by the shaded area. (B) The United Kingdom, English Channel, and north-west Europe. Insert: Jersey, Channel Islands.

populations were a key driver behind the establishment of the Taiāpure (Hepburn et al. 2008). Through the Committee, the local hapū has been provided an avenue through which to work toward restoring this taonga species (Jackson et al. 2018; Table 1). A long-term monitoring program has been established and runs every four years (Hepburn et al. 2008, Richards 2009, Gnanalingam 2013; Hepburn et al. 2016), bag limits have been reduced and areas closed (Gnanalingam et al. 2021), and active restoration strategies have been trialed (Gillies 2013, Bennett-Jones et al. 2021). Management of pāua within the Taiāpure has proven successful regarding many aspects of comanagement; community efforts are focused at a small scale (25 km of coastal habitat), enabling reef-by-reef management and restoration that observes and accounts for the fine scale variability of pāua and the management goals of the community. Recent surveys indicate that several reefs, protected by rāhui (temporary closure), have seen sustained population densities over time, whereas other reefs have witnessed significant increases (Gnanalingam et al. 2021). However, despite these efforts, population decline has also been witnessed across reefs that remained open to fishing (East Otago Taiāpure Management Committee, *unpublished data*), demonstrating the small-scale variability of pāua, the impact of sustained fishing
Table 1. Regulations for pāua (blackfoot abalone, Haliotis iris) in the East Otago Taiāpure, New Zealand, enacted through the Fisheries Act 1996 Part 9 Sections 174 - 185.

<table>
<thead>
<tr>
<th>Legislation</th>
<th>Detail</th>
<th>Date</th>
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<tr>
<td>Fisheries (East Otago Taiāpure) Order 1999.</td>
<td>East Otago Taiāpure established.</td>
<td>1999</td>
</tr>
<tr>
<td>Fisheries (South East Area Amateur Fishing) Amendment Regulations 2010.</td>
<td>Bag limit reduction, from 10 per person per day to five.</td>
<td>2010</td>
</tr>
<tr>
<td>Fisheries (South East Area Amateur Fishing) Amendment Regulations 2010.</td>
<td>First two-year closure at Huriwa Peninsula.</td>
<td>2010</td>
</tr>
<tr>
<td>Fisheries (Huriwa Peninsula Temporary Closure) Notice 2014.</td>
<td>Third two-year closure at Huriwa Peninsula.</td>
<td>2014</td>
</tr>
<tr>
<td>Fisheries (South East Area Commercial Fishing) Amendment Regulation 2019</td>
<td>Closure to commercial fishing.</td>
<td>2019</td>
</tr>
<tr>
<td>Fisheries (Amateur Fishing) Amendment Regulations 2019.</td>
<td>Closure to recreational fishing.</td>
<td>2019</td>
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pressure, and the requirement for management that can account for this.

The Committee wished to introduce additional management measures to address this decline. Traditionally, tangata whenua gathered pāua by wading (Fig. 3A; Hepburn et al. 2017), with a fraction of shellfish close to shore targeted and deeper populations remaining out of reach and unexploited (Smith 2013). Interviews with customary fishers highlight the success of this approach, evidenced by historic abundances of pāua and growing concerns over the present state of stocks (Bird et al. 2009, Dick et al. 2012, McCarthy et al. 2014). The Committee proposed to introduce a wading-only regulation. It was suggested as a simple-to-understand way to return to customary harvest methods, protecting deeper populations while maintaining some access and associated tikanga. However, despite the urgent need to protect declining stocks, support from local stakeholders, cultural relevance, and reinforcement by scientific data, the Ministry for Primary Industries (MPI) was reluctant to consider the approach, ultimately opposing the application because “a closure would be far easier to enforce than the proposed wading fishery regulations” (Committee Minutes 2017).

However, legislating for a wading abalone fishery is not a novel concept. In the Northern Hemisphere, the ormer (green abalone, Haliotis tuberculata) reaches its northerly distribution in the British Channel Islands (Mgaya and Mercer 1995, Huchette and Clavier 2004). In Jersey (Fig. 2B), the largest of eight Channel Islands at 118 km², ormer fishing is restricted to wading at low water via a ban on taking ormers “while totally or partially submerged and breathing with the aid of breathing apparatus, or wearing a face visor, a mask, or goggles” (Sea Fisheries (Underwater Fishing) (Jersey) Regulations 2003: Regulation 2 Section 1) (Fig. 3B, Table 2). Legislation also defines the tidal nature of fishing practices through reference to the lunar cycle; ormering may take place within the open season (October–April) on “the first day of a new moon, the first day of a full moon” and “one of the 3 days immediately following” (Jersey Sea Fisheries (Miscellaneous Provisions) (Jersey) Regulation 1998: Regulation 4 Section 3) (Table 2). Together with a bag limit and minimum landing size, the prohibition of scuba and free diving is considered to be successful, with subtidal populations thought to be healthy despite fishing of intertidal populations. As a blanket ban, the wading regulation is also considered straightforward to enforce (P. Chambers, personal observation).

**DISCUSSION**

Long-term, small-scale pāua management and restoration efforts within the Taiāpure have simultaneously helped to restore rangatiratanga of the local hapū and densities of some pāua populations, demonstrating the benefits that can be achieved via New Zealand’s fisheries comanagement mechanisms. The Committee’s successes highlight the importance of an appropriate managerial scale for species such as abalone and the inextricable link between ecosystem health and the well-being and identity of a community that has a long-standing, unbroken connection to the environment. However, the opposition to the wading proposal exemplifies some of the constraints that are still faced by Tangata Tiaki and taiāpure management committees as they endeavour to operate within the confines of New Zealand’s broader legal system. Therefore, the experiences of the Committee also highlight the potential for continued advancement of fisheries policy in a way that will further benefit both fisheries restoration goals and better addresses social injustices. We investigate some of these constraints in the context of the unsuccessful wading proposal. Jersey’s ormer regulations provide a useful example of the legislative applicability and enforceability of a wading regulation for abalone, and thus, where appropriate, we draw upon...
insights from this fishery. Despite differing cultural structures and landscapes, the example is useful because Jersey is one of few jurisdictions to have successfully implemented wading legislation for abalone. Further, the small scale at which fisheries management in Jersey is conducted (Fig. 2B) demonstrates some of the advantages to be gained through small-scale, local management structures.

**Worldviews and political attitudes**

Cross-cultural comanagement partnerships stand to benefit from utilisation of different knowledge bases and application of the best available information (Berkes et al. 2000, Berkes 2009, Nicholson et al. 2019). To achieve this, an open mind must be maintained toward differing worldviews, each given a voice within management spaces (Richardson 2008, Ogar et al. 2020). However, comanagement arrangements are influenced by a country's political structure (Sen and Nielsen 1996), and governance in New Zealand is driven by colonial paradigms that often conflict with te ao Māori (Māori worldview; Roberts et al. 1995, Mutu 2019). Subsequently, western management strategies are still favored over tikanga Māori. Despite the Treaty of Waitangi purporting tangata whenua to be an equal partner, colonial attitudes and political inequities persist (Jackson 2003, Turnier et al. 2013, Ruru et al. 2017, Hepburn et al. 2019).

This is evident within marine management spaces. Western protectionist paradigms that address biological conservation by separating people from nature (e.g., closures, no-take reserves) take precedence over Indigenous practices that place people within the ecosystem, maintaining connections through responsible resource use and environmental stewardship (Adams and Hutton 2007, Richardson 2008, Wilshusen et al. 2011, Stephenson et al. 2014, Ruru et al. 2017, Lyver et al. 2018). What results is management that focuses solely on biocological conservation, ignoring socio-political contexts at the expense of cultural conservation and alienating tangata whenua from culturally important places and resources (Roberts et al. 1995, Adams and Hutton 2007, Mutu 2019). For the Taīpāpure, this clash of worldviews was evident throughout the establishment process, with news headlines such as “Iwi [tribe] versus Kiwi,” implying that its designation would be in direct conflict with interests of non-Māori fishers (Kāti Huirapa Rūnaka ki Puketeraki 2013) despite it not excluding recreational or commercial activities (Fisheries Act 1996). The lack of support for the wading application demonstrates that, over two decades later, resistance remains toward customary management methods that ensured abundant stocks for hundreds of years pre-colonization in favour of maintaining current approaches (freediving) that have contributed to the significant decline of pāua in little over 50 years (Dick et al. 2012).

**Inequitable power sharing**

Where management is centralized, return of local authority can only be realised through legislative recognition from the governing body holding legal power (Folke et al. 2005, Cudney-Bueno and Basurto 2009, Steneck and Wilson 2010). Effective comanagement is therefore reliant on formal acknowledgment of the partnership (Noble 2000, Berkes 2007, Fujita et al. 2010) via devolution of managerial responsibility through legally robust frameworks (Pomeroy and Berkes 1997, Pomeroy 2001). In practice, the extent of legal support and recognition varies, often leaving community efforts open to insufficient legitimisation (Pomeroy and Berkes 1997, Noble 2000, Pomeroy 2001). Thus, the basis of comanagement—the “sharing of power and responsibility”—can result in unequal partnerships (Berkes 2009:1692, Jenito 2005).

As a result of perceived inferiority of Indigenous worldviews and customary practices, Indigenous voices are often at a disadvantage (Richardson 2008, Stephenson et al. 2014). Although New Zealand has created a legal framework that enables establishment of customary management areas, the extent to which power and authority is shared remains unequal, and the degree to which customary legislation supports active local management is debated (Jackson 2013, Jackson et al. 2018, Hepburn et al. 2019). According to MPI, taīpāpure are “managed by local communities” (Fisheries New Zealand 2020b), yet establishment of a taīpāpure and introduction of regulations “may be made only on a recommendation made by the Minister” (Fisheries Act 1996:Part 9 Section 176(1); Fig. 1). Thus, power and authority remain with central government, who choose whether to accept proposals, reducing taīpāpure committees to an

### Table 2. Regulations for ormer (green abalone, Haliotis tuberculata) in Jersey, Channel Islands.

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<thead>
<tr>
<th>Legislation</th>
<th>Detail</th>
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<tbody>
<tr>
<td>Sea-fisheries (Immature Sea-fish) (Jersey) Regulation 1974.</td>
<td>Introduction of a minimum landing size of 80 mm.</td>
<td>1974</td>
</tr>
<tr>
<td>Sea Fisheries (Ormers - Temporary Restrictions) (Jersey) Regulations 1999.</td>
<td>Closure of the ormer fishery in response to infection by a Vibrio sp. and subsequent mass mortalities.</td>
<td>1999</td>
</tr>
<tr>
<td>Sea Fisheries (Ormers - Temporary Restrictions) (Repeal) (Jersey) Regulations 2002.</td>
<td>Reopening of the ormer fishery.</td>
<td>2002</td>
</tr>
<tr>
<td>Sea Fisheries (Minimum size Limits) (Amendment) (Jersey) Regulations 2002.</td>
<td>Minimum landing size increased to 90 mm.</td>
<td>2002</td>
</tr>
<tr>
<td>Sea Fisheries (Bag Limits) (Jersey) Regulations 2016.</td>
<td>Bag limit introduced at 20 per person per day. Until this time, it had been an advisory limit.</td>
<td>2016</td>
</tr>
</tbody>
</table>
advisory role. This lack of authority was keenly felt regarding the rejection of the wading proposal despite the ecological and social benefits it could have brought.

If te ao Māori is not valued as equal to colonial paradigms, tangata whenua will not be viewed as equal co-management partners but as stakeholders to whom rights may or may not be granted (Roberts et al. 1995, Adams and Hutton 2007). If communities do not feel able to be an effective co-management partner, they may turn away from formal agreements (Sen and Nielsen 1996, Berkes 2009). There are a number of instances where customary protections have been implemented without legal backing (Van Halderen 2019). Although this works under some circumstances, there are no legal grounds for enforcement in the event of fishing pressure. The efficacy of customary legislation comes into question if communities do not feel they are able, or that it is worth their while, to utilize it.

**Inability to introduce customary mechanisms**

Globally, there is significant recognition of the benefit that local and Indigenous knowledge can provide to biodiversity conservation and resource management (Berkes et al. 2000, Reed 2008, Richardson 2008, Pretty et al. 2009, Ogar et al. 2020). In New Zealand, establishment of a taïpūre purports to enable tangata whenua to conduct management in ways that “best fits their local practices” (Fisheries New Zealand 2020b). A key objective of the Committee is subsequently to “actively promote the use of traditional tikanga (customs) and kawa (protocols) ... through the management regulations for the taïpūre (using law to give effect to the lore)” (Fisheries New Zealand 2018:3). However, whereas changes to conventional management measures (Table 1) have been straightforward (yet still take several years to process [N. Scott, personal observation]), regulations requiring novel legislative approaches face more significant hindrances. Challenges arise in transcribing lore into law, and meaning and flexibility are lost when Indigenous customs are shoehorned into colonial translations (Roberts et al. 1995, Jackson 2013, Gnanalingam and Hepburn 2015). For example, although there was a desire to provide a legal mechanism for rāhui, the legal wording results in inflexible two-year restrictions requiring almost prohibitive implementation and renewal processes (Gnanalingam and Hepburn 2015).

Similar difficulties introducing the wading regulation were anticipated: “This is a new step and a new idea and thus could be difficult to pass through the Ministry” (Committee Minutes 2014). Yet it was acknowledged that the mechanisms currently available were insufficient to address the problem; “Doubt about the current tools available which are not addressing serial depletion. Does MPI have interest in trying something new?” (Committee Minutes 2017). When the proposal was rejected, there was a feeling of being misunderstood and that the proposal was ultimately “both ‘too new’ and ‘too old’” (Committee Minutes 2017). Use of modern equipment such as fins, masks, and wetsuits is so engrained that a return to “old” ways would be uncomfortable for many. Ultimately, the legal mechanism designed to recognise customary values does not go so far as to accept te ao Māori; “there is a dangerous precedent that could be formed here if MPI/Minister does not support the use of customary fishing methods in a customary fishing protection area. Watering down the taïpūre mechanisms in this way seriously undermines the currency of the fisheries settlements” (Committee Minutes 2017).

Although the Taïpūre is theoretically locally managed, the legislation with which this must be conducted has yet to be developed in a way that enables use of Indigenous customs, limiting management to regulations such as minimum sizes, temporary closures, and bag limits, despite the range of protection mechanisms that traditionally existed and regardless of their biological, ecological, or cultural suitability (Jackson 2008, Ruru et al. 2017, Jackson et al. 2018). Although the purposes of customary fisheries management areas are for the recognition and provision of Indigenous values and practices, limiting attempts at bioecological restoration to use of colonial mechanisms is counterintuitive to achieving this. Unable to implement the wading regulation, the Committee proposed to close the fishery entirely (Fisheries New Zealand 2018). This proposal was accepted by MPI. The ready acceptance of a full closure over reduced access through customary practices demonstrates the willingness to remove fishing opportunities for all in favour of realigning with tikanga Māori. Although only temporary in this instance, customs stand to be lost through closures (Lyver et al. 2019).

**A hidden requirement for conventional science**

Whereas government officers focused across large spatial scales are unable to detect and account for small changes, taïpūre enable use of local information obtained at an ecologically relevant scale, acknowledging that local people observe changes earlier and more profoundly (Mccarthy et al. 2014, Stephenson et al. 2014, Mclean et al. 2020). Further to use of local knowledge, comanagement in New Zealand also purports to enable the use of mātauranga Māori. As such, there is no legal requirement for taïpūre applications or regulatory proposals to be supported by conventional scientific data (Fig. 1). The Committee has long been aware of continued decline in pāua throughout the Taïpūre (“the advice from the committee is that the fishery hasn’t yet recovered” [Committee Minutes 2015]), and of the propensity for a wading fishery to address this (“Are there good subtidal populations of pāua? Yes, there are. Will the wading-only fishery be effective? Yes, it should be” [Committee Minutes 2015]). Yet, even though “It is a customary area and the regulations will provide for customary purposes” (Committee Minutes 2015), the proposal was not supported by MPI.

It is subsequently considered that mātauranga Māori and local knowledge alone are insufficient to build consensus for management or convince MPI that action is warranted (Hepburn et al. 2019), which brings into question the extent to which the government trusts and supports its comanagement partner (Jackson 2008, Berkes 2009). The concept of customary management is prized on the devolution of responsibility back to local communities, yet it is evidently still reliant on external systems of conventional science to reinforce applications. Although the Committee, through its relationship with the local university, has had access to scientific monitoring to support its applications, use of conventional science is not a legal necessity. However, the perceived requirement for scientific baselines and monitoring as a prerequisite for proposals to be seriously considered significantly limits their use because not every community has personnel trained in conventional scientific
methodology or the resources necessary to complete scientific assessments.

**Bureaucratic processes**

Comanagement strategies are often most effective when the government structure and associated bureaucracy is small, i.e., regional or local (Noble 2000). Further, regulations that are adopted quickly are often better able to protect the resources to which they are applied (Basurto and Coleman 2010). The Committee has long been aware of this; “better to shift to this model [wading] early and ensure that a much higher catch can be sustained” (Committee Minutes 2014). However, taitāpure proposals must filter up through slow bureaucratic processes before legislation can be introduced, slowing reactions to time-sensitive environmental issues (Fig. 1). Further administrative challenges are posed by the navigation of the process itself, particularly when little or no administrative support is provided (Pomeroy and Berkes 1997, Fujita et al. 2010, Jackson et al. 2018).

Within a self-governing island of Jersey's size, government hierarchical chains and bureaucratic processes are short, with time and effort required for matters to travel from community discussion to Ministerial debate also short, enabling regulatory changes to reflect current concerns and recent changes in the local environment. This was exemplified by a temporary closure of the ormer fishery in response to a *Vibrio* outbreak (Nicolas et al. 2002). In August 1999, fishers reported large numbers of dead ormers. Government divers conducted surveys that same month, finding 25–50% mortality. A temporary closure of unspecified duration was drafted and came into force in October 1999 (Table 2), the whole process taking less than two months (G. Morel, personal communication). Under New Zealand's customary legislation, the regulatory processes for taitāpure can take considerably longer (Hepburn et al. 2010), with an average turnaround of three years for regulations established in the Ngāi Tahu area to date (N. Scott, personal observation). Discussions regarding the need for new pāu regulations in the Taitūpure were ongoing in 2014, and the Committee was aware of the almost-prohibitive length of time implementation would take; "regulations need to account for changes in the next three years while they are in process ... doing this through the normal channels takes a very long time ... there is some urgency here” (Committee Minutes 2014). In 2015, it was noted that “new regulations might take ~ 3 years” and that “if something isn’t done then the fishery will not be there in a few years” (Committee Minutes 2015). Ultimately, there was truth to both statements. Introduction of new regulations took almost five years (58 months), and, in that time, the stock declined to a state that, when new measures were introduced, they were to close the fishery.

So long as ultimate responsibility is held within disconnected governing bodies, implementing new taitāpure regulations will be a long, drawn-out process that removes power from local managers and slows introduction of measures that rely on swift implementation to be successful (Hepburn et al. 2019). Long time frames can result in further damage that is either more difficult to recover from or irreversible (Hughes et al. 2005, Lyver et al. 2019). Calls have been made for reform of New Zealand's conservation laws (Ruru et al. 2017, Mutu 2019, Herse et al. 2020) to enable greater leadership from iwi and hapū in locally driven approaches to conservation that incorporate social justice (Breachin et al. 2002, Stephenson et al. 2014, Lyver et al. 2018). Enabling a more equitable sharing of legal power and responsibility within customary fisheries management legislation by changing the requirement for high-level approval would enable introduction of new regulations in a proactive, timely manner (Fujita et al. 2010), removing pressure from committees to anticipate problems before they arise, which currently confounds their ability to implement successful management strategies (Gnanalingam and Hepburn 2015).

**Holistic management**

Effective fisheries management is multi-faceted, requiring assessment of individual stocks, knowledge of interconnected species, and broader monitoring across the ecosystems to which they are all connected, along with subsequent formulation and enforcement of appropriate policy and regulations that are sensitive to local species, habitats, and communities (Sen and Nielsen 1996). This aligns directly with the kaupapa Māori framework, “Ki Uta ki Tai: From the Mountains to the Sea,” through which management of the Taitūpure is approached (Hepburn et al. 2010:142, Hepburn et al. 2019). Whereas there are species-specific management initiatives, e.g., for pāua, the Committee is also dedicated to ensuring an ecosystem-based approach. Kelp, being an ecosystem engineer and culturally valued species, is monitored regularly (East Otago Taitūpure Management Committee, unpublished data). Native species have been afforded greater protection via a prohibition on harvesting (Fisheries New Zealand 2019), and a control and removal program has been established for invasive species (*Undaria pinnatifida*; G. Keeler-May, Department of Marine Science, University of Otago, unpublished data). Broader processes that occur beyond the boundaries of the Taitūpure, yet undoubtedly influence the ecosystems within it, are also monitored. As examples, a long period of consultation between the Committee and the Port Company in Otago sought to protect inshore habitats from offshore disposal of sediment from port dredging operations (Hepburn et al. 2019), and the He Pataka Waiora project aims to monitor and restore the health of river and estuarine systems upstream of the Taitūpure (Van Halderen et al. 2016). Centralized agencies, however, typically compartmentalize managerial requirements, resulting in a disjointed response to a task that requires a holistic approach and management that is disconnected from the resource and the people who rely upon it (Berkes et al. 2000).

The Government of Jersey's Environment Department includes 10 Marine Resources officers who are responsible for enforcing fishing laws and maintaining policy and legislation based on the latest stock and environmental information. Gathering the information to do so also falls within their remit, through periodic environmental sampling, stock assessments, and analysis of commercial fishery statistics (Government of Jersey 2019). Management in this way becomes a uniquely connected approach, enabling officers to gain a broad understanding of, and relationship with, the local environment and fishing community. New Zealand’s taitāpure management committees are required to be representative of the local hapū (Jackson 2013). Aside from this, membership is flexible, and has allowed the Committee to be set up in a way that gives a voice to a variety of people with a wide background of knowledge, enabling a combination of mātauranga Māori, local knowledge, and conventional science.
The Committee subsequently encompasses most aspects of marine management and can apply this directly within a small geographic area. Cooperation at the community level also fosters a sense of guardianship and trust, and regulations are subsequently better accepted (Noble 2000). However, unlike Jersey’s Marine Resources officers, the Committee does not hold legal authority to implement or update regulations without government approval (Fig. 1) nor can they enforce regulations once they are introduced. All legal authority remains with government-employed individuals “who do not have as broad, or as long term, a view of the area being managed” (Hepburn et al. 2019:5). Thus, while the capacity and capability for effective local management exists, legally it is underutilised.

CONCLUSION

The Taiāpure, despite acknowledged constraints, has provided a model for local management that is targeted at a relevant biological, ecological, and social scale. Numerous benefits have been achieved through the hard work and commitment of the Committee and wider community, from the establishment of long-term research projects to the implementation of regulations and community cooperation, support, and involvement with these processes. However, although Aotearoa New Zealand has endeavoured to introduce legislation that provides for customary fisheries management, further transformation is required to improve the current mechanisms that underpin the restoration of customary management and cultural keystone species. The experience of the Committee demonstrates the ways in which they remain constrained in their implementation of active, local management. Legislative changes could facilitate more equitable sharing of power and devolution of responsibility from which many benefits could be gained such as greater acceptance of te ao Māori, customary protection mechanisms, mātauranga Māori, and local knowledge and timelier introduction of regulations via pathways that foster greater responsibility within local communities and improved trust in, and cooperation with, central government. Constraints such as those presented here are indicative of many of the challenges posed to Indigenous communities globally as they strive to reclaim rights to access and management of local resources and, in doing so, restore Indigenous values. In the face of the present climate crisis, returning resource management to people and places offers a way to protect and restore biological and cultural diversity at a time when the importance of each has been unanimously acknowledged (United Nations 2007, IPBES 2019). Although steps are being taken in the recognition of Indigenous rights, more significant policy reforms are required before Indigenous communities are truly able to comanage the natural resources on which they rely, and to which they have rights.

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Data Availability:

Datocode sharing is not applicable to this article because no datal code were analyzed in this study.

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### Appendix 1. Glossary of Te Reo Māori words.

<table>
<thead>
<tr>
<th>Te Reo Māori term</th>
<th>English interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aotearoa</td>
<td>New Zealand</td>
</tr>
<tr>
<td>Hapū</td>
<td>Sub-tribe, kinship group</td>
</tr>
<tr>
<td>Iwi</td>
<td>Tribe</td>
</tr>
<tr>
<td>Kaimoana</td>
<td>Seafood</td>
</tr>
<tr>
<td>Kaitiaki</td>
<td>Guardian</td>
</tr>
<tr>
<td>Kaitiakitanga</td>
<td>Guardianship</td>
</tr>
<tr>
<td>Kāti Huirapa Rūnaka ki Puketeraki</td>
<td>A hapū of Ngāi Tahu</td>
</tr>
<tr>
<td>Kaupapa Māori</td>
<td>Framework, policy, plan</td>
</tr>
<tr>
<td>Kawa</td>
<td>Protocols</td>
</tr>
<tr>
<td>Ki Uta ki Tai</td>
<td>Traditional, holistic management; ‘from the mountains to the sea’</td>
</tr>
<tr>
<td>Mahinga kai</td>
<td>The customary use and management of natural resources, the places where those resources are gathered, and the resources themselves</td>
</tr>
<tr>
<td>Mana whenua</td>
<td>Territorial rights, power from the land, authority over land or territory</td>
</tr>
<tr>
<td>Mātaitai Reserves</td>
<td>A management tool within the customary fishing regulations to protect to recognise and provide for the customary use and management practices of hapū and iwi</td>
</tr>
<tr>
<td>Mātauranga Māori</td>
<td>Māori knowledge</td>
</tr>
<tr>
<td>Ngāi Tahu</td>
<td>Tribal group of much of the South Island</td>
</tr>
<tr>
<td>Pāua</td>
<td>Blackfoot abalone, <em>Haliotis iris</em></td>
</tr>
<tr>
<td>Rāhui</td>
<td>Temporary closure</td>
</tr>
<tr>
<td>Rangatiratanga</td>
<td>Governance, chieftainship, self-determination</td>
</tr>
<tr>
<td>Rohe</td>
<td>Tribal region</td>
</tr>
<tr>
<td>Taiāpure Local Fisheries</td>
<td>A management tool within Part 9 of the Fisheries Act to make better provision for customary fishing rights under Article II of the Treaty of Waitangi</td>
</tr>
<tr>
<td>Tangata Tiaki</td>
<td>Customary fisheries managers appointed under the customary fishing regulations</td>
</tr>
<tr>
<td>Tangata whenua</td>
<td>Local Indigenous people with historical claim to the land, Māori</td>
</tr>
<tr>
<td>Taonga</td>
<td>Treasure, cultural keystone</td>
</tr>
<tr>
<td>Te ao Māori</td>
<td>Māori worldview</td>
</tr>
<tr>
<td>Te Waipounamu</td>
<td>South Island of New Zealand</td>
</tr>
<tr>
<td>Tikanga</td>
<td>Customary practices and values</td>
</tr>
</tbody>
</table>