

Usefulness of two bioeconomic frameworks for evaluation of community-initiated species-conservation projects

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Appendix S1.

(i) Biodiversity conservation agencies in New Zealand

The Department of Conservation is the major central government agency in New Zealand having a core mandate to conserve biodiversity, primarily on Crown- (i.e. state-) owned land (approximately one-third of total land area), but also through support, advocacy and collaboration on other land tenures. The Department works towards a series of national outcomes (including that “the diversity of our natural heritage is maintained and restored”), partly through a series of 11 regional conservation strategies that identify local priorities for management. Support for private landowners, community and cultural restoration groups is achieved through engagement or via direct funding in the form of three contestable funds totalling NZ\$10.5 million in 2012/13 (NZOAG, 2013).

Local government (territorial authorities and regional councils) also has an important role in conserving biodiversity, under the Resource Management Act 1991. An amendment to the Act in 2003 added “maintaining indigenous biological diversity” and “maintenance and enhancement of ecosystems in water bodies and coastal waters” to the functions of regional councils. There are 11 regional councils, which coordinate and set policy for resource management; 69 district and city councils with local biodiversity management responsibilities; and 4 unitary authorities, which combine the functions of regional and district councils. Councils develop non-statutory management strategies under guidance from national policy statements from central government and through consultation with local communities, but capacity for implementation varies greatly (e.g. total spend on biodiversity-linked activities: Marlborough District 2003/04, \$0.9 million; Waikato Region, \$3.7 million; Ministry for the Environment, 2004). Increasingly, community initiatives also contribute to biodiversity conservation through the control of pests and weeds or intensive “hands-on” management of native species in local areas or in site-based private reserves or “sanctuaries” (Jay, 2005; Hardie-Boys, 2010). These groups are self-driven, but generally need to show that their efforts contribute to national, regional or local priorities when applying for funds from government agencies and some non-government conservation organisations.

(ii) Agency responsibilities in the case study area

The Department of Conservation allocates funding, and therefore much of its conservation effort, across a series of high-level national outcomes, some of which are based on threatened or iconic ecosystems and species. National threatened-species-based project ‘prescriptions’ have been based on the project prioritisation protocol (PPP) developed by Joseph et al. (2009) and are used to guide local investments within conservancies. The Department is in the process of changing how investments are prioritised; now incorporating a spatial framework that considers species within representative whole ecosystems (Moilanen 2007). The Department contributes to biodiversity conservation in the Wildside both directly, through management of its six reserves and monitoring of key native species populations, and indirectly, through advice and engagement activities.

The regional council, Environment Canterbury (ECan), makes decisions regarding its support for biodiversity projects based on strategic policy criteria and local community drivers. It provides two types of project funding. The first is catchment-based, reflecting the region’s ongoing issues with water management. Funding is split between 10 water management zone committees and the regional committee. The committees determine how their share of funding should be spent in their jurisdiction, with strong emphasis given to projects involving biodiversity enhancement in and around waterways. Applications are assessed by the council against a common set of criteria to attain a score on which the council classifies the project as high, medium or low priority. The relevant committee then takes this recommendation into account, along with local drivers, to apportion funding for that zone. The second funding pool is open to projects across the region. All applications for support are assessed against criteria relating to the ecological value of the project and six goals set out in the Canterbury Biodiversity Strategy (ECan 2008):

- (1) Protect and maintain the health of all significant habitats and ecosystems.
- (2) Restore the natural character of degraded indigenous habitats and ecosystems.
- (3) Increase the integration and sustainable use of indigenous species in modified environments (e.g. farm, urban, lifestyle blocks).
- (4) Enhance public awareness, understanding and support of biodiversity.

(5) Encourage, celebrate and support action by landowners and communities to protect, maintain and restore biodiversity.

(6) Improve the range and quality of knowledge and information about Canterbury's biodiversity for its sustainable management.

The regional council contributes to biodiversity enhancement on the Wildside by providing funds to support projects such as covenanting of land and also contributes to monitoring and managing pest animal populations.

Christchurch City Council manages a series of conservation reserves within its boundaries, including one reserve in the Wildside. The Council's priorities for supporting biodiversity projects are driven by its biodiversity strategy (2008). Its current priorities for Banks Peninsula are the identification of a series of 'sites of ecological significance', which will be prioritised based on a threat ranking and an assessment of remediation (time, feasibility and costs) via an internally-derived process. The city council undertakes direct management including pest mammal control, faunal surveys and other monitoring, rural fire risk management and landowner engagement. The council also provides advice and funding through various contestable pools and makes a direct financial contribution to the operation of BPCT.

The Banks Peninsula Conservation Trust is a registered charitable trust formed in 2001. It is a not-for-profit organisation set up to promote the conservation and enhancement of indigenous biodiversity and sustainable land management on Banks Peninsula. The Trust's work includes covenanting, biodiversity workshops, conservation forums, meetings, a newsletter, weed control and collaboration with landowners, agencies, and other community groups. In May 2003, BPCT became the first non-government organisation in 30 years to become a covenanting authority. In 2010, it established the Wildside Project – an informal collaborative effort initially focused on predator control for the protection of penguins. The project has grown to a larger multi-species pest control effort involving landowners, agencies, volunteers, corporations and non-government funding providers. Most BPCT projects are initiated by local landholders.

Appendix S2. Details of case study conservation projects

(1) The New Zealand endemic yellow-eyed penguin (hoiho; *Megadyptes antipodes*) is classified as endangered internationally (B2b(iii)c(iv); BirdLife International 2012) and threatened (nationally vulnerable) nationally (New Zealand Threat Classification System; Miskelly et al. 2008). The Wildside marks the northern limit of its breeding range (Marchant and Higgins 1990); the penguin was first recorded breeding there in the late 1960s (Harrow 1971) and they have continued to nest in small numbers (five nests in four separate bays in 2011/12). They are solitary breeders nesting in loose colonies with each nest shielded from its neighbouring nests in coastal forest or scrub habitat, and producing up to two chicks per nest per annual breeding attempt (Darby and Seddon 1990). Key terrestrial threats to their continued presence include introduced mammalian predators, particularly feral cats (*Felis catus*), larger mustelids and uncontrolled domestic dogs (*Canis familiaris*); habitat loss; and human disturbance; while factors such as food supply and disease can also affect population viability (McKinlay 2001). Conservation management interventions in the Wildside are primarily predator trapping, covenanting of breeding habitat, and public engagement activities to raise awareness of threats. The target outcome for this project is an increase in the breeding population on the Wildside to an average of 20 pairs each season by 2030, with an average annual nest productivity (to fledging) of at least 1.0.

(2) The white-flipped penguin (kororā; *Eudyptula minor albosignata*) is generally considered a subspecies of the Australasian little blue penguin (*E. minor*, but see Baker et al. 2006) and is classified by DOC as threatened (nationally vulnerable). It breeds only in the Canterbury Region, primarily on Banks Peninsula and nearby Motunau Island (Challies and Burleigh 2004). Numbers of the penguins on the peninsula have declined significantly since the early 1980s, but managed populations, particularly in one mainly landowner-managed bay on the Wildside and on Motunau Island, are increasing (Challies and Burleigh 2004; DOC/BPCT unpubl. data). As with yellow-eyed penguins, key land-based threats to population growth and persistence are introduced predators, habitat loss and anthropogenic disturbance (Allen et al. 2011). Management activities aimed at

conserving the Wildside population include predator trapping by government agencies, BPCT and local landholders; provision of nest boxes to enhance breeding opportunities and success (Perriman and Steen 2000); habitat protection; and community awareness-raising. The target outcome is a 50% increase in the breeding population on the Wildside by 2030.

(3) The Wildside contains the only mainland breeding colony of sooty shearwaters (titi, muttonbird *Puffinus griseus*) in the Canterbury Region. The species is a colonial-nesting petrel, the chicks of which are harvested traditionally by New Zealand's indigenous Maori people, although no harvesting occurs at the Wildside. Sooty shearwaters are probably the most numerous and ecologically important seabird in the New Zealand region (Warham and Wilson 1982), but globally they are in decline (listed as declining by DOC and near-threatened by the IUCN). Vast numbers of birds breed on offshore islands during the austral summer although many breeding colonies that once existed on mainland New Zealand have decreased in size or disappeared (Jackson 1957; Moors and Atkinson 1984; Hamilton et al. 1997; Jones 2000). At least three breeding colonies have existed on Banks Peninsula in the last 60 years, but only one remains (Hamilton et al. 1997). In 1997, there were only two breeding pairs recorded nesting at the site. The following year a fence was constructed around the colony, which increased to 16 pairs in 2002 (Schmechel 2004), and 32 occupied burrows in 2011 (DOC unpubl. data). Before the fence was constructed, the most significant terrestrial threats to the population were the impacts of introduced predators, burrow loss due to trampling by stock, unmanaged harvest, and landslips. Management is based on maintenance of the predator-proof fence and control of introduced predators, both in the vicinity of the colony and the wider area, to facilitate the possible establishment of new breeding colonies. The target outcome for the Wildside sooty shearwater population is, by 2030, to increase in size and distribution compared to a 2013 baseline. To make the target more specific, we assumed a target of 30 breeding pairs, and the establishment of at least one other breeding site by 2030.

(4) The tui (*Prothemadera novaeseelandiae*) is a common endemic honeyeater, found in most forests and towns across New Zealand. They are classified by DOC as non-threatened (Miskelly et al.

2008), but are locally rare in the deforested east of the South Island (Robertson et al. 2007). They play a role in pollination and dispersal of native plants and are considered an iconic species because of their appearance, distinctive song, and presence in urban areas that otherwise have few native bird species. Tui are threatened by introduced mammalian predators, including common brushtail possums (*Trichosurus vulpecula*) and rats (*Rattus* spp.), with populations able to recover well following predator control (Innes et al. 2004; Miskelly et al. 2005). Loss of habitat is also important, but can be mitigated by restoration, particularly through planting of native or non-native nectar sources. Tui had been absent from Banks Peninsula for around 20 years until a community-driven restoration effort was initiated in 2007. Group members carried out predator control and habitat preparation in advance of translocation of 30 birds to a 1200-ha privately-owned reserve on the Wildside in April 2009. A further 42 adult birds were released a year later. In the austral summer of 2010/11, 11 tui chicks were detected on the Wildside (BPCT unpubl. data). The target outcome for the Wildside tui population is ‘a healthy, self-sustaining tui population back on the peninsula’. To make the target SMART, we assumed a target of a stable resident population of at least 70 tui within 10 years of project commencement.

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Table S1. Guide to scoring V for different types of assets provided with INFFER. The examples are all Australian-based environmental assets reflecting the source and originally-targeted users of the tool

Asset significance	Example	V
<i>International significance</i>	Great Barrier Reef	
	Kakadu	
	Lord Howe Island	>100
	Tasmanian wilderness	
<i>National significance</i>	The Gippsland Lakes	
	The Coorong Wetlands	
	Kosciusko National Park	
	Ningaloo Reef	
	Victorian Alps	50 to 100
	Grampians National Park	
	Great Ocean Road hinterland	
<i>Very high state significance</i>	Macquarie Marshes	
	Fitzgerald River National Park	
	Western Port Bay	
	Wilsons Promontory	25 to 40
<i>High state significance</i>	Gunbower Island/Murray reaches	
	Lake Warden (a Ramsar wetland)	
	A nationally endangered species of large bird	15 to 25
	Victorian Volcanic Plains grassland ecosystem	
	Lower Ovens River and floodplain	

<i>Moderate state significance</i>	A highly valued estuary	
	Whole rivers (e.g. Loddon)	5 to 15
<i>Regional (catchment) significance</i>	The most highly valued reach of an important river	
	Threatened species of regional significance	
	A bioregionally significant wetland	
	A river reach of moderate importance	2 to 5
	An very important local wetland	
	10,000 ha of high-value land	
<i>Local significance</i>	A locally valued wetland or creek	0.1 to 2
