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THE SIXTH: A JEWELLER'S EXPLORATION OF EXTINCTION AND BIODIVERSITY LOSS IN NEW ZEALAND

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ABSTRACT

Contemporary jewellery can encourage people to learn more about our environment through the body, the jewellery object itself and the conscious act of wearing and interacting with it. This calls for a move towards an approach based on social interaction.

My research examines how jewellery can act as a form of communication and an agent for change. It argues that the framework of contemporary jewellery has great potential to speak to issues relevent to society and the environment.

In exploring these ideas, I consider how jewellery can assist in communicating the latest scientific knowledge on the state of the environment in New Zealand. I place jewellery within the context of the history of art and science, working together in order to reveal the ability of contemporary jewellery to function as a teller of these stories.

INTRODUCTION

Contemporary jewellery can be used to address the complex questions facing both society and the environment. My research shows, through a study of art/science approaches and case studies, that jewellery can do this by illustrating and augmenting scientific theories, discoveries and questions. Concepts of extinction, biodiversity loss, and the biological effects of the Anthropocene are brought together with natural history theories and discoveries and with contemporary jewellery.

I investigated different ways of seeking public engagement, curiosity and participation within an art inquiry that challenges the viewer to question beyond what they see and to think more deeply about the anthropogenic effects that shape our contemporary world. My work has a critical function – it quietly questions our role as a keystone species and the effect we are having on our environment, referencing the tools and techniques of both art and science.

The jewellery objects do this by enabling us to look at traces, what is left behind – shadows, ashes, and impressions – and by combining this with the scientific practices of literature and field research, taxonomy and classification, I present scientific information and observations in a new way.

THE RESEARCH: AIMS AND OBJECTIVES

My aim was to create and present a series of work rooted in the theoretical framework of participatory art[1] and open-ended action research.[2] Public interaction with the pieces at various stages of their making and exhibiting life cycle was intrinsic to my aims.

This approach was informed by the growing range of platforms employed by art practitioners in order to engage a wider audience. I believe that my research demonstrates the value of a contemporary practice that moves away from the autonomy of the contemporary jewellery object and focuses instead on the relational processes and social interactions involved in the making, wearing, touching and viewing of that object.

Each artwork presented was built on empirically robust scientific research. While the resulting pieces were not exact facsimiles of the scientific data, they were made with the objective of communicating the scientists' story. Their purpose was to kindle appreciation, to foster an interest in the issues, to communicate research findings and questions of public interest, to become conversation starters and to act as triggers for further research and personal behavioural change.

SETTING THE SCENE

Author Richard Louv has talked about a growing "nature-deficit disorder" among youth and adults resulting from an increasing disconnect from experience of the natural world.[3] The result is a widespread lack of understanding of ecosystems, other organisms and even ourselves, as part of a living community. We are fast losing our connection to nature. In my work I try to engage audiences physically, emotionally and intellectually through personal participation.

Over the last half billion years, there have been five mass extinction events on Earth.[4] Scientists around the world are now monitoring another, considered to be the result of human impact, which is predicted to be the most devastating extinction since the asteroid impact wiped out the dinosaurs along with 80 percent of animal and plant species.[5] The anthropologist Richard Leakey has warned that "*Homo sapiens* might not only be the agent of the sixth extinction, but also risks being one of its victims."[6]

The archipelago of New Zealand, with its well documented human history and wealth of recent fossils, has the dubious distinction of being one of the best places to research the causes of extinction and the effects of humans on the environment.[7]

New Zealand's destiny is intimately tied to that of its celebrated natural environment. But this environment continues to be under extraordinary pressure from introduced pests and human activity, ranging from development and pollution to climate change and tourism.

Over the past 800 years, humans and their accompanying pests have brought about the extinction of at least 32 percent of indigenous land and freshwater birds, 18 percent of endemic seabirds, three of seven native frogs, at least 12 invertebrates, possibly 11 plants, a fish, a bat and at least three known reptiles. Today, around 1000 animal, plant and fungi species are considered threatened, and it is likely that many unknown species are also threatened.[8]

Increasingly, our changing climate is looking set to add another element to biodiversity decline, either directly, through warmer temperatures making existing habitat unsuitable, which may already be occurring in some alpine and marine ecosystems, or indirectly – for example, through the increasing frequency of tree-seeding events swelling the impact of rodents and stoats in our forest ecosystems. A changing climate, bringing wind-borne spores of plant pathogens such as myrtle rust to New Zealand's shores, is also putting increasing pressure on at-risk plants such as the iconic Bartlett's rata and kauri.

Together, these global environmental stressors mean that we need to pay much more attention to the decline of biodiversity. There is a need to raise awareness and public support for the concept of kaitiakitanga, or guardianship of biodiversity, because when local and regional governments see that their constituents value biodiversity, they are more likely to respond. Unless we can raise awareness of our biodiversity decline and provide people with opportunities to do something in their local area, local species will continue to slide towards extinction.

CONTEMPORARY JEWELLERY AS A PARTICIPATORY FORM OF COMMUNICATION

From the origins of humanity, jewellery has played a connecting role through symbolic representation. Its logical connection to the body gives it the potential to speak of important issues within society.[9]

By its very nature, contemporary jewellery incorporates social participation. It can bring awareness to, or start a discussion of, themes or topics relevant to society.[10] Conversely, due to its scale and placement, jewellery can also be a quiet, almost private, statement. It orientates its face towards the social environment, while holding part of itself back, interacting with the wearer alone.

But can jewellery also be an effective agent for change?

Jack Cunningham's research into what he calls "narrative jewellery" identified a triangular relationship between maker, wearer and viewer.[11] For Cunningham, a piece of jewellery is the conduit through which this relationship unfurls. By putting on the object, the wearer adds new meaning, which she or he can then communicate to the viewer.

As a way of connecting people, jewellery can be a powerful means of mobilising change.[12] Once attached to a human host, jewellery has great potential for impact. The conscious use of the brooch as a subtle means of communication was demonstrated by former US foreign minister Madeleine Albright, who used her brooches to show her attitude to diplomatic talks.[13]

LOCATING MY RESEARCH: THE BROOCH AS AN ENVIRONMENTAL EMISSARY

Brooches and necklaces are often seen as the most confronting pieces of jewellery, because they are generally worn on the chest and directly address the outside world.[14]

A brooch can act as a tiny canvas where ideas may be expressed. Apart from some flexible restrictions around wearability in terms of size and weight, there are no limitations with brooches, the pin on the rear side giving the wearer the choice to fasten it in whatever position they want.

In my case studies, the wearer and viewer were of paramount importance, and their interests were thoroughly considered in the designing and making of the pieces. Each of the brooches became a mobile narrator of a science story, hovering somewhere between natural history and the imagination.

The three projects outlined below were based on comprehensive personal research. In many cases, I found that information was in a continual state of flux, with species classifications changing as genetic techniques improve and new discoveries are made. Taxonomic species revisions usually reflect progress in the understanding of New Zealand fauna and their relationships with other species worldwide. The better we understand these interactions, the greater the likelihood that we can preserve what is left of the world's biodiversity.

As components of a larger, ongoing project, I undertook extensive research into three groups of animals that have been significantly affected by anthropogenic environmental change in New Zealand: birds, bats and freshwater fish.

THE REVENANT BIRD PROJECT

For this body of work, I developed a series of brooches depicting the 61 species of New Zealand native birds that have become extinct since human arrival.[15] In their form, the brooches resembles a Victorian silhouette mourning brooch, worn in memory of someone who has died. Each brooch contains an image, a shadow, a trace of a bird now missing from New Zealand's biota (Figure 1).

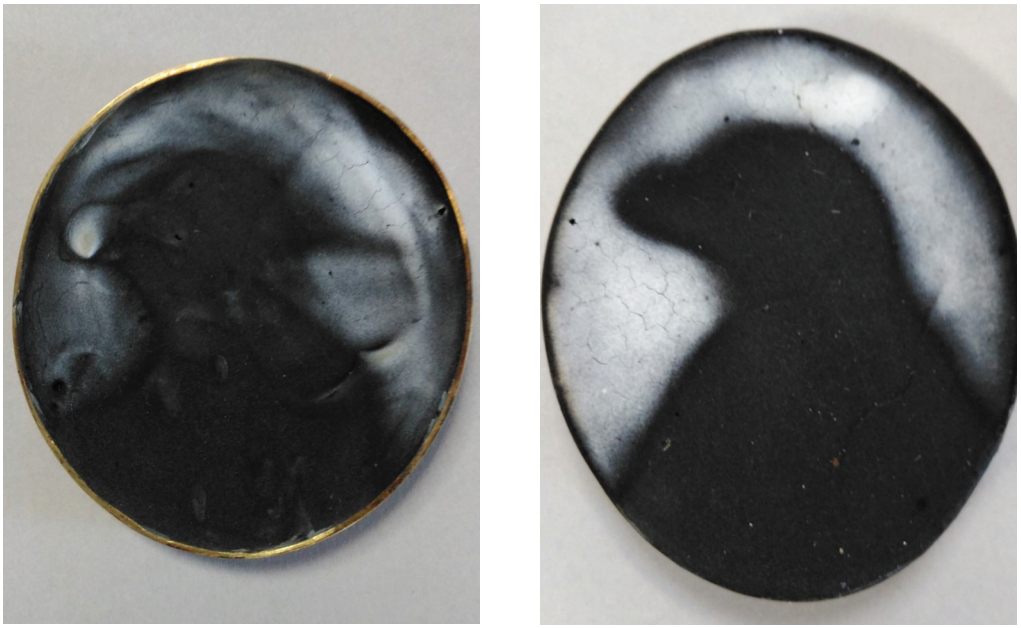

Figure 1. Two brooches by Michelle Wilkinson depicting extinct New Zealand birds: *MW2016-01-03 Chatham Island Duck* (left) and *MW2016-01-57 Waitaha Penguin*, brass, gypsum plaster, pigment, resin, steel pin, 60 × 70 mm.

The purpose of this series was to illustrate the large number of species that are now missing from our unique, previously bird-dominated, environment. The reasons for their extinction are wide-ranging: from hunting by humans for food, feathers and taxidermy to predation and competition from introduced species such as cats, rats and mustelids, as well as the loss of habitats and environmental modification.

All these species were unique to New Zealand, and, following their demise, other plant and animal species have either been lost or are now on the brink. Individually, these brooches mark their passing and collectively form a memorial and tribute to them.

Some of the images captured in the brooches are more cryptic and ambiguous than others (Figure 1), reflecting the mercurial process involved with the production of these images. These esoteric forms invite inquiry and closer examination, reflecting the work of palaeontologists and taxonomists in uncovering historical biological evidence.

How can a viewer who sees someone wearing such a brooch possibly understand what it means at a glance? Much of its narrative stays hidden. It invites a conversation and engagement with the wearer, leading to the passing on of the story behind the piece.

As part of the larger participatory Revenant Bird Project, each brooch was sent out to a volunteer, along with a background information sheet containing natural history information about that bird. The wearer was asked to 'escort' the brooch to the region where the bird once lived and take a photograph of themselves wearing or holding it, or of it installed in the environment.

When these works were taken out into the world, they carried and spread their stories in a different way than a display in a gallery or museum could achieve. The intimate relationship and emotional engagement that comes with possession, touch, interaction and ownership was likely to leave a different kind of impression.

Public participation in the project was integral to the aim of information-transfer and the engagement of the participants (and viewers) in the story of New Zealand's avifauna. This approach falls into the category known as a relational aesthetic project, with the brooches becoming facilitators of data exchange.

The taking of photographs was also intended to provide visual evidence of the brooches returning to where the birds depicted on them once called home, tying each brooch to a place (Figure 2). Many of these areas are now highly modified, having become farmland, suburban or urban areas. The brooches did not have to be taken to pristine environments; a photograph of the contemporary environment was what was needed. This 'returning' of the birds to their former habitats was intended as a form of mourning, a cathartic means of connection to other species, both living and lost.

Figure 2. Two of Michelle Wilkinson's bird brooches in situ: *MW2016-01-36 North Island Raven*, Auckland Northern Motorway (left) and *MW2016-01-25 New Zealand Little Bittern*, Lake Wakatipu.

The collating of these photographs into a book (Figure 3) provided an interesting insight into the New Zealand environment. Images of farms, living rooms and beaches combine to create a snapshot of how and where we live, and with a little imagination it is possible to reinsert these missing species into the pictures.

Some participants found the whole process dispiriting, while others said that it provided a happy reconnection of the bird with the environment. Most commented on their excitement in being part of the project and noted that a connection had formed between themselves and their bird species, enabling them to become champions of their extinct bird. Some participants said that they now had a renewed interest in the environment and were taking a greater interest in endangered species as a result.

Figure 3. Michelle Wilkinson, Bird Books, installation image. Front: *Book of the Dead*; back: *Background Information Sheets*.

A BAT FORSAKEN

The greater short-tailed bat (*Mystacina robusta*) was once found all over New Zealand. With the arrival of rats, their numbers seriously declined until the species was only known to survive only on a single offshore island, Big South Cape Island, south-west of Stewart Island. When ship rats were accidently introduced to the island in 1963 much of the bird life was decimated, resulting in the extinction of two bird species.

At the time, the greater short-tailed bat was not recognised as a separate species from its closely related cousin, the lesser short-tailed bat, and not considered a priority for conservation effort. Consequently, when the wildlife service translocated bird species to save them, they left the bat behind. The last confirmed sighting of the bat was in 1965. No further confirmed sightings have been recorded despite numerous surveys.[16]

This idea of representing something that is now removed from our living biota led me to consider museum collections and the way they are stored, which eventually directed me to create pieces in the negative, referencing the carved-out conservation foam and beaten-up archive boxes in which precious specimens are often held.

When the brooch elements are placed together, the image of the bat is apparent. However, when examined individually, the focus falls on the discrete parts of the animal – the feet, the clawed wings and the large ears. Displaying the fragmented pieces as a collection encourages the viewer to make connections between each element, visually putting them back together and thus establishing a narrative that focuses on the object's form.

As well as being visual representations, the bat brooches asked to be touched. Naked fingers traced the impressions of a creature that is now absent, following the ridges and valleys that make up the imprint of its body. This physical involvement with the material surface of the brooches encourages a build-up of a surface patina, at the same time as blurring the brooch face. The emphasis on permanence and preservation that is part of the tradition of gallery and collection spaces is turned on its head with the invitation to interact with the pieces. As theoretical considerations of patina suggest, the materiality and imagery of the brooches will inevitably alter over time.

Figure 4. Michelle Wilkinson, brooch series from the "A Bat Forsaken", depicting the greater short-tailed bat, *MW2017-03-01 – MW2017-03- 08*, sterling silver, polyurethane resin, steel pin, sizes range from 55 x 54 x 20 mm to 95 x 35 x 20 mm.

GRAYLING DRAUGHT

In recent decades, an estimated 20 percent of the world's freshwater fish species have become threatened, endangered or extinct.[17] Extinction rates in fresh water are higher than in terrestrial and marine environments.[18] But New Zealand's only extinct freshwater fish – the grayling or upokororo – was probably long gone before the current wave of species extinctions.

Once the most common freshwater fish in New Zealand, the grayling appeared to disappear almost overnight. As early as the 1870s a decline was suspected.[19] There were reports of the fish's disappearance from the Waikato River as early as 1874, and from the Buller district in 1884. Both areas had previously had very high populations.[20]

Ironically, by the time legislative protection was granted in 1952 the fish was probably extinct. New Zealand's foremost freshwater fisheries scientist at the time, Gerald Stokell, wrote of grayling as illustrative of "the indifference with which many natural resources of this country have been treated."[21] He advised that anyone knowing the location of grayling should keep it a profound secret.

In 1992 the World Conservation Monitoring Centre included grayling on its list of extinct taxa, but noted there was still a chance that the fish survived. But in 1996 the *Red List of Threatened Species*, compiled by IUCN, categorised the grayling as extinct.[22]

The "Grayling Draught" exhibition was made with the purpose of casting shadows rather than light in order to create a feeling of immersion. It was made up of individual grayling brooches, or pins, attached to a frame that slowly turns, reflecting the reported habit of the species of disappearing and reappearing in a ghostly fashion, which was probably a reflection of its migration and spawning habits.

The individual fish pins had their own unique markings and patterns, just like the morphological variations seen within the species. Each was designed to be worn as an individual piece, as well as being a component of the larger artwork. The brooches were etched using the designs drawn by school-aged participants in a grayling design workshop held during school holidays (Figure 5). As part of the workshop, the participants learnt about the grayling's story and about the importance of preserving our native species.

Figure 5. Grayling design workshop participant decorating the individual fish forms in preparation for etching.

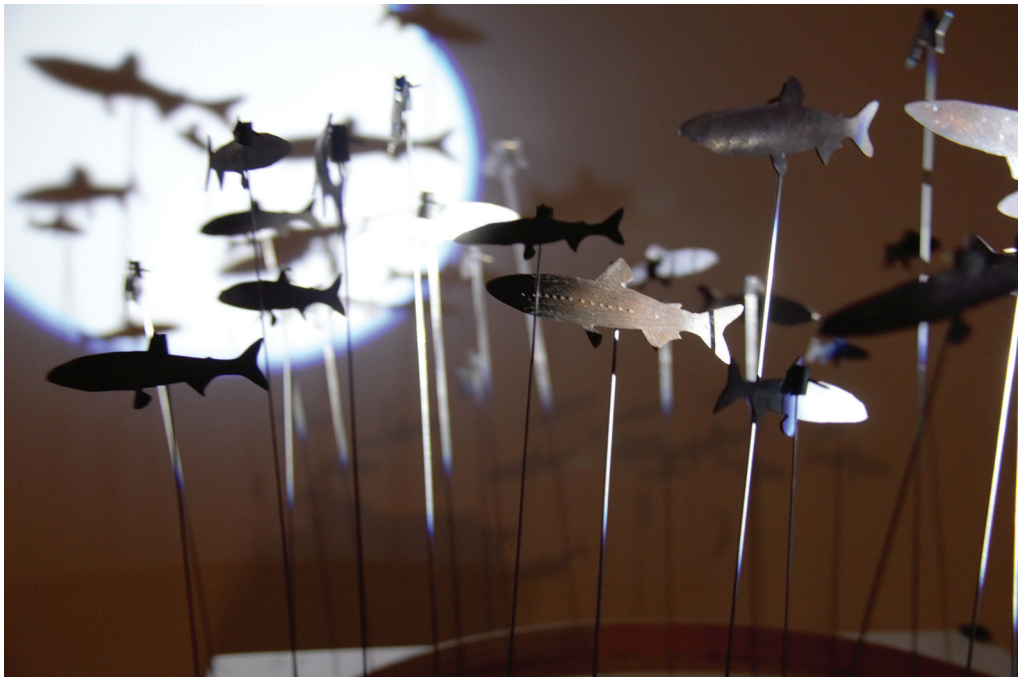

Figure 6. Michelle Wilkinson, "Grayling Draught" exhibition, Dunedin, 2019. Installation image.

When set up in a darkened room, "Grayling Draught" created a feeling of sadness and melancholy. As the shadows moved through the light, they gave the impression of circling the vortex of a drain (Figure 6).

For this piece, participation was passively sought. While explanatory text about the work was available, the emphasis was on discovery rather than statement. The work sought to engage the viewer's attention through contemplation, without offering conclusions; simply watching the shadows or examining the tactility of the pins was encouraged, leaving the viewer to add their own interpretation to the experience.

The pins could then be removed from the turntable, taken away and worn by gallery visitors, allowing the shoal to slowly decrease, until they were all gone.

INTERACTIVE EXHIBITION DESIGN

The inherent quality of jewellery as wearable becomes secondary once displayed in an exhibition space, shedding the role of the wearer and reshaping the maker/wearer/viewer discourse. If the work is appraised off the body, then the relationship between maker/wearer/viewer and the jewellery object becomes fragmented and abstracted through the absence of the wearer's tactile engagement with the work, but also through the absence of the role of jewellery as the conduit between wearer and viewer. As a result, the object can usually only be deciphered visually.

Galleries and museums most commonly serve as places for the display of contemporary jewellery. This alienates it from the everyday, as the gallery scene tends to be restricted to a self-selecting elite. According to Liesbeth den Besten, these venues of display generate a separation between contemporary jewellery, the body, the viewer and the wearer.[23]

While the initial intention for my pieces was that they be worn and experienced, for the purpose of a final exhibition they were displayed in a museological way, referencing the traditional display mechanisms and furniture of collection repositories. In this way, the uniformity of the display case permitted the viewer time and space to contemplate each object in succession, as well as collectively, allowing for engagement with the material content and aesthetic detail of each object while observing their differences and removing the awkwardness inherent in staring at someone's chest for an extended period of time.

By placing the pieces in these traditional vitrines they became autonomous objects, with the act of being worn removed from them. However, for the purposes of this exhibition, the conventional protective glass and velvet ropes were absent.

The Bat Forsaken brooches were intended to be picked up and touched by gallery visitors, *without* the traditional white gloves (Figure 7). The patina that comes with touch was, in this case, desirable. As jewellery belongs to a class of objects where understanding is contingent on touch, preventing this direct access to the object denies complete knowledge of it – a restriction which goes against what these brooches are designed for, the physical acknowledgement of absence.

Figure 7. Michelle Wilkinson, *"A Bat Forsaken"* , Dunedin 2019. Installation image.

The turning of the "Grayling Draught" could be interrupted, and the brooch components removed and pinned on the viewer before it was restarted (Figure 8). This removal of the objects on display emulated the removal of individual fish from the greater gene pool, eventually leaving nothing behind but the display structure itself. The purposeful removal of objects challenged traditional gallery etiquette.

The Revenant Bird brooches, sorted by geographical location, were displayed in simplified, oversized museum drawers, referencing the concepts of classification, collecting and preservation, as well as alluding to jewellery storage drawers, both public and private (Figure 9). As a space, the drawer offers an intermediate form of exhibition, but can also indicate potential: objects-in-waiting. The presence of the book, *Revenant Birds: Book of the Dead* (Figure 3), suggested the possibility of the brooches as objects once worn. The book contained an image of each brooch returning to the place where the bird it represented had once lived. The brooch in the drawer was dislocated from its origins as a worn object, but could be reunited with its provenance through the associated photograph.

Figure 8. Michelle Wilkinson, "Grayling Draught" exhibition, Dunedin, 2019. Installation image.

Figure 9. Michelle Wilkinson, "Revenant Birds" exhibition, Dunedin, 2019. Installation image.

Figure 10. Michelle Wilkinson, "Revenant Birds" exhibition, Dunedin, 2019. Installation image.

RESEARCH SUMMARY AND EVALUATION

This project, the contemporary jewellery objects themselves and the accompanying exhibition illustrated a range of methods used in art/science investigations. Together, they demonstrated the ability of the art object to transcend empirical science research and knowledge barriers and deliver accessible narrative works.

In answer to my original research question which set out to consider if contemporary jewellery, as objects and as an art practice, can disseminate, inform and question scientific research and discoveries, I have shown that indeed it can. But contemporary jewellery can do much more than that – it also has the ability to connect people; to become a mobile storyteller; to raise questions; be either intimate or public in its outlook; to speak of the past, present and future; and to rise above the limitations of culture and language.

Maker and writer David Watkins claimed that the emotive qualities embedded in the handmade, and the social importance of the jewellery object, allows it to become "a testing ground for questions, provocations, emotions and allegory."[24] Dormer and Turner describe jewellery as "a shrewd monitor, reflecting the ups and downs not only of money and fashion, but also of political, social and cultural change."[25] These interpretations identify a structural shift from the ornamental interests of the traditional jeweller to the exploratory concerns of the contemporary maker, and a desire to challenge and extend preconceptions of what jewellery can be.

This relatively new, socially led approach to contemporary jewellery suggests how the wearing of, or engagement with, an object can influence how the body behaves and functions. It also illustrates the choices that can be made by an individual, and the personal, bodily experience of wearing or using an object. The body becomes a platform for artistic contemplation that aims to question, challenge and provoke.

The size and weight limitations imposed on each piece in the project, in terms of wearability, mean that they beg closer inspection, which in turn leads to conversations. Material choices, image reproduction and mechanisms of display also demand viewer investigation, prompting further discourse.

While such communication is widely acknowledged and encouraged within the contemporary jewellery and arts communities, the communities themselves are relatively small. The sphere of influence in terms of a wider audience is limited. By taking these jewellery objects outside of the usual arts arenas, such as galleries and museums, and letting them loose in the countryside (the Revenant Birds project), encouraging touch (the Bat Forsaken project) and participation (the Grayling Draught project), I sought to engage a wider audience and expand the boundaries of influence.

The science research material investigated and embodied in the artworks was often multi- layered and complicated. The art objects broke these elements down into a more accessible, digestible format, allowing viewers and participants to translate this information and make emotional connections with it. This interpretation of the specialised scientific data allowed for ownership of the information to be passed on, liberating the research content so it could be understood through the jewellery objects themselves, with little or no background knowledge being necessary.

The interaction and social participation aspects of these works, and the research project itself, help to reinforce the stories they tell. It is a well-recognised phenomenon that as soon as something comes into your hands, by touching it, interacting with it, absorbing it, the recall and understanding of that object or subject increases and it sparks a deeper interest. Such interactions expand the level of engagement with a subject. If you get to interact with the object and its story – whether it be at the beginning (its inception and creation – the making of the individual grayling); becoming part of the story itself (bird volunteers and inclusion in the book); or in the final display (the handling of the bat brooches and the removal of the fish from the "Grayling Draught") – the understanding and impact of the objects and their story becomes etched so much deeper into the minds of the participants.

Hands-on experiences also allow for passive learning. Having been engaged by art objects, people end up with experiences and stories that are more likely to be retained and retold. This information transfer – from the maker, the wearer and the observer – was fundamental to this project, which aimed to spread the story of New Zealand's anthropogenic biodiversity loss and to inspire ownership and governance of the future.

The exhibition was designed to allow as much hands-on interaction as possible, while still referencing the museological displays it was based on. The bird brooches were displayed like specimens in a museum, grouped and ordered based on geographical location, with cards representing the spaces reserved for new objects (Figure 9). The accompanying book illustrated the brooches' adventures in the real world (Figure 3). The fragmented bat brooches were set up like a protective specimen bed in a box, vacant, awaiting its object (Figure 7). The public was encouraged to pick up the brooches, to touch, to disassemble and reassemble the pieces like a jigsaw puzzle. Being lifesize and based on a bat specimen held deep within the Auckland Museum collections (the only complete specimen of this species in existence), the observer could visualise an extinct species that we will never get to see in the wild and are unlikely to see on public display. The immersive "Grayling Draught" display, with its ever-decreasing school of fish, could be halted and the brooches removed to be taken away (Figure 8). While this removal of objects on display goes against usual gallery and museum protocols, it allows for mementos to be taken home. Removing the brooches is analogous to the removal of the fish from our rivers and streams.

By combining art and science and producing artworks that demystify and inform, it is possible to take a conservation message beyond scientific circles and allow the narrative to become part of the vernacular.

Michelle Wilkinson graduated with a BSc (tech) from Waikato University in 1994, and a PGDip Sci (Environmental Science) in 2000. She worked in Marine and Environmental Science for many years before retraining in Contemporary Jewellery, and has recently been awarded a Master of Fine Arts (distinction) from the Dunedin School of Art.

1 Benjamin Lignel, "Made Together: Thrills and Pangs of Participatory Jewelry," *Art Jewelry Forum*, 28 June 2016, https://artjewelryforum.org/made-together. (accessed 15 August 2018).

2 G Mills, *Action Research: A Guide for the Teacher Researcher* (Upper Saddle River, NJ: Merrill/Prentice Hall, 2003.

3 R Louv, *Last Child in the Woods: Saving our Children from Nature Deficit Disorder* (New York: Workman Publishing Company, 2005).

4 E Kolbert, *The Sixth Extinction: An Unnatural History* (London: Bloomsbury Publishing, 2014).

5 Ursula K Heise, *Imagining Extinction: The Cultural Meanings of Endangered Species* (Chicago, IL: University of Chicago Press, 2016).

6 Kolbert, *The Sixth Extinction*.

7 A Tennyson and P Martinson, *Extinct Birds of New Zealand* (Wellington: Te Papa Press, 2006).

8 J Morton, "Could 'Bio-banking' Halt NZ's Species Loss?," *New Zealand Herald*, 5 November 2017.

9 L den Besten, *On Jewellery: A Compendium of International Contemporary Art Jewellery* (Stuttgart: Arnoldsche Art Publishers, 2012).

10 Ibid.

11 J Cunningham, *Maker, Wearer, Viewer: Contemporary Narrative European Jewellery* (Glasgow: Scottish Arts Council, 2005).

12 D Skinner, *Contemporary Jewelry in Perspective* (New York: Lark Books, 2013).

13 Madeleine Albright, *Read my Pins: Stories from a Diplomat's Jewel Box* (New York: HarperCollins, 2009).

14 den Besten, *On Jewellery*.

15 HA Robertson, K Baird, JE Dowding, GP Elliott, RA Hitchmough, CM Miskelly, N McArthur, CFJ O'Donnell, PM Sagar, RP Scofield and GA Taylor, *Conservation Status of New Zealand Birds, 2016*, New Zealand Threat Classification series 19 (Wellington: Department of Conservation, 2017).

16 JE Hill and MJ Daniel, "An Historic Record of the New Zealand Greater Short-tailed Bat, *Mystacina robusta* (Microchiroptera: Mystacinidae) from the South Island, New Zealand," *Journal of the Australian Mammal Society*, 10:1 (1986).

17 "Freshwater Threats," https://www.nationalgeographic.com/environment/habitats/freshwater-threats/ (accessed 6 March 2018).

18 Ibid.

19 KR Allen, "The New Zealand Grayling – A Vanishing Species," *Tuatara*, 2:1 (1949), http://nzetc.victoria.ac.nz/tm/scholarly/tei-Bio02Tuat01-t1-body-d5.html (accessed 11 February 2018).

20 Ibid.

21 C Walrond, "Out of the Frying Pan: Into Oblivion," *New Zealand Geographic*, 75 (2005).

22 D West, B David and N Ling, *Prototroctes oxyrhynchus*. *The IUCN Red List of Threatened Species* 2014, http://dx.doi.org/10.2305/IUCN.UK.2014-3.RLTS.T18384A20887241.en.

23 den Besten, *On Jewellery*.

24 David Watkins, *Jewellery*, Design Sourcebook series (London: New Holland, 2002), 92.

25 P Dormer and R Turner, *The New Jewelry: Trends and Traditions* (London: Thames and Hudson, 1985), 178.