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Moving Birds in Hawai'i: Assisted Colonisation in a Colonised Land

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Abstract:

In September 2011, a delicate cargo of 24 Nihoa Millerbirds was carefully loaded by conservationists onto a ship for a three-day voyage to Laysan Island in the remote Northwest Hawaiian Islands. The goal of this effort was to establish a second population of this endangered species, an 'insurance population' in the face of the mounting pressures of climate change and potential new biotic arrivals. But the millerbird, or ulūlu in Hawaiian, is just one of the many avian species to become the subject of this kind of 'assisted colonisation'. In Hawai'i , and around the world, recent years have seen a broad range of efforts to safeguard species by finding them homes in new places. Thinking through the ulūlu project, this article explores the challenges and possibilities of assisted colonisation in this colonised land. What does it mean to move birds in the context of the long, and ongoing, history of dispossession of the Kānaka Maoli, the Native Hawaiian people? How are distinct but entangled process of colonisation, of *unworlding*, at work in the lives of both people and birds? Ultimately, this article explores how these diverse colonisations might be understood and told *responsibly* in an era of escalating loss and extinction.

Keywords:

Assisted colonisation; colonisation; conservation; extinction; ethics; Hawai'i; naming; Northwest Hawaiian Islands; Nihoa millerbird; ulūlu; unworlding.

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Nihoa is the first island that one reaches when travelling out from the main Hawaiian Islands into the vast expanse of the Kūpuna, or ancestor, islands. These islands, more commonly known as the Northwest Hawaiian Islands (NWHIs), stretch for 1,200 nautical miles across the north Pacific Ocean. Produced by the same volcanic hotspot that now grows the Island of Hawai ʻi, it is a string of ancient, eroded, remnants of once much larger islands, as well as coral atolls that grew around islands that are now themselves entirely gone. As these islands have worn down and away, their capacity to sustain diverse forms of plant and animal life has diminished too. For the most part, at least when it comes to the animal kingdom, they are islands now dominated by breeding sea birds and diverse insects and other arthropods, with frequent visits from monk seals and green turtles, hauling out on the beach. But the island of Nihoa is also home to two endemic songbirds, species found nowhere else in the world: a millerbird and a finch. It is the millerbird that is the focus of this story.

To borrow the words of Sheila Conant, a biologist who has studied the millerbird for much of her life, this is the story of a 'tiny population, of a tiny bird, on a tiny island, where almost no one is going to go'. More specifically, this article explores efforts to protect the future of this species in an increasingly uncertain world through a program of assisted colonisation: that is, by establishing a new population on another Hawaiian island, outside of these birds' historical range. What does it mean to take up this work responsibly? Doing so, I argue, requires a concerted effort to situate assisted colonisation inside the larger patterns of unravelling, of unworlding and colonisation, that in very different ways shape the lives of Indigenous peoples and diverse plants and animals in Hawai'i. I take up this situating work through an attentiveness to the possibilities opened up and foreclosed by the stories we tell, as well as by the words and names we use—which are, after all, themselves highly condensed stories. As Donna Haraway, thinking with Marilyn Strathern, reminds us: 'it matters what stories we tell to tell other stories with'. In exploring the world of the millerbird, this article considers three interwoven forms of movement: ways in which millerbirds are moved, are themselves a form of movement, and might in turn move others. It is in the entangled intersections of these forms of movement that the story of this species speaks most powerfully.

The account that I offer is drawn from textual sources and interviews in the main Hawaiian Islands. I have not visited the Kūpuna Islands at the centre of this story, or even seen a living millerbird in the flesh. Protected as part of the Papahānaumokuākea Marine National Monument (PMNM) the Kūpuna Islands are, as we will see, subject to stringent biosecurity and permit requirements. But the story of the millerbird is an important one; one that I feel needs to be told and retold, needs to move around in the world, and so one that I have tried to tell as best I can. My hope is that this story might contribute in some small way to the continuity of this and other Hawaiian species and ways of life. The kind of ongoingness that the Native Hawaiian Cultural Working Group of the PMNM presumably had in mind when they recently gave this species the Hawaiian name ulūlu, meaning 'growing things'.[1]

1. Nihoa

Nihoa is, by all accounts, a difficult place to land a boat. Today uninhabited by people, it is a rugged, jagged, little island that rises steeply out of the surrounding ocean. In wild weather, it is simply impossible to land and trips have to be delayed or cancelled. Even at the best of times though, landing involves the tricky job of bringing a small boat up alongside a narrow rock ledge and holding it steady in the heaving waves while people clamber out and equipment is unloaded. It was via this difficult route that a small team of scientists arrived on Nihoa in September 2011. Over the rocks they scrambled, carrying not only the food, water,

and camping gear they would need, but an assortment of cages, nets, and all of the other equipment required to catch and transport 24 millerbirds (*Acrocephalus familiaris kingi*). Over the next several days, the team did just this, spreading out across the rocky, scrubby, island to carefully trap the necessary birds. They weighed, banded, and monitored them as they did, preparing them for the long journey ahead.

The ulūlu is a small, grey-brown, insectivorous, bird, weighing in at a mere 15 grams. As Sheila put it to me: 'you might be able to post two of them with one forever stamp'. In physical appearance, the millerbird is pretty unremarkable; drab even. But all of the people I spoke to who have spent time with these birds seem to have become captivated by them. Specifically, they have been captivated by the particular way in which these birds move through the world. Like many island endemics, unfamiliar with humans and other potential predators, ulūlu are bold and inquisitive, keen to explore new items or opportunities in the landscape. On an island where the only vegetation is a low coverage of scrub, they tend to move around on the ground and through the branches in a manner that is as reminiscent of a mouse as it is of a bird. It is these kinds of behaviours that have allowed these birds to persist on this island with so few resources, an island with no real fresh water in which 'only species adapted to harsh, dry, salty, windy … conditions can survive'.[2] Nihoa is a bare, windswept, place, an island that provides little shelter from either the droughts or the violent storms that pass through. It is in this difficult landscape that these tiny birds have made their home; expert hunters and consumers of insects of all kinds, from the smallest fruit flies to trapdoor spiders and even the giant gray bird grasshoppers that swarm the island from time to time.

These birds remind us that a species is much more than a collection of organisms. Rather, a species is a distinctive *way of life*: a way of being and of interacting with others. It is this particular, embodied, way or style of movement that sustains a species across generations, allowing it to move, to endure, through evolutionary time.[3] In our present time, however, the particular way of being that is the ulūlu finds itself threatened, its movement out of sync with a wider world.[4] There are at least two significant ways in which this species might be rapidly extinguished. Both of these threats are, sadly, possibilities that are likely to only increase in the coming years. The first is what Sheldon Plentovich, the US Fish and Wildlife Service (USFWS) team leader for this project, referred to in our interview as a 'catastrophic stochastic event': an extreme weather event like a huge storm or hurricane hitting the island, or even a severe drought or fire.[5] Any of these events occurring on a large enough scale, at the wrong time, might wipe out the whole population, or reduce it in such a way that it is unable to recover. While these things have always happened on Nihoa from time to time, climate change predictions for this part of the Pacific indicate that they are likely to only increase in frequency and intensity.[6] Of course, climate change will also lead to higher sea levels, which are a major concern for many low-lying islands in the Pacific and around the world. But Nihoa, with its rugged, vertical, landscape, is anything but 'low lying'—and so, at least for now, sea level rise is not a major concern here.

The second looming threat to the ulūlu takes the form of one of many potentially dangerous new species finding their way to Nihoa. For example, if rats were to become established, as they have on so many other islands in the region, bird eggs and nestlings would be easy targets. As Sheila reminded me, past experience has shown that rats are incredibly efficient predators of island birds: it took only about 18 months for the rats accidentally introduced to Midway Atoll in the 1940s to completely wipe out healthy populations of both the Laysan rail (*Porzana palmeri*) and the Laysan finch (*Telespiza cantans*).[7] The NWHIs have stringent biosecurity protocols in place in an effort to prevent, or minimise, precisely these kinds of

species introductions. All equipment taken on to an island must be brand new or only used on that particular island. Either way, it must also be frozen for a minimum of 48 hours to kill any potential contaminants. But still, there are no guarantees. A single shipwreck or thoughtless island explorer—unlikely but far from impossible in these remote waters—might undo all this work. Indeed, rats have recently been reported on two other NWHIs with the same biosecurity protocols.[8]

It was these kinds of concerns that ultimately grounded the decision to establish a second population of millerbirds—a backup, or security, population—on another Hawaiian island. And so in 2011, and again in 2012, a small team of scientists under the leadership of the USFWS, relocated approximately 25 birds (each year) from Nihoa to Laysan Island. Islands have been at the forefront of these kinds of efforts to safeguard species by translocating them, or creating additional populations elsewhere. In part, this is because islands are also at the forefront of biodiversity loss: home to so many unique species with relatively small populations. But there is also a long tradition of using islands as research laboratories for everything from biology and anthropology, to climate change modelling and nuclear weapons testing. In these contexts, islands have frequently been imagined, or indeed remade, as isolated, bounded, and controlled, places and populations were things can be tested and their consequences contained—frequently at great expense to their inhabitants, human and not.[9]

Since at least the early 20th century, but with increased intensity in the last couple of decades, moving species to safer islands has been a core part of Pacific bird conservation. When species are moved to a place outside of their historical (or 'native') range for the purposes of preventing their extinction, this process is generally called 'assisted colonisation'.[10] Aotearoa-New Zealand has perhaps led in the development and implementation of these approaches, in particular in response to the threats posed by introduced predators like rats and stoats. There, iconic sanctuary islands like Tiritiri Matangi, Kapiti, and Whenua Hou are home to many endangered, translocated, birds like the hihi (stitchbird) and the kākāpō (night parrot).[11] Similarly, in the Mariana Islands a long-term project is underway to ensure that all bird species are present on at least two islands in the chain. There, the threat of the brown tree snake (*Boiga irregularis*) is the central driving factor: having been accidentally introduced to Guåhan (Guam) in the 1940s, the species has since spread across the island playing a major role in the extirpation of most of Guåhan's bird species. While it has not yet found its way to any of the other islands in the Marianas, many conservationists fear that it is just a matter of time. With so many unmanageable threats to avian diversity, these kinds of assisted colonisations are becoming an increasingly popular conservation strategy.

But in recent years the looming spectre, and indeed the lived-reality, of climate change has been added to this situation. Conservationists have started to wonder about the future of even those species that are today relatively healthy. As weather patterns shift, if species are not able to keep up they may simply find themselves without a suitable environment. In this context, some people are beginning to imagine the need for, and indeed to advocate for, scaled-up processes of assisted colonisation. But for others, this is a step too far. The many negative impacts of newly arrived species, not least on islands, have led them to view these projects as unavoidably sowing the seeds of tomorrow's ecological problems.[12] A broad ranging philosophical and ecological conversation is developing here that is asking not only pragmatic questions about which species ought to be moved, when, and where, but also whether what is valuable about species can actually be conserved in this way, and how the broader objectives of conservation—like those centred on maintaining ecosystem integrity—are challenged by this more 'recombinant' approach to ecology.[13]

In this larger context, the ulūlu represents a relatively uncontroversial assisted colonisation. Laysan Island was once itself home to a millerbird (*Acrocephalus familiaris familiaris*). These birds disappeared in the early 20th century, one of the many casualties of the extensive habitat loss that resulted from ongoing guano mining and rabbit and other livestock ranching on the island.[14] The taxonomy is a little debatable, but the Laysan and Nihoa millerbirds are usually considered to be subspecies, rather than unique species. As such, depending on how you look at it, this may not be an assisted colonisation at all. As Sheldon put it: 'It is an assisted colonisation if you're looking at the sub-specific level, but it is just a reintroduction at the species level'. This situation leads scientists to believe that the Nihoa millerbird is unlikely to have significant negative impacts on Laysan, as that environment, including most of the millerbird's insect prey species, likely co-evolved with a (sub)similar species. In fact, they argued that this (re)introduction was likely to have positive impacts, 'restoring a piece of Laysan'[15] in a way that might ultimately 'recreate functionality within the native ecosystem'.[16] Ultimately, however, there can be no guarantees: small or simply unseen differences between millerbirds may end up making important differences for local species and ecosystems. More generally, it is important to note that this situation is in stark contrast to most assisted colonisations, in which creating entirely novel ecological relationships is precisely the name of the game. In these cases, decisions have to be made in a context where no reassurances can be offered from the past presence of a closely related subspecies.[17]

Beyond their impacts on other species and the broader environments of their new homes, there is also the question of how these assisted colonisers might themselves be changed. To introduce a species to a new environment is to open up a new evolutionary trajectory; it is, in Sheila's apt terms, to 'tinker with evolution'.[18] The millerbirds of Nihoa were once distinct enough from those of Laysan (prior to their extinction) to be designated as separate sub-species. There is a range of possible explanations for this difference, but adaptation to unique environmental factors is likely to be at least part of the story. Given enough time on Laysan—exposed to different prey to hunt and different vegetation to live and nest amongst—these newly arrived millerbirds would no doubt diverge in their own ways from those of Nihoa. This situation reminds us that the ulūlu, as with all species, is a shifting, dynamic, and adaptive way of being that has arisen out of the particular milieu, the particular co-evolutionary relationships, that have shaped birds' lives. In such a context moving a species to a new island must matter profoundly; moving living bodies into new environments we shift the relationships, the contexts, the possibilities, within which they reside. In so doing, given the fullness of evolutionary time, we are potentially not just fledging new populations, but new species.

2. Assisting colonisation?

The term 'colonisation' carries very different meanings, histories, and possibilities in the ways in which it is applied to human and other-than-human contexts. At its core, the term describes the establishment of a group of living beings in a new locale, but for biologists 'colonisation' does not really imply anything about the consequences of this arrival for the locals already in place. Rather, it describes an inevitable part of the life history of species and broader patterns of biogeography and evolution. It is in this context that biologists speak about the millions of years of colonisation events that populated the Hawaiian Islands: birds, snails, plants, and countless others arriving by wing, wave, and wind, settling in, spreading out, and diversifying. In fact, the term colonisation actually seems to have a generally positive air about it in biology, denoting not only arrival but successful integration.[19] While this integration may certainly

displace or even extinguish other species, biologists tend to use the term 'invasion'—as in the field of 'invasion biology'—to describe more harmful arrivals (especially in contemporary contexts). In this respect, if a species that was the subject of an assisted colonisation were to impact significantly on the ecology of its new home, the colonisation would likely be said to have gone wrong in some sense. In short then, the term has none of the connotations of violence, displacement, and dispossession that it has gathered up over the past decades and centuries, slowly and unevenly, in its application to human contexts.

But, of course, the human and the nonhuman of colonisation cannot be so neatly separated from each other. At least since Alfred Crosby's *Ecological Imperialism*, scholars have been well aware of the way in which the deliberate and accidental movements of plants, animals, and diseases—of a portmanteau biota—have played an essential role in enabling the expansion of colonial empires, not least in the Pacific.[20] Beyond providing material support—in everything from their flesh to large scale processes of environmental and population transformation—relocated plants and animals were also part of broader settler colonial acclimatisation efforts that aimed to remake their new homes into more familiar, more civilized, versions of themselves, perhaps through the introduction of new song birds, ornamental plants, and game species. This is a process that Anna Boswell describes in Aotearoa-New Zealand as one of 'grafting a new lifeworld over the existing one'.[21]

In Hawai'i, these entanglements between colonial powers and local people and lands took on their own particular forms. After European contact in 1778, countless new species rushed into the islands, including diverse crop plants and livestock animals. Initially these introductions were primarily the prized possessions of the Hawaiian royal family and various ali'i (nobles). From the early 19th century, however, they became the backbone of a process in which plantation and ranching properties gradually expanded to swallow the islands as more and more land was acquired by outsiders.[22] In 1893, a group of wealthy settlers seized control of the sovereign nation of Hawai'i, overthrowing Queen Lili'uokalani with the aid and support of members of the United States government and its military. Through a complex series of events, over roughly the next fifty years Hawai'i became a territory and then a state within the USA. Although there was some attempt, both in the lead up to the overthrow and afterward, to provide maka'āinana (people of the land, or commoners) with some form of property rights in small parcels of land, this never really worked out in their favour: from the Great Mahele of 1848, through subsequent decades of dispossession and annexation, until, in J. Kēhaulani Kauanui's words 'Hawaiians and their descendants [had become] largely a landless people'.[23]

At the time of the overthrow, the nation of Hawai'i was in the process of establishing a renewed relationship with the island of Nihoa, which had become uninhabited about 200 years earlier. Prior to roughly 1700, however, it is clear from traditional oli, mele, and mo'olelo (chants, songs, and stories), as well as archaeological evidence, that Kānaka Maoli (Native Hawaiians) frequently visited, and likely also lived on, Nihoa, collecting seabirds and their eggs, fishing, growing crops, and conducting religious rites.[24] In 1822, Queen Ka'ahumanu visited the island and formally annexed it to the Kingdom, reconnecting it to the young nation. The respected teacher of Hawaiian language and culture, Puakea Nogelmeier has noted that at a time of considerable social change, this act affirmed the foundations of Hawaiian society, reaching into the distant past to pull into the present an island that was remembered in stories but no longer in personal experience. So significant was this act, that for a time buildings and children in the islands were named 'Nihoa'.[25] About 70 years later, however, the Kingdom was overthrown, with most Kānaka dispossessed of their land and made subjects of ongoing colonisation.

What does it mean to practice 'assisted colonisation' in a colonised land? The fact that terms like 'colonisation' so often go on leading largely separate lives within discussions of 'nature' and 'culture' is much more than a semantic issue. When we hold these two conversations together, we see that there is a subtle (and unintended), but nonetheless very real, violence to the way in which the term colonisation is used in biology. Not only do stories of biological colonisation emphasise settlement and establishment while backgrounding the displacement and death that frequently accompany any such movement, they are also frequently tinged with a progressive aura, stories of struggle and success in new lands. But, of course, Indigenous peoples are telling very different stories with this same word, stories that have long had to struggle against precisely this kind of erasure in the name of progress. As such, it seems essential that all colonisation—assisted or otherwise—be understood as a process that is *necessarily* both constructive and destructive, opening up and foreclosing possibilities for different ways of life. Doing so forces us to enquire seriously into the always unequal dynamics of who wins and who loses, and in what ways, inside biocultural, multispecies, 'contact zones'.[26]

More broadly, however, situating the possibility of relocating species in a colonised landscape requires us to ask *who* is entitled to make decisions about these island environments, to establish new forms of life in new places, and under what processes? In the case of the ulūlu, this assisted colonisation took place as part of the broader management of the Papahānaumokuākea Marine National Monument (PMNM). The PMNM is overseen by several state and federal agencies and aims to include Kānaka Maoli voices and perspectives through the Office of Hawaiian Affairs (a co-trustee of the Monument), as well as its Advisory Council, and its Native Hawaiian Cultural Working Group. It is sometimes easy to imagine the Kūpuna Islands as having been historically 'empty', and therefor existing somehow outside the colonial history of the main islands. Today, these islands are frequently presented as pure and untouched, although increasingly threatened; the 'last wild place' as a recent editorial put it.[27] The fact that these islands are today largely uninhabited does reduce some conservation and management issues, minimising impacts on people's lives and livelihoods. But the reality is more complex: the Kūpuna Islands have, since time immemorial, been vital parts of the Hawaiian world. Alongside the very material relationships that existed with these places at some points in history, these islands always remained thoroughly woven into Kānaka cosmology, into people's sense of the world and their place in it. As David A. Chang has noted, contrary to Western imaginations of one-sided exploration and discovery, the world beyond the main Hawaiian Islands was anything but empty for Kānaka Maoli: they 'looked out across the ocean at a world they knew extended far beyond the horizon',[28] a world that included a larger archipelago frequently or occasionally visited, but also the more distant lands of their ancestors, like Kahiki, to which they remained connected by hundreds of years of voyaging and the ongoing records of mele, oli, and mo'olelo.[29]

It is with precisely these kinds of connections in mind that the management of the Monument has worked to promote and facilitate an ongoing interaction with this place as a dynamic cultural heritage, celebrating its rich Kānaka Maoli past while also engaging in activities like bringing traditional cultural practitioners out into the Kūpuna Islands so that they can craft new stories about these places, building the kinds of relationships that might nurture people and the 'āina (land, source of nourishment) into the future. As Ty P. Kāwika Tengan has noted, Kānaka Maoli 'have always made and remade their identities through the re-membering and retelling of mo'olelo, especially in times of rapid change that threaten their continued existence as a people'.[30]

One of the people who joined these voyages to the Kūpuna Islands to weave new stories into and out of this place was Cody Pueo Pata, a distinguished kumu hula (teacher of hula). In our discussion Pueo emphasised the vital role that stories, new and old, and the intimate knowledge of the islands that they contain, must play in the context of a long and ongoing history of colonisation. Pueo works as an educator at Papahana Kuaola on O'ahu, 'an 'āina based learning organization that is connecting the area's past with a sustainable future'.[31] He explained to me that his work with students is grounded in the understanding that:

> *If they don't have a sense of pride in, or responsibility to, this place, and a good foundation in Hawaiian identity, there's not that much that is keeping them here. About eight residents of Hawai'i leave every day to move to another place because it is so expensive here, and to be honest, there's not really a connection for many people to place anymore, unless they were raised in a traditional family.*

Sam 'Ohu Gon, a biologist and Kumu oli (teacher of chants), expressed a similar understanding and challenge. As he put it: 'the vast majority of people are trying to feed their families, pay their rent'. He went on to say:

> *It is a tough thing when the people that were once so closely tied to their environment and their species no longer know and no longer care about them. It is a mission among many people to rebuild those connections between people, place, and the elements of place. But we're not there yet and we need to be.*

This kind of (re)connection work—connecting to place through story—is an ongoing process in Hawai'i today; as it perhaps always is, but taking on new forms in the wake of colonisation. As Kali Fermantez has noted: 'In Hawai'i today, Native Hawaiians find ourselves literally and figuratively out of place. Such displacement can be countered through conscious acts of re-placement, or reconnecting to Hawaiian ways of knowing and being that are rooted in place'.[32] In this context, (re)connection work must also be an important aspect of considering assisted colonisations in this colonised land: asking how these movements—as well as the stories that we tell about them—might contribute to or undermine efforts to acknowledge the past and craft and celebrate meaningful relationships and connections. Relationships and connections that can hold open, generate, and protect possibilities for what Noelani Goodyear-Ka'ōpua has described as multiplicitous, Indigenous, futurities.[33]

3. Laysan

With the ulūlu loaded on board, the ship set sail. Keeping tiny, insectivorous, birds in good health in captivity is a challenging thing to do, especially on a ship. Millerbirds don't have much bodyweight to play with, so their diet and health need to be constantly monitored and managed. Peter Luscomb, an expert at this kind of work, was enlisted for the task. During the voyage, the ulūlu were housed in purpose built cages, designed by Peter to minimise their stress and enable ongoing monitoring. They were fed carefully prepared meals, including 'gut loaded' mealworms; that is, worms that have previously been fed a nutrition supplement that they then pass on to the birds when they're consumed. It took about three days to make the roughly 1,000km journey between Nihoa and Laysan. On arrival, the delicate cargo of birds was carefully offloaded, each weighed and their health evaluated. All of them seemed to have made the trip well so the team decided to proceed with the planned release.

Laysan, sometimes called by the Hawaiian name Kauō, is a long, relatively flat, island. At its centre, running most of the length of the island, is a huge, hyper-saline lake. The selected

release site for the millerbirds was at the northern end of this lake, in a large expanse of vegetation dominated by naupaka (*Scaevola taccada*), a low growing shrub with a distinctive half-flower. Although these birds had presumably never encountered this particular plant before, as it is not found on Nihoa, they seemed to settle in right away, quickly beginning to establish and defend territories.

But, despite appearances, Laysan is far from being an ideal home for the millerbird. Decades of work by conservationists have removed the rabbits and other introduced livestock, and revegetated large areas of the island. Laysan is also home to very large rookeries of several species of breeding sea birds, including Laysan and Black-footed Albatrosses, Great Frigatebirds, and Sooty Terns. In short, the island is in a much healthier state than it has been for almost one hundred years, when its last millerbird inhabitants were extirpated and their subspecies extinguished from the world. The question, however, is how long it will remain this way.

The spectre of climate change hangs over this island too. Unlike Nihoa, however, it is thought that sea level rise is going to present real challenges for continued life on this island. Places like Laysan have not received a great deal of attention in discussions of sea level rise to date. Smaller coral atolls and islets, many of them less than 3m above present sea level, have rightly been the focus of a great deal of concern. Indeed, amongst the NWHIs, Laysan is in a strong position—as was dramatically demonstrated in late 2018 with the sudden 'disappearance' of another island in the chain in the wake of Hurricane Walaka, the 11-acre East Island.[34] But these things are always relative. Research is now showing that Laysan, on average about 10m above sea level, may be in more imminent danger than had previously been thought. In contrast to passive or 'bathtub' inundation models—which imagine sea level rise as a relatively uniform process—more recent dynamic modelling has tried to take account of the cumulative effects of things like storm-driven waves, increased storm frequencies, and larger landscape transformations of erosion and segmentation.[35] Depending on the degree of sea level rise that we see in the coming decades, large areas of islands like Laysan might become virtually uninhabitable. Even if they are not permanently underwater, if seawater is washing over them relatively frequently it may kill vegetation and contaminate freshwater (which Laysan has very little of to begin with). Depending on when these 'overwash' events occur, they will also impede breeding, causing mortalities of chicks and eggs.

The various species of seabirds, many of which nest along the beaches on Laysan, will be affected first. Some scientists worry that the large storm surge that hit Laysan and other Kūpuna islands in 2011, after the Tōhoku earthquake, might offer us a glimpse of things to come. In that case, huge numbers of breeding seabirds were killed outright on Laysan, including over 20,000 albatross chicks, their rotting bodies leading to an outbreak of avian botulism which subsequently killed many more birds. So worrying are these trends, and these islands so significant for the global populations of many of these seabird species, that more and more work has been done in recent years to establish breeding colonies on the higher, main Hawaiian islands—often through significant investments in fencing and ongoing programs to remove predators like rats and cats.[36]

It might be hoped that these newly arrived millerbirds will be a little safer from the effects of a rising sea. They do, after all, prefer the vegetated interior of the island. Here too, however, things are a little more complex. At present we just don't know what a rising sea level will do to this habitat. One key area for concern is the possibility that the large hyper-saline lake in the centre of the island, around which all of the millerbirds live, might expand significantly. A recent study by the US Geological Survey noted that 'the degree of groundwater connectivity

between the ocean and lake remains unknown … [as such] a comparable rise in groundwater and sea level remains a distinct possibility, especially over the decadal and centurial time periods relevant to climate change'. If this were to happen, a sea level rise of as little as one or two meters would flood the majority of the suitable millerbird habitat on the island.[37]

None of this is news to the conservationists that relocated the millerbirds to Laysan. It is with precisely these kinds of predictions in mind that the USFWS have acknowledged that 'creating a second population of Millerbirds on Laysan is a short-term solution'. For something more akin to long-term 'recovery' of the species to be achieved, in their words, 'multiple translocations to other, higher islands will be necessary'.[38] As Sheldon put it to me: 'Obviously Laysan wouldn't be the best choice because it is a low island and models predict that the island is going to have washover events—where the waves washover the entire island—within about 100 years. We were very cognisant of that, but it was the best option'. The prior presence of millerbirds on the island is, of course, a key part of this situation: indicating not only that the species will likely survive there with minimal impact, but that in doing so it might in some way 'restore' an aspect of the island's prior ecosystem. But there is more to the story than this. Laysan was also the 'best option' because there are just so few others.

Rats and other mammalian predators, alongside mosquitoes, are at the heart of this situation. These two groups of relatively recently arrived animals are the principal reason why, despite the threat of rising sea levels, none of the high islands were considered to be a suitable home for ulūlu. An introduced population of these birds would likely have been quickly extinguished by a combination of predation, and mosquito-borne diseases (especially avian malaria and pox). Indeed, these threats are so pervasive that the high islands can no longer really offer suitable habitat for any of Hawai'i's endemic forest birds. Of the 113 avian species known to have lived exclusively on these islands just prior to human arrival, almost two-thirds are now extinct. Of the 42 species that remain, 31 are federally listed under the US *Endangered Species Act*.[39] Gone are the large, flightless, goose-like, moa-nalo; gone are the mamo and the ʻōʻō with their striking black and yellow feather; gone are so many others. It is not hard to see why Hawai'i is regarded as one of the 'extinction capitals' of the world. As it was once a land particularly rich in birds, it is birds that have suffered the heaviest losses, at least amongst the vertebrate animals who tend to dominate discussions of extinction.

Of course, it is not just introduced species that have caused these extinctions. Long histories of land clearing and habitat destruction have also been enormously significant. This process began with the arrival of Polynesian peoples—perhaps as early as 300-600CE—as they cleared lowland forests to make room for kalo (taro) and the other agricultural plants that would allow these islands to sustain Polynesian life.[40] Habitat loss was drastically scaled-up from the early 19th century as vast areas of land were cleared and taken over for plantations, ranching, tourism, urban, and military developments.[41] But today, with so much land already cleared, introduced predators and mosquito-borne diseases represent the most significant ongoing threats to Hawaiʻiʻs surviving endemic birds. These are incredibly widespread and pervasive threats that stalk birds throughout the high islands, from the National Parks to the suburbs of Honolulu, from the Big Island to the tiny island of Kahoʻolawe. Everywhere birds are found, they are exposed to one or the other—usually both—of these threats.

When it comes to the millerbird, Sheila summed this situation up simply: 'there are just so many risks to those birds in the main Hawaiian Islands'. In our conversation, Sheldon noted that high islands like Kaho'olawe and Lehua might have been suitable options, except for the fact that 'both have mosquitoes'. While both islands also currently have rats, eradication programs are planned or underway targeting these species. As on Laysan, it is possible that

in the future these predators will be entirely removed.[42] But at the present time, avian malaria in Hawai'i is a problem without a solution. Hawai'i's endemic birds evolved in the absence of mosquito-borne diseases like malaria. As such, many Hawaiian birds have very little resistance to the disease which weakens them until they succumb to starvation or predation. The vector for this disease, the southern house mosquito (*Culex quinquefasciatus*) is thought to have arrived in Hawai'i in 1826 as a stowaway in water casks brought ashore for refilling by the crew of a ship sailing from Mexico.[43] Since this time the species has spread across all of the main islands, decimating bird populations.

The majority of the endemic bird species that remain in the main Hawaiian islands live predominantly in higher elevation forests. Apart from the fact that these are often the best remaining forests—many having escaped the axe and chainsaw because the land was too steep to be put to another use—the cooler temperatures at these higher elevations offer some protection to birds, inhibiting the development of both mosquito larvae and the malaria parasite.[44] At least for now. As the climate warms, mosquitoes are making their way higher and higher into these last refugia, placing acute pressure on the few remaining populations of species like the ʻAkikiki (*Oreomystis bairdi*) and the ʻAkeke'e (*Loxops caeruleirostris*) on Kaua'i.[45] As time is running out for these species, more and more conservationists in Hawai 'i are beginning to support the use of emerging approaches to broad-scale mosquito eradication or management, from sterile male releases, to wolbachia, and gene drive.[46] As Sheldon put it:

> *It's frustrating to spend so much time and money on these single species [of endangered birds]. I would much rather spend that time and money managing an ecosystem. The best way to do that in Hawai'i, when we're talking about passerines, is to deal with the mosquito issue.*

In her view, Hawai'i's ecosystems are not unravelling, they're already largely *unravelled*. This situation, she argues, demands different kinds of conservation approaches.

This is the larger context in which Laysan was selected as the best available home for a new population of ulūlu. Alongside the extensive impacts of habitat loss across the island chain, today a warming climate is causing rising mosquitoes and rising sea levels, further shrinking those few remaining pockets of suitable habitat for both forest and sea birds. So, while Laysan cannot offer a long-term future for the species, conservationists hope that it might buy them enough time for alternatives of one kind or another to emerge. Ultimately, this also means that it is exceedingly unlikely that millerbirds will survive on Laysan long enough to be substantially transformed by, and with, this island—for a new species to be fledged there.[47]

The seas were unseasonably calm in 2012 for the voyage that took the second group of ulūlu between Nihoa and Laysan. Shortly after this auspicious trip, the Native Hawaiian Cultural Working Group of the Papahānaumokuākea Marine National Monument (PMNM) decided to give this new population its own, distinctive, Hawaiian name: ulūlu niau, 'niau' meaning 'moving smoothly, swiftly, silently, and peacefully; flowing or sailing thus'.[48] In this name they captured a hope, that this act of movement might contribute to the ongoing growth of the species that the name ulūlu describes and invokes. These acts of naming carry with them the powerful potential to reweave relationships, with birds and indeed islands; to not only hold these connections in the world, but to thicken and vitalise them. But, as Puakea Nogelmeier pointed out to me in an interview, only if naming is taken up with care. In our discussion, Puakea emphasised that formal processes of naming are a key part of the dynamic, ongoing, life of ʻŌlelo Hawai'i (Hawaiian language). Equally, however, he noted, we must pay close attention to the names used in the past: 'The new words are a sign of vitality; the old words of strength'.[49] Both are needed. In addition to its ongoing oral culture, Hawai'i has a phenomenal

archive of historical newspapers and other documents in 'Ōlelo Hawai'i. Very soon after the arrival of the printing press in the islands with Christian missionaries, Hawai'i became perhaps the most literate nation on Earth and Kānaka Maoli set up their own newspapers to record and preserve their stories and histories. There are over a million standard pages worth of printed text in this archive, including manuscripts, letters, and government documents, as well as 'a staggering 125,000 [pages of]… Hawaiian-language newspapers published from 1834 to 1948'.[50] Puakea worries that sometimes the work has not been done to search these archives for the old names, for birds or even whole islands, before new ones are selected. In his view: giving Hawaiian names is 'an easy thing to do'. Looking for old ones, less so:

> *We are facing a century of disconnect… the language was not being kept fresh at a time of great change… If an effort has really been made to find a reference, and there isn't one, then it's very important to bring it in [provide a Hawaiian name].*

But the work of looking for an old name first is important. Creating new names where there are already old ones will mean, in his words, 'creating a future that is disconnected'. Will future generations 'be able to read their own history?' In this context we must ask, were the ulūlu, and indeed perhaps even the ulūlu niau, once known by other names? Nihoa, after all, has a long and diverse set of connections to Hawaiian life. Does the old name, or even names (plural), for the millerbirds still linger in an archive, or a living memory, somewhere? Perhaps not lost, but rather misplaced, lying in wait for those who would search carefully? To pose these questions is not to diminish the importance of a well-given Hawaiian name, its capacity to shape relationships and worlds in profound ways, but rather simply to note some of the important potentials for *both* reconnection and disconnection that reside in names, in the particular words that are strung together in succession to form stories.

4. Unravelling worlds?

Seven years after their introduction the millerbirds of Laysan, the ulūlu niau, are doing very well. From an original founding population of 50 birds there are now thought to be several hundred. As millerbirds only live for about seven years, almost all of these birds will have actually been hatched into the world on Laysan. For many years the new population packed more and more tightly into the large patch of naupaka that the initial birds were released into. Just a couple of years ago though they started to spread out more, finding new parts of the island to call home. They are that rare but much hoped for result of an assisted colonisation or translocation: a breeding, self-sustaining, population.

By all accounts, this was a highly successful project. The techniques developed and refined during this process might allow other small insectivorous birds to be similarly moved around. What is more, it is likely that this success will do important rhetorical and persuasive work, generating acceptance of this general approach and paving the way for other assisted colonisations. As Sheldon pointed out to me, the less controversial nature of this particular project due to the prior presence of a millerbird on Laysan, made it 'a really good first step in getting folks a little more accustomed to translocations'. And so it should perhaps be no surprise that planning is currently underway to establish a second population of Nihoa's other threatened endemic bird, the Nihoa finch (*Telespiza ultima*). In this case there is no suitable nearby island missing its finch, so it will need to be an assisted colonisation in the full sense of this term.

Part of me celebrates the fact that the resourceful little millerbird is, at least for now, a bit more securely in the world. In contrast to so many other species at the present time, the millerbird has taken a decisive step away from, rather than towards, extinction. But another part of me can't let go of the fact that this is such an uncertain and ambivalent situation. We just don't know how long Laysan will remain a liveable island for ulūlu niau. It is hard to believe that it will be more than 100 years though; Laysan is not an ideal new home, it's not even an improvement on Nihoa. In all likelihood, the new population will be lost before the old one.

None of this is to say that these birds ought not to have been moved. The whole point of a second population is to avoid having the species in one place, in part precisely because things frequently don't work out in predictable ways. In fact, the more I learnt about this particular case the more I found myself supporting these efforts and the passionate people who have taken on this work. Rather than rejecting this approach, my concern here is simply that 'success' not be reduced to the work of 'buying time'. Without the larger systemic changes that will make a real difference for the species—foremost amongst them, effective action on climate change and perhaps even the bio-control of mosquitoes—buying time becomes nothing more than a process of delaying the inevitable, of drawing out the death of yet one more species. Put another way, if ulūlu is to move into the future "smoothly, swiftly, silently, and peacefully", we will need to do the work to ensure that there is somewhere for the species to be or move to.

The sad reality is that we are losing the kind of world that might accommodate the millerbird.[51] There is simply nowhere left to move these birds that can offer them anything like a long-term future. Between the rats, the mosquitoes, the rising sea levels and the increased extreme weather events, they are being squeezed out of the world. Of course this is true of so many species today. As we have seen, many of Hawai'i's terrestrial and sea birds are in a similar, if not worse, situation. As Anna Tsing and Donna Haraway have noted, our Anthropocene epoch is one that is generally characterised by 'the destruction of places and times of refuge for people and other critters'.[52]

But there is something about the millerbird story that makes the 'unravelling' of this species' world somehow more apparent, more palpable. My suspicion is that this understanding is closely connected to the act of moving birds, of translocation and assisted colonisation. Perhaps it is only when we free ourselves to ask, where else might they go?', that we can see the full scale and significance of our current predicament. The millerbird's problem is not only that their particular island environment is likely to become increasingly unliveable, but that all of those places they might reasonably inhabit have already been made similarly, or indeed more, inhospitable.[53] In short, by raising the possibility of movement we see that there is nowhere left to go.

To the extent that this is the case for a single species like the ulūlu, things are made infinitely more difficult when we consider the vast numbers of species that will likely become candidates for being moved around the world in the coming years. With all of this in mind, it is hard not to feel that the millerbirds of Laysan ought not to, *cannot*, be understood as an exemplar of a bold new conservation paradigm. They do not so much signify a new future, as they do the desperateness of our current situation, and so the dire need to address its underlying causes. However necessary, even desirable, assisted colonisation is or might become in the future, the simple fact of having had to take on this work should continue to shock and disturb. We are literally shuffling species around the Earth—with all of the risks, impacts, and costs that this entails—to, in many cases, buy them a handful of years.

To describe the world of the ulūlu as one that is unravelling is to point to the breakdown of the relationships, the landscapes, the contexts, that once nourished and sustained the ongoingness of this form of life. It is to describe a process of *unworlding*. In contrast to the more spectacular and obvious violence of direct killing, this unravelling is often more insidious and draw-out, the suffocation, erasure, undermining, overwriting, of possibilities. This is so much the case that, like the 'slow violence' that Rob Nixon describes, it often does not appear to be a form of violence at all.[54] In other work I have described the way in which all extinction takes the form of an unravelling of worlds, of relationships, that begins long before the death of the last individual of a kind and ripples out into the world long afterwards.[55] As Rosemarie-Claire Collard reminds us, these drawn out unravellings are not necessarily slow processes: ecological losses and violences unfold within multiple, varied, and halting temporalities.[56] In these cases, my emphasis was on the way in which extinctions *give rise* to processes of unravelling, impacting on diverse biocultural relationships. In the context of the ulūlu, however, we see that the connection between extinction and unravelling is much less linear, much less unidirectional. Here, it is the loss of a world that in many ways precipitates (a possible) extinction. There is a different kind of spectrality at work in these processes in which a species—a form of life—lingers, at least for a time, as its world is undone around it.

Ironically, the process of unworlding that I am describing here is one that frequently goes by the name of *colonisation*; at least it does when the forms of life at stake are recognised as being human. As Deana Heath notes, 'colonialism is a violation of the world of the colonized, which entails a process of unworlding' in which relationships and systems—economic, social, legal, and more—are undone and redone.[57] It is a process, in other words, in which the worlds that sustain the ongoingness of particular forms of life are over-written through diverse forms of more or less visible, spectacular, and systematic violence. In Hawai'i, the occupation and colonisation of the lives and lands of the Kānaka Maoli involved precisely these kinds of processes. As Jonathan Kay Kamakawiwo'ole Osorio has noted: colonialism in Hawai'i worked 'through a slow, insinuating invasion of people, ideas, and institutions'.[58] These processes undermined and prohibited the use of 'Ōlelo Hawai'i (Hawaiian language), as well as hula and diverse other expressions and practices of Hawaiian culture. While, as Osorio and other scholars have documented, many Kanaka resisted—fighting 'this invasion with perplexity and courage'—ultimately 'that colonialism literally and figuratively dismembered the lāhui (the people) from their traditions, their lands, and ultimately their government'.[59] The process of *dismemberment* that Osorio describes is readily recognisable as one of *unworlding*: one in which a way of life is undermined through the destruction of its world, its systems of meaning, relating, and nourishment.

To name the violence of unworlding as colonisation is, in a sense, to even further complicate the confusing biocultural valences of this term. Naming, after all, is always a complex business: connecting and disconnecting, formative of possibilities for understanding and inhabiting worlds. Perhaps, as we move ever more deeply into the Earth's sixth mass extinction event, we need another name for these relentless processes of unravelling other species' worlds? Perhaps to think about climate change and large-scale habitat modification and destruction as the 'colonisation' of animal and plant lives only confuses the issue? Equally as concerning, perhaps such a framing diminishes the ongoing struggles of Indigenous peoples who are all too familiar with the dangers of being considered under the same rubrics as 'flora and fauna'? Much of the existing research on 'environmental colonialism' or 'eco-colonialism' has focussed on the negative impacts of conservation projects on local people, highlighting the ways in which global environmentalism can itself become a continuation of the colonial project of

dispossession by other means.[60] As such, this work does not generally refer to the colonisation of the lives and worlds of plants and animals themselves. But these unhuman and inhuman violences must also be part of the stories that are told here. If this is the case, perhaps the naming of the unworlding of the ulūlu and other species as 'colonisation' helps us to see the thoroughly entangled, naturalcultural, dimensions of all of those diverse processes of violence, displacement, and overwriting, that are gathered together here?[61] From such a perspective we can see that it is precisely because we—some of us—have colonised these islands, perhaps colonised the planet and its future, that the assisted colonisation of the ulūlu is both so necessary and so profoundly difficult.[62]

There is, however, a problematic politics to all of these declarations of unravelling or disappearing worlds. Frequently these declarations function as political and ethical devices: imaginations of what was or still just is, are enrolled to speak to the present. As Geoffrey M. White and Ty Kāwika Tengan note, stories of 'rapidly disappearing native cultures'—and the salvage ethnology that often accompanies them—have long histories in Hawai'i and the Pacific, as they do around the world.[63] All too often, as Matt Hooley has argued, Indigenous people and their environments get bundled up together in these discussions, the inevitable demise of one signalling the death of the other. In these cases, the rich—even if threatened—lives and possibilities of people and places slip from view. Hooley asks, what do narratives of disappearing worlds themselves *disappear*, what do they make 'legible only as a disappearance?'[64] In recent years, climate change and in particular rising sea levels, have become key aspects of these narratives. Discussing media and environmentalist portrayals of Tuvalu, Carol Farbotko describes a narrative of "wishful sinking" in which this small island nation is lost beneath the waves as a message to the rest of the planet that we must act on climate change.[65]

My account of the unravelling world of the ulūlu risks falling into these kinds of narrative traps. Certainly I am mindful of the ethics of putting ulūlu 'to work' to make more general points about extinction, colonisation, and climate change. But, I do not think these narrative of disappearance are always to be strictly avoided; nor are they the only ones that do dangerous disappearing work—stories of hope and success can equally do this. The story that I have told here is one about ulūlu *and* other species, including diverse peoples, a story about loss *and* a celebration of what has been and what might still endure.[66] Likewise, my intention is certainly not to suggest that Kānaka Maoli and their ways of life are themselves in decline. To understand colonisation as an unworlding is not to suggest that these processes have always succeeded in this effort. Rather, as Marisol de la Cadena notes, ongoing colonising efforts to destroy heterogeneous Indigenous worlds are simultaneously stories of the 'destruction of these worlds *and* the impossibility of such destruction'.[67]

And yet, it remains the case that amongst the many consequences of the incredible loss of birds in Hawai'i is a profound and ongoing impact on Kānaka Maoli. On a recent trip to Hawai'i, I was reminded by Sam 'Ohu Gon that the i'iwi (*Vestiaria coccinea*), a beautiful red honeycreeper that is now on the endangered species list, is the last living connection to the long tradition of Hawaiian feather-work, all of the other key bird species having already been lost.[68] Kumu hula Pueo Pata told me about the way in which the loss of plants and animals profoundly impacts traditional religious practices. The use of parts of plants and animals, like feathers sustainably harvested through catch-and-release, is a key part of traditional hula. As Pueo explained: 'The feathered gods are no longer possible if they required the yellow feathers of the 'ō'ō bird or the mamo [both now extinct] … We can never recreate or resurrect that part of the religion'.[69] Without doubt, these are intimate and profound relationships. But there is no simple correlation between the loss of birds and the loss of people and their cultures—

although, as Sam pointed out to me, these processes did occur hand in hand in the early days of US colonisation. While species have continued to be lost at a staggering rate in recent decades, this same period has seen an incredible renaissance of Hawaiian language, culture, and politics.[70] The roles taken up by Kānaka Maoli in the naming and management of species like the ulūlu are just one small example of this. The broader, ongoing, work of invigorating connections to culture, to ʻāina, that is taking place all across the islands is showing that, like at least some of the old names, things thought lost by some may yet endure or be recovered with care, made part of the crafting of multiplicitous futures.

I hope that this is also true of the ulūlu and Hawai'i's other birds, but it seems increasingly less likely that their worlds can be recovered, ravelled together in ways that might sustain them. Acknowledging this broader context of unworlding—of what we might recognise as another form of colonisation—is essential to the possibility of moving birds responsibly. Doing so requires that we tell the story of the ulūlu in ways that do not allow it to become divorced from the larger patterns of loss at work here. In the information booklet and the 30 minute documentary about ulūlu produced by Mālama Learning Center, the organisation tasked with communicating this project to the wider public, we are offered an account of the project as an unmitigated success.[71] A great job is done here of connecting these islands and the ulūlu to Kānaka Maoli history and culture, summoning up important possibilities for (re)connection. But there is no mention whatsoever of climate change, of rising sea levels and increased storms, of the deeply uncertain future of Laysan Island. We need to get better at telling stories of ambivalent success. Tales of what Tsing has called 'gardening in the ruins';[72] of dedicated care and achievement that are nonetheless tinged with the unavoidable uncertainty of our Anthropocene epoch. This was an ambivalent success not because the plan didn't work out, but rather because the world in which we live is one in which the best plans, the best options, are now often so far from ideal, or even from what might have been possible a few decades ago. As Alexis Shotwell has noted: 'We are compromised and we have made compromises, and this will continue to be the way we craft the worlds to come, whatever they might turn out to be'.[73]

While the millerbird story is undoubtedly one of success, it is simultaneously a profound tragedy acted out across an ocean; a tragedy that, if we are paying attention, must summon us into new modes of responsibility. In the coming years we will need to ask, again and again, is assisted colonisation the right course of action here, and if so when and where to, and who should decide? These are vitally important questions. But they are not enough. Moving birds will never be enough. We must also be *moved by them*, affected, put into motion by the tragedy of so many unravelling worlds and the growing need to relocate so many of Earth's species. If we—whoever that 'we' turns out to be—are to *responsibly* take on the work of fledging new species, or even just new populations in distant places, then we must do so in a way that engages with the complexities of colonisation, of unworlding, in its diverse historical and ongoing forms. As such, while I sincerely hope that the movement of the ulūlu has bought the species a little more time, my more solemn hope is that the story of this species, tangled up as it is with so many other colonised forms of life, might help to set in motion those more substantial changes that are vitally needed to sustain all of our futures.

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1. Monument, Papahānaumokuākea Marine National, *Nihoa Millerbird Receives Hawaiian Name*, (<https://www.papahanaumokuakea.gov/news/millerbird_hawaiian_names.html>.

2. Neal L. Evenhuis, & Lucius G. Eldredge, 'Habitats and Climate', in Neal L. Evenhuis, & Lucius G. Eldredge (eds), *Natural History of Nihoa and Necker Islands* (Honolulu: Bishop Museum Press, 2004), p. 13.

3. van Dooren, Thom, *Flight Ways: Life and Loss At the Edge of Extinction* (New York: Columbia University Press, 2014); Deborah Bird Rose, 'Multispecies Knots of Ethical Time', *Environmental Philosophy*, 9 (2012): 127-140

4. On being out of sync, temporally, with a changing world, see Michelle Bastian, 'Encountering Leatherbacks in Multispecies Knots of Time', in Deborah Bird Rose, Thom van Dooren, & Matthew Chrulew (eds), *Extinction Studies: Stories of Time, Death, and Generations* (New York: Columbia University Press, 2017); Michelle Bastian, 'Fatally Confused: Telling the Time in the Midst of Ecological Crises', *Environmental Philosophy*, 9 (2012): 23-48

5. USFWS, 'Nihoa Millerbird Translocation Project Frequently Asked Questions (Faqs)', (2011): 1-5

6. Reynolds, Michelle H, Paul Berkowitz, Karen N Courtot, & Crystal M Krause, 'Predicting Sea-Level Rise Vulnerability of Terrestrial Habitat and Wildlife of the Northwestern Hawaiian Islands', (2012), p. 72.

7. These two avian species were introduced to Midway from Laysan at the end of the 19th century. The finch still survives on Laysan but the rail was already gone in the 1940s so its extirpation from Midway meant the extinction of the species. Rats also aren't the only dangerous stowaways. Believe it or not, several species of introduced ants—like the yellow crazy ant—are currently having a devastating impact on birds in Hawai'i and around the world, especially nestlings and breeding birds. These ants spray formic acid on birds which leads some parents to abandon their nests or young; if they stick it out, however, prolonged exposure of chicks to this acid can cause a range of extreme and even life threatening developmental conditions including malformed eyes and bills which lead to blindness and difficulties breathing and eating. https://abcbirds.org/battling-invasive-ants-in-hawaii/

8. Interview and personal correspondence with Sheldon Plentovich, the USFWS team leader for the Nihoa Millerbird project. Interview conducted by the author in Haleiwa, O'ahu, on 30 May 2018.

9. Beth Greenhough, 'Tales of an Island-laboratory: Defining the Field in Geography and Science Studies', *Transactions of the Institute of British Geographers*, 31/2 (2006): 224-237; Elizabeth DeLoughrey, 'Radiation Ecologies and the Wars of Light', *MFS Modern Fiction Studies*, 55/3 (2009): 468-498; Carol Farbotko, 'Wishful Sinking: Disappearing Islands, Climate Refugees and Cosmopolitan Experimentation', *Asia Pacific Viewpoint*, 51/1 (2010): 47-60; MacLeod, Roy M., & Philip F. Rehbock, *Darwin's Laboratory: Evolutionary Theory and Natural History in the Pacific* (Honolulu: University of Hawai'i Press, 1994)

10. IUCN/SSC, *Guidelines for Reintroductions and Other Conservation Translocations* (Gland, Switzerland: IUCN Species Survival Commission, 2013), p. 3.. The translocation of wildlife for conservation purposes is generally divided into two broad categories, "reintroductions" and "conservation introductions," where the former involves movement within a (sub)species' historical range, and the latter to areas outside this range. Within the broad category of "conservation introduction," a further distinction is usually made on the basis of the intention behind this move. An "assisted colonisation" aims to prevent the extinction of the relocated species, while an "ecological replacement" seeks to restore or enhance "functionality" in an ecosystem through the introduction of a surrogate species Ibid..

11. DoC, *Island Sanctuaries* (Christchurch: Department of Conservation / Te Papa Atawhai, 2006). On the deep-seated "colonial investment in sanctuary as concept and practice" in Aotearoa-New Zealand, see Anna Boswell, 'Settler Sanctuaries and the Stoat-Free State', *Animal Studies Journal*, 6/2 (2017): 109-136.

12. David M Richardson, Jessica J Hellmann, Jason S McLachlan, Dov F Sax, Mark W Schwartz, Patrick Gonzalez, E Jean Brennan, Alejandro Camacho, Terry L Root, & Osvaldo E Sala, 'Multidimensional Evaluation of Managed Relocation', *Proceedings of the National Academy of Sciences*, 106/24 (2009): 9721-9724; A Ricciardi, & D Simberloff, 'Assisted Colonization is Not a Viable Conservation Strategy', *Trends Ecol Evol*, 24/5 (2009): 248-253; Lucas Fortini Shannon Noelle Rivera, Sheldon Plentovich, Sheila Conant, Melissa Price, 'Nowhere to Go: Barriers to the Use of Assisted Colonization for Climate Sensitive Species', (in press).

13. Also see Ben A Minteer, & James P Collins, 'Move it or Lose it? The Ecological Ethics of Relocating Species Under Climate Change', *Ecological Applications*, 20/7 (2010): 1801-1804; Ronald Sandler, 'The Value of Species and the Ethical Foundations of Assisted Colonization', *Conservation Biology*, 24 (2009): 424-431. On "recombinant ecology" see Michael Soulé, 'The Onslaught of Alien Species, and Other Challenges in the Coming Decades', *Conservation Biology*, 4 (1990): 233-239.

14. "Isles of Refuge: Wildlife and History of the Northwestern Hawaiian Islands." Mark J. Rauzon, ISBN: 0-8248-2330-3

15. USFWS, 'Nihoa Millerbird Translocation Project', *Pacific Islands Fish and Wildlife Office: Project Updates*, (2014)

16. USFWS, *Nihoa Millerbird Translocation Project Frequently Asked Questions (Faqs)*

17. See endnote 10 for a discussion of the terminology of translocation. Sheldon's suggestion that this may be a species "reintroduction" raises an important terminological consideration. In most cases, official discussions of the millerbird project use the broadest terminology of "translocation." As Holly B. Freifeld and colleagues note in the case of the ulūlu, the translocation was both "an assisted colonization because the primary goal was to prevent extinction of the focal species, and an ecological replacement because we expect that the Nihoa millerbird will perform a similar ecological function to that of the Laysan millerbird lost in the early 20th century" 'Long-Distance Translocations to Create a Second Millerbird Population and Reduce Extinction Risk', *Biological Conservation*, 199 (2016), p. 148..

18. Sheila Conant, 'Saving Endangered Species By Translocation: Are We Tinkering With Evolution', *BioScience*, 38/4, Hawaii's Unique Biology (1988): 254-257

19. Surprisingly, the term colonization seems to be rarely given an explicit entry in encyclopedias of biology Rittner, Don, & Timothy Lee McCabe, *Encyclopedia of Biology* (New York: Facts on File, 2004), or even invasion biology Simberloff, Daniel, & Marcel Rejmánek, *Encyclopedia of Biological Invasions* (Los Angeles: University of California Press, 2011). The *Springer Encyclopedia of Astrobiology*, however, makes the point well: "Colonization is the occupation of a habitat or territory by a biological community or of an ecological niche by a single population of a species. Biological colonization relates to all species, from microbes – including bacteria, archaea, and fungi – to more complex organisms, like plants and animals. ... Biological colonization is a dynamic process that begins when unoccupied habitats, territories, or niches become available, or when organisms acquire the ability to survive and reproduce under environmental conditions of new niches, by a process of adaptation" Silvano Onofri, 'Colonization (Biological) Encyclopedia of Astrobiology', in Muriel Gargaud, Ricardo Amils, José Cernicharo Quintanilla, Henderson James (Jim Cleaves, William M. Irvine, Daniele L. Pinti, & Michel Viso (eds), (Berlin, Heidelberg: Springer Berlin Heidelberg, 2011): pp. 326-328

20. Alfred W. Crosby, 'Ecological Imperialism: The Biological Expansion of Europe, 900-1900', (2nd edn, Cambridge and New York: Cambridge University Press, 2004); Newell, Jennifer, *Trading Nature: Tahitians, Europeans and Ecological Exchange* (Honolulu: University of Hawai'i Press, 2010)

21. Boswell, *Settler Sanctuaries and the Stoat-Free State*, p. 117.

22. Fischer, John Ryan, *Cattle Colonialism: An Environmental History of the Conquest of California and Hawai'I* (UNC Press Books, 2015); Newell, *Trading Nature: Tahitians, Europeans and Ecological Exchange*. Of course, prior to these European plant and animal introductions, the first settlers of these islands brought with them the diverse "canoe species" that would allow these places to sustain Polynesian life: kalo (taro), pigs, paper mulberry, and more.

23. J. Kēhaulani Kauanui, *Hawaiian Blood: Colonialism and the Politics of Sovereignty and Indigeneity*, Duke University Press, Durham and London, 2008, p. 75. On this topic also see Noenoe K. Silva, *Aloha Betrayed: Native Hawaiian Resistance to American Colonialism,* Duke University Press, Durham and London, 2004. Stuart Banner, "Hawaii: Preparing to be Colonized," in *Possessing the Pacific: Land, Settlers, and Indigenous People From Australia to Alaska,* Harvard University Press, Cambridge and London, 2007. The Great Mahele was a period of land redistribution—initiated by the king and the parliament of Hawai'i—that "converted" traditional customary rights in lands into private property in the mid-nineteenth century (in the lead-up to U.S. occupation). I accept Kauanui's argument about the appropriateness of the term "colonization" to describe the social and political dynamics of Hawaiian life after what was technically an "occupation'" of the internationally recognized sovereign nation of Hawai'i. J. Kehaulani Kauanui, "Hawaiian Independence and International Law (Episode #23)," *Indigenous Politics on WESU Radio* (2009). See also Silva, *Aloha Betrayed: Native Hawaiian Resistance to American Colonialism*; Kūhiō Vogeler, "Outside Shangri La: Colonization and the US Occupation of Hawai'i," in Noelani Goodyear-Ka'ōpua, Ikaika Hussey, and Erin Kahunawaika'ala Wright (eds.), *A Nation Rising*, Duke University Press, Durham, 2014.

24. Susan A. Lebo, 'Cultural History', in Neal L. Evenhuis, & Lucius G. Eldredge (eds), *Natural History of Nihoa and Necker Islands* (Honolulu: Bishop Museum Press, 2004): pp. 33-44

25. Puakea Nogelmeier in Mālama Learning Center, *A Story of Hope: The Millerbird's Journey*, (nd) <https://www.malamalearningcenter.org/ul363lu-translocation-project.html>. Also see Lebo, *Cultural History*, p. 40.

26. Pratt, Mary Louise, *Imperial Eyes: Travel Writing and Transculturation* (Taylor & Francis, 2003); Haraway, Donna, *When Species Meet* (Minneapolis: University of Minnesota Press, 2008)

27. Beat, Civil, *The Last Wild Place*, (2018) <https://www.civilbeat.org/projects/the-last-wild-place/>

28. Chang, David A., *The World and All the Things Upon it: Native Hawaiian Geographies of Exploration* (Minneapolis: University of Minnesota Press, 2016)

29. ho'omanawanui, ku'ualoha, *Voices of Fire: Reweaving the Literary Lei of Pele and Hi'laka* (University of Minnesota Press, 2014); McDougall, Brandy Nālani, *Finding Meaning: Kaona and Contemporary Hawaiian Literature* (University of Arizona Press, 2016)

30. Tengan, Ty P. Kāwika, *Native Men Remade: Gender and Nation in Contemporary Hawai'i* (Durham and London: Duke University Press, 2008), p. 67.

31. http://papahanakuaola.com/ Accessed 16 November 2018.

32. Kali Fermantez, 'Re-Placing Hawaiians in Dis Place We Call Home', *Hūlili: Multidisciplinary Research on Hawaiian Well-Being*, 8 (2012), p. 97.

33. Noelani Goodyear-Ka'ōpua, 'Protectors of the Future, Not Protestors of the Past: Indigenous Pacific Activism and Mauna a Wākea', *South Atlantic Quarterly*, 116/1 (2017): 184-194

34. On East Island, see Oliver Milman, "Hawaiian island erased by powerful hurricane: 'The loss is a huge blow'" *The Guardian*, Wednesday 24 October, 2018, https://www.theguardian.com/us-news/2018/oct/24/hawaiian-island-erased-by-powerful-hurricane. On low-lying islands and sea level rise more generally, see Curt D. Storlazzi, Edwin P.L. Elias, & Paul Berkowitz, 'Many Atolls May be Uninhabitable Within Decades Due to Climate Change', *Scientific Reports*, 5/1 (2015), pp. 5-6.

35. Reynolds, Michelle H, Paul Berkowitz, Karen N Courtot, & Crystal M Krause, 'Predicting Sea-Level Rise Vulnerability of Terrestrial Habitat and Wildlife of the Northwestern Hawaiian Islands', (2012), p. 74.

36. https://www.allaboutbirds.org/facing-into-the-wind-the-complicated-fate-of-the-laysan-albatross/

37. Ibid., p. 58.

38. USFWS, *Nihoa Millerbird Translocation Project Frequently Asked Questions (Faqs)*

39. David L Jr. Leonard, 'Recovery Expenditures for Birds Listed Under the Us Endangered Species Act: The Disparity Between Mainland and Hawaiian Taxa', *Biological Conservation*, 141 (2008): 2054-2061. The first rats arrived with Polynesian peoples and likely ate birds' eggs and nestlings. Numerous bird species became extinct during this period Alison G Boyer, 'Extinction Patterns in the Avifauna of the Hawaiian Islands', *Diversity and Distributions*, 14/3 (2008): 509-517. Additional rat species were unintentionally introduced by European explorers/settlers, contributing to the many subsequent avian extinctions IAE Atkinson, 'A Reassessment of Factors, Particularly Rattus Rattus L., That Influenced the Decline of Endemic Forest Birds in the Hawaiian Islands', *Pacific Science*, 31/2 (1977): 109-133. The introduction of mosquitoes is discussed further below.

40. The date of Polynesian settlement of the Hawaiian Islands remains a topic of ongoing research. For a review, and an argument that this event likely took place between 1000-1200CE, see Kirch 'When Did the Polynesians Settle Hawaii? A Review of 150 Years of Scholarly Inquiry and a Tentative Answer', *Hawaiian Archaeology*, 12/2011 (2011): 3-26.

41. Boyer, *Extinction Patterns in the Avifauna of the Hawaiian Islands*; David W Steadman, 'Prehistoric Extinctions of Pacific Island Birds: Biodiversity Meets Zooarchaeology', *Science*, 267 (1995): 1123-1131

42. https://www.fws.gov/refuge/Hawaiian_Islands/about/Laysan_Island.html

43. LaPointe, Dennis A, 'Feral Pigs, Introduced Mosquitoes, and the Decline of Hawai'i's Native Birds', (2006).

44. Ibid.

45. Mary M. Abrams, & et al., 'To Restore a Mosquito-Free Hawai'i', Summary Report of the Workshop to Formulate Strategic Solutions for a "Mosquito-Free Hawai'i, (2016). It is not yet known how the millerbird might fair in the face of avian malaria. There is some suggestion that it may be less susceptible to the disease than Hawaiian forest birds. The "challenge studies" needed to evaluate millerbird susceptibility to malaria, pox, and other avian diseases are expensive and time consuming. As such, Sheldon explained to me, the priority was to establish this additional population first. Now that this is done there might be some breathing room and available birds to conduct these kinds of studies. If it turns out that millerbirds are significantly less susceptible to these diseases, then several new island possibilities might be opened up for them.

46. For a short overview of these technologies, see https://www.newyorker.com/news/daily-comment/could-genetically-modified-mosquitoes-save-hawaiis-endangered-birds

47. If islands have long been treated as laboratories—their complexities and connectivities erased or ignored to produce convenient objects of study—in this Anthropocene age of changing climate and global movement, they are often becoming dysfunctional laboratories: their edges, their conditions, their inhabitants, rapidly shifting in ways that cannot be bracketed out, in fact in ways that are themselves now often the focus of what must be studied and understood, for better and worse.

48. Monument, *Nihoa Millerbird Receives Hawaiian Name*

49. Nogelmeier, Puakea, 'Long Story Short With Leslie Wilcox', (November 3 2009

50. Noelani Arista, 'Navigating Uncharted Oceans of Meaning: Kaona as Historical and Interpretive Method', *PMLA*, 125/3 (2010), p. 665.. Also see Puakea Nogelmeier, 'Mai Pa'a I Ka Leo: Historical Voice in Hawaiian Primary Materials, Looking Forward and Listening Back', (2003)

51. Here, I think we see a foreshadowing of the kind of tragedy of extinction that Ronald Sandler points to when he notes that "It is terrible that there are no passenger pigeons in the United States or fresh water dolphins in China. But what is even more terrible is that this is no longer a world for them." Ronald Sandler, 'Techno-Conservation in the Anthropocene: What Does it Mean to Save a Species?', in Ursula K. Heise, Jon Christensen, & Michelle Niemann (eds), *The Routledge Companion to the Environmental Humanities* (Milton Park and New York, 2016), p. 77.

52. Donna Haraway, 'Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin', *Environmental Humanities*, 6 (2015): 159-165

53. What counts as a "reasonable" environment for species in need of new habitat will likely be questions and stretched in this context. Perhaps we will soon find ourselves considering assisted colonisation to other island chains, or even other oceans?

54. Nixon, Rob, *Slow Violence and the Environmentalism of the Poor* (Cambridge, MA: Harvard University Press, 2011). On this topic also see Susanna Lidström, Simon West, Tania Katzschner, M Isabel Pérez-ramos, & Hedley Twidle, 'Invasive Narratives and the Inverse of Slow Violence: Alien Species in Science and Society', *Environmental Humanities*, 7 (2015): 1-40

55. van Dooren, *Flight Ways: Life and Loss At the Edge of Extinction*

56. Rosemary-Claire Collard, 'Disaster Capitalism and the Quick, Quick, Slow Unravelling of Animal Life', *Antipode*, 50/4 (2018): 910-928

57. Deana Heath, 'Colonialism, Violence and Bare Life', *Unpublished paper*,

58. Osorio, Jonathan Kay Kamakawiwo'ole, *Dismembering Lahui: A History of the Hawaiian Nation to 1887* (Honolulu, HI: University of Hawai'i Press, 2002), p. 3.

59. Ibid.. Lāhui is a multiplicitous Hawaiian term that means nation, gathering, people, and tribe. As in this case, it sometimes used to evoke the tight relationship between people and nation.

60. West, Paige, *Dispossession and the Environment: Rhetoric and Inequality in Papua New Guinea* (New York: Columbia University Press, 2016); Brockington, Dan, & K Scholfield, *Celebrity Colonialism and Conservation in Africa* (Newcastle: Cambridge Scholars Publishing, 2009)

61. As Deborah Bird Rose has argued in the context of colonizing processes in Australia *Reports From a Wild Country: Ethics for Decolonisation* (Sydney: UNSW Press, 2004).

62. From such a perspective we are also, of course, required to acknowledge that all unworldings are also at the same time worldings, opening up space and possibilities for others. Again, the pressing question is for whom, and at whose expense?

63. Geoffrey M White, & Ty Kāwika Tengan, 'Disappearing Worlds: Anthropology and Cultural Studies in Hawai'i and the Pacific', *The Contemporary Pacific*, 13/2 (2001), p. 389.

64. Matt Hooley, 'Reading Vulnerability: Indigeneity and the Scale of Harm', in Tobia Menely, & Jesse Oak Taylor (eds), *Anthropocene Reading: Literary History in Geologic Times* (University Park, PA: Pennsylvania State University Press, 2017), p. 187.

65. Farbotko, *Wishful Sinking: Disappearing Islands, Climate Refugees and Cosmopolitan Experimentation*

66. I have discussed the ethics of this "political" use of dead and dying birds in more detail in Chapter Five of *Flight Ways* van Dooren, *Flight Ways: Life and Loss At the Edge of Extinction*.

67. Marisol de la Cadena, 'Runakuna: Human But *Not Only*', *Knowledge/Culture/Ecologies*, (2017)

68. Sam is a senior scientist and cultural advisor for The Nature Conservancy Hawai'i and a distinguished Kumu oli, a singer and teacher of chants.

69. He went on to note: "We can never put foreign plants [or animals] on our kuahu [altar], they're not our akua [gods], they're not the bodyforms of our ancestors... If we no longer have access to the bodyforms of our ancestors, of our akua, that form of worship stops."

70. Noelani Goodyear-Ka'ōpua, Ikaika Hussey, & Erin Kahunawaika'ala (eds), *A Nation Rising: Hawaiian Movements for Life, Land, and Sovereignty* (Durham: Duke University Press, 2014); Yamashiro, Aiko, & Noelani Goodyear-Ka'opua, *The Value of Hawaii 2: Ancestral Roots, Oceanic Visions* (University of Hawai'i Press, 2014)

71. https://www.malamalearningcenter.org/ul363lu-translocation-project.html

72. Anna Lowenhaupt Tsing, 'Blasted Landscapes, and the Gentle Art of Mushroom Picking', in Eben Kirksey (ed.), *The Multispecies Salon: Gleanings From a Para-Site* (Durham: Duke University Press, 2016)

73. Shotwell, Alexis, *Against Purity: Living Ethically in Compromised Times* (Minneapolis and London: University of Minnesota Press, 2016)