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Citation:

Cooke, B and Lane, R 2015, 'Re-thinking rural-amenity ecologies for environmental management in the Anthropocene', *Geoforum*, vol. 65, pp. 232-242.

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Version: Accepted Manuscript

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Link to Published Version:

<http://dx.doi.org/10.1016/j.geoforum.2015.08.007>

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Re-thinking rural-amenity ecologies for environmental management in the Anthropocene

COOKE, Benjamin, RMIT University, Melbourne, ben.cooke@rmit.edu.au

LANE, Ruth, Monash University, Melbourne, ruth.lane@monsh.edu

Abstract

The migration of lifestyle-orientated landholders (amenity migrants) to rural landscapes is resulting in the production of new rural ecologies. To date, the future implications of these ecologies for environmental management have been framed largely in 'traditional' conservation biology terms, focusing on how we can conserve or restore natural environments to a past ecological benchmark. However, the Anthropocene provides an opportunity to critically examine how we can progress environmental management in a way that locates ecologies as emergent products of human-environment interaction through time. We extend from Tim Ingold's work on wayfaring to position people and plants in environmental management as cohabitants who are traversing a world that is continually in the making. We conducted qualitative research in the hinterlands of Melbourne, Australia, involving narrative interviews with landholders and walking their property with them, using a form of participant observation called the 'walkabout' method. We found that the conservation aspirations of amenity migrants were mediated by the landscape histories that were embodied in the plants they engaged with on their property. These embodied landscape histories served to structure the trajectory of ecological emergence in which landholders were a part. We develop the concept of 'landscape legacy' to explain how past actions and future aspirations come together in management practice to produce novel and often unanticipated ecologies. Landscape legacy grounds the Anthropocene in everyday environments, capturing the need to progress environmental management as a wild experiment in rural-amenity landscapes, focusing on ecological form, function, relationship and process.

Key words: amenity migration; exurban; nonhuman agency; temporality; environmental management; Anthropocene

1. Introduction

Amenity migration is producing new rural-amenity ecologies in many post-industrial nations, as regions that were once the domain of productive agriculture now encompass a suite of aesthetic, recreational and lifestyle land uses. To date, the future implications of these ecologies for environmental management have been framed largely in 'traditional' conservation biology terms. This framing has focused on the threats or opportunities presented by rural-amenity migration for conservation or restoration of 'natural' environments to a past ecological benchmark. We suggest that the long history of human modification that characterises rural ecologies, combined with uncertainty about future ecological trajectories in light of global environmental change processes, presents an opportunity for re-framing rural-amenity ecologies and, by extension, re-thinking environmental management in rural-amenity landscapes (Abrams, Gill, Gosnell, & Klepeis, 2012; Harris, Hobbs, Higgs, & Aronson, 2006).

Human modification of global earth systems has now seen more than three quarters of earth's biomes converted into 'anthromes' (anthropocentric biomes) (Ellis, 2013), where human use and activity are now predominant. Geographers and ecologists engaged with conservation biology research are increasingly accepting of the prevalence of anthropogenic influence, which is beginning to shift traditional notions of conservation and restoration ecology (Marris, 2011). Either directly or indirectly, an increasing proportion of research and discussion on the implications of human-dominated landscapes for conservation biology has progressed via the global-scale concept of the Anthropocene (detailed below). The Anthropocene positions ecologies as temporally *emergent* products of human and nonhuman interactions, rather than as natural 'pre-human' artifacts (Castree, 2014). We use the Anthropocene's attentiveness to time and nonhuman agency to re-frame the question of ecological implications for rural-amenity migration by asking: how are rural-amenity ecologies produced through interactions between people and plants over time? By grounding the Anthropocene at the scale of tangible, everyday interaction between people and plants, we deploy the concept in a way that can progress environmental management in rural-amenity landscapes in a context where pre-human notions of nature no longer apply (Castree, 2014; Lorimer & Driessen, 2014; Ellis, 2013).

To explore the future implications for environmental management in rural-amenity

landscapes we interrogate how local-level ecologies are produced on private properties through intimate interactions between people and plants in the hinterlands of Melbourne, Australia. To understand the temporal processes at play, we focus on how amenity migrants engage with the legacy of past human-environmental interactions embodied in the contemporary landscape in the course of their plant-based land management practices. We suggest that the way in which past human-environment interactions translate into the present and future will need to be carefully considered if we are to navigate a more reflexive approach to environmental management in the Anthropocene.

In this paper we consciously focus on the more recent phase of post-colonial land use. While acknowledging that a rich history of indigenous land use shaped Australian ecologies that have too frequently been rendered as 'wilderness', absent of human agency (Gammage, 2011; Trigger, Mulcock, Gaynor, & Toussaint, 2008; Rose 1996), contemporary environmental management responds to the dominant transformative process set in train by more recent and intensive post-colonial land use. Moreover, as we will discuss, it is this recent landscape modification that research participants often aspire to reverse through their amenity migration.

British colonisation since 1788 has also provided a ubiquitous delineation of the 'nativeness' of Australia's flora and fauna. As a result, restoration and conservation is often framed around a return to a pre-colonial assemblage of native species (Chew and Hamilton, 2011). As has been increasingly argued, colonial demarcations of native and non-native need to be de-centred in recognition of the historically contingent and social constructed dimensions of nativeness (Ginn, 2008; Head, 2011; Mastnak, Elyachar, & Boellstorff, 2014). This de-centring helps makes space for Indigenous Australians in the making of pre-colonial ecologies and increase management reflexivity in the Anthropocene. While we seek to contribute to this de-centring of nativeness, we retain the traditional descriptors of native and non-native (weed, introduced, invasive) to reflect the terminology used by research participants.

2. The ecological implications of amenity migration

The diversification of rural land use is seeing landscapes that were once valued for their productive capacity become increasingly valued for their consumptive amenity values

(scenery, recreation), as an increasing number of people seek a rural lifestyle change (Gosnell, 2011; Tonts, Argent, & Plummer, 2011; López-i-Gelats, Tàbara, & Bartolomé, 2009; Holmes, 2006 Paquette & Domon, 2003). Despite a history of amenity migration into rural areas stretching back to the 1970s and beyond (Curry et al., 2001), its recent acceleration has brought a range of land use and environmental management issues to the forefront of policy and academic debate (Abrams, Gill, Gosnell, & Klepeis, 2012; Larsen, Sorenson, McDermott, Long, & Post, 2007; Barr, 2005).

Amongst the issues associated with amenity migration have been concerns about the types of new rural-amenity ecologies that will emerge as a result of changing land use (Abrams et al, 2012). As noted above, the rural landscape changes associated with amenity migration have been largely framed in terms of positive or negative future implications for the natural environment. The negative ecological consequences centre on the potential for species loss and ecological fragmentation as farmland is sub-divided into small lifestyle-orientated lots (Argent et al., 2010). Negative implications have also been raised regarding the preferences of some amenity migrants to pursue management for recreational purposes, resulting in the retention of species for aesthetic reasons over institutional environmental management efforts aimed at 'bringing back' a rare species (Urquhart & Courtney, 2011; Knoot, Schulte, & Rickenbach, 2010; Van Auken, 2010).

Running counter to the narrative of negative ecological 'impacts' are suggestions that rural-amenity migration is actually catalysing ecological restoration and conservation activities. A motivation to preserve and restore native ecologies is an aspiration for a host of rural-amenity migrants (Cooke & Lane, 2015; Mendham, Curtis, & Millar, 2012; Gill, Klepeis, & Chisholm, 2010). Indeed, some landholders purchase rural property with the express intention of pursuing conservation as their core land use activity (Yung & Belsky, 2007; Jackson-Smith & Kreuter, 2005). At a regional level, ecological regeneration has been reported in select rural areas that have seen an increase in amenity migration and a reduction in intensive agriculture in recent decades (Walker, Marvin, & Fortmann, 2003).

We view the 'positive/negative ecological futures' framing of emerging rural-amenity ecologies as problematic for two central reasons: First, it ignores the long history of pre

and post colonial human modification that has shaped rural-amenity landscapes in myriad ways, presupposing that a benchmark nature can indeed be recreated amidst this biophysical transformation, and 2) there is limited sensitivity to the uncertainty and unpredictability characterising the processes of global environmental change (Ellis, 2015; Head, 2011).

The Anthropocene provides a useful provocation for de-centering conservation biology by advancing a cross-disciplinary discussion about future environmental management in ways that resonate for rural-amenity landscapes. While the hallmarks of the Anthropocene that signify the end of the Holocene era continue to be debated by geologists and environmental scientists, its conclusion is said to mark the phase in which earth systems have become largely overwhelmed by human activity (Kareiva, Lalasz & Marvier 2011). If the natural world has been consigned to the now departed Holocene, the Anthropocene requires us to de-centre traditional ecological benchmarks as the reference point for environmental management, reflecting instead that ecologies are emergent products of human-environment interaction (Castree, 2014; Head et al., 2015; Lorimer and Driessen, 2014; Robbins and Moore, 2013). Such a conception is particularly relevant for rural-amenity landscapes, given the often complex and multiple successions of landscape modification and habitation they embody.

While a framing of rural-amenity ecologies as emergent helps us to de-centre traditional notions of conservation biology, key questions remain: 1) In what specific ways are ecologies produced through human-environment interaction in rural-amenity landscapes, and; 2) what are the implications for environmental management theory and practice in heavily modified landscapes?

3. Temporality, nonhuman agency and environmental management practice

We argue that the tangible and intimate interactions between people and the environments in which they live are an essential starting point for interrogating rural-amenity ecologies in the Anthropocene. As Halfacree (2006, p309) notes, 'relationships between land and everyday life' are critical in the making and re-making of rural landscapes over time. However the ecological implications discourse has so far progressed with limited attention to the tangible relationships between amenity migrants and the landscapes they inhabit (for a notable exception see Gill, Klepeis, &

Chisholm, 2010). As a result, the inter-relationship between people, biophysical environments and time in the production of rural-amenity ecologies has been under-examined (Abrams et al., 2012; Gill et al., 2010). The environmental management practices of rural-amenity migrants on their properties can offer a starting point for exploring how these inter-relationships contribute to ecological emergence (Holmes, 2006). We define environmental management practice at this fine-grained scale as any form of interaction between landholder and landscape – motivated by a conservation aspiration or other broader amenity land use aspiration – that shapes ecological assemblages. As rural-amenity migrants appear to be most interested in engaging in environmental management on their own private property parcel, as opposed to public land, this space of everyday landscape interaction is the focus for this research (Cooke and Lane, 2015).

The nonhuman agency of most interest for this paper is the form, habit and lifecycle of plants. While plants may be agents acting without intentionality, their change or continuity through time not only shapes the landscape, but shapes human perception and engagement with the landscape (Head & Atchison, 2008). We concentrate on plants, because the making of new rural ecologies for aesthetic, recreational or ecological ends, centres on flora. Whether it is planting, tending or removing vegetation, landholders are interacting directly and tangibly with plants through these practices.

We note that there are strong parallels between emerging rural-amenity ecologies and the interaction of people and plants in domestic and community gardens, as both represent ecologies that have been intensively inhabited over time. Gardening has been positioned as a form of ‘conversation’ between human and nonhuman actors through which the active and ongoing experience of gardening changes both gardens and gardeners (Doody et al., 2014; Head and Muir, 2006; Power, 2005). Past people-plant relations have also been shown to be pertinent for influencing contemporary management in long-running community gardens, where planting arrangements have been established through the labour of gardeners who have since moved on (Barthel et al., 2010). While those gardeners may no longer be present, the form and arrangement of plants mediates the way the garden is tended by a new generation of gardeners, connecting past people-plant relations to those in the present. How rural-amenity migrants engage with the histories of landscape modification embodied by the plants

they encounter may provide important insights into how dynamic, emergent ecologies are being produced.

4. Inhabiting ecologies – locating people-plant relationships through time

To be useful for understanding rural-amenity ecologies and environmental management practices, the Anthropocene concept must be brought to ground in the fine-grained interactions between people and plants. To achieve this we connect with the work of anthropologist Tim Ingold, who has sought to re-embed human perception, knowledge and experience in the contextual 'lifeworlds' that people inhabit (Ingold, 2000, 2011). A core tenant of Ingold's work is the notion that human perception of the environment is indivisible from our experiences of that environment (Ingold, 2011). Through the term 'wayfaring' Ingold suggests that movement along lines of becoming defines human existence, as we traverse through the world with other human and nonhuman inhabitants (Ingold, 2007, 2011). Thus, 'inhabiting' the world is not *being* in place, but rather '*movement* along a way of life' (Ingold 2011, p4, emphasis our own). Where the 'lines' of different inhabitants intersect, the 'life of each becomes bound up with the other' (Ingold 2011, p148) in a meshwork. Imagining environmental management as an enmeshing of the lines of movement of people and plants (both through space and over time) gives management a dynamic sensibility in keeping with the Anthropocene. It also raises a pertinent question for environmental management in the Anthropocene: what are the epistemological implications of meshwork interactions for understanding how perceptions of ecological function are generated and appropriate management interventions are produced?

Ingold's work on wayfaring makes two substantive contributions to our research framing. First, it captures an active engagement with the environments of our everyday lives that can inform an interrogation of environmental management practice (Ingold, 1993, 2011). This helps us to think about environmental management practice as a 'performative achievement' (Jones & Cloke 2008, p84) rather than a static, outcome-orientated process. It also helps to understand how landholders' initial aspirations for management are mediated by their tangible engagements with plants that grow, spread and change over time. Emphasising lines of movement also guards against a positioning of the property parcel as a bounded ontological space of human-environment interaction (Massey, 2005). Second, wayfaring brings a sense of temporality to land

management and the process of rural ecological change. The temporal aspect of landscape interactions highlights that to inhabit a landscape is to occupy a space that embodies a succession of past human and nonhuman inhabitants. In this sense, 'past patterns of action' (Gosden & Head, 1994, p114) in the landscape are recognised for their potential to structure future ecologies, as well as structuring the way current human inhabitants move through and perceive ecologies in the process of environmental management (Ingold, 2011).

5. Methodology

Study Site

The site of this research project was the hinterlands of Melbourne, Victoria, Australia. This was an appropriate research setting due to the increasing pace of rural-amenity land use transition in this region (Mendham & Curtis, 2010). In Victoria, coastal and coastal hinterland areas within commuting distance to Melbourne have experienced especially strong amenity migration (Argent et al., 2010). Increasing property prices and land subdivision have characterised both regions in recent decades, with land in one of the study areas (East Corangamite) nearly twice the price per hectare of land of similar size and productive potential further to the west of the catchment, suggesting a high amenity premium for land in this region (Mendham & Curtis, 2010) (Figure 1). All but five of the participants in this study had bought property that had been subdivided from a larger farming property, with the remainder purchasing small farms that were no longer viable in an expanding global agricultural sector. Price rises and property subdivision are largely indicative of rural-amenity migration in post-industrial nations (Abrams et al., 2012; Yung and Belsky, 2007), though smaller farms can remain intact when sold to amenity landholders (Gosnell et al., 2006).

While no specific financial data was collected from participants, the stories of their upbringing, previous homes and working life that punctuated the interviews suggested participants in this study came from a wide socio-economic spectrum. Despite property prices generally being on the rise in Australia, rural-amenity land prices remain competitive in relation to the urban property markets of capital cities, resulting in a relatively diverse socio-economic profile amongst newcomers to many regions (Ragusa, 2010). Indeed, an important component of amenity migration amongst early retirees stretching back to the 1970s in Australia has been the availability of cheap land in close

proximity to urban centres (Curry et al., 2001).

While gentrification of rural landscapes is certainly occurring in Australia, with absentee and retiree property ownership on the rise (Race et al., 2010), it may not be as pronounced as the US, where amenity migration is often framed as the buy-up of rural land by wealthy individuals seeking to deploy capital they have accumulated in the city (Walker and Fortman, 2003). This characterisation shares much in common with the extensive rural gentrification literature from the UK, detailing the displacement of working rural landscapes and those who work them by wealthy in-migrants (Marsden et al., 2003). The similarities and differences between this case and other contexts reinforce the uneven spatial, structural and political economic characteristics of amenity migration across post-industrial nations (Cocklin & Dibden, 2006), and the associated challenges of generalising research results from any given case. Yet, there is some consistency across a range of studies concerning land management; conservation and restoration that focuses on the private property parcel is a common motivation for amenity migrants, suggesting some degree of similarity to how landholders come to engage with the ecologies on their property for generating understandings of ecological function and appropriate environmental management (Cadieux, 2011; Cooke & Lane, 2015; Gill et al., 2010; Urquhart & Courtney, 2011; Van Auken, 2010; Yung & Belsky, 2007).

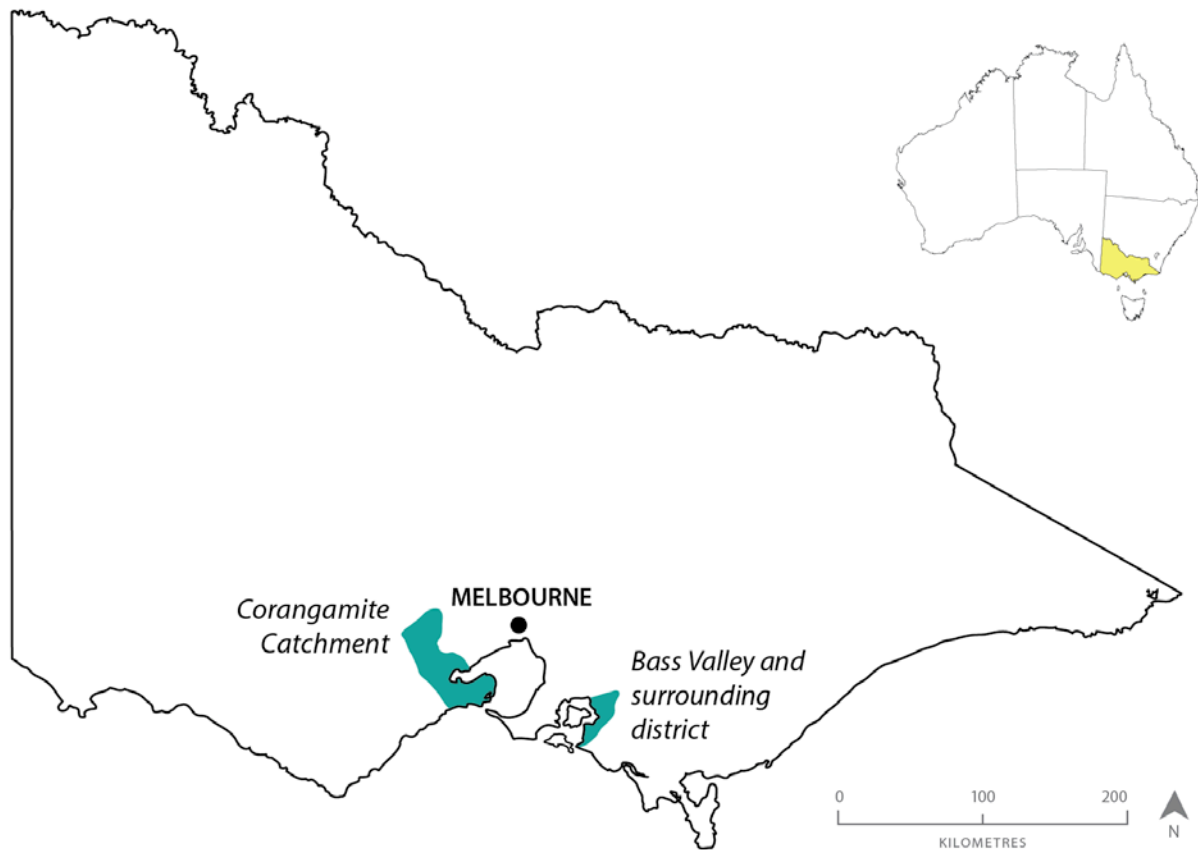


Figure 1. The case study regions with Melbourne's hinterland that were explored in this study.

The landscapes of both East Corangamite and the Bass Valley are characterised by historical agricultural modification. The influence of farming is evident in the presence of paddocks, farm fencing, livestock and pastures that have thoroughly transformed these landscapes since British settlement. Dairy and cattle farming have traditionally dominated the rolling hills and high rainfall area of the Bass Valley, while the comparatively drier and flatter East Corrangamite has been the site of sheep grazing and cropping. Despite their varying agricultural trajectories, both regions have seen significant clearance and conversion of forests and grasslands in the making of their current ecological arrangement. Alongside the process of amenity migration (Mendham & Curtis, 2010; ABS, 2006), both regions are subject to local and regional environmental programs that are seeking to increase the quality and extent of native ecologies (CCMA, 2003). This includes efforts to encourage private landholders to take up conservation and restoration projects on private land, in an effort to improve ecological function at a landscape scale. The combination of amenity migration, highly modified landscapes and active efforts to encourage landholders to participate in restoration makes these regions ideal for exploring the processes of ecological emergence.

Research methods and participants

A total of 21 landholders were interviewed between June and October 2010 in the two localities shown in Figure 1. 2. Participants had resided on their properties for varying lengths of time, ranging from six years to over 20 years. This provided a wide time frame over which the management practices of landholders had been conducted and reflected upon. Most participants had moved from suburban Melbourne, with three moving from small properties in rural townships. Three landholders had some previous farming experience, with two having retired on the property they previously farmed. The varying ecological characteristics of landholders' properties are evident from the figures contained within the following section which reinforce the heterogeneous ecologies that have resulted from a long history of rural landscape modification. Details of all participants are listed in Table 1, including their initial intentions for environmental management upon migrating to their property, which serves as a useful counterpoint for the types of practices and ecologies that emerge in the following section.

Research participants were recruited primarily from people who participated in private land conservation schemes in Victoria, as the wider research project involved an exploration of how these programs were enacted by participants. While this somewhat explains the commonality of ecological restoration motives to all participants, there was one cohort of participants (six people) who did not participate in any programs, yet still undertook restoration. These participants were recruited via direct letter drops to properties in the study areas. Given this program adoption, it is reasonable to expect the participants had a higher level of conservation interest than a random sample, though it should be noted that all six participants who had not been involved in a conservation scheme were also active land managers.

349 **Table 1.** Research participants and their management aspirations upon in-migration.

Participant/s	Age	Environmental management aspiration upon in-migration	Length of Tenure
Alex & Simone	30-39	Leave forested areas intact and plant linear tree buffers around paddocks	14 years
Alice & Sam	50-59	Remove weeds from creek line	14 years
Dan	70-79	Plant linear tree buffers to shelter livestock and forest patches to increase forest cover	28 years
Emma	70-79	Establish garden and allow natural regeneration of former pine plantation	26 years
Hannah	40-49	Allow woodland to regenerate and establish garden	18 years
Jeff & Claire	50-59	Leave forested area and establish garden	14 years
Jim & Beatrice	40-49	Conserve existing forest ecology on the property	15 years
Karen	70-79	Re-plant under storey vegetation amongst scattered trees	13 years
Kelly	60-69	Conserve existing forest and plant out open areas around the house	11 years
Ken	50-59	Actively restore woodland to former grazing land	6 years
Lauren	40-49	Plant under storey in open paddock	22 years
Liz	50-59	Conserve existing forest and allow natural regeneration of paddocks to continue	20+ years
Maddy	50-59	Allow grazing land the regenerate and establish garden	8 years
Martina	40-49	Retain existing forest and plant along fence line	17 years
Nick	50-59	Revegetating woodland, planting garden and orchard	7 years
Pauline & Allan	40-49	Plant linear tree buffers to shelter livestock	12 years
Rob	50-59	Leave forested area largely untouched	20+ years
Sally	40-49	Leave forested area and establish garden	8 years
Steve	50-59	Leaving forest to regenerate and planting under storey	9 years
Tina	50-59	Replant forest to former grazing land, establish garden and orchard	22 years
Trevor	70-79	Leave open paddocks and plant linear tree buffers to shelter livestock	20+ years

350

351 We pursued a qualitative research project that adopted two primary research methods;

352 narrative interviews and a form of participant observation called the ‘walkabout

353 method’ (Strang, 2010). The narrative approach to interviews aimed to encourage

354 landholders to tell stories about their experiences and interactions with the local

355 landscape over time (Rosenthal, 2004). Narrative interviews were useful in efforts to

356 understand how people’s property landscapes and surrounding regions had changed

357 over time, with a focus on significant events or experiences that illustrated these

358 changes. Narrative interviews were selected in accordance with their use in oral history

359 research, where participants are encouraged to tell stories about their past. This

360 storytelling approach was adapted to encourage landholders to tell stories about

361 landscape change and plant interactions. In advance of the interview, participants were

362 also encouraged to locate any photographs they had of their property at the time of

363 arrival, which could be used as a prompt for stories about how the landscape had

364 changed and by what means. Interviews were conducted in or around the home of the

participant.

The walkabout method – exploring human-environment interactions

Following the narrative interview, the researcher (first author) walked participants' properties with them to expand on the discussions of landscape change and management practices that had already taken place. This 'walkabout method' (Strang, 2010) recognises that material environments that are of importance to people will embody memories and experiences of interactions with those spaces. Moreover, in keeping with a traditional 'field studies' approach, the walkabout method recognises the value of observation and informal conversations in the spaces of relevance for people's actual practices (Doody et al., 2014; Kvale & Brinkman, 2009). Allowing the landscape to serve as a repository of memory for landscape change and management activity provided significant insights into the complex process of land management. For example, being able to compare a landholder's first planting with their most recent efforts, and then talking about how these changed practices had come about, provided critical insight into the temporal dimensions of management practice. It also brought a sense of movement to inhabiting the landscape, as we traversed tracks from one management space to the next. Indeed, participants noted the presence of 'weedy' plants considered as we walked the property, with five participants gravitating toward specific property spaces to inspect the weeds and remove them by hand.

The walkabout method also attributed some agency to the landscape as a participant in the research process. Observing the evidence of ecological change over time (remnant vegetation or past efforts at revegetation, for example), the varying growth patterns and fortunes of different plants, competition between different species for resources and evidence of plant regeneration and spread over time became evident. Direct observation of the lives of plants could then be compared to how landholders' perceptions and practices had been shaped by encounters with plants as they inhabited their property. Observing the physical outcomes of management practice also provided evidence of how management practices had shifted over time. Property walks averaged around two hours in length.

While we focus on plant agency for the purposes of this paper, it is important to note that there are many other nonhuman actors in the landscape that also interact with

people to produce ecologies. For example the presence (or absence) of fauna may play a vital role in shaping future ecologies. How ecologies emerge through observation, presence, interaction and absence of fauna warrants scrutiny for progressing environmental management. Analysis of abiotic elements like soil and weather as actors in the landscape would also likely yield insights into ecological emergence, especially when we consider their role as contingent agents in the making of plants (Head et al., 2014; Knapp & Fernandez-Gimenez, 2009).

6. Inhabiting the embodied histories of landscapes

The form and arrangement of heavily modified rural-amenity ecologies presented the perfect canvas for many participants to further their aspirations for 'bringing back' native ecologies to the landscape. Seven participants stated explicitly that they thought their in-migration would allow the return native nature to a rural landscape that had long been 'over-worked' through farming practices. Alan's declaration that 'people spent decades clearing the land here and we'll spend decades revegetating it' captured the broad redemptive aspiration that many participants brought with them to their new surroundings (See Table 1). However, our exploration of their efforts to bring these imported aspirations to fruition revealed the extent to which landholders are not the only actors contributing to the making of new ecologies. Throughout this section we heavily foreground the role of plant agency in the co-production of rural-amenity ecologies. This foregrounding achieves two goals: 1) to redress the general neglect of nonhuman agency in environmental management scholarship, and 2) exemplify the 'power' (Head & Atchison, 2008, p#) of plants in disrupting and re-orientating the ecological aspirations of human actors. We work through three separate examples, each exploring a particular element of the agency of plants.

433 **6.1 How past people-plant relations are brought into the present**



434
435 **Figure 2.** Sugar Gums (*Eucalyptus cladoclyx*), located rear centre and right of the image, are beginning to
436 fill the open paddock space in the foreground, that had initially set aside for the natural regeneration of
437 the local the Yellow Gum Species (*Eucalyptus leucoxylon*).
438

439 Despite being less than a decade old, the Sugar Gums (*Eucalyptus cladoclyx*) that are
440 establishing in Trevor's paddock are beginning to express a characteristic form. The
441 dense timber contained in their single straight trunks – abnormally straight for eucalypt
442 species – are already supporting dense, deep-green foliage. Combined with the wide,
443 outward growth habit of the limbs, the foliage helps to buffer the wind that blows
444 across the open grassy plains. The relative flourishing of the Sugar Gums during this
445 period of time is notable, in comparison to the fortunes of other species over the same
446 period, as south-eastern Australia experienced a particularly harsh period of drought
447 that began in the early 2000s. Endemic to regions of South Australia notable for a dry
448 climate, Sugar Gums possess a tolerance to drought that is distinguished even amongst
449 eucalypt species. Indeed, the contrasting fortunes of different eucalypt species during
450 the drought, reflected by the death of at least one of the locally endemic mature Yellow
451 Gums (*Eucalyptus leucoxylon*) in the foreground of Figure 2, reveal how Sugar Gums
452 came to occupy a section of Trevor's paddock.

453

454 The fenced section of paddock was originally intended to be home to Yellow Gums that
455 would regenerate from seed stores that were likely still present in the soil, once sheep
456 were excluded. In the 1990s, a local natural resource management (NRM) group gave
457 Trevor a small grant to facilitate this regeneration. As the denoted endemic large tree
458 species for the region, Yellow Gum restoration is encouraged. Conservation groups and
459 NRM agencies in Victoria rarely advocate for Sugar Gum planting, given the species is
460 endemic to South Australia and therefore not 'indigenous'. Moreover, the dense timber
461 yielded by Sugar Gums, which is prized for its fence posts and firewood, does not readily
462 form good hollows for local wildlife (Hamilton, 2001). However, in the years following,
463 virtually no Yellow Gums self-seeded, and the fenced area became choked with pasture
464 grass that spread from adjoining paddocks. As the drought began to take hold, the lack
465 of natural regeneration became a secondary concern, as the mature Yellow Gums died
466 back. While the causes of the Yellow Gum dieback are likely to be multiple, it was the
467 overlap with the drought period that proved significant in the re-making of this local
468 ecology.

469

470 Dieback of the Yellow Gums was contrasted by the persistence of some large old Sugar
471 Gums in Trevor's yard, which were planted by the previous property owner. These
472 mature Sugar Gums remained healthy through the early years of the drought with little
473 to no tending. Visible from the lounge room and casting shade across the pathway from
474 home to shed, the imposing persistence of the Sugar Gums was an ingrained component
475 of Trevor's everyday activities. It was this persistence that saw Trevor plant the Sugar
476 Gums that are visible in Figure 3, in lieu of the lack of natural Yellow Gum regeneration.
477 Trevor was aware of the attitude that conservation agencies had towards Sugar Gums,
478 but his lived experience of the robustness character of these trees through adverse
479 conditions took precedence.

480

481 The persistence and durability of Sugar Gums in the landscape demonstrated the
482 capacity of these plants to actively propagate to other parts of the property. Trevor's
483 planting of Sugar Gums in a new part of the property produced a rural-amenity ecology
484 that is novel in its arrangement and location, while also being structured by the
485 continuity with previous trees of this species and with the actions of a past landholder.
486 In this sense, the habitation of the previous landholder is being extended but also re-

487 interpreted by Trevor in the making of a rural-amenity ecology. Through inhabiting the
488 landscape with the Sugar Gums over time, Trevor's perspective shifted on what types of
489 species should be restored in the landscape. The proliferation of Sugar Gums reinforces
490 that trees often persist along a timeline that far exceeds that of human life, showing how
491 people-plant relations can connect through multiple generations via the lifecycle of the
492 plant (Lien and Davison, 2010). The capacity of plants to prosper in the changed and
493 changing climatic conditions of the Anthropocene, in combination with the multitude of
494 landscape alterations embodied in rural-amenity landscapes, suggests that drought
495 tolerance is a highly desirable characteristic for future environmental management
496 (Mastnak et al., 2014; Young, 2014).

498 **6.2 Working with and against historical trajectories of land management**



499 **Figure 3.** A green tussock of native Poa (*Poa labillardierei*) planted by Nick (lower centre image) as part
500 of a restoration project struggles to establish itself amidst the surrounding pasture grasses, dominated by
501 Cocksfoot (*Dactylis glomerata*) (light sandy-coloured seed head). This photo was taken around two years
502 after the restoration project began.
503
504

505 Soil seed banks play an unseen role in the ecology of plant assemblages. The seeds of
506 plant species can lay dormant in the soil for extended periods, germinating quickly in
507 response to disturbances like fire, or changes in soil moisture (Wang et al., 2013). This

applies to both native species and those that have been imported, such as the host of pasture grass varieties from Europe, Africa and the Americas. The soil seed bank of pasture grasses such as Cocksfoot, pictured in Figure 3, can persist in the soil for up to four years, making it difficult to remove when attempting ecological restoration projects (a relatively short duration compared to many native seeds) (Farm Future Industries CRC, 2011). Over a century of grazing and cropping in the region pictured above suggests a soil seed bank dominated by pasture grass seed. In this sense, the history of landscape modification that is visible above the ground is reflected below the ground, in the soil profile.

While the history of landscape modification embodied in the soil is out of sight, it is not out of mind. When conducting ecological restoration projects like the one taking place on Nick's property, pasture grasses are sprayed with herbicide to knock down the existing grasses and exhaust the seed bank. In this case, the initial knock down proved successful, which paved the way for the sowing of native grass seeds and seedling, along with the planting of canopy tree seedlings, to replicate the pre-colonial grassy forest vegetation community of the area. While heavy rain that followed the initial planting triggered growth of native grasses and trees, it also helped to germinate the Cocksfoot from soil seed. This initial flush of growth from the seed bank has resulted in competition with the native grasses for light, space and nutrients. While some Cocksfoot has undoubtedly blown in on the wind from surrounding paddocks, the dense swathes of Cocksfoot that quickly established underscored its abundance in the soil seed store.

Despite the thick growth of Cocksfoot grasses, the Yellow Gums that had been sparsely planted across the site in line with the imagined grassy forest ecological restoration, established quickly and broke through the mat of grasses (Figure 4), in contrast to the struggling native Poa's pictured in Figure 4. The capacity of the Yellow Gums to overcome the choking constraints of the rejuvenating Cocksfoot proved a trigger event for the rural-amenity ecology on Nick's land. Experiencing this Yellow Gum growth led Nick to plant more of these Gums as he felt they 'did well' and sometimes 'you've just got to plant the stuff that survives in the ground'. According to Nick, during an annual site visit, the conservation officer responsible for overseeing his restoration project voiced displeasure at the increased density of eucalypts, suggesting that the site no longer reflected a grassy forest ecology.



Figure 4. Nick planted additional Yellow Gums in a section of his restoration project as they were establishing successfully amongst the introduced pasture grasses. A mature eucalypt can be seen at the rear of the photo.

The rural-amenity ecology emerging here reveals a tension between a soil seed bank that embodies a history of landscape modification, and the redemptive ecological restoration aspirations that Nick initially sought to realise. Nick's aspiration for restoring a past ecology was catalysed by the ecological restoration program, driving the attempts to re-create a pre-colonial ecology. However, the seed store of Cocksfoot – a hidden and dormant form of plant agency – proved an immediate and powerful actor. The constant replenishment of the seed store over the decades of its cultivation, activated in a harmonised flush of growth, had shifted the trajectory of environmental management in a period of less than two years. Just as notably, as Cocksfoot materialized, Nick's practices shifted from management aimed at bringing back a past ecology, to prioritising the species that 'did well' in this landscape. The prominence of the Yellow gums rising above the grasses as we walked Nick's property gave a sense of how Nick's management practices would be affected by experiencing this growth over time; the capacity of the gums to persist and then flourish represented an avenue for a future ecological trajectory that worked with the historical ecology that was already

given.

Ecological restoration in the Anthropocene must reflect carefully on the suitability of the plants we consider for restoration amidst the plant agency that may lie dormant in the soil. While site preparation, like weed spraying, is common practice for many environmental management practitioners, we cannot think about these practices as making space for the re-creation of a pre-colonial ecological assemblage. The suitability of restoration species and the assemblages in which they are planted will be partly dictated by the embodied histories of landscape change. Moreover, the challenges and unpredictability of environmental management in these landscapes must be clearly communicated to rural-amenity migrants with ecological restoration aspirations; the importance of communicating the uncertainty of future outcomes is no better exemplified by the success of Yellow Gums on Nick's property, and their dieback on Trevor's property. Embracing uncertainty when dealing with landholders may increase their preparedness for the types of 'surprise' outcomes experienced by Nick.



Figure 5. Martina cleared a patch of the ‘invasive’ Sweet Pittosporum (the green leafy tree seen in the background) from around the small native tea trees (spp) seen in the foreground. Rather than triggering the growth of these native trees, Martina’s disturbance of the site resulted in an infestation of pasture grass from the neighbouring paddock.

Sweet Pittosporum (*Pittosporum undulatum*) has a dense, shrubby form. Its thick leaves are so closely packed that few understory species can persist beneath its canopy for lack of nutrients and light. When growing in close proximity to other Pittosporums, the thick foliage produces a ‘wall’ of vegetation (visible in the background of Figure 5) that is imposing and difficult to penetrate for humans and nonhumans alike.

Sweet Pittosporum has a dual ecological status in Victoria, listed as an endangered species in one part of the state, while considered an invasive species outside its pre-colonial range (Head, 2011; Lien & Davison, 2010). Not only is this dual status emblematic of the spatial and temporal construction of species nativeness, but its physical presence also creates uncertainty for environmental management – should it be retained or removed? In practice, the capacity for Sweet Pittosporum to spread rapidly and establish quickly through forested areas, potentially out-competing other middle and lower storey plants, has seen many local and regional environmental

management institutions target it for removal. However, the question of whether to remove or retain this species is a conundrum that is especially acute in areas that sit on the boundary of what is considered its original range, such as the Bass Valley District where Martina's property is located.

The growth of Sweet Pittosporum on Martina's property created a thick middle-storey in what was previously an open forest with very few middle storey species. The decade of drought mentioned earlier, along with the clearing of trees on an adjoining property that once buffered her property from invasive plant spread, triggered rapid changes to the local ecology. Martina's initial reaction to the establishment of Sweet Pittosporum was to remove them in specific places where small native trees still persisted, to give those native trees an opportunity to prosper. This was Martina's attempt to conserve the ecology she had come to know during the decade she had inhabited her property. Much to Martina's disappointment, her weed removal efforts proved futile, as rather than encourage the growth and consolidation of native trees, the patches that were cleared of Sweet Pittosporum were rapidly re-populated by pasture grass seed blown in from nearby paddocks (Figure 5).

The successive establishment of different weed species caused Martina to question whether her attempts to re-create the native ecology that she felt had been lost from the landscape were either preferable or desirable. Observing and experiencing unexpected responses of plants to goal-oriented human actions such as this can shift ideas and approaches to environmental management when one occupies the space in which interventions are conducted (Cooke & Lane, 2015; Head & Muir, 2006). The shift in Martina's perception of appropriate management and ecological function was further progressed when observing that Brown Thornbills (*Acanthiza pusilla*), a native bird species, had established a nest in the Pittosporums that remained (Figure 5). The same thick foliage that can envelop other native plants also provides the type of protected habitat that is preferred by many small birds, including the Brown Thornbill (Morcombe, 2004). Martina stopped removing pittosporums to retain their habitat value, as 'that's actually where (the birds) were nesting'.

The habitat value and rapid spread of Pittosporum from a neighbouring property was a pivotal catalyst for rupturing Martina's view of what was desirable management

practice on her property. When walking down the road with Martina, she pointed out how her property was only ever a remnant island of forest amidst a mosaic of farming, rural-recreational and rural-residential properties. The realisation that she lived in a 'modified landscape' came as a consequence of the spread of invasive plants, rupturing an implicit assumption that the property boundary was an impermeable barrier to ecological processes like plant propagation and spread. The observation of birds nesting in the same shrub species she had been removing caused Martina to see the danger of being 'too avid a conservationist' and doggedly pursuing native ecologies. It was notable that Martina's redemptive management aspirations persisted until the tangible process of weed removal produced an unanticipated ecological response. Having experience this response, and observed how non-native plant species could contribute to bird habitat, Martina now felt she was contributing to the emergence of an ecology that was concerned with function rather than species type (Hobbs, Higgs, & Harris, 2009). The lack of structural complexity in the ecological assemblage of highly modified landscapes means that non-native species (and contested species like *Pittosporum*) can create favourable habitat conditions for a diversity of bird species (Daniels and Kirkpatrick, 2006). Environmental management must consider how a more diverse range of species could contribute to habitat creation in the Anthropocene, including species that might otherwise be the target of weed removal efforts in rural-amenity landscapes.

While the arrangement of ecologies differed across the three cases above, they generated unique actions and interventions by landholders, which exposed them to past people-plant relations. The long 'temporal arc' (Lien & Davison 2010, p250) of the old Sugar Gums across generations helped to facilitate their replanting in a new arrangement. While the soil seed bank of Cocksfoot lay dormant for decades, it was its rapid and uniform materialisation that catalysed Nick's planting of eucalypts. For *Pittosporums*, their rapid spread and then growth to the point of manifesting as species habitat helped to enable their persistence in the landscape. These cases serve to highlight a challenge for environmental management practice in the Anthropocene; having identified the emergent dimension of ecologies, how does environmental management respond practically and conceptually to the ways in which embodied histories of landscape modification are structuring future ecological arrangements?

7. Progressing environmental management in rural-amenity landscapes

7.1 Landscape legacy – a temporal trajectory of people-plant relations

The concept of ‘landscape legacy’ holds promise as a heuristic for operationalising the Anthropocene for environmental management in rural-amenity landscapes, by rendering the past and future as co-present (Figure 6 below). Wider applications of the notion of ‘legacy’ capture the idea of something being handed down from the past, with the potential to positively affect the future. As we have seen, rural-amenity migrants often want to leave their properties in better ecological condition than when they purchased them. While aspirations for being a ‘steward’ of the land come in many forms (Gill et al., 2010), a common thread is the desire to be active in creating and ultimately leaving a positive landscape legacy (Worrell and Appleby, 2000). Yet, efforts to realise this legacy involve environmental management in heavily modified landscapes. We can think about the way that landscape histories structure environmental management practices as a process of inheriting landscape legacy from the past. Thus, land management practice represents a moment where the bequeathing and inheriting of landscape legacies become entwined, as future aspirations and past practices embodied in the landscape come together to produce new and often unanticipated ecologies.

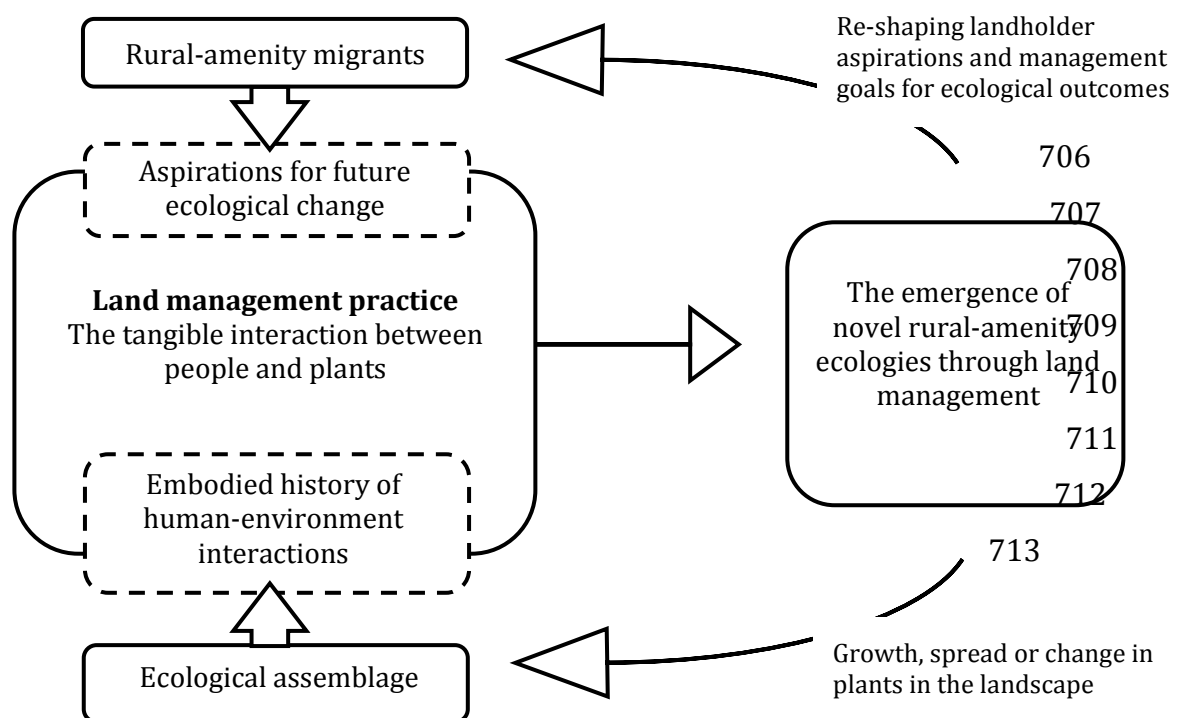


Figure 6. Landscape legacy characterises the transformative process of environmental management practice as a bringing together of past and future, as people and plants cohabit their surrounds and navigate the meshwork of embodied landscape histories in setting trajectories for future ecologies.

Ingold's work on wayfaring is instructive for considering how amenity migrants are encountering the structuring influence of past landscape legacies. We can conceive of past-people plant relations embodied in the landscape as a practice that 'lays a trail' (Ingold, 2011, p148) of human and nonhuman interaction in the landscape. These meshworks of trails, or trajectories, are the structuring dimension that shapes the ecological assemblages that amenity migrants encounter through environmental management practice. Thus, through management practice, current landholders are performing within the pathways that have been set down by previous inhabitants. As we have seen, however, the trajectories of these trails are diffuse, and new paths can be forged as people and plants inhabit landscapes in ways that push back against embodied legacies. Therefore, landscape legacy is not pre-defined past 'transmitted ready-made' (Ingold, 2011, 141) into the present, but a trail of human and non-human interactions that sets a direction for current and future environmental management. Engaging with the past as a trail being traversed by people in conjunction with non-human actors positions past, present and future as a continuing trajectory of ecological emergence. Thus, landscape legacy offers a means for displacing past ecological benchmarks as a management objective, positioning the meshwork of interactions embodied in the landscape as the historical touchstone for environmental management in the Anthropocene.

Relating landscape legacy back to the experiences of participants above, Trevor can be seen to have inherited a legacy through the Sugar Gums that were planted by the previous owner of his property. Over time, Trevor's inherited legacy was translated into a new legacy that is being projected forward through the growth of Sugar Gums in a new assemblage – a new trail but one that has diverged from a past trajectory. The legacy of farming on Nick's property dictated an ecological trajectory that Nick initially resisted, before seeking to encourage a novel ecology that could persist within parameters set by past activity. The legacy of landscape change in Martina's region saw weed species establish and then become integral as bird habitat, directing Martina towards management practices that maintained ecological function for fauna. Consequently, as amenity migrants traced the trajectories of past landscape interactions, they became co-participants in the production of future ecologies that were already in the making.

7.1.1 *Moving beyond redemptive conservation through landscape legacy*

Evident in the experiences of all three research participants was that even when redemptive ecological conservation was their initial land management aspiration, the process of inhabiting rural ecologies – but most importantly, being inhabited by them – produced unanticipated ecological assemblages. Following Hobbs et al. (2006), we need to consciously position the pursuit of ‘novel’ environmental management centred on ecological function and process as the necessary starting point for land management, rather than the inevitable outcome. While Trevor, Martina and Nick eventually embraced novel ecological assemblages through trial-and-error, environmental management will be more effectively progressed with novelty as an aim. However, as we have seen, amenity migrants are part of the unfolding story of ecological novelty through landscape legacy; *over time*, the enfolding of the lives of people and plants produces ecologies that are unique in their assemblage and function (Head et al., 2014). These processes of past production must be reflected in environmental management efforts (Trigger et al., 2008). We need an approach that positions environmental management as a type of ‘wild experiment’ involving multiple agents working together under uncertainty (Lorimer & Driessen, 2014; Hinchliffe, 2008). Thinking about management as a wild experiment can allow us to consider how best to create or maintain ecological form, process and function in ways that respond to ecological trajectories rather than ecological benchmarks.

Highlighting the power of people-plant interactions at the private property scale does reveal a danger that ecological assemblages could become constrained by that scale over the period of an individual’s land tenure (Cooke and Lane, 2015). Progressing wild experiments in environmental management practice becomes even more critical in this context, as it highlights the importance of connecting landholders to knowledge and experience of ecological trajectories operating beyond the scale of their lived experience. For example, the predicted temperature increase for Australia of 2.5 degrees by 2070 even with significant emission reductions (CSIRO, 2014) may see the drought-tolerant Sugar Gums that Trevor planted become a more prominent component of novel rural-amenity ecologies. However, it may be preferable to progress a wild experiment where Sugar Gums are interspersed with other drought-tolerant shrubs and trees, to create a more complex and diverse ecology that provides habitat to a greater range of fauna. Preparedness amongst environmental management

practitioners to progress such experiments collaboratively with landholders, rather than insisting on pre-colonial native ecologies, may produce future ecologies that are more capable of responding to larger scale ecological processes.

8. Conclusion

Here we have explored how emergent rural ecologies provide an opportunity to question how we currently conceptualise and practice environmental management in rural-amenity landscapes. The persistence of trees across generations of landholders, the dormancy and rapid propagation of soil seed banks and the habitat assemblages of weed species have shown how the lives of plants exemplify an extensive history of land use change. These altered landscapes structure a trajectory for ecological assemblages, as plants and plant interactions mediate the redemptive ecological aspirations of landholders. How we make space for the co-production of rural-amenity ecologies through environmental management, both conceptually and in practice, presents as a significant challenge.

Landscape legacy offers a way to conceive of how human and nonhuman actors are making and re-making rural-amenity ecologies. Rather than engaging with fixed historical baselines for conservation, landscape legacy positions environmental management as a *process*, with people positioned within a temporal trajectory of ecological change. While these trajectories can be re-shaped and re-orientated, the embodiment of trajectories through the ‘meshwork’ of people-plant relations over time serves as a pathway for the emergence of future ecological assemblages. Thus, landscape legacy allows us to see contemporary environmental management practice as a confluence of inheriting and bequeathing legacies through the co-habitation of people and plants. Such a perspective invites some reflections for what open and reflexive environmental management might look like in the Anthropocene.

So, what might environmental management that is attentive to ecological function and process look like, in light of landscape legacy? From the experiences of participants in this case study, we must start with the ecologies that are already given and progress carefully, assessing the current ecological assemblage and seeking to understand how different species *relate* to one another. ‘Progressing carefully’ is an acknowledgement that wild experiments in the Anthropocene are not an invitation to abdicate

management to plants in the face of uncertainty. In fact, landscape legacy suggests the opposite; we need to progress a more critical, process-focused, contingent framing for environmental management, in light of the de-centering of benchmark ecologies. Such a framing will be centred on the functional qualities of particular plants (and their inter-relationships) and whether they are suited to increasing the diversity and habitat complexity of ecologies in a given space (Head et al., 2015). Through this lens, wild experiments in the Anthropocene direct a form of reflexive human agency that works actively with the trajectories of ecological assemblages. An experimental trajectory for environmental management will build on existing ecological diversity, while being attentive to the structuring influence of historical pathways, to shape an Anthropocene that is habitable for humans and nonhumans in the face of environmental change.

A diverse trajectory of ecologies will need to be contemplated in order to meet present and imminent socio-ecological challenges, at local to global scales (Head, 2011; Young, 2014). As we have shown, there is a great deal of uncertainty in knowing which species will flourish and in what arrangement, and how the experiences of the people who inhabit these landscapes will contribute to that flourishing (Lorimer & Driessen, 2014; Hinchliffe, 2008). A wild experiment framing allows environmental management to respond to the observed behavior of plants and their interaction with the broader ecological assemblage as those ecologies are taking shape. Given management is already progressing at the property scale, there is a need to bring this experimentation into the theory and practice of environmental management at an institutional level. Rural-amenity landscapes are firmly of the Anthropocene in terms of their historical modification and uncertain future trajectory, making them a productive space for novel and reflexive environmental management.

Acknowledgements

This paper was written with support from the Australian Government's National Environmental Research Program and the Australian Research Council Centre of Excellence for Environmental Decisions. Thanks to A. Backstrom for species identification advice.

References

- ABS (Australian Bureau of Statistics). (2006). Bass Coast Shire Council community profile data. Retrieved August 2, 2012, from <http://profile.id.com.au/bass-coast/industries?WebID=130&DataType=en>
- Abrams, J., Gill, N., Gosnell, H., Klepeis, P., 2012. Re-creating the rural, reconstructing nature: An international literature review of the environmental implications of amenity migration. *Conserv. Soc.* 10, 270. doi:10.4103/0972-4923.101837
- Argent, N., Tonts, M., Jones, R., Holmes, J., 2010. Demographic Change in Australia's Rural Landscapes. *Victoria, Landscape Series* 12, 23–44. doi:10.1007/978-90-481-9654-8
- Barr, N. (2005). *The changing social landscape of rural Victoria*. Melbourne: Department of Primary Industries Victoria.
- Barthel, S., Folke, C., Colding, J., 2010. Social–ecological memory in urban gardens—Retaining the capacity for management of ecosystem services. *Glob. Environ. Chang.* 20, 255–265. doi:10.1016/j.gloenvcha.2010.01.001
- Cadieux, K.V., 2011. Competing discourses of nature in exurbia. *GeoJournal* 76, 341–363. doi:10.1007/s10708-009-9299-0
- Castree, N., 2014. The Anthropocene and Geography I: The Back Story. *Geogr. Compass* 8, 436–449. doi:10.1111/gec3.12141
- CCMA. (2003). Corangamite regional catchment strategy 2003-2008. Colac: Corangamite Catchment Management Authority.
- Chew, M., Hamilton, A., 2011. The rise and fall of biotic nativeness: a historical perspective, in: *Fifty Years of Invasion Ecology. The Legacy of Charles Elton*. Blackwell, pp. 35–48.
- Cocklin, C., Dibden, J., 2006. From market to multifunctionality? Land stewardship in Australia. *Geogr. J.* 172, 197–205.
- Cooke, B., Lane, R., 2015. How do amenity migrants learn to be environmental stewards of rural landscapes? *Landsc. Urban Plan.* 134, 43–52. doi:10.1016/j.landurbplan.2014.10.006
- CSIRO. (2014). State of the climate 2014. CSIRO and The Australian Bureau of Meteorology.
- Curry, G.N., Koczberski, G., Selwood, J., 2001. Cashing Out, Cashing In: Rural change on the south coast of Western Australia. *Aust. Geogr.* 32, 109–124. doi:10.1080/00049180020036268
- Daniels, G.D., Kirkpatrick, J.B., 2006. Does variation in garden characteristics influence the conservation of birds in suburbia? *Biol. Conserv.* 133, 326–335. doi:10.1016/j.biocon.2006.06.011
- Doody, B.J., Perkins, H.C., Sullivan, J.J., Meurk, C.D., Stewart, G.H., 2014. Performing weeds: Gardening, plant agencies and urban plant conservation. *Geoforum* 56, 124–136. doi:10.1016/j.geoforum.2014.07.001
- Ellis, E., 2015. Ecology in an Anthropogenic Biosphere. *Ecol. Monogr.*
- Ellis, E.C., 2013. Sustaining biodiversity and people in the world's anthropogenic biomes. *Curr. Opin. Environ. Sustain.* 5, 368–372. doi:10.1016/j.cosust.2013.07.002
- Future Farm Industries CRC. (2011). Management guide to minimise environmental weed risk: Cocksfoot. Retrived from: www.futurefarmonline.com.au/about/weedrisk
- Gammage, B. (2011). *The biggest estate on earth: how Aborigines made Australia*. Allen and Unwin: Sydney.

- Gill, N., Klepeis, P., Chisholm, L., 2010. Stewardship among lifestyle oriented rural landowners. *J. Environ. Plan. Manag.* 53, 317–334.
doi:10.1080/09640561003612890
- Ginn, F., 2008. Extension, subversion, containment: eco-nationalism and (post) colonial nature in Aotearoa New Zealand. *Trans. Inst. Br. Geogr.*
- Gosnell, H., 2011. Amenity migration: diverse conceptualizations of drivers, socioeconomic dimensions, and emerging challenges. *GeoJournal* 76, 303–322.
doi:10.1007/s10708-009-9295-4
- Gosnell, H., Haggerty, J., Travis, W., 2006. Ranchland Ownership Change in the Greater Yellowstone Ecosystem, 1990–2001: Implications for Conservation. *Soc. Nat. Resour.* 19, 743–758. doi:10.1080/08941920600801181
- Hamilton, L (2001). *The Sugar Gum story: the marketing success of a humble shelter tree.* The Regional Institute Ltd.
- Harris, J., Hobbs, R., Higgs, E., Aronson, J., 2006. Ecological restoration and global climate change. *Restor. Ecol.* 14, 170–176.
- Head, L., 2011. Decentring 1788 : Beyond Biotic Nativeness. *Geogr. Res.* 1–13.
doi:10.1111/j.1745-5871.2011.00746.x
- Head, L., Atchison, J., 2008. Cultural ecology: emerging human-plant geographies. *Prog. Hum. Geogr.* 33, 236–245. doi:10.1177/0309132508094075
- Head, L., Atchison, J., Phillips, C., 2014. The distinctive capacities of plants: re-thinking difference via invasive species. *Trans. Inst. Br. Geogr.* n/a–n/a.
doi:10.1111/tran.12077
- Head, L., Larson, B., Hobbs, R., Atchison, J., Gill, N., Kull, C., Rangan, H., 2015. Living with invasive plants in the Anthropocene: the importance of understanding practice and experience. *Conserv. Soc.* 1–21.
- Head, L., Muir, P., 2006. Suburban life and the boundaries of nature : resilience and rupture in Australian backyard gardens. *Trans. Inst. Br. Geogr.* 31, 505–524.
- Hinchliffe, S., 2008. Reconstituting nature conservation: Towards a careful political ecology. *Geoforum* 39, 88–97. doi:10.1016/j.geoforum.2006.09.007
- Hobbs, R., Arico, S., Aronson, J., 2006. Novel ecosystems: theoretical and management aspects of the new ecological world order. *Glob. Ecol. Biogeogr.* 15, 1–7.
doi:10.1111/j.1466-822x.2006.00212.x
- Hobbs, R.J., Higgs, E., Harris, J. a, 2009. Novel ecosystems: implications for conservation and restoration. *Trends Ecol. Evol.* (Personal Ed. 24, 599–605.
doi:10.1016/j.tree.2009.05.012
- Holmes, J., 2006. Impulses towards a multifunctional transition in rural Australia: Gaps in the research agenda. *J. Rural Stud.* 22, 142–160.
doi:10.1016/j.jrurstud.2005.08.006
- Ingold, T. (2011). *Being Alive: Essays on Movement, Knowledge and Description.* Routledge: London.
- Ingold, T. (2007). *Lines: A Brief History.* Routledge, Oxon: UK.
- Ingold, T. (2000). *The perception of the environment: essays on livelihood, dwelling and skill.* London: Routledge.
- Ingold, T. (1993). The temporality of the landscape. *World Archaeology*, 25(2), 152–174.
doi/abs/10.1080/00438243.1993.9980235
- Jackson-Smith, D., Kreuter, U., 2005. Understanding the multidimensionality of property rights orientations: evidence from Utah and Texas ranchers. *Soc. Nat. Resour.* 587–610. doi:10.1080/08941920590959578
- Jones, O., & Cloke, P. (2008). Non-human agencies: trees in place and time. In, (Eds.) C. Knappett & L. Malafouris. *Material agency: towards a non-anthropocentric approach.* New York: Springer, p. 79-96.

- 959 Klepeis, P., Gill, N., Chisholm, L., 2009. Emerging amenity landscapes: Invasive weeds
960 and land subdivision in rural Australia. *Land use policy* 26, 380–392.
961 doi:10.1016/j.landusepol.2008.04.006
- 962 Knapp, C.N., Fernandez-Gimenez, M.E., 2009. Knowledge in Practice: Documenting
963 Rancher Local Knowledge in Northwest Colorado. *Rangel. Ecol. Manag.* 62, 500–
964 509. doi:10.2111/08-175.1
- 965 Knoot, T.G., Schulte, L. a, Rickenbach, M., 2010. Oak conservation and restoration on
966 private forestlands: negotiating a social-ecological landscape. *Environ. Manage.* 45,
967 155–64. doi:10.1007/s00267-009-9404-7
- 968 Kvale, S., & Brinkmann, S. (2009). *Interviews: learning the craft of qualitative research*
969 *interviewing*. Thousand Oaks, California: Sage.
- 970 Larsen, S., Sorenson, C., McDermott, D., Long, J., Post, C., 2007. Place Perception and
971 Social Interaction on an Exurban Landscape in Central Colorado. *Prof. Geogr.* 59,
972 421–433. doi:10.1111/j.1467-9272.2007.00632.x
- 973 Lien, M.E., Davison, A., 2010. Roots, Rupture and Remembrance: The Tasmanian Lives of
974 the Monterey Pine. *J. Mater. Cult.* 15, 233–253. doi:10.1177/1359183510364078
- 975 López-i-Gelats, F., Tàbara, J.D., Bartolomé, J., 2009. The rural in dispute: Discourses of
976 rurality in the Pyrenees. *Geoforum* 40, 602–612.
977 doi:10.1016/j.geoforum.2009.04.008
- 978 Lorimer, J., Driessen, C., 2014. Wild experiments at the Oostvaardersplassen: rethinking
979 environmentalism in the Anthropocene. *Trans. Inst. Br. Geogr.* 39, 169–181.
980 doi:10.1111/tran.12030
- 981 Marris, E. (2011). *The rambunctious garden: saving nature in a post-wild world*.
982 Bloomsbury: New York.
- 983 Marsden, T., Murdoch, J., Lowe, P., and Ward, N. (2003). *The differentiated countryside*.
984 London: Routledge.
- 985 Massey, D. (2005). *For Space*. London: Sage.
- 986 Mastnak, T., Elyachar, J., Boellstorff, T., 2014. Botanical decolonization: rethinking native
987 plants. *Environ. Plan. D Soc. Sp.* 32, 363–380. doi:10.1068/d13006p
- 988 Mendham, E., Curtis, A., 2010. Taking Over the Reins: Trends and Impacts of Changes in
989 Rural Property Ownership. *Soc. Nat. Resour.* 23, 653–668.
990 doi:10.1080/08941920801998893
- 991 Mendham, E., Curtis, A., Millar, J., 2012. The Natural Resource Management Implications
992 of Rural Property Turnover. *Ecol. Soc.* 17, 5. doi:10.5751/ES-05071-170405
- 993 Morcombe, M (2004). *Field guide to Australian birds*. Steve Parish Publishing: Gold
994 Coast.
- 995 Paquette, S., Domon, G., 2003. Changing ruralities, changing landscapes: exploring social
996 recomposition using a multi-scale approach. *J. Rural Stud.* 19, 425–444.
997 doi:10.1016/S0743-0167(03)00006-8
- 998 Power, E.R., 2005. Human–Nature Relations in Suburban Gardens. *Aust. Geogr.* 36, 39–
999 53. doi:10.1080/00049180500050847
- 1000 Race, D., Luck, G.W., Black, R., 2010. Demographic Change in Australia's Rural
1001 Landscapes, in: Luck, G.W., Black, R., Race, D. (Eds.), *North, Landscape Series*.
1002 Springer Netherlands, Dordrecht, pp. 1–22. doi:10.1007/978-90-481-9654-8
- 1003 Ragusa, A.T. (2010). Seeking trees or escaping traffic? Socio-cultural factors and 'tree
1004 change' migration in Australia. in: Luck, G.W., Black, R., Race, D. (Eds.), *North,*
1005 *Landscape Series*. Springer Netherlands, Dordrecht, pp. 1–22. doi:10.1007/978-90-
1006 481-9654-8
- 1007 Robbins, P., Moore, S. a., 2013. Ecological anxiety disorder: diagnosing the politics of the
1008 Anthropocene. *Cult. Geogr.* 20, 3–19. doi:10.1177/1474474012469887

- Rose, D.B. (1996). *Nourishing terrains: Australian Aboriginal view of landscape and wilderness*. Australian Heritage Commission: Canberra.
- Rosenthal, G. (2004). Biographical research. In (Eds.) C. Seale, G. Gobo, J. F. Gubrum, & D. Silverman, *Qualitative Research Practice*. Thousand Oaks, California: Sage. p. 48–65.
- Strang, V. (2010). Mapping histories: cultural landscapes and walkabout methods. In A. Smith, & S. Aswani (Eds.), *Environmental social science: methods and research design* (pp. 132–156). Cambridge: Cambridge University Press.
- Tonts, M., Argent, N., Plummer, P., 2011. Evolutionary Perspectives on Rural Australia. *Geogr. Res.* 50, 291–303. doi:10.1111/j.1745-5871.2011.00745.x
- Trigger, D., Mulcock, J., Gaynor, A., Toussaint, Y., 2008. Ecological restoration, cultural preferences and the negotiation of “nativeness” in Australia. *Geoforum* 39, 1273–1283. doi:10.1016/j.geoforum.2007.05.010
- Urquhart, J., Courtney, P., 2011. Seeing the owner behind the trees: A typology of small-scale private woodland owners in England. *For. Policy Econ.* 13, 535–544. doi:10.1016/j.forpol.2011.05.010
- Van Auken, P.M., 2010. Seeing, not Participating: Viewscape Fetishism in American and Norwegian Rural Amenity Areas. *Hum. Ecol.* 38, 521–537. doi:10.1007/s10745-010-9323-5
- Walker, P., Marvin, S., Fortmann, L., 2003. Landscape changes in Nevada County reflect social and ecological transitions. *Calif. Agric.* 57, 115–121.
- Walker, P.A., Marvin, S.J., Fortmann, L.P., 2003. Landscape changes in Nevada County reflect social and ecological transitions. *Environ. Toxicol. Chem.* 115–121.
- Wang, Y., Jiang, D., Toshio, O., Zhou, Q., 2013. Recent advances in soil seed bank research. *Contemp. Probl. Ecol.* 6, 520–524. doi:10.1134/S1995425513050181
- Worrell, R., Appleby, M.C., 2000. Stewardship of Natural Resources : Definition , Ethical and Practical Aspects. *J. Agric. Environ. Ethics* 12, 263–277.
- Young, K.R., 2014. Biogeography of the Anthropocene: Novel species assemblages. *Prog. Phys. Geogr.* doi:10.1177/0309133314540930
- Yung, L., Belsky, J.M., 2007. Private Property Rights and Community Goods: Negotiating Landowner Cooperation Amid Changing Ownership on the Rocky Mountain Front. *Soc. Nat. Resour.* 20, 689–703. doi:10.1080/08941920701216586