THE EMOTIONAL LIVES OF KANGAROOS: REHABILITATION, SCIENCE AND THE ENVIRONMENT

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1. Introduction

For many decades, bio-physical scientists, environmentalists and social scientists have debated climate change, resource depletion, species extinction, deforestation, warming oceans, changing seasons and melting ice caps. However, it was not until quite recently that governments came to realise that the sustainability crisis was urgent, real, and comprised an array of complex and interrelated problems such that it is not possible to identify one process that will provide a final solution. The crisis of sustainability comprises problematic relationships and problematic understandings of those relationships (Matthews *et al* 2008). As Morin states: '…the planetary problem is a whole fed by multiple, conflictual crisis-laden ingredients; it encompasses, surpasses and feeds them in return' (2004: 52). It is a crisis of the ways modern capitalist societies combine with nature and a crisis of understanding whereby the citizens of those societies fail to understand their relations with nature (Huckle, 2004: 34).

For far too long we have relied on human exceptionalism (Plumwood 2007) in tackling the urgent questions of the planet's environmental sustainability. The tacit assumption of a transcendent animal/ human boundary ensures our learning and understanding is predicated on lop-sided anthropocentric and anthropomorphic perspectives. Human exceptionalism and anthropocentrism have been the mainstay of Western modernity, metaphysics, environmental science, ethics and humanism (Derrida 2008). Over the millennia this divisive and unbalanced way of acquiring knowledge has enabled Western civilisation to inflict astoundingly barbarous and destructive results on the environment.

Advances in affective neuroscience of mammals (Panksepp 1998, 2004) and a 'being-for' relational ethic of care (Derrida 2008, Noddings 1984) enable insights into the emotional lives of wild animals. In the wild, expressed emotion can be a key to understanding the knowledge animals can convey to humans about their environmental circumstance (Garlick 2012). As a form of new human learning, the knowledge held by wild animals has the potential to bring wildlife rehabilitation and wildlife caring into mainstream environmental science in addressing environmental sustainability. It puts a responsibility on wildlife carers to assist in advancing scientific understanding of wildlife and the environment. It also questions the received knowledge and ethics of conventional wildlife ecology and other environment science (Leopold 1968) which for too long has been predicated on human exceptionalism, numbers, the biota and animal objectification (Garlick 2012).

By excluding the knowledge held by non-human animal inhabitants in the environment, science disciplines may be challenged as not fully meeting their own epistemological rules of empiricism. Ecology, prone in the hands of some to focus only

on the collective biota, is one such discipline in which these rules of empiricism might be challenged.

This paper reports on our research into wildlife emotion, and its interpretation and usefulness as a means for learning more about environmental sustainability. The social, affectionate and gentle nature of kangaroos, their ability to range over large areas of the landscape, their vulnerability in limiting environments, the overtness in the expression of their emotion, and the strong anthropocentric instrumentalism and barbarism toward them by some ecologists and conservationists and Australian governments supposedly concerned about environmental sustainability, makes this wild animal highly relevant for humans to learn about matters of environmental integrity.

. Having been a part of the Australian landscape for 16 million years, our belief is that the globally iconic kangaroo can tell us much about the environment that otherwise remains unseen and unheard if we are able to have a direct means of communication with them.

2. Literature themes

A 'new way of knowing' about sustainability is proposed that seeks to learn directly from wildlife through their emotional states, as individuals and in their social groups, through a 'being-for' (Bauman 1995), relational (Derrida 2008), ethic of care (Plumwood 1993, Donovan 1996, Kheel 2008). Based on this ethic, we incorporate recent research on affective neuroscience in mammals (Panksepp 1998, 2004) into our own work in rehabilitating large numbers of seriously injured kangaroos prior to their release/ return to the wild (Garlick and Austen 2010). This work provides some of the building blocks for identifying and interpreting emotion markers in various contexts, including the wild environment and its sustainability.

This approach to knowing about environmental sustainability seeks to go beyond knowing about animal biophysics and biota only from obtuse and remote scientific experimentation and simple observation. Introducing learning into the mix of an encounter with a wild animal underpinned by an ethic of care has interesting implications not only for a number of environmental science disciplines (particularly wildlife ecology), but for institutional environment 'managers'.

Six neural emotional states (joy, separation, anger, relaxation, nurturance, and sexuality) are used and a range of kangaroo markers that reflect these states are identified in both in-care and the wild contexts. From these, reinforcing and restricting environments for wildlife are identified with respect to two key emotional states for mammals identified by Panksepp (1998, 2004). These are 'seeking' to engage with opportunity in the wider world in terms of their capability (Nussbaum 2003, 2011), and 'fear'/ 'escaping' from a limiting environment to places where capability can be exercised more fully. The classification of a wildlife environment as reinforcing or restricting is a clear indication of health from the perspective of a wild animal.

The task of progressing from a case example and a particular environmental context, in which there is learning through a particular transformational animal encounter, to one in which an entire community or numerous communities might be similarly transformed to address sustainability can be conceptualised. To advance this we have elsewhere suggested the idea of the 'ecoversity' as a learning framework for engagement between humans and the environment (Garlick *et al* 2009; Matthews and

Garlick 2009; Garlick and Matthews 2009; Matthews *et al* 2009; Matthews and Garlick 2012; Garlick 2012). The 'ecoversity', with its foundation in context-based relational ethics and learning provides a mechanism to help bridge the gap between human and non-human animals. It can facilitate a transformative encounter which can generate the knowledge to foster creative and ethical solutions to animal welfare and environmental sustainability.

3. Derrida and transformative encounters with wildlife

Close and mutual encounters with wildlife can be special and transformative experiences that enables learning that can take us beyond typical biophysical and virtual understandings. Learning from individual encounters with wildlife is unconstrained by the anthropocentric and automata constructs of much conservation and ecology, which are based on a hierarchical value of contribution to the good of the biota (Leopold 1968, Callicot 1987). Such conservation and ecology, unfortunately, reason-out (sometimes advocating brutal methods) as unimportant the energy, emotion, personality and individuality of wild animals. However, as with quantum physics and the Tao the whole will not exist without the energy of the interrelationship of the individual parts and the parts are dependent on their interconnection with other parts in a holistic system (Kheel 1985).

It is the Cartesian view of the wild animal as being unexceptional in anything other than its physicality that has resulted in ecology and conservation regarding wildlife individuality as unimportant in consideration of the environment, unless of course the species is considered to be on the verge of extinction (Leopold 1968, Callicot 1987). Even then, neoliberal 'science' will question the cost of captive breeding programs (Clements *et al* 2011). This, it would seem, justifies the aggression of these sciences toward individual natives animals as a socially acceptable method for maintaining a biota. Leopold in various publications was a strong proponent of this practice and some in the ecology discipline have not progressed far beyond it. When it comes to wildlife, such disciplines not only promote animal cruelty but also seriously short change us in our learning about things that are critical for our planet's environmental sustainability.

In *The Animal That Therefore I Am*, Derrida (2008) provides two important connected thoughts that can assist us in learning in transformative ways through an encounter with wildlife. The first of these is equality in suffering between humans and animals. This sees animals and humans as fellow creatures with a common finitude. It also sees animals as individuals and not the collective ordinarily portrayed as holders of certain rights and entitlements (Regan 1983); or placed in some hierarchical order according to notions of consciousness or language (Singer 1984); or as part of some living ecosystem (Leopold 1968). As Nussbaum reminds us: 'As for aggregation across lives: animals pursue not simply the avoidance of pain but lives with many distinct components, including movement, friendship, honor and dignity. It seems important to retain a sense of the separate importance of each of these elements.' (Nussbaum 2011:160).

The second thought is that once the boundary between human and non-human animals is erased there can be transformative learning through engagement. This is the kind of human – animal engagement that Derrida says can interrupt our being,

challenge how we think about whom we are and call us into some kind of responsibility to take action (Derrida 2008).

Human transformation in the presence of an animal is a process of learning about us as humans through our understanding of animal capabilities. It is not restricted to those animals which might head any hierarchy of anthropocentric cognition testing. Whales, dolphins, great apes and chimpanzees are often cited in this regard, but Derrida was never species-specific in relation to the transformative impact of human/ non-human animal relations.

When faced with acting on any learning from engagement with an animal we are limited by the unsatisfactory human tools on which we have to draw. The first of these is to respond to animal suffering with arguments and images that connote compassion and tolerance. However, these are anthropocentric concepts and while a moral onus is implied in them, no actual transformational emotional engagement with animal suffering of the 'being-for' kind need occur because of them. Following Bauman's forms of togetherness, these relations are more likely to be of the 'being-alongside' or 'being with' kind. In these, there is no attempt to view the animal as an equal subject, of equal worth, to a human. There is no attempt to connect this suffering to our own human finitude, and definitely no thought that there might be learning possible from animals. The second of these unsatisfactory tools is to make moral and ethical choices based on a hierarchy of utility and relative animal cognition and consciousness. The approach is speciesist, giving preference to some animals over others. The tests for cognition, consciousness, pleasure and pain are anthropocentric and ignore the complexity of animal diversity and emotion.

4. Animal emotion as a marker for communication and human learning about the environment

Recent thinking in behavioural neuroscience suggests a neural basis for emotion and consciousness affect in mammals, both human and non-human (Panksepp 1998, 2004). This takes us beyond the human-animal dualism that previously separated animal emotion from notions of consciousness in neuroscience and psychology. Previously held back by a lack of animal data, and human exceptionalism in brain function research, it is now argued that predictions can be made about animal emotion, despite limitations of language, from laboratory studies on human brain function (Panksepp, 2004: 2).

Such consciousness might assist in our learning about sustainability markers from animal emotion when there is a trusting relationship with wildlife. This is a different, more effective and more ethical way of gathering information about wild animal emotion than the usual laboratory reward –stimulation tests carried out on animals. In humans, emotion markers can be measured through skin conductance, endocrine response, heart rate, blood pressure and similar laboratory tests. In wildlife however, in order to interpret whether an environment is healthy we need to depend on a relationship with the animal to allow us to determine emotion markers. With wildlife, in our view, emotion markers can be revealed through the relational ethic of care of the 'being-for' kind. It is argued that emotions (affection, joy, sadness, anger, anxiety, aggression, fear, etc) suggests a form of language and communication (Panksepp 1998, 2004) and can potentially provide intelligence to us on the well-being of a wild animal in its habitat.

Panksepp has identified two key emotional brain circuits in mammals. The first is 'seeking/ expecting', where the animal has expectancy, an aspiration, and a wanting to engage with the wider world. '…the neuroscience evidence indicates that all mammalian brains do contain a general purpose seeking system designed to actively engage the world, especially in its life-sustaining resources'. (2004:17). This neural circuit seems consistent with the capability approach articulated for humans by Sen (1985) and for animals by Nussbaum (2003), based on opportunity achievement. In terms of the natural environment seeking/ expecting emotional circuits appear to equate with a healthy, satisfying and reinforcing habitat.

The second key emotional brain circuit in mammals is 'fear/ escape', which seems consistent with responding emotionally to a harming or limiting habitat and environment. These notions of reinforcing and limiting environments for wildlife need to be considered in making an assessment of environmental sustainability. In addition, Panksepp has identified at least five other basic emotional systems common to mammalian social affect, viz: anger, sexuality, nurturance, distress and joy. Panksepp suggests that these emotions are important in influencing physical and mental conditions in humans, such as pain, depression and other psychiatric disorders. There are likely to be similar effects for animal conditions including recovery from illness and injury, although as Panksepp notes (2004: 27-29) there are species differences in the relative significance of each emotion.

5. A 'being for' ethic of care, forms of togetherness and wildlife ecology

Neoliberal relations favour fragmentary, momentary and episodic encounters characterised by 'values' of competition, efficiency and individualism. These are the same superficial connections that humans, in general, and some scientists in particular has with animals – particularly those in the wild. Action-oriented narratives of animals in the wild on film and television or in 'wildlife' parks are the closest most humans are prepared to the natural world. Other episodic connections with animals and wildlife in particular are more sinister and involve cruelty. Institutions, companies and individuals that approach wildlife with the objective of making money view it as a 'resource' or a 'pest'. Such people are unable to have a transformational experience with an animal and, thereby unlock knowledge about sustainability.

Our concern with the discipline of wildlife ecology is that it draws conclusions about environmental sustainability and wildlife habitat through an objectified, episodic, collective perspective towards the animal, when so much more relevant knowledge can be gained directly from the animal, individually and in groups, through its various emotional states when there is a 'being-for' ethic of care. Most ecologists do not have transformational engagement of the 'being-for' kind with wild animals. They tinker with and then discard the wild animal and draw conclusions based on partial knowledge and human exceptionalism.

The focus of the wildlife ecologist is on the quantitative rather than the qualitative characteristics of wildlife. If the ecologist assesses there that there are 'too many' wild animals of a particular species a programme of killing is usually advocated; if 'too few', a programme of captive breeding is advocated (Leopold 1968). Mathematical modelling of these gross physical relationships has recently become popular (Clements 2011). Such 'science' ensures we make little real progress on our broader knowledge of sustainability because it assumes humans have all the answers

and all the world's environmental problems can be 'managed' or even solved by experimentation on animals by human scientists rather than by learning with them through relational transformation.

There are cases where disciplines like wildlife ecology are, in our view, not science because they fail the epistemological rules of empiricism. In particular, it can be argued this discipline does not adequately meet the correspondence and comprehensiveness tests of scientific inquiry.

The correspondence test tells us whether the conclusions drawn from analysis can be fully confirmed by what can be seen in the real world. This should be ecosystem-specific, but often we find ecologists 'borrowing' parameters from other ecosystems and applying them in different circumstances. The correspondence test consists of checking the isomorphism of the model of a specific ecosystem so the conclusions drawn can be assessed against what is found in the real world. The comprehensiveness test assesses whether all the known facts about an ecosystem are being captured in interpreting conclusions and if observable phenomena are not accounted for in the analysis it should be judged to have failed. The conclusions drawn in this paper about learning directly from wildlife through emotion affect would suggest that wildlife ecology would not meet this epistemological test of science.

Wildlife carers, whatever the species they care for, can learn much when they employ a 'being-for' ethic of care. In our view, ecology can and should learn from the methods and experiences of ethical wildlife carers on matters relating to environmental sustainability.

Bauman's (1995) classification of forms of togetherness provides a useful tool for getting to the heart of what engaging with wildlife should be like if it is to stimulate transformational learning in humans in the way Derrida argued, and be useful in expanding our knowledge about environmental sustainability using animal emotion markers. Bauman describes 'being-alongside' and 'being-with' as fragmented and episodic encounters characterised by a lack of consequence. In a 'being-aside' modality the participants exist only in a co-presence with others. Participants move from a 'being-alongside' to a 'being-with' modality only where there is a mutual dependency – but only in so far as it relates to what the topic at hand requires (Bauman 1995: 50). This is our concern with the disciplines of wildlife ecology and other sciences that draw conclusions about wildlife without a 'being-for' engagement. Derrida seeks much more in consciousness from an animal encounter than an episodic or non-consequential contact. Using Bauman's (1995) ideal 'forms of togetherness' the most complete form of togetherness with an 'other' is 'being-for'.

> 'Being-for is a leap from isolation to unity; yet not towards a fusion, that mystics' dream of shedding the burden of identity, but to an alloy whose precious qualities depend fully on the preservation of its ingredients' alterity and identity.' Being-for' is entered for the sake of safeguarding and defending the uniqueness of the Other; and that guardianship by the self as its task and responsibility makes the self truly unique, in the sense of being irreplaceable; no matter how numerous the defenders of the Other's unique otherness may be, the self is not absolved of responsibility. Bearing such a task without relief is what makes a unique self out of a cipher. Being-for is the act of transcendence of being-with.' (Bauman 1995:51).

According to Noddings (1984, 2002) a caring encounter will have three elements: First, A is consciously motivated to care for B. Second, A performs some act of care that accords with the consciousness and motivation revealed in the first element. Third, and significantly, B recognises that A cares for B.

> 'The caring relation, in particular, requires engrossment and motivational displacement on the part of the one-caring. It is important to emphasise that this reciprocity is not contractual; that is, it is not characterised by mutuality. The cared-for contributes to the caring relation, as we have seen, by receiving the efforts of the one-caring, and this receiving may be accomplished by a disclosure of his own subjective experience in direct response to the one-caring or by a happy and vigorous pursuit of his own projects'. (Noddings 1984:).

In our view not all wildlife carers have a 'being-for' approach to the animals in their care. Many care relationships may be described in Bauman's terms as 'being-alongside' or 'being-with' forms of togetherness. There may be an episodic co-presence with no alterity between carer and the cared for.

6. Engaging with the kangaroo

At our wildlife recovery centre we have around 120 severely injured and sick macropods (mostly kangaroos) and wombats coming into care each year. These animals range in size from the tiny (several hundred grams) to the very large (60kgs). Some are simply orphaned infants, some are old and in need of some recuperation, and many have a variety of injuries that include limb, pelvic and skull fractures, severe wounds or head injuries, as well as serious issues such as pneumonia and stress-induced illness. Almost every day we witness and respond to the suffering and trauma that uncaring and sometimes cruel humans inflict on wild animals with their motor vehicles, fences, uncontrolled dogs, guns wielded by thugs and the cruel practices of governments and farmers.

Recovery of an injured macropod may take 12 months or more depending on the extent of the injury or illness. Once the veterinarian has carried out the initial clinical work there is much more to be done before an animal recovers enough to be returned back to its natural environment with its kin. Tasks include regular feeding and, if necessary, nutritional support, antibiotic treatment, splint changes, wound dressings, physiotherapy and exercise, and, finally, translocation prior to release in a wild environment as safe from human intervention as possible. Each year around 80 fully recovered animals are transported from our recovery centre and released to their natural environment in social groups of ten or more (Garlick and Austen 2010). Our most recent translocation and release featured 30 kangaroos ranging in size from 14kgs to 55kgs.

Trust, kindness and appropriate auditory, olfactory, visual and tactile communication between the injured or sick wild animal and the human carer are vital over potentially long periods to enable a successful outcome. An attitude of respect, encouragement and persistence is as important for the injured or sick kangaroo as appropriate veterinary treatment. Being with others of its kin is also important. Understanding animal communication through close and sensitive observation and interaction and responding to animals in ways consistent with such communication form an important basis for having good relations with injured wild animals and for monitoring their emotional state.

Kangaroos have long memories and while they naturally avoid human contact and correctly regard humans as predators, they can maintain a long-lasting relationship over many years with their human carer if the care has been of the ‘being-for’ kind. There is no habituation with these wild animals, solely a special relationship with the particular care giver. This facilitates daily engagement and monitoring when they return to their wild environment. These visits to the wild environment allow observation of kangaroo emotional markers of stress and relaxation. These animals are extremely wary of humans and will not approach anyone except the carer who has exhibited the characteristics of a ‘being-for’ ethic toward them.

When we visit the wild in a location where we know that within hearing distance there are kangaroos which we have cared for, it is possible with about 20 minutes of calling to attract up to 36 kangaroos, as well as their off-spring. These kangaroos recognise the carer’s voice and even after a number of years will allow physical contact.

These two acts by wild animals: the act of recovery from severe injury or illness and the act of recurrent visits to their carer after return to the wild provide evidence of the practical effectiveness of a ‘being-for’ modality of togetherness in its application to wildlife. Noddings (2002: 19) suggests reciprocity from the wild animal to the human carer is one of the key requirements of an ethic of care. Of particular significance for this paper is the fact that this reciprocity can be in the form of a transfer of knowledge from wild animal to human.

Table 1 brings together a number of neural emotions, outward manifestations of these emotions as they relate to the kangaroo, and what they mean in terms of the environment in which they live. The first column in Table 1 lists the five social emotions for mammals, taken from Panksepp (2004: 22), together with an additional emotional state, relaxation, based on our observation of macropods. These social emotions are within the context of a seeking/expectancy/wanting scenario or a fear/escape scenario. Column two lists the outward indicators associated with each emotional state. These outward indicators have come from close observation over a long period. Column three attributes an environmental context and whether the environment reinforces seeking emotions, or is limiting or restricting in that it generates fear and escape emotions.

Table 1. Connecting wildlife emotion to environmental health: The kangaroo

Neural emotion state	**Outward indicators**	**Environmental opportunity/ context**
Joy (play)	Hooning, kicking legs into the air, boxing with kin, chasing kin, eye expression.	Reinforcing
Separation, distress (panic)	Vocal, running into objects in panic, eye expression, erect and extended posture, licking forearms, rapid respiratory rate, flared nostrils.	Restricting
Nurturance (care)	Preening, embracing kin, body contact, protective behaviour by dominant males	Reinforcing
Sexuality (lust)	Courtship behaviour, pairing, long term male/ female friendships	Reinforcing
Anger (rage)	Vocal, eye expression, posture	Restricting
Relaxation	Lying on back asleep, mothers relaxing pouch muscle, mothers allowing small infants to exercise outside pouch	Reinforcing

7. The ecoversity: A practical approach to community learning about sustainability from wildlife engagement

The task of progressing from a case example in which there is learning through a particular transformational animal encounter to one where an entire community or a number of communities might be similarly transformed, to address sustainability questions, is possible to conceptualise. To advance this we have elsewhere suggested the idea of the 'ecoversity' as a learning framework for engagement between humans and the environment (Garlick et al 2009; Matthews and Garlick 2009; Garlick and Matthews 2009; Matthews et al 2009). The 'ecoversity', with its foundation in place-based relational ethics and learning provides more than a mechanism to help bridge the gap between human and non-human animals. It can facilitate a transformative encounter which can generate the knowledge to foster creative and ethical solutions to animal welfare and environmental sustainability. It therefore has the potential to assist in resolving the current conservation and animal welfare dichotomy (Kheel 1985, 2008). It can also open pathways between science and environmental sustainability knowledge generated through transformational animal encounters.

The goal of the ecoversity approach is to find alternatives to the non-relational education practices in sustainability learning 'that got us into trouble in the first place'. (Orr 1992: 24). The ecoversity approach proposes lifelong learning and enterprising action within a spatial and ethical context (Garlick and Palmer 2008). Just as neuroscientists propose that there are critical and sensitive periods in human life that generate multiplied returns from learning (Cunha and Heckman 2007); it can also be argued that there are critical and sensitive places or contexts for learning about environmental sustainability and which contribute to multiplied returns on learning investment (Garlick 2011). The ecoversity can be such a context for learning. Moreover, the ecoversity approach promotes a new and dynamic community-based form of eco-literacy which involves relational learning about environmental sustainability.

Following Sacks (2008), the goal of the ecoversity is to teach us what we are already a part of. It does this by sharing knowledge, identifying local/global problems and solutions, stimulating ethical debates and challenging unsustainable development and the excesses of transnational capitalism (Matthews et al 2009). It is not therefore that sustainability should be integrated into learning institutions, but that these institutions need to transform themselves into the integrated holistic communities implied and required by sustainability perspectives (Sterling 2004).

8. Conclusions

The purpose of this paper has been to show that our knowledge about the solutions that contribute to the environmental sustainability of the planet need not be restricted to episodic investigations on animals based on human exceptionalism, incomplete science or an untrammelled belief in human rationality. We have endeavoured to suggest there is another hitherto-untapped source of knowledge that can be gleaned from those wild animals that are resident in the environment and that the means of conveying this knowledge is by understanding the overt behavioural affects of wild animal emotion.

In this paper we have attempted to demonstrate that the kangaroo represents an ideal wild animal to learn more about environmental sustainability through emotional markers that can be ascertained through a relational ethic of care. It was also suggested that such contextual understandings about wild animal knowledge could be generalised through the learning concept of the 'ecoversity'.

This approach puts wild animal carers, who employ a relational ethic of care, in a position of making contributions to aspects of science and the environment through their ability to elucidate knowledge from wild animals through emotional affect. Such contributions should be formalised and would add significantly to the current inadequate analysis of wildlife ecology and other sciences where there are epistemological shortcomings of empiricism. We also propose the 'ecoversity' as a means of applying this approach to wider sets of circumstances in our community knowledge about environmental sustainability.

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Rosemary began caring for native animals twelve years ago with an interest in injured macropods and wombats. She has a particular interest in wound care for fence injured macropods, and macropods and wombats with limb, pelvic, spinal and head injuries.

PROFESSOR STEVE GARLICK PHD, FAUCEA

Steve has professorial positions at various Australian universities in the fields of spatial economics, community engagement and animal ethics and wildlife welfare. He is on a number of international boards and has an extensive publication record. He was the founder and initial president of the Animal Justice Party of Australia. In 2009 with wife Rosemary he received the World Shining Compassion Award for his work rehabilitating seriously injured kangaroos and wombats. Together, Steve and Rosemary have helped in the recovery and release back to the wild of close to one thousand injured macropods and wombats over the last 12 years.