REFINING THE DEFINITION OF WILDERNESS

SAFEGUARDING THE EXPERIENTIAL AND ECOLOGICAL VALUES OF REMOTE NATURAL LAND

MARTIN HAWES, GRANT DIXON & CHRIS BELL

The term for large landscapes that are intact [and] full in their integrity in Mongolian is 'unagan baigal', a literal translation of 'unagan' from 'unagan daakh': the untouched hair of a newborn baby or the hair with which a baby appears from the mother's womb. Thus, wilderness would be a landscape with the qualities of purity and wholesomeness of a newborn.

Erjen Khamaganova, in Kormos et al. (2017a)

BOB BROWN FOUNDATION
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Tasmanian National Parks Association

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AT A GLANCE

There is at present no consensus on how wilderness should be defined.

Most definitions acknowledge the ecological values of wilderness, but there is less emphasis on experiential values and little recognition of the significance of remoteness.

The experiential values of wilderness are strongly linked to remoteness.

The lack of recognition of the importance of remoteness leaves wilderness at risk from developments that compromise experiential values.

Many definitions require wilderness areas to be large, but an area can be large without containing remote country (e.g. a riverine reserve might cover thousands of hectares yet be no more than 1 km wide at any point).

We recommend defining wilderness as land characterised by a high degree of

- **biophysical naturalness**
- **linear remoteness from infrastructure and landscape disturbances**
- **time-remoteness from points of mechanised access**

as well as having minimal evidence of modern technological society.

An area's status as wilderness is not affected by infrastructure and landscape disturbances associated with Indigenous societies following predominantly hunter-gatherer ways of life.

Specifically, for the purpose of delineating wilderness, we recommend:

- **that its linear remoteness be a minimum of 5 km from major infrastructure and landscape disturbances (e.g. roads and impoundments); and**
- **that it require at least half a day of travelling by non-mechanised means from the nearest access point for mechanised vehicles (including recognised boat and aircraft landing sites).**

For wilderness to be remote it must be surrounded by a 'remoting buffer' that makes it remote.

Wilderness areas and their associated remoting buffers must be maintained in a largely natural condition and free of major structures and landscape disturbances.

Wilderness protected areas (i.e. reserves designed to protect wilderness areas) must contain those areas and their remoting buffers.

Wilderness areas combined with their remoting buffers are, by definition, large and natural, and hence are well suited for protecting ecological values.

Our recommended definition is based on physical parameters, not land tenure.

CONTENTS

SUMMARY

A variety of definitions of wilderness has been developed and adopted by governments, intergovernmental agencies, wilderness researchers and environmental non-government organisations (NGOs). While these definitions reflect widespread recognition of the values of wilderness, we (the authors) are concerned that the lack of consensus on how wilderness should be defined weakens the basis for effectively managing wilderness and for protecting the full range of its associated values.

All prominent definitions of wilderness acknowledge the importance of naturalness, but wilderness is much more than just natural country. Our major concern is that few definitions adequately emphasise its experiential values – that is, values associated with the direct and indirect human experience of wilderness. In particular, few definitions acknowledge the significance of remoteness, a factor that we argue is strongly linked to the experiential values of wilderness. By 'remoteness' we mean linear distance from infrastructure and landscape disturbances such as roads and cleared land, and travelling time, by foot or other non-mechanised means, from points of access for mechanised transport (including recognised powered-boat or aircraft landing sites).

After reviewing several prominent definitions of wilderness and examining the implications of various approaches to defining wilderness, we list what we consider to be desirable criteria for a definition. Based on these criteria, we recommend a definition of wilderness that we believe addresses some of the deficiencies of existing definitions and goes some way towards resolving the disparities between them. We draw a clear distinction between two kinds of 'wilderness': land defined by its physical characteristics; and land that has been assigned an administrative designation of 'wilderness' (**see 4.5**). Wilderness by our definition is of the former kind.

We define wilderness to be land (including inland water bodies) that is characterised by a high degree of biophysical naturalness, linear remoteness from infrastructure and landscape disturbances, and time-remoteness from points of mechanised access, as well as having minimal evidence of modern technological society. In short, wilderness is land which is natural, remote and primitive. For explanation of these terms refer to the Glossary and 7.1.

Consistent with most contemporary definitions of wilderness, our definition can include areas that are or have been inhabited or influenced by Indigenous people following predominantly hunter-gatherer, wilderness-based ways of life. (The terminology here is based on that used by the IUCN; see Casson et al. 2016).

Wilderness is land which is natural, remote and primitive.

For wilderness to be identified in practice it is necessary to specify the minimum levels of naturalness and remoteness that an area needs to satisfy in order to qualify as wilderness. We recommend requiring wilderness to fall into a category of 9 or 10 on the naturalness scale proposed by Machado (2004); that it have a minimum linear remoteness of 5 km from specified infrastructure and landscape disturbances (e.g. roads and impoundments); and that it be half a day remote, by non-mechanised travel, from the nearest point of access by mechanised transport (including recognised powered-boat and aircraft landing sites). More stringent thresholds may be appropriate in some environments. For details of our recommended definition and for an explanation of our rationale for these thresholds, see section 7.

A corollary of our recommended definition is that no place where access by mechanised vehicles (including snowmobiles) is possible and legal would qualify as wilderness (although some mechanised access for official purposes may be acceptable). This excludes many areas, such as large expanses of ice cap or desert, which are popularly considered to be wilderness but are generally only accessed by powered vehicles. **See 4.11**.

For wilderness to be remote it must be surrounded by an area of land or sea that makes it remote. (For this purpose, the term 'land' includes inland water bodies.) We recommend the term 'remoting buffer' to describe such an area, and 'wilderness region' to refer to a tract of land and/or sea that comprises one or more areas of wilderness together with their associated remoting buffers (see Figure 1). Unlike a wilderness area, a remoting buffer is not remote enough to qualify as wilderness. However, a wilderness area and its remoting buffer are complementary parts of an inseparable whole, and the management of a remoting buffer is integral to the management of the wilderness with which it is associated.

Wilderness regions are, by our recommended definition, large: at least 7800 hectares (i.e. the area of a circle of 5 km radius), and frequently much larger. Wilderness regions also tend to be intact (i.e. not fragmented), compact (i.e. having a low boundary-to-area ratio), and locally extensive

(in the sense that every point in them will be part of a large circle of land that is free of major infrastructure and landscape disturbances). Each of these factors contributes to the suitability of wilderness regions, when appropriately managed, for protecting ecological values on a landscape scale.

Protecting wilderness implies maintaining its biophysical naturalness and remoteness. This implies keeping wilderness regions *in their entirety* free of major infrastructure such as roads and buildings, free of major disturbances such as plantations and cleared land, and free of mechanised access. Wilderness protected areas should therefore include entire wilderness regions: that is, they should include identified wilderness areas together with their associated remoting buffers. In order to delineate remoting buffers and to specify what kinds of development are acceptable within them (for example, whether walking track development is allowed), it is helpful to define wilderness in terms of simple remoteness thresholds – hence our recommended thresholds of 5 km and half a day.

The foregoing approach to delineating wilderness does not take account of the fact that remoteness and naturalness will vary both inside and outside any delineated wilderness, and that many areas that do not qualify as either remoting buffers or wilderness may nevertheless have a degree of wildness that warrants protection. It also disregards many factors that can contribute to 'minimal evidence of modern technological society'. These include factors such as viewshed integrity, the proximity of minor infrastructure such as walking tracks and survey markers, and transient impacts such as those associated with crowding and overflights by low-flying aircraft.

This deficiency can be addressed by assessing the 'wildness' of an area quantitatively, based on a wide range of factors that affect its naturalness and remoteness, the perception of its wildness, and its capacity to offer opportunities for a wilderness experience. 'Wildness' can be regarded as a continuum whose values vary across the full range of landscape development, from 'highly developed' to 'remote and pristine'.

Several methodologies have been developed for making such measurements, using terms such as 'wilderness quality', 'wilderness character' and 'wilderness value' for the measured variable. Such methodologies are valuable for assessing the extent and quality of wilderness and of less-remote wild land in a given region. They are also valuable for assessing how wildness and wilderness values are affected by developments such as building and road construction, and by management measures such as road closures and restrictions on access by low-flying aircraft.

We recommend (see 8.3) a similar methodology for calculating a quantity that we call wild character. We define wild character based on what we have identified as the defining qualities of wilderness. To illustrate the usefulness of 'wild character' as a measure of the impact of development on wilderness, we examine the case study of proposed (and potentially imminent) hut or lodge development in the Tasmanian Wilderness World Heritage Area (see Appendix).

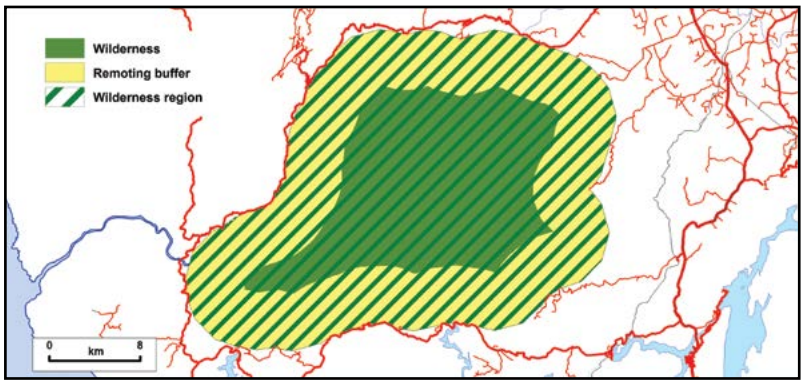


Figure 1: Simplified diagram of a wilderness area (solid green) with its associated remoting buffer (yellow) and wilderness region (hatched). Refer to Glossary for definitions of these terms. Red lines indicate roads.

GLOSSARY

The following are terms that are used in the course of this paper, together with the meanings that we have ascribed to them. The list includes our recommended (qualitative) definition of wilderness (see section 7). The inclusion of this definition here should not be seen as an attempt to present it as a fait accompli, or to pre-empt our explanation of our rationale for recommending it.

See 7.1.1 for definitions of additional terms specifically relating to our recommended definition of wilderness.

Access-time remoteness	Travel time by foot or other non-mechanised means from the nearest point of mechanised access (see 7.1.1).
Ecocentric values	Values associated with the view that non-human living things (including, in some views, landscapes and other non-organic manifestations of life) have inherent value and an inherent right to exist and evolve, independently of human interests.
Ecological values	Values associated with the natural and ecological features and processes of an area. These include biodiversity, intactness of habitats, and values associated with geological and geomorphological features and processes.
Evidence of modern technological society	Proximity (in both time and space) to infrastructure and landscape disturbances contributes to this but the term is also inclusive of distant views of artificial features, and transient impacts such as those of crowds and noise.
Experiential values	Values associated with the direct and indirect human experience of wilderness. They include opportunities for self-reliance and solitude, and the solace of knowing that wilderness exists.
Land	'Land' here includes inland water bodies, but excludes ocean.
Naturalness	The extent to which an area is unaffected by the influences and impacts of human activity, except those associated with Indigenous societies following predominantly hunter-gatherer ways of life.
Primitive [land]	[Land] exhibiting minimal *evidence of modern technological society.*
Remoting buffer	The land or sea surrounding a wilderness area that makes it remote (see Summary, Figure 1, p.5).
Rewilding	'A process to move areas … towards a wilder state, where the final stage is wilderness.' (European Commission 2013).
Wilderness	Land (including inland water bodies) characterised by a high degree of biophysical naturalness, linear remoteness from infrastructure and landscape disturbances, and time-remoteness from points of mechanised access, as well as having minimal evidence of modern technological society. (These terms are defined in detail in 7.1.1.)
Wilderness area	An area of land that has the characteristics of wilderness. Not to be confused with a *wilderness protected area* or a *wilderness region*.
Wilderness experience	The experience of being and feeling immersed in a remote natural landscape, largely self-reliant, with minimal awareness of modern technological society.
Wilderness protected area	A land management category designating an area managed for the primary purpose of protecting the wilderness values within it.

Wilderness region	A region comprising one or more wilderness areas together with their associated *remoting buffers*.
Wilderness restoration	The active or passive restoration of wilderness by restoring one or more of its defining components: for example, restoring remoteness by preventing access by mechanised vehicles.
Wilderness values	The ecological, experiential and other values associated with wilderness.
Wildness	The degree to which an area of land is natural, remote, and free of evidence of modern technological society, whether or not it has these qualities in sufficient measure to qualify as wilderness.
Wild character	A measure of factors that affect the wildness of an area or location. These factors include its degree of biophysical naturalness, the presence and proximity of human infrastructure, its remoteness in terms of non-mechanised travelling time from points of mechanised access, and the evidence of modern technological society. (See section 8.)

1 INTRODUCTION

As stated in the Summary, a variety of definitions of wilderness has been developed and adopted by governments, intergovernmental agencies, wilderness researchers, and environmental non-government organisations (NGOs). The wording and emphasis of these definitions is far from a semantic concern, as they have real-world implications for how wilderness areas are delineated and managed (Bastmeijer 2016; Washington 2007).

Most definitions associate the word 'wilderness' with large tracts of mostly natural and undisturbed land, while recognising that many such areas are or have been inhabited and/or influenced by Indigenous people following traditional wilderness-based ways of life. However, definitions vary in the emphasis that they place on the ecological and experiential values that can be associated with wilderness. For example, the United States' Wilderness Act 1964 – the world's first legislation enacted specifically to protect wilderness – defines a wilderness area as an area of undeveloped federal land that, amongst other things, 'has outstanding opportunities for solitude or a primitive and unconfined type of recreation'. By contrast, the definition used by Kormos et al. (2017b) makes no mention of recreation or recreational values. We will examine these and other definitions in greater detail in section 3.

Most definitions specify that wilderness areas need to be large in size, but they do not explicitly require wilderness to be remote. As we point out in 5.1, an area can be large without any part of it being remote; and for reasons that we will explain in detail in 2.6, the experiential values of wilderness are strongly linked to its remoteness.

The term 'wilderness' can be used either as an administrative designation for an area of land (commonly called a 'wilderness area') or to refer to land that exhibits specified qualities and characteristics, regardless of its management status. The distinction is important, as there is clearly a difference between a) defining wilderness on the basis of the actual condition of a tract of land and b) specifying what the physical condition and management requirements of a designated area should be. The implications of this distinction are explored in 4.5.

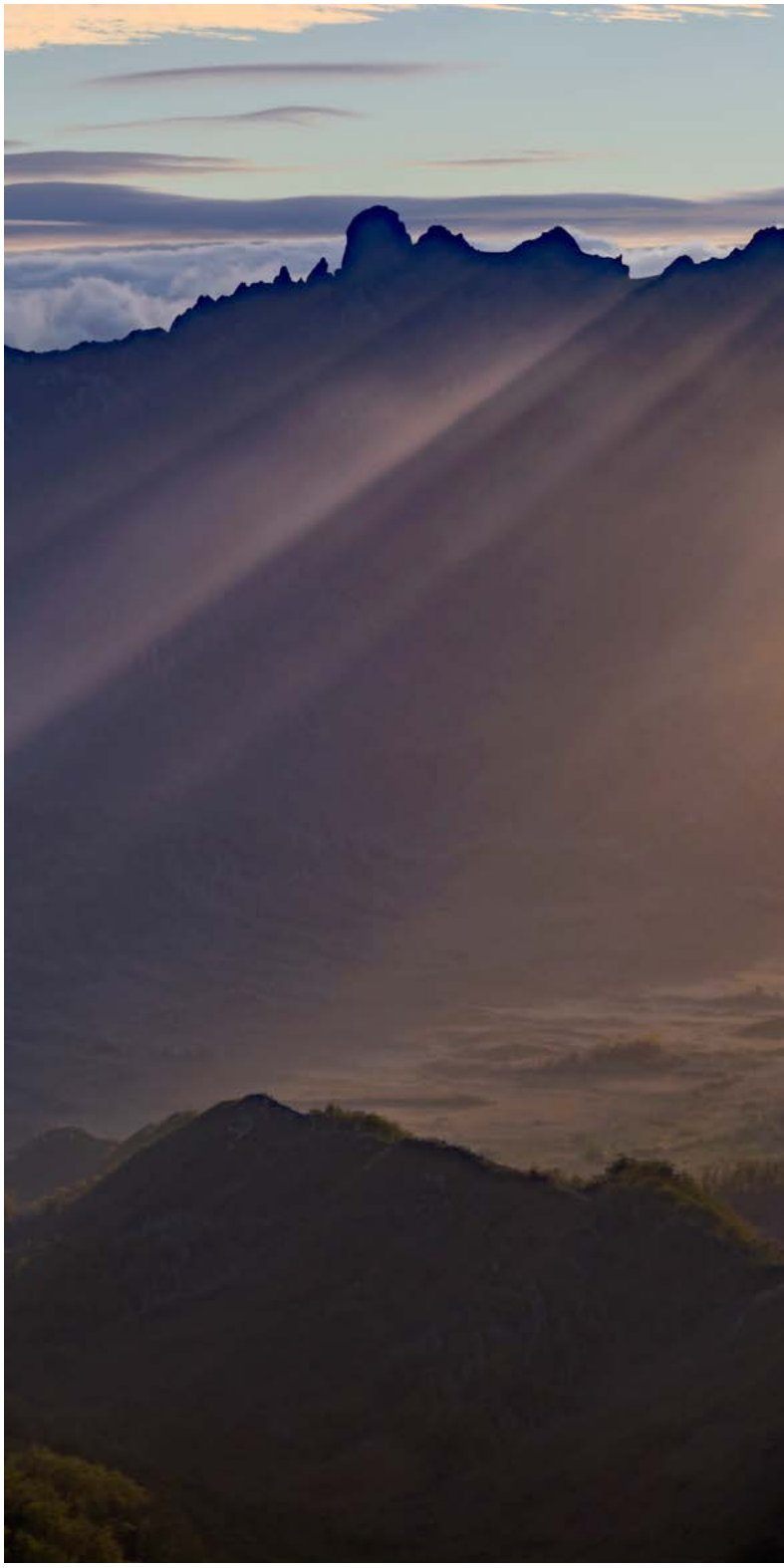
Most published definitions of wilderness are stated in a few sentences, but these are generally augmented by extended passages of text that elaborate on the details and implications of the definition. This detailed text needs to be taken into account when appraising the implications of definitions. In the case of definitions used by the US Wilderness Act, the IUCN (International Union for Conservation of Nature) and the European Commission, government or intergovernmental agencies have published lengthy documents explaining the implications of the definitions and how they can and should be applied in designating and managing wilderness areas (Landres et al. 2015; Casson et al. 2016; European Commission 2013).

Formal definitions of wilderness do not exist in isolation from the political, cultural and philosophical arenas in which the meanings and values associated with the word 'wilderness' are formulated, advocated and contested. As we note in 4.1, these meanings and values have changed radically in the past 100 years, and they continue to evolve. In non-academic circles the word 'wilderness' is often used loosely to denote almost any tract of land with some degree of naturalness, regardless of its proximity to human infrastructure. For example, the promotion of 'wilderness' as a tourism drawcard has spawned such oxymoronic phrases as 'wilderness lodge', 'wilderness railway' and even 'wilderness mall'. Such usage erodes the public's understanding of the values of wilderness and weakens the political will to protect it.

As Washington (2007, p. 441) has pointed out, in recent decades the concept of wilderness 'has come under sustained attack on philosophical, cultural, political and "justice" grounds', to the extent that, in his view, 'wilderness has become a knot—a tangle of confused meanings'. Washington (2011) criticises the basis for much of this attack as 'myths' and challenges them as such. Sawyer (2015, p. 100) suggested that, for a range of reasons including political hostility and a shift in emphasis to biodiversity conservation, the word wilderness had become 'almost unmentionable' in some government and professional land management circles in Australia. Notwithstanding these setbacks, major governmental and inter-governmental institutions continue to recognise the significance of wilderness (at least verbally, and albeit with differing interpretations of the word), and the body of literature on the value of wilderness continues to grow.

Wilderness is a place where a visitor can have a profound sense of being immersed in nature, largely unaware of modern technological society (**see 2.2**). This requires not only a natural and remote setting, but also the absence of sights and sounds associated with modern technology, such as the noise of aircraft or the sight of cleared land. Similarly, encounters with other visitors reduce opportunities for solitude and can result in the social experience overwhelming the experience of nature. The extent to which such disturbances impact a visitor's experience and enjoyment of wilderness is likely to vary according to the frequency and magnitude of the disturbances, the visitors' background and expectations, and other factors. This is an issue that merits further research.

The primary focus of this publication is on ‘wilderness, the place’ rather than on the broad range of factors that can influence the experience of wilderness. Nevertheless such factors are important. We touch on these factors in section 8, where we recommend a methodology for quantifying what we call ‘wild character’. Detailed consideration of these factors merits further research.



2 THE SIGNIFICANCE OF WILDERNESS

2.1 What is wilderness and why is it important?

Wilderness is land whose landscapes and the living systems thereon remain in a largely natural condition: that is, largely undisturbed by the impacts and activities of human society other than Indigenous societies following predominantly hunter-gatherer ways of life. It is a place where the cycles of life are governed primarily by natural forces and processes, and where living organisms evolve and interact, with one another and with the Earth, with minimal human interference. Such places are of value as ecological refuges, as storehouses of bio- and geodiversity, as buffers against climate change, and much else besides (Mackey et al. 1998).

Additionally, wilderness, as we recommend defining it, is a place that is remote from roads, towns, dams and human-cleared areas, where the visitor is largely unaware of evidence of modern human society. It is a place where a human visitor can stand with their senses steeped in nature, far from the noise of machines and the distractions and turmoil of modern life. It is a place that requires a journey to reach: a journey on which the traveller is largely self-reliant, and the day-to-day rhythms of life get stripped back to the basic rhythms of survival and interacting with the natural world. It is a place where one can find psychological refreshment and spiritual inspiration; where one can rediscover one's relationship with the living Earth, indeed with life itself.

Wilderness is a place that is remote from roads and towns, where there is minimal evidence of modern human society.

A few centuries ago – a mere blink in ecological time – most of our planet was in a condition that we would now regard as wilderness. Since then, at an ever-increasing rate, vast amounts of wilderness have been lost to urbanisation, road construction, agriculture, extractive industries and other developments. By some estimates, less than a quarter of the planet's land area can be described as wilderness today. This represents nearly a ten per cent drop just in the last 20 years, or a loss of wilderness twice the area of Alaska (Watson et al. 2016). Much of the wilderness that remains today is desert or ice cap. Temperate wilderness is especially rare.

Wilderness has been a battlefront for many of the conservation struggles that have been waged in Australia and around the world in recent decades. Recognising the crucial significance of wilderness areas as havens of unspoilt nature, conservationists have succeeded in gaining at least a measure of protection for approximately 15 per cent of the Earth's land area (UNEP-WCMC & IUCN 2016). The remaining 85 per cent has either already been lost to development or remains at risk of being lost.

A significant proportion of the world's wilderness shows evidence of habitation by Indigenous people, and in some places such habitation is ongoing. Many Indigenous cultures maintain close physical, cultural and spiritual links to areas that are now regarded as wilderness. The presence of Indigenous people, or evidence of their occupation, does not disqualify an area as wilderness.

Nelson and Vucetich (2013) list over 30 values of wilderness, ranging from its function as a pharmacopoeia to its inspirational benefits. While it is beyond the scope of this paper to discuss or even list all these values, most of them can be broadly classified as either experiential or ecological. We briefly discuss these classifications in the following sections.

2.2 The experiential values of wilderness

We use the term 'experiential values' here to refer to values associated with the experience of human visitors to wilderness, as well as values associated with the indirect human experience of wilderness. Experiential values include values associated with remote-area recreation, such as self-reliance, physical and mental challenge, and the opportunity to experience solitude, as well as values such as aesthetic appreciation, artistic inspiration, and the solace of knowing that wilderness exists.

From the perspective of our species' evolutionary history, wilderness is our natural home. The ten millennia or so that (some) humans have lived in cities and towns are an aberration compared to the millions of years that our human and hominid ancestors lived in natural environments. Our bodies, our senses and our minds are intimately adapted and attuned to those environments. It is no surprise, then, that natural environments can provide the settings for profound and life-changing experiences, for personal growth, for artistic inspiration, and for awakening 'a sense of relationship and interconnectedness with the community of life' (Zahniser 1956, in Landres et al. 2015). As Tasmanian nature photographer Peter Dombrovskis expressed it, 'When you go out there you don't get away from it all, you get back to it all. You come home to what's important. You come home to yourself' (ABC 2003).

Wilderness provides a refuge both for nature and for those humans who seek respite from and a contrast to the human-dominated world.

In a world that has become extensively altered and dominated by human activity, wilderness provides a refuge both for nature and for those humans who seek respite from and a contrast to the human-dominated world. Arguably this contrast with day-to-day existence is a large part of the attraction of wilderness for many people, and contributes to a societal need for wilderness to be preserved. The contrast is especially great for the 50 per cent or more of humans who now live in cities and whose day-to-day environments are often largely bereft of natural settings: so much so that many people do not even get to see stars at night or experience natural quiet (i.e. the absence of human-caused sounds).

Our urban environments are not only almost entirely human-made, they are almost entirely human *controlled*: we are awakened by alarms, work under artificial lights, travel by artificial means such as freeways and underground railways, and so forth. A large part of the appeal of wilderness is that it is a place where nature is not fenced in and controlled, and where the cycles and processes of life follow natural patterns and rhythms. Indeed, it is a place where we are confronted with the fact that nature is indifferent to human affairs.

People who visit wilderness have the opportunity to enjoy what has been broadly termed a 'wilderness experience'. Although the exact nature of this experience will vary from one visitor to another, from one visit to another, and even from one moment to the next, it has certain aspects that are universal. They include the sense of being immersed in a wild, challenging, remote, and often beautiful environment; of being largely dependent on one's own (and one's companions') resources; of being physically and mentally intensely involved with, and in contact with, one's immediate and wider surroundings; of having one's senses awakened and sharpened; and of being far removed from the distractions and preoccupations of everyday modern life. The sensations and feelings associated with this experience may include excitement, awe, fear, exaltation, inner peace, a sense of mystery, or a complex mixture of all of these and others besides. The wilderness experience can be a deep and complex journey, as much inwardly as in the outer, physical environment. Journeys into wild places bring benefits in terms of physical, mental and spiritual health, including reduced risks of disease and lower stress levels (Worboys et al. 2015; Myers et al. 2013).

The experiential benefits that wilderness brings are not the exclusive privilege of the relatively small numbers of people who venture into remote places. People who visit the fringes of wilderness can appreciate that they are standing on the edge of vast wild areas, and may have the benefit of extensive views into the heart of such areas. Through written and spoken accounts, videos, photographs, and other media, millions of people can enjoy wilderness vicariously. Many people derive solace and inspiration from the knowledge that there are parts of the world that have not been subjugated and disturbed to suit human purposes: places where nature still thrives in a largely undisturbed state, where remote journeys are still possible, and where there is little if any evidence of the influence of modern technological society. Such benefits are associated even with wilderness areas where human access is excluded or severely restricted, such as scientific reference areas. Many people feel anxiety or despondency when learning of the loss of wilderness areas, regardless of whether they would ever have visited those areas themselves.

Wilderness contributes indirectly to ecological values by raising human awareness of those values. Indeed, wilderness can be described as a 'living museum' that provides the natural setting for education on natural process and on the significance of water resources, soil conservation, biodiversity and similar issues. The experience of wilderness, whether immersive or vicarious, is often associated with a deep appreciation of the beauty, complexity, vastness and interrelatedness of terrestrial life, and of our own place in it. Indeed, one of the greatest values of wilderness may lie in its capacity to teach us deep truths about ourselves, our place in the cosmos, and our relationship to the living systems of which we are a part (e.g. Ashley 2012).

2.3 The ecological values of wilderness

Wilderness areas are places where natural systems exist, thrive, evolve and mutually interact with minimal human interference. They are storehouses of genetic diversity, reservoirs of biodiversity, and habitat for innumerable species. They contribute to global and regional ecosystems by providing functions such as water storage, carbon sequestration and climate maintenance, which play a vital role in maintaining a stable and habitable environment for the benefit of all life on Earth. They also provide a scientific baseline for monitoring changes in ecosystems over time.

The protection of ecological values such as biodiversity requires the protection and management of a wide range of environments, including environments that may be small, fragmented and have little if any remoteness. For example, the remnants of some types of Australian woodland are confined to places such as cemeteries and railway easements (Centre for Plant Biodiversity Research 2002). Nevertheless,

the long-term health and even survival of many species and ecosystems requires the preservation of *extensive* tracts of predominantly natural land. As a general rule, for ecological systems to be viable in the long term, such areas must be large enough to absorb the impact of the largest-scale disturbances that are likely to occur. An obvious example is the impact of wildfires: while a small region might be entirely burnt out, a large, environmentally heterogeneous region is more likely to contain unburnt areas.

The long-term health and even survival of many species and ecosystems requires the preservation of extensive tracts of predominantly natural land.

Similar considerations apply to the potential effects of climate disruption, which are likely to involve large-scale changes to ecological systems. Again, mitigating the impact of these effects is likely to require the protection of a wide range of environments; but the protection of wilderness areas and their associated remoting buffers – which together will be large and intact (see 5.2) – is likely to be particularly important. Large, intact landscapes provide the best chance for species and ecosystems to persist in the face of rapid climate change. They have greater resilience to external stressors, provide more options for species in both space and time, sustain critical ecological processes such as long-distance biological movement, and maximise the adaptive capacity of species (Mackey et al. 1998).

Wilderness protected areas, if appropriately designed (see 9.1) to include wilderness areas and their associated remoting buffers, will necessarily be large and connected, lack outliers and narrow corridors, and have low boundary-to-area ratios. These characteristics tend to enhance their suitability for protecting ecological values on a landscape scale, for example by minimising edge impacts such as weed invasion, feral animals and invasive fire. By contrast, fragmentation tends to reduce habitat, increase edge effects, and subdivide and isolate populations (Mackey et al. 1998; European Commission 2013).

The absence of roads, in particular, contributes to the suitability of wilderness areas for ecological conservation, not least because it makes human access more difficult and time-consuming. Roads are associated with a range of adverse impacts on nature conservation values, including the isolation and fragmentation of plant and animal populations; provision of access for hunting and timber collection (legal or otherwise); enhanced dispersal of weeds and feral animals; increased risk of anthropogenic fire ignition; and often significant wildlife mortality due to motor vehicles (Mackey et al. 1998; Laurance et al. 2017). By facilitating access, roads can also be associated with increased off-road impacts such as those associated with off-road vehicular use and trampling of vegetation by recreational users.

2.4 The ecocentric and intrinsic values of wilderness

The foregoing arguments are primarily concerned with the benefits that wilderness can bring in terms of facilitating and maintaining ecological processes and offering opportunities for the enrichment of human experience. Such benefits can, for the most part, be framed in anthropocentric or at least utilitarian terms; for example, it can be argued that the preservation of biodiversity is ultimately necessary for human survival.

Many people believe that wilderness also has a right to exist for its own sake; or, to put this another way, that areas of the natural world that exist and flourish in a largely unaltered condition, independently of human needs and desires, have intrinsic value (e.g. Curry 2011; Thompson 2017). Indeed, many environmental philosophers and academics have considered the recognition of intrinsic value to be an ethical imperative (Piccolo 2017).

Many people believe that wilderness has a right to exist for its own sake.

One argument in support of ecocentrism is that undiluted anthropocentricism is ultimately destructive and self-defeating, as it fails to acknowledge that humans are not at the apex of terrestrial life but are merely part of an interconnected and interdependent web of existence. Chan et al. (2016) argue that the debate over the relative merits of the extrinsic and intrinsic values of nature is too narrowly focussed, and that it is necessary to also consider relational values, which connect to both, and which pertain to the relationships between people and nature. Such values are reflected and expressed in a diversity of world views, including contemporary environmentalism.

2.5 Wilderness areas as Indigenous cultural landscapes

Indigenous people have, for millennia, inhabited and accessed many areas that meet our recommended definition of wilderness. In many parts of the world such habitation and access continue, and Indigenous people retain strong cultural and spiritual links to such areas. Indeed, in some

places the preservation of wilderness may be the only option for saving the last isolated Indigenous peoples from unwanted contact (Allan et al. 2017).

Throughout much of the twentieth century, western conceptions of wilderness tended to reflect a settler-colonial perspective that ignored or downplayed the deep interrelationships that existed between Indigenous people and 'wild' landscapes. The US *Wilderness Act 1964*, for example, does not acknowledge that many of the areas it defines as wilderness were inhabited or visited for millennia by Native Americans, many of whom retain strong cultural and spiritual links to such areas.

Partly because of its association with a western colonial mindset, there is a wide diversity of opinion among Indigenous communities on the concept of wilderness (Casson et al. 2016). In Tasmania, for example, opinions in the Aboriginal community range from hostility to the concept to support for the proposition that managing large parts of the Tasmanian Wilderness World Heritage Area as wilderness is the best way to ensure the ongoing protection of the Indigenous Tasmanian cultural heritage in its original context.

In recent decades, conservation NGOs and government agencies have increasingly recognised the importance of Indigenous communities' links to the land, and have consulted with Indigenous groups to develop mutually acceptable definitions of wilderness. For example, the stated objectives of the IUCN definition of wilderness include: 'To enable Indigenous communities to maintain their traditional wilderness-based lifestyle and customs', and 'to protect the relevant cultural and spiritual values and non-material benefits to Indigenous or non-Indigenous populations, such as solitude, respect for sacred sites, respect for ancestors etc.' (Dudley 2013).

2.6 The significance of remoteness

The experiential values of wilderness are strongly linked to its remoteness, because remote settings isolate the visitor from the influences of modernity and confront them with the vastness of the natural world (Hawes 2017). The further one stands from roads, buildings and other trappings of modern civilisation, the greater one's opportunity for experiencing solitude and a sense of 'immersion' in the natural world, independent from external support. Natural landscapes that include remote areas are conducive to the appreciation of boundlessness, immensity, and that special quality of silence and harmony that one senses in wild places. Visiting remote places, especially those remote enough to require at least one overnight stay in a remote location, requires undertaking challenging journeys that demand self-reliance and heighten the sense of 'passage' to a more primal state.

The word 'remote' implies physically distant from infrastructure and other evidence of modern society, including relatively minor artefacts such as huts (cabins), towers and helipads. The presence of such infrastructure impacts experiential values in a variety of ways, often over considerable distances. A walkers' hut offers shelter, but at the price of self-reliance. A helipad signals occasional mechanical access that intermittently shatters the peace of the environs. An airstrip, logging coupe or mining scar can mar the view from distant peaks. The mere knowledge that one is close to an artefact of modern civilisation, such as an abandoned mine or a communications tower – even if it is out of sight – diminishes the impression that one is in a natural and minimally-disturbed environment, and hence impacts the sensations and experiences that are associated with that impression.

Remote settings isolate the visitor from the influences of modernity and confront them with the vastness of the natural world.

Remoteness can protect cultural values such as those associated with Indigenous relics (DPIPWE 2016). It can also have ecological benefits, providing a defence against disturbances such as air pollution, species invasion, fire, and poaching. As noted earlier (see 2.3), reserves designed to keep places remote tend to be large, have convex boundaries, and have low boundary-to-area ratios: characteristics that enhance their suitability for protecting ecological values on a landscape scale. In their survey of World Heritage sites that have been listed because they have attributes that correspond to wilderness areas as defined by Kormos et al. (2017b), van Merm and Osipova (2017, p.21) noted that 'the wilderness attribute most frequently referred to in statements of Outstanding Universal Value is that of "remoteness".' The authors added, 'for the majority of sites (25, or more than half) their remoteness is recorded as contributing to their conditions of integrity'. (van Merm and Osipova do not elaborate on what is meant by 'remoteness' in these statements, but they associate the word with 'isolation' and 'inaccessibility'.)

Our definition of wilderness requires that wilderness areas have a high degree of linear remoteness and access-time remoteness. The latter is the degree to which a location or area is remote (in terms of travelling time by foot or by non-mechanised craft, such as kayaks) from points of mechanised access such as roads, airstrips, jetties, and shorelines accessible to powered boats. Access-time remoteness tends

to limit human access; and the presence of humans can be associated with a range of ecological and environmental impacts as a result of activities such as trampling of vegetation, disturbing wildlife, fire-lighting, littering, timber-cutting, hunting, and the spread of weeds and pathogens such as *Phytophthora cinnamomi* (DPIPWE 2016). Limiting human access also increases individual opportunities for solitude and decreases the likelihood of encountering evidence of modern civilisation.

In 5.2 we discuss further the significance of remoteness insofar as it relates to the largeness, local extensiveness, intactness and compactness of wilderness areas.

3 EXISTING DEFINITIONS OF WILDERNESS

In this section we review the definitions of wilderness that have been adopted by prominent agencies such as the IUCN and the European Commission, as well as by prominent advocates for better consideration of wilderness in a World Heritage context. We briefly critique each of these definitions in terms of the characteristics and values that they associate with wilderness, particularly the extent (if any) to which they acknowledge the significance of remoteness.

3.1 IUCN

The International Union for Conservation of Nature (IUCN) is composed of both government and civil society organisations, with the mission of informing and empowering conservation efforts worldwide. It is also the advisory body on natural heritage to the World Heritage Committee.

The IUCN defines wilderness areas as a category of protected area, specifically Category Ib protected areas. The definition of these areas is included in the document *Guidelines for applying Protected Area Management Categories* (Dudley 2013) along with explanatory notes. Detailed guidelines for applying the categorisation are given in Casson et al. (2016).

Key passages from the Dudley 2013 document are as follows:

> *Category Ib protected areas [i.e. wilderness areas] are usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition.*
>
> ***Primary objective***
>
> - *To protect the long-term ecological integrity of natural areas that are undisturbed by significant human activity, free of modern infrastructure and where natural forces and processes predominate, so that current and future generations have the opportunity to experience such areas.*
>
> ***Other objectives***
>
> - *To provide for public access at levels and of a type which will maintain the wilderness qualities of the area for present and future generations;*
> - *To enable Indigenous communities to maintain their traditional wilderness-based lifestyle and customs, living at low density and using the available resources in ways compatible with the conservation objectives;*
> - *To protect the relevant cultural and spiritual values and non-material benefits to Indigenous or non-indigenous populations, such as solitude, respect for sacred sites, respect for ancestors etc.;*
> - *To allow for low-impact minimally invasive educational and scientific research activities, when such activities cannot be conducted outside the wilderness area.*
>
> ***Distinguishing features***
>
> *The area should generally:*
>
> - *Be free of modern infrastructure, development and industrial extractive activity, including but not limited to roads, pipelines, power lines, cellphone towers, oil and gas platforms, offshore liquefied natural gas terminals, other permanent structures, mining, hydropower development, oil and gas extraction, agriculture including intensive livestock grazing, commercial fishing, low-flying aircraft etc., preferably with highly restricted or no motorized access.*
> - *Be characterized by a high degree of intactness: containing a large percentage of the original extent of the ecosystem, complete or near-complete native faunal and floral assemblages, retaining intact predator-prey systems, and including large mammals.*
> - *Be of sufficient size to protect biodiversity; to maintain ecological processes and ecosystem services; to maintain ecological refugia; to buffer against the impacts of climate change; and to maintain evolutionary processes.*
> - *Offer outstanding opportunities for solitude, enjoyed once the area has been reached, by simple, quiet and nonintrusive means of travel (i.e., non-motorized or highly regulated motorized access where strictly necessary and consistent with the biological objectives listed above).*
> - *Be free of inappropriate or excessive human use or presence, which will decrease wilderness values and ultimately prevent an area from meeting the biological and cultural criteria listed above. However, human presence should not be the determining factor in deciding whether to establish a category Ib area. The key objectives are biological intactness and the absence of permanent infrastructure, extractive industries, agriculture, motorized use, and other indicators of modern or lasting technology…*
>
> ***What makes category Ib unique?***
>
> *… But whereas II usually includes (or plans to include) use by visitors, including supporting infrastructure,*

in Ib visitor use is more limited and confined to those with the skills and equipment to survive unaided. (p. 15).

Table 4. How size of protected area relates to the category

… Part of the rationale of wilderness areas is that they provide enough space to experience solitude and a large scale natural ecosystem. (p. 36).

Comment

The preceding passages acknowledge both the ecological and experiential values of wilderness, and specify some of the preconditions (such as absence of permanent infrastructure) for ensuring the protection of the latter. However, the text does not mention remoteness; and as we explained in 2.6, the experiential values of wilderness are strongly linked to its remoteness. The specification that a wilderness area be free of modern infrastructure does not guarantee that it will be remote from such infrastructure; and, as we point out in 5.1, the requirement that it be large does not guarantee that any part of it will be remote, or that its qualities of remoteness will be adequately protected.

While the IUCN definition above states that a wilderness area should 'offer outstanding opportunities for solitude', it does not contain guidance on how these opportunities should be provided, which limits its usefulness for arguing for the protection of remoteness and, hence, experiential values.

3.2 United States of America Wilderness Act 1964

The US *Wilderness Act 1964* was the world's first legislation enacted specifically to protect wilderness. Some of the key implications of the Act, particularly in relation to the monitoring of wilderness character, are discussed in the interagency strategy document *Keeping it wild 2: An updated interagency strategy to monitor trends in wilderness character across the National Wilderness Preservation System* (Landres et al. 2015).

The Act defines 'an area of wilderness' as:

> *A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.*

Comment

The above definition reflects the view that emerged particularly in the United States in the early twentieth century of wilderness as a place of retreat from the commotion of modern technological society and as a setting for wholesome outdoor pursuits. As with the IUCN (Dudley 2013) and European Commission (2013) definitions (see 3.3), the US definition specifies that a wilderness area be large without specifically requiring that any part of it be remote.

Landres et al. (2015) identified 'Solitude or primitive and unconfined recreation' as a component of wilderness character, and listed 'Remoteness from sights and sounds of human activity', as an indicator of this component. However, only one of the examples that Landres et al. suggested of possible measures of this indicator, namely 'area of wilderness away from access and travel routes and developments' involves direct measurements of linear or temporal remoteness.

3.3 European Commission

The document *Guidelines on Wilderness in Natura 2000* (European Commission 2013) contains the Commission's definition of wilderness as well as explanatory notes and guidelines for applying the definition.

Key passages in this document are as follows:

> *A wilderness is an area governed by natural processes. It is composed of native habitats and species, and large enough for the effective ecological functioning of natural processes. It is unmodified or only slightly modified and without intrusive or extractive human activity, settlements, infrastructure or visual disturbance.* (p. 10).
>
> *[Size] is important as people identify spiritually with the wilderness and feel emotionally bound to the landscape. The size of the area often determines the perception of 'wildness', i.e. if a visitor can experience solitude, wholeness and other spiritual experiences* (p. 11).
>
> *… wilderness is often related to remoteness, although this is not a strict prerequisite …*(p.11)
>
> *Undevelopedness is another important aspect of wilderness. Habitation, settlements or other human artefacts such as power lines, roads, railways, fences may hinder ecological processes directly or by promoting the likelihood of human interference …* (p.12)
>
> *In the European context, and the Natura 2000 network in particular, it is important to notice that there is a spectrum of more or less wild areas*

according to the intensity of human interference. In that sense, wilderness is a relative concept which can be measured along a 'continuum', with wilderness at one end and marginal used land at the other. Re-wilding is a process to move areas up towards a wilder state, where the final stage is wilderness ... (p. 12)

In this guidance document the term 'wilderness' is applied to protected areas where management objectives of the site aim at achieving those objectives. The term 'wilderness' is also used for areas outside protected areas where most of the wilderness qualities are found. (p. 12).

Comment

Unlike the IUCN and US Wilderness Act definitions, this definition identifies wilderness in terms of its characteristics rather than as a management category. As with the IUCN and US Wilderness Act definitions, however, the *Guidelines* stress the importance of size, acknowledging that 'wilderness is often related to remoteness' but stating that remoteness is not a strict prerequisite.

3.4 New Zealand Conservation Act 1987

Legal provision for wilderness areas in New Zealand was first made in the *National Parks Act 1952*, but from the late 1970s advocacy for the protection of wilderness in New Zealand was driven by the outdoor recreational community (Molloy 2001). Policy developed by a government-appointed advisory group in 1985 (Molloy 2001) states:

> *Wilderness areas are wildlands that appear to have been affected only by the forces of nature, with any imprint of human interference substantially unnoticeable. Designated wilderness areas are managed to perpetuate their natural condition.*

New Zealand's Conservation Act 1987 provides for the designation of 'wilderness areas', and there are similar legislative provisions in related Acts (Cessford & Reedy 2001). The Conservation Act lists the following provisions that must apply to any Wilderness Area:

- *Its Indigenous natural resources shall be preserved.*
- *No building or machinery shall be erected on it.*
- *No building, machinery, or apparatus shall be constructed or maintained upon it.*
- *No livestock, vehicles, or aircraft shall be allowed to be taken onto or used on it.*
- *No roads, tracks, or trails shall be constructed on it.*

The New Zealand Department of Conservation's *Visitor Strategy* (1996) described the operational specifications of the physical and social conditions that are required, to provide for wilderness experiences in such designated wilderness areas (and also contains more detailed guidance on how these conditions should be achieved):

- *They will be large enough to take at least two day's foot travel to traverse.*
- *They should have clearly defined topographic boundaries and be adequately buffered so as to be unaffected, except in minor ways, by human influences.*
- *They will not have facilities such as huts, tracks, bridges, or signs, nor will mechanized access for recreation be allowed.*

The Visitor Strategy also emphasised the need to protect 'natural quiet', particularly through the restriction of aircraft flying over the back-country.

Comment

Clearly this definition of 'wilderness area' is of the 'administrative designation' category. The NZ Act provides a firm basis for protecting experiential values, with its implementation documentation specifying the 'physical and social conditions ... required to fulfil wilderness experiences'. Interestingly, no explicit mention is made of ecological values, and a wilderness area is not explicitly required to be in a largely natural condition in biophysical terms. Indeed, the 1996 *Visitor Strategy* states, 'Wilderness is ... principally a recreational and cultural concept which is compatible with nature conservation'. However, Cessford and Reedy (2001) state that 'while New Zealand wilderness originated as a recreation-experience concept, an important value component relates to the ecological integrity of the environment'.

The requirements that wilderness areas be large enough to take at least two days' foot travel to traverse, and that they be 'adequately buffered so as to be unaffected, except in minor ways, by human influences', go a long way to ensuring that the protection of remoteness is recognised as a necessary component of wilderness conservation. The exclusion of infrastructure such as trails, signs and bridges imposes more stringent conditions on wilderness areas than does our own definition, although we note that such infrastructure impacts wild character and should therefore be limited as far as possible (see 9.2).

Specific guidelines in the Department of Conservation's *Visitor Strategy* (1996) for the identification and management of wilderness acknowledge the value of remoteness in limiting access: 'Wilderness is a fragile resource, susceptible to overuse; while wilderness areas are open to everyone, overuse will be minimised by selecting areas for their remoteness rather than by regulating access by permit.'

3.5 The Wild Foundation

The Wild Foundation is a US-based non-profit organisation advocating for wilderness protection. Amongst other ongoing projects, the Foundation organises the World Wilderness Congress and publishes the *International Journal of Wilderness.*

On its website, the Foundation defines wilderness as:

> *The most intact, undisturbed wild natural areas left on our planet – those last truly wild places that*

humans do not control and have not developed with roads, pipelines or other industrial infrastructure.

A wilderness area is not necessarily a place that is biologically 'pristine'. Very few places on earth are not in some way impacted by humans. Rather, the key is that a wilderness area be mainly biologically intact: evidence of minor human impact, or indications of historical human activity does not disqualify an area from being considered wilderness. Nor must a wilderness area be free of human habitation: many indigenous populations live in wild areas around the world, often playing a key role in keeping wilderness intact and free of development.

The essence of a wilderness area is that it is a place where humans can maintain a relationship with wild nature. Whether that relationship is characterized by recreational use or traditional, indigenous use does not matter, so long as the relationship is predicated on a fundamental respect for – and appreciation of – wild nature.

Wilderness areas are protected for a broad range of biological, social, economic, spiritual and recreational benefits – they often also have powerful iconic value, holding great significance as spectacular, awe inspiring places. (Wild Foundation n.d.)

Comment

This definition acknowledges the ecological and experiential values of wilderness. However, it does not state that wilderness needs to be remote or contain remote areas, or even that it needs to be large.

3.6 Robertson et al. 1992

Robertson, Vang and Brown (1992) developed the following definition for the then-Australian Heritage Commission. The definition was used by The Wilderness Society (Australia) and was cited in the 1999 Tasmanian Wilderness World Heritage Area Management Plan:

> *A wilderness area is defined as an area that is, or is capable of being restored to be: of sufficient size to enable long term preservation of its natural systems and biological diversity; substantially undisturbed by colonial and modern technological society; and remote at its core from points of mechanised access and other evidence of colonial and modern technological society.*

Comment

The requirement that a wilderness area be 'remote at its core' implies that its peripheral parts will not necessarily be remote (and indeed generally won't be). It also leaves open the possibility that part of a 'wilderness area', such as a narrow extension of land bordering a river, may not be remote and may not contribute to the remoteness of the core area. **See 5.1** for further discussion of this point.

3.7 New South Wales Wilderness Act 1987

The *New South Wales Wilderness Act 1987* is an example of legislation drafted specifically to protect wilderness in Australia. The Act states (Section 6):

> *An area of land shall not be identified as wilderness by the Director-General unless the Director-General is of the opinion that:*
>
> *a) the area is, together with its plant and animal communities, in a state that has not been substantially modified by humans and their works or capable of being restored to such a state,*
>
> *b) the area is of a sufficient size to make its maintenance in such a state feasible, and*
>
> *c) The area is capable of providing opportunities for solitude and appropriate self-reliant recreation.*

Comment

Item (c) in the above text specifically relates to what we are terming the experiential values of wilderness. The requirement that wilderness provide opportunities for solitude and appropriate self-reliant recreation can be interpreted as implying that at least parts of it should be remote, but the Act does not state this explicitly.

3.8 Tasmanian Wilderness World Heritage Area Management Plan 2016

The Tasmanian Wilderness World Heritage Area Management Plan 2016 (TWWHA Management Plan) states:

> *A wilderness area is an area that is of sufficient size, remoteness and naturalness to enable the long-term integrity of its natural systems, diversity and processes, the maintenance of cultural landscapes and the provision of a wilderness recreational experience.* (DPIPWE 2016, p. 175)

Comment

This is the only definition in this list that explicitly identifies remoteness as one of the defining characteristics of wilderness. The definition also emphasises, as we do, the ecological and experiential values of wilderness. Unfortunately, the Management Plan fails to specify the protection of wilderness as a management objective. Furthermore, its Wilderness Zone delineation is based on current recreational use, not on the distribution of areas of high Wilderness Value as identified in the Plan. In consequence, the Wilderness Zone excludes some areas of high Wilderness Value and provides inadequate remoteness buffering for many other such areas (see Appendix).

3.9 Kormos et al. 2017b

The authors of 'The need for a wilderness and large landscapes and seascapes approach under the World Heritage Convention' (Kormos et al. 2017b) are advocates for ensuring that the World Heritage List includes full coverage of Earth's wilderness areas. They propose the following definition of wilderness in an IUCN publication (Kormos et al 2017a, p. 2), although their views are not necessarily those of the IUCN:

> *We use the term wilderness to describe landscapes and seascapes that are biologically and ecologically largely intact, with a low human population density and that are mostly free of industrial infrastructure.*
>
> *The term 'wilderness' is therefore not exclusive of people, but rather of human uses resulting in significant biophysical disturbance. As a result, wilderness quality is often defined in terms of remoteness from urban settlements and modern infrastructure and the degree of ecological impacts from industrial activity …*
>
> *We emphasize that our use of the term [wilderness] is to indicate large, mainly biologically intact landscapes and seascapes which do not exclude people, but rather limit certain, mainly industrial, uses that would cause significant disturbance.*

Comment

Kormos et al. (2017b) proposed this definition in the context of an assessment of biologically and ecologically largely intact landscapes at a global and continental scale. Such landscapes are undoubtedly of outstanding ecological importance, and the impacts associated with (for example) isolated settlements are arguably inconsequential in ecological terms at the scale under consideration. Nevertheless, we have a number of concerns about the implications of this definition, especially if it is used outside the context of global- and continental-scale assessments.

One concern is that this definition could foster the perception that industrial infrastructure may be acceptable in wilderness providing it does not cause significant disturbance. While Kormos et al. do not define the term 'significant disturbance', this suggests, for example, that activities such as mineral exploration or the construction of communication towers could be acceptable in wilderness. The reference to 'low population density' is also problematic, as it leaves open the possibility that isolated settlements other than those associated with hunter-gatherer societies could be acceptable in wilderness. We suggest that the use of a phrase such as 'large area where natural ecological processes are still predominant' would be a more accurate characterisation of the lands Kormos et al. are referring to, and would avoid confusing such areas with wilderness as we recommend defining it.

A similarly broad definition was adopted by Mittermeier et al. (2003), who classified places as wilderness areas of global significance if they covered more than 1 million hectares, retained at least 70 per cent of their historical habitat extent and had human population densities of less than or equal to five people per square kilometre. We are concerned that the adoption of these or similar definitions by governmental and intergovernmental agencies, such as the IUCN, or non-government organisations could lay the foundation for 'wilderness-protection' policies that do little to deter the infiltration of roads, buildings, settlements and 'low impact' industrial infrastructure into wilderness areas, resulting in substantial further loss of experiential (and possibly other) values.

4 APPROACHES TO DEFINING WILDERNESS

To gain a better understanding of the implications and ramifications of existing definitions of wilderness, and of the rationale for our own definition, it is useful to consider the various ways in which one can approach the task of defining wilderness.

4.1 Historic meanings

The word 'wilderness' derives from an Old English word denoting 'a place of wild animals'. Biblical references to wilderness associate it with wild, threatening landscapes and barren lands 'uncivilised' by human hands. It was only in the late nineteenth century that a more sympathetic view of wilderness began to take root in the western world, by which time much of the planet's wilderness had already been lost to agriculture, road construction, resource extraction and similar developments (and many of the world's Indigenous societies had been decimated and displaced from their ancestral lands). Thanks to campaigners such as Henry David Thoreau, Aldo Leopold, Waldo Emerson, John Muir, Howard Zahniser and (in Australia) Myles Dunphy, the view began to emerge that wilderness had value as a place of retreat from the commotion of modern civilisation, as the setting for wholesome outdoor pursuits, as a refuge for nature, and as a symbol of humanity's capacity to limit its greed for natural resources. By the 1960s and 1970s, many people had begun to regard wilderness as a place of outstanding value, with a right to exist for its own sake. And since the 1980s there has been increasing recognition of the rights of Indigenous people as custodians of and stakeholders in many of the planet's wilderness areas.

4.2 Values implicit in a definition

Definitions of wilderness reflect the values that their authors consider of primary importance. And as we noted in the Introduction, the wording and emphasis of definitions is far from a merely semantic concern, as they have real-world implications for how wilderness areas are delineated and managed (Bastmeijer 2016; Washington 2007).

Areas identified as wilderness by definitions that emphasise ecological values will not necessarily have high experiential values, and reserves designed to protect the former will not necessarily protect the latter. For example, an ecological reserve might be subject to frequent low-altitude aircraft overflights, which might have minimal (known) impact on ecological values but which might substantially reduce opportunities for people to appreciate the area, either directly or indirectly, as 'undisturbed'. Similarly, structures such as communications towers, and activities such as visitations by offshore cruise ships or recreational snowmobiles, might be acceptable in wilderness as identified by ecologically-oriented definitions, but not as identified by definitions that recognise experiential values.

The wording and emphasis of wilderness definitions have real-world implications for how wilderness areas are delineated and managed.

A more extreme example is that, previously cited, of the 'wilderness areas' identified on a continental scale by Kormos et al. (2017b). Such areas undoubtedly have outstanding value in terms of ecological conservation, and the Kormos et al. approach may be the only practical way to assess wilderness across regions where limited information is available on the location of (for example) minor roads. However, the fact that areas thus defined may include some types of roads, low-impact industrial infrastructure, and even settlements, renders the classification unsuitable for application across less extensive regions (say, less than 1 million square kilometres), and unsuitable as a guide to the location of areas of any size having significant experiential values. Indeed, 'wilderness areas' as defined by Kormos et al. would not necessarily meet the requirements of the IUCN definition, which requires wilderness areas to 'be free of modern infrastructure' (Dudley 2013), or of the European Commission definition, which requires wilderness to be 'without intrusive or extractive human activity, settlements, infrastructure or visual disturbance' (European Commission 2013).

Definitions that recognise experiential values generally require wilderness to be in a largely natural condition. However, the degree of naturalness that might be considered adequate to safeguard experiential values will not necessarily be sufficient to protect an area's ecological values. For example, sporadic trampling of an alpine meadow might have little obvious impact on visitors' impressions of its naturalness, but might threaten the viability of localised rare plant species. Similarly, an introduced plant may be present in significant numbers but only be recognised as such by informed visitors.

The foregoing examples illustrate that the objectives of protecting ecological and experiential values could conflict,

at times. For example, efforts to prevent the extinction of a bird species might require the installation of artificial structures such as helipads and bird hides, or, to promote habitat regeneration, controlled burning might be needed in a remote area. Hence, managing 'wilderness' as identified by a definition that recognises both ecological and experiential values may (and generally will) require weighing the relative priorities of each objective, and arriving at compromises where they compete. These sorts of management dilemmas are discussed by Cole (2001).

4.3 Two different terms for wilderness?

The fact that ecological and experiential perspectives can yield different conceptions of what constitutes 'wilderness' raises the question of whether we should adopt separate terms to identify the two different meanings of the word. We could, for example, use the term 'ecological wilderness' to refer to large, predominantly natural areas, such as those termed 'wilderness' by Kormos et al. (2017b) and others, and 'experiential wilderness' to refer to areas within ecological wilderness that are also remote from roads, settlements and the like, and that provide opportunities for a wilderness experience. While this approach might have merit from the point of view of academic rigour, it seems unlikely to gain wide currency and it raises the question of what the word 'wilderness' would mean when used without qualification. It would also run the risk of creating further confusion about what wilderness is. For these reasons, we do not recommend it.

4.4 Wilderness definition and Indigenous rights

It is important that the rights of Indigenous people be respected and, as far as possible, accommodated in the design and management of protected areas. The achievement of this may (and generally should) involve including Indigenous communities in the governance of areas with which they have historic, cultural and spiritual links, and may include allowing Indigenous people to pursue some traditional activities such as hunting in protected areas.

That said, as we have chosen to define wilderness descriptively (see 4.5) we hold that wilderness should be defined, delineated and measured in terms of its conditions and types of usage, regardless of the cultural affiliations of the people who are responsible for those conditions and types of usage. For example, by our definition, access by motorised vehicles or the construction of a building will have the same impact on wilderness, regardless of who is responsible for such access or construction.

4.5 Administrative designation or an area defined by its actual condition?

It is important to be clear about whether wilderness is defined by some combination of parameters based on the actual condition of a tract of land (which may include aspects of its tenure and/or management), or whether it is an administrative category that designates a tract of land to be 'wilderness' or a 'wilderness area', and prescribes desired conditions to be achieved and/or maintained by management actions. Lack of clarity on this point can easily lead to confusion.

This is particularly true with regard to the term 'wilderness area'. According to our recommended definition (see the Glossary and section 7) this is 'an area of land that has the characteristics of wilderness', not to be confused with an area of land that has been assigned a management designation associated with the management of wilderness values. This distinction is closely related to the question of whether the periphery of a wilderness area should be or can be remote (see 4.6), and whether a wilderness area requires or should incorporate a remoting buffer (see 4.7).

The European Commission (2013) definition is an example of a definition that identifies wilderness purely in terms of the characteristics of the land. An area designated as wilderness according to the requirements of the US Wilderness Act (see 3.2) is an example of wilderness as an administrative category (despite the inclusion of standards which need to be met before an area can be considered for designation as wilderness). Another section of the Act prescribes that designated wilderness areas be managed for the preservation of their wilderness character.
Note that, if 'wilderness areas' are defined as an administrative designation, not all areas that could potentially qualify as 'wilderness areas' will necessarily be recognised and designated as such, and not all designated 'wilderness areas' will necessarily meet the standards that label implies.

4.6 Does wilderness need to be remote?

It is widely (although not universally) agreed that the term 'wilderness' should be used to denote extensive tracts of natural land. But is it enough to say that a wilderness area should be large? Should it also be remote, or at least contain remote land? We have previously argued that the experiential values of wilderness are strongly linked to its remoteness (see 2.6).

As we explain in detail in 5.1, specifying that an area be large does not guarantee that any part of it will be remote. To take an extreme example, a riverine reserve might cover thousands of hectares, yet be no more than a kilometre wide at any point. Nevertheless, many existing definitions go no further than specifying that a wilderness area be large, with or without specifying a minimum size.

Robertson et al's (1992) definition, subsequently used by other Australian organisations (see 3.6), mentions remoteness, but only requires wilderness to be 'remote at its core from

points of mechanised access and other evidence of colonial and modern technological society' (i.e. only this core can potentially comply with our definition of wilderness). As noted in 3.6, the requirement that wilderness have a remote 'core' implies that areas outside the core will not be remote. It also leaves open the possibility that some parts of a 'wilderness area', such as a narrow extension of land bordering a river, could neither be remote nor contribute to the remoteness of the core area. We illustrate this in 5.1.

Excluding features such as roads from wilderness does not guarantee that wilderness will be *remote* from them.

A similar problem arises in relation to definitions that specify that wilderness should be *free of* features such as roads and settlements, without specifying that it should be *remote from* them. Excluding such features from wilderness does not guarantee that wilderness will be remote from them. For example, the European Commission (2013) requires that a wilderness be 'without intrusive or extractive human activity, settlements, infrastructure or visual disturbance'. This requirement does not guarantee that an area thus defined will not be immediately adjacent to a mine (for example), providing the latter is not visible.

The question of whether all or part of a wilderness area should be remote is closely related to the question of whether wilderness is defined prescriptively or descriptively, as discussed in 4.5. If a 'wilderness area' is an area of land that has been assigned a management designation associated with the management of wilderness values, it makes sense for the area to extend out to boundaries such as roads and developed areas – in which case its outer regions will not be remote, and hence will not be wilderness as we are defining it.

4.7 Implications of defining wilderness as remote

Our definition of wilderness requires it to be remote (see 7.1). A crucial point that needs to be understood is that, in order for wilderness thus defined to exist, it needs to be surrounded by country (i.e. land or sea) that makes it remote. In order to do this, the country in question must be free of the kind of structures and impacts that the wilderness is remote from, such as roads, dams, drilling platforms and logging areas. Moreover, such country has to be managed to *remain free* of such structures and impacts if this remoteness, and hence by definition the wilderness itself, is to be preserved.

Such country thus plays a role similar to that of an ecological buffer zone. We recommend the term 'remoting buffer' to emphasise its essential function in relationship to wilderness (see Glossary). It is important to emphasise that the role of a remoting buffer is to maintain the remoteness of wilderness (see Figure 1, page 5), whereas a buffer zone in the ecological sense may not maintain the same sort of remoteness. For example, some types of ecological buffer zone might contain roads, whereas remoting buffers will not.

The categorisation of land into 'wilderness', 'remoting buffer' and 'other' may appear unnecessarily cumbersome, particularly to readers who are more familiar with the approach in which an area is assigned a management designation which prescribes the management of wilderness values. Our rationale is that the recommended descriptive approach makes unequivocally clear what wilderness is, and what is required to preserve it as such. The prescriptive approach may have an appealing simplicity, but it can – and often does – lead to areas that are not remote, and do not even serve as buffers for remote country, being designated as 'wilderness'. We illustrate this in 5.1. The resulting lack of clarity on what wilderness is can weaken arguments for the protection of wilderness.

4.8 Does a wilderness area have to be large?

As we have noted previously, many definitions specify that a 'wilderness area' must be large. However, the crucial question again here is whether the term 'wilderness area' is an administrative designation or identifies land that has specified characteristics, regardless of its management status.

We agree that any region that is managed to protect wilderness must necessarily be large. Exactly how large is dependent on the degree of physical remoteness – see below. We also acknowledge that there are circumstances when it is advantageous to emphasise the largeness of all or part of a wilderness area, particularly from an ecological perspective. For example, it is likely to be of interest from an ecological perspective to know that an area encompasses 80,000 hectares of largely undisturbed savanna or rainforest.

However, there are two key points to bear in mind. First, as we have pointed out previously and will explain in more detail in 5.1, being large does not guarantee that any part of an area will be remote. And second, wilderness regions (which we define as areas comprising wilderness together with its remoting buffers) are *inevitably* large, even if the wilderness areas that they contain are small. For this reason, we see no compelling reason to require a wilderness area itself to have a minimum size.

The definition of wilderness that we recommend in section 7 requires wilderness to have a high degree of physical remoteness from major infrastructure and landscape disturbances such as roads and impoundments. Specifically, we recommend a minimum linear distance of 5 km from such infrastructure and disturbances (see 7.2). The wilderness region associated with any area of wilderness – even a very

small area – must therefore have an area of at least 7850 hectares, i.e. the area of a circle with a 5 km radius. For example, in Figure 2 the area of wilderness (shaded dark green) covers only 186 hectares, but the wilderness together with its associated 5-km remoting buffer covers more than 11,000 hectares. This is the area that would need to be kept free of roads and similar infrastructure to keep the wilderness remote.

Our definition also requires wilderness to have a high degree of access-time remoteness. Specifically, we recommend that wilderness should be sufficiently remote of access for most visitors to require an overnight stay to visit it. If Figure 2 depicts terrain in which typical walking speeds are 10 km per day, then the depicted wilderness area (shaded dark green) will (just) satisfy this condition, even though it is small.

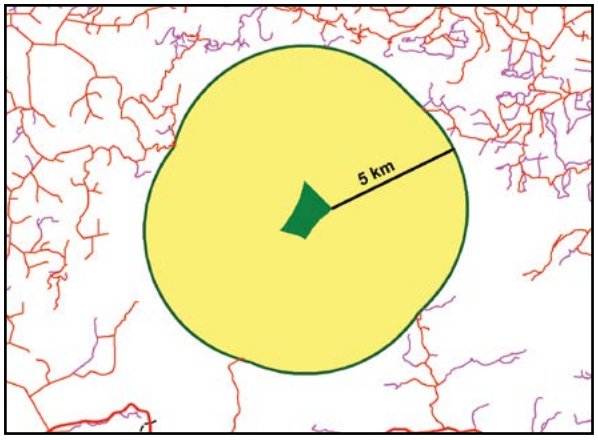


Figure 2: Hypothetical small area of wilderness with its associated remoting buffer. Red and magenta lines represent roads and vehicular tracks repectively.

4.9 Does a wilderness area have to be viable?

Closely related to the issue of whether wilderness is defined by its physical condition or designated as an administrative category is the question of whether an area has to be capable of *remaining* as wilderness in order to be defined as such. Small areas with large boundary-to-area ratios generally have less chance of being viable in the long term than large areas with low boundary-to-area ratios. But the viability or lack thereof of an area is also likely to depend heavily on how the area itself and adjacent areas are managed.

If wilderness is defined on the basis of its characteristics, it can be advantageous *not* to have viability as one of the requirements, since this will allow the recognition as wilderness of regions that may be under threat, or even likely to be lost. It also avoids the problem that viability will generally depend on numerous complex factors and be hard to predict with confidence. By contrast, if a 'wilderness area' is an administrative designation, it makes sense to ensure – as far as possible – that the managed area will be capable of protecting the wilderness within it, in the long term. For example, the US Wilderness Act 1964 (Section 2c), in which wilderness is an administrative category, requires that a wilderness area:

> *… has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition.*

4.10 Qualitative vs quantitative definitions

Some definitions of wilderness are entirely qualitative, describing the qualities that characterise wilderness without specifying the thresholds that distinguish it from non-wilderness. An example is the IUCN definition (Dudley 2013), which requires wilderness areas to be large enough to protect and sustain ecological processes and to offer opportunities for wilderness recreation, without specifying a minimum size.

Other definitions provide quantitative guidelines for delineating wilderness. For example, the US Wilderness Act suggests that wilderness areas should have a minimum area of 5000 acres (approximately 2000 hectares), although it does not insist on this. Similarly, the New Zealand Department of Conservation's *Visitor Strategy* (1996) states that designated wilderness areas will be large enough to take at least two days to traverse on foot.

Again, the relative advantages of defining wilderness qualitatively or quantitatively are linked to the question of whether the definition is based on its physical condition or designates an administrative category. If the latter, an advantage of couching the definition in purely qualitative terms is that it allows flexibility to designate 'wilderness areas' based on conditions (such as openness of terrain) that may be specific to a particular area.

In western Tasmania, for example, some areas are over half a day remote (i.e. taking more than half a day to reach by non-mechanised means), even though they are only 2–3 km from the nearest road, because of the density of the vegetation to be traversed. From the perspective of protecting experiential values there is an argument for protecting such places as wilderness, since they require an overnight journey to reach from roads or other points of mechanised access However, access remoteness is not the only defining characteristic of wilderness; linear remoteness is also necessary to ensure the extensiveness of wilderness regions and to limit distance-dependent impacts such as noise pollution from traffic.

On the other hand, if wilderness is defined by its physical condition there is a strong argument for specifying thresholds, to facilitate the identification and delineation of wilderness. In section 7 we recommend a two-tiered definition: the first tier identifying the qualities that distinguish wilderness; the second specifying thresholds of remoteness, and guidelines for determining a sufficient

degree of biophysical naturalness. A potential drawback of setting such thresholds is that areas such as those just referred to in western Tasmania will not be classified as wilderness, due to their linear proximity to points of mechanised access. This disadvantage can be partially offset by measuring wilderness attributes as a continuum, as we describe in section 9.

4.11 Defining wilderness in different environmental and cultural contexts

The points discussed in 4.10 raise the question of whether it is possible and/or desirable to craft a definition of wilderness that is suitable for application anywhere on the planet, and to specify thresholds that can similarly delineate wilderness everywhere.

We hold biophysical naturalness, linear remoteness, access-time remoteness and primitiveness to be the defining qualities of wilderness, regardless of its geographical location. The question of thresholds is less clear-cut, since it involves considerations such as which types of access and infrastructure are acceptable in wilderness protected areas – acceptable from a cultural and regulatory perspective, as well as in relation to the long-term viability of the wilderness in question.

For example, the riding of horses or other animals has traditionally been regarded as acceptable in wilderness areas, and is permitted under existing regulations, in many parts of North America and Eurasia. In such regions, it is reasonable to define access-time remoteness in terms of speeds of travel when riding animals. This is not the case in (for example) Tasmania, where most of the state's wilderness is unsuitable for horseriding and highly susceptible to trampling damage by horses and other hoofed animals. In light of such disparities, it is reasonable to adapt the interpretation of access-time remoteness to suit the environmental and cultural context of the region under consideration.

A related question is whether some types of infrastructure, such as vehicle tracks and cabins, and some types of landscape disturbances, such as grazed land, should be regarded as acceptable in wilderness in some geographical regions and not in others. An advantage of this approach is that it would allow the identification of wilderness in regions (such as much of Europe) where the exclusion of such infrastructure and disturbances would render wilderness largely non-existent.

While acknowledging that some flexibility along these lines may be appropriate, we recommend a set of 'non-negotiable' conditions that an area should meet in order to qualify as wilderness, regardless of its geographical conditions or its location on the planet. We list these in 7.2. Note that our 'non-negotiable' specifications exclude vehicle tracks and cabins from wilderness.

A corollary of our recommended definition is that no place where access by mechanised vehicles (including seasonal access by snowmobiles) is possible and legal would qualify as wilderness (although some mechanised access for official purposes may be acceptable). This excludes many areas, such as large expanses of ice cap or desert, which are popularly considered to be wilderness despite being accessed by vehicles. While recognising that such areas may in many ways be natural, remote and primitive, the experiential values that are associated with them are substantially different from those of areas that are totally inaccessible by motor vehicle. We therefore recommend using a term other than 'wilderness' to refer to such areas.

5 SIZE AND SHAPE OF WILDERNESS REGIONS

5.1 Largeness does not guarantee remoteness

The questions concerning largeness and remoteness in sections 4.7 and 4.8 deserve elaboration, because many existing definitions of wilderness specify that wilderness areas should be large, without acknowledging that the size of an area says nothing about its shape. The requirement of largeness alone fails to guarantee that an area will be remote, or that any part of it will be remote (Hawes 2017). By contrast, requiring wilderness to be remote ensures that a wilderness region, comprising an area of wilderness and its associated remoting buffer, will inevitably be large (see 5.2). (The wilderness area itself would not necessarily have to be large, as explained in 4.8.)

An area can be large without any part of it being remote.

Consider, for example, the hypothetical candidate for a 'wilderness area' shaded dark green in Figure 3. The region is bordered by a coastline and by a network of roads, illustrated as red lines. Assume that the entire shaded area is free of infrastructure (including other roads) and has a high degree of biophysical naturalness.

The area is reasonably large, having a total area of approximately 13,000 hectares. Hence, by several definitions, it would qualify as 'wilderness' or as a 'wilderness area'. Moreover, the region has a remote 'core', since point A is over 8 km from the nearest road.

However, areas close to the road-boundaries of this region are clearly not remote. Moreover, the shaded area in the vicinity of B is a corridor less than 5 km wide, bordered by two roads. It is not remote, and it does not contribute to the remoteness of any other part of the shaded area. The 'bottleneck' at C is not remote either; and the outlying coastal strip in the vicinity of D is neither remote nor large. None of the localities B, C or D qualifies as wilderness by the definition that we are recommending, nor do they contribute to the remoteness of the area around locality A.

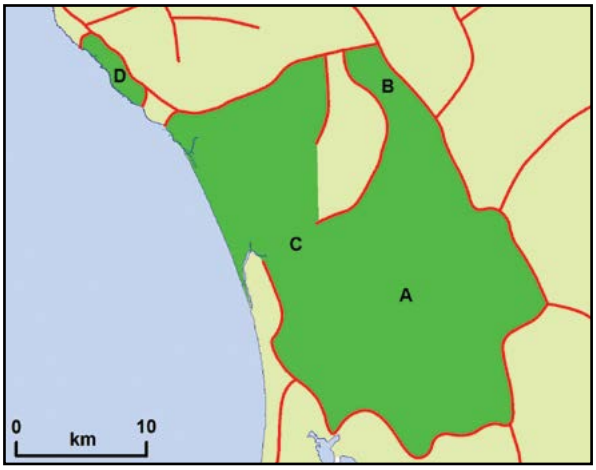


Figure 3: Hypothetical candidate for a 'wilderness area' (shaded dark green). Red lines indicate roads.

The series of figures overleaf (page 30) illustrates this point in more detail, depicting a hypothetical road and mine development in the Meredith Range region in northwest Tasmania – an area that is currently largely undeveloped.

Figure 4: Hypothetical reserved area in NW Tasmania. Red lines indicate roads.

Figure 5: Hypothetical road and mine development. Pink shaded area indicates mine.

Figure 6: Hypothetical reserve, with vicinity of mine and road excised.

Figure 7: Land 5 km remote from roads (pre-development).

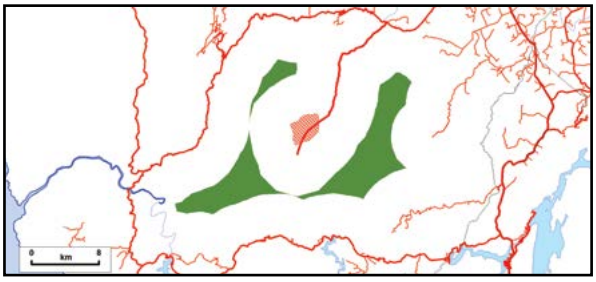


Figure 8: Land 5 km remote from roads (post-development).

The dark-green area in Figure 4 depicts a hypothetical reserved area spanning land that is currently free of roads, mines and similar developments. (There are some little-used vehicle tracks in the area, which we have ignored for the sake of this exercise.) The area covers approximately 76,000 hectares, which would qualify as 'large' by many size-based definitions of wilderness. It also contains locations that are more than 5 km remote from the nearest roads or other major developments, and that therefore qualify as wilderness by our definition (see Figure 7).

Suppose that a road and mine were to be constructed in the heart of this region, as shown in Figure 5. As such developments are generally considered incompatible with wilderness, a politically expedient response to such development might be to excise the road and mine from the reserved land, resulting in the area shown in Figure 6. (This figure does not show the road and mine, to focus attention on the remaining reserved land.) The remaining reserved land still covers just under 74,000 hectares; hence, if size were our only guide, it could be argued that there has been only a minor loss to the area of reserved land.

The impact on remoteness, however, is drastic. As a simple illustration of this, consider the land within this region that is at least 5 km remote from roads. Figure 7 shows the area of such land before construction of the road and mine, and Figure 8 shows the area remaining after construction. Clearly most of the 5-km-remote land is obliterated. (This does not imply that, in the event of such a development, the area should simply be written off, or that it would completely lose its conservation value. The point is that its remoteness, and hence its wilderness-related experiential values, will have been severely impacted.)

A more refined way of illustrating the impact of this kind of development on remoteness, and hence on wilderness values, is to map 'wild character' as we explain in detail in section 8. Figure 9 shows the distribution of wild character across the central roadless area before the hypothetical development, the darker green colouring highlighting the areas with the highest wild character (and, broadly speaking, the greatest remoteness). Figure 10 shows the distribution of wild character after construction of the road and mine. The reduction in wild character clearly illustrates the impact of the development in a way that the simplistic measurement of

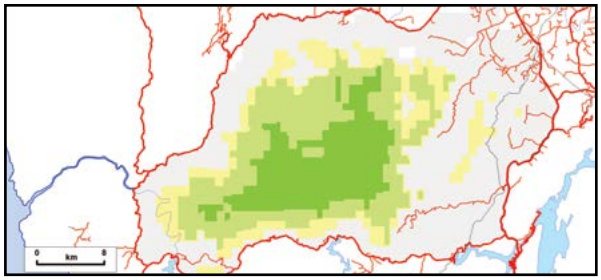


Figure 9: Wild character (see 8.3) pre-development.

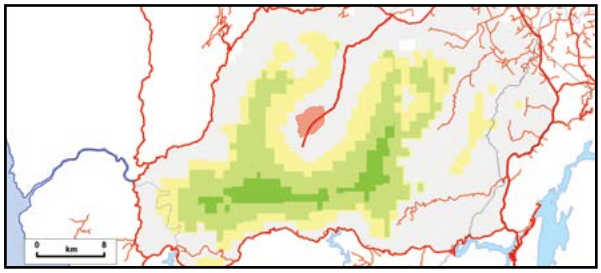


Figure 10: Wild character post-development.

the area of the reserve does not.

As we demonstrate in the Appendix, hut development can have a similarly drastic impact on the wild character of remote areas. Dixon (2016) presents a similar illustration for the real-world loss of wilderness associated with the Three Capes Track development in Tasmania.

5.2 Remoteness guarantees largeness, local extensiveness, intactness and compactness

In 5.1 we demonstrated that remoteness is essential to the definition of wilderness. A definition that fails to recognise remoteness as a defining characteristic of wilderness leaves the areas thus delineated vulnerable to developments that could drastically reduce their remoteness, potentially to the extent that they would no longer qualify as wilderness in our definition. By contrast, the insistence on remoteness as an essential characteristic of wilderness ensures that the wilderness regions associated with wilderness areas will be large, locally extensive (as defined below), intact (i.e. not fragmented), and compact (i.e. having a low boundary to area ratio).

Recall that we define (in the Glossary) a *remoting buffer* as the region that makes a given area of wilderness remote. We also define a *wilderness region* as an area comprising one or more areas of wilderness together with its/their associated remoting buffers.

As we will argue in section 9, the essential requirement of a 'wilderness protected area' is that it contain the wilderness area(s) that are to be protected, *together with* the associated remoting buffer(s), and that this entire protected area be kept free of roads, major buildings and similar developments.

Revisiting the example in 5.1, Figure 11 depicts land that is at least 5 km remote from the nearest roads in the region under consideration. The area shaded yellow in Figure 12 depicts the associated remoting buffer, the outer boundary of which (delineated with a dark-green line) encompasses the wilderness region.

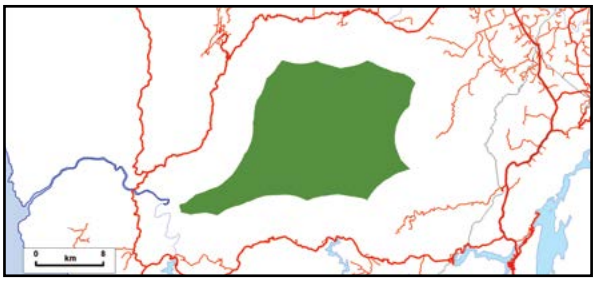


Figure 11: Land 5 km or more remote from roads in the Meredith Range region, NW Tasmania.

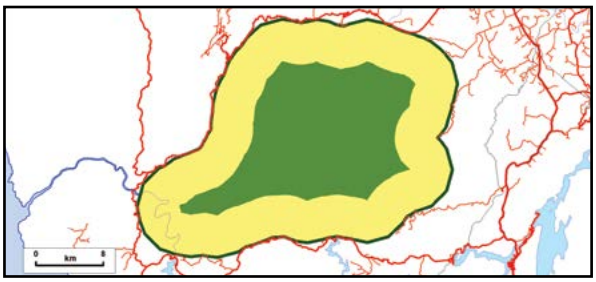


Figure 12: Yellow area depicts the remoting buffer associated with 5-km-remote land. The combined green/yellow shaded area is the wilderness region.

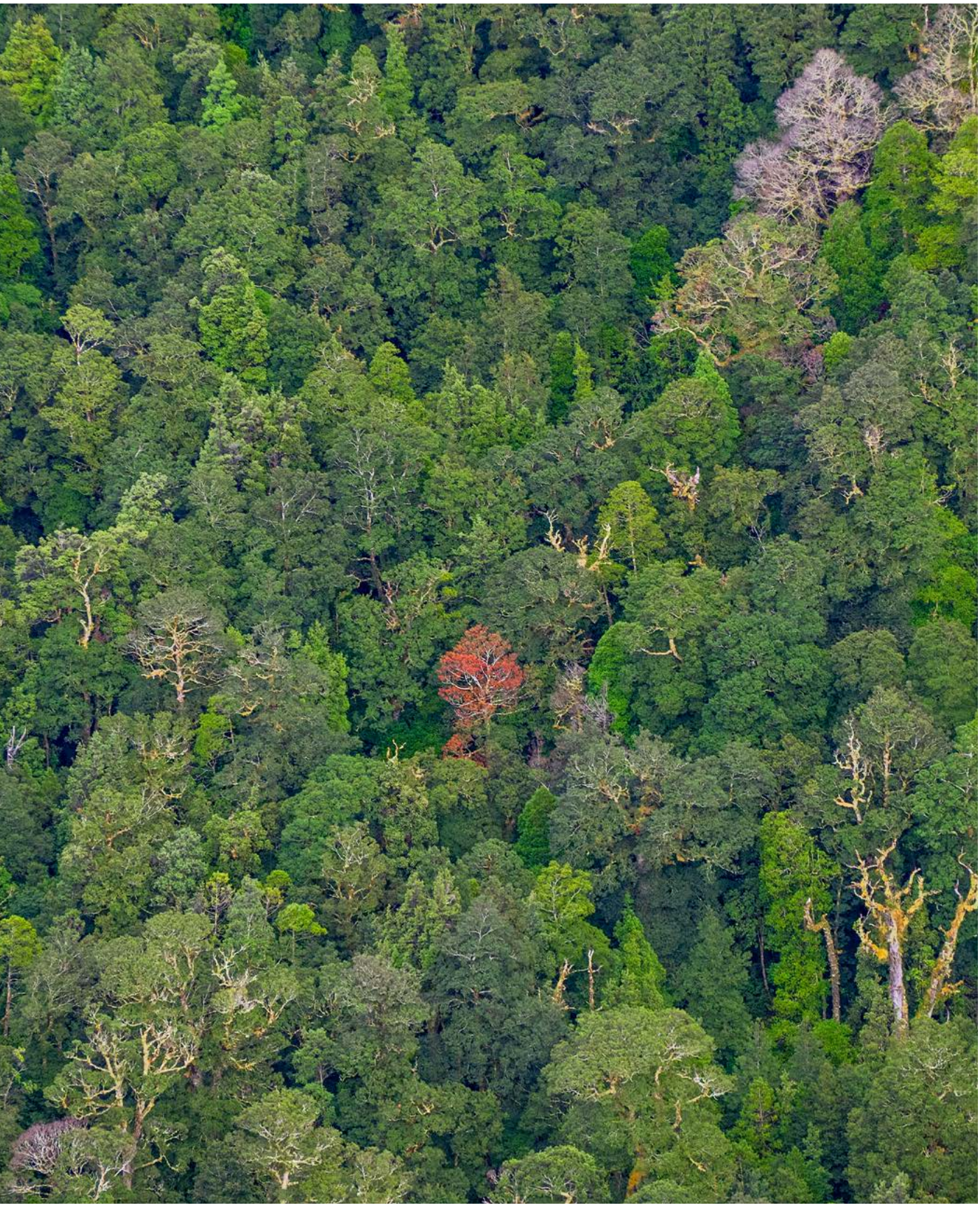
A crucial point to observe is that, if the wilderness is to retain its remoteness, the entire wilderness region (i.e. including the remoting buffer) must remain free of major infrastructure and landscape disturbances. Any incursion of a road into the wilderness region would inevitably reduce the area of the wilderness.

Consideration of the area enclosed within the dark-green outer boundary in Figure 12 illustrates that the wilderness region corresponding to a continuous wilderness area will necessarily be:

- large in area, since its area must be at least that of a 5-km-radius circle;
- intact, i.e. not fragmented;
- locally extensive, in the sense that every point in the region will be contained in at least one circle at least 5 km in diameter, that is free of major infrastructure and landscape disturbances; and
- compact, in the sense that the region will have a low boundary-to-area ratio.

The last point holds because, roughly speaking, the buffering process tends to smooth out any indentations in the area being buffered.

As we have already explained, each of the above characteristics are broadly conducive to the protection of ecological integrity on a landscape scale.



6 DESIRABLE ATTRIBUTES OF A WILDERNESS DEFINITION

In drafting our definition of wilderness, we were guided by the conviction that it should meet or attempt to meet each of the following criteria:

1. It should acknowledge both the experiential and the ecological values associated with wilderness.
2. It should clearly identify the qualities and characteristics that distinguish wilderness from other types of land (for example, front-country).
3. It should define wilderness descriptively rather than prescriptively; that is, it should identify the characteristics that distinguish an area as wilderness, regardless of its management status.
4. It should acknowledge that the experiential values of wilderness are strongly linked to its remoteness, and that remoteness is a useful measure of the intactness, local extensiveness and compactness of wilderness regions.
5. It should acknowledge that the experiential values of wilderness can be affected by subtle factors such as the proximity of minor infrastructure, and by transient impacts such as those associated with low-flying aircraft.
6. It should acknowledge the historical, cultural and spiritual links that Indigenous communities have to many areas that have been or have the potential to be designated as wilderness protected areas.
7. It should have global application, yet be adaptable for application to specific terrestrial environments.
8. It should facilitate the development of methodologies for delineating and measuring wilderness.
9. It should identify wilderness regardless of the likelihood of the areas thus identified being capable of remaining as wilderness.

7 RECOMMENDED DEFINITION OF WILDERNESS

Wilderness can be succinctly described as land that is natural, remote and primitive. However, for the purposes of identifying, measuring and facilitating the protection of wilderness, it is essential to have a more precise definition.

In 4.10 we noted that wilderness can be defined qualitatively or quantitatively, or by a mixture of these. We recommend a two-tiered definition, the first tier defining the qualities that distinguish an area as wilderness, the second specifying the thresholds that allow wilderness to be identified and delineated.

7.1 The defining qualities of wilderness

In line with the criteria listed in section 6, we recommend defining wilderness as follows:

Wilderness is land characterised by a high degree of

- biophysical naturalness
- linear remoteness from infrastructure and landscape disturbances
- time-remoteness from points of mechanised access

as well as having minimal evidence of modern technological society.

Wilderness is land characterised by a high degree of

- **biophysical naturalness**
- **linear remoteness from infrastructure and landscape disturbances**
- **time-remoteness from points of mechanised access**

as well as having minimal evidence of modern technological society.

7.1.1 Terminology and explanatory notes

- **Land** in this context includes inland water bodies, but excludes ocean. The definition of ocean wilderness requires different criteria, and we do not address these in this paper.
- The **biophysical naturalness** of a locality or area is the degree to which its landscapes and ecological systems remain in an essentially natural condition: that is, unaltered and uninfluenced, either directly or indirectly, by the impacts and activities of human society except for Indigenous societies following predominantly hunter-gatherer ways of life.
- The terms **infrastructure** and **landscape disturbances** exclude infrastructure or 'disturbances' associated with predominantly hunter-gatherer societies.
- The preceding definitions acknowledge that many areas that are now regarded as wilderness have been (and in some cases still are) inhabited, utilised and influenced by Indigenous people following traditional, wilderness-based, predominantly hunter-gatherer ways of life. For more discussion of this point, see 2.5.
- The visitor's awareness of evidence of **modern technological society** is influenced not only by remoteness (in both time and space) from infrastructure and landscape disturbances but also by factors such as distant views of artificial features, crowds, and noise (e.g. from low-flying aircraft).
- The **linear remoteness** of a locality or area is its physical distance from major infrastructure and landscape disturbances.
- The **access-time remoteness** of a locality or area is its remoteness in terms of non-mechanised travelling time (by foot, riding animals where permitted, or by non-mechanised craft, such as kayaks) from points of mechanised access (see below).
- **Points of mechanised access** are locations that are generally accessible, either year-round or seasonally, to the public using powered or mechanised vehicles. The latter include on-road and off-road vehicles, snowmobiles, powered boats, and bicycles. Management-only helipads, and areas that are normally off limits to non-management helicopter landings, are excluded from this classification. Note that helicopter landings and low-altitude overflights for any purpose have a major impact on experiential values.
- The riding of horses or other animals, and the use of pack animals, are acceptable in some, but not all, wilderness areas (see 4.11). Where such uses are acceptable, **access-time remoteness** should be defined in terms of travelling time that includes such means.
- As a**ccess-time remoteness** is a measure of (non-mechanised) travelling time, its values will depend partly on physical distance but also on factors such as steepness and ruggedness of terrain, density of vegetation, the presence of rivers or lakes navigable by unpowered craft,

and the presence, orientation and condition of walking tracks. Note that typical walking speeds in wilderness can vary from several kilometres per hour on formed tracks or in open terrain, to less than 1 km a day in dense vegetation or extreme terrain. Special considerations will be required when measuring access-time remoteness in locations where travel times vary according to the direction of travel – as is the case, for example, with travel on fast-flowing rivers.

> Note that we have defined 'wilderness' (and, by implication, 'wilderness area') in terms of the characteristics of an area of land, regardless of its management status.

7.2 Parameters and thresholds for delineating wilderness

We recommend delineating wilderness by setting quantitative thresholds for biophysical naturalness, linear remoteness from (specified) major infrastructure and landscape disturbances, and time-remoteness from points of mechanised access. This allows the delineation process to be based on a small number of relatively straightforward measurements. Moreover, once wilderness areas have been identified by this method, it provides a simple basis for delineating their remoting buffers. The parameters and thresholds proposed below are intended to apply in all parts of the world.

7.2.1 Biophysical naturalness

Wilderness must be entirely free from all the types of major infrastructure and landscape disturbances listed in 7.2.2 and 7.2.3 below, as well as from areas subject to grazing by domesticated animals. Machado (2004) proposes a system for ranking the naturalness of an environment on a scale of 0 to 10, based on factors such as the presence of resource extraction, pollution, and exotic biotic elements. We recommend requiring an area to fall into a category of 9 or 10 on the Machado scale in order to qualify as wilderness (see Table 1).

We acknowledge that the notion of naturalness is becoming increasingly tenuous as anthropogenic climate change and other human-related factors disrupt and alter the global environment. Nevertheless, for the foreseeable future the scale proposed by Machado will provide a meaningful guide to determining the level of biophysical naturalness by which wilderness can be identified.

Component	*Description*
10	*Natural virgin system; only natural elements and processes. Possible anecdotal presence of negligible or hardly noticeable anthropic elements, or totally insignificant physical-chemical pollution coming from exterior anthropic sources.*
9	*Natural system; presence of few exotic biological elements (no qualitative effects); minimal artificial infrastructure, temporary or removable. Physical-chemical pollution absent or of no significance.*
8	*Sub-natural system: possible extended presence of wild exotic species, but not dominant (low impact); artificial elements located, not extensive. Occasional pollution processed by the system (does not go beyond resilience). Possible minor extraction of renewing resources. Fragmentation irrelevant. Natural dynamic little altered.*
7	*Quasi-natural system; extensive anthropic activities of low physical impact; facilities if present, dispersed, not connected; wild exotic species well established but not dominant; natural structures modified but not distorted (re-location of physical or biotic elements). Moderate extractions, if present. Little alteration of water dynamics.*
6	*Semi-natural system; anthropic infrastructure scarce or concentrated; possible dominance of wild exotic species; native elements considerably reduced. Occasional additions of energy and/or extraction of renewable resources or of non-relevant materials. General dynamic still controlled by natural processes. It may include abandoned cultural systems undergoing natural recovery.*

Table 1: The upper five categories of naturalness proposed by Machado (2004)

7.2.2 Major infrastructure

We recommend that the following be classified as major infrastructure. By our proposed specifications for biophysical naturalness (7.2.1, above) and minimum linear remoteness (see 7.2.4, below), wilderness must be free of and at least 5 km remote from all of the listed types of infrastructure.

- Towns, settlements and residences
- Buildings with floor area greater than 5 square metres
- Roads
- Vehicular tracks (open)
- Railways
- Pipelines
- Transmission lines
- Canals
- Dams and weirs
- Airstrips
- Helipads
- Jetties and boat ramps
- Mines
- Lighthouses
- Towers
- Drilling rigs and platforms
- Windfarms
- Standing ruins of buildings and other major structures

Notes

1. Infrastructure not listed above will be classified as minor. The presence or proximity of minor infrastructure (e.g. survey markers and walking tracks) will not affect an area's status as wilderness, although it will generally affect its 'wild character' – see 8.3.
2. Features may be exempt from the above list if they are disused and in an advanced state of decay or rehabilitation. For example, a closed road with heavy revegetation would not rank as major infrastructure (although it would still affect the wild character of adjacent land).

7.2.3 Major landscape disturbances

We recommend that the following be classified major landscape disturbances. By our proposed specifications for biophysical naturalness (7.2.1) and minimum linear remoteness (7.2.4), wilderness must be free of and at least 5 km remote from all of the listed types of landscape disturbance.

- Areas greater than 1 hectare in extent and more than 50 per cent cleared of native vegetation by human activity
- Areas subject to clearfelling or selective logging in the past 75 years
- Plantations
- Artificial impoundments

7.2.4 Minimum linear remoteness

Wilderness should be a minimum of 5 km from the nearest major infrastructure and major landscape disturbances. In most environments this distance should ensure a reasonable degree of isolation from noise pollution (e.g. traffic noise) and visual disturbance. Higher thresholds of linear remoteness may be appropriate in some areas due to environmental conditions (e.g. open terrain).

7.2.5 Minimum access-time remoteness

Wilderness should be a minimum of half a day's non-mechanised travelling time from the nearest point of mechanised access. This condition reflects the intention that a visit to wilderness requires at least one overnight stay in a remote location. As suggested in 2.6, overnight trips make substantially greater demands on visitors' self-reliance than day trips, and increase visitors' sense of exposure to and immersion in the natural environment.

7.2.6 Evidence of modern technological society

Parameters for this are less readily defined and quantified than for the physical characteristics listed above. They include 'viewshed naturalness' (a measure of the visibility of artificial features and landscape disturbance such as roads, buildings, logged areas and farmland) and 'transient impacts' (a measure of the extent to which a visitor's experience is impacted by disturbances such as aircraft overflights or encounters with other visitors).

Further research is needed to improve our understanding of the impact of factors such as distant views of artificial features, crowding and the noise of aircraft on the human experience of wilderness, both direct and indirect. In particular, it would be useful to establish a threshold at which particular transient impacts (e.g. low-level flights) become so frequent and intrusive that the impact on wild character is so great as to disqualify an area as wilderness.

8 MEASURING WILDERNESS ATTRIBUTES

8.1 Why measure wilderness attributes?

As previously stated (4.10), the categorisation of land as wilderness or non-wilderness is useful for locating and delineating wilderness, and as a guide for designing wilderness protected areas (see section 9). However, the categorisation is necessarily simplistic, since remoteness and naturalness will vary both inside and outside any delineated wilderness. These variations can be significant from both an experiential and an ecological perspective, and many areas that do not qualify as wilderness or remoting buffers may nevertheless have a degree of wildness that warrants protection. Moreover, the wilderness/non-wilderness dichotomy does not take into account the full range of factors that can affect the values – and, in particular, the experiential values – of wilderness, including transient factors such as the impacts of low-flying aircraft.

Recognising this, researchers have developed methodologies for measuring 'wilderness character' (or similar terms) as a continuum, the values of which can be regarded as ranging from 'highly developed' to 'remote and pristine' (e.g. Lesslie & Maslen 1995). To be precise, these methodologies measure the physical, geospatial, social and management factors that contribute to an area's remoteness, naturalness and capacity to offer opportunities for a wilderness experience.

The continuum approach can be used to assess variations in 'wildness' both inside and outside designated wilderness areas.

Such methodologies can be used to assess variations in 'wildness' across a given region, both inside and outside delineated wilderness areas. They are valuable for assessing changes in 'wildness' over time, particularly changes associated with physical developments such as road construction and track closures, and with management measures such as restrictions on access by low-flying aircraft. They can also be used to identify areas of exceptionally high 'wild character' (see 8.3), the maintenance of which might require the exclusion of overflights and even minor infrastructure such as roughly marked walking tracks. Hence, such methodologies can be a useful tool for protecting, maintaining and enhancing wilderness values (Hawes, Ling & Dixon 2015; Carver & Fritz 2016).

In 8.3 we outline a 'wild character' measurement methodology based closely on our recommended definition of wilderness.

8.2 Previous approaches

Australia has been a global leader in developing methods for assessing and mapping wilderness. The first published paper on this subject in Australia was an assessment of wilderness values in Tasmania by Kirkpatrick and Haney (1980). Hawes and Heatley (1984) used a simple distance-based algorithm for assessing the potential impact of forestry inroads on wilderness in western Tasmania. Prineas, Lembit and Fisher (1986) undertook Australia's first nationwide wilderness study.

In the late 1980s, Rob Lesslie and others at the Australian Heritage Commission developed a wilderness-assessment method and used it to assess wilderness values Australia-wide. This survey was known as the National Wilderness Inventory (Lesslie, Mackie & Preece 1988; Lesslie & Maslen 1995).

The National Wilderness Inventory (NWI) method assessed 'wilderness quality', which was defined as the sum of four components, three of which were based on distances from human-made features such as roads and logging areas. In calculating the three remoteness-based components, features were classified and the resulting classes were weighted so that major features such as roads and dams had greater influence on wilderness quality than minor features such as cairns and walking tracks. (The weighting was achieved by using different mathematical parameters in the formulas.) The fourth component was a measure of (local) biophysical naturalness.

Although the use of the NWI approach in Australia has waned (Sawyer 2015), and any such approach is dependent on the availability of quality data, the approach has many strengths that can be built upon. Variants of this method have been used to assess wilderness quality or similar measures across Europe (Kuiters et al. 2013), and within a number of European countries including the United Kingdom (Carver, Evans & Fritz 2002), Austria (Plutzar et al. 2016), Italy (Orsi, Geneletti & Bordsdorf 2013), and Iceland (Ólafsdóttir, Sæþórsdóttir & Runnström 2016). Hawes, Ling and Dixon (2015) employed a modified version of the NWI method to assess wilderness value across the Tasmanian Wilderness World Heritage Area in 2005, taking into account travel times from points of mechanised access. The results of a rerun of this process, undertaken by Hawes and Ling in 2015, are included in the 2016 TWWHA Management Plan

(DPIPWE 2016).

In the United States an interagency strategy has been developed to measure wilderness character, which is defined in terms derived from the wording of the US Wilderness Act (Carver, Tricker & Landris 2013; Landres et al. 2015). Wilderness character is a measure based on five qualities, corresponding to the degree to which an area is untrammelled, natural and undeveloped, offers opportunities for 'solitude or primitive and unconfined recreation', and exhibits other features of value.

8.3 Assessing 'wild character'

The NWI methodology originated in the mid-1980s when GIS technology was in its infancy and digitised spatial information was scarce. This limited it to parameters that could be mapped with the available technology. The methodology has since been refined (Hawes, Ling & Dixon 2015), but we feel it is time to revisit the concept, particularly in view of our recommended definition of wilderness.

We use the term 'wild character' to denote a (numerical) measure reflecting the components of our recommended definition of wilderness, namely biophysical naturalness, linear remoteness from infrastructure and landscape disturbances, time-remoteness from points of mechanised access, and other evidence of modern technological society (see Table 2).

We have chosen the term 'wild character', in preference to 'wilderness character' or similar terms, for two main reasons. Firstly, we wanted a term that reflected the fact that wild character is a measure of factors that are associated with experiential values as well as ecological values. Secondly, areas with low levels of remoteness and biophysical naturalness will generally have non-zero (albeit low) levels of wild character, and the use of this term avoids creating the impression that such areas are wilderness.

Wild character will generally be assessed using GIS data and a measurement grid covering the region of interest, the resolution of the grid being selected to suit the size of the region, the level of detail required and the available computing resources. Values of each component of wild character will be assigned to the centroids of each grid square, and finally combined using suitable algorithms and weighting. For example, remoteness from roads would be calculated by measuring the map distance of each centroid from the nearest road.

Establishing a methodology for calculating a quality such as wild character is necessarily a complex affair, involving subtle decisions on questions such as the weighting that should be assigned to structures such as survey markers and walking tracks in the calculation of linear remoteness, and the relative impacts associated with mechanised craft, ranging from mountain bikes to quad bikes and snowmobiles. There are inevitably grey areas, and further research is needed to improve our understanding of the impact of factors such as the proximity of infrastructure and the noise of aircraft on the human experience of wilderness, both direct and indirect. Extending the methodology to include consideration of viewsheds (e.g. Sang 2016) is important but also challenging. Such details are beyond the scope of this paper.

Component	Description
Biophysical naturalness	Measure of the degree to which an area's ecological, geological and geomorphological systems remain in an essentially natural condition: that is, unaltered and uninfluenced, either directly or indirectly, by the impacts and activities of human society, other than Indigenous societies following predominantly hunter-gatherer ways of life.
Linear remoteness	a) Map distance from major infrastructure and landscape disturbances as listed in 7.2.2 and 7.2.3. b) Map distance from minor artificial features and environmental disturbances such as lightly grazed land, survey markers, and navigation lights. Distances will be weighted to reflect the relative impact of different types of feature; for example, grazed land at 3 km may have the same impact as a survey marker at 1 km.
Access-time remoteness	a) Travel time by foot or other non-mechanised means from the nearest point of mechanised access including roads, jetties, landing strips, shorelines accessible to powered boats, and publicly accessible helipads. b) Travel time by any permissible means (including mechanised travel) from the nearest settlement. This factor would be weighted to reflect the type of travel and the frequency with which such travel occurred; for example, visits by small powered boats two or three times a year would have less impact than weekly helicopter landings.
Other evidence of modern technological society	a) Viewshed naturalness: A measure of the visibility of artificial features and landscape disturbance such as roads, buildings, logged areas and farmland. b) Transient impacts: A measure of the extent to which a visitor's experience is impacted by disturbances such as aircraft overflights or encounters with other visitors.

Table 2: Components of 'wild character'

9 IMPLICATIONS OF OUR RECOMMENDED DEFINITION FOR WILDERNESS PROTECTION AND MANAGEMENT

9.1 Designing wilderness protected areas

It follows from our recommended definitions of wilderness and remoting buffers that managing to protect wilderness requires maintaining the predominantly natural and undeveloped condition of the wilderness in question *and* of its associated remoting buffer(s) – that is, of the entire wilderness regions associated with the wilderness in question. Wilderness protected areas will therefore necessarily be large. Like wilderness itself, wilderness regions must be kept free of major infrastructure such as roads and major landscape disturbances such as clearfell coupes, although their outer boundaries may – and in general will – border such features.

Protecting wilderness requires maintaining the predominantly natural and undeveloped condition of wilderness and its associated remoting buffers.

The first step in designing a wilderness protected area is to identify the wilderness that is to be managed and protected. This can be done by identifying areas that satisfy all three of the prerequisite physical conditions: of biophysical naturalness, linear remoteness and access-time remoteness.

The second step is to identify the remoting buffer(s) associated with the identified wilderness. This can be done by generating component buffers around each wilderness area, corresponding to the specified thresholds of linear remoteness and access-time remoteness. The remoting buffer for each wilderness area will consist of land (as defined in the Glossary) or sea that lies within either of these component buffers.

A wilderness protected area should include, at the minimum, identified wilderness areas together with their associating remoting buffers. Additional areas may be included to protect the wild character of areas that are not wilderness but are sufficiently wild to warrant protection. Boundaries may be extended beyond the outer edges of remoting buffers, to facilitate practical management, for example by following roads or rivers.

Wilderness protected areas should also be designed as far as possible to contain areas where there is the potential for rewilding: that is, where the removal of infrastructure (such as the closure of vehicle tracks) or the rehabilitation of disturbed ground would significantly increase the area of wilderness and/or contribute to the stock of wild character.

Wilderness protected areas will often form part of larger reserve systems (such as national parks), encompassing country that has low wild character and is not part of the remoting buffers of wilderness areas. In such circumstances, the wilderness-related part of the reserve should be regarded as a reserve within a reserve, and assigned a management regime specifically designed to maintain and protect its wilderness values.

9.2 Maintaining the wild character of wilderness

The primary management objective of wilderness protected areas should be to maintain and, where possible, enhance their wild character. As we have pointed out in several places, this requires maintaining the wilderness areas *and* their associated remoting buffer(s) in a largely natural condition and free of major structures and landscape disturbances such as roads, powerlines, buildings, and dams. It also requires maintaining the access-time remoteness and visual naturalness of wilderness areas; minimising the encroachment of minor infrastructure such as walking tracks and survey markers into these areas; and preventing the loss of opportunities for solitude due to low-altitude overflights.

Maintaining the wild character of wilderness requires maintaining each of the components of wild character as listed in Table 2.

- Maintaining biophysical naturalness requires maintaining landscapes and ecological systems in an essentially natural condition. (See the definition of 'naturalness' in the Glossary.) This implies excluding structures and activities that significantly impact naturalness, particularly roads, vehicular tracks, major buildings, inundation, mining and quarrying, logging, grazing and clearance of vegetation. Active intervention may be required in some instances, to offset artificial disturbances to the natural environment; for example, fire regimes may be managed to protect vulnerable vegetation communities from the full impact of climate change, and hunting may be undertaken to exclude or reduce populations of feral animals. Note, however, that such intervention will temporarily have an adverse impact on wild character.
- Maintaining the linear remoteness of wilderness areas requires keeping those areas and their remoting buffers free of major infrastructure and landscape disturbances as

defined in 7.2.2 and 7.2.3.

- Maintaining the access-time remoteness of wilderness areas requires excluding roads, vehicular tracks, off-road vehicles (including bicycles), powered water craft, airstrips, and publicly accessible landing sites (including helipads) from wilderness areas and their associated remoting buffers. (See the definition of 'points of mechanised access' in 7.1) Some helipads may be required for essential management purposes, but note that these have a negative impact on wild character. The construction or development of new walking tracks should be avoided if these would reduce access times to wilderness areas.
- Other factors that need to be limited to maintain the wild character of wilderness areas include the presence and proximity of minor structures and artefacts such as walking tracks, campsites, signposts, survey markers, cairns, helipads, communications infrastructure and automated weather stations; visitor behaviour issues such as large party sizes and competitive events; environmental factors such as noise and light pollution; and overflights by low-flying aircraft including light aircraft, helicopters and drones. Overflights by high-altitude aircraft also impact wild character, but it is unlikely that steps can or will be taken to mitigate such impacts.
- The maintenance of wild character is best facilitated by evaluating wild character across the area under consideration under different management and development scenarios – for example, before and after the hypothetical construction of a walking track. Ideally, developments should not proceed unless pre-existing levels of wild character can be maintained.

9.3 Restoring and enhancing wild character

There are a number of ways in which the wild character of wilderness and other areas can be restored or enhanced. Such restoration can be regarded as a type of rewilding. The restoration or enhancement of wild character may be difficult to achieve politically, but it is essential that efforts be made to reverse the decline of what will otherwise be a forever-dwindling wilderness resource.

The simplest way to achieve substantial gains in wild character is to remove or downgrade major structures that compromise the remoteness of these areas. Examples include removing isolated buildings, closing and rehabilitating roads, downgrading roads to vehicle tracks, and downgrading vehicle tracks to walking tracks.

When a natural environment has suffered substantial physical damage from human impacts such as mining or logging, recovery to its original state may take centuries or might never occur. The open-cut mine at Savage River in Tasmania's Tarkine region, for example, is likely to scar the landscape for thousands if not millions of years. Hence, in some cases, wilderness restoration may be impossible or only partly achievable, even if there is the political will to achieve it. The restoration of biophysical naturalness may, however, be possible in some circumstances, for example by allowing cleared areas to naturally revegetate, or by undertaking active rehabilitation.

The naturalness of wild lands can also be altered by, for example, recreation impacts, the discontinuation of past Indigenous practices (e.g. firing), or ecological change due to human-induced climate change. Cole (2001) highlights these issues and notes the management dilemma when considering whether to undertake restorative ecological manipulations: a choice between managing for naturalness and managing for 'wildness' in the sense of the absence of human intervention.

Other ways in which it might be possible to enhance wild character include imposing restrictions on low-altitude overflights and other forms of mechanised access, regulating or redirecting human access, and imposing restrictions on the visual impact of developments such as buildings on the fringes of wilderness protected areas.

9.4 Protecting wild character in restricted-access areas

Human access might be excluded from or highly restricted in some wilderness areas or parts thereof, to protect ecological, cultural or other values, or because the area in question has been set aside for scientific reference.

In such circumstances, one might ask if experiential values and the factors associated with such values are relevant to management. For example, would the installation of an automatic weather station adversely affect the wild character of the adjacent area, if the structure was only seen or visited by technical staff once or twice a year? We would argue that it would, because it would diminish the perceived wildness of the area in the mind of anyone who was aware of the structure's existence. Moreover, it is likely to be desirable to exclude infrastructure, as far as possible, from reference areas, in order to minimise overall human impact. Furthermore, higher access-time remoteness is likely to help limit unauthorised human access. For these reasons, we recommend that the protection of wild character be given as much priority in restricted-access areas as in other wilderness areas.

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ABBREVIATIONS

DPIPWE	Department of Primary Industry, Parks, Water and Environment
IUCN	International Union for the Conservation of Nature
TWWHA	Tasmanian Wilderness World Heritage Area
UNEP-WCMC	United Nations Environment Programme–World Conservation Monitoring Centre

APPENDIX: CASE STUDY – IMPACT OF HUT (LODGE) DEVELOPMENT IN WILDERNESS, TASMANIA

The following case study is included to illustrate (a) the significance of remoteness as a defining characteristic of wilderness, (b) the practical application of wild character assessments, and (c) the potential impact on wilderness values of building construction (in this case a series of walkers' huts).

The case study assesses the wilderness impact of constructing six commercial walkers' huts or lodges on Tasmania's South Coast Track in the Tasmanian Wilderness World Heritage Area (TWWHA). To allow direct comparison with the findings of the TWWHA Management Plan (DPIPWE 2016) we have measured wild character using the same methodology that was used to assess 'Wilderness Value' in the Plan (see 8.2.) The quantity measured by this methodology is different from 'wild character' as we recommend measuring it in 8.3, but the general trend of the results is likely to be similar whichever approach is used.

The 85 km South Coast Track, which normally takes six to eight days to walk, is regarded as one of the premier coastal wilderness walks in Australia. The track is currently hut-free except at its western trailhead at Melaleuca, where there is a public airstrip, historic homestead and recently closed small-scale mine. The track lies in the 641,000-hectare Southwest National Park, which is the largest national park in the TWWHA and contains some of its remotest wilderness, much of it in the hinterland of the South Coast (see photo, page 28). Unlike the other major national parks in the TWWHA, the Southwest National Park is almost entirely free of remote-area walkers' huts.

The hut development has been proposed by a private developer and has received a federal government grant, although no timeline for the development has been publicly released. The locations of the huts are as yet unknown, but it is reasonable to assume that they would be built in the vicinity of the existing major campsites on the South Coast Track. The huts, which would accommodate ten clients and two guides, would require associated infrastructure including water tanks, toilets, sewage management systems, walking tracks for access, and helipads.

The threat that this development would pose, as well as the fact it has been provided for by the management plan, illustrates the inadequacy of the current planning framework for wilderness in the TWWHA. While the 2016 Management Plan contains a reasonably robust definition of wilderness (see 3.8) and maps the Wilderness Value of the TWWHA, it fails to specify the protection of wilderness as a management objective, and its zoning scheme provides for developments that would have a major impact on wilderness values. The South Coast Track exemplifies this: The 400-m-wide Recreation Zone corridor in which the hut is situated allows for hut construction, despite the fact that it traverses high-value wilderness and the remoting buffers associated with such wilderness.

Figure 13 shows the current wild character in the vicinity of the South Coast. Note that the hinterland includes areas whose wild character is in the highest possible category (19–20 on a scale of 0 to 20). Indeed, this region contains some of the wildest country in Australia.

Construction of the huts would affect only one of the four components of wild character, namely the (misleadingly named) component 'Apparent Naturalness', which is a measure of remoteness from artefacts such as roads, dams and buildings. Buildings are ranked 'Medium' in terms of their impact on Apparent Naturalness.

Figure 14 shows the projected wild character following construction of the six huts. As the figure shows, the development would have a substantial impact on wild character, even if the direct biophysical impacts of the huts were confined to their immediate footprints. Indeed, wild character would be significantly reduced over tens of thousands of hectares of country. Note that relatively minor variations in the locations of the huts would make little difference to the overall impact of the development on wild character across the region.

The losses of wild character reflect the fact that, for example, many areas that are currently days remote from the nearest building would fall within a few hours' walk of the nearest hut. The huts would be visible from the air and probably from some ground-level vantage points. The presence of the huts would degrade the undeveloped quality of the region, and would substantially reduce the recreational challenge of the South Coast walk, even for walkers not using the huts.

Helicopters required for constructing and servicing the huts would be audible and visible for kilometres around, and would frequently disrupt the solitude of walkers traversing the South Coast Track. The methodology used here does not take account of the impact of helicopters; a revised methodology that took such impacts into account would show additional losses in wild character in the vicinity of the huts and along much of the coast.

In short, the wild character and wilderness values of what is currently one of Australia's wildest and most challenging wilderness walks would be significantly damaged.

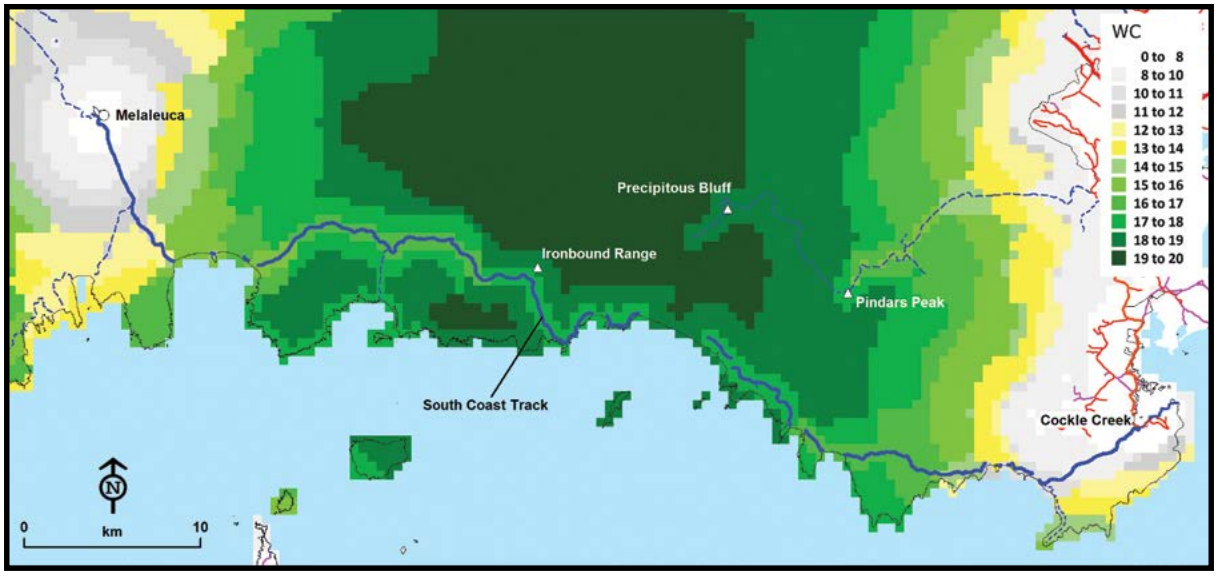

Figure 13: Current distribution of wild character (WC) in the vicinity of the South Coast, Tasmania. Red, magenta and blue lines indicate roads, vehicle tracks and walking tracks respectively.

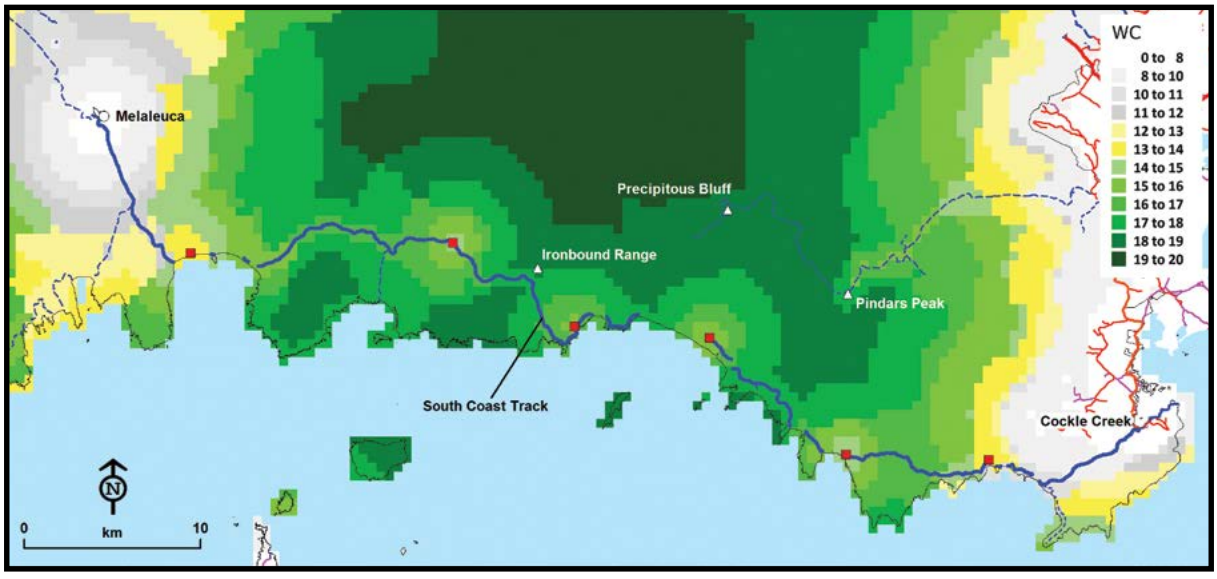

Figure 14: Projected distribution of wild character in the vicinity of the South Coast, Tasmania following construction of six walkers' huts (indicated by red squares).

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LIST OF PHOTOGRAPHS

WHAT IS WILDERNESS ?

Wilderness is more than just land in natural condition. Wilderness is a place where a visitor can have a profound sense of being immersed in nature, largely unaware of modern technological society. It is a place where natural systems thrive across entire landscapes.

For this to be possible, wilderness must be:

- in a largely natural condition;
- physically remote from infrastructure such as dams and buildings;
- remote in travel-time from access points such as roads and airstrips; and
- primitive – largely free of the sights and sounds of modern society (such as low flying aircraft).

In short: Wilderness is land that is natural, remote and primitive.

OFFERING A SCHOLARLY PERSPECTIVE ON THE DEFINITION OF WILDERNESS, THIS STUDY APPRAISES THE EFFECTIVENESS OF EXISTING DEFINITIONS AND RECOMMENDS A DEFINITION THAT FOCUSES ON EXPERIENTIAL AS WELL AS ECOLOGICAL VALUES.

By some estimates, 10% of the planet's wilderness – an area twice the size of Alaska – has been lost in the past 20 years alone. Wilderness in temperate climates, such as Tasmania's, is especially rare.

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