IUCN (International Union for Conservation of Nature)

IUCN helps the world find pragmatic solutions to our most pressing environment and development challenges. IUCN works on biodiversity, climate change, energy, human livelihoods and greening the world economy by supporting scientific research, managing field projects all over the world, and bringing governments, NGOs, the UN and companies together to develop policy, laws and best practice. IUCN is the world’s oldest and largest global environmental organisation, with more than 1,200 government and NGO members and almost 11,000 volunteer experts in some 160 countries. IUCN’s work is supported by over 1,000 staff in 45 offices and hundreds of partners in public, NGO and private sectors around the world.

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The WILD Foundation

As the heart of the global wilderness community for over 40 years, the WILD Foundation protects wilderness while meeting the needs of human communities, working across cultures and boundaries by collaborating with local peoples, organizations, the private sector, and governments to create dynamic practical projects, inspiring solutions and communications initiatives.

WILD’s work advances a reciprocal, balanced relationship between people and nature – our Nature Needs Half vision. Our aim is to ensure that enough wild land and seascapes are protected and interconnected (scientifically estimated to be at least half of any given ecoregion) to maintain nature’s life-supporting systems and the diversity of life on Earth. The vision supports human health and prosperity, and secures a bountiful, beautiful legacy of resilient, wild nature. Nature Needs Half recognizes that we are part of nature, not separate from it. The “half” also suggests a planet that is respectfully shared, where the needs of all living things are considered and protected equally, for the good of all.

www.wild.org

IUCN World Commission on Protected Areas (WCPA)

IUCN WCPA is the world’s premier network of protected area expertise. It is administered by IUCN’s Programme on Protected Areas and has over 1,400 members, spanning 140 countries. IUCN WCPA works by helping governments and others plan protected areas and integrate them into all sectors; by providing strategic advice to policy makers; by strengthening capacity and investment in protected areas; and by convening the diverse constituency of protected area stakeholders to address challenging issues. For more than 50 years, IUCN and WCPA have been at the forefront of global action on protected areas.

www.iucn.org/wcpa

Wilderness Specialist Group of IUCN

The Wilderness Specialist Group serves as a liaison between IUCN WCPA and the World Wilderness Congress to establish linkages between the World Wilderness Congresses and IUCN's World Parks Congresses and World Conservation Congresses. The Wilderness Specialist Group was launched at the World Parks Congress in Durban, South Africa, in 2003. The objectives of the Wilderness Specialist group include promoting research and discussion on the importance and role of wilderness, helping integrate wilderness related issues into WCPA publications, proceedings and meetings, and providing expert referral service to the WCPA for wilderness-related issues.
The designation of geographical entities in this book, and the presentation of the material, do not imply the expression of any opinion whatsoever on the part of IUCN or other participating organisations concerning the legal status of any country, territory, or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

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# Contents

Foreword ................................................................. vi

Acknowledgements ................................................. viii

1. Introduction .............................................................. 1
   1.1 What is a 1b protected area? ........................................ 2
   1.2 History of the IUCN 1b protected area category .......... 4
   1.3 Objective of the IUCN 1b protected area management category ...... 6
   1.4 Extent of 1b sites ...................................................... 8
   1.5 Inclusion of Indigenous Peoples and Local Communities .......... 9
   1.6 Application of 1b category: Assignment and Reporting .......... 13

2. Management Principles .................................................. 14
   2.1 Manage wilderness comprehensively through development of large-scale, intact wilderness protected areas and connectivity between wilderness protected areas ................................................. 15
   2.2 Manage wilderness, and cultural sites within, to maintain highest integrity of all components of ecosystems, wildlife, and sacred and traditional cultural use sites ...................................................... 17
   2.3 Engagement between stakeholders and non-tribal government with Indigenous Peoples, Tribes and local communities in management and designation of wilderness in true partnership relations .......... 20
   2.4 Manage wilderness both to preserve intrinsic wilderness values and to produce human values ................................................. 24
   2.5 Prioritise wilderness-dependent activities and areas of minimal human recreation ...................................................... 27
   2.6 Guide wilderness management using written plans with specific area objectives and cultural norms ................................................. 29
   2.7 Manage carrying capacities through establishing limits of acceptable change ...................................................... 32
   2.8 Focus management on threatened sites and damaging activities ...................................................... 34
   2.9 Apply only the minimum tools, regulations, or force to achieve wilderness protected area objectives ...................................................... 36
   2.10 Monitor wilderness conditions and experience opportunities to guide long-term wilderness stewardship ...................................................... 39
   2.11 Manage wilderness in relation to its adjacent lands ...................................................... 41

3. Governance and Authority .................................................. 45
   3.1 Introduction: governance and authority in wilderness protected areas ...................................................... 46
   3.2 Governance and authority of wilderness protected areas by government ...................................................... 48
   3.3 Governance and authority by Indigenous Peoples and local communities ...................................................... 51
   3.4 Private governance of wilderness protected areas ...................................................... 54
   3.5 Shared governance and authority of wilderness protected areas ...................................................... 56
   3.6 Multilateral governance and authority of wilderness protected areas ...................................................... 60
   3.7 Variances in jurisdiction and diversity of governance and authority ...................................................... 62

4. Current Management Issues .................................................. 65
   4.1 Planning systems and management framework ...................................................... 66
4.2 Decision tools in wilderness management ...............................................................68
4.3 Infrastructure and technology in wilderness protected areas ................................73
4.4 Changing demographics and relevance of wilderness .......................................75
4.5 Emerging recreation management issues ............................................................79
4.6 Managing wilderness for marine wilderness values ........................................83
4.7 Management decisions about passive management, restoration  
and climate change intervention .............................................................................85
4.8 Subsistence use and relationship values of wilderness ....................................90
4.9 Managing wilderness for sacred values ..............................................................93
4.10 Variance .............................................................................................................96
4.11 Incorporating science into management decisions ............................................99

5. Evaluating Effectiveness of 1b Sites.........................................................................104
5.1 Assessing ecological representation in 1b sites ..................................................105
5.2 Assessing social and cultural justice in 1b sites ..................................................108
5.3 Tools and monitoring techniques for evaluation of 1b wilderness  
attribute protection .................................................................................................110

References ..............................................................................................................113
Dear Reader,

Thank you for your interest in and commitment to wilderness conservation, protection, and management. The IUCN protected area category of wilderness allows us to understand nature on its own terms and maintain those terms while allowing (and even encouraging) humans to experience wilderness. No other category of protected area management allows for such a relationship between humans and nature. As a manager of wilderness, you are the guardian of this relationship. Remember that, while the work you do now is very important, it will be even more important in the future. It is our job to protect wilderness for future generations.

These management guidelines apply to category 1b (wilderness) within the Guidelines for Protected Areas developed by the World Commission on Protected Areas and adopted by the International Union for the Conservation of Nature (IUCN). The Wilderness Specialist Group of the World Commission on Protected Areas is comprised of international, professional volunteers and coordinated by the WILD Foundation. These guidelines were produced and reviewed by an independent, international team of Indigenous Peoples and non-Indigenous Peoples who are academic researchers, policymakers, and field managers. The product created and reviewed by this team are the first-ever international guidelines produced for wilderness managers. Your feedback is welcome: These guidelines will evolve, just as does the wilderness we love and manage.

There has never been a time when a unified code for management management is needed more than it is now. It is necessary to manage wilderness to protect thriving wilderness and healthy human relationships with wild nature against the threats posed by climate change and other environmental degradations. The rapidly increasing rate and scale of these negative impacts on wilderness add additional issues and complexities to wilderness management not faced by previous generations. View these challenges as prospects, not problems. Challenges bring new opportunities upon which wilderness managers and policymakers can capitalise: The negative impacts that threaten wilderness areas also create a social, political and economic imperative for wilderness protection and management, with important benefits of doing so. Healthy wilderness is a cost effective, highly functioning, natural solution that builds planetary resilience.

Wilderness decision-makers navigate a plethora of diverse issues when creating management plans. The management of wilderness areas requires addressing the ecological and cultural tenets of the site. The creation of a good management plan necessitates understanding the ecology and the people in relationship with the wilderness area and their needs, histories, and expectations.

Management plans cannot be done in isolation: They are as much of a social construct as they are the ecological objectives for a wilderness area. An effective plan is the result of a process that should include some partners, many stakeholders, and multiple professional disciplines. There
will be challenges. Difficulties in creating management plans generally arise only through five variables: lack of correct information, miscommunication, poor procedures, negotiations in bad faith (including politics, local or otherwise), and/or unrealistic appraisal of the financial and human resources available to do the management. Attention to these five variables is essential to the quality and effectiveness of the final management plan.

As you face the challenges, know that wilderness designation and management is beneficial to all people now and in the future, no matter their cosmovision, race, or level of economic development. Always remember that you are on the front lines of conservation, working now to secure a future for all life on earth.

Signed,

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Introduction
1.1 What is a 1B protected area?

IUCN Protected Areas Category 1b (wilderness) areas are large-scale sites in which ecological processes can function with minimal human disturbance. These sites are defined as: “Protected areas that 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” (Dudley 2013, p. 14).

Wilderness values do not exclude people. Rather, they exclude certain human uses, in particular industrial uses, which are inconsistent with maintaining wilderness values. In fact, wilderness protected areas can be defined as places that are biologically intact, or largely intact, with which humans have a relationship (Kormos 2008). That relationship can include the many Indigenous Peoples and Tribes who call wilderness areas homeland. It can also include rural or urban residents seeking solitude, recreation or other human benefits in wilderness protected areas.

Unprecedented levels of industrial activity, such as roads, mining, oil and gas development, logging, hydroelectric projects and climate change threaten the planet’s remaining wilderness areas. Such threats endanger the ability of 1b protected areas to conserve wilderness resources and to provide Indigenous Peoples the ability to maintain traditional wilderness-based lifestyle and customs, if desired. Tactics for combating and managing for these severe threats can be found in Section 4 (Current Management Issues).

It is critical to ensure the protection of enough wilderness areas of proper size and legal protection. Wilderness protected areas because of their size and intactness are essential to climate change mitigation and adaptation (Hilty et al. 2012, Watson et al. 2013). Wilderness areas are generally more resilient to climate change than smaller, less biologically intact areas. They are also critical to ensuring biodiversity conservation, especially for wide-ranging species, and for a wide range of other critical ecosystem services, from freshwater quality to maintaining the wild relatives of commercial crops (MEA 2005, Mittermeier et al. 2003). Wilderness areas are essential as biological controls: to provide examples of what intact or largely intact ecosystems contain. They are also very often homes “to thousands of indigenous cultures living at low densities and provide livelihoods to local communities around the world (Sobrevilla 2008)” (Kormos et al. 2015, 5).

![Superstition Mountains, Arizona, USA](https://example.com/superstition.jpg)

© Aldo Leopold Wilderness Research Institute

A growing consensus states that we need to protect a much larger percentage of the planet than called for under current multilateral agreements. The science-based global vision of Nature Needs Half—protection of at least half of the world’s terrestrial and marine ecosystems—is supported by prominent scientists like Dr. E. O. Wilson (Wilson 2003). The Promise of Sydney document created at the 2014 IUCN
World Parks Congress calls for a vision of the future in which the balance between human society and nature is restored (IUCN World Parks Congress 2014). Protecting new wilderness areas and enhancing the current protection of wilderness is critical to both Nature Needs Half vision and the vision outlined within the Promise of Sydney. The number of designated category 1b sites is increasing with time and will likely grow much larger and diverse in the future (Kormos 2008).

The objective of wilderness protected areas is characterised by a core set of wilderness values and attributes. These include biological intactness, sacred areas, traditional use, absence of significant permanent infrastructure or commercial resource extraction, and opportunities for experiencing solitude, uncertainty and challenge.

While the concept of designating areas of minimal human use is old, and while the term ‘wilderness’ is also old, use of the term ‘wilderness’ within protected area nomenclature is relatively recent. The United States Forest Service first used the term in 1924 in the administrative designation of the Gila Wilderness in New Mexico. 40 years later the United States Congress passed the Wilderness Act, which is the first-ever national legislation of wilderness globally. As detailed in Section 1.2, the term wilderness was officially adopted into the IUCN Guidelines for Protected Areas in 1994.

Unlike other protected area categories, wilderness protected areas are the subject of national legislation in only 11 countries (Kormos 2008). Wilderness as a category is more often the subject of provincial and state legislation or unit zoning. This category is often used as an administrative designation applied by managers or supervisors of parks or reserves. Thus, wilderness standards will vary between countries depending on circumstances ranging from geographical size, biographical context and social-cultural histories and national relationship with the wilderness concept. These guidelines provide the implementation tools to best protect of wilderness attributes and values.

IUCN’s protected area categories classify protected areas according to their management objectives. While these categories are merely intended as guidelines, international bodies, like the United Nations, and many national governments recognise them as the global standard for defining and recording protected areas and, as such, are increasingly being incorporated into government legislation.

While the concept of wilderness is invariably applied in different manners according to cultures, languages, conservation perspectives, and worldviews, these guidelines suggest a baseline standard for wilderness management decisions. The IUCN protected areas category 1b definition and management guidelines strive to integrate many and diverse views while still being consistent with core wilderness values.
1.2 History of the IUCN 1b protected area category

The concept of ‘wilderness’ was not included in the 1978 publication that established the original set of IUCN categories (IUCN 1978). The IUCN introduced protected area category 1b in 1994 because of growing demand and necessity for this category.

IUCN senior Ecologist Raymond Dasmann suggested in 1972 at the Second World Parks Congress that a protected areas category system be adopted and explicitly used the term wilderness as one of the examples of what he referred to as ‘Strict Nature Reserves’ (Phillips 2008, p. 14). Kenton Miller, who served both as IUCN Director General and Chairman of IUCN’s Commission on National Parks and Protected Areas, led an international team that investigated the usefulness of protected area categories and in 1978 published a table that used the term “wildlands” as a major protected area classification (Miller 2008).

The World Wilderness Congress played a decisive role in developing the wilderness concept for consideration as an IUCN category and advocating for its adoption (Eidsvik 1990). At the 1st World Wilderness Congress (Johannesburg, 1977) the lack of an international definition for wilderness was noted. At the 2nd World Wilderness Congress (Australia, 1980) a committee headed by Dr. George Stankey, US Forest Service, reported on various ways to approach and shape such a definition, given the diverse views and uses of the term (Martin 1982).

At the 3rd World Wilderness Congress (Scotland, 1983) an informal caucus was formed around the commitment to advocate within the IUCN for official adoption of a wilderness category (Martin and Inglis 1984). Coordinated by the 3rd World Wilderness Congress Executive Director, Vance G. Martin, this caucus was energised and informed by Ian Player (founder, World Wilderness Congress), Sierra Club leaders Dr. Ed Wayburn (President) and Mike McCloskey (Executive Director and, later, Chairman). Also in this caucus and especially helpful because of their positions and long experience within IUCN were Dr. Kenton Miller and Harold Eidsvik (Director, Parks Canada and Chairman, IUCN CNPPA).

In 1984, subsequent to IUCN General Assembly resolutions calling for more recognition of wilderness and for inclusion of Indigenous Peoples in protected areas, members of this caucus and others within CNPPA created a task force to review and update the categories. In 1994 at the IUCN General Assembly in Buenos Aires, the current Protected Area Categories, including the category 1b, were adopted and wilderness was officially recognised for the first time within the IUCN (Dudley et al. 2012).

At the IUCN World Commission on Protected Areas meeting during the World Conservation Congress in Amman, Jordan, in 2000, Vance G. Martin (President, WILD Foundation) proposed that a Wilderness Task Force be established. Terms of Reference were subsequently developed and were adopted in 2002 which, inter alia, created the first official linkage between the World Wilderness Congress and the IUCN. The Wilderness Task Force was upgraded to a Wilderness Specialists Group in 2009.

In 2004 at the IUCN World Conservation Congress in Bangkok, a resolution was adopted requesting the IUCN World Commission on Protected Areas to review
and revise its guidelines for protected areas. After three years of intensive debate (coordinated by Nigel Dudley and Sue Stolton) that produced over 50 papers containing many suggestions (one of which proposed that descriptive nouns such as ‘wilderness’ and ‘national parks’ should be dropped in favour of just using category numbers), a Protected Area Summit convened 100 invited protected area experts in Almeria, Spain in 2007. Core members of the Wilderness Task Force (Cyril Kormos, Harvey Locke, Vance G. Martin) and others presented formal and adjunct arguments promoting nature conservation as the highest value of protected areas, and the key role of wilderness in fulfilling this objective.

Thoroughly debated and ultimately adopted, the primacy of nature conservation was one of the central outcomes of the Almeria Summit. This rigorous three year process and its outcomes subsequently informed the IUCN World Commission on Protected Areas 2008 Guidelines on Protected Area Categories, which were approved at the World Conservation Congress in Barcelona (Dudley et al. 2012). In these revised guidelines, both category 1b and the term ‘wilderness’ were retained.

As of this publication, the IUCN Wilderness Specialist Group is facilitated by the WILD Foundation (http://www.wild.org/) and associates. It remains the coordinating hub for protected areas category 1b within the WCPA and IUCN.
1.3 Objective of the IUCN 1b protected area management category

Objective
Consistent with the 2008 Almeria Summit, the primary management objective of category 1b is nature conservation. The objective is management that will protect the long-term ecological integrity of natural areas that are undisturbed by significant human activity, have no modern infrastructure, and are characterised by freely occurring and reasonably intact natural processes. An important aspect of this objective is the emphasis on biological health and intactness rather than human benefits.

Compatible Objectives
Where the biological integrity of a wilderness protected area can be secured and the primary objective of nature conservation is met, the management focus of the wilderness area may include other objectives such as recreation, but only in so much as the primary objective is maintained securely. Traditional lifestyles and cultural and spiritual uses should always be considered compatible with wilderness management and as noted throughout these guidelines rights-based approaches should be fully implemented at all times. Other important objectives include:

1. Recreation and access
In contrast to category 1a, which in most cases disallows public access, category 1b encourages such public experience but only to the extent and of a type that it will maintain the wilderness qualities of the area for present and future generations. Mechanical and motorized access is uniformly not allowed (with notable exceptions, made for subsistence lifestyles in very remote areas, for example use of snowmobiles by Native Alaskans);

2. Traditional lifestyles
Category 1b exists to enable Indigenous Peoples, Tribes, and local 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. For example, the ability of Saami people in Northern Scandinavia to continue their reindeer herding;

3. Cultural and Spiritual Uses
Category 1b promotes the protection of relevant non-material benefits, such as solitude, respect for sacred sites, respect for ancestors, etc. While this has always been evident for Indigenous Peoples’ communities, the concept of wilderness as a place of worship for many non-traditional people is gaining currency as public participation wanes in institutionalised religion. The types of experiences most associated with this are “awe, wonder, transformation, connection” (Ashley 2012).

4. Education and Science
Category 1b allows for low-impact educational and scientific research activities, especially when such activities cannot be conducted outside the wilderness

Exceptions to Objectives
Although we have referred thus far entirely to large intact areas of land and sea, the objectives above are equally important when applied to (a) somewhat disturbed areas that are capable of restoration to a wilderness state—a process commonly referred to as “rewilding” (Johns 2016)—and (b) smaller areas that might be expanded over time. Both of these types of areas could play an important role in a larger wilderness
protection strategy as part of a system of protected areas that includes wilderness, if the management objectives for those somewhat disturbed or smaller areas are otherwise consistent with the objectives set out above.
1.4 Extent of 1b sites
The following countries have wilderness protected areas that fit IUCN category 1b. These wilderness areas are established via legislative or administrative designation or wilderness zones within protected areas: Australia, Botswana, Canada, Finland, Iceland, Italy, Japan, Kenya, México, Namibia, New Zealand, Pakistan, the Russian Federation, South Africa, Sri Lanka, Tanzania, Uganda, Ukraine, the United Kingdom of Great Britain and Northern Ireland, the United States, Zambia, and Zimbabwe (www.protectedplanet.net). The governance structures of these wilderness protected areas varies across and within countries. For more detail on wilderness governance, see Section 3. Wilderness protected areas have a critical role to play as the world works to stop biodiversity loss and safeguard ecosystem services.
1.5 Inclusion of Indigenous Peoples and Local Communities

In many cases Indigenous Peoples’ traditional knowledge systems, customary rights, governance and cultural practices sustained wilderness since before there was a “wilderness” concept (Cajune, Martin and Tanner 2008; Martin and Sloan 2012). In the majority of cases, conservation schemes developed and superimposed on Indigenous Peoples and local communities territories without adequate consultation or inclusion. This process resulted in gross violations of rights, and has been a detriment to both conservation and Indigenous Peoples (Stevens and DeLacy 1997; Stevens 2014).

In a growing number of cases around the world, Indigenous Peoples and local communities have regained management and/or governance control of resources through self-determination, legal advances and negotiated partnerships with non-tribal governments and national agencies. There are also an increasing number of cases in which Indigenous Peoples have been able to preserve or regain complete territorial control of their land, including environmental protection and wildlife management (Confederated Salish and Kootenai Tribes 2005; Martin et al. 2011).

It should be noted that the majority of the conservation priorities for this century are on Indigenous Peoples lands. These natural areas and ancestral homelands are the location of multi-stakeholder conservation accomplishments, integrating the management and governance approaches of Indigenous Peoples, local communities and institutional conservation (Stevens 2014). These same areas are also sometimes the site of continued violations of human rights, treaties and cultural values. Ongoing, these abuses undermine Indigenous Peoples well-being, life-ways, cultural practices, and economic stability, and result in the inability of Indigenous Peoples to continue their cultural practices which include stewardship and protection for the Earth. This is a detriment to both Indigenous Peoples and these natural areas, and is counterproductive to global conservation goals to protect and sustain wild nature. Current trends suggest that conservation schemes that may have been adequate historically, including those applied by Indigenous Peoples and local communities and institutional and contemporary conservation, are often not sufficient in the face of mounting pressures of climate change and increased environmental degradation. New approaches are needed, including strengthened partnerships between Indigenous Peoples and local communities and non-Indigenous governments and agencies. As stated in the 2014 Promise of Sydney:

[By] working in partnership with and recognising the long traditions and knowledge, collective rights and responsibilities of Indigenous Peoples and local communities to land, water, natural resource and culture, we will seek to redress and remedy past and continuing injustices in accord with international agreements. (Promise of Sydney, World Parks Congress, November 2014)

The true partnership between Indigenous Peoples’ governments and non-indigenous governments within wilderness areas is one of the most important as it is challenging areas of work. Extra attention is both required and deserved. This is emphasised by the fact that two of the four compatible objectives for category 1b relate specifically
(though not entirely) to Indigenous Peoples and non-Indigenous local communities:

• To enable Indigenous Peoples to maintain their traditional wilderness-based ways of life 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 Peoples or non-Indigenous populations, such as solitude, respect for sacred sites, respect for ancestors etc.;

The ultimate best practice approach to wilderness management with Indigenous Peoples and non-Indigenous governments is to collaborate from the beginning. Work together to first identify the areas for wilderness designation. Cooperatively design appropriate, ecologically sensitive and culturally relevant management plans that protect wilderness values while allowing Indigenous Peoples and local communities to maintain their relationship with the wilderness area for customs, ceremonies, ancestral respect, subsistence uses, etc. Too often, especially in the twentieth century, this was not the case and central government declared wilderness areas with little or no local consultation. Though lack of consultation still occurs in some countries, the accepted international standard is free, prior, and informed consent (FPIC) (UNDRIP 2007, article 10). Extensive consultation is now the norm but not yet universally practiced. A free, prior and informed consent process should be used through all planning, policy making and policy implementation in wilderness protected areas.

The best wilderness management is a composite of science and culture, and this is nowhere more important than when considering wilderness areas either inhabited by Indigenous Peoples or areas that have active land claims. Some central and guiding realities that category 1b decision-makers need to use when considering such areas are:

1. Partnership — Indigenous Peoples are not another group in a diverse range of stakeholders to be consulted as management plans are developed. Indigenous Peoples are partners: category 1b lands or seas under consideration have been their physical and cultural home for centuries, if not millennia, prior to colonisation. In most cases, except for the very few instances where local communities have jurisdiction over land declared as wilderness with management authority vested in the Tribe or community, the authority of the current governing institution arose far later than that of the resident Indigenous Peoples.

2. Reciprocity — Indigenous Peoples’ culture by definition is fully integrated with the entirety of nature (land-and sea-scape, flora, fauna, sky, soil, etc), and the people are in relationship with nature. Therefore, even aboriginal land practices such as fire management and subsistence harvesting (hunting, gathering) are viewed through the perspective of ‘reciprocity’ rather than ‘best practice management.’ In this case, ‘reciprocity’ can be defined as the quality that informs a partnership, whereby the partners share equally with each other all aspects of the partners lives and reality. This is also demonstrated through the way that most native cultures understand the world and build knowledge. ‘Traditional Ecological Knowledge’ as some Western Science researchers
Few human communities are homogeneous. This is equally true of Indigenous Peoples and local communities as it is of non-Indigenous, western-style communities. Internal factors and externalities are always at work: level of education and economic development, religion, rivalries, greed, ‘outside’ influences and other factors are common in all communities. In many ways, when working with Indigenous Peoples’ communities — or any local community — the non-Indigenous government wilderness manager is almost always regarded by local people as another outside, often intrusive, and complicating influence.

In such a case as this, the manager needs to be mindful of and practice four important behavioural tools.

1. **Time** – Spending time within these communities or with their representatives is essential, before asking lots of questions and expecting answers. Go away and return. “Showing up” builds trust, and is valued as much or more than practical plans.

2. **Solutions** – Understand that non-indigenous, western-style education teaches people to prioritise the creation and deployment of solutions. This needs to be somewhat reversed when working with local communities. Assume that they already have the answers to the management issue(s), and do your best to reaffirm that, work with it, and slowly interject your own ideas. Effective management plans empower people to understand their important role in the situation being managed.

3. **Humour** – Humour is generally an intrinsic part of conversations, of sharing knowledge and building relationships.

4. **Knowledge** – Indigenous Peoples have repeatedly had their traditional knowledge, customs, ceremonies, images, and cultural artefacts stolen, used without permission, and/or otherwise abused. Justifiable sensitivities abound around this issue. Asking permission is both polite and necessary, as is giving attribution to any contributions.

**Consultative Management and Co-management**

As national governments increasingly and appropriately recognise Indigenous Peoples’ land claims, numerous innovations have been devised to accommodate wilderness management. At a minimum, wilderness decision-makers should incorporate consultative management strategies within their management plans to ensure Indigenous Peoples’ ability to partner in all decisions.

Where possible, co-management between Indigenous governments and non-Indigenous governments should be sought for wilderness areas (Stevenson 2006). Such co-management structures should be based upon respect of Indigenous Peoples and of their rights (Carlsson and Berkes 2005;
Casson 2015; Nie 2008). Within the United States, the Native Environmental Sovereignty Project at the University of Oregon is an important resource (https://law.uoregon.edu/explore/ENR-nesp). Canada is very advanced in this regard as they work with their First Nations to increase and manage wilderness areas such as occurred with the large expansion of the Nahanni National Park, with the Dene leaders and people playing a primary role in the negotiations that extended for many years (The Deh Cho First Nations, The Government of Canada and The Government of the Northwest Territories 2001a; The Deh Cho First Nations, The Government of Canada and The Government of the Northwest Territories 2001b; Parks Canada 2010; UNESCO World Heritage Committee 2011).

Australia has developed excellent policy and practice in this regard, with some of the best and varied examples of consultative management and co-management (Ens et al. 2012). The Australian government’s practices include a range of approaches (Hill et al. 2011; Hill et al. 2012). In some instances Indigenous Peoples have formally ceded management responsibilities to state or national government. In other instances Indigenous governments and non-Indigenous governments establish co-management regimes in which responsibilities are shared and overseen by a committee representing both local and governmental interests. In all cases, Indigenous Peoples are assured rights of access and “appropriate” mechanised transport to assure non-interference with their customs and traditions while still assuring protection of wild processes and systems. A policy statement by the Australian Conservation Foundation (1999) remains one of the best outlines of management approaches in regards to Wilderness and Indigenous Cultural Landscapes.

Variance within Category 1b for Indigenous Peoples and Local Communities
Management plans for wilderness that has indigenous communities in and around it always requires variance or management exceptions. See sections 3.7 and 4.10 for more information.
1.6 Application of 1b category: Assignment and Reporting

Once wilderness decision-makers select category 1b as the proper IUCN protected area category, the site’s decision-makers must follow IUCN protocol for the assignment and reporting process to properly categorise a wilderness area as an IUCN protected area category 1b site. The governance body that oversees the site is responsible for the process of assignment. As is detailed in Section 3, governance of a wilderness area can be varied. The assignment principles for an IUCN category apply to all governance types of wilderness areas. As outlined by Dudley 2013 (p. 39) there are five principles for assignment:

1. **Responsibility**: The ability to assign protected area category type lies within the governing body responsible for the uses of the land and water within the wilderness area
2. **Democracy**: All partners and stakeholders related to the wilderness area should be consulted prior to the final assignment
3. **Grievance procedure**: Those opposed to the proposed assigned wilderness category should have the ability to challenge the decision in due process
4. **Data management**: Data collected within the wilderness area should be reported to the United Nations Environment Programme (UNEP) World Conservation Monitoring Centre
5. **Verification**: IUCN may soon institute a verification system through which all protected areas can choose to have their site verified as complying with protected area category objectives

To assign wilderness status and report on that status, follow these seven steps (modified from Dudley 2013, p. 40):

1. Identify the management objectives of the site
2. Assess if the site meets the IUCN definition of a wilderness protected area
3. Document the wilderness characteristics (wilderness values, management objectives, governing bodies, etc) and the justification for wilderness protected area status
4. Consult with relevant partners and stakeholders to agree on wilderness category designation
5. Propose that the area be designated as protected area category 1b
6. Governing body of site makes final decision of assigning protected area category 1b designation to site
7. Report wilderness category assignment to UNEP World Conservation Monitoring Centre for site inclusion in the World Database on Protected Areas

Whenever possible communicate updates to the UNEP World Conservation Monitoring Centre. At a minimum, annual communication to UNEP and the international conservation community is best. Communicate important on-going work, challenges and successes of the wilderness site through publication in academic peer reviewed journals, like the *International Journal of Wilderness*, in conference presentations, and in publicly accessible documents and newspapers. Publications, whenever possible, should be written by a multitude of wilderness partners and stakeholders.
Management Principles
2.1 Manage Wilderness Comprehensively through Development of Large-Scale, Intact Wilderness Protected Areas and Connectivity between Wilderness Protected Areas

[WAITING ON HARVEY]
Saving this page for Harvey's 2.1
2.2 Manage wilderness, and cultural sites within, to maintain highest integrity of all components of ecosystems, wildlife, and sacred and traditional cultural use sites

Guiding Principles
Once the wilderness environmental or cultural resources areas are degraded by human activity and exploited for non-wilderness land uses, such as forestry or mineral extraction, they cannot easily be recreated. A better and more cost-effective approach than restoration is to adopt a non-degradation concept (Dawson and Hendee 2009). Non-degradation is defined as the maintenance of existing environmental conditions where they meet or exceed minimum standards of wilderness or cultural values. The concept is best applied when the ecological integrity of an area is maintained as far as is possible, free from human impact, interference and influence (Dawson and Hendee 2009). Wilderness sites, and the cultural sites within, should be managed to maintain the highest integrity of all components of ecosystems, wildlife and cultural meaning through an explicit focus on non-degradation. When necessary, the concept of managing for non-degradation provides an opportunity to upgrade or restore wilderness quality.

Key Considerations
The principle of managing for non-degradation is the maintenance of environmental and cultural conditions within the designated wilderness area to not allow these to degrade or deteriorate unduly. Three areas in need of particular management consideration are: establishing baselines, inventoring cultural sites and monitoring visitation.

Baselines
To ensure non-degradation, management must define a baseline against which degradation can be measured. This baseline will influence how priorities are set for restoration and monitoring and future goal planning. An understanding of baseline conditions is essential to measure the pre-existing impacts and influences of human activity. Degradation of a wilderness area is assessed against this quantitative baseline.

To prevent a shifting baseline phenomena—in which target conditions are based on living memory that slowly degrades from one generation to the next—management must rely upon as many data sources as possible to inform the baseline to which degradation is measured (Papworth et al. 2009). Evidence from a single source may not represent the true ecological conditions for natural ecosystems. Not accounting for shifting baselines in historic accounts can have a marked effect on what is and is not considered natural, even among trained ecologists (Pauly 1995).

Cultural Sites
Management under the non-degradation concept is not limited to the biophysical characteristics of wilderness areas but applies equally to sacred and traditional cultural use sites. It is essential to protect the special qualities of these sites and adjust management practices to allow sacred and traditional practices to be observed wherever appropriate. Examples include sacred pools and rivers, religious sites, and archaeological sites like prehistoric petroglyphs, rock art, and historic markers. Cultural sites may be discrete locations or, as in many cases, entire landscapes. For example, the
designated wilderness area landscape of Mount Yengo in New South Wales, Australia is of great cultural and spiritual significance to the Wonnarua, Awabakal, Worimi and Darkinjung aboriginal groups (Clark 2003). As with many sacred places, only certain aspects of the area’s spiritual values of the site can be discussed publicly (see Section 4.9). Sacred sites should not be located on maps available to the public.

Monitor Visitation
It should be recognised that any kind of visitation to a wilderness area involves some level of impact and therefore impacts cannot be avoided, if human visitation occurs. In some cases, however, such as small island wilderness, or extremely fragile ecosystems, visitation may not be allowed. Certain types of visitation impact are also in direct conflict with the non-degradation concept. For instance, heavy horse and mule traffic in sensitive environments can cause irreparable impacts. Such visitation-induced degradation must be avoided.

Examples of unacceptable degradation through visitation include:

- Crowding of popular trails, destinations and campsites leading to loss of values of solitude due to crowding, often operationalised by frequency of encounters with other people.
- Noticeable signs of over-use, including extreme trail erosion, trail braiding (multiple trails in one spot), and campsite impacts.
- Visual and audible impacts from other users within the wilderness.

It is important to protect wilderness areas against degradation and promote the special qualities that make experiencing wild nature and landscapes in wilderness areas valued and highly rewarding. Access to cultural sites may be restricted from public access and open only to specific individuals or peoples with cultural and spiritual ties to the site.

Case Study
The California Desert Protection Act of 1994 (Public Law 103-433) in the United States created 69 new wilderness areas in and near the southern California desert region. The United States Bureau of Land Management (BLM) developed one plan to guide the management of five of these areas: (www.blm.gov/ca/st/en/fo/bakersfield/Programs/wilderness.html). The plan applies to five of these areas: Chimney Peak Wilderness, Domelands Wilderness, Kiavah Wilderness, Owens Peak Wilderness, and Sacatar Trail Wilderness. The management plan specifies a non-degradation approach through each of the following management goals:

1. To provide for the long-term protection and preservation of the area’s wilderness character under a principle of non-degradation. The area’s natural condition, opportunities for solitude, opportunities for primitive and unconfined types of recreation, and any ecological, geological, or other features of scientific, educational, scenic, or historical value present will be managed so that they will remain unimpaired.

2. To manage the wilderness area for the use and enjoyment of visitors in a manner that will leave the area unimpaired for future use and enjoyment as wilderness. The wilderness resource will be dominant in all management decisions where a choice must be made between preservation of wilderness and visitor use.

3. To manage the area using the minimum tool, equipment, or structure necessary to successfully, safely, and
economically accomplish the objective, the chosen tool, equipment, or structure should be the one that least degrades wilderness values temporarily or permanently. Management will seek to preserve spontaneity of use and as much freedom from regulation as possible.

4. To manage nonconforming but accepted uses permitted by the Wilderness Act and subsequent laws in a manner that will prevent unnecessary or undue degradation of the area's wilderness character. Nonconforming uses are the exception rather than the rule; therefore, emphasis is placed on maintaining wilderness character.

Implementation

Hendee et al. (1990) suggested a non-degradation philosophy should underlie all management decisions in a wilderness area. If possible, management should act to improve wilderness conditions through careful application of these management principles that adhere to a non-degradation purpose. These include:

- Manage human influences on wilderness (e.g., recreation pressure) and not the wilderness itself.
- Favour wilderness-dependent activities and experiences.
- Guide management with written plans and objectives.
- Set carrying capacities as necessary to prevent unnatural change.
- Focus management on threatened sites and damaging activities.
- Apply the minimum necessary tools or regulations to achieve desired outcomes.
- Involve stakeholders in developing acceptable management plans.
- Monitor wilderness conditions and experiences and modify management plans accordingly.
- Work closely with Indigenous Peoples, Tribes and local communities who identify important cultural sites within a wilderness area to maintain cultural practices and non-degradation.

Aspects of these basic principles are considered in the following sections. An explicit focus on maintaining non-degradation will help combat a potential shifting baselines situation and subtle degradation of wilderness components within an area.

Recommended Reading

2.3 Engagement between stakeholders and non-tribal government with Indigenous Peoples, Tribes and local communities in management and designation of wilderness in true partnership relations

Guiding Principles
For Indigenous Peoples and local communities, the need for reconciliation and building mutual trust are paramount to building true partnership relations. For Indigenous Peoples and local communities, reconciliation begins with the affirmation of Indigenous Peoples’ sovereignty and all internationally recognised instruments for protecting Indigenous Peoples and local communities’ rights; this is the basis of establishing trust. Without this integration, conservation advances can be seen as taking a step backwards for Indigenous Peoples and local communities. True partnership relations require that historical methods of ‘inclusion’ expand from attempts to integrate Indigenous Peoples and local communities into non-traditional government and agency processes toward mutually determined processes in which power is equitably distributed. True partnership means redefining the processes that are used to determine management and stewardship practices, priorities and strategic plans.

Key Considerations
Indigenous Peoples and Cross-Cultural Notions of ‘Nature’ and ‘Wilderness’
Most Indigenous Peoples’ languages do not have a word for “wilderness.” Rather, many Indigenous Peoples have had intimate, sustained relationships with what is commonly referred to as “nature” for thousands of years, relating to “wilderness” as homeland and ancestral domain. Further, the notion of “wilderness” as pristine, uninhabited, and/or “untrammelled by man” is not accepted by most Indigenous Peoples who see “wilderness” as “well-conserved nature that intrinsically includes people” (10th World Wilderness Congress 2013). Indigenous Peoples do not regard their territories as “natural,” but created and/or transformed by past interactions between their ancestors and the ancestors of other species (Reichel-Dolmatoff 1976; Berkes 2012). Thus, while many Indigenous Peoples celebrate the care for and protection of place that wilderness implies, many have rejected wilderness schemes which interfere with the way they have traditionally interacted with nature. Some Indigenous Peoples have simply side-stepped this issue by recognising and/or establishing Indigenous Peoples’ and Community Conserved Territories and Areas (ICCAs), which can have many names, including Indigenous Protected Areas, Tribal Parks, nature reserves, biocultural reserves, etc., and may or may not support wilderness characteristics. To partner with Indigenous Peoples and local communities in wilderness designations and management, the institutionalised commitment to “no-use” must be abandoned to, at minimum, support non-industrial, customary use for subsistence and traditional purposes.

Reciprocity, Stewardships & Management
Traditionally, Indigenous Peoples depended entirely on local fish, wildlife, and habitat, and needed creative ways to avoid their collapse. To achieve this, by western standards, one could say that Indigenous Peoples traditionally “managed” their resources: they not only used what was physically available to them, but made social choices about the rate of use, within sustainable limits and modified ecosystems, in selective and sustainable ways to increase
the availability of useful resources (International Indigenous Commission 1991). However, Indigenous Peoples do not typically use the term “management” to describe their relationship with an ecosystem, because it implies human domination. Rather, they are more likely to speak in terms of reciprocity, a relationship of give and take aimed at harmonising the human and non-human worlds, based on mutual accommodation or adaptation aimed at bringing people and the land into balance. Thus, for many Indigenous Peoples, true partnership requires expanding management definitions to include the principle of reciprocity.

The reported instances in which Indigenous Peoples appear to have been using their fish, wildlife, and habitat non-sustainably can be traced to losses of land or depletion of natural abundance resulting from settlements, removal, or state administration and exploitation of their territory (International Indigenous Commission 1991). Thus, the right to the traditional territories is the key to continued protection of Indigenous Peoples lands and seas, which include a significant number of potential future wilderness areas.

Kayapó boy holding a parrot.

Supporting Indigenous Peoples is necessarily part of true partnership. This should include: sustaining and supporting networks of sacred natural sites, cultural practices, traditional languages, methods of teaching traditional cultural values, respecting and upholding Natural Law, engaging multi-generational timeframes in planning schemes, eliminating economic incentives that undermine traditional values and endanger cultures and peoples, and supporting governance systems that align with Indigenous Peoples and local communities values.
Wilderness Designation and Free Prior and Informed Consent

Currently, Indigenous Peoples total 5% of the world population, have traditional land claims to 24% of the Earth’s lands and seas—containing 80% of the planet’s biodiversity—and inhabit 80% of protected areas. Indigenous Peoples are currently the stewards of at least the same amount of wild nature as all regional and national governments and conservation organisations combined (11%) (10th World Wilderness Congress 2013). Most of the world’s remaining ‘pristine’ ecosystems which may be fit for wilderness designation are actually human-modified environments, and their current levels of biodiversity are in part the result of niche modifications by Indigenous Peoples and local communities inhabitants. Thus, most, if not all, future wilderness designations necessarily include Indigenous Peoples and local communities.

Historically, such designations were made either without regard to Indigenous Peoples and local communities, or by attempting inclusion by exposing a projected management plan to Indigenous Peoples and local communities for their input under the terms set by the author. Though there is often discrepancy of jurisdiction according to customary, traditional, local, national and international law, engaging Free Prior and Informed Consent (FPIC) is the international norm and increasingly so (Hanna and Vanclay 2013). FPIC requires inclusion in the design as well as implementation of a management plan, as well as the governance structure for a designated wilderness area. Moreover, if not done correctly, where a wilderness designation undermines or otherwise determines Indigenous Peoples and local communities relationship with a place, the designation may be deemed false if Indigenous Peoples and local communities have not been adequately involved in the planning and determination of the designation.

Case Study

On November 13, 1979 the Confederated Salish and Kootenai Tribes set aside 92,000 acres (38,333 hectares) as a Mission Mountains Tribal Wilderness (Confederated Salish and Kootenai Tribes 2005). Many of the Tribal members at that time did not know the meaning of wilderness in the context outlined in these guidelines but did agree that this mountain range was an integral part of their core values and that future management of this resource was needed to preserve it as a natural and cultural area.

The Tribe’s resource management staff and the Federal government’s Bureau of Indian Affairs were given the authority to manage the area under the guidance of two key documents: a Tribal Council Wilderness Ordinance and a management plan. A management plan to protect a buffer zones within the wilderness area’s adjacent tribal lands was also created. These three documents provide the guiding policies for Tribal management of the wilderness area on the Flathead Indian Reservation.

Local, State and other Federal management agencies, such as the United States Forest Service, were not delegated any management authority for the Mission Mountains Tribal Wilderness. Instead, government-to-government consultation and partnerships assisted with the Tribes’ efforts to sustain the tribal wilderness resource.
**Implementation**
When partnering with Indigenous Peoples’ Governments, non-Indigenous governments should:

- Expand definitions of wilderness to incorporate concepts of homeland and ancestral domain.
- Implement Free Prior and Informed Consent, i.e. co-determine wilderness designations and management schemes with Indigenous Peoples and local communities from the beginning of the design process; establish and work toward common goals.
- Adopt provisions addressing Indigenous Peoples and local communities leadership and active participation in the governance, development and management of terrestrial, marine and estuarine wilderness areas.
- Honour customary use for subsistence and other traditional activities within and surrounding wilderness areas.
- Adopt language to honour the rights and roles of Indigenous Peoples and local communities throughout policy and legal documents.
- Incorporate sacred natural sites and networks, biocultural systems and cultural keystone species in management and governance plans.
- Redress past and current injustices.

- Recognise and affirm Indigenous Peoples’ rights and customary and legal jurisdiction in accordance with all recognised international instruments, including the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and the Convention on Biodiversity Article 10(c) Sustainable use and Article 8(j) Protection and Recognition of Traditional Knowledge
- Engage processes of dialogue, reconciliation and trust building.

**Recommended Reading**
2.4 Manage wilderness both to preserve intrinsic wilderness values and to produce human values

Guiding Principles
Wilderness should be managed in an approach that understands a holistic view of the world in which humans and non-humans are respected (Berkes 2012; Folke 2004; Savory and Butterfield 1999; Watson et al. 2003). Humans should be understood as part of nature and as performing complex interactions with non-humans in ways that can “enhance and improve the ecosystem” (Watson et al. 2003, p.3). Management should both preserve intrinsic wilderness values and produce human values. This kin-centric approach is grounded in a state of reciprocity between humans and nature (Salmón 2000). Such management permits natural ecological processes to operate as freely as possible because, ultimately, wilderness values for society depend on retention of naturalness (Hendee and Stankey 1973). Such benefits and values derived from kin-centric management apply to both Indigenous Peoples engaged in the wilderness area and visitors who use the area recreationally.

Key Considerations
Different approaches to knowledge
Management should be informed by all knowledge systems of the partners involved in the conservation of the area. The concept of knowledge can vary greatly between those using Traditional Ecological Knowledge (TEK) and those informed by western science (Babidge et al. 2007; Berkes 2012; Dove 2005; Menzies 2006). Western science often views knowledge as static, TEK understands knowledge as an on-going process (Berkes 2012, p.8). A kin-centric management approach must employ both in a manner that does not subjugate TEK beneath or within Western Science. TEK should be understood by managers as a nested system of processes that produce a way of knowing the world. TEK is not a body of knowledge but rather how a life is lived (Berkes 2012). As Watson et al. 2003 argue, “TEK assumes that humans are, and always will be, connected to the natural world, and that there is no such thing as nature that exists independent of humans and their activities (Pierotti and Wildcat 1997)” (p. 3). One cannot separate TEK into discrete items to be integrated into Western Science or selectively employ local knowledge without the repercussion of tokenizing TEK (Nadasdy 1999). TEK can only be approached as a nested system of local knowledge, land and management systems, social institutions, and worldview constantly in interaction with one another (Berkes 2012).

Precautionary principle
Management that follows a kin-centric approach follows the Precautionary Principle, which is the anticipation of harm before it occurs in order to protect humans and the environment against uncertain risks of human action (Deville and Harding 1997; UNESCO 2005). This principle as it relates to wilderness, assumes that when an area’s wildness is reduced or distorted, then the human values including experiential, spiritual, scientific and educational, will be lessened. Management of wilderness areas should follow the Precautionary Principle.

Examples
Ways in which wilderness can be managed both to preserve intrinsic wilderness values and to produce human value include:
• Experiential values such as self-reliance, physical and mental challenge, companionship, solitude, freedom, and
expressions of humility are enhanced by a wilderness setting and are clearly impacted by the presence of human development which reduce risk and effort while providing easier access to supporting infrastructure.

• Spiritual values such as aesthetic beauty, awe, connectedness, mindfulness, religious and philosophical freedom associated with being in an environment that is separate or apart from everyday societies rules, regulations and mental pressures are enhanced in a wilderness setting. While the label wilderness might not be significant, wilderness areas are often areas of immense cultural and spiritual significance to Indigenous Peoples.

• Scientific values of wilderness including provision of sites and subjects for data collection, experimentation and general study. Wilderness is particularly valued for science because of the lack of human influence on natural processes, ecosystems and human behaviour and psychology. For this reason wilderness areas are often used as control sites for studies on human impacts on global ecosystems. Human impact in wilderness areas reduces the usefulness of such studies as varied and sometimes unknown human influences will be exerted on the results of these scientific studies and controls.

• Educational values of wilderness areas are many and varied but include sites and case studies for the study of natural ecosystems and processes, and outdoor skills and ethics. The wilderness condition allows students to study natural ecosystems, wildlife and processes without needing to allow for possible human influences, which would otherwise detract from the value of such studies. Wilderness areas additionally provide ideal training grounds for outdoor education in wilderness survival skills, navigation, minimum impact camping and ethics (see Section 2.8).

Implementation
To implement management both to preserve intrinsic wilderness values and to produce human values, a fair and equal treatment of both TEK and western science knowledges should be employed in all management decisions. Ways to do this include:

• Establishing the capacities, mandates and motivations of the management partners and assessing the compatibility (and non-compatibility) between the partners in terms of power, interest and assess to resources.

• Assessing the wilderness area’s distribution of burden and benefits.

• Understanding the historical legacy of the wilderness area and respecting existing legal and customary rights to land and resources within the wilderness area.

• Incorporating TEK and western science as equally legitimate processes and contributions to management decisions.

• Ensuring future adaptability and flexibility for the management relationships to continually evolve.

• Assume a long-term view of management plans that allows for proper consultation of all partners and stakeholders, and to allow ongoing involvement in the management process.

Political actors involved in the management of a wilderness area must constantly work to ensure that conservation practices reflect a holistic approach to wilderness. Such an approach is not quickly or easily done but when done correctly can create strong management of wilderness areas that uphold human rights and wilderness values.
Recommended Reading


Long-distance hiking in Southwestern USA.
© Sarah Casson
2.5 Prioritise wilderness—dependent activities and areas of minimal human recreation

Guiding Principles
When making decisions about conflicting activities, wilderness decision-makers should favour activities within the protected area that are wilderness-dependent. Such activities include scientific research, traditional means of livelihood, and low-key recreational activities. All activities should be consistent with the overarching wilderness values. Areas of minimal human recreation should be prioritised within management plans and zoning.

Key Considerations
Defining wilderness-dependent
Wilderness-dependent activities are those that can only be done within a setting that uphold wilderness values: biological intactness, sacred areas, traditional use, absence of significant permanent infrastructure and commercial resource extraction, and opportunities for experiencing solitude. Declaring activities as wilderness-dependent may vary between protected areas. Wilderness decision-makers must use their best judgement. As Dawson and Hendee (2009) state, “Defining an activity as wilderness-dependent can be difficult. Often, it is not the activity itself that is dependent, but the particular style in which it is pursued. For example, hunting is not necessarily wilderness dependent. However, certain styles of hunting, such as pursuing game under the most natural conditions away from roads or talking a bighorn sheep among high peaks, are highly dependent on wilderness settings. The importance of naturalness and solitude to the experience, not the mere quest for game, defines certain kinds of hunting as wilderness-dependent” (p. 186).

Case Study
Prioritising wilderness-dependent activities and designating areas of minimal recreational use can prove difficult for wilderness decision-makers. The managers of the Mission Mountains Tribal Wilderness Area have worked hard to ensure the proper and respectful protection of the area (Confederated Salish and Kootenai Tribes 2005). In 1979 when the Confederated Salish and Kootenai Tribes created the first tribally designated wilderness in the United States, lack of general public awareness and vitriol racism threatened the protected area’s existence.

One tactic undertaken by the Mission Mountains Tribal Wilderness Area managers was education through the work of the Wildland Recreation Program. In 1982 the Confederated Salish and Kootenai Tribes government created the Wildland Recreation Program to lead in the management of the wilderness area and provide tribal wilderness education to the Flathead Indian Reservation and Western Montana public. The Wildland Recreation Program began a visitor awareness effort by producing a photographic slide show of the wilderness area with narration and music, with the goal to inform the local population about the resource, visitation rules and value of the designation.

Beyond the people reached by the visual education program, the managers still needed to educate the recreationists who did not adhere to the management zoning and designation of the Mission Mountains Tribal Wilderness Area. The wilderness managers assumed that those recreationists were not aware of the tribal wilderness land boundaries and the management distinctions between the area managed by the
Confederated Salish and Kootenai Tribes and the area managed by the United States Forest Service.

In 1989 the Wildland Recreation Program proposed a cooperative effort with the United States Forest Service Flathead National Forest to develop a joint map covering both Federal and Tribal wildernesses of the Mission Mountain Range. The map would help improve compliance to the tribal wilderness conservation rules. By the end of 1992, the Wildland Recreation Program presented the new Tribal/Federal wilderness map to the Tribes’ governing Council. Program staff stated that even though the boundaries between the two wildernesses are contiguous, the management differs between the two distinct agencies. Specific regulations for each wilderness area were listed separately on this map, along with general backcountry information that was common to both the Mission Mountains Tribal Wilderness and the Mission Mountains Wilderness.

The joint Tribal-USFS wilderness map has proved to be hugely beneficial for the Tribes’ wilderness management efforts. Managers now have an educational tool that demonstrates the Tribal wilderness boundaries and rules in mass print, and the map helped silence those who questioned Confederated Salish and Kootenai Tribes’ ability and commitment to resource management and conservation. The map includes a reference guide with tribal cultural quotes and highlights areas within the Mission Mountains Tribal Wilderness Area not open to recreationists. This map is an important tool to show that the Mission Mountains Tribal Wilderness Area is trust lands open to public use to individuals that have obtained a Confederated Salish and Kootenai Tribes’ conservation license to recreate on tribal lands.

Implementation

When use conflicts arise within a wilderness protected, the activity defined as most wilderness-dependent should be favoured to prevent overuse and to adhere to wilderness values. Implementing this into practice may prove challenging but, ultimately, more beneficial to the wilderness area as demonstrated within the case study. If any zoning of locations with minimal or no recreation within the protected area, all wilderness decision-makers should uphold this zoning regulation in everyday practice, in educational outreach and in the management plans.

Recommended Readings

2.6 Guide wilderness management using written plans with specific area objectives and cultural norms

Guiding Principles
Wilderness management actions should be guided by formal plans that state specific objectives and explain how they will be achieved, consistent with all applicable legal authority for the area. The plan guides individual area stewardship with increasingly refined legislative, policy, and local management directions, strategies and actions toward specific area objectives. These objectives, by providing clear descriptions of the desired conditions to be achieved, serve as benchmarks for periodic evaluation of stewardship progress, and subsequent adjustments or revision. The entire planning process must include, in all its stages, the involvement of area stakeholders, using whatever variety of methods is needed to acquire their input, and enlist their continuing involvement in resolving issues that are encountered during plan implementation (Dudley 2013; Dawson and Hendee 2009; IUCN 2016). The plan should include the cultural norms of Indigenous Peoples, where relevant and appropriate, and form true partnerships in the creation and the implementation of the management plan.

Key Considerations
Management plan as a written document
A wilderness management plan is a written document stating the authority and policies under which a designated area is managed; the goals and objectives for management; the management direction and actions necessary to achieve the stated goals and objectives, and; the monitoring program to ensure that the goals and objectives are being met following management activities (Dawson and Hendee 2009). A management plan should strive to address all wilderness area partners’ histories, needs and cultures. Extra care should be taken if some wilderness decision-making partners do not come from cultures where writing and objective-planning are commonplace. In such cases, a mediator, such as a cultural anthropologist, should work closely with all decision-makers in creating the objectives. Such mediation works to prevent the stagnate subjugation of Indigenous Peoples’ relationship to nature and adaptive knowledge systems to western science static knowledge paradigms (Simpson 2005).

The internal logic of a written plan is expressed in an orderly process that establishes clear, attainable, measurable, and acceptable objectives that allow for flexibility and consistency in purpose across time to guide management activities toward desired outcomes and conditions (Dawson and Hendee 2009). Change is inevitable both within an area and in the adjoining landscape and good planning requires anticipating trends, changes, and problems so that management direction and actions can proceed in a logical manner. Without a written document to guide decision-making, managers could too quickly react to problems or outside pressures and arrive at a cumulative undesirable result based on incremental decisions that were not focused on the goals and objectives.

Components of management plans
The framework for a written management plan (Dawson and Hendee 2009) includes five types of components:

1. **Goals** are the broad statements of intent, direction, and purpose based on national policy and the specific
authority that designated a local area as wilderness. The goals stated for designation as a protected area under IUCN category 1b should be considered in this statement (IUCN 2016).

2. **Objectives** are hierarchical statements under each goal that describe the specific and attainable conditions sought for a particular wilderness area, serve as criteria for deciding which management actions are needed and appropriate, and used as a basis for later monitoring and evaluation of the effectiveness of management actions and activities. The objectives stated for IUCN category 1b should be considered in this statement (IUCN 2016).

3. **Current situation and assumptions** are statements that set the context for developing a set of management actions for an area by summarising local conditions and situations, prediction likely changes to wilderness conditions and uses, and focus the overall direction for management actions.

4. **Management direction and actions** are statements of program direction to guide managers toward achieving each stated objective within the plan.

5. **Monitoring program** is a statement of which specific measurable standards can be used to evaluation the effectiveness of management actions and activities to attain each stated objective.

**Case Study**

Nahanni National Park Reserve, a wilderness protected area, is located in the southwest corner of the Northwest Territories of Canada. The South Nahanni River is the main feature of the park and is an important ecological and cultural homeland area for the Dehcho First Nations who use the traditional name for the park: Naha Dehé. The park was established in 1976 and expanded in 2009 to 30,000 sq. km making it the third largest Park The park was established in 1976 and expanded in 2009 to 30,000 sq. km making it the third largest Park in Canada. The park includes a Canadian National Heritage river and a World Heritage area.

In 2000, Dehcho First Nations and Parks Canada jointly created the Naha Dehé Consensus Team to engage in cooperative planning and management for the Nahanni National Park Reserve (The Deh Cho First Nations, Government of Canada and Government of the Northwest Territories 2001a; Deh Cho First Nations). Some of the principles expressed in cooperative management by the Naha Dehé Consensus Team included: recognising and respecting traditional use; sharing the stories and traditions of the Naha Dehé; using traditional knowledge in park management; supporting cultural learning; managing in partnership and looking to the future (Parks Canada 2010). The Canada National Parks Act requires all national parks to develop a park management plan that guides management and operation decisions and actions. The most recent management plan for the Nahanni National Park Reserve was revised and completed in 2009-10. The planning team included the Naha Dehé Consensus Team, Parks Canada staff, community and local stakeholders, and the public. The plan provides a long-term vision and strategic direction for the park and it is reviewed every five years to ensure that the plan remains valid and effective. This park plan is a good example of cooperative management and the inclusion of the cultural norms of Indigenous Peoples.
**Implementation**

Good planning is essential to support good management and stewardship of a wilderness area (Dawson and Hendee 2009). The intent of writing wilderness management plans is to organise the best logical thinking about which objectives to achieve and the management direction necessary to be successful. Goals and objectives stated in a wilderness management plan serve as guiding statements for deciding which management actions are necessary and appropriate, and provide targets against which the effectiveness of management actions and activities can be judged toward achieving the desired objectives. Furthermore, by stating the situation and assumptions at the time the plan was written, the written document allows future decision-makers to decide if those conditions still exist, or if the plan needs to be revised in view of changing conditions. All wilderness area decision-makers from relevant Indigenous Peoples governments and non-Indigenous governments should be part of the management planning process.

Examples of wilderness management planning approaches and sample plans for the four United States federal agencies who manage areas of the 110 million acres in the National Wilderness Preservation System can be found through the “Wilderness Management Planning Toolbox” (http://www.wilderness.net/planning) (Arthur Carhart National Wilderness Training Center and others 2016).

**Recommended Reading**

2.7 Manage carrying capacities through establishing limits of acceptable change

Guiding Principles
Management should determine the limits of acceptable change in wilderness conditions by setting standards to protect the area and uphold wilderness values. Setting such standards allows use within carry capacity through the management of human behaviour and distribution. While limits on use are sometimes established in cases where impacts are solely related to user numbers, impacts have become the more desirable focus to protect wilderness attributes. Indicator-based planning systems take a threat-oriented approach to protect both experiences and resources.

Key Considerations
Visitor-use indicator-based frameworks
A popular visitor-use indicator-based framework is the limits of acceptable change (LAC) framework (Frissell and Stankey 1972; Cole and Stankey 1997). This framework asks the questions ‘how much change is acceptable’ and ‘what are the desired conditions’ rather than asking ‘how much use is too much’? (Watson et al. 2003; McCool et al. 2007, Newsome et al. 2013). It defines the amount of degradation in biophysical and/or social conditions permitted in a wilderness area’s management objectives (McCool et al. 2007).

Another framework, Visitor Experience and Resource Protection (VERP), is useful to wilderness managers (U.S. Department of the Interior 1993; U.S. Department of the Interior 1997; Manning 2001). VERP is largely an adaptation of the earlier LAC model. VERP crucially includes additional elements concerned with developing a public involvement strategy from the outset and is explicit about defining different zones within the park where different desired visitor experiences and resource conditions might apply, mapping these and selecting indicators and standards for each zone that can then be used in development of appropriate management actions and monitoring of their efficacy (Bacon et al. 2006). Other useful frameworks exist and can be found in Recommended Reading below.

Indicators
Useful indicators are ones that can be measured in cost-effective ways at acceptable levels of accuracy and precision; are related to the type, level and location of use; reflect changes in conditions due to visitor use; respond to and help determine management effectiveness; help report on the quality of visitor experiences; and are meaningful to stakeholders, including senior managers (Moore et al. 2003). Such indicators are needed to report on the objectives that ideally make explicit the desired conditions.

Examples of biophysical indicators include the percentage of vegetation cover around a campsite or extent of trail erosion or ‘braiding’. A social indicator in widespread use in wilderness areas is the number of trail encounters with other parties, and number of parties camped within sight or sound, as an indicator of crowding, a threat to solitude (Manning 1997). See Section 2.10 for more information on selecting indicators to monitor wilderness conditions and experience opportunities.

Implementation
Using indicators to define and protect carrying capacity provides a means by which the acceptability of inevitable impact can be determined and managed. Desired
conditions must be explicitly detailed in the management objectives for the wilderness area. These objectives must be sufficiently specific and provide clear guidance for wilderness decision makers. Using planning systems and managements to develop such objectives is expounded upon in Section 4.1.

**Recommended Reading**

2.8 Focus Management on Threatened Sites and Damaging Activities

Guiding Principles
A threatened site or area can be defined as any site or location where wilderness physical attributes and/or social conditions are at risk or are undergoing change or degradation as a result of non-natural forces, like impacts from recreation. Wilderness areas by their very nature tend to be large and can encompass varied and complex mosaics of different landscapes and ecosystems. Management must be designed to the individual circumstances of the wilderness area. Management should focus on threatened sites and activities that damage wilderness areas. Such a focus is more effective than applying unnecessary management actions to areas not under threat.

Key Considerations
Activity outside the defined wilderness area
Difficulties arise for the manager where sites are threatened by the impacts of activities taking place outside of the wilderness area (Cole and Landres 1996; Landres et al. 1998). These might include air and water pollution from agriculture, forest operations and industry. They may also include impacts from hunting on dilution of wildlife populations and the resultant effects on territories. The creation of buffer zones, policy and/or legislation and incorporation, when applicable, of World Heritage or UNESCO Biosphere Reserves are critical in ensuring core wilderness. Further discussion on management in relationship to adjacent lands can be found in Section 2.11.

Special provisions
Stipulations exist within individual countries’ legislation to protect or allow non-compliant or non-conforming—but legal—activities under special provisions (Nickas and Proescholdt 2005; Watson et al. 2004). An example can be found within the United States: Limited commercial use is a special provision within the Wilderness Act. These special provisions are sometimes the most threatening human uses within a wilderness area and cannot always be contained by managers (Natural Resources Law Center 2004).

Implementation
To focus on threatened sites and damaging activities management must be selective and site-specific (Cole 1994; Franklin and Aplet 2009). This approach allows managers to address and solve problems that occur only locally or are temporary in nature.

Examples of this focused style of management include:
• Temporary trail closure during wet season to prevent excessive erosion from foot traffic.
• Closure and vegetative restoration of popular campsites to allow renewal.
• Segregation of hikers and horse-riders on different trails to minimise possible inter-user conflicts.
• Closure of sensitive areas during critical breeding season for certain species.
• Impose quotas on user numbers in heavily used areas to maintain use within specified limits to protect user experiences.
• Manage visitor’s behaviours, group size, and distribution through limits of acceptable change protocol to protect the area’s ecological integrity.
• Implement visitor restrictions to mitigate damage to threaten sites with directional
flow, assigned campsites and designated routes through the area.

Many of these restrictions apply to recreation use (Cole et al. 1997; Cole and Wright 2003). When considering which recreational activities to focus on, managers often face difficult decisions regarding fairness. Careful thought should be given to who should be restricted, under what conditions and criteria, and how should these restrictions be implemented, placing minimum burden on those facing some sort of restrictions, if necessary. Management should first focus on the most damaging activities at the most threatened sites, and then address wider issues arising from other uses. It is often the case that the greatest total impact arises from high frequency, low impact uses (e.g., hiking) whereas highly localised yet damaging impacts come from low frequency, high impact uses (e.g., horses). Impacts can also arise from manager efforts to fix the problem. It is incumbent on the manager to make decisions about which impacts to focus on and which users/uses to target, bearing in mind that the high frequency/low impact uses might be the most difficult to manage with these being dispersed and often with multiple entry points (Leung and Marion 2000).

For example, management actions and policies focused on reducing trampling of vegetation and disturbance of wildlife along busy trails by imposing trail quotas, restrictions or even closures will adversely impact on visitor experiences by restricting choice and accessibility to key destinations. Another example might be how a ban on firewood collection at a popular campsite to protect populations of saprophytic insects and the species, which depend on them for food will impact user enjoyment by removing the option of having a campfire.

**Recommended Reading**

2.9 Apply Only the Minimum Tools, Regulations, or Force to Achieve Wilderness Protected Area Objectives

Guiding Principles
Decisions about wilderness administrative actions and how they both protect and can threaten the wilderness resource and visitor experiences are very important. Many characteristics of wilderness are fragile and irreplaceable. If decisions are made without systematic analysis and without forethought for protecting key benefits of wilderness designation, a great deal could be lost through the wrong, or at least not the most appropriate, administrative actions. A systematic decision process should be used for determining appropriateness of administrative actions in wilderness. This can include the use of tools (like methods used to control invasive plants, suppress fires, or conduct scientific research), to regulations (such as weighing user restrictions that impact experiences but protect the resource against educational approaches) to applications of force (citations, warnings, education, etc.). A firm, systematic process for making decisions is recommended.

Key Considerations
The Minimum Requirements Decision Guide (MRDG 2014) (developed by the Arthur Carhart Wilderness Training Center in the United States) suggests a simple principle of “use the minimum tool” that is necessary to accomplish the task. The tool that is least obtrusive to the wilderness environment and visitor experiences and addresses the issue will be the best tool, regulation or amount of force to use. The Minimum Requirement Decision Guide (MRDG) describes two steps to this decision process:

1. Determine if any administrative action is really necessary. The absence of visible presence of humans is highly desirable in wilderness, and opportunities for spontaneity, exercising freedom in decision-making and lack of heavy-handed, authoritarian management presence is highly compatible with the wilderness ideal. Describe the situation that may prompt action and describe why it is a problem or issue. Determine if there are any options outside of wilderness — can action be taken outside of wilderness that adequately addresses the situation? If action is necessary, move to step 2, to determine the minimum requirement to address the issue. In the United States, the MRDG limits this analysis to “…actions include, but are not limited to, scientific monitoring, research, recreational developments (trails, bridges, signs, etc.), and activities related to special provisions mandated by the Wilderness Act or subsequent legislation (such as grazing, exercising mineral rights, access to inholdings, maintenance of water developments, and commercial services).”

2. Determine the minimum required activity. To do this, identify a selected alternative after identifying and evaluating all reasonable alternatives. Describe the rationale for selecting this alternative, referencing law and policy criteria. And describe any monitoring and reporting requirements. The MRDG suggests a worksheet that forces the administrator to work through a series
of questions in describing each alternative solution and helps to document why an alternative was selected.

Case Study
On the MRDG website (www.wilderness.net/MRA), there are case studies for such issues as livestock grazing management, historic cabin management, insects and disease control, native fish restoration, non-native invasive plants management and wildlife surveys. A key example found in the MRDG is that of non-native invasive plants management. This work resulted in a solution that is highly driven by protection of the wilderness character of the place and the symbolic values of wilderness protected at this place. In this example, after learning from monitoring activities that non-native invasive plants were increasing at one location in a wilderness in the United States, a minimum requirement analysis was conducted.

This prescription was adopted: Treatment of non-native invasive plants infestations would occur within the wilderness and continue on national forest and private lands adjacent to the wilderness. All treatment actions in this case study follow the recommendations of an Integrated Weed Management Plan (see Colorado Natural Areas Program 2000 for more details on such planning). These treatment actions are to be adjusted annually as needed. Hand-pulling and grazing, using domestic goats controlled by a herder, will be used for knapweed and herbicides will be applied to treat leafy spurge, toadflax and Canada thistle. Only non-motorised spray equipment will be used and all transportation of personnel and equipment will be on foot or pack string. All personnel will camp in existing campsites and use Leave No Trace techniques to minimise impacts. Temporary area closures will be used during herbicide application operations. Monitoring of existing infestations and inventory of new outbreaks would continue as required. A public information program would be implemented outside wilderness (i.e., trailhead information boards, forest offices, forest website, etc.) to inform wilderness visitors and others about the threat of non-native invasive plants infestations and to promote prevention measures to minimise introduction and spread. The public and adjacent landowners would be informed of treatment actions and temporary area closures during herbicide application operations.

Implementation
The MRDG suggests development of specific criteria for determining necessity. Such decisions must be made in a consistent manner. As issues and personnel change, wilderness managers must strive to apply the same criteria in action planning and decision making. The MRDG suggests making decisions of necessity minimally based on these five criteria:

1. **Valid existing rights or special provisions of wilderness legislation**: Is action necessary to satisfy valid existing rights or a special provision in wilderness legislation that requires action?

2. **Requirements of other legislation**: Is action necessary to meet the requirements of other federal laws?

3. **Wilderness character**: Is action necessary to preserve one or more of the important qualities of wilderness that were behind formal protection of this area as wilderness?

4. **Legislation language**: Is there “special provisions” language in legislation (or other Congressional direction) that explicitly allows consideration of a use otherwise prohibited AND/OR has the
issue been addressed in agency policy, management plans, species recovery plans, or agreements with other agencies or partners?

5. **Time Constraints:** What, if any, are the time constraints that may affect the action?

For each decision made, managers must describe what possible methods and techniques could be used, when the action would take place, where the action would take place and what mitigation measures would be necessary. Wilderness managers should select the method or technique that causes minimum impact to the resource and visitor experiences while solving the issue.

**Recommended Reading**

2.10 Monitor Wilderness Conditions and Experience Opportunities to Guide Long-Term Wilderness Stewardship

Guiding Principles
To monitor wilderness conditions is to observe and measure the quality of the area over time through the systematic review of specific metrics, indicators and measurements. Any management plan requires effective monitoring systems and protocols to evaluate progress towards its stated objectives. Monitoring is essential to guide planning and identify any revisions that may be required to the management plans or actions. It is also essential to understand any changing circumstances and to be able to assess management actions already undertaken. Only through monitoring can it be determined if the objectives in a wilderness area management plan have been accomplished or not.

Adaptive management
Wilderness areas are subject to human-induced change that can be addressed by wilderness managers (e.g., soil erosion) and other human-induced changes that are not (e.g., climate change, air pollution). Management needs to be able to deal flexibly with both these endogenous and exogenous influences, with flexibility particularly important with respect to the latter where uncertainty is an inherent trait. Flexibility in management is also needed to respond to changing visitor and visit characteristics over time and associated changes in impacts. And, what is societally acceptable over time is going to keep changing. Also adding uncertainty is whether a particular management strategy for visitors is going to work or not, and needing to adjust it accordingly. For all these reasons, adaptive, flexible management is necessarily central to successful management. The limits of acceptable change framework was designed with adaptive management in mind (Moore and Hockings 2013, Cole and McCool 1997).

Importance of collaboration between all stakeholders
Managing for desired conditions or acceptable levels of change suggests value judgments are integral to decision making (McCool et al. 2007). These judgments could be made by managers but they are unlikely to reflect the full suite of values held regarding a wilderness area; values held by Indigenous People, visitors, commercial

Key Considerations
Long-term perspective
Monitoring, when employed correctly, allows for the possibility of a wilderness area’s long-term stewardship for future generation’s use (Cole 2010). Wilderness management takes a long-term view. Monitoring is a key factor in ensuring the continued ecological and cultural intactness of a wilderness area. The use of an indicator-based planning system is essential for long-term monitoring (see Sections 2.7 and 4.1).

Wilderness manager collecting monitoring data.
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operators (concessionaires), neighbours, environmental organisations, and others. Collaboration is needed throughout the planning cycle in determining desirable conditions and encapsulating them in the objectives, through to indicator and site selection and the review of results (Newsome et al. 2013).

Implementation
Devising effective monitoring for wilderness management plans can be a major challenge. Good monitoring systems involve the careful and systematic collection of data followed by careful analysis and evaluation. Monitoring of the quality of wilderness areas should include baseline documentation of influence external forces from adjacent lands (see Section 2.11). Analysis should focus on the assessment of non-degradation of an area (see Section 2.2), the wilderness experiences of recreational users and the cultural needs of the Indigenous Peoples and local communities associated with the area (see Section 2.3). Data should be collected on biological, physical, social, psychological and cultural metrics for the wilderness area in question and for the adjacent lands (Merigliano and Krumpe 1986; Landres et al. 2005).

It should be recognised that most of these indicators will vary both spatially and temporally across the wilderness area and will require appropriate tools and systems to assist in both data collection, management and subsequent analysis. In some instances a Geographical Information System (GIS) populated with appropriate datasets, supported by the necessary hardware and software, and personnel within an appropriate organisational setting, will be used to handle the data management and analysis (Carver and Fritz 2016). In all instances working closely with natural and social scientists will be extremely useful.

Recommended Reading
2.11 Manage Wilderness in Relation to Its Adjacent Lands

Guiding Principles
Adjacent lands are the areas surrounding the demarcated protected area and are outside the limits of the core wilderness area. Threats to core wilderness can come from human activities outside the protected area. Discrete legal and practical protected area boundaries do not necessarily reflect boundaries followed by natural processes, like wildlife migration and wildfires. It is often necessary to manage the wilderness area not in isolation but in coordination with its adjacent lands.

Key Considerations
Do not manage wilderness in isolation
In a recent survey of wilderness managers in the United States (Dawson et al. 2015) one of the most serious threats to wilderness conditions identified by these managers was the threat posed from adjacent lands. All of the natural processes, and many of the human ones too, do not respect judicial and administrative boundaries that we place around designated wilderness and other protected areas. We cannot always establish boundaries in a way that limits exchange of organisms, sounds, water and human uses across landscapes. Wilderness cannot be managed in isolation from the physical, ecological and human context of its surroundings. Managers must manage wilderness in relation to its adjacent lands. In some countries, buffer zones can be implemented to protect the core wilderness area from activities outside the protected area. In some countries or at specific sites, buffer zones cannot be established.

Legal and administrative involvement
Wilderness can be regarded as one side of the environmental modification spectrum (or wilderness continuum). It is difficult to draw the boundary between legally protected (i.e., de jure) wilderness and non-wilderness (Nash 1982). Boundaries are usually decided through a process of legal and administrative decision-making. Boundaries can often cross, divide or intersect natural biophysical zones or ecosystems making the manager’s task all the more difficult. Wilderness managers must involve themselves with the management of land uses outside of their immediate area of jurisdiction. Careful planning and coordination with decision-makers, landowners and wilderness area partners is essential.

Influence of and on adjacent lands
There are many ways in which adjacent lands influence (and are influenced by) wilderness areas. These can be summarised as follows:
• Air pollution from nearby urban areas (e.g., emissions from cars, power stations and industry) can negatively affect air quality inside wilderness areas leading to impacts on wildlife and vegetation health.
• Dust and smoke from agriculture and forestry (e.g., wind-blown soil from ploughed fields and smoke from deliberate burning of crops and forestry residues) can also impact on air quality within wilderness areas and adversely affect visibility. Within the United States’ categorisation of air quality, wilderness areas should be ranked as cleanest. Monitoring of air quality within a wilderness area affects a local industry’s ability to increase air pollutants.
• Water quality within wilderness areas can be affected either by wet/dry fallout of atmospheric pollutants or by direct runoff where a wilderness area boundary does not encompass the whole of a catchment,
watershed or drainage basin. It is usual for wilderness areas to be regarded as highly beneficial water supply zones and have often been preserved as wilderness for just this purpose (e.g., the Catskill Mountains supply drinking water for New York City).

• Wildfires are a particular concern in regard to the management of wilderness in relation to adjacent lands. Wildfires originating from natural ignitions (e.g., lightning strikes) in wilderness areas and allowed to burn as part of the ecological management plan, can cross the boundary and pose a threat to lives, property and economic land use outside of the wilderness. Similarly, fires started by human action (either accidentally or deliberately) outside of wilderness areas can burn into the wilderness and cause unnatural damage.

• Access and recreation also needs to be considered. Roads, trails and trailheads at the wilderness boundary create localised areas of higher accessibility within the wilderness with associated impacts from higher recreational use. Trespass into wilderness from adjacent lands by violators using motorised or mechanized methods of conveyance can severely threaten wilderness resources.

• Disease is often a key concern in regard to adjacent land use. While natural pests and diseases are often not controlled within a wilderness area (e.g., Pine and Spruce bark beetle in Europe and North America) and are perhaps considered a natural process, they can cause problems from economic damage and losses once they cross the boundary.

• Wildlife is generally highly mobile, sometimes with large home ranges or territories that extend well beyond the wilderness boundary. Movement and migration of wilderness dependent and wilderness associated species beyond the wilderness protected area can bring it into conflict with economic land uses such as farming and ranching as a result of livestock predation, genetic dilution from interbreeding and transmission of disease. Thus, ranching and farming landowners may sometimes view wildlife as threats to their livelihoods.

Case Study
On Montana’s Flathead Indian Reservation the tribal council designated the 92,000-acre Mission Mountains Tribal Wilderness (Fig. 1) in 1982 at the urging of many tribal members. The wilderness is a symbol of the overarching relationship the Confederated Salish and Kootenai tribes once had with the northern Rocky Mountains. The Tribes also established protection in 1987 for an additional 22,000 acres west of the wilderness to serve as a buffer zone against unwanted human activities. The wilderness buffer zone essentially established a checks-and-balances system that assured deliberation and conscious decision making to ensure that trust is protected and wilderness values do not deteriorate. This parcel of land—half of which is owned by the Tribe, half by tribal and non-tribal individuals—contains some homes and roads and remains a working landscape within the community. Both the wilderness and the buffer zone are considered protected cultural as well as natural landscapes; thus major decisions about the management of these areas are subject to review by the Tribal Cultural Committee, the Tribal Council and other tribal members (Watson et al. 2013).

To successfully improve forest health within that wilderness buffer zone and increase opportunities to restore fire in the wilderness, the Tribal Forestry Department and the
public are working together to find solutions to increasingly threatening fuel buildups. Decades of fire suppression within the wilderness buffer zone have resulted in heavy accumulations of dead wood on the forest floor, a dense understory of brush and young trees, and closed forest canopy. This accumulation renders the forest highly susceptible to destructive wild fires, disease, and infestations of pine bark beetle and other harmful insects. Yet, at the same time improving forest health demands the use of fire to restore a structure that makes it more fire-resilient over the long term. Although the tribal people and their governing agencies are ostensibly committed to seeing fire restored in the wilderness, the situation of fuels abundance in the buffer zone has been a serious obstacle.

Implementation

Wilderness is often managed in relation to adjacent lands through zoning and coordinated planning. Zoning can be applied both inside and outside of wilderness areas. Inside the wilderness area, zones describing levels of use based on landscape indices and accessibility can be used to manage use based on remoteness from the wilderness boundary and access points. The creation of buffer zones should be encouraged outside of the wilderness boundary. Buffer zones are usually zones of limited economic activity (e.g., extensive grazing and light forestry) and developed recreation (e.g., serviced camp grounds) that act as a buffer or separation between the wilderness and intensive land uses beyond. Buffer zones act in both directions depending on the threats and influences under consideration. For example, a wilderness buffer can protect wilderness from intensive land use via legal planning restrictions within the buffer zone. It can also protect economic land use from wildlife and diseases originating inside the wilderness (Cole and Hall 2006) or restoration fires to move outside the wilderness boundary to valuable cultural forest or homes (Watson et al. 2013).

Buffer zones are not the sole answer to managing wilderness in relation to its adjacent lands. It is essential to work with law enforcement, to get local community support, and to implement legal restrictions. Careful coordination of management actions both within and outside the wilderness areas between reserve managers and local planning authorities is necessary to protect wilderness areas from external forces and development.
Recommended Reading


Governance & Authority
3.1 Introduction: Governance and Authority in Wilderness Protected Areas

Governance refers to the interactions among institutional structures, processes and traditions through which political actors can enact legislation, delegate power and responsibility, and determine the appropriateness and equity of management objectives (Graham et al. 2003; Borrini-Feyerabend et al. 2013). Governance is intimately related to management but ultimately separate (Borrini-Feyerabend and Hill 2015). Management determines the actions that are undertaken in pursuit of wilderness area protection, whereas governance dictates which political actors have the power and responsibility to make those management decisions (Lockwood et al. 2006). Management focuses on the ‘what’ of wilderness protection and governance focuses on the ‘who’ and ‘how’ (Graham et al. 2003).

Those charged with the task of wilderness area governance should strive to uphold a set of governance quality principles customised to a particular area’s specific cultural concerns, historical land use, and geography. Borrini-Feyerabend et al. (2013) argue, “These principles provide insights about how a specific governance setting will advance or hinder conservation, sustainable livelihoods and the rights and values of the people and country concerned” (p. xii). Strong adherence to governance principles within wilderness law is required to ensure proper protection. There are five main principles of good governance quality defined by the IUCN: Legitimacy and Voice, Equity, Fairness and Rights, Performance, and Accountability. These principles of governance quality should be upheld by all political actors involved at all scales of wilderness protected areas.

No single governance model can be used as the ideal across all wilderness areas. Wilderness areas are intrinsically different, and require different governance approaches. Section 3 recognises four principle governance types: by government, by Indigenous Peoples and local communities, by private governance, and by shared governance. Shared governance can incorporate any of the three other governance types. Section 3 also provides guidelines for wilderness governance through multilateral treaties (see Section 3.6).

As stated in the 2014 Promise of Sydney (see Introduction for more detail on the 2014 Promise of Sydney document) quality for all governance approaches must be coupled with governance diversity and vitality. Governance diversity requires dynamic systems that involve as many political actors as is feasible. Full participation of government officials, rights-holders, non-governmental organisations and private institutions is essential to high quality governance. Diversity of actors can be enforced through official legislative bodies and informal social structures. Governance vitality is “the capacity for integration and connectivity, learning from experience and social-ecological history, fostering engagement and developing innovative and empowering solutions” (IUCN World Parks Congress 2014: 3). A focus on improving governance vitality provides a way to ensure the protection of wilderness areas is premised on respectful and equitable relationships.

Section 3 also explores the permitted governance variances from wilderness legislation (see Section 3.7). Within all
governance types wilderness legislation regulates certain human uses within wilderness areas but allows other uses that are consistent with wilderness values (Kormos 2008: 356).

Recommended Reading For Section 3


• IUCN Protected Areas Governance website, accessed online <www.iucn.org/pa_governance>
3.2 Governance and authority of wilderness protected areas by government

Guiding Principles
National government governance occurs when a national government body, like a ministry or protected area agency, has an official mandate and the necessary capacity to govern a wilderness protected area. Sub-national governance of wilderness protected areas occurs at the provincial, regional and local government levels. Most national government and sub-national legislative approaches to wilderness correspond with IUCN Protected Areas Category 1b classification. Governance by government of wilderness is growing in adoption internationally. It is likely that more countries will soon adopt their own wilderness laws that correspond to the IUCN categorisation.

Key Considerations
National government governance
A national government body may declare new wilderness areas, determine the conservation objectives of the areas, and oversee the area’s management (Borrini-Feyerabend et al. 2013; Borrini-Feyerabend and Hill 2015; Lockwood et al. 2006; Worboys et al. 2015). Sometimes the government body in a country, like Namibia and the Philippines, will delegate day-to-day management and governance, for example to a sub-national government agency, Indigenous Peoples’ management board, non-governmental organisation, or private sector actor though usually retaining the ultimate responsibility and decision making authority (Dawson and Hendee 2009; Borrini-Feyerabend et al. 2013).

Wilderness laws perform two tasks: 1) they define the attributes that wild areas must possess to qualify as a wilderness protected area, and 2) they define the range of human uses that are deemed compatible with those attributes and which are therefore permitted within wilderness (Kormos 2008: 21). Such laws create the legal and political definition of wilderness protected by those tasked with the conservation of the area. Governance creates and upholds wilderness legislation within protected areas.

With all types of national government legislation of wilderness governance, the challenge for legislators is to combine the social, biological and recreational aspects of wildlife protection legislation.
wilderness into nationally applicable law that remains consistent with wilderness values (Kormos 2008). Policymakers must draft wilderness statutes that combine protection for ecological resiliency, recreational values, and Indigenous Peoples’ traditional means of livelihoods that are dependent upon the wilderness resource.

Sub-national government governance

Government is not a monolithic entity. A multitude of agencies comprise all nations’ governments and work at the local, regional, provincial, and national levels (Lockwood et al. 2006; Worboys and Trzyna 2015), often in concert with private interests and non-governmental authority. Each agency has its own claims to authority, legitimacy and ability to produce quality conservation. Sub-national government governance creates the potential for a more collaborative and decentralised process of conservation (Borrini-Feyerabend and Hill 2015) based upon locally-defined relationships between government agencies, local communities, non-governmental organisations and private individuals. Today it is rare that a sub-national wilderness protected area is solely governed by a government agency without collaboration with Indigenous Peoples or other conservation actors.

Case Study

In 2009 the European Parliament passed a resolution calling for improved protection and recognition. The European Commission (2013) published guidelines on management of wild and wilderness areas in the Natura 2000 network. Covering 18% of Europe’s terrestrial area, this network is now the largest coordinated set of protected areas in the world. 130 non-governmental organizations approved these guidelines’ recommendations on how, where and under which circumstances non-intervention management may be applied within Natura 2000 areas.

The wilderness definition used within these European Commission guidelines was derived from the IUCN definition of category 1b. These guidelines enable implementation of protection and restoration schemes to a uniform standard regardless of geographic or cultural circumstances, and also provide direction for governance. The document calls for more effective use of legislative capacity already existing within the Natura 2000 network to protect wilderness and to coordinate with local law. It also directs decision-makers to incorporate protected wilderness areas within more general conservation agendas by realizing the economic, social and cultural importance of wilderness in addition to its intrinsic, biodiversity and ecosystem service benefits.

Implementation of the European Commission guidelines represents part of a broader programme to advance the wilderness and wild area agenda in Europe. These guidelines provide governance advice while also sending a useful global message about the importance of wilderness protection.

Implementation

A wilderness protected area governed by a national or sub-national government body should:

- Be transparent in management decisions
- Alert the public of actions through publication of management policies and performance effectiveness reports
- Foster engagement with political actors across government agencies and with non-government individuals
- Promote dialogue between stakeholders and conservation partners
Above all, such a governance structure should strive to uphold the ecological and social wilderness values of the area.

Planning meeting of wilderness decision-makers.
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3.3 Governance and authority by Indigenous Peoples and local communities

Guiding Principles
Governance of land and marine territories by Indigenous Peoples, Tribes and local communities is both widespread and the oldest form of governance. If Indigenous People, a Tribe or the local community chooses to have their self-governed and managed territories designated as a wilderness protected area, that site can be referred to as an ICCA (Indigenous Peoples' and Community Conserved Territories and Areas) (Dudley 2013; Kothari et al. 2012). ICCAs have three key tenets: 1) “An Indigenous People or local community possesses a close and profound relation with a site (territory, area or habitat)”; 2) “The people or community are the major players in decision-making related to the site and have de facto and/or de jure capacity to develop and enforce regulations”; and 3) voluntary “decisions and efforts lead to the conservation of biodiversity, ecological functions and associated cultural values, regardless of original or primary motivations” (Borrini-Feyerabend and Hill 2015:185; Stevens 2014: 71). While not all ICCAs are wilderness areas, within ICCAs there is vast diversity in governance structures, customary and local organisations, mandates, and capacities to protect wilderness attributes. The guidance of United Nations Declaration on the Rights of Indigenous Peoples should be followed within all ICCAs.

Key Considerations
International recognition of Indigenous Peoples’ customary ICCAs as protected areas is an important step within conservation. Many territories governed and managed by Indigenous Peoples and local communities uphold wilderness values and should, if desired by the specific Indigenous People or local community, be registered as a wilderness protected area. In 2012 the IUCN adopted resolution 5.094 Respecting, Recognising and Supporting Indigenous Peoples’ and Community Conserved Territories and Areas that called for governments, non-governmental organisations and the IUCN body to “recognise and support ICCAs in situations where they overlap with protected area or other designations” (IUCN 2012; Stevens 2014). Such recognition comes from the proper international and national respect of Indigenous Peoples’ customary territories and laws used to govern those areas. Adhering to the United Nations Declaration on the Rights of Indigenous Peoples is essential. In cases where indigenous people do not hold direct authority over culturally significant areas, but no other protection exists, ICCA listing goals can motivate communities to seek or declare needed authority.

Holistic approach
Indigenous Peoples’ and local communities’ territories and practices that align with the IUCN definition of category 1b sites and ICCAs may be concerned with more than biodiversity conservation alone (Stevens 2014:70). ICCAs often “can be central to livelihood, culture (including identity, relationships to territory, and spiritual beliefs), and, when appropriately recognized and respected, the realization of rights. They are essential to secure livelihoods, providing access to food, water, shelter, clothing, energy and income (Dias 2012) through sustainable use of natural resources based on local knowledge, cultural values, and collective management of commons” (Stevens 2014:70-71). ICCA is an umbrella term that impasses many of the ways that
Indigenous Peoples and local communities conserve and protect their territories and areas through customary traditions, culture, self-governance, and relation to place (Stevens 2014). Overly restrictive definitions of ICCAs, often premised upon non-Indigenous Peoples’ romanticisation and static understanding of Indigenous Peoples and local communities, undermine the autonomy of ICCAs, Indigenous Peoples’ rights and ICCA’s conservation contributions (Borrini-Feyerabend et al. 2013; Stevens 2010, 2014; Jonas et al. 2012; Kothari et al. 2012).

Collective rights
ICCAs are often governed and managed collectively. Recognition of Indigenous Peoples’ collective rights—as opposed to individual—to their land, water and natural resources is essential (Borrini-Feyerabend and Hill 2015:183). Collective rights support community institutions’ ability to be the governing bodies of protected areas. Denying collective rights to Indigenous Peoples harms their capacity to govern their traditional lands.

Acknowledgement of negative conservation legacies
All work done must acknowledge conservation’s historical legacy of nation-building, subjugation of Indigenous Peoples, blatant racism and ethnocentrism, expulsion of Indigenous Peoples from their territories, and extreme prejudices by non-Indigenous Peoples of the purported threats posed by Indigenous Peoples to so-called conservation efforts (Stevens 2014:40). In instances where ICCAs exist within larger government-governed wilderness protected areas, all wilderness decision-makers must support ICCAs and governance by Indigenous Peoples in a manner that respects the rights of Indigenous Peoples in accordance with the United Nations Declaration on the Rights of Indigenous Peoples. Without proper recognition of ICCAs, non-Indigenous governments risk undermining, suppressing, and violating the rights of Indigenous Peoples (Borrini-Feyerabend and Hill 2015; Stevens and Pathak-Broome 2014). Nation states must recognise customary territories and law, and many are beginning to do so (Borrini-Feyerabend and Hill 2015: 193). Customary law must be understood and respected as a legitimate body of law separate from a non-Indigenous government’s body of law.

Implementation
A wilderness protected area governed by Indigenous Peoples or local communities should affirm Indigenous peoples sovereignty and rights, including: rights to control their own development and to use, conserve and manage all natural features of their lands, including the rights to keep their own systems of land tenure, and to be protected from environmental degradation; right to participate in decisions regarding the disposition of any state-owned minerals which may affect them, with the objective of obtaining their agreement or consent, and not to be removed from lands without their consent. This includes the allowance of limitations of recreational access seasonally and/or spatially to assure privacy for the spiritual and traditional practice of Indigenous Peoples.

Recommended Reading

• Indigenous peoples’ and community conserved territories and areas (ICCAs) consortium website: <www.iccaconsortium.org>


3.4 Private ownership and governance of wilderness protected areas

Guiding Principles
Private governance of wilderness protected areas is an important field of conservation in which wildlands are overseen by private institutions, not government agencies (Dudley 2013). The authority and responsibility to make conservation decisions rests solely with the private institutional owners, individuals or trusts who own the land. To be formally recognised within the IUCN definition, any wildlands governed by private actors must prioritise the conservation needs of the area over any activities that might impinge on the conservation objective and must adhere to best practices as defined within IUCN management guidelines.

Key Considerations
Certain countries, particularly Eastern and Southern African countries, have more land protected under private ownership and governance than under the authority of government (Worboys et al. 2015). It is important to ensure best practices on these wildlands and proper recognition of the quality conservation performed through private governance.

Legacy of private governance in conservation
Private ownership and governance has a long history within nature conservation (Borrini-Feyerabend and Hill 2015; Johnson 1996; Nash and Hendee 2009). The origins of private conservation governance can often be found in lands set aside by aristocrats and monarchs to protect areas to use as hunting grounds (Lockwood et al. 2006). Such governance saw conservation practices as secondary to the wants of private individuals. Today private governance prioritises the conservation needs of wildlands, often through conservation easements. A common example of such governance is seen when corporations, non-governmental organisations or private trusts purchase and lease of wildlands for the explicit purpose of conservation (Langholm and Krug 2004). Many are driven by respect for nature and desire to protect wild places (Worboys et al. 2015). More utilitarian motivations include corporate responsibility objectives, biodiversity offsets, ecotourism income and tax incentives. Both motivations are important and interrelated.

Oversight and certification
Oversight and certification by external sources should be encouraged to maintain strict standards of best practice governance and management (Worboys and Trzyna 2015). Many protected areas are privately owned and governed are managed by a board whose purpose is to ensure proper governance practices (Worboys and Trzyna 2015). Poor governance practices in private wilderness areas can result in “‘islands for elites’—places where wealthy landowners host affluent tourists (Langholz and Krug 2004)” (Worboys et al. 2015: 192). This is especially a concern with foreign ownership of lands protected for their wilderness value and character. Oversight by external sources allow for the use of specific legal and political contexts to ensure quality governance, which requires cooperation with the national and sub-national government agencies and relationships with communities surrounding the private wildlands. Proof of such cooperation can come from certification given by the national government or international bodies that monitor and evaluate the effectiveness and equity of a wilderness area (Lockwood et al. 2006: 130).
This regulation can ensure private governance adherence to IUCN standards of quality governance and true partnerships with surrounding communities (Worboys et al. 2015).

**Case Studies**

Private governance is often best implemented through partnerships between private actors and conservation-focused nongovernmental entities, governments, or grant-making foundations. Working at a landscape-scale can bring together multiple private landowners and conservation agencies to agreement on large conservation management plans and governance objectives (Worboys et al. 2015). Examples of such partnerships can be seen in the 2.4 million-hectare Adirondack Park in New York State in which half of the land is privately owned and can be seen in the vast private ranches of the American West (Kormos 2008). Another example is El Carmen, a private wilderness protected area in northern Mexico (www.cemex.com/Sustainable Development/cases/ElCarmen). El Carmen is owned by the private company CEMEX, which is advised by several non-governmental conservation organisations on best practices for wilderness conservation. CEMEX announced the creation of El Carmen at WILD9, the 9th World Wilderness Congress in 2009. As a result of work done by the organisers of that Congress and the Mexican Government, one year later El Carmen was a key part of a three million hectare transboundary protected area, the El Carmen-Big Bend Conservation Corridor Initiative, formally declared by Mexico and the United States. A further example was the Shamwari Game Reserve in South Africa, which was the first private wilderness protected area designated in South Africa. Shamwari is no longer a privately owned wilderness protected area but did set many good examples of how to govern a privately owned wilderness area. Examples of quality private governance can be found in Kormos' (2008) writing on conservation by corporations and individual landowners and Borrini-Feyerabend's (2013) description of ecotourism and private hunting reserves.

**Implementation**

Private wilderness protected areas should:

- Be overseen by an external source to ensure best practices
- Where applicable, use a management board to execute governance decisions
- Cooperate with national and sub-national government agencies
- Partner with conservation non-governmental organisations or grant-making entities
- Where possible, create financial incentives for private actors to respect the ability of Indigenous Peoples to continue accessing traditional places and land uses.

All governance and management decisions should be toward upholding best practices and wilderness values.
3.5 Shared governance and authority of wilderness protected areas

Guiding Principles
A shared governance structure that can balance diverse partners and stakeholders with differing (sometimes vastly differing) capacities and interests will be a much stronger long-term governance system than one that ignores these complexities to focus only on the politically powerful (Berkes 2012; Worboys and Trzyna 2015). Shared governance requires institutional mechanisms that share governance and authority among several actors but can be individualised at the local level (Worboys et al. 2015). A multi-level emphasis incorporates a management structure able to work with a plurality of governance that brings together different levels of national, state and local governments of the state to work in coordination with Indigenous Peoples, Tribes and local communities’ governments. The complexities of power relationships between a politically and culturally diverse group can present major difficulties to a successful shared governance structure, but, when successful, this diversity can likewise better ensure the long-term stability and success of a wilderness protected area.

Key Considerations
Key features of successful shared governance structures include partnerships that are multi-party, multi-level, multi-disciplinary, and flexible with an emphasis on constantly evolving process, and created in a paradigm in which powers are shared and benefits distributed (Dudley 2013; Borrini-Feyerabend and Hill 2015). An explicit focus on multi-party collaboration requires incorporating different types of political actors, their respective capacities and interests. This focus on diversity allows for a multitude of engaged actors to be involved in the conservation process and for the recognition of partners and stakeholders beyond national government agencies to be formally involved in the governance of a wilderness area (Dovers et al. 2015). Some actors, like Indigenous Peoples, local communities and private landowners, have almost always been informally involved in the governance of wilderness but can now be given due recognition through shared governance roles (Lockwood et al. 2006). Wilderness decision-makers in shared governance structures must adhere to the United Nations Declaration on the Rights of Indigenous Peoples. Two articles within this declaration of particular importance to shared governance are:

- Article 12: “the right to maintain, protect, develop and teach their spiritual and religious traditions, customs and ceremonies; the right to maintain, protect and have access in privacy to their religious and cultural sites, the right to use and control their ceremonial objects and right to repatriations of their human remains….” (UNDRIP 2007: 9).

- Article 31: “the right to control, protect and develop their cultural knowledge…..and intellectual property rights…” (UNDRIP 2007: 11). These rights include the right to research employing indigenous science and methodology and to ensure the inclusion of indigenous science in policy implementation, other research projects, assessments and response to protected area threats.

Shared governance presents the possibility that a protected area could incorporate the ecological and cultural needs of an area in a manner that upholds the best practices required by governments, communities,
scientists, and conservationists. In some situations, non-governmental organisations may oversee the governance of a wilderness area and be charged with the responsibility of bringing together a range of stakeholders and conservation actors, including government agencies.

Collaborative governance
Collaborative governance occurs when one government agency—often a state or provincial agency—possesses the authority and mandate to govern an area but must at least consult and inform stakeholders when implementing regulations and initiatives (Borrini-Feyerabend et al. 2013). Consultation may vary from informal to formal depending upon the regulation at hand and the actors involved. A strong form of collaborative governance uses a type of consultation that requires the fully informed and comprehensive involvement of all stakeholders in the decisions made for the area (Lockwood et al. 2006; Borrini-Feyerabend and Hill 2015). Applicable to all protected areas, collaborative governance works well for wilderness protected areas as does joint governance described below.

Joint governance
Joint governance has a regulation body composed of actors representing a variety of vested interests and constituencies that are charged with the authority and responsibility of a protected area’s decision-making (Borrini-Feyerabend and Hill 2015). The nuances and balances of such power sharing structures is defined in a formal manner from the outset of the joint governance relationship. The balance of power between the conservation partners and stakeholders spans a continuum from full control by government agency to full control by non-government conservation partners and is often based upon an individualised platform of shared authority, responsibility, mandate and capacity to govern a wilderness area. Joint governance has a strong potential to incorporate the pressing social and ecological needs of conservation (Carlsson and Berkes 2005).

Transboundary governance
When applicable to wilderness protected areas, transboundary governance refers to the ways in which wilderness protected areas are established and managed across national government borders to allow the free migration of animals across political borders (Mittermeier et al. 2005; Sandwich et al. 2001; Vasiljević et al. 2015). Transboundary governance should include management plans in which the management is truly shared between and integrated across the nations involved in the transboundary area. Transboundary efforts may not explicitly focus on wilderness but include the protection of wilderness areas as part of an overall conservation strategy. Transboundary governance can and should include collaborative or joint governance.

Peace Parks (www.peacepark.org) provide examples of transboundary governance structures that benefit ecosystems, peoples and wildlife in the name of conservation and social justice. The Kavango-Zambezi Transfrontier Conservation area that spans Angola, Botswana, Namibia, Zambia, and Zimbabwe is a good example of a peace park that contains wilderness protected areas.

An example of another transboundary governance structure is the Yellowstone to Yukon Conservation Initiative that stretches from northwestern Wyoming (Yellowstone, USA) to northwestern Canada and northeastern Alaska (Yukon) (http://y2y.net/). It is an example of an area conserved at a
continental scale through a governance structure that incorporates hundreds of diverse political actors working together to best direct the conservation objectives (Bates 2010; Locke and McKinney 2013). These transboundary conservation governance structures allow for the protection of important ecosystems in entirety. Transboundary protected areas can be governed through multilateral treaties (see Section 3.6).

**Implementation**

A shared governance structure should acknowledge the rights of the partners and increases the participation of peoples involved in the conservation of protected areas. Successfully executed, shared governance can promote both social justice and scientific best practices of conservation. Borrini-Feyerabend and Hill (2015) argue that it is possible to achieve a balance “between fairness and acquired rights, stability and innovation, local meaning and values and broader liberating principles” by adopting a ‘human rights-based approach,’ by which a multiplicity of procedural and substantive rights is respected” (p. 201). Such a structure must incorporate historical events and relationships, previous governance structures, multiplicity of actors with explicit interest in area protected, ecological realities as well as the more intangible aspects like fairness of process, capacity and means to manage, and true power-sharing (Borrini-Feyerabend et al. 2004; Borrini-Feyerabend and Hill 2015; Nie 2008). The principles of effective shared governance of protected areas as outlined by Stevens (2014:300-301) should be followed in all shared governance of wilderness protected areas:

- “Recognise Indigenous Peoples’ status as Indigenous Peoples and their human and Indigenous rights and responsibilities.

- Recognise Indigenous peoples’ territories, collective land and sea tenure, self-determination, self-governance, and customary law or agree to differ on issues such as territorial ownership while dispute resolution processes proceed.

- Only undertake shared governance with the free, prior, and informed consent of Indigenous Peoples.

- Provide for periodic review and renegotiation of shared governance arrangements.

- Provide, when agreed to by all parties, for shared governance to be an interim arrangement to facilitate transition to Indigenous Peoples’ self-governance of protected areas in their customary territories.

- Establish formal, clear, legally binding agreements on shared governance that include institutional arrangements, decision-making process, dispute resolution mechanisms, protected area goals and management categories, and key policies and regulations.

- Ensure that Indigenous Peoples have at least equal decision-making power and authority in shared governance arrangements.

- Develop decision-making processes with Indigenous Peoples’ full and effectiveness participation that respect their own decision-making protocols.

- Ensure that when management boards are established these are not merely advisory and define their purview to include policy-making, planning, assessment and evaluation, oversight of day-to-day management, fiscal responsibility, and accountability.

- Ensure that Indigenous Peoples approve the means by which management board members are selected.
• Ensure that Indigenous Peoples have at least equal representation and leadership on management boards.
• Provide capacity building for all involved, including for improving cross-cultural communication, relationships, and interactions.
• Foster trust and a strong shared commitment to working together.
• Carry out joint work and training, the shared experience of which can foster better interpersonal relationships, mutual understanding, and respect.
• Strive for decisions that reflect respect for Indigenous Peoples’ values and knowledge as well as non-Indigenous Peoples’ concerns and knowledge.
• Recognise ICCAs that overlap with or are contained within these protected areas.
• Provide legal authority for Indigenous rangers, guardians, and others designated by Indigenous Peoples to enforce customary law and protected area regulations.”
3.6 Multilateral governance and authority of wilderness protected areas

Guiding Principles
Multilateral governance structures can be used to protect wilderness areas through treaties agreed to by three or more sovereign states. These treaties are often concerned with the conservation of wildlands that are transboundary, are of global importance, or are areas not administered by specific countries such as Antarctica and the High Seas. These governance structures often require the participation of many non-governmental organisations, government agencies, advocacy groups and private individuals. The incorporation of so many disparate actors provides both benefits and challenges to the creation of a successful governance structure.

Key Considerations
Multilateral governance
Multilateral governance of wilderness protected areas occurs when three or more national governments decide upon a formal conservation agreement. Governance at the multilateral level requires implementing legislation at the national level for each participating country. Examples of such conservation agreements are the Convention on Biological Diversity, the Convention on Migratory Species, the Barcelona Convention, General Fisheries Commission for the Mediterranean and Black Sea, the Convention for the Conservation of Antarctic Seals, the Hamilton Declaration, and the Abidjan Convention.

Three multilateral environmental agreements that have been used to protect wilderness and which have great potential for further, more systematic use in the future, are the Convention on Wetlands of International Importance (Ramsar Convention), the World Heritage Convention, and the UNESCO Biosphere Programme (Dawson and Hendee 2009; Borroni-Feyerabend et al. 2013). While the Ramsar Convention and the Biosphere Programme do not explicitly describe wilderness areas, they do describe key wilderness values (see Introduction for discussion of wilderness values) like naturalness and minimal human impact (Dawson and Hendee 2009: 58) creating good potential to use these mechanisms to protect wilderness qualities or areas with high wilderness value. The Convention Concerning the Protection of the World Cultural and Natural Heritage of 1972 protects sites with Outstanding Universal Value by inscribing them on the World Heritage List. The World Heritage Convention has already been used to protect very large, intact areas (including a number of protected areas designated or partially designated as wilderness protected areas) and potential exists for a more systematic contribution to wilderness conservation globally in the future (Kormos et al. 2015)

Ocean wilderness governance
The United Nations Convention on the Law of the Sea (UNCLOS) dictates governance of the High Seas, i.e. areas beyond national jurisdiction. UNCLOS provides the foundation upon which any regional governance structures for the High Seas should be built. Any High Seas governance structure must first establish the correct type of governance that allows for as many diverse actors to be as involved in the decision-making process given their respective capacities, authorities and mandates. Governance vitality can be maintained through the overarching supervision of a multilateral body like the United Nations Environment Programme
Regional Seas Programme. The survey on potential high seas wilderness areas by McCloskey (2001) should be used as a reference in establishing governance of such areas.

Antarctica
Antarctica is the world’s largest area with intact wilderness qualities. It is governed by the Antarctic Treaty System (ATS), a complex governance structure that incorporates a multiplicity of regulation agreements between multiple countries. Within ATS, the Protocol on Environmental Protection to the Antarctic Treaty provides specific protection to the wilderness values of Antarctica with a legal status (Deary and Tin 2015). Two Annexes to this Protocol provide environmental management directives specific to wilderness: Annex I Environmental Impact Assessment and Annex V Area Protection and Management (Deary and Tin 2015, 2). As the tourism sector increases visitation to Antarctica and climate change threatens to disrupt Antarctica’s ecosystem dynamics, the governance structures must remain adaptive and protective in accordance with wilderness values.
3.7 Variances in jurisdiction and diversity of governance and authority

Guiding Principles
In certain instances the interpretation of wilderness legislation recognises specific variances. General category principles, explained below, should be used in assessing whether certain activities are consistent with the intent of wilderness law. As a rule, activities should be judged by the extent to which they undermine—or do not undermine—wilderness values of the protected area. As wilderness law and policy continue to evolve so will the nuances of variances permitted within wilderness areas. All current and future variances should be analysed by their consistency with the principles of wilderness values. Variances for new designation types, like those by Indigenous Peoples and the private sector, must be explored further. Wilderness law and the variances from it must be assessed by their ability to work in conjunction with and in a context of Indigenous Peoples' land rights (Kormos 2008:357). See Section 4.10 for the management and permitting of variances.

Key Considerations
Kormos and Locke (2008: 24-25) describe six categories of human activity that may be compatible with wilderness:

1. **Wildlife sanctuary**—Humans restrain their own activity, providing an area in which other species are free from human predation.
2. **Hunting and gathering**—Humans hunt wild animals and harvest plants that have grown without human intervention or cultivation.
3. **Fishing**—Humans take species from fresh or salt water for food or recreation.
4. **Primitive recreation**—Humans use their own legs, canoes, or domestic animals to spend time in places they enjoy.
5. **Benchmark study**—Humans use an area to learn more about the world’s natural conditions.
6. **Restoration**—Humans restore natural processes and conditions to an area they have previously converted to other use.

The compatibility of these categories depends upon other factors, including national legislation. At times, these categories may be in conflict with one another. Some of these categories, like fishing and hunting, may be restricted within individual areas to specific peoples, like traditional aboriginal inhabitants, or to specific zones within the larger wilderness area. Specific activities may be governed at a sub-national level instead of at a national government level. For example, in the United States, wildlife and fish are governed at the sub-national level, which means hunting and gathering variance differs within the country. Sport hunting and fishing is permitted within wilderness areas, provided the activity is regulated in accordance to wilderness values and the prevailing wilderness legislation.

Grazing variation
Kormos and Locke (2008) explain that the grazing of domestic animals is rarely compatible with wilderness values. They define this category of human activity as “Humans domesticate animals and concentrate their grazing activity. They may use an area permanently or move through it temporarily” (p.25). Often the grazing that is permitted within a wilderness area is by
nomadic peoples and is categorised as non-intensive grazing (Dudley 2013). Such grazing activity must be analysed and continually re-analysed on an individual basis to confirm its compatibility with wilderness values. As Kormos and Locke (2008) emphasise, unless grazing is done in an extremely light manner, it should be considered incompatible with wilderness values unless there is legal direction otherwise. Intensive grazing can quickly destroy the ecological integrity of any wilderness area. As a general rule, as with all variances, grazing within a wilderness protected area must remain consistent with the overarching wilderness values. As stated in the Australian Environmental Protection and Biodiversity Conservation Act: “Indigenous human communities living at low density and in balance with the available resources should be able to maintain their lifestyle” (CoA 1999). If the traditional knowledge systems, customary rights, governance and cultural practices of an Indigenous People includes non-intensive grazing then such grazing should be a permitted variance.

Variance defined within national wilderness legislation
Certain countries have explicit variances written into their wilderness legislation that are not compatible with wilderness values. For example, Finland’s wilderness law has explicit allowances for activities, like herding and limited forestry, and infrastructure, like roads, in wilderness areas that benefit either “the common good or the indigenous livelihoods in the area” (Kormos and Locke 2008:27-28). As with all variances these represent a small fraction of all Finnish wilderness areas and are often exceptions, not norms, within Finnish protected areas. The Alaska National Interest Lands Conservation Act (ANILCA) stipulates variance for subsistence use of wilderness in Alaska. See section 4.8 for more detail on ANILCA. Similar country-wide variances exist in Australia and Canada (Kormos 2008).

Size Variation
All wilderness areas should meet the biological definitions of size and intactness set by the IUCN. In a few instances, variance must be given to areas that cannot reach these definitions but should still be defined as wilderness. Such exceptions can be reached if the decision-makers see potential to restore the area to a wilderness state, to include in a landscape wilderness approach, or to make the best of a physically limited, but excellent, representation of wildlands (Kormos and Locke 2008:28).

Emergency Management
During times of emergency, like out of control fires, emergency management powers may be permitted to override wilderness legislation and allow fire control equipment to operate in a wilderness area until the emergency is controlled. For example, wilderness areas within the Australian state of New South Wales allows bulldozers within wilderness areas if required during an emergency wildfire incident (Worboys 2015). Worboys (2015: p. 823-850) gives definitions of incidents requiring emergency management, examples of protocol for handling emergency incidents, and best practices for preventing emergencies that require variance from wilderness legislation.

Implementation
As described in Section 1, all wilderness areas are intended to adhere to a set of wilderness values. Six categories of human activity described by Kormos and Locke (2008:25) are not compatible with these wilderness values and cannot be given variance:
1. **Farming**—Humans change the species composition of an area for their own nutritional benefit by altering the land or seabed and planting one or several species.

2. **Mechanical recreation**—Humans use vehicles for recreational activities, including bicycles, automobiles, off-road vehicles, motorboats, and snowmobiles.

3. **Transportation corridors and infrastructure**—Humans build highways, railways, airports, harbours, shipping lanes, irrigation canals, or straightened river channels for navigation.

4. **Permanent dwellings**—Humans build structures that provide permanent human habitation in a fixed place.

5. **Towns and cities**—Humans build large collections of permanent dwellings and other infrastructure.

6. **Industrial activity**—Humans refine or reassemble primary products from the earth on a large scale for human use or obtain such primary products by clearing forests for lumber; damming rivers for hydroelectricity or diverting them for irrigation; mining; or oil and gas exploration and exploitation.

*Manager and pack mule in Bob Marshall Wilderness Area.*
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Current Management Issues
4.1 Planning systems and management framework

Guiding Principles
Frameworks provide ways for wilderness managers to understand complex situations and develop situational awareness (McCool et al. 2015). Useful indicator-based planning systems and management frameworks are those that help decision makers ‘work through’ choices in a manner that allows technical expertise, knowledge (of various forms) and public values and interests to be incorporated, assessed and used (Stankey and Clark 1996). Planning systems and management frameworks ask two questions: 1) What social and biological conditions are appropriate or acceptable in wilderness? and 2) How much change from the ideal pristine is acceptable?

Key Considerations

Appropriate Conditions
The most critical question underlying wilderness stewards when faced with management and planning decisions is what conditions are appropriate or acceptable that protects the natural conditions at the heart of the wilderness. Finding resolutions to this question is not simple: numerous constituencies compete to protect their interests, cause-effect relationships are often loosely coupled and dynamically complex, second and third order effects are spatially and temporally discontinuous, and people impacted by decisions may not even yet exist. To account for this complexity all framework or planning systems should be assessed against four criteria; 1) conceptual sound; 2) ease of translation; 3) identifies distributional consequences and 4) efficient and effective (Brewer 1973).

Decision-Making
A planning system and management framework helps wilderness management decision makers gain insights about the particular issues within their protected area and provides guidance on how to best address the issues. Frameworks build understanding of what acceptable conditions are, what impacts on those conditions are predicted to occur as a result of a proposed action, and what mitigations may be necessary if the proposed action takes place. Frameworks promote appreciation of contexts, relationships and processes and provide specific components to make a management decision.

Promoting understanding
To transfer a puzzling, troubling and uncertain situation into a solvable problem, wilderness decision makers rely on indicator-based planning systems and management frameworks (Weick 1995). Such a reliance avoids oversimplification of management challenges and provides solution possibilities.

Resolving competing trade-offs
Planning systems and frameworks are useful mechanisms for management of wilderness uses that contain two or more competing demands and interests (McCool et al. 2007). These systems resolve trade-offs among competing objectives. A common management dilemma is the trade-off between wildness and naturalness. Wilderness decision-makers might strive for more naturalness, but impose heavy-handed management to achieve it, imposing trammelling on the freedom of choices and experiences of risk, uncertainty, and spontaneity.

Indicator-based planning systems often assist in management decisions about trade-
offs between human uses of wilderness and the protection of natural conditions (Manning 2004; McCool and Lime 2001). Frameworks specifically focused on visitor-use, like LAC (Limits of Acceptable Change) and VERP (Visitor Experience and Resource Protection), serve to 1) identify, define and work to ensure that the negative social and biophysical impacts from recreational uses are acceptable, and 2) provide guidance in selection of appropriate and effective management actions.

**Implementation**

To implement a framework follow these steps:

• Select a framework appropriate to the question facing management.

• Select and modify if necessary a framework that has been tested and used in prior situations.

• The dominant indicator-based planning systems have a large literature associated with their use and document advantages, shortcomings and rationale (see Recommended Reading). Read this literature, talk to other managers and gain insights on what to expect.

• Develop the capacity to use these frameworks in a protected area organisation. Each of the frameworks holds a learning curve and thus managers will need, as with any other management tool, some training for their efficient application. Mentoring and workshops are two ways of developing capacity for their application.

**Recommended Reading**


4.2 Decision tools in wilderness management

Guiding Principles
Those involved in managing wilderness areas are often faced with challenging issues where their decisions may affect public support and trust for an agencies’ wilderness management mission. Decision-making tools improve a manager’s ability to make informed, consistent and defensible decisions that help achieve wilderness management objectives.

Key Considerations
Understand wilderness, protected area and biodiversity conservation law and policies
It is imperative that decision-makers understand and comply with laws and statutes related to wilderness, including legislative history and intent, specific statutory prohibitions, and special provisions. Understanding the law and associated compliance requirements is essential to maintaining program integrity and public trust. Sound decision-making can also be enhanced through understanding and awareness of previous case law rulings related to legal challenges to previous decisions or actions.

Know the wilderness resource
It is essential that decision-makers understand and identify what is unique and special about a wilderness area. This includes tangible bio-physical resources and characteristics as well as the intangible, experiential, and inspirational aspects of a wilderness. This understanding is an important aspect of making sound and informed wilderness management decisions.

Establish wilderness policy
It is extremely important that wilderness management agencies develop and institute clear and concise policies related to their wilderness management mission and objectives, including but not limited to designation of wilderness areas, protection of wilderness resources, preservation of wilderness character, public recreational use of wilderness, and gathering and disseminating information regarding use and enjoyment as wilderness. A general policy should also address how wilderness management objectives interface with an agency’s enabling legislation and/or stated mission.

Define responsibilities
Managing agencies should clearly identify the specific role and function, required competencies, supervisory hierarchy, and decision-making authority for all key staff engaged in wilderness stewardship. These responsibilities should be identified in policy and articulated in appropriate position vacancy announcements, position descriptions, and annual performance plans.

Foster consistency
Wilderness management agencies should seek to achieve consistency in wilderness management objectives, techniques, and practices both within an agency and at an interagency level. Agencies should maintain effective intra-agency and inter-agency communications, and should encourage, sponsor, and participate in intra-agency and inter-agency training and workshops designed to promote the sharing of ideas, concerns, and techniques related to wilderness management. Consistency can be encouraged and enhanced through the development and implementation of agency-wide policies, guidelines, and standard operating procedures.
Provide continuity
Nature conservation management agencies should actively address the importance of continuity and the need for succession planning associated with changing administrations and/or decision-making personnel. This can be accomplished through training, development and recruitment programs that focus on entry and mid-level personnel who will become the next generation of decision-makers.

Ensure accountability
Human resource management processes should be implemented to acknowledge and/or award personnel for sound wilderness management decisions, particularly those involving sensitive, controversial, innovative or courageous decisions. In addition, agencies should establish human resource management protocols and procedures to holding wilderness management decision-makers accountable when failures occur on failure to compliance with wilderness law, policy or other guidelines.

Engage the Public
Those working in wilderness areas should strive to engage the public in important decision-making processes within the context of policy or law. Proposed actions involving legislation, rule-making, management or access plans are of particular importance. Solicitation of public comment is an important aspect of involving stakeholders and constituents and analysis of public comments can have a significant influence on final decisions.

Document and disclose decisions
Proper documentation and archiving of decisions is an important aspect of a progressive wilderness management program. The ability for decision-makers to access and review administrative records associated with past wilderness management decisions can play an important role informing contemporary decisions.

Establish priorities
The establishment of wilderness management priorities through vision or mission statements and/or management plans can help decision-makers stay focused on the most important wilderness preservation issues at hand and apply an appropriate level of attention to make informed decisions.

Implementation
The following tools should be used in implementing decision-making tools in wilderness management:

Wilderness training and development
The training and development of key staff with wilderness management responsibilities is a vital component of sound decision making. Wilderness management agencies should identify specific core competencies for all staff engaged in wilderness management decision making along with the specific training requirements to ensure these competencies. Training should be made available on regular intervals
commensurate with the demand. Agencies are encouraged to develop and institute a program to identify and train trainers along with appropriate curriculums to meet training objectives. Training requirements should be incorporated into annual training and development plans for appropriate personnel. The Arthur Carhart National Wilderness Training Center (http://carhart.wilderness.net/) in represents an excellent example of an interagency wilderness stewardship training program that services America’s national wilderness preservation system. Some universities also sponsor distance education programs (e.g., the Wilderness Management Distance Education Program at The University of Montana (www.cfc.umt.edu/wmdep/)) that are available worldwide.

Legal compliance and counsel
Wilderness management decisions must be made within the context of law and statute to ensure the integrity of and public trust for wilderness stewardship programs. It is vital that appropriate due diligence be given to legal compliance requirements for proposed actions, including but not limited to wilderness legislation, environmental protection, endangered species, clean air and water, historic and archeological resource protection, etc. Consulting with agency legal counsel is a highly encouraged practice when making decision associated with sensitive or controversial issues.

Wilderness Regulations
Statutes that mandate wilderness preservation and stewardship must be supported by lawful regulations that allow for the enforcement of specific statutory requirements and prohibitions. Wilderness regulations should be based on well-articulated definitions and include language that clearly describes the elements of the regulation. Wilderness regulations are of particular importance to visitor use management objectives that address visitor behaviour, carrying capacity and use allocations, etc.

Wilderness character narrative
A qualitative, affirming, and holistic narrative describing what is unique and special about a specific wilderness can serve as an important component in helping decision makers recognise the broader and more holistic meanings of wilderness for an area. These meanings, in turn, are essential for highlighting priorities for monitoring wilderness character as well as for identifying priorities in planning and stewardship. The narrative is intended to capture the feelings and relationships of a wilderness. For example, a narrative may describe the ecological processes that shaped a wilderness landscape, visitor experiences that may not be available elsewhere, or notable scientific, conservation, educational, scenic, or historical values of a wilderness area. In addition, the narrative can acknowledge and celebrate the intangible, experiential, and inspirational aspects of a wilderness, including historical or cultural connections to the landscape.

Wilderness management planning
Wilderness management plans or equivalent documents should be developed and maintained to guide the preservation, management, and use of wilderness areas (see also Section 2.6). Wilderness management plans should identify the desired future conditions, as well as establish indicators, standards, conditions, and thresholds beyond which management actions will be taken to reduce human impacts on wilderness resources. In addition to wilderness management plans, wilderness management actions should be carried out
within an interdisciplinary framework of other management plans, including but not limited to natural resource management plans, cultural resource management plans, fire management plans, and other activity level plans. Wilderness management and other associated plans serve as a key tool in fostering consistent and defensible decisions that help achieve wilderness management objectives. Established management plans also help provide for continuity needed to address the succession of personnel and decision-makers.

Inventory and monitoring
The ability to make informed wilderness management decisions can be enhanced through an understanding of the presence, extent, and condition of tangible wilderness resources in an area. The conditions and long-term trends of wilderness resources should be monitored to identify the need for or effects of management actions. The purpose of monitoring is to ensure that management actions and visitor impacts on wilderness resources and character do not exceed established standards and conditions (see also Section 2.10). As appropriate, wilderness monitoring programs may assess physical, biological, and cultural resources and social impacts. Monitoring programs may also need to assess potential problems that may originate outside the wilderness to determine the nature, magnitude, and probable source of the impacts.

Wilderness science
Knowledge gained through scientific research in wilderness can serve as a vital link to making sound and defensible wilderness management decisions. Scientific research is of particular importance when the desired information is essential for understanding health, management, or administration of wilderness and should be encouraged when consistent with agencies responsibilities to preserve and protect wilderness. Wilderness can and should serve as an important resource for long-term research into and study and observation of ecological processes and the impacts of humans on the ecosystem. The Aldo Leopold Wilderness Research Institute (www.leopold.wilderness.net/) represents an excellent example of an interagency wilderness science program that serves the United States' national wilderness preservation system and provides a repository of recent and previous wilderness science studies, compilations of papers, and publications, and monitoring and application guidelines.

Case studies
Detailed case studies summarising challenging wilderness management issues and associated decisions can provide a very useful tool to help inform wilderness management decisions. Case studies can be shared and discussed in a number of forums, including but not limited to interactive training sessions, webinars, written narratives, discussion forums and sharepoint sites.

Wilderness mentors
The international wilderness management “community” is blessed with a number of current and/or retired professionals who have dedicated their careers to wilderness stewardship. These individuals represent an invaluable source of subject expertise and advice and are often willing to provide consultation or serve as a mentor to fellow wilderness colleagues. Wilderness management agencies are encouraged to explore avenues to advertise opportunities and initiate mentoring programs.
Decision-making resources
There are a variety of techniques and formats available to share and distribute guidelines and resources that inform wilderness management decisions, including but not limited to decision trees, flow charts, frameworks, handbooks, policy manuals, reference manuals, memorandums, etc. These resources may be provided in either hard copy or digital format and may be distributed through websites, share-point sites, face-to-face meetings or trainings, webinars, and other venues. The Minimum Requirement Decision Guide (MRDG) developed by the Arthur Carhart National Wilderness Training Center (see also section 2.9) serves as an excellent example of a step by step decision making tool that guides decisions related to prohibited uses in the national wilderness preservation system (www.wilderness.net/MRA).

Recommended Reading
4.3 Infrastructure and technology in wilderness protected areas

Guiding Principles
Infrastructure and technology in wilderness protected areas should be regulated carefully by wilderness decision-makers. The potential uses of emerging technologies such as unmanned aircraft systems (UAS or drones) in wilderness, including recreational use by visitors (see Section 4.5), commercial use, managerial or administrative use, search and rescue, and scientific research, are nearly limitless. The use of these emerging technologies also has the potential for serious negative impacts to a wilderness area and must therefore be monitored closely by wilderness decision-makers. Infrastructure is generally not permitted within wilderness areas. Exceptions are allowed in certain instances like built structures, trails, scientific installations and variances given to Indigenous Peoples (see section 4.10), but such exceptions are only permitted within wilderness protected areas if their production and use are consistent with wilderness values.

Key Considerations
Emerging technologies
While wilderness decision-makers have long dealt with the complexities of infrastructure in wilderness areas, the regulation of technology within wilderness areas is new. Researchers and managers are just beginning to examine visitor attitudes toward such technology (Pope and Martin 2011); visitor use of technology in wilderness (Blackwell 2015); how such technology might affect use levels and the spatial distribution of use and impacts (e.g., more inexperienced people visiting wilderness because they feel safer, increased use of remote areas and cross-country routes); whether such technology could influence visitor behaviours in wilderness (e.g., increased risk-taking); how such technology might both increase the frequency of search and rescue efforts, but potentially also make such efforts easier; and how the use of such technology might affect visitor experiences, including the experiences of other visitors who might be exposed to it. In addition, advanced technology such as Google Trekker and unmanned aircraft systems that can record and quickly disseminate high quality photography, when combined with advanced digital trip planning tools, also have the potential to attract, increase and redistribute use, and potentially lead to an over-reliance on such technology relative to route-finding and risk-taking. On the other hand, all of these technologies also have the potential to increase support for wilderness, through both direct use and indirect appreciation. Incorporating the most recent research on this topic will support management strategies (Watson et al. 2015).

Implementation
All uses of technology and infrastructure in wilderness areas must first comply with wilderness values. While certain uses of technology are permitted within wilderness areas, most instances of infrastructure are incompatible with wilderness values and thus not allowed within wilderness areas. The following categories should be used in the decision-making process to determine if a technology and what uses of a technology are compatible with wilderness values.

Protection of biological resources and ecological processes
The use of technologies, like drones, or of infrastructure in wilderness protected areas may disturb or disrupt certain types of resources and processes, like the natural
behaviours of wildlife. To minimise impacts to biological resources and ecological processes, recreational and commercial use of unmanned aircraft systems and other similar and potentially disruptive technologies should not be permitted.

Visitor opportunities for solitude
Wilderness decision-makers should manage technology and infrastructure to maximise visitor opportunities for solitude and a sense of remoteness. An essential characteristic of wilderness is freedom, including personal privacy, freedom from surveillance, and the ability to enjoy nature free from the disruptions and distractions of modern industrial civilisation. The presence of unmanned aircraft systems can negatively impact visitors’ sense of solitude and separation from civilisation. Recreational and commercial use of these technologies should not be permitted (see Section 4.5).

Motorised equipment
A natural soundscape is an important part of a wilderness experience for visitors and equally important to wildlife species. The use of motorised equipment disturbs and intrudes on a natural soundscape. Motorised equipment, except in specific variances (see Section 4.10), is not permitted in a wilderness area. Unmanned aircraft systems and other similar technologies are a form of motorised equipment. Therefore, wilderness decision-makers should not permit the use of the recreational and commercial use of unmanned aircraft systems, as well as other forms of motorised equipment and technology, within a wilderness area. Any permitted variances must minimise the use of and intrusions by motorised equipment in accordance to wilderness values.

Administrative and managerial use
Any administrative or managerial use of technology and infrastructure in a wilderness area must first comply with wilderness values. Such use should be limited by wilderness decision-makers. In certain circumstances, administrative or managerial use of unmanned aircraft systems or other motorised technology may be the best, the only, or the most appropriate action. Managers must be sure that such use is justified as being the minimum required action. Administrative use of unmanned aircraft systems and other future technology should be limited to applications such as Search and Rescue, fire management, and scientific research, and permitted only after a minimum requirements analysis has been completed. A procedure for conducting a minimum requirements analysis should be formalised and should take into account factors such as how the proposed unmanned aircraft systems (and other future technology) use would: 1) contribute to the preservation of wilderness character; 2) protect resources, including visitor experiences; and 3) be consistent with the legislative purpose of the wilderness area.

Recommended Reading
4.4 Changing demographics and relevance of wilderness

Guiding Principles
Changing demographics of populations around the world and the dynamic nature of ‘what’s relevant’ to societies in general presents a challenge for promoting the creation, protection and management of large wilderness areas across the globe, and new opportunities. The understanding of these changing demographics has important implications for management and policy-making regarding wilderness protected areas. As new information and knowledge about the benefits of wilderness is accumulated, it will necessarily change our approach to educating managers, policy-makers, and the general public about the importance of wilderness protection. Wilderness protected areas are relevant to all people and significant worldwide.

Key Considerations
Wilderness practitioners, policy managers, research scientists, and advocates must examine and understand the changing demographics of our global population. It is necessary to understand the meaning of nature across our diverse cultures and how the relevancy of wilderness may ebb and flow over time. Such an understanding should inform the education, interpretation, and outreach efforts that will invigorate and inspire future generations of wilderness advocates and stewards.

Young Adults
Many resource managers and wilderness advocates see links between appreciating wild nature, participating in traditional outdoor activities, and support for protecting wild areas. Some of these individuals express concern that the values and recreation behavior of today's young people may suggest less support for protecting wilderness in the future. However, emerging adults appear to express strong pro-environmental values, but they exhibit outdoor recreation patterns strikingly different from the past (Zinn and Graefe 2007).

Future generations of wilderness advocates, scientists, and stewards must be engaged. Young adults often have strong environmental values and land ethics. Organisations, management agencies, and educational institutions must continue to provide entry into wilderness stewardship as a profession. Career ladders need to be built and expanded to allow individuals to direct their passion for wilderness into a life-long career. Young adult professionals that strive towards the future sustainability of wilderness is essential to the continued protection of wild nature.

If we are to recruit younger generations to appreciate and protect nature, this will occur in a global context that has been more urbanised and with greater challenges to have transformational experiences with nature and protected areas. Efforts to address urbanisation should be focused on its implications for human’s conceptualisation and connection with nature (Kowari 2013). The Promise of Sydney recognises the rebalancing of the relationship between human society and nature is essential. Valuing wild nature can strengthen the link between nature and urban young adult residents.

Diversity
One line of thought suggests that connections and experiences within nature are also critical for the development of environmental values and an understanding
of the importance of wilderness (Stumpff 2013). It is through our personal experiences that we form a lasting relationship and bond with nature. However, a greater understanding of how wilderness benefits increasingly diverse populations, who may or may not have strong connections to nature, is critical for developing support for wilderness management and policy (Turner et al. 2004).

If a constituency is to be created that can embrace and protect wilderness values, a greater diversity of wilderness users and advocates must be created (Chavez et al. 2008; Pease 2015). Previous research has shown that barriers continue to exist for people from minority, racial, and ethnic groups to recreate in parks and protected areas (Johnson et al. 2004). Lack of financial resources, time, and information about visiting protected areas continue to be constraints to access and enjoyment. Individuals may not feel welcome or perhaps discriminated against if workers at sites and protected areas are not of their ethnicity or heritage. Efforts need to target mitigating these barriers to participation, thus growing this potential wilderness constituency.

**Ageing**

According to the 2013 edition of the United Nation’s report World Population Ageing, the number of global individuals age 60 years or over is expected to more than double from 841 million in 2013 to more than 2 billion in 2050. This global demographic profile is particularly important when compared to wilderness area user profiles. Dvorak et al. (2012) examined wilderness visitor use and users trends over a 40 year period in the Boundary Waters Canoe Area Wilderness, United States. Over this period, mean user ages increased from 26 years of age in 1969 to 45 years of age in 2007. Little change in gender differences were observed, with men representing approximately 75% of wilderness users over that time period. Similar user profiles were observed by Gundersen, Tangeland, and Kaltenbron (2015) among users of the Oslomarka outside of Oslo, Norway. Users of the urban wilderness area zones were typically male (61%) and on average 52 years old.

If we are to inspire people across generations, geography, and cultures to experience nature through wilderness, it will be necessary for us to understand the implications of an ageing population with gender disparities. In terms of wilderness users, an ageing population may have constraints related to accessibility, personal mobility, and recreation choice behaviour. These constraints must be negotiated while maintaining wilderness values. Our ageing population is predominantly female, while wilderness users are predominantly male. If future generations are to form bonds and relationships between nature, protected areas, and wilderness, gender differences must be addressed and barriers to participation and inclusion must be removed among wilderness users. Wilderness practitioners, scientists, and advocates should prioritise efforts to negotiate and overcome these barriers and constraints. On the other hand, Watson (2013) suggests that the relevancy of the ecosystem services provided to the population is not age or gender specific and that the growing importance of these relationships with wilderness only needs to be recognized through better explanation to visitors and non-visitors.

**Interpretation**

It is important to recognise that while recreational experiences in wilderness and nature are necessary to create bonds and
form relationships, we must strive to communicate conceptualisations of wilderness and protected areas that are beyond a utilitarian point of view. Managers engage the public in discussions that frame wilderness as something beyond only tourism and recreation experiences. The *Promise of Sydney* calls for an investment in nature’s solutions. Wilderness is a safeguard for biodiversity, mitigates climate change impacts, and is deeply embedded in the cultures of many Indigenous Peoples. Wilderness provides ecosystems services that improve food and water security along with global human health. Wilderness managers should ensure that wilderness areas are understood in these value contexts as well as the economic and recreational benefits often associated with wilderness and protected areas.

Understanding how different societies appreciate wilderness can help managers anticipate potential conflict and educate wilderness users. For example, Boxall et al. (2002) found that canoeists in wilderness areas in Canada highly valued the experience of viewing aboriginal rock art., However, they also noted that managers are faced with the conundrum of promoting this benefit for an enhanced visitor experience whilst also risking the negative impacts of directing visitors to a place that holds spiritual and cultural importance to Canadian First Nations Peoples. Education and interpretation may help visitors to understand values and therefore encourage users to be sensitive and respectful to wilderness areas.

**Wilderness activities**
A narrow focus on particular wilderness activities may result in the perception that wilderness support is declining (Cordell et al. 2008). For example, during the early 2000s in the United States, a growing perception that wilderness-based recreation was declining created the opportunity for cuts to wilderness funding and decreased support for wilderness designation. However, by considering a broad range of activities (not just fishing and hunting, but also other activities such as foraging, landscape viewing and photography, kayaking, and the study of nature), Cordell et al. 2008 found that despite a decrease of participation in particular activities, there was an overall increase in nature-based recreation and visits to wilderness. However, actual visits to wilderness may not be the primary benefit future generations will receive from wilderness protection.

**Case Studies**
Finland created official wilderness legislation in response to increased pressure on wilderness caused by an expansion from ‘traditional’ use (i.e., subsistence and cultural activities) of wilderness to ‘modern’ uses of wilderness such as recreation, tourism, and forestry (Sippola 2002). In the USA, wilderness is increasingly viewed as a source of diverse benefits that expands far beyond the original, on-site uses established in the *Wilderness Act* (Cordell et al. 2003) and, in Europe, the European Parliament recently recognised the benefit of wilderness protection for the conservation of biodiversity (Carver et al. 2014).

In the United States, Dvorak et al. (2012) examined how visitors to the Boundary Waters Canoe Area Wilderness changed between 1969 and 2007 by analysing survey data collected in 1969, 1991, and 2007. The trend analysis focused on changes in user characteristics (e.g., age, education, gender), activities (e.g., fishing, camping) and opinions (e.g., perceptions of crowding). Although collecting data over long periods of time is costly, there are ongoing efforts to
make previously collected data more available to the public. For instance, a data catalog of raw data, survey instruments, and other relevant supporting documents from many wilderness studies completed in the USA are available on the United States Department of Agriculture, Forest Service website (http://www.fs.usda.gov/rds/archive/Catalog).

Implementation
To understand the relevance of wilderness to visitors, non-visitors, future generations, and relevance to overall conservation accomplishments, wilderness decision-makers must employ social science qualitative and quantitative research. Data archives can provide the needed baseline data for trend studies, and provide supporting information (e.g., example questions and survey instruments) for collecting data in areas where data regarding human perceptions of wilderness may not be readily available.

Social science approaches and efforts to compile baseline data should target:
• Increased documentation and representation of the relevancy of wilderness for minority, racial, and ethnic groups
• Identification of barriers to wilderness recreation and engagement, particular for underrepresented populations and young adults
• Monitoring the ongoing influence of urbanisation on individual nature experiences and the value of protected areas
• Developing interpretation and education materials that emphasise both the regional and global significance of protected areas to all citizens

Recommended Reading
4.5 Emerging recreation management issues

Guiding principles
Wilderness decision-makers are witnessing a whole new array of recreation management issues that they were not confronted with in the past. How visitors use or recreate in wilderness can create challenges for wilderness decision-makers. Emerging recreation management issues in wilderness have increased due to advancement in backpacking equipment and gear, new technology being used by visitors in wilderness, and the ways in which wilderness visitors pursue recreation in wild nature. Finding solutions to future unanticipated recreation conflicts requires that wilderness decision-makers ensure that the emerging issues adherence to the central mandates of wilderness values.

Key Considerations
Emerging issues are not new to wilderness stewardship. New technology has always held a conflicting juxtaposition for wilderness visitors and managers. In the United States, Aldo Leopold was confronted in the twentieth century with the issue of hunting scopes on rifles and whether this new technology was ethical or created an unfair hunt (Leopold 1949). As was true in Leopold’s time, it can be difficult to tell if the new technology is changing the values of those recreating in wilderness, or if it is simply new visitors with a new set of ethos who are more comfortable using technology in all aspects of their lives, including how they recreate in wilderness.

Clothing
New equipment and gear have always held a conflicting juxtaposition for wilderness visitors and wilderness managers and rangers. As new products enter the market place, wilderness consumers have embraced products that have helped them recreate in wilderness. Since the 1960s, improved clothing (Gortex water-proof materials), backpack design (internal frame packs), tent construction (dome tents) and light-weight hiking boots with rock-gripping tread, has made backpacking, camping and hiking in remote wilderness more comfortable and convenient (Turner 2002). Managers observed that these new comforts drastically changed visitor length of stay and travel patterns. Wilderness visitors ventured to more remote corners of the wilderness and camped in shoulder seasons; earlier in spring and later in autumn. Wilderness managers and rangers began to witness increased resource degradation, more user-created trails and crowding.

Unmanned Aircraft Systems as recreational tools
As discussed in Section 4.3, Unmanned Aircraft Systems (UAS), commonly known as drones, are unprecedented for wilderness managers. The ramifications of recreational UAS use are incompatible with wilderness values. Today’s sophisticated recreational or hobby drones, if permitted, would will take the very essence of wilderness being a place of self-discovery and mystery to a landscape that can be viewed in real time. Drones, with their high-definition cameras attached to the aircraft, become eyes in the sky for the drone operator, providing real-time images of landscapes, possible campsites, number of other people in the area and even the ability to track nearby wildlife. See section 4.3 for more information about the use of technology in wilderness areas.

Personal computers in wilderness
Some of today’s wilderness visitors use modern technology never envisioned by
previous generations of wilderness decision-makers. It is not uncommon today to find a wilderness visitor at a pristine alpine lake deep inside a wilderness using a personal computer (laptop powered by a solar panel and internet connection obtained through a cell phone or satellite hot spot device) to stay connected to their job or respond to emails and text messages. Other visitors now hike wilderness trails listening to internet-streamed music on a device powered by small, roll-up solar panels with minimal weight and take up little room in one’s backpack.

Global Positioning System as a recreational tool
Advances in technology also help visitors navigate in wilderness areas beyond the tried-and-true use of map and compass orienteering. Today’s Global Positioning System (GPS) devices have changed how visitors can plan their wilderness adventure, how they orient themselves to rugged and remote landscapes, and how they can bread-crumble their way back to the trailhead in ways never available ten or 20 years ago. New products such as personal satellite tracking devices), allow for immediate response to a ‘need help’ or emergency notice (even when the visitor is only temporary lost, cold, out of water or injured in ways that most would not define as life-threatening). Wilderness managers and search and rescue teams have responded to these satellite alerts only to find backcountry visitors scared or disoriented. An increase is such alerts can have negative resourcing implications for managing agencies.

Changing recreation pursuits
Wilderness recreation pursuits are changing just as quickly as the gadgets are changing. Today, it is not uncommon to find a ridge runner (extreme trail runners), covering long distances in remote wilderness and sharing the trail with other users that are hiking, backpacking or horseback riding. Trail running as an individual pursuit in wilderness is an acceptable recreational use, however sponsored and commercial running races in the USA are not permitted within wilderness areas as they are considered to conflict with and impact on wilderness values.

Overcrowding of recreation areas
Even the pursuit of seeking out solitude, it appears, is changing. In the past, it was common to travel in small groups and seek out remote areas to find solitude so that one could connect to wild places with friends that have a with similar desire for quietness and tranquility. However, today’s users seem to have no apparent adversity with going to very popular wilderness ‘magnet’ areas that also draw large crowds. In some cases,
these popular spots can have hundreds of other visitors sharing the same location and experience.

In the United States the central mandate of the Wilderness Act is to preserve wilderness character. The qualities of wilderness character can be degraded by signs of human use and overuse at popular ‘magnet areas’ where visitors congregate. Resource damage is starting to show signs of wear and tear to these fragile landscapes. The Wilderness Act established the United States’ National Wilderness Preservation System, in part, for the use of the enjoyment of the country’s citizens. No doubt, these popular spots have always been a draw, but continued use at these fragile sites in wilderness, are starting to show the wear and tear of thousands of boots. Associated impacts of trash, human waste and denuded campsites diminish the natural condition of the wilderness with some previously pristine areas now hard-panned brown spots of dirt the size of a small car.

**Implementation**

To deal with the increasing use, managers have implemented a variety of management actions such as indirect controls to educate visitors about Leave No Trace techniques and to promote user responsibilities to taking care of the land. In some circumstances, more direct controls, such as visitor use restrictions (permits) are now required to limit the amount of visitors to a particular area so that the land has a chance to heal.

With the exception of the use of recreational drones, many managers would argue that new technology and how visitors use new technology in wilderness is a personal decision. Unless the use of emerging technology, or user, creates resource damage or interferes with other’s ability to enjoy wilderness, little if any management intervention is needed or appropriate. It is difficult to tell if the new technology is changing the values of those recreating in wilderness. When faced with new and emerging recreation management challenges, wilderness decision-makers must check these challenges for their compatibility (or incompatibility) with wilderness values.

**Recommended Reading**

4.6 Managing wilderness for marine wilderness values

Guiding Principles
The places most often identified or designated as wilderness are on land, yet the idea of areas in the oceans and coastal waters possessing wilderness qualities and values worthy of preservation has been debated and discussed for more than half a century (Barr 2007). Effective wilderness stewardship requires the management agency have the legal authority to establish and manage wilderness. As well as wilderness-specific management goals and strategies adopted, implemented, and evaluated that insures the wilderness values and qualities of the area are preserved. This is true of both terrestrial and marine wilderness areas.

Key Considerations
Similar tenets as terrestrial wilderness
While the specific human uses encountered in marine wilderness may be different from uses of the land, they are similar enough, in terms of their general characteristics and potential impacts to wilderness character and values. This can offer managers a clear place to start when developing a management framework for marine wilderness (Day et al. 2012). There are few examples of international wilderness law or policy that explicitly mentions or offers specific guidance for marine wilderness areas (Landres et al. 2008b, Barr 2012). The management framework for marine wilderness areas can appropriately be captured from the overarching IUCN management guidelines for category 1b.

Case Studies
Examples of ocean and coastal waters included in designated boundaries of wilderness can be found in the United States. Around 100,000 acres of marine waters, designated under the Wilderness Act, are included in the National Wilderness Preservation System (Barr 2012). In their evaluation of international wilderness law and policy, Landres et al. (2008b) found that, generally, the Wilderness Act possessed similar goals and provisions included in the wilderness laws and policies of many other countries. There is no language explicitly included in the Act that would preclude the designation of ocean and coastal waters, and the wilderness waters inventory provided in Barr (2012) offers at least 13 examples of wilderness designated under this law. As statutory language, it offers relatively unambiguous guidance for a management framework for wilderness areas designated under this legislation. Examples of marine wilderness management within North America has been outlined by the Marine Wilderness and Protected Areas Working Group, part of the North American Intergovernmental Committee on Cooperation for Wilderness and Protected Area Conservation which is available online (www.nawpacommittee.org). The working group has produced many case studies that examine and address the key tenets of marine wilderness areas that are managed and governed by a plurality of political actors, including partnerships between Indigenous Peoples governments and non-Indigenous government agencies. More examples of marine wilderness can be found at www.natureneedshalf.org.

Implementation
Marine wilderness areas should uphold the same wilderness values and management principles expected of terrestrial wilderness areas. The tenets detailed within these category 1b guidelines apply both to terrestrial and marine wilderness areas.
Recommended Reading

4.7 Management decisions about passive management, restoration and climate change intervention

Guiding Principles
It is impossible to accurately predict all future climatic changes or environmental degradation, which creates challenging management decisions within wilderness areas. Despite climate change being an external forcing factor impacting on wilderness ecosystems it is incumbent on managers to respond to changes within the ecosystem that go beyond normal successional changes. There is little that managers can actually do to ameliorate these wider impacts of climate change or large-scale environmental degradation, but they can act to influence outcomes and make wilderness ecosystems more resilient to the worst effects. Such resilience may best come from the passive management of wilderness areas. When passive management is not an option, managers should look to restore the ecological processes of the wilderness area by allowing for increased connectivity between wilderness protected areas, restoring ecological functions of wildfire and hydrology within the protected area, and controlling for invasive species and introduced diseases. In certain circumstances where passive management and restoration do not adequately address the threats posed by climate change, managers may need to intervene in the species’ range, breeding and location within the protected area. All restoration and intervention decisions should align with the principle wilderness values.

Key Considerations
Wilderness managers steward essential aspects of climate change action. Wilderness areas have an important role to play in providing space, unhindered by modern human land use, in which wildlife can respond to climate change by natural processes of succession and migration, and so adapt and adjust to changing climatic conditions (Cole 2010). Where relevant, wilderness decision-makers should consult with Indigenous Peoples in appropriate restoration and intervention activities. Indigenous science, Traditional Ecological Knowledge and worldviews should be implemented in policy decisions and actions in appropriate ways (Cruikshank 2005).

Passive Management
Passive management in the face of climate change is perhaps the best and least costly approach to adopt. Here, wilderness areas are simply retained as non-intervention areas that allow wildlife and ecosystems to adapt and respond to climate change as it occurs. It accepts that active management or direct interventions in wilderness areas is difficult and likely to fail in many instances, and so maintains that the best approach is to increase resilience to climate change. It does this through ensuring that wilderness is protected from human impacts (beyond climate change) and core areas are connected via landscape corridors and permeable landscapes that give wildlife the ability to move and migrate unhindered to more favourable areas as ecosystems change. Human stresses on flora and fauna should be maintained at a minimum acceptable level by restricting disturbance from hunting, tourism, recreation and management.
Restoration

Connectivity
Maintaining connectivity at a landscape scale will allow species to migrate and shift their ranges in response to climate change (Heller and Zavaleta 2009). Many species whether plants or animals, occupy particular environmental niches determined by geology, soil, topography and climate. If the global climate is warming then it is logical to expect that temperature limited species will migrate to higher latitudes and higher altitudes to compensate (McKelvey et al. 2011). Ensuring ecological and physical connectivity between core wilderness areas can accommodate latitudinal shifts in species ranges. Altitudinal shifts are less easy to manage as species found locally only at the tops of mountains have nowhere to migrate to and may literally disappear from these areas as the climate warms (Gifford and Kozak 2012). Island ecological communities face similar problems since the surrounding water means there is nowhere to migrate to. This is a particular problem for endemic species in both mountain and island ecosystems because they are found nowhere else and face extinction from climate-change-induced shifts in their eco-climatic niche, unless they can adapt to the changing conditions. Strategic-level management across landscape, regional, national and continental scales is required to ensure maximum connectivity between core wilderness areas that will permit the maximum degree of freedom of movement to threatened wildlife species. The Cores, Corridors and Carnivores (CCC) model attempts to encapsulate this level of thinking wherein protected area cores are connected into a coherent network via either landscape corridors, linear corridors (e.g., riparian zones), permeable landscape mosaics or intermediate stepping stones (Soulé and Noss 1998).

Wildfire
Wildfire has received a great deal of attention in the past and continues to do so as climate change increases global temperatures and affects seasonality leading to reduced precipitation in some areas (Marlon et al. 2009). In forest and grassland ecosystems, higher temperatures and reduced precipitation can lead to increased incidence of wildfires, especially when linked to greater incidence of ignition from lightning associated with dry thunderstorms. Managers can intervene here in one of two main ways, by either reducing the available fuel loading that can lead to disastrous (large and intense) and therefore very destructive fires, or by fighting fires when they occur and stopping them getting out of hand. The former approach is usually a better choice and involves reducing the fuel load by either prescribed burning (small magnitude, controlled burns) or by mechanical thinning and removal of the fuel.

Hydrology
Alterations in hydrological regimes are highly likely, as a result of predicted climatic changes in temperature and precipitation, which will influence potential evapotranspiration and corresponding changes in vegetation, soil moisture and runoff. Water levels in lakes and rivers will be affected as will season flow regimes with knock-on effects on aquatic ecosystems and water availability for animals. Water impoundments are an important aspect of hydrological restoration in light of climate change effects. Constructing animal watering holes (guzzlers) is one possible intervention but this is likely to result in modified animal behaviour and local impacts on populations and vegetation cover. Water extraction upstream of a wilderness protected area can clearly impact heavily on river levels such as seen in many rivers in the Southwest United
States. In such circumstances managers should carefully coordinate abstraction licenses in liaison with relevant upstream authorities.

Invasive species
Climate change may be responsible for outbreaks of alien invasive species within wilderness areas. It is likely, however, that this has more to do with the human vector introducing both plant and animal species into ecosystems where they have hitherto been unrecorded. Species introduced in this manner become invasive when both the conditions are particularly suited for the species in question, and a niche exists within the existing ecosystem which it can effectively exploit. Having found such a niche within a suitable habitat, the alien species can proliferate and spread, outcompeting endemic species, at which point it is considered invasive. Despite the negative connotations of the invasive label this is simply a natural process of species establishment, competition and succession, albeit often one accelerated by human action. Often invasive species find their own balance and place within their adopted ecosystem and, after an initial period of rapid colonisation, become naturalised and add to the biodiversity. Rather, the aesthetics of invasive species and their ability to outcompete established native species (at least to begin with) is often met with disapproval by humans. Nonetheless, managers should be aware of the potential problems posed by alien invasive species and take action to protect indigenous species wherever possible, especially where the effects of climate change and human modification of natural ecosystems have made them vulnerable to competition. Actions that managers may consider include eradication of the invasive species using trapping and hunting for larger animals, and pesticides and herbicides for smaller species and plants. Once established however, invasive species are notoriously difficult to get rid of, so the best a manager can hope for is to perhaps halt or limit its progress (Pearce 2015).

Disease
Outbreaks of disease are often associated with climate change, either because the affected organism is under stress from the effects of climate change, or because the changing conditions allow the pathogen to spread and infect new hosts without the normal environmental controls (Millar et al. 2007). Managerial responses to disease outbreaks are very much dependent on the pathogen and the conditions observed, but can include inoculation, creating disease breaks or barriers to its spread, or introduction of a counter-pathogen where this is possible. Whichever approach (if any) is adopted, this needs to be done carefully with a view to costs, chances of success and the possibility of unforeseen knock-on effects (such as diseases jumping from one species to another or introduced biological countermeasures attacking unintended targets). The most common approach is often just to monitor the situation and hope that the incidence fizzles out in due course (Heller and Zavaleta 2009).

Species Intervention
Range
Climate change will inevitably mean there are both winners and losers within wilderness ecosystems. Local actions can be implemented to try to help some especially threatened species to survive climate change. Such actions could be extremely expensive and not guaranteed to succeed. Managers need to look carefully at what they are trying to preserve. If a species deemed to be at risk is locally rare but globally common
throughout a wide home range, it may be that we have to accept the loss of that species in that area hoping it will be safe across the rest of its home range (Araújo et al. 2011). If a threatened species is locally common but globally rare, then it might be necessary to intervene to ensure its survival. Introducing new genetic material into a wilderness protected area is an important but complicated aspect of climate change adaptation.

**Captive breeding**

Those species that are globally rare and under threat of extinction, either regionally or globally, due to climate change induced shifts in their habitat may require direct intervention if they are to survive. Where species interventions are deemed necessary and beneficial these should be based on best available scientific evidence, use appropriate genetic stock and as far as is possible minimise the stress to the individual animals. Capture and release programs have been shown as one way of ensuring meta populations survive in new and suitable habitat areas (Parker 2008). Captive breeding programs for especially rare and endangered species have been successful maintaining and increasing the numbers of individuals in a species population. Captive breeding should be carried out with the minimum amount of exposure to humans and in conditions that mimic the species natural habitat and food sources as closely as possible. Release sites should be carefully chosen to ensure the maximum possible chances of survival and naturalisation taking remoteness from human disturbance and persecution, availability of suitable habitat for feeding, breeding and cover, and connectivity to other suitable habitat in the wider landscape.

**Relocation**

Capture and relocation of individual animals from healthy or weakening populations to suitable habitat within their former range has also been shown to be effective. The return of the grey wolf (*Canis lupus*) to Yellowstone National Park is a well-documented example (Mech and Boitano 2010; Smith et al. 2003). Originally exterminated by hunting from the park in the early years of the twentieth century, wolves were reintroduced by the United States National Park Service in 1995 (14 wolves) and 1996 (17 wolves) and have increased in number to around 100 though numbers fluctuate. The reintroduction of this missing keystone predator has been credited with widespread ecological recovery within the park due to its effect on modifying the behaviour and numbers of elk in the park leading to unforeseen trophic effects on other species, vegetation and even the rivers (Ripple and Beschta 2003). While these effects are still disputed, the recovery of the wolf in Yellowstone has clearly been a success. However, managers need to carefully weigh up the pros and cons of any such program before engaging what will most likely be a costly, and sometimes controversial course of action, before proceeding.

**Implementation**

When passive management is not enough because of climate change or other human-induced environmental degradations, managers should strive to restore wilderness areas to a level of health at which the area can be managed passively. In extreme circumstances, intervention may be required but managers should be aware of the complications and controversies surrounding climate change interventions. Restoration and intervention, when done in accordance with wilderness values, can help wilderness areas adapt to climate change by creating
more resilient ecosystems able to withstand future climatic uncertainties. Managers must work to protect the ecological functions of ecosystems within wilderness areas and can do so by implementing the restoration and intervention key principles outlined above.

**Recommended Reading**


4.8 Subsistence use and relationship values of wilderness

Guiding Principles
Subsistence users are a powerful and necessary partner for the protection and stewardship of large wilderness areas. These constituencies, who are often but not always Indigenous People, have deep cultural and traditional connections to the landscape. These close relationships with resources and natural systems should be embraced as part of the vision for wilderness areas. Traditional subsistence practices and relationship values of wilderness are complementary to the protection of wilderness. Subsistence use and the recognition of relationship values of wilderness can help protect indigenous culture and advance the conservation of large, intact landscapes.

Key Considerations
The harvest of wild resources in large wilderness protected areas presents many unique management challenges. Allowable subsistence use is very context specific and a number of variables and conditions play into resource exploitation and stewardship. Here, allowable uses and the goals of wilderness areas have to be effectively balanced.

Defining subsistence
The meaning of subsistence is complex, context and regionally specific, and ever changing. It refers to traditional means of livelihood and can be understood as a way of life that involves the harvest, preparation, sharing, and consumption of wild resources for food and other cultural purposes. The Alaska National Interest Land Conservation Act (ANILCA), the law that protects subsistence resources and practices in wilderness areas in the United States, formally defines subsistence as “the customary and traditional uses by rural Alaskan residents of wild renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of non-edible byproducts of fish and wildlife resources taken for personal or family consumption; for customary trade” (Alaska National Interest Lands Conservation Act 1980). The meaning of subsistence extends well beyond food and has a deep level of social and cultural importance that is directly related to the natural environment.

Allowable uses
The effective management of wild resources is critical to ensuring sustained subsistence uses within wilderness areas. Biological and physical systems are multifaceted, dynamic, and often not completely understood (Ludwig et al. 1993). As such, effective resource stewardship requires intensive monitoring and adaptive management and this may be undertaken utilising Traditional Ecological Knowledge or more western methods. A variety of variables should be considered when allowing for the use of wild resources in protected areas. Wilderness managers should consider, among others, the following factors and circumstances to ensure ecosystem values and processes, and subsistence resource abundance:
- Size of the protected area
- Natural history of the particular wild resource
- Level of resource abundance
- Amount of harvest and the desired level of harvest
- Resource replacement rate
- Traditional Ecological Knowledge and the legal rights of some Indigenous People
• Factors that could influence and/or complicate resource stewardship, such as climate change or other anthropogenic disturbances

Buffer zones
Wilderness areas may sometimes surround or be within proximity to small, rural communities that rely on the larger landscape for subsistence purposes. Recognising that some elements of rural community life, such as clearing tracts of land for agriculture or cutting wood for building materials or fuel, may be counter to the goals of wilderness protection, buffer zones offer an effective way to protect and manage wilderness areas. In such instances, buffers can allow less-restrictive activities around communities and offer an effective transition area that can reduce conflict and better ensure that the goals of wilderness area management are achieved.

Benefits
Subsistence resources and practices have numerous benefits for remote residents and help elevate the relevance and importance of conservation. While functioning ecosystems are a foundational determinant of the public’s health and wellness everywhere, in remote places with subsistence-based economies these factors are particularly valuable. Subsistence resources and practices are directly connected to food security, familial and community-wide social networks and relationships, cultural institutions, and mental health (Loring and Gerlach 2009). Additionally, the harvest and preparation of subsistence resources is often labor intensive and positively contributes to an active lifestyle with physical health benefits. All of these factors are drivers and mediators of health, and positively contribute to overall wellness (Loring and Gerlach 2009). Such benefits, when recognised, can help increase the significance of conservation areas and contribute to the sustained protection of wild areas.

Case Study
The Arctic National Wildlife Refuge is a 19.64 million acre area managed by the United States Fish and Wildlife Service in northeast Alaska. The Refuge protects a vast area and encompasses entire ecosystems, from the peaks of the Brooks Range to coastal areas. In 1980, 7.16 million acres of the Refuge was formally designated as wilderness through the Alaska National Interest Land Conservation Act. Recently, in January 2015, the United States Fish and Wildlife Service completed a Comprehensive Conservation Plan for the Refuge and formally recommended three additional tracts, totalling 12.28 million acres, to the United States Congress for inclusion within the Wilderness Preservation System. This recommendation offers a constructive case study for how to advance wilderness area designation while incorporating the involvement, rights, and needs of subsistence users.

The Refuge is the traditional land of the Inupiat and Gwich’in peoples. One village is located entirely within the Refuge’s...
boundaries and six other communities are located outside of the protected area on the south and western sides. These communities, which have populations of a couple hundred people, have rich subsistence use, traditional means of livelihood and relationship values to wilderness that include hunting, fishing, and gathering a variety of wild resources from within the Refuge. Wild resources include, among many others, caribou, moose, salmon, and various types of berries. Surveys by natural resource managers have found that hundreds of pounds of wild resources are gathered and consumed by residents of these communities every year (http://www.adfg.alaska.gov/sb/CSIS/).

To complete the Comprehensive Conservation Plan and the associated wilderness recommendation, the United States Fish and Wildlife Service went through an extensive public planning process that involved extensive communication and consultation with Alaskan Native entities. Over the course of plan, there were regular government-to-government meetings between sovereign tribal governments and federal agencies of the United States. The management of the Refuge will change little with the latest revised Comprehensive Conservation Plan and in the future with formal wilderness designation expansion by Congress. The harvest of fish, wildlife, and other wild resources will still be regulated by the state of Alaska and federal agencies. This includes allowing fishing, hunting, trapping, berry picking, the harvesting of plant materials, and the collection of house logs and firewood. Additionally, means of transportation traditionally used for subsistence purposes, including snowmobiles and motorboats, will still be permitted.

**Implementation**

Subsistence users can be constructive and powerful advocates for wilderness protection and for relationship values of wilderness. To ensure that sound stewardship and inclusive management objectives are accomplished, efforts should be made to understand the local, traditional land ethic. Non-Indigenous decision-makers should partner with Indigenous Peoples government decision-makers to ensure incorporation of traditional means of livelihood and subsistence within the management of wilderness protected area. Such partnership will likely expose shared values for landscape-level protection. These values should be built upon to identify goals for protection and stewardship.

**Recommended Reading**

4.9 Managing wilderness for sacred values

Guiding Principles
An examination of the linkage between places of high spiritual/cultural value and nature conservation, in a research report by World Wide Fund for Nature, Equilibrium, and Alliance for Religions and Conservation Dudley et al. (2005) concluded: “The limited quantitative evidence that does exist suggests that sites protected by faiths for their spiritual values can indeed perform a valuable function in protecting wild nature” (p. 120). Since many of these sites are wild lands, all wilderness users and advocates need to be aware of their metaphysical nature and value to some faiths or traditional cultures, and not only refrain from damaging behaviour, but be supportive of any efforts to protect them from sacrilegious development.

Key Considerations
Designation
Sacred natural sites that exhibit both wilderness values and sacredness values should be formally designated as IUCN protected area category 1b (see Section 1.6). Many such sacred sites also have high biodiversity and scenic values. Formally designating such sites as category 1b provides extra protection and stronger barriers against harmful development. Too often the claim for the sanctity of a site comes after a harmful development is well into the planning stage and even into the action stage. It would be better to designate the area as sacred and of high wilderness value before harmful development can begin. An international conservation additional overlay may be warranted for particular wilderness sites with sacred values. Further designation of a site under UNESCO’s Biosphere Reserve or the World Heritage Convention can add additional international protection for a wilderness site with sacred values.

The major impediment to this is the secrecy aspect of the site, whose custodians fear the loss of significance, if outsiders, who do not share the same values, know of such sites. Visitors may also abuse this sacred knowledge, exploiting a Sacred Natural Site as a spectacle or a tourist magnet (e.g. Uluru (Ayers Rock), in Australia). Registering a Sacred Natural Site as a formal designation also implies some loss of control to sites that have been protected for years by Indigenous Peoples’ elders and leaders. The free, prior and informed consent process is imperative when considering any new designations over indigenous land and sites. Such threats to the sacredness of a site are severe and must be treated as such by the Indigenous Peoples governments and non-Indigenous governments responsible for the management of the site. Management plans should include the appropriate zoning to ensure proper protection and respect.

Appropriate zoning
Once designated as a wilderness protected area, appropriate zoning within the site is necessary to give extra protection to sacred places. Such zoning may include exclusive access to areas within the wilderness site as part of the management plan. This may include pilgrimage management devices or regions that are ‘closed areas’ to maintain the sacredness and wildness of the site. Custodians of wilderness areas with sacred values must be given the ability to not reveal all their knowledge of a site for cultural and security reasons.

Consultation
If a government or agency that is not of the same belief-system of those regarding the site as sacred manages a wilderness area
then proper and consultation-based interpretation of cultural values must be incorporated into every part of the management and governance of the site.

**Personnel**
The management of Sacred natural sites should be in the form of co-management, self-management or participatory management. Where sacred values are high, special cultural skills are needed in managing the land and associated resources. Management staff should be selected from local people of the belief system, and they should be given special training, involving the Elder Traditionalists. Such a policy has been used successfully in some of the wilderness protected areas of Australia (Bauman et al. 2013).

**Case Studies**
Two case studies that illustrate some of the key tenets of sacred natural sites are the Kachina Wilderness Area in the United States and the Peak Wilderness Park in Sri Lanka.

In the United States, the Kachina Wilderness Area incorporates the San Francisco Peaks of Arizona, a volcanic mountain range. The Kachina Wilderness Areas is within the Coconino National Forest, which is administered by the United States Forest Service under a policy of multiple use. The designated Kachina Wilderness Area recognises the sacredness of the area to the Hopi Tribe and the wilderness values of the site. The sacredness of the area and the wilderness values are threatened by encroachment of ski development in an adjacent area. At publication, these wilderness values and the overall sacredness of the entire massif to 13 Native American Tribes has not been sufficient to halt an economically marginal ski resort expansion using waste-water from the city of Flagstaff for artificial snow that threatens the sacred and wilderness values of the site. Lawsuits have been through various levels of courts to halt what is to the tribal coalition a sacrilege, but at present skiing is winning (Benally and Hamilton 2010).

The Peak Wilderness Park (also referred to as Adam’s Peak and Sri Pada) of Sri Lanka has high spiritual value to Buddhists, Muslims, Christians and Hindus (Mansourian 2005). The sacredness and wilderness values of this area have allowed wilderness decision-makers to ensure protection against damaging development from mining, forest cutting and clearing and excessive tourism.

**Implementation**
Management of a wilderness area as a sacred natural site can be done by implementing the key considerations of registration, designation, zoning, consultation, and employment mentioned above. All inventory methodology undertaken within a Sacred Natural Site must respect the traditional custodians of the site and their ability to not reveal all knowledge for cultural and security reasons. Such management will likely take the form of co-management between Indigenous Peoples governments and non-Indigenous governments or self-management by Indigenous Peoples government agencies.

**Recommended Reading**


4.10 Variance

Guiding Principles
Variance from the protocols discussed within these guidelines are sometime permitted within wilderness areas. Variances occur for practical reasons, for political expediency, for the rights of Indigenous Peoples, for competing legislative mandates, and for many other reasons. Permitting variances require a well-thought and thorough approach to appropriately manage them, while still meeting the purposes of protecting the wilderness values.

Key Considerations

Determining future variance
Any variance allowed within a wilderness protected area requires a principled decision-making process. The process for permitting variance during the establishment of a new wilderness protected area differs from the process of incorporating a variance into the management of an already existing wilderness. When considering whether to allow variances when establishing a newly designated wilderness, all decisions should be determined through an informed legislative process. Variances permitted during the establishment process of a wilderness area should be decided by the governing body and written into the management plan. Decision-makers must permit variances that align with wilderness values. Within a site designated as a wilderness protected area decisions to allow otherwise non-conforming uses are the responsibility of the manager but often the permission is elevated to higher levels within the agency. The process to be followed for granting such variance is described below. It is important that any decisions to allow variances should be principled and that there are mechanisms in place to make sure that happens.

Case study
Specific variances that are allowed on the congressionally designated wilderness areas on federal lands in the state of Alaska are managed differently than other federal wilderness lands in the United States. These variances stem from the Alaska National Interest Lands Conservation Act of 1980, the law that designated federal wilderness areas in Alaska and informs some of their unique elements of management. Central to the variances within the Alaska wilderness context are features that enable access and maintain traditional practices within these large, remote tracts of wildlands.

As discussed in Section 4.8, subsistence practices are a unique and important part of Alaska’s wilderness areas. Wildlands that are managed by state and federal natural resource agencies provide rural residents the opportunity to harvest significant quantities of wild resources. These resources include a large variety of fish, game, and berries, and other natural materials, like logs for homes. The importance of these wild resources for cultural purposes and rural life is the primary reason for Alaska’s access and structure variances to federal designated wilderness lands that are otherwise governed by the United States’ Wilderness Act.

Unlike wilderness areas in other parts of the United States, certain motorised access is allowed within Alaska’s designated wilderness. Alaska National Interest Lands Conservation Act specifically allows for the use of motorboats, snow machines (or snowmobiles), and fixed-wing aircraft within wilderness tracts for traditional activities, like hunting and fishing, and for travel to and from villages, home-sites, and subsistence cabins. The allowable use of these machines for access can vary between management units and is regulated by specific placed-
based rules. For example, depending on the national park, national preserve, national forest or wildlife refuge, allowable floatplane landings can be limited to certain bodies of water and snowmobiles are often only permitted during particular times of year, in designated areas, and under certain snow conditions. Permits that allow for recreational and scientific access by motorised transport can also be granted within wilderness areas in Alaska.

Subsistence cabins are another instance of variance within the Alaska wilderness context. Subsistence cabins that were in existence before the passage of the Alaska National Interest Lands Conservation Act are allowed to stay on the landscape; and in very rare circumstances, subsistence cabins can be constructed in new locations. These structures are generally authorised through a renewable and nontransferable permit system that allows them to be maintained and used by qualified claimants for traditional activities. This exception helps to provide continued access to subsistence resources and ensures human safety within remote places.

Alaska’s wilderness areas support important traditional uses that are enabled and managed, among other ways, though motorised transport and the use of small structures. These variances, which are generally strictly enforced, help to ensure that Alaska’s unique wilderness values are maintained while allowing traditional activities to continue.

Implementation
When granting variance, wilderness decision-makers must rely upon a sound, principled, and informed process when considering non-conforming uses. There are several principles that should be applied, and two tools that are essential.

Principles:
• Respect the high standards associated with this most protected, most natural land-designation existing on the planet
• Maintain a bias for protection, for sustaining the highest degree of naturalness possible.
• When the reasons for previously allowed variances no longer exist, eliminate the variance
• Respect other statutes.
• Respect the rights of Indigenous Peoples
• Respect implications to the cultural and biological systems beyond site-specific decisions
• Ask “Is the variance necessary?” Do not merely ask, “Is the variance allowed?”

Tools:
Management Plan
A management plan for a protected area gives the manager an over-arching framework within which to make their decisions. The management plan should ensure the long-term accomplishment of the overall objective of preservation of pristine nature. It should include means to monitor trends toward or away from that objective. It should identify goals and objectives that will then direct site-specific, time-sensitive decisions the manager must make.

Minimum Impact Analysis
Each decision implemented by a manager on a site-specific, activity-specific variance demands a principled, informed decision-making process. A minimum impact analysis should put the manager through a decision-making process that ensures all of the correct variables are considered. The minimum impact analysis should first answer the question if the variance is necessary.
Variances should be given only in instances where they are necessary, not because the variance is legally allowed. Once it has been determined the variance is both legally allowed and necessary, and does not pose a significant impact to the resources and character of the area, then the minimum impact analysis should go through a process of determining the management method or tool that will cause the least amount of impact.

The factors to consider when determining what method will cause the least impact will vary by location, resources involved, and many other factors. At the least, consideration should be given to the amount of time the impact occurs, how long the evidence of the impact will remain, and both the physical resources and the experiential qualities of the area. By employing a management plan for the long-term timeline and utilising a minimum impact analysis tool whenever a variance is considered, a manager is treating these important variance decisions with the care appropriate for our planet’s most protected places.
4.11 Incorporating science into management decisions

Guiding Principles
The systematic study of testable hypotheses, science, is a necessary tenet of all wilderness management decisions. As more areas are designated as wilderness around the world, society’s relationship with these places will change. We are anticipating all of society will pay even more attention to the benefits accumulating from strict nature protection with human witness. Clean water, wildlife corridors for movement, air sheds, filtration of ground water, traditional cultural practices in nature and wilderness-dependent recreation are important to us as a society. Research that is focused on flow of ecological services is useful to managers by creating understanding of the value of protecting biodiversity, carbon storage reservoirs and sources of high quality water for off-site benefits. Social science researchers from the disciplines of anthropology, political ecology and economics provide valuable resources and understanding of wilderness that must be incorporated into management decisions.

Key Considerations
Establishing boundaries and baseline conditions
A great deal of wilderness management is focused on protecting the resource. Agencies must often translate legislation into formal boundaries to understand exactly the land (or water) base they are protecting. They must develop signing and policies to assure people know it is wilderness, let people know what uses are allowed in wilderness and managers can begin to inventory trails, needed restoration and understand the condition generally of impacted sites within the wilderness. Therefore, a great deal of science for wilderness involves mapping, inventory and monitoring biophysical conditions. Much of this science needed is not specific to wilderness, but involves understanding natural processes protected in wilderness through general hydrology inventories, wildlife and fish inventories, assessment of invasive species, vegetative inventories, air quality and human use impacts assessments. This information is important to understand long-term trends in naturalness, establish baseline data, effects of protection decisions, and to establish desired future conditions descriptions.

Social science
An early focus of wilderness science was the need to understand recreation use and the effects of management. Although this is still an important topic, research has contributed also to managers’ needs to understand general societal attitudes toward wilderness which extend well beyond recreation values. Current wilderness social science is evolving even farther to contribute knowledge on public attitudes toward adaptation practices to address climate change issues, attitudes toward restoration to correct past human influences, the role of technology in wilderness experiences, and the future relevance of wilderness to a changing society and environment (Watson et al. 2015). Beyond the contributions to public wilderness values research, social science contributes greatly to our understanding of wilderness. The disciplines of anthropology, political ecology and sociology all contribute greatly to the field of wilderness management and produce valuable knowledge pertinent to wilderness decision-makers. Management decisions should be based on science and the many disciplines of natural and social science.
Monitoring
Scientists have also contributed to managers’ needs to estimate recreation use to all dispersed outdoor recreation sites and eventually with specific applications to wilderness. Researchers have been crucial in helping managers identify use monitoring objectives, the type of monitoring system that could provide this information, technology and sampling considerations, and data analysis methods (Watson et al. 2000). A science-based method of measuring use levels, distribution and trends is vital to good stewardship. Both social and natural science should be used in monitoring.

Conflict management
A rich literature history also suggests several insights for managing conflict in wilderness. Research has found that where direct or interpersonal conflict is present, zoning may be an effective management strategy. Educational programs may also be an effective management approach to conflict that is based on direct or interpersonal sources, and education may be effective where conflict is related to indirect causes such as alternative social values. Educational programs can be effective in two ways. First, they can help establish a basic etiquette, code of conduct, or other behavioural norms that might lessen both direct and indirect conflict. Second, they can help address indirect or social values-related conflict by increasing tolerance of recreation visitors for other types of groups and activities, perhaps by explaining the reasons behind certain behaviours that might be viewed as objectionable and by emphasising similarities that are shared by recreation groups and activities (Ivy et al. 1992). Most other conflict management solutions, such as management interventions to influence directional flow of travel (e.g., everyone moves in a clockwise direction through a trail system), set activity restrictions (e.g., set fines for conflicting behaviours), or timing of conflicting uses (temporal zoning), are aimed at only direct or interpersonal conflict sources. Only elimination of one use or the other can completely eliminate conflict, and this, of course has serious implications to the group eliminated. Science can help determine the level of conflict, suggest ways to manage conflict, provide methods to monitor changes in conflict levels and evaluate the impact of conflict on experiences.

Recreation in Galiuro Wilderness, United States.
© Sarah Csson

Economic value of wilderness recreation
Scientists have estimated the per acre economic value of wilderness recreation and provided a framework for considering allocation of additional public land to wilderness status. A variety of studies have been done to further illuminate the values attributed to wilderness protection, beyond those of on-site recreation experiences. In part, this advancement sprang from the work of natural resource economists who suggested that on-site recreation visit values captured only a part of the total value of wilderness. The idea that the societal value of wilderness is multi-dimensional has been widely accepted. For example, research has expanded the definition of wilderness values
Research can also guide managers in decisions related to charging fees, particularly in order to understand how wilderness use fees might be different from other recreation use fees, can consider tradeoffs in setting prices for wilderness access, and distinguish between day user and overnight user attitudes toward wilderness fees. Generally, research in the United States has found wilderness visitors less supportive of wilderness fees than fees for more developed recreation, setting fees for wilderness is complex due to social justice issues and difficult to describe costs of production issues, and wilderness visitors generally express more support for fees for restoring or maintaining conditions than somehow “improving” them.

**Case Studies**

**Limits of acceptable change and visitor experience**

Research on wilderness recreation carrying capacity led to the concept of “limits of acceptable change” (Stankey et al. 1985) wilderness planning process, introduced as a way to systematically address recreation carrying capacity in wilderness through a focus on how recreation use threatened specific attributes of the wilderness environment (social and biophysical) and how much departure from the pristine was acceptable. Research to define indicators and set standards has involved both qualitative and quantitative research methods. Qualitative approaches, as well as in situ place-based methods, to understanding experiences and identifying threats and contributions to wilderness experiences (cf., Patterson et al. 1998, Glaspell et al. 2003, Watson et al. 2007) have been employed in a number of studies.

These studies have asked visitors to define important elements of the wilderness experience and the things that threaten or facilitate them. For instance, at Juniper Prairie Wilderness in Florida, United States (Patterson et al. 1998) management was focusing on numbers of intergroup encounters (as a surrogate for solitude) as the primary indicator of wilderness character without a full understanding of how these encounters (or other possible indicators) influenced visitor-defined experiences (e.g., way-finding, challenge, and immersion in nature). Research here greatly expanded understanding of how management policies, commercial activities, visitor behaviours and numbers of visitors affected a range of experience outcomes. This research was in contrast to many previous studies that either focused narrowly on the experiences believed to be prescribed by legislation (primarily solitude), those experiences investigated in studies at other places (primarily solitude), or upon a single aspect of the setting, such as crowding and its effect on trip satisfaction.

**Climate change intervention and visitor perception**

There is increasing recognition of the value of wilderness as a baseline of relatively undisturbed landscapes, and as such, wilderness will be subject to more intensive natural science to understand the impact of climate change. There are new demands on wilderness for installation of ecological measurement devices, more human activity in wilderness to support ecological monitoring in remote locations, and more pressure for wilderness managers to review proposals for achieving the scientific values of wilderness (Carver et al. 2014). Important questions are also emerging about public attitudes toward the appropriateness of human intervention in wilderness to adapt to
climate change influences. Although managers must comply with legislation guidance and policy interpretations, many managers agree that understanding public perceptions of appropriateness of intervention in wilderness to adapt to climate change influences may help them make decisions about intervention and about how to explain either intervention or non-intervention decisions. Decisions about whether to provide water improvements due to changes in hydrologic features or weather patterns, introduction of new genetic material more resistant to drought and disease in a changing climate, and whether to assist in migration of plants or animals may be easier to make outside of wilderness. Initial research on this topic among wilderness visitors found strong opposition to these practices in wilderness (Watson et al. 2015).

Public attitudes toward ecosystem services and restoration

In addition to creating more opportunities for a more diverse public to visit wilderness our responsibility may be to promote awareness and commitment to protection of areas with wilderness characteristics for other than use values. Public wilderness values research certainly has suggested these are increasingly the values for which society supports wilderness protection. Our knowledge has changed about the functions and services provided by protected lands and water, and this knowledge may suggest the need to weight the contribution of environmental well-being to human well-being more than in the past (Watson 2013).

Managers are reporting more need to restore the effects of past human intervention in wilderness ecosystems. After the large western United States’ fires of 1988 and 2000, however, there has been renewed interest, but limited funding, to understand a variety of wildland fire issues relevant to wilderness management. Shortly after the 1988 fires in the Greater Yellowstone ecosystem, research helped uncover differences in public support levels between the public in the region of the fire and a national sample (Manfredo et al. 1990). Those who lived in the region of the fires were more supportive of restoration and more knowledgeable about the role of fire in nature. An additional topic explored in wilderness fire social science includes public attitudes toward management-ignited fire in wilderness. For example, support was found for management ignited fires and no difference between justifying those fires for ecological restoration or protecting adjacent lands resources by reducing hazardous fuels inside wilderness (Knotek et al. 2008).

Implementation

While most wilderness research has occurred to understand wilderness visitors’ or potential visitors’ experiences and threat to those experiences, research on wilderness values has extended across the United States population. United States wilderness management agencies wanted to know public attitudes toward wilderness protection and indications of public support for designating more federal land as wilderness. This research informs legislators, land management agencies, designation advocates and other stakeholders about public support for wilderness. One early study commissioned in the 1960s (ORRRC 1962) in the United States highlighted two broad classes of wilderness values—recreation and indirect values. Indirect values were defined to include conservation ethics, scientific uses and the wilderness idea. The
“wilderness idea” established the roots of the concept of existence value; wilderness is valuable to society because it is there and has been designated for protection from development and exploitation.

Recommended Reading

Evaluating Effectiveness of 1b Sites
5.1 Assessing ecological effectiveness in 1b sites

Guiding Principles
Protecting wilderness habitat across a broader range of ecological, geographical and geophysical occurrence of species provides the greatest opportunity for evolutionary processes to persist regardless of imminent changes in the future (Aycrigg 2013). To understand and protect wilderness areas, conservation managers need to be able to measure what they are trying to conserve (Stem et al. 2005). Assessing the ecological effectiveness of wilderness areas allows wilderness decision-makers to better facilitate appropriate, targeted management action at both local and national levels, improve efficiency and effectiveness of conservation action (including future site designation). Assessment of wilderness areas’ ecological effectiveness provides opportunities to learn from and respond to conservation successes, failures or inadequacies (Gaston et al. 2006).

Key Considerations
The IUCN PAME (Protected Area Management Effectiveness) framework is commonly used by wilderness-decision-makers (Hockings et al. 2015). Key areas of this framework are explained below.

Measures of inventory and condition
Measures of inventory concern the amount of biodiversity present, such as genetic diversity, numbers of individuals, or numbers of species, or the area of a particular habitat type (Gaston et al. 2006). Measures of condition or persistence concern the status of biodiversity, such as the viability of observed levels and dynamics of genetic diversity, population sizes or species occurrences, or the condition of a habitat or vegetation type (Gaston et al. 2006). Measures of inventory and condition within an ecological effectiveness assessment of a wilderness area can include a gap analysis, which measures the site’s ability to meet its conservation objectives (Davis et al. 2014).

Baseline measurements
Ecological effectiveness assessments can employ different baselines, depending on the combination of measure, biological organisation and spatial scale. Data should be collected to inform wilderness decision-makers on trends in the biodiversity, ecosystem functions, landscape and geology, and climate change resilience of the wilderness protected area (Hockings et al. 2015). Inventory assessments can focus on occurrence, coverage, and abundance of particular biological organisations at different spatial scales (Gaston et al. 2008). Condition assessments can focus on how the state of features have changed within one or more sites through time, how the state of features within sites compares with that outside them, or how the state of features has changed within sites compared with how it has changed outside them (Gaston et al. 2008).

Spatial extent of ecological effectiveness
Ecological effectiveness can be addressed at different spatial extents, i.e., site level to system-wide assessments. For individual sites, the principle concern is how well the biodiversity features for which the area has been considered important are maintained (Gaston et al. 2006). Site-level assessments are primarily based on quantitative, fine-scale monitoring data (Ervin 2003), necessitating extensive fieldwork. Portfolios of individual sites and system-wide assessments are concerned with how well they represent the full range and examples of a particular feature across regional or national landscapes (Gaston et al. 2006).
These assessments are primarily based on qualitative scoring data or broad-scale quantitative data (Ervin 2003), and exploit remotely sensed datasets.

Sufficient data collection
Data collection through monitoring can require significant investment of staff resources and funds, collection of these data requires a long term commitment to the assessment program (Hockings 2003). Without this long-term commitment, the shortness of time series for measuring occupancy and abundance will limit the ability to detect both directional changes and more complex dynamics (Gaston et al. 2008). This is significant because species may differ greatly in the rapidity of their responses to threats and conservation measures, and the interactions between the two (Gaston et al. 2008).

Network wide assessments
When possible ecological effectiveness of wilderness sites should include or be included within network wide assessments, which are primarily based on qualitative data scoring data or broad-scale quantitative data (Ervin 2003), such as remotely sensed or region-wide datasets, and include regular habitat and species gap analyses (Chape et al. 2005). Several large conservation non-governmental organisations have developed stratified, eco-regional-based plans and approaches to formally structure the process of developing and maintaining protected area networks (Cummings et al. 2015).

Assessment timelines
Responsibility for assessing ecological effectiveness can vary between individual sites and networks, and a number of approaches exist (cf. Hocking et al. 2006). Site level assessments are typically based on quantitative fine-scale monitoring data (Ervin 2003a), which are collected over a period of time (i.e., 5-10 years). The quickest and cheapest assessments use established assessment methodologies, relying largely on literature research and the informed opinions of site managers (Hocking et al. 2006).

Multidisciplinary teams
Multidisciplinary assessment teams that include biologists and ecologists are necessary to meet the goals of the required rigorous ecological assessments. Where appropriate the assessment team should include Indigenous People trained in indigenous science, knowledge and worldviews. Ecological effectiveness assessments should not be done by individuals or a team of non-specialists who lack the required knowledge and experience (Parrish et al. 2003; Gaston et al. 2008). Stem et al. (2005) argue that it is important to involve conservation partners in the monitoring and evaluation process because they can offer greater insight to what is actually happening on the landscape. This supports the notion that an assessment conducted solely by the managing agency may lack credibility (Heck et al. 2011).
Implementation
When wilderness decision-makers assess the ecological effectiveness of a wilderness area they should:

• Consider the size of the wilderness area and connectivity to other protected areas in a network
• Examine the species’ population dynamics and their influence on the wilderness area’s ecosystem dynamics
• Ecosystem dynamics should be measured both from the perspective of animal population ecology and predator-prey relationships
• Work with a multidisciplinary team to include inputs from a range of experts, organisations and stakeholders.

Recommended Reading


5.2 Assessing social effectiveness in 1b sites

Guiding Principles
All wilderness protected areas should be evaluated for their social effectiveness. To do so, wilderness-decision makers must be composed of and employ a multi-disciplinary team. Anthropologists and political ecologists should lead all social effectiveness assessments and ensure Indigenous Peoples’ full partnership in wilderness management and governance (Stevens 2014). Wilderness protected areas must respect Indigenous Peoples’ rights and adhere to the United Nations Declaration on the Rights of Indigenous Peoples. Free, prior and informed consent is an essential indicator for all wilderness areas.

Key Considerations
The Rapid Assessment and Prioritisation of Protected Area Management (RAPPAM) methodology will prove useful to wilderness decision-makers assessing the social effective of a protected area (Ervin 2003b; Hockings et al. 2015). Members of the relevant Indigenous People community and Tribe should have leading roles in social effectiveness evaluations. Social scientists like cultural anthropologists—not just natural scientists—should be full members of any decision-making team of a wilderness protected area. Any decision-making team comprised without proper Indigenous Peoples representation and inclusion of social scientists will be unable to produce worthwhile evaluations. Assessments of social effectiveness are typically multi-year endeavours that are undertaken by the individuals and institutions who have the mandate and responsibility to perform such an evaluation. Key considerations in any social evaluation of a wilderness protected area are described below.

Rights
When evaluating the social effectiveness of a wilderness area, decision-makers must pay close attention to the rights of Indigenous Peoples. Adherence to the United Nations Declaration on the Rights of Indigenous Peoples is required of all wilderness protected areas. Part of recognising the rights of Indigenous Peoples is the acknowledgement of the value of traditional knowledge in all areas of management. Such acknowledgement requires recognising indigenous method and including indigenous knowledge in all management activities from planning to implementation, enforcement, Western science studies and the use of technology. The management and governance of a wilderness protected area should be analysed to ensure such recognition and implementation is in place. As Stevens (2014) says, “Facilitating Indigenous Peoples’ full and effective participation in assessment and evaluation, including provisions for them to report independently on their findings, may ensure their values, aspirations, concerns, and understanding of their rights will figure prominently in governance and management assessments. Nothing less is likely to be considered legitimate by them or under international law” (69). Respect for the rights of Indigenous Peoples requires “promotion of constructive dialogue and fair access to information; accountability in decision-making; and existence of institutions and procedures for fair dispute resolution” (Borrini-Feyerabend et al. 2013:4).

Free, prior and informed consent
Free, prior and informed consent is a key indicator to the social effectiveness of a site. As discussed in Section 1.5, the use of free,
prior and informed consent is essential to all wilderness protected areas. The protected area management procedures and practices should be analysed to ensure that free, prior and informed consent is always sought and given.

**Sufficient data collection**

As with assessments of ecological effectiveness, studies on the social effectiveness of a site must have sufficient data collection. Such data must be collected over multiple years, informed by multiple academic disciplines, and comprised of both qualitative and quantitative data.

**Socio-economic attributes**

Analysis of social effectiveness should also include evaluations of the site’s protection of recreation uses, science and educational uses, community engagement, and human health and wellbeing (Hockings et al. 2015: 908). Multi-year evaluations should seek to understand if these aspects are both protected and consistent with overarching wilderness values.

**Implementation**

Research tools used in social evaluations of wilderness protected areas should include:

- Ethnographic Research
- Social Network Analysis
- Triangulation Evaluation
- Participatory Action Research
- Textual Analysis
- Process Tracing
- Surveys

Cultural anthropologists and political ecologists are best trained to conduct social evaluations of wilderness protected areas.

Wilderness decision-makers, including Indigenous Peoples, should either be trained in these disciplines themselves or work closely with such professionals. Assessing the adherence to United Nations Declaration on the Rights of Indigenous Peoples requires in-depth study and expertise in social science research. Such research is essential to the effectiveness of all wilderness protected areas.

**Recommended Readings**

5.3 Tools and techniques for evaluation of 1b site effectiveness

Guiding Principles
Evaluating whether the attributes that are intended to be protected by legal wilderness designation are actually being protected is crucial for determining whether management is effective and wilderness is providing its intended benefits. Wilderness decision-makers should use best practices tools and robust monitoring frameworks to evaluate whether the full range of wilderness attributes are being protected (Ferraro and Pressey 2015). Three broad categories of evaluating wilderness attributes are: 1) whether the system of wilderness management is effective; 2) whether wilderness is protecting ecosystems and biodiversity; and 3) whether cultural and social wilderness attributes are protected.

Key Considerations
Evaluating management effectiveness
Evaluating whether management is effective is a basic necessity if any wilderness attributes are to be protected. Protected Area Management Effectiveness (PAME) While developed for protected areas generally and not specifically for wilderness, to date the global database of PAME includes records of 18,000 evaluations in 9300 protected areas (Coad et al. 2015, Leverington pers comm.).

Most of the methodologies used to evaluate management effectiveness are based on the framework developed by the IUCN-WCPA (Hockings et al. 2006), which includes evaluating six foundational elements of management:

• Context: understanding the area, including its existing status, values, threats, opportunities, stakeholders, and the management and political environment in which the area exists;
• Planning: establishing the vision, goals, objectives, and strategies for the area that protect its resources and values, and reduce or mitigate threats to these resources and values;
• Inputs: the resources that are available to implement the plan, including staffing, funding, equipment, and other management necessities;
• Processes: the management actions and systems that will be used to implement the plan given the available inputs;
• Outputs: the goods and services that are delivered from the management processes, including the management plan, records of decisions, and analyses of impacts from proposed projects;
• Outcomes: the impact on the land showing the results of the planning, inputs, processes, and outputs.

Hockings et al. (2015) provides detailed discussion about each of these six elements and how to implement PAME. Many protected area agencies have adapted common methodologies or developed specific applications of PAME to fit their needs, including South Africa (Timko and Satterfield 2003), Iran (Kolahi et al. 2013), Tasmania, Australia (Tasmania Parks and Wildlife Service 2013), Siberia (Anthony and Shecstockova 2015), Brazil (Carannza et al. 2014), and New South Wales, Australia (Hockings et al. 2009).

Tools for evaluating protection of ecosystems and biodiversity
Protecting the integrity of ecological systems and the species occurring therein is a primary goal in all wildernesses. Wilderness decision-makers can look to evaluations of the effectiveness of protected areas in protecting ecosystems and species, for
example in South Africa (Timko and Satterfield 2008), the United Kingdom (Gaston et al. 2006), and Brazil (Pfaff et al. 2015). Wilderness decision-makers can also look to evaluation frameworks used by Canada and the United States.

In an examination of Canadian wilderness protected areas, Woodley (2010) summarises the history of and methods used for monitoring ecological integrity, which are formally described in a report by Environment Canada (2012). Trend information is compiled for reporting across the system of Canadian parks to be used for decision-making at the level of the park, and for assessing the effectiveness of national policies for managing parks and wilderness.

In the United States, a variety of frameworks have been used to evaluate ecological integrity in designated wilderness and other protected areas. These frameworks can be adapted to be used in other country’s wilderness protected areas to evaluate protection of ecosystems and biodiversity. The National Park Service developed the “vital signs” monitoring program to assess trends in natural resources, and this program is applied to designated wilderness managed by the Service (http://science.nature.nps.gov/im/monitor/). The organisation NatureServe has developed methods and resources to assess ecological integrity across a variety of ecosystems and these could readily be applied to wilderness (http://www.natureserve.org/conservation-tools/ecological-integrity-assessment).

Unnasch et al. (2008) developed a conceptual framework for monitoring the trend in ecological integrity for the National Park Service, which could be applied to designated wilderness. Theobald (2013) mapped threats to ecological integrity in the United States and these methods could be readily applied at a finer spatial scale to wilderness. Last, Parrish et al. (2003) provided a framework for monitoring ecological integrity on privately protected areas that could be adopted for wilderness.

**Tools for evaluating protection of social and cultural wilderness attributes**

A tool specifically designed to evaluate the trend in the condition, threats, and outcomes from management planning, decisions, and actions across a wide range of wilderness attributes in the United States is called Wilderness Character Monitoring (Landres et al. 2015). Managers evaluate trends of wilderness qualities by measuring indicator data collected every five years. This system allows needed agency and local flexibility within a nationally consistent framework. Stoll-Kleemann (2010) argue that more emphasis needs to be placed on evaluating the protection of social, socio-economic, and socio-cultural attributes of protected areas. Wilderness decision-makers should work with social scientists, like anthropologists and political ecologists, to create frameworks that evaluation a wilderness protected area’s ability to effectively protect the site’s social and cultural tenets (Izurieta et al. 2013).

**Recommended Reading**


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