A Working Definition of European Wilderness and Wild Areas

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Background

The concept of wilderness has gained considerable momentum in Europe during recent years. A political milestone was the adoption of the "European Parliament Resolution on Wilderness in Europe" in February 2009, which calls on the European Commission to (1) develop a clear definition of wilderness, (2) mandate the European Environment Agency to map existing wilderness areas in Europe, (3) undertake a study on the values and benefits of wilderness, (4) develop a EU wilderness strategy, (5) catalyze the development of new wilderness areas (restoration or "rewilding"), and (6) promote the values of wilderness together with NGOs & local communities.

The EU Member States were invited to exchange 'best practices' in managing wilderness, develop a code of conduct for tourism in wilderness areas, and to ensure the best protection of wilderness areas. Particular emphasis was given to how to best integrate the wilderness concept into the Birds and Habitats Directives, especially through the Natura 2000 Network with wilderness areas having "a central place".

In February 2009, the European Parliament also welcomed the establishment of the Wild Europe Initiative (WEI) - a collaborative effort to promote the wilderness concept, including personnel from the European Commission and the Council of Europe, alongside European nature conservation organizations, such as PAN Parks Foundation, EUROPARC Federation, WWF, BirdLife International, IUCN, UNESCO, Institute for European Environmental Policy (IEEP), European Centre for Nature Conservation (ECNC) and Rewilding Europe.

In May 2009, more than 230 representatives from governments, conservation agencies, NGOs and academic institutions met in Prague at the "Conference on Wilderness and Large Natural Habitat Areas" developed by WEI and hosted by the Czech European Union Presidency and the European Commission. A key outcome was the "Message ("Poselstvi") from Prague", which contained 24 recommendations from the participants on policy, research, awareness raising, and partnerships. The Conference re-affirmed the role of the WEI, and a working partnership was set up under the Chairmanship of Ladislav Miko, Director of Natural Environment at the European Commission, with the aim of ensuring adequate follow-up of the "Message from Prague".

A definition of wilderness had been formulated for the Conference, and the Wilderness Working Group (WWG) of the Wild Europe Initiative was established to develop this as a practical entity. WWG workshops were held during 2010 and early 2011 with participation from several of the WEI partner organizations. This document is largely the result of WEI consultations during the period March 2011 to March 2013.

Update – use of the definition

The definition of wilderness is being used for the EC Guidelines on Management of Wilderness and Wild Areas in the Natura 2000 Network (published August 2013), and in development of the forthcoming EC Wilderness Register. This document is additionally now a reference point for a number of strategies and projects for wilderness and wild areas.

The objective

To produce a standardized and practical definition of wilderness and wild areas that can form the basis for effective protection, restoration or rewilding initiatives[1] across a range of geographic and cultural circumstances in Europe. It should provide an easily understood, unambiguous and attractive description that can mobilize the necessary interest and support among practitioners and across key sectors of society.

To be successful, especially on a crowded continent like Europe, the conservation of wilderness areas and restoration/rewilding work within natural and wild areas must be embedded within the cultural and historical fabric of the relevant region.

To optimize support it is also important that, wherever relevant, the surrounding communities and wider interests understand the opportunities offered by the economic, social and environmental benefits of wilderness, wild areas and their wildlife.

The definition should in the immediate future also help facilitate drafting and adoption of non-intervention management guidelines, and development of a Wilderness Register.

The need for a practical definition

One of the main reasons for the absence of a coordinated strategy on wilderness and large natural habitat areas in Europe is the lack of a common working definition.

There are many different words for 'wilderness' and 'wild' and it is impossible to adequately promote, protect, restore or rewild an area if its qualities remain unclear, or are understood differently according to geographic location, individual perception or local culture.

It is important that any definition can thus be applied in operational circumstances:

- For development of clear policy proposals that can be uniformly applied
- To promote this form of land use in the context of threats and opportunities
- To enable identification and monitoring of its status – e.g. for the Wilderness Register
- To provide a context for guidelines related to management, protection and restoration/rewilding.

Overall, it is essential to remain focused on practical objectives, and not get overly enmeshed in academic debate.

Definition of Wilderness
The consensus definition of wilderness in a European context is:

"A wilderness is an area governed by natural processes[2]. It is composed of native habitats and species, and large enough for the effective ecological functioning of natural processes. It is unmodified or only slightly modified and without intrusive or extractive human activity, settlements[3], infrastructure or visual disturbance."

[1] For more information on the concepts of protection, restoration and rewilding, see Appendix I
[2] See Appendix III for listing of natural processes
[3] Except for uninhabitable archaeological remains

Wilderness areas should be protected and overseen so as to preserve their natural condition.

This is substantially aligned with the globally accepted definition of wilderness - IUCN Protected Area Category 1b[4] – although more specific in its stipulation of natural condition.

Wilderness areas represent a vital element of Europe's natural and cultural heritage. In addition to their intrinsic value, they offer the opportunity for people to experience the spiritual quality of nature in the widest experiential sense - beyond mere physical and visual attributes, and in particular its psychological impact.

They also provide important economic, social and environmental benefits, including ecosystem services, for local communities, landholders and society at large.

Definition of Wild Areas

The following definition is proposed:

"Wild areas have a high level of predominance of natural process and natural habitat. They tend to be individually smaller and more fragmented than wilderness areas, although they often cover extensive tracts. The condition of their natural habitat, processes and relevant species is however often partially or substantially modified by human activities such as livestock herding, hunting, fishing, forestry, sport activities or general imprint of human artifacts."

Where feasible, agreement should be reached to halt or at least mitigate human activity in these areas within a given timescale. Conservation emphasis is on restoration/rewilding so as to improve wilderness value – and on linkage by ecological corridors to create a network.

Wild areas are often also of great value, and many should be considered for inclusion in the forthcoming Wilderness Register.

What is wild? The concept of a 'continuum'

The degree to which an area is wild can be measured along a 'continuum' - with wilderness at one end and marginal agriculture and marginal forestry at the other.

The position of any particular area on this continuum is dependent on the degree of habitat and process modification, human impact etc. Wherever possible, it should progress over time along this continuum, through increased stages of naturalness towards a wilder state - as a result of restoration/rewilding of its habitat, wildlife and natural processes.

This restoration/rewilding can occur purely through the actions of nature or with some initial human involvement.

Attainment of "wilderness" condition is the ultimate goal wherever scale, biodiversity needs and geography permit.

This continuum provides the backdrop to a two-fold strategy for wilderness conservation[5], involving protection and restoration/rewilding.

[4] "*Wilderness areas are usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, which are protected and managed so as to preserve their natural conditions*"

[5] See Appendix IV

Benefits of wilderness and wild areas

In addition to their intrinsic and spiritual worth, wilderness and wild areas can generate important economic, social and environmental benefits.

Their value for biodiversity is widely acknowledged: harbouring a gene pool of species that favour large areas dominated by natural process with minimal human imprint, enabling resilience, adaptation and migration in the face of climate change, providing a base-point for assessment of the health and integrity of ecosystems generally and a crucible for ongoing evolution.

Such areas can also produce a range of often financially quantifiable benefits for local communities, landholders and wider society: potential for nature tourism, recreation and therapy-based activities, together with ecosystem services including carbon sequestration, flood mitigation, water table retention and pollution alleviation that can both address a key cause of climate change and lessen its consequences.

The importance of using the right label

If inappropriate definitions are employed in certain circumstances, this can itself create an obstacle to achieving conservation objectives.

Whilst the words 'wilderness' or 'wild' can evoke strong support in some quarters, they can also provoke negative reaction from landholding or farming interests whose resource has produced a well tended landscape which they do not wish to see 'reverting to scrub'.

Under such circumstances, it can also be useful to refer to 'generally large areas of natural habitat and natural process' with 'wilderness' or 'wild' predominantly employed as promotional labels.

Criteria for wilderness areas

Wilderness areas can be categorised into three 'zones,' with a core area surrounded by a buffer area of minimal activities, which in turn is surrounded by a transition zone (see Appendix II). It is considered that this threefold structure offers best protection of key wilderness principles whilst allowing potential for future expansion and flexible interaction with other land uses.

- The **core area** would have the 'highest' quality of wilderness, with minimal impact of human activity or infrastructure and a dominance of natural processes. Where feasible, outward expansion would occur over time through restoration/rewilding into the buffer zone – particularly if the core is not large enough initially to allow complete ecological processes.

- The **buffer zone**, with relatively low impact of human presence, surrounds and protects the core zone. Emphasis here should be on restoration/rewilding of natural habitats and processes, with phasing out of built structures[6] and high impact activities within 10 years. Where feasible, there should be plans for it to be incorporated into the core zone and expand outwards over time into the transition zone.

[6] Except for uninhabitable archaeological remains

- The **transition zone** is an area where a range of human activities is permitted, but with management controls preventing development of major infrastructure, wind farms or large scale clear felling, that might significantly alter the landscape or natural environment. Sustainable harvesting is possible of timber, animals (hunting & fishing) and plants (berries, fruits, mushrooms), together with organic agriculture.

The zonal patterns will vary. Where possible, they should be roughly concentric, but can be opportunistically designed to accommodate local geography, etc. A single core is preferable, but if there are initially two or more, these should be linked by substantial ecological corridors with a clear plan for future amalgamation where possible.

Minimum size is ideally governed by multiple considerations that need to be considered collectively in determining a definition. Three of these are:

- Absolute size - a crucial determinant, along with ecological integrity, to enable key wilderness attributes and benefits.

- Enabling integrity of ecological function under given geographic and habitat conditions; a boreal forest complex might require 100,000 hectares for proper functioning of natural processes, whilst a wetland area might be self-sufficient with say 2,000 hectares. Even large areas may be influenced by external water sources or windborne pollution. In mountain regions it is particularly important to ensure an altitudinal perspective covering the spectrum from valleys to the highest peaks.

- Landscape and perception of how wild an area is. A wilderness panorama should ideally be uninterrupted by manmade elements of landscape. A feeling of wilderness can be engendered in a relatively small area of hills and valleys, whereas a much larger but flat area may have views of distant agricultural or other human-influenced landscapes.

A minimum of 3,000 hectares is recommended for labelling any *new* core area as 'wilderness' – and a clear majority of the land must already be comprised of natural habitat and process, and devoid of human activity, habitation or infrastructure. Where because of fragmentation there is an *existing* core area of 2,000 hectares or more which meets these criteria and has the potential through restoration to grow into a (single) area of least 3,000 hectares, then this may also be labelled 'wilderness'. However in both cases, clear plans must be evidenced for restoration/rewilding of the remaining area, involving elimination of remaining infrastructure and human activity, within a maximum timeline of 10 years.

There need be no buffer zone where the core is more than 8,000 hectares. Equally, an area of 3,000 hectares minimum can be given wilderness classification if there is no possibility of establishing a buffer zone because of its geographic status – e.g. as an island, where the surrounding water itself can provide further zonation or where it already provides ecological integrity – e.g. for mires or other wetlands – and there are credible and actively pursued plans to provide appropriate buffer and transition zones even where these involve different ecosystem or habitat types; in this latter instance it will be accorded 'interim' wilderness status.

A minimum of 10,000 hectares for core wilderness areas is however recommended as an objective wherever feasible, particularly where larger areas are needed for effective functioning of natural processes, with an appropriate timescale designated. In many regions, very much larger core areas could be aimed for. Where a new wilderness area is not large enough to allow full functioning of key ecological processes, there should be plans in place with a timeline for appropriate expansion.

Size of the zones will vary according to local opportunity, but the overall presumption should be to make them – particularly the core – as large as circumstances permit.

See Appendix II for more detailed criteria related to wilderness zones.

Implications of increased minimum size

The increase in minimum size for core wilderness from its present level of around 50 hectares to 3,000 will inevitably mean many areas ceasing individually to have a formal wilderness label.

The new size is much more credible for wilderness, but it is important to realize that nothing has changed on the ground. These areas are still highly valuable for their natural processes and other wilderness attributes, and should remain separately identified and recorded. Certainly they must not lose their high protection priority as defined by IUCN Category 1a and 1b classification.

Urgent attention should be applied to enlarging and linking them wherever possible.

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APPENDICES

Appendix I

Protection, restoration and rewilding – some clarifications

Protection of wilderness seeks to safeguard the naturalness of its processes, habitat and wildlife without human intervention within a particular area, and to minimize unintended external influences – including water and air pollution. Conservation work in such an area should be undertaken using principles of 'non intervention management' which promote natural process and natural succession – focusing on overall ecological integrity rather than individual species.

Restoration involves reinstatement of natural habitats and processes, together with reintroduction of wildlife, appropriate to the geography of an area at the present time. Wherever possible it is implemented through natural regeneration followed by non intervention, although the process may initially involve human-centred activity: for example where there is no local seed source, or artificial drainage needs removal. In either case, the outcome is not predictable. It should not be seen in terms of turning the clock back to recreate any particular epoch from the past.

'Rewilding' is effectively another term for restoration, meaning the return of an area to its wild natural condition. As with restoration, re-wilding involves initiating, stimulating and allowing natural processes to occur (again), replacing human management and interference to shape new and wilder areas; it is applicable to any type of landscape and may not result in a predictable end-state, or restoration of an old state. A naturally functioning landscape that can sustain itself into the future without active human management is the ultimate goal of the rewilding approach.

Appendix II

Criteria for wilderness, related to zones

This table explains what characteristics and activities are appropriate for each of the three zones defined above: core, buffer and transition. It should help guide the protection or restoration of existing wilderness areas, as well as the establishment of new wilderness areas.

Issue	Core zone	Buffer zone	Transition zone
1. Minimum size	Minimum 3,000 ha is compulsory to gain a wilderness label, with an objective of 10,000 ha as an aspiration to be achieved wherever possible within a stated timescale. The area should be compact. Could have two or more cores if linked and with a plan for full amalgamation	Minimum size for total core plus buffer zones should aim to be not less than 8000 ha. If the core exceeds 8,000 hectares the buffer is not needed. Ideally the combined core+ buffer zone area should be large enough to allow expansion of the core zone to an aspiration objective of at least 10,000 hectares	No minimum size, but should aim to be at least a quarter of the total core/buffer/transition zone area. This zone is not 'compulsory', but highly recommended.
2. Biodiversity	Natural dynamics in biodiversity, even if species and habitats are lost, would be accepted as inherent in the objective of total natural integrity of the ecosystem	Natural changes in biodiversity would be accepted. Transition from domestic to wild-living herbivores should be promoted to maintain biodiversity.	A fuller range of traditional intervention management practices permitted, but giving way to non intervention management wherever possible
3. Natural processes	100% of the area (see Annex III for explanation of natural processes)	A clear plan to restore natural processes where possible, and to restore them fully in any part where expansion of the core zone could occur in the future	Restoration/rewilding can also occur here, e.g. to accommodate dispersion, migration or overflow of wildlife from core and buffer zones into this area
4. Settlement	No permanent settlements. Temporary shelters subject to regulation. No structures other than uninhabitable archaeological remains	No new permanent settlement. Temporary shelters for camping and hides subject to regulation, and dependent on size of core and buffer zones. Very large areas with 50,000 hectares or more of core zone could consider non-permanent buildings [7]but only for tourism	Yes, but subject to controls on new developments to preserve visibility values from core/buffer zones, and landscape

[7] For example, lodges modeled on the African style but allowing for more challenging European climatic conditions, which can eventually be removed, leaving 'no trace'

Issue	Core zone	Buffer zone	Transition zone
		purposes where revenue is of direct and indispensible importance to the funding of the wilderness area; local materials and architecture should be used, and structures hidden in the landscape. No permanent structures other than uninhabitable archaeological remains.	
5. Infrastructure	No infrastructure, with a clear agreed plan for removal of existing infrastructure within 5 years (with the exception of traditional gathering sites required by indigenous peoples to practice their traditional reindeer herding in Nordic countries[8]). No roads or tracks. Footpaths should be minimal with no or minimal markings unless necessary for local conservation requirements or public safety. No fencing.	No significant infrastructure, with a clear agreed plan for removal of existing infrastructure within 10 years. No roads or tracks, Footpaths should be minimal and with only discrete markings unless necessary for local conservation requirements or public safety. Temporary fencing only if necessary for restoration/rewilding purposes.	No significant new developments that risk further fragmenting the habitats or disturbing landscape and visibility values, including wind farms, ski slopes, substantial industrial plant or large new settlements. Fencing allowed, but managed to enable foraging and other mobility needs of wildlife from the core and buffer zones Any development of facilities for wild area activities should be low profile in design and located so as not to impede potential expansion of the transition zone(s) in the future
6. Access	Free to public access on foot, with option for local management control to minimize negative impacts on biodiversity, natural process or landscape aspects. But generally allowing access on foot also outside marked paths.	Free to public access on foot, with option for local management control to minimise negative impacts on biodiversity, natural process or landscape aspects. But generally allowing access on foot also outside marked paths.	Free to public access. Access by wheels and motorized vehicle possible, but with certain restrictions.

[8] Exceptions have been made with a number of criteria in Nordic countries where wilderness legislation already exists to permit certain activities, which cannot thus be legally excluded. However this situation does not apply elsewhere in Europe.

Issue	Core zone	Buffer zone	Transition zone
	No wheels or motorized access for recreational use, except for restoration in the management plan. Horses with restrictions. Dogs on leads in core and buffer zones	Wheels or motorized access possible but very strictly regulated and on designated tracks only. Horse riding with restrictions.	
7. Collecting berries, nuts, mushrooms, etc.	None, except by special agreements for subsistence of bona fide indigenous peoples in Nordic countries, visitors for personal use during their visit and local communities for subsistence not trading purposes. In no case should there be any significant negative impact on biodiversity.	Allowed, but only for visitor personal use during their visit and local communities for subsistence and sale. There should be a clear phasing out policy of any collection for sale in any future core expansion area In no case should there be any significant negative impact on biodiversity	Allowed, provided sustainable management principles are followed
8. Livestock grazing	None, except in exceptional circumstances for bona fide indigenous peoples (Nordic countries) or for provenly essential subsistence, in the latter case with a clear plan to phase out within a nominated timescale (10 year maximum) as soon as alternative income is available. It should be managed meantime to allow sustainability of mixed habitat including natural regeneration including young trees. In no case should there be a significant negative impact on biodiversity. No additional grazing capacity would be permitted.	Grazing by domestic livestock not permitted except in exceptional circumstances, tightly managed at very low densities, for essential local livelihoods. In no case should there be a significant negative impact on biodiversity. No additional grazing capacity would be permitted, and there should be plans with clear timelines to phase out in any future core expansion area	Yes, but subject to controls on density, based on sustainability principles

Issue	Core zone	Buffer zone	Transition zone
9. Forestry	None	Allowed but highly restricted, under a credible certification scheme, and with a clear phasing out policy in any future core expansion area. Any felling should be of individual specimens only in previously agreed areas, with stumps strictly cut right to ground level. No plantation forestry, and any replanting, if unavoidable, should be of indigenous species only. No new road or track construction.	Allowed under credible certified scheme. No clear felling in excess of a small area (say a hectare), unless required to replace alien species with native habitat or for management of fire and pests (including bark beetles). No new plantation forestry, with natural regeneration where possible.
10. Dead wood collection	None, except by special agreements for subsistence of bona fide indigenous people and limited use for tourism if allowed by local management plans, for subsistence not trading purposes; in both cases there should be no significant impact on biodiversity and a plan should exist to phase out within five years, wherever alternative provision or income is available.	Very restricted, for subsistence and some tourism use only.	Allowed, but with certain restrictions
11. Hunting, fishing and game management	None, except by exceptional agreements under existing wilderness legislation in Nordic countries only for subsistence use only and not for trading purposes, so long as there is no significant impact on biodiversity or wildlife population numbers or behaviour for tourism – in the latter case regulated by management plans. No restocking except for restoration purposes.	None, except by exceptional agreements under existing wilderness legislation in Nordic countries for subsistence use only, so long as there is no significant impact on biodiversity or wildlife population numbers or behaviour for tourism – in the latter case regulated by management plans. No restocking except for restoration purposes. Any management action should cease within 10 years.	Allowed under strict regulation, only if wildlife/species numbers allow.
12. Crop	None	None	Farming allowed. Traditional, organic

Issue	Core zone	Buffer zone	Transition zone
agriculture			farming where possible
13. Research	Yes regulated by management plans, with minimal visual impact and without ecological impact	Yes, but with minimal visual or ecological impact, regulated by management plans	Yes
14. Restoration/ rewilding	Human assisted where necessary to support natural processes, e.g. where natural seed sources are absent or artificial drainage needs removing, using alternative seed or plant sources from closest available geographic proximity. Human intervention is also permitted for removal of human infrastructure (built structures, fences, roads, tracks etc). To include wildlife reintroductions and re-stockings using indigenous species only and supplementary feeding of scavengers (where legal) until numbers are up to appropriate carrying capacity levels. Such activities must be based on scientifically sound, site specific considerations No forestry-style tree planting (no rows, no fertilizer or pesticide use). To be followed by non intervention management.	The aim should be for a substantial proportion of buffer zones to become incorporated into the core zone, through restoration/ rewilding: either natural or human-assisted if necessary. To include wildlife reintroductions and re-stockings where necessary and supplementary feeding of scavengers (where legal) until numbers are up to appropriate carrying capacity levels, using indigenous species only. No forestry-style tree planting (no rows, no fertilizer or pesticide use). To be followed wherever possible by non intervention management.	Yes. Wildlife reintroductions and re-stockings where necessary. No forestry-style tree planting (no rows of trees, no groundwork, no alien species). Culling allowed, under strict regulation, where necessary and not possible from adjacent lands
15. Tourism and recreation	Activities allowed where not requiring a built infrastructure. Camping, canoeing, climbing, cross country ski with strict 'leave no trace' rules and spatial restrictions. There should be no ecological	Camping, canoeing, climbing, cross country ski with strict 'leave no trace' rules and spatial restrictions. Wildlife watching also from temporary hides and bait stations according to local	Yes, also hotel, lodge and B&B development, with emphasis wherever possible on promoting a broad spread of benefits among the local community. All outdoor activities with strict 'leave no

Issue	Core zone	Buffer zone	Transition zone
	impact.	management plan. All outdoor activities with strict 'leave no trace' rules and spatial restrictions. Any new build infrastructure should be for ecotourism purposes only, temporary, with minimized visual impact and strictly controlled, along with any associated activities.	trace' rules and spatial restrictions.
16. Landscape management	There should be full perception of wilderness atmosphere, with no artificial features in the landscape and minimal audible intrusion. As a general rule of thumb, when in a core area, only core or buffer zones should be visible.	There should be perception of wilderness atmosphere, with minimal visual or audible intrusion. As a general rule of thumb, when in a buffer area, only core or transition zones should be visible.	Management of landscape as defined above
17. Fire control	Only if needed (e.g. for public safety) and fire is not part of natural process, and then by controlled burning rather than felling	Only if needed and fire is not part of natural process, and then by controlled burning rather than felling. Fire control through reestablishment of original fire-resistant vegetation and wild herbivore grazing, where appropriate, to be explored and promoted.	Yes – use the zone for overall fire control, but with landscape impact minimized by management plan. Fire control through reestablishment of original fire-resistant vegetation and wild herbivore grazing, where appropriate, to be explored and promoted.
18. Disease control	None	Non extractive, non chemical only (e.g. bark beetle traps)	Non chemical only
19. Alien species control	Alien species[9] to be removed as part of restoration/rewilding if in early stages or possible to remove.	Alien species are to be removed as part of restoration/rewilding if in early stages or possible to remove	To be removed where threatening to spread into core and buffer zones. However the transition zone does allow for multiple land use, including some plantation forestry and arboriculture

[9] Careful definition is needed to exclude from this category species which may have migrated or been displaced by the effects of climate change

Appendix III Natural Ecological Processes

These processes have greatest application in wilderness areas, more modified impact in wild areas

- **Abiotic processes**
    - Wind (transport of soil, blowing down trees: making open spots in the forest and holes and heaps for varied micro habitats)
    - Water: streams, waves, flooding, ice, snow – including hydrological impact, flood mitigation, water table maintenance
    - Fire
    - Avalanches
    - Geology: minerals and salt impact – including soil and water composition + richness
    - Climate
- **Biotic processes**
    - Wildlife
        - Herbivores (large and small)
            - As food for carnivores, carrion eaters/scavengers, dung eaters etc.
            - Seasonal/diurnal migration & population dynamics
            - For natural management
                - Grazing & browsing
                - Tree bark stripping
                - Manuring
                - Dam building, wetland creating (beaver)
                - Burrowing (rabbits), rooting (wild boar)
                - Seeding (squirrel, jay)
                - Cleansing (filtration from sedges, dam oxygenation)
        - Carnivores
            - Prey-predator relationship: equilibrium densities for a balanced ecosystem
            - Managers of healthy prey populations
            - Indirect impact on vegetation and processes (via effect on prey)
        - Scavangers (large and small)
        - Disease – vectors including bark beetle, moth, fungus
        - Genetic selection and evolution, diversity
        - Reproduction, migration internally and repopulation of external areas
        - Adaptation, resilience (eg in response to climate change, alien species impact)
    - Habitats/flora
        - Natural succession to climax vegetation
        - Habitat mosaics determined by natural dynamics
        - Healthy and diverse ecotone functioning
        - Food source provision
        - Shelter, bedding, medicinal use
        - Genetic selection and evolution, diversity
        - Reproduction, spread internally and repopulation of external areas
        - Adaptation, resilience (eg in response to climate change, alien species impact)
        - Large trees needing a long development period to fulfill ecological potential

- Natural cycles
    - Sequestration, storage, emission of carbon dioxide, nitrous oxide, methane
    - Carbon – availability of dead biomass (trees, reeds, grasses) as base for microbiotic activity and invertebrates in the foodchain
    - Nitrogen
    - Other elements

Key principles and indicators for proper functioning of natural processes:

- Scale – large enough to permit as full a range of processes as possible to function
    - Abiotic: room for the water, fire and wind processes
    - Biotic: especially on the level of meta-populations: *"key (steering) species"*, facilitating viable gene pools, enabling migration and adaptation
- Self-contained so far as possible – including water sources, habitat ranges
- Influence from external influences (pollution, alien species, human impact) minimal
- Highest species variability and broadest age structure within species that can be permitted by local geography

Appendix IV

Strategic Aspects for Wilderness Conservation in Europe

With so little relatively pristine wilderness left in Europe, the wilderness agenda should give adequate protection to the few remaining places but also grasp the new opportunities emerging across large sections of the continent from abandonment of farming in less productive areas, and growing realization of the environmental and socio-economic benefits of wilderness.

This situation provides historic opportunity for the return of wilderness on a crowded continent. The conservation of wilderness should also be seen in a wider landscape perspective with the creation of ecological corridors to neighbouring natural wilderness and wild lands. Opportunities for enlargement should be considered wherever feasible.

A wilderness strategy oriented to the future must also be solidly anchored in the four conservation biology principles: 1) all the native ecosystems should be represented in a protected areas system, 2) viable populations of all native species should be maintained and allowed to fluctuate in a natural way, 3) ecological and evolutionary processes such as free flowing rivers, wind, fire and impact of herbivores and carnivores must be ensured, and 4) the system should be designed and managed so that it is resilient to both short-term and longer-term change, including climate. We should strive to establish wilderness areas across a wide spectrum of ecosystems, including high and intermediate mountains, forests, steppes, wetlands, rivers, deltas, coastal areas and oceans.

Recent findings show that “large apex consumers” at the top of the food chain are of particular importance for the natural functioning of ecosystems. The disappearance of big predators - such as wolves and lynx on land, sharks in the oceans, and large fish in freshwater ecosystems, along with large herbivores such as bison, can generate extensive cascading effects in marine, terrestrial and freshwater ecosystems. This “*trophic downgrading*” affects processes, functions and resilience of global ecosystems and can in turn have negative impacts on the incidence of infectious diseases, wildfires, carbon emission, invasive species, and biochemical cycles. So, “large apex consumer” species should be promoted as part of a European wilderness strategy.

Appendix V

Consultation list

Below is a list of consultees in the development of the definition document, with their position at the time of consultation. Thanks are also due to all those who participated whose names are not included.

Alberto Arroyo	WWF European Policy Office
Toby Aykroyd	Coordinator, Wild Europe Initiative
Ben Delbaere	Senior Programme Manager, ECNC/LHN
Boris Barov	European Manager, Birdlife International
Neil Birnie	Director, Conservation Capital
Georgiy Bondaruk	Ukrainian Institute of Forestry
Steve Carver	Director, Wildland Research Institute
Nigel Dudley	Equilibrium Research, Vice Chair WCPA/IUCN
Eladio Fernandez Galiano	Head of Biodiversity, Council of Europe
Mark Fisher	Leeds University/WRI
Georg Frank	Danube Parks Project Manager
Hans Friederich	Director, IUCN Regional Office for Europe
Hugh Fullerton-Smith	Director, The European Nature Trust
Adrian Hagatis	Wilderness Project Manager, WWF Danube Carpathian Programme
Wouter Helmer	Director, ARK Nature Foundation
Natarajan Ishwaran	Head of Biodiversity, UNESCO
Rob Jongman	Director, Alterra Consultancy
Manon Kaandorp	Project Officer, Large Herbivore Network
Hans Kampf	Director, Large Herbivore Network (retd)
Ctibor Kocman	European Commission, DG Env, B3
Cyril Kormos	Vice President Policy, WILD Foundation
Zdenka Krenova	Dept of Biodiversity Research, University of South Bohemia
Loek Kuiters	Alterra, Centre for Ecosystem Studies
Zoltan Kun	Director, PANParks Foundation
Kari Lahti	Senior Advisor, Metsahallitus, Finland
Stefan Leiner	Head of Department, EC Natura 2000 network, DG Environment
Harvey Locke	Strategic Advisor, WILD, Canada
Jeffrey McNeely	Chief Scientist (retd), IUCN Global

Gernant Magnin	Leader, Ecological Networks Programme WWF Netherlands
Vance Martin	Chair, IUCN Wilderness Task Force
Wolfgang Mattes	Environment Agency, Austria
Erich Mayrhofer	Director, Kalkalpen National Park, Austria
Ladislav Miko	Former Director Natural Environment, European Commission, Deputy Director-General SANCO, EC
Federico Minozzi	European PO, Europarc Federation
Patrick Nuvelstijn	European Coordinator, Natuurmonumenten
Olli Ojala	Finnish Environment Institute. Former European Commission DG EnvB3
Feiko Prins	Former European Coordinator, Natuurmonumenten
Carol Ritchie	Director, Europarc Federation
Trevor Sandwith	Director, Global Protected Areas Programme, IUCN
Ernst Schulte	European Commission, Head of Forest Sector, AFS, B1
Frans Schepers	Managing Director, Rewilding Europe
Pirkko Siikamaki	Natural Heritage Services, Metsahallitus
Erika Stanciu	Former President, Europarc Federation.WWF DCP
Magnus Sylven	International consultant, former Director WWF Europe & Middle East
Graham Tucker	Head of Biodiversity Programme, Institute of European Environmental Policy
Daniel Vallauri	WWF France
Vladivoj Vancura	Conservation Manager, PANParks Foundation
Per Wallsten	Director, Tyresta National Park, Sweden
Tony Whitbread	Royal Society of Wildlife Trusts (UK)
Staffan Widstrand	Managing Director, Wild Wonders of Europe
Sebastian Winkler	Former Coordinator, Countdown 2010
Michael Zika	Nature Conservation Dept, WWF Austria

For further information, please contact:

Toby Aykroyd (Editor) tobyaykroyd@wildeurope.org

Erika Stanciu (WWG Coordinator) erikastanciu@wildeurope.org