

# Completing the System: Opportunities and Challenges for a National Habitat Conservation System

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*The United States has achieved significant conservation goals to date, but the loss of biodiversity and ecosystem processes is accelerating. We evaluate opportunities and challenges to conserving our biodiversity by completing a national habitat conservation system, which could stem losses of natural resources and ecosystem services and proactively prepare for climate-change impacts. Lessons learned from two international conservation systems and the infrastructure of national bird conservation partnerships provide examples for completing a national habitat conservation system. One option is to convene a national forum of interested public and private parties to undertake four key actions; develop a common conservation vision and set measureable goals, complete a conservation assessment, use an adaptive management framework to monitor progress toward this vision, and implement strategies to complete a national habitat conservation system. Completing a national habitat conservation system is key to meeting the challenges of conserving habitats and biodiversity of the United States.*

**Keywords:** national habitat conservation system, conservation planning, biodiversity, conservation areas, public-private partnerships

**T**he United States has created a valuable foundation of conservation areas: terrestrial, freshwater, and marine. We define conservation areas as lands having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a natural state within which natural disturbance events may be allowed to proceed without interference and/or be mimicked through management (Dudley 2008, GAP 1 and 2 status defined by USGS-GAP 2012). Because citizens of the United States value these conservation areas and their inherent biodiversity (i.e., diversity of native species and all their associated processes, including structural, compositional, and functional), numerous laws, policies, and programs have been developed to ensure their stewardship and long-term persistence. Land trusts, for example, can partner with landowners to place conservation easements on private properties; a state wildlife agency can secure new wildlife management areas; a US federal land management agency can provide incentives to willing landowners to protect and restore wetlands, grasslands, and forests; and the US Congress can designate new national parks and wilderness

areas. Despite these laws, policies, and programs, the long-term trends in increasing numbers of endangered species, species and ecosystems expected to be affected by climate change, habitat loss, and current and anticipated trends in land and water use represent significant ongoing threats to our nation's natural heritage (Lawler et al. 2014). Developing a national conservation vision of a systematic, comprehensive, and resilient habitat conservation system is the single most important action we can undertake as a nation to conserve our natural heritage.

As a result of conservation activities by a variety of public and private players, a *de facto* collection of conservation areas of lands and waters already exists in the United States (USGS-GAP 2012). This collection was assembled over decades in an *ad hoc* manner for many reasons including scenic, recreation, biological, and cultural values. Still, our conservation area portfolio is not representative of or adequate to protect the environmental, ecological, or species diversity of the terrestrial, freshwater, and marine realms of United States and the ecosystem services they provide (Sowa et al. 2007, Aycrigg et al. 2013, Jenkins et al. 2015).

Current and previous conservation efforts were often not implemented at sufficiently large scales to provide for long-term persistence of many species and the ecological processes that support them. Many natural resource agencies and conservation organizations work within their own jurisdictions to advance conservation, but these efforts are not always as coordinated, efficient, or synergistic as they could be. Lessons learned from conservation planning tell us that such a diffuse and uncoordinated approach results in a system lacking a unified vision for comprehensive conservation (Groves et al. 2002). Even though conservation efforts to date have been successful in establishing conservation areas, limited conservation dollars continue to be spent in conservation planning and action by conservation organizations and agencies at all levels of government without guidance from a bigger picture that looks beyond any one institution's mission or geopolitical jurisdiction. A step in the direction of more comprehensive conservation would be to develop a cohesive and comprehensive strategy for building on past achievements and completing a national habitat conservation system for conserving our country's natural heritage.

We examine the historic precedent for a national habitat conservation system in the United States, articulate the current status of a *de facto* collection of conservation areas, explain the reasons for acting now, present three models that provide lessons for developing this system, and identify four key actions to complete a national habitat conservation system. Our intent is to start the conversation on this issue.

### An abbreviated history

The concept of a national habitat conservation system across the United States is not new. The Ecological Society of America in about 1917 prepared a list of all preserved and potential areas in North America "to urge the reservation of such important areas" (as cited in Shelford 1926). In 1946, the Ecologists Union was formed and dedicated itself to preserving important ecosystems that could remain unmanaged for the purposes of scientific study. In 1951, this group was incorporated as The Nature Conservancy (TNC) to protect key private lands and advocate for representative protection of ecosystems (Brewer 2003). Dassmann (1972) advocated for a system of classifying natural regions of the world and their representation by national parks and reserves. Soulé and Terborgh (1999) proposed continental level conservation with large mega-reserves linked by corridors to facilitate natural flows and processes. Similar ideas followed, some looking to protect particular biological phenomenon (e.g., migration), others looking for representative protection of individual species or ecosystems (Scott et al. 1993), and still others arguing for a comprehensive system (e.g., Meretsky et al. 2012).

In the last decade, state and federal agencies as well as nongovernmental organizations have sought to develop more comprehensive and cohesive conservation plans and strategies that transcend geopolitical boundaries. The first attempt at a comprehensive vision for habitat conservation

in the United States was conducted by TNC, which used ecoregional assessments to identify a network of lands and waters to conserve biodiversity (Groves et al. 2002). More recently state wildlife agencies developed State Wildlife Action Plans (SWAPs) in each state, identifying areas as important for species of greatest conservation need (i.e., SGCN) and for wildlife habitat. Although some hoped that SWAPs could be the basis for a national system of conservation areas, each state's individualized goals and plans do not yet add up to a cohesive national strategy (Meretsky et al. 2012). Landscape Conservation Cooperatives (LCCs), facilitated by the US Fish and Wildlife Service, are building on SWAPs by developing regional conservation blueprints (i.e., landscape conservation designs), such as the South Atlantic Conservation Blueprint, which are based on the input of hundreds of stakeholders from the public, non-governmental organizations, and private entities. Similar to states, federal agencies are considering their conservation strategies and actions in the context of larger land- and seascapes. Advisory groups to the National Park Service have outlined a vision in the context of larger landscapes (e.g., *21<sup>st</sup> Commission of the Park Service and Revisiting Leopold Report*), the Bureau of Land Management (USBLM) has begun addressing large landscape conservation through Rapid Ecological Assessments (REAs), the US Fish and Wildlife Service (USFWS) has outlined a broader landscape approach to planning for current and future National Wildlife Refuges (USFWS 2013), and the US Forest Service is addressing biodiversity and ecosystem services by requiring land planners to consider conditions beyond national forest boundaries. The Department of Interior (USDOI) and others coordinate the LCCs, which are intended to provide a collaborative framework for establishing shared goals and objectives and delivery of scientific information to support conservation planning and actions across multiple jurisdictions through partnerships at the landscape scale (Academies 2016, LCCN 2015). These collective efforts demonstrate that natural resource professionals are moving toward strategically restoring and/or expanding the system of conservation lands and waters within the context of land- and seascape conservation, but their efforts would be measurably improved by creating country-level goals that would ensure that each of these efforts contribute to an efficient national habitat system of conservation lands and waters.

### Conservation of lands and waters in the United States today

On the basis of our definition of *conservation areas* as land having permanent protection from conversion of natural land cover and a mandated management plan in place to maintain a natural state, there are approximately 129 million hectares of land in conservation areas in the United States, which constitute 13.3% of the total land area (table 1 and figure 1; Dudley 2008, GAP 1 and 2 status defined by USGS-GAP 2012). As significant as these conservation areas are in the United States, they fall short of meeting the

**Table 1. Area (in hectares) and percent area of conservation areas in the United States, including Alaska, Hawaii, Puerto Rico, Virgin Islands, and US Territories.**

Category	Conservation areas		Total	
	Area (in hectares)	Percent of total	Area	Percent of overall total
Public lands	122,037,009	34.8	350,926,270	36.2
Other	274,081	0.8	42,120,557	4.3
Territorial	4,967,571	96.4	5,155,846	0.5
Private conserved	1,732,608	16.0	10,802,899	1.1
Private unconserved	0	0.0	559,850,491	57.8
Overall total	129,011,269	13.3	968,856,063	100.0

*Note:* Conservation areas are defined as lands and waters designated as GAP status 1 or 2 (USGS-GAP 2012). The waters included are associated with a coast or island and do not include solely oceanic areas. *Public lands* include federal and state land management agencies and local government, such as county and city lands. The category *Other* includes regional agency and jointly managed lands. We did not include any Native American lands set aside for conservation because no coherent data set yet exists for such lands. *Private conserved* includes lands with conservation easements and lands owned by nonprofit groups (e.g., The Nature Conservancy). *Private unconserved* includes all other lands within the United States. Percentages are of the totals within the rows and percent total is of the overall total within the last column. See figure 1 for spatial distribution of these conservation areas. Based on Protected Areas Database of the United States (PAD-US version 1.3; USGS-GAP 2012), which includes data from the National Conservation Easement Database (NCED).

recommended policy goal of each nation having established by 2020 an “ecologically representative and well-connected system of protected areas” that covers the terrestrial land base (CBD 2010).

A recent assessment of terrestrial ecosystem diversity estimated that approximately 30,000 individual land parcels exist within the US system of conservation areas; these conservation areas range from private conservation easements to publicly managed National Parks and Wilderness Areas and range in size from 25 ha to 2,500,000 ha (table 2; Aycrigg et al. 2013). However, these areas are not representative of the nation’s total natural diversity because only about two-thirds of the 518 terrestrial ecosystems are conserved at the proposed policy goals for adequate representation within the existing system of conservation areas (Aycrigg et al. 2013). Many conservation areas are simply too small and isolated to allow for long-term persistence of biodiversity or ecological processes. Most conservation areas were not established with connectivity as a criterion and the isolation of many conservation areas suggests that they fall short of being “well connected.”

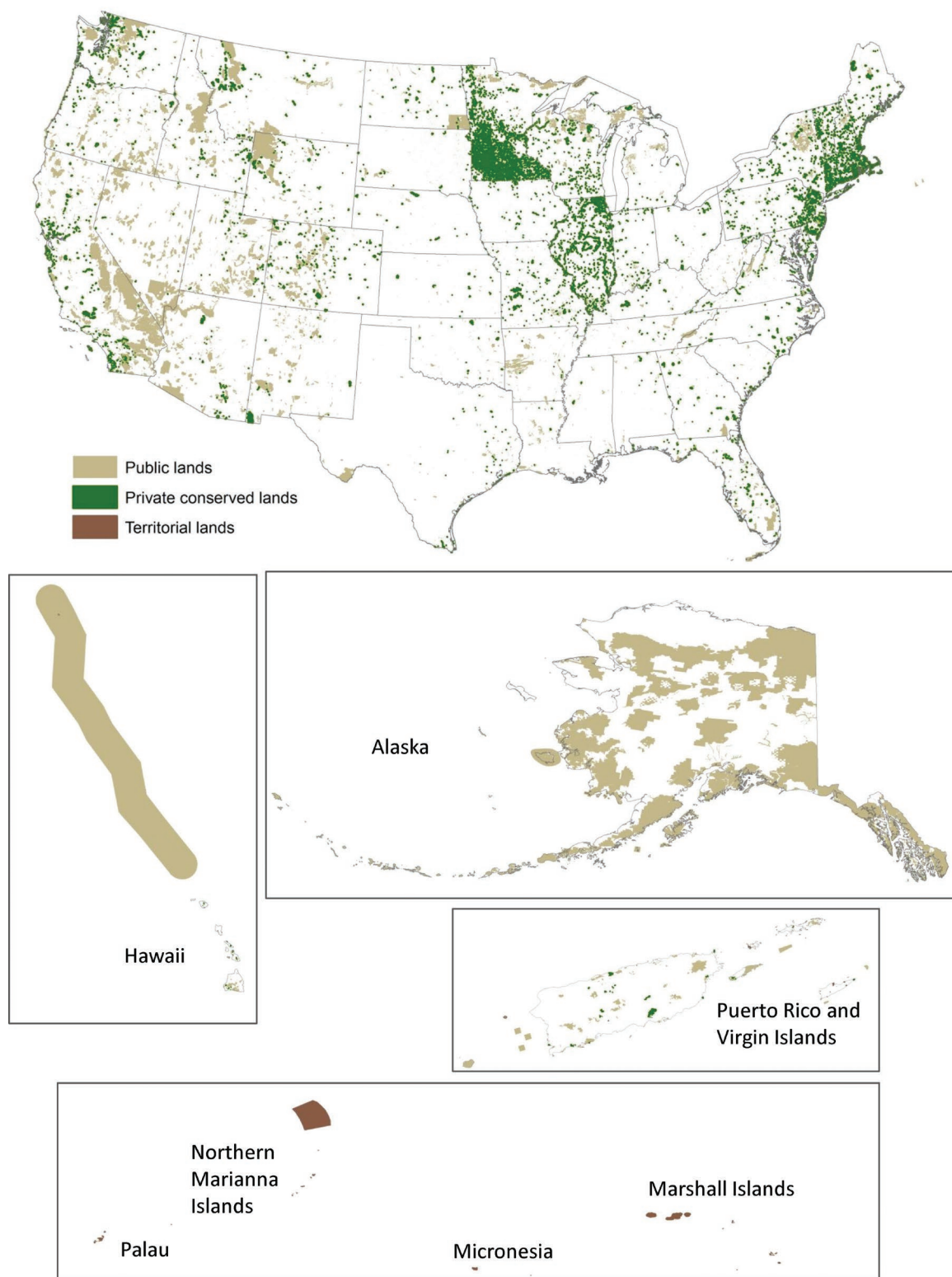
Although terrestrial conservation areas afford some degree of conservation to freshwater ecosystems, comprehensive analyses that identify gaps in conservation for freshwater environments, ecosystems, or species are not as well developed, even though freshwater biota are arguably the most endangered group in the United States (USFWS 2014; see also Fremier et al. 2015). Somewhat more conservation planning has occurred in the marine realm. For example, approximately 41% of US marine waters (within 200 nautical miles of the coast) have some sort of defined resource-management plan, including open ocean, estuaries, coastal areas, intertidal zones, and the Great Lakes. Most areas allow multiple uses, with less than 3% of all US waters being in no-take zones that are defined in a manner consistent with how we have defined terrestrial conservation areas (NOAA 2010). From a policy perspective, the internationally recognized

marine conservation goal for each nation is currently 10% (CBD 2010).

### Why act now?

The conversion of natural landscapes will continue with little regard to the long-term consequences of their loss. Furthermore, climate-change models forecast major ecological effects as current species climate envelopes rapidly change location, disappear, or novel ones appear (Hobbs et al. 2013). With monumental ecological change forecasted for the decades ahead, society can either plan to conserve biodiversity or risk losing species through extinction. Without a more systematic, collaborative, and scientifically driven approach to establishing and managing a system of conservation lands and waters, our current *ad hoc* system will remain insufficient because it lacks the representation, resilience, and redundancy needed to maintain the biological diversity of the United States and the ecological processes that support this diversity (Shaffer and Stein 2000). Despite current conservation efforts in the United States and globally, both habitat and biodiversity continue to be lost at an unprecedented rate (CBD Secretariat 2010). Ecosystem processes and services are also being compromised, providing further harm to nature and humanity (CBD Secretariat 2010, Palomo et al. 2014).

The impacts of climate change are predicted to exacerbate habitat changes and the loss of biodiversity worldwide. Changes in species distributions and alteration of ecosystem function consistent with climate change are already being documented (Parmesan 2006, Hilty et al. 2012). Some of the most important recommendations during this time of rapid global change include ensuring representative and redundant habitat conservation, creating larger conservation areas where possible, restoring and maintaining connectivity, and reducing the effects of other stressors (WHPRP 2010, NFWPCAP 2012, Belote et al. 2016). Increased communication and the establishment



**Figure 1.** Conservation areas within the United States, including Alaska, Hawaii, Puerto Rico, Virgin Islands, and US Territories. Conservation areas are defined as lands and waters designated as GAP status 1 or 2 (USGS-GAP 2012). The waters included are associated with a coast or island and do not include solely oceanic areas. Public lands include federal and state land-management agencies and local government, such as county and city lands. Private conserved lands include land with conservation easements and lands owned by nonprofit groups (e.g., The Nature Conservancy). Territorial lands include conservation areas within all US Territories. Based on Protected Areas Database of the United States (PAD-US version 1.3; USGS-GAP 2012), which includes the National Conservation Easement Database (NCED).



**Table 2. Area (in hectares) and percent area of public and private conservation areas in the United States, including Alaska, Hawaii, Puerto Rico, Virgin Islands, and US Territories by management agency or conservation group.**

Category	Conservation areas		Total	
	Hectares	Percentage within group	Hectares	Percentage within group
Public lands	122,037,009	100.0	350,926,270	100.0
Federal	109,678,303	89.9	272,945,000	77.8
Bureau of Indian Affairs	0	0.0	3,717	0.0
Bureau of Land Management	14,145,414	12.9	107,936,234	39.5
Department of Defense	175,185	0.2	10,589,194	3.9
National Oceanic and Atmospheric Administration	31,219	0.0	31,246	0.0
National Park Service	30,654,601	27.9	32,058,139	11.7
Other federal	339,877	0.3	2,359,965	0.9
US Forest Service	24,324,680	22.2	79,906,045	29.3
US Fish and Wildlife Service	40,007,327	36.5	40,060,460	14.7
State	11,970,307	9.8	76,318,636	21.7
Local government	388,399	0.3	1,662,634	0.5
Private conserved	1,732,608	100.0	10,802,899	100.0
Private	762,543	44.0	9,360,290	86.7
Nongovernmental organization	970,065	56.0	1,442,609	13.3
Overall total	123,769,617		361,729,169	

*Note:* Conservation areas are defined as lands and waters designated as GAP status 1 or 2 (USGS-GAP 2012). The waters included are associated with a coast or island and do not include solely oceanic areas. *Other federal* includes Bureau of Reclamation. *State lands* include land managed by state natural resource agencies. Local government includes county and city lands. Percentages are calculated within categories. For example, the National Park Service is 27.9% of the Federal lands whereas Federal lands are 89.9% of public lands. The Department of Defense lands included in conservation areas (0.2%) are owned by the Department of Defense but are managed by other agencies, such as the US Fish and Wildlife Service and the National Park Service. We excluded lands owned or managed by Native American groups, Territorial governments, and other regional groups. Based on Protected Areas Database of the United States (PAD-US version 1.3; USGS-GAP 2012), which includes data from the National Conservation Easement Database (NCED).

of national goals and objectives for conserving biodiversity that inform local decisionmaking would enhance the likelihood of implementing these climate adaptation recommendations and achieving conservation outcomes that could mitigate the anticipated negative impacts of climate change.

Finally, a national habitat conservation system could contribute to sustainable economic development and improved social well-being. Conservation areas, whether public or private, often benefit nearby communities financially (Hannum et al. 2012, Headwaters Economic 2013). In addition, recreation and wildlife watching, much of which occurs in conservation areas, can generate significant income to communities and states. For example, during 2011, 38% of wildlife-related recreation was wildlife watching, and participants spent \$54.9 billion dollars (USFWS and USCB et al. 2014). Furthermore, \$646 billion dollars is spent annually in the United States on outdoor recreation activities, a significant portion of which occurs within conservation areas (OIA 2012). Conversely, poorly planned development costs society both financially and in overall health. Rural sprawl—the number-one source of land conversion in the United States and the most typical type of development around conservation areas—generally costs society money in the long term and once converted is unlikely to change

(Ando et al. 1998, Hamilton et al. 2015, Martinuzzi et al. 2015). In addition to financial benefits, access to nature, such as through a completed national habitat conservation system, could increase the health and well-being of society (e.g., Palomo et al. 2014).

### Models of habitat conservation systems

Several multicountry, national, subnational, or regional examples could serve as models and provide lessons for completing a national habitat conservation system. We highlight three: (1) the North American Bird Conservation Initiative (NABCI); (2) Natura 2000, a multicountry initiative of the European Union (EU); and (3) the National Reserve System of Australia.

**North American Bird Conservation Initiative (NABCI).** Although not specifically a conservation area system, NABCI coordinates efforts among partner agencies and initiatives to focus on bird population and habitat conservation by using birds as indicators (e.g., NABCI 2011). NABCI partners created a set of strategic conservation plans with biological and habitat objectives, established focal areas to prioritize land conservation, and increasingly incorporated the human dimensions and economic impacts of conservation to develop a comprehensive approach to conservation.

The oldest and most successful of these plans is the North American Waterfowl Management Plan (NAWMP), which since 1986 has guided the protection and restoration of over 6.3 million hectares of wetlands and associated habitat through expenditures of over \$4 billion in Mexico, Canada, and the United States (NAWMP 2012). A crucial component to the success of the NAWMP was the passage of the North American Wetland Conservation Act in 1989 and the creation of a dedicated mechanism for implementing the NAWMP and other bird conservation plans through Joint Ventures (JVs)—“collaborative, regional partnership of government agencies, nonprofit organizations, corporations, tribes, and individuals that conserve habitat for priority bird species, other wildlife, and people” (USFWS 2014). There are now 18 habitat-based JVs and three species-specific JV Partnerships in the United States. JV actions include planning, habitat design and prioritization, project development and implementation, monitoring and evaluation, research, communications, education, and funding support for projects and activities.

The strengths of NABCI include (a) successful public-private partnerships with engagement from all US federal and state land management agencies and (b) strategies for the protection and restoration of all wetland and terrestrial habitats. The weaknesses of NABCI include (a) inconsistent participation by specific partners and (b) the lack of a dedicated funding source to implement many agreed-on conservation strategies.

**Natura 2000.** Probably the most developed and formalized habitat conservation system in the world is Natura 2000, an initiative to conserve the most valuable species and habitats in Europe through coordinated efforts of EU members. Over 27,000 Natura 2000 sites (figure 2) are spread across 28 countries, representing approximately 110 million hectares (18%) of the EU (EU 2016). These sites are not a network of strict nature reserves with limitations on human activities but instead span the range of protected-area types as defined by IUCN’s World Commission on Protected Areas (Dudley 2008).

The EU works closely with members in overseeing the establishment and implementation of the Natura 2000 network and provides considerable guidance on the management of these sites. Considerable analyses and evaluations of Natura 2000 have been conducted and the results offer important lessons learned for establishing a national habitat conservation system in the United States (Crofts 2014, Kati et al. 2015, Maiorano et al. 2015). The success of the network can be attributed to (a) a political willingness and an underlying legal framework by EU member states to implement a protected-area scheme across geopolitical boundaries, (b) the use of a common biogeographic framework and species or habitat classification systems to help ensure representation, and (c) the strong contributions of nongovernmental organizations to the designation and management of Natura sites. The principal weaknesses of Natura 2000 have been (a) a top-down approach that has failed to adequately engage local stakeholders; (b) inadequate consideration of managing

Natura sites at landscape and seascape levels, including the consideration of connectivity among the sites; and (c) a weak implementation mechanism to help ensure the long-term management and integrity of Natura 2000 sites.

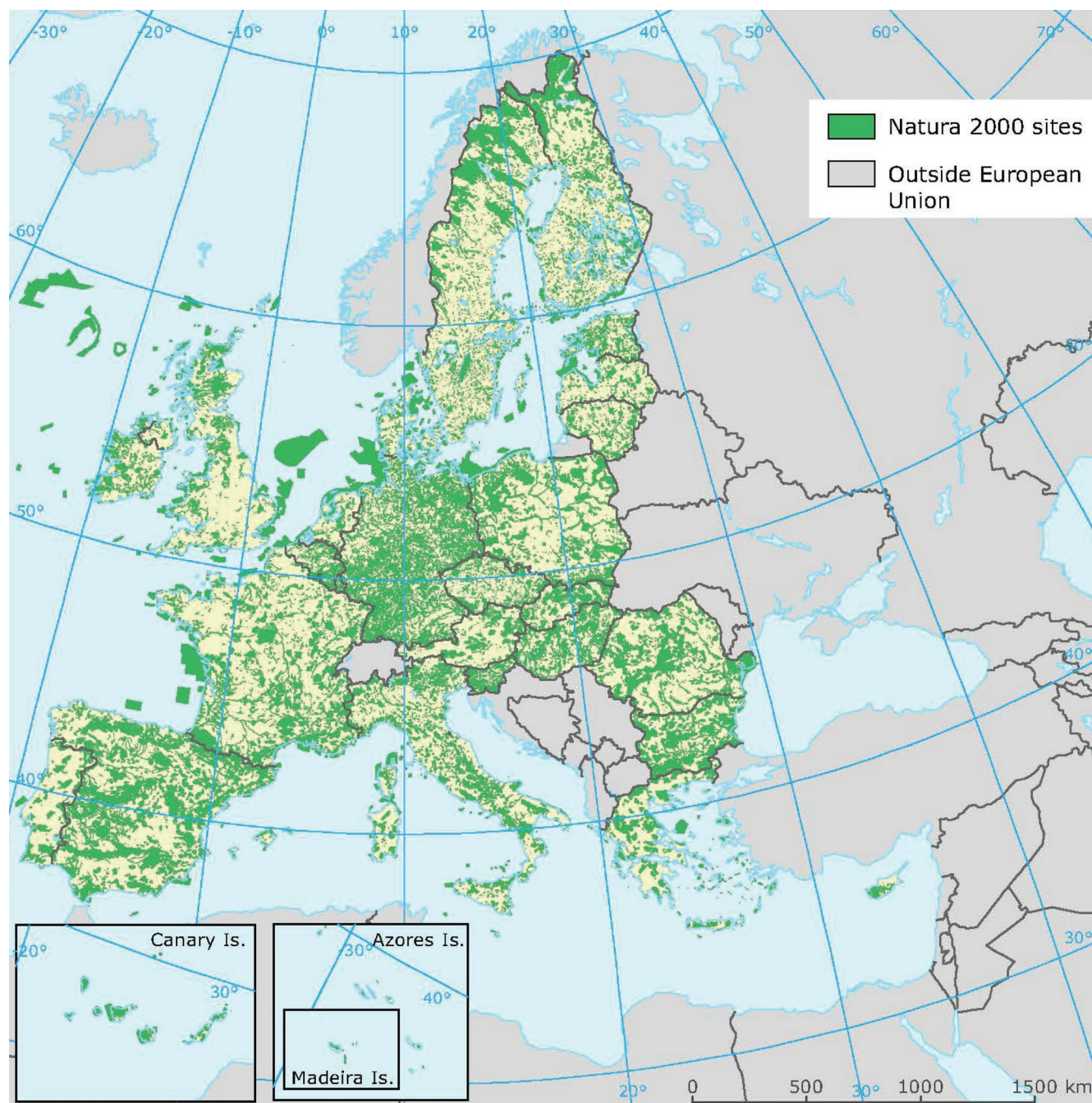
**Australia’s National Reserve System.** The National Reserve System (NRS), which is Australia’s network of habitat conservation areas, covers 12.7 million hectares (16%) of the country and includes over 10,000 protected areas (Australia Department of the Environment 2013). There numerous strengths of the NRS. First all of Australia’s 89 bioregions have some representation in the network of federal, state, indigenous, nonprofit, and private lands and increased commitment to the NRS during 2009–2013, which substantially increased representation. Second, there are specific guidelines for the inclusion, management, and monitoring of these protected areas. Third, all Australian state governments have agreed to minimum standards concerning each protected area, including protection in perpetuity; contributing to a comprehensive, adequate, and representative network that, if appropriately implemented, could lead to Australia meeting its international protected-area obligations under the Convention on Biological Diversity; and managing for biodiversity conservation.

Despite these strengths of the NRS, there are key areas for improvement and lessons for establishing systems of conservation areas elsewhere, including the United States. The most important recommendations for improving the system include (a) forging new partnerships with state, territory, and nongovernmental organizations to expand the system; (b) placing a greater emphasis on landscape and seascape approaches, with particular attention to conservation covenants on private land; and (c) improving the coordination of terrestrial and marine conservation planning so that the entire NRS better meets its goals of representation, comprehensiveness, and adequacy (Taylor et al. 2014).

The Natura 2000 and Australian National Reserve examples are valuable because they are establishing new conservation areas for all elements of biodiversity consistent with and supportive of global conservation efforts to broaden the protected-area network. In addition, many lessons are being learned for improving the effective implementation of these systems. Although NABCI and JVs have been focused by definition only on bird conservation, the successful collaborative public-private partnerships provide a modern example of how to work across diverse partners. The combination of the lessons learned from Natura 2000 and Australia’s National Reserve System with the successful partnerships of NABCI and JVs provide strong examples of how to pursue completion of the national habitat conservation system for the United States.

#### **Four key actions the United States could take now to complete the national habitat conservation system**

Effective conservation of America’s natural heritage in the 21<sup>st</sup> century requires an unprecedented level of cooperation



**Figure 2.** Natura 2000 sites across the European Union make up a network of habitat conservation areas including Special Areas of Conservation and Special Protection Areas (EEA 2014).

and partnerships across a broad conservation community and geopolitical boundaries. To achieve this level of cooperation and partnership we propose convening a national forum of interested parties that would exist for as long as needed to undertake the four key actions described below. This forum would include conservation scientists (ecological, social, economic), species and ecosystem experts, natural resource managers, and policymakers from federal, state, local and tribal government agencies, nongovernmental

conservation organizations, academic institutions, and the private sector.

The four key actions are the following: (1) develop a common vision for a national habitat conservation system and establish a set of measurable conservation goals, (2) complete a comprehensive assessment of the natural heritage of the United States and evaluate the extent to which the current conservation estate meets the common vision and the set of measurable conservation goals, (3) set



standards and use an adaptive management framework for periodically monitoring progress toward achieving the common vision and set of measurable conservation goals, and (4) implement a broad set of strategies to complete the national habitat conservation system.

The first key action is to develop a vision for a national habitat conservation system and establish measurable goals for achieving this vision. This action should include not only biodiversity but also the ecological and evolutionary processes that underpin the biodiversity and the ecosystem services on which people depend. These processes occur on a variety of lands, including working landscapes where conservation of biodiversity is a management objective. To achieve this action, the forum participants would evaluate the state of conservation science, such as setting ecological thresholds and deciding what needs to be conserved by system type, including metrics for representation, resilience, and redundancy. These measurable goals may pertain to particular environmental features, ecosystems, species, ecosystem processes, and ecosystem services across terrestrial, freshwater, coastal, and marine realms. The forum participants could consider current and future threats to conservation—including climate change, for which we need to ensure adaptive capacity (IPCC 2014). Drawing on experiences from NABCI, Natura 2000, and Australia's National Reserve System and other successful programs would be invaluable.

The second key action is to complete a comprehensive conservation assessment of the United States that would evaluate the extent to which current conservation lands and waters meet the conservation goals established in the first key action (Scott et al. 1993, Sowa et al. 2007, Aycrigg et al. 2013, Jenkins et al. 2015). To determine a best course of action in a changing world, the conservation assessment would provide a complete understanding of habitats and species that are adequately conserved and those that are threatened. The results would point to gaps in the current conservation of lands and waters and help determine priorities for action to fill these gaps. We recognize that this key action will take time and that the forum participants may request assistance from additional experts.

The third key action is to use the results of the conservation assessment to set standards and use an adaptive management framework for periodically monitoring progress toward achieving the national goals (e.g., a scorecard). There will be many challenges to achieving set goals, but the forum participants could draw from national and international examples such as the Open Standards for the Practice of Conservation, the USDO's mitigation policies and practices, and IUCN's *Protected Planet Report* (CMP 2013, Clement et al. 2014, Juffe-Bignoli et al. 2014).

The fourth key action is implementation, which involves filling the gaps in the current conservation network through a broad suite of conservation strategies and actions by a wide range of public and private entities operating across multiple spatial scales. Because many federal and state agencies manage conservation lands (i.e., both current and

potential) and work with private land owners, implementation will require an unprecedented level of coordination and a clear conservation mandate between and among these agencies, organizations, and private entities. Collaboration among the northeastern US state fish and wildlife agencies in implementing State Wildlife Action Plans is an excellent example of the coordination and cooperation needed to help implement a national vision at a regional scale (Terwilliger Consulting 2015). Filling important gaps could be accomplished through a variety of strategies that include but are not limited to adding to the existing habitat system. Strategies might also include mitigation policies and practices, such as those being proposed at a landscape-scale by the USDO (Clement et al. 2014).

It is likely that implementation of the national habitat conservation system also would require assessment and development of new conservation tools. For example, some priority habitats may fall under private ownership, therefore existing tools to work with private landowners need to be considered and new approaches, such as existing incentive programs may need to be expanded or, in some case, new ones developed. New policies may need to be considered as well. For example, the United States currently has no formal mechanisms to designate habitat connectivity zones or wildlife corridors across multiple jurisdictions (e.g., Lausche et al. 2013, Belote et al. 2016). A clear understanding of the array of existing tools is needed to evaluate the need for additional policy tools. Other new policy considerations might focus on the conservation of ecological processes and services. New incentives could also ensure effective collaborations across public and private jurisdictions as well as across terrestrial, freshwater, and marine environments to implement a complete habitat conservation system (Beever et al. 2014). Furthermore, completing this national habitat conservation system means exploring new integrative ideas, such as a social-ecological approach to conserving biodiversity, ecosystem services, and protected areas (Mace 2014, Palomo et al. 2014).

Existing transboundary state partnerships with federal entities as well as local collaborations would not only provide the intellectual and institutional foundation for completing the national habitat conservation system but would also be essential to its implementation. There will be the opportunity to build on the accomplishments of state and federal agencies (e.g., SWAPs, *21<sup>st</sup> Commission of the Park Service and Revisiting Leopold Report*), NABCI, JVs, LCCs, and other existing private-public conservation partnerships to inform and especially to increase the integrity, diversity, and completeness of the national habitat conservation system. Most importantly, implementation requires establishing priorities and aligning agencies and other organizations toward achieving the goal of completing a national habitat conservation system, which is bigger than any one entity could achieve.

This level of coordination and cooperation might best be handled by a formally established entity, such as a National



Conservation Committee (NCC) that would be charged with creating an implementation plan to be executed by a decentralized group of public and private entities. A precedence for a NCC was set back in 1908 when President Teddy Roosevelt convened a conference at the White House to consider the conservation of natural resources of the United States (Van Hise 1910). An NCC could coordinate among both new and existing national networks, such as the USDOJ Landscape Conservation Cooperatives and USDA Climate Hubs to encourage sharing tools and information (e.g., syntheses) with land managers and assist in successfully completing the national habitat conservation system. Furthermore, learning how Natura 2000 has been implemented by the EU across different countries and how the Australian federal government works with state governments and other groups on implementing the National Reserve System would prove insightful for a committee, such as an NCC. An umbrella organization, such as an NCC, could provide the leadership, facilitation, and coordination to help stitch together the planning, design, protection, and management of our most valuable conservation lands and waters.

## Conclusions

An enormous amount of conservation work, much of which benefits biodiversity, occurs every year in the United States. This work ranges from the local, state, and federal establishment and restoration of parks and conservation areas to land-trust actions and the institution and implementation of natural-resource policies. As impressive as all this work is, much of the funding and land protection often is not directed at habitats and species in greatest conservation need. In part, this is because most conservation programs have multiple objectives and habitat and biodiversity conservation are likely, at best, to be just some of those objectives. However, the lack of a comprehensive vision and strategy to integrate these efforts for achieving national as well as local conservation goals is a major impediment to ensuring that our individual efforts add up in the most effective manner to conserving our nation's natural heritage.

Whereas, habitat conservation efforts by local land trusts and governments have increased, the number of species listed and waiting to be listed on the Endangered Species Act (ESA) continues to rise. In the near future, that number could eventually skyrocket from the impacts of climate change, which could further overwhelm the ESA and its associated agency conservation efforts. The United States can rise to this challenge by completing a national habitat conservation system that would provide the best chance to proactively conserve the rich diversity of our natural heritage.

The future of habitat and biodiversity conservation will rely on an unprecedented level of cooperation across private, local, state, tribal, and federal agency boundaries. It is clearer than ever that habitat and biodiversity conservation cannot rely on the isolated efforts of individual agencies and organizations as they have in the past (Hilty et al. 2012). Completing a national habitat conservation system will be

the key to proactively meeting the challenges of conserving the habitats and biodiversity of the United States as well as North America.

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