INTEGRATING LAND USE PLANNING & BIODIVERSITY

ACKNOWLEDGEMENTS

We wish to thank all of the participants in the workshop for their valuable contributions before, during and after the workshop. Mark Shaffer, senior vice president for program, Laura Watchman, vice president for habitat conservation, and Sara Vickerman, director west coast office of Defenders of Wildlife provided guidance in the creation of the workshop and this report. Tim Mealey, senior partner at Meridian Institute served as an effective facilitator at the workshop. Chuck Huckelberry, Pima County Administrator, and Sharon McGregor, Massachusetts Executive Office of Environmental Affairs, both gave excellent overview presentations of their planning projects at the workshop. Marc Bonta, Lisa Hummon, Inga Sedlovsky, and Chapman Stewart of Defenders of Wildlife helped with logistics for the workshop. Kathie Cowell and Mitzi Wallace at the Aspen Wye River Conference Center were extremely helpful in arranging the workshop. Maeveen Behan, Pima County, Arizona, and Jessica Patalano, Massachusetts Natural Heritage Program, provided map graphics for the report. The authors especially wish to acknowledge Kassandra Stirling, media production specialist with Defenders' west coast office for bringing the final report together. Any errors or misrepresentations of the various planning efforts described here are ultimately the fault of the authors.

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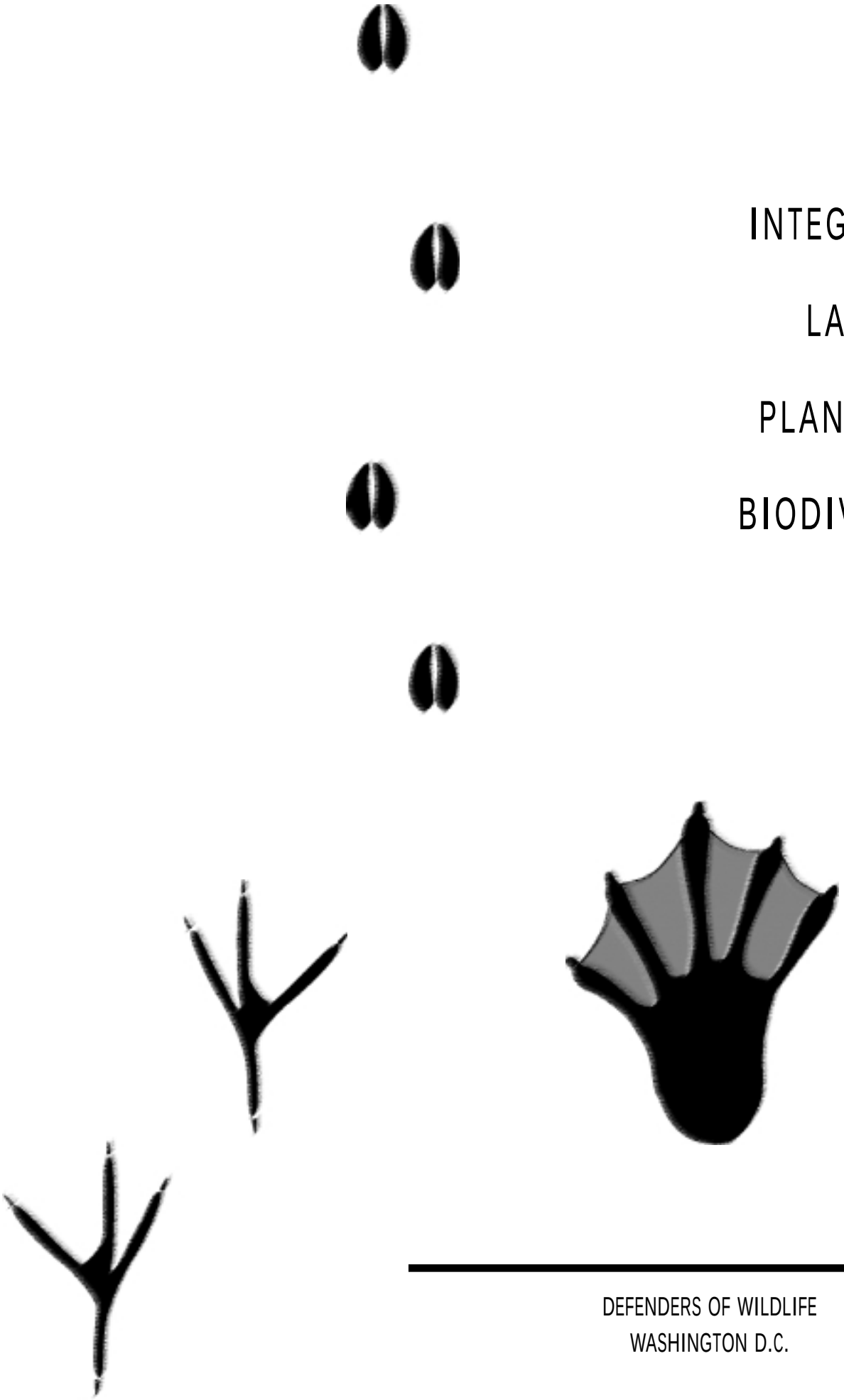

DEFENDERS OF WILDLIFE
WASHINGTON D.C.

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EXECUTIVE SUMMARY

Sprawl now has such a large and permanent impact on every aspect of the landscape that to achieve their goals for wildlife and ecosystem protection, conservationists must become involved in land use planning. Development is encroaching on parks and protected areas. For every new acre protected, many more are lost to poorly planned development. The Natural Resources Inventory estimates that in the United States, 2.2 million acres are now being converted to development each year. Roads have an ecological impact on an estimated 20 percent of the U.S. landscape. Of the 6,700 species in the U.S. considered at risk of extinction, 85 percent suffer primarily from habitat loss. Although federal wildlife agencies list only approximately 1,300 of these species under the Endangered Species Act, implementing the act remains controversial. If such ecological problems are to be solved, conservationists and land use planners must work together. Yet how can the planning community make use of the vast quantity of available conservation information and the tools of their trade to improve the prospects for the preservation of biodiversity?

Land use planning occurs at many different scales across the country. At its best, it is progressive, democratic, timely and responsive to change. When it works, communities thrive and enjoy a high quality of life. When land use planning fails, communities struggle for years with the consequences. Many planners understand the importance of the natural environment to their communities' quality of life, and realize that their decisions can affect human society and wildlife habitats far into the future. Despite this understanding and land use planning's influence on the landscape, conservationists have traditionally made little use of the local planning process in working toward biodiversity protection.

With funding from the Doris Duke Charitable Foundation, Defenders of Wildlife brought together land use planners and conservationists from around the country at a workshop held in the spring of 2002. The workshop's goal was to begin a national dialogue about the integration of biodiversity and land use planning. This report attempts to summarize that discussion and draw attention to the numerous fledgling efforts at conservation planning currently underway in communities throughout the country.

The workshop emphasized large-scale conservation planning: the networks of conservation lands that are being planned at state and regional levels across the country. Ideally, this approach will help preserve the country's rich biodiversity by protecting its most viable habitats and species populations. This strategy represents current theories on the application of conservation biology principles to wildlife preservation, and is conservation biologists' recommendation for curtailing loss of habitat

and biodiversity. Workshop organizers felt it was crucial to understand how local land use planners view such plans.

Among the messages repeated at the workshop was that existing land use planning tools can be used to protect biodiversity. The conservation plans presented at the workshop showed how a variety of incentive-based programs and regulations can be applied locally to protect biodiversity. These presentations also indicated that planners can and do make efforts to assemble networks of conservation lands but that land acquisition — by conservation organizations and/or federal agencies — is not the only solution to protecting lands of conservation value.

The lack of political will among community leaders can, however, hamper planners' efforts to use conservation information or make creative use of planning tools. Developing political support for biodiversity protection may be one of the more significant hurdles for large-scale conservation planning efforts to overcome. Planners are not the only people with whom conservationists need to communicate effectively. Members of local planning boards and commissions are tremendously influential, and must be educated and kept informed about conservation issues.

Planners at the workshop were quick to point out that conservation planning exercises cannot take place in isolation. Property owners, government agencies and special interest groups will all want to be involved in making decisions that affect land use. For years, the conservation community has discussed the need to include partnerships and multiple stakeholders in their projects. This is especially true in the local land use planning process, particularly in urban areas with large, diverse populations. A conservation plan can only succeed when a community understands and accepts the plan's methodology, goals and results.

Large-scale conservation plans work best when used as guidelines and should not be confused with specific, prescriptive land use plans. Large-scale conservation plans can be used to steer development away from ecologically significant areas, but this also requires many more detailed site-specific decisions than such large-scale plans provide. To ensure that they satisfy local needs for open space, large-scale conservation plans may have to be modified.

Land use planning can determine how — or even if — the country's urban areas expand, how they affect the surrounding landscape, and health of our environment. The workshop discussion indicates that biodiversity conservation and large-scale conservation plans can be effectively incorporated into the land use planning process.

INTRODUCTION

Defenders of Wildlife has long been a leader in the conservation of wolves and other endangered species. While Defenders takes great pride in that work, the organization's mission is to protect all native wildlife in its natural habitat and to secure biodiversity throughout the country, not only in places with large expanses of protected land and populations of large predators. As communities grow and their borders expand, Defenders' mission has led the organization to examine the land use planning process and its effect on wildlife outside of parks, preserves and refuges.

Biodiversity has been defined as "the variety of living organisms, the genetic differences among them, the communities and ecosystems in which they occur, and the ecological and evolutionary processes that keep them functioning, yet ever changing and adapting" (Noss and Cooperrider 1994). That diversity is essential to the biological processes that sustain life. The quality of the air we breathe, the water we drink, the soil we cultivate, the plants and animals we depend on for food and fiber, and the landscape we enjoy for recreation — the fundamentals of our civilization, economy, and health all depend on biodiversity.

Habitat loss is now the most significant threat to biodiversity. As many other reports and scientific papers have shown, the loss, degradation and alteration of habitat are the primary factors responsible for the worldwide decline in numbers of wild animals and plants. While many people think habitat destruction and loss of biodiversity are problems confined to exceptionally species-rich areas like the tropics, they are very real problems here in the United States. Uncontrolled growth, often referred to as "sprawl", plagues communities across the country. It permanently fragments contiguous habitat into marginal pieces of land. Habitat loss and diminishing biodiversity may be the most urgent environmental problems we now face.

In December 2000, to help draw attention to the importance of biodiversity, problems caused by habitat loss, and the potential role of land use planning in solving the current conservation crisis, the Doris Duke Charitable Foundation awarded a grant to Defenders of Wildlife, NatureServe, the Environmental Law Institute and Island Press. The Duke Foundation asked the four groups, together known as the Consortium on Biodiversity and Land Use, to examine the interaction of biodiversity, habitat protection and land use planning in a program of research, publishing, and public outreach. To investigate the vital role conservation planning can play in connecting land use planning and biodiversity preservation, and as part of work funded by the Duke Foundation grant, Defenders of Wildlife sponsored a two-day workshop at the Wye River Conference Center in Queenstown, Maryland from February 28 to March 1, 2002. The workshop brought together over three dozen

state and local land use planners, government officials, and representatives of conservation organizations from around the country, who are all involved in innovative efforts to integrate biodiversity and land use planning at the state, regional and/or local level. This report describes their discussions and the broad range of views expressed at the workshop.

One of the goals of the workshop and this report is to help promote comprehensive conservation planning by stimulating interest in ecosystem-based land use plans designed to facilitate environmental restoration, protect and conserve wildlife habitat and other natural resources. Workshop participants agreed that conservation planning presents an opportunity to make the United States' approach to conservation more proactive. Given the importance of preserving natural habitats and biodiversity, the information and insights gathered at the workshop will be relevant to communities throughout the country.

BIODIVERSITY AT RISK

The world is now in the midst of an extinction crisis. Many species have been driven to the brink of extinction or beyond, and we are in danger of losing much of the biodiversity that has made our quality of life possible. According to The Nature Conservancy and NatureServe, more than 6,700 animal and plant species in the United States are vulnerable to extinction (Stein et al. 2000). The federal Endangered Species Act currently lists only about 1,300 of those species as endangered or threatened. Losing these species could severely affect the diversity of life and the biological processes on which all living things, including humans, depend.

Populations of some species protected by the Endangered Species Act are rising, but many others are not. In 1996, the U.S. Fish and Wildlife Service reported to Congress that, despite protection under the Endangered Species Act and other laws, less than 40 percent of listed species are stable or improving. Nearly 30 percent of those listed in the early 1970s with the Act's inception continue to decline (U.S. Fish and Wildlife Service 1996).

Preventing extinction and preserving species' ecological roles requires protection of their natural habitats. The most significant threat to biodiversity now lies in the loss, degradation and fragmentation of the habitats animals and plants need to survive (Wilcove et al. 2000). According the Natural Resources Conservation Service's Natural Resources Inventory, an estimated 2.2 million acres of land are lost to development in the United States each year (Natural Resources Conservation Service 2000). The Department of the Interior reports that more than half the nation's wetlands have been filled since the American Revolution (Dahl 1990). In the Tucson area of Arizona alone, an estimated 6,400 acres of Sonoran Desert are now being converted to human use annually. A 1995 analysis by Defenders of Wildlife identified 69 ecosystems in the United States that had lost 85 percent or more of their acreage to development over the last three centuries (Noss and Peters 1995). Other studies indicate that only 42 percent of U.S. lands remain covered with natural vegetation (Bryer et al. 2000).
Parks and preserves help protect natural habitats, but they are scattered throughout the country with few natural landscape linkages between them. Most protected areas are also found at high elevations, or on biologically unproductive lands that tend to harbor fewer species than those at lower elevations (Scott et al. 2001). These low-elevation, biologically diverse areas are also attractive for development.

THE NEED FOR CONSERVATION PLANNING

The federal Endangered Species Act is the most powerful regulatory tool for protecting individual species and natural habitats in the United States. The Endangered Species Act prohibits taking, killing or otherwise harming species that have been officially listed as endangered or threatened, and calls for protection of habitat critical to their survival. But the Endangered Species Act has been used

to protect species only after their numbers have dropped to perilously low levels. Waiting until populations of the species reach the brink of extinction reduces their chances for successful recovery and such reactive, urgent rescue operations usually require intensive management and habitat restoration. This kind of last-minute regulatory action is also often extremely expensive and contentious.

Over the last decade, in an attempt to protect endangered species and their habitats on non-federal lands, habitat conservation plans have been adopted as a provision of the Endangered Species Act. Under 1982 amendments to the Endangered Species Act, the U.S. Fish and Wildlife Service can approve habitat conservation plans that allow the destruction or alteration of habitat for listed species in one area in exchange for conservation measures that protect those species and their habitat elsewhere. Habitat conservation plans represent a pragmatic advance in endangered species protection, but few plans are designed to preserve a full range of species over an extended area, let alone an entire region. Too many plans, especially the early ones, deal only with one or two endangered species, small parcels of land, and a limited number of landowners.

Recently, a number of habitat conservation plans that seek to protect many species and large areas of land have been undertaken at the state and regional level. In southern California, for example, multi-species conservation plans have been adopted for large portions of San Diego and Orange counties. Similar plans are underway in other California counties, as well as in Arizona and Nevada. While such multi-species plans represent progress in conservation, they are often not integrated well with local land use planning.

Experience suggests that a more comprehensive, refined, and proactive approach is needed to protect large areas that support whole communities of wildlife and other natural resources. Conservation should be initiated to prevent species from becoming endangered or threatened, rather than begun only when their numbers have declined to the point where emergency protection and recovery is required. Ultimately, preserving entire ecosystems cost less, give landowners, wildlife biologists, and land use managers greater flexibility, and reduce conflicts between conservation and economic interests.

Linking state or regional conservation planning with local land use planning is one way to achieve a more comprehensive approach to habitat and biodiversity preservation. Some states and communities have already begun to do so, but to secure the nation's biodiversity and to make habitat conservation work comprehensively across the landscape, more plans that integrate wildlife conservation and local land use planning are needed.

Conservation planning offers a powerful way to address the needs of wild animals and plants while incorporating the goals of biodiversity and habitat preservation into state, regional and/or local planning processes. With conservation planning, the needs of wild animals and plants, and the human community can be considered concurrently. Such planning can help identify where to locate new housing developments, transportation corridors, and business sites so that natural habitats, aquatic resources, open space, and wildlife will be protected and conserved. To be effective, comprehensive conservation plans should be designed on a landscape-scale as much as possible, and include active community involvement.

PROMOTING COMPREHENSIVE CONSERVATION PLANNING

In a proactive effort to protect endangered species, a number of state agencies, local and regional governments, and conservation groups have initiated comprehensive conservation planning processes. Five states — Florida, Massachusetts, Maryland, New Jersey and Oregon — have undertaken large-scale conservation assessments. Seven other states have begun to draft

assessments, and others have expressed interest in drafting plans in the near future (see status map on the next page).

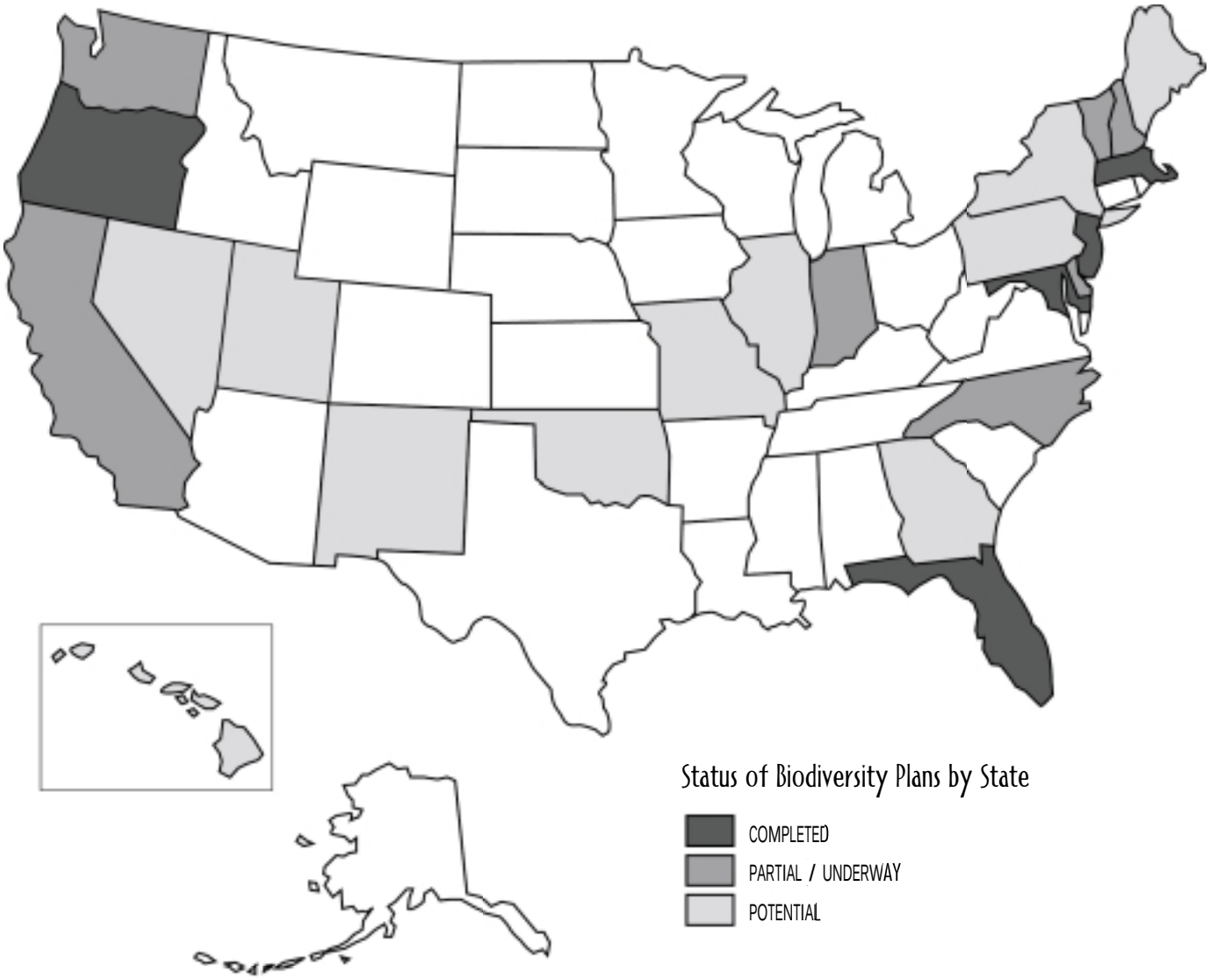
Although these states' assessments differ in approach, scope and methodology, all recognize the connection between conservation and land use planning, and that these disciplines can be used in a complementary fashion to help preserve biodiversity and natural habitats. This is particularly true in urbanizing landscapes where land use planning tends to focus and is most influential.

The few existing statewide conservation assessments use habitat and species information compiled by various government and private groups. Among these sources of information are the individual state's natural heritage programs. Initiated by The Nature Conservancy more than 25 years ago, these programs catalogue inventories of each state's wild animals, plants and plant communities. The Nature Conservancy has also begun to develop ecoregional plans, using ecological boundaries defined by environmental conditions such as moisture and solar radiation, and characteristic assemblages of species and habitats (Groves et al. 2000) to define 80 ecoregions within the United States. Each plan will feature conservation sites containing native plant and animal communities representative of the ecoregion's biodiversity and provide habitat for the region's "at risk" species.

To assist state fish and wildlife agencies in developing and implementing statewide conservation plans Federal funds are available through the Department of Interior's State Wildlife Grants Program. As of 2001, this program was funded at $80 million per year. To be eligible for these grants, a state fish and wildlife agency must agree to complete a comprehensive wildlife conservation plan by October 2005, and have the federal funds matched by nonfederal funds at a level of twenty-five percent for planning activities, and fifty percent for plan implementation. The State Wildlife Grants program, along with the information compiled by The Nature Conservancy and others, puts state and local land use planners in a good position to undertake comprehensive conservation planning.

However many state and local planners remain unaware of conservation plans or how to integrate them with local land use planning. Consequently, existing conservation strategies, local land use plans and related decision-making processes are not often connected effectively. Historically, local planning has not addressed habitat conservation systematically, and conservation groups and wildlife agencies have not always used land use planning processes effectively for habitat protection, hence opportunities to protect biodiversity and conserve habitat have often been missed. Even so called "smart growth" plans have often failed to include specifically designated wildlife habitats.

Figure 1: Statewide Biodiversity Planning Status Map



CONSERVATION PLANS IN PROGRESS

The methodology for large-scale conservation planning is still evolving, but comprehensive conservation planning is already underway at the state, regional or municipal level in communities across the country. Three such efforts — the Massachusetts BioMap, the Sonoran Desert Conservation Plan in Pima County, Arizona, and the Oregon Biodiversity Project — are discussed below. More information about the integration of conservation and local land use plans, along with profiles of eighteen other planning projects, can be found in Appendix A.

MASSACHUSETTS BioMap

The Massachusetts Executive Office of Environmental Affairs has made preservation of the state's biodiversity a top priority. In 1998, Massachusetts made a commitment to protect 200,000 acres of open space within ten years. The $1.5 million BioMap planning project is designed to identify biologically important areas, and create a blueprint for statewide biodiversity and open space protection. To do this, the BioMap project defines and maps functioning ecosystems, indicating large, contiguous expanses of land as core habitats with the most viable populations of wildlife, including species that are endangered or of conservation concern, along with natural landscape corridors, and surrounding natural areas that act as buffer zones.

The BioMap project helps local land use planners make ecologically informed decisions about development and conservation. The project's map (see page 26), information and other resources help planners and other community members identify which natural areas and open spaces in their communities should be protected, and which may be developed responsibly. To generate interest in conservation planning and the BioMap project, and to discuss environmental issues related to development, the Massachusetts Office of Environmental Affairs has also held a series of community preservation summits and five statewide "super summits" with communities throughout the state. These meetings include Biomap materials, as well as maps and analyses that show the maximum development permissible under local zoning laws.

THE SONORAN DESERT CONSERVATION PLAN

Prompted by the need to protect the federally listed, endangered cactus ferruginous pygmy owl, Pima County in southern Arizona is in the process of creating the Sonoran Desert Conservation Plan. Like Massachusetts' BioMap, the Sonoran Desert Conservation Plan is designed to direct development in a way that will protect habitats for both rare and common species, specifically riparian and mountain habitats in and around Tucson. There are now 56 vulnerable species covered in the Pima County plan. The plan combines wildlife conservation with wetlands and riparian restoration, cultural and historical preservation — including ranch protection — and develops natural corridors to link protected areas.

The planning area encompasses 5.9 million acres, 97 percent of which fall under the jurisdiction of over a dozen local, state and federal land management agencies. The Sonoran Desert Conservation Plan has created a partnership between these agencies, and has, through various committees, task forces, advisory groups and study teams, involved over 5,200 participants, and published more than 200 reports and planning documents.

The Pima County project has created a series of maps (see page 27) similar to the Massachusetts BioMap, that show areas of varying habitat importance. The maps indicate a total of 2.1 million acres where preservation would aid Pima County's endangered, threatened and vulnerable species. To date, the Sonoran Desert planning process has created two national preserves: Ironwood Forest National Monument northwest of Tucson and Las Cienegas National Conservation Area southeast of the city.

By updating its comprehensive plan, Pima County has incorporated the Sonoran Desert Conservation Plan into its local land use strategy. The county has also developed new rules and ordinances that ban or regulate development around existing, newly expanded and proposed reserves, particularly on hillsides and in riparian zones. Among other things, the new ordinances specify how much land must remain in a natural state when new housing, commercial and industrial structures are developed.

OREGON BIODIVERSITY PROJECT

A third example of large scale conservation planning is the Oregon Biodiversity Project which is directed by Defenders of Wildlife in partnership with The Nature Conservancy of Oregon, the Oregon Natural Heritage Program, and other public and private groups. In 1998, the project produced a conservation assessment and strategy for the state. The assessment compiled biological and ecological data about native species, their habitats, and existing conservation areas throughout the state. Using this information, 42 "conservation opportunity areas" were identified that could be used as part of a strategy to protect a broad range of habitats and species (see page 28). Although two-thirds of these newly identified sites are already publicly owned, they have not been managed primarily to protect biodiversity (Defenders, 1998). The Oregon Biodiversity Project conservation strategy is now being implemented through state, federal and private acquisition and restoration of lands with high conservation value, and with incentives that encourage private landowners to protect their property's ecological values. This effort has been aided by a 1998 Oregon state ballot initiative that dedicates $45 million of annual state lottery revenue to park and habitat conservation, and by a 2001 bill passed by the state legislature that addressed incentives to encourage management of private land for long-term ecological sustainability.

WILLAMETTE RESTORATION INITIATIVE

Recommendations from several Oregon Biodiversity Project partners and the need to address a variety of environmental issues in western Oregon's Willamette Basin prompted Governor John Kitzhaber to establish the Willamette Restoration Initiative in 1998. Using information from the Oregon Biodiversity Project, the Initiative developed a strategy that includes mapping of a potential conservation network designed to protect biodiversity and ecosystem function throughout the Willamette Basin (see page 29). The Initiative is working with local governments, state and federal agencies, and private landowners to protect and restore habitat and endangered species, to improve water quality, and manage flood plains in a way that allows for continued development and growth.

WORKSHOP DISCUSSION

In recent years, as more has become known about biodiversity and conservation biology, scientists have begun to steer the conservation community toward working on a larger scale. At the same time, the number of conservation planning projects around the country has grown. Workshop participants were asked to identify the rewards and barriers to using such large-scale conservation plans.

Guided by their years of experience with the Endangered Species Act, and their work on conservation assessments as part of the Oregon Biodiversity Project, Defenders of Wildlife has developed a proactive, incentive-driven, state-based approach to habitat conservation. One of the workshop goals was to determine how well such an approach could be connected to local land use planning. Participants also provided suggestions on how best to create and implement comprehensive conservation plans for their communities, and advice for agencies involved in this work. The remainder of this report summarizes that discussion.

THE BENEFITS OF ADOPTING CONSERVATION PLANNING

Workshop participants helped identify how state, regional and/or local governments can benefit from conservation strategies such as those underway in Massachusetts, Oregon and Arizona. A growing number of citizens now identify wildlife and natural habitats as essential to a high quality of life. Thus, preservation of a community's natural landscape makes it a more desirable place to live and work, enhances community pride, and helps raise property values. Yet first and foremost, large-scale conservation planning helps identify which natural habitats should be preserved to protect a particular area's diversity of wild animals and plants.

These landscape-scale conservation plans identify for protection large blocks of land along with the natural corridors that connect and make these parcels more functional. These plans can include other environmental improvements, such as stream restoration for flood control, water quality and wetlands protection. Landscape-scale planning works across jurisdictional boundaries, so it can help make acquisition of land for conservation strategic rather than haphazard. These conservation plans can also help organize, streamline and inform the process through which natural resource management agencies evaluate and set priorities for sites under consideration for conservation, restoration, and residential or commercial development.

The land use and conservation planning process can help communities control growth, prevent urban sprawl, and preserve open space. Public involvement in this process can also help enhance a sense of community by providing an opportunity for citizens to express their hopes, values, and visions for their community's future.

BOX 1.
BENEFITS OF USING STATE/REGIONAL CONSERVATION PLANNING AT THE LOCAL LEVEL

- Avoids haphazard conservation by providing a framework for local activities, preservation, acquisition and restoration.
- Avoids haphazard development that fragments habitat.
- Promotes species viability and maintains ecosystem function.
- Avoids conflicts over endangered species by providing predictability for all community members and other interested parties and preventing expensive future mitigation and restoration.
- Strategically targets use of conservation funding (e.g. Land and Water Conservation Fund).
- Attracts more conservation funding for site-specific activities.
- Complements existing environmental and natural hazard prevention programs.
- Justifies local open space and other planning decisions.
- Encourages flexibility in the land use planning process.
- Facilitates ecological, social and political connections across jurisdictional boundaries.
- Creates the opportunity for diverse interest groups to work together on creative problem solving.
- Creates a forum for public education on the environment.
- Enhances quality of life and provides economic benefits to communities (e.g. aesthetics, recreation, community pride, tourism, ecosystem services).
- Leaves a positive legacy for future generations.

Community engagement in the details of such a plan can create the shared vision necessary for its success. Participation in the planning process also provides community members with some sense of security regarding decisions about which areas can or cannot be developed and under what conditions — something particularly important to property owners and developers. Oregon's Willamette Restoration Initiative is a good example of how a diverse community came together to develop a shared vision for restoring a large and varied landscape.

A comprehensive conservation plan cannot succeed without sufficient funding, and good planning efforts can help a community attract funding. In addition to the Interior Department's State Wildlife Grants Program, other sources of funding for such conservation projects include federal and state agencies, charitable foundations, private donors, and nonprofit groups. Many states, counties and local communities have directed large sums of money toward open space acquisition, protection, and management through ballot initiatives. Many communities also use new taxes or bonds to support open space protection. About $23 billion have been secured for such programs through state and local ballot initiatives over the past five years. A well-orchestrated plan can help direct funds to where they will be most effective.

Comprehensive conservation plans can create measurable goals for biodiversity and habitat protection, and by working at a landscape scale they can provide the context for a broad range of information about the area of concern. Both are helpful to government agencies, public officials, wildlife and land managers, scientists and conservationists, especially as they seek to improve the efficiency and effectiveness of comprehensive and smaller site-specific conservation projects, as they evaluate proposed development, and comply with existing environmental regulations. A comprehensive conservation plan

can also reduce the likelihood of conflict over how to protect endangered species and the need for costly remediation programs.

Clark County Nevada, home to the city of Las Vegas, completed a multispecies Habitat Conservation Plan in 2000. The plan addresses the habitat needs of hundreds of species, including many not yet listed under the Endangered Species Act. The community now feels confident its rare species will be adequately conserved, and that development can proceed without conflict with future endangered species requirements.

BARRIERS TO USING CONSERVATION PLANNING AT THE LOCAL LEVEL

Despite the potential rewards, numerous obstacles may prevent comprehensive planning projects from being adopted or from achieving their full potential. These obstacles include a lack of funding or staff specifically trained in and assigned to conservation planning projects. Conservation planning can also be hindered by inadequate ecological data, lack of access to such information or by lack of access to or training in advanced technologies, such as Geographic Information Systems (GIS).

A lack of political will may be the most imposing — and often most frustrating — barrier to comprehensive conservation planning. Because politics and timing are so influential in determining which community projects move forward, on-going political support is essential to the success of a long-term conservation strategy. Without such support, it is difficult to secure funding. Political support is also needed to overcome the obstacles to conservation planning that may be posed by outdated state planning statutes, inadequate regulations and incentives, and bureaucratic turf battles between agencies. Other political and social obstacles to conservation planning include state fish and wildlife or natural resource agencies that may be so focused on hunting and fishing that they may not be effective participants in such efforts, and rural communities that may be less interested in these programs than their urban counterparts.

BOX 2.
BARRIERS TO USING REGIONAL/STATE CONSERVATION PLANNING AT LOCAL LEVEL

- Lack of political will (state and local).
- State planning statutes that inhibit plan implementation.
- Lack of funding for community involvement, data collection and dissemination, effective planning, implementation, and dedicated staff.
- Lack of relevant incentives and regulations.
- Lack of public participation or local involvement.
- Lack of education on values of natural resources.
- Conflicts with resource use.
- Data issues including access, technical capacity, and lack of information at appropriate scales.
- Locally significant wildlife habitat left out of large-scale conservation maps.
- Objections from developers and industry.
- Private property rights issues.
- Fear of change and the unknown.

Experience shows that these obstacles can be overcome, but to do so often requires the right kind of political leadership. If educated about the issues and involved in the process, elected officials can become key factors in a conservation plan's success. Support for conservation planning is more likely to be forthcoming if elected officials at all levels of government understand how these plans benefit their constituents and see that such plans

are not created to impose new environmental restrictions. For example, to explain the significance of the BioMap project to the public, Massachusetts Office of Environmental Affairs staff chose to focus on the connections between community water budgets, development and the future of the state's biodiversity.

Other major community concerns about conservation plans include property rights issues, and fear of potential loss of revenue for local government. Although there is growing evidence of the economic benefits and increased land values associated with conservation (Lerner and Poole 1999), these factors are still not widely or well understood. To gain acceptance, conservation plans must show that biodiversity preservation is the best way to protect the ecological processes essential to human and wildlife communities.

RECOMMENDATIONS FOR CREATING STATE AND REGIONAL CONSERVATION PLANS

The relatively few statewide conservation plans that exist vary in scope, scale, methodology and detail. This variety and the experiences shared by workshop participants provided suggestions that can be used to help make future plans successful. Some of these recommendations are summarized here.

Good scientific information is crucial to conservation planning. It is used to identify which areas need what kind of ecological protection, and to demonstrate to the public, political, scientific or legal community how and why a plan is valid. Among other things, high quality data can show the connections between biodiversity, habitat protection, human health, and the economy. Although scientific information is constantly evolving, it is important to proceed using the best existing data, and to revise plans with improved data when it is available.

Maps are an excellent, visually engaging way to present scientific and other geographically related data. Good conservation planning maps will show all land in the area under consideration, regardless of ownership. The maps should also show:

- The current conservation status of the entire planning area;
- Which land is protected, and its designation;
- Which land is targeted for conservation and restoration;
- The location of the natural landscape corridors, actual or planned, that connect conservation areas.

In Maryland, for example, the state's "green infrastructure" assessment includes a series of maps that form the basis of the state's new GreenPrint program. Because so much of Maryland has been developed for agriculture or affected by urbanization, these maps are useful in assessing where restoration is needed, and in locating areas of core habitat (hubs) and natural corridors that connect them (links). Although mapping technology now offers many options for presenting detailed data, maps need not reveal sensitive data, such as rare species point locations or private property boundaries.

Comprehensive conservation plans should aim to protect whole ecosystems, preserve ecological processes and all native species — both terrestrial and aquatic — for the long term. While land and water are inextricably linked, they are often approached separately in regulation and conservation. Yet many species depend on both wetland and upland habitats, so terrestrial and aquatic elements of the landscape should be considered concurrently.

Whatever their scope, conservation plans and the maps produced for them should use a variety of data. Among the sources of such information is the U.S. Geological Survey's Gap Analysis Program, which uses geographic information about plants and animals to determine current gaps in species protection. Each state is working toward a gap analysis and most states have produced maps depicting historical and current vegetation, and the

actual and predicted distribution of animals within their boundaries. Other sources include state natural heritage programs, which provide data on rare habitats and species; The Nature Conservancy, which has compiled ecoregional data; and state planning offices, which have land ownership records. Much of this information exists in electronic format, and Geographic Information Systems should be used to store and analyze all such data.

Specific, measurable goals for the long-term preservation of wild animals, plants and their habitats are essential to a conservation plan's success. Without such goals, a plan may be little more than a large database. To be effective, conservation plans should be developed at the state, regional and local level with explicit and similar methodology, so they can be used easily by all parties involved. Their implementation strategies should be for the long term, should clarify what is expected of officials and agencies at all levels of government, and should include public education.

To be accepted, the conservation planning process should, from the start, involve the entire community — including local officials, the public and critics of the process. This requires public meetings held at regular intervals and regular communications about the plan's progress written so they can be easily understood by all. Representatives of all interest groups and individual citizens should be involved in planning sessions and committee work. Undertaking a comprehensive planning effort with this degree of public participation requires patience and persistence.

Every region of the United States has a characteristic assemblage of native plants and animals that should be protected for future generations. Even land heavily impacted by human use, such as that in urban areas, may be important to a biodiversity program. These areas contain vital habitat remnants, provide buffers and links to larger intact conservation areas, and are part of the overall landscape and ecological processes that determine ecosystem health. For these reasons, conservation plans cannot be limited to the most pristine areas. In addition, working lands and protected open spaces within urban

BOX 3A

SCIENCE & TECHNICAL RECOMMENDATIONS FOR STATE/REGIONAL CONSERVATION PLANNING

- Produce a map of priority conservation areas with linkages. All lands, whatever their ownership, should be considered in mapping and overall planning processes.
- Use GIS technology for spatial analysis.
- Use a variety of data (e.g. rare species, vegetation, land ownership, etc.).
- Adopt a habitat/ecosystem protection approach. Consider functioning ecological processes and long-term conservation of native species.
- Analyze terrestrial and aquatic elements together.
- Use ecological boundaries to help define planning units.
- Create plans at multiple scales (state, region, local) with similar methodology.
- Produce an explicit methodology with a manual to assist planners.
- Identify and include areas requiring restoration.
- Address threats to wildlife and ecosystems.
- Provide technical assistance and guidance for all interested parties throughout planning and implementation.
- Include an adaptive management component to monitor progress and periodically update the data and maps.
- Establish a clearinghouse for biodiversity and natural resource information.

BOX 3B

INSTITUTIONAL RECOMMENDATIONS FOR STATE/REGIONAL CONSERVATION PLANNING

- Include multiple stakeholders in the process from the beginning. Develop specific, clear and measurable goals for the long-term viability of native species and natural communities.
- Clarify the roles of local government and all agencies involved.
- Dedicate staff to work with local communities on the assessment, strategy and implementation of the plan.
- Create plans that include biodiversity protection along with other environmental elements, such as water quality improvement, storm water management, recreation, etc.
- Create long-term implementation and site specific conservation strategies.
- Provide funding for local implementation.
- Develop local pilot projects derived from state or regional planning.
- Develop a variety of incentives and regulations specifically for areas identified in conservation plans.
- Include an education, marketing and communication strategy.
- Familiarize the public with the concept of green infrastructure.
- Link conservation plans to quality of life.
- Document the economic benefits of biodiversity.
- Use such plans to reform state planning statutes. Or use planning reform to initiate or support existing conservation plans.
- Encourage state officials, federal agencies, and political leaders to support local land use planners in carrying out these plans.
- Establish a mechanism for state approval of state, regional or local biodiversity plans.

areas provide opportunities for many people to experience nature close to home.

To protect biodiversity and natural habitats, more land in the United States must be managed for conservation. The existing statewide conservation efforts have determined that roughly 20 to 40 percent of each state's land area requires some level of ecological protection. Ideally, protected land should be distributed across a variety of habitats.

Acquiring land for public ownership and designating it for ecological preservation is the most effective way to ensure full conservation protection, but it is not always possible. Nor, as noted above, is it always possible or appropriate to manage land solely to benefit wildlife. In many places, privately owned land can make a significant contribution to biodiversity protection, and for some species and habitats this may be the only option.

RECOMMENDATIONS FOR INTEGRATING REGIONAL CONSERVATION PLANS INTO LOCAL PLANNING

Large-scale comprehensive conservation plans are meant to complement, not take the place of, local land use plans. Conservation plans can be used to direct development away from ecologically sensitive areas and to minimize the effects of development on biodiversity and natural habitats. They can also help local communities shape their policies regarding growth management, transportation, and other development issues.

To be effective, local, regional and statewide conservation plans should all use compatible methodology. A local plan should bring the community together to set goals and guidelines, and to create a set of informational maps. For example, the Chicago Wilderness project, which encompasses an area of 200,000 acres in three states and nine counties, a coalition of more than 140 public and private organizations adopted a regional biodiversity conservation plan to guide conservation activities

in the planning area's many communities. The plan should identify available open space, gather existing species data, and include specific regulations and incentives for preserving biodiversity. It should also provide for the mitigation of past or future habitat losses.

Local officials should take a broad and creative view of how zoning ordinances and other land use laws and regulations may be used to conserve biodiversity. Zoning laws and regulations can undermine biodiversity by increasing habitat fragmentation, or they can help conserve natural habitats, although not necessarily by establishing preserves. A variety of measures, including conservation easements, transfer of development rights, special augmentation of existing zoning, and tax incentives can, if employed in ecologically sound ways, help create or maintain existing open spaces in working landscapes, such as ranches, farms and private forests. Working landscapes can promote conservation while maintaining the economic value of land and forestalling the kind of intense development that destroys or fragments natural habitats.

If used strategically, rezoning can be extremely useful in conservation, especially where purchasing land for preservation is either not possible or desirable. There is, however, an ongoing debate over the merits of "up-zoning" and "down-zoning." Up-zoning increases density (by allowing more lots per acre) and is generally favored by "smart growth" advocates as a way to contain sprawl. Down-zoning decreases density (by allowing more acreage per lot), and has been used by many communities to protect open space from sprawl. Because it is thought to discourage ranches and farms from being divided and subdivided, downzoning is usually employed when communities seek to preserve agricultural land from development.

In many developed communities, zoning may be the best and only option for protecting the area's remaining wildlife habitat. Either scenario, however, may have an adverse impact on wildlife and biodiversity. Dense development can eliminate wildlife habitat completely. If managed properly, farms and ranches can provide some wildlife habitat; if not, they can contribute to its degradation. Historically, wildlife has rarely been considered in rezoning, but regional or statewide conservation planning can help change this situation. A notable example is the Metropolitan Conservation Alliance, a Wildlife Conservation Society program that works in the New York City metropolitan area.

BOX 4.

REGIONAL/STATE PLANS INFORM LOCAL LAND USE PLANNING AT THE FOLLOWING POINTS:

- Community vision and goal setting.
- Local open space planning.
- Regulations or incentives to conserve biodiversity.
- Review of development proposals and projects.
- Siting of infrastructure facilities in the community (e.g. roads, schools, hospitals, sewage treatment plants, etc.).
- Comprehensive or master planning process.
- Applications of local planning measures (e.g. zoning, conservation easement programs, transfer of development right programs).
- Creation of intermunicipal planning councils and agreements.
- Habitat mitigation for development, transportation projects, etc.
- Discussions with public agencies and elected officials should focus on environmental benefits of biodiversity rather than environmental constraints.

THE ROLE OF CONSERVATION ORGANIZATIONS

Workshop participants were asked to suggest how Defenders of Wildlife and other conservation and

environmental organizations can help integrate habitat and biodiversity conservation into local land use planning. The list of tasks was long, and included education campaigns that would communicate the importance of biodiversity and habitat preservation to local and state officials, and the public. Another suggestion was to have nonprofit organizations help build on existing knowledge by sharing information (scientific, technical and procedural) from other communities with local planners. Participants felt this would help states define the core elements of a biodiversity plan, and help planners and the public understand the costs and benefits of implementation.

Conservation groups can help improve and expand public involvement in the comprehensive wildlife conservation plans being created under the State Wildlife Grants Program. State fish and wildlife agencies should be encouraged to make their comprehensive wildlife conservation planning a collaborative process that involves a variety of interest groups, including conservation organizations. Defenders and others should also continue working with the U.S. Fish and Wildlife Service to develop policy guidelines for the State Wildlife Grants Program.

BOX 5.

RECOMMENDED NEXT STEPS FOR NONPROFIT CONSERVATION ORGANIZATIONS

- Promote awareness of state and regional conservation plans around the country.
- Define the core elements of state biodiversity plans.
- Encourage states to create plans involving multiple public agencies and private partners.
- Assist in translating regional conservation to local planning decisions.
- Work with U.S. Fish and Wildlife Service to develop guidelines for the State Wildlife Grants Program.
- Work with and support state fish and wildlife agencies, and encourage them to develop high quality statewide wildlife conservation plans.
- Showcase specific habitat conservation projects.
- Inform states about conservation planning through examples, process recommendations, and technical assistance.
- Provide information about the connection between biodiversity and other community values.
- Communicate costs and benefits of implementing plans.
- Build constituent support for plan development and implementation.

CONCLUSIONS

Information that would enable every state in the nation to undertake a biodiversity assessment — the first step toward creating a comprehensive conservation plan — is now available. It is important to remember that biodiversity assessments and conservation plans are meant to complement, not replace, local land use plans.

Biodiversity conservation plans should encompass areas large enough to ensure that the entire diversity of habitat types and species present are included. The areas identified for conservation should be connected whenever possible, and sufficiently large and/or numerous to ensure the long-term survival of all relevant species. The assessment should consider the entire landscape, regardless of ownership, particularly as there are a growing number of measures to facilitate biodiversity protection on private lands.

To be effective, conservation plans must be developed within the context of a state or local community's existing political process, and adapted to reflect local conditions. No matter who leads such an effort, a single collaborative conservation plan should be created, as multiple, potentially competing plans decrease the chances of any being implemented. Creativity and flexibility on the part of all involved is essential to any plan's success. Workshop participants agreed overwhelmingly that political will, rather than scientific data, is most likely to determine a conservation plan's success.

Extensive public involvement and a shared vision of a conservation plan's goals are essential to its success, regardless of the expertise and authority of those leading the effort. If the public does not understand, or is suspicious of the process, they will reject it. Although not prescriptions for local land use, conservation plans will influence land use decisions and should be undertaken carefully.

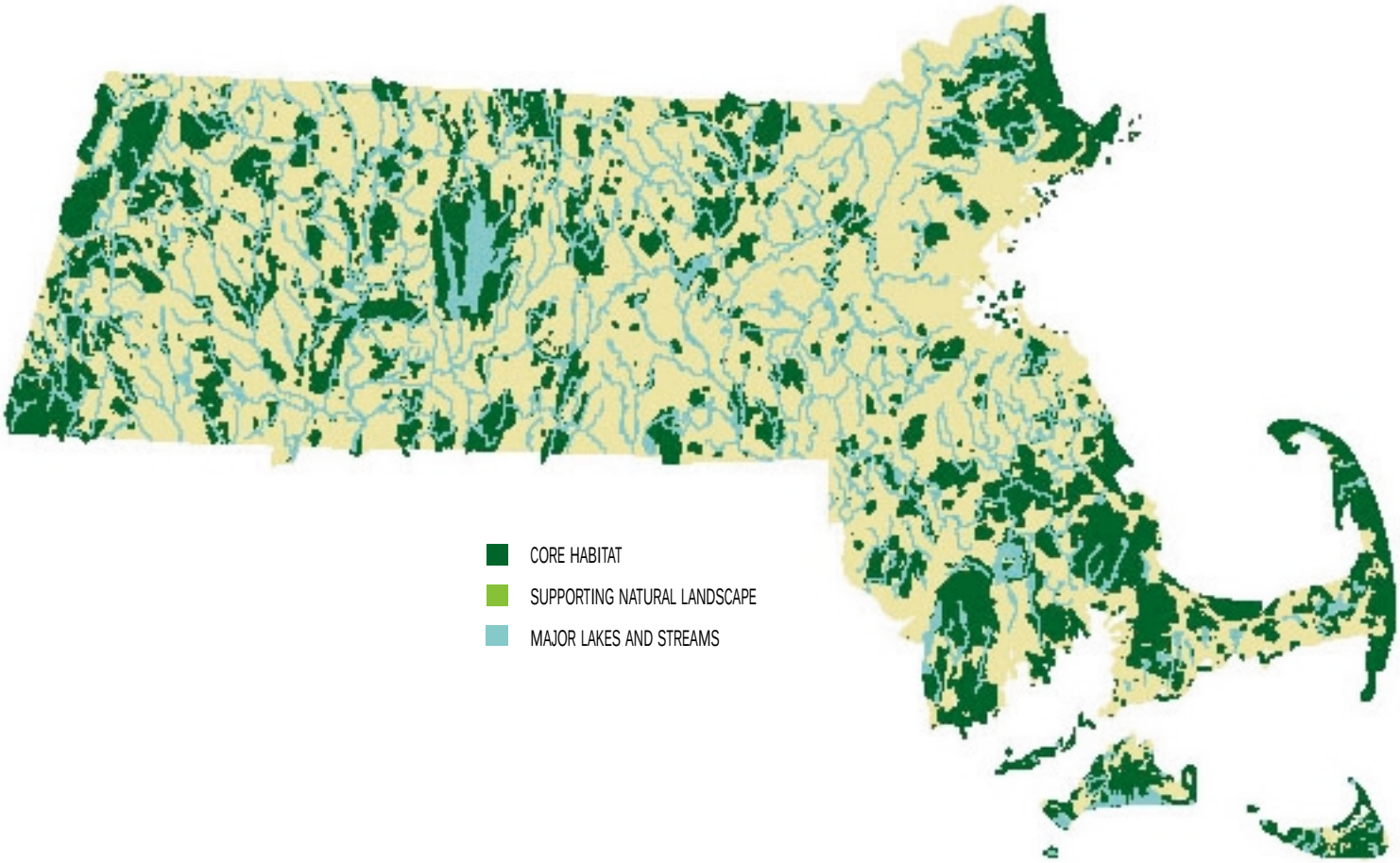
For a statewide comprehensive conservation plan to be implemented successfully, local governments are likely to need financial and technical assistance. Personnel at state natural resource agencies are also likely to need special training. The regulatory authority, policy guidelines, tax incentives and land use tools used in conjunction with conservation plans will probably come from the state government. Rewards and incentives, which may include financial, technical and legal assistance, are often more persuasive than mandates or penalties in convincing local officials and landowners of a plan's benefits. Pilot projects are extremely useful in demonstrating the benefits and feasibility of incorporating conservation into local land use planning.

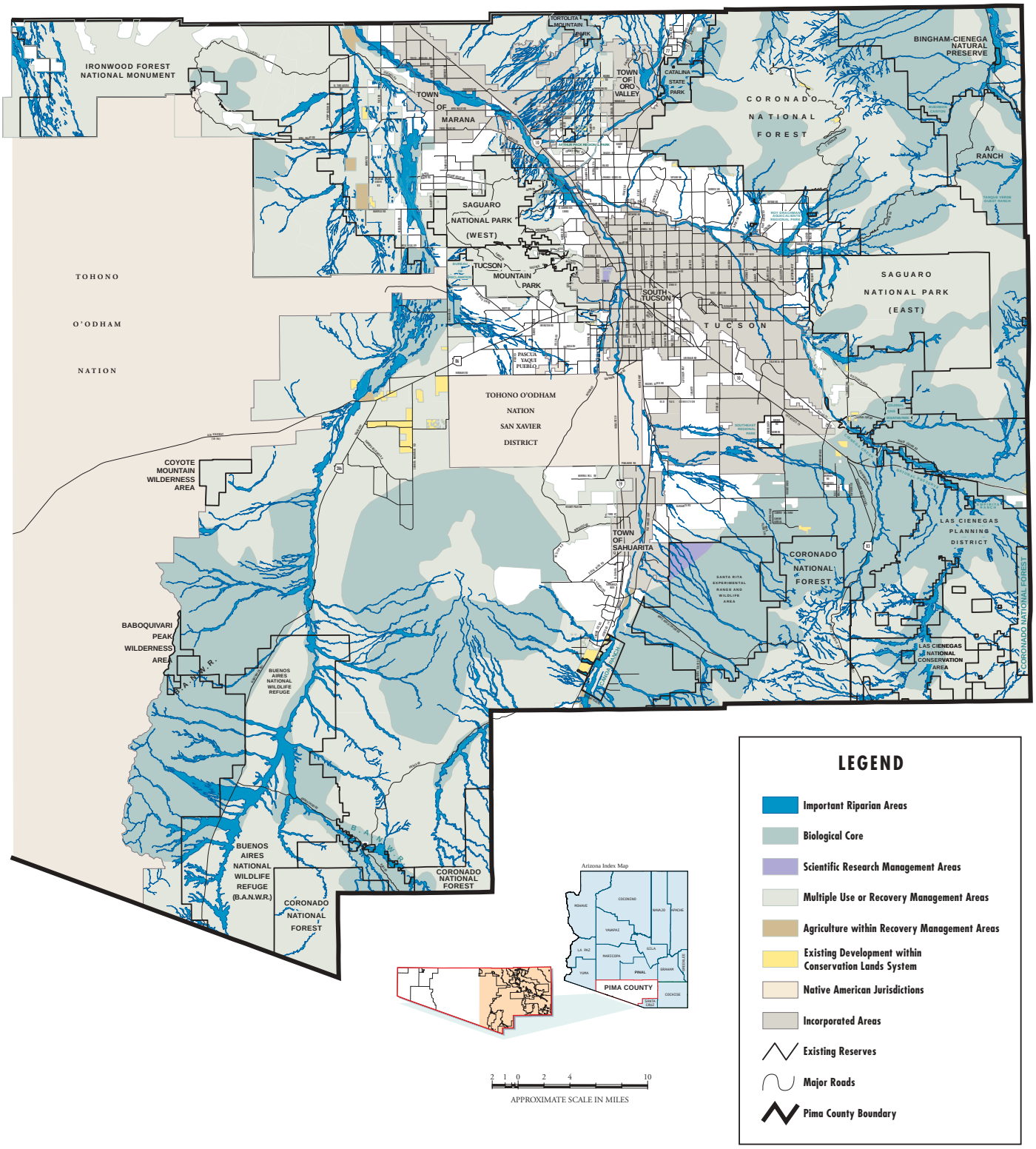
Conservation planning is new to many land use planners and conservationists, and tests the practical applications of conservation biology. The United States is such an ecologically diverse country, that no single conservation plan can be used as a national model. Most of the plans

presented at this workshop were initiated within the last ten years, and are works-in-progress. All have their strengths and weaknesses, and all are achieving some success at the state, regional or local level.

Conservation planning should become the primary means used to protect biodiversity, and to be successful must achieve more than what has become the standard, piecemeal approach to conservation. Conservation plans should connect the importance of biodiversity, habitat and natural resource conservation to a community's quality of life — in theory and in practice. If properly implemented, conservation plans will have an impact that extends beyond the borders of the acres protected or restored, and help maintain and improve the quality of life for generations to come.

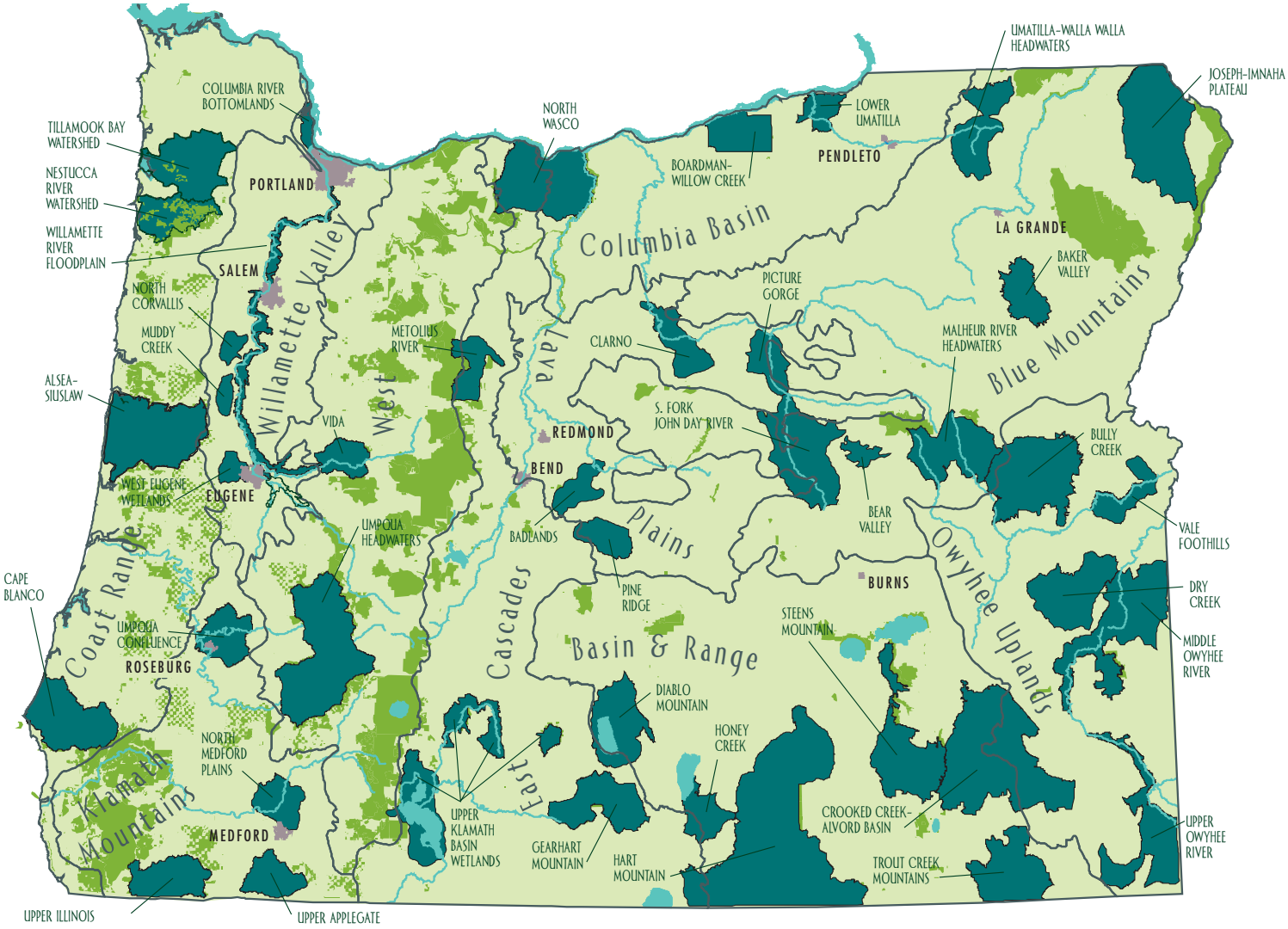
Massachusetts BioMap





PRIORITY BIOLOGICAL RESOURCES of the SONORAN DESERT CONSERVATION PLAN

Oregon Conservation Opportunity Areas



CONSERVATION OPPORTUNITY AREAS

CURRENT CONSERVATION NETWORK

OREGON'S ECOREGIONS

TOWNS

The map represents a first cut at a network of existing and potential areas for conservation in the basin. Information on the map is still in the process of being refined at local levels. As information on the map is field-checked and refined, map details will evolve.

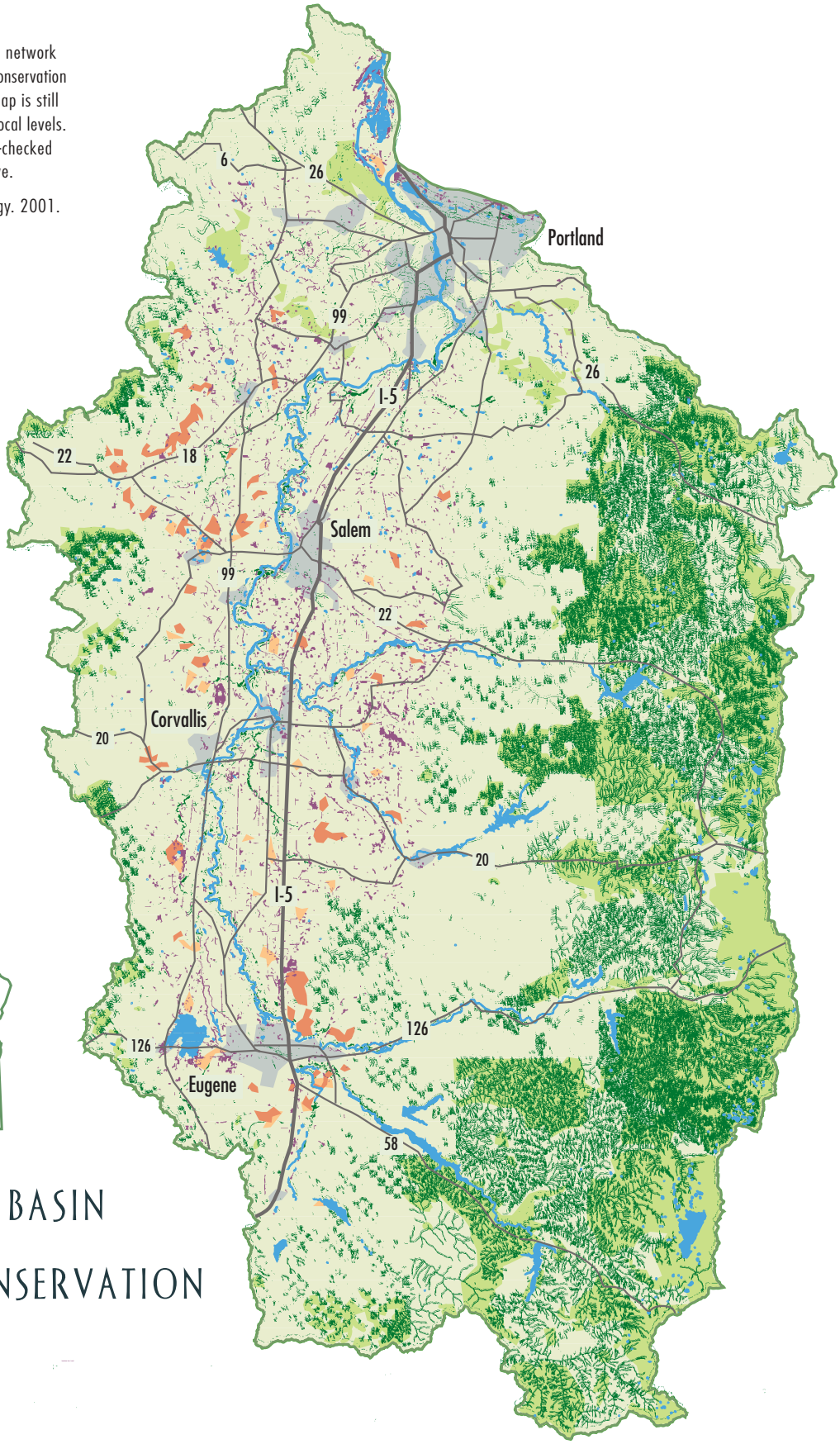
The Willamette Restoration Strategy. 2001. Willamette Restoration Initiative

Map Features

- Cities
- Water

Conservation Priority Habitat Types

- Upland Forests
- Prairie
- Oak Savanna
- Riparian/Bottomland
- Wetlands



WILLAMETTE BASIN HABITAT CONSERVATION PRIORITIES

APPENDIX A: PROJECT DESCRIPTIONS

This appendix contains descriptions of conservation planning projects represented at the workshop. These projects are divided into three categories:

1. Statewide plans come from states that have completed a comprehensive biodiversity assessment and strategy for the state's entire land area. Some less extensive but related projects within these states are also included.

2. Habitat Conservation Plans describe a series of large, regional plans recently completed or in progress in Arizona, California and Nevada. These plans were created to address multiple endangered species issues in urbanizing areas.

3. Various regional plans from around the country demonstrate more locally focused examples of conservation plans produced independently of a statewide plan. These plans are just as sophisticated as the statewide efforts, but concentrate on an area limited to a portion of one or more states.

STATEWIDE PLANS

Statewide biodiversity assessments and strategies described in this category have some similar characteristics. Each state completed its assessment in less than four years with a budget of roughly $1 million dollars. The land identified ranged from 42 percent to 18 percent. It should be noted that biodiversity assessments are not prohibitively expensive nor do their associated conservation plans attempt to put the majority of the state's landscape off limits to any development.

One way of building support for statewide conservation planning is to showcase a local demonstration project that links local land use and conservation planning. The descriptions included here for Oregon, Florida, Maryland, Massachusetts and New Jersey describe some projects that might be labeled demonstration cases. Undertaken separately from the states' recently completed biodiversity assessments and strategies, these projects were not conceived of as demonstrations for statewide biodiversity efforts, but did help set the stage for the kind of mapping and planning that the statewide assessments entail, and all reflected the goals expressed in the larger strategies. Five states have completed statewide biodiversity plans, and another seven are in the process of developing such plans. With the infusion of funding from the federal State Wildlife Grant Program, many more states will draft and implement biodiversity plans in the next few years.

OREGON BIODIVERSITY PROJECT

Defenders of Wildlife initiated the Oregon Biodiversity Project in 1994. Working closely with The Nature Conservancy of Oregon and the Oregon Natural Heritage Program the project produced a statewide biodiversity

assessment and outlined a conservation strategy that included 42 "Conservation Opportunity Areas" across the state. The project's goal was to develop a pragmatic strategy for conserving Oregon's native biodiversity. The Conservation Opportunity Areas represent the diversity of habitats and species found throughout Oregon's ten distinct ecological regions. The strategy is designed to protect native flora and fauna and thus reduce the risk of future endangered species designations, while giving landowners more flexibility in resource management decisions.

During the assessment, the team evaluated public lands to determine how well those lands are managed to protect biological diversity. Areas were ranked on a ten-point scale. Nature preserves dedicated to biodiversity protection received higher scores while land used for commercial, industrial or residential purposes that had little remaining wildlife habitat received lower scores.

Part of the project's strategy was to give conservation priority to areas with the greatest potential for biodiversity protection. Priority was based on land management, contiguity, habitat types represented, species present and likelihood of conservation success. The prioritized areas, around 18 percent of the state's land, became the strategy's Conservation Opportunity Areas. The previously existing conservation network that was composed mostly of federal and state lands occupied 10 percent of the state. The Conservation Opportunity Areas overlap with existing federal lands and, because over 50 percent of Oregon is federal land, federal agency land stewardship practices have a large influence on the state's biodiversity. Oregon's private lands also contain significant biodiversity, but are not well represented in the existing conservation network. Project staff are now focusing much of their effort on conservation incentives.

Incentive programs are a significant part of the strategy for protecting biodiversity on private lands. A summary of conservation incentives used in Oregon was completed as part of the project and prompted a national review of such incentive programs. In 2001, the Oregon legislature passed HB3564, a bill that expanded existing conservation incentive programs for private landowners.

WILLAMETTE RESTORATION STRATEGY

The Oregon Biodiversity Project does not have official state approval, but its efforts have not gone unnoticed. Over the last four years the governor has supported a related conservation strategy adopted by the Willamette Restoration Initiative. The Willamette Valley contains roughly 75 percent of Oregon's population, is heavily impacted by agriculture and development, and has a long history of use by Native Americans and Oregon's early pioneers. The Willamette Valley is also home to a host of native wildlife species associated with the unique oak woodlands and wet prairie found in few other places in the state. The initiative attempts to improve the basin's ecological health through protection and restoration of fish and wildlife habitat while accommodating continued population and economic growth. Oregon Biodiversity Project staff were instrumental in initiating the program and expanding it into a comprehensive basin-wide conservation strategy. The strategy contains a map of priority habitat conservation habitat that was produced by the Pacific Northwest Ecosystem Research Consortium through a five-year, $10 million Alternative Futures Landscape Modeling Project. By visualizing various growth scenarios, Willamette Restoration Initiative partners and participants were able to identify a vision for the Willamette basin. The Alternative Futures Project required new processing of existing data, but not much additional data.

At the outset, this collaborative effort brought together participants from a wide range of interest groups, including federal, state, and local governments, academia, industry and conservation organizations.

WEST EUGENE WETLANDS, OREGON

In 1992, the City of Eugene adopted a plan to address the future of over 1,000 acres of wetlands discovered on the western side of the city, an area that had been zoned for industrial development involving $20 million of infrastructure. Planners, environmentalists, federal agencies and concerned citizens came together to develop the West Eugene Wetlands Plan. The plan identifies high quality wetlands for protection, complies with existing federal and state wetlands law, protects rare species, and provides predictable guidelines for development.

The plan uses the existing land use planning process, strategic zoning, and establishes a wetland mitigation bank for the area of concern. It aims to balance environmental protection with sound urban development by preserving open space, protecting rare species, improving water quality and flood storage, and providing advance identification of opportunities for and constraints on development. The plan also highlights the need for biodiversity protection within areas designated for development. This is especially true for the aquatic systems that pass through many of the region's major cities. Eugene's experience with wetlands has helped prompt a Metropolitan Regional Parks and Open Space Study for a system of connected open spaces around the region's hills and waterways.

After the wetlands were discovered, a full biological inventory was completed. The inventory produced a map recommending 48 percent of the wetlands for protection, 20 percent for development and 30 percent for restoration. Criteria were developed for determining each status category and all wetlands were evaluated. Developing any wetlands normally requires a permit under section 404 of the Clean Water Act. These permits are usually arranged on a site-specific basis, so they often lack a larger ecological perspective and require more time to process than they would if a whole wetland complex was evaluated at once. The West Eugene Wetlands Plan is a significant departure from the norm, streamlining the permit and conservation process by adopting the larger plan. To date, 2,500 acres comprising more than 100 parcels of land have been protected, all acquired from willing sellers. The project has received $12 million in federal Land and Water Conservation Fund support.

To implement the plan, the city adopted a series of zoning changes in 1995. These changes included a natural resource zoning district, a waterside protection zone for streams, and a protection zone around key wetlands. For each of these areas the zoning aims to provide wildlife habitat, protect water quality, and prevent damage from flooding. Biodiversity protection is an important goal, but is not the only reason for these land use controls. The wetland mitigation bank was created to coordinate mitigation projects for developers working within the planning area. Developers can purchase wetland mitigation credits that sell for $30,000 each; a total of $960,000 worth of credits have been purchased. The revenue from mitigation credits goes directly toward restoring significant wetlands identified in the plan rather than to disconnected sites elsewhere in the state. The seed used for restoration projects must be native to the region and come from within a 25-mile radius of the planning area. This practice ensures that the restored wetlands will contain a historic genetic composition. The developers involved are assured a predictable and streamlined process and don't have to organize or manage the restoration work themselves.

The Oregon Biodiversity Project described above was initiated after the West Eugene Wetlands Plan was well underway. Since much of the attention generated from the Oregon Biodiversity Project focused on the Willamette Valley where Eugene is located, the wetland protection serves as a model for other communities seeking to build their own conservation networks, restoration plans and open space programs. The West Eugene Wetlands Plan also coincides with the objectives of the Oregon

Biodiversity Project. Although conservationists recommend an orderly process of regional ecological assessment as the basis for local planning, many progressive communities, such as Eugene, have already started projects that address biodiversity on a local level.

FLORIDA CLOSING THE GAPS PROJECT

In 1994, Florida's Fish and Wildlife Conservation Commission produced a comprehensive statewide biodiversity assessment and strategy entitled Closing the Gaps in Florida's Wildlife Habitat Conservation System (Cox et al. 1994). The report identified existing conservation lands and additional areas in need of conservation necessary to safeguard the state's wildlife. The initial assessment evaluated the needs of 40 wildlife species, 105 rare plants, four priority habitat types, wetlands for wading birds, and bat roosts. Overall, 33 percent of the state was identified for conservation, about two-thirds of which was already protected. The remaining 13 percent of the state lands targeted for protection comprise 4.82 million acres called Strategic Habitat Conservation Areas. In 1998, a second phase of the project analyzed habitat needs for an additional 125 species and identified 59,806 acres to add to the Strategic Habitat Conservation Areas. The project is now in its third phase with another update expected in 2003. With each update the project uses new information about species and habitats, and evaluates progress made toward achieving its conservation goals. Since the project's inception the state has protected one million acres, or 20 percent of the strategic areas, at a cost of $1.92 billion.

A key aspect of the plan is its attempt to evaluate the viability of the species targeted for conservation. Population viability has been a contentious issue within the scientific community, often requiring extensive and expensive data gathering and monitoring. Florida's assessment is a very practical application of these viability concepts and serves as a model for other conservation plans. A series of 40 focal species were chosen because of their large area habitat requirements or their ability to serve as indicators of the health of natural communities. For each focal species a set of minimum areas was identified to secure 10 populations of 200 individuals, each distributed over a broad enough area so catastrophic events would not eliminate the populations all at once. Those areas, identified both within and outside existing conservation lands, were then combined with other information on rare species and rare plant communities to produce the final map of strategic areas.

Florida has no specific statewide policy on biodiversity, but does have at least three state policies that address biodiversity protection. The state's Comprehensive Plan calls for "protecting and acquiring unique natural habitats" and establishes a mechanism for conserving fish, wildlife, marine life, endangered species and various habitat types. Florida's Growth Management Act requires each county and municipal comprehensive plan to include a conservation element to specify the use, protection and conservation of natural resources including wildlife and marine habitat as well as native plant communities. Whether or not communities choose to use the maps and habitat information developed for the Strategic Habitat Conservation Areas in their planning has been somewhat controversial, but the program does enable local governments to pursue wildlife habitat protection under the auspices of growth management. In 2001, the Florida Forever Act was passed to build upon a successful Preservation 2000 program that devoted public funds to the protection of open space and wildlife habitat. Florida Forever is a ten-year program designed to spend $3 billion on acquiring land and water resources. Wildlife protection is one aspect of the Florida Forever program. To guide and prioritize spending, the program uses a Conservation Needs Assessment, which includes the Strategic Habitat Conservation Areas as one layer.

The results of the Closing the Gaps project have been used in parts of peninsular and southern Florida for

regional planning, and strategic areas have been incorporated into some county comprehensive plans. However, because of private property concerns, some communities in the northern and central portions of the state have resisted using these maps and associated information for planning. Yet the state has made extensive use of conservation easements to add land to the conservation network and to secure habitat protection while leaving the land in private ownership. This approach has become increasingly popular with private landowners who stand to receive 80-90 percent of their property's fair market value in an easement while retaining ownership of the property. As more communities learn about this program, support for the habitat maps has grown.

FLORIDA ECOLOGICAL NETWORK

The concept of creating an integrated habitat conservation system for Florida grew out of work initiated in the 1980's by Larry Harris, Reed Noss and others, to plan comprehensively for the protection of the state's irreplaceable habitat for native wildlife. The Florida Greenways Program began in early 1991 as a cooperative effort of 1000 Friends of Florida and The Conservation Fund. The program goal was to create a vision and framework for a statewide greenways system. One of the most significant accomplishments of the Florida Greenways Program was Governor Lawton Chiles' creation of the Florida Greenways Commission. The Florida Greenways Commission was created for a three-year period (1993-1995) ". . . to plan and support a statewide system of greenways linking natural areas and open spaces to benefit Floridians today and in generations to come" (Florida Greenways Commission 1994). The 40-member Commission represented a variety of interest groups from across the state. The result of the Commission's work in 1993 and 1994 was the preparation of a report entitled *Creating a Statewide Greenways System: for People…for Wildlife…for Florida.* The Commission's concept was that the statewide greenways system would be composed of two sub-systems or networks: an Ecological Network, consisting of ecological hubs, linkages and sites along rivers, coastlines and across watersheds; and a Recreational/Cultural Network with trail corridors, connecting parks, urban areas, working landscapes and cultural/historic sites.

In 1995, Florida's Greenways initiative changed from a non-governmental organization-based program and a gubernatorially appointed Commission to a government-based program and legislatively appointed Council. The Florida Department of Environmental Protection was designated the lead state agency for the program. The Department of Environmental Protection contracted with the University of Florida to develop the physical design for the statewide greenways system, and worked with the Florida Greenways Coordinating Council to prepare an implementation plan (Florida Department of Environmental Protection, Florida Greenways Council 1998). The plan was forwarded to the legislature in February 1999 and resulting legislation was signed into law in June 1999.

The Florida Ecological Network was designed as the ecological component of the statewide greenways system. The network was based on six strategies to conserve the state's native ecosystems and landscapes that were identified by the Florida Greenways Commission:

- To identify and conserve an integrated, statewide system of greenways that encompasses the full range of Florida's native ecosystems and landscapes;

- To use Florida's rivers, springs, lakes, and other inland and coastal aquatic features as strategic building blocks in the statewide greenways system;

- To link a full range of regional landscapes through Florida's system of greenways and landscapes that include publicly owned lands harboring native ecosystems and privately owned, highly managed forestry and agricultural properties;

- To plan and manage the statewide system of greenways using the best information available about the requirements of Florida's native ecosystems and landscapes;

- To address native ecosystem conservation and human use compatibility issues by developing greenway design and management guidelines; and

- To undertake and/or support the research and monitoring efforts necessary to effectively plan and manage native ecosystems and landscapes within Florida's system of greenways (Florida Department of Environmental Protection, Florida Greenways Council 1998).

The development of the Ecological Network was undertaken in a two-step process. First, a GIS Decision Support Model was used to categorize both native and non-native landscape features in terms of their significance and compatibility with ecological conservation objectives. The GIS model used a diversity of spatial data including biodiversity data from the Florida Fish and Wildlife Conservation Commission's Closing the Gaps report and the Florida Natural Areas Inventory as well as data depicting features with water resource and other conservation values. First, the areas of largest and highest quality were selected as hubs for the Ecological Network, then linkages among those hubs were identified. In the final ecological modeling step, these hubs and linkages were combined to create a preliminary Ecological Network. The ecological modeling results incorporated approximately 57 percent of the state, including coastal waters. Open freshwater, coastal waters, existing public conservation lands, and private preserves compose 53 percent of the model results. Proposed public conservation lands compose 10 percent of the model results. Other private lands comprise 37 percent of the results, approximately one-third of which is either wetlands or within 100-year floodplains.

The second step in the Ecological Network development process involved public review of the results of the GIS model, and incorporation of those comments into the plan. The public participation process included three forums: the Florida Greenways Workshop Series in 1996; the work of the six Regional Greenways Task Forces, including public hearings, in 1997 and 1998; and the work of the Florida Greenways Coordinating Council, including public hearings, in 1997 and 1998. Primary funding for the design of the Statewide Greenways System came from Florida Department of Transportation's ISTEA (Intermodal Surface Transportation Efficiency Act) Program.

The statewide assessment identified a diversity of significant conservation hub linkages across the state. The five largest hubs consist of habitat complexes composed of national park, national wildlife refuge, national and state forest, Air Force, and other public and private lands. These hubs serve as anchors and therefore are the major "destinations" for identified linkages and corridors of public and private lands. These hubs encompass river floodplains, coastal and interior wetlands, and uplands.

From the descriptions of its design and components, the utilitarian aspect of the plan is clear, but its Ecological Network is also biologically robust. If fully implemented, the Ecological Network would maintain genetic diversity of native biodiversity and keep natural landscape functions intact so that evolutionary processes can proceed. The Ecological Network employs a "fine filter" and "coarse filter" approach which, when combined, should support the greatest level of native biodiversity. A "fine filter" targets specific endangered or threatened species, such as the Florida scrub jay. In contrast, a "coarse filter" identifies and protects an entire ecosystem or community and all of the associated species. Fine filters help to ensure protection for species with particularly large or specific habitat requirements that might slip through the cracks of a coarse filter. Using this approach, the network

seeks to protect all 81 ecological communities identified in Florida, which are home to 600 vertebrate species (115 of which are endemic to Florida) and 3,500 vascular plants (300 of which are endemic to Florida).

This statewide assessment maps out a "green infrastructure" for the State of Florida. Green infrastructure is a relatively new concept now being applied in many communities across the country (Benedict and McMahon 2002). The Conservation Fund, working with the USDA Forest Service, has assembled a group of federal and state agencies and non-governmental organizations to refine the concept and educate communities about green infrastructure principles and strategies: "Infrastructure is an interconnected network of green space that conserves natural ecosystem values and functions and provides associated benefits to human populations" (Benedict and McMahon 2002). The Ecological Network and the Florida Greenways Program are designed not only to protect and manage Florida's biodiversity and water resources, but to connect the people of Florida to their natural environment, and develop more support for natural resource conservation.

MARYLAND GREEN INFRASTRUCTURE ASSESSMENT AND GREENPRINT PROGRAM

Modeling its effort on Florida's Ecological Network, the Maryland Department of Natural Resources completed a statewide Green Infrastructure Assessment in 1998. The assessment identifies a network of hubs and corridors that would link and protect the most critical remaining undeveloped lands before they are lost or fragmented. In a proactive application of available information developed by different state and federal agencies, the Green Infrastructure Assessment uses GIS and principles of landscape ecology to identify landscape hubs, nodes, and corridors (links) for protection and/or restoration. As with the Florida Greenways effort, the goal of the assessment to identify ecologically significant lands for biodiversity can also dovetail with recreational areas along waterways, on trails and in parks. However, the emphasis of the assessment is biodiversity, and 98 percent of significant areas for biodiversity identified by Maryland's natural heritage program are included in the assessment.

The Green Infrastructure Assessment began as a project of the Maryland Department of Natural Resources watershed management program, and the results were formalized by the governor into a land protection program called Maryland GreenPrint. The Green Infrastructure Assessment serves as the ecological basis for the GreenPrint program. Officially adopted in 2001, the program has received $35 million in state funds. The program will make use of Maryland's existing land preservation programs: Program Open Space and the Rural Legacy Program. These two programs have been successful in protecting hundreds of acres of land for both recreational and rural preservation purposes. Now, with the Green Infrastructure Program, ecological conservation will become a more significant consideration.

The GreenPrint program is also intended to mesh with Maryland's existing Smart Growth program where maps developed for GreenPrint will be critical in creating an effective link. Maryland's "smart growth" program was last updated in 1997 with legislation that called for the creation of priority funding areas in each municipality. Unique among similar statewide programs because it is non-regulatory, the priority funding areas receive preferential funding for infrastructure to encourage development to take place within these boundaries. Development is permitted outside these areas, in compliance with existing land use zoning, but because developers must pay for their own infrastructure, it is hoped that they will be discouraged from doing so thus slowing down the rate of expansion.

The GreenPrint program is fairly new, but in upcoming years more counties will use the maps as their

comprehensive plan land use codes come up for review. The Maryland Department of Natural Resources has met with representatives from each county's planning and zoning and parks and recreation departments, and others to review the maps and GIS model. Because the network of hubs and links serves as the ecological compliment to a network of greenways and trails, the Maryland Greenways Commission plays an important role in outreach for and implementation of the GreenPrint program. South of Washington D.C., St. Mary's, Calvert and Charles counties attempt to coordinate their activities through the Southern Maryland Tri-County Council. In 1999 the council adopted a regional strategy that includes the goal of creating a green infrastructure using the results of the Green Infrastructure Program.

Another important feature of the assessment is its identification of areas requiring restoration. One such site is Chino Farms, a 6,000-acre private farm located in a hydrologically significant part of the Middle Chester River watershed on the eastern shore of Maryland. The landowner retains ownership of the property, but has decided to work with the Maryland Department of Natural Resources to make significant wildlife habitat improvements guided by the assessment. Forest restoration projects have already begun there. Without the assessment, such projects would never have been considered. These restoration projects also demonstrate how state and federal incentive programs can be used to achieve habitat improvements without infringing on private property rights.

BALTIMORE GREENWAYS

Of Maryland's 24 counties, Baltimore County and Montgomery County have been the most active in building greenway networks. These counties lie within the metropolitan corridor between Washington D.C. and Baltimore, and are home to most of Maryland's residents. Protecting biodiversity in a landscape with so much development pressure is a challenge, and significant habitat has already been lost. The greenways and parks system assembled over the last 50 years focuses primarily on stream valley parks, and there is some protection for the habitats favored by native species. The areas that Baltimore focuses on for greenways protection were also identified in the state's Green Infrastructure Program. One of the challenges here, as in many other urban areas, is how to expand the network of conservation lands before they become developed, and to control the invasive species that threaten many parks and other natural areas.

The city of Baltimore has a history of land conservation planning that dates back to the 1960s. Noted landscape architect Ian McHarg in his classic text, *Design with Nature*, describes a project one of his classes undertook to evaluate the possible uses of the rural agricultural lands surrounding Baltimore (McHarg 1969). McHarg's information was less complete than what we now have to work with, but many of his recommendations for land use continue to be used by Maryland's Valleys Planning Council. In 1967, using the McHarg study, Baltimore County established an Urban-Rural Demarcation Line to separate areas of intensive development from rural areas where development would be limited or discouraged. The bulk of the county's recent growth has been focused in designated growth areas where planning mechanisms and development regulations work to ensure that communities remain attractive with ample open space interspersed with the planned development.

Taking in portion of 14 major watersheds which flow into Chesapeake Bay, the rural and urban portions of Baltimore County's 640 square miles of land still contain remnants of habitat for biodiversity. The county's more than 2,100 miles of non-tidal streams and rivers form the backbone of the county's existing greenways system and retain the best examples of native biodiversity. The "Baltimore County Master Plan, 1989-2000" designated a vast network of streams and rivers as greenways, and

formalized the county's ongoing efforts to attain and preserve linear landforms (especially along stream valleys) for recreational and environmental purposes. This important step laid the groundwork for the county's acquisition of land along its designated greenways.

Two other significant steps in the county's greenways effort took place between 1999 and 2000. The first was approval of the greenways-related recommendations within the recently completed "Baltimore County Master Plan 2010." These recommendations, which are called "actions" in the plan, include the delineation of additional stream-related greenways, and implementation of a classification system to make a distinction between all greenways as either "recreational" or "environmental." These two types of greenways were further defined within the master plan as follows:

- Environmental greenways will remain predominantly natural and serve as open space and wildlife corridors, with little if any public access.

- Recreational greenways are intended for public use and may include improved trails and other recreational amenities.

The second accomplishment, also a recommendation within the Master Plan, was the formulation and approval of the county's updated *Local Open Space Manual*, which added new greenways-related standards to the existing planning process. This manual requires that any greenways created within properties being subdivided be accessible by the public, as well as for emergencies and maintenance. These "greenways standards" also define the extent of greenways created, whether by reservation or easement — on any properties being subdivided, regardless of zoning by reservation or easement — to the 100-year flood plain, wetland or forest buffer, whichever is greater.

With its protection of stream valley parks that set aside some of the state's most significant habitat for species, Maryland made an unconscious commitment to biodiversity protection. If other U.S. cities (especially those in the arid west) had taken such steps as their communities developed, many species might have been kept off the federal endangered species list. Development in stream valleys creates economic and ecological problems. Efforts to restore such riparian lands with ecologically functional greenways are an excellent way to help maintain local biodiversity.

NEW JERSEY LANDSCAPE PROJECT

New Jersey is the most densely populated state in the country. Since 1972 the state has lost 20,000 acres of wildlife habitat each year. The Landscape Project, initiated by the New Jersey Division of Fish and Wildlife's Endangered and Nongame Species Program in 1994, attempts to address this habitat loss by providing scientific information about the distribution of biodiversity across the New Jersey landscape. It is a statewide, ecosystem-level approach to the long-term protection of rare species and critical habitat. The project's goal is "to protect New Jersey's biological diversity by maintaining and enhancing rare wildlife populations within healthy, functioning ecosystems." The project aims to make scientifically sound information easily accessible to planning and protection programs throughout the state. This information, including GIS maps, is available through the New Jersey Department of Environmental Protection web site (http://www.state.nj.us/dep/gis/). The maps may serve as the basis for developing habitat protection ordinances, critical habitat zoning, or land acquisition and management projects. The project also anticipates that use of this information will encourage better planning and reduce conflicts over endangered and threatened species protection.

A relatively straightforward method is used to identify and map critical habitat. First, satellite images of land

cover and land use are examined to identify habitat types and contiguous habitat patches. Next, rare species locations are intersected with the habitat patches. Finally, habitat patches are given weighted values based on the protection status of the species present (i.e., federally listed, state endangered, state threatened, state priority). A final composite map is produced, showing weighted habitat values for every part of the state.

New Jersey's landscape project is one of the few conservation plans that assigns conservation values for the entire state, not only for sites that have been identified as most critical. Although the maps produced in this project do not make up a typical statewide conservation network, they do attempt priorities for protection. With the information in these maps, communities will have the tools to make informed conservation decisions.

NEW JERSEY PINE BARRENS

The New Jersey Pine Barrens comprise a 1.4 million-acre area. It is the largest contiguous tract of forest along the mid-Atlantic seaboard, and is rich in biodiversity. The topography is generally flat with sandy soils that support a series of cedar and sphagnum swamps along with vast tracts of pine forest. Underneath the barrens is a huge freshwater reservoir, the Kirkwood-Cohansey aquifer, that contains an estimated 17 trillion gallons of water. The health of the aquifer is important to the ecological balance of the coastal estuaries which are critical to many species. The aquifer also supports the region's streams and agriculture, and provides drinking water for hundreds of thousands of people. Protecting the aquifer's water quality and quantity is essential to natural resource protection in the Pine Barrens and a driving force behind making the area a preserve, which is now of national significance. Today, development is the greatest threat to the Pine Barrens.

In 1978, the National Parks and Recreation Act recognized the ecological significance of the New Jersey Pine Barrens and established the Pinelands National Reserve. Establishment of the reserve came through New Jersey's 1979 Pinelands Protection Act, which created the New Jersey Pinelands Commission to manage the area. The Commission uses a Comprehensive Management Plan, essentially a regulatory land use tool, to restrict development over large areas in the Pinelands Reserve. The plan also attempts to regulate land uses in ways that are compatible with the preservation of the underlying aquifer.

The Pinelands National Reserve is 1.4 million acres of "working landscape" where farming, ranching, forestry and other land uses are managed in a way that maintains wildlife habitat and biodiversity. Development and agricultural land uses of various kinds are permitted throughout much of the reserve, including the most ecologically sensitive area where cranberries and blueberries are produced. The peripheral areas of the reserve allow residential development according to various low-density formulas that allow 1.5 to 5.25 dwelling units per acre. The military (primarily Fort Dix) also manage areas in the reserve.

The Pinelands Comprehensive Management Plan includes an innovative transferable development rights program designed to mitigate the economic loss of a landowner whose property is heavily restricted while applying permanent deed restriction for the most ecologically important areas. Landowners in the plan's preservation districts are allocated Pinelands Development Credits, while developers in the growth districts get "density bonuses" if they purchase and retire credits as part of their development applications. When a landowner sells credits, his or her land is automatically deed-restricted from development, giving that land permanent protection. The plan also creates a state agency, the PDC Bank, which acts as the buyer and seller of last resort to help ensure that the market in Pinelands Development Credits works well. During the first 20 years of the program, sales of credits have led to deed restrictions on 27,750

acres of land. The program, which supplements the economic value of land in the preservation districts, has also helped New Jersey successfully defend the plan against constitutional takings claims.

Experience with the Pinelands National Reserve suggests that a "working landscape" approach to habitat conservation may be successful. Although very little of the Pinelands Reserve can be termed pristine, it has a functional ecosystem and a management plan that strives to balance human use and conservation. To help with this balance, the Pinelands Preservation Alliance, a non-governmental organization, was formed specifically to enhance conservation of the region's natural resources by working with the Commission and through community outreach.

The Pinelands National Reserve Comprehensive Management Plan is one of the United States' few long-term examples of conservation planning. It successfully uses regulatory tools to achieve conservation goals. Over the preserve's 20-year history, residents have learned to live with and value these regulations, yet progress has been slow because changes to these regulations are controversial.

MASSACHUSETTS BioMap

Funded by the Massachusetts Executive Office of Environmental Affairs, the BioMap Project was initiated by the Massachusetts Natural Heritage and Endangered Species Program in the spring of 1998. Project collaborators included the Massachusetts Executive Office of Environmental Affairs, Massachusetts Division of Fisheries and Wildlife, MassGIS, Manomet Center for Conservation Sciences, The Nature Conservancy, Harvard Forest, and the Natural Heritage Programs of New Hampshire, Vermont, New York, Connecticut, and Rhode Island. The goal of the project was "to promote strategic land protection by producing a map showing areas, that if protected, would provide suitable habitat over the long term for the maximum number of Massachusetts' terrestrial and wetland plant and animal species and natural communities." The Massachusetts BioMap was created using GIS technology to process state rare species and exemplary natural communities data. The map identifies 2,130,000 acres (42 percent of the state) as important to the long-term conservation of species and natural communities. Of the area identified, 1,160,000 acres are considered Core Habitat (23 percent of the state), and 970,000 acres are considered Supporting Natural Landscape (19 percent of the state). The statewide "BioMap" and other products, including a report, technical appendix, and poster, were completed in the summer of 2001.

The BioMap is now being used as a tool to facilitate informed land conservation decisions, including land acquisition priorities, throughout Massachusetts. The Executive Office of Environmental Affairs encourages towns to use the BioMap to guide land use planning decisions as part of their Community Preservation. The Community Preservation Initiative is designed to address the problems associated with urban sprawl that affect the quality of life of the state's residents. It is essentially a locally driven smart growth effort for the state. The Executive Office of Environmental Affairs held 24 Community Preservation summits across the state where they presented information on how existing local zoning would affect development in each community. These "build out analyses" also showed impacts to water resources and biodiversity.

An educational component of the BioMap are Biodiversity Days designed to generate interest in biodiversity among communities throughout the state. During this event, participants are encouraged to get out and explore the native biodiversity of their areas with support from local experts and Executive Office of Environmental Affairs staff. A workbook called *Exploring Biodiversity* accompanies materials for the

event and provides a general overview of the threats to biodiversity and information on how to collect field data. Reports of observations can be submitted to local species and habitat registries or to the state natural heritage program if rare species are observed.

The Trustees for Reservations, the Executive Office of Environmental Affairs, and the City of Fall River have recently established a "core habitat" along Fall River as the southeastern Massachusetts BioReserve. In August 2002, the state legislature passed a bill authorizing the transfer of land to establish the southeastern Massachusetts BioReserve. This area is more than 13,600 acres, and although its significance has been known for some time, the BioMap demonstrates its significance in a statewide context. The purpose of the bioreserve is to protect, restore and enhance the biological diversity and ecological integrity of a large-scale ecosystem representative of the region; to permanently protect public water supplies and cultural resources; to offer interpretive and educational programs; and to provide opportunities for appropriate public use of the land. Although the BioReserve has been established, the threats of sprawl are apparent and immediate action and development restrictions are needed.

Creating the Bioreserve is one strategy to protect areas identified on the BioMap. Another strategy is the use of conservation easements, called "conservation restrictions" in Massachusetts. All "conservation restrictions" must be approved through the Executive Office of Environmental Affairs to ensure they will result in a demonstrated public benefit. The BioMap can serve as a guide to locate areas for "conservation restrictions."

WASHINGTON STATE GROWTH MANAGEMENT AND ECOREGIONAL CONSERVATION

The State of Washington's Growth Management program began in 1990 with the passage of the state's Growth Management Act. The flexible program, run by the state's Office of Community Development, encourages growth to take place in locally defined Urban Growth Areas. The act also requires each of the state's 39 counties to identify fish and wildlife conservation areas, designate areas critical to conservation, and establish development regulations to help protect these areas. Washington loses an estimated 70,000 acres of fish and wildlife habitat each year, mostly to development, so conservation has become critical. To justify the protection of critical areas, the program has produced a synthesis of the best available science. It has also initiated a Puget Sound Demonstration Project to examine alternative future scenarios for land and water resource use involving conservation sites. The program has developed model planning code language to be used in designating and protecting critical areas.

Most recently, Washington's Office of Community Development has teamed up with the Washington Department of Fish and Wildlife, Department of Natural Resources and The Nature Conservancy on an ecoregional planning project to protect state biodiversity. The project is modeled after The Nature Conservancy's ecoregional approach, but modified to fit state boundaries. Washington contains parts of eight ecoregions in which sites of significant habitat and biodiversity will be identified. The results will be coordinated with other state conservation efforts, prioritize land for conservation easements and other protections, help counties plan for wildlife habitat conservation across their jurisdictional boundaries, and assess potential sites for Marine Protected Areas. The four-year planning process is expected to cost $3.5 million. The Washington Office of Community Development will help create and translate the resulting plans to local governments. Washington State is one of only a handful of states with plans to link its comprehensive statewide wildlife planning process with its policies on growth management.

The ecoregional conservation approach will not meet all of the Washington Department of Fish and Wildlife's

goals for fish and wildlife management, so county plans will also be created. In addition to conserving fish and wildlife diversity, the agency's goals include maintaining the historic distribution and viability of species and habitats, recovering threatened and endangered species, and enhancing fish and wildlife populations for harvest. The county is the appropriate geo-political unit for addressing these conservation goals because counties are responsible for implementing the State Growth Management Act, which requires comprehensive land use planning and provides a regulatory framework for controlling the impacts of growth on fish and wildlife habitats.

Washington Department of Fish and Wildlife currently participates in county growth-management planning through the state's Priority Habitats and Species Program. The existing program provides counties with information about the location of important fish and wildlife habitats and recommendations for their management. Agency habitat biologists then consult with county planners or landowners on a site-by-site basis when development permits come up for review. The biologists also work with county planners to improve Critical Areas Ordinances and open space plans. Yet because it works on a site-specific basis, the Priority Habitats and Species Program approach does not address larger landscape issues of habitat connectivity, regional or local species viability, multi-county habitat issues, or prioritize habitat areas for protection. The State Office of Community Development, which administers the Growth Management Act, encourages counties to address these issues, but does not have the resources to do this alone.

Washington Department of Fish and Wildlife is working to develop a scientifically sound tool that will enable counties to do landscape-scale conservation through the Growth Management Act. The community development office is now using a decision-making tool called "Alternative Futures" to evaluate the impacts of various development scenarios on important fish and wildlife habitats in the Chico Creek watershed of Kitsap County. Washington Department of Fish and Wildlife will adapt and improve these methods in a pilot project covering all of Kitsap County that will be completed by December 2003. The project has two elements:

1) A draft conservation network for the Kitsap Peninsula that includes conservation sites and wildlife corridors identified through ecoregional planning;

2) An analysis of how the habitat conservation goals and network will be affected by different development scenarios. If the Kitsap pilot project is successful, the State Office of Community Development may encourage other counties to design and connect habitat conservation networks across the state.

While the efforts described above were underway, Washington's 2002 legislature passed state Senate Bill 6400 that authorizes a public/private biodiversity conservation committee to review existing programs and develop recommendations for a state biodiversity strategy by December 2003. If implemented, a state biodiversity strategy would likely support existing ecoregional and county conservation planning efforts and would coordinate conservation activities through a variety of programs, including county growth management, landowner incentives, conservation easements, habitat acquisition and voluntary protection. The bill was initiated by Defenders of Wildlife and supported by a number of state agencies and organizations including those involved in ecoregional planning.

REGIONAL MULTI-SPECIES HABITAT CONSERVATION PLANS

Habitat Conservation Plans under section 10 of the Endangered Species Act grant a permit to "take" or destroy endangered species habitat on non-federal lands in exchange for creating a plan to protect that species elsewhere. In many parts of the U.S., plans to expand urban areas will inevitably encounter endangered species conflicts. Cities and counties are thus finding it more cost effective to address those conflicts by adopting a regional, multi-species approach to conservation and applying for a Habitat Conservation Plan permit. The examples here all come from urbanizing areas of California, western and southwestern U.S., the part of the country now experiencing the highest growth rates on record. In all cases the county or local government is the permit holder responsible for assembling the proposed plan in consultation with U.S. Fish and Wildlife.

SONORAN DESERT CONSERVATION PLAN IN PIMA COUNTY, ARIZONA

The Sonoran Desert Conservation Plan covers a 5.9 million-acre portion of the Sonoran desert ecosystem in Pima County, Arizona. The plan was initiated in 1998 in response to conservation needs for a handful of rare species, most significantly the endangered cactus ferruginous pygmy owl. Since then, the county administrator and Board of Supervisors have expanded the plan significantly. For this work they received the American Planning Association's 2002 Outstanding Planning Award. The purpose of the current plan is "to ensure the long-term survival of plants, animals and biological communities that are indigenous to this county." The Sonoran Desert plan contains six areas of focus: Habitat, Corridors, Cultural, Mountain Parks, Ranch Lands, and Riparian. Protection of endangered species does not require consideration of historic ranching or other cultural resources. However, the county saw the plan as an opportunity to address many of the problems caused by urban sprawl, such as a declining tax base and a loss of cultural identity. The first few years of the project were spent gathering technical information. Over 205 reports and a mapped Conservation Reserve Design have now been produced. The research and inventory work generated the scientific and historical justification for two new national conservation areas: The Ironwood National Monument and Las Cienegas National Conservation Area, both managed by the Bureau of Land Management.

The plan is not without controversy. A significant portion of the reserve network is made up of state trust lands. State trust lands have been set aside in many western states, usually to be sold over time to generate funds for education. The disposal of these lands and their use for conservation is continually debated. Conflicts also exist between conservation and ranching interests. The Pima County Board of Supervisors is leading the SDCP effort in coordination with 12 major government land managers and some 40 community groups. In the future, the county plans to apply for approval of the multi-species Habitat Conservation Plan and permit under the Endangered Species Act for the take of 56 species in exchange for habitat protection in the Conservation Reserve system.

> "Ironically, the compatibility of natural and built environmental planning has been made possible by the Endangered Species Act. Because now we must talk in terms of biological reserve design, we finally can talk in terms of urban design. These are discussions that are long overdue and I think will be welcomed within the community. They are the essence of rational and meaningful planning."
>
> - Chuck Huckelberry, Pima County Administrator

In December 2001, Pima County updated its comprehensive land use plan to incorporate the Sonoran Desert Conservation Plan. The comprehensive plan contains seven elements. One of those elements is environmental protection and essentially prescribes the SDCP strategy

for natural and cultural resource protection. To do this the Conservation Reserve design has been formalized into a Conservation Lands System that categorizes future land use in all unincorporated lands in the planning area. Land use categories include: Important Riparian Areas, Biological Core Management Areas, Scientific Research Management Areas, Multiple Use Management Areas, Recovery Management Areas, Agriculture within Recovery Management Areas, Critical Landscape Connections.

The Sonoran Desert plan has also generated a series of policy changes associated with the county's built environment. Over the last few years, a series of ordinances have been passed that seek to protect biological resources while maintaining better quality urban design. These ordinances include: buffer overlay zones around biological preserves, hillside development, riparian habitat mitigation, native plant protection, conservation subdivisions, big box store limitations and home design standards.

SOUTHERN CALIFORNIA HABITAT CONSERVATION PLANS AND NATURAL COMMUNITY CONSERVATION PLANS

Southern California has more rare species than any other region of the U.S. A combination of topography and vegetation make for many unique habitats in this Mediterranean climate. It is also one of the most populated parts of the country. Los Angeles County is home to nine million people. In response to the numerous rare species and the threat of sprawling communities, the state of California initiated the Natural Community Conservation Plan process to complement the Habitat Conservation Plan process under the federal Endangered Species Act. Essentially each county in southern California is now involved with one of these plans.

Riverside County

There are two multi-species Habitat Conservation Plans in progress in central and western Riverside County. These plans have mostly grown out of single species plans designed to protect the Stephen's Kangaroo Rat and the Coachella Valley Fringed Toed Lizard, but which do not address a rapidly growing list of more endangered species. The western county effort has attempted to link transportation and comprehensive planning with the Habitat Conservation Plan. In contrast, the central county effort in the Coachella Valley, where Palm Springs is located, occurs in a less populous area where climate and terrain may preclude some development and land is valued most highly for retirement and resort activities.

Western Riverside Multi-Species Habitat Conservation Plan

The Riverside County Integrated Project is a comprehensive three tier planning process, which the county hopes will enable it to complete a Habitat Conservation Plan and address its infrastructure needs. As with Arizona's Sonoran Desert Conservation Plan, project planners have decided to combine their conservation activities with efforts to control growth and relieve traffic congestion. These three elements will be combined into the county's updated land use plan. The purpose of the Riverside plan process is: "to create a high-quality, balanced and sustainable environment for the citizens of Riverside County and to make Riverside County's communities great places to live, work and play." As part of the process, the county will address endangered species protection by developing a Habitat Conservation Plan. This process will also entail preparation of an Environmental Impact Statement under the National Environmental Protection Act and completing work required to meet state environmental laws. The project was initiated in 1999, has a budget of $20 million, and was expected to be completed in 2002.

The Riverside plan covers a 1.26 million-acre area in western Riverside County, from west of the San Jacinto Mountains to the Orange County border. While protecting high profile species like the Stephen's Kangaroo Rat

and the Quino Checkerspot butterfly, the multi-species HCP will be designed to protect over 150 species and conserve 510,000 acres. The planning area is composed of 15 habitat types, including chapparal, coastal sage scrub, vernal pools, playas, forests, woodlands, and native and non-native grasslands. The preserve design makes extensive use of existing public lands, of which 376,000 acres are already in some form of protection. Of the 153,000 acres of private land that need protection, 112,000 acres are the primary conservation target.

The most contentious part of the plan involves how to secure the private land within the conservation area. The project aims to acquire land with funds from impact fees, mitigation for roads and other buildings, with state, federal and local appropriations, or through areas set aside as part of development projects. The estimated cost of this private land is $1.45 billion, less than half the amount that will be spent on transportation projects.

In addition to the Habitat Conservation Plan, the Riverside plan also includes:

- An updated General Plan for the unincorporated portion of the county, which includes land use, circulation, housing and open space. The General Plan includes incentive programs to enhance transit alternatives and encourage the development of mixed-use centers.

- The country's Community and Environmental Transportation Acceptability Process, which identifies future transportation corridors in the western part of the county and provides the environmental documentation needed to allow advance reservation of the development rights for these corridors.

- A Special Area Management Plan to address regional watershed management and water quality issues.

Coachella Valley Multi-Species Habitat Conservation Plan

The Coachella Valley in Riverside County has a long history with the Habitat Conservation Planning process. The plan for the Coachella Valley fringed-toed lizard was the first regional Habitat Conservation Plan and second ever permitted in the U.S. The valley is also a world class resort and retirement community where quality of life is the foundation of the local economy, and support for open space protection and associated conservation is generally strong. In 1994, a scoping study completed for the Coachella Valley Association of Governments recommended a multi-species plan to address the conflicts between development and the increasing number of endangered species at both the state and federal levels. In 1995, a Memorandum of Understanding was signed to create the multi-species plan between Riverside county, the various cities in the valley, the U.S. Fish and Wildlife Service, U.S.D.A. Forest Service, National Park Service, and the Bureau of Land Management. The planning process has included strong involvement from scientists, developers and local government.

The planning area for the Coachella Valley is roughly 1.2 million acres, about the same size as the western Riverside County effort. The Coachella Valley Habitat Conservation Plan addresses 30 species (11 listed under the federal and state Endangered Species Act), which include the desert tortoise, flat-tailed horned lizard, yellow warbler, burrowing owl, peninsular bighorn sheep, and desert slender salamander. The plan does not address section 404 of the Clean Water Act, which is used to protect wetlands, but must comply with the federal Endangered Species Act and National Environmental Protection Act as well as California environmental laws. Habitat conservation is also addressed in the California government code, which requires comprehensive plans for cities and counties to include conservation, open space and land use planning.

Land ownership in the valley is 45 percent private, 47 percent federal (Bureau of Land Management, National Park Service, and U.S.D.A. Forest Service) and eight percent tribal lands. The local tribes are pursuing their own Habitat Conservation Plan, but there is some coordination with the larger multi-species plan. Half of the valley's landscape is now in some form of conservation status, but current protections do not adequately meet the needs of the species of concern. In some areas the checkerboard land ownership pattern characteristic of public and private lands in the west complicates conservation efforts.

The Coachella Valley Habitat Conservation Plan included a reserve design process that used a four point ranking system similar to the national GAP analysis program's planning system. All lands in the planning area were ranked using this system. Vegetation community types were identified with satellite imagery. Additional inventory work was conducted and the distributions of species of concern mapped. Finally, site identification maps were generated to show areas of highest conservation value and ultimately to indicate three alternative reserve networks. The final plan, which has yet to be completed, will include an adaptive management and monitoring program. For the plan to succeed, federal agencies will need to coordinate management of their lands for conservation of endangered species.

San Diego County Multiple Species Conservation Plan

San Diego County completed a Habitat Conservation Plan in 1996, which also employed California's new Natural Community Conservation Plan process. The plan's main objective was to protect the remaining coastal sage scrub communities for its resident species, including the rare California gnatcatcher. The county is home to 200 rare plants and animals — over half of which were found in the planning area. There were enormous challenges in designing a preserve system. The remaining habitat areas had almost all been zoned for low density residential development, and San Diego expected to reach its maximum population for the existing build-out scenario by 2005. Consequently, the plan had to strike a compromise between species protection and development. Thus, major tenets of the process were that private property rights would be upheld, and that public land would be used to meet habitat needs. Where private land was needed to complete the preserve system, only lands from willing sellers would be used.

The Multi-Species Conservation Plan evaluates a 582,000-acre area in the western portion of San Diego County. Bounded by the Pacific Ocean, national forest and military lands, the habitat contains a number of endemic species that depend on the area's unique soils and shrub communities. The final preserve network encompasses about 171,000 acres, but it may take 30 years to acquire all the necessary land.

The results of the multi-species plan are connected to the county's land use planning by sub-area plans drawn up by local jurisdictions. Each of the county's seven sub-areas has its own plan. These sub-area plans contain some variation and flexibility. Some plans include ,mapped preserve area boundaries, while other plans have quantitative goals for vegetative communities. Each of the sub-area plans will guide local jurisdictions to incorporate the multi-species plan into their local land use plans. No new administrative agency is needed to implement the plans, with the possible exception of administering funds. The costs of the plan are supposed to be divided equitably across the planning area, so regional funding sources and allocation rules are needed and a regional funding authority may be necessary. The plan recommends the creation of two committees, one to manage technical habitat issues and the other to coordinate implementation. The total cost of the preserve system is not expected to exceed $411 million in 1996

dollars. Various funding mechanisms are possible including taxes, which would cost an estimated $20-25 per household over the life of the project.

The plan has not been without its critics. Shortly after completion of the plan, when the building moratorium that was imposed during the planning process was lifted, a series of vernal pools were lost to development. While not critical gnatcatcher habitat, these pools were important to other species, and the action resulted in litigation from conservation groups. Conservation in an area as heavily urbanized as San Diego is extremely challenging especially when it must be undertaken retroactively in an area that no planner had ever imagined would need protection. Whether or not the plan is successful, the process the stakeholders ironed out is instructive. This process includes the design of a preserve network with linked core areas, a mixture of mechanisms to protect public and private land, sub-area plans designed to integrate but not replace area-wide land use plans, a regional funding effort, and respect for private property rights.

Placer Legacy Open Space and Agricultural Conservation Program — Placer County, California

As the fastest growing county in California for the last two years, Placer County was prompted to address balancing its rapid growth with natural resource conservation. After an extensive public input period, the Placer Legacy Open Space and Agricultural Conservation Program was initiated in 2000. It was developed to implement the Placer County General Plan's open space conservation goals, policies, and programs. The Legacy Program's goal is to conserve the county's open space and agricultural resources, including its unique biodiversity (the county has 62 percent of California's habitat types), and endangered species and associated habitats. Prior to initiation of the Placer Legacy Program, the county's existing open space program was implemented through its General Plan and zoning designations. The new program's protections are intended to be more proactive than those achieved by applying ordinances and policies to new development projects. The Legacy Program's conservation measures focus on proactively preserving agricultural and timberlands in order to protect scenic and historic areas, provide new recreational opportunities, and protect against damage from natural hazards, by identifying willing sellers of such lands. The Placer Legacy Program also provides new outreach programs to assist a wide range of stakeholders. The Placer Legacy Program's start-up, development, and land acquisition costs are estimated to be between $840,000 and $6,100,000 annually for the first 30 years of operation.

In addition to the Legacy Program, and to comply with state and federal endangered species acts and federal wetland laws, Placer County and its partners have embarked on development of a Natural Community Conservation Plan, a Habitat Conservation Plan, and a programmatic wetlands development permit. The plans will address habitat needs for 36 species of concern, including those listed by the federal and state endangered species acts. Habitats of emphasis include vernal pools, riparian areas, salmon/steelhead habitat, raptor foraging areas, and oak woodlands. The plans will be developed in three phases; each will address a different geographic area of the county. A GIS system has been assembled to analyze inventory work for the species. Both coarse filter (GIS-based) and fine filter (supported by field gathered data) analyses will be used to address regional biodiversity. The project has three working groups: a Biological Resources Stakeholder group, a Scientific Working Group and an Interagency Working Group. The Placer Legacy Program forms the basis of a means to safeguard and create buffer zones for habitat while maintaining working landscapes.

CLARK COUNTY, NEVADA MULTI-SPECIES HABITAT CONSERVATION PLAN

Clark County, Nevada contains the rapidly growing city of Las Vegas. Surrounded by extensive tracts of federal land managed mostly by the Bureau of Land Management, many rare species are found in this arid

environment. In September 2000, the county completed a multi-species Habitat Conservation Plan for 79 species. Five of these species are listed under the federal Endangered Species Act. Four are endangered: the Southwest willow flycatcher, Moapa dace, Virgin River chub, and woundfin. One is threatened, the Mojave desert tortoise; and another is a candidate for listing, the blue diamond cholla. Most of the plan is now directed at protection of terrestrial systems and the tortoise. The aquatic component will be addressed in future phases. The plan covers Clark County and some transportation right-of-ways into neighboring counties. Within Clark County, 89 percent of the land is federally managed by seven agencies, while 10.9 percent of the land is held by the state, local government or private landowners.

The Habitat Conservation Plan supercedes an earlier plan, the desert conservation plan, which focused only on the tortoise. Like the single species plans reviewed in Riverside County, California, this single species approach proved to be inadequate. Clark County's new plan is much larger in scale and scope, and the county feels confident it can proceed with development, having addressed its endangered species' needs well into the future. The goals of the overall effort include: ecosystem protection, flexibility in mitigation and conservation, dividing economic and logistical burdens fairly between all land managers, coordinating decision-making, providing long-term planning assurances, increasing the number of species for which assurances are given, and reducing the regulatory burden of the Endangered Species Act.

There are a total of 418,000 acres available for development in the permit area, but the 'taking' area will not exceed 145,000 acres. More than 3.5 million acres of tortoise habitat exists in Clark County so even if all the available acreage were developed, it would still be less than 4 percent of the tortoise's Clark County habitat. To analyze land management activities and their impact on habitat, the landscape was divided into four management categories: Intensively Managed Areas, Less Intensively Managed Areas, Multiple Use Managed Areas, and Unmanaged Areas. The landscape was also divided into twelve ecological zones. Analyses were made of each ecosystem and its associated management categories.

The plan outlines 650 specific conservation measures. An Adaptive Management Program, which provides a way to make changes in the plan over its 30-year period, has also been created. Changes can be made when threats to or substantial changes in populations of all species covered by the plan are observed, not just those listed under the Endangered Species Act.

Since so much of the planning area is under federal and state management, implementation will need to involve federal and state agencies. Consequently the plan is very inclusive of cooperating agencies with at least 18 agencies and/or research institutions involved.

Dedicated funding is expected to be $2 million per year, with the possibility of adding up to $1 million per year if more species are added as warranted by the results of the Adaptive Management Program. Funding will be raised by collecting development impact fees of $550/acre, and from interest on an endowment created for the plan. Over the next six years, the sale of 27,000 acres of federal land now disconnected and located within the heavily urbanized part of the county is expected to generate another $420 million that can be used for acquisition or management.

Although the scope of the plan is very large, it could have been larger. Clark County rejected the opportunity to create a Mojave Desert ecosystem program because the burdens of cross-jurisdictional coordination were too great. A Mojave ecosystem program would have meant working with California, Utah, and Arizona, and their associated state and local policies. The county was also concerned about how such a plan would directly benefit them.

REGIONAL PLANS

The last category of plans described here represent regional approaches to conservation planning where statewide plans do not exist, and where endangered species listings do not drive the process. The six summarized here attempt to address biodiversity in a regional context, and to protect lands in an urbanizing landscape with local land use planning. Some like the Chicago Wilderness and the Metropolitan Conservation Alliance, a program of the Wildlife Conservation Society, cover large urbanized regions that cross-state boundaries. Others in Maine, Minnesota, Virginia and Colorado are entirely contained within a single state.

CHICAGO WILDERNESS

The Chicago Wilderness coalition is an unprecedented alliance of over 140 public and private organizations working together for the benefit of the public to protect, restore, study and manage the precious natural ecosystems of the Chicago region. The coalition has developed a Biodiversity Recovery Plan that has been adopted by two regional planning agencies and 40 other government and private entities. The plan received the American Planning Association's 2001 Outstanding Planning Award. In the plan, The Chicago Wilderness identified a regional conservation reserve network that includes more than 200,000 acres of protected natural lands stretching from southeastern Wisconsin, through northeastern Illinois into northwestern Indiana. Chicago Wilderness also conducts research, ecological monitoring, education and communication, prescribed burning, natural landscaping initiatives, land management programs, such as prairie restoration, technical assistance to local governments, and classroom instruction with hands-on stewardship that has introduced thousands of students to nature.

Each institution participating in Chicago Wilderness adds to the scope and strength of the coalition by contributing its own resources and expertise. Many of these member organizations offer educational and volunteer opportunities to the public. Some welcome individual memberships and offer other opportunities to support their work and the coalition's work. All coalition members serve as resources for those who wish to learn more about nature in the Chicago region, and information about all member organizations can be found on the Chicago Wilderness web site (http://www.chicagowilderness.org). All members have pledged a commitment to the protection, restoration and management of the Chicago region's natural resources. The work is funded by a variety of sources, including member organizations, state and federal government grants, and private sector contributions.

The coalition's publication *Protecting Nature in Your Community* helps guide counties, municipalities, park districts, and wastewater authorities in understanding and using existing tools to preserve biodiversity in their areas of authority (Northeastern Illinois Planning Commission, 1999). Since 90 percent of regional land use decisions are made at the local level by these entities, Chicago Wilderness has wisely chosen to target the guidebook to them. The existing conservation tools include: Comprehensive Plan revisions, compatible zoning and subdivision regulations, improved stormwater management, wetland protection, natural landscaping ordinances, improved wastewater management, open space preservation, natural areas management and restoration, and public education. Each of these tools is described in its own section of the guide with sample language and examples of where it is being applied elsewhere in the Chicago region.

METROPOLITAN CONSERVATION ALLIANCE

The Metropolitan Conservation Alliance is a program of the Wildlife Conservation Society. It focuses on protecting and restoring native wildlife in the New York City Metropolitan area, which includes New York, Connecticut and New Jersey. The basic premise of the program is that planning tools can be used to protect

natural resources. Through the land use planning process, the Alliance works with communities on key policy issues and site-specific problem solving. The Alliance has championed common but sometimes neglected species, and ecosystems that are in decline and lack federal or state protection.

The Alliance's ongoing projects throughout the region include work on biotic corridors, lowland forests, wetland areas and the development of ecologically functional working landscapes. In these projects the Alliance brings together a wide array of stakeholders and experts to discuss and understand the biological, social, economic, and legal aspects of current land use planning systems. It then provides biological information that integrates science and planning practices, and shares it with land use decision-makers and the public. Some communities have completed their own landscape survey work in order to develop conservation overlay zones for their master plans. Such work raises public awareness of conservation values and encourages professionals and decision-makers to increase their knowledge of conservation. The Alliance staff's familiarity with ecology and land use planning practices puts it in a unique position to determine the effectiveness of various land use planning tools and to share that knowledge to promote better habitat stewardship for the benefit of both wildlife and people.

In a recently completed project, the Alliance worked with the New York towns of North Salem, Lewisboro and Pound Ridge to formulate the Eastern Westchester Biotic Corridor. The corridor expands a state delineated Significant Biodiversity Area, the 4,700 acre Ward Pound Ridge Reservation, and identifies ecologically contiguous lands crossing the three townships. The corridor attempts to buffer and maintain the viability of the Ward Pound Ridge Reservation which is located in the center of the corridor and may be too small to support the area's biodiversity on its own.

Traditional conservation relies on land acquisition or conservation easements, but the Eastern Westchester Biotic Corridor project uses a broader set of tools developed by the land use planning process. These tools include special conservation overlay zones, inter-municipal compacts, and better guidelines. Together they produce a more meaningful biological review of development applications. All have been developed with an economically attractive incentive-based approach which maintains the townships' individual authority (Miller and Klemens 2002).

Like other parts of the northeast, these three states are fiercely independent and have a system of government that yields most land use decision-making power to cities, towns and villages. There are 1,600 municipalities in the 31 county tri-state region. To help tackle the problem of coordination, the Alliance worked with the Pace University Land Use Law Center to examine the statutory authority available for regional wildlife protection. The study confirmed the strong role of local government, and that differences between the states may present challenges to adopting a regional conservation framework (Metropolitan Conservation Alliance, 1999). For example, the oversight role of county governments is highly developed in New York, while in New Jersey this role is restricted primarily to agricultural issues, and in Connecticut it is restricted to roads and drainage.

MAINE'S "BEGINNING WITH HABITAT" PROGRAM

Maine's Department of Inland Fisheries and Wildlife began research for its "Beginning with Habitat" program in the mid-1990s. The department had several decades of experience of using zoning and regulation to protect habitat, and had found these methods inadequate at preserving Maine's natural landscape. Through the "Beginning with Habitat" program, the agency developed a series of maps designed to highlight areas of the landscape important to the conservation of biodiversity.

These maps identify habitats of management concern, riparian buffers, and unfragmented landscape blocks.

By 2000, an interagency partnership made up of Maine Department of Inland Fisheries and Wildlife, Maine Natural Areas Program, U.S. Fish and Wildlife Service, Maine State Planning Office, Southern Maine Regional Planning Commission, Maine Audubon Society, and the Wells National Estuarine Research Reserve (Wells) was formed to develop a pilot program of "Beginning with Habitat" in southern Maine. The program is designed to provide communities with scientific information and technical assistance, and each of the partners contributed an element essential to the program's success.

Habitat and wildlife information from other programs was incorporated into the project to produce a consolidated information package for towns to use. Maine Natural Areas Program provided the natural heritage data; U.S. Fish and Wildlife Service provided information on habitats of importance for their priority species; Wells provided information on lands already in conservation; and the State Planning Office provided a wetlands analysis. Recognizing the importance of local planning to the conservation of biodiversity, the partnership developed guidelines for towns seeking to integrate "Beginning with Habitat" information into their local planning efforts. The partnership also provided technical assistance to towns wishing to analyze and use this information. The experience of Maine Audubon Society, Southern Maine Regional Planning Commission, Wells, and the State Planning Office in working with local communities and local planning efforts was especially important in making this effort relevant and understandable to those ultimately using the data. "Beginning with Habitat" has pilot projects in 12 southern Maine coastal towns where development is proceeding at an alarming pace. Because Southern Maine is the northern extent of certain species and the southern extent of others, this region has the richest biodiversity in the state. Conservation efforts are also well established in this area. "Beginning with Habitat" was presented to local and regional area land trusts, while program outreach was being conducted with area towns.

Since the pilot phase of "Beginning with Habitat" the State Planning Office has incorporated the project's data into a package that is distributed to towns receiving comprehensive planning grants. Over 50 towns have now received this data. All of the regional planning commissions in southern Maine have learned about "Beginning with Habitat" and its role in land use planning. The regional planning commissions have also received the project's data for their respective jurisdictions in digital form. A "Beginning with Habitat" website is under development, and it will have downloadable data and some analysis capability along with guidelines for and case studies exploring the use of the information. The Maine Coastal Program is providing grant money for regional use of "Beginning with Habitat". Finally, the State Planning Office is now working with other state agencies to incorporate additional relevant data into this project.

Before initiation of "Beginning with Habitat," the Department of Inland Fisheries and Wildlife and others had completed a statewide assessment of biodiversity associated with forest resources. Maine, like many other states has distinctly separate urban and rural areas. The northern part of the state is largely characterized by extensive industrial timberlands, while the southern portion of the state maintains most of the population and tourist industry. The Forest Resources assessment was useful in assessing biodiversity in the state, but it did not meet the immediate needs of the southern communities, hence the need for "Beginning with Habitat." This program is a good example of natural resource agencies acknowledging their stake in land use decisions involving private lands. It also required a significant change in the way that the state interacts with local governments. To enable local governments to make sound land use decisions, the state had to provide up to date and complete

biodiversity information in a usable format and with technical expertise and assistance. The "Beginning with Habitat" program shows the effectiveness of partnership and its ability to develop a dynamic product by incorporating the strengths each partner brings to the effort.

MINNESOTA METRO GREENWAYS

Minneapolis and St. Paul, Minnesota's Twin Cities, lie at the confluence of three major rivers — the Minnesota, the Mississippi and the St. Croix. Historically an area of extensive oak hardwood forests and tallgrass prairie, the seven county metropolitan area currently retains only five percent of its native habitat. In 1997 a group of planners, developers and conservationists came together to form a greenway and natural areas collaborative. Patterned after the open space and greenway planning work in urban areas of Maryland, Oregon, Florida, Colorado and Illinois, the Metro Greenways effort aims to protect, restore, connect and manage a metro-wide network of regionally and locally significant natural areas, open spaces and corridors. Starting with an existing park network of 45,000 acres, the plan will create the network with natural areas, open space and greenways.

An initial natural resource assessment identified 230,000 acres of habitat (12 percent of the seven county area) that should be protected and restored. Maintaining biodiversity is a significant component of the assessment which also includes identification of lands to maintain the following: habitat for game and nongame wildlife, landscape connectivity, groundwater recharge and improved water quality, examples of native plant communities, or populations of state-listed rare plants, animals and animal aggregations. To create the assessment, a new statewide ground cover classification system was developed by the Department of Natural Resources, the Minnesota Land Cover Classification System.

The collaborative offered many important recommendations in their report called Metro Greenprint: Planning for Nature in the Face of Urban Growth. One of the most significant recommendations was to establish an advisory committee responsible for creating the greenways and natural areas, which would include a detailed mapping process and extensive community involvement. The collaborative would integrate the primary planning for the network with participation from federal, state and local agencies in other areas of environmental concern and on issues involving the built infrastructure. The collaborative also recommended an initial investment of $20 million to jump-start the program and project priority areas. A $500,000 grant program is recommended to encourage community participation in the network, and a sustaining budget of $250,000 for operational support.

The collaborative realized that a diverse array of methods was need to achieve their goals. In their final report, the collaborative presented a summary of regulations, incentives and other planning mechanisms to be used for land protection. By focusing on the seven county area, the individual cities gain a regional perspective, which will help them understand how local conservation activities affect the wider region. Because of its size, quality and connectivity, the land network improves water quality and ecosystem functions, sustains ecological diversity, and provides additional wildlife habitat, while contributing to the human community's economic well being, education, and enjoyment.

In the Metro Greenprint report, the collaborative also provides program goals, which include:

- Identify and develop, through a collaborative process, a network of significant natural areas, open spaces and greenways in the seven county metropolitan area.

- Protect and manage natural areas to sustain their ecological functions.

- Connect, buffer and enhance natural areas, open spaces, outdoor recreational amenities, and cultural resources.

- Ensure that Metro Greenways provides multiple opportunities for regional residents to understand and enjoy their natural resources.

- Build public and political support for a regional land network.

- Create and sustain, through public and private sources, adequate funding to achieve the vision of Metro Greenways.

ALBEMARLE COUNTY, VIRGINIA

Another local approach to conservation planning is being implemented in Albemarle County, Virginia. Albemarle County includes sections of the Blue Ridge Mountains and rolling Piedmont landscapes, an area particularly diverse in plant and freshwater species. The county surrounds the city of Charlottesville and University of Virginia. Before European colonization, forests covered most of the area. Most of the local forests were cleared at some point after the start of European settlement. With the decline of agriculture in the latter part of the twentieth century, forests have returned to much of the original Albemarle landscape. Since the 1970s, the area has experienced rapid growth with sprawl emerging as a major new threat to biological resources. A handful of diminutive freshwater mussels, the rarest of the country's listed species, are found in Albemarle County. These mussels are important indicators of declining ecological system health, and have been instrumental in rallying the community around the issue of conservation. Over the past decade, local public interest groups concerned with conservation of landscape resources have emerged and participated heavily in land use planning.

In a 1992, amendment to its comprehensive plan, Albemarle County called for an inventory of its biological resources. Around this time, Citizens for Albemarle, a local environmental group with many resident scientist members, began a campaign to incorporate biodiversity protection into local land use planning. In 1994, the group began publishing a technical handbook for residents who wished to participate in the formal proceedings that are part of the land use planning process. In 1996, it published a booklet that reviewed the biological history of the county and pointed out the need for explicit consideration of biological conservation in local government planning. During the update of the natural resources section of the county comprehensive plan in 1997, Citizens for Albemarle proposed creation of a standing county biological advisory committee that would oversee conduct of the biological inventory, and begin development of conservation measures to be integrated into the planning process. In 1999, Albemarle County added a new natural resources chapter to its comprehensive plan, one that provided for creation of the biological advisory committee. The new chapter specifies that the committee's responsibilities will include oversight of a biological inventory, development of biodiversity protection plan and public education program, and otherwise advising the Board of Supervisors on matters related to biodiversity. The standing committee will include both scientists and other interested parties. At present, a biodiversity working group of local scientists and county planning staff are assessing the state of county biological resources. The group is scheduled to report its findings in 2003, and the standing advisory committee should be created soon thereafter.

Virginia state law allows local governments to create "purchase of development rights" programs. They are essentially easements that require properties remain undeveloped. The easements may require management practices aimed at protecting the properties' open space values. In return, local governments compensate the landowners for loss of development rights.

In 2000, Albemarle County created an" acquisition of conservation easements" or "ACE" program, one of the first purchase of development rights programs in Virginia. Proponents of farmland protection initially proposed creation of the program to address a long-standing problem of farmland loss (25,000 acres were lost in Virginia between 1974 and 1992). In the course of public discussions, the program was revised to strengthen protection of water and biological resources. The program code protects both farm and forest lands, specifically mentions biological diversity including aquatic species, and outlines a mechanism for easements involving a review committee with members who have expertise in conservation biology.

LARIMER COUNTY, COLORADO: THE PARTNERSHIP LAND USE SYSTEM

In Colorado, a strong desire to preserve the ranching way of life has prompted communities to examine and modify their land use planning laws in a way that combines growth management and ecological information. In a region with strong feelings about private property rights, this is a tricky balancing act. In 1994, the Larimer County Commissioners initiated a project to examine and revise the county's land use planning system. This project has come to be known as the Partnership Land Use System or PLUS, which was developed "to maintain and enhance . . . [the] county's quality of life and to be fundamentally fair to all our citizens and to respect their individual rights."

In the first phase of Partnership Land Use System, project partners worked with ecologists to identify areas of the landscape in need of protection. The group settled on four landscape features: conservation sites for rare species, habitat for economically important species, areas of high species richness, and rare plant communities. Each of these features was worked into a map of the entire county. Using the maps, areas requiring Habitat Mitigation Plans were identified, and before any changes in land use may occur, it must be determined to what extent they will affect these land features, and how mitigation will be accomplished, on- or off-site. These requirements provide developers operating in the county with a predictable process and information about environmentally sensitive lands prior to initiation of a permit application or proposal. The ecological data is updated regularly, allowing for reassessment, and creating a more dynamic land use planning process.

The second phase of the process, development of a new land use code, was completed in 1999. Besides requiring Habitat Mitigation Plans in designated areas, the code requires clustered development in rural subdivisions to protect sensitive natural areas and agricultural lands. The amount of open land preserved within the subdivisions has varied from 50 to 80 percent, with its protection lasting from 40 years to perpetuity.

The Partnership Land Use System allows planners to address open space loss in a flexible fashion. To assist rural landowners in designing limited development and preservation options for their property, Larimer County has established the Rural Land Use Center.

Larimer County's land use planning approach does not focus specifically on biodiversity. However, with national parks and forests in the county, residents have come to consider wildlife and natural resources, along with rural land uses, essential to their quality of life, and thus expect to protect biodiversity in their communities. As more Colorado communities become aware that not only wildlife and rare species are at risk, but also their ranching way of life, they may embrace the land use planning and information technology that enables them to document and thus help preserve the landscape they value. These conflicts are being played out all over the developing west; the Partnership Land Use System offers an attempt to resolve some of these dilemmas.

ARIZONA	LEAD AGENCY / ORGANIZATION / WEB ADDRESS	CONTACT PERSON
Sonoran Desert Conservation Plan	Pima County Board of Supervisors http://www.co.pima.az.us/cmo/sdcp/index.html	Chuck Huckelberry 520-740-8162 chh@exchange.co.pima.az.us
CALIFORNIA		
Riverside County Integrated Project	Riverside County Transportation & Land Management Agency http://www.rcip.org	Richard Lashbrook 909-955-6742 rlashbro@co.riverside.ca.us
Coachella Valley MSHCP	Coachella Valley Association of Governments http://www.cvag.org/mshcp/index.htm	Jim Sullivan 760-346-1127 X117 jsullivan@cvag.org
San Diego County MSHCP	City of San Diego http://www.sannet.gov/mscp/	Randy Rodriguez 619-533-4524 rfrodriguez@sandiego.gov
Placer Legacy Program	Placer County Planning Department http://www.placer.ca.gov/planning/legacy/	Loren Clark 530-889-7470 lclark@placer.ca.gov
COLORADO		
Partnership Land Use System	Larimer County Planning & Building Services Division http://www.co.larimer.co.us/	Jill Bennett 970-498-7689 bennettvj@larimer.org
FLORIDA		
Florida Closing the Gaps Project	Florida Fish and Wildlife Conservation Commission http://floridaconservation.org/oes/habitat_sec/pubs.htm	Randy Kautz 850-488-6661 kautzr@fwc.state.fl.us
Florida Ecological Network Project	Florida Greenways Commission http://www.geoplan.ufl.edu/projects/greenways/ greenwayindex.html	Tom Hoctor 352-392-5037 tomh@geoplan.ufl.edu
ILLINOIS (METRO)		
Chicago Wilderness	Chicago Wilderness Coalition http://www.chiwild.org	John Paige 312-4540400 paige@nipc.org
MAINE		
Beginning with Habitat Program	Maine State Planning Office http://www.state.me.us/newsletter/Aug2001/habitat.htm	Liz Hertz 207-287-8935 elizabeth.hertz@state.me.us
MARYLAND		
Maryland GreenPrint Program	Maryland Department of Natural Resources http://www.dnr.state.md.us/greenways/greenprint/	David Burke 410-260-8705 dburke@dnr.state.md.us
Baltimore Greenways	Baltimore County Department of Environmental Protection & Resource Management http://www.co.ba.md.us/p.cfm/agencies/deprm/index.cfm	Don Outen 410-887-5683 douten@co.ba.md.us

MASSACHUSETTS	LEAD AGENCY / ORGANIZATION / WEB ADDRESS	CONTACT PERSON
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MINNESOTA		
Metro Greenways Program	Minnesota Department of Natural Resources http://www.dnr.state.mn.us/greenways/index.html	Bill Penning 651-793-3981 bill.penning@dnr.state.mn.us
NEVADA		
Clark County MSHCP	Clark County Department of Comprehensive Planning http://www.co.clark.nv.us/comprehensive_planning/ Environmental	Ron Gregory 702-455-4181 RGY@co.clark.nv.us
NEW JERSEY		
Landscape Project	New Jersey Division of Wildlife http://www.state.nj.us/dep/fgw/lndscpe.htm	Larry Niles 609-292-9101l niles@dep.state.nj.us
Pinelands National Reserve	New Jersey Pinelands Commission http://www.state.nj.us/pinelands/	Annette Barbaccia 609-894-7300 abarbacc@njpines.state.nj.us
NEW YORK (METRO)		
Metropolitan Conservation Alliance	Wildlife Conservation Society http://wcs.org/home/wild/northamerica/973/	Michael Klemens 914-925-9175 mwklemens@aol.com
OREGON		
Oregon Biodiversity Project	Defenders of Wildlife http://www.biodiversitypartners.org	Bruce Taylor 503-697-3222 btaylor@defenders.org
West Eugene Wetlands Plan	Lane Council of Governments http://www.ci.eugene.or.us/wewetlands/default.htm	Steve Gordon 541-682-4426 sgordon@lane.cog.or.us
VIRGINIA		
Biodiversity update to Comprehensive Plan	Albemarle County Department of Planning & Community Development http://www.albemarle.org	Scott Clark 434-296-5823 X 3325 sclark@albemarle.org
WASHINGTON		
Ecoregional Conservation Planning Project	Washington Department of Fish and Wildlife http://www.wa.gov/wdfw/hab/phspage.htm	Elizabeth Rodrick 360-902-2696 RODRIEAR@dfw.wa.gov
Puget Sound Demonstration Project	Kitsap County http://www.kitsapgov.com/nr/chico.htm	Chris Parsons 360-725-3058 chrisP@CTED.WA.GOV

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We gratefully acknowledge the support of the Doris Duke Charitable Foundation in the production of this report

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Defenders of Wildlife is dedicated to the protection of all native wild animals and plants in their natural communities. We focus our programs on what scientists consider two of the most serious environmental threats to the planet: the accelerating rate of extinction of species and the associated loss of biological diversity, and habitat alteration and destruction. Long known for our leadership on endangered species issues, Defenders of Wildlife also advocates new approaches to wildlife conservation that will help keep species from becoming endangered. Our programs encourage protection of entire ecosystems and interconnected habitats while protecting predators that serve as indicator species for ecosystem health.

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