THE URBAN OPEN SPACE MANAGER

A newsletter about wildlife and nature conservation in urban areas

Volume 1, Number 1 1996

Editor's Note

This is the first issue of *The Urban Open Space Manager*, a quarterly newsletter about wildlife and nature conservation in urban, suburban, and urbanizing areas. My objective is to provide useful, practical information to land managers and planners, landscape architects, biologists, and others interested in wildlife and nature conservation in the metropolitan environment. I have worked as an urban wildlife biologist for almost 20 years and will draw on my own experiences as well as those of others. In addition, a substantial literature base is developing in the fields of wildlife biology, planning, and landscape architecture related to the subject area, and this material will be used.

Over the years, I've seen growing interest on the part of counties and cities in placing greater emphasis on urban wildlife and nature conservation. "Natural resources" and "wildlife" have crept into organizational charts--the Natural Resources Group of the New York City Department of Parks and Recreation; the Fort Collins Natural Resources Division (Colo.); the King County Wildlife Program (Wash.), and the Montgomery County Natural Resources Management Program (Md.). There are others. This is an encouraging sign for those of us devoted to wildlife and nature conservation, and I hope it continues.

I welcome your feedback on *The Urban Open Space Manager*. Please tell me what you like or do not like about its coverage. How could it be made more useful to you? Topics you would like to see addressed in future issues are eagerly sought.

--Lowell Adams, editor

Urban Savannas

Savanna landscapes figure prominently in the metropolitan environment. Urban parks, residential areas, and many other sites are characterized by scattered mature trees and grass ground cover with little or no shrub layer. Human preference research shows that both adults and children prefer savannas over habitats like coniferous forests, deciduous forests, tropical forests, deserts, wetlands, or prairies. A widely-held theory for this observation states that humans prefer savanna landscapes because they evolved in such landscapes in Africa.

Savannas have certain structural characteristics that are appealing to people. Mature, even-aged trees that provide high overstory canopy rate high. In addition, "openness" is important, with maximum tree density of 40-65 trees per acre and little or no middlestory separating short grass ground cover and the tree canopy. Neatness is preferred. Comments regarding natural areas often refer to such areas as "messy," "overgrown," or "unkept."

Paul Gobster, a research social scientist with the U.S. Forest Service in Chicago is interested in determining whether or not human preferences can be used to restore natural savanna landscapes in or near urban areas. His research has focused on Midwest oak savannas, which have been largely destroyed by humans. Gobster's work points out that, although many people favor the structural qualities of oak savanna, they react negatively to management techniques like tree cutting, burning, or use of herbicides needed to maintain these habitats. He recommends several guidelines for gaining public support in planning and implementing restoration projects. At the outset, be sensitive to the location and size of the restoration relative to where people live. In high human use areas, restoration projects that are small and garden-like will be more acceptable than large projects with little management. Small projects of this nature will serve more as symbols rather than working ecosystems, but they have education value as well as aesthetic appeal. Use design cues, like an attractive rail fence or a mowed strip to separate the restoration area from higher human use areas. Gobster further recommends the use of on-site signage, newsletters, and other outlets to interpret the management practices needed to maintain a restored savanna. The use of fire, for example, is an important management tool but has a negative public image. Finally, Gobster recommends that restorationists involve the public in an active way with a project. Judicious use of nature trails can help to educate interested citizens with regard to the restoration effort. Sponsored tours can be

conducted for the same purpose. Involving the public actively in restoration management practices also will help to communicate management needs to maintain a savanna landscape.

Reference: *Restoration & Management Notes* 12(1):64-71, 1994.

Urban Open Space and Children

What kind of open space do inner-city children prefer? In the summer of 1991, Paul Gobster of the USDA Forest Service examined inner-city children's preferences for different natural ecosystems. He was interested in identifying levels of naturalness most preferred and studied 62 African-American boys and girls from 5-12 years old who were Chicago Housing Authority residents. The children viewed and rated their preferences for color slides of various urban landscapes. Gobster found a moderately strong, negative relationship between preference and level of naturalness. Low to moderate levels of naturalness were preferred; as landscapes became more natural, they were less preferred. Gobster recommended considering the level of naturalness in the design and management of parks and natural areas for children. "Providing settings with moderate levels of naturalness where children feel comfortable might foster greater appreciation and learning, and encourage children to explore wilder settings without trepidation." This could be done by making some areas more highly developed with trails and signs and leaving other areas more natural. Children might be encouraged to use the less wild areas but not feel too fearful of the presence of more natural areas.

Reference: *Proceedings of the 1993 Northeastern Recreation Research Symposium*. Gen. Tech. Rep. NE-185, USDA Forest Service.

More on Open Space

"Cluster" development seems to be gaining favor as an alternative to "suburban sprawl," which is widespread throughout the metropolitan areas of the United States. Clustering may allow the same number of dwelling units as permitted under traditional development, although it is quite common to give density bonuses to developers choosing the cluster design. Lot sizes are smaller and dwellings are grouped, thus the general plan incorporates common open space that would be lacking from a traditional development plan.

Cluster development offers many benefits, including reduced road-building and utility costs, and lower municipal and public service costs. In addition, habitats like floodplains and wetlands can be protected, and park and greenway systems can be created to benefit both people and wildlife.

In the October 1994 issue of *Zoning News*, authors Dan Biver and Sarah Bohlen discuss the use of cluster developments, or open space developments. They include a sample community ordinance that is a composite of the best provisions from across the country. The most common titles for such ordinances are "Cluster Development Ordinance," or "Open Space Development Ordinance." Clear definitions are needed to avoid confusion about what developments qualify for clustering. The intent or purpose of the ordinance also should be clear. The community must decide what it deems important and what must be preserved. The application procedure should describe the process and requirements for submitting a cluster development proposal.

Biver and Bohlen suggest that open space provisions can best be obtained through measures such as overlay zones, performance-based zoning, and density bonuses. An overlay district is a set of additional regulations superimposed over base district requirements to protect some resource like steep hillsides or scenic rivers. Performance-based zoning protects resources by regulating the impact of uses rather than the uses themselves. Instead of allowing uses "by right," this zoning grants special permits if proposed uses satisfy performance criteria. Density bonuses of additional dwelling units can be offered to developers choosing clustering to preserve open space.

Lastly, Biver and Bohlen point out that the ordinance must have a clear section on "Design Standards and Review." This section should include the method of calculating overall dwelling density, infrastructure requirements for roads and provisions of utilities, permitted types of dwellings and the physical design standards, criteria establishing dimensions of lots, setbacks, and road frontages, the amounts and types of buffers required, and open space requirements.

A good example of the value of clustering comes from Columbia, Maryland. There, 1,000 acres of valuable riparian habitat was slated for single-family detached housing. Local citizens, including knowledgeable biologists, convinced the developer and local authorities that the area should be preserved. As a result, the development plan was modified, slightly increasing planned housing density elsewhere in Co-

lumbia in order to preserve this natural area. The site not only will now retain its value to numerous wildlife species, but also will be of exceptional value to people. It will be used as an environmental study area for school children, and adults will have access to the nature trails and other facilities and programs as well.

Reference: *Zoning News*, October 1994, published by the American Planning Association, Chicago, and *Urban Wildlife Habitats: A Landscape Perspective*, University of Minnesota Press, 1994.

American Network of Parks and Open Space

In early 1994, at the request of the National Park Service Director, the National Park System Advisory Board formed a committee to review federal assistance programs to state and local authorities under the Land and Water Conservation Fund and the Urban Park and Recreation Recovery Program. Among its recommendations, the committee states "We envision a network of parks, preserves, open spaces, greenways and recreation areas stretching across this nation, touching all communities, and accessible to all Americans. This network will be crafted by new partnerships among local, state and federal governments and the private sector, and will be based upon the active involvement and participation of a broad spectrum of citizens."

Reference: *An American Network of Parks and Open Space: Creating a Conservation and Recreation Legacy*, National Park Service, Washington, D.C., 1994.

Urban Deer

Deer populations continue to increase in many metropolitan areas throughout North America. It is commonly thought by many urbanites that this is the result of animals being driven into such areas because of surrounding development of the rural countryside (in other words the animals have nowhere else to go). There may be some truth to this because deer are quite mobile and will be pushed out of areas under development. However, deer populations are up throughout broad regions of North America and their rise in urban areas is mostly due to suitable food and cover, protection from hunting, and few natural predators.

Restoration of deer is a real success story of wildlife conservation because populations of both white-tailed and mule deer were decimated following settlement of North America by Europeans. This destruction resulted primarily from habitat loss (largely as a result of the cutting of forests followed by agricultural development) and unregulated hunting.

Estimates place precolonial deer densities at 8-11 deer per square mile. Many metropolitan areas have densities of 60-90 deer per square mile (or even greater). Such high populations have a big impact on the ecosystem. All vegetation within reach is consumed as food, resulting in loss of ground cover and shrub layer. Preferred plant species are browsed preferentially over less palatable species, altering the species composition of the forest. These habitat alterations are detrimental to ground and low shrub nesting birds and other species. High deer populations also result in more deer-vehicle collisions and damage to property. In some parts of the country, concern about Lyme disease is a major issue.

How do you manage such populations? Wildlife professionals, state and local authorities, and citizens are confronted with this question. Wildlife biologist Dr. Paul Curtis and colleagues at Cornell University and New York State Department of Environmental Conservation, Bureau of Wildlife, have been involved with this issue in the Rochester, New York, metropolitan area. They believe strongly that citizens need to be involved in policy decisions and formulation of management plans.

In the Rochester metropolitan area, an 11-member citizen task force was assembled and charged with two tasks: (1) to recommend a suitable deer population size for the area and (2) to recommend management strategies for achieving the desired population. An attempt was made to include diverse community interests on the task force and at least one hunter, gardener, motorist, animal welfare advocate, farmer, and homeowner was included. Dr. Curtis (Cornell Cooperative Extension) served as a third party facilitator.

Task force members individually recommended a deer population size from no change in the present population to an 80% decrease of the population. Eight members wanted a decrease in the population, whereas three thought that no change was warranted. After further deliberation, the task force recommended a population density of 20-25 deer per square mile in quality deer habitat. The task force further recommended, for the short term, that selective culling by professional sharpshooters be implemented in the Town of Irondequoit, with immunocontraception to be pursued as a long-term preferred method of population stabilization. Police officers were selected to carry out the culling

operation, which consisted of shooting deer over bait at night in Durand Eastman Park in the town. It is hoped that immunocontraception, currently in the research stage, will prove practical as a long-term solution to maintaining an acceptable deer population.

Reference: Much of the material for this article came from the *Transactions of the 58th North American Wildlife and Natural Resources Conference*, 1993, published by the Wildlife Management Institute, Washington, D.C., and from personal communication with staff of the Human Dimensions Research Unit in the Department of Natural Resources at Cornell University, Ithaca, N.Y.

More on Urban Deer

Pennypack Wilderness Preserve, an 813-acre tract surrounded by suburbia some 15 miles northeast of Philadelphia, is owned and managed by the Pennypack Ecological Restoration Trust. The preserve hosts a large deer population--estimated deer density in 1984 was 233 per square mile. Because of severe overbrowsing, there is no evidence of tree seedling regeneration except for unpalatable species like black cherry, sweet cherry, tree-of-heaven, and Ohio buckeye.

Hunting was initiated in the preserve and surrounding area to reduce the deer population. This activity was conducted by a sportsmen's association and tightly controlled. Most deer have been taken by archers; a few by shotgun hunters. Under present hunting permit allotments, the herd appears to have stabilized at about 140 deer per square mile, seven times higher that the density recommended by the Pennsylvania Game Commission. The Game Commission has increased the number of antlerless permits for the area and further reduction of the herd should follow to the goal of about 20 deer per square mile. This density should allow for natural tree and shrub regeneration. In addition, tree, shrub, and herbaceous species can be planted with good assurance that they will grow.

Reference: David J. Robertson, White-tailed deer management in the Pennypack Wilderness Preserve (Pennsylvania), *Restoration & Management Notes* 12(2):206-207, 1994.

Strife for Purple Loosestrife?

Purple loosestrife, a mainly aquatic plant of Eurasian origin, is now well established and spreading in North America. Its introduction in the United States probably was through a variety of means, including importation from English gardens of the 17th, 18th, and early 19th centuries for use in early American flower gardens. The plant offers a striking floral display and its use in garden and border plantings continues in Canada and the United States. Biologists are primarily concerned with purple loosestrife's ability to replace native wetland plant communities with solid stands of loosestrife of little value to wildlife. A promising control measure is the deliberate use of natural insect enemies. Five species of beetles showing high host specificity have been researched and federally approved for introduction into the U.S. Dr. Richard Malecki, of the Coopera tive Wildlife Research Unit, Cornell University, directed this work. Hopes are to reduce purple loosestrife abundance over the next 15-20 years to approximately 10% of its current level over 90% of its North American range. In Europe, loosestrife is a minor member of the plant community, not a dominant plant.

Reference: *Fish and Wildlife Reference Service Newsletter*, No. 104 (1995), and *Urban Wildlife Habitats: A Landscape Perspective*, University of Minnesota Press (1994).

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Municipal Wildlife Management Plans

A relatively recent trend in the United States has been emergence of urban wildlife programs within city and county governments. A major portion of this issue of *The Urban Open Space Manager* is devoted to Seattle's Urban Wildlife and Habitat Management Plan. Future issues will focus on programs of other cities and urban counties.

Seattle's plan is designed to integrate nature and people in the city's parks and open spaces; it is part of the comprehensive plan of the Department of Parks and Recreation, which manages some 6,000 acres of land within Seattle. The Seattle Urban Wildlife and Habitat Management Plan incorporates three major components: 1) goals, 2) preliminary wildlife and habitat inventory, and 3) specific management plans.

Plan Goals

The following seven goals were developed for the Seattle program. They were formulated after several focus group sessions and a public meeting soliciting citizen input.

o Continue and increase wildlife habitat protection and enhancement efforts.
o Protect and enhance wildlife populations.
o Develop and maintain a wildlife resource inventory.
o Provide environmental education, using wildlife resources.
o Promote volunteer involvement in wildlife and habitat protection and enhancement.
o Promote internal education and consistency in Department actions.
o Promote interdepartmental and interagency cooperation to protect wildlife.

Wildlife and Habitat Inventory

Wildlife is defined broadly in the Seattle management plan and includes saltwater and freshwater fish, aquatic and terrestrial invertebrates, amphibians, reptiles, birds, and mammals. A preliminary inventory was based largely on existing information in various reports and journal articles, aerial photo interpretation, and limited field work consisting of brief walking and driving surveys. This effort revealed a lack of information on wildlife resources of the city. Inventory information was entered into a computer database that can be updated. It will be linked to the city's geographic information system and will be available for use in the planning process.

Wildlife habitats were classified based on the draft classification systems used by the Washington State Gap Analysis Project and the Interagency Committee for Outdoor Recreation. More than 45 habitat types were recorded within Department lands.

Specific Management Plans

Specific wildlife and habitat management plans for Seattle's parks and open spaces were developed to meet each of the goals listed above. Management plans are summarized here for each of the seven goals.

Continue and Increase Wildlife Habitat Protection and Enhancement Efforts

Parks are for people and human use should be encouraged. However, excessive use can destroy qualities that attract people in the first place. One technique for managing human use is to develop access to highly attractive wildlife viewing areas to avoid disturbance of wildlife, trampling of vegetation, erosion of streams, and similar problems. Protection of habitats is aided by use of signage, such as "wildlife habitat area," or "wildlife protection zone." Also, by fencing, plantings, or other means, erosion along trails can be reduced.

Structural diversity of habitat should be maintained or enhanced by allowing grasses and forbs to grow to maturity and by encouraging development of shrubs and secondary forest canopy, either through the natural process of plant succession or by planting. Snags should be retained where possible, and, in landscaped areas, native plants providing food and cover should be used. Regulations should be enforced with regard to

free-roaming pets and unauthorized human encampments.

Special attention should be given to critical, sensitive, rare, or uncommon habitats. These should be expanded through planting where possible. Often, such habitats are threatened by exotic plants. Invasive exotics should be removed (or controlled) and native plant communities should be promoted, with native species used in revegetation efforts. The Department might maintain nursery stock of native plants for this purpose. In addition, native plants could be salvaged from areas undergoing development and used elsewhere. Research into exotic plant control should be encouraged.

Attention should be paid to overall landscape design. In this regard, large blocks of habitat should be favored, and, where possible, these should be connected by habitat corridors.

The city also should encourage protection of habitats that lie outside jurisdiction of the Department of Parks and Recreation. There are various techniques available for such purpose. A number of tax incentive measures could be encouraged, including use of conservation easements. Land donations, transfer of lands to the Department from other city agencies, acquisition, and regulation are other measures that could be used.

Protect and Enhance Wildlife Populations

Urbanization and other human developments often lead to local extinction of some wildlife species. Where this has occurred, native species should be reintroduced, if possible. Control of exotic species, which often serve as strong competitors to native species, may be needed. Bullfrogs and snapping turtles are examples.

Particularly sensitive species, or those occurring in low numbers, may need special protection. Extra protection at breeding and feeding sites may be called for. For example, restrictions on human activity, including low-flying aircraft, may be needed during the breeding season. And control of free-roaming domestic animals may be needed.

Develop and Maintain a Wildlife Resource Inventory

A wildlife resource inventory should include a description and map of each habitat area. Also to be included are dominant plant species and canopy cover for each vegetative layer, density of vegetation, and any habitat degradation or special wildlife features. Particular attention should be focused on wetlands, stream habitats, fish spawning sites, kelp and eelgrass beds, marine mammal haul-out areas, and habitat for special status species.

Both formal and informal wildlife surveys should be conducted. For each species, formal surveys should include its abundance, breeding status, and exact location of breeding site if known. Also to be included are season of the year and specific habitat area (with a description of habitat type). Standardized field data collection forms would aid in this effort. Informal observations should be collected and added to the database.

Provide Environmental Education Using Wildlife Resources

Public environmental education should be an important function of the Department of Parks and Recreation. This might include active measures like short courses and single classes on natural history, ecology, wildlife biology, plant and animal identification, ecological principles, and life history of park animals. Collaboration among park naturalists, Seattle Office of Education, local school teachers and college professors, The Wildlife Society, Washington Native Plant Society, and neighborhood-community groups and churches will assist this effort. For example, working closely with the Seattle Office of Education, parks and other public greenspaces might be used for field trips and other educational programs. Passive educational measures could include signs, kiosks, brochures, and self-guided nature trails.

Continuing education of park staff and staff of other city departments also is important. Some of this could be handled internally by knowledgeable staff and some could be handled externally by encouraging staff to attend courses at local colleges and universities, and encouraging instructors to provide on-site courses.

Biological research should be promoted in city parks. Local college and university professors might be encouraged by the Department providing assistance in the form of facilities and perhaps equipment. Specific research of direct interest to the Department should be encouraged.

Finally, an ecology-biology library should be developed and maintained and be open to staff as well as to the interested public. Access should be available to park management plans, research papers, species checklists, vegetation maps, aerial photos, environmental impact statements, park videos, and the wildlife resources inventory database.

Promote Volunteer Involvement

Volunteers can be used effectively in assisting park staff with many activities, like restoration of degraded sites. Volunteers also can be effective in assisting with educational programs and generating additional public support for the park and open space system.

Promote Internal Education and Consistency in Department Actions

Wildlife experts should review Department of Parks and Recreation development projects and vegetation management practices. Staff with wildlife expertise should be involved early in the planning process of Department projects. Knowledgeable staff members also can provide insight to protecting and enhancing native plant communities and the impact of various mowing regimes on plants and wildlife.

Promote Interdepartmental and Interagency Cooperation to Protect Wildlife

The Department of Parks and Recreation should provide wildlife information to other city agencies and develop guidelines for wildlife resources on other city properties. The latter might consist of best management practices for various properties. The city's street tree program should be integrated with parks and greenspaces. This would require working with the Engineering Department, local utility, and others. Emphasis should be placed on use of native species and attempts should be made to connect isolated habitat patches with corridors. Collaboration also should occur with federal, state, and county agencies.

Reference: *Urban Wildlife and Habitat Management Plan*, Seattle Department of Parks and Recreation, Seattle, Wash., 1994.

A Colorado Planning Guide

Dr. Del Benson of Colorado State University, in cooperation with the Colorado Chapter of The Wildlife Society, recently developed a planning guide designed to enhance urban areas for both people and wildlife. The basic framework of the guide is presented below.

Steps in Identifying Important Lands and Waters

1. Obtain maps of area.
2. Get input from professionals who manage land, water, and wildlife.
3. Ask citizens and civic groups about "quality of life" features important to the community.
4. Mark habitats on maps that are of immediate concern of being lost or those with potential for wildlife and outdoor recreation values.
5. Make evaluations, working with local professionals and citizens, perhaps using the criteria suggested below.

Evaluation Criteria

A. Species of Local Interest
Rate on a scale, few to many.

B. Rare, Threatened, or Endangered Species
Rate on a scale, few to many.

C. Vertical Vegetation Structure and Diversity
This refers to plants of various heights from grass and flowers to shrubs and trees.
Rate on a scale, low to high.

D. Horizontal Vegetation Structure and Diversity
This refers to the linking together of plants over the landscape.
Rate on a scale, low to high.

E. Patches or Clumps of Vegetation or Topography
Is size sufficient to support major needs of wildlife?
Rate on a scale, small to large.

F. Corridors of Vegetation or Topography
Linkages of plants, ravines, water courses, hills, and other open spaces.
Rate on a scale, few to many.

G. Suitability-Capability
Are habitats suitable for wildlife or capable for improvement?
Rate on a scale, difficult to improve to relatively easy to improve.

H. Other Unique Features (Water, Canals, Rights-of-way, etc.)
List and provide comment.

An excellent video also is available that discusses these steps and evaluation criteria. It illustrates examples with on-the-ground footage and interviews with

local experts and officials.

Reference: *Wildlife habitats in urban areas: planning guide*. Coop. Ext., Colorado State Univ., Fort Collins, and Colorado Chapter of The Wildlife Society, 1992.

Artificial Burrows for Burrowing Owls

Burrowing owls are unlike most other owls in that they are frequently active during the daytime and they nest underground. Two subspecies are found in North America--the "western" owl and the "eastern" one. Western burrowing owls are found from western Minnesota, Iowa, Missouri, and Louisiana, northward into lower British Columbia and Manitoba, and southward through lower California and Mexico, into Central and South America. The eastern owl breeds throughout Florida and southward into the Bahamas and West Indies. Both owls inhabit grassland and prairie habitat.

The western owl generally does not dig its own burrow. Rather, it uses abandoned burrows of prairie dogs and ground squirrels. This owl has declined over the past 150 years as a result of agricultural development, control of prairie dogs and ground squirrels, and urbanization. It is listed as endangered in Minnesota and Iowa, threatened or endangered in several Canadian provinces, and a species of special concern in six western states.

Can owls be relocated to new sites from burrows facing destruction by urban expansion? Research shows that traditional relocation, whereby owls are live-trapped and moved some distance, does not work well. Burrowing owls show strong site tenacity and it is difficult to get them to accept a new site. Most relocated birds vanish and are never seen again. Some return to the original nest site.

Researchers are finding that a slightly different approach to relocation has promise. So-called "passive relocation" refers to birds moving on their own to a new site of "natural" burrows or artificial burrows constructed by humans. In a recent paper published in the *Journal of Field Ornithology*, Lynne Trulio of San Jose State University discusses results of six passive relocations in northern California from 1988 through 1993. In five cases, where new sites were within 82 yards of old sites, owls moved into new burrows within 1 month. The sixth attempt involved a distance of 180 yards and owls did not move to the new site. Results of this, and other work, have led researchers to recommend passive relocation where owl burrows are facing destruction. Because of the owl's strong attachment to an area, artificial burrows should be placed as close as possible to those being destroyed (not more than 110 yards away) and as far as possible from trees, roads, sidewalks and other structures, and human disturbance. Each mated pair of owls should have at least 6.4 acres of open grassland for foraging that is contiguous with or near the burrows. The area can be mowed but use of pesticides and rodent poisons should be discouraged. Readers desiring detailed information about artificial burrow design of tunnels and nest boxes will find such information in Trulio's paper.

Reference: *Journal of Field Ornithology* 66(1):99-106, 1995, and *Urban Wildlife Habitats: A Landscape Perspective*, published by the University of Minnesota Press, 1994.

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Conserving Wildlife in Urbanizing Utah

A cooperative effort of the Utah Division of Wildlife Resources, the Cooperative Extension Service, and Utah State University's Department of Landscape Architecture and Environmental Planning has resulted in publication of *A Wildlife Conservation Manual for Urbanizing Areas in Utah*. The manual calls for including urban wildlife conservation in the master planning process for new and existing developments. It provides information to interested citizens, community leaders, and elected officials as well as technical data for developers, land planners, landscape architects, wildlife biologists, and others. Although focused on the Wasatch Front of Utah, the concepts and ideas apply more broadly to other urban and urbanizing areas. Here I'll focus on two important issues detailed in a section of the manual concerning the planning process--habitat inventory-evaluation and preparation of a conservation-management plan and report.

Habitat Inventory and Evaluation

The goal here is to identify all open space areas in the city or county and rate their value as wildlife habitat. The final products should be a map delineating all open spaces and their ratings as wildlife habitat, and data sheets for each site with pertinent information described below.

A first step in this process involves obtaining aerial photographs and preparing a "base map," which includes public and private ownership patterns. This step also involves preparing site evaluation data forms and compiling wildlife information. Both general information about wildlife in the area and detailed information for specific sites or wildlife species should be collected. Sources of information include state wildlife agencies, other state and federal agencies, university wildlife and planning departments, local planning offices, local nature clubs and groups, and libraries.

A second step in habitat inventory and evaluation is identifying and describing publicly owned open spaces and underdeveloped areas. From aerial photographs, plant community types should be marked for each site. Suggested categories are barren land, aquatic area, wetland (cattail or salt grass), grassland/shrubland, shrubland, woodland (deciduous or coniferous), riparian, managed open space, or agricultural land.

Information obtained in the office should be ground-truthed in the field. Once in the field, the general condition of a site, and level of disturbance, can be assessed. Information gathered will be used in the habitat rating system and in preparing the conservation-management plan.

After completing the above steps, wildlife professionals should be consulted, with the aim of ensuring accuracy and having the best available information on which to make evaluations. (Ed. note: If time and budget allow, wildlife biologists could assist with the above steps as well, including the collection of original wildlife and vegetation data.)

Following habitat inventory, hard decisions must be made concerning which habitats are more valuable than others, realizing that development will occur and should take place on the least valuable wildlife habitats. A fairly simple classification scheme is proposed to rate habitats as of primary, secondary, or tertiary importance. Primary habitats support, or could support, a wide variety of species. Diversity and structure of the plant community are high. Habitat of rare or endangered species is included here. Secondary habitats are of potential importance to the urban public. Included here are areas close to education, recreation, and other institutional facilities. Green corridors through the city or county are included as are sites already used extensively by the public for wildlife-related recreation. Tertiary habitats provide few of the necessities for supporting a diverse wildlife community. Site restoration is necessary here before the potential of the habitat can be realized.

Sites are evaluated with the aid of an evaluation form listing primary factors (for identifying primary habitat characteristics) and secondary factors (for determining secondary habitat characteristics). A site information form also is used as a checklist of habitat characteristics to look for. A rough map is prepared showing the classified habitats.

Wildlife professionals should review the rough map and site information form. At this point, review by an advisory board, city or county staff, and elected officials would be appropriate. Preparation of the final habitat map, showing all sites and habitat ratings, follows such review. The final habitat map and site information forms provide the bases for preparation of the conservation and management plan.

Conservation and Management Plan and Report

A conservation-management plan and report should present findings of the habitat inventory and reflect community attitudes toward wildlife. Each community should write a specific goal statement and formulate objectives for meeting goals. The following goals, from Tylka et al. (1987), should apply to most communities: "To establish and maintain diverse, self-sustaining urban wildlife populations at population levels in harmony with ecological, social, and economic values of the human community; to develop optimal levels of appreciation and use of urban wildlife and associated habitats; and to promote support for the state fish and wildlife agency."

The conservation-management plan consists of two parts, a map showing the pattern of wildlife habitat to be preserved, enhanced, or restored for the city or county, and a report that describes the plan, argues for its adoption as public policy, and details programs necessary for its implementation.

Preparing the Plan

Consider habitat size, connectivity, and diversity in plan preparation. Large habitat patches are better than small ones, although small patches can be useful as "stepping stones" to larger parcels. Use corridors to maintain connectivity among patches. Maintaining structural diversity and historical habitats are important in maintaining native species diversity. Include in the plan all or portions of habitat types rated as primary that are:

a. aquatic areas, including wetlands and riparian areas.
b. habitat patches containing unique flora or are essential habitat for unique fauna, and patches that are irreplaceable as sources of food, cover, or water, or serve as sites for reproduction.
c. undisturbed sites or are representative of the region.
d. migration corridors or corridors linking habitat patches.
e. managed open spaces.

Consider including in the plan all or portions of habitat types rated as primary that do not conform to the above, or secondary or tertiary habitats that:

a. are complete habitat corridors.
b. provide habitat (through enhancement-restoration) in sections of the city or county lacking wildlife habitat.
c. enlarge primary or secondary habitats or increase the length of edge.
d. provide buffers between major urban developments and highly sensitive wildlife habitats.
e. provide safe, attractive footpaths between major public facilities (e.g., schools) and wildlife habitat areas.

At this stage, prepare a new map showing desired habitats to retain along with public and private ownership boundaries. Have this map reviewed by the state wildlife agency and city or county planning staff. Retention of habitat on public property will depend on policies and programs developed by the advisory board, approved by elected officials, and adopted by local agency department heads. Retention of habitat on private property will depend on incentive programs and regulations promulgated by the advisory board and approved by elected officials.

Preparing the Report

The report should include a statement of goals and objectives and a discussion of benefits and costs of the plan. Describe how the plan will benefit the entire community, including discussion of economic, educational, quality-of-life, and environmental values. Also include recommended specific actions and program priorities that will lead to implementation of the plan. Incentives and regulations for private lands should be detailed along with management guidelines for public lands. The report should be submitted along with the plan to elected officials and government departments when a formal application is made for plan approval. Once the plan is approved by elected officials (following public hearings, approval of local planning staff, planning and zoning commission, and legal counsel), it will become part of the city or county comprehensive master plan.

Reference: *A Wildlife Conservation Manual for Urbanizing Areas in Utah*, Utah Division of Wildlife Resourc-

es, Salt Lake City, 1993, and David Tylka et al. *in Integrating Man and Nature in the Metropolitan Environment*, Natl. Inst. for Urban Wildl., Columbia, Md., page 199, 1987.

Metropolitan Open Space Systems

The Durban, South Africa, Model

The implementation of a Metropolitan Open Space System (MOSS) in South Africa is most advanced in Durban, where the system is known as D'MOSS. The concept for the system was originally proposed by the Natal Branch of the Wildlife Society of Southern Africa in the early 1970s. Its purpose is to improve the long-term quality of life for Durban residents and to preserve viable and representative examples of the region's indigenous plant and animal communities within the city. Envisaged is an open space network of nine parks, based on river valleys and the coastline of municipal Durban, that "integrates the needs of recreation, conservation, amenity, engineering services and security within a low-cost structure."

Design of the D'MOSS system incorporates three basic principles in an attempt to maximize ecological viability: 1) maximized reserve areas, 2) maximized landscape continuity, and 3) minimized system linearity. Three design categories are recognized. **Core Conservation Areas** are indigenous community types where conservation is the primary function. They are linked by **Dispersal Corridors. Buffer Areas** are other open spaces, like sports fields, golf courses, parks, cemeteries, industrial parks, private gardens, and road and rail rights-of-way. Consideration should be given to managing these areas more effectively to favor indigenous species composition and diversity.

The D'MOSS model recognizes that an open space system must be multifunctional to meet the needs of people. Examples of uses within the system to meet such needs include small-scale urban agriculture, fish farming, use of wetlands in sewerage systems, and controlled harvesting of traditional medicinal plants.

Reference: *D'Moss: Urban Ecology in Action*, by Debra Roberts. Dept. of Geographical and Environmental Sciences, Univ. of Natal, Durban, South Africa. 4pp.

Natural Areas Management in Bellevue, Washington

Roger Hoesterey, Dan DeWald, and Stacey Good recently prepared a report titled *Stewardship of Natural Areas* for the Parks and Recreation Department of Bellevue, Washington. On page two of the report they state "Urban open spaces must be managed with the same skill and commitment as any other community resource." These authors go on to present a management process for the stewardship of open space, the basic outline of which follows.

Policy Development and Planning

Elements of the planning process for developing a stewardship program for urban open space natural areas should include:

o Defining a community vision. Here the authors suggest including a policy statement within the community comprehensive plan.
o Setting short- and long-term goals and objectives. Important objectives would include ensuring the safety of citizens, improving degraded areas, protecting and enhancing wildlife habitat, providing recreational and educational opportunities, buffering land uses and separating developments, protecting water quality, and building community support. Public education and involvement in developing the plan are important.
o Assessing the capacity of the organization and defining individual roles and responsibilities.

Developing an Operational Plan

One should begin this effort with an inventory of the resource base. Ownership patterns and boundaries should be documented along with the legal history (including any easement restrictions) of each site. Zoning and types of permitted uses should be well understood. Once this is completed, a site specific inventory should be conducted along with resource enhancement recommendations. The site specific inventory should include the following.

Site History

What is the successional history of the site? Has there been logging, livestock grazing, cropping, fire, or flooding? This evaluation will be helpful in determining areas in need of restoration and areas that can accommodate public use.

Site Boundaries

These should be legally defined and identifiable in the field.

Site Liabilities

Human safety in use of the site is considered here. Structures like fences, trails, bridges, and picnic tables should be maintained in good repair. Although highly beneficial to wildlife, the hazard potential of standing dead or dying trees that could fall on houses or otherwise endanger human life must be addressed.

Vegetation

Here one should classify vegetation into cover types. The use of aerial photographs is helpful in this regard. The historical habitat of the site should be determined and future effort made to maintain it or recreate it.

Soils, Hydrology, and Topography

Soils on site should be determined. If available, soil surveys of the Soil Conservation Service (now Natural Resources Conservation Service) will provide adequate detail. Knowledge of site hydrology will elucidate watersheds and drainage patterns, stormwater capacity, and wetlands. Knowledge of site topography will help define steep slopes and other features. U. S. Geological Survey maps and other aids are helpful in this regard.

Wildlife Habitats and Corridors

Wildlife is an important component of urban open spaces. It is rated high in public surveys of open space users and also is a measure of environmental health. Habitat should be assessed (determine plant community types) and wildlife inventoried. Any natural corridors should be determined and future efforts made to link natural areas with corridors. Stream corridors are particularly important.

Recreation and Trails

Provision for recreation and trails should be well thought out and planned for with the aim of meeting the needs of the community and minimizing detrimental impact to the natural qualities of the site. Impact to sensitive areas can be minimized by channeling human use away from them. Some factors important to consider in planning and designing trails include:

o Types of users and their safety in use of the trail.
o Type of trail. Is it for single or multiple uses?
o How does the trail fit into the landscape?
o What type of surface is needed?
o Keep trail grade below 20% (will help control erosion and will facilitate human travel) and construct to a width of 4-6 feet if possible (this will allow two people to walk together). Keep vegetation cleared to a height of 8 feet.
o Make good use of signs.

Environmentally Sensitive Areas

Pay particular attention to streams and wetlands. Readers desiring more information will find stream and wetland care guidelines in the report.

Public Education and Involvement

Individuals, school groups, conservation organizations, and local businesses should be invited to participate in projects. In addition, brochures, slide programs, and videos should be developed for educational purposes.

Stewardship Funding and Budgeting

Open space is a community asset and operation-maintenance (stewardship) funds should be budgeted. It is not enough to simply acquire areas.

Reference: *Stewardship of Natural Areas*, Bellevue Parks and Recreation Department, Resource Management Division, Bellevue, Washington, 1994.

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THE URBAN OPEN SPACE MANAGER

A newsletter about wildlife and nature conservation in urban areas

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More on Urban Open Space in Durban, South Africa

The last issue of *The Urban Open Space Manager* briefly discussed a metropolitan open space system for Durban, South Africa. Some additional information regarding that system is presented in a 1994 paper published in *Environmental Conservation* and authored by Dr. Debra Roberts of the Durban Urban Development Department. According to Dr. Roberts, it is estimated that 79% of the human population in South Africa will be urbanized by the year 2000. Durban is one of the four largest urban areas in South Africa and among the fastest-growing cities in the world. It lies in a diverse biogeographical transition zone where both tropical and temperate plants and animals are found.

In 1983, the Natal Town and Regional Planning Commission established a Metropolitan Open Space System (MOSS) Steering Committee. At about the same time, Durban officials were considering the development of an open space system at a more localized level. An early project of the latter effort was a study that recorded 18 distinct plant communities within the municipality. These were grouped into five community types.

With a goal of preserving some of the original South African landscape (including native plants and animals) as Durban continues to urbanize, Dr. Roberts and her colleagues were faced with a central question: How can this be done? Their adherence to island biogeography theory was discussed in the last issue of *The Urban Open Space Manager*. Two related questions are how large do reserves have to be and how wide do connecting corridors have to be in order to be effective in meeting this goal? These are questions that others are grappling with too. The difficulty one faces in this situation is that there is a lack of good information on these topics. However, the process of urbanization continues, and if one hopes to have any influence on the development process some guidance must be provided. Dr. Roberts recognizes this dilemma and discusses the effort made to estimate minimum area requirements necessary to ensure long-term ecological viability for each community. The methodology utilized resulted in minimum area requirements among the 18 communities ranging from 18 hectares for four (Mangrove Short Forest, Short Closed Grassland, Low Closed Grassland, and Short/Low Closed Grassland) to 272 hectares for Tall Closed Shrubland/Short Closed Grassland Mosaic. All but the Mangrove Short Forest (Mangrove Community) were classified into a grassland complex.

Dr. Roberts estimated minimum corridor width by calculating the diameter of a circle having an area equivalent to the minimum critical area for each community. This figures out to 478 meters for the 18-hectare communities and 1,861 meters for the 272-hectare community. According to Roberts, system development also considered amenity and recreational requirements, economic feasibility, stormwater management, opportunities for environmental education, public security, and community involvement. The plan recognizes the need to consider specific ecological requirements for long-term maintenance, and development of a management plan is currently being coordinated with development of a comprehensive monitoring program.

Reference: *Environmental Conservation* 21(1):11-17, 1994.

Landscape Planning

There is much current concern about loss of the earth's biological diversity (or biodiversity for short). Efforts to slow the destruction of wetlands, rainforests, and endangered species illustrate this concern. However, the human population continues to grow worldwide and is the major cause of decline of these resources. Somehow we've got to learn to live in a "sustainable" way with the earth's resources, including living resources like plants and animals.

Paul Rookwood discusses this subject in a recent article in *Landscape and Urban Planning*. Rookwood argues that, in addition to national and international work in conservation of biological diversity, action is needed at regional and local levels where important decisions are made regarding changes to the physical environment. Landscape planning from an ecological

perspective is needed to help lessen the impact of development. Public support seems to be building for such action. For example, Rookwood notes a shift in cultural values whereby people's attitude toward nature is shifting from one of subduing the earth to one reflecting greater respect and protection of it. There is wider realization of the impacts that humans have on the environment.

In developing a biodiversity plan at regional and local levels, Rookwood recommends the following:

Define Resources to Protect

As a first step, one should clearly define the resources of interest. Is the objective to retain representative habitats of the region, or distinct-unique habitats, or habitats supporting particularly high species or genetic diversity? What is the relative importance of "edge" habitat and "interior" habitat? What is the minimum area required to support species of interest?

Establish the Plan as Legally Binding

A plan that is legally binding will be more effective than one which is only advisory. A strong case can be made for preparing the plan at a regional scale where one can provide a framework for long-term development within which local authorities and private enterprise can operate. By way of example, Rookwood briefly discusses such a planning effort in the San Diego region of southern California. There, some 10,900 square kilometers encompass a diversity of habitats and more than 300 endangered or sensitive species. The plan calls for a connected system of habitat preserves.

Delineate Specific Areas to Protect

Identify areas to be protected on maps. Through a technique called "gap analysis" one can identify any additional conservation measures needed.

Integrate Multiple Open Space Objectives

Urban open spaces provide considerable aesthetic and recreation value to people. Recreation may be "active," like sport activities, or "passive," like hiking or bird watching. Rookwood argues that greater success will be achieved by integrating biodiversity objectives with these other objectives. [Ed. note: I'm reminded of some work done by landscape architect Kerry Dawson a few years ago (*Landscape Journal* 7:170-175, 1988). He pointed out that landscape architects in the past paid attention only to *visual* aesthetics, ignoring *audio* aesthetics. Dawson argued that sound was an important feature to people. He provided research data showing that people, whether living in rural or urban areas, preferred natural sounds, and bird song ranked high on the list. This example illustrates how objectives for landscape aesthetics can be integrated with bird conservation objectives.]

Solicit Public Consultation and Participation

Critical to successful planning is involving all affected citizens in the process. To the extent possible, all interest groups should be identified and invited to assist in preparing the plan. The final plan should be a framework for decision making that will uphold the biodiversity objectives set forth. It should build support and define broad direction. Progress should be continuously monitored and the plan modified periodically as necessary to attain stated objectives. Rookwood does not mention "public education" directly, but he may have had that in mind in connection with "building support" for the plan.

Implement Environmental Regulation and Impact Assessment Within Context of the Plan

Enforcement of environmental regulations in the past has been reactive in nature and applied on a project by project basis, resulting in a fragmented pattern of areas reserved free from development. Rookwood argues that "The application of implementation tools such as environmental regulations and impact assessment procedures needs to occur within the context of a clearly defined plan." For example, adherence to a regional plan calling for maintenance of a connected preserve and corridor system would ensure that individual developments would contribute to regional objectives.

Use Mitigation Effectively

Mitigation is a process of allowing development of certain valuable habitat if habitat elsewhere, either on or off site, is protected, enhanced, or created. How can mitigation be used effectively to meet biodiversity objectives? A regional biodiversity plan should define appropriate receiving areas for mitigation actions.

Development projects in the region, whether inside or outside the specific area, should be required to make mitigation contributions within the area.

Distribute Economic Impact Fairly

Maintaining biodiversity benefits society as a whole, and Rookwood argues that it is unreasonable for a few individuals to pay for such maintenance. He notes that a strong argument can be made for developers bearing the cost of protecting a reasonable level of biodiversity under the principle that those who cause negative impact should pay for it. Under this approach, all new development within a region should contribute equally to cost, regardless of whether or not an individual project impacts habitat targeted for conservation. Financial compensation should be made to landowners whose development potential is restricted. One way of doing this is through "transfer of development rights" whereby a landowner within a desired conservation area can sell development rights to a landowner outside the desired conservation area. The land not developed should be deeded for conservation in perpetuity.

Reference: *Landscape and Urban Planning* 31:379-385, 1995.

Placing Value on Urban Open Space

In a market economy, something must have economic value or it is labeled "worthless." Urban open space must be judged to have value under this system or it likely will not exist. But how do you determine the value of urban open space? It probably holds different values to different people and these may be hard to measure.

Researchers G.D. Garrod and K.G. Willis, of the University of Newcastle upon Tyne, England, grappled with valuing biodiversity and nature conservation at a local level in a recent paper published in *Biodiversity and Conservation*. They used the "contingent valuation method" to assess the value of reserves to members of the Northumberland Wildlife Trust by determining members "willingness to pay" to acquire additional habitat reserves.

The Northumberland Wildlife Trust is part of a network of county wildlife trusts across Britain under the umbrella of the Royal Society for Nature Conservation. The combined membership in these groups is some 200,000 people and the trusts hold and manage over 53,000 hectares of land. The trust network is designed to protect and enhance wildlife and wildlife habitats and to create greater appreciation and understanding of wildlife and greater awareness of the need for conservation. The trusts encourage active participation in conservation and provide numerous opportunities for people of all ages to enjoy wildlife and wild places in towns and the countryside. The Northumberland Wildlife Trust manages 61 nature reserves in Northeast England.

By use of a mail questionnaire survey to current members of the Northumberland Wildlife Trust, Garrod and Willis obtained data on threats to different types of habitats perceived by members, their preferences for different habitat types, frequency of visits to various habitats and reserves, and willingness to pay for additional reserves.

Personal preferences for habitats were closely related to perceived threats to those habitats. Conifer forests and large man-made lakes ranked low in preference and those habitats had the lowest "willingness to pay" values. One exception to low valuation of conifer forests was when such habitat contained red squirrels. The red squirrel is declining in England and conifer forest containing the species rated high with regard to people's willingness to pay for additional habitat. Highest values recorded were for broad leaved woodland habitat, coastal dune habitat, and traditional hay meadow habitat. The number of visits to habitats related to personal preferences for habitats. These researchers concluded that the contingent valuation method is a useful tool for local level management decisions. It helps to define what people perceive as most important to protect, their habitat preferences and uses, and their willingness to pay.

Reference: *Biodiversity and Conservation* 3:555-565, 1994.

Staten Island Breeding Birds

Populations of many forest birds are declining. Can wooded open space in the metropolitan environment help to conserve these birds? A considerable research base now is available that gives us a pretty good understanding of changes in bird communities as areas urbanize. Christina Dowd of the New York Division of Fish and Wildlife adds to that knowledge base with her study of two forested wetlands in Staten Island, New York. One study site was an undisturbed area in a big city park, and the second site was surrounded by residential development. Dowd used the spot mapping

method to study species composition of breeding birds in the two forested wetlands in 1989 and 1990. She found the same number of bird species (19) breeding in the two habitats, but the compositional make up of the community differed. The undisturbed site supported a more typical forest community of birds that were less tolerant of humans (birds like the veery and the red-eyed vireo). The site surrounded by residential development supported more non-forest species and more species attracted to, or tolerant of, humans (birds like the American robin and northern mockingbird). Development is continuing on Staten Island, with removal of forest habitats and substitution of residential and edge habitats. Dowd's study shows that urban woodlands can provide nesting habitat for some of the neotropical migrant species whose populations are declining, but such habitats become less and less effective as they are reduced in size by development.

Reference: *Journal of Field Ornithology* 63(4):455-461, 1992.

Urban Birds in Finland

Researchers Jukka Jokimaki, of the University of Lapland, and Jukka Suhonen, of the University of Jyvaskyla, recently studied the effects of urbanization on breeding birds in Finland. They worked in the following habitats: forest, countryside, village, small city center, and large city center. In addition, they studied breeding birds along a gradient from park to residential area to city center in different towns in three ornithogeographical zones (north to south) in Finland. Data were analyzed from their own research as well as from work of others conducted between 1971-1990 (including 1956 in Helsinki) and reported in the literature.

Forest habitat in the study consisted mostly of mature Norway spruce with some Scots pine and birches. No nestboxes or supplemental food were provided by humans. **Countryside** habitat was a mix of forest and field (many edges) with isolated farmhouses and barns present. Some nestboxes and feeding tables were provided for birds near houses. Human inhabitants varied between 50-100. **Villages** were characterized by many houses with gardens and some blocks of flats. Patches of forest and fields remained and many nestboxes and feeding tables were evident. Human populations varied between 3,000-7,000. Small blocks of flats predominated in **small city center** habitat. Isolated small parks were present where deciduous trees predominated and understory was managed. A limited number of nestboxes and feeding tables were present. The human population varied between 8,000-30,000. **Large city center** habitat was characterized by large blocks of flats. Small, isolated parks were strictly managed. Few nestboxes were present and pigeon feeding was common. The human population exceeded 30,000.

Habitat characteristics for the urban gradient study were as follows. **City centers** consisted of high and densely located buildings and little vegetation. Nestboxes and feeding tables were rare. **Residential** areas were located around city centers and incorporated more single-family housing with gardens and many feeding tables and nestboxes. **Parks** were mostly small and isolated and understory vegetation was strictly managed.

The number of breeding bird species decreased with increasing urbanization. On average, forest habitat contained 18.1 species, countryside, 21.8, village, 18.2, small city center, 12.3, and large city center, 7.4. Species richness within cities showed 6.8 species in city centers, 10.2 species in residential areas, and 12.1 species in urban parks. No difference was noted in species richness at different latitudes for the same level of urbanization (the general trend for exurban habitats is a reduction in number of species from south to north). The authors hypothesize that food productivity and availability throughout the year in urban habitats, along with warmer temperatures and less snow, may explain why species richness does not decrease northwards in the urban environment. These results fit the pattern emerging from other research with regard to the effects of urbanization on birds.

Reference: *Ornis Fennica* 70:71-77, 1993.

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