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ECOLOGICAL CORRIDORS YEAR 1 FINAL REPORT

Year 1 Project Summary: The first full year of the Northwest Michigan Greenways-Ecological Corridors project was indeed a full one, with many tasks and challenges. As the year's efforts came to a close, several distinct issues became evident, as did potential opportunities to address those issues.

In several public meetings, the river corridors that the Task Force had selected as potential ecological corridors were evaluated for 5 primary values: recreational, ecological, scenic, educational, and economic/tourism. In every county, local residents indicated that "ecological" was indeed the best and highest use for all river corridors except one. The sole exception was the Platte River in Benzie County, which was anticipated, due to the extremely popular canoe livery and campground located along M-22.

Leelanau
Benzie
Grand Traverse
Manistee
Wexford
Mason
Lake
Emmet
Charlevoix
Antrim
Kalkaska
Missaukee
Osceola

In subsequent public meetings, private property rights, and the ***"takings"*** issue was the topic of greatest concern for private landowners. Many landowners feel threatened when any organization or agency or conservation group approaches them about their land, no matter what the reason for contact may be. Some people don't want to hear that their land is "unique" or "critical" for water quality, aesthetics, wildlife, etc. Conversely, most people were very concerned about the ***fragmentation*** of resources through subdivision and over-development. This message was universal, no matter if the group was primarily non-consumptive (birders, hikers) or consumptive (hunters, anglers) users.

It is clear that to be successful in protecting the remaining resources in this region in the future, we must educate not only landowners, but also local and county level government officials, and those with economic interests. Getting the word out to school-aged children was mentioned again and again in public sessions. Residents told us repeatedly that ***education was the key*** in order for resource managers to be able to work on private lands and protect the resources.

This knowledge provides the basis and lays the groundwork for future efforts in the Ecological Corridors and the overall Greenways Project. Year 2 Funding from the coastal Management Program will concentrate on the educational aspect. One tool that is currently under development is the Greenways Concept map, illustrated by local artist Kristin Hurlin. This colorful and creative map shows the potential network of recreational trails and the interconnectedness of the rivers between tracts of public land that are valuable for wildlife. The map will be printed on quality paper, with text and additional drawings on the back explaining what ecological corridors are, and why they are important. The information will stress the importance of landowners becoming informed and educated so that they can make good management decisions about their lands. Voluntary stewardship on private lands will be the underlying theme of the text on back of the map.

A coordinated effort that will benefit the Ecological Corridors project directly is the Special Wetland Area Mapping Project (SWAMP). This project is administered by the Northwest Michigan Council of Governments (NWMCOG) and is funded by the MDEQ-Nonpoint Source Program. This project has an extensive landowner database covering the 5-county Grand Traverse Bay Watershed that will provide the basis for the Ecological Corridors landowner database. A panel of local experts, including several members of the Eco-Corr Task Force, has convened to determine how the SWAMP database can help identify and prioritize wetlands in the region so that resource managers can target high priority wetlands more efficiently.

There is much left to pursue on the road to implementation. We are fortunate because many of the proposed Ecological Corridors probably already function as travel corridors for wildlife. It is likely that more efforts need to be directed at raising public awareness, both at the private and local government level, and to providing some sort of incentives to private landowners to protect what they already have. We would also like to explore the how private lands management issue s are being addressed by local, state and federal agencies, and whether private landowners are satisfied with the current status of existing programs.

The need for research on wildlife habitats (throughout the region, and those connected by potential corridors), and specific habitat needs should also be addressed in the future. Data are needed to confirm our assumptions, which can then be used in a rational manner to address issues that would directly impact resources within the study area. The proposed Hammond-Hartman road extension across the Boardman River would be an example where such data could help define specific cause and effect relationships to wildlife in the impact area.

We will continue to seek funding from MDEQ-Coastal Management Program and other sources to address the many issues that remain unanswered at this point. The level of commitment to the resources that conservation organizations have always maintained is now being joined by non-traditional partners such as the New Designs for Growth project sponsored by the Traverse Area Chamber of Commerce. It is through the coordinated efforts of all partners in the Grand Traverse Bay Watershed Initiative that we will see the preservation the resources that characterize the region.

Year 1 Project Specifics: Several tasks served to create or discover the outcomes discussed in the summary above. First, a Task Force of wildlife biologists, local conservancy personnel, a GIS specialist, planners, MDNR personnel, Conservation District personnel, and interested private citizens was formed to compile and evaluate the available resource information.

Resource information included in the Greenways GIS database includes all rivers, lakes and streams, their associated wetlands, public lands (including local conservancy properties and lands with conservation easements), land use, and land cover. Land cover is further broken down into upland and lowland hardwoods and conifers. The Task Force determined that river corridors, and their associated floodplains, provide the greatest opportunity for wildlife to travel between larger tracts of public land. Currently, the Ecological Corridors is using a 5-county map showing land ownership and the wetlands to illustrate the potential corridors in the study area (see enclosed).

The Task Force also determined that the objectives of the Ecological Corridors project should be considered on an ecosystem basis, in conjunction with the current NLP Ecosystem Management Project. Indicator species, who continued health and well-being in the study area will verify the protection of critical habitats, include river otter, black bear, bobcat, pileated woodpecker, and great blue heron. These are species that are native to the region, still exist in relative abundance, and depend on the forest resources and water quality that characterize the area.

As the Greenways Project moved into its next Public Participation phase, it was decided that the residents of each county should be allowed to evaluate all river corridors in their county as what they felt was the best and highest use for the corridor when considering these 5 values: ecological, recreational, scenic, educational, and economic/tourism. As discussed in the Summary above, residents agreed that "ecological" was indeed the best and highest use for these river corridors, except the Platte River.

The next phase of Public Participation was to target specific groups in the study area whose interests are directly influenced by the protection and sustained management of the region's natural resources. Selected groups included the Board of Directors for the Grand Traverse County Nature Education Reserve and the Brown Bridge Citizens Advisory Committee (focusing on the Boardman River), the Grass River Natural Area Board of Directors and the Chain of Lakes Watershed Steering Committee (focusing on the Chain of Lakes Watershed), and the MUCC District 15 member clubs located within the 5-county region (focusing on Grand Traverse, Leelanau and Benzie Counties).

The results of the Focus Groups was an overwhelming concern with the fragmentation of the resources, due primarily from over-development. Although each group had very different perspectives on why this was important, the most critical result was that each group came to the same conclusion.

Remarkably, when asked about possible solutions to the fragmentation issue (and its underlying causes), all groups said that education was the key. Local and county level officials, private landowners and school aged children were suggested targets of education and outreach efforts.

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ECOLOGICAL CORRIDORS:

A LITERATURE REVIEW

By

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ECOLOGICAL CORRIDORS - A LITERATURE REVIEW

I. ***Definition:*** Ecological corridors may be known by different names, such as wildlife corridors, or travel corridors, but the essential meaning of all of these terms is a typically linear landscape element that connects one or more wildlife areas with each other. These linkages effectively increase the space available for wildlife to survive and reproduce.

Wildlife *habitat*, or the space animals need to survive, is becoming smaller and more fragmented as more people move from cities into the rural landscape. Construction of houses, businesses, new subdivisions, and the roads to access these amenities are carving up the forests and rural landscape with human derived artifice. Instead of seeing human development occurring in a matrix of natural landscapes, natural areas are now occurring in a matrix of human-dominated landscapes. ***Fragmentation*** of the resources has become the most serious issue that biologists consider when managing for wildlife. Ecological corridors are quickly becoming a popular tool for wildlife managers to maintain current health and abundance of native wildlife in the face of declining natural landscapes.

II. ***History and Background Theory:*** The study of linkages has resulted from the need to address rapid human population growth in areas that once were prime for wildlife. When wildlife species begin to decline, biologists start to research possible causes. When the variety of native wildlife that once existed also begins to decrease, it becomes clear that something is happening on a larger scale, and may have world-side implications.

Wildlife in the United States has been declining in the number of species for decades.. This loss of variety is called a decline in **biodiversity.** Another common occurrence is that as native wildlife declines in areas of rapid human population growth, there is a simultaneous increase in non-native and nuisance species. Examples of these types include European starlings, English sparrows, raccoons, and opossums. These species are highly adaptive to their surroundings, and compete with native species that are not as tolerant of humans.

In many areas of the U.S., growth is occurring at such a rapid rate that communities often do not have the ordinances in place to plan or regulate the patterns of development. What happens next is a rapid transformation of the landscape, with natural areas becoming increasingly isolated from one another. Historical wildlife travel patterns are disrupted , along with the ecological processes that characterized predevelopment conditions.

Although movement corridors have been used as a wildlife management technique for nearly 50 years, they are just recently considered critical by many experts in order to maintain biodiversity. How does isolation of populations in the fragmented landscape affect wildlife? First of all, populations will be limited by the quality and quantity of food in their patch. Another important factor is the possibility of inbreeding within isolated populations. For some groups, particularly the larger animal species, there simply won't be enough space to maintain a healthy population.

If there are connections that allow movement between two or more patches of habitat, then individuals may travel between populations. Inbreeding is avoided, the chance of the population being decimated by disease is reduced, and the habitat will be able to sustain a viable level of individuals without harm. The theory of ecological corridors assumes that if connections between favorable patches of wildlife habitat remain intact, then wildlife populations will have the means to utilize these patches and maintain viable populations, even as the landscape becomes increasingly developed by man. Without these linkages, native wildlife diversity and abundance will decline.

III. ***Pros and Cons of Ecological Corridors:*** There appear many benefits to maintaining linkages between larger natural areas. Since fragmentation is believed to be the principal cause of the loss of species, then linkages between larger natural areas across the landscape can help counter these losses.

Corridors provide animals, especially the larger carnivores, enough room to find food and mates, as well as migrate safely without crossing a landscape dominated by humans. It has been documented that isolated populations have a higher extinction rate than populations that are connected. Corridors allow for the influx of genetic material that will counteract the problems associated with inbreeding.

Furthermore, corridors provide connections not only for animals and plants, but also for ecological processes, such as fire, the flow patterns of water and energy, and function of wetlands. These processes are critical to the overall function of the ecological community. Riparian habitats, for example, are very dependent on animal movement. Fish, birds, and other animals move biological matter (food) and energy along the stream environment, and are an intricate part of the food chain. Wide-ranging carnivores, such as black bear, use food sources from more habitats than animals lower in the food chain. Carnivores impact the relative abundance and distribution of prey species. The loss or decline of such species has far reaching implications on the relationships within an ecosystem.

But corridors are not a simple solution to such a complex problem. Most biologists will confirm that corridors, regardless of their effectiveness, will never replace the effectiveness of large tracts of natural landscape for the protection of ecosystems and the species found within them. Corridors should be, at best, considered bandages for a wounded natural landscape, and can only partly compensate for the denaturing activities of humans. Many experts also believe that badly designed corridors can be worse for wildlife than no corridor at all. Potential pitfalls include the transmission of fires, disease from one patch to another, and allow predators to target prey within their confines. Corridors could also promote non-native species over native species, and attract more human use.

The design of corridors is probably the most important aspect of implementation. Ideally, corridors should connect patches that were once linked historically. The 2 most important objectives should be to (1) provide a high quality corridor for native species, especially those most sensitive to fragmentation and human impacts, and (2) maintain enough functional connectivity along the entire length of the corridor to allow safe passage of the target species. It is critical,

then, to know the habitat needs of the species the corridor is being designed for. Width and length of the corridor are also important design considerations, and whether there is adequate food and escape cover for species within the corridor.

Although there are many arguments for and against ecological corridors, most experts agree that the established present-day conservation techniques are not adequate for the conservation of biodiversity in human-dominated landscapes. Many also agree that the maintenance and/or restoration of corridors that allow organisms and natural ecological processes will be necessary to maintain biodiversity in the 21st century.

No one will argue that ecological corridors are a panacea to the biodiversity crisis, nor that they are without costs or liability. The critical question may not be whether corridors are good or bad, but whether a managed, interconnected system of protected areas that incorporates movement corridors will function better to conserve biodiversity than dispersed protected areas with no connections. It seems the answer is yes.

IV. *Current Ecological Corridors Programs:*

Arizona: Based on a 1986 study by the University of Arizona, the Tucson metropolitan area and Pima County and pursued the protection and linkage of identified wildlife habitats through regulatory means In Tucson, the 1990 Environmental Resource Zone ordinance uses overlay zoning to protect areas and corridors essential to wildlife. The zoning is based on a "Critical and Sensitive Wildlife Habitat Map" that was previously adopted. The ordinance provides strong incentives for keeping projects out of any floodplain area and prohibits any permanent walls or fences that could impede wildlife movement. Tucson's other riparian and wildlife protection ordinance the Watercourse Amenities Safety and Habitat ordinance, requires developers to provide complete plant and habitat inventories and a basin management plan within 50 feet of the banks of each riparian corridor. Pima County is also planning two ordinances aimed at protecting riparian zones , and the Arizona Game and Fish Departments is studying animal and vegetation density with the idea of developing guidelines for cluster housing that will help to preserve habitat.

California: In 1991, California passed the Natural Community Conservation Planning Act which shifted planning and protection emphasis away from individual endangered species to multiple habitats. Based on this law, San Diego has three programs that are studying the connection of habitat preservers throughout the 4,200 square mile county. Habitat of separate small areas were quantified using criteria of connectivity, species diversity and the amount of habitat needed by certain species. An analysis was made of areas most at risk for development with insufficient land use controls. A key element of this program was identifying wildlife movement corridors and biological "core" areas that the corridors would connect. Once the mapping and analysis is complete, jurisdictions can then analyze costs and determine the most cost effective size of the preserve system that they can protect or preserve through development regulations

Southeastern Wisconsin: In 1966, the Southeastern Wisconsin Regional Planning Commission (SEWRPC) adopted a plan for a system of corridors along waterways and natural ridgelines. Four hundred and sixty-seven square miles of primary environmental corridors were identified for protection and nearly 349 square miles were protected as of 1993. Of the total area recommended for protection, 31% were purchased by local and county governments and the State of Wisconsin. Forty-four percent were private lands that were protected through the Wetlands Act and local and State wetland regulations. The design and identification of these corridors began with a comprehensive resource inventory which included aerial photos, and data on vegetation, soils, habitat, hydrology, scenic vistas, and land use. This inventory is updated every 5 years.

Colorado: The purpose of the Boulder Greenways program is to protect open space for recreation and wildlife and protect the water quality of Boulder Creek. In 1967, the City of Boulder started an open space acquisition program by dedicating 0.4% sales tax, which was raised in 1989 to 0.77%. So far, 20,000 acres of land in and around the city have been protected. Most of the tax funds are currently being used to create a greenbelt just outside of the city in order to protect natural areas, provide access to recreation and limit urban sprawl. Connectivity is stressed as an important feature for wildlife movement, although the width of the greenways is limited by existing development in most places in the city.

Boulder County has identified and is protecting significant wildlife habitat and elk migration corridors on private land. Deer, mountain lion and black bear also use these corridors. The county is using a variety of tools to protect these corridors: cooperative land management plans, transfer of development rights, and cluster hosing. The county also has the authority to deny approval fro new construction that encroaches on to key habitats and corridors.

The Boulder County Nature Association is trying to create a broader ecosystem plan for the county consisting of critical areas, core habitats and connecting corridors. The Association is working cooperatively with the U.S. Forest Service, the National Park Service, private landowners and municipal and county governments because the plan includes private, federal, municipal and county lands. The Association acts as a facilitator in cooperative efforts such as ecological management planning, transferring development rights, fashioning creative development plans, obtaining conservation easements, assisting in fee acquisition, and promoting land trades to consolidate disjunct federal lands.

California: The Santa Monica project is designed to protect habitat and several wildlife species that are sensitive to habitat fragmentation through connecting greenways and highway underpasses that will link large habitat areas in the Santa Monica Mountains, the Simi Hills, and the Santa Susana Mountains. Originally, these mountain ranges were connected by wildlife habitat, but now are currently split by intensive development and two major freeways. The greenways and underpass design is based on the landscape characteristics, the needs of local wildlife species and property ownership [patterns. When completed, the corridors and habitat are expected to encompass nearly 270,000 acres. Habitat in the mountains remains largely intact at the moment. However, land fragmentation between the mountain ranges greatly inhibits wildlife movement.

Wildlife corridors will be created by providing underpasses under freeways, adding artificial water sources, creating plantings for cover, and relying on development to steer wildlife towards the corridors. Most of the initial framework for the corridors was based on the location of existing core habitats and opportunities for suitable linkages. Once the initial framework was laid out, a study of native species of concern was completed, which included estimates of population sizes, territorial needs, and minimum viable population levels for population longevity. Based on this information, several guidelines were created for several fragmentation sensitive species such as mule deer, mountain lion, bobcat, badger, gray fox, long-tail weasel and coyote. These guidelines include:

- Locate movement corridors along traditional wildlife routes.
- Provide multiple movement routes so that alternate corridors are provided in case of human impacts or natural disturbance.
- Seek a minimum corridor width if 1,500 feet and even greater across 1/4 mile or more.
- Locate corridors so that their edges include steep terrain that will deter human use and development
- include water sources if possible.
- Make areas with structurally diverse vegetation a high priority for inclusion.
- Include grassland and chaparral (specific habitats for some of the species of concern).
- Locate corridors as far from human activity as possible.
- Include habitat nodes within and adjacent to corridors when possible to increase wildlife movement through the corridors.
- Maximize the width of the crossing on non-freeway roads to increase the number of alternative crossing points for animals.

After the above guidelines were created, detailed ownership information was gathered and applied along with the guidelines to the initial corridor framework in order to create a detailed design for land acquisition. If the corridors function as expected, the wildlife populations in the Los Angeles area should be large enough to be self-sustaining.

Massachusetts: The Quabbin to Wachusett Wildlife Corridor Study was an exercise by graduate students in landscape architecture at the University of Massachusetts at Amherst in 1990. Sponsored by the Massachusetts Audubon Society, the purpose of the study was to design wildlife corridors for an area in central Massachusetts. The target area was approximately 38,400 acres between tow state preserves.

The main goal of the study was to use Geographic Information Systems (GIS) to identify wildlife corridors that could link together the two preserves. Another goal was to explore ways of integrating the wildlife corridor design into the area's development processes. Two predatory indicator species that were also sensitive to habitat fragmentation were selected: the river otter and fisher. The assumption was that their presence indicates a healthy food chain at the lower levels. Habitat requirements for these species were then used for the design of the corridors. Existing vegetative cover was mapped using GIS in order to identify potential nodes for the indicator species habitat. Nodes for the habitat network were chosen where suitable habitat existed for these two species, and also where the land was already protected. A series of very

broad swaths were then identified that could link the nodes together. Criteria for scenic features and land suitable for development were added to the mapping process.

Property boundaries were next added to the GIS. Habitat needs for the fisher and river otter were added and used to define suitable corridors within a selected study swath .Wildlife experts assisted in defining minimum widths necessary for the two species. Besides width, other criteria for locating the corridors was selected according to two scenarios: protecting wildlife habitat and movement needs and minimizing effects on private property and future development. The final part of this study considered appropriate land conservation techniques such as fee-simple purchase or bargain sales, and zoning regulations. Although the study results have not been implemented, the process of developing a method of ecological design is considered a useful one.

Authors' Note: Numerous articles, books and research papers contributed to the content of this literature review. If you are interested in reading any of the original documents summarized in this review, or many other Greenways resource articles and books, they are available in the **Greenways Reference Library**, located at the Northwest Michigan Resource Conservation and Development Council, Inc. office. Hours are Monday through Friday, 8:00 AM to 4:30 PM. Calling (616) 946-6817 prior to visiting the Library will ensure that someone will be available to assist you.

*The Greenways Reference Library was created with generous funding support from the **National Park Service - Rivers, Trails and Conservation Assistance Program** and the **Coastal Management Program - Michigan Department of Environmental Quality**.*