2004 Oakland County

Potential Conservation/ Natural Areas Report

Prepared by:
Michigan Natural Features Inventory

Prepared for:
Oakland County Planning & Economic Development Services

Oakland County
Potential Conservation/Natural Areas Report

April 2004 Update

Prepared by:
John Paskus, Associate Program Leader - Conservation
Helen Enander, Information Technologist I

Michigan Natural Features Inventory
P.O. Box 30444
8th Floor, Mason Bldg.
Lansing, MI 48909-7944

MNFI maintains a continuously updated information base, the only comprehensive, single source of data on Michigan's endangered, threatened, or special concern plant and animal species, natural communities, and other natural features. MNFI has responsibility for inventorying and tracking the State's rarest species and exceptional examples of the whole array of natural communities. MNFI also provides information to resource managers for many types of permit applications regarding these elements of diversity.

Prepared for:
Oakland County Planning & Economic Development Services
Daniel P. Hunter, Manager

L. Brooks Patterson, County Executive
Dennis Toffolo, Director, Community & Economic Development Services

For additional information contact Oakland County Planning & Economic Development Services at (248) 858-0720.

Table of Contents

Oakland County Potential Conservation/Natural Areas

Introduction

Natural resource conservation is a fundamental component of a community's long-term environmental and economic health. Natural resource areas perform important natural functions such as water filtration and they provide recreational opportunities and wildlife habitat that enhance the overall vitality of a community. Abundant natural resources once surrounded population centers in Oakland County. Now, much reduced in size, natural resource areas are becoming encircled by population. These remaining sites are the foundation of Oakland County's natural heritage; they represent the last remaining remnants of Oakland County's native ecosystems, natural plant communities and scenic qualities. Consequently, it is in Oakland County's best interest and to a community's advantage that these sites be carefully integrated into the planning for future development. Striking a balance between development and natural resource conservation and preservation is critical if Oakland County is to maintain its unique natural heritage. This approach will provide the greatest opportunity to maintain high property values and continued market demand. Part of what makes Oakland County such a unique and desirable place to work, live, and play is the combination, quality, and accessibility of its natural landscapes, lakes, rivers, and streams.

Successful land use planning requires more than simply protecting small preserves and trusting that they will remain in their current condition indefinitely. Many human activities such as road construction, chemical and fertilizer application, fire suppression, and residential development can have a detrimental impact on populations of plants, animals, and insects and the natural communities in which they live. In order to maintain the integrity of the most fragile natural areas, a more holistic approach to resource conservation must be taken, an approach that looks beyond the borders of the site itself. What happens on adjacent farmland, in a nearby town, or upstream should be considered equally as important as what happens within a preserve. By looking to the past, understanding the present, and considering the future, it becomes apparent that a balance must be struck between development and natural resource preservation.

This report identifies and ranks Potential Conservation Areas remaining in Oakland County. Potential Conservation Areas are defined as places on the landscape dominated by native vegetation that have various levels of potential for harboring high quality natural areas and unique natural features. In addition these areas may provide critical ecological services such as maintaining water quality and quantity, soil development and stabilization, pollination of cropland, wildlife travel corridors, stopover sites for migratory birds, sources of genetic diversity, and floodwater retention. However, the actual ecological value of these areas can only be truly ascertained through on the ground biological surveys. The process established by the Michigan Natural Features Inventory (MNFI) of identifying potential conservation areas, can also be used to update and track the status of these remaining sites. The Michigan Natural Features Inventory recommends that Oakland County Planning &

Economic Development Services Division (PEDS) incorporate this information into their comprehensive natural area mapping services. The site map and ranking data can be used by local municipalities, land trusts, and other agencies to prioritize conservation efforts and assist in finding opportunities to establish an open space system of linked natural areas throughout Oakland County.

In this report the term **"potential natural area" (PNA)** has been used in place of the term **"potential conservation area."** The substitution was made in order to convey to the reader a clearer picture of the type of sites that are being delineated. It is felt that more people have a better understanding of the term "natural area".

The term "potential natural area," however, is not to be confused with the legal term "dedicated Natural Area" as described in Part 351, Wilderness and Natural Areas, of the Natural Resources and Environmental Protection Act of 1994 which gives land special legal protection.

History

In 1987, the foundation for preserving Oakland County's natural heritage was put in place when the County contracted with the Michigan Natural Features Inventory (MNFI) to conduct the first inclusive natural area survey of Oakland County. This survey identified 37 sites of high natural quality and relatively undisturbed native vegetation. This survey proved useful in numerous preservation efforts in areas of acquisition, establishing conservation easements, and helping to guide the efforts of local land trusts. The survey's limitation was in its ability to identify the larger ecosystems that maintain the long-term integrity of Oakland County's highest quality natural areas. Subsequently, in the fall of 1997, six Oakland County municipalities (Rose, Springfield, Highland, Milford, White Lake Townships, and the Village of Milford) along with Oakland County Planning and Economic Development Services (PEDS) decided to undertake a more comprehensive study of natural areas. This new survey takes a more holistic approach to natural resource protection and is the foundation of the Shiawassee & Huron Headwaters Resource Preservation Project (S&H project). This project was a multi-jurisdictional, community based, public/private partnership, which demonstrates how to comprehensively identify and prioritize natural resources and critical ecosystems and identifies tools for the protection and sustainability of these resources. A systematic process was developed in order to identify and prioritize potential natural areas for preservation and/or further field survey efforts. This process was substantiated by the natural features data that the ecologists, botanists, and zoologists collected during field survey work performed at several of the S&H project identified sites.

In order to make comparable data available for the entire County, Oakland County PEDS contracted with the Michigan Natural Features Inventory (MNFI) to complete the mapping and ranking of areas not included within the S&H project. Using a slightly refined process than was utilized during the S&H project, over 600 potential natural areas were identified and ranked. These sites represent what appears to be the least disturbed natural areas remaining within Oakland County. This report was published in July 2002.

In 2004, MNFI was contracted to update the 2002 potential natural areas as well as the PNAs that were identified in the original five-township area. Again, the process was slightly refined. The 2002 boundaries were "tightened up" and natural lands that had changed to development or agricultural lands were removed. As a result, the new boundaries are much more accurate than previous boundaries.

Over 800 PNAs were identified and ranked. These sites represent what appear to be the least disturbed natural areas remaining within Oakland County. The increase in the number of sites is primarily due to the use of roads to define sites, not an increase in additional lands. In fact, 2002 PNA acreage decreased from 110,000 acres countywide to approximately 93,500 acres, representing a 15% reduction. These 93,500 acres represents approximately 16% of the total county acreage.

When using this information it is important to keep in mind that site boundaries and rankings are a starting point and tend to be somewhat general in nature. Consequently, each community, group or individual using this information should determine what additional expertise is needed in order to establish more exact boundaries and the most appropriate conservation efforts.

Process for delineating and ranking Potential Conservation/Natural Areas within Oakland County

Materials and Interpretation Methodology

Interpretation of the 25-township area in Oakland County was conducted by using digital aerial photography taken in 2002 and provided by Oakland County's Planning and Economic Development Services Division.

Delineation of sites was done through aerial photo interpretation, with emphasis placed on 1) intactness, 2) wetlands and wetland complexes, 3) riparian corridors, and 4) forested tracts. Delineation of sites during this phase of the process was done conservatively, such that the chance of capturing sites that may end up being eliminated upon closer inspection, was greater than the chance of omitting sites that should have been delineated. Sites were delineated by focusing on wetlands and forest tracts and eliminating as much development (including roads), active agriculture and old fields as possible. Boundaries typically were defined by hard edges such as roads, parking lots, developments, and railroad beds. All potential natural areas were identified and delineated regardless of size. Municipal boundaries were not utilized to delineate site boundaries unless the boundary corresponded to a defined hard edge, such as a road. Once all sites were delineated, sites under 20 acres were deleted.

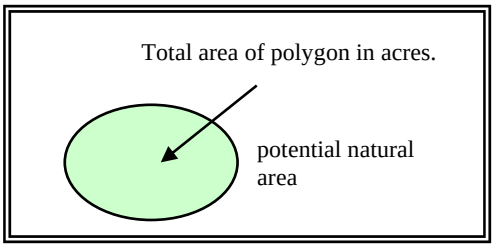
Site Selection and Prioritization

Following the aerial photo interpretation and the delineation of potential natural areas, a more rigorous level of examination was undertaken based upon specific scaled criteria to

prioritize sites. The criteria used to first delineate the sites were translated to a numerical scale. Each site could then be assessed based upon the scaled criteria and a total calculated score, based upon the sum of the scores for each criterion.

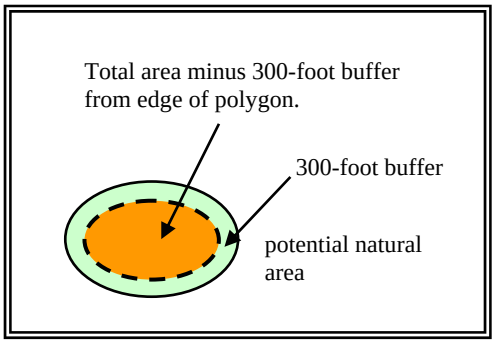
Description of Criteria

Total Size - The total size of a site is recognized as an important factor for viability of species and ecosystem health. Larger sites tend to have higher species diversity, higher reproductive success, and improve the chances of plant and animal species surviving a catastrophic event such as a fire, tornado, ice storm, or flood.



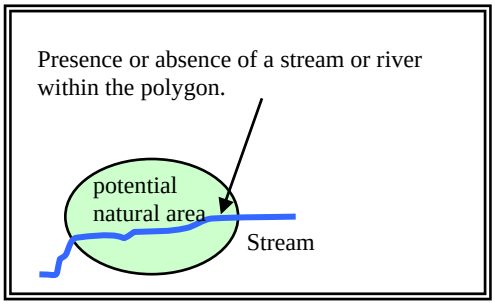
Size is defined as the total area of the polygon.

Size of Core Area - Many studies have shown that there are negative impacts associated with the perimeter of a site on "edge-sensitive" animal species, particularly amphibians, reptiles, and forest and grassland songbirds. Buffers vary by species, community type, and location, however most studies recommend a buffer somewhere between 200 and 600 ft. to minimize negative impacts. Three hundred feet is considered a sufficient buffer for most "edge-sensitive" species in forested landscapes.



For this project, core area is defined as "size" (see above) minus a 300-foot wide buffer measured inward from the edge of the polygon. Core area is different from total area of the site because it takes into account the shape of the site. Typically, round shapes contain a larger core area relative to the total site than long narrow shapes.

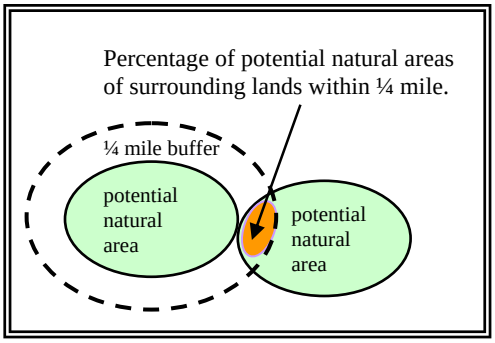
Stream Corridor (presence/absence) - Water is essential for life. Streams are also dynamic systems that interact with the surrounding terrestrial landscape creating new habitats. Waterways also provide the added benefit of a travel corridor for wildlife, connecting isolated patches of natural vegetation.



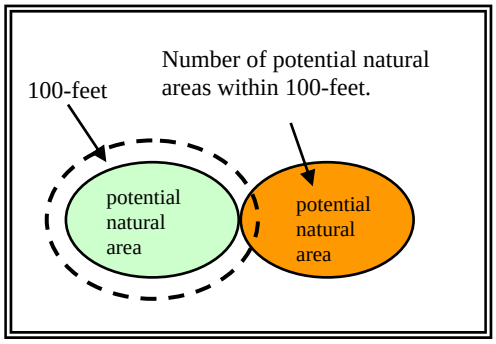
Sites that are part of riparian corridors were given a score of 2 or 0 points depending upon whether or not the site included a portion of a river or

stream system. Oakland County GIS hydrography data layer was used to determine presence/absence of river or stream.

Landscape Connectivity - Connectivity between habitat patches is considered a critical factor for wildlife health. High connectivity improves gene flow between populations, allows species to recolonize unoccupied habitat, improves resilience of the ecosystem, and allows ecological processes, such as flooding, fire, and pollination to occur at a more natural rate and scale. Landscape connectivity was measured in two ways, *percentage* and *proximity*.

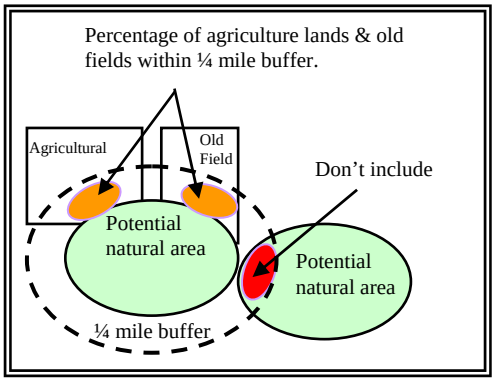


Percentage
Landscape connectivity was measured by building a ¼ mile buffer around each polygon and measuring the percentage of area that falls within other potential natural areas.



Proximity
In addition to measuring the area around a polygon that is considered natural, connectivity can also be measured by the number of individual potential natural areas in close proximity to the site. The greater the number of polygons in "close proximity," the higher the probability for good connectivity. Close proximity was determined to be 100 feet. One hundred feet was chosen as the threshold based on digitizing error and typical width of transportation right-of-ways, pipelines, and powerline corridors.

Restorability of surrounding lands - Restorability is important for increasing the size of existing natural communities, providing linkages to other habitat patches, and providing a natural buffer from development and human activities.



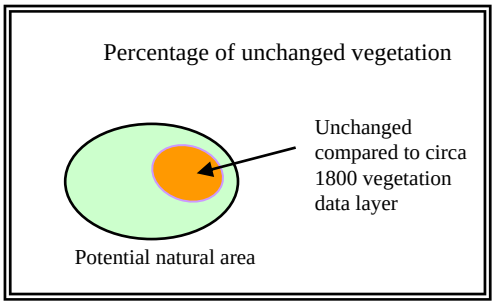
Restorability is measured by the potential for restoration activities in areas adjacent to the delineated site. First, a ¼ mile buffer was built around each site. Potential natural areas as defined by MNFI, located within the buffer area were then removed, and the percentage of agricultural land and old fields within the remaining buffer area was measured. Only

agricultural land and old fields were considered because they require the least amount of effort to restore back to some sort of natural condition. 1995 SEMCOG landcover data was used to identify areas of agricultural land and old fields.

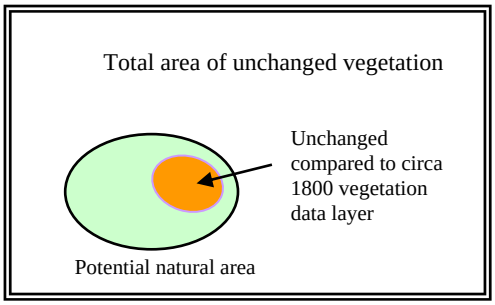
Enhanced Criteria

The process established by the Michigan Natural Features Inventory for prioritizing conservation areas continues to evolve. In order to incorporate the most up to date information available for assessing PNAs, an Enhanced Criteria category was added. Two new criteria for 2004 have been added that address vegetation quality and parcel fragmentation. Element occurrences, while not a new criterion, were not used in 2002 as part of the ranking criteria.

Vegetation Quality – The quality of vegetation is critical in determining the quality of a natural area. Vegetation can reflect past disturbance, external impacts, soil texture, moisture gradient, aspect, and geology. Vegetative quality however is very difficult to measure without recent field information. As a surrogate to field surveys, a vegetation change map comparing the 2000 Integrated Forest Monitoring Assessment and Prescription (IFMAP) landcover datalayer to the circa 1800 vegetation datalayer was created. The resulting potential unchanged vegetation can then act as an indicator of vegetation quality.



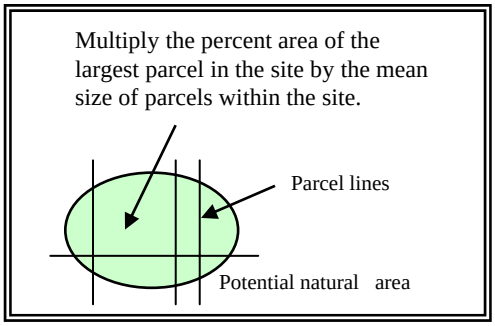
Percentage
Vegetation quality was measured by calculating the percentage of the site that contains potentially unchanged vegetation. This allows small sites with a high percentage of potentially unchanged vegetation to score points.



Area
Vegetation quality was also measured by calculating the area of potentially unchanged vegetation that falls within each site. This balances the bias of small sites with high percentage of potentially unchanged vegetation by awarding points based on actual area covered.

Parcel Fragmentation – Although this criteria varies somewhat from the ecologically based criteria, it can be a useful indicator in determining

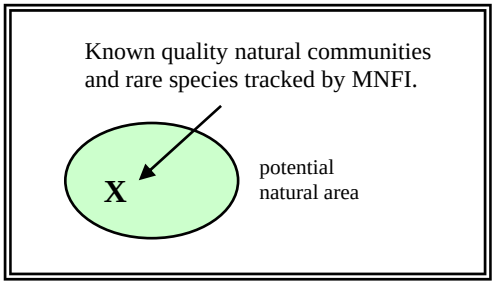
the long-term conservation success of a project. While parcel boundaries are simply lines on a map the associated consequences of splitting parcels can adversely affect habitat. Sites that contain numerous small parcels are typically much more difficult to manage and protect than sites with a few large parcels. Associated problems with smaller parcels include increased wildlife/human conflicts, stewardship coordination, additional septic systems, fences, introduction of invasive plants and general loss of vegetation.



Parcel fragmentation was determined by multiplying the percent area of the largest parcel in the site by the mean size of parcels within the site.

Number of Element Occurrences - The location of quality natural communities and rare species tracked by MNFI are often, although not always, indicative of the quality of a site. The occurrences in and of themselves are important.

Three points were awarded to sites that had three or more element occurrences (EOs), two points for 2 EOs, one point for 1 EO, and zero points if there were no EOs. Since Oakland County has never received a comprehensive natural features site field inventory, two total scores were calculated, one with element occurrence scores and one without. Excluding the element occurrence criteria from the matrix eliminates survey bias towards public lands and complications associated with the variability of the last observed date amongst element occurrences.



Note: The number of points assigned for each criterion is in the *site criteria table* on page 13.

Priority One, Priority Two & Priority Three Ranking

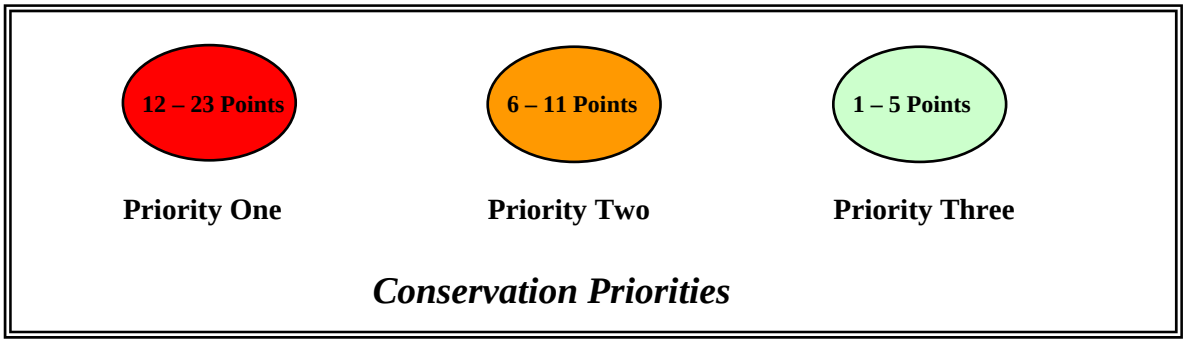
In order to provide consistency with the 2002 results, the model was run **without** the **Enhanced Criteria** added**.** The enhanced criteria includes the element occurrence criterion as well as the two new criteria (parcel fragmentation and vegetation quality). Each of the 830 delineated sites, totaling 93,521 acres, was given a total score based upon the criteria described in the following table, **excluding** the enhanced criteria.

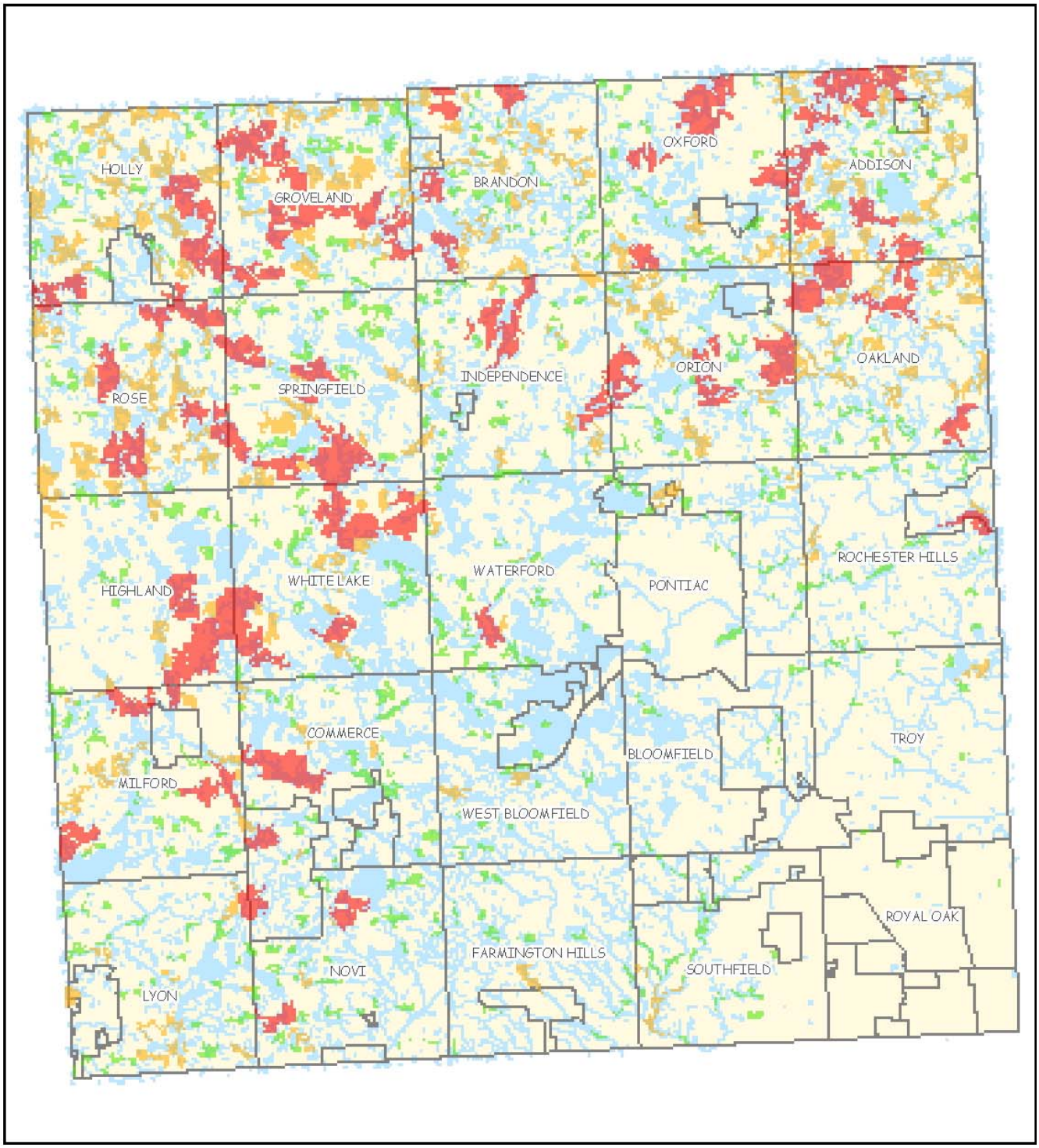
Total scores ranged from 23 points (out of a possible 25) to a low of 1 point. Once the total scores were tabulated, the next step was to determine a logical and reasonable break between priority one, priority two, and priority three sites. Many potential natural area sites can be just one point away from being placed into another category.

The 2002 classification method was an iterative process taking into account the number of sites in a given category, the number of sites with the same score, and a visual inspection of spatial data layers in a geographic information system (GIS). For 2004, MNFI decided to review different methodical classification schemes. In the end MNFI decided to use the natural break classification (or Jenk's optimization) because it provided an objective division of classes that produced a distribution very similar to the more subjective approach we used in 2002. The natural break method is the default classification method in ArcView. This method identifies breakpoints between classes using a statistical formula called Jenk's optimization. The Jenk's method finds groupings and patterns inherent in the data by minimizing the sum of the variance within each of the classes.

Despite the more methodical approach to classification, it still could be argued that sites scoring one point below should be included in the higher category or that sites scoring right at the low end of a category should be placed in the next lowest category. To help alleviate anxieties about which category a particular site is placed, actual numeric total scores can be displayed in the middle of each polygon. This would allow the viewer to see how a site compares directly to another site without artificially categorizing it within a group.

Using the natural break classification, a total of 484 sites were placed in the priority three category, 262 sites were placed in the priority two category, and 84 sites were placed in the priority one category (see map on page 11). Breaking it down into percentages of total sites identified, 58.3% were labeled priority three, 31.6% were labeled priority two, and 10.1% of the sites were identified as priority one. It is important to note that although only 10.1% of the sites were identified as priority one, these 84 sites total 38,674 acres. This corresponds to 41.3% of the total acreage of all delineated sites (93,521 acres).





Oakland County Michigan
L. Brooks Patterson, County Executive

Oakland County 2004
Potential Conservation/Natural Areas

Planning & Economic Development Services

Executive Office Building
1200 N. Telegraph Road
Department 412
Pontiac, MI 48341-0412
TEL 248.858.0720
FAX 248.975.9555
www.co.oakland.mi.us

Dennis Toffolo, Director
Community & Economic Development

Daniel P. Hunter, Manager
Planning & Economic Development Services

Environmental Stewardship Program

Planning & Economic Development Services

Map Created: April, 2004

Conservation/Natural Areas

- Priority One
- Priority Two
- Priority Three
- Lakes & Rivers

Miles
0 1 2 3 4

N
W E
S

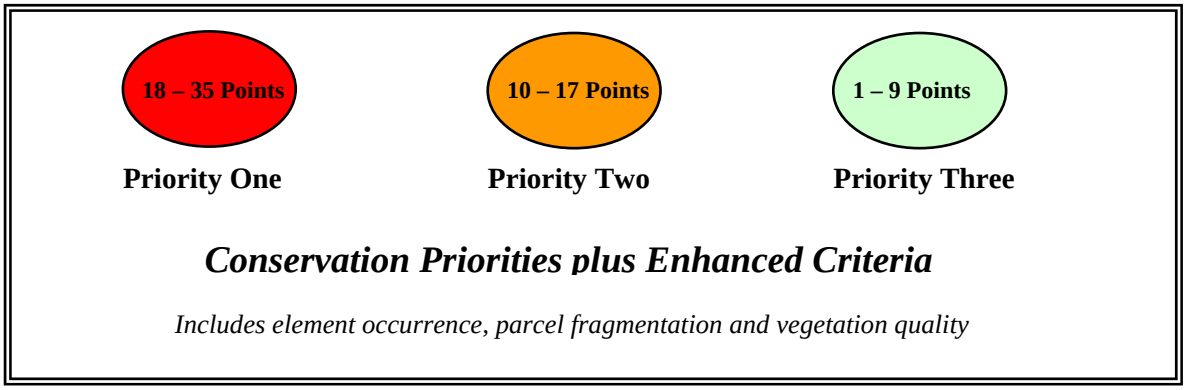
Priority One, Priority Two & Priority Three Ranking with Enhanced Criteria

There are multiple ways of interpreting and analyzing datasets for ranking the priority of a site. Since the process of ranking potential natural areas continues to evolve with new and improved datasets we have added this ranking with enhanced criteria section to the report.

It is felt that the addition of vegetation quality and parcel fragmentation enhances the existing set of criteria. As mentioned, the actual ecological value of PNAs can only be truly established through on the ground biological survey. When establishing sites for possible field inventory, each community, group or individual should look at all available criteria in conjunction with their unique local conditions.

With the element occurrences plus two new considerations (vegetation quality and parcel fragmentation) included in the criteria, total scores ranged from a high of 35 points (out of a possible 40 points) to a low of 1 point. The mean or average score was 10.

Using the natural break classification and all criteria, a total of 436 sites were placed in the priority three category, 312 sites were placed in the priority two category, and 82 sites were placed in the priority one category. Breaking it down into percentages of total sites identified, 52.5% were labeled priority three, 37.5% were labeled priority two, and 9.9% of the sites were identified as priority one. It is important to note that although only 9.9% of the sites were identified as priority one, these 82 sites total 38,256 acres. This corresponds to 40.9% of the total acreage of all delineated sites (93,521 acres).



After running the model with and without the element occurrence criterion as well as the two new criteria (parcel fragmentation and vegetation quality) some comparisons could be drawn, although the differences between the two results are actually very minimal. Based on the model outcomes, **Michigan Natural Features Inventory recommends the use of the enhanced criteria which includes parcel fragmentation, vegetation quality and element occurrence**. If a community wishes to use the Enhanced Criteria ranking, please contact Oakland County Planning & Economic Development Services for a map and explanation of the changes for your community.

Site Criteria Table

CRITERIA	*DESCRIPTION*	*DETAIL*	*PTS*
Total Size	Total size of the polygon in acres. ❑ *Size is recognized as an important factor for viability of species and ecosystems.*	20 - 40 ac.	0
		>40 - 80 ac.	1
		>80 - 240 ac.	2
		>240 ac.	4
Size of Core area	Acres of core area. - Defined as total area minus 300 ft. buffer from edge of polygon. ❑ *Greater core area limits negative impacts on "edge-sensitive" animal species.*	0 - 60ac	0
		>60 - 120 ac	2
		>120 - 230 ac	4
		>230 ac	8
Stream Corridor (presence/absence)	Presence/absence of a stream or river within the polygon. ❑ *Stream corridors provide wildlife connections between patches of habitat.*	none	0
		present	2
Landscape Connectivity Percentage	Percentage of potential natural areas within 1/4 mile. - build 1/4 mile buffer - measure % of buffer that is a potential natural area	0 - 11%	0
		>11 - 22%	2
		>22 - 33%	3
		>33%	4
Proximity	Number of potential natural areas within 100 ft.. ❑ *Connectivity between habitat patches is considered a critical factor for wildlife health.*	0	0
		1	1
		2	2
		3	3
		4+	4
Restorability of surrounding lands	Restorability of surrounding lands within 1/4 mi. - build 1/4 mile buffer - subtract potential natural areas from buffer - measure % agricultural lands and old fields ❑ *Restorability is important for increasing size of existing natural communities, providing linkages to other habitat patches, and providing a natural buffer from development.*	0 - 35%	1
		>35 - 65%	2
		>65%	3
Note Total possible points = 25			

Enhanced Criteria Table

ENHANCED CRITERIA	*DESCRIPTION*	*DETAIL*	*PTS*
Vegetation Quality Percentage	Estimates the quality of vegetation based on circa 1800 vegetation maps and 2000 Integrated Forest Monitoring Assessment and Prescription (IFMAP) landcover data. Measures the percentage of potentially unchanged vegetation within a polygon.	1 - 10%	0
		10.1 -30%	1
		30.1 – 65%	2
		65.1 – 100%	4
Area	Measures the actual area within a polygon of potentially unchanged vegetation regardless of the size of the polygon. ❑ *The quality of vegetation is critical to determining the quality of a natural area.*	0 – 10ac	0
		10.1 – 40ac	1
		40.1 – 80ac	2
		80.1 - 160	3
		> 160ac	4
Parcel Fragmentation	Measures the feasibility of conservation for a site by analyzing parcel numbers and size. It is calculated by multiplying the percent area of the largest parcel in the site by the mean size of parcels within the site. The results were classified using the Jenk's optimization formula. ❑ *The associated consequences of subdividing land can adversely affect habitat.*	0 -2.5 ac	0
		2.6 – 8 ac	1
		8.1 – 18 ac	2
		18.1 – 43 ac	3
		< 43 ac	4
Number of Element Occurrences (EOs)	Known element occurrences increase the significance of a site. ❑ *The location of quality natural communities and rare species tracked by MNFI are often, although not always, indicative of the quality of a site.*	0	0
		1	1
		2	2
		3+	3
Note Total possible points with all enhanced criteria added = 40			

Conclusion

This inventory documents that Oakland County remains rich with high quality natural resource areas that still look and function the way they did 200 years ago. Some of these sites have the potential of harboring endangered, threatened, or special concern animal and plant species. With the high rate of development and its associated stresses on the natural environment, conservation of these remaining areas and their native plant and animal populations are vital if the County's diverse natural heritage is to be maintained.

Comments/Recommendations

1) Local units of government, individuals and interest groups using this information should consult the Shiawassee & Huron Headwaters Resource Preservation Project study. The study includes information on tools and techniques that conserve natural resources and create open space linkages while allowing for economically viable development.

2) Local municipalities should identify opportunities to link other possible natural resource sites not mapped during this survey. This would include small patches of land, tree and fence row plantings, agriculture land, and open fields.

3) Field inventories should be conducted on identified potential natural areas. This fieldwork would provide much needed additional site-specific data that should be considered when developing in and around such areas.

4) All identified sites, regardless of their priority, have significance to their local setting. This is especially true in areas that have experienced a high degree of development and landscape fragmentation.

5) A direct relationship exists between natural area protection and long-term water quality. With the abundance of water resources found in Oakland County and the potential impact on the economy associated with degradation of these resources, natural area protection should be integrated into local watershed management plans.

6) Municipalities should adopt a comprehensive conservation/greenway plan. The conservation of potential natural areas is most effective, and successful, in the context of an overall conservation/greenway plan.

7) Oakland County Planning & Economic Development Services should incorporate funding into the annual budget in order to update mapping and assessment of County potential natural areas.

8) Efforts to conserve potential natural areas should include on-going site assessment and stewardship.

9) Oakland County Planning and Economic Development Services should undertake widespread distribution of this survey in order to build awareness and encourage long-term resource planning and stewardship. Knowledge of potential natural areas is meaningless unless action is taken to ensure that they will remain part of the County's natural heritage.

10) When establishing sites for possible field inventory, each community, group or individual should consider all available criteria in conjunction with their unique local conditions. Site selection may well be influenced by local growth pressure and ownership of the land.

References

Dale, V. H., S. Brown, R. A. Haeuber, N. T. Hobbs, N. Huntly, R. J. Naiman, W. E. Riebsame, M. G. Turner, and T. J. Valone. 2000. Ecological Society of American Report: Ecological Principles and Guidelines for Managing the Use of Land. Ecological Applications. 10(3):639-670.

Dramstad, Wenche E., J. D. Olson, and R. T. T. Forman. 1996. Landscape Ecology Principles in Landscape Architecture and Land-Use Planning. Island Press, Washington, D.C.

Forman, Richard T. T. and Michel Gordon. 1986. Landscape Ecology. Wiley, New York.

Leach, M. K. and T .J. Givnish. 1996. Ecological Determinants of Species Loss in Remnant Prairies. Science. Vol. 273:1555-1558.

Peck, Sheila. 1998. Planning for Biodiversity: Issues and Examples. Island Press, Washington, D.C.

Rosenberg, K. V., R. W. Rohrbaugh, Jr., S. E. Barker, J. D. Lowe, R. S. Hames and A. A. Dhondt. 1999. A land managers guide to improving habitat for scarlet tanagers and other forest–interior birds. The Cornell Lab of Ornithology.