Barry County
Potential Conservation Areas

Prepared by:
Michigan Natural Features Inventory

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Prepared for:
Barry Conservation District

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Potential Conservation Areas Report

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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:
Barry Conservation District

Cover Photo:
Prairie Fen Habitat: Barry County, by Daria Hyde

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Table of Contents

Barry County Potential Conservation 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 the area. Now, much reduced in size, natural resource areas are becoming encircled by development. These remaining sites are the foundation of Barry County's natural heritage; they represent the last remaining remnants of the areas native ecosystems, natural plant communities and scenic qualities. Consequently, it is 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 Barry County is to maintain its unique natural heritage.

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. Changes in zoning, building codes, and technology can cause areas that were once considered "safe" from development to be exposed to development. 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, a nearby town, or upstream should be considered equally as important as what happens within the preserve

This report identifies and ranks Potential Conservation Areas (PCA's) remaining in Barry 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) for identifying potential conservation areas, can also be used to update and track the status of these remaining sites. MNFI recommends that local municipalities in Barry County 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 in the county.

Process for delineating and ranking Potential Conservation Areas

Materials and Interpretation Methodology

Identification of potential conservation areas in Barry County was conducted using the Simplified Barry County Land Cover Data Set (Barry County, 2006), Vegetation circa 1800 of Michigan (Comer, et. al, 1995), the Biotics Database (MNFI, 2006), and The Michigan Geographic Framework (MGF) base layers for Barry County (MDIT-CGI, 2006). Analysis was conducted using Arc View GIS 3.2. This is computer software, which provides a desktop geographic information system for visualizing and analyzing geographic information.

The boundary of the land cover was clipped to the framework county boundary (MDIT-CGI, 2006). Natural land cover classes for the PCA analysis were obtained from selecting land cover types Deciduous, Wetland, and Conifer. Restorable land cover types were Agriculture, Open land, Shrub, and Hay/Pasture. For this analysis, these land cover types are considered restorable since they differ from what was documented by early land surveyors during the early 1800's (See Appendix I.) Water was retained only if it was completely surrounded by the other potential PCA classes. Since the land cover layer had originated from a raster dataset of 28.5 meter pixels and had been converted to vector format, significant numbers of individual "pixels", in the form of 28.5 meter polygons remained. To reduce this "speckling" inherent in satellite-derived land cover, individual 28.5 meter polygons were eliminated by dissolving them into the largest neighboring polygon.

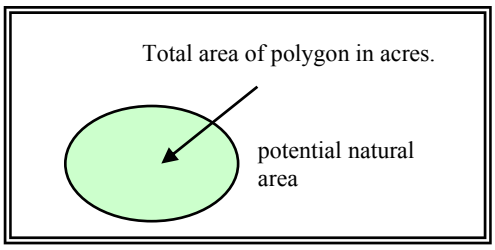
Delineation of potential conservation areas was conducted through analysis in a geographic information system with emphasis placed on 1) intactness, 2) wetlands and wetland complexes, 3) riparian corridors, and 4) forested tracts. PCA's were identified by focusing on wetland and forested land cover and eliminating as much development (including roads), active agriculture, and old fields as much as possible. The natural land cover types were combined into a single cover type, potential PCA. The framework roads (MDIT-CGI, 2006) were buffered by 30 meters, and that area was removed from the potential PCA layer. Boundaries were defined by hard edges such as roads, parking lots, developments and railroad beds. All potential conservation 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, remaining potential PCA polygons smaller than 20 acres in size were deleted.

Site Selection and Prioritization

Following the delineation of PCA's, a more rigorous level of examination was undertaken based upon specific spatially based criteria to prioritize sites. Spatially based criteria that were determined to be important indicators of ecological health included: total size, size of core area, length of stream corridor, landscape connectivity, restorability of surrounding lands, vegetation quality, and bio rarity score. Each criterion was then divided into several different categories, or levels, which were translated to a numerical score. Each site was then assessed and compared to other sites based upon the sum of the scores for each criterion. Possible scores for the Barry County sites ranged from 2 to 41.

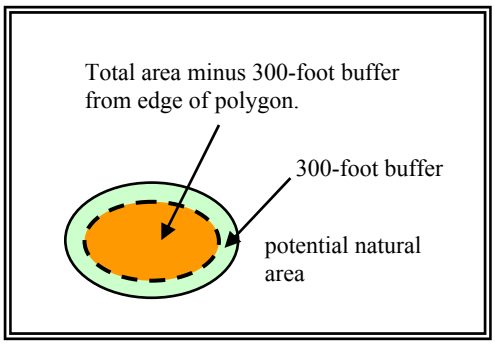
Description of Criteria

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.



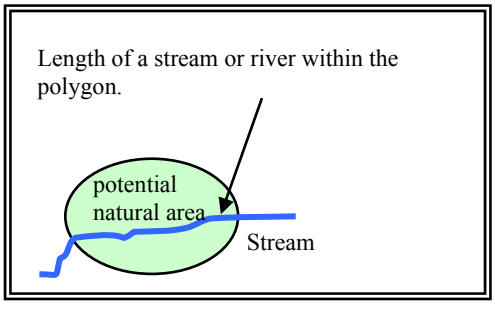
Size is defined as the total area of the resultant polygon.

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.



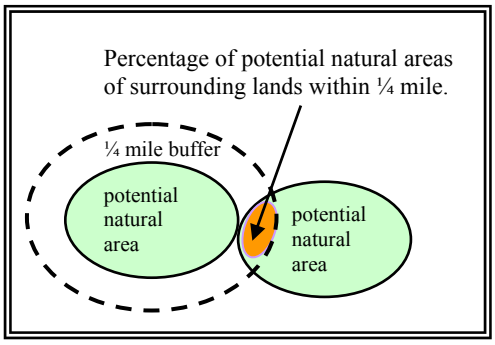
For this project, core area is defined as the total area minus a 300-foot wide buffer measured inward from the edge of the polygon. Core area is different from total area of the site because it takes into account the shape of the site. Typically, round shapes contain a larger core area relative to the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

Stream Corridor (length) - 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, particularly fragmented landscapes such as those found in areas of Southwestern Michigan.



Sites that are part of riparian corridors were given a score 0-6 points depending upon the length of stream or river that was present at the site.

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*.

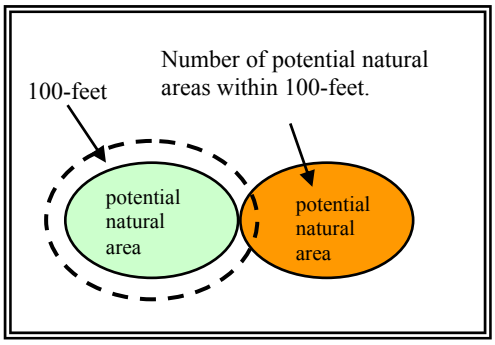


Percentage

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

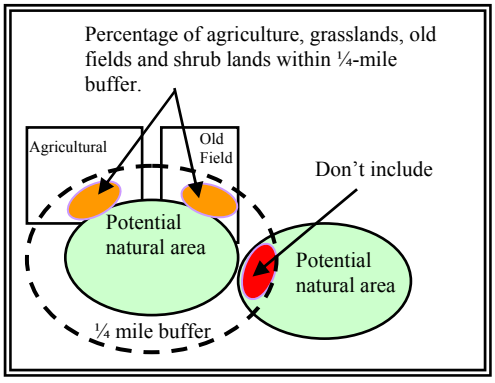
Proximity

In addition to measuring the area around a polygon that is considered natural, connectivity can also be measured by the number of individual potential conservation 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 power line 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.

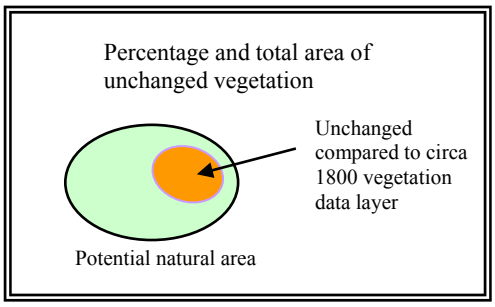
Restorability is measured by the potential for restoration activities in areas adjacent to the delineated site. First, a ¼ mile buffer was built around each site. Potential conservation areas as defined by MNFI, located within the buffer area were then removed, and the percentage of agricultural land,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



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 (cardinal direction of slope), 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 IFMAP land cover data layer to the MNFI circa 1800-vegetation data layer was created. The resulting potential unchanged vegetation can then act as an indicator of vegetation quality.

Percentage

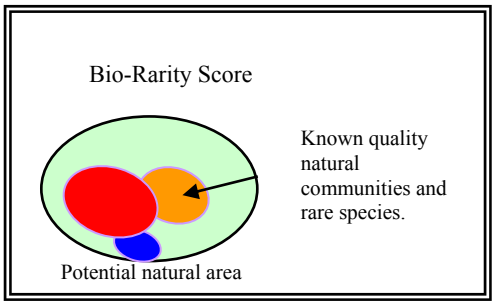
Vegetation quality was measured by calculating the percentage of the site that contains potentially unchanged vegetation. This allows small sites with a high percentage of potentially unchanged vegetation to score points.



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 a high percentage of potentially unchanged vegetation by awarding points based on actual area covered.

Bio-Rarity Score - 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.



The Bio Rarity Score is based on the cumulative score of each element occurrence (EO) found within a site Each EO is scored based on its probability of being found, global rarity, state rarity, and condition or viability (*See Appendix 4, 5 & 6*). For example, a much higher score would be awarded to a population of Mitchell's satyr, which is globally and state imperiled, and that is in good condition, compared to a population of box turtles, which is globally secure and rare in the state, and is in fair condition

Note: The number of points assigned for each criterion is in Table 1. S*ite Criteria* on page 9. An element occurrence is an occurrence record of a federally and/or state listed species, state special concern species, exemplary and/or rare natural community, or another type of natural feature such as a unique geologic formation or bird colony.

Ranking of Highest, High, Medium and Low Priority Sites

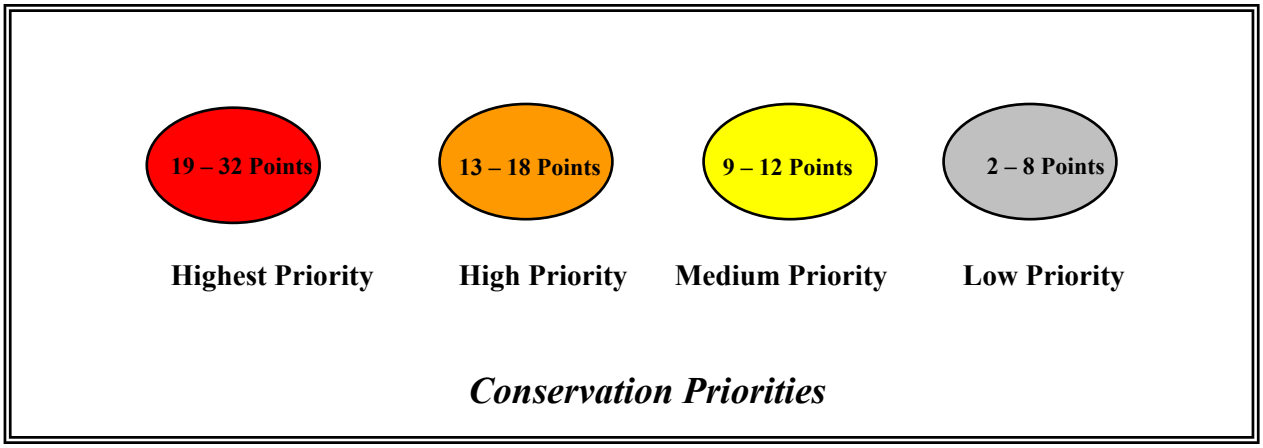
Once the total scores were tabulated, the next step was to determine a logical and reasonable break between high priority, medium priority, and low priority sites. Many potential natural area sites can be just one point away from being placed into another category. Natural break and equal interval classification are two legitimate methods for classifying sites. Equal interval classification, as defined for this project, is based on absolute values. It shows the value of each site relative to the highest (41) and lowest (2) possible values. Equal interval classification breaks all possible scores into equal classes regardless of actual scores. This eliminates the relative nature of scores when sites are compared only to other sites within a given area. 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. Based on the results of each method, MNFI recommends using the natural break method for Barry County.

Priority Rankings for Barry County

A total of **741 sites, totaling 115,137 acres** were identified as potential conservation areas in Barry County. **This represents 31% of the total area in the county**. Total scores ranged from a high of 32 points (out of a possible 41 points) to a low of 2 points. The mean score was nine.

As a result of applying the natural break method, 346 sites were placed in the low priority category, 271 sites were placed in the medium priority category, 97 sites were placed in the high priority category and 27 sites were placed in the highest priority category. Breaking it down into percentages of total sites identified**, 47% were identified as low priority, 36% were identified as medium priority, 13% of the sites were identified as high priority and 4% were identified as the highest priority.** Breaking it down by area within a PCA, 19% (21,495 acres) fell into the low quality category, 28% (31807 acres) fell into the medium quality category, 30% (35,305 acres) fell into the high priority category, and 23 % (26,530 acres) fell into the highest priority category (See Table 2, pg 10 and Table 3 and 4, pg 11).

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.



Not surprisingly, the three highest scoring sites occur on public land. They include:

1) **Score:** 32 pts

Location: SE corner- Barry State Game Area, along Glass Creek.
Rutland Twp.-Sec.32 and Hope Twp. Sec 5, 6, 7, and 8. N. of Pine Lake Rd., S. of Goodwill Rd., E. of Whitmore Rd. and W. of Havens Rd.

Acreage: Total - 1,255 acres. Core area - 464 acres.

2) **Score:** 30 pts

Location: Yankee Springs State Park and the SW part of the Barry State Game Area. Yankee Springs Twp.-Sec. 21-23, 26-28. (Deep, Long, McDonald and Williams Lakes). N. and W. of Gun Lake Rd. (Hwy 430), S. of Chief Noonday Rd. and E. of Yankee Springs Rd.

Acreage: Total - 2,645 acres, Core area - 1,129 acres.

3) **Score:** 29 pts

Location: Barry State Game Area (including Otis Lake and Dagget Lake). Yankee Springs Twp.–Sec. 35-36, Rutland Twp.-Sec 30-31, Hope Twp. 6-7, Orangeville Twp.- Sec 1-2, 11-12. N. of Mullen Rd., S. of Gun Lake Rd., E. of Norris Rd. and W. of Otis Lake Rd.

Acreage: Total - 3,635 acres, Core area - 1,726 acres.

The five highest scoring sites on private land include:

1) **Score:** 26 pts

Location: Orangeville Twp.- Sec. 21-22, 27-28 (includes Tamarack and Crystal Lakes). N. of Bever Rd., S. of Guernsey Lake Rd., E. of Enzian Rd. and W. of Norris Rd.

Acreage: Total - 1,073 acres, Core area - 223 acres.

2) **Score:** 24 pts

Location: Baltimore Twp. - Sec. 9, 16-17, 20-21 (along Cedar Creek). N. of Cloverdale Rd., S. of Brogan Rd., E. of Broadway Rd. and W. of Hwy. 37.

Acreage: Total - 1,074 acres, Core area - 222 acres.

3) **Score:** 24 pts

Location: Hope Twp. - Sec. 7-8, 17-18. Southern tip of Barry State Game Area. N. of Keller Rd., S. of Pine Lake Rd., E. of Otis Lake Rd. and W. of Head Lake Rd.

Acreage: Total - 774 acres, Core area - 239 acres.

4) **Score:** 24 pts

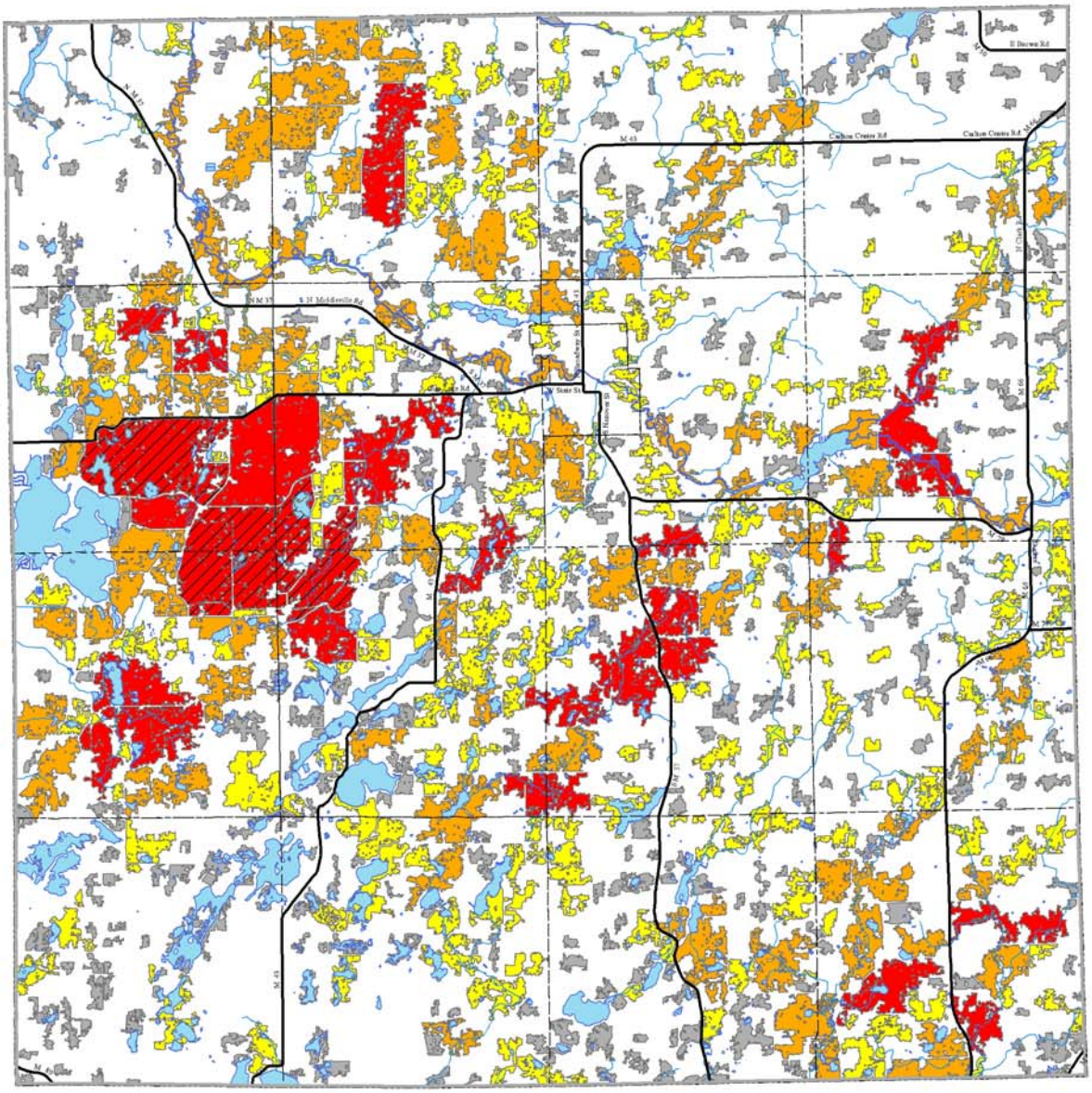
Location: Castleton Twp. - Sec. 20-21. Along the Thornapple River, W. of Thornapple Lake. N. of Thornapple Lake Rd., S. of State Rd., E.of Barger Rd. and W. of S. Woodland Rd.

Acreage: Total - 667 acres, Core area - 352 acres.

5) **Score:** 24 pts

Location: Baltimore Twp. - Sec. 3-4, 9-10. Along the convergence of Cedar and Kellie Creeks, just west of Mixer and Middle Lakes. N. of Lawrence Rd., S. of Mixer Rd., E. of Hwy. 37 and W. of McKeown Rd.

Acreage: Total - 577 acres, Core area - 171 acres.



Barry County
Potential Conservation Areas

0 1.25 2.5 5 7.5 10 Miles

Version 2 with road edits requested by Barry County.
Map date 3/13/2007

N

Legend

- Major road
- Streams
- Lakes
- County Boundary
- Township boundary
- Top 3 sites

PCA Score

- 2 - 8
- 9 - 12
- 13 - 18
- 19 - 32

Table 1. Site Criteria

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 (length)	Length of a stream or river within the polygon. ❑ *Stream corridors provide wildlife connections between patches of habitat.*	0	0
		>0-400 m	1
		>400-800m	2
		>800-1600m	3
		>1600-3200m	4
		>3200 m	6
Landscape Connectivity Percentage	Percentage of potential conservation areas within 1/4 mile. - build 1/4 mile buffer - measure % of buffer that is a potential conservation area	0 - 11%	0
		>11 - 22%	2
		>22 - 33%	3
		>33%	4
Proximity	Number of potential conservation 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 conservation 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

CRITERIA	*DESCRIPTION*	*DETAIL*	*PTS*
Vegetation Quality Percentage	Estimates the quality of vegetation based on circa 1800 vegetation maps and 2000 IFMAP land cover data (only done for Michigan sites). Measures the percentage of potentially unchanged vegetation within a polygon.	1 - 10% 10.1 -30% 30.1 – 65% 65.1 – 100%	0 1 2 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 10.1 – 40ac 40.1 – 80ac 80.1 - 160 > 160ac	0 1 2 3 4
Bio Rarity Score	Known element occurrences increase the significance of a site and increase the bio rarity score. ❑ *The location of quality natural communities and rare species tracked by MNFI are often, although not always, indicative of the quality of a site.* ❑ *Values were determined using the Jenk's optimization formula.*	0 – 5.75 5.75 – 19.5 19.5 -41.5 41.5 -68	1 2 3 4
Note Total possible points = 41			

Table 2. Results of PCA Analysis for Barry County

Class	Count	Percentage	Acres	% of PCA area	% County Area
Low 2-8	346	47%	21,495	19%	6%
Med 9-12	271	36%	31,807	28%	8.5%
High 13-18	97	13%	35,305	30%	9.5%
Highest 19-32	27	4 %	26,530	23 %	7%
TOTAL	741	100%	115,139	100%	31%

Table 3. Frequency Distribution of PCA Scores in Barry County

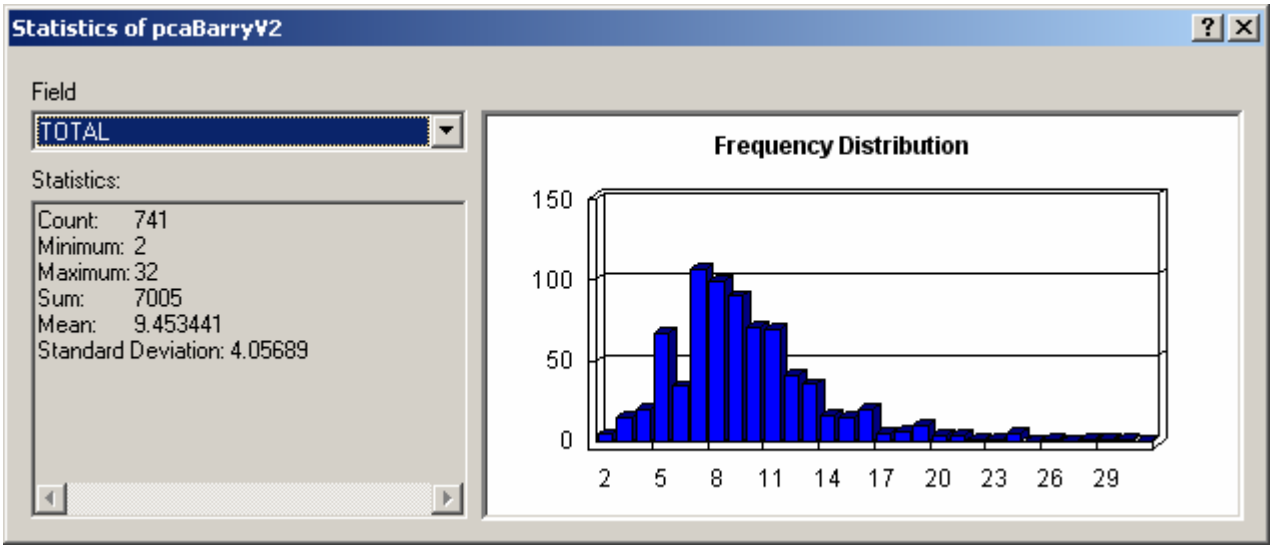
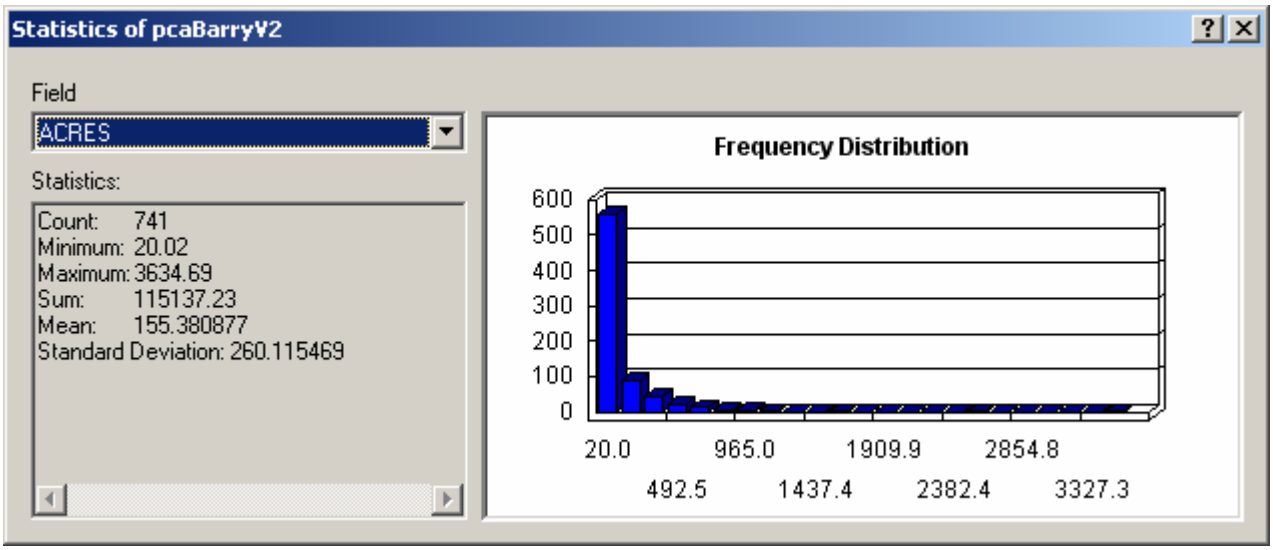
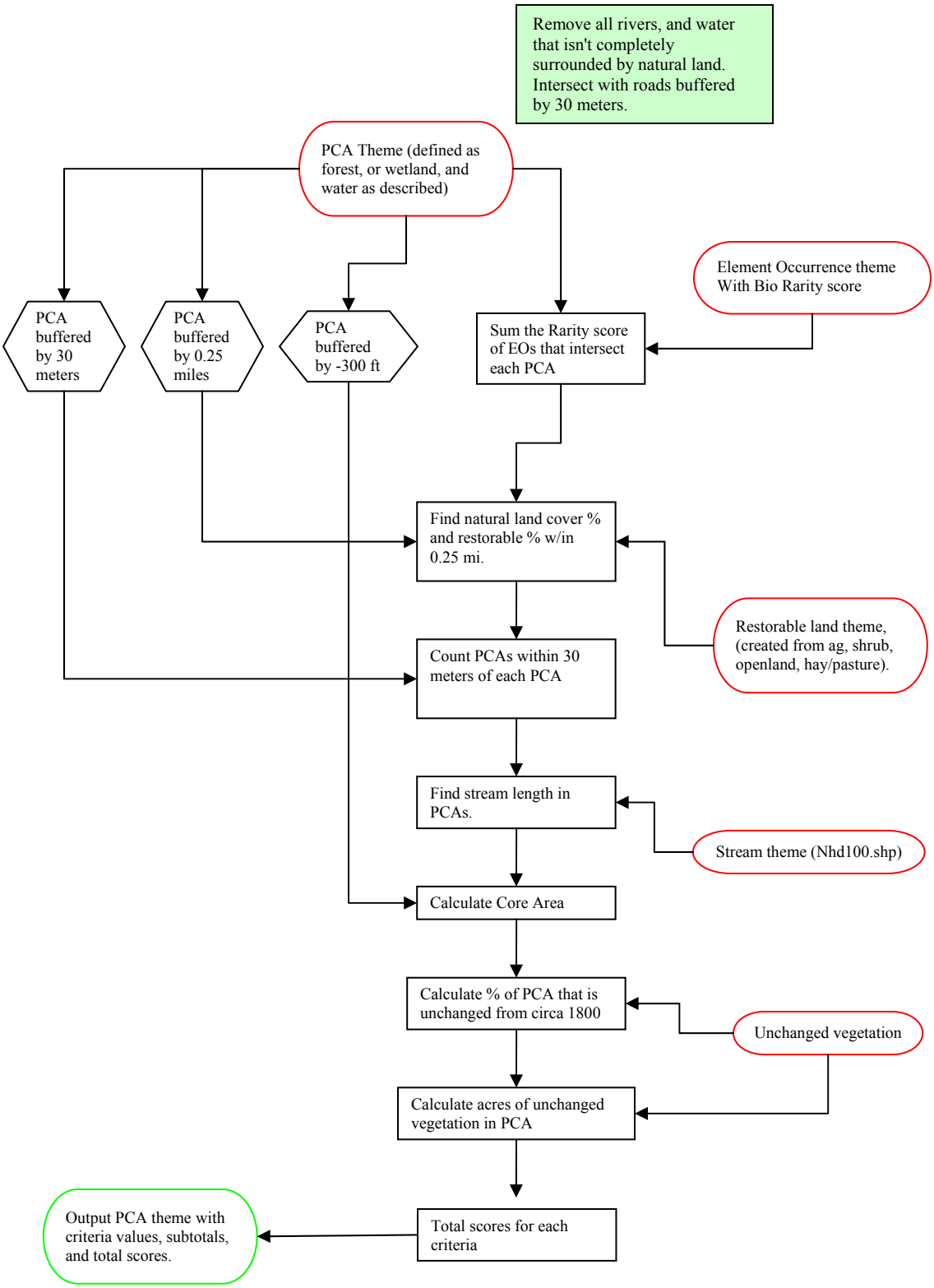


Table 4. Frequency Distribution of PCA Acreage



Flow chart for PCA model



Conclusion

This inventory documents that Barry County has several high quality natural areas that still look and function the way they did 200 years ago (*See Appendix 7*). Of the remaining high quality sites, some 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 Region's diverse, natural heritage is to be conserved.

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 boundaries that are more exact and the most appropriate conservation efforts.

Comments/Recommendations

1) Local units of government, individuals and interest groups using this information should consult a publication produced by SEMCOG in 2003 entitled, "Land use Tools and Techniques." The publication includes information on tools and techniques that conserve natural resources and create open space linkages while allowing for economically viable development.

2) 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 (greenways).

3) Field inventories should be conducted on identified potential conservation 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 Barry County and the potential impact on the economy associated with degradation of these resources, natural area protection should be integrated into local water quality management plans.

6) Municipalities should work together and adopt a comprehensive green infrastructure plan. The conservation of critical natural areas is most effective, and successful, in the context of an overall plan.

7) Funding should be secured to update the mapping and assessment of this project's potential conservation areas approximately every three to five years.

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

9) Local units of government in Barry County should undertake widespread distribution of this information in order to build awareness and encourage long-term resource planning and stewardship. Knowledge of potential conservation areas is meaningless unless action is taken to ensure that they will remain part of this area'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.

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Appendix 1: Land Cover in 1800 (Comer, et. al. 1995)

COVER TYPE 1800	**Area (ac)**	**%**
BEECH-SUGAR MAPLE FOREST	131,539	36%
OAK-HICKORY FOREST	129,476	35%
MIXED OAK SAVANNA	34,264	9%
MIXED CONIFER SWAMP	21,397	6%
LAKE/RIVER	14,839	4%
MIXED OAK FOREST	12,555	3%
SHRUB SWAMP/EMERGENT MARSH	9,109	2%
MIXED HARDWOOD SWAMP	7,589	2%
BLACK OAK BARREN	5,321	1%
WHITE PINE-WHITE OAK FOREST	1,363	0%
WET PRAIRIE	955	0%
OAK/PINE BARRENS	316	0%
GRASSLAND	211	0%
MUSKEG/BOG	48	0%
BLACK ASH SWAMP	20	0%
PINE BARRENS	-	0%
BEECH-SUGAR MAPLE-HEMLOCK FOREST	-	0%
SUGAR MAPLE-YELLOW BIRCH FOREST	-	0%
SUGAR MAPLE-BASSWOOD FOREST	-	0%
ASPEN-BIRCH FOREST	-	0%
WHITE PINE-RED PINE FOREST	-	0%
JACK PINE-RED PINE FOREST	-	0%
MIXED PINE-OAK FOREST	-	0%
WHITE PINE-MIXED HARDWOOD FOREST	-	0%
SPRUCE-FIR-CEDAR FOREST	-	0%
HEMLOCK-WHITE PINE FOREST	-	0%
SUGAR MAPLE-HEMLOCK FOREST	-	0%
HEMLOCK-YELLOW BIRCH FOREST	-	0%
CEDAR SWAMP	-	0%
SAND DUNE	-	0%
EXPOSED BEDROCK	-	0%
TOTAL	**369,004**	

Appendix 2: Land Cover in 2005 (Barry County, 2006)

COVER TYPE 2005	Area (ac)	%
AGRICULTURE	96,601	26%
DECIDUOUS	66,246	18%
*OPENLAND	63,308	17%
WETLAND	53,855	15%
SHRUB	31,464	9%
HAY/PASTURE	25,144	7%
URBAN	11,365	3%
WATER	10,555	3%
CONIFEROUS FOREST	8,624	2%
HEAVY COMMERICAL	1,184	0%
EXTRACTION/MINING	425	0%
GOLF COURSE	267	0%
TOTAL	**369,038**	100%

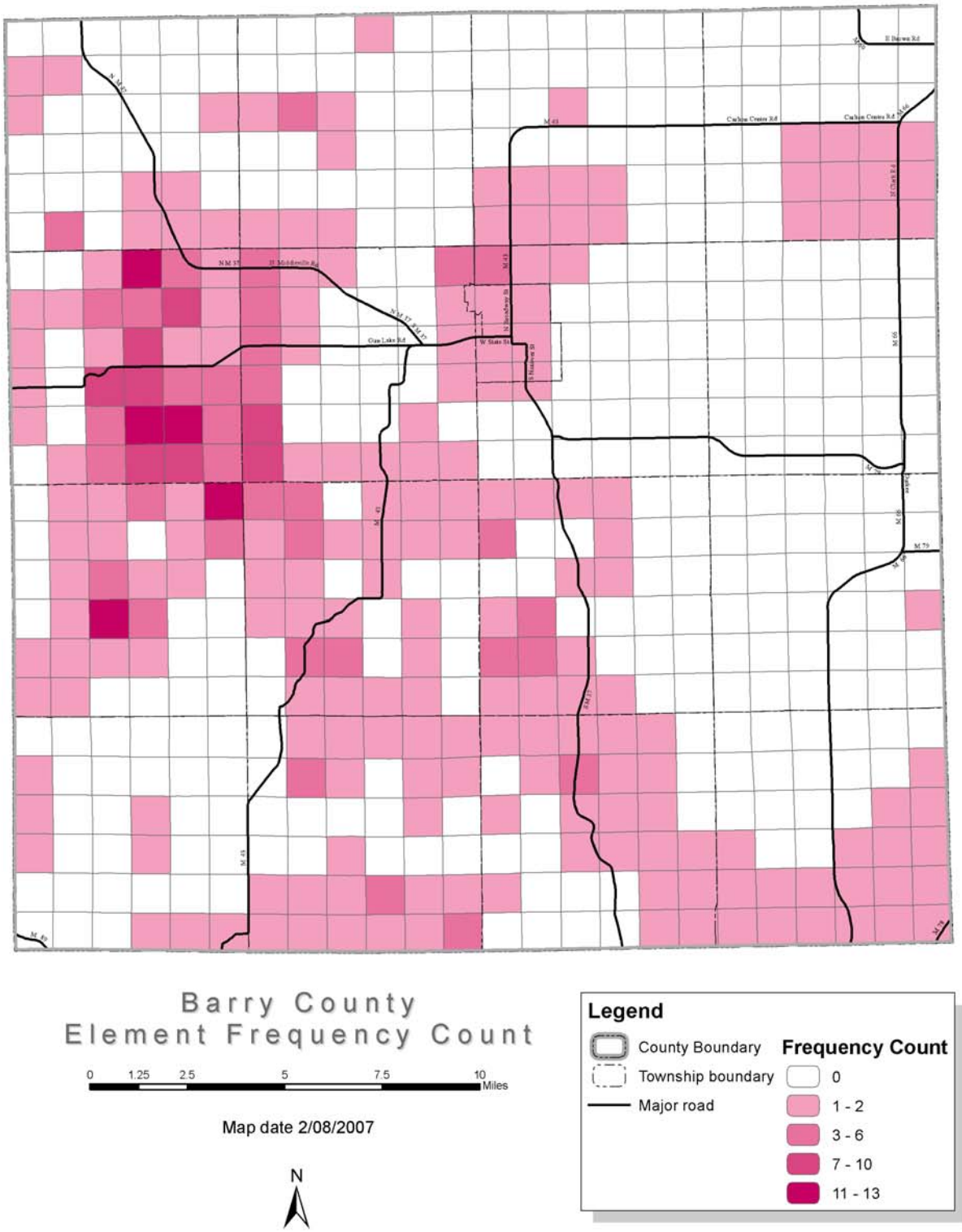
* Note: Open land - Areas dominated by upland grasses and forbs. In rare cases, herbaceous cover is less than 25 percent, but exceeds the combined cover of the woody species present. These areas are not intensively managed, but they are often utilized for grazing.

Appendix 3: Land Cover Change from 1800 to 2000 (IFMAP) (MNFI, 2003)

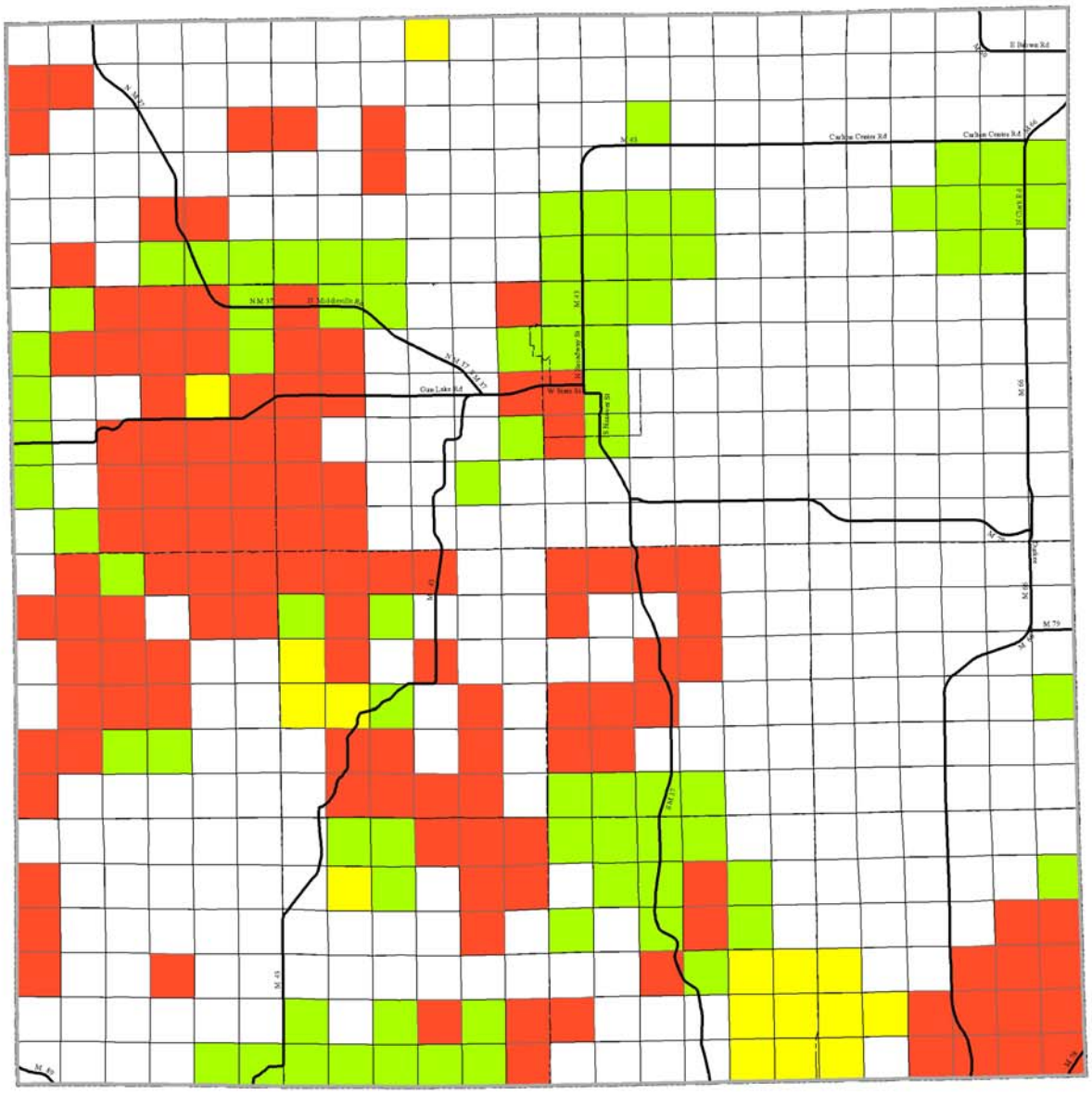
COVER TYPE CHANGES c1800 - c2000 (IFMAP)	Area (ac)	%
Changed To Agriculture	166,093	45%
*Other Change	128,783	35%
Oak-Hickory Forest Unchanged	20,375	6%
Changed To Urban	16,594	4%
Beech-Sugar Maple Forest Unchanged	15,103	4%
Lake/River Unchanged	9,837	3%
Mixed Oak Savanna Unchanged	2,631	1%
Mixed Oak Forest Unchanged	2,465	1%
Mixed Oak Savanna Minor Change	1,656	0%
Mixed Hardwood Swamp Unchanged	1,534	0%
Mixed Conifer Swamp Minor Change	1,233	0%
Mixed Hardwood Swamp Minor Change	724	0%
Shrub Swamp/Emergent Marsh Unchanged	677	0%
Black Oak Barren Unchanged	328	0%
Black Oak Barren Minor Change	284	0%
Mixed Conifer Swamp Unchanged	209	0%
White Pine-White Oak Forest Minor Change	207	0%
White Pine-White Oak Forest Unchanged	124	0%
Wet Prairie Unchanged	38	0%
Pine Barrens Unchanged	37	0%
Pine Barrens Minor Change	33	0%
Muskeg/Bog Unchanged	27	0%
Grassland Unchanged	10	0%
Sand Dune Unchanged	-	0%
Sugar Maple-Hemlock Forest Unchanged	-	0%
Cedar Swamp Unchanged	-	0%
White Pine-Red Pine Forest Unchanged	-	0%
Spruce-Fir-Cedar Forest Unchanged	-	0%
Aspen-Birch Forest Unchanged	-	0%
Hemlock-White Pine Forest Unchanged	-	0%
Black Ash Swamp Unchanged	-	0%
W. Pine-Mixed Hardwood Forest Unchanged	-	0%
Hemlock-Yellow Birch Forest Unchanged	-	0%
Jack Pine-Red Pine Forest Unchanged	-	0%
Oak/Pine Barrens Unchanged	-	0%
Oak/Pine Barrens Minor Change	-	0%
Beech-Sugar Maple-Hemlock Forest Unchanged	-	0%
Mixed Pine-Oak Forest Minor Change	-	0%
Mixed Pine-Oak Forest Unchanged	-	0%
	369,004	100%

*Note: "Other Change" is defined as any of the possible 78 circa 1800 vegetation types now occurring as one of 31 possible IFMAP 2000 cover types where the “from-to” combination was not identified as "unchanged" or a "minor change" by MNFI ecologists. Two classes "Changed to Agriculture" and "Changed to Urban" are listed separately due to their large size. MNFI Ecologists developed a crosswalk for the cover type categories from the circa 1800 land cover layer to the circa 2000 IFMAP land cover layer to identify combinations that are a potentially unchanged vegetation type. In some cases a “from-to” cover type combination was labeled a potentially "Minor change".

Appendix 4. Barry County Element Frequency Count



Appendix 5. Barry County Probability Value



Barry County
Probability Value

0 1.25 2.5 5 7.5 10 Miles

Map date 2/08/2007

N

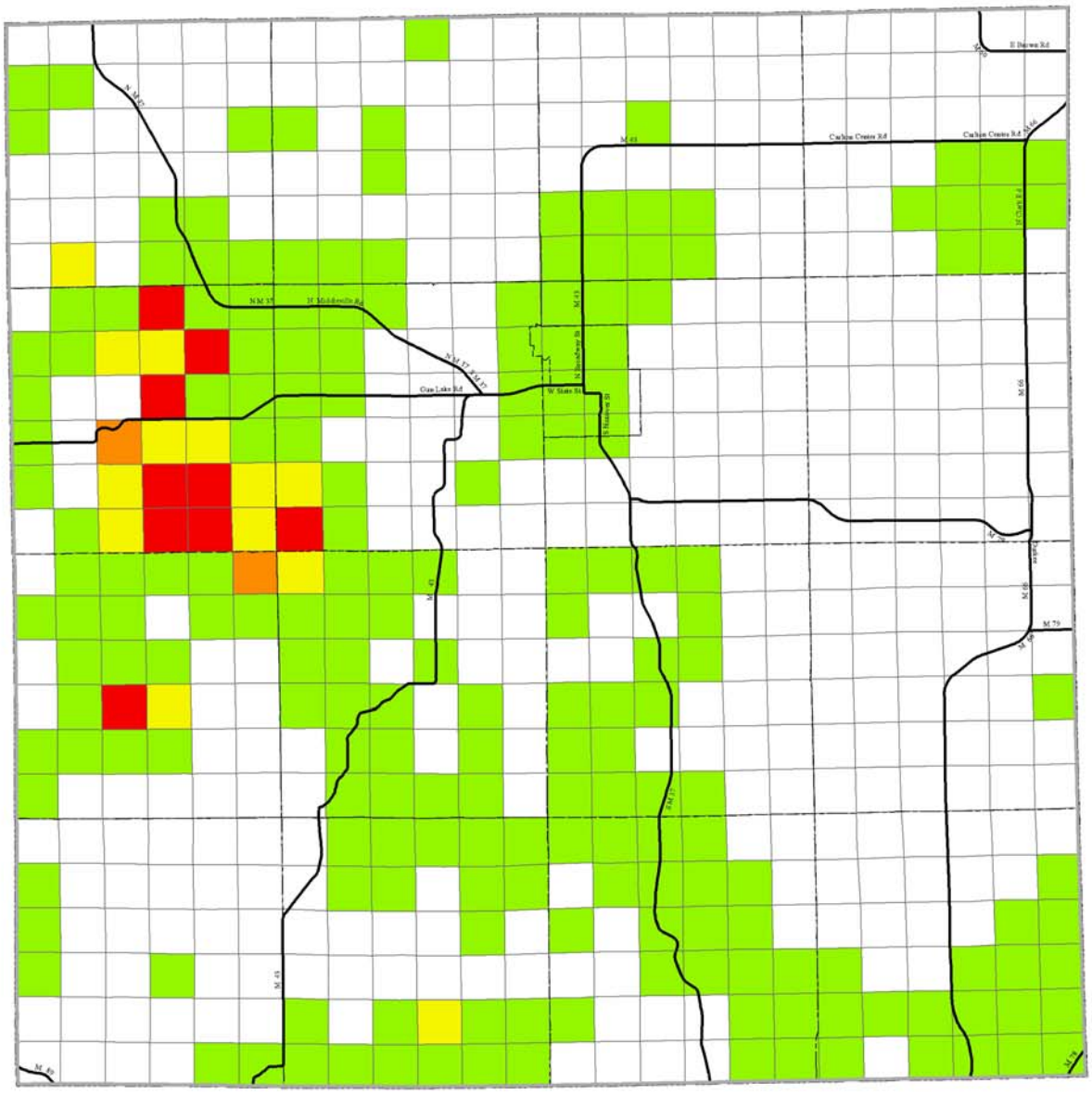
Legend

- County Boundary
- Township boundary
- Major road

Probability Value

- No Status
- Moderate
- Low
- High

Appendix 6. Barry County Biological Rarity Score



Barry County
Biological Rarity Score

0 1.25 2.5 5 7.5 10 Miles

Map date 2/08/2007

N

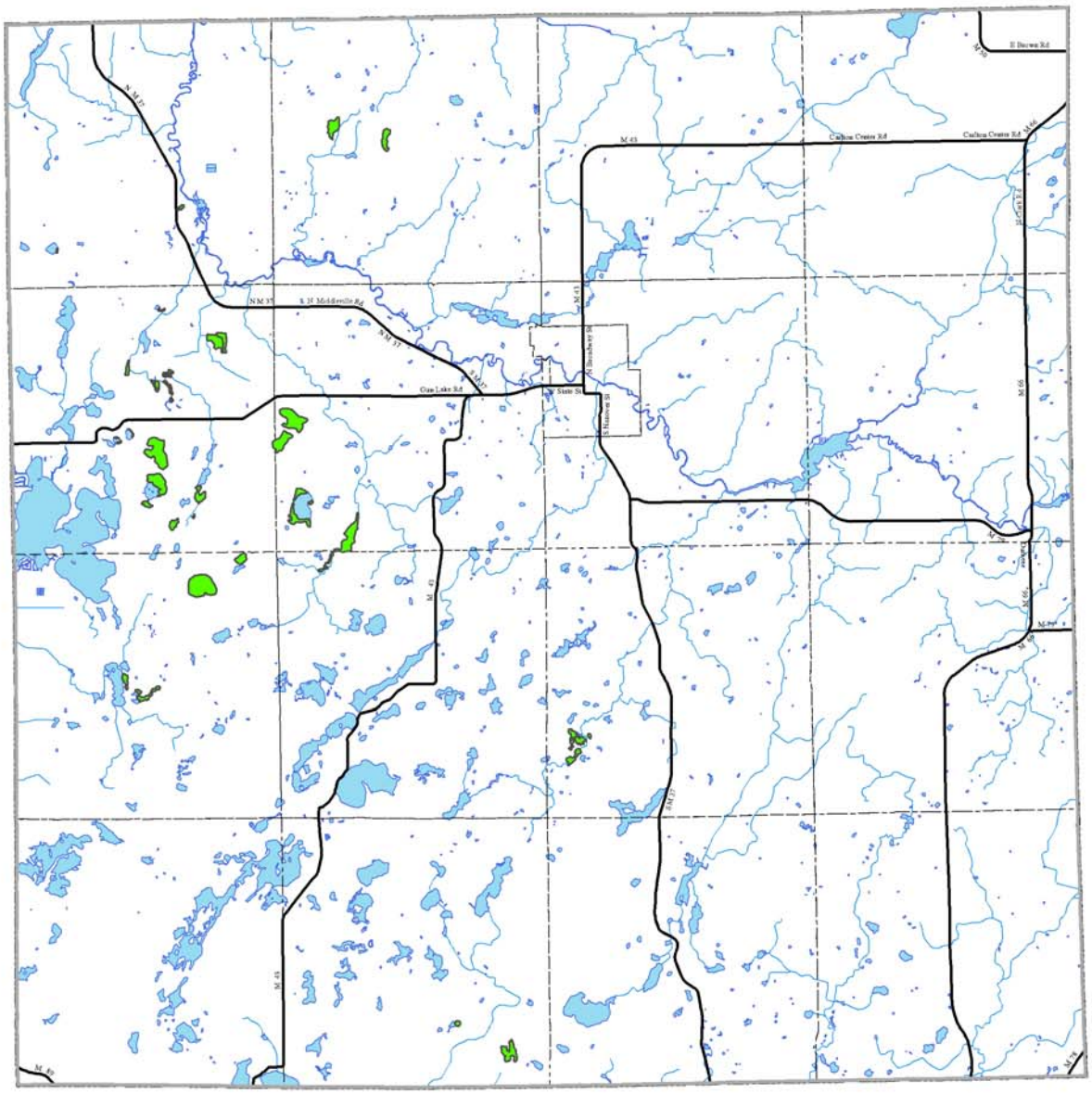
Legend

County Boundary
Township boundary
Major road

Bio-rarity Score

0.00
0.01 - 25.00
25.01 - 50.00
50.01 - 75.00
75.01 - 150.00

Appendix 7. Barry County Natural Communities



Barry County
Natural Community
Element Occurrences

0 1.25 2.5 5 7.5 10 Miles

Map date 2/16/2007

N

Legend

- Major road
- Streams
- Lakes
- County Boundary
- Township boundary
- Community