

Green Infrastructure Planning Areas

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. In many communities across the state, natural resource areas have become encircled by development and only remnants of native ecosystems remain. Presque Isle County is in the enviable position of having abundant high quality natural communities and native ecosystems that are still relatively intact. 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 Presque Isle 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. Green infrastructure planning is important for insuring that the land and water that supports native species, maintains natural ecological processes, sustains air and water resources and contributes to the health and quality of life for the community is protected.

This report identifies and ranks Potential Conservation Areas (PCA's) that occur in Presque Isle 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 Presque Isle 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.

Materials and Interpretation Methodology

Identification of potential conservation areas in Presque Isle County was conducted using 1995 land use data (updated MIRIS), Vegetation circa 1800 of Michigan (Comer, et. al, 1995), the Biotics Database (MNFI, 2006), and The Michigan Geographic Framework (MGF) base layers for Presque Isle County (MDIT-CGI, 2006). Analysis was conducted using Arc View GIS 3.2a. This is computer

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software, which provides a desktop geographic information system for visualizing and analyzing geographic information.

Geometry for the land use layer was checked and repaired. Slivers between polygons were removed. Land use types were coded either "restorable", "potential conservation area (PCA)", or "other" (See metadata for a table of each land use type and its code). Water was included as a PCA type only if it was completely surrounded by PCA land types.

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 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.

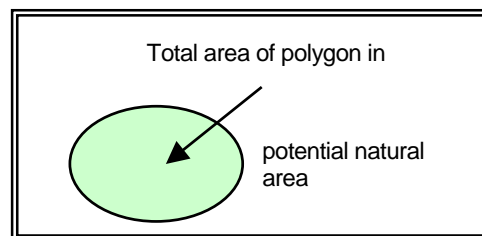
Site Selection and Prioritization

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. Scores for Presque Isle County sites ranged from 1 to 30.

Description of Criteria

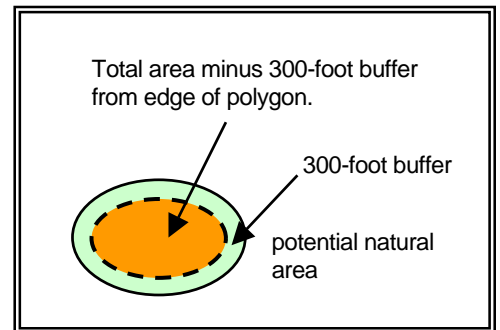
Total Size - The total size of a site is recognized as an important factor for viability of species and ecosystem health. Larger sites tend to have higher species diversity, higher reproductive success, and improve the chances of plant and animal species surviving a catastrophic event such as a fire,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

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



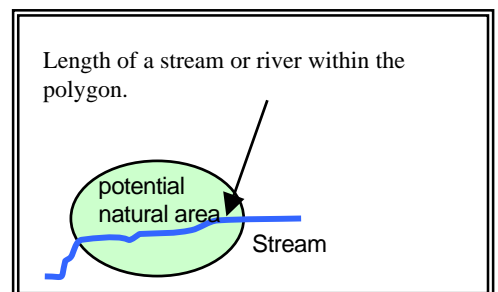
Size of Core Area - Many studies have shown that there are negative impacts associated with the perimeter of a site on “edge-sensitive” animal species, particularly amphibians, reptiles, and forest and grassland songbirds. Buffers vary by species, community type, and location, however most studies recommend 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 in fragmented landscapes.

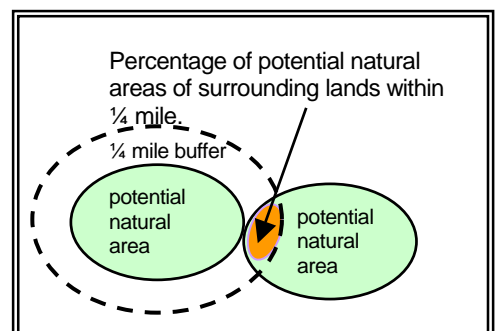
Sites that are part of riparian corridors were given a score 0-6 points depending upon the length of stream or river that was present at the site.



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

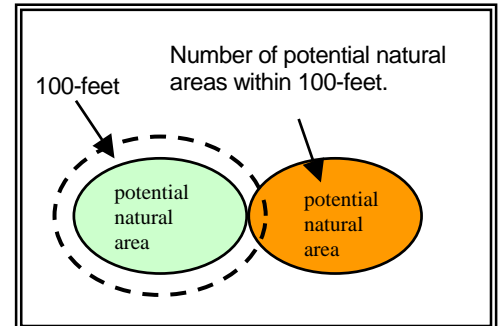


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and measuring the percentage of area that falls within other potential conservation areas.

Proximity

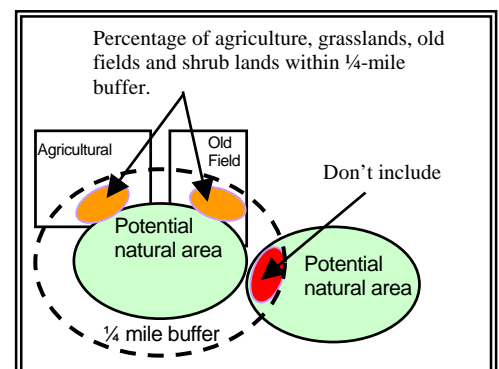
In addition to measuring the area around a polygon that is considered natural, connectivity can also be measured by the number of individual potential conservation areas in close proximity to the site. The greater the number of polygons in “close proximity,” the higher the probability for good connectivity. 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.



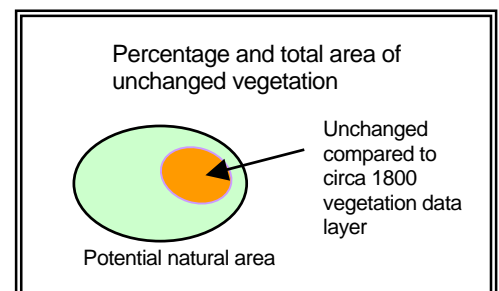
Restorability of surrounding lands -

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 (See Appendix 1.).



Percentage

Vegetation quality was measured by calculating the percentage of the site that contains

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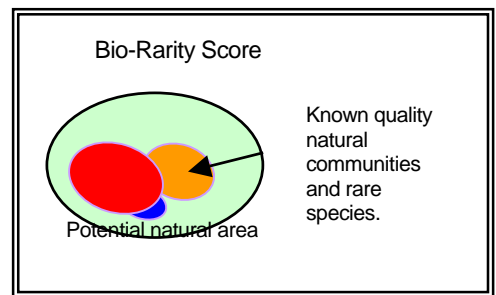
potentially unchanged vegetation. This allows small sites with a high percentage of potentially unchanged vegetation to score points.

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 2, 3 & 4*). 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



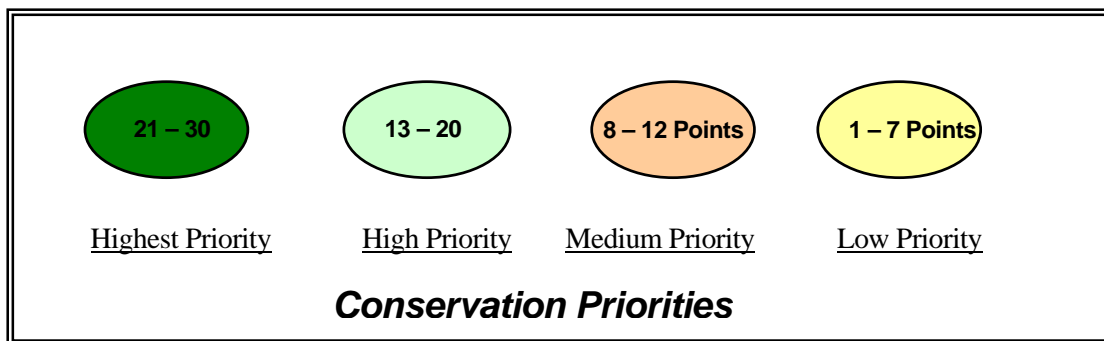
Note: The number of points assigned for each criterion is in Table 1. An element occurrence is an occurrence record of a federally and/or state listed species, state special concern species, exemplary and/or rare natural community, or another type of natural feature such as a unique geologic formation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

Table 4.1: Site Criteria

CRITERIA	DESCRIPTION	DETAIL	PTS
Total Size	Total size of the polygon in acres. <input type="checkbox"/> <i>Size is recognized as an important factor for viability of species and ecosystems.</i>	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. <input type="checkbox"/> <i>Greater core area limits negative impacts on "edge-sensitive" animal species.</i>	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. <input type="checkbox"/> <i>Stream corridors provide wildlife connections between patches of habitat.</i>	0	0
		>0-400 m	1
		>400-800m	2
		>800-1600m	3
		>1600-3200m	4
		>3200 m	6
Landscape Connectivity	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. <input type="checkbox"/> <i>Connectivity between habitat patches is considered a critical factor for wildlife health.</i>	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 <input type="checkbox"/> <i>Restorability is important for increasing size of existing natural communities, providing linkages to other habitat patches, and providing a natural buffer from development.</i>	0 - 35%	1
		>35 - 65%	2
		>65%	3

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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%	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. <i>The quality of vegetation is critical to determining the quality of a natural area.</i>	0 – 10ac	0
		10.1 – 40ac	1
		40.1 – 80ac	2
		80.1 - 160	3
		> 160ac	4
Bio Rarity Score	Known element occurrences increase the significance of a site and increase the bio rarity score. <input type="checkbox"/> <i>The location of quality natural communities and rare species tracked by MNFI are often, although not always, indicative of the quality of a site.</i> <input type="checkbox"/> <i>Values were determined using the Jenk's optimization formula.</i>	0 – 5.75	1
		5.75 – 19.5	2
		19.5 -41.5	3
		41.5 -68	4
<p><i>Note: Total possible points = 41</i></p>			



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 (30) and lowest (1) 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 Presque Isle County.

Priority Ranking for Presque Isle County

A total of **477 sites, totaling 300,369 acres** were identified as potential conservation areas in Presque Isle County. **This represents 71% of the total area in the county.** Total scores ranged from a high of 30 points (out of a possible 41 points) to a low of one point. The mean score was nine.

As a result of applying the natural break method, 195 sites were placed in the low priority category, 213 sites were placed in the medium priority category, 52 sites were placed in the high priority category and 17 sites were placed in the highest priority category. Breaking it down into percentages of total sites identified, **41 % were identified as low priority, 44.5 % were identified as medium priority, 11 % of the sites were identified as high priority and 3.5 % were identified as the highest priority.** Breaking it down by area within a PCA, 5.5 % (23,253 acres) occur in the low quality category, 12.6 % (53,150 acres) occur in the medium quality category, 18 % (76,612 acres) occur in the high priority category, and 35 % (147,354 acres) occur in the highest priority category (See Table 2.)

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.

Table 4.2 Results of PCA Analysis for Presque Isle County					
PCA Class	PCA Count	Percentage	Acres	% of PCA acreage	% County acreage
Low 1-7	195	41%	23,253	7.8%	5.5%
Med 8-12	213	44.5%	53,150	17.7%	12.6%
High 13-20	52	11 %	76,612	25.5%	18%
Highest 21-30	17	3.5 %	147,354	49%	35%
TOTAL	477	100%	300,369	100%	71%

The first map (Figure 4.1) on the following page depicts the four different classes of PCA's for Presque Isle County. The next map (Figure 4.2) shows only the two highest-ranking PCA classes for the county. The third map (Figure 4.3) groups the two highest-ranking PCA's together and the fourth map (Figure 4.4) delineates lower ranking PCA's that could act as connectors between the high-ranking PCA's. Thus, the GIS model provides information useful in beginning to identify key areas that represent relatively intact natural communities. This provides a solid foundation for green infrastructure planning.

Figure 4.2

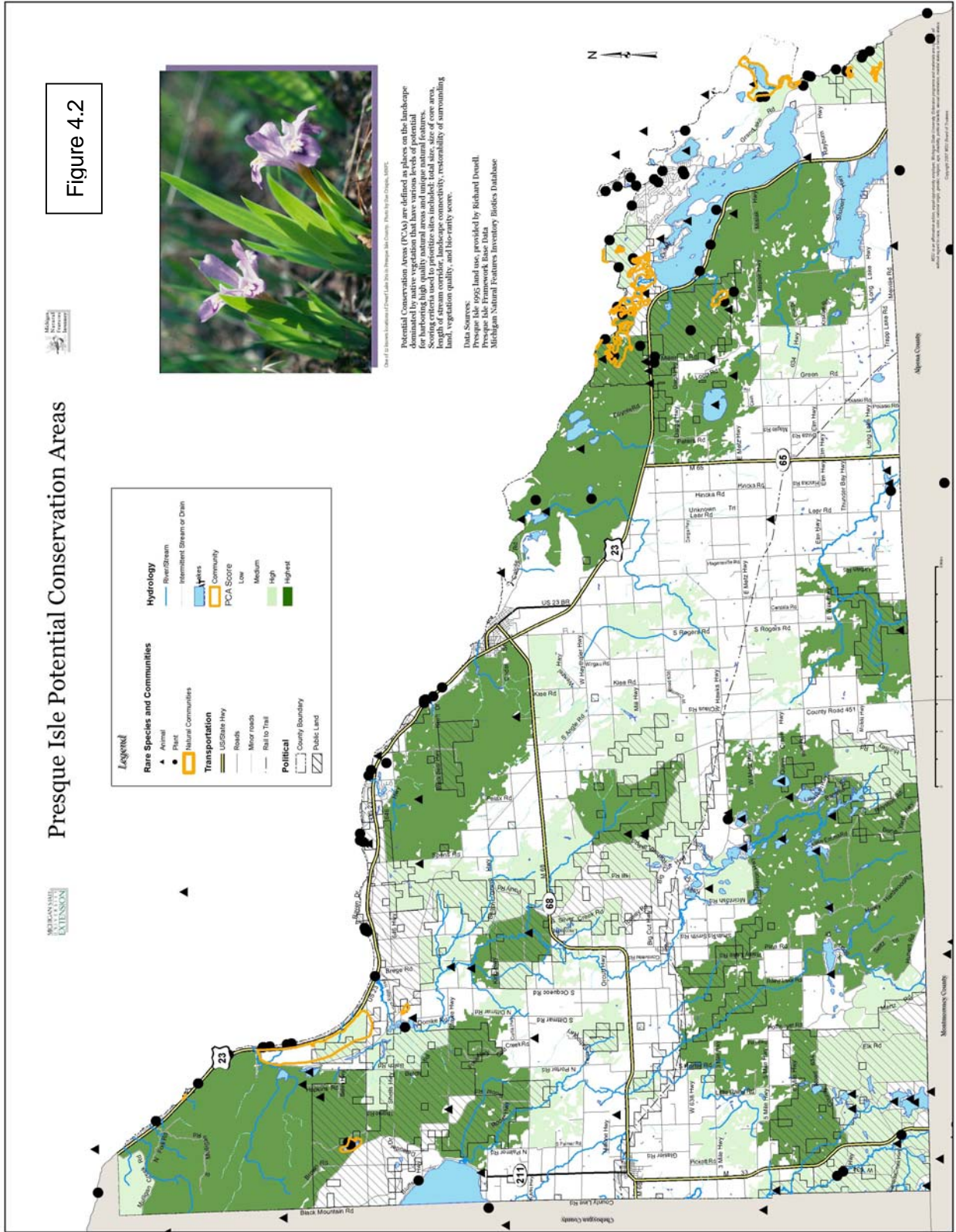
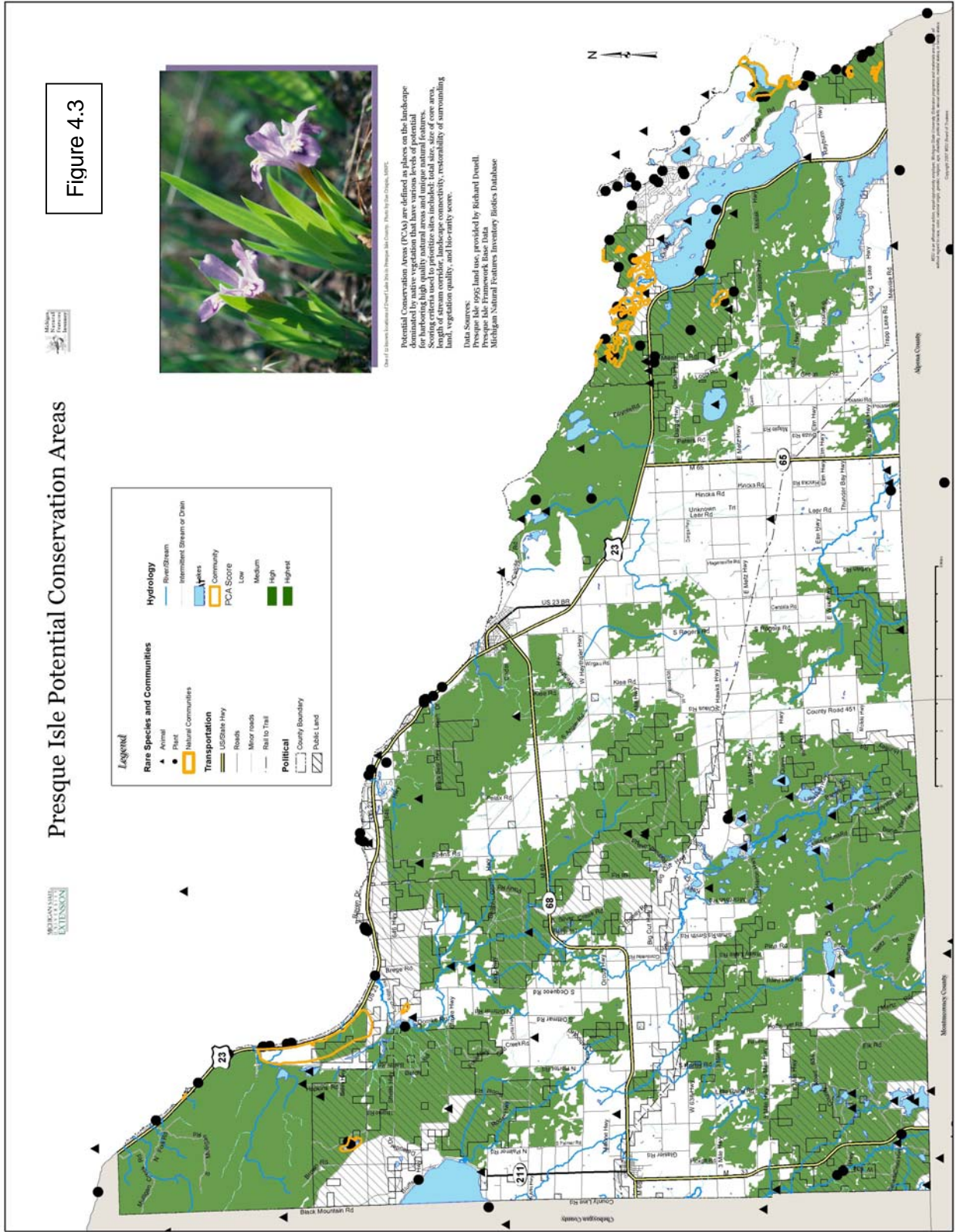


Figure 4.3



Presque Isle Potential Conservation Areas
And Connectors



Figure 4.4



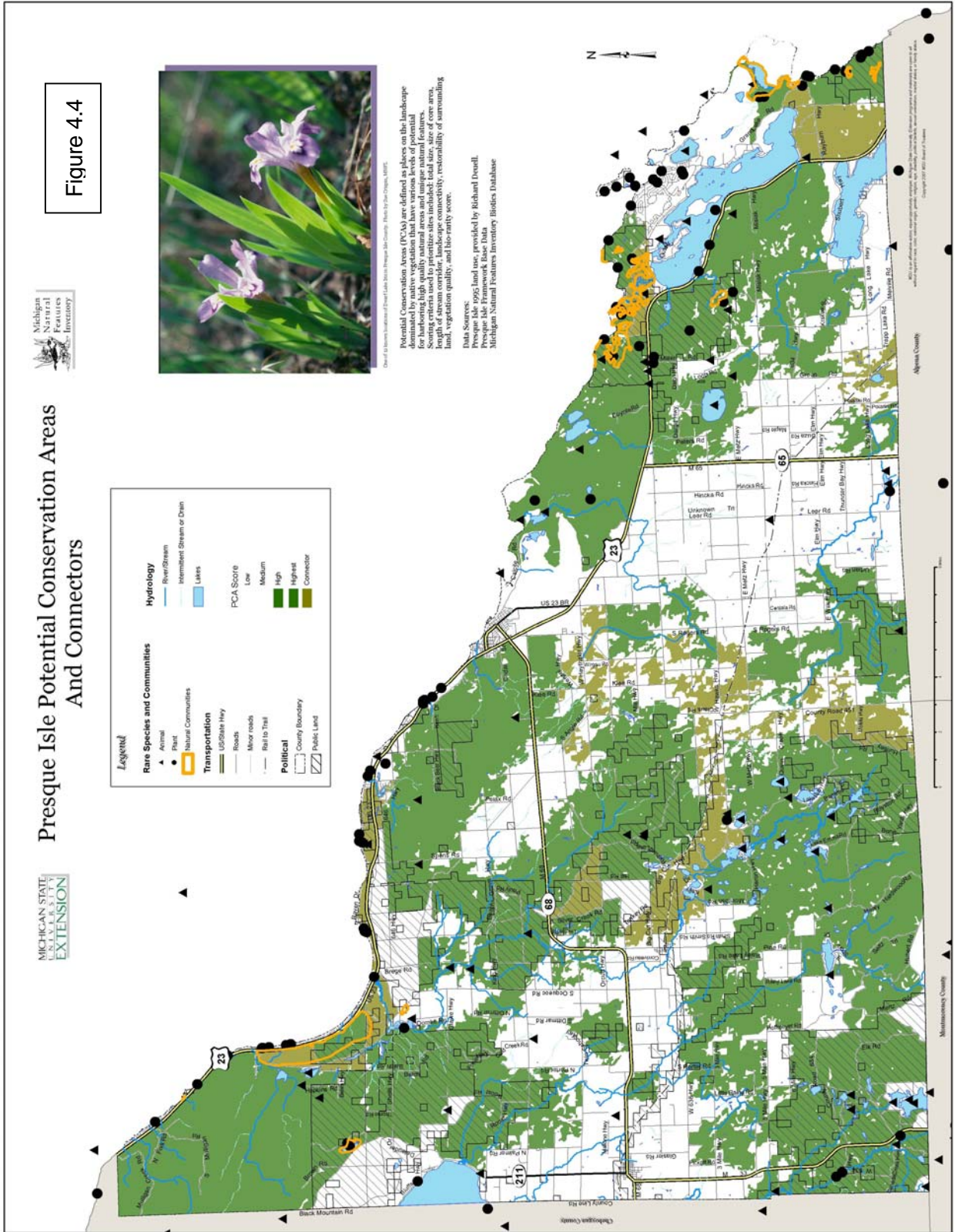
David G. Bennett, Institute of Forest Ecology, Forest Science Center, Forest to the Future, MSU.

Potential Conservation Areas (PCAs) are defined as places on the landscape for harboring high quality natural areas and unique natural features. Scoring criteria used to prioritize sites included: total size, size of core area, length of stream corridor, landscape connectivity, restorability of surrounding lands, vegetation quality, and the rarity score.

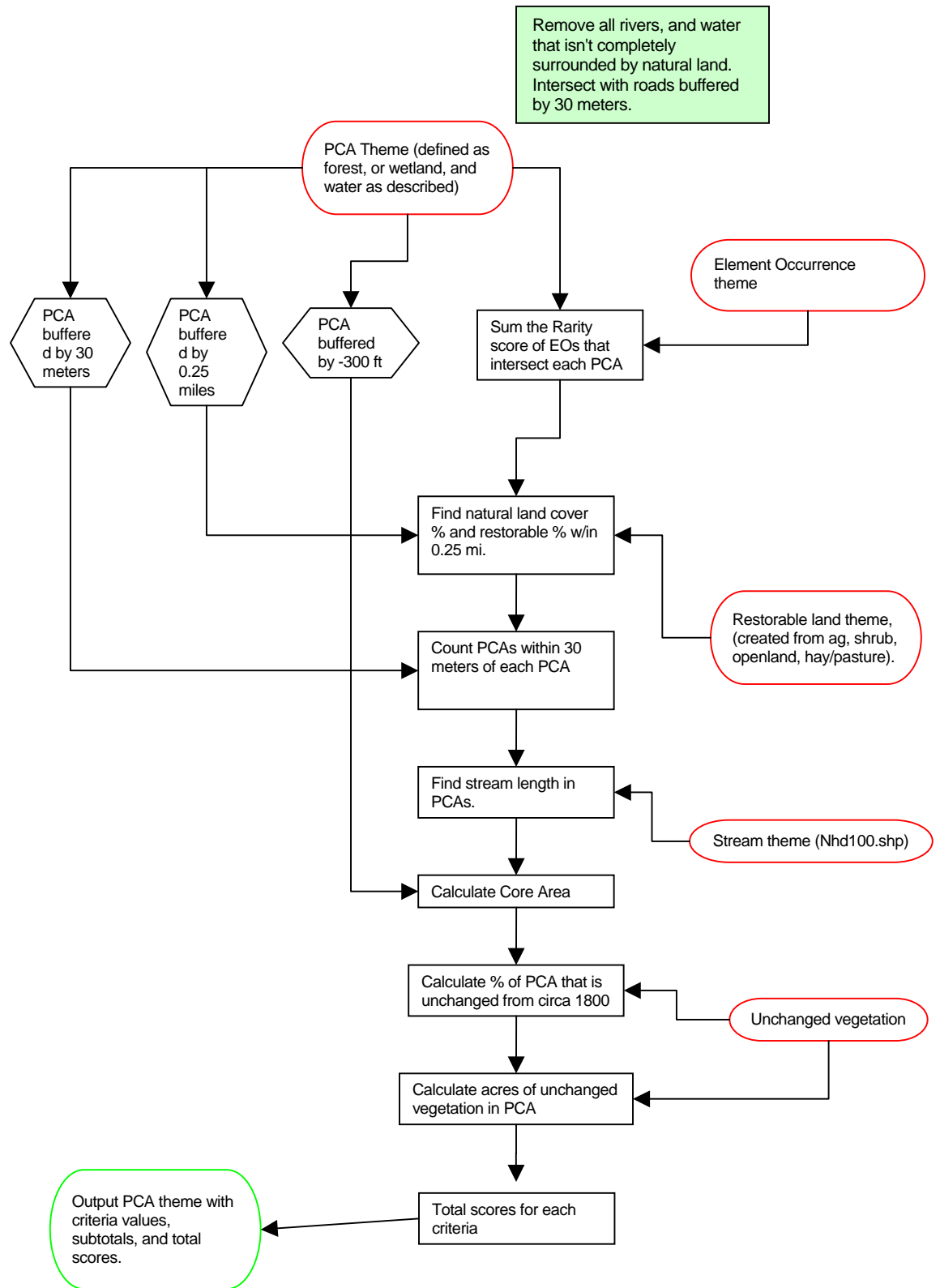
Data Sources:
 - Wetlands: National Wetlands Inventory
 - Presque Isle Framework Base Data
 - Michigan Natural Features Inventory Database

Legend

Rare Species and Communities	Hydrology
▲ Animal	— River/Stream
▲ Plant	— Intermittent Stream or Drain
▲ Natural Communities	— Lakes
Transportation	
— US/State Hwy	PCA Score
— Roads	Low
— Minor roads	Medium
— Rail to Trail	High
— Political	Highest
— County Boundary	Connector
— Public Land	



Flow chart for PCA model



Green Infrastructure: Hubs, Sites, and Links

Ecological information is useful in identifying features on the landscape that can be the foundation for green infrastructure plans. Hubs are large intact natural landscapes that provide important aesthetic, ecological and recreational functions to communities. They are areas worthy of conservation and careful planning so that the values they supply are preserved. We delineated nine key hubs in Presque Isle County. We identified adjacent high priority PCA's. and used major roads to help define the boundaries of the hubs. Sites are smaller ecological landscape features that contain high quality natural communities or unique assemblages of species that are important to conserve. We identified three sites that contained high ranking PCA's that were isolated from the nine hubs. All of these sites occur along the Lake Huron shoreline. Finally, links provide a connection between hubs and sites and help to facilitate the flow of ecological processes. Three areas that we delineated are important for providing this connectivity. A map, which shows these hubs, links and sites, follows their description.

Description of Hubs

1-NW Forest

Total Acres: 50,164

Public Land: Mackinaw State Forest

Natural Land Cover/Features: Large contiguous forested tract (Primarily aspen-birch with some areas of lowland conifer and pine). Black Mallard River, Carp, Grace, Mulligan and Three Creeks, Black Mallard, Clear, Mud, Ocquoec, Orchard and Sixteen Lakes, Hammond Bay, Huron Beach.

Natural Communities/Rare Species: Interdunal wetland, Intermittent wetland, Wooded dune and swale complex, Intermittent wetland, Bald eagle, Blanding's turtle, Common loon, Dwarf lake iris, Lake Huron locust, Lake Huron tansy (2 records), Pine drops, Pitcher's thistle (3 records). Ram's head lady slipper, Red-shouldered hawk.

2-Lower Ocqueoc River

Total Acres: 12,744

Public Land: Mackinaw State Forest

Natural Land Cover/Features: Large contiguous forested tract (Primarily aspen-birch, pine and central hardwood with areas of lowland conifer and lowland hardwood). Ocqueoc River, Silver Creek and Ocqueoc Falls.

Natural Communities/Rare Species: Wood turtle (2 sites), Spike-lipped crater (historical record (rare snail)).

3-Moltke/Ocqueoc Forest

Total Acres: 18,969

Public Land: Mackinaw State Forest, P.H. Hoeft State Park, Herman Vogler Conservation Area

Natural Land Cover/Features: Large intact forested area (Aspen-birch, lowland conifer with some areas of central hardwood). Trout River, Hartwick, Schmidt and Silver Creeks and Beechnut Lake.

Natural Communities/Rare Species: Bald eagle, Eastern massasauga (2 sites).

4-Little Ocqueoc River

Total Acres: 22,579

Public Land: Mackinaw State Forest

Natural Land Cover/Features: Large intact forested area (Aspen-birch, pine, lowland conifer, central hardwood). Little Ocqueoc River, Fox and Indian Creek, Klees Pond and Richard Lake.

Natural Communities/Rare Species: Secretive locust (2 sites), Red-legged spittlebug.

5-Rainy River Headwaters

Total Acres: 49,650

Public Land: Mackinaw State Forest

Natural Land Cover/Features: Large contiguous forested tract (primarily aspen-birch and pine with areas of lowland conifer and northern hardwood). Sinkholes, Little Rainy River, Upper Rainy River, Stony Creek, Tomahawk Creek and Flooding, Francis, Hesler, Krauth, Loon, McAvoy, Rainy, and Shoepac Lakes.

Natural Communities/Rare Species: Bald eagle, Common loon (3 sites) Osprey, Henry's elfin (historical record, rare butterfly).

6-Ocqueoc River Headwaters

Total Acres: 25,310

Public Land: Mackinaw State Forest

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Natural Land Cover/Features: Large intact forested area (primarily central hardwood with some aspen-birch, lowland conifer and pine). Ann, Bear, Clear, Drum, Ella, Emma, Ferdelman, Gifford, Horseshoe, Kelsey, Lost, Louise, May, McIntosh, Nettie, Ruth and Twin Lakes.

Natural Communities/Rare Species: Bald eagle (2 sites), Common loon (6 sites), Red-shouldered hawk.

7-Thunder Bay River Headwaters

Total Acres: 11,240

Public Land: Mackinaw State Forest

Natural Land Cover/Features: North Branch Thunder Bay River, Quinn Creek, Large contiguous forested tract (aspen-birch, lowland conifer, northern hardwood and some pine).

Natural Communities/Rare Species: Bald eagle, Great blue heron rookery.

8-Krakow Forest

Total Acres: 32,945

Public Land: Mackinaw State Forest

Natural Land Cover/Features: Large intact forested area (aspen-birch, northern and central hardwood, lowland conifer, and pine). Little Trout River, Monaghan, Schalks, Schaot, Shuberts and Warren Creeks, Lake Augusta and Clinton Lake, Grand Lake Pike Spawning Area.

Natural Communities/Rare Species: Limestone bedrock glade/Alvar, Bald eagle (2 sites), Blanding's turtle, Common loon, Cooper's milk vetch, Dwarf lake iris (2 sites), Grizzled skipper, Ram's head lady's slipper (2 sites).

9-Thompson's Harbor

Total Acres: 19,365

Public Land: Thompson's Harbor State Park

Natural Land Cover/Features: Swan River, Grand Lake outlet, Little Trout River, Big Trout, Little Trout, Mud, Penny, and Swan Lakes

Natural Communities/Rare Species: Limestone bedrock glade/Alvar, Cobble Beach, Northern Fen, Rich Conifer Swamp, Bald eagle (2 sites), Bulrush sedge, Butterwort, Dwarf lake iris (2 sites), Grizzled skipper (2 sites), Hine's emerald dragonfly, Houghton's goldenrod,

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Pitcher's thistle, Prairie Indian plantain (2 sites), Prairie warbler, Ram's head lady's slipper, Red-legged spittlebug, Richardson's sedge.

Description of Sites

1-Southeast Shoreline

Total Acres: 3,968

Public Land: Besser Bell Natural Area, Mackinac State Forest

Natural Land Cover/Features: Sinkholes, Shoreline forest (primarily aspen-birch and northern hardwood with areas of lowland hardwood).

Natural Communities/Rare Species: Northern fen, Bald eagle, Dwarf lake iris (4 sites), Houghton's goldenrod, Pine drops, Pitcher's thistle (3 sites), Ram's head lady's slipper.

2-Presque Isle Harbor

Total Acres: 4,331

Public Land: Presque Isle Lighthouse Park

Natural Land Cover/Features: Shoreline forest (primarily aspen-birch with area of lowland hardwood).

Natural Communities/Rare Species: Beauty sedge, Butterwort, Climbing fumitory, Common loon, Dwarf lake iris (2 sites), English sundew, Houghton's goldenrod, Lake Huron tansy, Pine drops, Pitcher's thistle, Ram's head lady's slipper.

3-Forty Mile Point Shoreline

Total Acres: 2,311

Public Land: Mackinac State Forest, P.H. Hoeft State Park, Seagull Point Park, Forty Mile Point County Park, Hammond Bay Fishery Laboratory.

Natural Land Cover/Features: Shoreline forest (Aspen-birch, central hardwood, pine).

Natural Communities/Rare Species: Butterwort, Dwarf lake iris, Eastern massasauga, English sundew, Houghton's goldenrod (2 sites), Lake Huron locust (3 sites), Lake Huron tansy (3 sites), Lichen (historical record), Pine drops (historical record), Pitcher's thistle (3 sites), Ram's head lady's slipper (historical record).

4-Canada Creek

Total Acres: 5,840

Public Land: Mackinaw State Forest

Natural Land Cover/Features: Pine, aspen/birch, and lowland conifer forests

Natural Communities/Rare Species: Calypso, Ram's head lady's slipper, Hungerford's crawling water beetle, Osprey, Wood turtle

Description of Links

1- Headwaters Link

Total Acres: 1,792

Public Land: Mackinac State Forest

Natural Land Cover/Features: Contiguous forest (primarily aspen-birch with areas of lowland hardwood and lowland conifer).

Natural Communities/Rare Species: None presently recorded

2-Ocqueoc River Link

Total Acres: 4,787

Public Land: Mackinac State Forest, Upper Barnhart Lakes, Bullhead and Mud Lakes,

Natural Land Cover/Features: Contiguous forest (primarily aspen-birch with areas of lowland hardwood, lowland conifer and central hardwood).

Natural Communities/Rare Species: Hill's thistle (historical record), Secretive locust (historical record).

3-SE Shoreline-Forest Link

Total Acres: 4,422

Public Land: State Public Access-Metzelaar/Whiskey Bay on Grand Lake

Natural Land Cover/Features: Contiguous forest (primarily aspen-birch with lowland hardwood and lowland conifer).

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Natural Communities/Rare Species: Dwarf lake iris, Spike-lipped crater (historical record, rare snail).

4-NW Shoreline-Forest Link

Total Acres: 5,394

Public Land: Mackinaw State Forest

Natural Land Cover/Features: Pine, Northern/Central hardwood, and aspen/birch forests

Natural Communities/Rare Species: None presently recorded

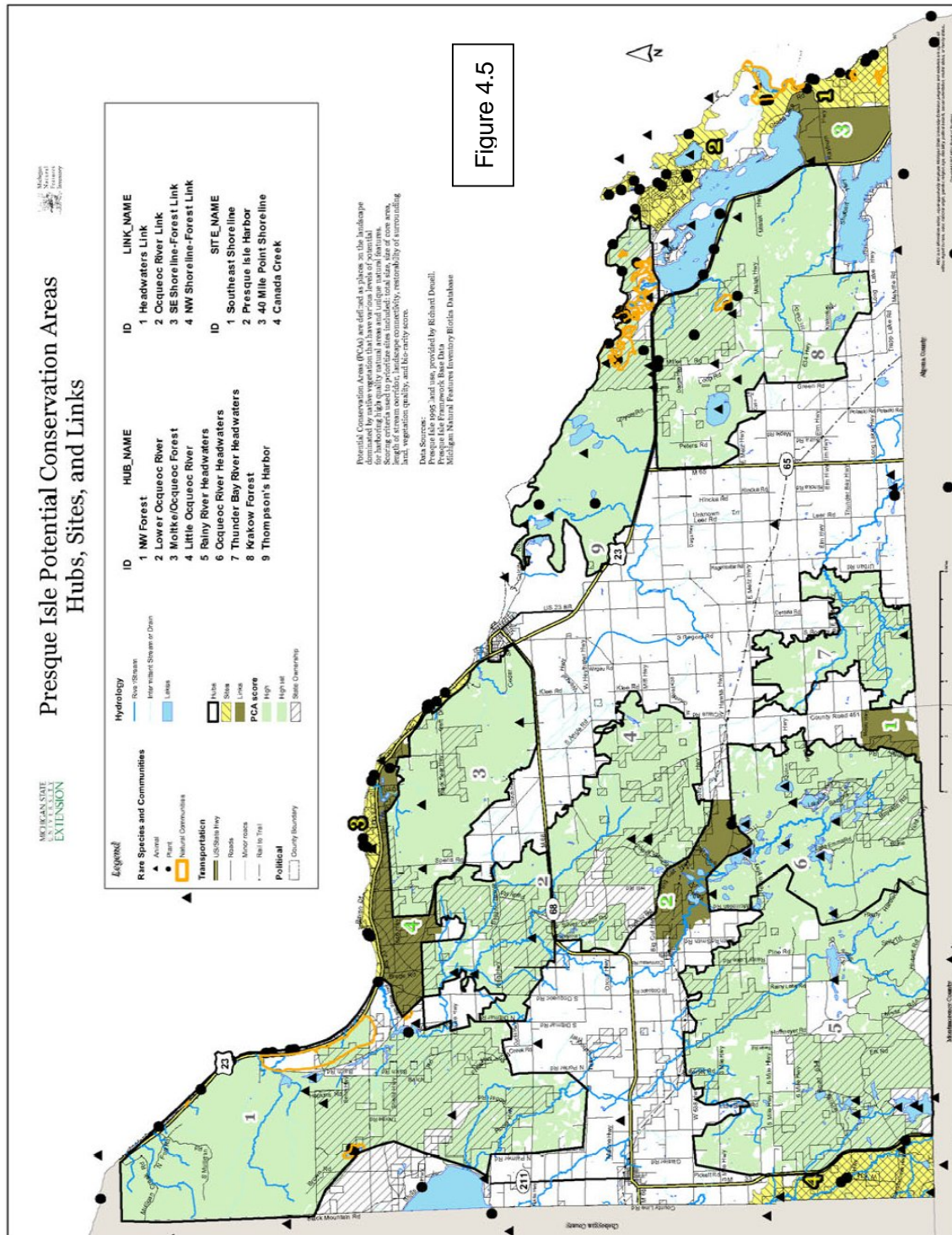


Figure 4.5

Conclusion

This inventory documents that Presque Isle County has several high quality natural areas that still look and function the way they did 200 years ago (*See Appendix 5*). Of the remaining high quality sites, some have the potential of harboring endangered, threatened, or special concern animal and plant species. With the potential for increased development pressure (particularly along the shoreline and around inland lakes) and the 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 fencerow 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.

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- 9) Local units of government in Presque Isle 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.

References

- Comer, P. J., D. A. Albert, H.A. Wells, B. L. Hart, J.B. Raab, D. L. Price, D. M. Kashian, R. A. Corner, and D. W. Schuen. 1995. Vegetation circa 1800 of Michigan. Michigan's Native Landscape: As Interpreted from the General Land Office Surveys 1816-1856. Michigan Natural Features Inventory. Lansing, MI. 78 pp. + digital map.
- 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.
- Duell, Richard, Presque Isle 1995 land use. Presque Isle Framework Base Data.
- Forman, Richard T. T. and Michel Gordon. 1986. Landscape Ecology. Wiley, New York.
- MDIT-CGI. 2006. The Michigan Geographic Framework (MGF) Standard Reference Base GIS Data Layers for Michigan Roads, Hydrology, and County Lines, Version 6b. Center for Geographic Information (DIT-CGI), Michigan Department of Information Technology (MDNR), Lansing, Michigan. Base data layers include roads, hydrology, and county lines and other standard reference layers; data layers created as part of maintaining Michigan base data layers for GIS applications. Data and metadata available online at <http://www.mcgi.state.mi.us/mgdl/>.
- MNFI, 2003. Draft Land Use Change of Michigan's Lower Peninsula, Circa 1800-2000. Raster digital data.
- MNFI, 2006. Biotics 4 database. The element occurrence database for the state of Michigan, created by the Michigan Natural Features Inventory (MNFI) in Lansing, MI. These data represent a current snapshot of the elements of biodiversity (animal species, plant species, natural communities, geologic features, and champion trees) being maintained by MNFI using established Natural Heritage Methodology developed by the Association for Biodiversity Information (ABI) (now NatureServe) and The Nature Conservancy (TNC).
- 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 manager's guide to improving habitat for scarlet tanagers and other forest-interior birds. The Cornell Lab of Ornithology.