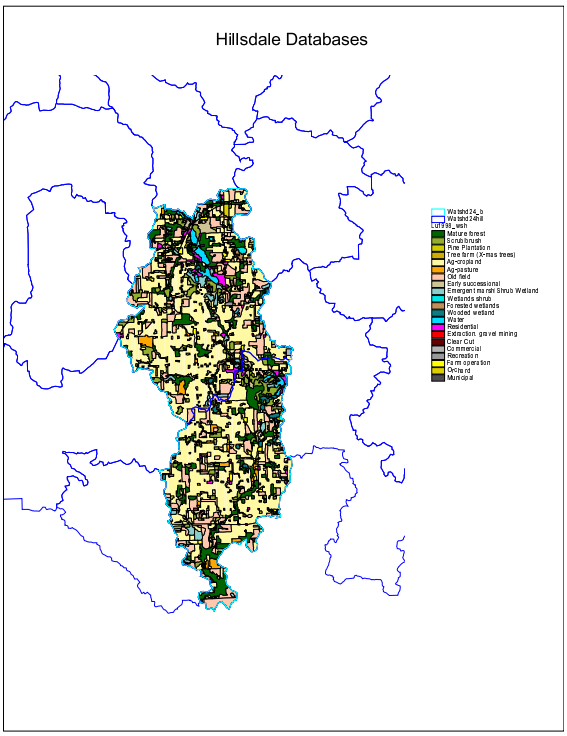
Partnerships for Effective Long-term Ecosystem Conservation



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Michigan Natural Features Inventory
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MICHIGAN STATE UNIVERSITY EXTENSION

Michigan Natural Features Inventory

Contents

Introduction

Several high priority ecosystems with high biodiversity value are located in southern Michigan, namely the prairie fen-oak upland ecosystem, oak-pine barrens ecosystem, and southern riverine ecosystem. Prairie fen is a globally rare wetland community home to numerous rare plants, animals, and insects such as the federally endangered Mitchell's satyr butterfly. Significant areas for the prairie fen-oak upland ecosystem are primarily limited to the interlobate region of the southern Lower Peninsula. The oak-pine barrens ecosystem consists of three globally rare natural communities; oak-pine barrens, dry sand prairie, and coastal plain marsh. Ten rare plants and 11 rare animals are associated with oak-pine barrens and dry sand prairies, and the coastal plain marsh community harbors 45 rare plants. The southern riverine ecosystem consists of rivers and streams and adjacent southern floodplain forests. Michigan's streams and rivers, particularly those in southern Michigan, harbor numerous rare mussel and fish species including the federally endangered clubshell. Southern floodplain forest, a globally rare natural community, harbors over thirty rare plant species and numerous rare animals including the federally endangered Indiana bat and northern copperbelly water snake.

One of the biggest challenges facing the conservation of these threatened ecosystems is the large amount of small private parcels that dominates the southern Michigan landscape. 95% of the land in southern Michigan is privately owned, and there is tremendous pressure on this area from spreading residential, commercial, and industrial developments, landfills, intensive agricultural operations (such as large hog confinement operations), and the rapid spread of zebra mussels into rivers and lakes. Additionally, only a small percentage of these high priority ecosystems is permanently protected or managed for biodiversity.

Opportunities and constraints:

Numerous local conservation organizations, as well as several state and federal agencies, work in southern Michigan to conserve and protect natural resources on private land. Our past experience with landowner contact and education has convinced us that an established, local presence is essential for success in stimulating conservation on private lands. Local organizations are valuable partners because they have an established relationship with the community, a good understanding of local politics, landscapes, and culture, and they are readily accessible. Our centralized Lansing based program cannot provide this local presence.

The majority of these organizations, however, lack expertise in conservation planning, landscape ecology, and rare plant, animal, and natural community identification. Many also lack the resources and/or expertise to implement education and stewardship programs. In addition, although many of these organizations have similar goals, they tend to work independently of each other minimizing the potential effectiveness of collaboration.

Action

To address this need, MNFI identified local conservation groups in southern Michigan interested in the conservation of their region's biodiversity and high priority ecosystems. The three organizations which expressed an interest in forming a partnership with MNFI were: 1) the Southwest Michigan Land Conservancy, 2) the Land Conservancy of Western Michigan, and 3) the St. Joseph River Watershed Initiative. Our goal was to provide these organizations with natural features information, skills, and conservation tools so that they could become more effective leaders, and have a long-term impact on local policy and the development of a strong local conservation ethic.

To help these organizations become more effective in the conservation of their region's biodiversity, MNFI provided each organization with 1) biological and ecological information to determine conservation priorities in their region of Michigan, 2) training to develop and implement a proactive landowner contact and education program, and 3) informal training in conservation planning. We also identified the educational material needs of each organization, developed a plan to create these materials, and initiated an ecosystem-based conservation project for the west branch of the St. Joseph River.

The following sections summarize the major activities and tasks accomplished during the course of the project. Sections are organized by the partner organization, and activities are subdivided into five headings: 1) partnership, 2) tools, 3) outreach, 4) educational materials, and 5) related/future projects. The report concludes with a discussion section and includes several appendices.

Partnership

At the start of this project, the Southwest Michigan Land Conservancy was a relatively young organization dedicated to the preservation of a wide array of values including open space, farmland, viewsheds, water quality and unique natural features. The organization also had a very involved board of directors, which had a wide array backgrounds and interests. In 1998, the Conservancy was interested in expanding membership, building staff capacity, and focusing on a few high priority conservation projects. This project provided the means to help achieve these long-term goals. It provided funds for hiring staff, purchasing equipment, and printing educational materials. It also provided the scientific credibility to leverage existing projects, and focus future efforts on large scale high priority conservation areas. Today the partnership between SWMLC and MNFI is very strong and will continue to remain strong as long as MNFI is able to provide good information and services.

One of the challenges we faced with SWMLC was the turnover or changes in staffing. The Land Protection Specialist of the SWMLC was hired with funds from this project but left for another job before the project had finished. The Director of the SWMLC also took another job before the project was completed, and the new Director was hired so much later that they were never able to get involved in the project. In addition, the new Land Protection Specialist was hired with only a little over one year left in the project. Needless to say, building a partnership in such a transitional environment was difficult but not impossible. One of the key relationships built in this project was with the SWMLC board of directors, which maintains relatively consistent membership. Their trust in MNFI was extremely valuable during transition periods, and carried over to the new staff brought on during the project.

Tools

The SWMLC was provided several color maps at 1:250,000 scale displaying a variety of information such as 1978 land cover, circa 1800 vegetation (presettlement vegetation), watershed boundaries, and element occurrences for the 9 counties in the southwest lower peninsula that make up their service area. To facilitate the identification and spatial location of a large number of element occurrences over such a large region, a mylar overlay displaying township, range, section was created (Appendix F) along with element occurrence tables sorted by county and by township, range, section (Appendix G). Color circa 1800 vegetation maps at 1:100,000 scale for each individual county were also provided. John and SWMLC staff used this information in conjunction with The Nature Conservancy's (TNC) ecoregional portfolio sites, local knowledge, and SWMLC's list of potential conservation projects to identify key sites.

The information and tools mentioned above did not necessarily lead to any clear or simple decisions. The landscape in southwest Michigan is highly fragmented and has been impacted by agriculture for over 150 years. Element occurrences are scattered throughout the region with only a few large clusters showing up on large publicly owned lands such as the Allegan State Game Area. One of the more interesting findings was discovering the majority of Mitchell's satyr populations, federally and state listed as Endangered, occur in the southwest lower peninsula of Michigan. However, this species is very rare and occurrences are highly scattered rather than concentrated. We also found that there were a large number of prairie fen occurrences in the interlobate region of southwest Michigan.

Prairie fen, a globally rare wetland community, is primarily limited in Michigan to the interlobate region of the southern Lower Peninsula. This unique ecosystem is home to several rare plants such as small white lady's slipper and prairie Indian plantain, rare insects such as Mitchell's satyr butterfly, and rare animals such as e. massasauga rattlesnake. Historically, prairie fens were originally found in a mosaic of oak woodlands, oak savannas, and tall grass prairies. However, during the 1800's, many of these uplands were logged and farmed by European settlers. Today, many of these uplands are being converted to residential and commercial development. Development of these uplands not only negatively impacts the remaining oak woodland and prairie remnants but also the adjacent lowlands by altering hydrology, increasing erosion, and introducing exotic species.

Similar to the distribution of Mitchell's satyr, prairie fens are widely scattered and isolated from other natural features. The only strong pattern occurred when we looked at both element occurrences and 1978 land cover. The majority of element occurrences and natural lands in the southwest portion of the Lower Peninsula are located along, in, or very near a major river system. As a result, 3 watersheds, the Dowagiac River watershed, Paw Paw River watershed, Galien River, and one area focused on water quality, the Four Townships Water Resources project (2 townships in Barry County and 2 in Kalamazoo County), were identified as high priority projects.

GIS staff designed and provided the databases required to complete the maps and statistical analysis, and created large hardcopy maps of each of the projects mentioned above. These tools were then used by MNFI and SWMLC to identify one or two sites to focus on for this project. Although the Paw Paw River contained a fair amount of element occurrences and a relatively intact floodplain forest, SWMLC staff and the board of directors decided they did not have the capacity to initiate a project in the Paw Paw River watershed at that point in time. Likewise, SWMLC did not feel they had strong enough support in the Galien River watershed to start a project there, despite the fact that it is a high quality riverine system. That left both the four townships project and the Dowagiac River. SWMLC was interested in both projects. The four townships area had a relatively high number of element occurrences within the boundary and the project had support from MSU Extension, MSU Kellogg Biological Station, and township officials. The Dowagiac River came out as a high priority for both organizations. The watershed contains a high number of element occurrences, including one of the best unprotected Mitchell's satyr sites in the world (actually consists of 7 isolated populations). The watershed also contains many potential natural areas including potential prairie fens and additional Mitchell's satyr sites. In addition, the SWMLC was just getting involved in a restoration project along the mainstem of the river.

The next step was to identify and prioritize high quality natural areas in the watershed. 1978 land cover and USGS topography maps were used to identify large and/or high quality floodplain forests, upland forests, upland/wetland complexes, and open wetlands. In addition, MNFI used element occurrences to further target areas for landowner contact. These areas include natural communities such as southern floodplain forest, prairie fen, mesic and dry-mesic southern forest, coastal plain marsh, and bog, and numerous rare species such as Mitchell's satyr, massasauga rattlesnake, spotted turtle, and small white lady's slipper. MNFI also analyzed black and white 1999 aerial photographs (1:15,000) to identify potential prairie fen complexes. Polygons of these natural areas were digitized in Arcview, and SWMLC was provided paper maps and a copy of the digital GIS database (Appendix F).

Several sites were visited in the spring of 2000 to determine potential quality, prioritize landowner contact and protection efforts, and delineate more accurate boundaries for landowner contact. MNFI assisted with surveys of several potential natural areas in the Dowagiac River watershed with committee members and staff from SWMLC. The group also surveyed both known and potential Mitchell's satyr butterfly sites in the watershed, and observed several of these very rare butterflies in flight. As a result of these surveys, the Conservancy identified high priority sites for future conservation efforts.

To further assist SWMLC with prioritization of sites in southwest Michigan, MNFI provided an updated element occurrence spreadsheet in the fall of 2000, which included a field with the last observed date, as well as a list of the most ecologically significant sites in their region based on MNFI data.

Outreach

Landowner Contact

A subcontract was designed between MNFI and SWMLC to develop targeted outreach programs in high priority areas. The contract specified the minimum number of hours worked on the project, and described each task in detail. Primary tasks included: developing and implementing a proactive public outreach program, initiating and building partnerships, identifying educational material needs, and providing examples of materials developed. (appendix A).

The SWMLC focused landowner contact activities in two areas: 1) the Dowagiac River watershed, and 2) the Cedar Creek/High Banks Creek watersheds located in the four townships project area. A preliminary list of landowners to contact within Dowagiac River watershed was developed based on MNFI's database, 1978 landcover, and other resources. A list of key landowners in the watershed was compiled from equalization offices in both Cass and Van Buren Counties.

A total of 525 landowners were contacted in the Dowagiac River watershed between September, 2000 and May 1, 2001. SWMLC followed up with phone calls and site visits to 15 landowners in high priority sites, and continued to work closely with 5 of these landowners on potential land protection projects (Appendix D). To date, one landowner has signed a conservation easement for 80 acres along the Dowagiac Creek, and one landowner has agreed to sell the conservancy 15 acres of upland oak forest, prairie fen, and tamarack swamp along Cook Lake. This property contains populations of Mitchell's satyr and box turtle, and potentially e. massasauga rattlesnake and northern copperbelly watersnake. The Conservancy is also working with a landowner that owns over 2,500 acres in the watershed. The property contains prairie fen, tamarack swamp, and mature stands of both southern mesic forest and southern swamp. Landowner contact efforts in the Dowagiac River watershed were slated to continue in the spring

of 2001, focusing on a few key parcels along Pokagon Creek with potential for prairie fen and/or associated rare species. However, due to low accessibility, previous commitments, and unforeseen circumstances, we were unable to complete this additional task.

Workshops

SWMLC developed and delivered several workshops throughout the course of this project, including a workshop focused on the unique natural features of the Dowagiac River watershed, riparian land management, and protection options. Approximately 80 landowners attended the workshop held at the Dowagiac Conservation Club, which owns an ecologically significant parcel in the watershed. They also delivered three one hour workshops and one presentation for the Our Ultimate Resource land committee, (OUR-Land), a group of residents in Barry County concerned about land use and the protection of agricultural lands and natural resources. The purpose of the workshops was to educate landowners about land protection options and the unique natural features in their area. The presentation focused on educating newly elected officials about the SWMLC and specific land protection options. Approximately 60 Barry County residents attended the workshops, and 40 local officials attended the presentation.

Partnerships

During this project, SWMLC developed partnerships with the Dowagiac River Stewardship Project, Cass County Conservation District, OUR-Land Committee, resource professionals in each county, and MEANDRS, a grassroots group interested in the restoration of the Dowagiac River.

Educational materials

Educational materials such as the oak-pine barrens slide-audio program and abstracts related to prairie fens were provided and discussed to assist SWMLC in development of brochures, factsheets, and other materials. MNFI consulted with SWMLC on development of educational materials, provided follow up on database information, and provided background material to help develop brochures on wetlands such as prairie fens, and floodplain forests. Working with the Cass County Soil and Water Conservation District (SWCD), MNFI and SWMLC staff completed and produced four brochures for outreach in the Dowagiac River watershed: 1) hydrology, 2) wetlands, 3) fens, marshes, and bogs, and 4) floodplain forests. All of these brochures will also be applicable to other areas in southwest Michigan. We were also able to provide input to the content of a brochure developed by the SWCD. The brochure provides an overview of the watershed and introduces residents to the unique qualities of the watershed, including rare species and high quality natural communities. In addition, a group called Meeting the Ecological and Agricultural Needs of the Dowagiac River System (MEANDRS), developed a placemat of the watershed that will be used in many of the restaurants in the area. The placemat focuses on watershed facts, and highlights several rare species found in the watershed (based on MNFI's information) such as Mitchell's saytr, spotted turtle, and prairie trillium (Appendix C).

Related Work

In March of 2000, MNFI was awarded a three year grant funded by the US Fish and Wildlife Service (USFWS). The purpose of the grant is to enhance the conservation of eastern massasauga rattlesnake and the Mitchell's satyr butterfly in southwest Michigan. The objective is to build capacity within SWMLC so that they become the experts in their region of Michigan. To prepare for this project, two SWMLC staff members and three conservancy volunteers were given onsite instruction on the identification of Mitchell's satyr, prairie fen, and associated species at sites in Cass County during the last week of June, 2000. In the winter of 2000-01, MNFI staff met with SWMLC to discuss the initiation of this project. The group agreed to include information about SWMLC in the follow-up letters that MNFI sends to landowners visited during the previous field season. Letters were customized and divided into five groupings 1) Dowagiac River watershed with satyr, 2) Dowagiac River watershed with fen, 3) outside Dowagiac R. watershed with satyr, 4) outside Dowagiac R. watershed with fen, and 5) landowners in SWMLC region that MNFI was unable to visit. Letters were sent out in March, 2001, and landowners with known satyr populations on their property received a follow up phone call and/or site visit in June, 2001.

To learn more about the life history, management and research needs, survey techniques, and current outreach efforts of the e. massasauga rattlesnake, MNFI staff participated in a full day meeting in the fall, 2000. Several staff also developed a powerpoint presentation summarizing MNFI's past, current, and future efforts to study and conserve Mitchell's satyr, entitled "The Conservation of a Federally Endangered Butterfly, Neonympha mitchellii mitchellii, in a Highly Fragmented Landscape." The presentation was developed in the fall of 2000, and presented at the 2000 Natural Areas Conference in St. Louis. The information gained from the workshop and the presentation will be used to train SWMLC staff and

volunteers in the summer of 2001.

In addition to the USFWS project, MNFI plans to work with SWMLC on identifying and prioritizing potential conservation areas in the Paw Paw River watershed. Another exciting development is that the information developed for the Dowagiac River watershed is being utilized by the Cass County SWCD. The SWCD was recently awarded a 319 Clean Watershed Initiative grant from the Michigan Department of Environmental Quality. They would like to use the information to: 1) educate stakeholders, 2) develop a watershed plan, and 3) identify priority conservation sites. MNFI plans to assist the SWCD in prioritizing potential conservation areas and integrating biodiversity conservation into the watershed plan.

Lastly, SWMLC is building on this project by engaging biologists from all over their region to share site specific information, and develop comprehensive species lists for all of their preserves and conservation easements. The information will be entered into a spatial database to provide site specific information for larger conservation areas. Information on listed species and unique natural communities will be shared with MNFI.

Land Conservancy of West Michigan

Partnership

Founded in 1976, the Land Conservancy of West Michigan (LCWM) is a small organization located in Grand Rapids, Michigan. The mission of LCWM is to protect lands that contribute to the distinctive character and quality of life in West Michigan. Values include habitat for native plants and animals, centers for study and quiet recreation, and scenic beauty. In 1998, LCWM was primarily focused on protecting land along the Lake Michigan shoreline, portions of the Grand River, and sites within the Grand Rapids metropolitan area. The Land Conservancy was supportive of this project because they wanted to expand outreach efforts, and gain access to the heritage database for identifying high priority sites and parcels. The only contact we had at LCWM was with Ms. Scholtz, who was both Director of Land Protection and interim Director of the Land Conservancy for much of the grant period. Due to her previous employment with The Michigan Chapter of The Nature Conservancy, Ms. Sholtz was knowledgeable of MNFI and the rare natural features found in west Michigan. One of the main challenges of working with LCWM was forming a strong partnership and maintaining an adequate level of communication. Unlike SWMLC, LCWM did not require a lot of feedback or guidance, and consequently did not maintain a high level of contact with MNFI. This may be due to that fact that Ms. Sholtz was previously employed by TNC where she received training in landowner contact, community outreach, and some plant, animal, and natural community identification.

Tools

MNFI provided LCWM with several color maps at 1:250,000 scale displaying a variety of information such as 1978 land cover, circa 1800 vegetation (presettlement vegetation), watershed boundaries, and element occurrences for the x counties in the western portion of the lower peninsula that make up their service area. To facilitate the identification and spatial location of a large number of element occurrences over such a large region, a mylar overlay displaying township, range, section was created (Appendix F) along with element occurrence tables sorted by county and by township, range, section (Appendix G). Color circa 1800 vegetation maps at 1:100,000 scale for each individual county were also provided. MNFI and LCWM staff used this information in conjunction with The Nature Conservancy's (TNC) ecoregional portfolio sites, local knowledge, and LCWM's list of potential conservation projects to identify key sites.

Similar to what was found in the southwest Lower Peninsula, very few patterns emerged for west Michigan. The vast majority of element occurrences were located on public land, along the Lake Michigan shoreline, and along several large rivers. Areas with concentrations of element occurrences were 1) oak-pine barrens landscape in Newaygo and Muskegon Counties, 2) Lake Michigan shoreline, and 3) portions of both the Grand and Muskegon Rivers. LCWM was already working on a project along the Grand River, and was very familiar with the key landowners along Lake Michigan. That left the Muskegon River and oak-pine barrens landscape. Based on MNFI's information, it was decided that LCWM should focus their conservation efforts on the dry sand prairies, coastal plain marshes, and associated plants and animals found in southern Newaygo County and northern Muskegon County.

The oak-pine barrens ecosystem, located in the glacial outwash and lakeplain of the central western

part of Michigan's lower peninsula, historically was a dynamic mosaic of dry sand prairie, barrens, and closed canopy forest that changed and shifted over time. Three globally rare communities, oak-pine barrens, dry sand prairie, and coastal plain marsh are associated with this landscape. Ten rare plants and 11 rare insects are found in oak-pine barrens and dry sand prairies, and the coastal plain marsh community harbors 45 rare plants. Today, only a few remnants of dry sand prairies and oak-pine barrens still exist in Michigan, however, there are numerous opportunities for restoration. The two areas chosen, southern Newaygo County and northern Muskegon County, represent some of the best remaining remnants of the oak-pine barrens landscape in Michigan.

In addition, these two rural areas are experiencing residential pressure from the greater Grand Rapids and Muskegon areas. LCWM had previously not worked in these areas because it was believed they were too remote and secure to utilize limited financial resources.. After several meetings, however, LCWM agreed that southern Newaygo County as well as the Blue Lakes area of northern Muskegon County were important areas, and both were in need of conservation action. Using information from MNFI that was compiled from recent work in Newaygo County, and from TNC which was in the process of initiating a community-based conservation project in Brooks township, Newaygo County, LCWM identified key sites in both of these landscapes. For Muskegon County, however, very little current element occurrence data existed for the Blue Lakes area. To rectify this, MNFI assisted LCWM staff in interpreting historic or sparsely populated element occurrence records in Muskegon County by identifying potential remnant dry sand prairies and habitat for associated species using 1997 digital, 1:15,000 scale, black and white aerial photography, and USGS topography maps. Throughout the project, MNFI provided LCWM with clarification and interpretion of information regarding element occurrences in Muskegon County.

Outreach

Landowner Contact

Similar to SWMLC, a subcontract was designed between MNFI and LCWM to develop targeted outreach programs in high priority areas. The contract specified the minimum number of hours worked on the project, and described each task in detail. Primary tasks included: developing and implementing a proactive public outreach program, initiating and building partnerships, identifying educational material needs, and providing examples of materials developed (Appendix A).

LCWM sent an initial letter to targeted landowners in the townships and followed up with phone calls in July, 2000 to schedule on-site visits. A total of thirty-three landowners in Brooks Township and 34 landowners in Muskegon County were contacted by LCWM. LCWM followed up with 21 personal discussions in Brooks Township and 20 in Muskegon County. During these conversations, LCWM learned the status of these properties and the interests of each landowner. As a result, they ended up referring three landowners in Brooks Township to TNC because of mutual interest in acquisition of these properties, and have maintained contact with seven landowners interested in conservation easements.

They also developed a new voluntary program for landowners interested in registering their property with the conservancy. The concept behind the program was to offer landowners an introductory step to land conservation. The Conservation Partner Program provided landowners with a matted photograph of the unique feature they were protecting, along with maps, information sheets on the conservation partner program, conservation easements, and LCWM, and an aerial photograph of their land. Unfortunately, only one landowner enrolled in the program during the project period.

LCWM also agreed to actively participate in a partnership with the township, TNC, United States Forest Service (USFS), Natural Resources Conservation Service (NRCS), and the Newaygo County Soil and Water Conservation District (SWCD) to implement the land use vision developed by this partnership. Working with these partners, LCWM developed a management strategy for targeted areas, and identified several parcels to create and implement model management plans. LCWM played the role of "gatekeeper" by providing key information on the management needs of the local ecology, and coordinating with private organizations and government agencies that had the equipment, staff, and funding to implement the necessary activities to manage these fire dependent systems. As part of this effort, LCWM identified two landowners willing to participate in a model program to cut blocks of pine plantations in areas that were formerly dry sand prairie.

Workshop/presentations

LCWM staff gave presentations to the Muskegon Townships Association, Muskegon County Environmental Committee, Muskegon County NRCS and CD staff, and two environmental consulting firms working in the Blue Lakes area. LCWM organized a workshop with the local CRMI resource professional to inform a large group of landowners in Newaygo

County about the unique natural features in their area and opportunities for protection and enhancement. LCWM also presented a slide show on special natural features and conservation options at the following events: Brooks Township Open House (40 people), Newaygo County's Land Use Task Force Land Use Seminar (100 people), Land Conservancy Open House sponsored by the Community Foundation for Muskegon County (100 people), and the Dalton Township master planning group (10 people).

Partnerships

As a result of the Brooks Township Land Use Vision, LCWM was able to create key partnerships with several groups interested in the Brooks Township area. This Vision was essentially created by a partnership between the US Forest Service, Newaygo County Soil and Water Conservation District, Brooks Township government officials, and The Nature Conservancy. This committee welcomed the LCWM into the group and LCWM has and will continue to play a critical role in the implementation of the Vision. As a result of this partnership, LCWM worked with Brooks Township to secure a grant from the Fremont Area Foundation for funds to hire a staff person to implement the Land Use Vision. In addition, LCWM recently developed a formalized partnership with TNC to raise funds for continued conservation work in the oak-pine barrens landscape and other high priority ecosystems.

Other organizations that LCWM will continue working with as a result of this project include: the Muskegon River Watershed group, Newaygo County Land Use Task Force, Michigan State University Extension (MSUE), the West Michigan Regional Environmental Network, and the Timberland Resource Conservation and Development office.

Educational materials

MNFI assisted LCWM to develop outreach strategies focused on the oak-pine barrens landscape in Brooks Township and Blue Lakes area of Muskegon County. MNFI shared existing fact sheets, slide/audio programs, abstracts, notebooks, slides, and other information on the oak-pine barrens landscape and coastal plain marshes, and discussed potential materials to develop for the project. As a result, LCWM worked closely with Brooks Township to develop a brochure that highlights the natural features in the area, important ecological processes, and stewardship opportunities. LCWM also developed several factsheets that provide landowners with information on oak-pine barrens, dry sand prairies, coastal plain marshes, and Karner Blue butterfly (Appendix C). In addition, LCWM created a Muskegon County brochure and an educational slide show. They also distributed two chapters from the Private Lands Manual to interested landowners; warm season grasses and prairie restorations.

Related/Future Projects

As mentioned earlier, LCWM and TNC have worked out a formal partnership to continue efforts to preserve the oak-pine barrens landscape in west Michigan. After conducting landowner contact in both Brooks Township and the Blue Lakes area, however, they strongly feel that a volunteer stewardship program that encourages landowners to enroll and participate in a formal program will not work in these areas. Based on information from a seminar Ms. Sholtz in Muskegon County, residents in these rural areas are less affluent, skeptical of government programs, and considered "non-joiners." Despite these barriers, LCWM does not feel that landowner contact is futile. On the contrary, LCWM plans to contact key landowners a few times per year for the next 20 years to keep them informed and develop a working relationship. LCWM feels that landowners located in these two rural areas require a long period of time to develop a trust relationship with an organization.

In addition, as part of a two year grant from the US EPA-GLNPO, MNFI will review, update, and digitize over 600 element occurrence records along and near the Lake Michigan shoreline, and develop site packages for 14 large sites, 6 of which are located in LCWM's region. Site packages will include: base maps, ecological site boundaries, element occurrence data, information gaps, related information in files, and copies of appropriate element abstracts. MNFI will also visit each land trust (including LCWM) to deliver products, answer questions, and interpret information.

Partnership

Prior to the start of this project, MNFI staff identified natural streams and rivers and adjacent southern floodplain forests as a high priority ecosystem in southern Michigan. Southern floodplain forest, listed as a globally rare natural community, harbors over thirty rare plant species and numerous rare animals including the federally endangered Indiana bat and n. copperbelly water snake. These floodplain forests help protect the water quality of Michigan's streams and rivers which may harbor any number of the 18 species of listed mussels found in Michigan's waterways. Floodplain forests also contain ephemeral ponds that are important to many frog and salamander species, and they provide important habitat for migrating songbirds. One of the significant riverine ecosystems in southern Michigan is the west branch of the St. Joseph River in Hillsdale County.

This project started out by developing a partnership with the St. Joseph River Watershed Initiative (SJRWI), which is located in Ft. Wayne, Indiana. Although their primary mission is to develop partnerships to promote economical and environmentally compatible land uses that improve water quality in the St. Joseph River, The SJRWI also recognized the significance of biodiversity. After several meetings with this group, however, it became apparent that SJRWI was still a fledgling organization that lacked the experience, staff, and funding to carry out conservation outreach in the watershed. Fortunately, Larry Clemens, Director of the Fish Creek Project in Indiana and SJRWI board member, took over as interim Director of SJRWI in 1999. Just about the same time, The Indiana Chapter of TNC received funding from the Kellogg Foundation to 1) replicate the Fish Creek Project in other high priority subwatersheds of the St. Joseph River, and 2) help SJRWI become a more self-sustaining organization. MNFI met with Larry Clemens several times to discuss the possibility of starting a conservation project in the West Branch of the St. Joseph River. Larry agreed that it was a very important area, and supported the idea of hiring a field representative to initiate a community-based project in the watershed.

Tools

The one remaining hurdle was coordinating activities with the Michigan Chapter of TNC. TNC's ecoregional planning for the "Central Tillplain ecoregion" highlighted the West Branch of the St. Joseph River as a potential action site, however, the planning process was still in its infancy at that point, and a list of official action sites did not exist. As interest in conservation in the St. Joseph River watershed in Hillsdale County rose, MNFI organized and facilitated a meeting to determine conservation priorities and discuss the potential roles of MNFI, and the Michigan and Indiana Chapters of The Nature Conservancy (TNC). The group reviewed a variety of maps displaying circa 1800 vegetation, 1978 land cover, element occurrence distribution, and watershed boundaries for Hillsdale County, as well as element occurrence records (Appendix F). Based on that analysis, the group determined that this was a high priority watershed, and the best place to start a conservation project was the East Fork of the West Branch (EFWB). Based on MNFI's database, targets included both aquatic and terrestrial organisms with a focus on the river and immediate riparian zone. Primary targets were rare mussels such as clubshell and wavy-rayed lamp mussel, rare fish such as bridled madtom and silver shiner, and rare reptiles such as the northern copperbelly watersnake. Of special note, maternity colonies of the Indiana bat, a federally endangered species, were listed as a potential target but required additional systematic surveys.

The group also determined the roles of each organization. It was decided that MNFI would provide the Indiana Chapter of TNC with good spatial information, support for educational materials, and rare species expertise. The Michigan Chapter of TNC agreed to assist with conservation planning, and future land protection efforts particularly rolling over purchased farms to conservation minded buyers. The Indiana chapter of TNC would accomplish the on-the-ground conservation by working with landowners.

To assist conservation efforts in the watershed, MNFI's aquatic zoology staff shared information with the Indiana Chapter of TNC obtained from aquatic sampling in the area from 1998 to 2000, particularly information related to the clubshell mussel. In addition, MNFI staff updated current land cover for the east fork of the west branch using 1998 black and white aerial photography, and GIS staff generated and seamed the SWCD soils database for all townships located within the watershed. The soils database included data on water table levels, wildlife habitat, soil types, and soil erodibility. MNFI provided the Indiana Chapter with digital files of the circa 1800 vegetation, glacial geology, soils, and 1998 land cover

databases (Appendix F).

Outreach

Landowner Contact

The Indiana Chapter of TNC with input from MNFI staff, developed a conservation plan for the East Fork of the West Branch (Appendix E). Larry Clemens became director of the Upper St. Joseph River Watershed project, and hired a field representative to work with landowners on conservation techniques in the target area, and to implement the strategies recommended in the conservation plan. The name of the project became the East Fork Watershed Project (EFWP).

The highest priority stretch of the East Fork occurs from Cambria Millpond south to the Boys Scout Camp. In total, there are 33 landowners immediately adjacent to the river, and all of them have been contacted by mail and received a visit from an EPWP representative. In addition, all receive a newsletter developed by EFWP. A total of 85 acres spread across 9 different parcels have been planted to trees, 8.4 acres have been planted to filter strips, 6,800 feet of fence were installed to keep cows and horses out of the river, and 5,400 acres were enrolled in the Environmental Quality Improvement Program (EQIP). Only one landowner, with a total of 342 acres, has taken advantage of a pilot conservation tillage program promoted by TNC.

Workshops/presentations

The EFWP initiated a steering committee, made up of members from the local community, to help build a bridge between TNC and the local community. The advisory committee consists of 8 local farmers, the county drain commissioner, and representatives from NRCS and MSUE. To date, EFWP has held a total of 5 steering committee meetings. MNFI staff attended two of these meetings to meet members and discuss various conservation issues related to rare species, and aquatic zoology presented a summary of their fieldwork. Two of these meetings incorporated hands-on field trips to portions of the watershed. One trip included a visit to one of the clubshell megapopulation sites in which farmers were encouraged to wade in the river and look for mussels. The other field trip focused on best management practices for farmers with an emphasis on conservation tillage.

Partnerships

The most significant partnership occurred at the onset of this project between MNFI, the Indiana Chapter of TNC, and the Michigan Chapter of TNC. Interstate partnerships between TNC offices are extremely rare for a variety of reasons. This partnership marks the first time the Michigan Chapter has formed a partnership with one of its state counterparts. Without it, this project would not have happened. In addition, the EFWP has formed a strong partnership with local farmers, NRCS, USFWS, SWCD, MSUE, and the county drain commissioner.

Educational Materials

The development of educational materials was not an emphasis of the EFWP. The majority of outreach efforts focused on one-on-one meetings with landowners, group meetings, press releases, and field trips. EFWP has created and published an annual newsletter for watershed residents, and a brochure on the upper St. Joseph River that focuses on the East Fork and Fish Creek watersheds (Appendix C).

Related/Future Projects

During the summer of 2001, EFWP plans to continue landowner contact and meeting with landowners interested in planting trees on their floodplain, and/or restoring wetlands. They are currently working with the Hillsdale SWCD on a grant from the Clean Michigan Initiative, and making contacts within the Amish community to work with them on animal waste issues. Although the plan is to eventually pass this project onto SJRWI and SJRWI is growing and maturing, EFWP reports that they will not be taking over either the Fish Creek or the East Fork projects in the near future.

Discussion

Each organization posed different challenges and opportunities. All had very competent, dedicated, enthusiastic leaders who truly wanted to increase the protection level of unique natural features in their region. Some leaders were real strong in science and heritage methodology, while others were more adept at understanding the local culture and working one-on-one with landowners. Some were very good at communicating activities and asking for advice, while those who were more independent and experienced required less feedback and guidance.

Despite these differences, all three organizations shared similar situations. One of the major challenges facing all three of these organizations was instability such as office moves and staff turnover. All three experienced at least one major change to their

staff during the project, which typically caused a significant decrease in productivity and a major disruption to ongoing outreach activities. SWMLC probably endured the biggest changes with both the Director and the Land Protection Specialist departing midway through the project, and moving the office to another location. What tends to happen is that remaining staff end up trying to complete the jobs of 2 to 3 people and find it difficult to focus on any one project.

Another area that all three organizations need to enhance is technology. Paper copies of maps and spatial databases developed in Arcview were used to help make most conservation planning decisions. Although large sized paper copies can be very helpful for educational purposes and initiating discussion, it would have been much more effective to view the images on a computer when making decisions about where, geographically, to focus limited resources. Fortunately, SWMLC had some access to GIS from a nearby nature center, and EFWP eventually obtained Arcview 3.1 software and provided training to one of their staff.

Lessons Learned

One of the key elements to this project was building a strong partnership. A strong partnership is based on trust, which requires time, a large amount of personal investment, and a strong display of integrity. For the first few meetings between MNFI and each organization, the majority of time was spent listening to each other's perspectives on conservation, understanding each organization's mission, goals and philosophies, clearly communicating the goals of the project, and getting to know each other on a personal basis. As the project progressed, the level of trust increased and the partnership became stronger. Strong partnerships also require open lines of communication and a two-way flow of information. For example, both SWMLC and LCWM discussed their lists of proposed and existing projects with MNFI prior to any conservation planning. Each conservancy was looking for additional information that would make tough decisions easier. Once they received the information they needed, each conservancy was much more willing to risk venturing into a new conservation project with MNFI.

We also learned that things tend to work in an iterative process when working with partners. As circumstances changed and we learned more, gained information, worked with boards of directors, and discovered new opportunities, previous decisions were reexamined and changed if necessary. For example, the Mitchell's satyr butterfly and prairie fens were identified in the conservation planning process as the highest priority for SWMLC. As we analyzed the information, however, we realized that it would require a tremendous amount of resources to protect isolated and dispersed satyr populations and prairie fens. As a result, we reexamined priorities and looked for other sources of funding to protect existing Mitchell's satyr populations, associated species, and adjacent prairie fen in southwest Michigan.

Through this project, we reconfirmed that good planning occurs at multiple hierarchical scales, from the global down to the local scale. The Global and regional scales provide context for prioritization, rarity, quality. These larger scales also provide insight into ecological processes, natural disturbances, large-scale threats, and landscape scale patterns. The local and site specific scale provide the information needed to choose strategies and actions, direct resources, develop site conservation plans, and identify and mitigate local threats.

The more accurate and specific the data at each scale, the more these conservation organizations benefit. One of the challenges of working with land trusts, however, is determining the level of detail at the local scale. All three organizations expressed strong interest in detailed information down to specific parcels. On one hand, the information needs to be detailed enough for an organization to develop effective conservation strategies and defend significant conservation decisions. On the other hand, the privacy and rights of individual landowners needs to be considered. For landtrusts, the key is to 1) focus on high quality and/or unique ecosystems rather than individual species, and 2) build expertise within the conservancies to identify and survey for rare species in the field.

Appendix A

Contracts

ACCOUNTING INFORMATION

Budget Center Name: EPA Partnership LOC

THE NATURE CONSERVANCY
CONTRACT FOR SERVICES
(FEDERAL FUNDS)

Budget Center #: 122-085-6885

Source of Funds: EPA Grant #GL985156-01-0

THIS IS A CONTRACT BETWEEN THE NATURE CONSERVANCY, ACTING THROUGH ITS:

Conservancy Office/Department: Michigan Natural Features Inventory (MNFI)
Address:
Mason Building, P.O. Box 30444
Lansing, MI 48909-7944
Name and Title of Contact: Judith Soule, Director
Telephone: 517-373-1552

(HEREAFTER "**CONSERVANCY**") and:

Name of Contractor: Southwest Michigan Land Conservancy
Address: 8135 Cox's Dr. Suite 106, Portage, MI 49002-5829
Name and Title of Contact: Renee Kivikko
Telephone: 616-324-1600
Social Security or Taxpayer ID #:

ACTING AS AN INDEPENDENT CONTRACTOR (HEREAFTER "**CONTRACTOR**").

THE CONSERVANCY AND THE CONTRACTOR AGREE AS FOLLOWS:

1. CONTRACTOR'S DUTIES. The Contractor, who represents that the Contractor is qualified and willing to perform the services described below as an independent contractor, shall:

Tasks

1. Provide a minimum of 1200 person-hours on Tasks 2-6, below over the course of the contract.

2. Develop and implement a proactive public outreach program in one or more high priority ecosystems (determined jointly by MNFI and contractor) in southwest Lower Michigan.

- Outreach will focus on the unique natural features (plants, animals, and natural communities) of the area with an emphasis on habitat requirements, key ecological processes, and conservation opportunities and techniques.
- Outreach efforts will include workshops, presentations, and/or demonstration projects for both the general public and targeted landowners.
- Outreach will include (but not be limited to) developing and implementing a proactive landowner contact and education program. This program will target landowners who can have a positive impact on the conservation priorities in the region, and educate them about the unique natural features found on their property.
- Contractor will provide these landowners with information on the unique natural features, protection options, and an opportunity to sign up as a volunteer steward. Volunteer stewards agree to voluntarily protect the unique natural features on their property to the best of their ability.
- Contractor will develop and maintain a comprehensive database to track all contact with targeted landowners in high priority areas, as well as attendance of residents at workshops and presentations.

3. Initiate and build partnerships with other organizations and agencies in southwest Lower Michigan to further the protection of high priority ecosystems.

- Identify and contact other conservation organizations and agencies that are also engaged in the conservation and

enhancement of their region's natural features.
- Build partnerships with these groups by attending meetings, sharing information and resources, initiating meetings, and providing assistance when possible.

4. Convene one or more working sessions to identify specific educational materials needed for public outreach.
- Educational materials should include information on rare animals, plants, natural communities, landscape ecosystems, habitat needs, ecological processes, threats, and management recommendations.

5. Provide samples of educational materials developed under this contract for outreach, no later than August 31, 2000.

6. Provide brief progress reports on above tasks by the following dates: October 15, 1999; January 15, 2000; April 15, 2000; July 15, 2000.

7. Provide a 3 to 10 page final report, in electronic form, due August 31, 2000. Report will summarize all activities related to and the results of Tasks 2 through 4, including (but not limited to) the following elements:

a) Discussion of how conservation planning has been incorporated into your organization's operations.
   i) Have you changed your way of doing business based on the conservation planning process?

b) Discussion of conservation planning tools provided by MNFI:
   i) How useful were they?
   ii) How have you used them?

c) Summary of outreach efforts, i.e., workshops, presentations and/or demonstration projects.
   i) Number of sessions held
   ii) Number of attendees
   iii) Description of highlights of these sessions.

d) Evaluation of the success of the land owner contact program. Including:
   i) number of landowners contacted,
   ii) number of one-on-one meetings with landowners,
   iii) number and acreage of conservation successes as a result of the land-owner contact program (including volunteer stewardship agreements, conservation easements, donations, and acquisitions).
   iv) Sample database records and documentation of number of records in database.

e) Discussion of future plans for landowner outreach and education programs.

2. PAYMENTS.

A. Compensation: For all of the services described above and all goods and materials supplied by the Contractor, the Conservancy shall pay the Contractor a total of $15,000. Payments will be made according to the following schedule:

June 15, 1999 (or upon receipt of fully executed contract) - $6000
December 15, 1999 - $3000
March 15, 2000 - $3000
June 15, 2000 - $1500
Balance upon receipt and acceptance by MNFI of final report - $1500

B. Reimbursement: The total reimbursable expenses shall not exceed $0.00.

C. Terms of Payment: Payments will be made automatically by the Conservancy as indicated in the

schedule above (A. Compensation).

3. TERM OF CONTRACT. This contract shall begin on _June 15, 1999_ ("Commencement Date") and shall remain in effect until October 1, 2000 ("Termination Date"), or until the work required is satisfactorily completed, whichever comes first. Any extension beyond the Termination Date must be in writing and signed by the Conservancy.

4. PERFORMANCE OF WORK. The Contractor shall perform all work required under this contract in accordance with the highest standards of the Contractor's profession or craft and to the satisfaction of the Conservancy. The Contractor shall perform all work in accordance with all laws and regulations and shall obtain any permits or licenses required. The Contractor shall not be paid for any work found by the Conservancy to be unsatisfactory. If any of the services are to be performed on land that is owned by neither the Contractor nor the Conservancy, the Contractor shall obtain the owner's prior permission before entering upon such land.

5. LIABILITY/INSURANCE. The work to be performed under this contract shall be performed entirely at the Contractor's risk. The Contractor agrees to indemnify and hold the Conservancy harmless for any and all liability or loss arising in any way out of the performance of this contract. The Contractor shall carry appropriate workers' compensation, hazard and liability insurance coverage during the term of this contract. Upon request from the Conservancy, the Contractor shall have the Conservancy named as an additional insured on the Contractor's policy and provide the Conservancy with evidence that the appropriate insurance coverage is in effect.

6. TERMINATION AND REMEDIES. The Conservancy may cancel this contract at any time upon two weeks written notice. Should this occur, payment for work satisfactorily completed will be adjusted accordingly. In addition, if the Contractor defaults in performance of the Contractor's duties under this contract, whether for circumstances within or beyond the control of the Contractor, the Conservancy may immediately terminate this contract by written notice to Contractor. Should termination occur as a result of Contractor's default, the Conservancy shall be entitled to damages from Contractor resulting from Contractor's default and shall be entitled to offset any amounts payable to Contractor for work satisfactorily completed against such damages. The balance of amounts payable to Contractor for work satisfactorily completed, if any, shall be paid to Contractor.

7. INDEPENDENT CONTRACTOR. The parties intend that an independent contractor-client relationship will be created by this contract. The conduct and control of the work will lie solely within the purview of the Contractor. The Contractor is not to be considered an agent or employee of the Conservancy for any purpose, and no joint venture or principal-agent relationship exists. The Contractor and employees of the Contractor are not entitled to any of the benefits that the Conservancy provides for its employees. If appropriate, the Conservancy will report all fees paid to the Contractor to the IRS on Form 1099. Neither the Conservancy nor the Contractor shall have any right, power, or authority to create any obligation, expressed or implied on behalf of the other.

8. ASSIGNMENT/SUBCONTRACT. The Contractor may not assign or transfer this contract or subcontract for the work to be performed without the prior written consent of the Conservancy.

9. OWNERSHIP OF DOCUMENTS AND DATA. Funding for this contract has been provided to the Conservancy by the U.S. Environmental Protection Agency (EPA). Contractor shall have the right to use, publish and distribute the works produced under this contract provided that in any publication the Contractor shall acknowledge that funding of these activities was made available from the Conservancy and the EPA. Upon request, the Contractor shall supply the Conservancy and the EPA with cop8ies of any reports, along with supporting data and material, produced under this contract. The Conservancy and the EPA shall have a royalty-free, non-exclusive and irrevocable right to reproduce, publish or otherwise use the work and to authorize others to do so. Contractor warrants to the Conservancy that Contractor will not infringe the intellectual property rights of others in the performance of this contract.

10. NOTICES. Any notice required by this contract shall be sent certified mail, return receipt requested, to the parties at the addresses set out above.

11. CERTIFICATION. The Contractor certifies that the Contractor is an independent Contractor engaged in the business which is the subject of this contract, that the Contractor's social security or taxpayer identification number is correctly recorded on this contract, and that the Contractor is not a Conservancy Board Member or Trustee.

12. CONFIDENTIAL INFORMATION. During the course of the performance of this contract, Contractor may have access to materials, data, strategies, systems or other information relating to the Conservancy and its programs which may not be accessible or known to the general public. Any such information acquired by the Contractor shall not be used, published or divulged by the Contractor to any person, firm or corporation or in any advertising or promotion regarding Contractor or Contractor's services, or in any manner or connection whatsoever without first having obtained the written permission of the Conservancy, which permission the Conservancy may withhold in its sole discretion.

13. RECORD RETENTION. Financial records, supporting documents, statistical records, and all other records pertinent to this contract shall be retained by the Contractor for a period of three years from the date of submission of the final expenditure report. If any litigation, claim, or audit is started before the expiration of the three year period, the records shall be retained until all litigation, claims, or audit findings involving the records have been resolved.

14. ACCESS TO RECORDS. The Conservancy, the U.S. federal entity providing the funding from which this contract will be paid, the Comptroller General of the United States, or any of their duly authorized representatives, shall have the right of timely and unrestricted access to any books, documents, papers, and other records of the Contractor that are pertinent to the contract for the purpose of making audits, examinations, excerpts, copies, and transcriptions. The rights of access in this paragraph are not limited to the required retention period, but shall last as long as records are retained.

15. EQUAL EMPLOYMENT OPPORTUNITY. The Contractor must comply with E.O. 11246, "Equal Employment Opportunity," as amended by E.O. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity" and as supplemented by regulations at 41 C.F.R. Part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."

16. DEBARMENT CERTIFICATION. The Contractor certifies, by signature on this contract, that the Contractor is not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency. Where the Contractor is unable to certify to this statement, the Contractor shall attach an explanation to this contract; and, at the Conservancy's option, this contract shall be null and void.

17. CONTRACTOR LIABILITY. The Contractor assumes sole responsibility for reimbursement to the Conservancy or the Federal Government, whichever is appropriate, of a sum of money equivalent to the amount of any expenditures disallowed should the funding agency or any authorized agency rule, through audit exception or some other appropriate means, that expenditures from funds allocated to the Contractor were not made in compliance with the applicable cost principles and regulations of the funding agency, or the provisions of this contract.

20. ADMINISTRATIVE REQUIREMENTS. The Contractor shall comply with all applicable sections of OMB Circular A-110 or A-102, whichever is applicable.

32. PROCUREMENT.

A. MBE-WBE. Contractor agrees to ensure to the fullest extent possible that at least an 8 percent (4% Minority Business Enterprise [MBE]; 4% Women's Business Enterprise [WBE]) "Fair Share" of federal funds for prime contracts or subcontracts for supplies, construction, equipment or services are made available to orgainzations owned or controlled by socially and economically disadvantaged individuals, women, and historically black colleges

and universities.

Contractor agrees to include in its bid specifications, and require all of its prime contractors to include in their bid specifications for subcontracts an 8 percent (4 - MBE; 4 - WBE) "Fair Share."

Contractor agrees to document all efforts taken to achieve the "Fair Share" and to report on all procurement actions regardless of the size of the subagreement.

B. SBRA. Contractor shall take the following affirmative steps in awarding subcontracts, if any: (1) place Small Businness in Rural Areas (SBRA) on solicitation lists; (2) ensure that SBRA's are solicited whenever they are potential sources; (3) divide total requirements, when economically feasible, into small tasks or quantities to permit maximum participation by SBRA's; (4) establish delivery schedules, where the requirements of work will permit, which would encourage paparticipation by SBRA's; (5) utilize the services of the Small Business Administration and the Minority Business Development Agency of the U.S. Department of Commerce, as appropriate.

31. OTHER PROVISIONS. MONITORING. Project financial and programmatic monitoring will be conducted by The Conservancy during the course of this project. Conservancy staff shall be afforded access, at mutually agreed upon times, to all appropriate financial and programmatic records necessary to evaluate compliance with the terms of this agreement. A report of any monitoring findings shall be prepared. Any findings shall be resolved by the contractor as a condition of final payment of the contract.

32. BINDING EFFECT/AMENDMENTS. This contract shall become binding when signed by the parties. This contract contains the entire agreement of the parties and no amendment shall be effective except in writing signed by both parties.

INDEPENDENT CONTRACTOR

By:

Print Name Authorized Representative

Signature

Title:

Date:

THE NATURE CONSERVANCY

By:

Title:

Date:

Attorney Date

Original - TNC HQ/Accounting; Duplicate original - Contractor; Copies - TNC FO and TNC RO
Standard Contract - Federal funds.
(Confed$.stn: March 29, 1995)

ACCOUNTING INFORMATION

Budget Center Name: EPA Partnership LOC

THE NATURE CONSERVANCY
CONTRACT FOR SERVICES
(FEDERAL FUNDS)

Budget Center #: 122-085-6885

Source of Funds: EPA Grant #GL985156-01-0

THIS IS A CONTRACT BETWEEN THE NATURE CONSERVANCY, ACTING THROUGH ITS:

Conservancy Office/Department: Michigan Natural Features Inventory (MNFI)
Address:
Mason Building, P.O. Box 30444
Lansing, MI 48909-7944
Name and Title of Contact: Judith Soule, Director
Telephone: 517-373-1552

(HEREAFTER "**CONSERVANCY**") and:

Name of Contractor: Land Conservancy of West Michigan
Address: 432 Wealthy St. SE, Grand Rapids, MI 49506
Name and Title of Contact: April Scholtz, Executive Director
Telephone: 616-451-9476
Social Security or Taxpayer ID #:

ACTING AS AN INDEPENDENT CONTRACTOR (HEREAFTER "**CONTRACTOR**").

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a) Discussion of how conservation planning has been incorporated into your organization's operations.
   i) Have you changed your way of doing business based on the conservation planning process?

b) Discussion of conservation planning tools provided by MNFI:
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   ii) How have you used them?

c) Summary of outreach efforts, i.e., workshops, presentations and/or demonstration projects.
   i) Number of sessions held
   ii) Number of attendees
   iii) Description of highlights of these sessions.

d) Evaluation of the success of the land owner contact program. Including:
   i) number of landowners contacted,
   ii) number of one-on-one meetings with landowners,
   iii) number and acreage of conservation successes as a result of the land-owner contact program (including volunteer stewardship agreements, conservation easements, donations, and acquisitions).
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Balance upon receipt and acceptance by MNFI of final report - $1500

B. Reimbursement: The total reimbursable expenses shall not exceed $0.00.

C. Terms of Payment: Payments will be made automatically by the Conservancy as indicated in the schedule above (A. Compensation).

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5. LIABILITY/INSURANCE. The work to be performed under this contract shall be performed entirely at the Contractor's risk. The Contractor agrees to indemnify and hold the Conservancy harmless for any and all liability or loss arising in any way out of the performance of this contract. The Contractor shall carry appropriate workers' compensation, hazard and liability insurance coverage during the term of this contract. Upon request from the Conservancy, the Contractor shall have the Conservancy named as an additional insured on the Contractor's policy and provide the Conservancy with evidence that the appropriate insurance coverage is in effect.

6. TERMINATION AND REMEDIES. The Conservancy may cancel this contract at any time upon two weeks written notice. Should this occur, payment for work satisfactorily completed will be adjusted accordingly. In addition, if the Contractor defaults in performance of the Contractor's duties under this contract, whether for circumstances within or beyond the control of the Contractor, the Conservancy may immediately terminate this contract by written notice to Contractor. Should termination occur as a result of Contractor's default, the Conservancy shall be entitled to damages from Contractor resulting from Contractor's default and shall be entitled to offset any amounts payable to Contractor for work satisfactorily completed against such damages. The balance of amounts payable to Contractor for work satisfactorily completed, if any, shall be paid to Contractor.

7. INDEPENDENT CONTRACTOR. The parties intend that an independent contractor-client relationship will be created by this contract. The conduct and control of the work will lie solely within the purview of the Contractor. The Contractor is not to be considered an agent or employee of the Conservancy for any purpose, and no joint venture or principal-agent relationship exists. The Contractor and employees of the Contractor are not entitled to any of the benefits that the Conservancy provides for its employees. If appropriate, the Conservancy will report all fees paid to the Contractor to the IRS on Form 1099. Neither the Conservancy nor the Contractor shall have any right, power, or authority to create any obligation, expressed or implied on behalf of the other.

8. ASSIGNMENT/SUBCONTRACT. The Contractor may not assign or transfer this contract or subcontract for the work to be performed without the prior written consent of the Conservancy.

9. OWNERSHIP OF DOCUMENTS AND DATA. Funding for this contract has been provided to the Conservancy by the U.S. Environmental Protection Agency (EPA). Contractor shall have the right to use, publish and distribute the works produced under this contract provided that in any publication the Contractor shall acknowledge that funding of these activities was made available from the Conservancy and the EPA. Upon request, the Contractor shall supply the Conservancy and the EPA with cop8ies of any reports, along with supporting data and material, produced under this contract. The Conservancy and the EPA shall have a royalty-free, non-exclusive and irrevocable right to reproduce, publish or otherwise use the work and to authorize others to do so. Contractor warrants to the Conservancy that Contractor will not infringe the intellectual property rights of others in the performance of this contract.

10. NOTICES. Any notice required by this contract shall be sent certified mail, return receipt requested, to the parties at the addresses set out above.

11. CERTIFICATION. The Contractor certifies that the Contractor is an independent Contractor engaged in the business which is the subject of this contract, that the Contractor's social security or taxpayer identification number is correctly recorded on this contract, and that the Contractor is not a Conservancy Board Member or Trustee.

12. CONFIDENTIAL INFORMATION. During the course of the performance of this contract, Contractor may have access to materials, data, strategies, systems or other information relating to the Conservancy and its programs which may not be accessible or known to the general public. Any such information acquired by the Contractor shall not be used, published or divulged by the Contractor to any person, firm or corporation or in any advertising or promotion regarding Contractor or Contractor's services, or in any manner or connection whatsoever without first having obtained the written permission of the Conservancy, which permission the Conservancy may withhold in its sole discretion.

13. RECORD RETENTION. Financial records, supporting documents, statistical records, and all other records pertinent to this contract shall be retained by the Contractor for a period of three years from the date of submission of the final expenditure report. If any litigation, claim, or audit is started before the expiration of the three year period, the records shall be retained until all litigation, claims, or audit findings involving the records have been resolved.

14. ACCESS TO RECORDS. The Conservancy, the U.S. federal entity providing the funding from which this contract will be paid, the Comptroller General of the United States, or any of their duly authorized representatives, shall have the right of timely and unrestricted access to any books, documents, papers, and other records of the Contractor that are pertinent to the contract for the purpose of making audits, examinations, excerpts, copies, and transcriptions. The rights of access in this paragraph are not limited to the required retention period, but shall last as long as records are retained.

15. EQUAL EMPLOYMENT OPPORTUNITY. The Contractor must comply with E.O. 11246, "Equal Employment Opportunity," as amended by E.O. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity" and as supplemented by regulations at 41 C.F.R. Part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."

16. DEBARMENT CERTIFICATION. The Contractor certifies, by signature on this contract, that the Contractor is not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency. Where the Contractor is unable to certify to this statement, the Contractor shall attach an explanation to this contract; and, at the Conservancy's option, this contract shall be null and void.

17. CONTRACTOR LIABILITY. The Contractor assumes sole responsibility for reimbursement to the Conservancy or the Federal Government, whichever is appropriate, of a sum of money equivalent to the amount of any expenditures disallowed should the funding agency or any authorized agency rule, through audit exception or some other appropriate means, that expenditures from funds allocated to the Contractor were not made in compliance with the applicable cost principles and regulations of the funding agency, or the provisions of this contract.

20. ADMINISTRATIVE REQUIREMENTS. The Contractor shall comply with all applicable sections of OMB Circular A-110 or A-102, whichever is applicable.

32. PROCUREMENT.

A. MBE-WBE. Contractor agrees to ensure to the fullest extent possible that at least an 8 percent (4% Minority Business Enterprise [MBE]; 4% Women's Business Enterprise [WBE]) "Fair Share" of federal funds for prime contracts or subcontracts for supplies, construction, equipment or services are made available to orgainzations owned or controlled by socially and economically disadvantaged individuals, women, and historically black colleges

and universities.

Contractor agrees to include in its bid specifications, and require all of its prime contractors to include in their bid specifications for subcontracts an 8 percent (4 - MBE; 4 - WBE) "Fair Share."

Contractor agrees to document all efforts taken to achieve the "Fair Share" and to report on all procurement actions regardless of the size of the subagreement.

B. SBRA. Contractor shall take the following affirmative steps in awarding subcontracts, if any: (1) place Small Businness in Rural Areas (SBRA) on solicitation lists; (2) ensure that SBRA's are solicited whenever they are potential sources; (3) divide total requirements, when economically feasible, into small tasks or quantities to permit maximum participation by SBRA's; (4) establish delivery schedules, where the requirements of work will permit, which would encourage paparticipation by SBRA's; (5) utilize the services of the Small Business Administration and the Minority Business Development Agency of the U.S. Department of Commerce, as appropriate.

31. OTHER PROVISIONS. MONITORING. Project financial and programmatic monitoring will be conducted by The Conservancy during the course of this project. Conservancy staff shall be afforded access, at mutually agreed upon times, to all appropriate financial and programmatic records necessary to evaluate compliance with the terms of this agreement. A report of any monitoring findings shall be prepared. Any findings shall be resolved by the contractor as a condition of final payment of the contract.

32. BINDING EFFECT/AMENDMENTS. This contract shall become binding when signed by the parties. This contract contains the entire agreement of the parties and no amendment shall be effective except in writing signed by both parties.

INDEPENDENT CONTRACTOR **THE NATURE CONSERVANCY**

By: By:
Print Name Authorized Representative

Title:
Signature

Title: Date:

Date:

Attorney Date

Original - TNC HQ/Accounting; Duplicate original - Contractor; Copies - TNC FO and TNC RO
Standard Contract - Federal funds.
(Confed$.stn: March 29, 1995)

Appendix B

Final Reports

Final Grant Report for
The Nature Conservancy – Michigan Natural Features Inventory
Submitted April 10, 2001

Contractor: Southwest Michigan Land Conservancy, Inc. (SWMLC)
Budget Center Name: EPA Partnership LOC
Budget Center: 122-085-6885
Source of Funds: EPA Grant #GL985156-01-0

The following report is a complete list of all activities accomplished under the grant. The information is bulleted under each task to be accomplished per the workplan outlined in the grant contract. The latter portion of the report is the questions provided under Paragraph 1, item 7, of the grant contract.

Task 1:

The Conservancy provided 1200 person hours over the course of this contract. The hours were primarily for development of target areas with the MNFI staff and time spent developing new partnerships in these target areas. Time was also spent developing educational materials and working with landowners.

Task 2:

During the grant period, SWMLC worked with MNFI to develop priority sites in southwest Michigan. Both parties designated the Dowagiac River Watershed (Cass County) and Cedar Creek/High Banks Creek (Barry County) as target areas for the purposes of this grant. (SWMLC has further designated, for our use, a list of 6 other targeted areas in our 9 county service area based on the data provided to us by MNFI and the knowledge we have of potential protection projects.)

In the Cedar Creek/High Banks Creek area, SWMLC continues to work with landowners and partners (OUR-Land Committee and the Barry Conservation District) in priority sites. Properties including larger tracts of beech-maple and oak-hickory forests with various wetland complexes including tamarack swamp and white cedar swamp. Eastern massasauga has been documented at some of these sites. We also have been working with the 4-Townships Water Resources Council, another local group in Barry County working on a watershed management plan for their area. 4-Townships has already approached us about examining an opportunity to sub-contract from them for landowner outreach later in 2001.

In the Dowagiac River Watershed, SWMLC has worked with MNFI to identify properties with high-quality natural areas, particularly sites with intact southern floodplain forests and prairie fens. SWMLC participated in the Mitchell satyr butterfly surveys in July 2000 on properties in the watershed. SWMLC will continue to take on more responsibility of the planning and management of these surveys, as well as surveys for other state and federally threatened and endangered species in the watershed. We continue to participate in the planning of the watershed management plan under our subcontract with the Dowagiac River Stewardship Project housed in the Cass County Conservation District. Nicole Hill, SWMLC Land Protection Specialist, has recently become a member of the Board of Directors for the MEANDRS group working to restore meanders on the Dowagiac River.

The development of four educational brochures on the natural features in southwest Michigan was made possible under this grant. The subject of the brochures are: Southern Forested Floodplains; Fens, Marshes, and Bogs; Wetlands; and Hydrology. A fifth brochure was also done in conjunction with the subcontract monies from the Dowagiac River Stewardship Project on the uniqueness of the Dowagiac River Watershed. All of these brochures are attached to this report.

Outreach to landowners is underway in the Dowagiac River watershed. Over 500 residents in the watershed were identified as landowners or owners likely to have natural communities with moderate to high conservation value on their property. Monthly distributions of educational materials to these landowners, including the brochures referred to

in the previous paragraph, were initiated in September 2000, and will continue into July 2001. As of the date of this report, SWMLC has contacted (by phone and in person) over 15 watershed landowners interested in conserving their land. Five landowners continue to work with the Conservancy to evaluate the best method for conserving their land. One conservation easement, approximately 80 acres along Dowagiac Creek, was completed during the grant period. SWMLC looks forward to increasing the number of protected lands in the watershed by building on the partnerships and contacts made possible by this grant.

Task 3:

In the Cedar Creek/High Banks Creek area, SWMLC continues to work with the OUR-Land Committee and the Resource Professional, Jim Bruce, at the Barry Conservation District to provide assistance on land protection options. Staff have completed 2 workshops in the area as described under Task 4.

SWMLC currently has a subcontract with the Dowagiac River Stewardship Project and the Cass County Conservation District for landowner outreach and education regarding the features in the watershed. We completed a public presentation in the watershed, described below in Task 4 of this report. SWMLC continues to lend support and assistance to the MEANDRS group in the watershed and holds a position on the Board of Directors.

Task 4:

Staff completed 3 one-hour workshops for the OUR-Land (**O**ur **U**ltimate **R**esource-Land) Committee meeting on April 15, 2000 on land protection options for landowners with the unique features we had targeted in the area. There were approximately 60 Barry County residents in attendance.

SWMLC was invited for another presentation to OUR-Land on March 22, 2001 to familiarize local officials, particularly newly elected officials, with the Conservancy's mission and land protection options that contribute to the conservation of the special features of Barry County. The evening meeting had approximately 40 attendants. There were many request for specific information regarding the tax benefits of conservation easements and associated charitable contributions.

Staff also participated in a workshop on riparian land management and protection options at the Dowagiac Conservation Club on February 13, 2001. Bill Westrate, local farmer, talented naturalist, and past board member of SWMLC, provided a slide presentation on the natural features of the watershed and shared information on the rare and unique communities and species of the watershed, including the Mitchell satyr, massasauga, copper belly, Blanchard's cricket frog, and spotted turtle. Corey VanWyhe, the Cass County Resource Professional, also provided management advice. The Conservancy spoke on land protection options for landowners. There were approximately 80 people in attendance. It was an opportunity to meet a number of riparian landowners interested in conserving and appropriately managing their land.

The development of educational materials were discussed in Task 1.

Task 5:

Copies of the educational brochures for this project have been attached to this report.

Grant Report Summary Questions

a. Discuss how conservation planning has been incorporated into your organization's operation.

In 1999, SWMLC started to think strategically about developing targeted areas of conservation to proactively identify sites for outreach and land protection when we hired our first Land Protection Coordinator. SWMLC not only

targeted 2 sites for the purpose of this grant, but out of the process of identifying these sites, we have target an additional 6 sites. Two of those are now receiving grant monies from MDEQ to continue working on site plans: Four Townships Project and the Dowagiac River Watershed project.

b. Discuss the Conservation Planning tools provided by MNFI:
How useful where they?
How have you used them?

MNFI's greatest contribution to the grant were the maps and data that enabled SWMLC to identify the more critical areas for conservation. MNFI provided data on element occurrences that were indicators or obligates of target natural communities for conservation, particularly prairie fens (G3/S3) and southern floodplain forests. Another significant contribution by the MNFI staff was the training for our committee members and volunteers on these rarer and most unique habitats and species. As a result, SWMLC has a greater understanding of the ecology of the Mitchell satyr butterfly and Eastern massasauga rattlesnake, prairie fen, coastal plain marsh, and southern floodplain forest.

The maps will continue to be useful in assessing the features of properties and prioritization of sites. The training we received will be valuable as we take on more survey responsibilities in future grants (e.g. U.S. Fish and Wildlife Endangered Species Section 6 grant) and as we walk more properties with these species and ecosystems in mind.

c. Summary of outreach efforts, i.e. workshops, presentations, and/or demonstration projects.

SWMLC organized 3 workshops specifically targeting the local officials, large landowners, and active citizens of Barry County and the Dowagiac River Watershed during this grant period.

The first was in Barry County in conjunction with an OUR-Land's day-long workshop in April, 2000. Attendance was about 60 landowners and politicians. SWMLC did 3 one-hour long presentations. The presentations gave an overview of the natural features of Barry County and a description of the tools landowners can use to protect their land, such as conservation easements, purchase of development rights, and gifts or sale of land to conservation organizations.

The second was in Cass County in conjunction with a February 2001 Conservation District workshop for riparian landowners interested in managing habitat on the Dowagiac River and along tributaries. Attendance was about 80 landowners. The presentation consisted of a slide presentation describing the natural history of the area, some of the unique features in the watershed, and landowner options for protection of their property.

The third presentation was an invitation from OUR-Land to specifically speak to local officials in Barry County, particularly newly elected officials, to familiarize them with the Conservancy's mission and land protection tools available to them via state, federal, and local conservation groups. The March 22, 2001 meeting had approximately 40 attendants.

d. Evaluate the success of the landowner contact program.

The first mailings to 525 Dowagiac River Watershed landowners went out on September 29, 2000. SWMLC has completed 6 consecutive mailings as of the date of this report. SWMLC has been working on 5 potential land protection projects (Hassel, Thomas, Beik, Scherers/Bakeman, and Harrison) that could protect more than 400 acres. We have added new SWMLC members even though that was not a primary objective of the education. We have completed one very restrictive conservation easement on the McKaye's 64 acres along the Dowagiac Creek that is a rich mosaic of wetlands with some upland beech-maple forest and old field. Currently we are negotiating a 12 acre purchase project with documented occurrences of Mitchell satyr, box turtle, and potential occurrences of e. massassauga rattlesnake and Kirtland's water snake.

SWMLC has also been asked to provide technical assistance on the Edward Lowe Foundation property. This property was identified during analysis of the Dowagiac River watershed. The Lowe Foundation is a local community founda-

tion that owns 3000 acres. The foundation has been exploring development of a 10-year management plan with an emphasis on stewarding the unique features and habitats of the land. The property is a rich mosaic of forest, wetland, and grassland. SWMLC staff and volunteers and MNFI will be working on this property to inventory and identify features for conservation.

The completed mailings have primarily been the brochures explaining the features that make up the watershed. SWMLC is preparing to accept another grant that will provide us the tools and resources necessary to continue landowner contact and education with those landowners and visit more properties. It will take some time to nurture those landowner relationships. SWMLC will continue to work on developing these relationships as we continue our grant obligations with the Dowagiac River Stewardship Project and the Cass County Conservation District over the next 18 months.

e. Discuss future plans for landowner outreach and education.

As a component of our strategic plan, SWMLC has targeted outreach planned in the Cedar Creek/ High Banks Creek areas of Barry County during the summer and fall of 2001. Outreach will include reprinting and distributing brochures, 2-3 mailings, and neighborhood meetings. We also have verbally committed to a subcontract for landowner outreach with 4-Townships Water Resource Council, a partnership of Barry and Kalamazoo County and 4-Townships to facilitate a watershed management plan. Both of these are partnerships were initiated under this grant and will continue to nurture and grow.

OUR-Land and other Barry County supporters will continue to assist us in meeting new landowners and encourage more projects in the county. SWMLC currently has 1,040 acres of land under conservation easement in the county and we have been contacted regarding a number of good projects in recent months.

SWMLC will also continue with the work started with the Dowagiac River Stewardship Project and the Cass County Conservation District for landowner outreach and education under the subcontract we have for their watershed planning grant. We anticipate completing the 15 land protection projects (conservation easements, gifts, acquisitions) we started in the watershed, and hope that they will give SWMLC a higher profile in the watershed.

SWMLC is also scheduled to receive a 3 year subcontract from MNFI in the spring of 2001 to complete Mitchell's satyr butterfly and massasauga surveys across the service area, design site conservation plans, and form stewardship teams. The Dowagiac River watershed has a concentration of these sites, and the surveys give SWMLC an opportunity to meet and develop relationships with even more landowners.

April 4, 2001

John Paskus, MNFI
Stevens T. Mason Bldg.
PO Box 30444
Lansing, MI 48909-7944

Re: Final Report – Community Conservation/Landowner Contact Project

Dear John:

With this letter I would like to give you a final report on the contract we took with MNFI as part of your EPA grant. This contract allowed us to work on ecologically important sites in Newaygo and Muskegon counties, primarily through landowner contact.

Our task was to "develop and implement a proactive public outreach program in one or more high ecosystems in central Lower Michigan." We focused on the northeastern Muskegon area and Brooks Township in Newaygo. The attached report details project activities.

In this report you also asked us to cover the following points (as part of Task 7):

1. **Incorporating conservation planning.** This project did not drastically change the way in which we incorporate conservation planning into our organization. We have always been interested in sites identified by MNFI and other credible scientists as having ecological significance. Having land protection staff trained in The Nature Conservancy methodology has meant that we frequently operate in a manner consistent with their landowner contact programs.

   What this project did was give us the opportunity, through financial support, to concentrate on some of these more significant sites that are difficult to protect because of fragmentation, low support for conservation, low-income levels, and sites that have a low profile for the community.

2. **Usefulness of MNFI planning tools.** The conservation planning tools provided by MNFI were definitely useful but required significant amounts of time to adapt to our small land trust with no staff scientists and no mapping/aerial photo capacity in our office. It took us a long time to select viable sites from the raw data given to us and we had to purchase digitized aerial photos before we could make much progress. Background information and slides on elements were very useful.

3. **Summary of outreach efforts**. See attached report.

4. **Evaluation of the success of the landowner contact program.** If you were to judge the landowner contact program by the number or acreage of conservation successes achieved in the grant period, the results would be abysmal. Only one landowner wanted to participate in the Conservation Partners program and there were no donations of easements or land.

   In rural and northeastern Muskegon County and Brooks Township many of the landowners are of modest means, the land is highly fragmented and usually includes their residence, and people often live in these areas because they want to be in a place with little government interference.

   All of these factors contribute to this lack of conservation success and have caused us to think long and hard about how we work toward conservation of some of these important areas.

   As part of this project I had the opportunity to attend a environmental seminar held by the Community Foundation for Muskegon County in which one of the speakers was describing characteristics of the population. One way that he described a typical resident was a "non-joiner" that is overscheduled and has a hectic life.

   If a typical landowner in this area can be characterized as less affluent, a "non-joiner", with a hectic life and a skepticism for "programs", targeting landowners for the "Conservation Partnership" program or trying to get them to consider selling or restricting their home site is not going to be very fruitful.

   What we have decided to do from this point on is to de-emphasize joining a program, look for opportunities for conservation easements or acquisition (the latter potentially facilitated by TNC), develop model projects if possible, and focus on long-term, occasional contact by using the database to continue sending information or invitations to events.

5. **Future landowner outreach.** We intend to continue working in Muskegon County and Brooks Township on important ecological sites. In particular, in light of the above, we will continue to send information or meet with landowners contacted as part of this program. We are hoping that a long-term approach will pay off eventually.

   Working with the MIFO of TNC and the USFS, we worked to identify landowners who would be willing to participate in a model program to cut blocks of planted pines off former prairie land. We were successful in finding 2 cooperating landowners (a third, our Conservation Partner, wants to wait and see the results) and have found an appropriate contracting organization. We hope to use federal match-grant programs to fund these projects.

We hope to use these sites as models for other landowners who have sites that are degraded by planted pine.

We also recognize that the only way to protect some of these sites may be through purchase, since many of these lands are the landowner's primary asset.

Finally, we are working with The Nature Conservancy as they prepare to open a field office in Grand Rapids. Our partnership with them will include continued efforts to preserve the coastal plain marsh and prairie/savanna systems in our area.

For the most part, these are difficult sites to preserve. The Nature Conservancy has known about many of them for years, but because of land fragmentation, residential use of the properties, low-income levels, and a tendency toward anti-preservation and/or anti-government attitudes, these sites remain unprotected.

In conclusion, this contract allowed us to focus our efforts on ecologically significant sites in a way that was previously not possible. While we don't have much in the way of protected acreage to show for it, we are hoping that continued contacts will result in permanent conservation.

If you have additional questions, please feel free to contact me at 616/451-9476 or lcwm@naturenearby.org. Thank you.

Sincerely,

April Scholtz

Enc.

Final Grant Report: EPA Partnership LOC

Task 1: Provide a minimum of 1200 person-hours on Tasks 2-6.

Action:
Well over 1200 hours were consumed by this project, and Land Conservancy staff are continuing with follow-up visits, calls and mailings! Here are how the minimum hours were allocated:

- 2 terms of Calvin College interns (Jennifer Long, Brett Bowersox) – 300 hours.
- Summer 2000 paid intern (Laura Ediger) – 360 hours.
- Land Protection Director (April Scholtz) – 540 hours between Aug '99 and April '01.

Task 2: Develop and implement a proactive public outreach program in one or more high ecosystems in central Lower Michigan. Outreach efforts were to include presentations and/or demonstration projects, developing and implementing and landowner contact and education program, providing landowners with information and the opportunity to become a volunteer steward (we called it "Conservation Partner"), develop a database of landowners.

Action: The focus of the project was on the dry sand prairies and oak/pine savannas of Brooks Township and similar sites in Muskegon County, as well as Muskegon County's other high priority sites such as coastal plain marshes. The following activities took place:

- Worked with MNFI to identify priority sites in Muskegon County. This necessitated updating information on the site viability and land ownership.
- Worked with MIFO of TNC to identify priority sites in Brooks Township.
- Developed information sheets for landowners on the Karner Blue butterfly, savannas, dry sand prairies, and coastal plain marshes.
- Obtained a related grant from the Community Foundation for Muskegon County to produce a brochure designed to encourage private land conservation in the county.
- Created the "Conservation Partner" program with informational materials and designed an award.
- Contacted 33 landowners in Brooks Township and 34 landowners in Muskegon County. Followed up with 21 personal discussions in Brooks Townships and 20 in Muskegon. Learned status of properties, interests of landowners, and will continue to follow up with prospects. Referred 3 landowners in Brooks Township to MIFO/TNC because of mutual interest in acquisition for conservation. Have 7 prospects for conservation easements in future.
- Awarded only one Conservation Partner award.
- Presented slide show on special natural features and conservation options at following events: Brooks Township Open House (roughly 40 people in attendance), Newaygo County's Land Use Task Force's Land Use Seminar (100 attendees), Land Conservancy Open House sponsored by the Community Foundation for Muskegon County (100 attendees), and the Dalton Township Master Planning group (10 attendees.)

Task 3: Initiate and build partnerships with other organizations and agencies in central West Michigan to further the protection of high priority ecosystems.

Action: The most significant partnership that happened was the formalized partnership created between the Land Conservancy and the Michigan Chapter of TNC. The focus of the agreement was the partnership to raise funds for working on the sites of concern in this project, and other TNC-selected sites of ecological concern.

Other agencies that we are continuing to work with include the Muskegon River Watershed group, Brooks Township, the Newaygo County Land Use Task Force, the Lake Michigan Federation, the Conservation Districts, MSU Extension, the West Michigan Regional Environmental Network, and Timberland RC&D.

Task 4: Convene a working session to identify specific educational materials needed for outreach.

Action: Working with John Paskus, we were able to focus on selected natural communities and obtain scientific information and slides for these features. We used these materials to create our own handouts and slide presentations.

Appendix C

Educational Materials

Karner Blue Butterfly

Lycaides melissa samuelis

Background:

The Karner blue butterfly is a very rare, small, silvery blue butterfly that was listed as a federal endangered species in 1992. It is one of the best indicator species of oak-pine barren and dry sand prairie remnants. Its larvae feed exclusively on wild lupine, which is only found within these systems. The existence of this butterfly in Brooks Township is one of the primary reasons for all of the state and federal attention which has been directed towards this area by the DNR, the US Forest Service, and the Nature Conservancy.

Life History:

- Eggs are laid on lupine plants with two life cycles each year.
- Larvae feed on wild lupine and pupate after about three weeks.
- Adults can be seen in late May/early June, then again in July.
- All life stages are vulnerable to fire, which is necessary to maintain their habitat.

Threats:

- Off-road vehicle damage
- Red pine plantations
- Fire suppression
- Residential development (habitat loss & fragmentation)
- Gypsy moth spraying
- Invasive exotic weeds (e.g. spotted knapweed)

Management Techniques:

- Protect known populations of Karner blue from any disturbances
- Maintain habitat by inhibiting forest succession: prescribed burns, mowing
- Connect isolated populations by providing habitat corridors between major colonies of Karner blue butterflies

For more information on how to preserve this delicate species, contact:

The Land Conservancy of West Michigan
1345 Monroe Ave. NW Suite 324
Grand Rapids MI, 49505
Phone: (616) 451-9476
Fax: (616) 451-1874
e-mail: lcwm@naturenearby.org

A Threatened Community:
The Oak-Pine Barrens & Prairie Landscape

West Michigan is home to a unique ecosystem made up of dry sand prairies and oak-pine barrens. This community provides habitat for many different species: **9 rare plant species** and **14 rare insect species**, including the federally endangered Karner blue butterfly. The diversity of this natural habitat is the foundation of a unique larger community that has received national attention for its conservation value.

Dry Sand Prairies:

- Dry, nutrient-poor grassland dominated by little bluestem, big bluestem, and Pennsylvania sedge
- Maintained by recurrent fire, either natural or human-made
- Habitat for the Karner blue butterfly and other rare species

Oak-Pine Barrens:

- Typically found around the edges of dry sand prairies
- Similar to the dry sand prairie, but with widely scattered trees

History:

This area had continuous tracts of dry sand prairie surrounded by oak-pine barrens before the logging era. These have now been reduced to a few small remnants located on both public and private land. Most of the larger remnants have been identified, however, crucial corridor habitat exists in small isolated patches as well.

Management Techniques:

Oak-pine barrens and dry sand prairies can be protected and enhanced to support the diversity of the associated rare plant and animal species by using various techniques:

- Restore the landscape to its original condition by replanting native grasses and even possibly by removing closed canopy forest trees.
- Educate your neighbors and yourself about the rare communities and species found in your area.
- If a Karner blue butterfly is spotted on your property, protect the area from disturbance and maintain the wild lupine they depend on.

If you are committed to the preservation of this unique ecosystem on your proptery, consider available stewardship plans such as conservation easements or participating in the Forest Stewardship Program. For more information, contact:

Land Conservancy
OF WEST MICHIGAN

The Land Conservancy of West Michigan
1345 Monroe Ave. NW Suite 324
Grand Rapids MI, 49505
Phone: (616) 451-9476
Fax: (616) 451-1874
E-mail: lcwm@naturenearby.org

Coastal Plain Marshes: A Unique Michigan Habitat

Description:

A coastal plain marsh is a special type of wetland found on the shores of shallow soft-water seepage lakes and ponds. What makes this habitat so unique are the rare grasses, rushes, and other plants that are only found in coastal plain marshes – here and on the Atlantic coast. In order to survive, these plants must have open, shallow shorelines that are created as the water level rises and falls each year and throughout the seasons.

The plants of the marsh are generally situated around the pond or lake in concentric rings: in the center there is open water (at least part of the year), and in the shallow water or shoreline there are annual plant species and wetland plants. Slightly further out is a moist meadow area, and in the outermost zone of this community may be a band of shrubs and trees.

Range:

At one time, Michigan may have been home to around 300,000 acres of coastal plain marsh. Less than half of that remains today, and much of it has been degraded by dredging and filling of the shoreline, development, and ORV use.

What do coastal plain marshes need to survive?

These marshes are dependent on the body of water which they surround. The water quality and the changing water levels create the conditions that are essential for the rare plants of the coastal plain marsh to reproduce and survive.

What is harmful for coastal plain marshes?

Perhaps the greatest threat to this rare natural community in Michigan is shoreline development – for both housing and agriculture.

- **Water level:** if the water levels no longer fluctuate, the unique plant species will not be able to survive. Other more common plants will invade the area, and the coastal marsh community will disappear. This is a usually a result of dredging or filling.

- **Water quality**: as with all wetlands, contamination can result from excessive use of pesticides, herbicides, fertilizers and other chemicals on surrounding lands.
- **Off-Road Vehicles**: ORV use can damage and destroy not only the rare coastal marsh plants themselves, but can also dramatically alter the natural water flow, which changes the habitat and hydrology of these areas.

What you can do:

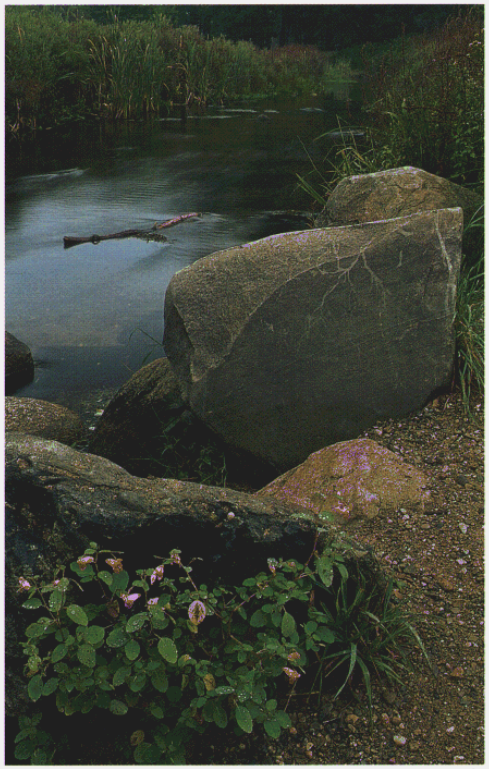
- Keep the shoreline undisturbed, and minimize impacts.
- If you want to preserve your marsh and its rare species, consider the potential benefits of a conservation easement. For more information, contact:

Land Conservancy
OF WEST MICHIGAN

The Land Conservancy of West Michigan
1345 Monroe Ave. NW Suite 324
Grand Rapids MI, 49505
Phone: (616) 451-9476
Fax: (616) 451-1874
e-mail: lcwm@naturenearby.org

What effects do humans have on the Dowagiac River Watershed hydrology?

One of the biggest effects that humans can have on hydrology is to upset the balance of water reaching the rivers and streams through groundwater. This balance is upset by increased impervious cover, which is any surface that does not allow water to infiltrate the ground. Examples include roads, parking lots, rooftops, and sidewalks. Studies indicate that even relatively small amounts of impervious surface coverage (10-15% of the total land area) can make it difficult to maintain water quality.



The groundwater flowing into the Dowagiac Creek flows into the Dowagiac River, St. Joseph River and at last reaches Lake Michigan Photo © Michael Kucinich

When impervious cover causes more rainfall to directly reach a stream or lake over the surface instead of infiltrating the ground, the result is:

- increased frequency of flooding.
- stream bank erosion as the stream widens to accommodate the additional water.
- habitat destruction as the banks erode, filling in pools and covering gravel stream beds with sediment.
- decreased groundwater recharge.
- more pollutants (oil, sediment, nutrients) entering a stream or lake.
- a 2 to 10 degree F. increase in the temperature of streams and lakes.

What can we do to preserve the hydrology of the Dowagiac River Watershed?

Encourage local governments to enact ordinances that will protect water quality when new residential, commercial, and industrial developments are built. Local ordinances can have requirements that reduce the amount of impervious cover on a site, require a certain amount of open space, retain the natural topography and natural resources such as wetlands, and require best management practices to be used when handling storm water. With the use of best management practices, a development can be planned so that the natural or pre-development hydrology of the site and watershed is maintained.

For more information on conserving hydrology

To learn more or to become involved in the Dowagiac River Watershed Project that addresses many of these issues, call the Cass County Conservation District at (616) 445-8643, ext. 3. To learn more about the Dowagiac River visit www.meandrs.org.

Printed on 20% post-consumer waste paper that is acid- and chlorine-free.
Cover photo © Michael Kucinich

Hydrology

The Dowagiac River Watershed — Its Unique Hydrology

What is so special about the Dowagiac River Watershed?

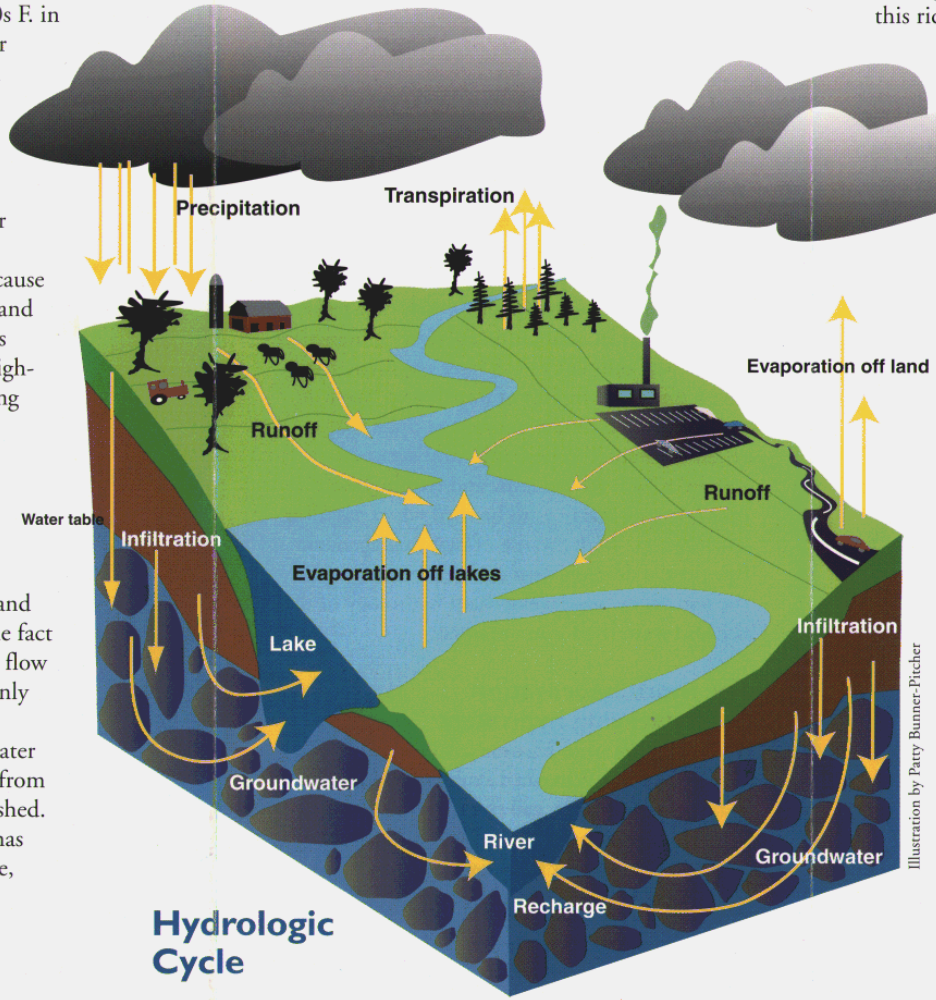
The Dowagiac River Watershed has received much attention because of two unique features of the river and its tributaries. First, the water in the Dowagiac River and many of its tributaries, exhibits a year-round cold temperature (averaging in the mid to upper 60s F. in July). Second, the Dowagiac River maintains a stable, steady flow. In comparison, many rivers and streams in southern Michigan contain warmer water and experience flashy flows after storms. Often the Dowagiac River is compared to rivers in northern Michigan such as the AuSable because of the similarities in temperature and flows. The Dowagiac River and its many tributaries are designated high-quality cold-water streams containing brown trout.

What causes the hydrology of the Dowagiac River Watershed to be unique?

Both the cold water temperature and stable flow can be attributed to the fact that 90% of the Dowagiac River's flow comes from groundwater, while only 10% is from surface water runoff.

The large amounts of groundwater discharge into the streams results from the soils and geology of the watershed. A large portion of the watershed has sandy soils that are very permeable, allowing much infiltration. The geologic feature that contributes to the groundwater discharge is the presence of what is called the Kalamazoo moraine. This moraine, a long narrow ridge left by glacial deposits, runs south of Decatur to northeast of Dowagiac and separates the Dowagiac Creek from the Dowagiac River. The head pressure created from this ridge and other areas of high elevation pushes the groundwater toward the streams and rivers and occasionally causes natural springs and wetlands.

Impervious surfaces should be minimized since they have a significant impact on many stream characteristics, including stream shape, water quality, stream temperature and biodiversity.



Hydrologic Cycle

Understanding the hydrologic cycle

Water is constantly being recycled. As rain or snow falls to the earth's surface:

- some water runs off the land to rivers, lakes, streams, and oceans (surface water runoff).
- some water returns to the atmosphere by evaporation or transpiration through plants.
- some water infiltrates the soil, where it can
  - be absorbed by plant roots, or
  - continue to move down to become groundwater, or
  - move down and sideways or back up to become surface water through wells, natural springs, marshes, streams, etc.

The movement of water between the earth and the atmosphere through runoff, infiltration, evaporation, transpiration, and precipitation is continuous.

and beavers), waterfowl (ducks and geese), shorebirds (plovers and sandpipers), wading birds (herons and rails), amphibians (salamanders, frogs, and toads), and insects (dragonflies and mayflies) are examples of creatures found in wetlands.

Wetland plants stabilize soils and reduce erosion. Wetlands act as huge sponges to store water, which helps to reduce flood damage. The water then percolates back into the earth, where it helps to recharge the groundwater supply and maintain water levels in streams and rivers.

Deadman's Hollow along the Dowagiac River
Photo © Michael Kucinich

Celithemis elisa, Calico Pennant Dragonfly
Photo by William Westrate

Should I protect, enhance, or create a wetland?

Wetlands should be preserved whenever possible. Natural wetlands, which developed over thousands of years, are hard to duplicate because of their complexity. Preserving those that are not currently being drained or altered by humans is the best way to maintain existing wetland functions. Recognize, however, that wetlands are a dynamic system that will change with time.

There are a number of programs designed to protect, create, or enhance wetlands. The Natural Resources Conservation Service has a Wetland Reserve Program for wetland protection and cost-share programs for wetland creation. In southwest Michigan, the Southwest Michigan Land Conservancy will accept donations of easements and gifts of land that may provide landowners with a tax deduction.

It is never too late to protect, enhance, or create a wetland!

For more information on conserving wetlands

Contact your county Conservation District or Southwest Michigan Land Conservancy at (616) 324-1600.

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Cover photo © Michael Kucinich

Wetlands

Wetlands should be protected whenever possible

Since European settlers arrived in America, wetlands have been filled, drained, or damaged in an effort to develop and use the land more intensely. Michigan has lost 35-50% of its presettlement wetlands by conversion to buildable land and agricultural use. These changes burden remaining wetlands with runoff and pollution from streets, yards, parking lots, agriculture, and industrial facilities.

Butorides striatus, Green-backed Heron (immature) Photo by William Westrate

What is a wetland?

Wetlands are known by various common names — swamps, bogs, sloughs, fens, and marshes. They all have water on or near the surface for all or part of the year, contain special soil types called hydric soils, and are populated by unique plants or animals.

What are some examples of wetlands?

Swamps have saturated soils that may have standing water during part of the year and are dominated by water-tolerant trees such as silver maple, cottonwood, black ash, or tamarack. Buttonbush, alder, willow, and red osier dogwood are shrub species that often grow in swamps. Types of swamps include forested floodplains, conifer swamps, and dense shrub swamps.

A **marsh** is another type of wetland covered periodically by standing or slow-moving water. Soft-stemmed plants such as cattails, sedges, and rushes dominate a marsh's nutrient-rich soil.

Wet meadows are similar to marshes in that they also contain grasslike vegetation. However, these wetlands typically have only seasonally saturated soils and little or no standing water. Blue vervain, Joe-pye weed, ironweed, red top, smooth goldenrod, and bluejoint grass are common in this type of wetland.

Bogs and fens are wetlands with a thick accumulation of organic matter called peat, but the similarities stop there. They differ in their source of water, location in the landscape, and types of plants. Bogs are rarer in southwest Michigan, usually found in kettle holes, with highly acidic soils and dependency on water from rainfall and runoff. Prairie fens are typically located on sandy hillsides along lakes, ponds, rivers, and streams, with constant sources of alkaline groundwater from seeps and springs.

Seasonal wetlands or vernal pools are shallow, temporary wetlands that can have standing water from late winter through early spring. Vernal woodland pools are typical seasonal wetlands that vary in size from a few square feet to over an acre. These wetlands are essential for migrant waterfowl and for breeding amphibians.

Why are wetlands important?

- Recreation for hunters, fishermen, bird watchers, photographers, and general nature enthusiasts.
- Assist in controlling water flow and reducing flood damage.
- Improvement in drinking water and surface water quality.
- Habitat benefits for many endangered or threatened species.

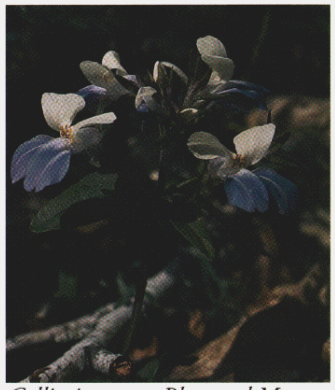
Why are wetlands important?

Some people wrongly view wetlands as wastelands, but all Michigan citizens, whether they own land or not, receive benefit from wetlands. Wetlands provide recreational opportunities for bird-watchers, hunters, hikers, photographers, canoeists, and other outdoor enthusiasts. Wetlands are among the most biologically diverse and productive landscape types, providing habitat for thousands of species of fish, insects, amphibians, reptiles, birds, and mammals. Nearly 35% of the nation's rare wildlife species are located in wetlands or are dependent on them. Mammals (muskrats, mink,

Nymphaea odorata, Fragrant Water Lily Photo by William Westrate

Early morning marsh Photo © Michael Kucinich

Floodplain forested wetlands also provide services that cannot easily be duplicated by man-made facilities. During heavy rainfall, these wetlands divert, store, and slow the flow of water to reduce flood damage downstream. Forested floodplains:



Collinsia verna, Blue-eyed Mary
Photo by William Westrate

- protect surface water quality
- aid in recharging groundwater
- act as buffers for rivers and streams to reduce erosion and sedimentation downstream, and
- improve the overall health of the watershed.

When protected, floodplain wetlands improve the quality and function of our natural systems.

Symplocarpus foetidus, Skunk Cabbage
Photo by William Westrate

Caltha palustris, Marsh Marigold Photo by Joe Ervin

What are the threats to southern floodplain forests?

Southern floodplain forests are among the lower peninsula's largest remaining natural habitats, because they are not easily farmed or logged. In recent years they have become highly desirable for home site development because of water access and scenic views.

The largest threat to our remaining forests is fragmentation, which occurs when large pieces of land are divided into smaller parcels. These smaller parcels are used for residential, commercial, and industrial activities, leaving isolated fragments of forests. These remaining small patches of forest become islands in a sea of human activity and face other threats, including over-grazing by livestock, browsing by deer, invasive exotic species, or hydrologic alterations.

For more information on conserving floodplain forests

Contact your county Conservation District or Southwest Michigan Land Conservancy at (616) 324-1600.

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Floodplain Forests

Floodplain forests improve the quality and function of our natural systems

In the early 1800s, forests covered most of Michigan's 36 million acres. Today, nearly all of Michigan's landscape has been disturbed by human activity causing the loss of more than 50% of the state's original forest.

Trillium grandiflorum, Large-flowered Trillium Photo by Joe Ervin

What type of forests do we find in southwest Michigan?

Floodplain forests, hardwood swamps, and moist hardwood forests are the dominant forest types in southwest Michigan. The most common forest type in southwest Michigan is the southern floodplain forest, found next to rivers and creeks along flat and seasonally wet areas.

Michigan's southern floodplain forests support silver and red maple, red ash, and cottonwood, with components of red oak, swamp white oak, black willow, black ash, butternut, tulip tree, and black walnut also occurring. Several southern trees reach their northern ranges in these forests, such as paw paw, Kentucky coffee tree, honey locust, red mulberry, and sycamore.

What is found in a southern floodplain forest?

Songbirds that inhabit these forests include the red-eyed vireo, northern oriole, indigo bunting, gray catbird, and eastern wood pewee. Other species include the wood duck, black duck, great blue heron, woodcock, deer, wild turkey, woodpecker, salamander, frog, snake, coyote, fox, beaver, and rabbit. Rare and unique species include the red-shouldered hawk, Indiana bat, smallmouth salamander, spotted turtle, Blanchard's cricket frog, cerulean warbler, and yellow-throated warbler.

Common plants found in floodplain forests include wild geranium, cinnamon fern, buttercup, violet, spring beauty, jewelweed, skunk cabbage, marsh marigold, and jack-in-the-pulpit. Rare plants include prairie trillium, cup plant, snow trillium, and black cottonwood.

How can I protect the remaining southern forested floodplains in southwest Michigan?

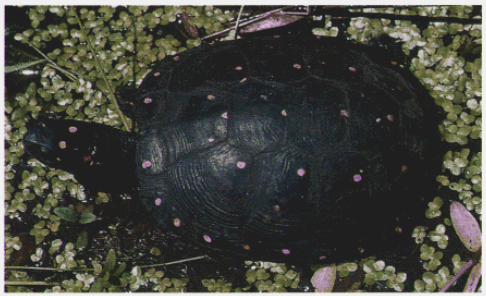
- Contact your county Conservation District representative to learn more about managing southern floodplain forests.
- Consider protecting these forests with a conservation easement through the Southwest Michigan Land Conservancy or through the Natural Resources Conservation Service Wetland Reserve Program.
- Consider re-creating and adding forested buffers or wetlands along waterways on your property.

Terrapene c. carolina, Eastern Box Turtle
Photo by William Westrate

Dowagiac Woods Photo © Michael Kucinich

Why are southern floodplain forests important?

Floodplain forests are a transitional habitat between the river or stream and upland and serve as a wildlife corridor between habitats. Nutrients are exchanged in these wetlands, with floodwater depositing silt and nutrients and the upland contributing leaf litter and runoff. The fluctuating water levels and nutrient-rich soils make these wetlands highly diverse and excellent habitat for aquatic and terrestrial wildlife.



Clemmys guttata, Spotted Turtle
Photo by William Westrate

What are coastal plain marshes?

Coastal plain marshes occur in relatively narrow bands around softwater ponds and depressions having gradually sloping shores and warm water temperatures. Soils range from sandy to muck and are very acidic.

Annual and seasonal water level fluctuations are what make coastal plain marshes unique. Many of the characteristic plant species are annuals, plants that live only for one growing season. They are adapted to the periodic natural draw-down of water levels, which exposes bare soils for germination.

Shallow water or recently emerged shore, due to draw-down, contains coastal plain marsh species like the purple spike rush and tooth-cup. More than 40 threatened or endangered plant species are associated with coastal plain marshes in Michigan. Cross-leaved milkwort, meadow beauty, tall beak rush, umbrella grass, and Hall's bulrush are just a few of the rare plants in this unique habitat.

Thomas Fen on Cook Lake Photo © Michael Kucinich

These marshes are very rare in Michigan and are considered by many conservation organizations to be critically threatened. Most records indicate the majority of coastal plain marshes are in the western Lower Peninsula.

What are bogs?

Bogs are composed of saturated peat soils that are low in nutrients and very acidic. Bogs originate in a shallow lake as a floating mat of sedges that becomes colonized by sphagnum moss. As the mat gradually thickens and stabilizes, it is invaded by shrubs and trees. Over time, the bog mat expands until no open water is visible. This transformation from open water to forest is very slow and can take thousands of years.

The peat is typically covered by a low-growing carpet of sphagnum moss. Low nighttime temperatures in bogs (often 30 degrees cooler than the surrounding uplands) are ideal for sphagnum moss, which acts as an insulator for the roots of other plants. Plants typically found in bogs include sedges and shrubs such as bog rosemary, Labrador tea, bog laurel, lowbush blueberry, and leatherleaf.

Carnivorous plants like pitcher plants and sundew are common in bogs. Bogs are also home to turtles, frogs, salamanders, and snakes. The spotted turtle and the red-bellied snake are two of the rarer finds in a bog, and they are protected by the State of Michigan.

For more information on conserving fens and bogs

Contact your county Conservation District or Southwest Michigan Land Conservancy at (616) 324-1600.

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Cover photo © Michael Kucinich

Fens, Marshes, and Bogs

Fens, marshes, and bogs need protection

These three specialized wetland systems are considered rare and a high priority for preservation in southern Michigan. They might even be considered "extreme" wetlands, because they occur only under specific conditions related to their source of water and location in the landscape.

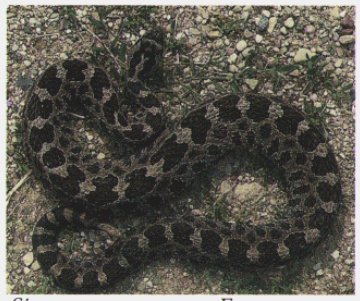
What are prairie fens?

Prairie fens are peat-covered wetlands that are often springy when walked upon. These fens are fed by a constant flow of mineral-rich groundwater that seeps to the surface and flows through and over the accumulated peat. The groundwater, rich in both calcium and magnesium, contributes to the alkaline soil condition. Historically, dry upland communities such as mixed oak savannas were subject to fire, which also burned into the adjacent prairie fens. Plants found in fens are adapted to alkaline soils, periodic fire, and a constant flow of cool groundwater.

Calopogon tuberosus, Grass-pink Orchid
Photo by William Westrate

Why protect these "extreme" wetlands?

- The "extreme" wetland systems are particularly important because they occur only under specific circumstances.
- They are not the type of wetland that can be created, and restoration can be challenging.
- The variety of plants and animals that occupy these systems is unique and specialized.



Sistrurus c. catenatus, Eastern Massassauga
Photo by William Westrate

Typical plants in a prairie fen are big bluestem, Indiangrass, tamarack, shrubby cinquefoil, bog birch, poison-sumac, and many species of sedges and rushes. The extremely alkaline soils limit the variety of plants found in fens, but alkaline-tolerant plants like grass-of-Parnassus, Kalm's lobelia, round-leaved sundew, and pitcher plant may be found. Prairie fens also harbor a number of rare plant species, including Indian plantain, white ladies'-slipper, common valerian, prairie dropseed, and rosinweed.

A number of animals make their homes in or around fens. The Mitchell's satyr butterfly, a federally endangered species, is one of the more special finds in the fens of southwest Michigan. Other common finds are dragonflies, water snakes, and turtles.

There are 85 known prairie fens in Michigan, totaling about 2,000 acres. Although prairie fens are not considered to be globally imperiled, they are often found only in very small, isolated pockets, and good quality sites can be very difficult to find. In the southern Lower Peninsula of Michigan, prairie fens occur primarily in areas with a lot of topographic relief.

Parnassia glauca, Grass-of-Parnassus
Photo by Emma Bickham Pitcher

A look at the Dowagiac River Watershed in the past

A scene along Dowigiac Creek
Photo © Michael Kucinich

Historically, oak savanna and oak hickory forests dominated the sandy uplands of the watershed and beech-sugar maple forests covered the drier soils. There were also a few large pockets of tall grass prairie in the more fire prone areas. The lowland areas were dominated by forested floodplains and other types of wetlands.

As settlers moved into the area, the uplands were quickly converted into agricultural fields. The wetland forests in the northern part of the watershed were eventually cleared and drained so farmers could utilize the rich organic soils.

The drainage of agricultural lands was accomplished with the installation of private drains and the channelization of the Dowagiac River in the early 1900's. The Dowagiac River was channelized from the headwaters in Van Buren County to just north of the Niles dam. This lowered the water table as expected, but also destroyed several natural springs and lakes along the river. The channelization also disconnected the river from its floodplain, made the banks unstable and destroyed stream and riparian habitats.

Did you know?

The City of Dowagiac lies in the deepest part of an ancient lake bed that extended from Grand Rapids to South Bend. This lake was formed by retreating glacial ice.

Rana catesbeiana, Bull Frog
Photo by William Westrate

Almost all of the Native Americans living in Cass County at the time of white settlement were the Potawatomies. They hunted, fished, trapped and cultivated crops in the watershed and other parts of southwest Michigan. The Potawatomies still have an active role in the Dowagiac River Watershed today.

In 1873, Michigan's first fish hatchery was located along the Dowagiac River just north of Sumnerville at the present day Crystal Springs Methodist Camp.

For more information about the Dowagiac River Watershed

River habitat restoration efforts are being coordinated by Partnership for MEANDRS. Watershed planning efforts are being coordinated by the Dowagiac River Watershed Project. For more information contact the Cass County Conservation District at (616) 445-8643 ext. 3. For general information on the watershed, visit www.meandrs.org.

This brochure is funded by a grant from the Michigan Department of Environmental Quality, Surface Water Quality Division. All programs and materials of the Cass County Conservation District are open to all without regard to race, national origin, sex, handicap, age or religion.

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Dowagiac River Watershed

Dowagiac River Watershed Facts

Where is the Dowagiac River Watershed?

The Dowagiac River Watershed is located in southwest Michigan with headwaters in southern Van Buren County. The river then flows through northwest Cass County and enters the St. Joseph River near Niles in Berrien County. The watershed drains about 287 square miles or 181,347 acres. The major tributaries to the Dowagiac River are the Dowagiac Creek, Pokagon Creek, Peavine Creek, McKinzie Creek, Silver Creek, and Lake of the Woods Drain.

Russ Forest along Dowagiac Creek Photo © Michael Kucinich

Are there lakes in the watershed?

Several — in fact, there are 23 lakes larger than 10 acres. Lakes are an important part of the Dowagiac River Watershed. Magician Lake, Indian Lake, Lake of the Woods, Lake LaGrange, Twin Lakes, and Bunker Lake are a few of the many lakes in the watershed.

Lake LaGrange Photo © Michael Kucinich

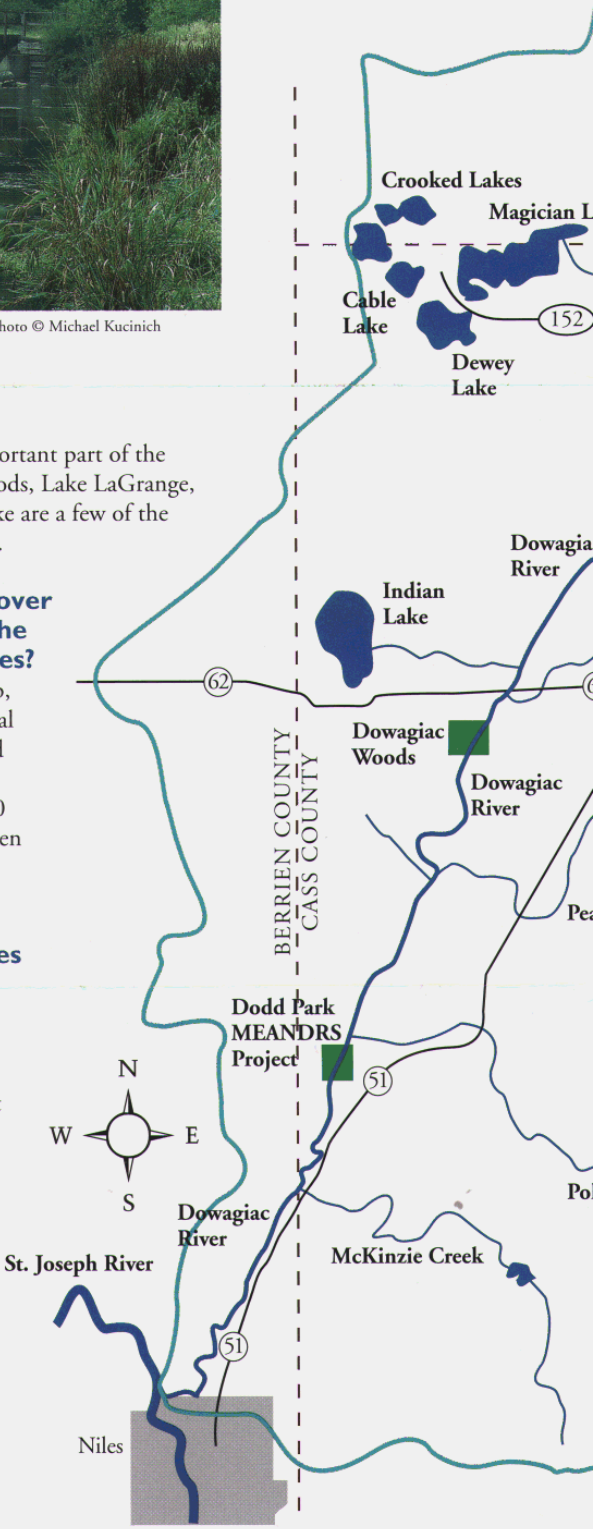
Who has jurisdiction over the land that affects the River and its tributaries?

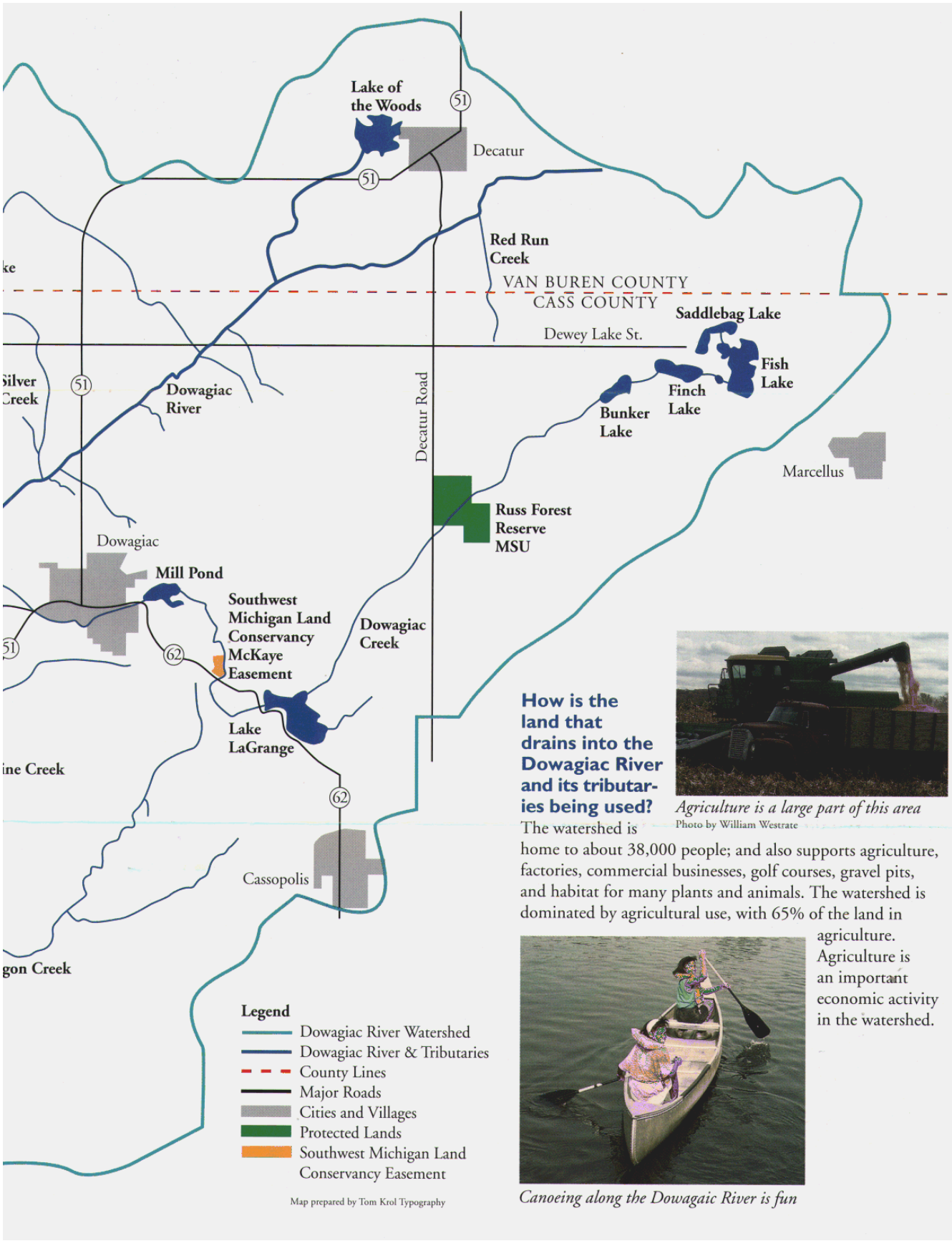
As you can see from the map, the watershed crosses political boundaries of townships and counties. The watershed encompasses all or part of 20 municipalities in Cass, Berrien and Van Buren counties, and include the cities of Dowagiac and Niles, the villages of Cassopolis and Decatur and 16 townships.

Why is the water in the Dowagiac River and its tributaries so cold, even on the hottest days of summer?

The river and its tributaries maintain a year round cool temperature because they are "spring fed." Because of the pervious, sandy soils in the watershed, the river and its tributaries get almost 90% of their flow from groundwater and only 10% from surface run-off. These unique characteristics maintain steady year round flows and high quality cold water temperatures. The shade provided by trees on the banks of the river also help to keep the water cool.

Trout fishing is very good in the cool waters of the Dowagiac River
Photo by Joe Ervin





Agriculture is a large part of this area
Photo by William Westrate

How is the land that drains into the Dowagiac River and its tributaries being used?

The watershed is home to about 38,000 people; and also supports agriculture, factories, commercial businesses, golf courses, gravel pits, and habitat for many plants and animals. The watershed is dominated by agricultural use, with 65% of the land in agriculture. Agriculture is an important economic activity in the watershed.

Canoeing along the Dowagaic River is fun

The Dowagiac River: a gem in southwest Michigan

The Dowagiac River Watershed is unique

The Dowagiac River is a hidden treasure in Michigan, being one of the most heavily groundwater-fed rivers of its size in the state. This unique hydrology supports a cold water fishery that has the potential to rank among the finest trout rivers in the Midwest.

Today the watershed is dominated by agriculture with only a few upland forests and small isolated prairies remaining. However, the lowlands, particularly those along the Dowagiac River and its tributaries, still have a rich array of natural communities. Large tracts of forested floodplain are still found along the main branch of the Dowagiac River. These wet forests harbor a rich variety of wildlife such as wood ducks, tree frogs, salamanders, song birds, wild turkey, spotted turtle, red tailed hawks, and much more.

Salmo trutta, Brown Trout Photo by Tom Krol

The watershed contains pockets of unique wet prairies, grasslands and wetlands that provide habitat for many species of plants, wild flowers, insects, animals and song birds. Prairie fens found in the watershed are home to many rare plants as well as the endangered Mitchell's satyr butterfly.

Asclepias incarnata, Swamp Milk Weed Photo by William Westrate

What is a watershed?

The next time it rains, watch the water run off your roof, your driveway, and down the street. Some of the water soaks into the soil to become groundwater, which slowly replenishes streams, lakes and wetlands. Some runs overland to the nearest stream, lake or wetland. Add up all of the land that drains into the same waterway and you have a watershed. A watershed crosses political boundaries connecting several communities by water.

Our shared responsibility

Each and every person who lives, works and plays in the boundaries of the Dowagiac River Watershed has an integral part in determining its future. The Dowagiac River Watershed is unique and valuable. It is our responsibility to protect and preserve the special features in the watershed. There are many things that we can do to help...

- Attend township and city planning and board meetings — important decisions regarding the use of the land are made at these meetings. How we develop land in the watershed will have a great impact on water quality and natural resources.
- Encourage and support development that is planned and takes into consideration the protection of community character, open space and natural resources.

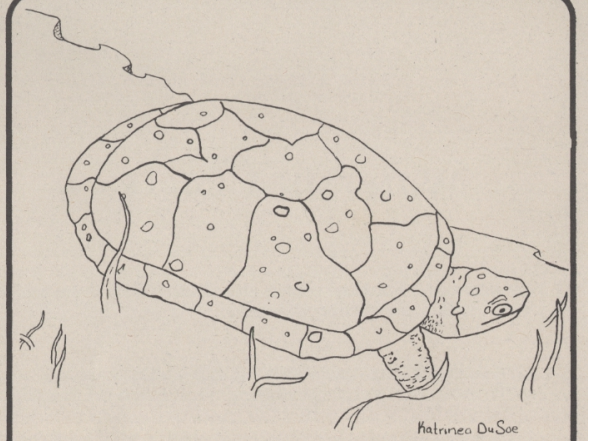
MEANDRS project at Dodd Park Photo © Michael Kucinich

Frank McKaye (shown), and his wife Mildred, placed a conservation easement on their property in Cass County that will permanently prohibit division of their land and protect the natural features of the land forever. Photo by SWMLC

- Dispose of household hazardous wastes properly — call the county MSU extension office for details. Cass: (616) 445-8661, Van Buren: (616) 657-7745.
- Consider placing a conservation easement on your property to protect it forever. Call the Southwest Michigan Land Conservancy for options (616) 324-1600.
- If you are a riparian owner, consider leaving a natural area at least 50 feet wide along streams, ditches, lakes and wetlands. This vegetation will filter and control run-off, provide habitat for wildlife and keep water temperatures cool.
- Be sure to maintain your septic system. Inspect sludge levels every 6 months and pump the tank every 1 to 3 years, depending on your household use.
- Only use fertilizers and pesticides if needed. Have your soil tested to see what kind of fertilizer, if any, is most appropriate. (Call your county conservation district for details).

Marbled Salamander by Dan Ostyn, grade 12. This amphibian is a state threatened species. It is black with silvery crossbands. It is found in the Berrien County portion of the watershed.

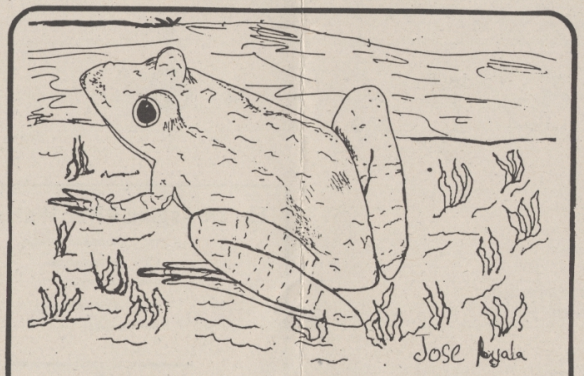
Prairie Trillium by Corey Skorupa, grade 12. This state threatened flower is rarely seen in Michigan but grows frequently in the watershed in Berrien County. Its small upright petals are a maroon color.



Spotted Turtle by Katrinea DuSoe, grade 12. This reptile is listed as special concern in Michigan. It is black with yellow spots. It lives in grassy marshes in the watershed.

COLOR THESE SPECIAL PLANTS AND ANIMALS OF THE DOWAGIAC RIVER WATERSHED

Prairie Vole by Suzanne Sommer, grade 12. This small, mouse-like, state threatened mammal has not been seen in Cass County for 30 years. Most animals that become extinct in an area do so due to a loss of habitat.



Blanchard's Cricket Frog by Jose Ayala, grade 8. This rare amphibian is listed as special concern in Michigan. This small, rough-skinned frog is greenish-brown with hazy, dark stripes on its thigh. It likes sunny, grassy, shallow ponds.

Small Whorled Pogonia by Emily Westendorp, grade 8. It is federally threatened and state endangered. This flower has small white petals enclosed in light green sepals. It is found in the Berrien County portion of the watershed.

Celebrating the 30th Anniversary of Earth Day
April 22, 2000

Watershed Facts

✓A watershed is a drainage basin or area of land that drains into a common marsh, stream, river, lake or groundwater.

✓The Dowagiac River Watershed is 287 square miles in size and encompasses all or part of 16 townships, two cities and two villages.

✓The headwaters of the Dowagiac River are in southern VanBuren County, the river flows through northwestern Cass County, and it joins the St. Joseph River in Berrien County.

✓The Dowagiac River System exhibits cold year-round temperatures and stable year-round flows which make it unique and the only of this caliber in southern Michigan.

✓The Dowagiac River has the potential to rank among the finest trout rivers in the Midwest.

✓The Dowagiac River Watershed contains sensitive animal and plant remnants representative of pre-settlement prairies, wetlands, and forests.

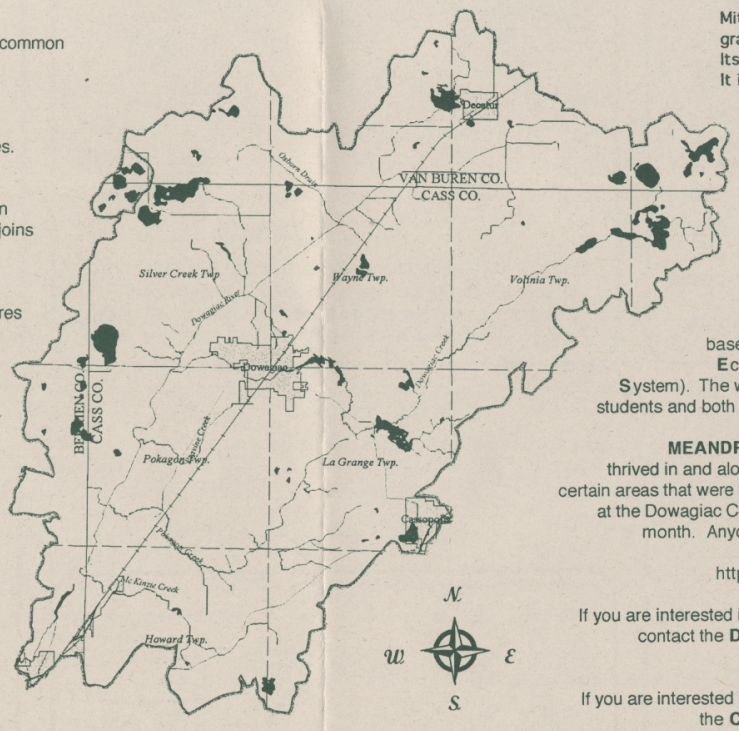
✓The Dowagiac River Watershed is worth protecting. It supplies us with groundwater for drinking; lakes, rivers and streams for recreation; farmland and beautiful natural areas.

✓Our actions throughout the entire watershed will affect the quality and quantity of water in the river and the groundwater.

✓Invasive plants and animals threaten our watershed. Purple Loosestrife, a tall, purplish pink flower is so aggressive that it will crowd out all native plants including cat tails. The zebra mussel is also found here in our inland lakes. These accidentally introduced species have no competition and contribute to a loss of diversity and health in our ecosystem.

✓With the help of Michigan State University, the Dowagiac Union High School biology classes have been participating in "The Purple Loosestrife Project" by raising beetles that will biologically control the loosestrife without harming other plants.

The Dowagiac River Watershed



The Dowagiac River Watershed

- Watershed Boundary
- Urbanized Area
- River/Drain
- Primary Highway
- Railway

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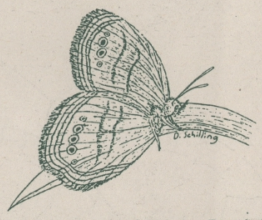
Southwestern Michigan Commission - Jan. 98



Mitchell's Satyr *(Neonympha mitchelli)* by Derek Schilling, grade 8. This butterfly is state and federally endangered. Its color is tan with black dots surrounded by yellow halos. It is found in wetlands in the watershed.

About the Placemat

This student-made, educational placemat is a partnership project between the **Dowagiac Education Association** and the citizen based organization, Partnership for **MEANDRS** (**M**eeting the **E**cological and **A**gricultural **N**eeds within the **D**owagiac **R**iver **S**ystem). The watershed facts were researched by Central Middle School students and both middle and high school art students drew the illustrations.

MEANDRS' focus is to restore the coldwater ecosystems that once thrived in and along the river by reconnecting old meanders and "restoring" certain areas that were historically dredged and straightened. **MEANDRS** meets at the Dowagiac Conservation Club at 7:30pm on the second Tuesday of the month. Anyone interested is invited to attend. Check out MEANDRS' homepage to learn more. http://members.tripod.com/Agusbear/MEANDRS/Index.html

If you are interested in sharing your knowledge of the watershed with students, contact the **Dowagiac Union Schools** and talk to a science teacher. (616) 782-4400

If you are interested in helping to protect surface water or groundwater, contact the **Cass County Conservation District.** (616) 445-8643

If you own land with natural areas and are interested in protecting or preserving its character, contact the **Southwest Michigan Land Conservancy.** (616) 324-1600

The **Dowagiac Education Association** and **MEANDRS** would like to thank all those who made this placemat project possible including the restaurants who voluntarily supported us with its distribution.

Color the special plants and animals on the reverse side.

East Fork Area

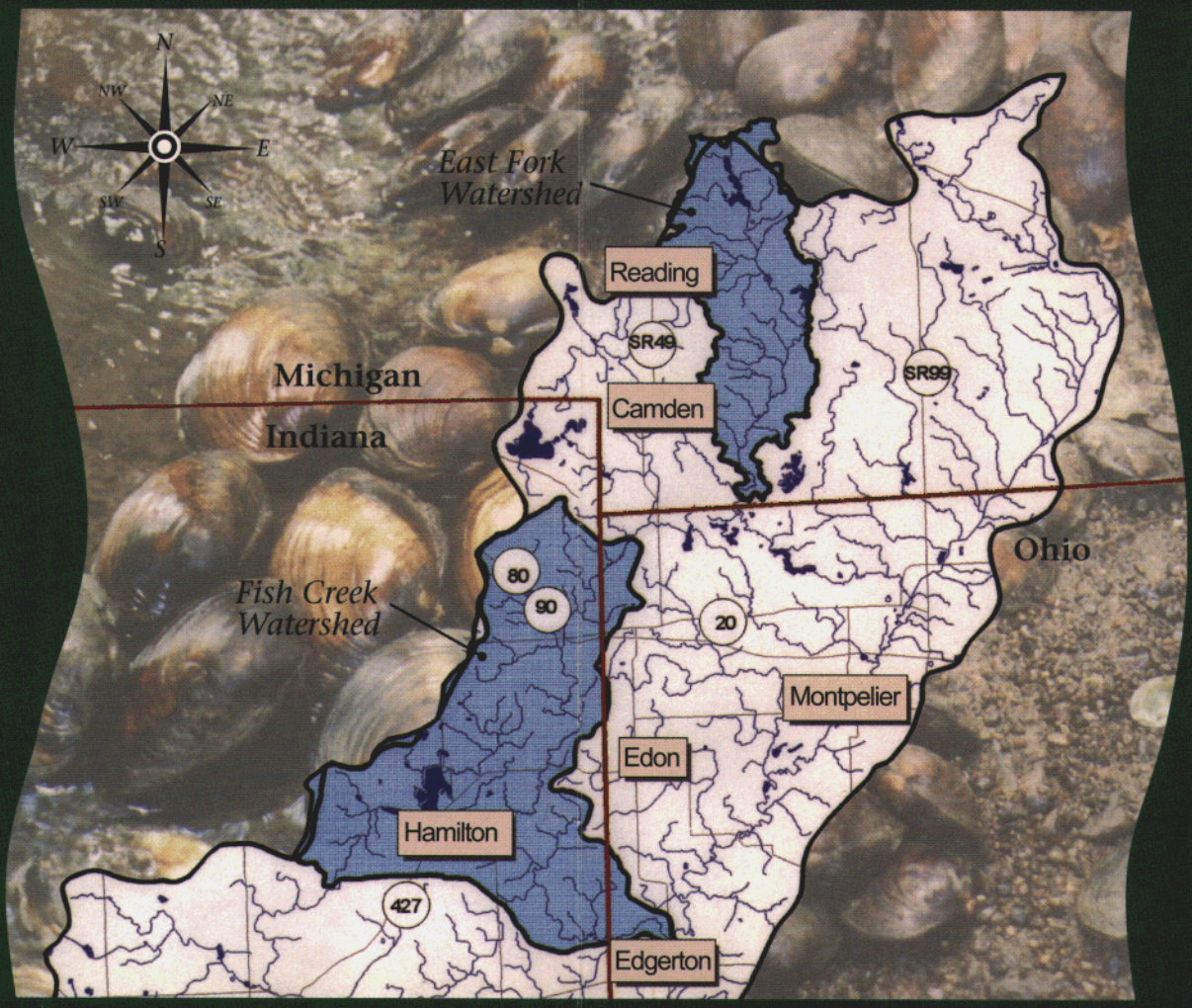
System: The East Fork of the West Branch of the St. Joseph River is very similar to Fish Creek in that it contains a great diversity of fresh water mussels, 15 species, including the federally endangered Cubshell. The East Fork drains approximately 35,000 acres of agricultural land located in Hillsdale County, Michigan.

Stressors: Although the water quality of the East Fork is very good as indicated by the mussels that live there, keeping it clean is the challenge. Sediments and nutrients slowly degrade the habitat and water quality, thus disrupting life cycles of the aquatic organisms. Hydrology alterations change the flow characteristics of the creek, thus destabilizing stream banks and natural flows during dry periods.

Sources of Stress: The sources of stress to the East Fork system are similar to those of Fish Creek and are all derived from use of natural resources within the watershed. The following are, in order of priority, the sources of stress to the quality of East Fork: nonpoint source pollution (soil erosion from exposed agricultural fields, stream bank erosion, livestock operations, and urban land uses); disrupted riparian corridor (the conversion of the forested riparian corridor to cropland); and stream channel dredging, excessive groundwater removal/inadequate ground water recharge.

Strategies: A local Advisory Group is guiding the project and helping to develop strategies. One strategy being used is reforestation of the land along the East Fork to buffer the creek. Additionally The Nature Conservancy is also working with area farmers to fence livestock from sensitive areas along the creek and its tributaries.

Measuring Success: We monitor land use changes such as adoption of conservation tillage and progress of the reforestation of the floodplain. The biological community, including insects, fish and mussels of the creek, is monitored on an annual basis to determine the effectiveness of the project.



Upper St. Joseph River Project Map

Since 1992, The Nature Conservancy has operated a Fish Creek Project office. The Upper St. Joseph River project is a natural expansion of the Nature Conservancy's work in this region. The project area includes Fish Creek and the St. Joseph River upstream from Fish Creek. Recent surveys have identified the East Fork of the West Branch of the St. Joseph River as having a mussel community with near equal quality to Fish Creek. The total project area of the St. Joseph River is more than 350,000 acres. Initially, The Nature Conservancy will focus on Fish Creek and the East Fork of the West Branch reducing the project area to 105,000 acres.

UPPER ST. JOSEPH RIVER NEWS

The Nature Conservancy
1220 North 200 West, Ste G * Angola, Indiana 46703 * (219) 665-9141

The Nature Conservancy
INDIANA CHAPTER
Saving the Last Great Places

July 2000

Since 1992, The Nature Conservancy has operated a Fish Creek Project office in Angola, Indiana. In 1999 we expanded our area of work to include the Upper St. Joseph River Watershed. The project area includes Fish Creek and the St. Joseph River upstream from Fish Creek. Recent surveys have identified the East Fork of the West Branch of the St. Joseph River as having a fish and mussel community with near equal quality to Fish Creek. The total project area of the St. Joseph River is more than 350,000 acres. Initially, The Nature Conservancy will focus on Fish Creek and the East Fork of the West Branch reducing the project area to 105,000 acres.

Upper St. Joseph River Map

The Fish Creek Watershed is approximately 70,000 acres in Steuben and DeKalb counties in Indiana and Williams county in Ohio

The East Fork Watershed is approximately 35,000 acres in Hillsdale County, Michigan

Joe Draper - Field Representative

Joe is the new field representative for the Upper St. Joseph River watershed project and will be replacing Angie O'Neill. He is a recent graduate from Michigan State University with a degree in Agronomy and Soil Sciences and a minor in agri-business management. He has a working knowledge of farming practices and equipment and is excited about working with all of you. Joe is a resident of the area and lives just outside the east fork watershed. He is from Hillsdale County, Michigan, where he helps with the family farm near Osseo. He will be working with area landowners to develop land management practices to stabilize the St. Joseph River watershed. Joe is anxious to meet with all of you and help in any way that he can.

Appendix D

Landowner Contact database examples

Contacts for MNFI Grant

OWNER	ADDRESS	CITY/STATE	ZIP CODE	ACREAGE	Known EO s?	Personal Contact?
ABIGAIL C SCHTEN	14916 DUTCH SETTLEMENT	MARCELLUS MI	49067	95.5+		Y-LP
BARBARA L PENDERGRASS	52185 M-51 NORTH	DOWAGIAC MI	49047	5.1		Y- Member
BARBARA W COOK	24 WOOD RD	NILES MI	49120	140.4		Y- Member
CREATIVE FOAM CORPORATION	PO BOX 238	DOWAGIAC MI	49047	22.3	Y	
DECATUR PUBLIC SCHOOLS	110 CEDAR ST	DECATUR MI	49045	116.9	Y	Y-LP
DOWAGIAC CONSERVATION CLUB	PO BOX 424	DOWAGIAC MI	49047	82.0	Y	Y
GALLUP FARM LLC	5007 W DONNA DR	STEVENSVILLE MI	49127	124.2+	Y	Y
GORDON P PHILLIPS	89861 54TH ST	DECATUR MI	49045	119.7		Y-Member
HARRIETT E HASSLE	89914 62ND ST	DECATUR MI	49045	75.45+	Y	Y-LP
JACK & BETTY BIEK	25340 PEAVINE	CASSOPOLIS MI	49031	21.2		Y-LP
JACK & JULIA THOMAS	53992 RUDY RD	DOWAGIAC MI	49047	28.9	Y	Y-LP
JOAN L WESTRATE TRUST	21406 MC KENZIE ST	CASSOPOLIS MI	49031	46.3+	Y	Y- Past Board Member
JOSEPH & JOYCE SCHERER	59105 CHAMPLAIN RD	DOWAGIAC MI	49047	76.2		Y- LP
JOSEPH A & HARRIETT HASSLE	28230 ELM ST	DOWAGIAC MI	49047	160+		Y-LP
MARK HARRISON	PO BOX 4144	EAU CLAIRE MI	49111	103.0		Y-LP
MILDRED E MC KAYE TRUST	20525 DECATUR ST	CASSOPOLIS MI	49031	127.0		Y-Protected
NELADENE WARD LIFE ESTATE	30078 ALLEN RD	DOWAGIAC MI	49047	48.0	Y	Y
RICHARD L AFFRISEO TRUST	PO BOX 655	DOWAGIAC MI	49047	6.0	Y	Y
RONALD E & EVELYN M BAKEMAN	55504 CALIFORNIA RD	DOWAGIAC MI	49047	47.0		Y
SAMUEL & JOSEPHINE MILLER	6 M 51 S	DOWAGIAC MI	49047	94.0		Y-Member
SAMUEL & MARJORIE C HANSEN	30170 BEESON ST	DOWAGIAC MI	49047	47.7		Y-LP
WILLIAM H JEWELL TRUST	603 GREEN ST	DOWAGIAC MI	49047	107.3+	Y	Y
WILLIAM R LOWE	27296 SWAMP ST	DOWAGIAC MI	49047	3.2+	Y	Y

LP = Interest in Land Protection

Appendix E

Upper St. Joseph River Watershed Strategic Plan
(Table of Contents)

DRAFT

UPPER ST. JOSEPH RIVER PROJECT

STRATEGIC PLAN

Prepared by:

The Nature Conservancy

February 10, 2000

TABLE OF CONTENTS

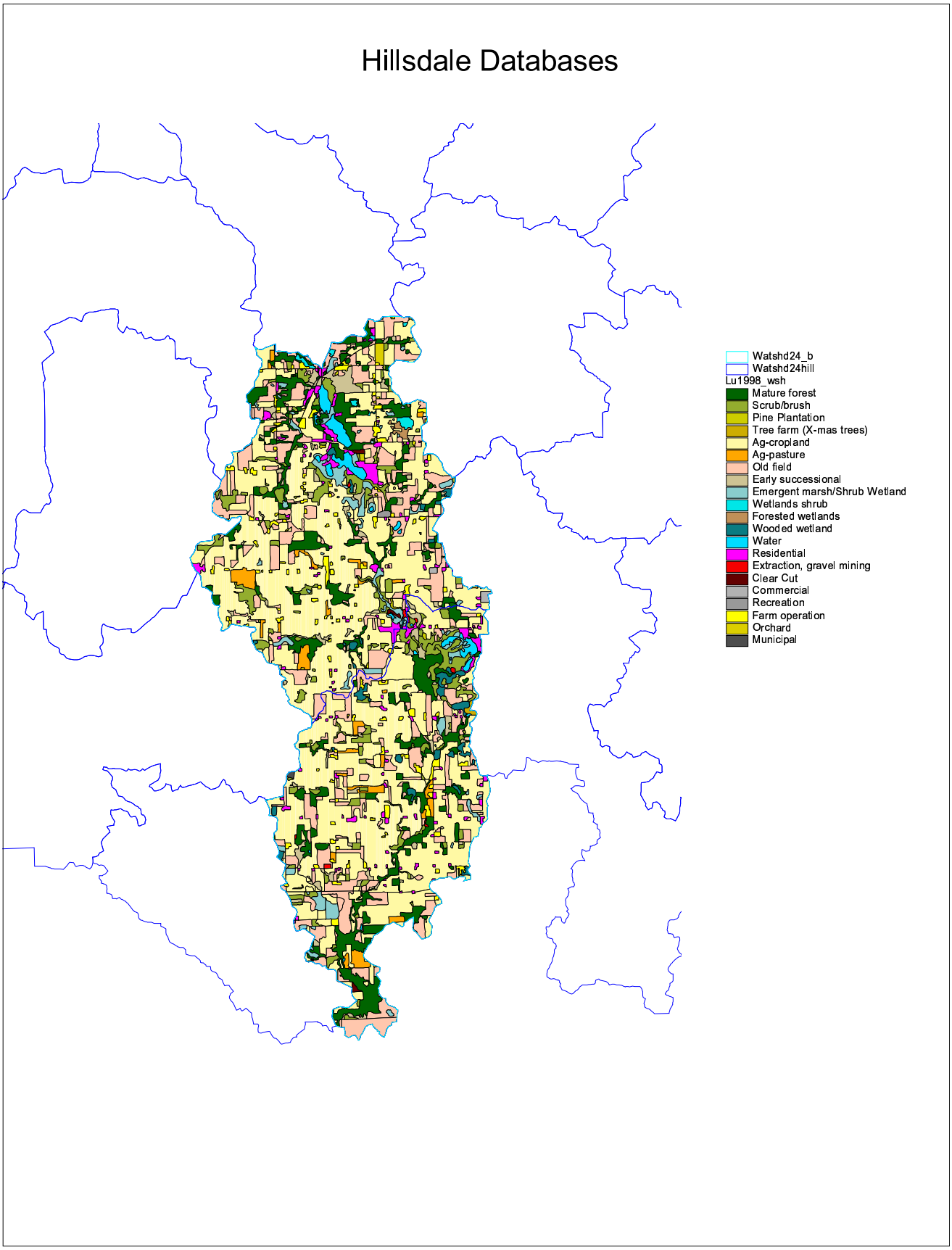
INTRODUCTION

The Upper St. Joseph River systems (Figure 1) supports what is probably the most diverse community of naiad mussels, fish and associate fauna in the Great Lakes Basin. Beginning as a series of first order tributaries in southeastern Michigan, northeastern Indiana and adjacent Ohio and terminating at the confluence of the Fish Creek and the St. Joseph River (of the Maumee River), the 350,000 acre project area supports populations of at least four Federally imperiled species. Perhaps the best known species, the Federally endangered White Cat's Paw Pearly Mussel (*Epioblasma obliquata perobliqua*), survives only within the project area (The purple catspaw pearly mussel - *Epioblasma. o. obliqua* - the only other subspecies, is also endangered and likewise reduced to a single population in southeast Ohio). The Upper St. Joseph also supports three other aquatic federally imperiled species, the endangered Clubshell pearly mussel (*Pleurobema clava*), the endangered Northern Riffleshell pearly mussel, (*Epioblasma rangiana*), and the threatened Copperbelly water snake (*Nerodia erythrogaster neglecta*). The endangered Indiana bat is also very likely to use riparian forests associated with the river, but no systematic surveys have been completed for this species. The river also supports nine additional mussel species considered imperiled in at least one of the three states.

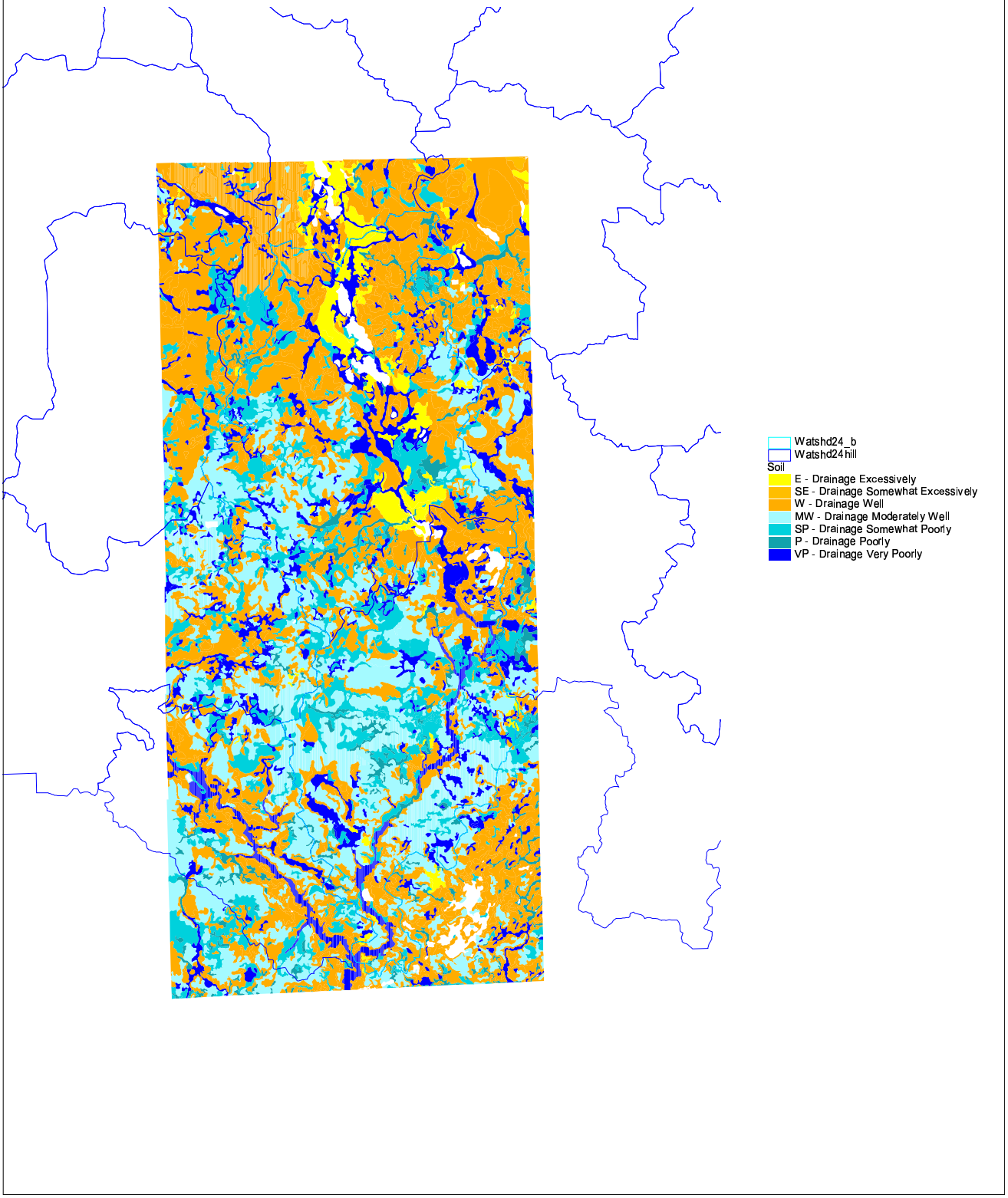
Three key features of the system have doubtlessly contributed to the outstanding aquatic community that still resides in the Upper St. Joseph. First, the system flows through a largely agricultural landscape, and has escaped point-source pollution associated with more urban and industrial watersheds. Secondly, much of the riparian forested corridor is still intact within key reaches of the river, protecting and sheltering the stream from many disturbances associated with agriculture. But perhaps most importantly, the glacial geology, especially deep deposits of glacial till and outwash, provide an abundant discharge of clean cool groundwater which has moderated the negative impacts of human activities in certain reaches of the river. In fact, the most important reaches of the system from a biological standpoint are precisely located in areas where the surrounding glacial topography reaches up to 50 feet in relative relief, and groundwater discharges into the river are conspicuous.

Appendix F

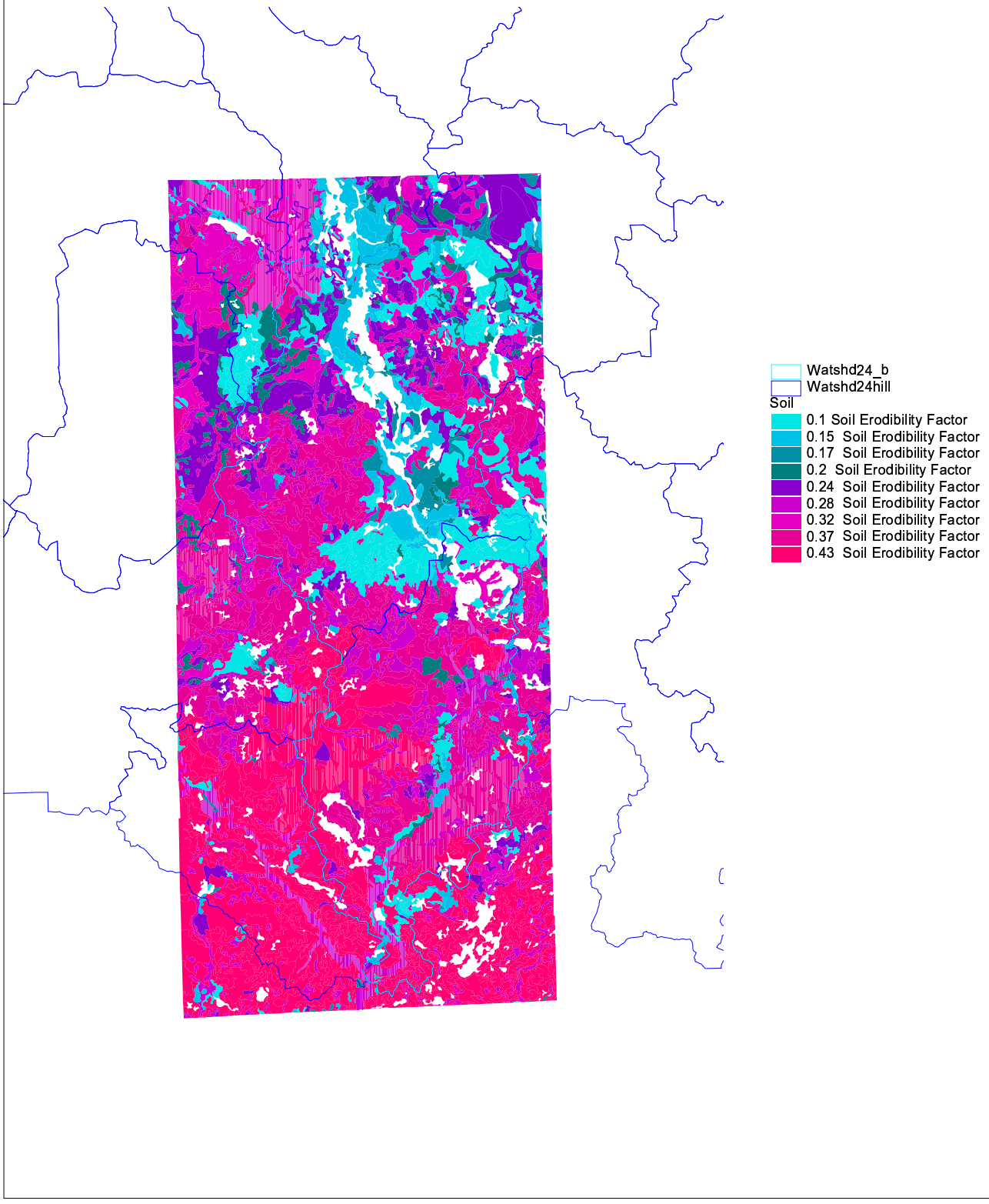
Maps



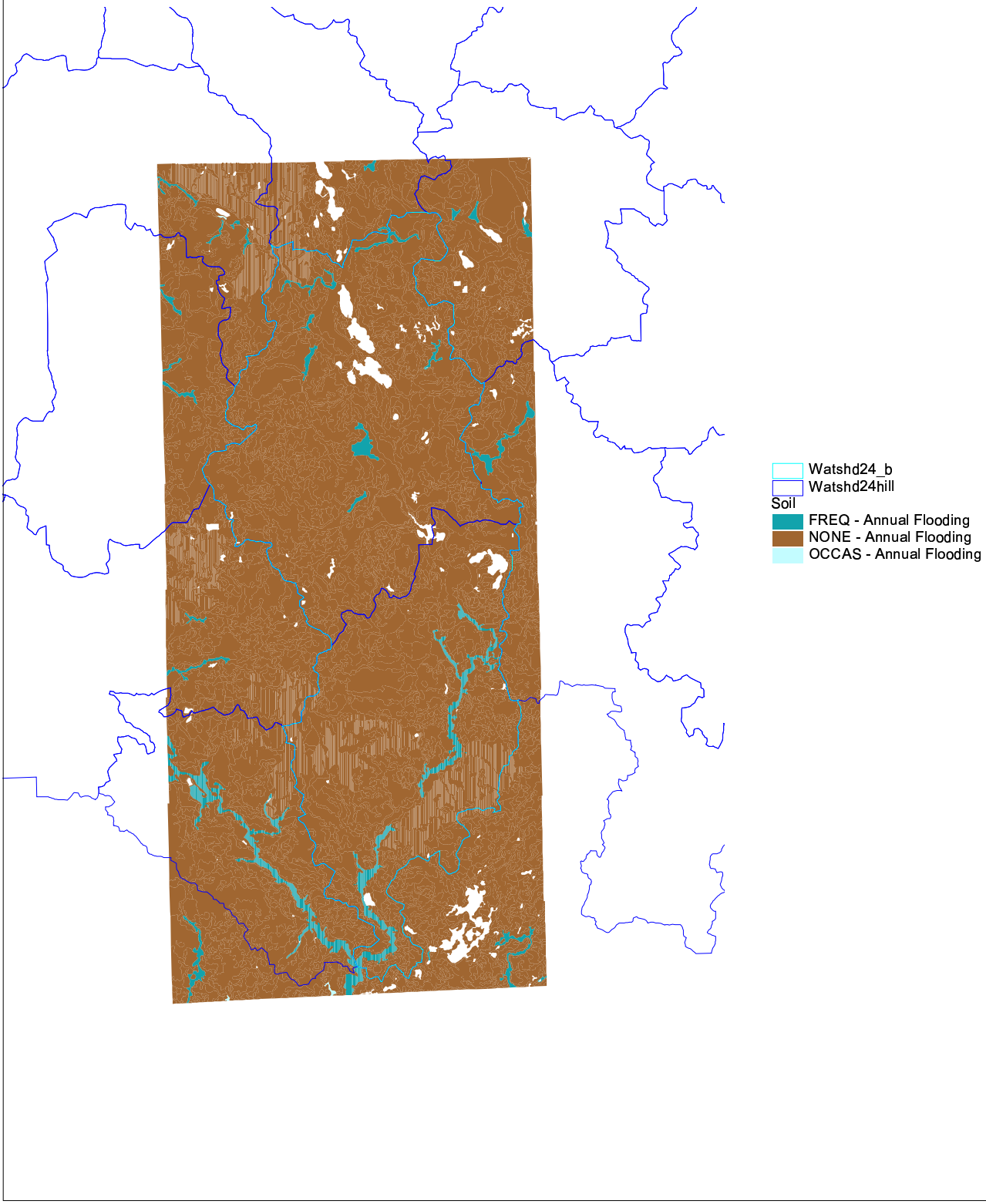
Hillsdale Databases

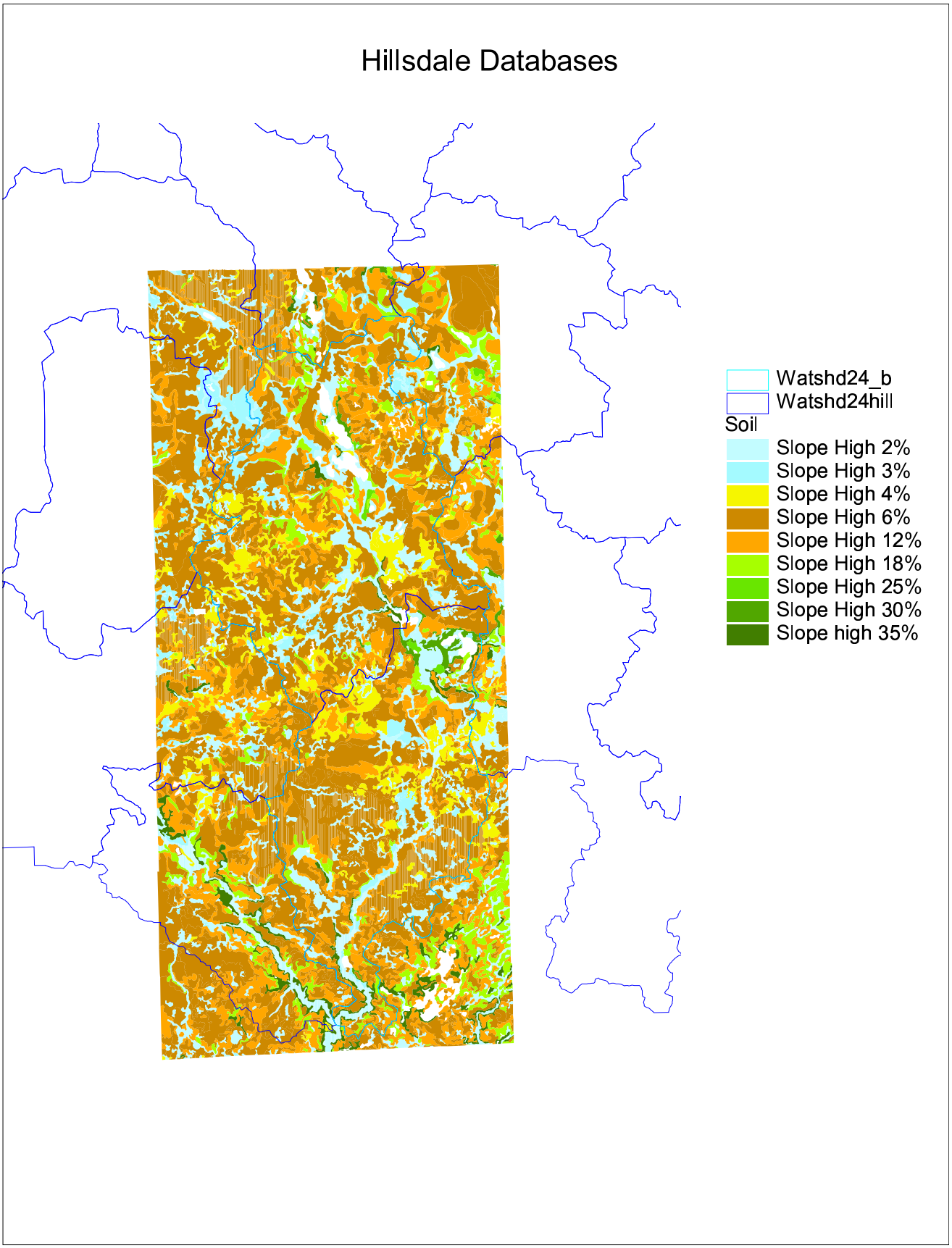


Hillsdale Databases

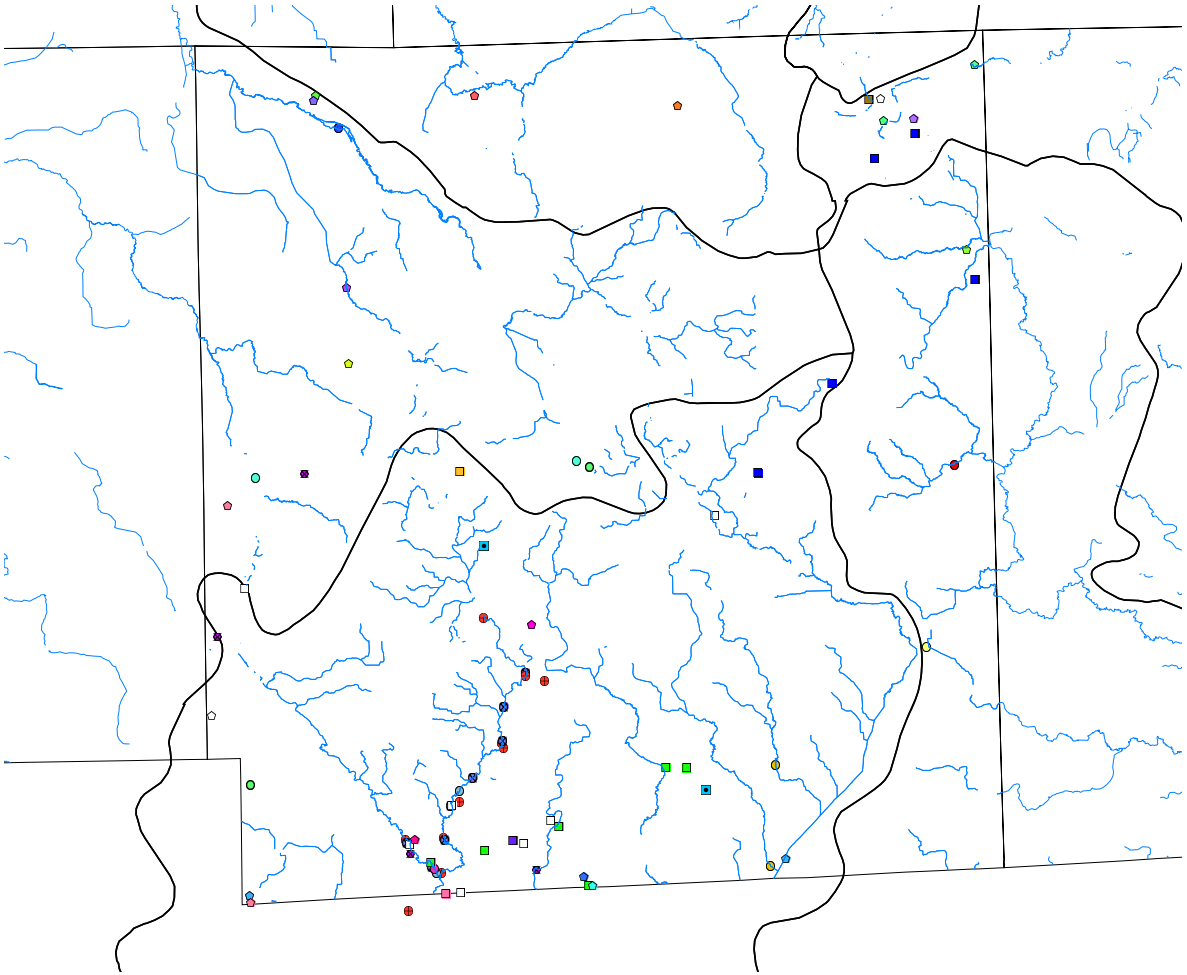


Hillsdale Databases

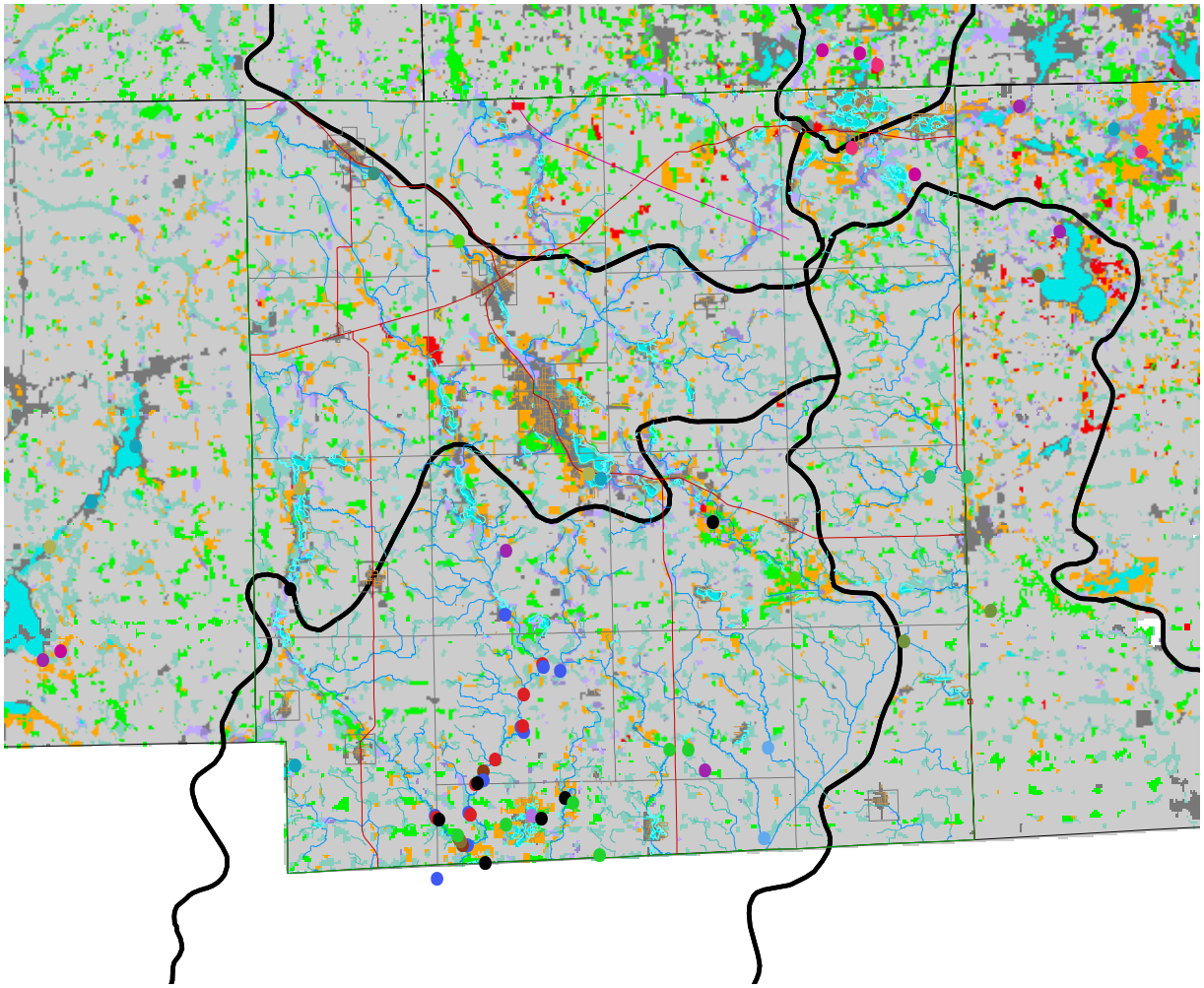




Element Occurences in Hillsdale County



St. Joseph River Watershed - Hillsdale Co.



Legend

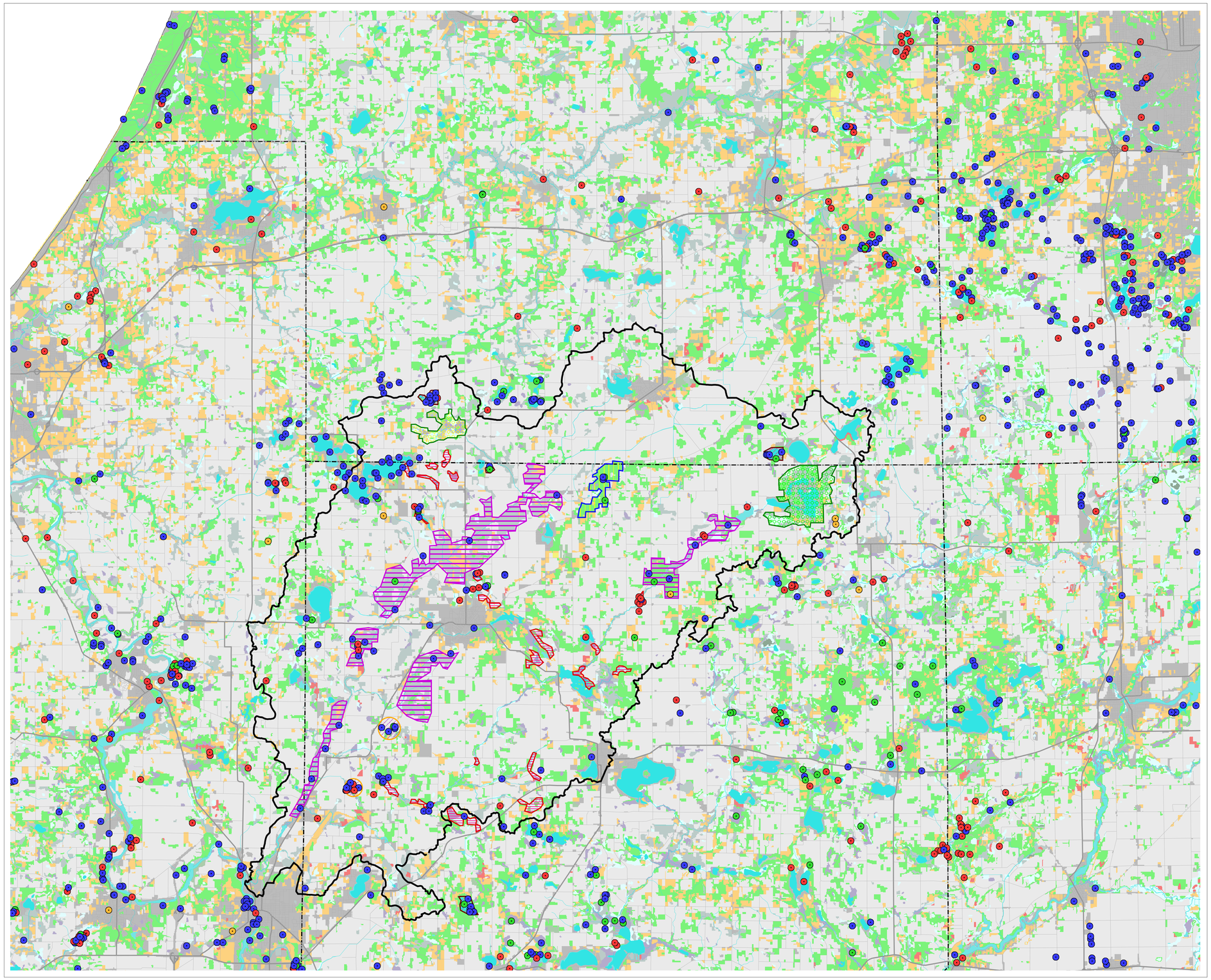
Bcd_x ImageLu1978erp_g

- ALKALINE SHRUB/HERB FEN MIDWEST TYPE
- Bigeye chub
- Blanchard's cricket frog
- Blanding's turtle
- Brindled madtom
- Clubshell
- Copperbelly water snake
- Creek chubsucker
- Eastern massasauga
- Indiana bat or indiana myotis
- Orangethroat darter
- Pugnose shiner
- Redside dace
- Silver shiner
- Smallmouth salamander
- Starhead topminnow
- Wavyrayed lampmussel

0.5 0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5 5.5 6 6.5 7 7.5 8 8.5 9 9.5 10 10.5 11 Miles

N
W E
S

Dowagiac River Watershed
Potential and High Quality Sites



Legend

Element Occurrences
- Animal
- Plant
- Community
- Other
- bog
- Upland Forest
- Complex
- Coastal Plain Marsh
- Prairie
- Floodplain forest
- Prairie fen
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- Rd100min_lp
- Rd100maj_lp

Landuse 1978 (Lighter Backdrop Shade)
- Urban/Industrial
- Agriculture
- Upland Savanna/Grassland
- Upland Deciduous
- Wetland Deciduous
- Aspen/Birch
- Wetland Conifer
- Upland Conifer
- Tree Plantation
- Water
- Shrub Swamp
- Wet Prairie/Marsh
- Barren
- No Data

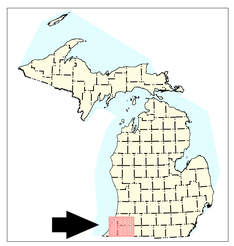
Scale

1:100000

0 1 2 3 4 5 Miles

N

Area Location in Michigan



John Paskus
Michigan Natural Features Inventory
Lansing, Michigan

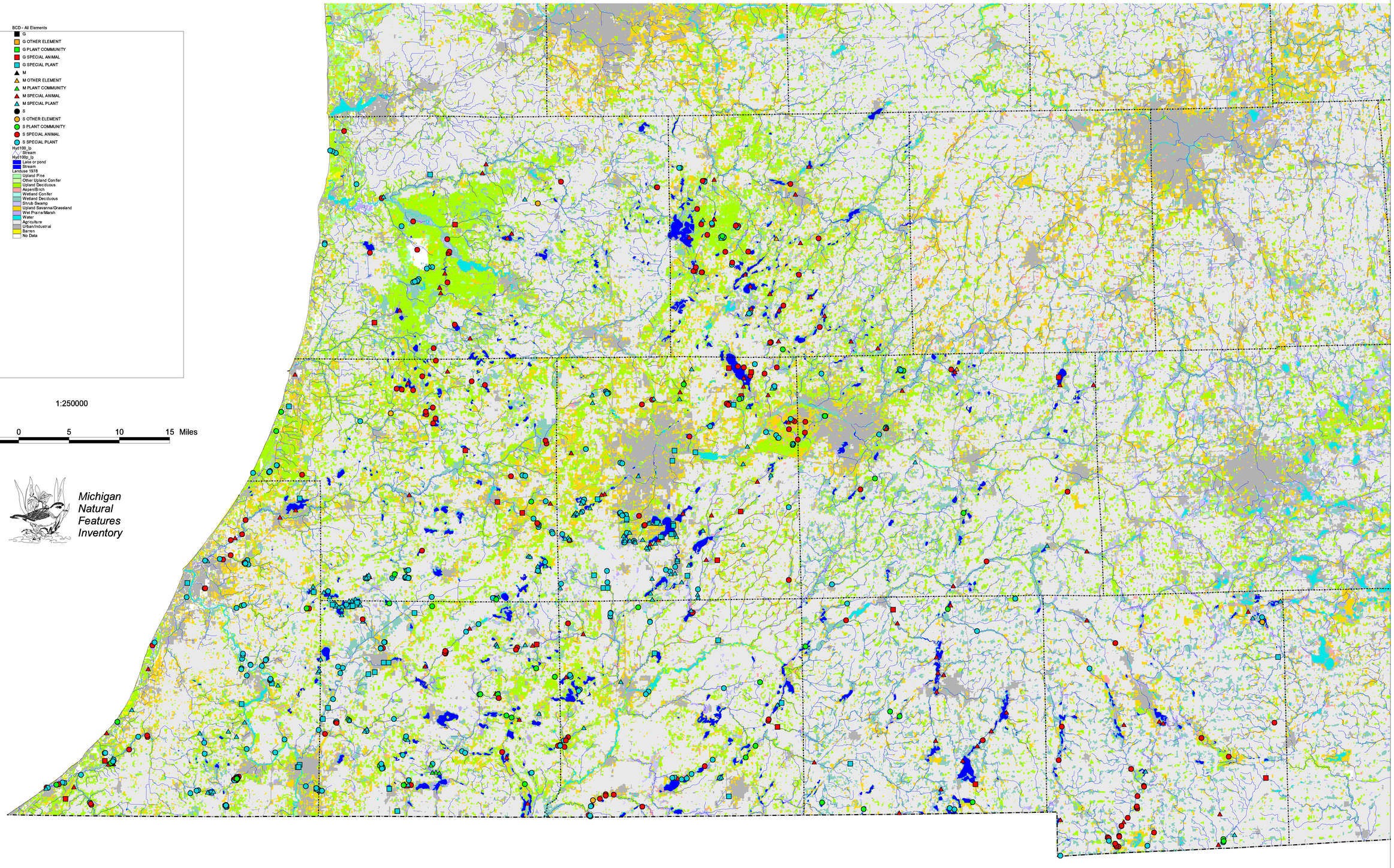
WORKING DRAFT MAP
Produced 2000 Aug. 03

Michigan Natural Features Inventory

MICHIGAN STATE UNIVERSITY EXTENSION

Michigan DNR Wildlife

Element Occurrences for Selected Counties
Michigan Natural Features Inventory
Selected Counties: Allegan, Barry, Berrien, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, St. Joseph, and Van Buren



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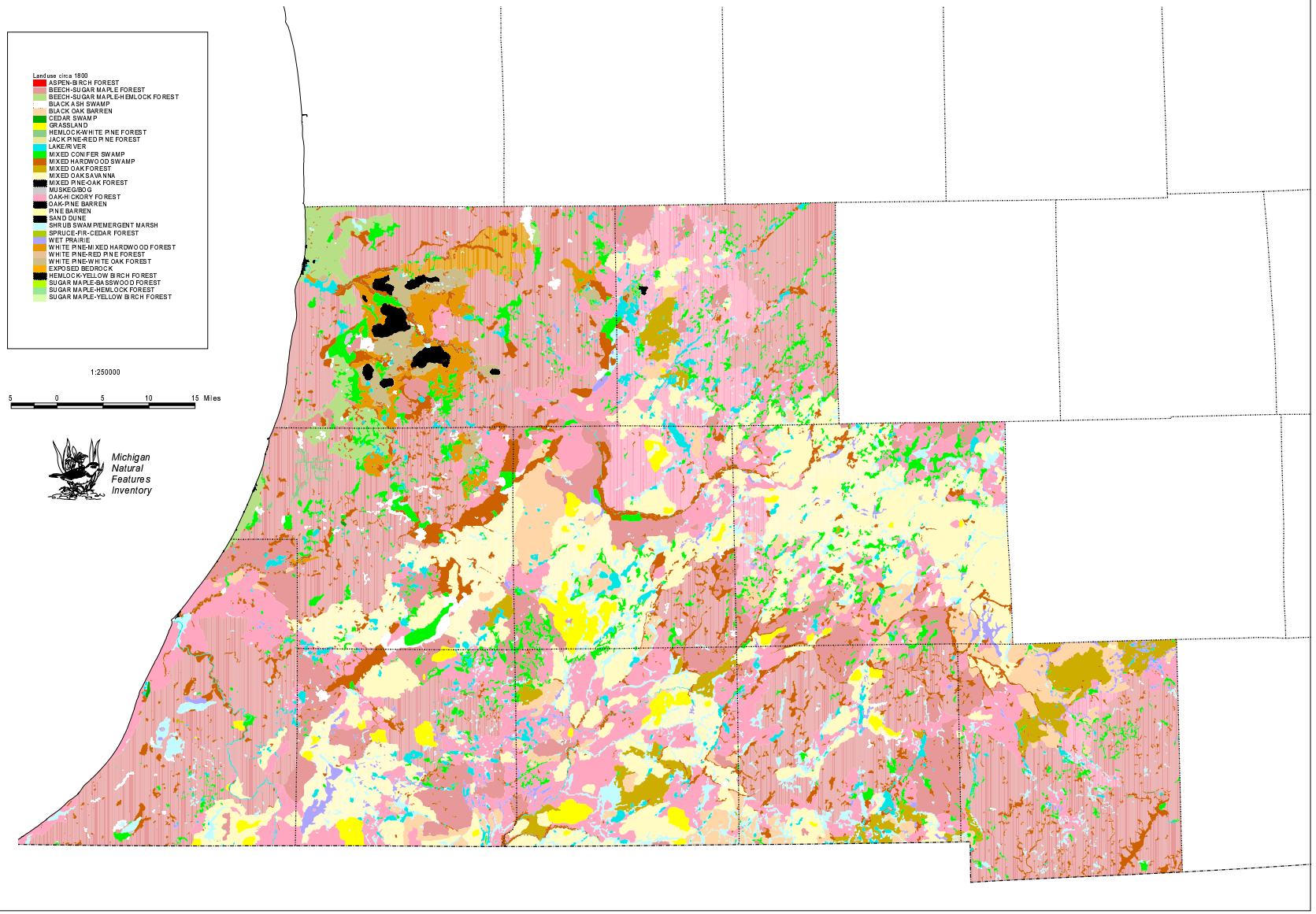
Michigan Natural Features Inventory

Element Occurrences for Selected Counties
Michigan Natural Features Inventory
Selected Counties: Allegan, Barry, Berrien, Branch, Calhoun, Cass,
Hillsdale, Kalamazoo, St. Joseph, and Van Buren



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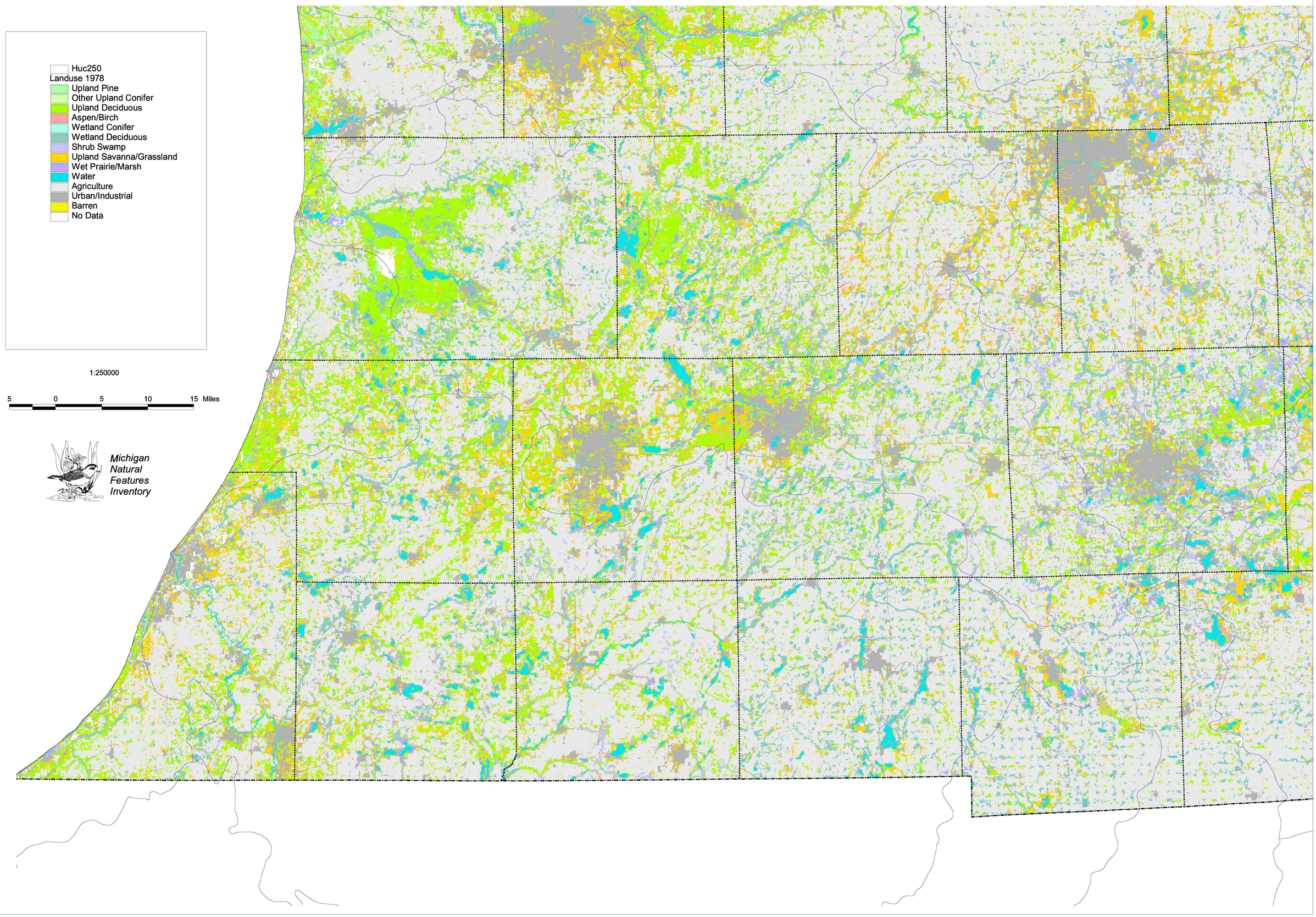

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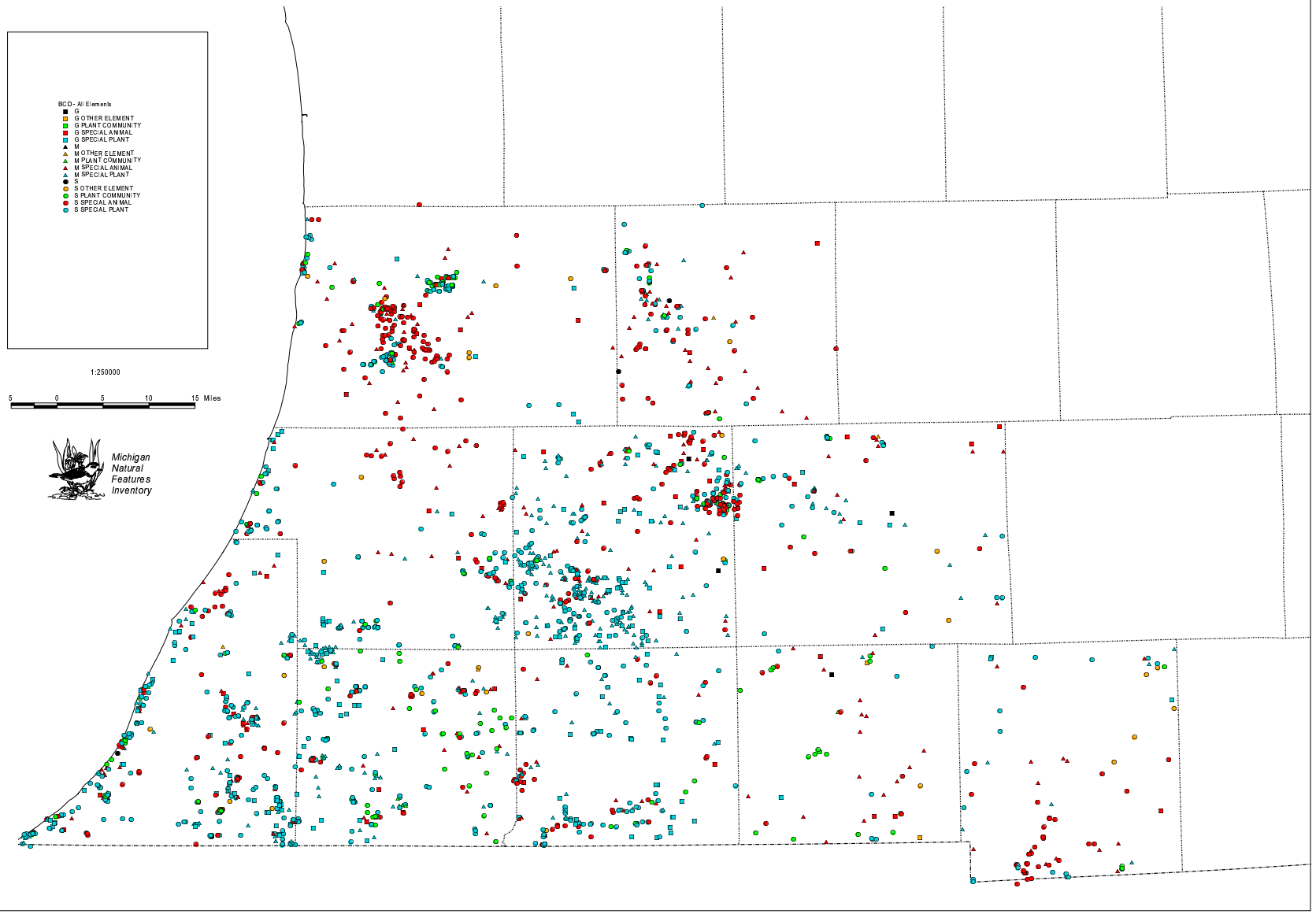

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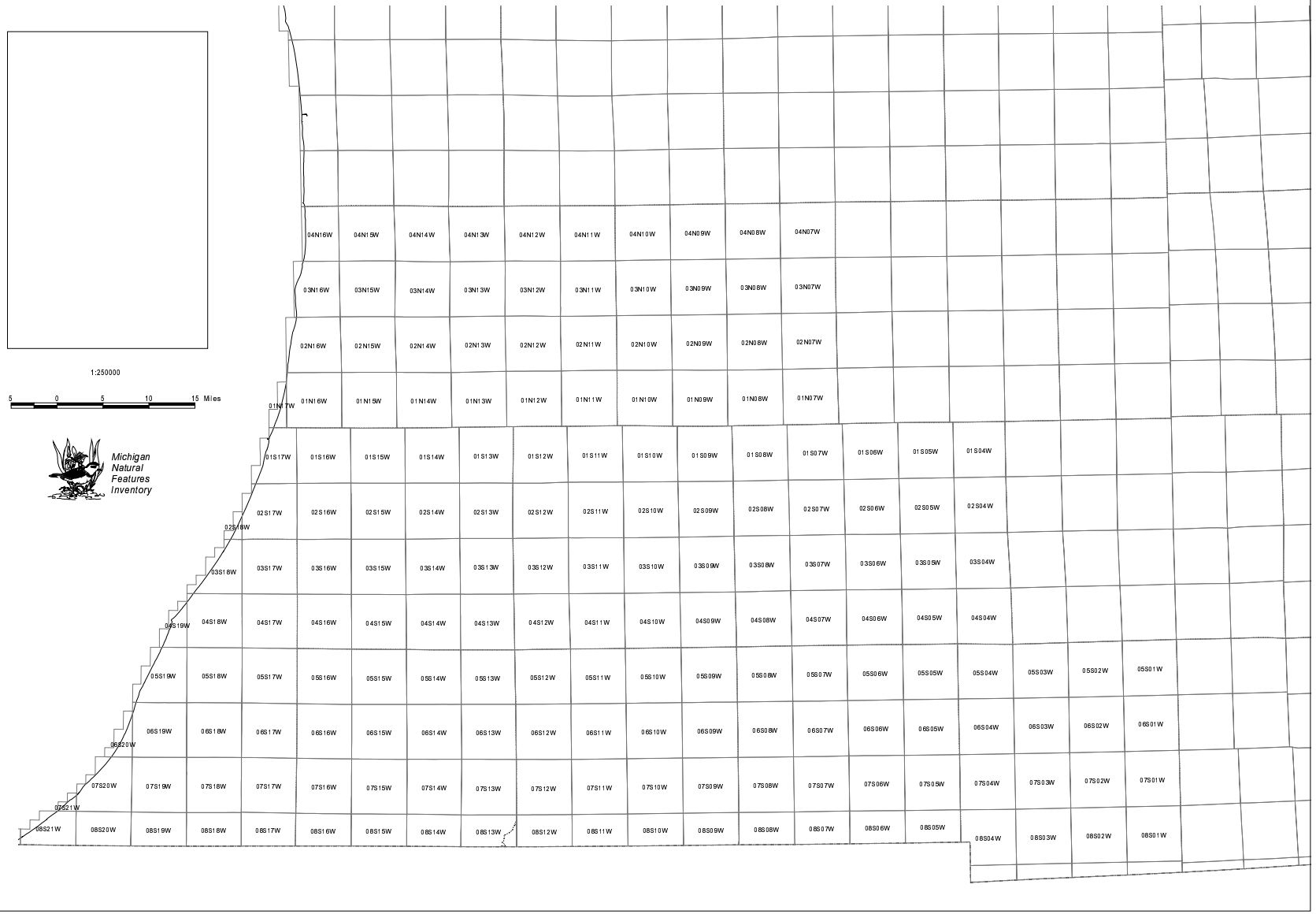
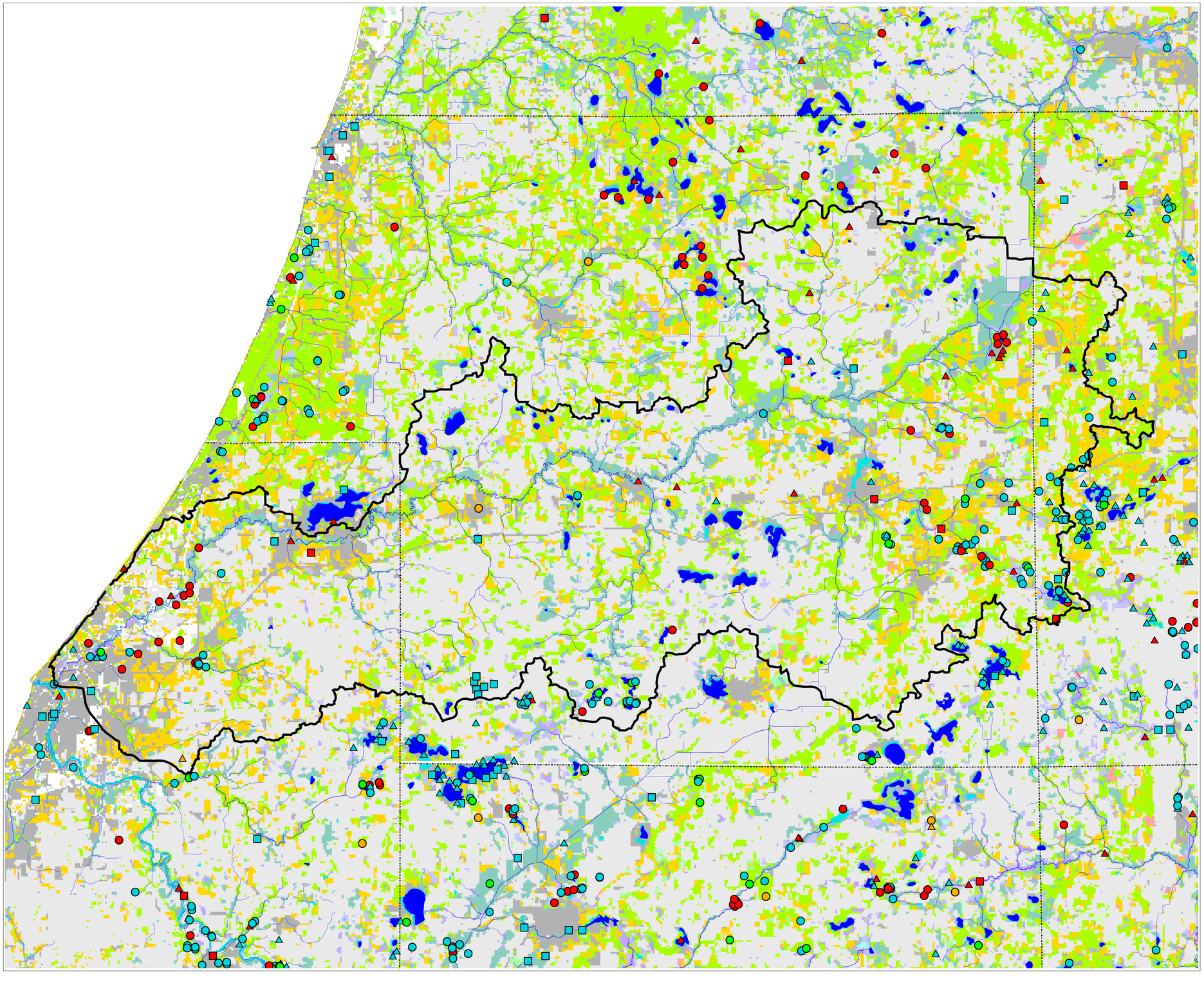


Paw Paw River Watershed with 1978 Landcover
Michigan Natural Features Inventory



Paw Paw Watershed

Element Occurences
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- G OTHER ELEMENT
- G PLANT COMMUNITY
- G SPECIAL ANIMAL
- G SPECIAL PLANT
- M
- M OTHER ELEMENT
- M PLANT COMMUNITY
- M SPECIAL ANIMAL
- M SPECIAL PLANT
- S
- S OTHER ELEMENT
- S PLANT COMMUNITY
- S SPECIAL ANIMAL
- S SPECIAL PLANT
- Lakes, rivers, streams

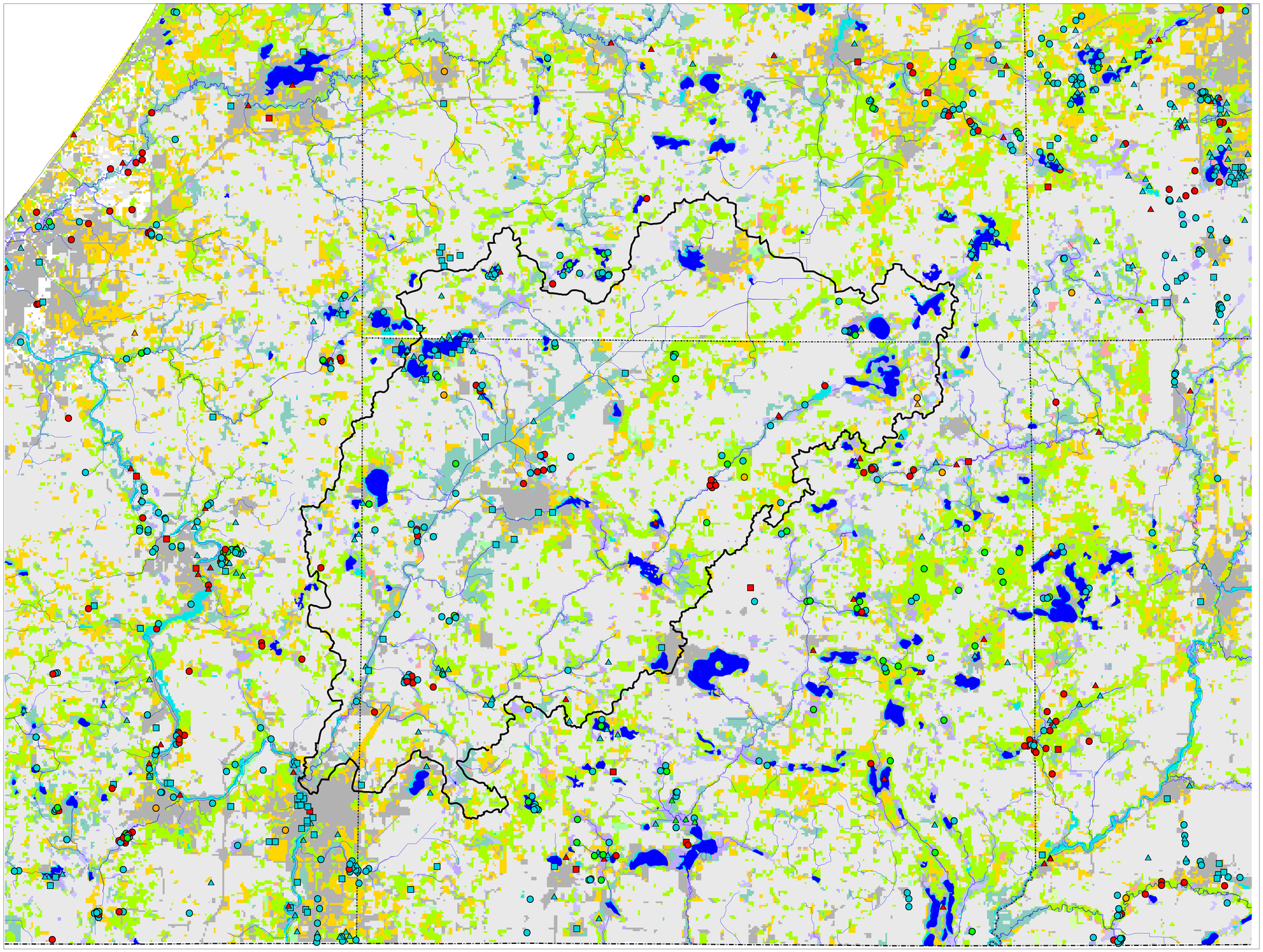
Landuse 1978
- Upland Pine
- Other Upland Conifer
- Upland Deciduous
- Aspen/Birch
- Wetland Conifer
- Wetland Deciduous
- Shrub Swamp
- Upland Savanna/Grassland
- Wet Prairie/Marsh
- Water
- Agriculture
- Urban/Industrial
- Barren
- No Data

1:100000

2 0 2 4 Miles

Michigan Natural Features Inventory

Element Occurrences for Dowagiac Watershed
Michigan Natural Features Inventory



Element Occurrences
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- G OTHER ELEMENT
- G PLANT COMMUNITY
- G SPECIAL ANIMAL
- G SPECIAL PLANT
- M
- M OTHER ELEMENT
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- M SPECIAL PLANT
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- S PLANT COMMUNITY
- S SPECIAL ANIMAL
- S SPECIAL PLANT
- Watshd24dowag_d.shp

Landuse 1978
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- Other Upland Conifer
- Upland Deciduous
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- Wetland Conifer
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- Shrub Swamp
- Upland Savanna/Grassland
- Wet Prairie/Marsh
- Water
- Agriculture
- Urban/Industrial
- Barren
- No Data

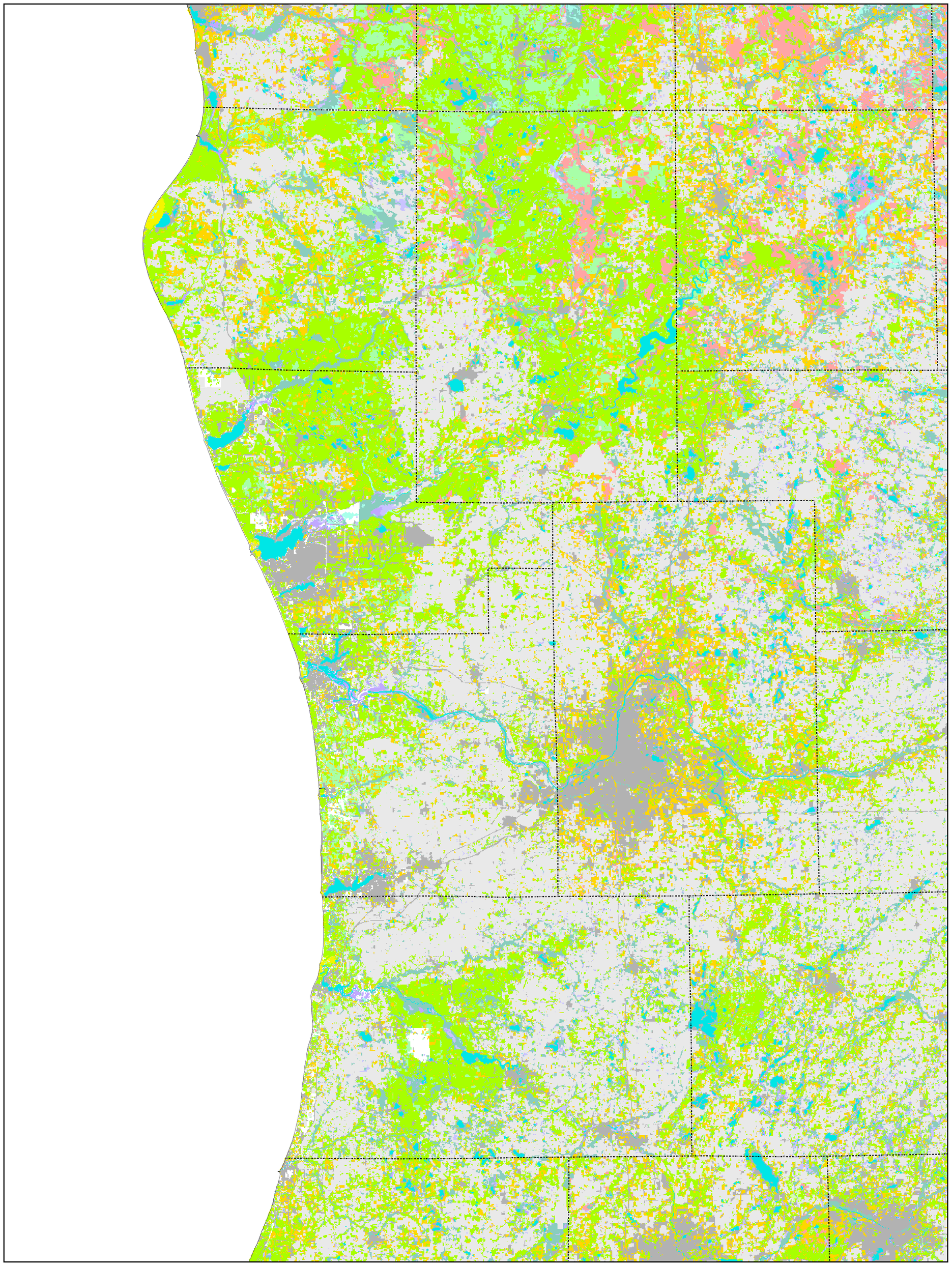
1:100000

1:100000

2 0 2 4 Miles

Michigan Natural Features Inventory

Element Occurrances for Selected Counties
Michigan Natural Features Inventory
Selected Counties: Allegan, Kent, Muskegon, Newaygo, Oceana, and Ottawa



Landuse 1978
- Upland Pine
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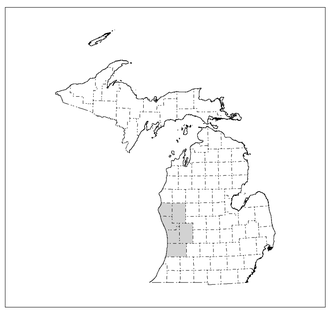
- Upland Deciduous
- Aspen/Birch
- Wetland Conifer
- Wetland Deciduous
- Shrub Swamp
- Upland Savanna/Grassland
- Wet Prairie/Marsh
- Water
- Agriculture
- Urban/Industrial
- Barren
- No Data

1:250000

5 0 5 10 15 Miles



Michigan Natural Features Inventory

Element Occurrences for Selected Counties
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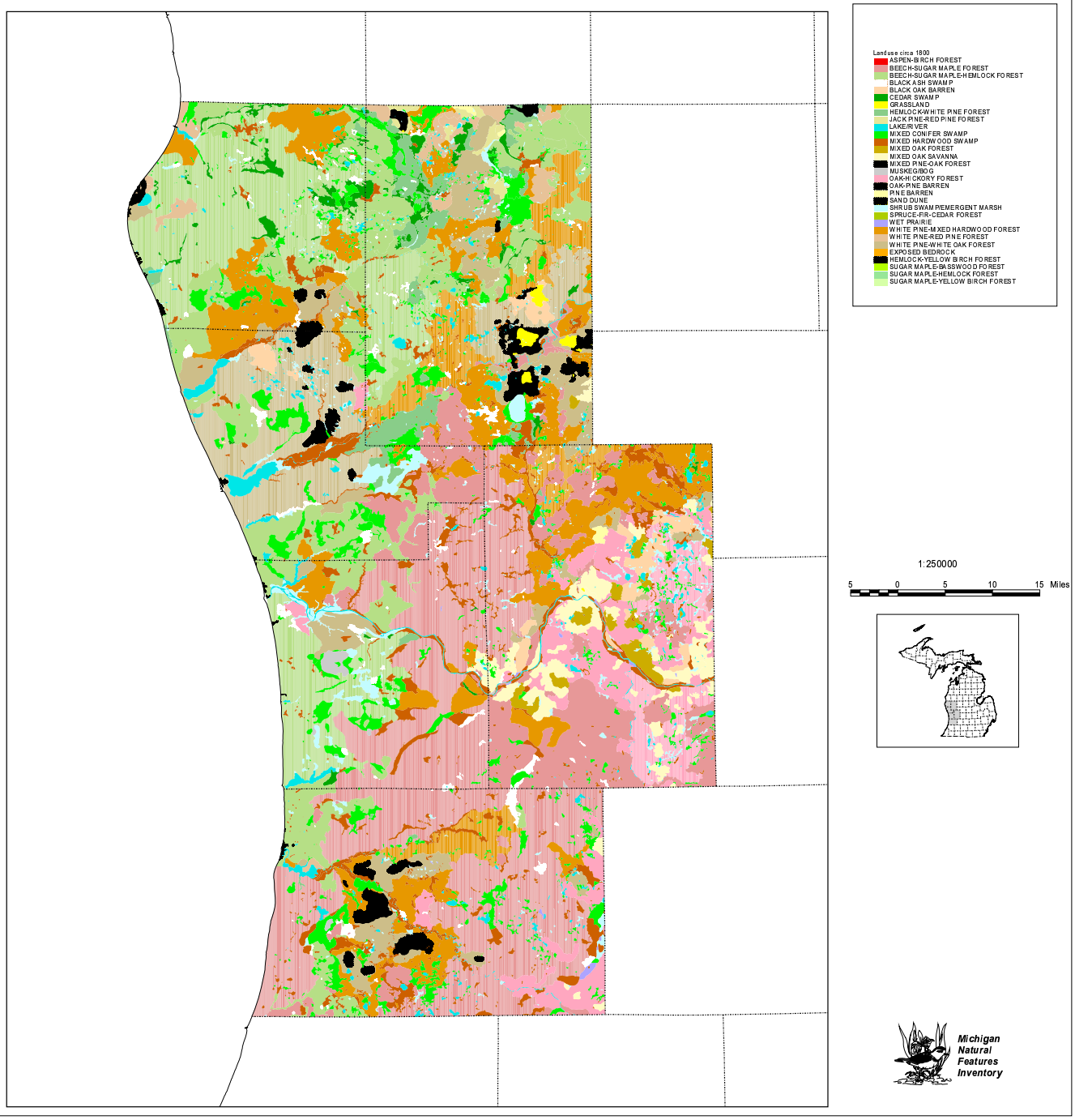
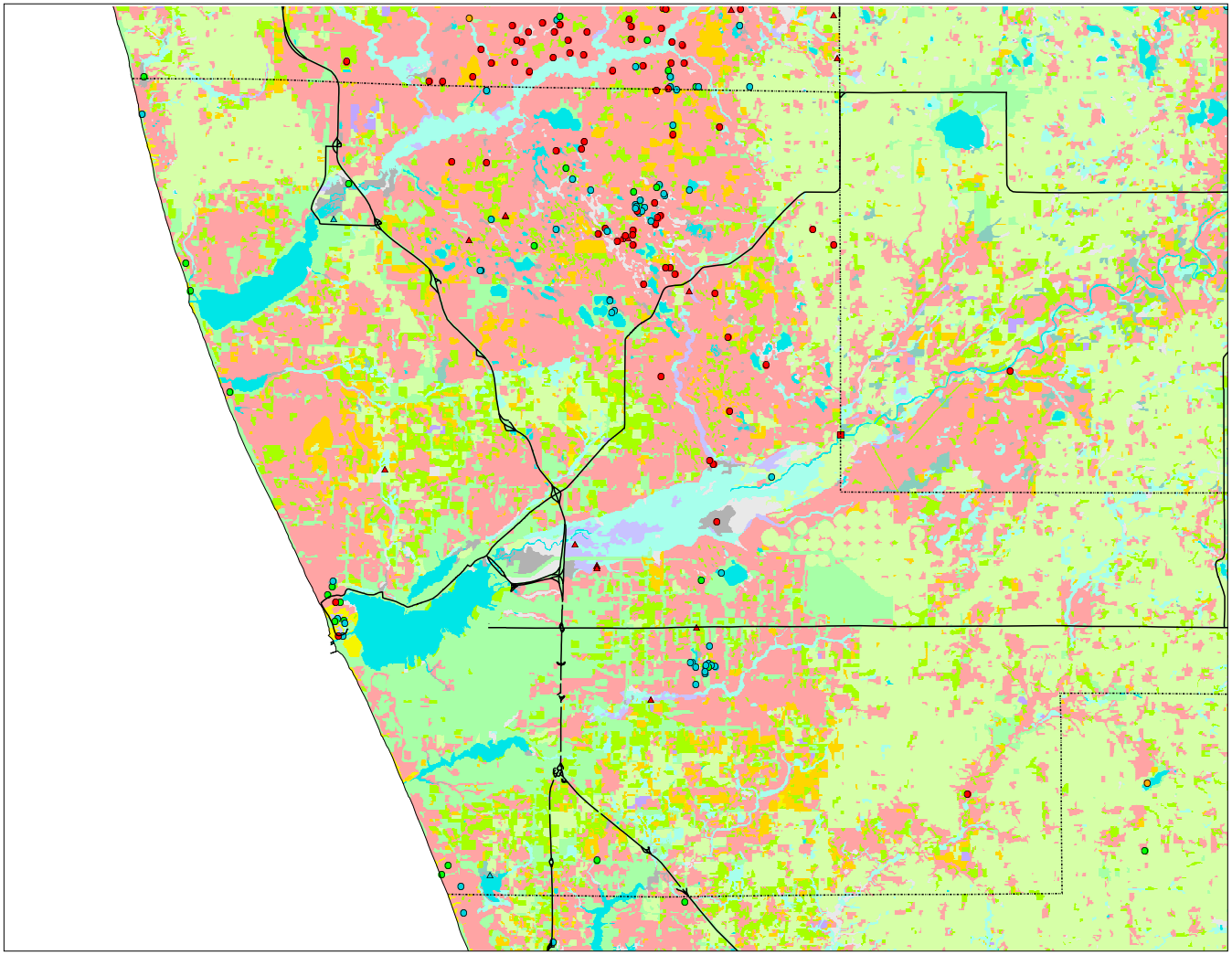


Muskgeon County
Element Occurrences >=1980 - 1978 Land Cover



Rd100maj_lp
BCD - All Elements
- G
- G OTHER ELEMENT
- G PLANT COMMUNITY
- G SPECIAL ANIMAL
- G SPECIAL PLANT
- M
- M OTHER ELEMENT
- M PLANT COMMUNITY
- M SPECIAL ANIMAL
- M SPECIAL PLANT
- S
- S OTHER ELEMENT
- S PLANT COMMUNITY
- S SPECIAL ANIMAL
- S SPECIAL PLANT

Landuse 1978
- Upland Pine
- Other Upland Conifer
- Upland Deciduous
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1:100000

2 0 2 4 Miles

Michigan Natural Features Inventory

Element Occurrences for Selected Counties
Michigan Natural Features Inventory
Selected Counties: Allegan, Kent, Muskegon,
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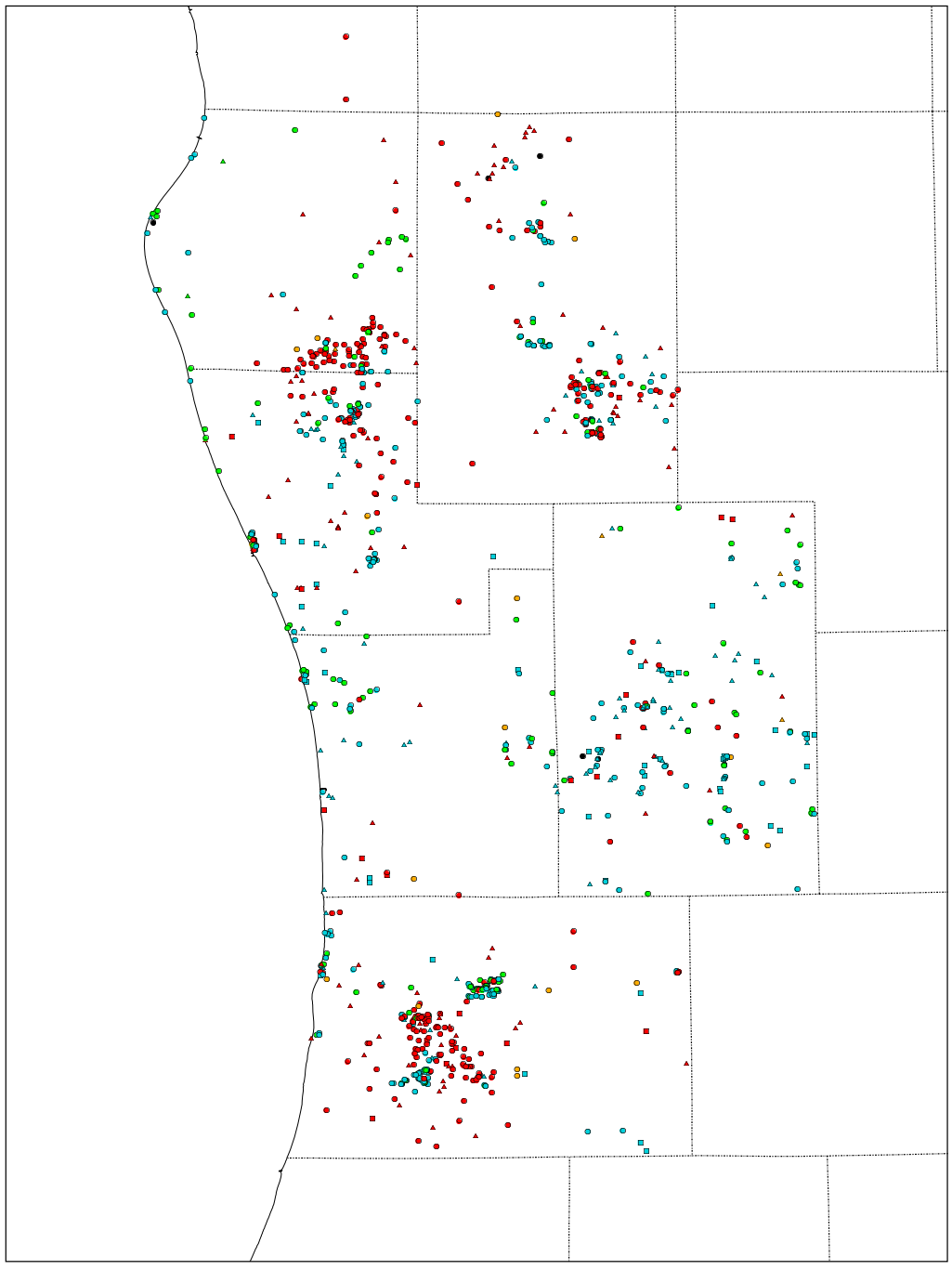

Element Occurrences for Selected Counties
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Selected Counties: Allegan, Kent, Muskegon,
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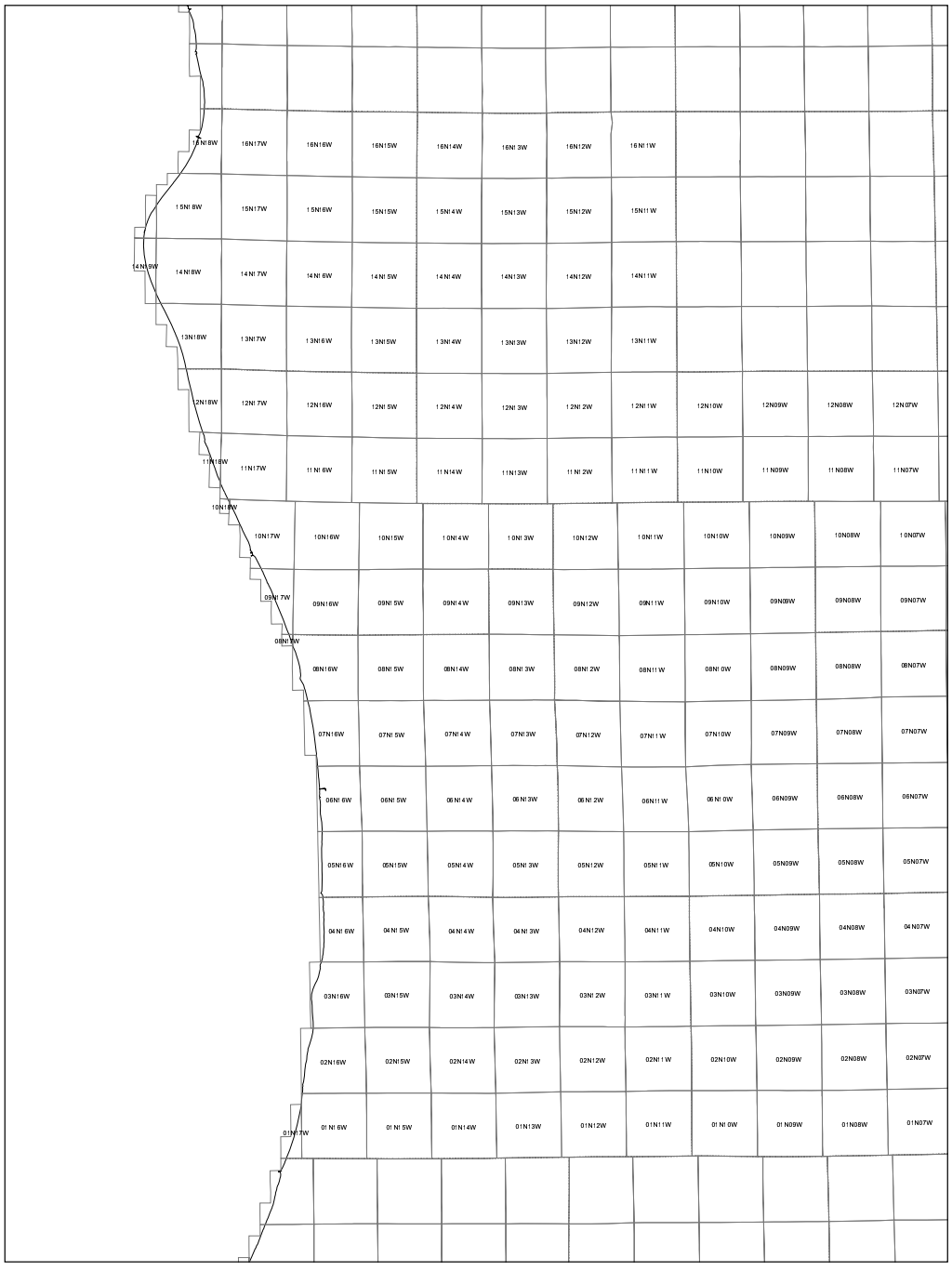

1:250000

5 0 5 10 15 Miles

Michigan
Natural
Features
Inventory

Appendix G

Element Occurrence Tables

SWMLC Element Occurence Table (Example)

sorted by county

CO_COMM	COUNT
Allegan	10
Allegan ALKALINE SHOREDUNES POND/MARSH GREAT LAKES TYPE	1
Allegan ALKALINE SHRUB/HERB FEN MIDWEST TYPE	1
Allegan ALKALINE TALLGRASS PRAIRIE MIDWEST TYPE	5
Allegan Appalachian quillwort	1
Allegan Atlantic blue-eyed-grass	4
Allegan BEACH/SHOREDUNES GREAT LAKES TYPE	1
Allegan Bald eagle	3
Allegan Bald-rush	3
Allegan Bastard pennyroyal	1
Allegan Black buffalo	2
Allegan Black maple (acer nigrum)	1
Allegan Black rat snake	2
Allegan Black redhorse	2
Allegan Black-fruited spike-rush	10
Allegan Blanchard's cricket frog	3
Allegan Blanding's turtle	1
Allegan Carey's smartweed	1
Allegan Common loon	1
Allegan Creek chubsucker	1
Allegan Cross-leaved milkwort	4
Allegan Culvers root borer	1
Allegan Cut-leaved water-parsnip	1
Allegan DRY SAND PRAIRIE MIDWEST TYPE	1
Allegan Downy gentian	1
Allegan Dwarf burhead	2
Allegan Dwarf-bulrush	1
Allegan Eastern box turtle	19
Allegan Eastern massasauga	13
Allegan Engelmann's spike-rush	3
Allegan Fescue sedge	1
Allegan Frosted elfin	7
Allegan Ginseng	6
Allegan Globe beak-rush	1
Allegan Globe-fruited seedbox	1
Allegan Goldenseal	1
Allegan Great blue heron rookery	2
Allegan Greenish-white sedge	1
Allegan Hackberry (celtis occidentalis)	1
Allegan Hall's bulrush	2
Allegan INFERTILE POND/MARSH GREAT LAKES TYPE	15
Allegan Karner blue	47
Allegan King rail	1
Allegan Lake sturgeon	1
Allegan Leafhopper	1
Allegan Least shrew	1
Allegan Leggett's pinweed	1
Allegan Long-bracted spiderwort	1
Allegan Long-leaved panic-grass	3
Allegan Marbled salamander	2
Allegan Maryland meadow-beauty	4

SWMLC Element Occurence Table (Example)

sorted by county

Allegan Meadow-beauty	13
Allegan Migrant loggerhead shrike	2
Allegan Missouri rock-cress	2
Allegan Netted nut-rush	3
Allegan Orange or yellow fringed orchid	2
Allegan Ottoe skipper	6
Allegan Panicled hawkweed	1
Allegan Panicled screw-stem	1
Allegan Pitcher's thistle	2
Allegan Prairie dropseed	1
Allegan Prairie warbler	1
Allegan Prairie-smoke	1
Allegan Purple wartyback	2
Allegan RICH FOREST CENTRAL MIDWEST TYPE	1
Allegan Red oak (quercus rubra)	1
Allegan Red-shouldered hawk	1
Allegan Scirpus-like rush	5
Allegan Shellbark or kingnut hickory	1
Allegan Short-fruited rush	1
Allegan Showy coneflower	1
Allegan Small-fruited spike-rush	1
Allegan Spotted gar	1
Allegan Spotted turtle	9
Allegan Sprague's pygarctia	1
Allegan Swamp rose-mallow	3
Allegan Tall beak-rush	8
Allegan Tall nut-rush	3
Allegan Three-birds orchid	1
Allegan Three-ribbed spike-rush	9
Allegan Tinted spurge	1
Allegan Tooth-cup	6
Allegan Torrey's bulrush	3
Allegan Two-flowered rush	6
Allegan Umbrella-grass	1
Allegan Vasey's rush	1
Allegan Waterthread pondweed	7
Allegan Weed shiner	5
Allegan Whiskered sunflower	1
Allegan White oak (quercus alba)	1
Allegan White or prairie false indigo	1
Allegan Whorled mountain-mint	3
Allegan Wood turtle	1
Allegan Woodland vole	2
Allegan Yellow nut-grass	1
Allegan Zigzag bladderwort	1
Barry	1
Barry ALKALINE SHRUB/HERB FEN MIDWEST TYPE	2
Barry Angular spittlebug	2
Barry Bald-rush	2
Barry Barrens buckmoth	1
Barry Beaked agrimony	1
Barry Black-fruited spike-rush	1

SWMLC Element Occurence Table (Example)

sorted by county

Barry Blanchard's cricket frog	15
Barry Blue-eyed-grass	1
Barry Common loon	7
Barry Creeping whitlow-grass	1
Barry Cut-leaved water-parsnip	1
Barry Downy serviceberry (amelanchier arborea)	1
Barry Dwarf-bulrush	3
Barry Eastern box turtle	8
Barry Eastern massasauga	8
Barry False boneset	2
Barry Geographical feature	2
Barry Ginseng	1
Barry Goldenseal	1
Barry Great blue heron rookery	1
Barry HIGH PRAIRIE MIDWEST TYPE	1
Barry Henry's elfin	1
Barry Horsetail spike-rush	2
Barry INFERTILE POND/MARSH GREAT LAKES TYPE	1
Barry Indiana bat or indiana myotis	1
Barry King rail	4
Barry Kitten-tails	1
Barry Leadplant	3
Barry Missouri rock-cress	1
Barry Mitchell's satyr	2
Barry Newman's brocade	1
Barry Northern harrier	1
Barry Ottoe skipper	3
Barry Prairie indian-plantain	4
Barry Pugnose shiner	4
Barry Scirpus-like rush	1
Barry Side-oats grama grass	2
Barry Small skullcap	1
Barry Spotted pondweed	1
Barry Spotted turtle	6
Barry Starhead topminnow	1
Barry TALLGRASS PRAIRIE CENTRAL MIDWEST TYPE	1
Barry Tall beak-rush	3
Barry Three-staff underwing	1
Barry Tooth-cup	1
Barry Umbrella-grass	2
Barry WET PRAIRIE MIDWEST TYPE	1
Barry Watercress snail	1
Barry Whiskered sunflower	1
Barry White lady-slipper	1
Barry Woodland vole	1
Berrien	15
Berrien ALKALINE SHOREDUNES POND/MARSH GREAT LAKES TYPE	1
Berrien ALKALINE SHRUB/HERB FEN MIDWEST TYPE	6
Berrien ALKALINE TALLGRASS PRAIRIE MIDWEST TYPE	1
Berrien American burying beetle	1
Berrien American chestnut	1
Berrien American lotus	1

SWMLC Element Occurrence Table (Example)

sorted by township, range, section

TRS_COMM	COUNT
Eastern massasauga	1
False hop sedge	1
001N007W33 Common loon	1
001N008W15 King rail	1
001N008W21 Eastern massasauga	1
001N008W25 King rail	1
001N009W01 Blanchard's cricket frog	1
001N009W01 Common loon	1
001N009W04 Woodland vole	1
001N009W08 Bald-rush	1
001N009W08 Dwarf-bulrush	1
001N009W08 Side-oats grama grass	1
001N009W08 Umbrella-grass	1
001N009W09 Common loon	1
001N009W26 Spotted turtle	1
001N009W27 ALKALINE SHRUB/HERB FEN MIDWEST TYPE	1
001N009W27 Cut-leaved water-parsnip	1
001N009W27 Eastern massasauga	1
001N009W27 Pugnose shiner	1
001N009W27 White lady-slipper	1
001N009W36	1
001N010W06 Geographical feature	1
001N010W07 Blanchard's cricket frog	1
001N010W17 Blanchard's cricket frog	1
001N010W22 Blanchard's cricket frog	1
001N011W0 Shellbark or kingnut hickory	1
001N011W0 Three-birds orchid	1
001N012W21 Swamp rose-mallow	1
001N012W24 Swamp rose-mallow	1
001N013W20 001N Eastern massasauga	1
001N014W03 Eastern box turtle	1
001N014W03 Spotted turtle	1
001N014W14 Eastern massasauga	1
001N014W16 Weed shiner	1
001N014W22 001N Eastern massasauga	1
001N014W30 Spotted turtle	1
001N015W09 Black buffalo	1
001N015W18 001N Eastern massasauga	1
001N015W26 Spotted turtle	1
001S004W0 Spotted gar	1
001S004W01 Eastern box turtle	1
001S004W17 Eastern massasauga	1
001S004W24 Weed shiner	1
001S006W10 001S Spotted turtle	1
001S006W10 Blanchard's cricket frog	1
001S006W10 Copperbelly water snake	1
001S006W10 King rail	1
001S006W10 Shagbark hickory (carya ovata)	1
001S006W14 Goldenseal	1
001S006W14 White lady-slipper	1
001S006W22 Blazing star borer	1

SWMLC Element Occurrence Table (Example)

sorted by township, range, section

001S006W28 King rail	1
001S007W0 Regal fritillary	1
001S007W11	2
001S007W11 Flattened spike-rush	1
001S007W11 Orange or yellow fringed orchid	1
001S007W11 Small-fruited panic-grass	1
001S007W11 Whorled pogonia	1
001S007W23 Pugnose shiner	1
001S007W31 King rail	1
001S008W0 Orange or yellow fringed orchid	1
001S008W09 Wild-rice	1
001S008W30 Prairie indian-plantain	1
001S008W30 Queen-of-the-prairie	1
001S008W30 Showy coneflower	1
001S008W32 Queen-of-the-prairie	1
001S008W33 ALKALINE SHRUB/HERB FEN MIDWEST TYPE	1
001S008W33 HIGH PRAIRIE MIDWEST TYPE	2
001S008W33 Leiberg's panic-grass	1
001S008W33 Queen-of-the-prairie	1
001S008W33 Showy coneflower	1
001S008W35 Leadplant	1
001S008W35 White or prairie false indigo	1
001S009W0 Swamp metalmark	1
001S009W02 Eastern box turtle	1
001S009W05 Rose-pink	1
001S009W06 American burying beetle	1
001S009W06 Spotted turtle	1
001S009W06 Sprague's pygarctia	1
001S009W07 Douglas stenelmis riffle beetle	1
001S009W08 Blanchard's cricket frog	1
001S009W08 Eastern box turtle	1
001S009W08 Eastern massasauga	1
001S009W08 Least shrew	1
001S009W08 Weed shiner	1
001S009W08 Woodland vole	1
001S009W09 Eastern massasauga	1
001S009W11 Great blue heron rookery	1
001S009W11 Spotted turtle	1
001S009W15 Bald-rush	1
001S009W15 Virginia flax	1
001S009W16 Spotted turtle	1
001S009W18 Pugnose shiner	1
001S009W19 Blanchard's cricket frog	1
001S009W20 Geographical feature	1
001S009W21 Blanchard's cricket frog	1
001S009W22 Laurae snaketail	1
001S009W22 Lesser ladies'-tresses	1
001S009W22 Umbrella-grass	1
001S009W24 ALKALINE SHRUB/HERB FEN MIDWEST TYPE	1
001S009W26 Queen-of-the-prairie	1
001S009W27 Spotted turtle	1
001S009W29 Virginia flax	1

SWMLC Element Occurrence Table (Example)

sorted by township, range, section

001S009W30 ALKALINE SHRUB/HERB FEN MIDWEST TYPE	1
001S009W30 White lady-slipper	1
001S009W34 002S Yellow fumewort	1
001S009W34 Regal fritillary	1
001S009W35 Yellow fumewort	1
001S009W36 002S Yellow fumewort	1
001S009W36 Eastern box turtle	1
001S009W36 Purple twayblade	1
001S009W36 Yellow fumewort	1
001S010W0 Black haw	1
001S010W08 Cut-leaved water-parsnip	1
001S010W08 Mitchell's satyr	1
001S010W09 White or prairie false indigo	1
001S010W12 Blanchard's cricket frog	1
001S010W15 Erect pinweed	1
001S010W15 Leadplant	1
001S010W15 Prairie birdfoot violet	1
001S010W15 Prairie coreopsis	1
001S010W15 White or prairie false indigo	1
001S010W17 Eastern box turtle	1
001S010W18 ALKALINE SHRUB/HERB FEN MIDWEST TYPE	1
001S010W18 Cut-leaved water-parsnip	1
001S010W18 Swamp metalmark	1
001S010W19 Eastern box turtle	1
001S010W22 Blanchard's cricket frog	1
001S010W22 Eastern box turtle	1
001S010W25 Cut-leaved water-parsnip	1
001S010W25 Eastern massasauga	1
001S010W25 Hairy skullcap	1
001S010W25 Pugnose shiner	1
001S010W25 Starry campion	1
001S010W26 Blanchard's cricket frog	1
001S010W26 Spotted turtle	1
001S010W27 False boneset	1
001S010W30 White or prairie false indigo	1
001S011W14 Eastern massasauga	1
001S011W14 Spotted turtle	1
001S011W22 001S Log fern	1
001S011W22 Eastern box turtle	1
001S011W22 Spotted turtle	1
001S011W27 Eastern massasauga	1
001S011W28 Spotted turtle	1
001S012W15 Blanchard's cricket frog	1
001S012W18 Eastern box turtle	1
001S012W21 Showy coneflower	1
001S012W22 Fleshy stitchwort	1
001S012W23 ALKALINE SHRUB/HERB FEN MIDWEST TYPE	1
001S012W23 Cut-leaved water-parsnip	1
001S012W23 Rattlesnake-master	1
001S012W23 Showy coneflower	1
001S012W24 Mat muhly	1
001S012W24 Prairie indian-plantain	1

SWMLC Element Occurrence Table

Sorted by township, range, section - Includes last date observed

Occurrence	LASTOBS
T01NR07W33 COMMON LOON	1986
T01NR08W05 WOODLAND VOLE	1960-10-20
T01NR08W10 KING RAIL	1934-07-16
T01NR08W20 DWARF-BULRUSH	
T01NR08W21 EASTERN MASSASAUGA	1995-08-30
T01NR08W25 KING RAIL	
T01NR09W01 BLANCHARD'S CRICKET FROG	1996-06-21
T01NR09W08 BALD-RUSH	1966-08-18
T01NR09W08 COMMON LOON	1970-PRE
T01NR09W08 SIDE-OATS GRAMA GRASS	1980-08-19
T01NR09W08 UMBRELLA-GRASS	1966-07-28
T01NR09W11 COMMON LOON	1989
T01NR09W26 SPOTTED TURTLE	1963-06-29
T01NR09W27 ALKALINE SHRUB/HERB FEN, MIDWEST TYPE	1980
T01NR09W27 CUT-LEAVED WATER-PARSNIP	1979-08-18
T01NR09W27 EASTERN MASSASAUGA	1994
T01NR09W27 PUGNOSE SHINER	1978
T01NR09W27 WHITE LADY-SLIPPER	1969-05-31
T01NR09W28 SWAMP METALMARK	1959
T01NR09W36 BOG	1961-08
T01NR10W06 GEOGRAPHICAL FEATURE	
T01NR10W07 BLANCHARD'S CRICKET FROG	1997-07-05
T01NR10W19 BLANCHARD'S CRICKET FROG	1997-07-01
T01NR10W22 BLANCHARD'S CRICKET FROG	1997-06-27
T01NR10W22 BLANCHARD'S CRICKET FROG	1997-06-27
T01NR11W28 OSPREY	1999-06-01
T01NR11W29 THREE-BIRDS ORCHID	1880-08-09
T01NR12W21 SWAMP ROSE-MALLOW	1981-SU
T01NR12W24 SWAMP ROSE-MALLOW	1981-SU
T01NR12W32 BLANDING'S TURTLE	
T01NR13W20 EASTERN MASSASAUGA	1994-07
T01NR14W03 SPOTTED TURTLE	1989
T01NR14W14 EASTERN MASSASAUGA	
T01NR14W16 WEED SHINER	1947-07-16
T01NR14W19 EASTERN MASSASAUGA	1993-08
T01NR14W23 EASTERN MASSASAUGA	1986-07
T01NR14W30 SPOTTED TURTLE	1990-05-08
T01NR15W04 EASTERN BOX TURTLE	1989-SP
T01NR15W10 BLACK BUFFALO	1956?
T01NR15W18 EASTERN MASSASAUGA	1995-07-16
T01NR15W26 SPOTTED TURTLE	1991
T01NR15W31 BLANDING'S TURTLE	
T01SR04W01 EASTERN BOX TURTLE	1935-08
T01SR04W16 EASTERN MASSASAUGA	1980-04-30
T01SR04W21 SPOTTED GAR	1863
T01SR04W24 WEED SHINER	1953-05-22
T01SR06W07 EASTERN MASSASAUGA	1993
T01SR06W10 COPPERBELLY WATERSNAKE	1992-04-09
T01SR06W10 KING RAIL	1960-08-24
T01SR06W10 SHAGBARK HICKORY (CARYA OVATA)	
T01SR06W14 BLANCHARD'S CRICKET FROG	1986-05-13
T01SR06W14 BLAZING STAR BORER	1968-09-13
T01SR06W14 GOLDENSEAL	1980-05-08

SWMLC Element Occurrence Table

Sorted by township, range, section - Includes last date observed

T01SR06W14 WHITE LADY-SLIPPER	1977-06-05
T01SR06W15 SPOTTED TURTLE	1989
T01SR06W28 KING RAIL	1924-06
T01SR07W11 FLATTENED SPIKE-RUSH	1967-05-30
T01SR07W11 ORANGE OR YELLOW FRINGED ORCHID	1980-08-13
T01SR07W11 SMALL-FRUITED PANIC-GRASS	1984
T01SR07W11 WHORLED POGONIA	1967-05-30
T01SR07W11 BOG	1979-08-10
T01SR07W11 BOG	1980
T01SR07W23 PUGNOSE SHINER	1953-08-27
T01SR07W31 KING RAIL	1960
T01SR07W32 ORANGE OR YELLOW FRINGED ORCHID	
T01SR08W09 WILD-RICE	1960-08-03
T01SR08W15 SPOTTED TURTLE	1997-07-04
T01SR08W30 BLANCHARD'S CRICKET FROG	1994-05-23
T01SR08W30 PRAIRIE INDIAN-PLANTAIN	1954-07-18
T01SR08W30 QUEEN-OF-THE-PRAIRIE	1980-08-25
T01SR08W32 QUEEN-OF-THE-PRAIRIE	
T01SR08W33 ALKALINE SHRUB/HERB FEN, MIDWEST TYPE	1981-09-19
T01SR08W33 HIGH PRAIRIE, MIDWEST TYPE	1981-09-19
T01SR08W33 QUEEN-OF-THE-PRAIRIE	1980-07-09
T01SR08W34 LEIBERG'S PANIC-GRASS	1980-07-01
T01SR08W35 WHITE OR PRAIRIE FALSE INDIGO	1985⌐
T01SR08W36 LEADPLANT	1985
T01SR09W02 EASTERN BOX TURTLE	1978-06-22
T01SR09W05 ROSE-PINK	1954-07-22
T01SR09W06 AMERICAN BURYING BEETLE	1961-06-28
T01SR09W06 SPOTTED TURTLE	1980
T01SR09W06 SWAMP METALMARK	1956-07-23
T01SR09W07 DOUGLAS STENELMIS RIFFLE BEETLE	1968-08-22
T01SR09W08 BLANCHARD'S CRICKET FROG	1986-06-04
T01SR09W08 EASTERN BOX TURTLE	1959-05-10
T01SR09W08 EASTERN MASSASAUGA	1963-04-21
T01SR09W08 LEAST SHREW	1937-07-02
T01SR09W08 MITCHELL'S SATYR	1956
T01SR09W08 WEED SHINER	1935-10-18
T01SR09W08 WOODLAND VOLE	1937
T01SR09W09 EASTERN MASSASAUGA	1995-09-10
T01SR09W11 GREAT BLUE HERON ROOKERY	1992
T01SR09W11 SPOTTED TURTLE	1989-06
T01SR09W15 VIRGINIA FLAX	1986-08-11
T01SR09W16 SPOTTED TURTLE	1956-06-22
T01SR09W18 PUGNOSE SHINER	1935-07-24
T01SR09W18 SPRAGUE'S PYGARCTIA	1968-08-05
T01SR09W19 BLANCHARD'S CRICKET FROG	1963-06-30
T01SR09W20 GEOGRAPHICAL FEATURE	
T01SR09W21 BLANCHARD'S CRICKET FROG	1965-08-20
T01SR09W22 BALD-RUSH	1937-09-16
T01SR09W22 LAURA'S SNAKETAIL	1997-06-27
T01SR09W22 LESSER LADIES'-TRESSES	1981-09
T01SR09W22 UMBRELLA-GRASS	1981-09-10
T01SR09W24 ALKALINE SHRUB/HERB FEN, MIDWEST TYPE	1961-08-26
T01SR09W26 QUEEN-OF-THE-PRAIRIE	1932-08
T01SR09W28 SPOTTED TURTLE	1990-06-13

SWMLC Element Occurrence Table

Sorted by township, range, section - Includes last date observed

T01SR09W29 VIRGINIA FLAX	1947⌐<
T01SR09W30 ALKALINE SHRUB/HERB FEN, MIDWEST TYPE	1981-08-18
T01SR09W30 WHITE LADY-SLIPPER	1987-05-24
T01SR09W34 REGAL FRITILLARY	1948-07-22
T01SR09W35 BEAKED AGRIMONY	1995-07-19
T01SR09W35 YELLOW FUMEWORT	1994-10-20
T01SR09W35 YELLOW FUMEWORT	1994-09-26
T01SR09W36 EASTERN BOX TURTLE	1994-05-24
T01SR09W36 PURPLE TWAYBLADE	1994-07-15
T01SR09W36 YELLOW FUMEWORT	1994-10-20
T01SR10W08 CUT-LEAVED WATER-PARSNIP	
T01SR10W09 PRAIRIE BIRDFOOT VIOLET	1981-05-15
T01SR10W12 BLANCHARD'S CRICKET FROG	1963-06-17
T01SR10W15 PRAIRIE COREOPSIS	1838-08-01
T01SR10W15 WHITE OR PRAIRIE FALSE INDIGO	1956-07-13
T01SR10W16 ERECT PINWEED	1947-08-15
T01SR10W16 LEADPLANT	1980
T01SR10W16 WHITE OR PRAIRIE FALSE INDIGO	1980
T01SR10W18 ALKALINE SHRUB/HERB FEN, MIDWEST TYPE	1998-07-08
T01SR10W18 CUT-LEAVED WATER-PARSNIP	
T01SR10W18 EASTERN BOX TURTLE	1978-07-21
T01SR10W18 MITCHELL'S SATYR	1999-07-05
T01SR10W18 SWAMP METALMARK	1987
T01SR10W19 EASTERN BOX TURTLE	1950-07-07
T01SR10W19 PRAIRIE DROPSEED	1940-08-01
T01SR10W20 BLACK HAW	1938-07-05
T01SR10W25 CUT-LEAVED WATER-PARSNIP	
T01SR10W25 EASTERN MASSASAUGA	1995-05-11
T01SR10W25 HAIRY SKULLCAP	1947-PRE
T01SR10W25 PUGNOSE SHINER	1983-08
T01SR10W25 STARRY CAMPION	1937-09-30
T01SR10W26 BLANCHARD'S CRICKET FROG	1997-04-20
T01SR10W26 SPOTTED TURTLE	1990-08-16
T01SR10W27 EASTERN BOX TURTLE	1978-06
T01SR10W27 FALSE BONESET	1947-PRE
T01SR10W30 WHITE OR PRAIRIE FALSE INDIGO	1966-07-08
T01SR11W14 EASTERN MASSASAUGA	1991-05
T01SR11W14 SPOTTED TURTLE	1982
T01SR11W22 EASTERN BOX TURTLE	1977-03-30
T01SR11W22 SPOTTED TURTLE	1987
T01SR11W27 EASTERN MASSASAUGA	1995-06-20
T01SR11W27 LOG FERN	1983-06-09
T01SR11W28 SPOTTED TURTLE	1991-05-20
T01SR12W15 BLANCHARD'S CRICKET FROG	1963-06-17
T01SR12W18 EASTERN BOX TURTLE	1973-08-03
T01SR12W22 FLESHY STITCHWORT	1947
T01SR12W23 RATTLESNAKE-MASTER	1981-SU
T01SR12W24 ALKALINE SHRUB/HERB FEN, MIDWEST TYPE	1981-08-19

Dowagiac River Watershed

Element Occurrences

SNAME	SCOMNAME	SURVEYSITE	SPROT	LASTOBS	GRANK	SRANK
AMORPHA CANESCENS	LEADPLANT	POKAGON CREEK SAVANNA	SC	1985-06-24	G5	S3
ARABIS MISSOURIENSIS VAR DEAMII	MISSOURI ROCK-CRESS		SC	1890-06-20	G4?QT3?Q	S2
ARISTOLOCHIA SERPENTARIA	VIRGINIA SNAKEROOT	DEWEY LAKE STREET WOODS	T	1985-07-30	G5	S2
ARISTOLOCHIA SERPENTARIA	VIRGINIA SNAKEROOT	MAGICIAN LAKE	T	1906-08-01	G5	S2
BAPTISIA LACTEA	WHITE OR PRAIRIE FALSE INDIGO	SUMNERVILLE	SC	1935-08-09	G4Q	S3
BERULA ERECTA	CUT-LEAVED WATER-PARSNIP	DOWAGIAC SWAMP	T	1930-07-25	G4G5	S2
BERULA ERECTA	CUT-LEAVED WATER-PARSNIP	GLENWOOD	T	1929-07-20	G4G5	S2
BERULA ERECTA	CUT-LEAVED WATER-PARSNIP	POKAGON CREEK FEN	T	1985-06-24	G4G5	S2
BERULA ERECTA	CUT-LEAVED WATER-PARSNIP	HATHAWAY ROAD	T	1986-08-09	G4G5	S2
BOG		DEWEY BOG		1986-07-20	G3	S3
CACALIA PLANTAGINEA	PRAIRIE INDIAN-PLANTAIN	DOWAGIAC VICINITY	SC	1930-07-25	G4G5	S3
CACALIA PLANTAGINEA	PRAIRIE INDIAN-PLANTAIN	COOK LAKE FEN	SC	1995-06-22	G4G5	S3
CACALIA PLANTAGINEA	PRAIRIE INDIAN-PLANTAIN	MAGICIAN LAKE	SC	1915-07-26	G4G5	S3
CACALIA PLANTAGINEA	PRAIRIE INDIAN-PLANTAIN	POKAGON CREEK FEN	SC	1985-06-24	G4G5	S3
CACALIA PLANTAGINEA	PRAIRIE INDIAN-PLANTAIN	RUDY ROAD FEN	SC	1985-06-25	G4G5	S3
CAREX LUPULIFORMIS	FALSE HOP SEDGE	MAGICIAN LAKE	T	1915-07-19	G3G4	S2
CATOCALA DULCIOLA	QUIET UNDERWING	WESTRATE'S FARM	SC	1990-07-16	G3	S1S2
CHAMPION TREE	RED ASH (FRAXINUS PENNSYLVANICA)				U	S?
CHAMPION TREE	BITTERNUT HICKORY (CARYA CORDIFORMIS)				U	S?
CHAMPION TREE	BLACK-GUM, TUPELO (NYSSA SYLVATICA)				U	S?
CHAMPION TREE	TULIP-TREE (LIRIODENRODN TULIPIFERA)			1979-06-05	U	S?
CIRSIUM HILLII	HILL'S THISTLE	SILVER CREEK	SC	1906	G3	S3
CLEMMYS GUTTATA	SPOTTED TURTLE	DOWAGIAC CREEK (GOODENOUGH ROAD)	T	1984-05-20	G5	S2
CLEMMYS GUTTATA	SPOTTED TURTLE	DOWAGIAC CREEK (MCKENZIE ROAD)	T	1990	G5	S2
CLEMMYS GUTTATA	SPOTTED TURTLE	DOWAGIAC WOODS	T	1989	G5	S2
CLEMMYS GUTTATA	SPOTTED TURTLE	DAILEY	T	1969-05	G5	S2
CLEMMYS GUTTATA	SPOTTED TURTLE	COOK LAKE FEN	T	1989-05-20	G5	S2
CLONOPHIS KIRTLANDII	KIRTLAND'S SNAKE	DOWAGIAC CREEK	E		G2	S1
COASTAL PLAIN MARSH	INFERTILE POND/MARSH, GREAT LAKES TYPE	SWIFT LAKE MARSH		1988-08-26	G2	S2
COASTAL PLAIN MARSH	INFERTILE POND/MARSH, GREAT LAKES TYPE	PITCHER LAKE		1985-08-20	G2	S2
COREOPSIS PALMATA	PRAIRIE COREOPSIS	GAGE ROAD	T	1981-07-03	G5	S2
COREOPSIS PALMATA	PRAIRIE COREOPSIS	THOMPSON ROAD PRAIRIE	T	1996-07-11	G5	S2
COREOPSIS PALMATA	PRAIRIE COREOPSIS	KLUMBIS ROAD PRAIRIE	T	1996-07-03	G5	S2
CUSCUTA GLOMERATA	ROPE DODDER	DOWAGIAC SWAMP	SC	1903-08	G5	SH
CYPRIPEDIUM CANDIDUM	WHITE LADY-SLIPPER	PRIEST LAKE FEN	T	1980-06-05	G4	S2
CYPRIPEDIUM CANDIDUM	WHITE LADY-SLIPPER	DUNNING STREET FEN	T	1985-06-25	G4	S2
CYPRIPEDIUM CANDIDUM	WHITE LADY-SLIPPER	DOWAGIAC SWAMP	T	1984-06-08	G4	S2
DRY-MESIC SOUTHERN FOREST		DEWEY LAKE STREET WOODS		1985-07-30	G4	S3?
DRYOPTERIS CELSA	LOG FERN	DOWAGIAC WOODS	T	1985-SU	G4	S2

Dowagiac River Watershed
Element Occurrences

DRYOPTERIS CELSA	LOG FERN	RUSS FOREST	T	1981-10-24	G4	S2
ELAPHE OBSOLETA OBSOLETA	BLACK RAT SNAKE	DOWAGIAC WOODS	SC	1989-11-13	G5T5	S3
ELEOCHARIS EQUISETOIDES	HORSETAIL SPIKE-RUSH	MAGICIAN LAKE	SC	1903-08	G4	S3
ELEOCHARIS MELANOCARPA	BLACK-FRUITED SPIKE-RUSH	MAGICIAN LAKE	SC	1915-08-13	G4	S3
ELEOCHARIS MELANOCARPA	BLACK-FRUITED SPIKE-RUSH	DEWEY LAKE	SC	1959-07-09	G4	S3
ELEOCHARIS MELANOCARPA	BLACK-FRUITED SPIKE-RUSH	DOWAGIAC	SC	1904-08-12	G4	S3
ELEOCHARIS MELANOCARPA	BLACK-FRUITED SPIKE-RUSH	KEELER LAKE	SC	1983-07-26	G4	S3
EMYDOIDEA BLANDINGII	BLANDING'S TURTLE	KEELER LAKE EAST	SC	1996-07-11	G4	S3
ERYNGIUM YUCCIFOLIUM	RATTLESNAKE-MASTER		T	1950-07-24	G5	S2
ERYNGIUM YUCCIFOLIUM	RATTLESNAKE-MASTER	THOMPSON ROAD PRAIRIE	T	1996-06-20	G5	S2
EUPATORIUM SESSILIFOLIUM	UPLAND BONESET	DEWEY LAKE STREET WOODS	T	1985-07-30	G5	S1
FUIRENA SQUARROSA	UMBRELLA-GRASS	SWIFT LAKE MARSH	T	1988-08-26	G4G5	S2
FUIRENA SQUARROSA	UMBRELLA-GRASS	KEELER LAKE	T	1959-07-09	G4G5	S2
GENTIANA FLAVIDA	WHITE GENTIAN	THOMPSON ROAD PRAIRIE	E	1996-09-16	G4	S1
GENTIANA FLAVIDA	WHITE GENTIAN	KLUMBIS ROAD PRAIRIE	E	1996-09-16	G4	S1
GEUM VIRGINIANUM	PALE AVENS	LAGRANGE	SC	1950-07-24	G5	S1S2
HELIANTHUS HIRSUTUS	WHISKERED SUNFLOWER	POKAGON CREEK FEN	SC	1985-06-24	G5	S3
HEMICARPHA MICRANTHA	DWARF-BULRUSH	KEELER LAKE	SC	1959-09-07	G4	S3
HEMICARPHA MICRANTHA	DWARF-BULRUSH	MAGICIAN LAKE	SC	1904-08-11	G4	S3
HEMICARPHA MICRANTHA	DWARF-BULRUSH	DEWEY LAKE	SC	1959-09-06	G4	S3
HEMICARPHA MICRANTHA	DWARF-BULRUSH	SWIFT LAKE MARSH	SC	1988-08-26	G4	S3
HYDRASTIS CANADENSIS	GOLDENSEAL		T	1960-05-12	G4	S2
INUNDATED SHRUB SWAMP	SHRUB SWAMP, CENTRAL MIDWEST TYPE	INDIAN LAKE		1986-08-11	GU	SU
JUNCUS SCIRPOIDES	SCIRPUS-LIKE RUSH	KEELER LAKE	T	1970-08-10	G5	S2
LESPEDEZA PROCUMBENS	TRAILING BUSH-CLOVER	DEWEY LAKE	X	1906-08-04	G5	SX
LUDWIGIA ALTERNIFOLIA	SEEDBOX	MAGICIAN LAKE	SC	1904-08-10	G5	S3
LUDWIGIA ALTERNIFOLIA	SEEDBOX	KEELER LAKE	SC	1983-07-26	G5	S3
LYSIMACHIA HYBRIDA	SWAMP CANDLES	MAGICIAN LAKE	SC	1904-08	G5	S2
MEROPLEON AMBIFUSCA	NEWMAN'S BROCADE	THOMPSON ROAD PRAIRIE	SC	1997-08-25	G2G4	S1S2
MESIC PRAIRIE	TALLGRASS PRAIRIE, CENTRAL MIDWEST TYPE	THOMPSON ROAD PRAIRIE		1981-07-16	G2	S1
MESIC SOUTHERN FOREST	RICH FOREST, CENTRAL MIDWEST TYPE	BALL FAMILY TREE FARM		1985-07-30	G3?	S3
MESIC SOUTHERN FOREST	RICH FOREST, CENTRAL MIDWEST TYPE	RUSS FOREST, NEWTON WOODS		1986-06-06	G3?	S3
MESIC SOUTHERN FOREST	RICH FOREST, CENTRAL MIDWEST TYPE	SHARKEY LAKE		1985-09-24	G3?	S3
MORUS RUBRA	RED MULBERRY	CASSOPOLIS	T	1890-06-01	G5	S2
NEONYMPHA MITCHELLII MITCHELLII	MITCHELL'S SATYR	PRIEST LAKE FEN	E	1993-07-07	G1G2T1T2	S1
NEONYMPHA MITCHELLII MITCHELLII	MITCHELL'S SATYR	COOK LAKE/RUDY ROAD FEN COMPLEX	E	1999-07-07	G1G2T1T2	S1
PANAX QUINQUEFOLIUS	GINSENG	FROST STREET	T		G4	S2S3
PANAX QUINQUEFOLIUS	GINSENG	HEMLOCK ISLAND	T	1905-08	G4	S2S3
PANAX QUINQUEFOLIUS	GINSENG	FROST STREET	T	1979	G4	S2S3
PANAX QUINQUEFOLIUS	GINSENG	CALIFORNIA ROAD	T		G4	S2S3

Dowagiac River Watershed

Element Occurrences

PANICUM LEIBERGII	LEIBERG'S PANIC-GRASS	KLUMBIS ROAD PRAIRIE	T	1996-06-20	G5	S2
PANICUM LEIBERGII	LEIBERG'S PANIC-GRASS	PRIEST LAKE FEN	T	1941	G5	S2
PANICUM VERRUCOSUM	WARTY PANIC-GRASS	KEELER LAKE	T	1988-08-21	G4	S1
PAPAIPEMA CERINA	GOLDEN BORER	WESTRATE'S FARM	SC	1988-09-21	G4	S1S2
PAPAIPEMA CERINA	GOLDEN BORER	THOMPSON ROAD PRAIRIE	SC	1997-09-24	G4	S1S2
PAPAIPEMA SCIATA	CULVERS ROOT BORER	INDIAN BOWL	SC	1988-08-13	G3G4	S2S3
PAPAIPEMA SCIATA	CULVERS ROOT BORER	THOMPSON ROAD PRAIRIE	SC	1978	G3G4	S2S3
PAPAIPEMA SILPHII	SILPHIUM BORER MOTH	THOMPSON ROAD PRAIRIE	T	1997-09-24	G3G4	S1S2
PAPAIPEMA SPECIOSISSIMA	REGAL FERN BORER	WESTRATE'S FARM	SC	1988-09-24	G4	S2S3
PLATANTHERA CILIARIS	ORANGE OR YELLOW FRINGED ORCHID	BOOT LAKE BOG	T	1981-07-23	G5	S2
PLATANTHERA CILIARIS	ORANGE OR YELLOW FRINGED ORCHID	DEWEY BOG	T	1986-07-20	G5	S2
POA PALUDIGENA	BOG BLUEGRASS	DOWAGIAC WOODS	T	1981	G3	S2
POLEMONIUM REPTANS	JACOB'S LADDER OR GREEK-VALERIAN	DOWAGIAC WOODS	T	1981-05-18	G5	S2
POLEMONIUM REPTANS	JACOB'S LADDER OR GREEK-VALERIAN	THOMPSON ROAD PRAIRIE	T	1995-04-27	G5	S2
POLEMONIUM REPTANS	JACOB'S LADDER OR GREEK-VALERIAN	POKAGON CREEK FEN	T	1985-06-24	G5	S2
POLEMONIUM REPTANS	JACOB'S LADDER OR GREEK-VALERIAN	DOWAGIAC SWAMP	T	1930-05-09	G5	S2
POLEMONIUM REPTANS	JACOB'S LADDER OR GREEK-VALERIAN	PRIEST LAKE FEN	T	1985-04-29	G5	S2
POLYGALA CRUCIATA	CROSS-LEAVED MILKWORT	DEWEY LAKE	SC	1906-08	G5	S3
POLYMNIA UVEDALIA	LARGE-FLOWERED LEAFCUP	SUMNERVILLE	T	1941	G4G5	S1
POTAMOGETON PULCHER	SPOTTED PONDWEED	BOOT LAKE	T	1974-07-29	G5	S2
PRAIRIE FEN	ALKALINE SHRUB/HERB FEN, MIDWEST TYPE	POKAGON CREEK FEN		1985-06-24	G3	S3
PRAIRIE FEN	ALKALINE SHRUB/HERB FEN, MIDWEST TYPE	PRIEST LAKE FEN		1981-10-03	G3	S3
PRAIRIE FEN	ALKALINE SHRUB/HERB FEN, MIDWEST TYPE	RUDY ROAD FEN		1985-06-25	G3	S3
PSILOCARYA SCIRPOIDES	BALD-RUSH	KEELER LAKE	T	1959-09-07	G4	S2
PSILOCARYA SCIRPOIDES	BALD-RUSH	SWIFT LAKE MARSH	T	1988-08-26	G4	S2
PSILOCARYA SCIRPOIDES	BALD-RUSH	MUD LAKE	T	1985-09-21	G4	S2
RHEXIA VIRGINICA	MEADOW-BEAUTY	MAGICIAN LAKE	SC	1915-07-20	G5	S3
RHEXIA VIRGINICA	MEADOW-BEAUTY	DEWEY LAKE	SC	1906-08-04	G5	S3
RHYNCHOSPORA MACROSTACHYA	TALL BEAK-RUSH	PITCHER LAKE	SC	1985-08-20	G4	S3S4
RHYNCHOSPORA MACROSTACHYA	TALL BEAK-RUSH	KEELER LAKE	SC	1959-09-07	G4	S3S4
RHYNCHOSPORA MACROSTACHYA	TALL BEAK-RUSH	SWIFT LAKE MARSH	SC	1988-08-26	G4	S3S4
ROTALA RAMOSIOR	TOOTH-CUP	DEWEY LAKE	SC	1959-09-06	G5	S3
ROTALA RAMOSIOR	TOOTH-CUP	SWIFT LAKE MARSH	SC	1988-08-26	G5	S3
SCUTELLARIA ELLIPTICA	HAIRY SKULLCAP	POKAGON CREEK FEN	SC	1985-06-24	G5	S3
SCUTELLARIA ELLIPTICA	HAIRY SKULLCAP	POKAGON CREEK SAVANNA	SC	1985-06-24	G5	S3
SCUTELLARIA ELLIPTICA	HAIRY SKULLCAP	INDIAN LAKE	SC	1986-08-11	G5	S3
SILPHIUM INTEGRIFOLIUM	ROSINWEED	PRIEST LAKE FEN	T	1985-04-29	G4G5	S2
SILPHIUM INTEGRIFOLIUM	ROSINWEED	DOWAGIAC SWAMP	T	1984-06-08	G4G5	S2
SILPHIUM INTEGRIFOLIUM	ROSINWEED	COOK LAKE FEN	T	1989-07-12	G4G5	S2
SILPHIUM INTEGRIFOLIUM	ROSINWEED		T	1917-08-09	G4G5	S2

Dowagiac River Watershed
Element Occurrences

SILPHIUM INTEGRIFOLIUM	ROSINWEED	GAGE ROAD	T	1981-07-03	G4G5	S2
SILPHIUM INTEGRIFOLIUM	ROSINWEED	THOMPSON ROAD PRAIRIE	T	1989-06-30	G4G5	S2
SILPHIUM INTEGRIFOLIUM	ROSINWEED	RUDY ROAD FEN	T	1987-06-27	G4G5	S2
SILPHIUM INTEGRIFOLIUM	ROSINWEED		T	1981-08-10	G4G5	S2
SILPHIUM INTEGRIFOLIUM	ROSINWEED	KLUMBIS ROAD PRAIRIE	T	1996-07-03	G4G5	S2
SILPHIUM INTEGRIFOLIUM	ROSINWEED	POKAGON CREEK FEN	T	1985-06-24	G4G5	S2
SOUTHERN FLOODPLAIN FOREST		INDIAN TRAIL		1986-08-05	G3?	S3
SPARTINIPHAGA INOPS	SPARTINA MOTH	THOMPSON ROAD PRAIRIE	SC	1986-09-26	G3G4	S1S2
STELLARIA CRASSIFOLIA	FLESHY STITCHWORT	MAGICIAN LAKE	T	1906-06-02	G5	S1S2
TERRAPENE CAROLINA CAROLINA	EASTERN BOX TURTLE	BUNKER LAKE WETLANDS	SC	1995-07-10	G5T5	S2S3
TERRAPENE CAROLINA CAROLINA	EASTERN BOX TURTLE	MCKINZIE CREEK	SC	1980-08-01	G5T5	S2S3
TERRAPENE CAROLINA CAROLINA	EASTERN BOX TURTLE	DOWAGIAC CREEK - MC KENZIE ROAD	SC	1985	G5T5	S2S3
TERRAPENE CAROLINA CAROLINA	EASTERN BOX TURTLE	PRIEST LAKE FEN	SC	1986-05-23	G5T5	S2S3
TERRAPENE CAROLINA CAROLINA	EASTERN BOX TURTLE	COOK LAKE FEN	SC	1989-07-13	G5T5	S2S3
TERRAPENE CAROLINA CAROLINA	EASTERN BOX TURTLE	KELSEY LAKE	SC		G5T5	S2S3
TERRAPENE CAROLINA CAROLINA	EASTERN BOX TURTLE	COOK LAKE/RUDY ROAD FEN COMPLEX	SC	1996-07-22	G5T5	S2S3
TERRAPENE CAROLINA CAROLINA	EASTERN BOX TURTLE	RUDY ROAD FEN	SC	1998-08-03	G5T5	S2S3
TRILLIUM RECURVATUM	PRAIRIE TRILLIUM	CRYSTAL SPRINGS CHURCH CAMP	T	1980-05-08	G5	S2S3
TRILLIUM RECURVATUM	PRAIRIE TRILLIUM	BARRON LAKE	T	1981-04	G5	S2S3
TRILLIUM RECURVATUM	PRAIRIE TRILLIUM	KINZIE ROAD	T	1981-05-19	G5	S2S3
TRIPHORA TRIANTHOPHORA	THREE-BIRDS ORCHID	MAGICIAN LAKE	T	1906-07	G4	S1
TRIPHORA TRIANTHOPHORA	THREE-BIRDS ORCHID		T	1907-09-21	G4	S1
TRIPHORA TRIANTHOPHORA	THREE-BIRDS ORCHID	RUSS FOREST	T	1978	G4	S1
VALERIANELLA CHENOPODIIFOLIA	GOOSEFOOT CORN-SALAD	DOWAGIAC WOODS	T	1985-04-28	G5	S1
VIBURNUM PRUNIFOLIUM	BLACK HAW		SC	1951-09-09	G5	S3
VIBURNUM PRUNIFOLIUM	BLACK HAW	NEWTON WOODS	SC	1933-05-30	G5	S3
VIOLA PEDATIFIDA	PRAIRIE BIRDFOOT VIOLET	THOMPSON ROAD PRAIRIE	T	1996-05-22	G5	S1
VITIS VULPINA	FROST GRAPE	HEMLOCK ISLAND	T	1905-08	G5	S1S2
WISTERIA FRUTESCENS	WISTERIA	DOWAGIAC CREEK - MC KENZIE ROAD	T	1982-08-16	G5	S1
WOODLAND PRAIRIE	HIGH PRAIRIE, MIDWEST TYPE	KLUMBIS ROAD PRAIRIE		1984-04-17	G3	S3

LCWM Element Occurrence Table (Example)

Sorted by County

CO_COM	COUNT
Allegan	10
Allegan ALKALINE SHOREDUNES POND/MARSH GREAT LAKES TYPE	1
Allegan ALKALINE SHRUB/HERB FEN MIDWEST TYPE	1
Allegan ALKALINE TALLGRASS PRAIRIE MIDWEST TYPE	5
Allegan Appalachian quillwort	1
Allegan Atlantic blue-eyed-grass	4
Allegan BEACH/SHOREDUNES GREAT LAKES TYPE	1
Allegan Bald eagle	3
Allegan Bald-rush	3
Allegan Bastard pennyroyal	1
Allegan Black buffalo	2
Allegan Black maple (acer nigrum)	1
Allegan Black rat snake	2
Allegan Black redhorse	2
Allegan Black-fruited spike-rush	10
Allegan Blanchard's cricket frog	3
Allegan Blanding's turtle	1
Allegan Carey's smartweed	1
Allegan Common loon	1
Allegan Creek chubsucker	1
Allegan Cross-leaved milkwort	4
Allegan Culvers root borer	1
Allegan Cut-leaved water-parsnip	1
Allegan DRY SAND PRAIRIE MIDWEST TYPE	1
Allegan Downy gentian	1
Allegan Dwarf burhead	2
Allegan Dwarf-bulrush	1
Allegan Eastern box turtle	19
Allegan Eastern massasauga	13
Allegan Engelmann's spike-rush	3
Allegan Fescue sedge	1
Allegan Frosted elfin	7
Allegan Ginseng	6
Allegan Globe beak-rush	1
Allegan Globe-fruited seedbox	1
Allegan Goldenseal	1
Allegan Great blue heron rookery	2
Allegan Greenish-white sedge	1
Allegan Hackberry (celtis occidentalis)	1
Allegan Hall's bulrush	2
Allegan INFERTILE POND/MARSH GREAT LAKES TYPE	15
Allegan Karner blue	47
Allegan King rail	1
Allegan Lake sturgeon	1
Allegan Leafhopper	1
Allegan Least shrew	1
Allegan Leggett's pinweed	1
Allegan Long-bracted spiderwort	1
Allegan Long-leaved panic-grass	3
Allegan Marbled salamander	2
Allegan Maryland meadow-beauty	4
Allegan Meadow-beauty	13
Allegan Migrant loggerhead shrike	2
Allegan Missouri rock-cress	2
Allegan Netted nut-rush	3
Allegan Orange or yellow fringed orchid	2

LCWM Element Occurrence Table (Example)

Sorted by County

Allegan Ottoe skipper	6
Allegan Panicled hawkweed	1
Allegan Panicled screw-stem	1
Allegan Pitcher's thistle	2
Allegan Prairie dropseed	1
Allegan Prairie warbler	1
Allegan Prairie-smoke	1
Allegan Purple wartyback	2
Allegan RICH FOREST CENTRAL MIDWEST TYPE	1
Allegan Red oak (quercus rubra)	1
Allegan Red-shouldered hawk	1
Allegan Scirpus-like rush	5
Allegan Shellbark or kingnut hickory	1
Allegan Short-fruited rush	1
Allegan Showy coneflower	1
Allegan Small-fruited spike-rush	1
Allegan Spotted gar	1
Allegan Spotted turtle	9
Allegan Sprague's pygarctia	1
Allegan Swamp rose-mallow	3
Allegan Tall beak-rush	8
Allegan Tall nut-rush	3
Allegan Three-birds orchid	1
Allegan Three-ribbed spike-rush	9
Allegan Tinted spurge	1
Allegan Tooth-cup	6
Allegan Torrey's bulrush	3
Allegan Two-flowered rush	6
Allegan Umbrella-grass	1
Allegan Vasey's rush	1
Allegan Waterthread pondweed	7
Allegan Weed shiner	5
Allegan Whiskered sunflower	1
Allegan White oak (quercus alba)	1
Allegan White or prairie false indigo	1
Allegan Whorled mountain-mint	3
Allegan Wood turtle	1
Allegan Woodland vole	2
Allegan Yellow nut-grass	1
Allegan Zigzag bladderwort	1
Kent	12
Kent ALKALINE SHRUB/HERB FEN MIDWEST TYPE	8
Kent Bald-rush	1
Kent Black-fruited spike-rush	6
Kent Blanchard's cricket frog	6
Kent Blue-eyed-grass	1
Kent Broad-leaved puccoon	1
Kent Brown walker	2
Kent Canadian milk-vetch	1
Kent Carey's smartweed	1
Kent Choke cherry (prunus virginiana)	1
Kent Climbing fumitory	1
Kent Cooper's hawk	1
Kent Cooper's milk-vetch	2
Kent Creeping whitlow-grass	3
Kent Cut-leaved water-parsnip	1
Kent Davis's sedge	2

LCWM Element Occurrence Table (Example)

Sorted by County

Kent Downy gentian	1
Kent Dwarf hackberry	1
Kent Dwarf-bulrush	4
Kent Eastern box turtle	10
Kent Engelmann's spike-rush	1
Kent False boneset	2
Kent Flattened spike-rush	1
Kent Furrowed flax	1
Kent Geographical feature	2
Kent Ginseng	1
Kent Goldenseal	2
Kent Goosefoot corn-salad	1
Kent Great blue heron rookery	4
Kent Green violet	4
Kent HIGH PRAIRIE MIDWEST TYPE	5
Kent Hairy-fruited sedge	4
Kent Kentucky coffee-tree	1
Kent King rail	1
Kent Kitten-tails	5
Kent Large-flowered leafcup	1
Kent Leadplant	2
Kent Missouri rock-cress	2
Kent Olney's bulrush	1
Kent Orange or yellow fringed orchid	4
Kent Pale sedge	1
Kent Poweshiek skipper	2
Kent Prairie buttercup	5
Kent Prairie golden alexanders	4
Kent Prairie-smoke	1
Kent Pugnose shiner	2
Kent RICH FOREST CENTRAL MIDWEST TYPE	3
Kent Red mulberry	2
Kent Rock cress	3
Kent SHRUB SWAMP CENTRAL MIDWEST TYPE	1
Kent Showy coneflower	7
Kent Showy orchis	2
Kent Side-oats grama grass	2
Kent Snuffbox	1
Kent Spindle lymnaea	1
Kent Stiff gentian	1
Kent Swamp metalmark	1
Kent Swamp rose-mallow	2
Kent Tall beak-rush	2
Kent Tinted spurge	2
Kent Torrey's bulrush	1
Kent Trailing wild bean	1
Kent Twinleaf	2
Kent Two-flowered rush	1
Kent Umbrella-grass	1
Kent Vasey's pondweed	2
Kent Virginia bluebells	6
Kent Virginia flax	2
Kent Virginia snakeroot	2
Kent Western silvery aster	1
Kent Whiskered sunflower	1
Kent White gentian	1
Kent White lady-slipper	2

LCWM Element Occurrence Table (Example)

Sorted by township, range, section

TRS_COM	COUNT
001N011W0 Shellbark or kingnut hickory	1
001N011W0 Three-birds orchid	1
001N012W21 Swamp rose-mallow	1
001N012W24 Swamp rose-mallow	1
001N013W20 001N Eastern massasauga	1
001N014W03 Eastern box turtle	1
001N014W03 Spotted turtle	1
001N014W14 Eastern massasauga	1
001N014W16 Weed shiner	1
001N014W22 001N Eastern massasauga	1
001N014W30 Spotted turtle	1
001N015W09 Black buffalo	1
001N015W18 001N Eastern massasauga	1
001N015W26 Spotted turtle	1
002N011W05 King rail	1
002N011W24 Eastern box turtle	1
002N013W04 003N Common loon	1
002N013W20 White oak (quercus alba)	1
002N013W29 Black maple (acer nigrum)	1
002N013W30 002N Marbled salamander	1
002N013W33 Tinted spurge	1
002N014W0 002N0 Two-flowered rush	1
002N014W0 Black rat snake	1
002N014W0 Woodland vole	1
002N014W04 Black redhorse	1
002N014W05 Bald eagle	1
002N014W05 Eastern box turtle	1
002N014W05 Karner blue	1
002N014W05 Weed shiner	1
002N014W06	1
002N014W06 Ottoe skipper	1
002N014W09 Black rat snake	1
002N014W09 Blanchard's cricket frog	1
002N014W09 Blanding's turtle	1
002N014W09 Eastern box turtle	1
002N014W09 Eastern massasauga	1
002N014W09 Spotted turtle	1
002N014W09 Woodland vole	1
002N014W10 Weed shiner	1
002N014W14 Bald eagle	1
002N014W16 Eastern box turtle	1
002N014W16 Karner blue	1
002N014W17 Ottoe skipper	1
002N014W18 Black-fruited spike-rush	1
002N014W18 Frosted elfin	1
002N014W18 Karner blue	2
002N014W18 Ottoe skipper	1
002N014W19 Blanchard's cricket frog	1
002N014W20 Eastern box turtle	1
002N014W20 Karner blue	1
002N014W21 Karner blue	2
002N014W22 Eastern box turtle	2
002N014W22 Karner blue	3
002N014W22 Ottoe skipper	1

LCWM Element Occurrence Table (Example)

Sorted by township, range, section

002N014W25 Eastern box turtle	1
002N014W25 Prairie-smoke	1
002N014W26 Karner blue	3
002N014W26 Ottoe skipper	1
002N014W27 Karner blue	3
002N014W29 Eastern box turtle	1
002N014W29 Red-shouldered hawk	1
002N014W32 Weed shiner	1
002N014W35 Black-fruited spike-rush	1
002N014W35 INFERTILE POND/MARSH GREAT LAKES TYPE	1
002N014W35 Meadow-beauty	1
002N014W36 Marbled salamander	1
002N015W01 003N Karner blue	1
002N015W01 Karner blue	3
002N015W02 003N Tall beak-rush	1
002N015W02 Karner blue	1
002N015W05 Eastern box turtle	1
002N015W07 Spotted turtle	2
002N015W11 0 Karner blue	1
002N015W11 Karner blue	3
002N015W12 Karner blue	3
002N015W13 Black-fruited spike-rush	1
002N015W14 Karner blue	3
002N015W20 Migrant loggerhead shrike	1
002N015W23 Karner blue	1
002N015W24 Bald-rush	1
002N015W24 INFERTILE POND/MARSH GREAT LAKES TYPE	1
002N015W24 Meadow-beauty	1
002N015W24 Netted nut-rush	1
002N015W24 Small-fruited spike-rush	1
002N015W24 Tall beak-rush	1
002N015W24 Waterthread pondweed	1
002N015W25 Bald-rush	1
002N015W25 Black-fruited spike-rush	1
002N015W25 Carey's smartweed	1
002N015W25 Cross-leaved milkwort	1
002N015W25 Dwarf-bulrush	1
002N015W25 Frosted elfin	1
002N015W25 INFERTILE POND/MARSH GREAT LAKES TYPE	1
002N015W25 Karner blue	1
002N015W25 Meadow-beauty	1
002N015W25 Spotted turtle	1
002N015W25 Tooth-cup	1
002N015W25 Torrey's bulrush	1
002N015W25 Umbrella-grass	1
002N015W25 Waterthread pondweed	1
002N015W26 Bald-rush	1
002N015W26 Black-fruited spike-rush	1
002N015W26 Cross-leaved milkwort	1
002N015W26 Goldenseal	1
002N015W26 INFERTILE POND/MARSH GREAT LAKES TYPE	1
002N015W26 Meadow-beauty	2
002N015W26 Netted nut-rush	1
002N015W26 Orange or yellow fringed orchid	1
002N015W26 Tall beak-rush	2

LCWM Element Occurrence Table (Example)

Sorted by township, range, section

002N015W26 Torrey's bulrush	2
002N015W26 Waterthread pondweed	2
002N015W27 Fescue sedge	1
002N015W27 INFERTILE POND/MARSH GREAT LAKES TYPE	1
002N015W27 Three-ribbed spike-rush	1
002N015W31 Spotted turtle	1
002N015W33 Atlantic blue-eyed-grass	1
002N015W33 Yellow nut-grass	1
002N015W34 Black-fruited spike-rush	1
002N015W34 Cross-leaved milkwort	1
002N015W34 Greenish-white sedge	1
002N015W34 INFERTILE POND/MARSH GREAT LAKES TYPE	1
002N015W34 Meadow-beauty	1
002N015W35 Meadow-beauty	1
002N015W36 Netted nut-rush	1
002N015W36 Tall beak-rush	1
002N016W05	1
002N016W05 Bastard pennyroyal	1
002N016W05 Lake sturgeon	1
002N016W05 RICH FOREST CENTRAL MIDWEST TYPE	1
002N016W13 Eastern massasauga	1
002N016W23 Migrant loggerhead shrike	1
003N011W0 Long-bracted spiderwort	1
003N011W02 ALKALINE SHRUB/HERB FEN MIDWEST TYPE	1
003N011W02 Eastern massasauga	1
003N011W02 Ginseng	1
003N011W07 Hackberry (celtis occidentalis)	1
003N011W11 Eastern box turtle	1
003N011W11 Showy coneflower	1
003N012W05 Eastern massasauga	1
003N013W07	1
003N013W07 ALKALINE TALLGRASS PRAIRIE MIDWEST TYPE	1
003N013W07 DRY SAND PRAIRIE MIDWEST TYPE	1
003N013W07 Downy gentian	1
003N013W07 Dwarf burhead	1
003N013W07 Engelmann's spike-rush	1
003N013W07 Hall's bulrush	1
003N013W07 INFERTILE POND/MARSH GREAT LAKES TYPE	1
003N013W07 Scirpus-like rush	1
003N013W07 Three-ribbed spike-rush	1
003N013W07 Tooth-cup	1
003N013W15 White or prairie false indigo	1
003N013W18 ALKALINE TALLGRASS PRAIRIE MIDWEST TYPE	1
003N013W18 Atlantic blue-eyed-grass	1
003N013W18 Scirpus-like rush	1
003N013W18 Three-ribbed spike-rush	1
003N013W18 Two-flowered rush	1
003N013W33 Eastern massasauga	1
003N014W0 Least shrew	1
003N014W0 Whiskered sunflower	1
003N014W09 Missouri rock-cress	1
003N014W10	1