

Integration of Natural Resources Data in Local Land Use Planning: A Preliminary Report



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Michigan Natural Features Inventory
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Abstract

Michigan's most valuable asset is its wealth of natural resources. Land use trends over the last half-century and those projected for the first half of the twenty-first century have raised serious concerns about the future of Michigan's natural resources, including those species in greatest need of conservation. In Michigan, local governments at the county and township levels are primary land planning decision makers. The perceptions and use of natural resource information by these entities is unknown. A survey was sent to all townships (1,242), all counties (83) and all regional planning commissions (14) in Michigan to measure the use of, satisfaction with, importance of, and need for natural resource information in local land use planning. Of the 1,339 distributed surveys, 937 (70%) usable surveys were returned. The most frequently used natural resource information was surface water (70%), land cover/land use (69%), soils (64%) and wetland vegetation (62%). Local governments were the least satisfied with invasive plant, invasive animal, endangered and threatened species, and wildlife information. When asked to rank the relative importance of natural resource information, these same categories were ranked lowest, with wildlife ranking somewhat higher. A significant number of respondents indicated they did not know how important invasive species, rare species and wildlife information would be in future land use activities. Of the local governments that expressed a need for services, 94% expressed the greatest need for knowing where to access natural resource information.

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Introduction

The roles and responsibilities of land use planning in Michigan are numerous, complex and at times, overlapping. In 1908, in response to rapid population growth from successful industrialization and natural resource exploitation, Michigan passed legislation identifying itself as a “home rule” state (MSPO 1995). The principle of “home rule” is based on the theory that local governments are better suited to create regulations and make decisions which affect residents at the local level. Local governments are given authority to govern their affairs through the state constitution and statutory laws. In 1921, Michigan adopted the City and Village Zoning Act which set the standard for state zoning (MTA 2003). Zoning allows local governments to identify what types of land uses and development densities are allowed in certain districts or zones. Typical zoning regulations were adopted to protect the public’s health, safety and general welfare. In 1943, the County Zoning Act and Township Zoning Act were adopted and established the regulatory authority for modern zoning in Michigan.

Soon after zoning regulations were instituted, it became clear that land use planning would be needed to anticipate problems, identify opportunities and develop solutions in communities undergoing rapid development. In 1931, Michigan established the Municipal Planning Act to allow planning in villages and cities. Following municipal planning, the Regional Planning Act and County Planning Act of 1945 enabled the creation of regional and county planning commissions. Regional planning commissions bring county and township governments together to identify, administer and provide information, programs and planning at a more economical and effective scale. The Township Planning Act of 1959 allowed the adoption of a “basic plan” and the creation of township planning commissions (MSPO 1995). Amendments have been incorporated in all these Acts to improve coordination, notification, content and natural resource protection at the local level.

Today, twenty U.S. states have some form of home rule legislation at the town or township level (NATT 1988). They include Maine, Vermont, New Hampshire, Massachusetts, Connecticut and Rhode Island in the New England region. New York, New Jersey and Pennsylvania in the Mid-Atlantic region, and Michigan, Ohio, Indiana, Illinois, Wisconsin, Minnesota, North Dakota, South Dakota, Kansas, Nebraska and Missouri in the Midwest. Variation does exist among regions. In New England, county governments are limited or nonexistent in the roles they perform. There, towns are the primary player in local self governance. In the Midwest, townships and counties actively share government responsibilities.

State law enables local governments with the power to plan and zone. These laws allow, but do not require local governments to perform planning and zoning functions. For example, in Michigan, if a county adopts a zoning regulation and a township within the county does not have a zoning ordinance, the township is subject to county zoning. If the township adopts its own zoning ordinance, it is no longer subject to county zoning control.

Similarly, a local government may develop a master plan to guide future development. If a county adopts a master plan and a township within the county does not have a master plan, the township is subject to county planning provisions. If the township adopts a master plan, it must submit a copy to the county planning commission for approval. If there is no county planning

commission, the plan must be sent to the regional planning commission (MTA 2003). Once approved, the township is no longer subject to county planning. Interestingly, adoption of a zoning ordinance does not require adoption of a master plan, although, many local governments at the township level do adopt both for more comprehensive planning and zoning.

It is not surprising with the multitude of governmental bodies and complex laws, that planning in Michigan is conducted in a piece meal and disconnected manner. Local government officials make decisions based on competing social, economic and environmental objectives. The process of making decisions is fraught with controversies about public versus private interests. Economic objectives often drive the decisions at significant cost to the environment and society. In 1992, the Michigan Environmental Science Board identified the lack of land use planning in consideration of resources and ecosystem integrity as one of the greatest risks to the state's environment (MDNR 1992). Local governments can easily obtain socio-economic data. These data are freely accessible from the U.S. Census Bureau, and internal and external government offices (e.g. township, county or state departments). However, environmental data are not as readily available or as consolidated. In some cases, specific technological requirements are needed to access and manipulate environmental data. It is also common for multiple agencies, organizations and governments to maintain and disseminate this information.

To project what Michigan's landscape might look like in the future if present land use trends continue, a Land Transformation Model was developed at Michigan State University (PSC 2001). The model simulates future change in land use and land cover based on historical and recent land use/cover data. From 1980 to 2040, the built areas of Michigan, which include residential, commercial and industrial areas, roads, etc., are expected to increase by 178 percent if current development trends continue. Agriculture, wetlands, forest and other vegetation are expected to decrease by 17%, 10%, 8% and 24% respectively. Contrary to the increase in the built environment, Michigan's population from 1980 to 1995 only grew at 1/8th the rate of development during the same time period (PSC 2001). This indicates that land conversion to urban-like environments is greatly out-pacing Michigan's rate of population growth. Given this model is an estimate of expected outcomes, the numbers are nevertheless a concern to those economic sectors that rely on Michigan's land-based industries of agriculture, recreation, tourism, mining, forestry and wildlife.

From 1995 to 2003, surveys of Michigan adults showed a consistent concern about sprawl (IPPSR 2003). Although concerned, adults did not feel very well informed on land use issues. Residents felt the state (42%) should have the most land use responsibility, followed by local (24%), county (17%), federal (9%), metro (6%) and private entities (4%) (IPPSR 2001). Unfortunately, Michigan has not adopted state land use goals to guide regional, county or township decision making as in other states. The Michigan Land Use Leadership Council identified the need for the state to provide the leadership, cooperation and technical information to improve land use decision making at all levels (MLULC 2003). An informed community can achieve a better future through coordinated and comprehensive land use planning, access to information, and creative use of new technologies.

The Michigan Department of Natural Resources recently created a Wildlife Action Plan (WAP). This plan identified fourteen priority conservation action needs and threats against wildlife

species and their habitats at the statewide, regional and species level (Eagle et al. 2005). Of the fourteen priority threats, seven (e.g. fragmentation, riparian modifications, non-consumptive recreation, altered sediment loads, altered hydrologic regimes, altered fire regime, and social attitudes) have specific local planning roles identified as conservation action needs. These roles include incorporating, improving, initiating, and implementing programs and ordinances that protect and enhance natural environments. However, in order for local governments to implement such ordinances, they must have accurate natural resource information to justify their decisions. If Michigan's WAP is to be successful, the Michigan Department of Natural Resources, and other land management agencies and organizations, must provide useful and accessible natural resource information to local and regional planning officials.

Since human existence is dependent on environmental health, the maintenance of natural habitats, biodiversity and ecological services are critical for human health and welfare. Land use, more than any other type of human activity, has direct impacts on water quality, sensitive environments, public health, public service delivery, economic development and community character (MUCC 1993). As habitat loss continues and the number of special concern (261), threatened (249), endangered (93) and extirpated (56) species in Michigan remains high, we must explore the relationship between natural resource information and local land use planning. Once this relationship is better understood, more effective tools can be created to improve the integration of natural resource information in the planning and decision making process.

This preliminary report evaluates the survey results from township, county and regional planning commissions in Michigan. The second phase of the project will involve interviews and additional analysis of survey results.

Methods

A 20-question survey (see Appendix A) was mailed to the Clerk in all of Michigan's townships (1,242) and counties (83), and to the Planner or Director in the fourteen regional planning commissions. The names and addresses of clerks were received from the Michigan Townships Association and Michigan Association of Counties. The fourteen individual regional planning commission websites were visited to retrieve the names and addresses of the Planner or Director. The survey design and implementation followed the Tailored Design Method outlined by Dillman (2000). Up to a five-contact sequence was utilized which included the first questionnaire, a reminder postcard, two replacement questionnaires, and a short non-response survey. The Tailored Design Method is based on the principles of social exchange theory which emphasize the survey's usefulness and the importance of a response from each person in the sample. Multiple contacts that differ in technique (i.e. letter, postcard, short survey) are essential for maximizing response rates.

All outgoing questionnaires and postcards were affixed with first-class stamps. Self-addressed business reply return envelopes or postcards were provided. The questionnaires were mailed with a detailed cover letter explaining the purpose of the research project and why a response was important. The first questionnaire was mailed in August 2005. A thank you postcard was sent two weeks after the first questionnaire. The second replacement questionnaire was mailed one month after the first questionnaire. The third replacement questionnaire was mailed one month

after the second questionnaire. In an attempt to measure non-respondents, a final shortened version of the questionnaire was mailed in November 2005, one month after the third questionnaire. Respondents that returned their questionnaire did not receive replacement questionnaires. A survey ID number was placed on the last page of the questionnaire to eliminate unnecessary mailings and to identify those local governments that indicated they were willing to participate in an interview (Question #14 in survey). A team of volunteers helped prepare and mail questionnaires and postcards. The survey was approved by the University Committee on Research Involving Human Subjects at Michigan State University (see Appendix B).

For the analysis purposes, the state was divided into four regions based on Albert's regional landscape ecosystems (Albert 1995). These four regions, or sections, are based on the prevailing climate, bedrock geology, physiography and vegetation patterns. Realizing ecological boundaries do not match political boundaries the four sections were adjusted to encompass the majority of the county in question (see Appendix C). Survey response data was analyzed using SPSS software. For phase I of this project the analysis included absolute and relative frequencies, means and cross tabulations. Additional analysis of survey data will be included in phase II of this project, including correlations, Chi-Square and multiple regression analysis. Phase II will also include analysis of 30 follow-up interviews from representative local governments across Michigan (3 regional planning commissions, 6 counties and 21 townships).

Results

Of the 1,339 total questionnaires mailed, 993 (74%) were returned. Fifty-six (4%) returned questionnaires did not have any usable information. The remaining 937 questionnaires (70%) had at least one question answered and were included for analysis. Of the 402 respondents that did not provide any information in the first three questionnaires, 55 (14%) did respond to the short non-response survey. The following survey results include absolute and relative frequencies, and when appropriate, the mean for questions that dealt with planning structure and natural resource use. Of the 937 usable surveys, planning commissions returned 13 (93% of planning commissions), counties returned 59 (71% of counties), and townships returned 935 (69% of townships). Two surveys were returned without an identification number but otherwise had usable information. Analysis of demographic and miscellaneous survey questions are provided in Appendix D.

Analysis begins with local government planning structure, whether a basic land use plan and zoning ordinance have been adopted at the township and county level (Tables 1-2). Approximately 75% of county governments have adopted a land use plan, but only a third of counties have adopted a zoning ordinance (Table 3). This is because in more urban and populous counties, townships and municipalities are likely to adopt their own land use plan. On average, approximately 70% of all townships in Michigan have adopted both a land use plan and zoning ordinance (Table 3).

Table 1: Has your township/county adopted a **Comprehensive Development Plan**, Master Plan, or other similar land use plan?

| Comprehensive Development Plan | Frequency | Percent |
|--------------------------------|-----------|---------|
| Yes | 656 | 71.8 |
| No | 223 | 24.4 |
| Not Sure | 35 | 3.8 |
| Total | 914 | 100.0 |
| No response | 23 | |
| Total | 937 | |

Table 2: Has your township/county adopted a **Zoning Ordinance**?

| Zoning Ordinance | Frequency | Percent |
|------------------|-----------|---------|
| Yes | 673 | 72.7 |
| No | 247 | 26.7 |
| Not Sure | 6 | .6 |
| Total | 926 | 100.0 |
| No response | 11 | |
| Total | 937 | |

According to a survey conducted in 2003 by the Institute for Public Policy and Social Research (IPPSR), sixty-one Michigan counties (73%) had adopted a master plan and twenty-four counties (29%) had adopted a zoning ordinance (IPPSR 2004). Although the overall response rate from the IPPSR survey was 93% and the overall response rate from this natural resource survey was 70%, a comparison of the responses reveals similar percentages (Table 3).

Table 3: Comparison of IPPSR survey results with natural resource survey results.

| Have Land Use Plan & Zoning | County | County % | Township | Township % |
|--------------------------------|-------------------|----------|-------------------|------------|
| IPPSR survey | N (# Respondents) | | N (# Respondents) | |
| Yes - Master Plan | 61 (83) | 73% | 756 (1120) | 67.5% |
| Yes - Zoning Ordinance | 24 (83) | 29% | 797 (1122) | 71% |
| Natural resource survey | N (# Respondents) | | N (# Respondents) | |
| Yes - Master Plan | 43 (57) | 75% | 606 (843) | 72% |
| Yes - Zoning Ordinance | 21 (58) | 36% | 647 (854) | 76% |

The types of natural resource information that are most often used by regional, county and township governments are surface water (70%), land cover/land use (69%), soils (64%) and wetland vegetation information (62%) (Table 4). Excluding the “Other Natural Resource Information” category, only invasive animal (12%) and invasive plant (14%) species information are used less often than wildlife (17%) or endangered and threatened species (18%) information.

Table 4: Have you **used** the following types of natural resource information in your land use plans, zoning ordinances or land use decisions/recommendations?

| Types of Natural Resource Information | Yes | | No | | Total # of Respondents |
|---------------------------------------|------------|------------|-----|-----|------------------------|
| | N | % | N | % | |
| Agricultural | 450 | 59% | 307 | 41% | 757 |
| Wetland Vegetation | 471 | 62% | 282 | 38% | 753 |
| Upland Vegetation | 304 | 41% | 435 | 59% | 739 |
| Invasive Plant Species | 107 | 14% | 632 | 86% | 739 |
| Wildlife Species | 124 | 17% | 619 | 83% | 743 |
| Invasive Animal Species | 88 | 12% | 650 | 88% | 738 |
| Endangered & Threatened Species | 133 | 18% | 603 | 82% | 736 |
| Geology | 326 | 44% | 411 | 56% | 737 |
| Surface Water | 528 | 70% | 225 | 30% | 753 |
| Ground Water | 354 | 47% | 391 | 53% | 745 |
| Soils | 482 | 64% | 266 | 36% | 748 |
| Land cover / Land use | 522 | 69% | 233 | 31% | 755 |
| Topographic | 398 | 53% | 347 | 47% | 745 |
| Comprehensive Green Space Map | 225 | 31% | 503 | 69% | 728 |
| Other Natural Resource Information | 68 | 14% | 425 | 86% | 493 |

For the purposes of this report, additional analysis was conducted on questions dealing with wildlife, and endangered and threatened species. Cross tabulations were calculated based on the use of wildlife and rare species information and level of government (township, county or regional planning commission) (Table 5). Counties use more wildlife information than the other levels of government and regional planning commissions use more endangered and threatened species information, although the vast majority of governments do not use either information at all.

Table 5. Use of wildlife and endangered and threatened species information by level of government.

| Level of Government | Yes | % Yes | No | % No | Total # of Respondents |
|--|----------|------------|-----|------|------------------------|
| Wildlife species information | | | | | |
| Regional Planning Commission | 3 | 23% | 10 | 77% | 13 (2%) |
| County | 9 | 25% | 27 | 75% | 36 (5%) |
| Township | 112 | 16% | 581 | 84% | 693 (93%) |
| Total # of Respondents | 124 | 17% | 618 | 83% | 742 |
| Endangered and threatened species information | | | | | |
| Regional Planning Commission | 5 | 38% | 8 | 62% | 13 (2%) |
| County | 12 | 33% | 24 | 67% | 36 (5%) |
| Township | 116 | 17% | 570 | 83% | 686 (93%) |
| Total # of Respondents | 133 | 18% | 602 | 82% | 735 |

Cross tabulations were also calculated on the location of the local government and their use of wildlife and rare species information (Table 6). Local governments in the Eastern Upper Peninsula were the most likely to use wildlife and rare species information, followed closely by governments in the Northern Lower and Western Upper Peninsula.

Table 6. Location of local governments and use of wildlife and endangered and threatened species information.

| Location in State | Yes | % Yes | No | % No | Total # of Respondents |
|--|-----------|------------|-----|------|------------------------|
| Wildlife species information | | | | | |
| Western Upper Peninsula | 9 | 21% | 33 | 79% | 42 |
| Eastern Upper Peninsula | 9 | 23% | 30 | 77% | 39 |
| Northern Lower Peninsula | 44 | 21% | 167 | 79% | 211 |
| Southern Lower Peninsula | 62 | 14% | 388 | 86% | 450 |
| Total # of Respondents | 124 | 17% | 618 | 83% | 742 |
| Endangered and threatened species information | | | | | |
| Western Upper Peninsula | 9 | 21% | 33 | 79% | 42 |
| Eastern Upper Peninsula | 10 | 26% | 28 | 74% | 38 |
| Northern Lower Peninsula | 47 | 22% | 164 | 78% | 211 |
| Southern Lower Peninsula | 67 | 15% | 377 | 85% | 444 |
| Total # of Respondents | 133 | 18% | 602 | 82% | 735 |

Local governments that use wildlife and endangered and threatened species information and have a land use plan and/or zoning ordinance were analyzed (Table 7). Eight-five percent of the local governments that have used wildlife and rare species information have adopted a land use plan and zoning ordinance. Conversely, of the local governments that have adopted a land use plan or zoning ordinance, less than 20% have used wildlife and rare species information.

Table 7. Use of wildlife or endangered and threatened species information in a Master Plan or Zoning Ordinance.

| Use of Natural Resource Information | Adoption of Land Use Plan | | | | Adoption of Zoning Ordinance | | | | |
|--|---------------------------|-----|----------|------------------------|------------------------------|-----|----------|------------------------|-----|
| | Yes | No | Not Sure | Total # of Respondents | Yes | No | Not Sure | Total # of Respondents | |
| Local government has used wildlife species information | No | 478 | 123 | 17 | 618 | 500 | 113 | 4 | 617 |
| | Yes | 105 | 16 | 3 | 124 | 105 | 19 | 0 | 124 |
| Total # of Respondents | 583 | 139 | 20 | 742 | 605 | 132 | 4 | 741 | |
| Local government has used endangered and threatened species information | No | 464 | 121 | 18 | 603 | 489 | 109 | 4 | 602 |
| | Yes | 112 | 18 | 2 | 132 | 109 | 23 | 0 | 132 |
| Total # of Respondents | 576 | 139 | 20 | 735 | 598 | 132 | 4 | 734 | |

Approximately 74% of all the natural resource information that is distributed is in a hard copy format (Table 8). Land cover / land use information had the highest percentage of electronic distribution (36%). Although, when asked in what format the information would be most preferred, only 60% of local governments indicate they prefer the hard copy format (Table 9). This may mean local governments are making investments in computers and technology (e.g. GIS) and/or information providers are unable or unwilling to meet desired format needs. Not surprisingly, regional planning commissions and counties, those entities which tend to have more personnel and financial resources, prefer electronic information, while just over 60% of townships prefer hard copy information (Table 10).

Table 8: If you have used the following types of natural resources information, in what **format** was the information provided?

| Types of Natural Resource Information | Electronic | | Hard Copy | | Total # of Respondents |
|---------------------------------------|------------|------------|-----------|-----|------------------------|
| | N | % | N | % | |
| Agricultural | 91 | 21% | 340 | 79% | 431 |
| Wetland Vegetation | 107 | 24% | 340 | 76% | 447 |
| Upland Vegetation | 82 | 28% | 214 | 72% | 296 |
| Invasive Plant Species | 28 | 28% | 72 | 72% | 100 |
| Wildlife Species | 25 | 22% | 90 | 78% | 115 |
| Invasive Animal Species | 17 | 21% | 66 | 79% | 83 |
| Endangered & Threatened Species | 29 | 22% | 101 | 78% | 130 |
| Geology | 72 | 23% | 246 | 74% | 318 |
| Surface Water | 140 | 28% | 361 | 72% | 501 |
| Ground Water | 87 | 26% | 249 | 74% | 336 |
| Soils | 110 | 24% | 358 | 76% | 468 |
| Land cover / Land use | 182 | 36% | 320 | 64% | 502 |
| Topographic | 119 | 31% | 262 | 69% | 381 |
| Comprehensive Green Space Map | 49 | 24% | 157 | 76% | 207 |
| Other Natural Resource Information | 19 | 31% | 42 | 69% | 61 |

Table 9: If you were to request natural resource information about your township/county/region, in what **format** would the information be most preferred?

| Format | Frequency | Percent |
|-------------|-----------|---------|
| Hard copy | 475 | 60.2 |
| Electronic | 314 | 39.8 |
| Total | 789 | 100.0 |
| No response | 148 | |
| Total | 937 | |

Table 10. Preferred format by level of government.

| Level of Government | Format information preferred to be in | | Total |
|------------------------------|---------------------------------------|-------------------|-------|
| | Hard copy format | Electronic format | |
| Regional Planning Commission | 1 (8%) | 11 (92%) | 12 |
| County | 10 (24%) | 32 (76%) | 42 |
| Township | 463 (63%) | 270 (37%) | 733 |
| Total | 474 | 313 | 787 |

Local governments were asked how satisfied they were with the natural resource information they used. Respondents were most satisfied overall (very and moderately satisfied combined) with surface water (66%), land cover/land use (63%), and soils (60%) information (Table 11a). However, when the “information not available or not used” respondents are eliminated from calculations, overall satisfaction with agricultural and upland vegetation information increases and matches the soils information (Table 11b). Interestingly, respondents are least satisfied (very dissatisfied) with invasive animal, invasive plant and endangered and threatened species information. When analyzing the overall mean response, land cover/land use (1.73), surface water (1.75), and soils (1.79) information receive the most satisfied response, while invasive plant (2.15), endangered and threatened species (2.15), and invasive animal species information (2.12) receive the least satisfied response, albeit still closest to “moderately satisfied” (2.0). Of the levels of government surveyed, townships appear more satisfied (very and moderately satisfied combined) than counties or regional planning commissions (Table 12).

Table 11a: How **satisfied** were you with the natural resource information that was used in your land use plans, zoning ordinances and land use decisions/recommendations?

| Types of Natural Resource Information | Very Satisfied | | Moderately Satisfied | | Moderately Dissatisfied | | Very Dissatisfied | | Information Not Available or Not Used | | Total # of Respondents |
|---------------------------------------|----------------|------------|----------------------|------------|-------------------------|----|-------------------|----|---------------------------------------|-----|------------------------|
| | N | % | N | % | N | % | N | % | N | % | |
| Agricultural | 125 | 17% | 277 | 38% | 34 | 5% | 10 | 1% | 285 | 39% | 731 |
| Wetland Vegetation | 139 | 19% | 276 | 38% | 43 | 6% | 11 | 2% | 257 | 35% | 726 |
| Upland Vegetation | 95 | 14% | 194 | 28% | 25 | 3% | 7 | 1% | 377 | 54% | 698 |
| Invasive Plant Species | 28 | 4% | 87 | 13% | 29 | 4% | 11 | 2% | 532 | 77% | 687 |
| Wildlife Species | 36 | 5% | 95 | 14% | 28 | 4% | 9 | 1% | 522 | 76% | 690 |
| Invasive Animal Species | 33 | 5% | 67 | 10% | 28 | 4% | 11 | 1% | 548 | 80% | 687 |
| Endangered & Threatened Species | 32 | 5% | 89 | 13% | 35 | 5% | 11 | 1% | 523 | 76% | 690 |
| Geology | 105 | 15% | 213 | 30% | 35 | 5% | 9 | 1% | 351 | 49% | 713 |
| Surface Water | 175 | 24% | 306 | 42% | 30 | 4% | 8 | 1% | 206 | 29% | 725 |
| Ground Water | 109 | 15% | 206 | 29% | 46 | 7% | 19 | 3% | 331 | 46% | 711 |
| Soils | 162 | 22% | 277 | 38% | 42 | 6% | 8 | 1% | 242 | 33% | 731 |
| Land cover / Land use | 191 | 26% | 268 | 37% | 42 | 6% | 7 | 1% | 219 | 30% | 727 |
| Topographic | 139 | 20% | 224 | 31% | 39 | 5% | 8 | 1% | 303 | 43% | 713 |
| Comprehensive Green Space Map | 68 | 10% | 137 | 20% | 31 | 4% | 8 | 1% | 451 | 65% | 695 |
| Other Natural Resource Information | 25 | 5% | 39 | 8% | 5 | 1% | 6 | 1% | 431 | 85% | 506 |

Table 11b: How **satisfied** were you with the natural resource information that was used in your land use plans, zoning ordinances and land use decisions/recommendations (without “Information Not Available or Not Used” responses)?

| Types of Natural Resource Information | Very Satisfied (1) | | Moderately Satisfied (2) | | Moderately Dissatisfied (3) | | Very Dissatisfied (4) | | Total # of Respondents | Mean |
|---------------------------------------|--------------------|-----|--------------------------|-----|-----------------------------|-----|-----------------------|----|------------------------|-------------|
| | N | % | N | % | N | % | N | % | | |
| Agricultural | 125 | 28% | 277 | 62% | 34 | 8% | 10 | 2% | 446 | 1.84 |
| Wetland Vegetation | 139 | 30% | 276 | 59% | 43 | 9% | 11 | 2% | 469 | 1.84 |
| Upland Vegetation | 95 | 30% | 194 | 60% | 25 | 8% | 7 | 2% | 321 | 1.83 |
| Invasive Plant Species | 28 | 18% | 87 | 56% | 29 | 19% | 11 | 7% | 155 | 2.15 |
| Wildlife Species | 36 | 21% | 95 | 57% | 28 | 17% | 9 | 5% | 168 | 2.06 |
| Invasive Animal Species | 33 | 24% | 67 | 48% | 28 | 20% | 11 | 8% | 139 | 2.12 |
| Endangered & Threatened Species | 32 | 19% | 89 | 53% | 35 | 21% | 11 | 7% | 167 | 2.15 |
| Geology | 105 | 29% | 213 | 59% | 35 | 10% | 9 | 2% | 362 | 1.86 |
| Surface Water | 175 | 34% | 306 | 59% | 30 | 6% | 8 | 1% | 519 | 1.75 |
| Ground Water | 109 | 29% | 206 | 54% | 46 | 12% | 19 | 5% | 380 | 1.93 |
| Soils | 162 | 33% | 277 | 57% | 42 | 9% | 8 | 1% | 489 | 1.79 |
| Land cover / Land use | 191 | 38% | 268 | 53% | 42 | 8% | 7 | 1% | 508 | 1.73 |
| Topographic | 139 | 34% | 224 | 55% | 39 | 9% | 8 | 2% | 410 | 1.80 |
| Comprehensive Green Space Map | 68 | 28% | 137 | 56% | 31 | 13% | 8 | 3% | 244 | 1.91 |
| Other Natural Resource Information | 25 | 33% | 39 | 52% | 5 | 7% | 6 | 8% | 75 | 1.89 |

Table 12. Satisfaction with wildlife species and endangered and threatened species information and level of government.

| Level of Government | Very satisfied | Moderately satisfied | Moderately dissatisfied | Very dissatisfied | Total # of Respondents |
|--|-----------------|----------------------|-------------------------|-------------------|------------------------|
| Wildlife species information | | | | | |
| Regional Planning Commission | 0 | 3 (75%) | 1 (25%) | 0 | 4 (2%) |
| County | 3 (30%) | 4 (40%) | 3 (30%) | 0 | 10 (6%) |
| Township | 33 (21%) | 88 (57%) | 24 (16%) | 9 (6%) | 154 (92%) |
| Total # of Respondents | 36 (21%) | 95 (57%) | 28 (17%) | 9 (5%) | 168 |
| Endangered and threatened species information | | | | | |
| Regional Planning Commission | 0 | 3 (60%) | 2 (40%) | 0 | 5 (3%) |
| County | 3 (23%) | 6 (46%) | 3 (23%) | 1 (8%) | 13 (8%) |
| Township | 29 (19%) | 80 (54%) | 30 (20%) | 10 (7%) | 149 (89%) |
| Total # of Respondents | 32 (19%) | 89 (53%) | 35 (21%) | 11 (7%) | 167 |

Planning and zoning activities that use natural resource information at least 75% of the time include Master Plan creation or update, zoning ordinance creation or update, and site development reviews (Table 13a). When the “activity not conducted” responses are eliminated from analysis, Planned Unit Development activities are included with Master Plan, zoning ordinance and site development reviews, with at least 60% of local governments indicating that natural resource information is used in these activities at least 75% of the time (Table 13b). Transportation and utility planning use the least amount of natural resource information, although the average mean is still closest to “sometimes” or approximately use the information 50% of the time (3.0).

Table 13a: How **often** do you use natural resource information in the following land use planning and zoning activities?

| Planning Activity | Always (100%) | | Frequently (~75%) | | Sometimes (~50%) | | Rarely (~25%) | | Never (0%) | | Activity Not Conducted | | Total # of Respondents |
|---|---------------|------------|-------------------|------------|------------------|-----|---------------|-----|------------|-----|------------------------|-----|------------------------|
| | N | % | N | % | N | % | N | % | N | % | N | % | |
| Master Plan creation or update | 232 | 31% | 171 | 23% | 110 | 15% | 60 | 8% | 33 | 4% | 145 | 19% | 751 |
| Site Development reviews | 198 | 27% | 170 | 23% | 135 | 18% | 53 | 7% | 36 | 5% | 151 | 20% | 743 |
| Planned Unit Developments (PUD's) | 166 | 23% | 119 | 16% | 70 | 10% | 54 | 7% | 54 | 7% | 276 | 37% | 739 |
| Land Division reviews | 136 | 18% | 127 | 17% | 140 | 19% | 86 | 11% | 71 | 10% | 185 | 25% | 745 |
| Zoning Ordinance creation or update | 230 | 31% | 162 | 21% | 119 | 16% | 54 | 7% | 34 | 5% | 154 | 20% | 753 |
| Preservation Ordinance creation or update | 155 | 21% | 105 | 14% | 80 | 11% | 49 | 7% | 53 | 7% | 298 | 40% | 740 |
| Land Acquisition planning | 84 | 11% | 81 | 11% | 78 | 11% | 57 | 8% | 64 | 9% | 372 | 50% | 736 |
| Park and Recreation planning | 135 | 18% | 122 | 16% | 81 | 11% | 57 | 8% | 58 | 8% | 290 | 39% | 743 |
| Transportation planning | 57 | 8% | 65 | 9% | 71 | 9% | 72 | 10% | 71 | 9% | 405 | 55% | 741 |
| Utility planning | 68 | 9% | 70 | 10% | 72 | 10% | 65 | 9% | 69 | 9% | 395 | 53% | 739 |
| Capital Improvements planning | 70 | 9% | 87 | 12% | 110 | 15% | 60 | 8% | 63 | 9% | 344 | 47% | 734 |
| Other activities | 12 | 3% | 11 | 3% | 8 | 2% | 11 | 3% | 32 | 8% | 324 | 81% | 398 |

Table 13b: How **often** do you use natural resource information in the following land use planning and zoning activities (without “Activity Not Conducted” responses)?

| Planning Activity | Always (1) | | Frequently (2) | | Sometimes (3) | | Rarely (4) | | Never (5) | | Total # of Respondents | Mean |
|---|------------|------------|----------------|------------|---------------|------------|------------|------------|-----------|-----------|------------------------|-------------|
| | N | % | N | % | N | % | N | % | N | % | | |
| Master Plan creation or update | 232 | 38% | 171 | 28% | 110 | 18% | 60 | 10% | 33 | 6% | 606 | 2.16 |
| Site Development reviews | 198 | 33% | 170 | 29% | 135 | 23% | 53 | 9% | 36 | 6% | 592 | 2.26 |
| Planned Unit Developments (PUD's) | 166 | 36% | 119 | 25% | 70 | 15% | 54 | 12% | 54 | 12% | 463 | 2.38 |
| Land Division reviews | 136 | 24% | 127 | 23% | 140 | 25% | 86 | 15% | 71 | 13% | 560 | 2.69 |
| Zoning Ordinance creation or update | 230 | 38% | 162 | 27% | 119 | 20% | 54 | 9% | 34 | 6% | 599 | 2.17 |
| Preservation Ordinance creation or update | 155 | 35% | 105 | 24% | 80 | 18% | 49 | 11% | 53 | 12% | 442 | 2.41 |
| Land Acquisition planning | 84 | 23% | 81 | 22% | 78 | 21% | 57 | 16% | 64 | 18% | 364 | 2.82 |
| Park and Recreation planning | 135 | 30% | 122 | 27% | 81 | 18% | 57 | 12% | 58 | 13% | 453 | 2.52 |
| Transportation planning | 57 | 17% | 65 | 19% | 71 | 21% | 72 | 22% | 71 | 21% | 336 | 3.10 |
| Utility planning | 68 | 20% | 70 | 20% | 72 | 21% | 65 | 19% | 69 | 20% | 344 | 2.99 |
| Capital Improvements planning | 70 | 18% | 87 | 22% | 110 | 28% | 60 | 16% | 63 | 16% | 390 | 2.89 |
| Other activities | 12 | 16% | 11 | 15% | 8 | 11% | 11 | 15% | 32 | 43% | 74 | 3.54 |

When local governments were asked how important the different types of natural resource information were, the overall response rate (very and somewhat important combined) indicated surface water, ground water, land use/ land cover, and soils information were most important (Table 14a). Following a common theme in previous questions, information identified as least important included invasive plant, invasive animal, endangered and threatened, and wildlife species information. Although, it is interesting to note that the highest percentage of “don’t know” respondents also identified the same least important pieces of information. With so few local governments using these unique pieces of information, a measurable uncertainty is expressed among respondents. Another example is the overall mean response. When the “don’t know” respondents are eliminated from calculations, the overall mean response for invasive plant, invasive animal, endangered and threatened species and wildlife information remains closest to 2.0 or “somewhat important” (Table 14b).

Table 14a: Assume the following information is freely available and of high quality. Please indicate how **important** each type of natural resource information is for future land use plans, zoning ordinances and land use decisions/recommendations?

| Future Importance | Very Important | | Somewhat Important | | Not Important | | Don't Know | | Total # of Respondents |
|------------------------------------|----------------|------------|--------------------|------------|---------------|-----|------------|-----|------------------------|
| | N | % | N | % | N | % | N | % | |
| Agricultural | 414 | 52% | 256 | 32% | 66 | 9% | 58 | 7% | 794 |
| Wetland Vegetation | 452 | 58% | 232 | 29% | 37 | 5% | 64 | 8% | 785 |
| Upland Vegetation | 289 | 37% | 287 | 37% | 107 | 14% | 97 | 12% | 780 |
| Invasive Plant Species | 182 | 23% | 291 | 38% | 159 | 20% | 146 | 19% | 778 |
| Wildlife Species | 205 | 26% | 339 | 43% | 116 | 15% | 123 | 16% | 783 |
| Invasive Animal Species | 238 | 30% | 256 | 33% | 147 | 19% | 138 | 18% | 779 |
| Endangered & Threatened Species | 216 | 28% | 309 | 40% | 125 | 16% | 127 | 16% | 777 |
| Geology | 290 | 37% | 313 | 40% | 82 | 11% | 96 | 12% | 781 |
| Surface Water | 567 | 72% | 155 | 20% | 11 | 1% | 54 | 7% | 787 |
| Ground Water | 527 | 67% | 183 | 23% | 24 | 3% | 58 | 7% | 792 |
| Soils | 441 | 56% | 257 | 33% | 21 | 3% | 66 | 8% | 785 |
| Land cover / Land use | 470 | 60% | 236 | 30% | 20 | 2% | 61 | 8% | 787 |
| Topographic | 367 | 47% | 278 | 35% | 61 | 8% | 76 | 10% | 782 |
| Comprehensive Green Space Map | 294 | 38% | 302 | 39% | 64 | 8% | 118 | 15% | 778 |
| Other Natural Resource Information | 61 | 16% | 79 | 20% | 22 | 6% | 221 | 58% | 383 |

Table 14b. Assume the following information is freely available and of high quality. Please indicate how **important** each type of natural resource information is for future land use plans, zoning ordinances and land use decisions/recommendations (without “Don't Know” responses)?

| Future Importance | Very Important | | Somewhat Important | | Not Important | | Total # of Respondents | Mean |
|------------------------------------|----------------|------------|--------------------|------------|---------------|-----------|------------------------|-------------|
| | N | % | N | % | N | % | | |
| Agricultural | 414 | 56% | 256 | 35% | 66 | 9% | 736 | 1.53 |
| Wetland Vegetation | 452 | 63% | 232 | 32% | 37 | 5% | 721 | 1.42 |
| Upland Vegetation | 289 | 42% | 287 | 42% | 107 | 16% | 683 | 1.73 |
| Invasive Plant Species | 182 | 29% | 291 | 46% | 159 | 25% | 632 | 1.96 |
| Wildlife Species | 205 | 31% | 339 | 51% | 116 | 18% | 660 | 1.87 |
| Invasive Animal Species | 238 | 37% | 256 | 40% | 147 | 23% | 641 | 1.86 |
| Endangered & Threatened Species | 216 | 33% | 309 | 48% | 125 | 19% | 650 | 1.86 |
| Geology | 290 | 42% | 313 | 46% | 82 | 12% | 685 | 1.70 |
| Surface Water | 567 | 77% | 155 | 21% | 11 | 2% | 733 | 1.24 |
| Ground Water | 527 | 72% | 183 | 25% | 24 | 3% | 734 | 1.31 |
| Soils | 441 | 61% | 257 | 36% | 21 | 3% | 719 | 1.42 |
| Land cover / Land use | 470 | 65% | 236 | 32% | 20 | 3% | 726 | 1.38 |
| Topographic | 367 | 52% | 278 | 39% | 61 | 9% | 706 | 1.57 |
| Comprehensive Green Space Map | 294 | 44% | 302 | 46% | 64 | 10% | 660 | 1.65 |
| Other Natural Resource Information | 61 | 38% | 79 | 49% | 22 | 13% | 162 | 1.76 |

Overall, regional planning commissions rank wildlife and endangered and threatened species information as most important, followed by counties, then townships (Table 15). Following the pattern of use, local governments in the Eastern Upper Peninsula identified wildlife and rare species information as the most important (very and somewhat combined) and the Southern Lower Peninsula governments, least important (Table 16).

Table 15. Importance of wildlife and endangered and threatened species information for future planning and the level of government.

| Level of Government | Very Important | Somewhat Important | Not Important | Total # of Respondents |
|--|----------------|--------------------|---------------|------------------------|
| Wildlife species information | | | | |
| Regional Planning Commission | 5 (42%) | 6 (50%) | 1 (8%) | 12 (2%) |
| County | 16 (38%) | 22 (52%) | 4 (10%) | 42 (6%) |
| Township | 184 (31%) | 309 (51%) | 111 (18%) | 604 (92%) |
| Total # of Respondents | 205 (31%) | 337 (51%) | 116 (18%) | 658 |
| Endangered and threatened species information | | | | |
| Regional Planning Commission | 6 (50%) | 6 (50%) | 0 | 12 (2%) |
| County | 17 (44%) | 18 (46%) | 4 (10%) | 39 (6%) |
| Township | 192 (32%) | 284 (48%) | 121 (20%) | 597 (92%) |
| Total # of Respondents | 215 (33%) | 308 (48%) | 125 (19%) | 648 |

Table 16. Location of local governments that ranked wildlife and endangered and threatened species information as important for future planning.

| Location in State | Very Important | Somewhat Important | Not Important | Total # of Respondents |
|--|-----------------|--------------------|---------------|------------------------|
| Wildlife species information | | | | |
| Western Upper Peninsula | 14 (37%) | 18 (47%) | 6 (16%) | 38 |
| Eastern Upper Peninsula | 15 (42%) | 18 (50%) | 3 (8%) | 36 |
| Northern Lower Peninsula | 82 (41%) | 91 (46%) | 26 (13%) | 199 |
| Southern Lower Peninsula | 94 (24%) | 210 (55%) | 81 (21%) | 385 |
| Total # of Respondents | 205 (31%) | 337 (51%) | 116 (18%) | 658 |
| Endangered and threatened species information | | | | |
| Western Upper Peninsula | 12 (32%) | 19 (50%) | 7 (18%) | 38 |
| Eastern Upper Peninsula | 12 (35%) | 18 (53%) | 4 (12%) | 34 |
| Northern Lower Peninsula | 74 (39%) | 89 (46%) | 29 (15%) | 192 |
| Southern Lower Peninsula | 117 (31%) | 182 (47%) | 85 (22%) | 384 |
| Total # of Respondents | 215 (33%) | 308 (48%) | 125 (19%) | 648 |

Three well known and well defined types of natural resource information were ranked as first, second and third most important for future planning and zoning efforts. Responses indicate agricultural, surface water and soils information were chosen respectively (Table 17). Endangered and threatened species information was least important in all three categories.

Table 17: Of the above natural resource information categories, please rank the **three most important** types of natural resource information that you would be interested in for future planning and zoning efforts.

| Future Most Important Information | Most Important | | Second Most Important | | Third Most Important | |
|------------------------------------|----------------|------------|-----------------------|------------|----------------------|------------|
| | N | % | N | % | N | % |
| Agricultural | 179 | 27% | 45 | 7% | 46 | 7% |
| Wetland Vegetation | 76 | 11% | 75 | 12% | 53 | 8% |
| Upland Vegetation | 9 | 1% | 16 | 2% | 20 | 3% |
| Invasive Plant Species | 10 | 2% | 9 | 1% | 16 | 3% |
| Wildlife Species | 12 | 2% | 16 | 2% | 20 | 3% |
| Invasive Animal Species | 6 | 1% | 16 | 2% | 21 | 3% |
| Endangered & Threatened Species | 3 | .5% | 5 | 1% | 7 | 1% |
| Geology | 9 | 1% | 15 | 2% | 22 | 4% |
| Surface Water | 107 | 16% | 166 | 25% | 84 | 13% |
| Ground Water | 115 | 17% | 125 | 19% | 79 | 12% |
| Soils | 29 | 5% | 56 | 9% | 93 | 15% |
| Land cover / Land use | 82 | 12% | 63 | 10% | 86 | 14% |
| Topographic | 10 | 1.5% | 22 | 3% | 38 | 6% |
| Comprehensive Green Space Map | 10 | 2% | 20 | 3% | 39 | 6% |
| Other Natural Resource Information | 15 | 2% | 10 | 2% | 10 | 2% |
| Total # of Respondents | 672 | | 659 | | 634 | |

An index was created to identify overall, how important the different types of natural resource information were to local governments (Table 18). The number of respondents identifying a type of information as “most important” was multiplied by three, the number of respondents identifying a type of information as “second most important” was multiplied by two, and the number of respondents identifying a type of information as “third most important” was multiplied by one. The results were then summed and divided by the highest possible score. The highest possible score a single type of information could receive is 2016 (total # of respondents under the most important column, $672 * 3 = 2016$). This created an index between 0 and 1. An example is provided: Agricultural information $(179*3) + (45*2) + (46*1) / 2016 = .334$. The index was then ranked by score. Surface water information is most important overall, followed with a tie between agricultural and ground water information.

Table 18. Top three types of natural resource information with index.

| Future Most Important Information | Most Important | Second Most Important | Third Most Important | Index | Rank |
|------------------------------------|----------------|-----------------------|----------------------|-------------|----------|
| | N | N | N | | |
| Agricultural | 179 | 45 | 46 | .334 | 2 |
| Wetland Vegetation | 76 | 75 | 53 | .214 | 4 |
| Upland Vegetation | 9 | 16 | 20 | .039 | 9 |
| Invasive Plant Species | 10 | 9 | 16 | .032 | 12 |
| Wildlife Species | 12 | 16 | 20 | .044 | 8 |
| Invasive Animal Species | 6 | 16 | 21 | .035 | 11 |
| Endangered & Threatened Species | 3 | 5 | 7 | .013 | 13 |
| Geology | 9 | 15 | 22 | .039 | 9 |
| Surface Water | 107 | 166 | 84 | .366 | 1 |
| Ground Water | 115 | 125 | 79 | .334 | 2 |
| Soils | 29 | 56 | 93 | .145 | 5 |
| Land cover / Land use | 82 | 63 | 86 | .227 | 3 |
| Topographic | 10 | 22 | 38 | .056 | 6 |
| Comprehensive Green Space Map | 10 | 20 | 39 | .054 | 7 |
| Other Natural Resource Information | 15 | 10 | 10 | .037 | 10 |
| Total # of Respondents | 672 | 659 | 634 | | |

Of the local governments that did rank wildlife and endangered and threatened species in the top three most important categories, townships identified the information as overall more important than counties or regional planning commissions (Table 19). These townships were overwhelmingly located in the Southern Lower Peninsula (Table 20).

Table 19. Level of government indicating wildlife species or endangered and threatened species information were the top 3 in importance for future planning.

| Level of Government | Most Important | | Second Most Important | | Third Most Important | | Total # of Respondents | Total # of Respondents to Question |
|------------------------------|------------------|---------------------------------|-----------------------|---------------------------------|----------------------|---------------------------------|------------------------|------------------------------------|
| | Wildlife species | Endangered & threatened species | Wildlife species | Endangered & threatened species | Wildlife species | Endangered & threatened species | | |
| Regional Planning Commission | 0 | 0 | 0 | 0 | 1 (100%) | 0 | 1(3%) | 34 |
| County | 0 | 0 | 0 | 0 | 1 (100%) | 0 | 1 (1%) | 110 |
| Township | 12 (20%) | 3 (5%) | 16 (26%) | 5 (8%) | 18 (30%) | 7 (11%) | 61 (3%) | 1,815 |
| Total # of Respondents | 12 (19%) | 3 (5%) | 16 (25%) | 5 (8%) | 20 (32%) | 7 (11%) | 63 (3%) | 1,959 |

Table 20. Location of local governments indicating wildlife species or endangered and threatened species information were the top 3 in importance for future planning.

| Location in State | Most Important | | Second Most Important | | Third Most Important | | Total # of Respondents |
|---------------------------------|------------------|---------------------------------|-----------------------|---------------------------------|----------------------|---------------------------------|------------------------|
| | Wildlife species | Endangered & threatened species | Wildlife species | Endangered & threatened species | Wildlife species | Endangered & threatened species | |
| Western Upper Peninsula | 3 (43%) | 0 | 0 | 1 (14%) | 2 (29%) | 1 (14%) | 7 |
| Eastern Upper Peninsula | 1 (25%) | 1 (25%) | 0 | 0 | 2 (50%) | 0 | 4 |
| Northern Lower Peninsula | 4 (19%) | 1 (5%) | 6 (28%) | 1 (5%) | 8 (38%) | 1 (5%) | 21 |
| Southern Lower Peninsula | 4 (13%) | 1 (3%) | 10 (32%) | 3 (10%) | 8 (26%) | 5 (16%) | 31 |
| Total # of Respondents | 12 (19%) | 3 (5%) | 16 (25%) | 5 (8%) | 20 (32%) | 7 (11%) | 63 |

Respondents indicated they needed to know most of all where to access natural resource information (mean 1.47), then funding to acquire the information (mean 1.66) (Table 21). Consultation with biologists on the environmental impacts of proposed land uses was in least demand (mean 2.02), although overall response was still closest to “somewhat need” (mean 2.0).

Table 21: With respect to incorporating natural resource information into land use planning and zoning, **how much of a need** do you have for the following information or services?

| Information or Services | Great Need (1) | | Somewhat Need (2) | | No Need (3) | | Total # of Respondents | Mean |
|---|----------------|------------|-------------------|------------|-------------|------------|------------------------|-------------|
| | N | % | N | % | N | % | | |
| Knowing where to access information | 470 | 59% | 273 | 35% | 51 | 6% | 794 | 1.47 |
| Computer hardware or software information | 241 | 32% | 371 | 48% | 155 | 20% | 767 | 1.89 |
| Funding to acquire information | 363 | 47% | 305 | 40% | 103 | 13% | 771 | 1.66 |
| Interpretation of information | 261 | 34% | 406 | 52% | 107 | 14% | 774 | 1.80 |
| Application of information | 256 | 33% | 410 | 53% | 105 | 14% | 771 | 1.80 |
| Creation of ordinances to protect natural resources | 235 | 31% | 405 | 52% | 133 | 17% | 773 | 1.87 |
| Consultation with biologists on environmental impacts of proposed land uses | 172 | 23% | 411 | 53% | 186 | 24% | 769 | 2.02 |
| Other needs | 24 | 13% | 30 | 16% | 135 | 71% | 189 | 2.59 |

The majority of local governments describe the level of past and anticipated future residential and commercial development as somewhat increasing. When combining the somewhat increasing and greatly increasing respondents, more than 80% of local governments are expecting increased development in the next five years (Table 22).

Table 22: How would you describe the **amount** of residential and commercial development occurring in your township/county/region over the past, and anticipated future, five-year time period?

| Development | Greatly Increasing | | Somewhat Increasing | | Unchanged | | Somewhat Decreasing | | Greatly Decreasing | | Don't Know | | Total # of Respondents |
|------------------------|--------------------|-----|---------------------|-----|-----------|----|---------------------|----|--------------------|----|------------|----|------------------------|
| | N | % | N | % | N | % | N | % | N | % | N | % | |
| Past five years | 267 | 31% | 457 | 54% | 79 | 9% | 23 | 3% | 10 | 1% | 13 | 2% | 849 |
| Next five years | 270 | 32% | 443 | 52% | 64 | 8% | 22 | 2% | 5 | 1% | 41 | 5% | 845 |

The final analysis looks at respondents with planning credentials. Not surprisingly, since the survey was sent to the clerk, the majority of respondents do not have planning credentials (Table 23). Respondents that do have planning credentials are mainly located in county governments and in the Southern Lower Peninsula (Table 24).

Table 23: Are you a Certified Planner or do you have other specific **planning credentials**?

| Planning Credentials | Frequency | Percent |
|----------------------|-----------|---------|
| Yes | 93 | 10.9 |
| No | 762 | 89.1 |
| Total | 855 | 100.0 |
| No response | 82 | |
| Total | 937 | |

Table 24. Planning credentials by level of government and location in state.

| | | Planning credentials | | Total # of Respondents |
|----------------------------|---------------------------------|----------------------|-----------|------------------------|
| | | Yes | No | |
| Level of Government | Regional Planning Commission | 2 (15%) | 11 (85%) | 13 |
| | County | 10 (21%) | 38 (79%) | 48 |
| | Township | 80 (10%) | 712 (90%) | 792 |
| Total # of Respondents | | 92 (11%) | 761 (89%) | 853 |
| Location in State | Western Upper Peninsula | 3 (7%) | 42 (93%) | 45 |
| | Eastern Upper Peninsula | 4 (8%) | 48 (92%) | 52 |
| | Northern Lower Peninsula | 23 (9%) | 236 (91%) | 259 |
| | Southern Lower Peninsula | 62 (12%) | 435 (88%) | 497 |
| Total # of Respondents | | 92 (11%) | 761 (89%) | 853 |

Approximately half of the respondents were male (53%) and female (47%), and two-thirds were elected (68.5%) officials (see Appendix D). The mean average number of years respondents have been in their current position is ten, although, the value that appears most frequently (mode) is one year. The mean age was 55.5 and approximately one-third (29%) of the respondents have had some college education. The last question on the survey provided space for comments from the respondent. Most of the returned, non-usable township surveys indicated they did not have planning or zoning responsibilities but the county conducted planning on their behalf. Additional comments, along with the answers to the “other” categories in previous questions, will be summarized in the final report.

Discussion

One challenge in conducting this survey was finding a source of names and addresses for local planning and zoning officials at the county and township level. Michigan does not have an organization that gathers land use contact information for the benefit of society. The Michigan Association of Planning tracks paying members, although not consistently by position, and for those local governments that do not have a membership, their information is unknown. The Michigan Association of Townships tracks the supervisor, clerk, treasurer and trustee positions. The Michigan Association of Counties tracks the clerk, drain commissioner, prosecuting attorney, registrar of deeds, sheriff, treasurer and county commissioners. E-mail addresses were not available from any organization. An additional challenge with this project was knowing which of the 1,242 townships plan and/or zone. The status can change at any time. Given these difficulties, we chose to replicate part of the methodology the Institute for Public Policy and Social Research undertook in 2003. That is, conduct a statewide survey of local governments and send the survey to the clerk (IPPSR 2004).

Knowing the clerk would be receiving the survey, instructions were provided that informed the recipient the survey should be filled out by an individual that actively gathers land use planning and zoning information. The survey response rate of this project was high (70%) and the responses that were provided were valuable and informative. Based on the survey results, almost half of the respondents were clerks (48%) and two-thirds (68%) of the respondents indicated their position requires making land use planning or zoning decisions/recommendations (see Appendix D). Clerks are often active members on a Board of Trustees, where final decisions are made about land use decisions, but clerks are not usually members of a Planning Commission. Since Planning Commissions are designed to make recommendations to the Board of Trustees on land use issues, it is the Commission members that are most likely to use and interpret natural resource information. Ideally, township and county Planning Commission or Zoning Board members should have received this survey.

The most common types of natural resource information used by local governments are: 1) surface water, 2) land cover / land use, 3) soils, and 4) wetland vegetation information. This may not be surprising since social, economic and regulatory factors heavily influence each category. The economic value of water front property has always driven development towards those areas with favorable access to open water. Due to unregulated development in wetlands, pollution of public waterways, contamination of ground water supplies and declining wildlife habitat, the Clean Water Act was passed in the 1970's to restore and maintain the chemical, physical, and

biological integrity of the nation's waters (ELI 2003). Surface water, ground water and wetland activities are now regulated under the Clean Water Act. In Michigan, this responsibility has been assumed by the Department of Environmental Quality. As a result, most information dealing with water or wetlands is provided by the MDEQ. Prime agricultural lands were identified long ago by willing and interested settlers using soils information from the United States Department of Agriculture. Soils information continues to be a critical component in site development decisions today. Understanding the patterns and use of our landscape is critical to land use planners at all levels. Both the Michigan Department of Natural Resources and Michigan State University provide land cover / land use information to the public. Some regional planning commissions are also able to provide more up-to-date land cover/use analysis. Several state and federal programs focus on the most commonly used pieces of natural resource information. These programs have been in existence for a long time compared to programs that offer access to some of the other information. It will be informative to learn during the second phase of this project, why local governments are not using some of the other information like invasive animal, invasive plant, wildlife, and endangered and threatened species information. Based on survey results, these types of information were used the least.

The relatively small number of local governments that do use wildlife (124) and endangered and threatened species (133) information are located primarily in the Northern Lower Peninsula and Upper Peninsula. Large parcels of public and private land are located in northern Michigan with relatively low densities of development. These parcels provide significant areas of suitable habitat for wildlife and rare species which increases the likelihood that community discussions will occur concerning the impact of land use activities on wildlife and rare species. These same factors likely affected the response on the importance of rare species and wildlife information. Northern Michigan respondents identified this information as more important than Southern Michigan respondents. However, when asked to rank their top three types of natural resource information relative to all possibilities, Southern Lower Peninsula governments identified wildlife and rare species information more frequently than northern governments. The lack of high quality habitat and pressure from development may be influencing southern Michigan respondents. The few local governments that have sought out rare species information have primarily been from southern Michigan (personal communication with MNFI).

Regional planning commissions expressed more interest in wildlife and rare species information than county or township governments. This may reflect the availability of time, technical and financial resources, and personnel required to pursue these more incomplete pieces of information. At least half of the natural resource information should be provided to local governments in hard copy format since the majority of respondents were not interested in electronic information (only 40%). Follow-up interviews will provide a better evaluation of the capabilities and reasons for the differences among the local governments.

Given that most local governments have not used wildlife or endangered species information, they did not express high satisfaction for either piece of information. Even though townships were least likely to use the wildlife or rare species information relative to counties or regional planning commissions, townships ranked the information in the top three more frequently and their satisfaction with the information the highest. This may be because the scale and detail provided at the township level is most effective. Species identification is often masked when

distributing rare species information. This may lead to more dissatisfied responses when moving to larger scales. In order to refute or confirm current hypotheses, it will be necessary to ask interviewees why certain types of information receive higher satisfaction responses than others – and vice versa.

When local governments were asked what types of natural resource information were important, they indicated surface water, ground water, land cover / land use and soils information were most important. However, when asked to rank their top three most important types of information overall, index scores showed surface water was first, and agricultural and ground water information tied for second. Ground water information received a relatively high dissatisfaction ranking by local governments. An evaluation of why ground water information was unsatisfactory will be conducted in phase II of the project. A possible recommendation may be to improve available ground water information.

Respondents indicated they most need to know where to access natural resource information. This is not surprising since natural resource information tends to be scattered among several agencies and organizations. Subsequent to knowing where to access information, funding, interpretation, application, preservation ordinances, computer requirements, and consultation with biologists were the services most requested respectively. Even though consultation with biologists was in least demand, 75% of the local governments that did respond indicated they had at least somewhat of a need (including those that have a great need) for this service. Results of the survey indicate outreach and training materials should focus on where to access natural resource information. Agencies and organizations that gather natural resource information should create one location to distribute their information. This may include links to the individual agencies or organizations, but the overriding goal would be to consolidate where natural resource information is accessed. The interview phase of this project will probe needs and training further.

Of the 937 respondents, 282 (34%) agreed to participate in an interview to further explore the current and potential role of natural resource information in planning and zoning activities. Many more local governments are willing to discuss natural resource issues than can be reasonably contacted in the scope of this project. The second and final phase of this project will involve conducting 30 representative, stratified interviews in the four ecoregions of the state. The following objectives will be addressed in the interviews:

- Are natural resources being addressed in local land use planning and zoning activities? If so, at what level are natural resources being addressed?
- Where are local governments obtaining natural resources information?
- What are the challenges and barriers to the integration of natural resource information in planning efforts?
- What information or tools (e.g. decision support systems) would facilitate greater consideration of natural resource data in local government land use planning?
- What educational efforts are needed to support these products?
- If rare species and/or natural resource information has been acquired by a local government, how have those data been incorporated into land use planning efforts? Are users aware of the data's limitations and how are those limitations addressed?

Conclusions

Reducing the rate of habitat degradation and consequent loss of biodiversity are difficult to achieve without access to good natural resource information. A 2002 survey of Michigan local land use decision makers found that across the state there is a perceived need for better information and planning tools (Suvedi et al. 2002). Local governments at the county and township levels are primary among those making land use and resource protection decisions. Local initiatives that focus on the protection of natural features are not widespread, either nationally or in Michigan (Thomas 2003). Yet, comprehensive land use planning which protects critical wildlife habitat, travel corridors, and ecological processes is an essential component of a successful conservation strategy.

Without informed decision-making, natural resources cannot be effectively protected, even when one desires to do so. Michigan has several policies and sources of data that can be used by local governments to improve the integration of natural resource information into land use planning. Under the Michigan Natural Resources and Environmental Protection Act, local governments may regulate wetlands of less than two acres if they adopt a local ordinance (Michigan Compiled Laws 324.30309). If such an ordinance is adopted, local governments must approve permits unless the wetland is “essential to the preservation of the natural resources of the local unit of government” (ELI 2003). Proving wetland importance may require additional information such as the location of endangered and threatened species, locally rare or unique ecosystems, waterfowl, or migratory birds, etc. This policy provides local governments an opportunity to protect critical resources. State leadership will be needed to provide the data and technical expertise to local governments in order to capitalize on local government capabilities to protect critical resources.

Local government officials in Michigan want to know where to access natural resource information. One recommendation may be to create a website or other portal for natural resource information, even if that application has links to other websites. If natural resource information is going to meet the needs of local land use planners, a discussion is needed regarding what, when, how and why natural resource information is and isn't being used and what, when and how is information desired. This project begins that discussion.

Even though wildlife and rare species information are not used frequently, nor ranked by many as very important, the vast majority of local governments rank the information as somewhat important. This may indicate planning officials are unaware of what information is available and how the information should be interpreted and applied to planning situations. Phase II of the project will probe these hypotheses for further explanations.

Acknowledgements

This project would not have been possible without the financial support from the Michigan Department of Natural Resources, Private Lands Program and Natural Heritage Program, and the Michigan State University, Land Policy Institute. A very special thank goes to the thirteen volunteers (graduate students, friends and family) that helped prepare, collate, stuff, stamp, and close thousands of envelopes and postcards. Michigan Natural Features Inventory also allowed Jennifer the flexibility to take graduate classes and reduce work commitments while undertaking this project.

Jennifer's graduate committee is gratefully acknowledged for providing direction, comments, suggestions, edits and patience throughout this project. Committee members are Dr. Gerhardus Schultink, (major advisor and Professor in the Community, Agriculture, Recreation and Resource Studies Department), Dr. Christine Vogt (Associate Professor in the Community, Agriculture, Recreation and Resource Studies Department), Dr. Patricia Machemer (Assistant Professor in the Urban and Regional Planning Program) and John Paskus (supervisor and MNFI Conservation Planning Program Leader). I truly would not have been able to undertake this project without the support and assistance from all the collaborators mentioned above.

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Appendix A: Original Survey

Integration of Natural Resource Information in Land Use Planning



This questionnaire is designed to assist local governments and planning officials in meeting their information and decision-making needs. Results of the survey will assist natural resource agencies, organizations and universities in providing improved data products and services to local governments and regional planning councils. This survey should be filled out by a planner, or individual that actively gathers land use planning and zoning information at the township, county or regional level. For some local governments, this may be a consultant. We ask, if the person receiving this survey is not involved with gathering planning or zoning information, that they please forward the survey to the appropriate individual.

Your views and experience are very important to us. Your response will help determine what type of natural resource information is needed and how information should be delivered to local governments. Please keep in mind that we are interested in everyone's response, from highly populated to sparsely populated townships, counties and regions across the state.

Your response will remain confidential and will never be associated with your name.

Please complete this questionnaire at your earliest convenience. Place the survey in the envelope provided and drop it in any mailbox. Return postage has been provided. The questionnaire should take about 15 minutes to complete. If you choose not to complete the questionnaire, **please return it** with a note on the last question, Question 20. Then simply place the survey in the return envelope and drop it in a mailbox.

If you have any questions regarding this survey, please contact Jennifer A. Olson, Project Manager, by e-mail: olsonje6@msu.edu or by phone: (517) 373-9405.

THANK YOU FOR YOUR ASSISTANCE!

For the purpose of this survey, **natural resources are defined as:** soils, surface and ground water, forests, minerals, air, fisheries, wildlife (common, rare, invasive), plants (common, rare, invasive), wetlands, grasslands, dunes, and other landscape features.

The Township, County, Region and You

1. How would you describe your current **appointment** in relation to the township, county or region receiving this questionnaire? *(Please check only one.)*
- Elected official
 - Appointed official
 - Hired staff
 - Volunteer staff
 - Consulting firm (please identify): _____
 - Other appointment (please identify): _____
2. Please specify your current **position** below. *(Please check only one.)*
- Township/County Supervisor
 - Township/County Manager
 - Township/County Clerk
 - Township/County Zoning Administrator
 - Township/County Zoning Board member
 - Township/County Planning Commission member
 - Township/County Planner
 - Planning Consultant (Private Firm)
 - Regional Council/Commission Planner
 - Regional Council/Commission Director
 - Other position (please identify): _____
3. Does your position require making land use planning or zoning decisions/recommendations, such as the placement of utilities, subdivisions, roads, zoning, etc. for the township/county/region?
(Please check one.)
- Yes No
4. Has your township/county adopted a Comprehensive Development Plan, Master Plan, or other similar land use plan? *(Please check one.)*
- Yes No Not Sure
5. Has your township/county adopted a Zoning Ordinance? *(Please check one.)*
- Yes No Not Sure

Integration of Natural Resource Information

6. This question has two parts. **Part 1:** Have you **used** the following types of natural resource information in your land use plans, zoning ordinances or land use decisions/recommendations? **Part 2:** If Yes, in what **format** was the information provided? (Please check up to two responses for each statement.)

| Part 1 | | | Part 2 | |
|---|--------------------------|--------------------------|---|--|
| Types of Natural Resource Information | No, did not use | Yes, used | Information provided in electronic format | Information provided in hard copy format |
| a. Agricultural (crops, livestock, size, location, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| b. Wetland vegetation (marsh, floodplain, shrub swamp, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| c. Upland vegetation (forests, prairies, savannas, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| d. Invasive plant species (purple loosestrife, Eurasian milfoil, garlic mustard, spotted knapweed, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| e. Wildlife species (game and non-game species, nuisance species, health risk species, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| f. Invasive animal species (emerald ash borer, zebra mussels, round goby, sea lamprey, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| g. Endangered & threatened species (animals and plants legally protected by state or federal legislation) | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| h. Geology (surface and subsurface minerals, oil, gas, bedrock, surface landforms, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| i. Surface water (lakes, rivers, streams, drainages, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| j. Ground water (aquifers, location, depth, springs, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| k. Soils (maps, texture, depth, productivity, erodibility, permeability, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| l. Land cover/use (maps, aerial photography, satellite imagery, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| m. Topographic (surface contours, steep slopes, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| n. Comprehensive green space map (land identified for the long term viability of natural ecosystems) | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| o. Other natural resource information (please identify and rate): | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

7. How **satisfied** were you with the natural resource information that was used in your land use plans, zoning ordinances and land use decisions/recommendations?
(Please check only one response for each statement.)

| Types of Natural Resource Information | | Very Satisfied | Moderately Satisfied | Moderately Dissatisfied | Very Dissatisfied | N/A* |
|---------------------------------------|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| a. | Agricultural (crops, livestock, size, location, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. | Wetland vegetation (marsh, floodplain, shrub swamp, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. | Upland vegetation (forests, prairies, savannas, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d. | Invasive plant species (purple loosestrife, Eurasian milfoil, garlic mustard, spotted knapweed, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| e. | Wildlife species (game and non-game species, nuisance species, health risk species, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| f. | Invasive animal species (emerald ash borer, zebra mussels, round goby, sea lamprey, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| g. | Endangered & threatened species (animals and plants legally protected by state or federal legislation) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| h. | Geology (surface and subsurface minerals, oil, gas, bedrock, surface landforms, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| i. | Surface water (lakes, rivers, streams, drainages, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| j. | Ground water (aquifers, location, depth, springs, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| k. | Soils (maps, texture, depth, productivity, erodibility, permeability, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| l. | Land cover/use (maps, aerial photography, satellite imagery, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| m. | Topographic (surface contours, steep slopes, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| n. | Comprehensive green space map (land identified for the long term viability of natural ecosystems) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| o. | Other natural resource information (please identify and rate): | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

* Information was not available, or available but not used.

8. How **often** do you use natural resource information in the following land use planning and zoning activities? *(Please check only one response for each statement.)*

| Planning and Zoning Activities | Always (100%) | Frequently (~75%) | Sometimes (~50%) | Rarely (~25%) | Never (0%) | N/A* |
|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| a. Master Plan creation or update | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Site Development reviews | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Planned Unit Developments (PUDs) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d. Land Division reviews | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| e. Zoning Ordinance creation or update (map or text) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| f. Preservation Ordinance creation or update (wetland, open space, woodland ordinance) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| g. Land Acquisition planning | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| h. Park and Recreation planning | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| i. Transportation planning | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| j. Utility planning | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| k. Capital Improvements planning | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| l. Other activities (please identify and rate): | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

* Not Applicable, activity not conducted by township/county/region.

9. How would you describe the **amount** of residential and commercial development occurring in your township/county/region over the past, and anticipated future, five-year time period?
(Please check only one response for each statement.)

| Time Period | Greatly Increasing | Somewhat Increasing | Unchanged | Somewhat Decreasing | Greatly Decreasing | Don't Know |
|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| a. Past five years | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Next five years | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

10. Assume the following information is freely available and of high quality. Please indicate how **important** each type of natural resource information is for future land use plans, zoning ordinances and land use decisions/recommendations? *(Please check only one response for each statement.)*

| Types of Natural Resource Information | | Very Important | Somewhat Important | Not Important | Don't Know |
|---------------------------------------|--|--------------------------|--------------------------|--------------------------|--------------------------|
| a. | Agricultural (crops, livestock, size, location, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. | Wetland vegetation (marsh, floodplain, shrub swamp, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. | Upland vegetation (forests, prairies, savannas, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d. | Invasive plant species (purple loosestrife, Eurasian milfoil, garlic mustard, spotted knapweed, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| e. | Wildlife species (game and non-game species, nuisance species, health risk species, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| f. | Invasive animal species (emerald ash borer, zebra mussels, round goby, sea lamprey, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| g. | Endangered & threatened species (animals and plants legally protected by state or federal legislation) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| h. | Geology (surface and subsurface minerals, oil, gas, bedrock, surface landforms, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| i. | Surface water (lakes, rivers, streams, drainages, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| j. | Ground water (aquifers, location, depth, springs, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| k. | Soils (maps, texture, depth, productivity, erodibility, permeability, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| l. | Land cover/use (maps, aerial photography, satellite imagery, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| m. | Topographic (surface contours, steep slopes, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| n. | Comprehensive green space map (land identified for the long term viability of natural ecosystems) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| o. | Other natural resource information (please identify and rate): | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

11. Of the above natural resource information categories, please rank the **three most important** types of natural resource information that you would be interested in for future planning and zoning efforts? *(Please write one type of information after each rank.)*

Most important _____

Second most important _____

Third most important _____

12. If you were to request natural resource information about your township/county/region, in what **format** would the information be most preferred? *(Please check one.)*

Hard copy format – paper copies of maps, tables, reports, publications, etc.

Electronic format – GIS data layers, web based data, digital info, models, etc.

13. With respect to incorporating natural resource information into land use planning and zoning, **how much of a need** do you have for the following information or services? *(Please check only one response for each statement.)*

| Information / Services | Great Need | Somewhat Need | No Need |
|--|--------------------------|--------------------------|--------------------------|
| a. Knowing where to access information | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Computer hardware or software information (GIS recommendations, minimum requirements, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Funding to acquire information | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d. Interpretation of information | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| e. Application of information | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| f. Creation of ordinances to protect natural resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| g. Consultation with biologists on environmental impact of proposed land uses | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| h. Other needs (please identify and rate): | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

14. Would you be willing to participate in an **interview** (telephone or in-person) to further explore the current and potential role of natural resource information, and data products, in your township/county/regional land use planning and zoning activities? *(Please check one.)*

Yes

No

Background Information

15. How many years have you been in your current position? *(Please write in number of years.)*
_____ Years
16. Are you: Male Female
17. In what year were you born? _____ *(Please write in year.)*
18. What is the highest level of formal education that you have completed? *(Please check only one.)*
- Less than high school
 - High school diploma or equivalent
 - Some college
 - Associate's degree
 - Technical / vocational degree
 - Bachelor's or 4 year degree
 - Graduate or professional degree (Master's, Doctorate, etc.)
19. Are you a Certified Planner or do you have other specific planning credentials? *(Please check one.)*
- Yes, please identify credentials: _____
 - No
20. Please use the space below for any additional comments you wish to make regarding the use of natural resource information in land use planning and zoning.

Thank you very much for your participation!

**Appendix B: Approval from Michigan State University – University Committee on
Research Involving Human Subjects (UCRIHS)**

MICHIGAN STATE
UNIVERSITY

Initial IRB
Application
Approval

July 12, 2005

To: Gerhardus SCHULTINK
310 Natural Resources

Re: **IRB # 05-362** Category: EXPEDITED 2-7
Approval Date: July 11, 2005
Expiration Date: July 10, 2006

Title: INTEGRATION OF NATURAL RESOURCE INFORMATION IN LAND USE PLANNING

The University Committee on Research Involving Human Subjects (UCRIHS) has completed their review of your project. I am pleased to advise you that **your project has been approved**.

The committee has found that your research project is appropriate in design, protects the rights and welfare of human subjects, and meets the requirements of MSU's Federal Wide Assurance and the Federal Guidelines (45 CFR 46 and 21 CFR Part 50). The protection of human subjects in research is a partnership between the IRB and the investigators. We look forward to working with you as we both fulfill our responsibilities.

Renewals: UCRIHS approval is valid until the expiration date listed above. If you are continuing your project, you must submit an **Application for Renewal** application at least one month before expiration. If the project is completed, please submit an **Application for Permanent Closure**.

Revisions: UCRIHS must review any changes in the project, prior to initiation of the change. Please submit an **Application for Revision** to have your changes reviewed. If changes are made at the time of renewal, please include an **Application for Revision** with the renewal application.

Problems: If issues should arise during the conduct of the research, such as unanticipated problems, adverse events, or any problem that may increase the risk to the human subjects, notify UCRIHS promptly. Forms are available to report these issues.

Please use the IRB number listed above on any forms submitted which relate to this project, or on any correspondence with UCRIHS.

Good luck in your research. If we can be of further assistance, please contact us at 517-355-2180 or via email at UCRIHS@msu.edu. Thank you for your cooperation.

Sincerely,



Peter Vasilenko, Ph.D.
UCRIHS Chair

C: Jennifer Olson
2519 Wilson Ave
Lansing, MI 48906



OFFICE OF
**RESEARCH
ETHICS AND
STANDARDS**

University Committee on
Research Involving
Human Subjects

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48824

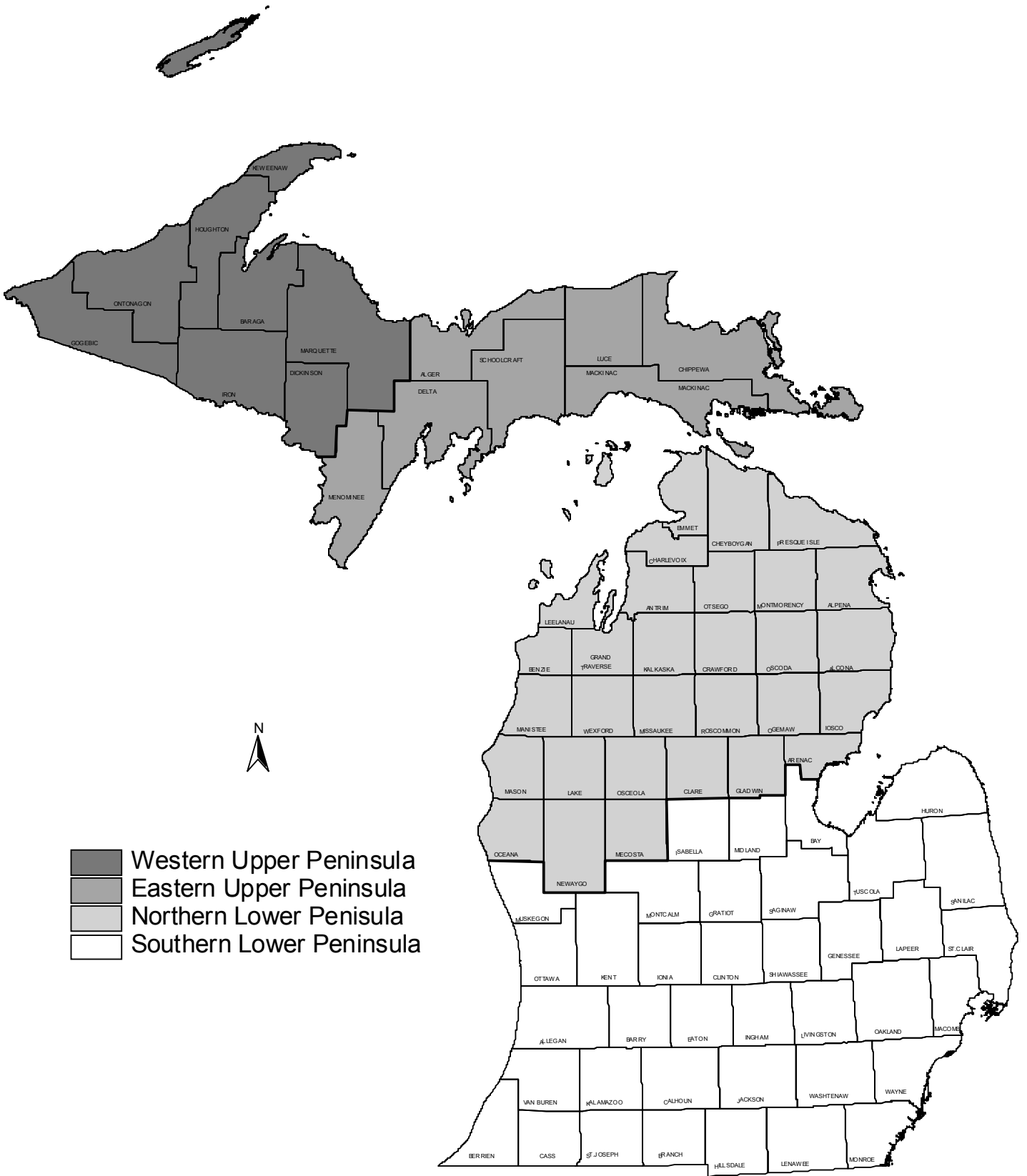
517/355-2180
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Appendix C: Regions used in analysis based on Albert's regional landscape ecosystem



- Western Upper Peninsula
- Eastern Upper Peninsula
- Northern Lower Peninsula
- Southern Lower Peninsula

Appendix D: Analysis of Survey Questions not included in Results Section

Table D-1: How would you describe your current **appointment** in relation to the township, county or region receiving this questionnaire?

| Current Appointment | Frequency | Percent |
|---------------------|-----------|---------|
| Elected official | 608 | 68.5 |
| Appointed official | 160 | 18.0 |
| Hired staff | 102 | 11.5 |
| Volunteer staff | 2 | .2 |
| Consulting firm | 13 | 1.5 |
| Other appointment | 2 | .2 |
| Total | 887 | 100.0 |
| No response | 50 | |
| Total | 937 | |

Table D-2: Please specify your current **position**.

| Current Position | Frequency | Percent |
|---|-----------|---------|
| Township or County Supervisor | 146 | 16.3 |
| Township or County Manager | 5 | .6 |
| Township or County Clerk | 431 | 48.2 |
| Township or County Zoning Administrator | 106 | 11.9 |
| Township or County Zoning Board member | 14 | 1.6 |
| Township or County Planning Commission member | 89 | 10.0 |
| Township or County Planner | 45 | 5.0 |
| Private Planning Consultant | 9 | 1.0 |
| Regional Commission Planner | 9 | 1.0 |
| Regional Commission Director | 3 | .3 |
| Other position | 37 | 4.1 |
| Total | 894 | 100.0 |
| No response | 43 | |
| Total | 937 | |

Table D-3: How many **years** have you been in your current position?

| Years in Current Position | |
|---------------------------|------|
| Mean | 10.0 |
| Median | 8.0 |
| Mode | 1.0 |
| Minimum | .5 |
| Maximum | 57.0 |
| Missing | 70 |
| Number of Respondents | 867 |

Table D-4: Does your position require making **land use planning or zoning decisions/recommendations**, such as the placement of utilities, subdivisions, roads, zoning, etc. for the township/county/region?

| Land Use Decisions | Frequency | Percent |
|--------------------|-----------|---------|
| Yes | 597 | 67.7 |
| No | 285 | 32.3 |
| Total | 882 | 100.0 |
| No response | 55 | |
| Total | 937 | |

Table D-5: Would you be willing to participate in an **interview** (telephone or in-person) to further explore the current and potential role of natural resource information, and data products, in your township/county/regional land use planning and zoning activities?

| Interview | Frequency | Percent |
|-------------|-----------|---------|
| Yes | 282 | 34.4 |
| No | 537 | 65.6 |
| Total | 819 | 100.0 |
| No response | 118 | |
| Total | 937 | |

Table D-6: Are you male or female?

| Gender | Frequency | Percent |
|-------------|-----------|---------|
| Male | 457 | 52.6 |
| Female | 411 | 47.4 |
| Total | 868 | 100.0 |
| No response | 69 | |
| Total | 937 | |

Table D-7: In what **year** were you born?

| Year Born | |
|-----------------------|---------|
| Mean | 1950.5 |
| Median | 1950 |
| Mode | 1947(a) |
| Minimum | 1919 |
| Maximum | 1984 |
| Missing | 112 |
| Number of Respondents | 825 |

(a) Multiple modes exist. The smallest value is shown.

Table D-8: What is the highest level of formal **education** that you have completed?

| Education | Frequency | Percent |
|-----------------------------------|-----------|---------|
| Less than high school | 5 | .6 |
| High school diploma or equivalent | 169 | 19.6 |
| Some college | 248 | 28.7 |
| Associate's degree | 95 | 11.0 |
| Technical / vocational degree | 38 | 4.4 |
| Bachelor's or 4-year degree | 186 | 21.6 |
| Graduate or professional degree | 122 | 14.1 |
| Total | 863 | 100.0 |
| No response | 74 | |
| Total | 937 | |