

Eastern Upper Peninsula Eco-Region Indicator Worksheet

Criterion 1 Conservation of Biological Diversity

Biological diversity, or biodiversity, is the variability among living organisms and the ecological systems of which they are a part. Biodiversity can be measured at the landscape, ecosystem, species and genetic levels. The conservation of biodiversity ensures that all ecosystems maintain their integrity and continue to be productive and to adapt to changing conditions.

Indicator 1.1 Landscape and Ecosystem Diversity

The complexity of landscapes is determined by the number of patches, their characteristics, their size and shape and their connectivity. Ecosystem diversity is the kind and number of ecosystems in an area and the patterns of association of ecosystems with one another and the recurrence of these patterns in a given landscape. The impacts of change in landscapes are expressed through shifts in ecosystem diversity.

| Proposed Metric | Data Available | Data Format | Data Source |
|--|---|--|--|
| <p>1.1.1. Percentage and extent of vegetation types relative to historical conditions (at varying scales)</p> <p>Lever/Gauge</p> | <p>Statewide coverage LSSF management units USFS By County EUP-LTA (USFS in revision)</p> | <p>Vegetation of Michigan Circa 1800 MIRIS 1978, 1992 & 1998 Landcover IFMAP/GAP 2003 Landcover OI data FIA data MNFI Change Map</p> | <p>MDNR USFS MNFI</p> |
| <p>1.1.2 Richness and evenness of ecosystems or vegetation types (By age class for forested systems)</p> <p>Gauge</p> | <p>Same as above</p> | <p>Same as above</p> | <p>Select diversity index</p> |
| <p>1.1.3 Richness and evenness of glacial landforms or soil types and index of topographic heterogeneity</p> <p>Gauge</p> | <p>Same as above</p> | <p>Landform maps Soils data base</p> | <p>Sources of info: Heikkinen 1998, Lapin and Barnes 1995. Soil SURvey GeOgraphic – SSURGO http://www.ftw.nrsc.usda.gov/ssur_data.html/</p> |

Indicator 1.1 Landscape and Ecosystem Diversity

| Proposed Metric | Data Available | Data Format | Data Source |
|---|--|--|---|
| <p>1.1.4 Percentage, area, and representativeness of vegetation types in designated protected areas of natural and scientific interest</p> <p>Lever</p> | <p>State and Federal lands across Michigan Private Land Trusts</p> | <p>Research Natural Areas (RNA's, PRNA's) Designated Wilderness Natural Areas, State Parks</p> | <p>USFS MDNR National Park Service USFWS Private Land Trusts, e.g. TNC, LTNC</p> |
| <p>1.1.5 Level of fragmentation, connectivity, shape, size and spatial distribution of vegetation types</p> <p>Lever</p> | <p>Statewide coverage LSSF management units USFS</p> | <p>Vegetation of Michigan Circa 1800 MIRIS 1978, 1992 & 1998 Landcover IFMAP/GAP 2003 Landcover OI data FIA data</p> | <p>*www.umass.edu/landeco/research/fragstats/downloads/fragstats_downloads.html *www.umass.edu/landeco/research/fragstats/documents/Metrics?Metrics%20TOC.htm</p> |
| <p>1.1.6 Connectivity of glacial landforms and/or soil types</p> <p>Gauge</p> | <p>Same as above</p> | <p>Soil data data base Quaternary Geology</p> | <p>SSURGO –web site- see above SIRC</p> |
| <p>1.1.7 Number, area and distribution of unusual or rare vegetation types</p> <p>Gauge</p> | <p>Same as above</p> | <p>Natural Community types (not all are available spatially) Other landcover data sets</p> | <p>MNFI www.natureserve.org</p> |

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Indicator 1.2 Species Population Diversity

Species diversity refers to the number and relative abundance of species found in an area. The impacts of change in ecosystems are expressed through shifts in species biodiversity.

| Proposed Metric | Data Available | Data Format | Data Source |
|---|-----------------------------|--|---|
| <p>1.2.1 Absolute and relative abundance of habitat types and their importance for focal species..</p> <p>Gauge</p> | Statewide | MI WILD IFMAP/GAP land cover MIS/Focal species Wildlife Conservation Plan | MDNR USFS MDNR Wildlife |
| <p>1.2.2 Distribution, dispersion and Population trends of focal species.</p> <p>Gauge</p> | Depends on species selected | Range maps | University Museums and Herbaria www.natureserve.org |
| <p>1.2.3 Changes in habitat of focal species.</p> <p>Lever</p> | Statewide | Vegetation of Michigan Circa 1800 MIRIS 1978, 1992 & 1998 Landcover IFMAP/GAP 2003 Landcover OI data FIA data | MDNR USFS |
| <p>1.2.4 Species classified as threatened, endangered, rare or vulnerable and their population sizes and habitat condition</p> <p>Gauge/Lever</p> | Not all species statewide | Biotics Species surveys Landcover data above Recovery Plans | MNFI MDNR,USFS, USFWS MDNR, USFS T & E Technical Committees |

Indicator 1.2 Species Population Diversity

| Proposed Metric | Data Available | Data Format | Data Source |
|--|--|--|---|
| <p>1.2.5 Number of known species that occupy a smaller portion of their former range and the number of known species that occupy a larger portion of their former range</p> <p>Gauge</p> | <p>Not all species statewide</p> | <p>Range Maps Computerized data sets</p> | <p>University Museum and Herberia Species references and Experts e.g. Breeding Bird Atlas, Herp Atlas</p> |
| <p>1.2.6 Species richness of all plants, animals and fungi within representative ecosystems</p> <p>Gauge</p> | <p>Number of species found within a given area</p> | <p>Range maps WCR Inventory (non-game fish) MNFI</p> | <p>Floristic Quality Assessment (MDNR) Diversity Index (needs to be selected)</p> |

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Indicator 1.3 Genetic Diversity

Genetic diversity includes the range of genetic characteristics found within a species and among different species.

| Proposed Metric | Data Availability | Data Format | Data Source |
|---|---|--------------------|--|
| 1.3.1 Proportion of forest area as plantations using native vs. non-native genotypes Lever | State, Fed & Private Present/future or past also | | MSU Geneticist – Paul Blazing MDNR Nurseries/Wyman and Brighton FMFMD Cultivation Team NRCS Conservation Districts |
| 1.3.2 Proportion of water bodies using native vs. non-native fish stock genotypes Lever | Basin Watershed | | MDNR Fisheries Division Intranet Stocking Records Pictured Rocks NLP |
| 1.3.3 Proportion of water bodies with sustainable fisheries produced by stocked vs. natural reproduction Gauge | “sustainable” & “stocked reproduction” | | MDNR Fisheries Division Intranet Stocking Records WCR Funding – Reuben Goforth – MNFI |
| 1.3.4 Proportion of planted openings on managed lands with native vs. non-native species Lever | OI FTPs | Data Base Paper | PRB FMFMD WLD |

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Criterion 2 Ecosystem Condition and Productivity

Ecosystem condition is a measure of relative freedom from stress and the relative level of physical/biological energy within an ecosystem. Ecosystem productivity refers to the rate of production of organic matter within an ecosystem. This results from interactions between biological components and abiotic factors such as soil, water and climate. Sustainable productivity is dependent upon the ability of ecosystems to recover from or adapt to disturbances; both natural and human induced. A healthy and diverse ecosystem is better able to respond to and recover from changes in its environment.

Indicator 2.1 Incidence of Disturbance and Stress

Ecosystem change is constant. Many of these changes are adaptations to disturbance. Disturbances generally cause ecosystems to revert to earlier successional stages or establish new patterns of succession. Fundamental to the continued health, vitality and productivity of ecosystems are their ability to adapt to the various stresses placed upon them. Disturbances may be part of natural ecological cycles or the result of human activities. Human-induced stress and disturbance include introduced (exotic) species, prescribed burning, fire suppression, populations out of balance with available habitat, pollution and land-use practices. Natural disturbances include native insects, high wind events and fire.

| Proposed Metric | Data Availability | Data Format | Data Source |
|---|--|--------------------|---|
| 2.1.1 Area and severity of forest stressor Gauge | Statewide | GIS ArcView | MDNR-Forest Health Section OI |
| 2.1.2 Area and severity of wind and fire activity Gauge | Statewide | GIS Web sites | MDNR; VMS salvage timber sales |
| 2.1.3 Presence, extent and number of invasive exotic species Gauge | Impact plot systems, FIA (phase 3) annual damage surveys and planned urban forest health monitoring; streams | | USFWS, MDNR, MDEQ, MIPC; Forest Health and USFS-FIA Local FD files |
| 2.1.4 Area and severity of mammalian herbivory Gauge | None | | |
| 2.1.5 Area and intensity of timber harvest Lever | Statewide | | CFA Cutting Reports USFS/FIA; MDNR Cutting Reports; OI |
| 2.1.6 Land clearing/urban sprawl Gauge | | | Remote sensing data; USDA? |

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Indicator 2.2 Ecosystem Resilience

Resilience is a measure of an ecosystems’ ability to maintain its natural range of variability given its disturbance regime and other dynamics. Resilience reflects the persistence of ecosystems and their capacity to respond to changes and disturbances.

| Proposed Metric | Data Format | Data Availability | Data Source |
|---|--|-----------------------------------|---|
| 2.2.1 Area by vegetation type and age class Lever | Various inventory systems for each landowner IFMAP/GAP 2003 landcover. | Limited ownership Statewide | MDNR, USFS, USFWS, TNC MEAD-WESTVACO, FORESTLAND GROUP |
| 2.2.2 Area successfully regenerated by vegetation type Lever | Various inventory systems for each landowner IFMAP/GAP 2003 landcover | Limited to ownership Statewide | MDNR, USFS, USFWS, TNC, MEAD-WESTVACO, FORESTLAND GROUP |
| 2.2.3 Ecological function, activity and responses to perturbation within “protected areas” Gauge | | None available | |
| 2.2.4 Distribution and abundance of top carnivores. Gauge | Excel spreadsheet Access db | Regional, by county | MDNR Wildlife Division |
| 2.2.5 Distribution and abundance of mammalian herbivores Gauge | Excel spreadsheet Access db | Regional, by county | MDNR Wildlife Division |

Indicator 2.2 Ecosystem Resilience

| | | | |
|--|---|--|---|
| <p>2.2.6 Ratio of exotic invasive plant species to native plant species in natural vegetative communities</p> <p>Gauge</p> | <p>ArcView coverage Access db Possible clearinghouse for point locations IFMAP?</p> | <p>EUP T/R/S</p> | <p>MDNR Wildlife Division survey MIPC (Michigan Invasive Plant Council) MDA RCS</p> |
| <p>2.2.7 Presence of spring ephemerals</p> <p>Gauge</p> | <p>IFMAP? Other survey information</p> | <p>Stand level information T/R/S</p> | <p>MDNR Field botanists</p> |

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Indicator 2.3 Biomass

Biomass represents the total mass of living organisms inherent in an ecosystem. It is an integrating measure of ecosystem condition (health and vitality of all species and habitat types). Evidence that the condition of habitat types is constant or improving indicates that they are being managed in a sustainable way. In this case, we are measuring forest productivity.

| Proposed Metric | Data Format | Data Available | Data Source |
|---|--------------------|-----------------------|---|
| 2.3.1 Mean annual increment by forest type and age class Lever | | . | USDA Forest Service FIA MI DNR IFMAP (FMFM) |
| 2.3.2 Net annual growth by forest type and age class for the EUP Lever | | | |
| 2.3.3 Biomass volumes of standing flora. Gauge | | | Same as above Literature search for other vegetative and historical information. |

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Indicator 2.4 Ecosystem Structure

Vegetation and other biotic and abiotic materials provide the physical structure within which most organisms live. Ecosystem structure includes the presence and arrangement of these physical structures in three dimensional space. Species richness in some taxa is correlated with ecosystem community structure.

| Proposed Metric | Data Format | Data Availability | Data Source |
|---|---|---|---|
| FORESTED ECOSYSTEMS | | | |
| 2.4.1 Number of super canopy trees Lever | OI, IFMAP, FIA Other forest inventory | Compartments on state lands, USFS, Corporate lands, NPS, USFWS, conservancies on their ownerships | MDNR, USFS, USFWS, TNC MEAD-WESTVACO, FORESTLAND GROUP Other conservancies |
| 2.4.2 Snags per area, basal area, mean DBH and decay class Lever | IFMAP (in part) | State forest lands | MDNR |
| 2.4.3 Cavities per area by size class Lever | Not recorded on state or federal ownerships except incidentally | Sporadic – biologist’s files May be a note in OI | MDNR USFS |
| 2.4.4 Coarse woody debris per area, mean DBH and decay class Lever | IFMAP, FIA | Statewide | MDNR, USFS |
| 2.4.5 Number of vertical vegetation layers per area Lever | IFMAP, FIA | Statewide | MDNR, USFS |

Indicator 2.4 Ecosystem Structure

| Proposed Metric | Data Format | Data Availability | Data Source |
|--|--|--------------------------|--------------------|
| 2.4.6 Number and size of tree fall gaps, harvest gaps and maintained wildlife openings per area in northern hardwood ecosystems Lever | OI data (for wildlife openings) | Statewide | MDNR, USFS |
| 2.4.7 Tree size: basal area per acre/hectare for different forested communities Lever | OI data, FIA | Statewide | MDNR, USFS |
| 2.4.8 Distribution of cliffs, outcrops, sinks and glacial erratics Gauge | Quaternary geology? MNFI Biotics, OI data | Statewide (sporadic) | MDNR, MNFI |
| NON FORESTED ECOSYSTEMS (dunes, bogs, etc.) | | | |
| 2.4.9 Number of vertical vegetation layers per area Gauge | IFMAP, FIA, Special studies in various community types | Statewide | MDNR, USFS, MNFI |
| 2.4.10 Ratio of open water to emergent vegetation in wetlands Gauge | | | |

Indicator 2.4 Ecosystem Structure

| AQUATIC ECOSYSTEMS | | | |
|--|--|--|---|
| 2.4.11 Surface and sub-surface geology of valley segment Gauge | | | UP Valley Segment Classification Data011203_1325 (Ed Baker – Version 1; MI Water Atlas – Institute of Fisheries/Ann Arbor; Hydrology & Recreation on the Cold-Water Rivers of Michigan’s UP (Water Information Series Report 4) – US Geological Survey Land and Water Management Division/Inland Lakes Local files |
| 2.4.12 Number of vertical vegetation layers by valley segment Gauge | | | |
| 2.4.13 Surface and sub-surface hydrology of valley segment Gauge | | | |
| 2.4.14 Coarse woody debris per area, mean DBH and decay class Lever | | | |
| 2.4.15 Bathymetric shape of lakes Gauge | | | |
| 2.4.16 Aquatic plant abundance and distribution Gauge | | | |

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Criterion 3 Water and Soil Conservation

Water and Soil are essential to sustaining the functioning and productive capacity of ecosystems. Water conservation is an important provision of suitable aquatic environments for plants and animals, and for the provision of potable water for humans and wildlife; whereas, soil conservation is the maintenance of the living substrate for forests, shrubs and grasslands.

Indicator 3.1 Water quality

Long term productivity and resilience of habitats, and a potable water supply for humans and wildlife, are dependent upon an abundant and clean water source. In order to ensure that aquatic ecosystems are maintained, policies that address stream crossings, watershed management and riparian areas will help maintain water flow patterns, water levels and water quality.

| Proposed Metric | Data Available | Data Format | Data Source |
|--|----------------|----------------------|--------------------------------|
| SURFACE WATER METRICS | | | |
| 3.1.1 Percent of rural/urban land managed for water conservation (watershed quality) Lever | | Spreadsheets Maps | SIRC |
| 3.1.2 Water chemistry (pH, dissolved O ² , water conductivity, turbidity and water temperatures) and volume flow Gauge | | Spreadsheets; ACCESS | FD Marquette; FD Newberry; SWQ |
| 3.1.3 Fecal coliform Gauge | | | County Health Dept., DEQ |
| 3.1.4 Nutrients (nitrates and phosphates) Gauge | | | Fish Division |
| 3.1.5 Fish species diversity Lever | | Data base | FD and SWQ |
| 3.1.6 Benthic species diversity Gauge | | Data base | FD AND SWQ Procedure 51 |

Indicator 3.1 Water Quality

| Proposed Metric | Data Available | Data Format | Data Source |
|-----------------|----------------|-------------|-------------|
|-----------------|----------------|-------------|-------------|

| | | | | |
|-------------------------------|--|---|--|--|
| 3.1.7 Lever | Number of water crossings per unit area | Ranked erosion potential Stream width, and width at high water mark Depth of sand to gravel substrate Width and type of buffer vegetation % canopy over streams | Spreadsheets; data bases VECTOR ACCESS | BMP; DEQ/SWQ |
| 3.1.8 Gauge | Pesticide residue concentrations in surface water | DEQ/EPA; bioassays on Great Lakes bald eagles; Bioassays on Great Lakes and inland fish | Data bases; spreadsheets | DEQ/SWQ |
| 3.1.9 Gauge | Area of wetlands | National Wetlands Inventory (NWI); land cover data sets; soil books | Data sets; spreadsheets; books | NWI; FD; NRCS |
| 3.1.10 Lever | Surface withdrawals by volume | | | |
| GROUND WATER METRICS | | | | |
| 3.1.11 Gauge | Ground Water Recharge Zones | DARCY maps | Maps | |
| 3.1.12 Gauge | Ground water elevations | DARCY maps | Maps | County Health Dept |
| 3.1.13 Gauge | Quality of drinking water | | | County Health Dept; DEQ |
| 3.1.14 Gauge | Total water wells abandoned due to man-made contaminants | | | County Health Dept; DEQ |
| 3.1.15 Lever | Sub-surface withdrawals by volume | | Tabular data; text | MSU Water Atlas; DEQ Office of the Great Lakes |

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Indicator 3.2 Soil Conservation

The long-term productivity and resilience of forests and other habitats are dependent upon the maintenance of appropriate levels of soil oxygen, nutrients and organic matter. In order to ensure that terrestrial and aquatic ecosystems are maintained and improved, policies must be enacted to provide for specific management practices or the protection of sensitive sites.

| Proposed Metric | Data Available | Data Format | Data Source |
|---|--|--|--|
| 3.2.1 Area of lands managed for soil conservation (reflects the fragility of the soil on some sites)) Gauge | Critical Dunes Act Conservation Reserve Program (CRP) National Wetlands Inventory USDA/MDA Farm Mgt Plans EQUIP FLEP WRP Natural Resource Inventory | Land Use Maps Digital shape file Paper Reports | DEQ – Natural Resources and Environmental Protection Act, 1994 PA 451 USFWS -National Wetlands Inventory ; MI Center for Geographic Information http://www.state.mi.us/webapp/cgi/mgdl/?action-thm MDNR – CRP; http://www.fsa.usda.gov/dafp/cep/crpinfo.htm CFSA – Consolidated Farm Service Agency USDA, USGS |
| 3.2.2 Soil stability and productivity (pH, soil faunal and fungal activity, soil erosion, degradation indices) Gauge | Soil surveys | Paper Digital data FD data base (?) | SIRC (when published) Individual counties www.ftw.nrcs.usda.gov/ssur_data.html MDNR – Fish Division USGS |

Indicator 3.2 Soil Conservation

| Proposed Metric | Data Available | Data Format | Data Source |
|------------------------|-----------------------|--------------------|--------------------|
|------------------------|-----------------------|--------------------|--------------------|

| | | | |
|---|--|-------|--|
| 3.2.3 Area of vegetated riparian corridors Lever | RMZ Natural River Legislation BMPs Bank Legislation | Paper | |
|---|--|-------|--|

NOT CURRENTLY FEASIBLE/MEASUREABLE/RELEVANT(?)

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Criterion 4 Ecological Cycles

Ecological cycles are a complex of self-regulating processes responsible for recycling the earth's limited supplies of water, carbon, nitrogen and other elements necessary to sustain life. Understanding the role that local systems play in these global cycles is essential for the development of sound ecosystem management and sustainability.

Indicator 4.1 Carbon cycle

The global carbon cycle represents an important set of processes linking plant and animal communities with climate change. The release or removal of CO₂ to and from the atmosphere impacts on global ecological cycles. Forests, wetlands and water bodies can act as either sinks (a vigorous and growing forest) or sources for atmospheric carbon, depending on whether they are primarily storing carbon or releasing it. Knowledge of the influence of natural disturbances and human intervention on this role can indicate the type of forest practices required for sustainable management.

| Proposed Metric | Data Available | Data Format | Data Source |
|---|-----------------------------|--------------------|-----------------------------|
| 4.1.1 Area of forest permanently, semi-permanently, or temporarily converted to non-forest land use | Great Lakes Forest Alliance | C&I/Report on line | Great Lakes Forest Alliance |
| 4.1.2 Carbon pool in forest products | Great Lakes Forest Alliance | C&I/Report on line | Great Lakes Forest Alliance |
| 4.1.3 Carbon pools in soils | Great Lakes Forest Alliance | C&I/Report on line | Great Lakes Forest Alliance |
| 4.1.4 Amount of fuels consumed | Cannot be measured easily | | Needs more research |
| 4.1.5 Fuelwood consumption/atmospheric | | | |

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Indicator 4.2 Hydrological Cycle

Hydrological cycles involve the movement of water from the atmosphere to the surface of the earth in the form of precipitation; from soils to streams to lakes; and from soil to plants to the atmosphere. Because of their vast area in the EUP, forests play a major role in Great Lakes hydrological cycles. Changes in forestland cover and management influence the storage and movement of water and the timing of the various components of the hydrological cycle. The forest can regulate the flow of water into lakes and wetlands directly or by influencing stream and river flows. Consequently, sustainable forest management plays a crucial role in contributing to the regulation of the hydrological cycle.

| Proposed Metric | Data Available | Data Format | Data Source |
|---|---|--------------------|--|
| 4.2.1 Number, distribution and acres of impoundments affected by natural and artificial water control structures Gauge | MDNR Aerial photos MDNR Operations Inventory data Fish Division Surveys | Photos Surveys | Aerial photos; operations inventory; Fish Division status and trends surveys |
| 4.2.2 Surface area of lakes and wetlands; total flow data for rivers and streams Gauge | Acreage of inland lakes Approximate acreage of various wetland types, flow data (USGS) | Databases | DEQ Surface Water Quality personnel USFS/MDNR operations inventory data Marquette NPDS permits MDEQ Lansing IFMAP/GAP land cover layer |

Indicator 4.2 Hydrological cycles

| Proposed Metric | Data Available | Data Format | Data Source |
|------------------------|-----------------------|--------------------|--------------------|
|------------------------|-----------------------|--------------------|--------------------|

| | | | |
|---|---|--|--|
| <p>4.2.3 Changes in Great Lakes water levels</p> <p>Gauge</p> | <p>Lakes Superior, Michigan and Huron – daily levels compared w/last year’s level and daily levels compared with monthly minimum and maximum mean levels</p> | | <p>www.ucsusa.org/greatlakes/gli-mpactover www.glerl.noaa.gov/data/now/wlevels/ NOAA; Tonello layers Web site IFMAP</p> |
| <p>4.2.4 Annual precipitation</p> <p>Gauge</p> | <p>Historical averages for EUP precipitation normals Monthly and annual total precipitation Monthly and seasonal (April – Sept) precipitation # of day w/precipitation at varying levels</p> | <p>Tables: Probability Distribution Function (PDF)</p> | <p>For historical data: http://climate.geo.msu.edu/e-upper.html For EUP locations: http://www5.ncdc.noaa.gov/climate_normals/clim81/MI_norm.pdf (Tonello has data layers)</p> |
| <p>4.2.5 Groundwater withdrawals</p> <p>Gauge</p> | <p>Limited data. Population studies (multiply population dependent on ground water x 100 gallons per day); MDEQ domestic, commercial and agricultural use figures</p> | | <p>MDEQ, Water Division</p> |
| <p>4.2.6 Great Lakes water withdrawals</p> <p>Gauge</p> | <p>IJC reviews proposals for large scale consumptive use removals</p> | | <p>MDEQ, Office of the Great Lakes (domestic use – Marquette; commercial and agricultural use – Lansing)</p> |
| <p>4.2.7 Acres of artificially created surface</p> <p>Gauge</p> | <p>MDNR</p> | | <p>IFMAP – land cover layer</p> |

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Criterion 5 Uncommon or Rare Natural Features

Identification and recognition of uncommon geological sites, plant and animal species, and ecological communities can make a difference between success and failure at sustaining our heritage and protection of natural systems over the long run.

Indicator 5.1 Uncommon or rare vegetation types

| Proposed Metric | Data Available | Data Format | Data Source |
|---|----------------|-------------|---|
| <p>5.1.1 Type, area, distribution and quality of uncommon or rare vegetation types. Size and distribution of uncommon or rare habitat types</p> <p>Gauge</p> | | | OI MNFI Biotics USFS Land Conservancies IFMAP GAP Landcover |
| <p>5.1.2 Type, area, distribution and representativeness of uncommon or rare vegetation types and their protection status (i.e. protected areas Natural areas, Old growth, Wild and Scenic Rivers, State Parks</p> <p>Gauge</p> | | | OI MNFI Biotics USFS Land Conservancies IFMAP GAP Landcover |
| <p>5.1.3 Type, area and distribution of uncommon or rare vegetation types under active management</p> <p>Lever</p> | | | OI FMFM unit offices MNFI Biotics IFMAP GAP Landcover FMFMD Forest Stewardship Program Coordinator USFS Land Conservancies |

Indicator 5.1 Uncommon or rare vegetation types

| Proposed Metric | Data Available | Data Format | Data Source |
|---|--|-------------|--|
| 5.1.4 Availability of critical fisheries habitat to support natural reproduction Gauge | | | Local files of on-site inspections |
| 5.1.5 Miles of undeveloped Great Lakes shoreline, inland lakes and water courses Gauge | Miles of undeveloped Great Lakes shoreline, inland lakes and water courses | | LAMP plans for Great Lakes Township Zoning |

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Criterion 5 Uncommon or Rare Natural Features

Identification and recognition of uncommon geological sites, plant and animal species, and ecological communities can make a difference between success and failure at sustaining our heritage and protection of natural systems over the long run.

Indicator 5.2 Uncommon or rare species

| Proposed Metric | Data Available | Data Format | Data Source |
|---|---|--------------------|--|
| <p>5.2.1 Population levels, habitat distribution and changes over time of selected uncommon or rare species (species will need to be selected)</p> <p>Gauge</p> | <p>For some select species e.g. T&E and SC. For certain grassland birds</p> <p>Forest habitat types and GLO available statewide across all ownerships</p> | | <p>MDNR, MNFI, USFWS, USFS, DEQ FD Marquette Research Forest habitat type maps MIWild database MIRIS, IFMAP, Breeding Bird Survey (BBS), Partners in Flight (PIF), Breeding Bird Atlas (BBA) (other species atlases)</p> |
| <p>5.2.2 Number of species classified as threatened, endangered, rare or vulnerable relative to the total number of known species by taxa</p> <p>Gauge</p> | | | <p>MDNR USFS SVE database MNFI</p> |

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Criterion 5 Unique Natural Features

Identification and recognition of unique geological sites, plant and animal species, and ecological communities can make a difference between success and failure at sustaining our heritage and protection of natural systems over the long run.

Indicator 5.3 Geophysical and Hydrophysical Features

| Proposed Metric | Data Format | Data Availability | Data Source |
|---|---|---|---|
| <p>5.3.1 Number, location and protection status of physical features and landforms (karsts, dunes, rock outcrops, eskers, drumlins, moraines, fossil beds)</p> <p>Gauge</p> | <p>Shapefile format. Full attribution</p> | <p>Data is incomplete (See NFI Metadata). What exists is very good.</p> | <p>http://www.caves.org/conservation/mkc/ Michigan Natural Feature Inventory-Biotics RMAP-1982 Quaternary Geology USFS SVE</p> |
| <p>5.3.2 Number of unique water features: aquifers, artesian wells, springs, waterfalls, recharge zones.</p> <p>Gauge</p> | <p>No digital data available</p> | | <p>Michigan Water Atlas Leverett, F., 1906. Flowing well Districts in the eastern part of the northern peninsula of Michigan, in Fuller, M. L., USFS Water Supply Paper 160 Allen, W. B., 1977. Flowing wells in Michigan 1974 USFS Water Information Series Report 2</p> |

Indicator 5.3 Geophysical and Hydrophysical Features

| Proposed Metric | Data Format | Data Availability | Data Source |
|------------------------|--------------------|--------------------------|--------------------|
|------------------------|--------------------|--------------------------|--------------------|

cultural fabric of the region. People who live in the eco-region point to the importance of their lifestyles and the strong connection with the land.

Indicator 6.1 Stability of land use

| Proposed Metric | Data Available | Data Format | Data Source |
|---|--|---|---|
| 6.1.1 Percentage of lands that are under alteration by vegetative type Gauge | Zoning variances awarded per year | Sizes and locations of variances by county—paper format: Compare with LTA-related (i.e., Albert) designations | County assessors office for variances; SIRC for habitat classifications DEQ/Land and Water Mgt., DNR |
| 6.1.2 Area of lands under restoration by vegetative type Gauge | Habitat restoration projects completed per year. | Restoration project events & locations by county (point source) | The Nature Conservancy, Little Traverse Conservancy DEQ, MDOT, MDNR Forest Land Enhancement Program (FLEP) |
| 6.1.3 Amount of change of ownership Gauge | Land parcel sales per year | Paper or electronic file format | County assessors office |
| 6.1.4 Amount of ownership fragmentation and parcelization of land Gauge | Land parcel splits per year | Paper or electronic file format | County assessors office |

Indicator 6.1 Stability of Land Use

| Proposed Metric | Data Available | Data Format | Data Source |
|------------------------|-----------------------|--------------------|--------------------|
|------------------------|-----------------------|--------------------|--------------------|

| | | | |
|---|--|--|--|
| <p>6.1.5 Traditional non-profit uses for cultural forest products (e.g.berries, syrup, mushrooms, black ash, cattails, etc.)</p> <p>Gauge</p> | <p>Estimated number of residents and visitors who participate in gathering activities.</p> | <p>Qualitative interviews of EUP residents and visitors</p> <p>Permits</p> | <p>USFS & MDNR Use/Special Use Permits</p> <p><i>The use and importance of natural resources for gathering and harvesting in Michigan's Eastern Upper Peninsula (1998) by Christina Kakoyannis—Master's thesis</i></p> |
| <p>6.1.6 Number and size of forested parcels that have been added to or removed from the Commercial Forest Program</p> <p>Gauge</p> | <p>Statewide coverage available by county</p> | <p>File copies available</p> <p>GIS</p> | <p>MDNR FMFMD. Private Lands Section, Commercial Forest Asst.</p> |

Eastern Upper Peninsula Eco-Region Indicator Worksheet

Criterion 6 Social / Cultural:

The Eastern Upper Peninsula Eco-region is a predominantly rural and natural resource rich region of Northern Michigan. This has provided a context for the social-cultural values of communities that make the sustainability of resources essential to the social and cultural fabric of the region. People who live in the Eco-region point to the importance of their lifestyles and the strong connection with the land.

Indicator 6.2 Place for nature and scientific study

| Proposed Metric | Data Availability | Data Format | Data Source |
|---|---|---|--|
| 6.2.1 Area and vegetation types in areas of natural and scientific interest Gauge | | Biotics, RNAs/PRNAs, Natural Areas, Dukes Exp. Forest | MNFI USFS MDNR |
| 6.2.2 Number of educational and recreational opportunities Gauge | Gillette Sand Dune Visitor Center, Gerald E. Eddy Discovery Center, DEQ, Cranbrook Institute of Science, Quincey Mine Tour, Copemish Mine Tour, Tahquamenon Falls, Pictured Rocks NLP | Web sites Chambers of Commerce Interpretive exhibits Tours | <hr/> <hr/> <hr/> http://www.uptravel.com http://www.exploringthenorth.com/mich/mich.html http://www.cranbrook.edu/ http://www.quincymine.com/ Parks & Recreation Division |
| 6.2.3 Presence of natural features, plant species and wildlife species important to the identity of area Gauge | | OIPC Biotics | MDNR |

Eastern Upper Peninsula Eco-Region Indicator Worksheet

Criterion 6 Social /Cultural:

The Eastern Upper Peninsula Eco-Region is a predominantly rural and natural resource rich region of Northern Michigan. This has provided a context for the social-cultural values of communities that make the sustainability of resources essential to the social and cultural fabric of the region. People who live in the eco-region point to the importance of their lifestyles and the strong connection with the land.

Indicator 6.3 Archaeology and History
 Resource management planning takes into account the identification and protection of known unique or significant Native American, Euro American, social, cultural and or spiritual sites.

| Proposed Metric | Data Available | Data Format | Data Source |
|--|--|---|---|
| 6.3.1 Archaeological Site Potential. Gauge | Currently only northern Lower Michigan. By 2004 the map will be expanded to the Upper Peninsula of Michigan. | A raster based map derived from a multi-criteria model which depicts the potential for a prehistoric archaeological site to be present. | This data is currently available to DNR staff through an intranet based GIS mapping system. State archeologist OI |
| 6.3.2 Presence of a known archaeological site (more weight can be given to sites that are on the National Register of Historic Places, this register includes prehistoric sites as well). Gauge | Statewide for areas that have been surveyed by an archaeologist (whether professional or amateur). | A section level map is available for the state which contains the presence/absence of archaeological sites. At the State Historic Preservation Office detailed maps (including reports and other sources of information) are maintained of archaeological sites. Hinsdale's <i>Archaeological Atlas of Michigan</i> also contains information (although it may be in accurate/limited) about archaeological site locations. | SHPO and or a historical/archaeological resource plan State archeologist OI |

Indicator 6.3 Archaeology and History

| Proposed Metric | Data Available | Data Format | Data Source |
|---|---|---|---|
| <p>6.3.3 Presence of an area(s) of Historical/Cultural Significance (many times these areas may show no visible signs of their significance, e.g. a Native American Indian trail corridor where the trail is no longer visible, or a spot at which a meeting or discovery took place).</p> <p>Gauge</p> | <p>Statewide although some information is sporadic.</p> | <p>Areas in and around historic markers or known historic sites. MNFI has created maps of Historic period Native American Indian trails and settlements which were recorded by early surveyors. Various historic accounts and or local markers (also see matrix above for sources).</p> | <p>A database of historic markers is available on-line at: www.michmarkers.com (maintained by Jim Brennan of Emmett, Michigan). MNFI/SHPO and or a historical/archaeological resource plan Bureau of History</p> |
| <p>6.3.4 Presence of spiritual/ceremonial activities.</p> <p>Gauge</p> | <p>Sporadic availability.</p> | <p>Likely found in ethnographic or historic accounts. Local tribal leaders/elders will also be a great source for this type of information. Some of these areas may be part of or listed as archaeological sites.</p> | <p>Local knowledge SHPO</p> |

Eastern Upper Peninsula Eco-Region Indicator Worksheet

Criterion 6 Social / Cultural:

The Eastern Upper Peninsula Eco-Region is a predominantly rural and natural resource rich region of Northern Michigan. This has provided a context for the social-cultural values of communities that make the sustainability of resources essential to the social and cultural fabric of the region. People who live in the eco-region point to the importance of their lifestyles and the strong connection with the land.

Indicator 6.4 Presence of local planning efforts for the sustainability of natural resources and communities

| Proposed Metric | Data Available | Data Format | Data Source |
|---|---|---|--|
| 6.4.1 Percent of townships addressing sustainability of natural resources and communities. Gauge | Available for each township in state. | Township zoning rules. Format would vary by township, mostly paper format | Contact each township individually. MDNR has list of townships and contacts. |
| 6.4.2 Percent of counties addressing sustainability of natural resources and communities. Gauge | Available for each county in state. | Format would vary by county, mostly paper format | Contact each county individually. MDNR has list of county contacts. |
| 6.4.3 Presence of regional or watershed area planning efforts Gauge | Coverage would depend on specific projects. | Data format varies by project. | UP Regional Planning www.eup-planning.org ; Lex Cheneaux Economic Forum; Tip of the Mit Watershed Council; Central Lake Superior Watershed Partnership; other watershed organizations; MDNR. |

Eastern Upper Peninsula Eco-Region Indicator Worksheet

Criterion 7 Spiritual

Spiritual values are personal feelings and sentiments that natural resources engender to the human spirit and are a reason for sustaining the landscape to provide those experiences. Because the essence here is personal and to a large degree intangible, the indicators pertain to the features of the ecosystem which are most evocative to the senses and secondly, which pertain to the ability of people to use those resources.

Indicator 7.1 Undeveloped natural resources

| Proposed Metric | Data Available | Data Format | Data Source |
|--|--|--------------------|--|
| 7.1.1 Size and distribution of natural and 'special management' areas and allowed use of those areas Gauges | Natural and special management area boundaries | | MDNR – Natural Areas boundaries, Special Management Areas USFS – RNAs PRNAs, designated wilderness MI Nature Association The Nature Conservancy Biodiversity Team |
| 7.1.2 Road and motorized trail density Lever & Gauge | County and statewide | | MIRIS – county, state, some trails MDNR – ORV tech, Recreation Specialist |
| 7.1.3 Density and distribution of dwellings and commercial structures Lever & Gauge | | | Census Zoning 1991 TM imagery - LANDSAT |
| 7.1.4 Measure / monitor distribution of undeveloped areas in populated areas Gauge | | | IFMAP GAP |

Eastern Upper Peninsula Eco-Region Indicator Worksheet

Criterion 7 Spiritual

Spiritual values are personal feelings and sentiments that natural resources engender to the human spirit and are a reason for sustaining the landscape to provide those experiences. Because the essence here is personal and to a large degree intangible, the indicators pertain to the features of the ecosystem which are most evocative to the senses and secondly, which pertain to the ability of people to use those resources.

Indicator 7.2 Aesthetics

| Proposed Metric | Data Available | Data Format | Data Source |
|--|-----------------------|------------------------|---|
| 7.2.1 Area and distribution of “secluded” natural resources. Gauge | | Data base Web sites | PRB MDNR Michigan Tourism Bureau |
| 7.2.2 Presence of litter or trash dumped on public land Lever | | | Clean forest.org Ada Takacs – Adopt-a-Forest Adopt-A-Highway |
| 7.2.3 Number of designated access opportunities to view scenic vistas and/or wildlife Gauge | | | MI Wildlife Viewing Guide MDOT-Designated scenic roads/turnouts PRB MDNR Recreation Natural Rivers, Natural Areas, etc. |

Indicator 7.2 Aesthetics

| Proposed Metric | Data Available | Data Format | Data Source |
|--|-----------------------|--------------------|---|
| 7.2.4 Miles of road by use class, distribution and density in EUP | Road systems in EUP | Maps | MDNR local units and Lansing FMFMD; County Road Commissions DOT |
| 7.2.5 Visual management | | | OI – Travel Influence Zones |
| 7.2.6 Emotional/intrinsic values (Are my needs being met?) | | Surveys | Research projects Campground Registrations |

Criterion 8 Recreation

An activity pursued during leisure time and by free choice that provides its own satisfaction.

Indicator 8.1 Hunting, Trapping and Fishing

| Proposed Metric | Data Available | Data Format | Data Source |
|--|----------------------------------|----------------------------|---|
| 8.1.1 User days/ activity Gauge | Reports; surveys | Paper; pdf files; web site | Wildlife and Fish Divisions Research Section; MDNR web site |
| 8.1.2 Satisfaction levels Gauge | Reports; surveys | Paper; pdf files; web site | Wildlife and Fish Divisions Research Section; MDNR web site |
| 8.1.3 Population health by species Gauge | Reports; surveys | Paper; pdf files; web site | Wildlife and Fish Divisions Research Section; MDNR web site |
| 8.1.4 Population density by species Lever | Reports; surveys; press releases | Paper; pdf files; web site | Wildlife and Fish Divisions Research Section; MDNR web site |
| 8.1.5 Harvest number by species Lever | Reports; surveys; press releases | Paper; pdf files; web site | Wildlife and Fish Divisions Research Section; MDNR web site |
| 8.1.6 Number and distribution of shooting ranges Lever | By unit and statewide | Web site; paper format | MDNR web site; LED Safety Section |
| 8.1.7 Amount of Commercial Forest (CF) lands, changes in status Gauge | Available statewide | Booklet form; web site | District CFM Specialist; FMFMD Lansing |

Indicator 8.1 Hunting, trapping and fishing

| Proposed Metric | Data Available | Data Format | Data Source |
|---|---|--|--|
| 8.1.8 Law Enforcement activity- number of warnings, summons, arrests per activity Gauge | Bi-weekly report | EXCEL format | District Law Supervisor |
| 8.1.9 Number of safety training opportunities per activity Lever | Schedules for ORV, snowmobiled, hunting, boating safety | Web site; paper list | MDNR web site, District Law Supervisor, DNR field offices, LED Lansing |
| 8.1.10 Accident trends per activity per season Gauge | District and Statewide | Paper reports, e-mail. press releases | MDNR web site, MSP, LED Lansing |

Criterion 8 Recreation: An activity pursued during leisure time and by free choice that provides its own satisfaction.

Indicator 8.2 Designated Trails – motorized and non-motorized (hiking, ORV, snowmobile, skiing, equestrian)

| Proposed Metric | Data Available | Data Format | Data Source |
|--|---|--|---|
| <p>8.2.1 Infrastructure and resources available for trail maintenance</p> <p>Lever</p> | <p>ORV All ORV Trails State Park Trails All trails in each State Park were inventoried including the trail conditions. Non-motorized trails- State, Federal, Local and private land trails Snowmobile-Due to constantly changing nature of the snowmobile trails, any data here would vary on an hourly basis.</p> | <p>ORV Trail by trail assessment. Criteria established to rate ORV trails in good, fair, or poor condition. Non-Motorized-little or no data readily available; data availability may vary by jurisdiction Snowmobile-Limited data available would be in the form of FMFMD trail inspection reports and user reports; Michigan Snowmobile Association (MSA) Trail Conditions Hotline Reports; multitude of trail condition websites.</p> | <p>ORV "Mich. State Forest Off-Road Vehicles Trail and Route Assessment and Estimate of Average Annual Maintenance Costs" 1997 FMFM/MSU State Park Trails All trails were inventoried by GPS and the data compiled by PRB Stewardship Program. North Country Trail Snowmobile-Management Unit; MSA; various websites. Federal and local units of government</p> |
| <p>8.2.2. User days per activity</p> <p>Gauge</p> | <p>Linear State Parks The 4 linear State Parks have some data available on user trends. Snowmobile-Dealer and Manufacturer surveys; additional trail counters</p> | <p>Linear State Parks The data is from surveys, report cards, past permit sales records. ORV Survey indicates ORV use, type, and activity. Snowmobile-UP Trail counts</p> | <p>Linear State Parks Kal-Haven Trail State Park, White Pine Trail State Park, Hart-Montague Trail State Park, Van Buren Trail State Park ORV"Mich. Licensed ORV Use and Users" 1998-98 FMFM/MSU Federal and local units of government</p> |

Indicator 8.2 Designated Trails – motorized and non-motorized (hiking, ORV, snowmobile, skiing, equestrian)

| Proposed Metric | Data Available | Data Format | Data Source |
|--|---|--|---|
| <p>8.2.3 Miles of trail systems by trail ownership and management type</p> <p>Lever</p> | <p>State Park Trails All trails in each State Park.</p> <p>State Forest Pathways</p> <p>North Country National Scenic Trail</p> <p>Pathways</p> <p>Snowmobile Trails</p> <p>Snowmobile Trails</p> | <p>State Park Trails GPS database</p> <p>GPS data for entire system; International Snowmobile Manufacturers Assoc and American Council of Snowmobile Associations (ISMA and ACSA) has user trend data</p> | <p>State Park Trails All trails were inventoried by GPS and the data compiled by PRB Stewardship Program. 1999-2001 DNR/PRB</p> <p>State Forest Pathways All pathways listed in Mich. Parks and Rec. Guide indicating distance and activity.</p> <p>Rails to Trails Conservancy publishes brochure listing all trails by distance, surface, activity.</p> <p>North Country Trail Trail Assoc. has gathered a GPS database on all their trails and produces brochures and detailed maps.</p> <p>Snowmobile Trails FMFM and Individual Club/ Sponsors produce snowmobile trail maps; DNR MIRIS database</p> <p>Federal, State, Local Unit government agencies;</p> <p>Nature Preserves and Conservancies</p> |
| <p>8.2.4 Percentage of stream and wetland crossings complying with BMPs, laws and policies.</p> <p>Gauge</p> | <p>Protocol established to collect data; Stream crossing buffer zones</p> | <p>Data may be available or collectable, but not currently compiled</p> | <p>Federal, State, Local Unit government agencies</p> |

Indicator 8.2 Designated Trails – motorized and non-motorized (hiking, ORV, snowmobile, skiing, equestrian)

| Proposed Metric | Data Available | Data Format | Data Source |
|--|--|---|--|
| <p>8.2.5 Number of safety training opportunities per activity</p> <p>Lever</p> | <p>ORV Department of Education administers ORV Safety Training.</p> <p>Snowmobile Department of Natural Resources, Law Division administers Snowmobile Safety Training. Classes conducted by Conservation Officers; County Sheriff Depts; Volunteer Instructors. DNR, LED tracks data on classes offered and number of students trained.</p> | <p>ORV Number of training classes is based on demand.</p> <p>Snowmobile Number of training classes; number of students trained; number of volunteer instructors available and new instructors trained</p> | <p>Department of Ed</p> <p>DNR LED; County Sheriff departments</p> |
| <p>8.2.6 Accident trends per activity per season</p> <p>Gauge</p> | <p>ORV Police Agencies and DNR Law compile data on ORV accidents.</p> <p>Snowmobile DNR Law compiles snowmobile FATAL accident data. MSP compiles data on all snowmobile accidents based on reports provided by investigating officers.</p> <p>State Park Trails Each park would complete incident reports on trail accidents but there is no central database.</p> | <p>MSP has ORV and Snowmobile Accident data in their computer system, based on UD-10s submitted.</p> | <p>Michigan State Police</p> <p>DNR, LED and FMFMD</p> <p>DNR Parks and Rec Bureau</p> <p>Upper Peninsula Emergency Management Services/Marquette 1-800-562-7849</p> |

Eastern Upper Peninsula Eco-Region Indicator Worksheet

Criterion 8 Recreation

An activity pursued during leisure time and by free choice that provides its own satisfaction.

Indicator 8.3 Nature Appreciation and Education

| Proposed Metric | Data Available | Data Format | Data Source |
|--|---|--------------------|---|
| 8.3.1 Area of EUP by vegetation type, age class and ownership Gauge | Age class – not available for all Ownerships Vegetative cover type – limited Ownership – readily available | Maps | National Park Service Seney Natl. Wildlife Refuge MDNR Divisions Professional Societies Nature Conservancies Universities/Colleges |
| 8.3.2 Miles of public Great Lakes shoreline, inland lakes and water courses Gauge | Shoreline miles by ownership | | MDNR - SIRC PRB – Harbor Guide |
| 8.3.3 Percentage, area and representativeness of vegetative types in areas of natural and scientific interest Gauge | | | National Park Service Seney Natl. Wildlife Refuge MDNR Divisions Professional Societies Nature Conservancies Universities/Colleges |
| 8.3.4 User days/activity Gauge | Seney NWR – data on wildlife viewing and educational programs Hiawatha NF –user day data Program attendance from state parks is available | | Same as above |

Indicator 8.3 Nature Appreciation and Education

| Proposed Metric | Data Available | Data Format | Data Source |
|--|-----------------------|------------------------|---|
| <p>8.3.5 Number of unique species observation opportunities</p> <p>Gauge</p> | | Web sites | MDNR “Watchable Wildlife” USFWS USFS USFS/NLP Whitefish Pointe web site Northern Birding.com Seney NWR |
| <p>8.3.6 Eco-tour opportunities</p> <p>Gauge</p> | | Web sites brochures | EUP Nature Tourism Alliance, Northern Initiatives, bholland@niupnorth.org |

Criterion 8 Recreation

An activity pursued during leisure time and by free choice that provides its own satisfaction.

Indicator 8.4 Special Scenic Sites

| Proposed Metric | Data Available | Data Format | Data Source |
|--|--|---|--|
| <p>8.4.1 Size and distribution of natural and 'special' areas and their allowed use</p> <p>Gauge</p> | <p>Plans Maps Acreages Uses</p> | <p>Paper Maps SIRC data bases Web sites</p> | <p>MDNR Nature Conservancies Michigan Nature Assn. Michigan Natural Areas Council Hiawatha National Forest Seney National Wildlife Refuge MDNR Parks & Rec Bureau Michigan Natural Features Inventory</p> |
| <p>8.4.2 Miles of designated scenic routes</p> <p>Gauge</p> | <p>Viewing/tour routes Private vendor travel schedules</p> | <p>Brochures Web sites</p> | <p>MDNR Travel Michigan www.michigan.org Chambers of Commerce Local web sites for area of Interest, e.g. www.stignace.com www.visitnewberry.org</p> |

Indicator 8.4 Special Scenic Sites

| Proposed Metric | Data Available | Data Format | Data Source |
|--|--|--|--|
| <p>8.4.3 Number of designated viewing areas</p> <p>Gauge</p> | <p>Wildlife viewing areas Scenic waterfalls Wilderness areas</p> | <p>Web sites SIRC Map overlays Brochures</p> | <p>USFS - Michigan Wildlife Viewing Guide MDNR MDOT web site, www.michigan.gov/mdot MSU Extension-UP www.msue.msu.edu/msue/ctyentpg/reg_up.htm UPTRA – www.uptravel.com Land Information Access Association ww.liaa.org/upvision</p> |

Eastern Upper Peninsula Eco-Region Indicator Worksheet

Criterion 8 Recreation

An activity pursued during leisure time and by free choice that provides its own satisfaction.

Indicator 8.5 Camping – Includes dispersed and designated sites

| Proposed Metric | Data Available | Data Description & Format | Data Source |
|--|---|----------------------------------|---|
| 8.5.1 Number, type and distribution of campground facilities- rustic, modern, semi-modern, cabins Gauge | State Forest CG- Statewide State Parks CG- Statewide National Forest CG National Parks Local Public CG Commercial CG | Pdf format DEQ/MSU Website | SFC-Program Database; Parks and Rec Bureau NF District Offices DEQ/Health Department/MSU website- http://www.tourismcenter.msu.edu DEQ/Health Department Recreational Vehicle Camping: http://www.michcampgrounds.com/ http://www.marvac.org/ |
| 8.5.2 Number of campsites by type in campgrounds Gauge | Same as above | Same as above Various formats | Same as above MSU Michigan Travel, Tourism, Recreation Resource Center website: http://www.tourismcenter.msu.edu http://www.michcampgrounds.com/ http://www.marvac.org/ |
| 8.5.3 User days by campground and campsite Gauge | SF, NF, SP-Data available Data also available for Local Public and Commercial Campgrounds | Various formats | Same as above |

Indicator 8.5 Camping – Includes dispersed and designated sites

| Proposed Metric | Data Available | Data Format | Data Source |
|--|---|--|--|
| <p>8.5.4 Number of dispersed camps per year</p> <p>Gauge</p> | <p>SFCG-Data not currently available NF Camping-Some data available for “regulated” dispersed camping sites Not applicable to State Park, Local Public and Commercial Campgrounds</p> | <p>Various formats</p> | <p>NF District Offices MSU studies by Dr. Charles Nelson</p> |
| <p>8.5.5 Environmental impact of camping</p> <p><u>Benchmarks:</u> -Soil erosion from human use -Trash presence -Carrying capacity of facility vs. overuse</p> <p>Gauge</p> | <p>Limited data available; primarily campground inspections</p> | <p>General observations and campground inspections</p> | <p>Appropriate campground managers. Comments on registration envelopes from campgrounds</p> |

SF = State Forest; NF = National Forest; SP = State Park

Criterion 8 Recreation

An activity pursued during leisure time and by free choice that provides its own satisfaction

Indicator 8.6 Water Recreation – motorized and non-motorized (including swimming, scuba diving, kayaking, etc.)

| Proposed Metric | Data Available | Data Format | Data Source |
|---|--|---|--|
| 8.6.1 User days per activity (power/sail boating, jet-skis, canoes, rafting/tubing, kayaking, swimming, snorkeling, fishing, water skiing, boat races, cruise ships, sail boarding, etc) Gauge | Harbor boat counts; campground registrations/surveys; marina reservation information | Monthly paper reports from harbors/marinas FMFMD camping data base County BAS data GIS (PRB in progress) | MDNR/PRB MDNR FMFMD MDNR web site US Park Service |
| 8.6.2 Number of water access sites and boat slips by type and capacity for watercraft and available amenities Gauge | | County BAS data GIS (PRB in progress Harbor & Boat Directory) ACCESS data base | MDNR/PRB MDNR FMFMD MDNR web site PRB – Michigan Recreational Boating Information System (MRBIS) |
| 8.6.3 Change in status of water body designation and use Lever | Included in MRBIS directory MDNR Director’s Orders Fishing Digest | ACCESS data base Paper format; Digests | PRB – MRBIS MDNR web site; digests |
| 8.6.4 Number of safety training opportunities per activity Lever | Lists of classes available | Paper Web sites | MDNR – LED; local schools; local sheriff’s departments MDNR web site American Canoe Assn.com for canoeing and kayaking |

Indicator 8.6 Water Recreation – motorized and non-motorized (including swimming, scuba diving, kayaking, etc.)

| Proposed Metric | Data Available | Data Format | Data Source |
|------------------------|-----------------------|--------------------|--------------------|
|------------------------|-----------------------|--------------------|--------------------|

| | | | |
|---|--|--|--|
| <p>8.6.5 Accident trends per activity per season</p> <p>Gauge</p> | <p>US Coast Guard Reports</p> <p>County sheriff's reports</p> <p>MSP reports</p> | <p>BARD – Boating Accident Reporting Database</p> <p>Paper files</p> | <p>USCG</p> <p>www.uscgboating.org</p> <p>-</p> <p>County sheriff's department</p> <p>MSP posts</p> |
|---|--|--|--|

Eastern Upper Peninsula Eco-Region Indicator Worksheet

Criterion 8 Recreation

An activity pursued during leisure time and by free choice that provides its own satisfaction

Indicator 8.7 Diversity of recreational opportunities: the availability of different ways for people to recreate on the landscape

| Proposed Metric | Data Available | Data Format | Data Source |
|---|--|---|---|
| 8.7.1 Availability of recreational activities by type i.e. lakes, rivers, forest, parks Gauge and/or lever | Number of lakes, rivers, streams, parks, campgrounds, hunting acres. Little or no data for berry picking, bird watching, mushrooming, etc. | Various brochures, pamphlets; data base; overlays for state lands; digest | FMFMD, PRB, USDA/USFS, MSU, National Park Service, local units of government; PRB Boating Guide, Michigan Trail Atlas; hunting/fishing digests; private land/public hunting lists |
| 8.7.2 Universal (barrier free) access to facilities Gauge and/or lever | ADA data is available but is not centralized | Various; basically ADA accessible or not | MDNR, USDA/USFS, MSU, USFWS; individual owners for local public, commercial and private campgrounds and parks |
| 8.7.3 Quality and satisfaction of recreational experience (would LED activity indicate quality?) Gauge | Not readily available. Most likely gained through surveys and studies; licensing and survey data; campground envelope comments | Surveys; data base; questionnaires | Federal, state and local units of government; web sites; FMFMD unit offices; Wildlife and Fish Divisions |

Indicator 8.7 Diversity of recreational opportunities: the availability of different ways for people to recreate on the landscape

| Proposed Metric | Data Available | Data Format | Data Source |
|---|---|--|---|
| 8.7.4 Seasonally adjusted number of participants Gauge | Campground data; snowmobile trail data; fishing, hunting data | Data bases, web sites data, digests, surveys | State and national forests; state parks; public and commercial campgrounds; FMFMD unit offices; web sites |

Criterion 9 Ownership Patterns

The pattern and distribution of ownership and use of lands in the Eastern Upper Peninsula (EUP), plays a role in sustainable resources. Land ownerships can affect management options, resource demand and fragmentation. The success of sustainable management of Michigan’s resources depends on making connections across disciplines, interest, boundaries and landscapes.

Indicator 9.1 Ownership types (the distribution and area of land by owner)

| Proposed Metric | Data Available | Data Format | Data Source |
|---|---|-----------------------|--|
| 9.1.1 Percent of public and private ownership in EUP Gauge | Acreage per county; acres for state owned land; acreage for federal lands; local land ownership | LOTS, data bases | MI Assn. of Counties, MSU, MDNR, NRCS, USFS, local units of government |
| 9.1.2 Changes in ownership by acres Gauge | Same as above | Same as above | Same as above |
| 9.1.3 Distribution of ownership in the EUP by acres Gauge | Same as above | Same as above Maps | Same as above |

Criterion 9 Ownership Patterns

The pattern and distribution of ownership and use of lands in the Eastern Upper Peninsula (EUP), plays a role in sustainable resources. Land ownerships can affect management options, resource demand and fragmentation. The success of sustainable management of Michigan’s resources depends on making connections across disciplines, interest, boundaries and landscapes.

Indicator 9.2 Stewardship

Stewardship is the practice of carefully managing land usage to ensure natural systems are maintained or enhanced for future generations; to preserve the capacity of the land for self-renewal.

| Proposed Metric | Data Available | Data Format | Data Source |
|--|--|---|---|
| <p>9.2.1 Number, acres and distribution of private land management plans and percent of private ownership with management plans</p> <p>Gauge</p> | <p>Statewide by county Acreages available by ownership type. Forest industry, NIPF, clubs, other business, other Private Preserves – land trusts including The Nature Conservancy Tree Farm Plans USFWS cost share programs DEQ – Wetlands Mitigations CiWPIS – Coastal Inland Waterway Permit System, Contact DEQ Lansing and Field Staff Remedial Action Plans for AOC Storm water management: GVSU/MSU Institute for Water Resources and 3.1.1 LIP – Landowner Incentive Program, MDNR Wildlife Division 906-226-1325 - Marquette</p> | <p>Management plans are generally paper copies</p> <p>Owners with legal descriptions in electronic spreadsheet.</p> <p>Digital shape files of CFP ownership by county.</p> <p>Databases</p> | <p>Commercial Forest Land Plans for Sustainable Forestry, CFA Asst., MDNR FMFMD, 517-373-1277 DNR, FMFM and DIT Phone: 517.335.3210 NRCS Programs – CRP, WHIP, EQIP, WRP Phone:517.324.5259 http://prmsreports.nrcs.usda.gov go to item 9, county reports. Lists acres by technical practice codes. Farm Service Programs – CRP tree planting, SIP 517.324.5106 Conservation Reserve Enhancement Program (CREP), MDA 517.373.9798 Forest Land Enhancement Program Phone: 517.335.3355 MDNR Official DEQ, LWMD Data Base Hard Copy Files Stored at the DEQ Field Offices for 3- 5 years Tree Farm / Mead/West Vaco MDNR/Fish Division – Inland Fisheries Grants</p> |

Indicator 9.2 Stewardship

| Proposed Metric | Data Available | Data Format | Data Source |
|---|--|---|---|
| <p>9.2.2 Miles of Great Lakes shoreline, inland lakes and water courses under special management</p> <p>Gauge</p> | <p>Statewide, region, local coverage</p> | <p>Collection methods/protocols Frequency of collection or updates. Paper Electronic File type (e.g. MS Excel) Digital files for GIS?</p> | <p>Lake Associations MDNR-Fisheries, Newberry OSC Phone: 906.293.5131 Gulliver Lake Assn., Indian Lake Assn., McDonald Lake Assn., Milakokia Lake Assn. Hiawatha Sports Club (Millecoquins Lake Assn.) USFS Private industrial land owners</p> |
| <p>9.2.3 Number and location of conservation easements in EUP</p> <p>Gauge</p> | <p>Biological Conservation Data (Advanced Revelations). Extensive biological information on parcels.</p> | <p>Electronic data Excel Spreadsheet Paper files GIS</p> | <p>Farmland Preservation Program (PA 116 and PA 451 parts 361 and 362) MDA, 517.335.3466 Forest Legacy Program MDNR, Lansing 517.335.3351 The Nature Conservancy (TNC) 906.225.0399 Central Lake Superior Land Conservancy (CLSLC) 906.226.2461 Little Traverse Conservancy (LTC) 231.347.0991 Michigan Nature Assn (MNA) 517-655-5655 www.michigannature.org</p> |
| <p>9.2.4 Number of cooperative planning “agreements” across ownerships in EUP</p> <p>Gauge</p> | <p>Clay Lake Plains Plan Two Hearted River Watershed Plan Lex Cheneaux Economic Forum Munuscong Watershed Plan St. Mary’s River Plan</p> | <p>Paper MS Excel</p> | <p>Eastern UP Partners in Ecosystem Management (EUPPEM) MDNR Field Offices; MDNR Operations Service Center Remedial Action Program, MDNR Fish Division</p> |

Indicator 9.2 - Stewardship

| Proposed Metric | Data Available | Data Format | Data Source |
|-----------------|----------------|-------------|-------------|
|-----------------|----------------|-------------|-------------|

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|---|--|--|-------------|
| <p>9.2.5 Land use patterns across all ownerships</p> <p>Gauge</p> | <p>Land use and land cover data sets, including pre-settlement vegetation and wetland delineation.</p> | <p>1978 MIRS Land Use data available by county –vector image</p> <p>1991 LANDSAT Thematic Mapper Imagery UP wide- raster image</p> | <p>MDNR</p> |
|---|--|--|-------------|

Eastern Upper Peninsula Eco-Region Indicator Worksheet

Criterion 9 Ownership Patterns

The pattern and distribution of ownership and use of lands in the Eastern Upper Peninsula (EUP), plays a role in sustainable resources. Land ownerships can affect management options, resource demand and fragmentation. The

success of sustainable management of Michigan’s resources depends on making connections across disciplines, interest, boundaries and landscapes.

Indicator 9.3 Accessibility

The extent to which a parcel or area of land can be reached and used by people.

| Proposed Metric | Data Available | Data Format | Data Source |
|---|---|---------------------------|---|
| 9.3.1 Percent of public and private land in the EUP Gauge | Maps; records on statewide, regional, local lands | LOTS; paper records; maps | MDNR Land Ownership Data Base; County Road Commission; MDOT; USFWS; NPS; USFS |
| 9.3.2 Number and location of easements across public lands Lever | Records on state easements granted and acquired | LOTS; paper records; maps | MDNR Land Ownership Data Base; County Road Commission; MDOT; USFWS; NPS; USFS |
| 9.3.3 Number and location of easements across private lands Lever | Records on state easements granted and acquired | LOTS; paper records; maps | MDNR Land Ownership Data Base; County Road Commission; MDOT; USFWS; NPS; USFS |
| 9.3.4 Number of acres of public land without access (landlocked by private ownerships) Gauge | Maps; state land holdings | LOTS; paper records; maps | MDNR Land Ownership Data Base; County Road Commission; MDOT |
| 9.3.5 Number of acres of private land enrolled in the Commercial Forest Program (CF) Gauge | Record w/ CFM foresters and Lansing FMFMD | LOTS; paper records | MDNR Land Ownership Data Base |

Indicator 9.3 Accessibility

| Proposed Metric | Data Available | Data Format | Data Source |
|--|---|----------------------|--|
| 9.3.6 Existence of a road maintenance plan and expenditures by agency Lever | LOTS for general planning; MAIN for FMFMD expenditures; DMB for MDOT expenditures | Maps; fiscal reports | MDNR local units and Lansing FMFMD; County Road Commission; MDOT |

| | | | |
|--|---------------------|------|--|
| 9.3.7 Miles of road by use class, distribution and density in the EUP Gauge | Road systems in EUP | Maps | MDNR local units and Lansing FMFMD; County Road Commission; MDOT |
|--|---------------------|------|--|

Eastern Upper Peninsula Eco-Region Indicator Worksheet

Criterion 10 Economic Health:

A wide range and services are derived from our natural resources that create opportunities for economic stability in the Eastern Upper Peninsula. In addition to traditional forest products sector, the resource base supports mining, commercial fishing and an ever-growing tourist and recreation industry.

Indicator 10.1 Local and community economic health and trends

| Proposed Metric | Data Available | Data Format | Data Source |
|---|--|--|--|
| <p>10.1.1 Number of local economic development plans in the EUP Eco-Region</p> <p>Gauge</p> | Local economic development plans that include a natural resource component | Type(s) of resources identified; Description(s) of <i>how</i> these resources are incorporated into local economic development | EUP Regional Planning and Development Commission 2002 Comprehensive Economic Development Strategy); UP Economic Development Alliance (|
| <p>10.1.2 Describe job/income / employment / retirement data</p> <p>Gauge</p> | Annual county-level data (some data also available at sub-county census tract level) | Electronic by county (generally, 2-4 years out-of-date. | http://www.michigan.gov/census/ incorporates County Business Patterns & other demographic data |
| <p>10.1.3 Contribution of the resource use to gross domestic product (GDP) of all sectors of the economy</p> <p>Gauge</p> | EUP and County, available every 5 years (corresponds to economic census) or decades (both lag 2-4 years) | Should probably use several anecdotal and quantitative measures <u>and</u> trend data. | See above for quantitative data. See Dec. '99 MSU Report, "The Role of Natural Resources in Community and Regional Economic Stability in the Eastern Upper Peninsula." |

Indicator 10.1 Local and community economic health and trends

| Proposed Metric | Data Available | Data Format | Data Source |
|------------------------|-----------------------|--------------------|--------------------|
|------------------------|-----------------------|--------------------|--------------------|

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|--|---|---|--|
| <p>10.1.4 Diversity of forest economic activity</p> <p>Gauge</p> | <p>Changes over decades with emphasis on most recent years – by EUP and County or sub-EUP patterns.</p> <p>State, State Forest and some EUP data.</p> | <p>Establishments, Sales (can be used with a variety of diversity measures) Quantified level of Activity Qualitative/anecdotal synthesis of trends (mostly rec focus)</p> | <p>Econ. & Ag Census, also recreation trend as reflected in changes in food & lodging sectors over time (for diversity measures, see Dec 99 EUP MSU Research Report bibliography or FMFM Pedersen) Rec activity, from '99 Rec & Trails Assessment (FMFM) SCORP 2003 Appendix A</p> |
| <p>10.1.5 Measure change in the tax base</p> <p>Gauge</p> | <p>Annual township & county (past data available for trends)</p> | <p>SEV or Taxable Valuation data (also ag, comm, ind breakdowns available) in report or electronic format (e.g. CDs)</p> | <p>MI Dept. of Treasury State Tax Commission County Equalization Department</p> |
| <p>10.1.6 Capital outlay and investment trends</p> <p>Gauge</p> | <p>Sector data by state (sometimes county) every 5 Years (1997 is out; 2002 will be available in 2004-5) Names of major firms and trends reported Nature of and Approximate amounts by firm</p> | <p>Dollars invested Same as #1 May be in terms of outputs, employment generated or jobs saved, etc.</p> | <p>http://www.census.gov/epcd/www/econ97.html (update/contrast to national trends with Annual Survey of Manufacturers and/or Annual Capital Expenditures Survey) Some detailed data in County Reports, available locally and through: http://medc.michigan.org/milInfo/Places/Advanced/ Direct calls to local firms</p> |

Eastern Upper Peninsula Eco-Region Indicator Worksheet

Criterion 10 Economic Health

A wide range of services are derived from our natural resources that create opportunities for economic stability in the Eastern Upper Peninsula. In addition to traditional forest products sector, the resource base supports mining, commercial fishing and an ever-growing tourist and recreation industry.

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|--|---|--|---|
| <p>10.2.4 Mean and median travel spending per person per day per activity</p> <p>Gauge</p> | <p>Frequency of participation in gathering, wildlife viewing, bird watching, hiking, camping, boating, fishing, hunting</p> | <p>Mail survey of Michigan residents in 2002; ordinal scale 1=never, 2=rarely, 3=sometimes, 4=frequently</p> | <p>2002 Resource attitudes in Michigan Survey by A. Mertig (MSU Department of Fisheries & Wildlife)</p> |
| <p>10.2.5 Total expenditures by individuals per activity in EUP</p> <p>Gauge</p> | <p>Nelson's survey circa 2000</p> | <p>Monthly mail surveys for UP and statewide coverage in tabular format</p> | <p>Michigan 2001 Travel Summary by D.K. Shifflet & Associates for Travel Michigan</p> <p><i>National Survey of Fishing, Hunting and Wildlife (Michigan) Associated Recreation (USFWS)</i></p> |

Eastern Upper Peninsula Eco-Region Indicator Worksheet

Criterion 10 Economic Health:

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Indicator 10.3 Timber and wood products

| Proposed Metric | Data Available | Data Format | Data Source |
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| 10.3.4 Wood product summary Gauge | Timber sale data available continuously from State by stand, annually from Hiawatha N.F., biennially from tpo for all ownerships by county | Electronic by product, species & location. | FMFM – Lansing (timber sale program, Forest Resource Mgmt Section) |
| 10.3.5 Determine ratio of harvest to growth by volume, species and products Lever | Available as needed/requested for State Forest (and, perhaps, Hiawatha N.F; other ownerships dependent upon annualized FIA data & tpo updating | Public Lands have inventory and timber sale dbs, allowing calculation as needed. Dependent upon FIA and tpo data for other owners. FIA data adequate in 2004-5, tpo data has lagged by ~4 yrs. | FMFM (cooperatively by Lansing and EUP Timber Management Spec.) Forest Service for tpo and FIA data. |

| | | | |
|--|---|---|---|
| 10.3.6 | 10.3.7 | 10.3.8 | 10.3.9 |
| 10.3.10 Net difference between growth and harvest by species. Lever | (same as previous metric above) | (same as previous metric above) | (same as previous metric above) |
| 10.3.11 Number of jobs/economic activity (e.g. logging, hauling, and mills) Gauge | Available by county annually (for most federal data), monthly (for some state data), or periodically (Wood Products db) | Electronic tables or dbs. Some federal data may be relatively aggregated or not disclosed due to few firms. | 1) MI Dept. of Career Dev./Office of Labor Market Info 2) US BLS – Cnty Bus. Patterns & US Census: http://censtats.census.gov 3) Wood Products DB – MI DNR http://www.michigandnr.com/wood/ |

| | | | |
|---|---|---|---|
| 10.3.8 Wood budget – how much wood going out of the area Gauge | If tpo estimates used, may be several years out-of-date; direct survey to supplement/update | Electronic data summed for EUP (some processing required) | 1) Tpo estimates – NCRS 2) State Forest & Hiawatha NF timber sale estimates 3) Survey of major EUP mills, FMFM forestry personnel |
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Eastern Upper Peninsula Eco-Region Indicator Worksheet

Criteria 11 Institutional Processes

Institutional processes address the legal and institutional framework for the application of ecosystem management. They address the policies, legislation, regulations and guidelines that drive and direct ecosystem practices, and direct how institutions cooperate with others in the application of ecosystem management. Processes examine the quality and quantity of opportunities for public involvement in ecosystem planning leading to resource decisions.

Indicator 11.1 Legal Framework for Ecosystem Management

The framework should include the existence and/or application of laws, regulations, policy and guidelines for land management. Also, the framework should consider and meet legal obligations with respect to duly established Native American treaty rights.

| Proposed Metric | Data Available | Data Format | Data Source |
|-----------------|----------------|-------------|-------------|
|-----------------|----------------|-------------|-------------|

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|---|--|------------|---|
| 11.1.1 Land management laws and regulations. | Public Act 451 of 1994 Articles I – III | Word files | Internet & Intranet www.michigan.gov/dnr/laws & legislation |
| | Administrative Rules R299.901, R299.2601, R299.921, R322.2.1 | Word files | Internet & Intranet www.michigan.gov/dnr/laws & legislation |
| | Land Use Orders of the Director | Word files | Internet & Intranet |
| | 36 CFR Part 219 | Word files | Internet |
| Lever | | | |

Indicator 11.1 Legal framework for ecosystem management

| Proposed Metric | Data Available | Data Format | Data Source |
|---|---|--------------------|---|
| 11.1.2 Wildlife management laws and regulations. | Public Act 451 of 1994 Articles I & III; | Word files | Internet & Intranet www.michigan.gov/dnr/laws & legislation |
| | Director’s Order; | Word files | Internet & Intranet www.michigan.gov/dnr/laws & legislation |
| | Administrative Rules R299.1021; The Wildlife Commission Order Part 50 CFR | Word files | www.michigan.gov/dnr/laws & legislation |
| | | Word files | Internet |
| Lever | | | |
| 11.1.3 Recreation laws and regulations. | Public Act 451 of 1994 Article III Chapter 4 | Word files | Internet & Intranet www.michigan.gov/dnr/laws & legislation |
| Lever | | | |

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|--|--|--|--|
| 11.2.1 Public participation in the design of decision-making processes Gauge | | Attendance sheets from meetings; e-mail, personal letters, web site | Meeting sponsor; number of web site hits |
| 11.2.2 Public participation in decision-making processes Gauge | | Attendance sheets from meetings, e-mail, personal letters, web site | Meeting sponsor; number of web site hits |
| 11.2.3 Public participation in implementation of decisions and monitoring Gauge | | Attendance sheets from meetings and participation in project implementation and project monitoring, e-mail, personal letters, web site | Meeting sponsor and/or person/group responsible for specific project that is being implemented and/or monitored, number of web site hits |

Eastern Upper Peninsula Eco-Region Indicator Worksheet

Criteria 11 Institutional Processes

Institutional processes address the legal and institutional framework for the application of ecosystem management. They address the policies, legislation, regulations and guidelines that drive and direct ecosystem practices, and directs how institutions cooperate with others in the application of ecosystem management. Processes examine the quality and quantity of opportunities for public involvement in ecosystem planning leading to resource decisions.

Indicator 11.3 Balance between different values

This indicator is to ensure that values identified as being important in the Eastern Upper Peninsula Eco-Region are not eliminated and that a dispute resolution policy be established to ensure balance between the values.

| Proposed Metric | Data Available | Data Format | Data Source |
|-----------------|----------------|-------------|-------------|
|-----------------|----------------|-------------|-------------|

| | | | |
|---|---|-------|---|
| 11.3.1 Amount of management effort/interest put into different values Gauge | Accounting procedures for time and expenditures | Excel | Metrics in other indicators; MDNR Divisions/Bureaus/Offices |
| 11.3.2 Annual evaluation and reporting of the ecosystem management effort in maintaining the values on the landscape and appropriate adjustments made. Gauge | From metrics in other indicators | | Annual analysis and report of Criteria and Indicators. |
| 11.3.3 Application and effectiveness of dispute resolution guidelines/policy Lever | Draft from EUP Eco-team | Word | EUP Eco-team; Department documents |

Eastern Upper Peninsula Eco-Region Indicator Worksheet

Criteria 11 Institutional Processes

Institutional processes address the legal and institutional framework for the application of ecosystem management. They address the policies, legislation, regulations and guidelines that drive and direct ecosystem practices, and direct how institutions cooperate with others in the application of ecosystem management. Processes examine the quality and quantity of opportunities for public involvement in ecosystem planning leading to resource decisions.

Indicator 11.4 Resources allocated for ecosystem management values.

| Proposed Metric | Data Available | Data Format | Data Source |
|-----------------|----------------|-------------|-------------|
|-----------------|----------------|-------------|-------------|

| | | | |
|--|---|---|--|
| 11.4.1 Resources allocated within the Department for ecosystem management planning, implementation and monitoring Gauge | Statewide for Fish, Law Enforcement, Wildlife, Parks and Recreation and Forest Mineral and Fire Management Division | Coding blocks maintained as Excel spreadsheets Division budget information | Managers of Financial Services Unit for each division. |
| 11.4.2 Participation in external planning efforts (e.g. National Forest Plan revisions) Gauge | Same as above | Same as above | Other agency plans reviewed EUPPEM |
| 11.4.3 Expenditure of resources and dedicated funds for “on the ground” projects Lever | Same as above | Same as above | Eco-team project ranking process |