

## MANAGEMENT INDICATOR HABITATS (MIH)

### Key Points

MIHs 1-10: Forest type and age management indicator habitats:

- For most MIH's, conditions continue to trend toward Forest Plan objectives and Forest Plan Final Environmental Impact Statement (EIS) conditions analyzed in Chapter 3.3.1. The exception is young spruce-fir and red and white pine forest which could fall below objectives by the end of the first decade if current harvest levels continue.

### A. MONITORING AND EVALUATION-TERRESTRIAL

#### Forest Plan Direction

This monitoring was conducted to address Management Indicator Habitat (MIH) 1-9 which are identified in the Landscape Ecosystem Objectives Section, MIH 10: O-WL-34 Provide a wide variety of vegetation conditions in the riparian zone to provide for the variety of species whose habitat includes riparian forest, MIH 11: O-WL-35 Reduce amount of forest edge created through vegetation mgt activities, while still retaining a range of small patches and edge habitat and MIH 14: O-WL-36. Maintain or improve lake and stream habitat quality.

#### Monitoring Conducted

##### Management Indicator Habitats (MIH)

Data for MIH outside the Boundary Waters Canoe Area Wilderness (BWCAW) are from the Superior National Forest's (SNF) Combined Data System (CDS) forest vegetation inventory. This monitoring report shows the annual "snapshot" of MIH conditions that occur on the ground as an "existing condition" for 2008.

Monitoring MIH outside the BWCAW is updated continuously so that Forest Plan implementation projects, especially the landscape-scale vegetation management projects, can use the most up to date information for planning and analysis. In addition to considering existing conditions, during project planning MIH conditions are also projected out to 2014. These are based on all project proposals and all projects that have already had final decisions made, but are not yet implemented. This ensures that any given project in the planning stage will recognize how other completed, ongoing or proposed future projects would contribute to moving toward Forest Plan objectives.

For MIH conditions within the BWCAW the SNF continues to rely on the Forest Plan Final Environmental Impact Statement (FEIS) data which are from the Fire Effects Tradeoff model for the 2001 BWCAW Fuel Treatment FEIS. In future years, the SNF

## 9b.2 Management Indicator Habitats (MIH)

expects to reassess those conditions, though the Forest Plan does not have MIH objectives within the wilderness.

### Population Trend Changes of Associated Species

On a one to five year basis the SNF and its partners are continuing to actively monitor or inventory a wide array of species. These ongoing monitoring efforts are as follows:

**Breeding forest birds:** In partnership with the Natural Resources Research Institute (NRRI), Chippewa and Chequamegon-Nicolet National Forests, annual surveys have been conducted on the SNF since 1991. Data for 2008 have not been analyzed so 2007 data were used for this report. In 2007 a total of 129, 133 and 167 stands (1,254 survey points) were surveyed for breeding birds in the Chequamegon-Nicolet, Chippewa, and Superior National Forests, respectively. The surveys were timed point counts in sampling locations distributed across the forest mosaic in a stratified random manner. These methods are described in detail in Etersson et al (2007).

Trends in relative abundance were calculated for 73 bird species, including 60 species in the Chequamegon-Nicolet National Forest, 57 in the Chippewa National Forest, and 49 in the SNF. Forty-one species were also tested for regional trends by combining data from the three national forests.

Analysis was also conducted by individual species as well as three types of guilds: migration strategy (permanent resident or short-or long-distance migrants), nesting substrate (such as ground, cavity, canopy, or shrub/sub canopy) and vegetation-type preference (variety of habitat groups). The vegetation type guild can be cross referenced to MIH, although the SNF has not yet reported trends in this format. Many of the 49 species, for which relative abundance was determined, are associated with one or more MIH. The full report can be found online at the following address:  
[http://www.nrri.umn.edu/mnbirds/reports/2007\\_annual\\_report.pdf](http://www.nrri.umn.edu/mnbirds/reports/2007_annual_report.pdf)

Terrestrial game species including white-tailed deer, moose, ruffed and spruce grouse, snowshoe hare, gray wolf, beaver, otter, fox, black bear, American woodcock, waterfowl and many others are monitored annually. Each of these species is associated with one or more of the MIH in the Forest Plan Revision FEIS (Vol. 2, Appendix D, pages D-26 to D-69). Monitoring of many species is conducted through a collaborative effort with the Minnesota Department of Natural Resources (MN DNR) and US Fish and Wildlife Service (USFWS). Because monitoring Minnesota's wildlife is a collaborative effort, it is not specific to the proclamation boundary of the SNF. Nevertheless, it is a good basis on which to evaluate impacts of management. The full report can be found online at the following address:  
<http://www.dnr.state.mn.us/publications/wildlife/populationstatus2008.html>.

In addition to the above species, the SNF, in partnership with others, monitors:

- Aquatic species such as game and non-game fish, mollusks, and other invertebrates.
- Frogs and toads through a statewide long-term annual monitoring effort that tracks abundance, presence, and distribution of native frogs and toads. Survey details are

available online at the following address:

[http://www.dnr.state.mn.us/volunteering/frogtoad\\_survey/index.html](http://www.dnr.state.mn.us/volunteering/frogtoad_survey/index.html).

- Non-native invasive species including new and established colonies of species listed as low to high risk (Forest Plan FEIS, Vol. 1, p. 3.3.7-2; and Non-native Invasive Species section of the 2008 Superior National Forest Monitoring and Evaluation Report (M&E). Pp 54-60).
- Many Regional Forester Sensitive Species (RFSS) through a variety of methods, though due to their rarity, population trends and management impacts are not always possible to reliably detect.
- Two federally listed species, Canada lynx and gray wolf, on a five year basis.

#### Featured Species: Moose

Moose is a species of management concern because it is a key prey species for the federally threatened gray wolf and is a very high public interest species with important social, ecological, and economic values and impacts. Also, recent survey data have raised concerns about a declining moose population in northeast Minnesota. The State of Minnesota has put together the Minnesota Moose Advisory Council (MAC) to provide information and recommendations to the MN DNR for the development of a moose management plan in the State.

Foraging habitat and thermal cover, both winter and summer, are both important aspects of moose habitat. The condition of moose habitat at the beginning of Forest Plan implementation and those conditions analyzed in the 2004 Forest Plan FEIS are represented by “2004”. Conditions in “2008” are actual conditions on the ground. The “2014 Objective” is the percent that was projected for 2014 (end of the first decade of the Forest Plan).

Foraging habitat is defined as all upland forest (Management Habitat Indicator-MIH 1) in the zero to nine years old age class. Moose utilize older stands for foraging, but use of this indicator allows analysis of management occurring during the first decade of the Forest Plan. Thermal cover is defined as all upland conifer (MIH 5) and lowland black spruce/tamarack (MIH 9) in the mature age class and older. Pole-sized forest stands are also used by moose for thermal cover but it is of lower value than mature forest. Spatial aspect of forage and thermal cover analyzed at the project level is an important part of habitat quality for moose.

### **Evaluation and Conclusions**

#### Management Indicator Habitats

MIH conditions change slowly because in any given year Forest Plan implementation changes only a small percent of the total habitat in each of the six Landscape Ecosystems (LE) described in the Forest Plan. Because there are minor changes from 2006, the more detailed analysis of MIH in the 2006 report remains appropriate for this year and will not be repeated in detail. The 2009 report (fifth year of Forest Plan implementation) will

#### 9b.4 Management Indicator Habitats (MIH)

include a more detailed analysis of MIH trends. The monitoring data for all MIH in 2008 can be found in the Monitoring Project File.

For most MIH, conditions continue to trend toward consistency with Forest Plan objectives and Forest Plan FEIS conditions analyzed in Chapter 3.3.1. Therefore, management actions for those MIH in the first four years of implementation are consistent with Forest Plan direction. The extent to which conditions for these MIH are trending toward objectives is acceptable. The conclusions of the Forest Plan FEIS about the effect of management on these MIH and their associated species also remain valid. The amount and distribution, by LE, of MIH is adequately representative of those habitats that would have been expected under the range of natural variability of SNF ecosystems and therefore, current implementation of the Forest Plan is expected to maintain the desired diversity and viability of native and desired non-native species. (Refer to 2006 Monitoring Report pp. 59-73 for discussion on MIH that are not specifically trending toward objectives.)

MIH that may not trend towards Forest Plan objectives by the end of the first decade would be mainly young spruce-fir and red and white pine forest. Objectives for both of these forest types are to reduce the percentage of young age classes in these MIH. Currently, both have been reduced from 2004 existing conditions so they technically meet objectives. However, according to the Forest Plan model they both exceed Forest Plan decade 1 outputs and may fall below objectives if current harvest levels continue. An opportunity exists to adjust harvest levels to achieve decade 1 objectives.

Figures 9b.1- 9b.5 show the conditions of MIH 1 (Upland Forest). MIH 1 is a habitat that encompasses all upland MIH and upland forest types: aspen, birch, spruce, balsam fir, northern hardwoods, and red, white and jack pine. As a “catch-all” upland MIH, it provides a very broad indication of habitat conditions based on age groupings. It represents the coarsest filter for upland habitat for associated species. Figure 9b.6 shows the conditions of MIH 9 in the Lowland Conifer Landscape Ecosystem. MIH 9 is lowland conifer forest habitat dominated by black spruce and tamarack.

The conditions represented in Figures 9b.1 – 9b.6 show four different age groupings of MIH 1 present in the five upland and one lowland LEs including young seedling/open forest, sapling/pole, mature forest and old/old-growth and multiaged stage.

The condition of the MIH at the beginning of Forest Plan implementation, and those conditions analyzed in the 2004 Forest Plan FEIS, are represented by “2004”. Conditions in “2008” are the current conditions on the ground plus decisions that have been made but not yet implemented. The “2014 Objective” is the percent that was projected in 2014 (end of first decade of the Plan) if the Forest Plan were fully implemented.

In the young forest stage of MIH 1 in each upland LE and there is less young forest than at the beginning of Forest Plan implementation in 2004 and there is less than what was projected by the Forest Plan FEIS by 2014. One of the main caveats here is that the existing conditions, including decisions, do not reflect the upcoming vegetation

treatments in the next six years of Forest Plan implementation. A second caveat is that many of the acres that were in the young stage at the time the Forest Plan was approved (2004) have now succeeded to pole stage. As discussed in more detail in the 2006 M&E report (p. 63), this does not cause concern about implementation or species viability.

#### Cumulative Effects for All Age Groups of MIH 1 and MIH 9.

In the fourth year of implementation (2008), there were no indicators that substantial unexpected changes occurred on non-federal lands. Therefore the conclusions about cumulative effects documented across the SNF in the FEIS (Chapter 3.3.1-43 to 3.3.1-51) are assumed valid.

#### Population Trends of Species Associated with Management Indicator Habitats

This report does not provide results of the various monitoring programs, although a wealth of information about abundance, distribution and trends is available online and is cited in the reference section below. During project planning, biologists used these sources and others to ensure use of best available information. The SNF intent is to evaluate the trends of many of these MIH associates in the 2009 monitoring report. With only four years of Forest Plan implementation, changes to habitats have been relatively minor and it is unlikely that impacts to species from projects could be detected in such a short timeframe. Therefore, information on species populations and habitat links that was documented in the Forest Plan FEIS for most species remains appropriate information for consideration during project planning.

#### Featured Species: Moose

Forest-wide foraging habitat (Figure 9b.7) appears to be adequate for moose. Habitat appears to be increasing after a decline from 2004 to 2007 during which time young forest cut in the mid-1990s grew into pole sized forests. It appears to be moving towards the 2014 objective for young forest. At the landscape level we believe the quantity and distribution of upland and aquatic forage in northeast Minnesota is not limiting the moose population. This is based on moose densities, size of home range (based on moose fitted with Very High Frequency (VHF) radio-collars) and browsing intensity on favored species. There may be local areas that are heavily browsed that would benefit from habitat management.

The adequacy of thermal cover is not as well understood (Figure 9b.8). The number of acres of potential thermal cover appear adequate but the quality needs to be analyzed at the project level. Species composition and spatial arrangement can be important. Thermal cover could be especially critical in the future, due to the added stressors of climate change, parasites, and other concerns. Management focused on maintaining or creating high quality thermal habitat may become an even more critical in the future. Across the SNF, thermal cover exceeds 2004 conditions and 2014 projected conditions.

In 2009, a Moose Management Plan will be developed for the state of Minnesota. A list of Best Management Practices (BMP's) to manage for moose would be a preferred outcome of this plan. The SNF should analyze the BMP's and implement them if they are consistent with the Forest Plan. Research on the SNF is also currently ongoing using

radio-telemetry and there is a proposal to start using some Global Positioning System (GPS) collars to gain valuable information on finer scale habitat use.

## **B. MONITORING AND EVALUATION – AQUATIC**

### **Forest Plan Direction**

This monitoring was conducted to address Forest Plan Objective: MIH 14 O-WL-36. Maintain or improve lake and stream habitat quality. Objectives, standards, and guidelines are found primarily under Watershed and Riparian Management direction.

### **Monitoring Conducted**

Several monitoring efforts are associated with maintaining or improving lake and stream habitat quality (MIH 14) including the following:

- Stream monitoring reach surveys occurred at sites downstream of potential management activities. Data collected includes stream channel cross sections, longitudinal profiles, pebble (substrate) counts, and fish, mussel and invertebrate community information. Fish communities were sampled using single pass electro-fishing, aquatic invertebrate communities were sampled using multi-habitat d-net samples, and mussels were sampled using semi-quantitative snorkel surveys. Biological community monitoring data are summarized below and the physical stream reach monitoring information and results are in the Water Resources section.
- Sustaining Lakes in a Changing Environment (SLICE) is a cooperative lake monitoring program led by MN DNR Fisheries and Minnesota Pollution Control Agency (MPCA). The study is designed to understand, predict, and respond to the outcomes of major drivers of change (i.e. development, agriculture, invasive species, climate change) on lake habitats and fish populations. The approach is to first explore processes and mechanisms that drive patterns in water quality and fish habitat in a diverse set (24) sentinel lake watersheds spread across the state's major eco-regions. This approach of augmenting traditional extensive data collection efforts with an intensive focus to understand processes in a few representative sentinel systems represents a novel and promising direction in water resource and fisheries management. The Forest Service's role in SLICE is to sample the aquatic vegetation in the five sentinel lakes that occur on the SNF for a period of five years from 2008 to 2013.

The SNF, in conjunction with both internal and external partners, also monitors the following:

- New and established populations of aquatic Non-Native Invasive Species (NNIS), evaluating resource risk and management (Forest Plan Revision FEIS, Vol. 1, p. 3.3.7-2; NNIS section of this report).

- Aquatic Regional Forester Sensitive Species (RFSS) through a variety of additional efforts due to their rarity, population trends and management strategies. Documentation for RFSS can be found in the RFSS section of this M&E report).
- Lake water quality at long term monitoring sites.
- Aquatic species such as game and non-game fish, mollusks and other invertebrates with the MN DNR and MPCA, 1854 Treaty Authority, Fond du Lac Reservation, and The Nature Conservancy. Examples of these partnerships and projects can be found online at the following address: [http://fsweb.wo.fs.fed.us/wfrp/wfrp\\_ms/index.htm](http://fsweb.wo.fs.fed.us/wfrp/wfrp_ms/index.htm).

## **Evaluation and Conclusions**

### Management Indicator Habitats-Aquatic

Stream monitoring occurred at six sites in 2008 that were previously sampled either in 2005 or 2006. Location, methods and time of year were consistent for each site across years to reduce variability. There was no actual timber harvest or other management activity near any of the sites for which these stations were set up. As a result, the data reflect baseline (natural) variability in fish communities. The data suggest that catch per unit effort are similar at sites between years for most fish species (Table 9b.1). Species that are present at a site in one year and absent in the other have low detection rates (low catch per unit effort), indicating that these species are subject to greater sampling variability. Overall, these sites represent the range of species expected in streams on the SNF.

Five SLICE lakes were sampled for aquatic vegetation including: Northern Light, Trout, Echo, Elephant, and White Iron. Since 2008 was the first year of the five year monitoring effort, only summary and baseline data are available. In general, these lakes represent the natural range of lake and watershed conditions within the Northern Lakes and Forest Eco-region.

## **C. REFERENCES**

Etterson, M.A., J.R. Etterson, and F. Cuthbert. 2007. A robust new method for analyzing community change and an example using 86 years of avian response to forest succession. *Biological Conservation* 138:381-389.

9b.8 Management Indicator Habitats (MIH)

Figure 9b.1. Fish species present at stream monitoring sites on the Superior National Forest.

Fish Species	Hill Creek		Kadunce River		Isabella River		Nester Creek		Sphagnum Creek		Trappers Creek	
	2006	2008	2005	2008	2006	2008	2005	2008	2006	2008	2006	2008
Brook Trout	0.64	1.69	4	2.92	0	0	0.84	1.07	1.26	0.58	0.41	0.54
Northern Pike	0	0	0	0	0.05	0.03	0	0	0	0.05	0	0
Blacknose Dace	0.05	0.04	0.64	1.64	2.63	3.17	1.31	1.99	3.72	1.26	1.63	1.41
Longnose Dace	0	0	0	0	1.24	0.34	0	0	0	0	0	0
Creek Chub	1.33	0.11	0	0.87	0.66	0.38	0.17	0.65	0.44	0.1	2.04	1.35
Pearl Dace	0	0.04	0	0	0	0	0	0	0	0	0.05	0
Finescale Dace	0	0	0	0	0.03	0	0	0	0.05	0	0	0
Common Shiner	0	0	0	0	0.55	0	0	0	0	0	0.36	0.87
Blacknose Shiner	0	0	0	0	0.26	0	0	0	0	0	0.41	0
White Sucker	0.59	0.07	0	0	0.37	0.52	0	0	0	0	0.5	0.14
Rock Bass	0	0	0	0	0.13	0.07	NA	NA	NA	NA	NA	NA
Smallmouth Bass	0.1	0	0	0	0	0	NA	NA	NA	NA	NA	NA
Largemouth Bass	0	0	0	0	0.03	0.07	NA	NA	NA	NA	NA	NA
Bluegill	0	0	0	0	0.08	0	NA	NA	NA	NA	NA	NA
Pumpkinseed	0	0	0	0	0.03	0.07	NA	NA	NA	NA	NA	NA
Yellow Perch	0	0	0	0	0.03	0	NA	NA	NA	NA	NA	NA
Johnny Darter	0	0	0	0	0.18	0.14	NA	NA	NA	NA	NA	NA
Mottled Sculpin	0	0.11	0	0	0.58	0.59	0	0	0.05	0.1	0	0
Central Mudminnow	0	0	0	0.13	1.76	0.9	0.4	1.3	0	0	0.14	0.08
Burbot	0.1	0.07	0	0	0	0	NA	NA	NA	NA	NA	NA
Logperch	0	0	0	0	0.03	0	NA	NA	NA	NA	NA	NA
Brook Stickleback	NA	NA	NA	NA	NA	NA	0	0.04	0	0	0	0
Blackside Darter	NA	NA	NA	NA	NA	NA	0	0	0	0	0.05	0

Figure 9b.1. Jack Pine/Black Spruce Landscape Ecosystem (Management Habitat Indicator 1 – Upland Forest) on the Superior National Forest.

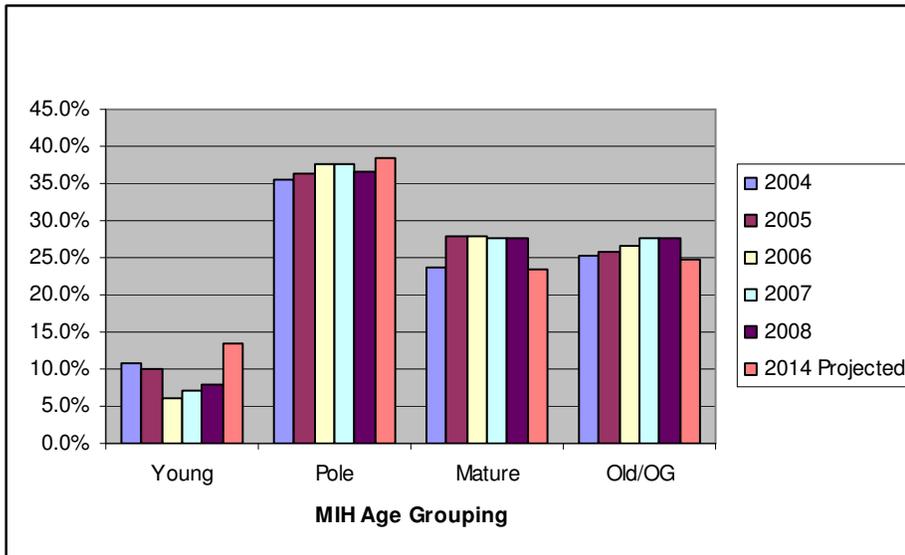
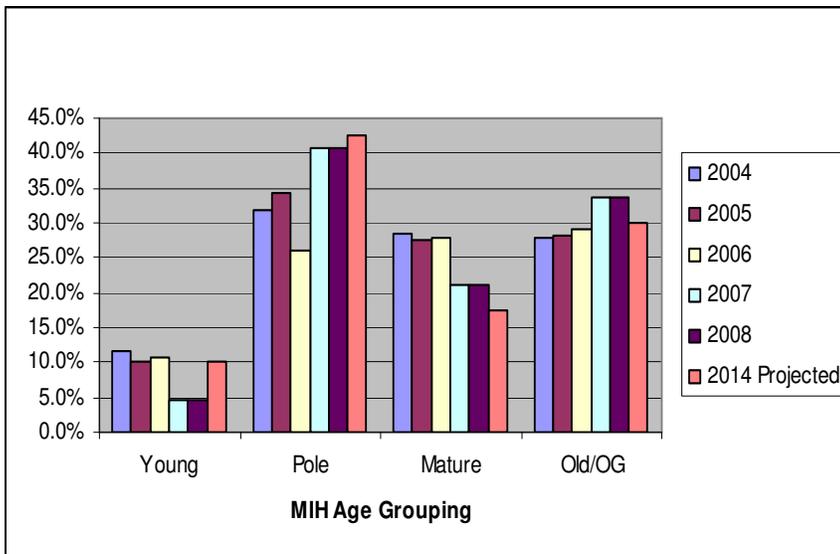


Figure 9b.2. Dry-Mesic Red and White Pine Landscape Ecosystem (Management Habitat Indicator 1 – Upland Forest) on the Superior National Forest.



9b.10 Management Indicator Habitats (MIH)

Figure 9b.3. Mesic Red and White Pine Landscape Ecosystem (Management Habitat Indicator 1 – Upland Forest) on the Superior National Forest.

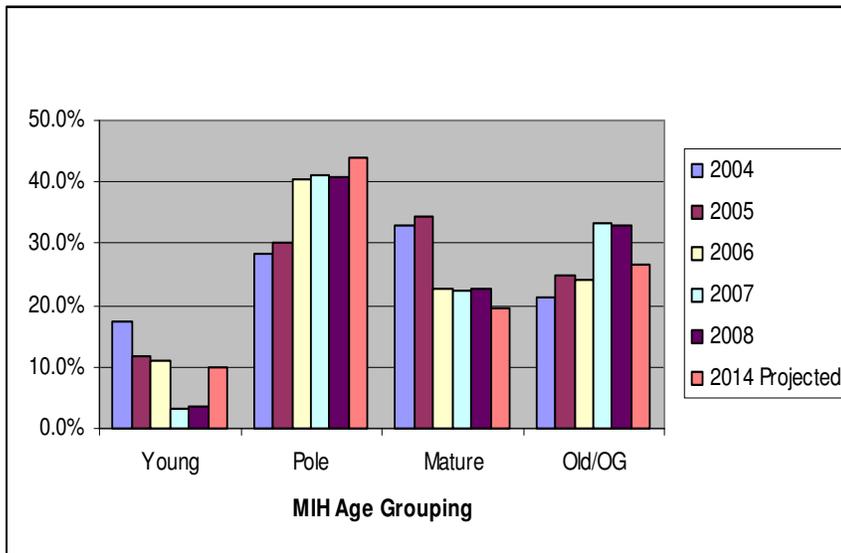


Figure 9b.4. Mesic Birch/Aspen/Spruce-Fir Landscape Ecosystem (Management Habitat Indicator 1 – Upland Forest) on the Superior National Forest.

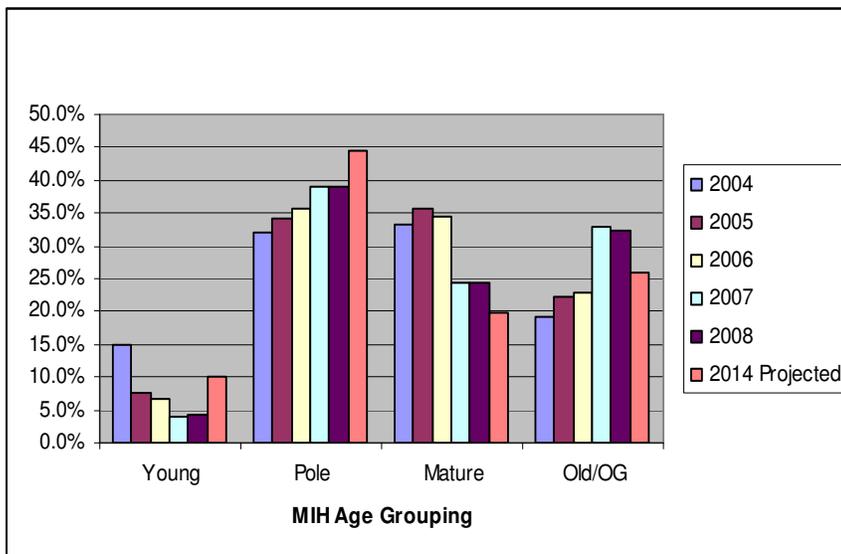


Figure 9b.5. Sugar Maple Landscape Ecosystem (Management Habitat Indicator 1 – Upland Forest) on the Superior National Forest.

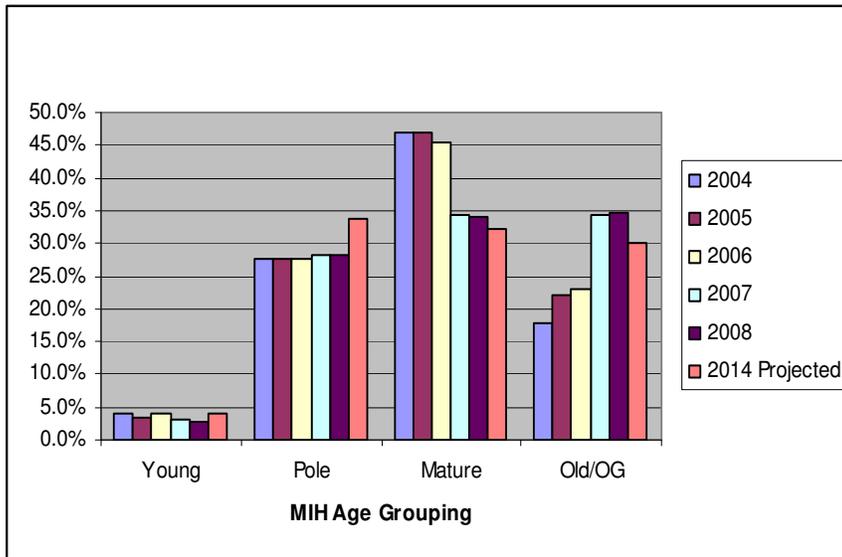
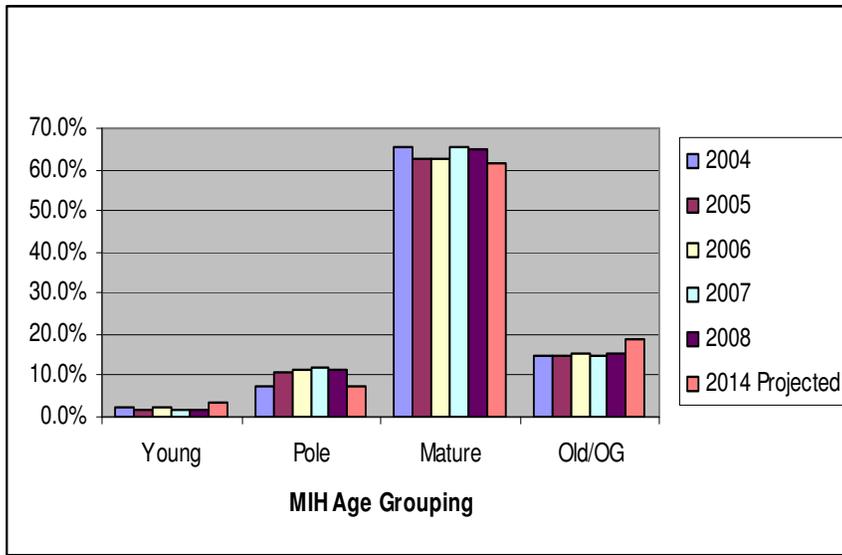


Figure 9b.6. Lowland Conifer Landscape Ecosystem (Management Indicator 9 – Lowland Black Spruce-Tamarack Forest) on the Superior National Forest.



9b.12 Management Indicator Habitats (MIH)

Figure 9b.7. Forest-wide moose foraging habitat on the Superior National Forest.

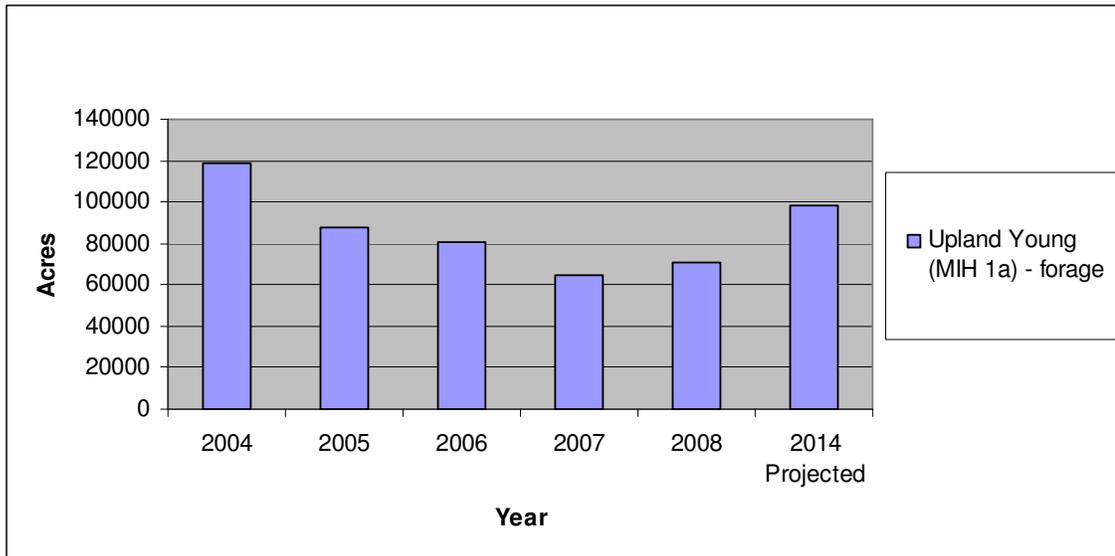


Figure 9b.8. Forest-wide moose thermal cover on the Superior National Forest.

