

### Monitoring Question

*To what extent are Superior National Forest management, natural disturbances, and subsequent recovery processes changing vegetation composition and structure? To what extent are conditions moving toward short-term (1-20 years) and long-term (100 years) objectives at Landscape Ecosystem, Management Area, and other appropriate landscape scales?*

### **Monitoring Conducted**

#### Forest Vegetation Composition, Structure, and Age

**Objective O-VG-1.** Move vegetation conditions from Year 2003 conditions toward the long-term desired composition, structure, age, spatial patterns, and within-stand diversity. **Objective O-VG-13.** Maintain a full range of age classes from young to old, including old growth and multi-aged growth stages, for the variety of forested vegetation communities. **Objective O-VG-8.** Restore structural diversity and ecosystem processes within stands when harvesting or burning by retaining a diverse mix of trees, shrubs, and herbs; live and dead standing trees; earth and tree root mounds caused by uprooted trees; coarse or large woody debris from fallen trees; and patches of live trees.

This monitoring question is addressed in two groups of monitoring drivers and activities:

- A) SNF Forest Vegetation Composition/Structure and SNF Forest Vegetation Age
- B) Within-stand Structural Diversity.

Monitoring to identify changes in vegetation composition, age, structure and within-stand diversity was accomplished through the Combined Data System (CDS) database and associated Geographic Information System (GIS) spatial data. The SNF “froze” the CDS database in November, 2006 so as to display both accomplished and planned (formal NEPA decision) activities which had occurred since October 2005.

Monitoring results from several NEPA decisions were used to further evaluate, on-the-ground, how well the SNF is addressing the Monitoring Question. These included several “post Forest Plan Revision” projects such as the Tomahawk, Dunka and Eastside Thinning projects; in addition, several “pre-Forest Plan Revision” analyses were reviewed and included Holmes/Chipmunk EIS and the Red Pine/White Pine Thinning Environmental Assessment (EA), among others. These projects evaluated treatments such as clearcutting with reserve trees, prescribed burning, timber stand improvement and reforestation to determine effects to forest composition, structure and age class distribution. Treatments occurred, at least to some extent, across all Landscape Ecosystems referenced in this report.

Finally, impacts from environmental disturbances (wildfire, wind events, etc) were evaluated.

## Forest Vegetation Spatial Distribution

**Objective O-VG-17 and 18.** *In mature or older upland forest types managed to maintain large patches (greater than 300 acres of all types) and mature or older red and white pine forest types managed to maintain large patches (100 acres or greater), manage patches to maintain the characteristics of mature or older native upland forest vegetation communities and promote the maintenance or development of interior forest habitat conditions.*

**Objective O-VG-19.** *Maintain a representative array of large patches (greater than 300 acres) of mature or older lowland forest.* **Objective O-VG-20.** *Create large patch temporary openings up to 1000 acres through management activities.*

Monitoring of mature and older red and white pine forest patches and lowland forest patches was accomplished through the Combined Data System (CDS) database and associated Geographic Information System (GIS) spatial data. Monitoring of mature or older upland forest patches greater than 300 acres, greater than 1000 acres, and greater than 10,000 acres entailed review of CDS and where it intersected with GIS Zones 1, 2, and 3. The SNF “froze” the CDS database in November, 2006 to display results of FY 2006 accomplishments. In addition planned but not yet implemented activities approved in decisions prior to 2006 were incorporated in the analysis.

## **Evaluation and Conclusions**

Changes in vegetation composition and age class distribution in the Jack Pine/Black Spruce; Dry-Mesic Red and White Pine; Mesic Red and White Pine; Mesic Birch/Aspen/Spruce-fir; Sugar Maple; and Lowland Conifer Landscape Ecosystems (LE's) were evaluated. The evaluations reflect actual accomplishments to date plus activities planned through formal NEPA decisions. These preliminary results (second year of 2004 Forest Plan implementation), while mixed, indicate that vegetation conditions across the SNF are generally moving towards the desired Forest Plan objectives. Possible exceptions include forest types within:

- \* Mesic Red and White Pine LE: Within the Mesic Red and White Pine LE, the Northern hardwoods forest type may exceed Decade 1, 2 and Long-term (100 yr) objectives. Although the forest type would be 3% instead of the 2% objective at this time, this forest type may warrant management to decrease the percent down to the 2% objective. This is because the northern hardwood tree diversity objective (FP, Table MRW-3, p. 2-68) is to decrease the percentage of northern hardwoods. Site-specific analysis of management opportunities will be important in making this decision, since the difference in objectives may also be the result of improved inventory.
- \* Jack-Pine/Black Spruce (JPB) LE: The white pine forest type, 4% in 2006 within the Jack Pine/Black Spruce, has the potential to exceed Decade 1, 2 and long term (100 yr) objectives (3%, 3%, and 2% respectively). Because the white pine tree diversity objective is to increase percent of white pines, any additional recruitment of white pine trees will move the Landscape Ecosystem towards the tree species objective of increasing white pine across the landscape.

Changes in Forest Vegetation spatial distribution in the Red/White Pine, Upland, and Lowland Conifer Mature & Older forest were also evaluated. The pine and lowland conifer mature/older forest was reviewed across the SNF while Upland Forest was evaluated by zones. Within the Red/White Pine Mature Forest, the acreage of patches greater than 300 acres increased from 6,000 acres in 2005 to 7,061 acres in 2006. This increase likely resulted from succession of forest stands into older age classes and updated inventories. Within zone 1, the number of 1,000 acre patches reported in 2006 was 5, which is three less than the Forest Plan guideline of eight patches. Within zone 2, Forest Plan direction is to maintain 1 patch at 11,700 acres which occurred in 2004. Current condition shows this patch has been fragmented to less than 10,000 acres. This fragmentation is due to gaps caused by environmental occurrences including wind and fire damage which affect the continuity of the overall patch.

Composition and age changes for all but the White Pine Forest Type in the Jack Pine/Black Spruce LE and Northern Hardwoods Forest Type in the Mesic Red are shown in Appendix C. Composition and age changes

since 2004 for the above mentioned White Pine and Northern Hardwoods Forest Types are displayed in Table 1. Changes in spatial distribution (patch types and sizes) are shown in Table 2. Figures 1 through 8 graphically display spatial distribution trends.

It is premature to meaningfully evaluate long term accomplishments or trends for several reasons because:

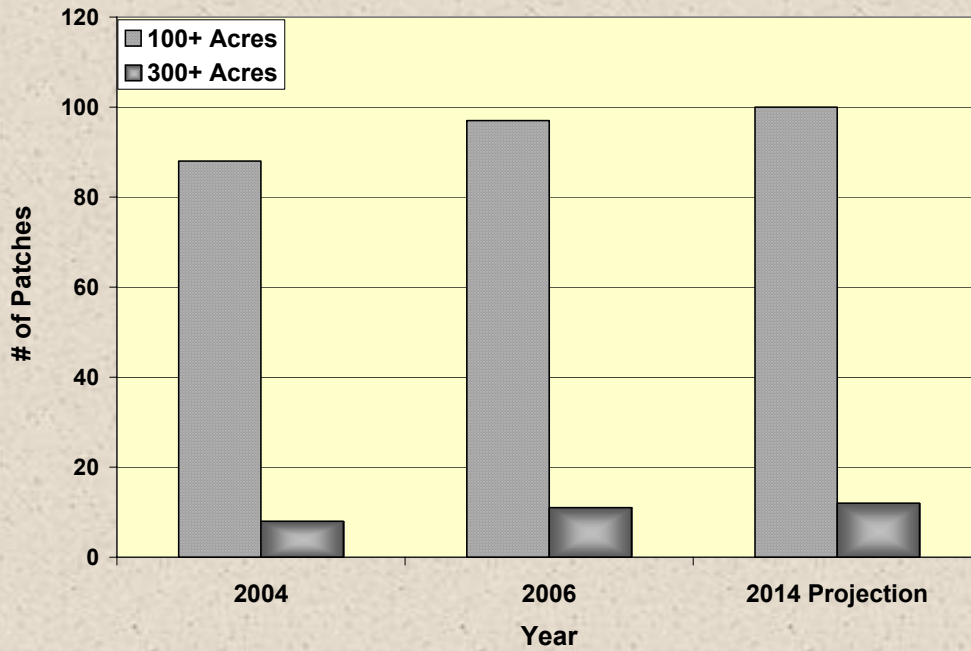
- \* With a limited number of vegetation management decisions since Forest Plan approval in 2004, only about 20% of the SNF has had site specific project level planning and implementation.
- \* The “pool” of young forest is continually changing as newly created areas (reforestation of past timber harvest, fire/wind damaged areas etc) are added while, at the same time, previously young forest is lost due to succession. For this reason, net changes in a given year are not meaningful until the SNF is 5 to 6 years into implementation of the Forest Plan and trends can be meaningfully evaluated.
- \* Project level activities do not necessarily uniformly occur across all LE’s. For this reason, opportunities to manage vegetation may be relatively absent in the early life of the Forest Plan while abundant in the latter years of implementation. It is likely to be closer to years 4 through 6 (the midpoint of the decade) before trends can be meaningfully evaluated.

<b>Table 1. COMPOSITION, ACHIEVEMENT OF FOREST PLAN DIRECTION</b>			
<b>Landscape Ecosystem/Forest Type</b>	<b>Existing Condition (ROD date-July, 2004)</b>	<b>Mgt Direction (Decade 1); Objectives % FEIS Projected Condition</b>	<b>Forest-wide Condition in 2006 Includes NEPA Decisions for vegetation management</b>
<b>Vegetation Composition</b>	<b>Percent</b>	<b>Percent</b>	<b>Percent</b>
<i>Jack Pine-Black Spruce Landscape Ecosystem</i>			
White pine Forest Type	3	3	4
<i>Mesic Red and White Pine Landscape Ecosystem</i>			
Northern Hardwoods	2	2	3

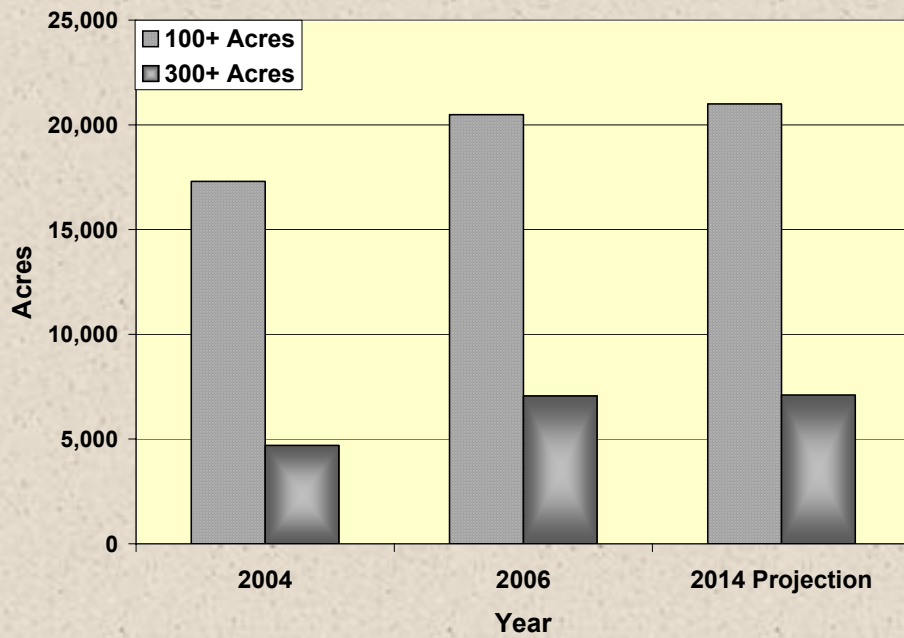
<b>Table 2. PATCH SPATIAL DISTRIBUTION, ACHIEVEMENT OF FOREST PLAN DIRECTION</b>								
<b>Patch Type and Size in Acres</b>	<b>Forest Plan Standards and Guidelines</b>		<b>Existing Condition (ROD – July 2004)</b>		<b>FEIS Projected Condition, Decade 1</b>		<b>Forest-wide Condition 9/30/06*</b>	
	<b>Acres</b>	<b>#</b>	<b>Acres</b>	<b>#</b>	<b>Acres</b>	<b>#</b>	<b>Acres</b>	<b>#</b>
<b>Red/White Pine Mature and Older Forest (Forest-wide)</b>								
100+ ac	17,300	88	17,300	88	21,000	100	20,485	97
300+ ac	4,700	8	4,700	8	7,100	12	7,061	11
<b>All Upland Mature and Older Forest (Zones 1, 2 and 3)</b>								
<b>Zone 1</b>								
300+ ac	44,700	n/a	51,500	86	36,600	57	43,948	76
1000+ ac	n/a	8	13,200	8	10,500	6	9,397	5
<b>Zone 2</b>								
300+ ac	54,400	n/a	60,700	35	58,000	36	62,814	38
1000+ ac	n/a	14	50,000	14	48,400	17	51,588	15
(5000-9999) 1/	n/a	n/a					16,525	3
10,000+ ac	11,700	1	13,000	1	0	0	16,063	1
<b>Zone 3</b>								
300+ ac	O-VG-24 Strive to minimize decrease in acres & numbers of patches of mature or older upland forest in patches ≥300 acres.		185,200	177	152,000	155	201,845	173
1000+ ac			116,500	47	92,900	40	134,775	46
10,000+ ac			10,100	1	0	0	30,320	2
<b>Lowland Conifer Mature and Older Forest (Forest-wide)</b>								
100+ ac	O-VG-19 Maintain representative array of large patches (≥ 300 ac) of mature or older lowland forest.		72,500	310	79,800	334	98,314	412
300+ ac			30,300	52	35,400	59	43,763	77
1,000+ ac			6,600	4	6,800	4	10,854	7

\*Values reflect existing plus decision plus conditions resulting from currently completed project decisions.

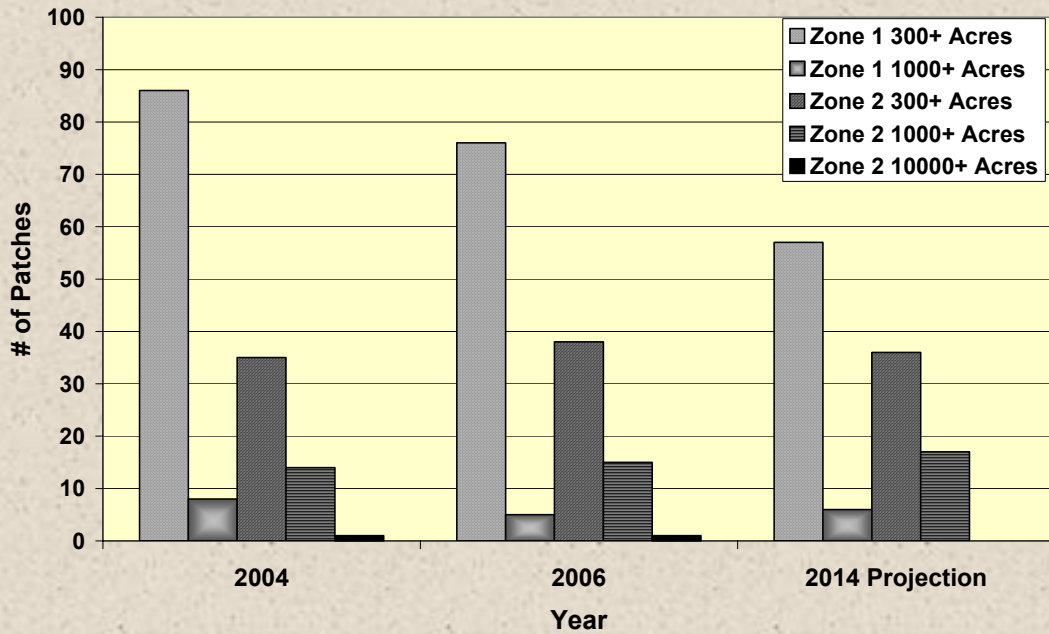
**Figure 1. Red-White Pine Mature and Older Forest-Patches**



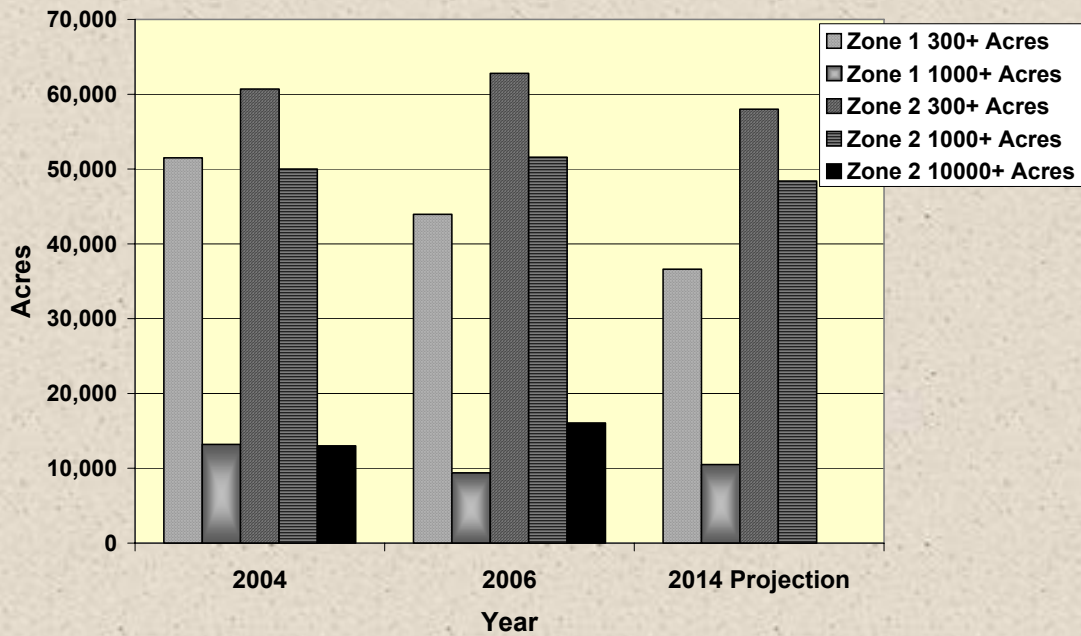
**Figure 2. Red-White Pine Mature and Older Forest-Acres**



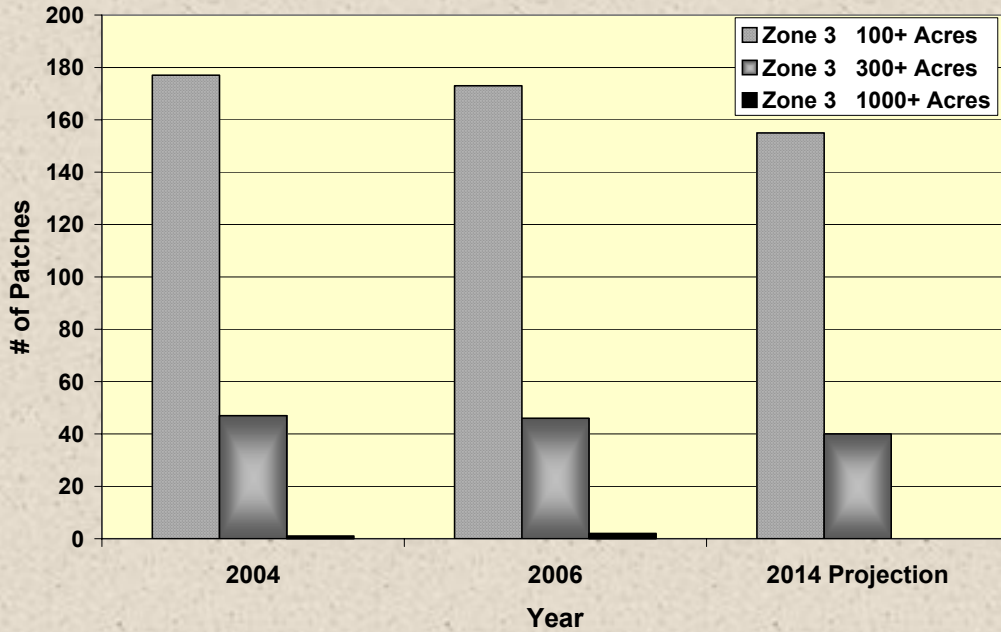
**Figure 3. Zone 1 & 2 Mature and Older Forest-Patches**



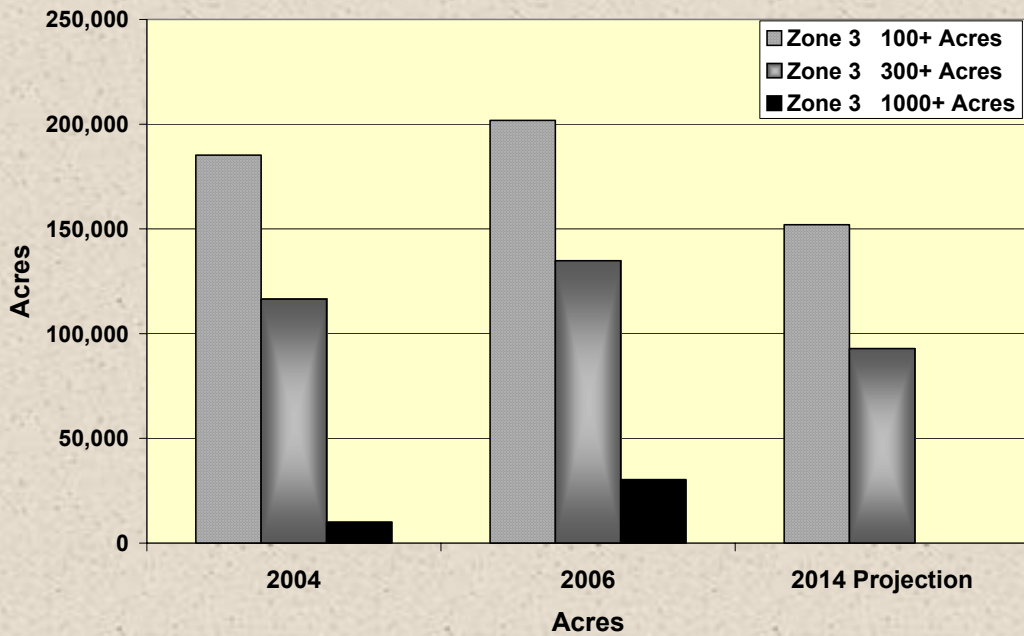
**Figure 4. Zone 1 & 2 Mature and Older Forest-Acres**



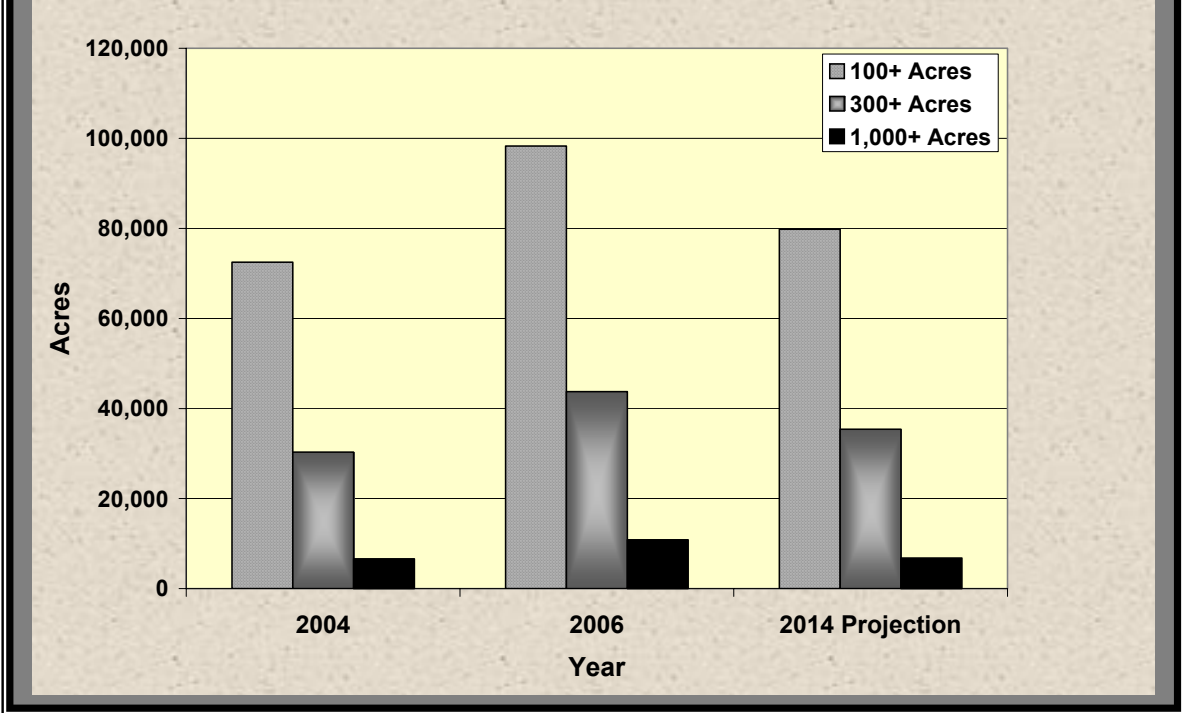
**Figure 5. Zone 3 Mature and Older Forest-Patches**



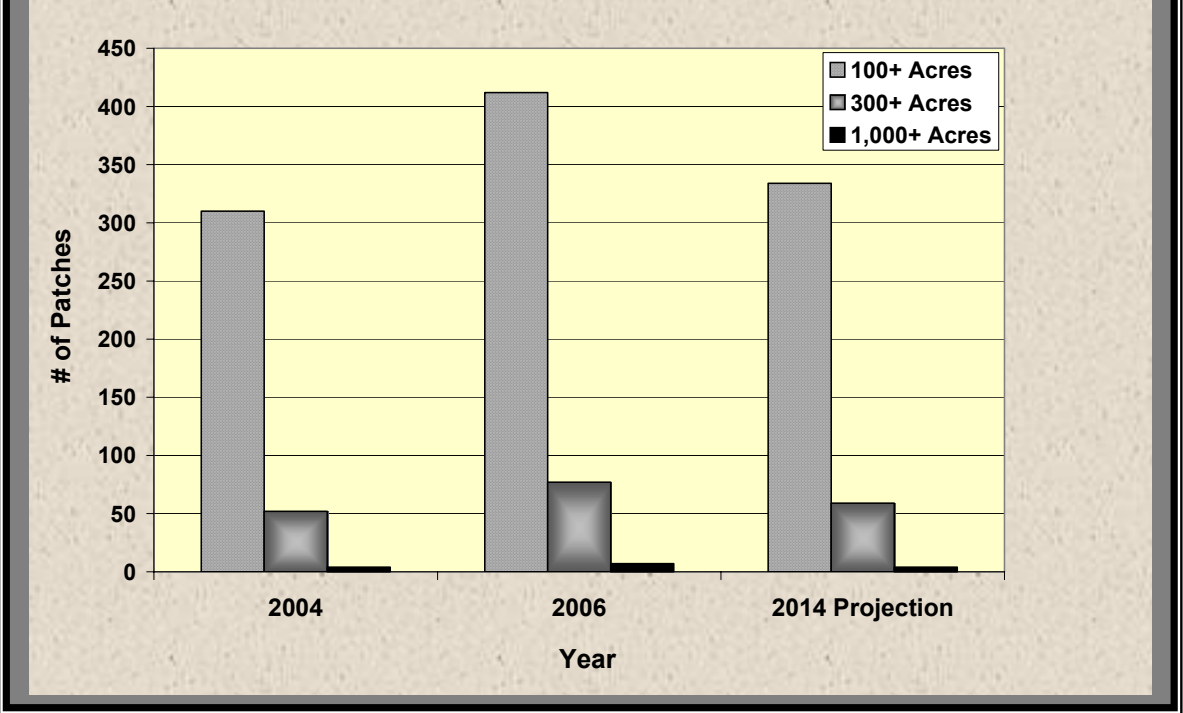
**Figure 6. Zone 3 Mature and Older Forest-Acres**



**Figure 7. Lowland Conifer Mature and Older Forest-Acres**



**Figure 8. Lowland Conifer Mature and Older Forest-Patches**



## Standards and Guides

Approximately eighteen applicable Standards and Guides were monitored during 2006 and fell into three basic categories. These are summarized as follows:

- (1) Forest Vegetation Age (S-VG-1) – This category deals with projects under the Healthy Forest Restoration Act (HFRA) which had the potential to adversely affect structure and composition within old growth stands. Monitoring did not occur as no projects that affected old growth forest were implemented under HFRA authority in 2006.
- (2) Forest Vegetation Spatial Patterns (S-VG-2 through 7; G-VG-1 through 7). Monitoring occurred through recent NEPA decisions (Tomahawk and Dunka EA's; also, the Virginia EIS). In all analyses, the SNF was in compliance with these Standards and Guidelines.
- (3) Special Forest Products (G-VG-8 through 11) – Monitoring occurred through a review of SNF policies and requirements involving the permitting process and through enforcement of regulations involving unauthorized collections. In all cases, the SNF was in compliance with these Standards and Guidelines.

## Necessary Follow-up and Management Recommendations

### Follow-up Actions

- \* Continued annual monitoring to measure progress towards achieving desired conditions as described in D-VG-1 through D-VG-8 on a Landscape Ecosystem basis is critical. This will provide the SNF with a timely basis for anticipating trends towards or away from these desired conditions. These efforts primarily involve forest composition, structure, age, within-stand diversity and spatial distribution. Useful tools include the annual “vegetation snapshot” to capture vegetative conditions on the SNF as well as aggressive forest inventory. Recent NEPA decisions can provide a reliable estimate of anticipated changes to vegetation on an LE basis.
- \* The SNF should continue to aggressively seek opportunities, through vegetation manipulation, to address vegetation objectives of the Forest Plan.
- \* Continue to integrate the Native Plant Community Classification concept into inventory efforts on the Forest. In 2006, this classification option was integrated into the Field Sampled Vegetation database, a Forest Service-wide application.

### Recommended Management Actions

- \* Intensify efforts to update forest inventory. This is essential to ensure effective and accurate vegetation planning and implementation.
- \* Correct Forest Plan error in Table JPB-2 regarding age class groupings. Planning and implementation efforts have used the correct groupings in NEPA projects; however, the correction should be published for the Forest Plan through errata.
- \* Clarify Lowland Conifer LE by addressing differences between the Forest Plan EIS LE map and the implementation layer LE map through an amendment or errata. Current Lowland Conifer LE (LLC-A-B and C) age objectives address lowland black spruce and tamarack, not white cedar and black ash. A possible resolution is to add sections similar to LLC for white cedar and black ash to provide a framework for monitoring general objectives in the Forest Plan that address these types.

## Collaborative Opportunities To Improve Efficiency And Quality Of Program

### Partnerships

Continue to work closely with Minnesota Department of Natural Resources and local governments in coordination and documentation of vegetation manipulation activities across multiple ownerships. If the Individual Tree Crown (ITC) remote sensing forest inventory project is carried forward, collaborate closely with the multiple partners (St. Louis, Lake and Cook county governments; MN Department of Natural



Resources; The Nature Conservancy; and other Forest Service entities including Northern Research Station and State & Private Forestry).

Continue to collaborate with Natural Resources Research Institute (NRRI) and Minnesota County Biological Survey in the area of native plant community inventory and classification. See Appendix F for further discussion.

### **Research**

Several research activities are underway on the SNF as follows:

- \* The Northern Research Station (USDA-Forest Service) has proposed a study of “Long Term Consequences of Salvage Treatments on Fuels, Regeneration and Carbon Storage in Lake States Forests”. Final approval of this study is pending.
- \* The University of Minnesota continues their study of “Succession Dynamics Following the 1999 BWCAW Windstorm”.
- \* Nationwide, the concept of using woody biomass as a means of generating energy (electricity) is gaining momentum. This effort involves the removal of small size woody material that traditionally has not been harvested. The Institute for Agriculture and Trade Policy, a private organization, has received a grant from the US Government to study the feasibility and practicality of harvesting this material. To facilitate this study, the SNF provided four study areas on which the harvesting occurred. The study has concluded and results are being analyzed and documented.
- \* Finally, the Minnesota Department of Natural Resources in conjunction with the Forest Inventory & Analysis (FIA) group (USDA-Forest Service) continues their vegetation study using permanent field plots.

### **Summary Points**

- \* Preliminary results, while mixed, indicate that vegetation conditions across the SNF are generally moving towards the desired Forest Plan objectives. Possible exceptions pertaining to vegetative composition include;
  1. Within the Mesic Red and White Pine LE, the Northern Hardwoods Forest Type may exceed Decade 1, 2 and Long-term (100 yr) objectives. The forest type would be 3% instead of 2% at this time.
  2. Within the Jack-Pine Black Spruce (JPB) LE, the White Pine Forest Type is likely to exceed Decade 1, 2 and Long-term (100 yr) objectives. The forest type would be 4% instead of 3% at this time.
- \* Within the Red/White Pine Mature Forest, the acreage of patches greater than 300 acres increased from 6,000 acres in 2005 to 7,061 acres in 2006.
- \* Within zone 1, the number of 1,000 acre patches reported in 2006 was 5, which is three less than the Forest Plan guideline of eight patches.
- \* Within zone 2, Forest Plan direction is to maintain 1 patch at 11,700 acres which occurred in 2004. Current condition shows this patch has been fragmented to less than 10,000 acres due to gaps caused by environmental occurrences including wind and fire damage.
- \* Continue to integrate the Native Plant Community Classification concept into inventory efforts on the Forest. In 2006, this classification option was integrated into the Field Sampled Vegetation database, a Forest Service-wide application.