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Hiawatha National Forest

Monitoring and Evaluation Report

FY2010

Hiawatha National Forest

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Approval and Declaration of Intent

I have reviewed the FY2010 Monitoring and Evaluation (M&E) Report for the Hiawatha National Forest that was prepared by an interdisciplinary team during the summer of 2011. The M&E Report meets the intent of both the Forest Plan (Chapter 4) and 36 CFR 219.

This report is approved

_____ _____

JO REYER
Forest Supervisor

Date

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Summary

This report includes monitoring activities associated with the 2006 Hiawatha National Forest Land Management Plan for Fiscal Year 2010. In accordance with the National Forest System Land Management Planning Rule (36 CFR 219), the Hiawatha National Forest monitoring framework includes annual monitoring of the management plan's implementation. This report represents monitoring activities that have occurred in the third year of the plan's implementation.

2010 Notable Findings:

Threatened and Endangered Species: The Forest initiated a research project to determine the nature of suitable Kirtland's Warbler (KW) habitat. Results of this study will help management more effectively allocate resources to assist in its recovery. For the third consecutive year, the forest exceeded the Forest Plan KW habitat goal, which may lead to short-term increases in the overall population level.

Recreation Opportunities: In 2009 the Moss Lake single track motorcycle trail was opened to public use on the Rapid River/Manistique Ranger District. This trail added 26.4 miles of trail to the motorized trail system, and moved the forest toward meeting the goal for motorized trails outlined in the Forest Plan.

Road Stream Crossing Inventory: During 2009, work continued on the Road Stream Crossing Inventory that started in 2008. A total of 906 locations were inventoried, including information about bankfull width, crossing type and crossing condition. A Geographic Information System was used to develop a set of points where mapped streams and roads crossed. The inventory has already been heavily used to develop a list of sites for potential aquatic organism passage problem locations.

Road Closing and Rehabilitation: In 2008, thirteen roads that had been damaged by illegal Off-Highway Vehicle use were closed and rehabilitated. These sites were revisited in 2009, and eleven of them were successful in preventing further resource damage, indicating a largely successful program.

Wetland Restoration: In 2008, the Nahma Snowmobile Grade was re-routed around a wetland, in order to restore function and species diversity. Closure effectiveness monitoring in 2009 detected that none of the closure blockages were breached and there was no evidence of illegal activity.

Introduction

The Hiawatha National Forest Land and Resource Management Plan (Forest Plan) was approved for implementation in 2006. National Forest Management Act (NFMA) regulations require the forest to develop and implement a program of Monitoring and Evaluation to determine the effectiveness of active management on resources found on or near National Forest lands (36 CFR 219). Specifically, the monitoring and evaluation plan described in Chapter 4 of the 2006 Forest Plan is designed to answer the following questions:

Did we do what we said we were going to do?

Did our standards, guidelines, and objectives work as we expected them to?

Is our understanding and science correct?

The purpose of monitoring and evaluation is to have the ability to respond to current conditions and to make appropriate changes based on new information or technology. Depending on the answers to the above questions, the Forest Plan may be amended or revised to adapt to new information or changed conditions.

Monitoring and Evaluation Strategy

Monitoring and evaluation are separate activities. Monitoring is the process of collecting data and information. Evaluation is the analysis and interpretation of the data collected from monitoring activities. A key requirement of the monitoring and evaluation process is for the forest staff to determine how closely Forest Plan standards and guidelines have been applied and how well the Forest Plan objectives are being met. This evaluation is presented in a Monitoring and Evaluation report to the Forest Supervisor, along with any recommended changes, revisions, or amendments to the forest plan deemed necessary (36 CFR 219.12(k)).

Budgetary constraints will affect the level of monitoring that can be done in a particular fiscal year. Generally, monitoring activity can be accomplished in resource areas with a low level of precision. If budget levels are adequate, the Forest may have the ability to conduct scientifically robust monitoring and evaluation activities.

Fiscal Year 2010 M&E Framework

There are fourteen key monitoring/evaluation activities identified by the 2006 Forest Plan included in this report. These activities require annual monitoring due to importance to the public (such as recreation) or a rapidly changing environment that requires expedited responses (outbreak of an insect pest). The following monitoring activity descriptions include the monitoring question to answer, a synopsis of the Forest Plan standards, guidelines, and objectives the question addresses, a brief summary of the data collected, and an evaluation of the activity. Finally, some activity descriptions conclude with a general statement about future monitoring activities.

Insects and Disease

Monitoring Questions:

Are insect and disease populations compatible with objectives for restoring or maintaining healthy forest conditions?

To what extent is Forest management managing undesirable occurrences of fire, insect, and disease outbreaks?

Monitoring Activity Relationship to Forest Plan:

Destructive insects and disease organisms do not increase to potentially damaging levels following management activities. Where did this come from?

2400 Vegetation Management, Desired Condition – Provide a diverse, productive, healthy and sustainable forest that is resilient to natural and human-caused disturbances. Non-native invasive species are at low levels and do not alter ecosystem processes.

3400 Forest pest Management, Desired Condition – Reduce the impacts from invasive species by restoring the Forest's health in order to be resilient to the effects of invasive insect, pathogens, plants, animals and other pests.

3400 Forest Pest Management, Guidelines 1 – 2:

1. Integrated pest management methods should be used to minimize the effect or prevent the spread of insect and disease infestations.

2. Promote spatial diversity of vegetation and age classes guided by the ecological characteristics of the landscape to reduce the risk of insect and disease damage.

Monitoring Activity and the Data Collected:

Two major monitoring efforts detected the presence of insect and disease occurrences on the Hiawatha National Forest in 2010. Results of the 2010 surveys indicated the presence of emerald ash borer, beech bark disease, and spruce budworm.

The Forest Health Protection division of the Northeastern Area of the Forest Service, State and Private Forestry conducted an aerial pest detection survey of the Hiawatha in the summer of 2010 to identify areas with dead or stressed trees. Such areas indicate insect infestations or disease infections on the Forest. This pest detection survey looks for insect or disease problems on all tree species on the Forest. Insect and disease problems identified include beech bark disease and spruce budworm.

The Michigan Department of Agriculture (MDA) again conducted detection surveys for emerald ash borer within the boundaries of the Hiawatha, particularly in the areas surrounding the known infestations near Moran and Garden, MI.

Beech bark disease:

Beech bark disease accounted for the most widespread damage of any pest on both sides of the Hiawatha in 2010. Beech bark disease is caused by the interaction of beech scale, a non-native insect, and one or more strains of Nectria fungus, including both native and non-native varieties. Beech bark disease causes wide-spread mortality of beech trees, particularly larger trees.

The area affected by beech bark disease on the west side has increased from 2009. Beech bark disease has been present for a longer time on the east side of the Forest, and since 2009 the area infected has increased to a lesser degree than on the west side.

Spruce budworm:

Spruce budworm is a native insect that attacks overmature spruce and fir trees. Outbreaks historically have occurred at about a 30-year interval. The last extensive outbreak on the Hiawatha peaked in 1976. In 2009, no spruce budworm was detected on the west side of the Forest, but some areas were identified on the east side. In 2010, the infested area on the east side was about the same as it had been in 2009. A few small infested areas were noted on the west side.

The National Forest system lands on east side of the Hiawatha have substantial acreages dominated by mature and overmature balsam fir and spruce. Some of these areas are near the current spruce budworm infestations, so there is the potential for the spruce budworm population to grow and spread rapidly. On the west side of the Hiawatha, spruce and fir occur in smaller acreages, or as components of stands dominated by other species. There is less potential for the spruce budworm population to rise to damaging levels on the west side of the Forest.

Emerald ash borer (EAB):

In 2010, MDA's survey efforts near Moran showed that the area included in the EAB infestation had expanded from what had been detected in the 2009 survey efforts. While the EAB population was still concentrated within about a mile of Moran, new outlier sites had been identified as much as three miles away.

Also in 2009, another EAB infestation was detected within the boundaries of the Hiawatha near Garden, MI. In 2010, MDA conducted surveys to determine the extent of this infestation, which appears to be older and more established than the infestation near Moran. As with the infestation near Moran, the area includes both private and National Forest System lands.

Evaluation of the activity:

Beech bark disease:

Beech bark disease continues to spread, though several vegetation management projects are either planned or in progress to treat affected stands on both sides of the Forest. In 2007, the Hiawatha developed a set of recommendations to address beech bark disease, both in stands that are already infected and in stands that are not yet infected. These recommendations were developed by the silviculture and wildlife staff after reviewing available peer-reviewed literature and applying the information contained in the literature to conditions on the Hiawatha. Stand management prescriptions on both sides of the Forest continue to use these recommendations to address beech bark disease risk. Beech mortality due to beech bark disease will be reduced to the extent feasible, and regeneration of other appropriate species will be encouraged in the treated stands.

Spruce budworm:

The area affected by spruce budworm did not increase substantially from the area affected in 2009, with nearly all of the infested areas on the east side of the Hiawatha. However, the greatest part of the spruce budworm-infested area on the east side is found on lands in private ownership. The areas in National Forest system ownership should be evaluated on the ground for possible treatment.

Emerald ash borer:

The Hiawatha continues to cooperate with other agency partners, including the Michigan Department of Agriculture; Michigan State University; Michigan Technological University; the Michigan Department of Natural Resources; USDA-Forest Service, Northeastern Area State and Private Forestry; and USDA-APHIS, in monitoring the emerald ash borer infestation near Moran. This site is being treated as a pilot project to evaluate the effectiveness of various activities in slowing the rate at which emerald ash borer populations grow and spread.

These same partner agencies are also involved with surveying the infestation near Garden, primarily to determine the extent and density of this EAB population. This infestation is more established than the one near Moran, so opportunities to influence it are more limited.

Future Monitoring Activities:

The Forest will continue to obtain aerial forest pest surveys from the Forest Health Protection division of the Northeastern Area of the Forest Service, State and Private Forestry to identify any areas with insect or disease outbreaks.

The Hiawatha will continue to implement projects to reduce the impacts of beech bark disease, both by harvesting affected beech before it dies and by regenerating other appropriate species to diversify the composition of treated stands.

The Hiawatha will also continue to cooperate with partner agencies in efforts to detect new emerald ash borer infestations, to identify changes in infestations that are already detected, and to identify activities that may be effective in slowing the spread of emerald ash borer. In addition to the ongoing surveys in the Moran area, intensive surveys will continue in 2011 for the infestation near Garden.

The monitoring strategy outlined in the Forest Plan will continue to be implemented.

Recreation Motor Vehicles

Monitoring Question:

To what extent is the Forest providing OHV opportunities?

What are the effects of OHVs on the physical, biological, and social environment?

How effective are Forest management practices in managing OHV use?

Monitoring Activity Relationship to Forest Plan:

2300 Recreation Management Motorized and Non-Motorized Trails:

Goals:

A safe and cost-effective road and trail system provides a variety of recreation experiences responds to changing social needs and minimizes user conflicts. The system includes loops and connections to access recreation facilities and local community services.

Trail and route development provide for multiple use, mitigate social conflicts and prevent natural resource damage.

Through coordination with adjacent public land/road management agencies complementing OHV and snowmobile policies and routes are provided.

Objectives:

1. In this planning period, provide off-highway vehicles trails, routes and areas indicated in Table 2300-5 (from the forest plan).

Table 2300-5. Off-Highway Vehicle (OHV) Trails, Roads and OHV Areas

Type of Access	Total
Maximum miles of trails	75 miles
Maximum miles of ML 3-5 Forest Service roads	150 miles
Maximum miles of ML 2 Forest Service roads	2,100 miles
Maximum acres of OHV area	15 acres

Monitoring Activity and Data Collection:

Off Highway Vehicle (OHV) Opportunities:

Management activities pertaining to OHV opportunities include maintaining a Motor Vehicle Use Map, trail development, and evaluating total trail miles relative to Forest Plan Objectives.

Motor Vehicle Use Map

The forest maintains a Motor Vehicle Use Map (MVUM) in accordance with the Travel Management Rule of 2005. In 2009, the Forest updated its map to reflect changes to the system and correct administrative errors. The MVUM identifies all roads, trails and areas open to wheeled motor vehicles as well as seasonal use restrictions. Data was collected for this map from the Forest's INFRA roads and trails data base. Data was verified for correctness prior to being incorporated into the Motor Vehicle Use Map.

Trail Development

In 2009 the Moss Lake single track motorcycle trail was opened to public use on the Rapid River/Manistique Ranger District. This trail was constructed in cooperation with the MDNRE and a local motorcycle club. This trail added 26.4 miles of trail to the motorized trail system.

Miles of OHV Opportunity

Based on the MVUM, the following table (Table RMV-1) shows the number of miles of road available for OHV riding opportunities on the Forest.

Table RMV-1: Off- Highway Vehicles Roads, Trails and Areas – Forest plan miles compared to 2009 miles

Type of Access	Forest Plan Maximum Miles Open	2009 Miles
OHV trails	75 miles	55 miles
ML 3-5 Forest Service roads	150 miles	159 miles
ML 2 Forest Service roads	2,100 miles	1,886 miles
Acres of OHV area	15 acres	15 Acres

Effects of OHV use:

Forest Service staff continues to find areas where illegal OHV use has created resource damage. Damage includes destabilization of sand dune slopes, channelization and erosion, damage to wetlands and lakeshores.

In 2009 a summer seasonal employee on the West unit surveyed several areas for resource damage by illegal OHV use. Five linear routes were surveyed including snowmobile trails and utility corridors. All of these routes exhibited illegal use and resource damage to varying degrees. Five additional sites were discovered where illegal use and damage were occurring.

Figure RMV-1 shows effects of illegal OHV use on a snowmobile trail closed to OHV use. In addition to resource damage occurring, rutting and the effects of standing water create accessibility issues for winter snowmobile trail grooming equipment. Figure RMV-2 shows a well established user created trail on a utility line corridor. In addition to creation of an unauthorized route and damage to vegetation, these corridors also provide a conduit for introduction of non native invasive species. Figures RMV-3a and RMV-3b illustrate OHV damage to the non-motorized North Country National Scenic Hiking Trail on the St. Ignace District. Such illegal use causes negative impacts to the physical and biological function of the areas and also can disrupt the recreation experience for the hiker seeking solitude.

Figure RMV-1: Trail 411 between CR 442 and CR 440

Figure RMV-2: Illegal trail under power line – CR 513

Figure RMV-3a and Figure RMV- 3b: Illegal OHV Use on the North Country National Scenic Trail – Saint Ignace District

Effectiveness of Management:

Management activities include revisiting previously closed or rehabilitated sites, rehabilitating known damaged sites, interacting with local user groups, and imposing penalties for incidents of illegal use.

Monitoring rehabilitated sites
In 2009 a summer seasonal employee on the West unit surveyed several areas for effectiveness of rehabilitation efforts on areas previously damaged. Thirteen such sites were monitored and eleven were determined to be effective.

Rehabilitating known sites
In 2009 the Forest rehabilitated thirteen sites using grant funds distributed through the Michigan Department of Natural Resources OHV grant program. These sites included: Stevens Lake power line, Sawmill Pond, Carr Lake, Gooseneck Lake, Jack Pine Lake, FR 2269 hill climb, FR2173 power line, FR2269F –Indian River, Haywire Grade fen, snowmobile trail 417, FR 2276 hill climb, FR 2546 hill climb, and Coalwood Grade hill climb. These sites will be monitored in 2010 for closure effectiveness.

Interaction with user groups
The Forest is actively working with the local Sportsmen's Off-Road Vehicle Associations (SORVAs) to refine the OHV system and educate users about responsible riding on the Hiawatha. Some of the activities in 2009 included quarterly meetings with the groups and courtesy patrols conducted by the clubs to educate users on OHV policy and regulations on the Forest.

Penalties for illegal use
In 2009 Forest Service law enforcement logged 365 incident reports related illegal OHV use. The majority of the incidents involved illegal user created trails (157) and use on roads, trails, or areas not designated for OHV use (109) on the Motor Vehicle Use Map Fourteen violation notices and sixteen warnings were issued for illegal OHV use or OHV damage on the Forest. The number of incident reports continues to rise (167 incident reports and 14 violations in 2008) primarily due to increased law enforcement activity.

Evaluation of Monitoring Activities:

Off Highway Vehicle (OHV) Opportunities:

The Forest has a system of roads and trails that provides loops and access to most local community services. The Forest's system is complemented with county roads that are also open to OHV use. Currently the Forest exceeds by 9 miles the maximum number of OML 3-5 roads open to OHVs. The 26.4 miles of new trail opened in 2009 increases total OHV trails to 55 miles. This is below the Forest Plan maximum 75 miles, and still allows for additional trail development as need arises and funding is available.

Total miles by trail and OML will continue to be monitored as annual updates are made to the Motor Vehicle Use Map. The Forest will work with the OHV clubs to refine this system in the future.

Based on the monitoring of OHV use on the Hiawatha National Forest, there is no need to revise any of the standards and guidelines at this time.

Effects of OHV use:

Illegal OHV trail development and use continues to degrade the physical and biological aspects of the site where it occurs. It also detracts from the recreation experience for those who seek out areas of the forest for non-motorized activities and solitude. The Forest will continue to detect and rehabilitate degraded areas where damaging, illegal OHV has occurred. MDNR OHV rehabilitation grant funds can be used to rehabilitate some of these areas.

Effectiveness of Management:

Eleven of the thirteen monitored sites exhibited successful closure and rehabilitation management activities. Therefore, these management activities were largely successful in achieving their objectives. That two of the closures were not successful is not surprising, given the difficulty of changing the attitude of some users.

With the amount of illegal cross country OHV use observed, the Forest will need to continue to educate users on what roads, trails and areas are open to use. This will be accomplished through "courtesy patrols" in partnership with SORVA clubs, law enforcement contacts, brochures and posters, and other media releases.

Future Monitoring Activities:

The Forest will continue to update the INFRA data base as changes are made in the number of roads trails and areas open to OHV's. The Motor Vehicle Use Map will be updated annually as required by the Travel Management Rule.

Areas of illegal OHV use will continue to be monitored and mapped. We will also monitor areas that have been rehabilitated for effectiveness of closures. A seasonal employee will be hired in the summer of 2010 explicitly to monitor and map illegal OHV sites on the Forest. These sites will be entered into a database for future rehabilitation and monitoring.

Social and Economic Stability

Monitoring Question:

To what extent do output levels, location of timber harvest and mix of saw timber and pulpwood compare to the levels projected in the Forest Plan?

Monitoring Activity Relationship to Forest Plan:

Projected timber output levels, location (by Ecological Land Type) and saw timber/pulpwood mix is described in Forest Plan Appendix A.

Monitoring Activity and Data Collection:

Timber sold:

Output levels

In fiscal year (FY) 2009, the Hiawatha National Forest Timber Sale Program sold 69,026 hundred cubic feet or 42 MMBF (million board feet) of timber. The 2006 Forest Plan states an Allowable Sale Quantity (ASQ) of 100 million board feet (MMBF) or 162,014 hundred board feet (CCF) may be offered at a sustainable level. Therefore the forest obtained 42% of the ASQ as stated in appendix A.

Location of timber sales

The volume sold in 2009 was split between the two units of the forest; 50% on the east unit and 50% on the west unit.

Species mix

The sold timber was split between softwood species groups (57%), and hardwood species groups (43%). Red Pine accounted for approximately 28% of the total volume sold. Jack Pine accounted for approximately 12% total volume sold. Aspen accounted for approximately 10% of total volume sold. Aspen and Jack Pine are two emphasis species groups identified in the forest plan. Red Pine, Jack Pine and Aspen species groups equate to 50% of total volume sold. The other 50% encompassed all other species groups.

Timber product mix

Sawtimber volume sold equaled 12 MMBF (22,026 CCF), or 29% of the total. Pulpwood volume sold made the up the other 30 MMBF (47,000 CCF) (71%).

Other timber sale metrics

In 2009, there were 6,536 acres sold, with an average sale size of 594 acres. The average volume sold per sale was approximately 3.8 MMBF.

The forest-wide average volume sold per acre was 10.3 CCF (6.37 MBF) per acre. This was approximately a 3% increase compared to 2008.

Timber sale volume under contract at the close of 2009 was 56.3 MMBF (91,295 CCF). This is an increase of 3% or approximately 1.4 MMBF. Timber sale volume under contract is that which has been sold but not yet harvested. This is an indication of harvest activity that may occur in the following year.

The value of timber sold was $2,773,244, which equates to $67 per MBF. Sold value decreased by 24% compared to previous year.

Timber harvest:

Commercial timber harvest

Timber harvest activities occurred only on suitable lands as identified in the 2006 forest plan. The 2009 harvest level was 38.8 MMBF (62,975 CCF), an 11% decrease compared to 2008 harvest level.

Sawtimber harvest accounted for 9.5 MMBF (15,333 CCF), or 24% of total volume. Pulpwood harvest was 29.4 MMBF (47,642 CCF), or 76% of total volume.

The total value of the harvested timber was $2,828,715, 22% lower than the previous year. The value decrease is in part due to the passing of the 2006 Farm Bill Act which reduced value of timber sales that qualified.

Approximately 74% of harvest occurred in softwood species types, 44% of which was Jack pine. Approximately 19% of harvest activity occurred in hardwood species types other than aspen. Aspen was tracked independently and totaled 7% of timber harvested.

Forest fuelwood:

The FY 2009 2400-1 charge permit volume sold totaled 1,342 MBF (2,121 CCF). This is a 2% increase over FY 2008. The total value of FY 2009 permits was $12,218.

Evaluation of Monitoring Activities:

On page 3-55 of the Forest Plan Environmental Impact Statement, it states, “About 63% of the annual timber sale volume will be sawtimber; 37% will be pulpwood during Decade 1”.

The discrepancy between forest plan projected sawtimber/pulpwood mix and actual output can be attributed to a prolonged jack pine budworm infestation across the forest. The infestation has emphasized the removal of jack pine which is sold for both pulpwood and dimensional lumber. This is consistent with the forest plan which directs aggressive jack pine management in the first decade. Jack pine management will mitigate major budworm infestations over time. Since this trend of intensive jack pine management is expected to decrease relatively quickly (1-2 years), there is need to change the current jack pine management strategy.

At the close of 2009 it is estimated that 80% of Jack Pine Salvage driven sales will have been sold and harvested. It should be noted that a Beech Bark Disease issue is present on the East Unit and is expected to impact the West Unit in 2010 – 2011. Beech Bark Disease outbreaks may increase salvage opportunities in hardwood species. Beyond 2011, budworm outbreak could develop in many of the Balsam Fir and White Spruce stands. This may cause another shift back toward selling softwood species in 3-4 years.

Currently the majority of volume offered still involves softwood species. Economically, the forest has improved the balance between species group outputs in proportion to local industry needs. As a result, the softwood pulp mills, softwood lumber mills and mills using Northern Hardwood species have benefited.

The 2010 sale program is expected to offer 71% softwood, 14% hardwood and 15 % Aspen. In fiscal Year 2010, the forest will continue to strive for a species output mix of 33% softwood, 33% hardwood and 33% aspen, a mix that will benefit the local lumber and pulp mills who buy the wood.

Future Monitoring Activities:

Data will continue to be collected concerning the type, location and amount of timber sold and harvested. Increasing attention to biomass and biofuels technologies may potentially create a need for monitoring adaptation in the future; however, it is currently a non-factor. The forest currently uses a factor of 10% of total volume sold or harvested to calculate its indirect contribution to biomass use.

Official timber sale harvesting data is maintained at the Regional level. It is stored in multiple data bases. The Automated Timber Sale Accounting system (ATSA) and the Timber Information Management system (TIM) are two of the more significant data bases which store this information. Quarterly accomplishments are reported in these two databases. The forest receives an official year- end report in late October or early November.

Soils

Monitoring Question:

Are the effects of forest management, including prescriptions, resulting in significant changes to the productivity of the land?

In this planning period, on a project level basis, identify soils that fail to meet Region 9 soil quality standards or where soil erosion or compaction is contributing to an overall decline in watershed condition or ecological function.

Monitoring Activity Relationship to Forest Plan:

2500 Watershed Management, Soil Resources Goals 1 and 2; Objective 1

LRMP, p. 4-5, Chapter IV, Table 4-3. Monitoring Items

Monitoring Activity and Data Collection:

Monitoring activities occurred using four main methodologies: soil disturbance monitoring (Forest Soil Disturbance Monitoring Protocol (FSDMP) and Phase 1 Soil Disturbance Monitoring), Best Management Practice (BMP) monitoring, participating in the winter logging study, and participating in Environmental Assessment teams.

Soil Disturbance Monitoring:

Twenty four payment units harvested in 2008 were monitored in 2009 to ensure that the regional soil quality standards were being met. During 2009, two different methodologies were used for soil disturbance monitoring. For both methods, the sampling unit was defined as the Payment Unit (PU) as this is the level that Timber Sale Administrators coordinate with purchasers.

1. Forest Soil Disturbance Monitoring Protocol

For 15 sites, we used the Forest Soil Disturbance Monitoring Protocol (Page-Dumroese et. al 2009). Briefly, this method involves evaluating point locations (approximately a 6-inch circle) along randomly oriented transects and evaluating each point for a standardized set of variables including:

- Forest Floor Depth
- Forest Floor Impacted
- Live Plant present
- Fine Woody (<7 cm)
- Coarse Woody (>7 cm)
- Bare Soil present at point
- Rock Present at point
- Topsoil displacement
- Erosion
- Rutting (<5 cm, 5-10 cm, >10 cm)

- Burning (light, moderate, or severe)
- Compaction (0-10 cm, 10-30 cm, >30 cm)
- Platy/Massive/Puddled structure (0-10 cm, 10-30 cm, >30 cm)

Each point was assigned an estimated soil disturbance class (Table S-1) and evaluated for detrimental disturbance. Although a minimum of 30 points per site is required, the actual number of points is calculated based on the variability of the collected data and the confidence interval and interval width established prior to sampling. The data is entered while in the field using a portable data recorder.

Table S-1: Soil Disturbance Class Descriptions (Page-Dumroese et. al 2009)

Soil disturbance Class 0	**Soil disturbance Class 1**
Soil surface: • No evidence of compaction; i.e., past equipment operation, ruts, skid trails). • No depressions or wheel tracks evident. • Forest floor layers present and intact. • No soil displacement evident. • No management-generated soil erosion. • Litter and duff layers not burned. No soil char. Water repellency may be present.	Soil surface: • Faint wheel tracks or slight depressions evident and are <5 cm deep. • Forest floor layers present and intact. • Surface soil has not been displaced and shows minimal mixing with subsoil. • Burning light: Depth of char <1 cm. **Accessory***: Litter charred or consumed. Duff largely intact. Water repellency is similar to pre-burn conditions. Soil compaction: • Compaction in the surface soil is slightly greater than observed under natural conditions. • Concentrated from 0 to 10 cm deep. Observations of soil physical conditions: • Change in soil structure from crumb or granular structure to massive or platy structure; restricted to the surface 0 to 10 cm. • Platy structure is noncontinuous. • Fine, medium, and large roots can penetrate or grow around the platy structure. No “J” rooting observed. • Erosion is slight.

Soil disturbance Class 2	Soil disturbance Class 3
Soil surface: • Wheel tracks or depressions are 5 to 10 cm deep. • **Accessory***: Forest floor layers partially intact or missing. • Surface soil partially intact and may be mixed with subsoil. • Burning moderate: Depth of char is 1 to 5 cm. **Accessory***: Duff deeply charred or consumed. Surface soil water repellency increased compared with the preburn condition. Soil compaction: • Increased compaction is present from 10–30 cm deep. Observation of soil physical condition: • Change in soil structure from crumb or granular structure to massive or platy structure; restricted to the surface, 10 to 30 cm. • Platy structure is generally continuous. • **Accessory***: Large roots may penetrate the platy structure, but fine and medium roots may not. • Erosion is moderate.	Soil surface: • Wheel tracks and depressions highly evident with depth >10 cm. • **Accessory***: Forest floor layers missing. • Evidence of surface soil removal, gouging, and piling. • Most surface soil displaced. Surface soil may be mixed with subsoil. Subsoil partially or totally exposed. • Burning severe: Depth of char is >5 cm. **Accessory***: Duff and litter layer completely consumed. Surface soil is water repellent. Surface is reddish or orange in places. Soil compaction: • Increased compaction is deep in the soil profile (>30 cm deep). Observations of soil physical conditions: • Change in soil structure from granular structure to massive or platy structure extends beyond 30 cm deep. • Platy structure is continuous. • **Accessory***: Roots do not penetrate the platy structure. • Erosion is severe and has produced deep gullies or rills.

2. Phase 1 Soil Disturbance Monitoring

On the other nine sites, we used methodology similar to the 2008 monitoring. This technique requires that each selected payment unit be evaluated using a meandering transect. During the site visit, a qualitative estimate of the area in each of four disturbance classes (Table S-2) was determined. The classes are a generalized version from Exhibit 2 from the Draft R9 Soil Quality Handbook (2002) and other Forest Service publications (Page-Dumroese et al. 2006, Page-Dumroese et al 2009) and are very similar to the classes shown in Table S-1. In order to estimate of the percentage of area in each disturbance class, a comparison was made to standard charts showing distribution percentages of 1- 50 percent.

Table S-2: Disturbance Class Categories

Class	Description
0	• No evidence of past equipment operation, • No depressions or old wheel tracks present, • Litter and duff layers present and intact, • No soil displacement evident
1	• Faint wheel tracks or slight depressions evident, • Litter and duff layers present and intact, • Surface soil has not been displaced and shows minimal mixing with subsoil
2	• Wheel tracks or depressions are evident but are not deep, • Litter and duff layers are partially intact or missing, • Surface soil is partially intact and may be mixed with subsoil
3	• Wheel tracks or depressions highly evident and deep, • Litter and duff layers are missing, • Evidence of topsoil removal, gouging, and piling, soil displacement has removed the majority of the surface soil • Surface soil may be mixed with subsoil, or subsoil totally exposed

Best Management Practice Monitoring

Nineteen sites were visited to assess compliance with Michigan and Federal Best Management Practices (BMPs) as well as Forest Plan Riparian Management Standards and Guidelines. BMP monitoring protocol were modified slightly for the 2009 field inventory to comply with the newly revised Michigan Forestry Best Practices Manual (MDNR and MDEQ, 2009). Seven specific BMP categories were identified and analyzed. Those categories were:

- Riparian Management Zone
- Vernal Pools, Bogs, and Seeps
- Stream Channel Protection
- Harvest Operations
- Roads
- Sale Closure
- EA Mitigations

BMPs were judged on implementation and effectiveness. The three implementation categories are: 1) properly implemented, 2) implemented with minor deviation, or 3) major deviation from implementation guidelines. In terms of effectiveness, BMPs were rated as effective or ineffective at preventing resource damage. In instances of major implementation deviation, BMPs were not rated for effectiveness because it was impossible to discern whether those BMPs would have prevented resource damage had they been properly implemented. Where minor deviations in implementation were found but there was no resource damage, BMPs were ruled effective.

Winter Logging Study

In January 2009, a winter logging study was performed on two units of the Hiawatha in conjunction with a larger study being conducted by the San Dimas Technology Development Center (SDTDC). The objective of the study was to develop science-based guidelines to minimize soil disturbance for winter logging by using low-cost, easily identifiable indicators of frozen soil. These guidelines should be practical enough to be implemented by the sale administrator, equipment operators, and soil scientist.

In the fall of 2008 (prior to treatment), soil disturbance monitoring evaluations were conducted using the FSDMP protocol (Dumroese et al, 2009). In addition, data loggers were installed to record air temperature, soil temperature, and moisture at the different depths along both main and secondary skid trails. Frost tubes were also installed as a low-tech method of determining the depth of frozen ground in the unit.

The units were harvested in January and February of 2009 following normal operating procedures for winter logging. Field observations were recorded during logging to identify the following attributes:

- Depth of snow in skid trail and adjacent undisturbed areas.
- Type of snow (dry, wet, cohesive).
- Depth of frozen ground using both spike and frost tubes

In July, 2009, post treatment monitoring was conducted using the FSDMP to determine the change of soil condition from pre-treatment to post-treatment.

Environmental Assessment Teams

On every 2009 Environmental Assessment (EA), soils were evaluated. These EAs included Gooseneck, Dutch Mill, Chemical Treatment of Non-native Invasive Plants, Niagara, West Unit Gravel Pits, Grand Island Cabins, Grand Island Garage/Maintenance Facility, Fishdam/442 Culvert Replacement, East Branch of Tahquamenon River Bridge, Shores EA, and FR 2279 Culvert Replacement. Soil input was also provided for the Stone-Moss midscale assessment.

Environmental Assessment teams made an attempt to identify soils that fail to meet Region 9 soil quality standards or where soil erosion or compaction is contributing to an overall decline in watershed condition or ecological function.

Evaluation of Monitoring Activities:

Data collected from monitoring was used to assess the impacts from management activities. The Forest Plan requires the Hiawatha National Forest to meet the Regional Soil Quality Standards (FP Goal 1) and to ensure that soil productivity is restored, maintained or enhanced (FP Goal 2).

Soil Disturbance Monitoring

Monitoring results are evaluated according to the percent of each site in the different disturbance classes. These results are then averaged and analyzed to determine the overall effectiveness and impacts of the management activity on the soil. To determine whether our management activities are effective in maintaining watershed function and preventing decreased productivity on the landscape, the level of disturbances is compared to the detrimental disturbance threshold from the Region 9 Soil Quality

Standards, This threshold states that less than 15% of a land unit scale area in should be detrimental soil condition. For the purpose of this report, detrimental soil condition was considered Class 3. .

1. Forest Soil Disturbance Monitoring Protocol

Fourteen of the 2o sites monitored had no additional site preparation for regeneration undertaken as of the monitoring visit. The six stands which had undergone site preparation included: Grimmor Salvage – 2, Grimmor Salvage – 5, Let Slip – 2, Let Slip – 4, Section 19 Salvage – 9, and Shotgun Salvage – 2. As shown in Figure S-1 below, for the sites that had not undergone site preparation for regeneration (i.e. harvest only) across all types of harvest, the average unit area in Soil Disturbance Class 3 was only 2.8% while the unit area in Soil Disturbance Class 0 (no impact) average was 67.5%.

As was expected based on previous monitoring, areas that had undergone site preparation had significantly higher soil disturbance rates than the harvest only areas. The 2008 monitoring report found these sites to be significantly different from the similar treatment stands that had not undergone site preparation (Gries 2009).

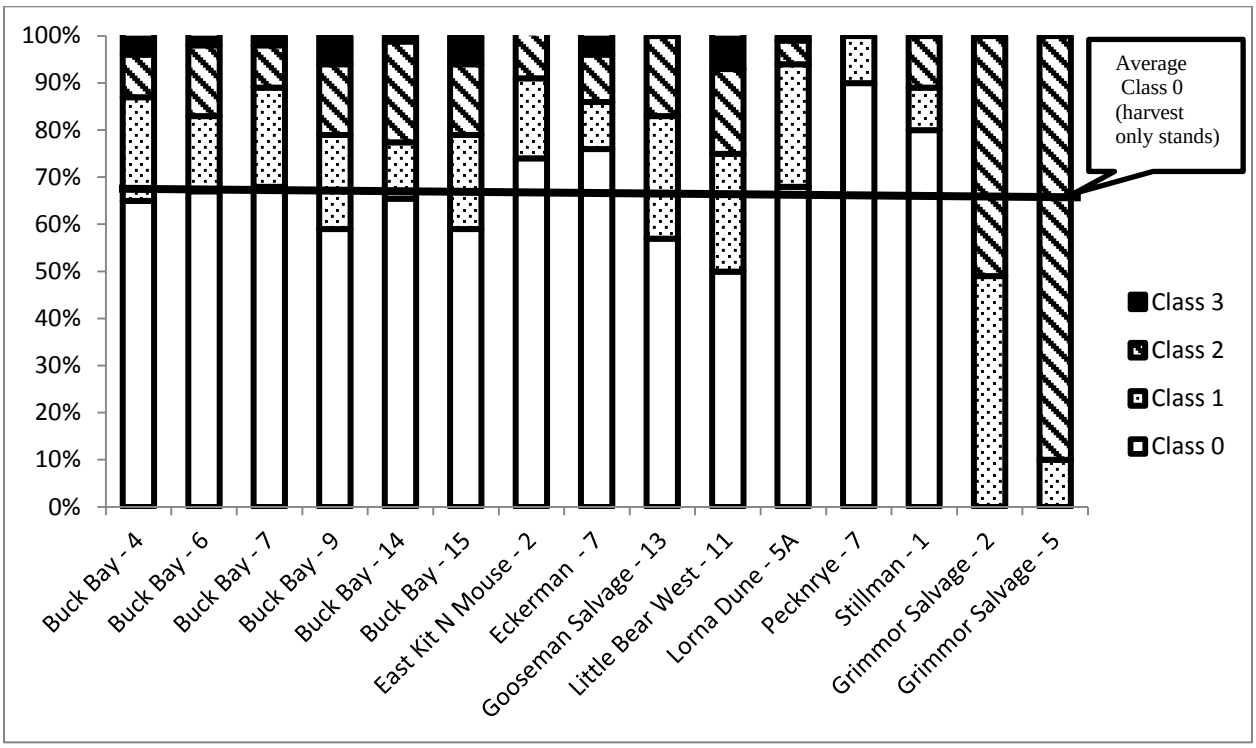

Figure S-1: Results from FSDMP Sampling

Another application of the FSDMP is to look at stands before and after harvest, allowing for evaluation of the direct impacts of harvesting on stands. During FY 2009, only two stands were monitored in this way, both as part of the winter logging study. The results of the pre- and post-harvest monitoring are shown below in Table S-3. Although there was a minor increase in Class 3 disturbance before and after harvest, most of the changes were increases in the percentages of Class 1 and 2. This is not unexpected since monitoring occurred immediately after harvest activities were completed. It is anticipated that these lower levels of disturbance will return to Class 0 within a few growing seasons.

Table S-3: Results of the pre and post harvest FSDMP Monitoring

Estimated Soil Disturbance Class					
Site	**Class 0**	**Class 1**	**Class 2**	**Class 3**	**Required Sample Number**
Eckerman 7 - Pre Harvest	96%	0%	2%	2%	45
Eckerman 7 - Post Harvest	76%	10%	10%	5%	83
Lorna Dune 5A - Pre Harvest	100%	0%	0%	0%	30
Lorna Dune 5A - Post Harvest	68%	26%	5%	1%	110

An increase in site variability after harvesting was noted, as indicated by the increased number of sample points required for statistical validity. Harvesting resulted in minor topsoil displacement and rutting. These impacts were primarily in disturbance Class 1 and are not considered detrimental.

2. Phase 1 Soil Disturbance Monitoring

Disturbance class results from the Phase 1 monitoring are shown below in Figure S-3. This figure shows the percentage of each monitored site in each disturbance class 0-3.

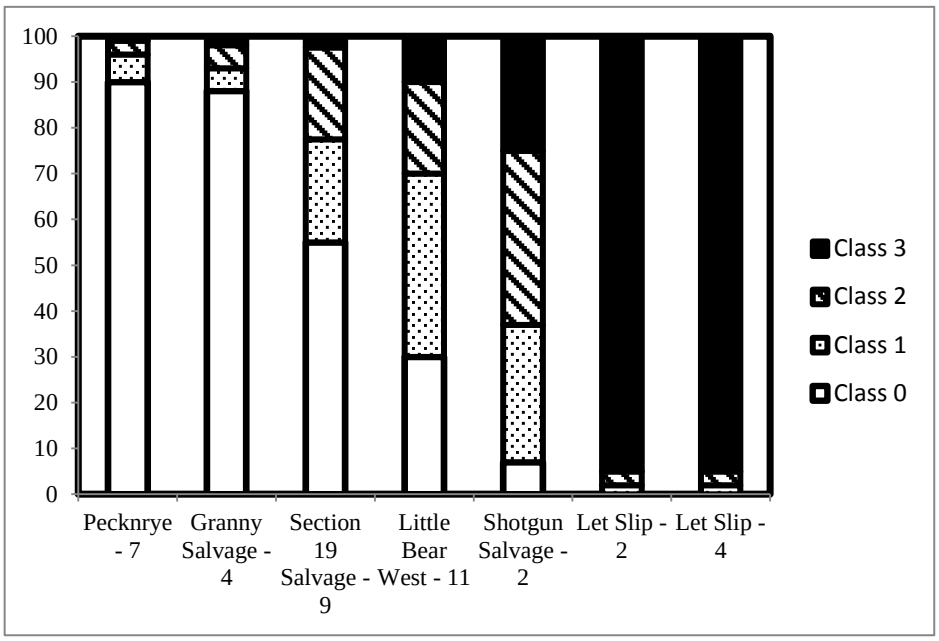

Figure S-3: Results from Phase 1 Monitoring

The overall average of the area in Class 0 disturbance on these units was 38.6%. Area in Class 3 disturbance was 32.9%. However, The Let Slip Sales, Shotgun Salvage, and Section 19 had undergone site preparation for planting prior to the soil evaluation. The average for the sites which only had harvest treatment (no site preparation), was 65.8% Class 0 and 3.9% Class 3.

Several of these units (Shotgun Salvage-2, Section 19-9, Let Slip-2, and Let Slip-4) had already undergone site preparation for regeneration prior to site visit. As was seen in previous years and in the FSDMP, these areas had a much higher percent of area in Class 2 and 3 than sites that had been harvested. Although no further statistical tests were run, it is expected that a significant difference would be found between the site prep stands and the harvest stands. This significant difference was also documented in 2008. Further, two of the sites (Let Slip-2 and Let Slip-4) were site prepped with a bulldozer resulting in many of the root wads being pulled out of the ground. The East Zone Rangers determined that this method will likely not be used in the future because of the high level of soil disturbance and the difficulty in undertaking planting after this form of site preparation.

The payment unit with the highest percentage of Class 3 disturbance that had not been site prepped was Little Bear West -11. This was an aspen clearcut. Field review found that the greatest disturbance was from rutting in wet soils. Appropriate mitigation and design criteria were applied to the harvest of this stand (winter harvested and indications of the use of slash mats) but there was still some rutting and other soil disturbance. It should be noted that this site is still well below the detrimental disturbance threshold.

Comparison of FSDMP and Phase 1 Soil Disturbance Monitoring

Since this was the first year of a new monitoring method, two units were monitored with both methods. This allowed direct comparison between the methods for the current year, comparison to data collected in previous years, and also provided an appropriate quality control. Results from these units are in Table S-4.

Table S-4: Percent Disturbance Comparison Between FSDMP and Monitoring Method used in previous years.

Method	Sale	PU	Class 0	Class 1	Class 2	Class 3
FSDMP	Pecknrye	7	90.0%	10.0%	0.0%	0.0%
Phase 1	Pecknrye	7	90%	6%	3%	1%
FSDMP	Little Bear West	11	50.0%	25.0%	18.0%	8.0%
Phase 1	Little Bear West	11	30%	40%	20%	10%

There was good agreement between the two methods, particularly at the Class 0 and 3 levels. This can mostly be attributed to the fact that the soil disturbance classes used for both methods are very similar. Further, the Phase 1 monitoring was performed only by experienced individuals that had been undertaking monitoring on the forest for several years.

Based on the similarity between the FSDMP and the Phase 1 monitoring, the data from the two methods was combined for an overall analysis as shown in Table S-5. In general, the results from the 2009 soil monitoring indicate that the HNF is minimizing soil disturbance during harvest operations. Per the 2009 monitoring, for the non-site prepped units the average area per PU that was in the most disturbed condition class was 2.8%. Further, on average approximately 69.0% of the PUs showed no visual evidence of soil impact at all (Class 0). This is very similar to the 2008 average of 70.3%.

Table S-5: Merged FSDMP and Phase 1 Data

Site	Percent Class 0	Percent Class 1	Percent Class 2	Percent Class 3	Monitoring Method	Harvest Type	Site Prep
Buck Bay - 14	65	12	21	1	Phase 1	Single-tree selection	N
Buck Bay - 15	59	20	15	6	FSDMP	Single-tree selection	N
Buck Bay - 4	65	22	9	5	FSDMP	Single-tree selection	N
Buck Bay - 6	67	16	15	3	FSDMP	Single-tree selection	N
Buck Bay - 7	68	21	9	2	FSDMP	Single-tree selection	N
Buck Bay - 9	59	20	15	6	FSDMP	Single-tree selection	N
East Kit N Mouse - 2	74	17	10	0	FSDMP	Commercial Thinning	N
Eckerman - 7	76	10	10	5	FSDMP	Single-tree selection	N
Gooseman Salvage – 13	57	26	17	0	FSDMP	Stand clearcutting	N
Granny Salvage – 4	88	5	5	2	FSDMP	Stand clearcutting	N
Grimmor Salvage – 2	0	49	51	0	FSDMP	Stand clearcutting	Y
Grimmor Salvage – 5	0	10	90	0	Phase 1	Stand clearcutting	Y
Let Slip – 2	0	2	3	95	FSDMP	Stand	Y

						clearcutting	
Let Slip – 4	0	2	3	95	FSDMP	Stand clearcutting	Y
Little Bear West – 11	50	25	18	8	FSDMP	Stand clearcutting	N
Lorna Dune - 5A	68	26	5	1	Phase 1	Stand clearcutting	N
Pecknrye – 7	90	10	0	0	Phase 1	Commercial Thinning	N
Section 19 Salvage - 9	55	22.5	20	2.5	Phase 1	Commercial Thinning	Y
Shotgun Salvage - 2	7	30	38	25	FSDMP	Stand clearcutting	Y
Stillman - 1	80	9	11	0	FSDMP	Commercial Thinning	N
Average all	**51.4**	**17.7**	**18.3**	**12.8**			
Average Harvest Only	**69.0**	**17.1**	**11.4**	**2.8**			
Average Site Prep	**10.3**	**19.3**	**34.2**	**36.3**			

It should also be noted, as shown in Figure S-4, there is a decreasing trend for the disturbance classes. For non-site prepared stands, we assumed Class 3 was detrimentally disturbed. We are consistently well below the threshold established in the R9 Soil Quality Standards (15% detrimental soil disturbance conditions) as required by the Forest Plan. This indicates a commitment at all levels to minimize impacts to soil resources from environmental analysis, stand layout, and sale administration.

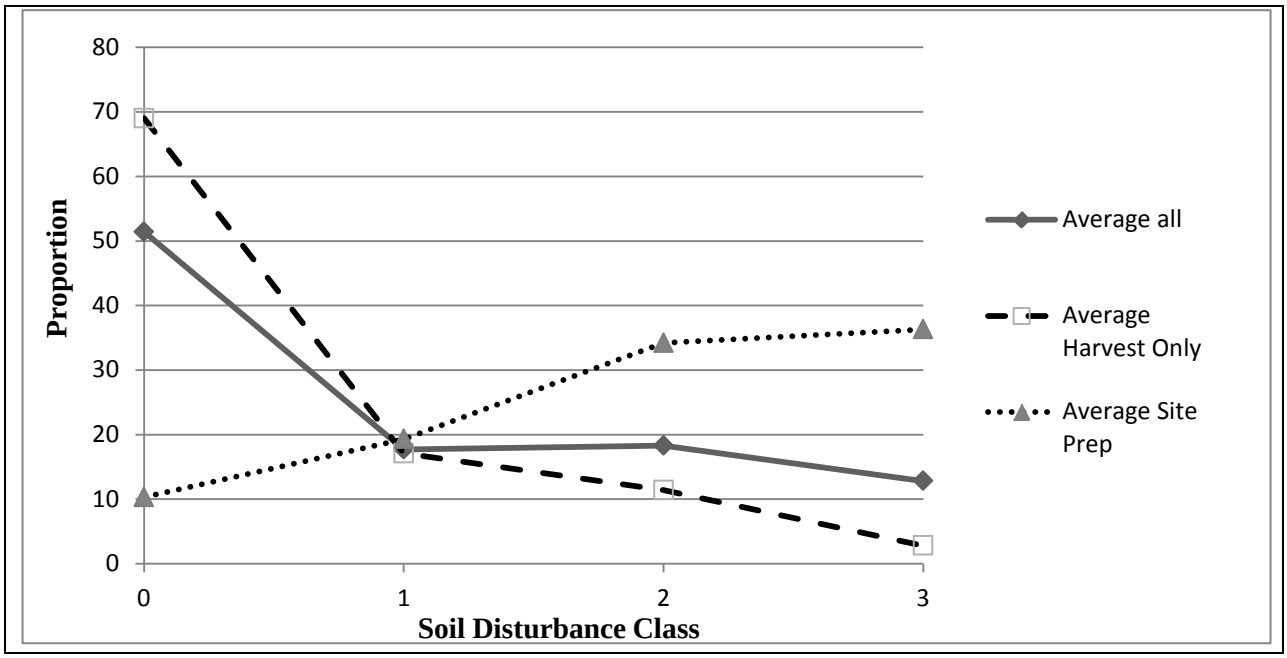

Figure S-4: Trend lines for the different disturbance classes

A review of the data found that most of the soil disturbance was in the form of minor rutting and topsoil displacement. Some of this is expected given the type of equipment used during the harvesting operation (processor and forwarders). Based on a review of the available data, it was found that many of the payment units had design criteria in place to minimize impacts, usually through the restriction of operational periods. Further, it was documented during the field visits that in many places the operators were using slash mats and other operational techniques to minimize their impact.

Compaction was not found to a major concern; however, most of the units evaluated during 2009 were sandy and not generally subject to compaction. The issue of compaction in sandy soils has been addressed both on this forest (Landwehr 2005, Gries 2006) and in the technical literature (Stone et al 1998). Range and Gries (2008) discuss compaction on fine textured soils.

Although the amount of Class 3 disturbance increases dramatically when stands that have undergone site preparation are included, this is expected and helps to more closely mimic the disturbance regimes required for the regeneration of these species. It was also noticed in the units that were site prepared even one growing season ago (Section 19) that there was considerable soil recovery and usually very good vegetative recovery. In previous years (see the HNF 2008 Monitoring and Evaluation report), we were able to collect additional data to statistically prove that the sites that had undergone site preparation were significantly different from the harvest-only stands.

Winter Logging Study

The winter logging study was designed to document the kind of soil impact associated with winter logging, to find methods to determine when the soils will support logging equipment, and to evaluate methods of soil stabilization during winter logging operations. It was documented that the existing methods to minimize impacts such as using slash mats to help reduce soil impacts do help. The results of the winter logging study (Table S-6) indicate that many of the changes to soil condition are due to the inability of some of these soils to fully support the equipment without incurring some minor impacts.

Table S-6: Winter Logging Study Results (Pre and Post Harvest FSDMP)

Estimated Soil Disturbance Class				
Site	**0's**	**1's**	**2's**	**3's**
Eckerman 7 - Pre Harvest	96%	0%	2%	2%
Eckerman 7 - Post Harvest	76%	10%	10%	5%
Lorna Dune 5A - Pre Harvest	100%	0%	0%	0%
Lorna Dune 5A - Post Harvest	68%	26%	5%	1%

Findings indicated that although some rutting was noted in both units, the soil standards were achieved with 5% and 1% of the soils in Class 3 condition, respectively post harvest. It was also determined that it may be possible to reduce soil impacts in the future during winter logging harvest operations with the following mitigation measures:

- Use skidding mats to reduce the equipment impact on soils with low load bearing strength due to high water table.
- Increase the frozen ground depth by plowing and packing the snow on the main skid trails that access the landing area.
- Use frost tubes to give the sale administrator and logger a better idea of depth of frozen ground within the unit so they can implement mitigation measures.
- Place slash on skid trails to reduce equipment impacts.

Environmental Assessment Teams

Environmental Assessment teams have made recommendations on which stands (or portions of stands) should be avoided, where winter harvesting should occur and other design and mitigation criteria to minimize impacts to soil resources. Field monitoring has not yet occurred on these stands to assess whether the recommendations were effective when combined with other resource management recommendations and limitations. However, given the results from the soil disturbance monitoring reported above, which was the result of previous EA team participation, EA team recommendations are likely to minimize soil impacts.

Future Monitoring Activities:

Soil Disturbance Monitoring

- Monitoring will continue in order to gain a more complete dataset of conditions and impacts.
- More pre-harvest sampling will be conducted of stands to allow pre and post comparison.
- It would be useful to monitor some of these stands again in several years to gain a better understanding of how long the classes of disturbance take to recover to Class 0.
- Monitoring activities will continue coordination with the Timber Program. They were able to provide information about stand history, operator, and other information that was very useful as background data in monitoring.
- Informal field training for and with timber sale administrators may help to clarify monitoring findings for both the Soil and Watershed team and the Timber program.

Environmental Assessment Teams

- Members of the Environmental Assessment teams will continue to work to identify sensitive areas and measures to protect soil quality.
- More evaluation needs to be done with regards to the adequacy of planning and field review prior to NEPA decisions. While sale layout and implementation is largely adequate in protecting resources, is it is often done by altering payment unit boundaries. Better information and knowledge earlier in the process would do a better job of identifying soils for protection prior to harvest.

Timber Regeneration

Monitoring Question:

Are harvested lands adequately restocked after five years?

Monitoring Activity Relationship to Forest Plan:

Lands are adequately restocked as specified in the Forest Plan, p. 4-4, Chapter IV, Table 4-3.

Monitoring Activity and the Data Collected:

Stands treated with regeneration harvests, such as clearcuts, seed tree cuts, shelterwood cuts, or selection cuts, must be reforested within five years of harvest under the National Forest Management Act (NFMA). Reforestation may be through natural regeneration with or without site preparation, or through artificial means such as planting seedlings or applying seed. Reforestation activities are scheduled as soon as possible after harvest. Any needed site preparation is usually done in the first field season following harvest. If seeding is planned, that activity usually takes place over snow cover late in the first winter following site preparation. If planting is planned, that activity usually takes place in the first spring following site preparation.

Stands are surveyed at least twice following reforestation activities to monitor reforestation success and to ensure that reforested stands are stocked with an adequate number and distribution of young trees to meet management goals. In planted stands, stocking surveys are usually done in the first and third years following planting, and these stands are usually certified as regenerated after the third-year survey. In naturally regenerated or artificially seeded stands, stocking surveys are usually done in the third and fifth years following natural regeneration or artificial seeding. These stands are usually certified as regenerated following the fifth-year survey. These stands are on a later schedule because when the regeneration is starting from seed, it takes longer to become established than it does when stands are planted with two- or three-year-old seedlings. For any regeneration method, additional surveys may be scheduled in some stands.

A minimum of five sample plots are taken in each stand surveyed, with the number of plots increasing as stand size increases. Plot locations are distributed throughout the stand to ensure that all areas of the stand are surveyed. While walking between plots, the surveyor also notes whether overall regeneration stocking is similar to the results in the plots. Stands where regeneration stocking is lower than desired for that stand's management goals will be scheduled for additional reforestation activities, usually supplemental planting.

Evaluation of Monitoring Activities:

Approximately 3,910 acres were scheduled for third year or later stocking surveys in 2010. Of these, about 3,600 acres were certified as regenerated with sufficient stocking. The approximately 310 acres that were surveyed but not certified as regenerated were stands that were being regenerated either by seeding or by natural regeneration; many of these stands received a third-year survey in 2010, but will not be

certified as regenerated until after a fifth-year survey in 2012. No stands that received third-year or later surveys in 2010 were identified as needing supplemental planting in 2011.

It is likely that there will often be a relatively small percentage of stands where the initial reforestation activity will need to be supplemented to some extent. The Forest often experiences extended periods of dry weather during the growing season, which can be particularly hard on new seedlings. Even when weather conditions are favorable, other factors such as deer browsing, insects or disease may sometimes result in a need for additional reforestation efforts. Current reforestation methods and activities are sufficient to fulfill the NFMA reforestation requirements, and no changes are needed.

Future Monitoring Activities:

Reforestation success will continue to be monitored through stocking surveys for all stands now in the process of regeneration, as well as for stands harvested and reforested in the future, to ensure that harvested stands are adequately reforested within five years. Where needed, supplemental reforestation activities will be carried out to ensure this goal is met within the required time period.

Wildlife Management Indicator Species Sharp-tailed Grouse

Monitoring Question:

Are habitat trends of MIS consistent with Forest Plan expectations?

- To what extent is the management of the Forest contributing to the conservation of sharp-tailed grouse?

Monitoring Activity Relationship to Forest Plan:

2600 Wildlife, Fish and Sensitive Plant Habitat Management Goals:

- Diverse, healthy, productive and resilient habitats for aquatic and terrestrial wildlife are provided

Monitoring Activity and Data Collection:

The HNF implements management activities in support of sharp-tailed grouse conservation. All management activities are consistent with guidance for sensitive species conservation specified in the Forest Plan. There were 3 major activities conducted in 2009.

- sharp-tailed grouse leks were surveyed
- active leks were protected
- openland habitat were treated mechanically or with prescribed fire to maintain or enhance habitat for sharptail or associated species

Lek Surveys

A lek is the location where males and females are concentrated during the breeding season. Lek habitat is critical to the success of local grouse populations. These locations are selected for surveys because adult sharp-tailed grouse can be readily observed and counted there. Surveys were conducted by FS staff and volunteers at 31 leks across the Forest. John Ries, volunteer and president of the Michigan Sharp-tailed Grouse Association, contributed 3 weeks of survey effort.

The number of dancing males and the number of flushed individuals was counted at each of the lek sites from April 16 through May 15, 2009. The west side had a total of 11 dancing males, 5 at Eight Mile, 5 at Ready Lake, and 1 at Dunkle. On the east side, 24 dancing males were counted. Total flush count across the forest which includes all birds at the lek, 2009 was 94, and appears relatively stable (Figure MIS-1).

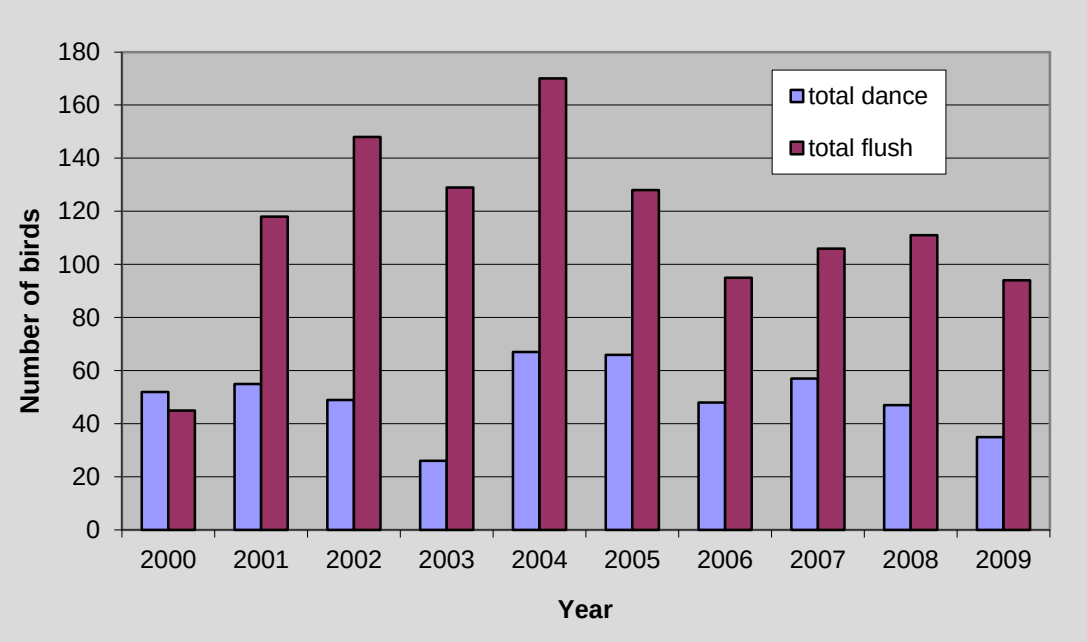

Figure MIS-1. Sharp-tailed grouse lek counts on the HNF, 2000 – 2009.

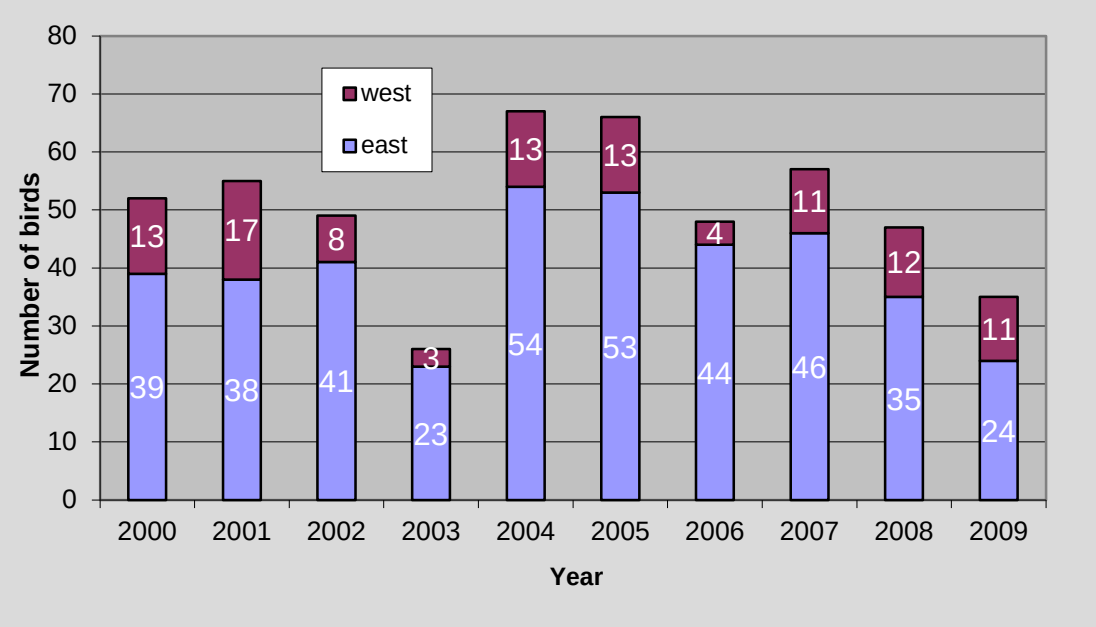

Figure MIS--2. Sharp-tailed grouse counts of male birds on the east and west sides of the HNF, 2000 – 2009.

Evaluation of Management Activities:

Sharp-tailed grouse counts on the west side have remained relatively constant from 2004-2009, with the exception of 2006 when only 4 males were counted. On the east side, the male sharptail count continued a 5-year decline with 24 dancing males in 2009 compared to 44 in 2006 (Figure MIS-2). Conversely, the total flush count, which includes all birds at the lek, appears relatively stable since 2006 (Figure MIS-).

Based on the population monitoring data, the sharptail grouse population on the HNF appears to be decreasing. Survey results from 2006-2009 show a decline in the number of dancing males (Figure MIS-1). A similar trend appears to exist for overall counts within Michigan (Figure MIS-3). However, recent jack pine budworm harvests have resulted in several hundred additional acres of openland on the Manistique, Rapid River and Sault Ste. Marie Ranger Districts. It is possible the extensive areas of new habitat are actually supporting more birds than are counted. The birds may be more spread out now, making lek detection and survey more difficult. In 2009, over 400 acres of sharptail habitat was improved through prescribed burns and vegetation mowing. These activities slow or set back succession in order to keep areas in the openland conditions favored by sharptails. This level of management in permanent openings is closely related to the HNF annual target for habitat improvement.

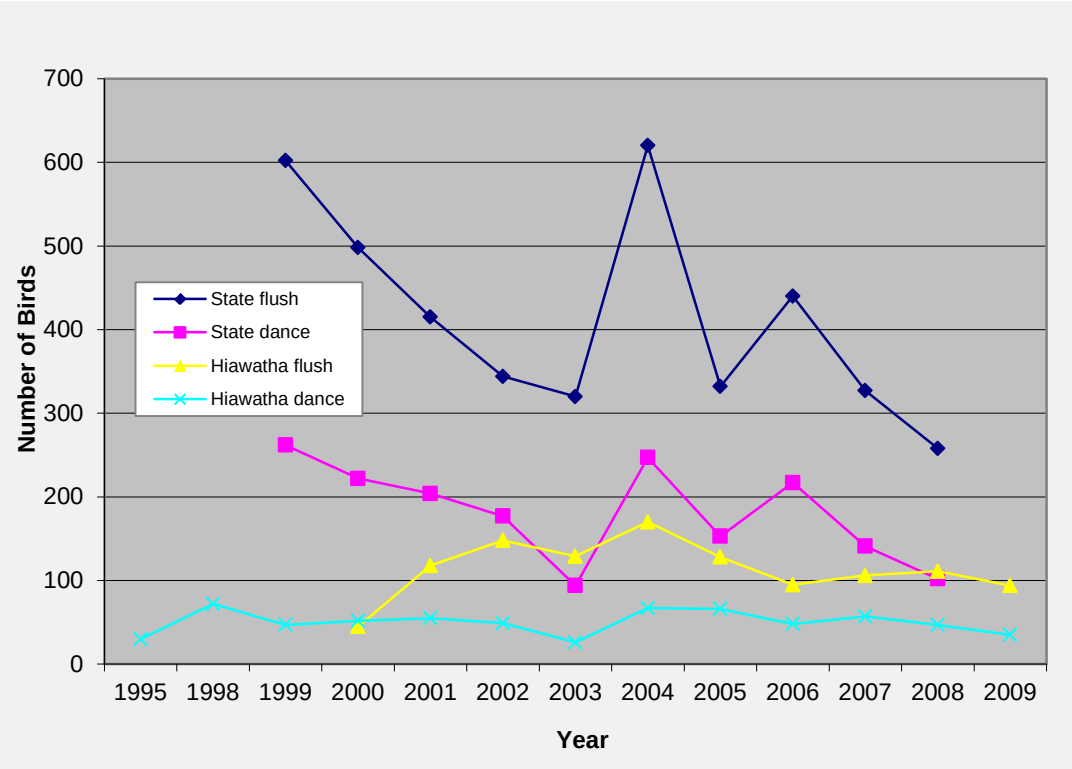

Figure MIS-3. Sharp-tailed grouse lek counts in Michigan and on the HNF, 2000 – 2009.

The current monitoring and inventory practices may be effective in assessing trends of sharp-tailed grouse on the HNF. However, surveying protocols could be missing birds that are dispersed throughout suitable habitat, especially in areas resulting from recent vegetation management projects. We are currently working with the Michigan Department of Resources and Environment on new techniques to survey

sharptails. It is anticipated that an updated survey method will be ready in the next couple of years. Based on the 2009 monitoring information there is no reason to change any of the management direction for this species.

Future Monitoring Activities:

Monitoring efforts should continue to survey sharp-tailed grouse habitat. It is anticipated that an updated survey method will be ready in the next couple of years.

Treaty Rights

Monitoring Question:

How are the Memoranda of Understanding (MOU) between the Forest and Native American Tribes being implemented?

Monitoring Activity and the Data Collected:

Background

The Forest Service shares in the United States' trust responsibility and treaty obligations to work with federally-recognized Tribes on a government-to-government basis to protect the Tribes' ceded territories on lands administered by the Forest Service. As such, the policies of the Forest Service toward federally recognized tribes are intended to strengthen relationships and further tribal sovereignty through fulfilling mandated responsibilities. The Hiawatha outlines its policies and responsibilities on tribal relations in two MOUs: 1) The 1999 MOU Regarding Tribal – USDA Forest Service relations on National Forest Lands within the territories ceded in the treaties of 1836, 1837, and 1842; and 2) 2006 MOU Regarding Tribal - USDA Forest Service Relations on National Forest Lands within the territory ceded in the Washington Treaty of 1836 and any National Forest Lands Located within the Exterior Boundaries of the Reservation of any Signatory Tribe.

2010 Activity

Forest Service leadership meets annually with the MOU tribal signatories (in separate meetings for each MOU) to discuss MOU implementation, facilitate ongoing communication, and discuss issues that arise regarding the MOU

In furtherance of relationships, Hiawatha National Forest deciding officials lead consultation efforts on all project level decisions. The deciding officials, along with interdisciplinary team members, made themselves available to tribal elected officials, tribal natural resource staff, and Tribal Historic Preservation Officers to discuss project proposals, solicit tribal concerns, and encourage input on projects. This occurred throughout 2010 with varied degrees of interest and input from the tribes.

Evaluation of Management Activities:

The 1999 MOU has been running smoothly. Through provisions laid out in the MOU, projects and activities have been put into place without notable complications. Some activities include notification of birch bark gathering opportunities, implementation of camping fee and length of stay waivers for tribal members exercising treaty rights, and implementation of an off-reservation National Forest gathering code.

Wetlands

Monitoring Question:

To what extent are wetlands being protected and wetland functions being restored?

Monitoring Activity Relationship to Forest Plan:

Plan objectives to restore soil-hydrologic functions

2500 Watershed Management, Desired Condition, Goals 1, 2, and 3, Objectives 2 and 3; Riparian Ecosystem Standards 1, Guideline 1 and 6

LRMP, p. 4-6, Chapter IV, Table 4-3. Monitoring Items

Clean Water Act

Monitoring Activity and Data Collection:

During 2009, the Hiawatha National Forest used a multi-factor approach to monitoring wetlands. Assessing wetland protection was a component of both the Best Management Practices (BMP) monitoring and the soil disturbance monitoring. We also participated in a multidisciplinary review of several stands where BMP and wetland issues were discussed, participated in environmental assessment teams, and continued work on restoring wetland function at a location where a snowmobile trail was moved out of a wetland area.

Best Management Practices (BMP) Monitoring

Nineteen sites were visited to assess compliance with Michigan and Federal BMPs as well as Forest Plan Riparian Management Standards and Guidelines. BMP monitoring protocol were modified slightly for the 2009 field inventory to comply with the newly revised Michigan Forestry Best Practices Manual (MDNR and MDEQ, 2009). Seven specific BMP categories were identified and analyzed. Those categories were:

- Riparian Management Zone,
- Vernal Pools, Bogs, and Seeps,
- Stream Channel Protection,
- Harvest Operations,
- Roads,
- Sale Closure, and
- EA Mitigations.

BMPs were judged on implementation and effectiveness. The three implementation categories are properly implemented, implemented with minor deviation, or major deviation from implementation guidelines. In terms of effectiveness, BMP were rated as effective or ineffective at preventing resource damage. In instances of major implementation deviation, BMP were not rated for effectiveness because it was impossible to discern whether those BMP would have prevented resource damage had they been

properly implemented. Where minor deviations in implementation were found but there was no resource damage, BMP were ruled effective.

Soil Disturbance Monitoring

During the 2009 growing season, 24 sites were qualitatively evaluated to monitor compliance with the Regional Soil Quality Standards in accordance with the Forest Plan. Although the primary purpose of this monitoring was to evaluate soil disturbance, evaluated factors included rutting in wet areas and other wetland impacts. For a more detailed description of the soil disturbance monitoring methodology and results see the Soils Section of this report.

Multidisciplinary BMP Meeting

In the fall of 2008 (Fiscal Year 2009), a multidisciplinary review trip was conducted. During this trip several wetland areas were visited including wetland damage by some herbicide spraying performed accidentally by an another entity and some rutting and other wetland impacts associated with timber management.

Environmental Assessment Teams

The Soil and Watershed group was involved with all major Environmental Assessments that occurred in 2009, including Gooseneck, Dutch Mill, Chemical Treatment of Non-native Invasive Plants, Niagara, West Unit Gravel Pits, Grand Island Cabins, Grand Island Garage/Maintenance Facility, Fishdam/442 Culvert Replacement, East Branch of Tahquamenon River Bridge, Shores EA, and FR 2279 Culvert Replacement. Wetland input was also provided for the Stone-Moss midscale assessment. For each of these projects, the group attempted to identify wetland areas that were in need of protection or had reduced functionality due to past land use. Furthermore, the Watershed Team made recommendations to protect wetland functions and avoid and/or minimize impacts.

OHV Impact Rehabilitation

In some locations on the Hiawatha, illegal OHV usage has impacted wetlands. Some of this impact has been along snowmobile routes and along pipelines. During 2009 the Recreation program undertook an inventory of these locations. Further, the watershed program monitored a location that we oversaw the relocation of during 2009.

Evaluation of Monitoring Activities:

Best Management Practices (BMP) Monitoring

Results of the 2009 monitoring show that BMPs were well-implemented and effective. Eighty-six percent of all BMPs were implemented with no departures from implementation guidelines. From a payment unit perspective, 68% of the units monitored had all BMP implemented with no departures. Field review found that the implementation of appropriate BMP is adequately protecting soil and water resources.

Pre-harvest planning is effective in avoiding and minimizing impact to the greatest extent practicable. Many wetland areas were avoided by modifying payment unit boundaries to keep operators off these sensitive soils and establishing appropriate buffers to prevent wetland disturbance. Although some rutting was noted on a few of these payment units, there did not appear to be detrimental impact.

The general lack of resource damage from harvest activities is testament to coordination between planning teams, sale administrators, and monitoring personnel. Not only are susceptible areas being identified and excluded from the sale during the planning process, but applicable precautions are also being taken to avoid resource damage during harvest operations.

In cases where rutting was noted, the impacted area was minor and anticipated to last less than 5 years. Rutting occurred most often in muck soils which have high shrink/swell rates during wetting/drying and freeze/thaw cycles. It has been noted during other work on the Hiawatha that ruts are generally absent from sites harvested in the past. Other sampling in previous years on the Hiawatha has documented that rutting in muck soils does not increase compaction. Rutting has impacted the values of wetland aesthetics and recreational use, but does not appear to have changed the wetland functions of flood attenuation, erosion control, water purification, sediment trapping, or nutrient removal because the ruts did not connect or flow into any streams or watercourses. In many locations, monitoring activity detected efforts to minimize wetland disturbance during harvest operations through the use of slash or altering the season of operation.

The BMP monitoring also noted that although 3 of the 6 wetland crossings had minor departures from BMP implementation guidelines, in all six instances the way the crossing was implemented was still effective in minimizing resource damage.

Soil Disturbance Monitoring

Wetland impacts were evaluated indirectly in the 2009 Soil Disturbance Monitoring. Efforts to restore or protect wetlands included limiting harvest seasons, carefully selecting sites, timing harvest activities to minimize impacts, and applying appropriate no-harvest buffers to sensitive areas.

In general, large and easily identified wetland areas are avoided during site selection and sale preparation stages by modifying stand boundaries, eliminating the stands from further consideration, and/or providing large buffers to protect the resources during Payment Unit layout.

The monitoring did detect some continuing issues with harvest operations in small wetland inclusions. As discussed in the Soils Section of this report and the BMP monitoring discussed above, the average level of Class 3 resulting from harvest operations was 2.8%. Although this is well below the R9 Soil Quality Standard of 15%, a high percentage of this Class 3 impact is associated with small wetland inclusions within the stands. These inclusions are difficult to identify pre-harvest as they are often hidden under leaves or vegetation and are not included in corporate datasets and published information. Currently, the problem is being explored in coordination with timber management personnel.

Multidisciplinary BMP Meeting

The multidisciplinary meeting allowed a free and open exchange of ideas on how to protect wetlands as well as other soil and water resources. Some of the ideas that came out of that meeting included:

- Protection of wetlands and other resources cannot be completely accomplished at any single phase of the projects. Rather, it will require consistent effort at all phases of timber sales: planning, marking, implementation, and administration. This will be particularly important for small wetland inclusions that are within stands and are frequently unmapped on published sources because of their size.
- Conduct similar multidisciplinary reviews of projects annually
- Although it is best to identify wetland harvest issues early during planning, timber markers and sale administrators have the ability to limit impacts.
- Minor modification of data collection forms and increased help from the Timber program could generate additional information before visiting the field.

Environmental Assessment Teams

An attempt is made during every environmental review to identify measures to minimize impacts to wetlands. Members of these teams have made recommendations on which stands or portions of stands should be avoided, and where winter harvesting should occur. Monitoring has not yet occurred on these stands and we cannot therefore know if the recommendations were effective when combined with other management recommendations and limitations. However, given the results from the monitoring that was conducted based on past recommendations, it appears that in general there will be a high likelihood of successful minimization of wetland impacts.

OHV Impact Rehabilitation

Much of the monitoring work in 2009 was to identify areas where future restoration would be conducted.

However, along the Nahma Snowmobile Grade reroute section (rerouted in 2008), wetland function and species diversity were targeted for additional restoration along the decommissioned portion of the trail via planting. The site was visited early in FY 2009 and midsummer 2009. Both visits found that there was no indication that the blockages had been breached or that the trail was once again being used illegally by ATV. It is anticipated that within a few seasons, the trail will grow back in and the wetland vegetation will reestablish, thereby making any additional usage of this area even more unlikely. The trail closure and reroute appears to have been effective. The planting done in early FY 2009 was not inspected for growth since it usually takes several seasons for native plants to form effective cover.

Based on the success of the partnerships formed during this project, other opportunities are being pursued to relocate other segments of snowmobile trails out of wetlands.

Future Monitoring Activities:

Best Management Practices (BMP) Monitoring and Soil Disturbance Monitoring

- The BMP and Soil Disturbance monitoring will continue. This monitoring helps assess wetland protection as required in the Forest Plan.

- Additional work needs to be completed to assess the protection of wetland functions.
- Monitoring of more winter harvest units should be conducted. Although these areas did seem to have higher levels of disturbance, additional work will help to evaluate if that is because of the time of year of the harvest or if it is the fact that the areas are more sensitive. The Hiawatha was involved in a Winter Logging Study to address this issue in FY 2009.
- There should be increased communication between Watershed Program personnel and sale administrators during harvest operations.
- There needs to be continued improvement of the monitoring protocol.
- More evaluation needs to be done with regards to the adequacy of planning and field review prior to NEPA decision. While planning, sale layout, and implementation appears to be adequately protecting resources, it is often done by altering payment unit boundaries. The question should be asked whether more review earlier in the process would do a better job of identifying wetlands for protection prior to harvest.
- Future field reviews should incorporate more precise data collection on individual BMP implementation and effectiveness. Further, sites should be revisited to assess the length of time necessary for natural conditions to return.

Environmental Assessment Teams

- Members of the Environmental Assessment teams will continue to work to identify sensitive areas and measures to protect watershed function.

Multidisciplinary BMP Meeting

- Future multidisciplinary BMP trips will be conducted to review progress towards minimizing wetland impacts.

Nahma Snowmobile Reroute

- The area should be monitored to ensure that the closure is not breached and that the restoration plantings are effective.
- Work is on-going with the Recreation program to identify areas with similar problems and to re-route those trails out of wetland areas.

Non-native Invasive Species

Monitoring Question:

How effective is the Forest at treating and controlling the spread of non-native invasive species (NNIS)?

Monitoring Activity Relationship to Forest Plan:

2500 Watershed Desired Conditions: "Exotic species are not spreading or adversely affecting native flora and fauna in riparian and aquatic areas".

3400 Pest Management Goals:

1. Work with state, local, tribal, other agencies and organizations to discourage the spread of undesirable non-native invasive species (NNIS).

2. The spread of NNIS is controlled using permissible mechanical, biological and chemical controls.

3. Educational materials about controlling and/or reducing the spread of NNIS are developed and distributed at appropriate locations including boat launches, trailheads, etc.

3400 Pest Management Objectives:

1. In this planning period, identify and map areas of NNIS concentrations on the Forest.

2. Annually treat 40 acres (ac.) of identified NNIS.

3400 Pest Management Guidelines:

1. Integrated pest management methods should be used to minimize the effect or prevent the spread of insect and disease infestations.

2. Promote spatial diversity of vegetation and age classes guided by the ecological characteristics of the landscape to reduce the risk of insect and disease damage.

3. Gravel and topsoil should be from a source where weed reduction practices are being used.

Monitoring Activity and Data Collection:

Monitoring for NNIS in 2009 consisted of recording acres of non-native invasive plant (NNIP) infestations treated, documenting the efficacy of the treatments, checking for implementation of equipment cleaning, and surveying new sites for infestations.

Acres Treated

In 2009, approximately 700 acres were treated on the HNF. Of the total acreage, districts contributed the following: Rapid River (73 ac.), Manistique (88 ac.), Munising (372 ac.), St. Ignace (51 ac.) and Sault Ste. Marie (116 ac.). There were 4 treatment methods used, including mechanical/manual (322 ac.), herbicide (250 ac.), cultural/prescribed fire (68 ac.) and biological (60 ac.). Treatments focused on the following

invasive species: Allaria petiolata (garlic mustard); Arctium minus (burdock); Centaurea biebersteinii (spotted knapweed); Cirsium arvense, C. palustre, C. vulgare (Canada, marsh and bull thistle); Cynoglossum officinale (houndstongue); Euphorbia esula (leafy spurge); Hypericum perforatum (St. Johnswort); Lythrum salicaria (purple loosestrife); and Melilotus alba (white sweet clover).

Treatment Efficacy

Treatment efficacy monitoring occurred on 423 acres at 76 sites. Across the Forest, the average treatment control was 70 percent. This means that 70 percent of the targeted noxious weeds were removed by mechanical and manual treatments, or showed mortality or substantial decline within 1 week or more after being treated with herbicide, mechanical and fire methods. General observations from 2009 indicated manual control was successful, however, the method takes more years to accomplish due to the persistent seed bank for many Non-Native Invasive Plants (NNIP). Work on Grand Island has documented reduced numbers of NNIP through manual control over a 12-year period of hand pulling at William's Landing and Trout Bay road. Herbicide treatments have a high success rate for kill on plants although little impact on the seed bank after 3 years. Assessment of areas treated with herbicides shows NNIP germinating from the seed bank only and high success rate for removal of emergent NNIP. A few sites treated for burdock on Grand Island had success rates approaching 99 percent. Herbicide treatment for a 9-acre site infested with purple loosestrife on the east side was 90 percent effective. Fire was used to help reduce the seed bank for garlic mustard and spotted knapweed. However, the success of St. Johnswort control was poor. We monitored biological control treatments in spotted knapweed infestations at 4 sites documenting success with the *Larinus minutes* beetle killing the flower heads and preventing plants from producing seed. On the east side at Raco airfield we observed insect larvae in the seed heads of over 65% of plants indicating success in the first year of the project.

Equipment Cleaning Inspections

Timber sale administrators confirmed equipment cleaning inspections and the requisite forms were used on 100 percent of the sales in 2009. On both sides of the Forest, administrators documented that for each piece of equipment brought onto a sale, an inspection form was completed. The number of times an inspection occurred depended on whether the purchaser stayed on the sale or moved equipment on and off the units during harvest operations; if they moved on and off frequently, more inspections and forms were required. Other forest activities are incorporating equipment cleaning provisons. All ARRA contract solicitations for hazardous fuel reductions included requirements for mandatory inspection and cleaning prior to entering project areas. Compliance was 100 percent.

Monitoring New Sites

Invasive plant surveys were conducted on Forest roadsides, timber sale areas and designated wilderness in 2009. Approximately 2000 acres of roadsides and 2000 acres of timber sales were surveyed for noxious weeds. Four wilderness areas were surveyed, including Big Island Lake, Mackinac, Round Island and Delirium. Over 10,000 acres were surveyed. The focus of the surveys was on roadsides and access points into wilderness. Generally infestations were light or absent. However, Some Japanese barberry and houndstongue was discovered, mapped and then removed by hand-pulling.

Partnership Coordination

The HNF participates in a weed cooperative with several other agencies, including The Nature Conservancy - Upper Peninsula chapter, Upper Peninsula Resource Conservation and Development Council, Marquette Conservation District, Pictured Rocks National Lakeshore Grand Island Association

and Moosewood Nature Center. Some sites were surveyed with the help of The Nature Conservancy and Superior Watershed Partnership. Additionally, volunteers contributed to inventory and treatment of approximately 150 and 33 acres, respectively.

Part of the cooperation effort included surveys for Eurasian watermilfoil (EWM) on lakes within the Big Island Lake Wilderness area, as well as Stueben Lake and Farm Lake. EWM is an exotic aquatic weed from northern Europe and Asia that has the capability to efficiently reproduce from fragments and spread rapidly. It can tolerate a wide range of environmental conditions and can be moved by boats, birds and currents to new locations. In areas where it is established it forms extensive mats which are at the surface further causing negative effects by shading out native vegetation, creating a problem for boating, and negatively affecting fish and other aquatic organism habitat. During 2009, a National Fish and Wildlife Foundation grant was received to continue studying EWM. Of the lakes surveyed, Stueben Lake was found to have naturally occurring milfoil weevils, a species that consumes EWM and will help control its spread.

Evaluation of Data Collected from Monitoring Activities:

While the HNF's average of 70 percent is good, we anticipate observing more effective long term results as integrated NNIP control progresses on the forest. We continue to see a downward trend in biomass removed at NNIP sites where manual methods (i.e. hand-pulling) are used. This is an indication the treatments are effective. Manual/mechanical treatments can cause plants to use carbohydrate reserves, which results in a reduction of total infestation. However, eliminating populations entirely is hard to accomplish because weeds are typically hardy and produce high numbers of seed. Therefore, this treatment is primarily used in sites inaccessible to equipment (e.g. wilderness) or areas with resource sensitivity (e.g. threatened & endangered species locations).

Gravel pit herbicide treatments showed an efficacy of 76-90 percent. Herbicides can systematically affect the entire plant and completely kill individuals and work well in large open areas. Pre-emergent herbicides can have great effectiveness at reducing the seed bank of NNIP. However, not all sites are able to be treated with herbicides. Therefore with an integrated management approach used on the HNF, all of the methods available for controlling NNIP, including mechanical/manual, herbicide, biological, and fire are important components of the program. Based on wilderness area monitoring, some level of noxious weed control will need to be accomplished in order to help ensure protection of sensitive plants and reduce the rate of NNIP spread to unaffected areas.

Future Monitoring Activities:

The HNF has an integrated NNIP treatment target of 613 acres in 2010. Effectiveness monitoring will be performed on a minimum of 307 acres in order to meet the criteria of monitoring 50 percent of all treatment acres in a fiscal year. We plan to look at more specific locations, such as roadside and portal areas, to determine ways to improve effectiveness on those locations. We anticipate timber sale administrators will complete cleaning inspection forms, allowing us to monitor whether equipment cleaning was implemented. Additionally, we may examine the effectiveness of prevention measures, such as equipment cleaning, by monitoring selected sale units for new NNIP infestations.

Water Quality

Monitoring Questions:

Is the Forest adequately implementing Best Management Practices (BMP) and are the BMP effective in protecting the beneficial uses of water?

Is the Forest improving water quality for waters within and flowing off of Forest Service boundaries?

How is the Forest complying with the Clean Water Act requirements?

Monitoring Activity Relationship to Forest Plan:

2500 Watershed Management, Desired Condition, Goals 1, 2, 3, 5, and 6, Standards 1, Guidelines 1, 3, 5, and 6; Riparian Ecosystem Standards 1, Guideline 1, 2, 5, and 7; and Aquatic Ecosystem Standard 1

LRMP, p. 4-6, Chapter IV, Table 4-3. Monitoring Items

Monitoring Activity and Data Collection:

To ensure that the Hiawatha National Forest is complying with BMPs, monitoring activities and data collection associated with water quality includes BMP monitoring and being active in project design during the Environmental Assessment phase of projects. To ensure that the Forest is improving water quality for waters within and flowing off of Forest Service boundaries, we continued to collect stream temperature data and undertook an inventory of every road stream crossing on the forest.

BMP Monitoring

Nineteen sites were visited to assess compliance with Michigan and Federal BMPs as well as Forest Plan Riparian Management Standards and Guidelines. BMP monitoring protocol were modified slightly for the 2009 field inventory to comply with the newly revised Michigan Forestry Best Practices Manual (MDNR and MDEQ, 2009). Seven specific BMP categories were identified and analyzed. Those categories were:

- Riparian Management Zone
- Vernal Pools, Bogs, and Seeps
- Stream Channel Protection
- Harvest Operations
- Roads
- Sale Closure
- Environmental Assessment Mitigations

BMPs were judged on implementation and effectiveness. The three implementation categories are properly implemented, implemented with minor deviation, or major deviation from implementation guidelines. In terms of effectiveness, BMP were rated as effective or ineffective at preventing resource damage. In instances of major implementation deviation, BMP were not rated for effectiveness because it

was impossible to discern whether those BMP would have prevented resource damage had they been properly implemented. Where minor deviations in implementation were found but there was no resource damage, BMP were ruled effective.

Environmental Assessment Teams

The Soil and Watershed group was involved with all major EAs that occurred in 2009, including: Gooseneck, Dutch Mill, Chemical Treatment of Non-native Invasive Plants, Niagara, West Unit Gravel Pits, Grand Island Cabins, Grand Island Garage / Maintenance Facility, Fishdam / 442 Culvert Replacement, East Branch of Tahquamenon River Bridge, Shores EA, and FR 2279 Culvert Replacement. Wetland input was also provided for the Stone-Moss midscale assessment. These meetings and documents discussed ways to avoid and minimize impacts to water quality and wetlands covered under the Clean Water Act.

Stream Temperature Data Collection

The forest continued collecting stream temperature data at several locations using continuous logging HOBO data loggers. The probes were put out in several locations but there were some failures of equipment and only two of the locations had complete data sets in 2009.

In FY 2009 an attempt was made to collect in streams where there is a harvest operation planned in future years. There was some difficulty in finding sites because the timber program has over time started avoiding all areas that are within the riparian zone.

Road Stream Crossing Inventory

During 2009, work continued on the Road Stream Crossing Inventory that started in 2008. GIS was used to develop a set of points where mapped streams and roads crossed. Each point was given a unique site number based on the Section, Township, and Range in which it was located.

At every one of these locations (906), an inventory was conducted to collect basic crossing information (bankfull width, type of crossing, condition of crossing, perched, erosion from the road, misaligned, stream substrate, and others) and the crossing and the road were each assigned a condition rank.

Evaluation of Monitoring Activities:

BMP Monitoring

Results from the BMP monitoring are shown in Table WQ-1 below. The BMP monitoring documented that wetland resources were protected in situations where the payment unit was an upland site near a large, mapped wetland area. In 68% of the 19 units evaluated, BMP were completely implemented and overall 86% of all BMPs were implemented with no minor departures from implementation guidelines (Table WQ-1). Where minor implementation departures from the BMP requirements were found, there was typically a small amount of rutting in wetlands in small, non-mapped wetland inclusions.

Table WQ-1. Tally of applicable BMPs and instances of effective implementation. Note that Wetland BMPs were not included in all data sheets.

BMP Category/BMP	No. Implemented	No. Effective	No. Minor Departure	No. BMPs Not Rated
Stream Riparian Management Zone				
Proper width	2	2	1	0
Disturbance minimized	2	2	1	0
Adequate shade	3	3	0	0
Proper slash management	3	3	0	0
Skid/road operations impacts	2	2	0	0
Vernal Pools, Bogs, and Seeps				
Vernal ponds protected	0	0	0	0
Wetland BMPs (not on all data sheets)	3	3	2	1
Bogs/Fens Protected	2	2	0	0
Seeps protected	0	0	0	0
Wetland crossflow	3	3	1	0
Stream Channel Protection				
Eph. stream area dist.	0	0	0	0
Stream crossing BMPs	0	0	0	0
No trees cut on stream bank	2	2	0	0
Harvest Operations				
Landing locations BMPs	9	9	0	0
Landing design	9	9	0	0
Skidding design/operations	14	14	3	1
Roads				
Wetland crossings minimized	3	3	0	0
Wetland crossing BMPs	6	6	3	0
Road location	8	8	0	0
Drainage	6	6	0	0
Design	6	6	0	0
Sale area closure (when applicable)				
Transportation system	7	7	1	0
EA Mitigations	0	0	0	1
Total	90	90	12	3

There were no major departures from BMP implementation and the rutting did not appear to have an impact on water quality since these seasonal wetlands do not usually flow into other surface water and are therefore not able to transport sediment. Although this slight impact is a minor concern, it is not affecting the overall water quality on the Hiawatha National Forest or waters flowing off of the Hiawatha National Forest. These disturbances are localized and represent impacts to only a limited portion of the

wetlands/waters on the Forest. We are meeting Guideline 1 of the Forest Plan Riparian Ecosystem section (page 2-14).

No issues were identified with respect to management activity that would adversely affect streams on the sites evaluated. In most cases where a stream was near a harvest unit, appropriate BMP were used and the aquatic resource was adequately protected from slash disposal, thermal loading, and sedimentation. In most instances, stand boundaries were altered such that the sale unit remained more than 100 feet from streams. Where payment units did occur 100 feet or closer to streams, buffer zones were established and maintained such that the stream was protected. In some locations, BMP monitoring noted that the proper riparian width was not maintained. However, even in these locations there was no evidence that harvest activities were resulting in increased sediment delivery to streams or wetlands. The conditions required by the Forest Plan and the state BMP are usually being implemented and appear to be effective in protecting waters.

Though more minor departures were noted on sites within 100 feet of water than on upland sites, there were three times as many of these sites monitored (Figure WQ-1).

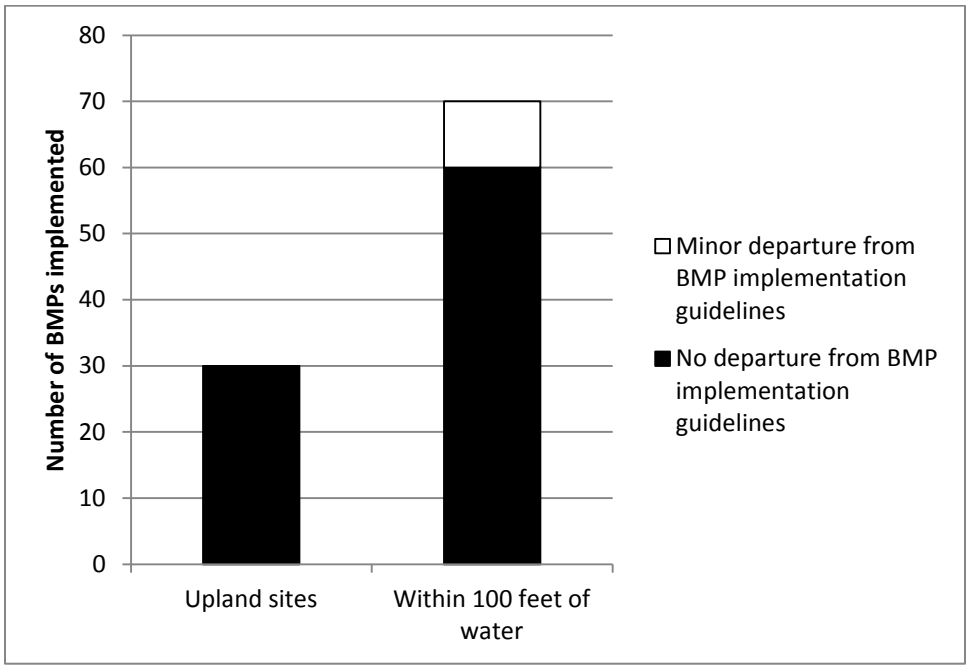

Figure WQ-1 Comparison of BMP implementation guideline deviation between upland sites and sites within 100 feet of water.

Environmental Assessment Teams

An attempt is made during every environmental review to minimize impacts to all waters. Teams have made recommendations about which stands or portions of stands should be avoided or where winter harvesting should occur to minimize impact. Monitoring has not yet occurred on these stands to determine if the recommendations were effective when combined with other management recommendations and limitations. However, given the results from the monitoring that was conducted based on past recommendations, it appears that in general we are minimizing impact and protecting water quality.

Stream Temperature Data Collection

The data from 2009 was joined with data collected in previous years to form a more complete stream temperature assessment. Stream temperature was classified as either cold (upper limit of 73°F), cool(upper limit of 78°F), or warm (temperature warmer than 78° F). Based on the data collected, most of the streams in the Hiawatha either fall into the Cold (50.7%) or Cool (34.7%) temperature classes.

An analysis of stream flucuation was also calculated. From the streams with data collected, 52.0% had a Moderate Fluctuation and another 30.7% showed Extreme Fluctuation. A plurality of streams, 32%, are within in the Cold Moderate Thermal Regime. For more information see Matthys 2010 report titled "Classification of Streams in the Hiawatha National Forest According to the Temperature and Fluctuation".

Road Stream Crossing Inventory

The road stream crossing inventory has already been heavily used to develop a list of sites for potential aquatic organism passage problem locations. These are being replaced as money and time allow.

This has become a very powerful dataset allowing base information about all the road stream crossings on the forest. Some concern has been raised that additional information is needed for project design. It is recognized that the data collected for this initial inventory needs more thorough review before project selection and will need to be continually updated as road stream crossings are replaced.

Stream crossings were replaced in several locations during 2009. Although a formal assessment of these was not undertaken, site visits by the watershed staff, such as to the Fishdam River, found that the new crossings are spanning bankfull width and appropriately restoring ecological connectivity to the stream.

Future Monitoring Activities:

- BMP monitoring will continue in 2010. In order to be cost effective, it will again be performed in conjunction with the soil monitoring (FSDMP).
- It has been discussed that it may be more effective to perform a limited amount of the BMP monitoring by looking at a complete timber project rather than just within PU close to streams. This may result in fewer units being evaluated but a more holistic view of potential impacts associated with a project.
- Additional review of Environmental Assessments (EAs), Decision Notices (DN), timber sale contracts, and sale administration notes should be performed in conjunction with field visits.
- Members of the Environmental Assessment teams will continue to work to identify sensitive areas and measures to protect water quality. More evaluation needs to be done with regards to the adequacy of planning and field review prior to NEPA decision. While sale layout and implementation is largely seen as adequate in protecting resources, is it is often done by altering payment unit boundaries. A more thorough review, done earlier in the process, would do a better job of wetland protection during harvest.
- Follow up on other stream reference locations after the projects (road stream crossings and timber harvest) have been implemented.

Water Quality Improvement

Monitoring Objective:

Implement 100 acres per year of vegetation improvements to enhance riparian function.

Monitoring Activity Relationship to Forest Plan:

2500 Watershed management Objective 7.

Monitoring Activity and Data Collection:

Several types of vegetation improvements were undertaken during 2009 to improve riparian and watershed condition. These activities included riparian inventory, planting of long lived conifers in the riparian corridor, invasive species control, and planting native species along the decommissioned Nahma Snowmobile route.

Riparian Inventory

During 2009, an attempt was made to assess the conditions of the riparian corridors on the Hiawatha, with a particular emphasis on identifying locations where we should restore long lived conifers.

In order to focus survey work, an initial GIS analysis was undertaken to evaluate areas that either had a higher historic conifer component than present or had a high potential for improvement with additional watershed planting. The following classes were developed:

- Class 1 - Upland Opening or Young Forest within 200 feet of Priority 1 Streams that are "forested types" ("open class" 3 or 4) on 1850 Vegetation Map.
- Class 2 - Upland Opening or Young Forest within 200 feet of Priority 1 Streams
- Class 3 - Upland Opening or Young Forest within 200 feet of non-priority 1 streams that are "forested types" on 1850 Vegetation Map
- Class 4 - Upland Opening or Young Forest within 200 feet of non-priority 1 streams that are open class 1 or 2 on 1850 Vegetation Map
- Class 5 - Aspen Types within 200 feet of Priority 1 Streams
- Class 6 - Aspen Types and Young Forest between 200 ft. and 500 ft. from Priority 1 Streams
- Class 9* - Aspen Types within 200 feet of non-priority 1 streams that are "forested types" on 1850 Vegetation Map
- Class 10 - Aspen Types within 200 feet of non-priority 1 streams that are open class 1 or 2 on 1850 Vegetation Map (non forested "open class", see Appendix)

* Classes 7 and 8 were defined but not analyzed.

These areas were then visited and inspected by seasonal personnel. Approximately 10,600 acres of riparian zone was inspected. Field documentation was qualitative and contained comments about the riparian corridor condition.

Planting Long Lived Conifers in the Riparian Corridor

Long lived conifer species were planted on 93.5 acres in the riparian corridors. For each tree planted, an area approximately 1 foot by 1 foot was hand scalped to minimize competition. This included 84 acres along Horseshoe Creek which is a tributary to the West Branch of the Waiska River in Sections 28 and 29 in Township46N Range 3W. Figure WQ-2 depicts some of the planting activity that occurred along Horseshoe Creek.

Figure WQ-2: Crews planting along Horseshoe Creek

An additional 9.5 acres of trees were planted along the Haymeadow and Ogontz Rivers. The planting area along Haymeadow Creek is shown in Figure WQ-3 and included the portion of the stand (shown in red) within the riparian buffer (beige). For each tree planted, an area approximately 1 foot by 1 foot was hand scalped to minimize competition.

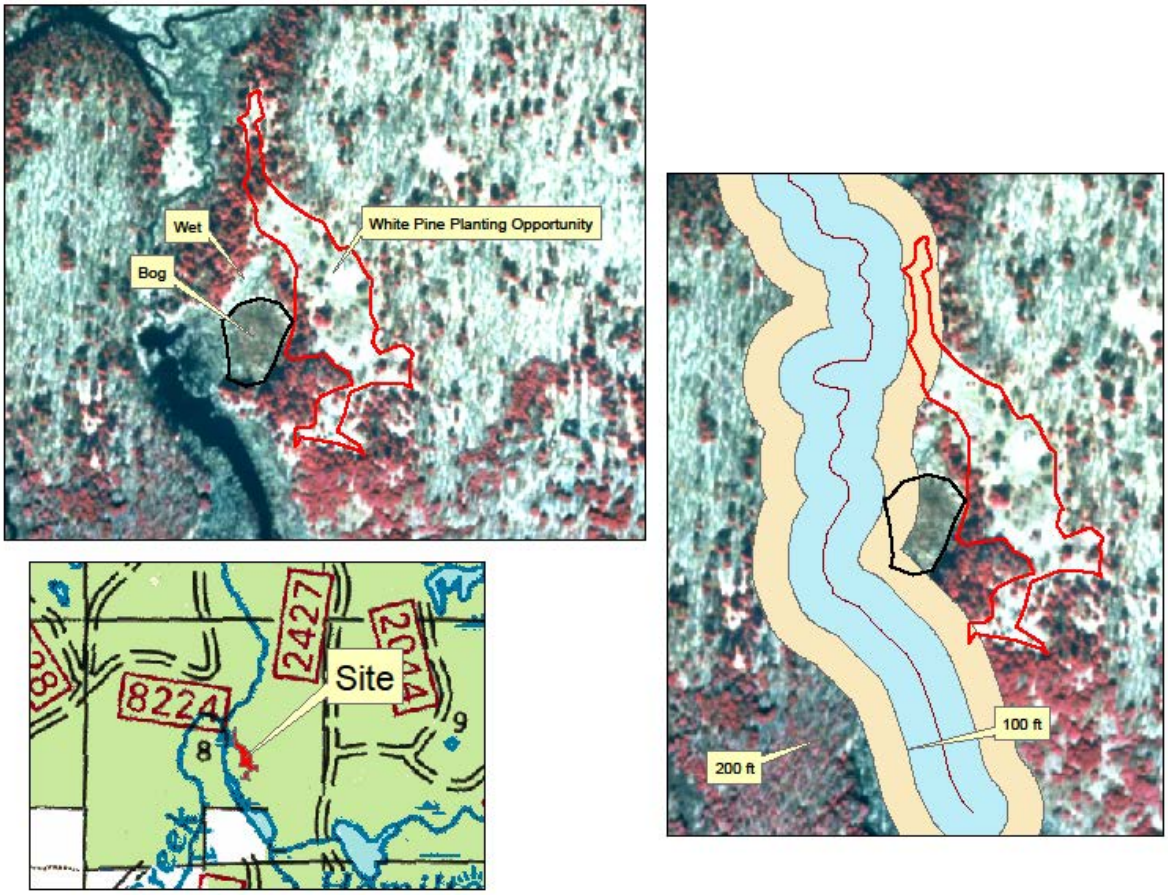

Figure WQ-E-3: Tree planting in the Haymeadow Area

Invasive Species Control

Purple loosestrife (Lythrum salicaria), a non-native invasive species of wetlands and riparian zones, was controlled via hand pulling and herbicide at various locations across the forest. Forty-eight locations were checked and the species was found at ten (10). A total of 8.6 acres of the species was controlled on the north side of East Lake (sprayed 7 acres of Forest Service Shoreline), at Highway 123 Eckerman (sprayed 1.5 acres), powerline Carp River boat launch (only 1 plant found, it was pulled), and Highway 123 south of Forest Road 3343 (sprayed).

Planting Natives in the Closed Section of the Nahma Snowmobile Trail

In 2008, a portion of the Nahma Snowmobile Trail was closed and re-routed to a level 2 road to keep mechanized equipment out of wetlands associated with the Sturgeon River in Township 41N, Range 19W, Section 4. During 2009 the closed portion of the trail was checked to see if the closure had been breached and seeded with native vegetation .

Evaluation of Activities:

Riparian Inventory

The results of the riparian inventory were mixed. First, although the GIS analysis was a good way to focus field inventory methods, there were many locations where the 1850s data was not a good match for the current conditions. Second, we made the mistake of referring to the classes above as priorities and by default they picked up bias that some areas were better than others. In reality, the field work found that Class 5, 6, and 9 areas had the highest potential for planting.

Second, the work completed by seasonal personnel did not provide enough quantitative data on the riparian condition. There were some areas visited later in the season that proved to not be as ideal for planting as initially identified for a variety of reasons.

Planting Long Lived Conifers in the Riparian Corridor

Monitoring and oversight was provided while the tree planting was implemented per the contract agreements. Planting appeared to be accomplished via standard planting specifications and was considered acceptable. No survival surveys were conducted during 2009.

Invasive Species Control

Control of purple loosestrife is a long term project. Each year small clumps are removed and the areas are checked the following year. Since the whole plant removed, the treatment is effective although continued treatment in an area is required for species control.

Monitoring in 2009 indicated that some areas appear to be coming under control. There were several areas where no purple loosestrife was identified at locations that previously were infested. Unfortunately, monitoring on the forest identified several new locations on both public and private land. It is planned to check all new infestations on public land again in 2010.

Future Monitoring and Other Activities:

Riparian Inventory

Although the GIS analysis and the field inventory did not yield as much information as hoped about potential areas to plant to long-lived conifer species, some good information did come out of the exercise. Changes to future monitoring should include:

- Provide field crews more detailed information on what conditions to look for while in the field. Develop a more quantitative method for the assessment. This could include prism cruise information on existing stand conditions or similar method.
- Develop a better data sheet for field data collection.
- Collect and maintain track and waypoint logs to more accurately determine where field crews went.

Planting Long Lived Conifers in the Riparian Corridor

- Survival surveys for the areas planted in FY 2009 should be conducted to determine under which conditions riparian planting is most successful and to ensure that riparian corridor condition is being improved.
- Additional areas in need of either riparian planting or improvement need to be identified. This task has been assigned to the West Zone Hydrologist and field checking areas will be a project to be performed by seasonal employees during the 2010 field season.

Invasive Species Control

- Purple loosestrife and common reed canary grass control will be an on-going project into the foreseeable future. Locations identified will be rechecked at the appropriate time in FY 2010.
- Continue coordination with the Forest Botany and NNIS programs to help in the identification and control of these species in the riparian corridor.

Nahma Snowmobile Reroute

- The area should be monitored to ensure that the closure is not breached.

Work is on-going with the Recreation program to identify areas with similar problems and to re-route those trails out of wetland areas.

Heritage Resources

Monitoring Question:

How are Heritage properties being protected from damage or disturbance?

Monitoring Activity Relationship to Forest Plan:

2300 Recreation Management Heritage Resources

Goals:

1. Heritage resources are identified, evaluated, preserved and enhanced

Objectives:

4. In this planning period, decrease the number of heritage resource sites that do not meet national management standards.

Monitoring Activity and Data Collection:

Heritage resource monitoring focuses on identifying the sites most threatened with damage or disturbance and the processes that pose the greatest threat to these resources. To accomplish this, a sample of known heritage site locations was field-checked in FY2010. Two almost identical monitoring protocols were used: one for Priority Heritage Assets (PHAs) and one for Other Heritage Assets (as defined by Interim Directive FSH 6509.11k 2006-14). PHAs are sites that need the most intensive management because of one or more of the following: 1. special designations such as the National Register of Historic Places, 2. prior investment in preservation, interpretation, and use, 3. an approved management plan, or 4. critical deferred maintenance needs. The designation of a PHA is a local management decision and the list of PHAs on any given unit is dynamic. Other Heritage Assets are non-priority assets that may have some important historical or cultural significance, but currently lack the need for intensive maintenance.

Several management actions were completed in 2010 to address impacts detected by past monitoring. Examples include follow-up evaluation and limited data recovery, physical barriers and signage for sites threatened by recreation use and OHVs, and increased monitoring and law enforcement patrols near sites being damaged by relic hunters. Funding has not been available to address all threats of site damage, so at-risk sites have been prioritized for follow-up actions on the basis of their potential value and the likelihood of future impacts.

For monitoring conducted in 2010, sites were chosen in order to minimize travel costs and maximize the number of sites that could be visited relative to the field time available. Since sites were selected on an opportunistic basis, conditions of these sites are not necessarily representative of the total number of sites on the forest.

Field notes, site forms, and sketch maps were utilized to document findings for all sites visited (both Priority and Other Heritage Assets). Site locations were also mapped using Global Positioning System

units. Each site was rated to describe the type and extent of damage evident at the site. Sites are visually assessed to rate damage as “heavy or severe”, “moderate”, “slight” or “undamaged”. For Priority Heritage Assets, monitoring information is entered into the Heritage Site database in IWEB in a different format and in more detail than Other Heritage Assets. However, for the purposes of monitoring Forest Plan implementation, these two categories are combined for analysis.

Evaluation of Monitoring Activities:

In 2010, forty-eight sites were visited for the purposes of monitoring – 12 sites with pre-European Native American components and 36 historic period sites such as logging camps and homesteads. This represents about 2% of the heritage resource sites on the Hiawatha and is consistent with the available level of funding and personnel time.

Overall, 31% of the sites showed some evidence of damage occurring within the last 5 years. This percentage is no doubt biased because many sites were checked because of previous episodes of damage or recent reports suggesting possible damage. The cumulative severity of damage was subjectively rated as moderate to heavy (8%), moderate (17%), and slight (6%). Damaged sites often retain some potential value and are usually impacted by recurring activities that gradually accumulate damage. Observed damage was caused by recreation (both authorized and unauthorized) use (15%), vandalism by relic hunters (4%), and natural erosion (10%). One site (2% of sample) was damaged by activities associated with a timber sale.

Based on this monitoring, there is no need to revise any of the practices or guidelines concerning heritage resource protection. The management direction and mitigation measures described in the Forest Plan are effective in preventing resource damage due to authorized projects or activities, but less effective in addressing relic hunting, OHVs, recreational use, and natural erosion or deterioration. Existing guidelines provide ample direction for addressing these impacts, but available funding has not been adequate to implement mitigation measures for all threatened sites.

Future Monitoring Activities:

Results of 2010 monitoring activities will be used in conjunction with other data to prioritize future projects designed to address resource damage or disturbance. Future projects could include more frequent monitoring, preservation/protective measures such as site closure, law enforcement actions, informational posting, test excavation for National Register of Historic Places evaluation, or phase 3 data recovery (based on significance, the degree of risk a site faces, and available funding).

Threatened and Endangered Species

Monitoring Question:

To what extent is the management of the Forest contributing to the conservation of threatened, endangered and sensitive species?

Monitoring Activity Relationship to Forest Plan:

2600 Wildlife, Fish and Sensitive Plant Habitat Management Goals:

1. Diverse, healthy, productive and resilient habitats for aquatic and terrestrial wildlife are provided.

Federal Threatened and Endangered Species and Regional Forester Sensitive Species Goals:

The Hiawatha National Forest contributes to the conservation and recovery of federal threatened and endangered species and works cooperatively with U.S. Fish and Wildlife Service, Tribes, and other state and federal agencies and recovery teams to update and implement threatened and endangered species recovery plans and management strategies.

The Hiawatha National Forest contributes to the conservation of Regional Forester Sensitive Species and works cooperatively with state and federal agencies to complete and implement conservation assessments and strategies.

Federal Threatened and Endangered Species and Regional Forester Sensitive Species Guidelines:

Adverse impacts to known occurrences of Regional Forester Sensitive Species should be avoided, minimized or mitigated.

Prior to implementing management activities, surveys should be conducted for federally listed species and Regional Forester Sensitive Species where suitable habitat exists.

For all threatened and endangered species, special closure orders may be used to protect known breeding areas, nests and denning sites.

Federal Threatened and Endangered Species and Regional Forester Sensitive Species Standards:

Signed federal recovery plans for threatened and endangered species will be implemented.

All known populations of threatened and endangered plant species and wildlife nest and denning sites will be protected.

Threatened and Endangered Species Monitoring Framework:

Wildlife and plant monitoring on the Hiawatha National Forest (HNF) was accomplished in compliance with requirements outlined by the Forest Plan. U.S. Fish and Wildlife Service monitoring and reporting requirements for threatened and endangered species (T&E) also influenced the extent of monitoring efforts on the HNF. Forest Service (FS) personnel, volunteers, contractors, and Michigan Department of Natural Resources (MDNR) personnel accomplished the monitoring. The annual monitoring program is designed to establish baseline information or continue established protocols for T&E and Regional

Forester Sensitive Species (RFSS) that will enable staff to evaluate ecological conditions and trends on the HNF. Collectively T&E species and RFSS are referred to as TES (Threatened, Endangered, or Sensitive). In addition to Forest Plan requirements and management direction, T&E species require frequent monitoring in order to satisfy mandates under the Endangered Species Act. This report includes monitoring and evaluation information for the species/groups that were monitored during 2009:

Faunal Species

Piping plover - *Charadrius melodus* (endangered)
Canada lynx – *Lynx canadensis* (threatened)
Kirtland's warbler – *Dendroica kirtlandii* (endangered)
Hine's emerald dragonfly – *Somatochlora hineana* (endangered)
Bald eagle – *Haliaeetus leucocephalus* (RFSS)
Sharp-tailed grouse[1] – *Tympanuchus phasianellus* (RFSS, MIS)
Regional Forester Sensitive Species (RFSS) Raptors – northern goshawk (*Accipiter gentilis*) and red-shouldered hawk (*Buteo lineatus*)

Floral Species

Hart's-tongue Fern - *Asplenium scolopendrium* var. *americanum* (endangered)
Lakeside daisy - Hymenoxys herbacea (threatened)
Pitcher's thistle – Cirsium pitcheri (threatened)
Dwarf lake iris - *Iris lacustris* (threatened)
Regional Forester Sensitive Species (RFSS) plants

Other species monitoring

There were other species for which surveys were conducted in 2009 that are not included in the report. They are, however, included in the zone monitoring reports for 2009. For the west side the surveys included breeding birds, ruffed grouse, furbearer winter track, monarch butterfly, wood turtle and bluebird. Surveys for all those listed for the west, except monarch and wood turtle, were conducted on the east side, plus surveys for common loon, common tern, black tern, salamanders, woodcock and land snails. The citations for the documents are:

USDA Forest Service. 2009. 2009 Wildlife, Fish, Plant and NNIS Monitoring Report. West Unit Hiawatha National Forest, Edited by: *L. Langstaff, J. Ekstrum, D. LeBlanc, M. Cole*. November 13, 2009. 22 pp.

USDA Forest Service. 2009. 2009 Wildlife, Fish, Plant and NNIS Monitoring Report. East Unit Hiawatha National Forest, Edited by: *D. Huebner, J. Reattoir, S. Davis, S. Sjogren*. December 15, 2009. 20 pp.

[1] Sharp-tailed grouse monitoring data is reported in the Management Indicator Species section of this report (above)

Piping plover - Charadrius melodus (endangered)

Monitoring Question:

- To what extent is the management of the Forest contributing to the conservation of piping plover?

Monitoring and Data Collection:

A comprehensive piping plover management and monitoring program was conducted in 2009. The Forest Service worked with partners from The Nature Conservancy (TNC), the U.S. Fish and Wildlife Service, the University of Minnesota and volunteers to implement piping plover management in 2009. Personnel on the HNF worked closely with TNC, U.S. Fish and Wildlife Service, and the University of Minnesota while implementing program activities in 2009. There were five major management and monitoring activities intended for piping plover conservation:

1. population monitoring
2. nest monitoring
3. nest protection
4. habitat enhancement
5. education and outreach

Population Monitoring

Population monitoring along the Great Lakes shoreline began in mid-April, 2009 and ended in early August. Six pairs of piping plovers established territories and constructed nests on HNF lands (five on the east side and one on the west side). A total of 7 young fledged from the 5 nests. Four chicks reared at the Pellston Biological Station by volunteer zookeepers from Great Lakes Zoos Captive Rearing Program were released on the west side shoreline near the successful nest (Figure P-1).

The west side nest was successful in 2009. Four chicks hatched on July 6 and all chicks successfully fledged on August 5. Piping plovers using East Unit habitat produced 5 nests from which 3 chicks fledged.

In 2009, all capture and banding of piping plovers was conducted by persons from the University of Minnesota. The individuals are experienced in these tasks and are familiar with the biology of the species.

The female found on the west side was banded with an adult band combination by a researcher from the University of Minnesota on June 23. The four chicks that hatched on the west side were banded by the same researcher on July 21.

We did not observe evidence of the botulism outbreak, which killed many water-birds on the HNF piping plover breeding habitat in 2007.

Nest Monitoring

Three volunteers and a researcher from the University of Minnesota assisted Forest Service biologist and a seasonal employee monitor the Lake Michigan shoreline for piping plovers. A contractor funded by a National Fish and Wildlife Foundation grant hired through The Nature Conservancy also assisted with monitoring for a portion of the summer. Monitoring began April 29, 2009 and concluded on August 7,

2009. The total number of site visits in 2009 during the breeding season was 82 days. The monitoring allowed the nest location to be accurately documented and protected.

Nests on the east side were observed at Pointe aux Chenes and the Brevoort River beach. Pointe aux Chenes (PAC) is about a mile stretch of beach that provided nesting habitat for 3 pairs of plovers this year. Water levels were quite high again resulting in much reduced habitat at PAC. One mile west of PAC is piping plover habitat known as the "Volleyball" beach, which was not used for nesting this year. Further west is the Brevoort River beach, which provided 1 nest on the eastern section and 1 nest on the western section of the suitable habitat. There was one nest found on the west side of the forest.

Nest Protection

A Forest Supervisor's Closure Order was implemented on both sides of the HNF in 2009, to protect the piping plover. Measures in the order provided for nest exclosures, fencing, monitoring, surveillance, and public outreach. It also provided for law enforcement officer (LEO) assistance of plover protection measures.

Predator exclosures and surveillance were conducted for all nests. Exclosures were installed by HNF personnel that had training in the proper techniques and procedures for successfully completing the activity. Personnel routinely patrolled occupied habitat, monitoring exclosure compliance and informing the public about threats to piping plovers and requirements for leashed pets.

We implemented a Memorandum of Agreement (MOA) with USDA Animal Plant Health Inspection Service (APHIS) that provides for predator removal in proximity to plover nesting habitat. The agreement was drafted to cover merlin predation; however, it has general text allowing for control of other predators as well. We contacted APHIS for predator control assistance during the 2009 nesting season, but they did not remove any predators on the Forest. The USDA Wildlife Service was also consulted for predator control, but did not remove any merlins this year. The forest conducted its own predator control measures. Two skunks were trapped and removed from Pointe aux Chenes.

A sand-bagging effort was employed to protect the nest due to its close proximity to the water and the historic washing out of nests at this area. No large storms occurred during the incubation period. Therefore, the sand bagging technique went untested.

Habitat Enhancement

Cobble patches were maintained and weeds were pulled at Pointe aux Chenes to maintain nesting and foraging habitat.

Education and Outreach

The Hiawatha National Forest conducted public outreach as opportunities presented during nest surveillance and monitoring. The majority of this activity occurred on the east side, the zone where most of the piping plovers and shoreline recreationists were concentrated in 2009.

In June an interagency informational sign provided by the Zoological Society of Milwaukee was placed on the west side of the forest to inform and educate Forest visitors about this endangered shorebird.

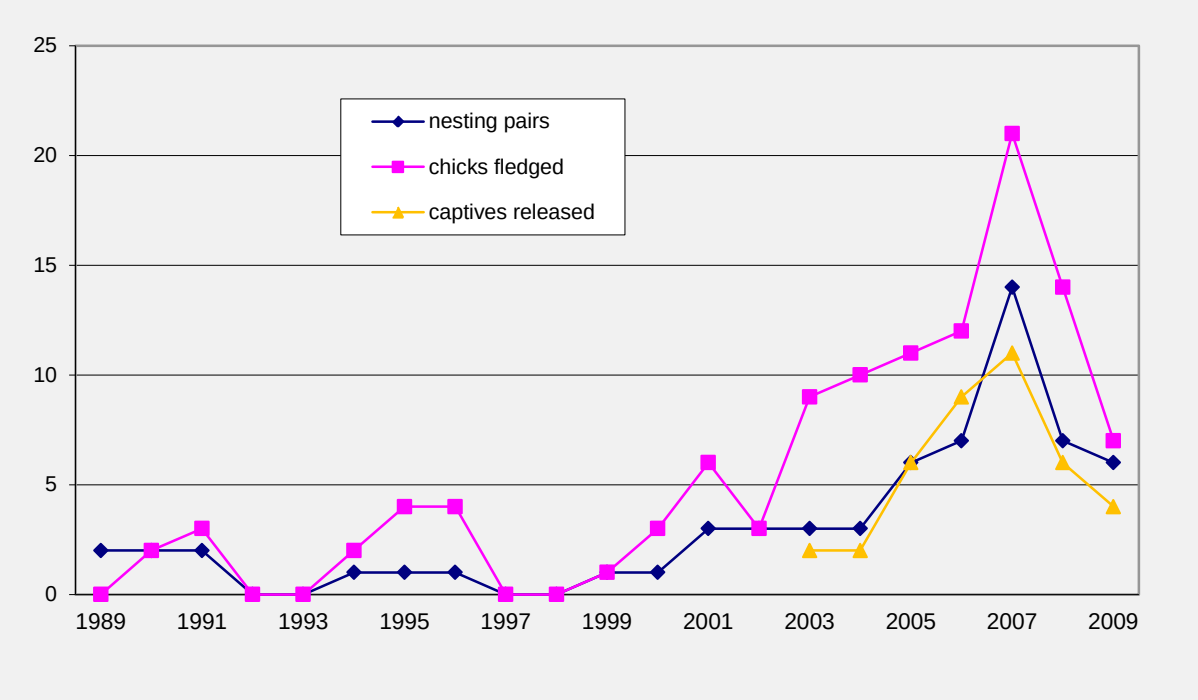

Figure P-1. Piping plover nesting season activity on the HNF, 1989-2009

Evaluation of Data Collected from Monitoring Activities:

Decreases in both the number of nests and the number of plover chicks fledged were observed in 2009. This was the second consecutive year of decreasing productivity on the forest. There were 50% fewer chicks fledged in 2009 than in 2008. The 2009 total of 7 chicks was the lowest since 2002 (3 were documented), and was below the 10-year average (9.6). Total nests decreased from 7 in 2008 to 6 in 2009, but was still above the 10-year average (5.3).

The lower productivity was attributed to a higher water level in Lake Michigan and predation. Information from the US Army Corps of Engineer confirmed the Lake Michigan water level was higher in 2009 than any year from 2001-2009 for the months May-August. Higher water levels during the 2009 nesting season resulted in a smaller area of suitable nesting habitat along the shoreline. A smaller beach surface area may have made it easier for predators to locate plover territories and nests. Specifically, we suspect some chick mortality was attributable to merlin predation. We also documented piping plover adult mortality and egg destruction by small mammals, which might have been due to skunk or weasel predation. However, we were not able to quantify total loses to predation.

None of the failed nests or young mortality was attributed to nest protection efforts, banding or non-compliance of leashed pets or areas closures. While it appeared predators excavated under the exclosure fencing, there was no indication improper installation was related to the events.

Future Monitoring Activities:

The current monitoring and survey practices are effective in assessing the management approach for piping plover on the Forest. We anticipate adequate personnel to monitor piping plovers on the forest and continue to implement nest protection and surveillance in 2009.

Tools for both combating predators and lessening the impacts of higher water levels are in place and will be implemented in 2010. Placing sand bags around nests is one possibility for mitigating the chance of nest failure from water damage. This technique, though untested by a storm surge, was successfully deployed on one plover site in 2009. The agreement with APHIS will increase flexibility to deal with rapidly changing circumstances associated with predators.

US Army Corps of Engineers Great Lakes projections indicate that the 2010 water level for May-August could decrease by a half-foot, or more, approaching conditions last observed in 2007, the program record year for piping plover productivity on the HNF. A lower lake level would increase available habitat and possibly decrease terrestrial predator presence during the nesting season.

Canada lynx – Lynx canadensis (threatened)

Monitoring Question:

- To what extent is the management of the Forest contributing to the conservation of Canada lynx?

Monitoring and Data Collection:

The HNF implements management activities in support of Canada lynx conservation. There were two major activities conducted in 2009.

- track surveys were conducted to detect presence of the species
- information pamphlets were distributed by ranger district staffs

Track Surveys

Canada lynx monitoring occurred as part of the 2009 furbearer monitoring survey. The survey provides a means to identify mammals that are infrequently observed due to factors such as relative low abundance or secretive behavior. Forest Service staff conducted 206 miles of furbearer surveys on the HNF in 2009, including 86 miles of furbearer survey routes and 120 miles of one-time project area transects. Survey routes used in prior years were modified in 2009 to include additional areas, while some track survey routes were eliminated due to reduced funding. Additional Canada lynx-specific surveys were conducted in areas having suitable forest types and structural components. All surveys were completed in winter within a requisite period of time after snowfall, as fresh snow makes it easier to identify the species. Generally, snowmobiles were used to access routes and transects.

There were no confirmed or potential lynx tracks observed along the 206 miles of surveyed routes. Additionally, there were no individual Canada lynx or evidence of the species documented by HNF staff elsewhere on the Forest. There were no occurrences of incidental take, injuries or any known mortality of Canada lynx on the Forest in 2009. There were no reports from the other agencies or the public regarding lynx sightings on the HNF or in the Upper Peninsula of Michigan in 2009. The Michigan DNRE confirmed a sighting of Canada lynx on Sugar Island in Chippewa County, Michigan early in 2010. This location is not on the Hiawatha National Forest. However, if pertinent information is available, the sighting will be included in the 2010 monitoring and evaluation report.

Information Pamphlet Distribution

Wildlife staff on HNF continued in a collaborative effort with the International Association of Fish and Wildlife Agencies to distribute the publication titled, “How to Avoid Incidental Take of Lynx”. The pamphlet is available to the public at all ranger district offices and the Supervisor’s Office.

Evaluation of Management Activities:

The trend for lynx presence on the HNF is unknown. Since 2003, when a Canada lynx was incidentally captured and released from a leghold trap set by a private citizen, there have been no confirmed or suspected occurrences of the species on the Forest.

The management activities cited above do not directly benefit lynx on the HNF. However, they do provide information or public outreach that indirectly benefits Canada lynx that might occur in or pass through an area on the Forest. Therefore, the management activities should continue.

Future Monitoring Activities:

As funding is available, we plan to continue track surveys in areas with the greatest potential for lynx presence.

Kirtland's warbler – Dendroica kirtlandii (endangered)

Monitoring Question:

- To what extent is the management of the Forest contributing to the conservation of Kirtland's warbler?

Monitoring Activity and Data Collection:

FS staff on the HNF implements management and monitoring activities in support of KW conservation. There were 6 major activities conducted in 2009.

- Breeding Habitat Monitoring:
    - Acres of suitable habitat are reported
    - Acres sold and regenerated as suitable KW habitat
- Population Monitoring: KW occurrences were monitored
- Suitable KW Habitat Study: FS staff collected data to compare stocking density,
- tree species, openings component, and ground cover for occupied verses unoccupied stands
- Nest Protection: KW nests were protected by limiting project activities within and adjacent to occupied stands
- Partnership Coordination: FS staffs coordinated with the USFWS and MDNR personnel regarding species conservation measures

Breeding Habitat:

Acres of suitable habitat

Potential breeding habitat is identified as jack pine in the age range of 6-16 years on Ecological Land Type (ELT) 10/20 (dry sandy outwash plains) in Management Areas (MAs) 4.2 and 4.4 (Figure K-1). Based on an analysis of the HNF vegetation status, there are approximately 6,477 acres of breeding habitat for KW on the HNF in Management Areas 4.4 and 4.2. These MAs were chosen due the HNF Forest Plan direction to maintain KW breeding habitat there. Of the total acreage, approximately 4,867 acres are located on MA 4.4 and 1,610 acres are located on MA 4.2. Within the 2 MAs, KW habitat is widely distributed across the Forest, including stands in Eight-mile/Indian River, Wetmore, and Whitefish Delta on the west side and Raco Plains on the east side.

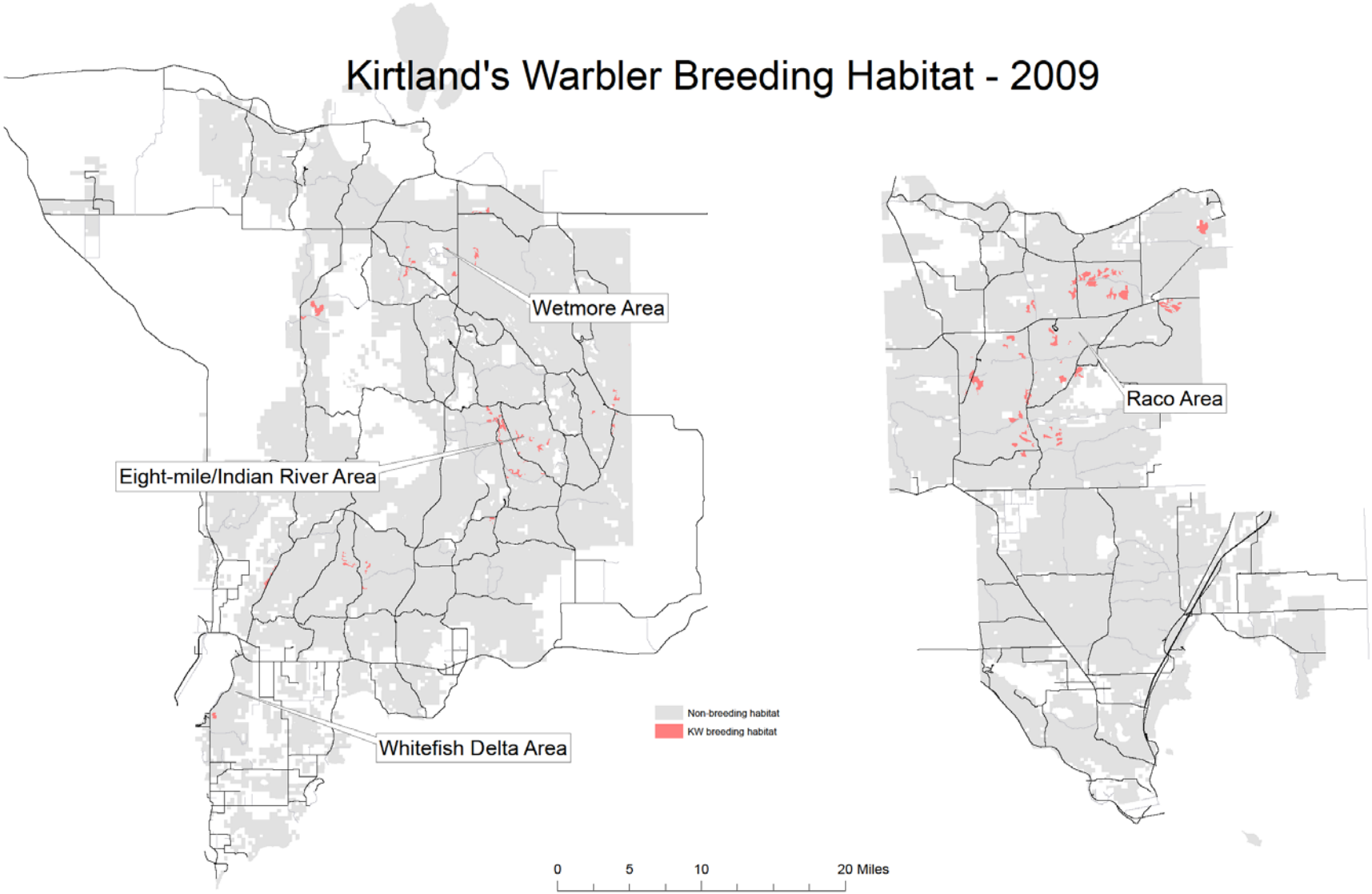

Figure K-1. KW habitat - acres of jack pine in Management Areas 4.2 and 4.4 on ELT 10/20 between 6-16 years of age in 2009.

Acres sold and regenerated as KW habitat

Management direction for KW in the Forest Plan is to provide a continuous 6,700 acres of jack pine suitable for KW breeding. It is known that presence of jack pine stands having the minimum stem density of about 1,100 trees per acre drives KW use during the breeding season. Management activities conducted by the Forest addressing that goal include, (1) acres of jack pine sold that will be regenerated to KW stem density, and (2) acres of completed reforestation stocked to KW stem density. Sold data indicates the likelihood of KW breeding habitat creation several years in the future. In 2009, 477 acres of jack pine were sold in stands to be regenerated for KW (Figure K-2). This is well below the 1,061 average for the period, 2004-2009. In 2009, 1472 acres were regenerated to KW breeding habitat criteria (Figure K-3). This is well above the Forest Plan goal of 670 acres per year.

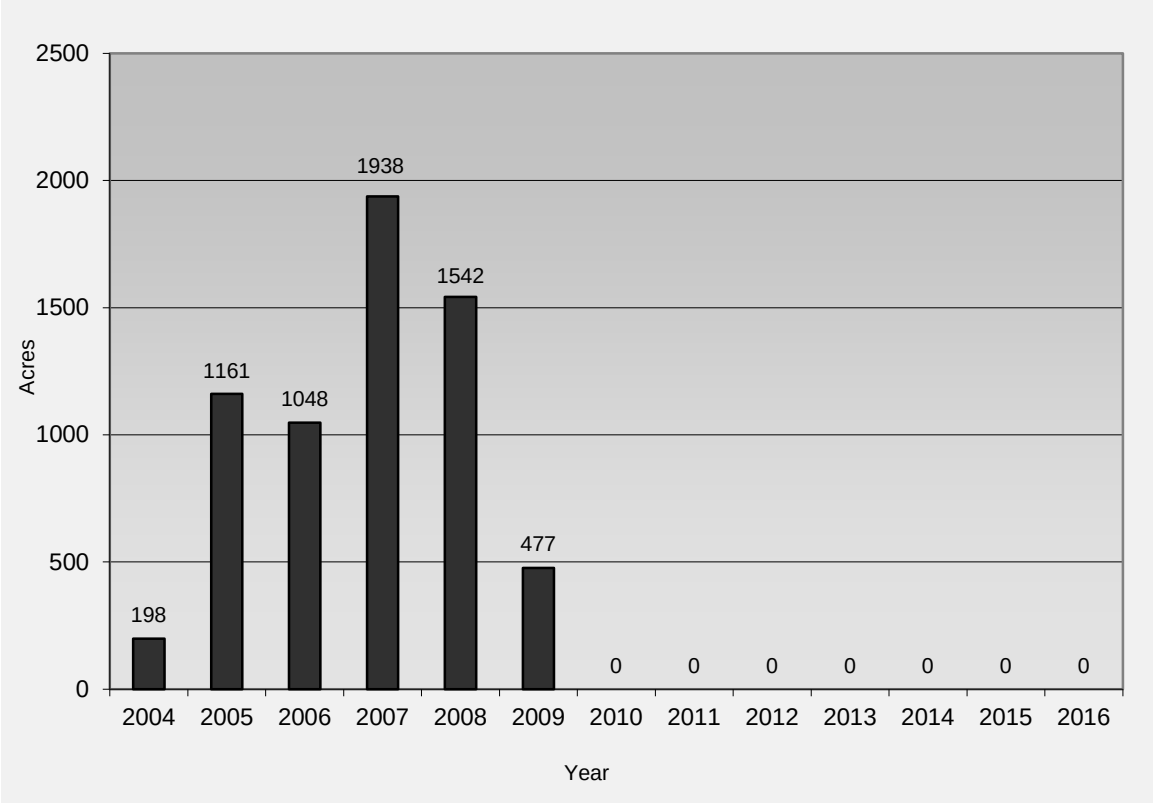

Figure K-2. Acres of jack pine sold for Kirtland's warbler (KW) on the HNF, 2004-2009.

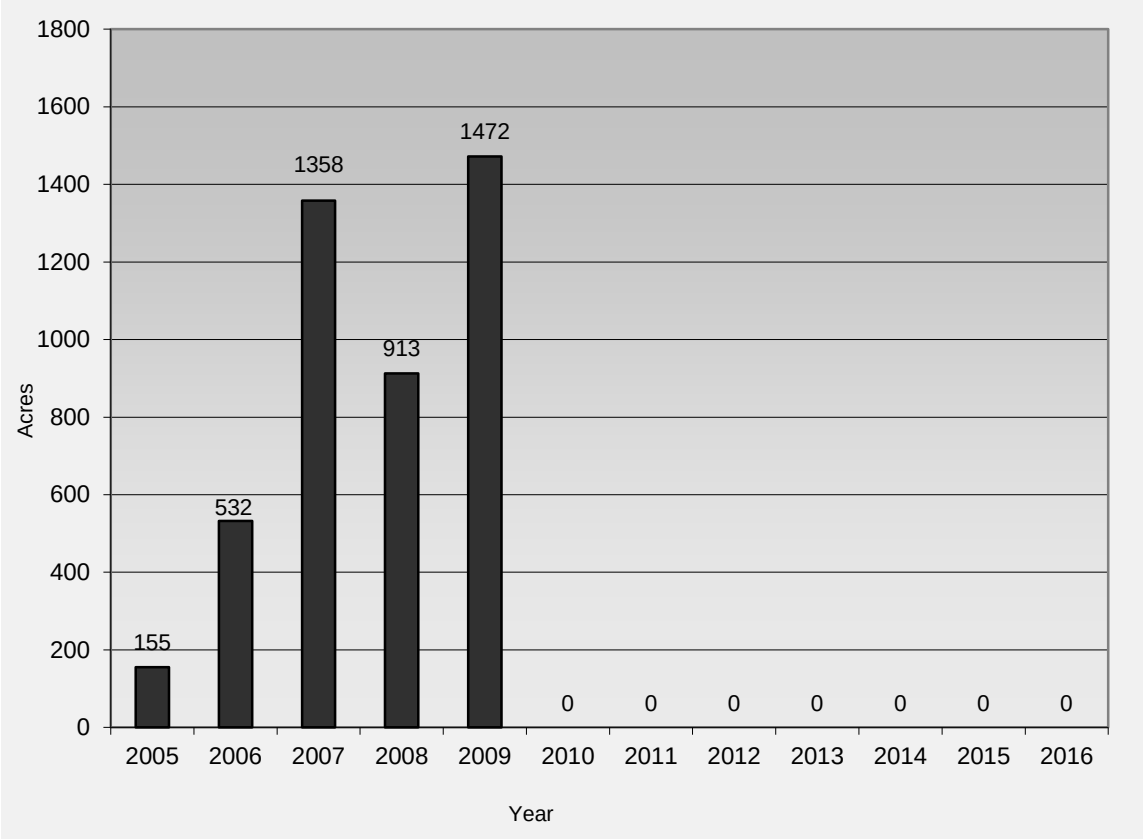

Figure K-3. Acres of reforestation for Kirtland's warbler (KW) on the HNF, 2005-2009.

KW Population Monitoring:

Forest staff and volunteers conducted the annual KW census on the HNF in 2009 (Figure K-4). The census was conducted by driving or walking through known and mapped potential KW habitat and listening for or observing the number of singing males. Singing males are counted because they are both easily observable (by their song) and they occupy distinct territories. The 2009 survey counted 25 singing males on the HNF . Females are noted, but not formally counted because they are more secretive and do not defend a territory. Twelve female Kirtland's warblers were also observed during the surveys, indicating the likelihood that successful nesting is occurring. There was no known KW mortality on the Forest in 2009.

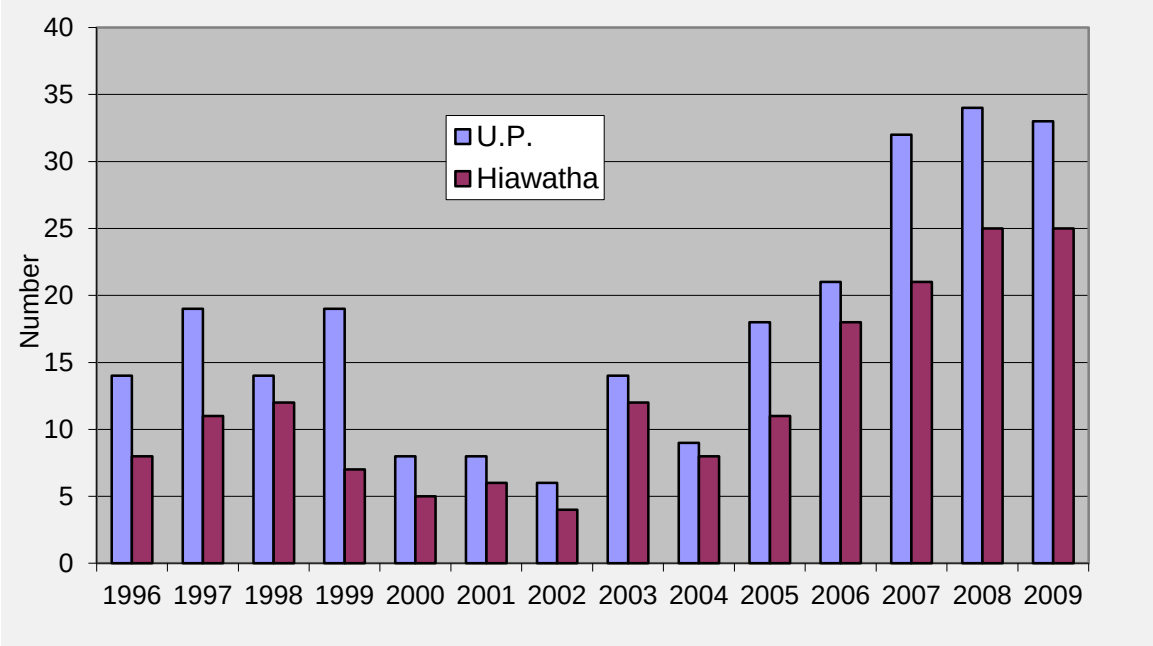

Figure K-4. Kirtland's warbler (KW) singing males on the HNF and Michigan's Upper Peninsula (U.P.), 1996 - 2009.

Suitable KW Habitat Study: In 2009, HNF staff initiated data collection in jack pine stands to compare stocking density, tree species composition, openings component, and ground cover in areas occupied by Kirtland's warbler verses areas that were unoccupied but determined suitable. The goal of the study is to learn more about what site characteristics encourage bird occupation, so that management can efficiently create good habitat. In this first year, data were collected in 309 plots on the east side and 166 on the west side. Data from 2010 will be collected before analyzing the results.

Evaluation of Management Activities:

Population monitoring results indicate that the species is stable on the HNF and on Michigan's Upper Peninsula. The number of males observed on the Hiawatha National Forest over the last 3 years is in the 20-25 range, and accounted for approximately 76% of the total Upper Peninsula population in 2009. This suggests that activities being implemented on the Hiawatha National Forest are effective in conservation of the species. As current efforts produce more jack pine stands in the appropriate age class we expect numbers of nesting KW to persist or increase.

The 2007 – 2009 three year average for KW breeding habitat creation is 1248 acres. This is more than the goal outlined in the HNF Forest Plan of 670 acres per year, and indicates that in the short-term (3-10 years), breeding habitat may occur at levels above that described in the Forest Plan. In 2009, there were 477 acres of jack pine sold on the Forest. This indicates that management of jack pine stands affected by the budworm infestation over the last decade is decreasing. Consequently, there may be decreases in breeding habitat on the HNF 8-16 years the future if the average annual regeneration is less than 670 acres over a 10-year period.

Implementation of conservation recommendations for KW is an ongoing process. Hiawatha staff is currently in the process of reviewing jack pine harvest, supplemental seeding, site preparation and slash treatment techniques to determine if additional efficiencies can be achieved for regenerating jack pine management for KW breeding habitat. Based on the 2009 monitoring information there is no reason to change any of the management practices for this species.

Future Monitoring Activities:

The current monitoring and inventory practices are effective in assessing management direction for Kirtland's warbler on the Forest. Consistent with available funding, similar monitoring should be continued in the future. The Suitable Habitat Study should continue in 2010, and results of this study will be analyzed to help guide future management activities.

Hine's emerald dragonfly – Somatochlora hineana (endangered)

Monitoring Question:

- To what extent is the management of the Forest contributing to the conservation of Hine's emerald dragonfly?

Monitoring Activity and Data Collection:

Monitoring activity for Hine's emerald dragonfly has the goal of identifying and protecting suitable habitat, indicated by the presence of the species in an area. The Hiawatha National Forest uses two monitoring protocols to detect suitable habitat; designed survey and field work observation.

Designed Survey

Monitoring for Hine's emerald dragonfly (HED) was conducted by HNF staff and a contractor. Potential sites with elements of suitable dragonfly habitat are field checked for presence of HED during the summer when adults are flying and more easily observed. In 2009, approximately 1650 acres were surveyed across the forest, including 250 acres on the east side and 1400 acres on the west side. On the east side, approximately 250 acres of pipeline and wetland habitat adjacent to pipelines were surveyed, but no new Hine's emerald dragonfly locations were identified. On the west side, approximately 1400 acres of wetland habitat were surveyed for HED. The two major survey areas were rich bog and poor fen in the Moss Lake area (500 acres), and 650 acres of peatlands. No HED observations of were made during the survey effort, and the habitat was considered marginal.

Field Work Observation

There were no new HED sites documented during the 2009 field work. There were no occurrences of incidental take, injuries or any known mortality of HED on the Forest in 2009.

Evaluation of Management Activities:

There are 11 known locations for the HED on the Forest, all on the east side. All known sites are protected from disturbances. Inventory of potential habitat continues on both sides of the HNF. Surveys on the west side for HED have not yielded any observations of the species. It's possible that the species is rare on the Forest with few locations yet undiscovered. However, a HED adult was documented in Menominee County in 2008. This location is between the southwestern boundary of the west side of the Forest and Wisconsin. Even so, based on our surveys and consideration of habitat requirements, we speculate there is a low probability of HED occurrences on the west side. This does not eliminate the chance of isolated HED sites occurring on the west side. Our assessment is that management activities conducted in 2009 should continue in 2010 to help ensure conservation of the species.

Future Monitoring Activities:

Future surveys may focus on substantiating breeding in locations were only presence has been documented, as well as locating new sites. We should continue to monitor OHV use, so that we can

respond while damage is limited. Mapping and assessment of groundwater conditions in HED habitat are desirable activities for critical habitat on the east side. This work should be initiated consistent with availability of funds.

Bald eagle – Haliaeetus leucocephalus (RFSS)

Monitoring Question:

- To what extent is the management of the Forest contributing to the conservation of bald eagle?

Monitoring Activity and Data Collection:

The HNF implements management activities in support of bald eagle conservation. All management activities are consistent with guidance for sensitive species conservation specified in the Forest Plan for the HNF. There were 4 major activities conducted in 2009.

- bald eagle nests were surveyed
- active bald eagle nest trees and historic nest trees were protected
- HNF staff coordinated with MDNR personnel regarding species conservation measures and surveys
- Barriers were placed to reduce human disturbances near an active nest

Monitoring of management activities occurs to assess their effectiveness. Major monitoring activities completed in 2009 were nest surveys and the effectiveness of a trail closure. Eagle mortality was also noted

Nest Surveys

The Michigan Department of Natural Resources (MDNR) provided the HNF with bald eagle productivity information from aerial nest surveys throughout the Upper Peninsula. Surveys are conducted twice a year, once in April to determine which nests are active, then again in late May-July to determine nest productivity. HNF staff also monitored some ATV trail use relative to eagle nesting on west side.

There were 39 bald eagle territories observed on the Forest in 2009. A territory is an area protected by a pair of bald eagles. There were 20 territories documented on the west side of the HNF (Table BE-1) and 19 on the east side (Table BE-2). Of the total surveyed, there were 21 active territories where nesting occurred, 16 of which (76%) were successful in fledging at least one young. A total of 24 young fledged from the 16 nests, which is equivalent to 1.5 young per nest.

Trail Closure Monitoring

On the west side, monitoring in 2009 found ATVs were still accessing trails near an eagle nest. Barrier posts were placed to block access to the nest tree and informational signs were prominently displayed. Eagles were observed at the nest. However, observations did not establish whether the nest was successful.

Eagle Mortality

There was no known bald eagle mortality on the HNF in 2009.

Table BE-1. West side bald eagle productivity summary for nests on the HNF.

Year	Total Territories	Active Territories	Successful Territories	Young
2004	18	11	8	10
2005	19	9	6	12
2006	17	11	8	11
2007	16	11	6	10
2008[1]	9	7	6	8
2009	20	12	8	13

Table BE-2. East side bald eagle productivity summary for nests on the HNF.

Year	Total Territories	Active Territories	Successful Territories	Young
2004	7	5	2	4
2005	11	8	5	7
2006	14	11	7	14
2007	16	8	7	11
2008[1]	16	6	6	11
2009	19	9	8	11

Evaluation of Management Activities:

There were 5 active territories that did not fledge young. Management activities on the HNF were not known to be responsible for the lack of success at these sites.

In 2009, the number of active territories, successful territories and young fledged increased when compared to 2008. The number of young per active nest (1.5) is comparable to the 1.6 observed in both 2007 and 2008. It appears that eagle numbers and productivity are stable. Based on the results of monitoring, no changes in bald eagle management are recommended.

[1] 2008 monitoring protocol was different from other years.

Future Monitoring Activities:

Monitoring efforts should continue to survey for active nests and document nesting success, as well as note any disturbance activities from either HNF management or other human uses (such as OHV trails).

Raptors – northern goshawk (Accipiter gentilis) (RFSS) and red-shouldered hawk (Buteo lineatus) (RFSS)

Monitoring Question:

- To what extent is management contributing to the conservation of northern goshawk and red-shouldered hawk?

Monitoring Activity and Data Collection:

The HNF implements management activities in support of red-shouldered hawk and northern goshawk conservation. The management activities are consistent with guidance for sensitive species conservation specified in the Forest Plan. There were 6 major activities conducted in 2009.

- historic nests were surveyed for presence of nesting pairs
- historic nests were surveyed for evidence of successful nesting and productivity
- raptor activity was monitored near timber sales
- active nest trees in timber sales were protected with buffers and seasonal restrictions, as detailed in the Implementation Guide for the HNF Forest Plan
- habitat analysis was completed for projects conducted on the Forest
- results of habitat analyses were applied to project design, as applicable, to lessen impacts to the species

Northern goshawk and red-shouldered hawk are Regional Forester Sensitive Species (RFSS) and were monitored in 2009. Raptor surveys were conducted by HNF staff and contractors, and consisted of checking historic nests and monitoring raptor activity near timber sales. Initial field surveys were conducted in April through June to determine nest and territory status. Productivity surveys for active nests were conducted in June and July. The contents of the nests were determined by using direct observations or a 50' fiberglass telescopic lineman's pole with a wireless video camera attached at the top. Observers on the ground used a hand-held monitor to see directly into the nest.

Productivity Surveys: A total of 130 intact nests were surveyed; 86 on the east side and 44 on the west side. This is a sample of the total nests since the entire Forest is not surveyed in any year. A total of 25 active red-shouldered hawk nests were documented on the Forest, 17 on the east side and 8 on the west side. There were 13 active northern goshawk nests observed. Nests having adults or young present are termed "Active – Breeding" (Tables R-1, R-2, R-3, and R-4), and are assumed successful. Successful nests are those having live young at the time surveys were conducted.

Table R-1. 2009 nest monitoring results for the east side of the HNF (n=86 nests).

Species	Inactive	Active - Breeding	No. of Young
Northern goshawk	21	9	14
Red-shouldered hawk	39	17	26
Total	60	26	40

Table R-2. 2009 nest monitoring results for the west side of the HNF (n=44 nests)

Species	Inactive	Active - Breeding	No. of Young
Northern goshawk	5	4	10
Red-shouldered hawk	18	8	unknown
Total	32	12	unknown

Table R-3. 2008 nest monitoring results for the east side of the HNF (n=84 nests).

Species	Inactive	Active - Breeding	No. of Young
Northern goshawk	19	7	14
Red-shouldered hawk	35	23	25
Total	54	30	39

Table R-4. 2008 nest monitoring results for the west side of the HNF (n=42 nests).

Species	Inactive	Active - Breeding	No. of Young
Northern goshawk	16	1	unknown
Red-shouldered hawk	21	4	6
Total	37	5	unknown

Monitoring indicated successful nests totaled 38, 26 on the east side and the remaining 12 on the west side. These 38 nests included 13 northern goshawk nests and 25 red-shouldered hawk nests. Young were counted in the 17 red-shouldered hawk nests on the east side only (a total of 26 young were counted). Goshawk young were counted on both sides of the forest. In 2009, 24 goshawk young were observed (Tables R-1 through R-4). Based on the number of active nests for which productivity data existed, an

average of 1.5 red-shouldered hawk young and 1.8 northern goshawk young were produced on the HNF in 2009.

Raptor Use Within Timber Sales: Several of the nests that were checked this year are within timber sales (Table R-5). Mitigation measures are currently being applied to the nests, including limiting forest management activity in close proximity to a nest location and where young forage after fledging. Annual nest monitoring can be used to evaluate the effectiveness of these measures. Harvest has not started within many of the sales containing red-shouldered hawk and northern goshawk nests. However, territories within the Cad Soo, Crib and Strongs timber sales have implemented harvest activities while incorporating the mitigation measures (Table R-5). Nests in all 3 sales were active again in 2009, so measures have been successful to this point. Harvest is expected to begin within more red-shouldered hawk and goshawk territories winter in 2009/2010, which will provide additional opportunities to evaluate the effectiveness of raptor mitigation measures.

Table R-5. 2009 raptor nest monitoring results for nests within timber sales

Sale Name	Species	Current Territory Status
Sales with harvest activity		
Cad Soo	Northern Goshawk	Inactive; Territory was active during/after harvest, but is now inactive.
Cad Soo	Northern Goshawk	Active; Ongoing harvest according to management guidelines.
Crib	Red-shouldered Hawk	Active; Ongoing harvest according to management guidelines.
Deerfoot Lake	Northern Goshawk	Inactive; Territory inactive before harvest occurred.
Eckerman	Red-shouldered Hawk	Active; Harvest has not started yet
Northwest	Northern Goshawk	Inactive; Territory inactive before harvest occurred.
Red Envelope	Red-shouldered Hawk	Inactive; Territory inactive before harvest occurred.
Strongs	Northern Goshawk	Active; Ongoing harvest according to management guidelines.
Strongs	Red-shouldered Hawk	Retired; Territory inactive before harvest occurred.
NW Cooperage	Northern Goshawk	Active; Ongoing harvest according to management guidelines.
Sales with no harvest yet		
Aquaduct	Northern Goshawk	Active; Harvest has not started yet.
Cad Salt	Red-shouldered Hawk	Active; Harvest has not started yet

Evaluation of Management Activities:

Based on the monitoring conducted over the past several years, the red-shouldered hawk appears in greater numbers and is possibly more stable than the northern goshawk. Even though our current monitoring and inventory constitutes a sample of the total population of the 2 species, it appears to be effective in assessing broad trends of the species on the HNF. Based on the 2009 monitoring information there is no reason to change management direction in the Forest Plan for northern goshawk and red-shouldered hawk. Mitigation measures within timber sales appear to be protecting nests well enough that they succeed even in the midst of ongoing timber harvest operations.

Future Monitoring Activities:

Monitoring efforts will continue to emphasize checking historic nests for goshawk and red-shouldered hawk productivity. In 2010, more opportunities will be available to monitor raptor use in timber sales.

American Hart's-tongue Fern

Asplenium scolopendrium var. americanum (endangered)

Monitoring Question:

- To what extent is management contributing to the conservation of Hart's-tongue fern?

Monitoring Activity and Data Collection:

There are two major management activities that contribute to the health and stability of hart's tongue fern on the Hiawatha National Forest.

- Selected occurrences are monitored to obtain status information. This action helps to identify threats and develop timely and adequate responses.
- Non-native invasive species (NNIP) near known populations are identified and treated. This helps maintain habitat in a healthy ecological condition.

American Hart's-tongue fern is known to occur on the east side of the Hiawatha National Forest. Monitoring activities were conducted for this species in 2009 on 4 of the 7 known populations. Monitoring included checking the sites for general disturbance and overall health of the populations. Overall, the populations are healthy, thriving, and few threats were observed. The four monitored sites are described below:

- East Lake Road (site #3) was checked for weeds and associated damage from the nearby road. Non-native invasive wild parsnip (*Pastinaca sativa*) that is growing among the bedrock and fissures was hand-pulled on about 0.2 acres; otherwise, the population remains healthy, abundant and free from threats.
- The new gryke site (site #7) was visited and the small population was counted. The population numbers remain constant at this site.
- Southwest of East Lake (site #5) was monitored and no disturbance was observed. A stand north of this site is proposed for treatment. The stand was searched, but did not detect new occurrences of hart's tongue fern.
- The Great Lakes Transmission Line (site #1) was inventoried. No disturbance was noted.

There were no activities undertaken in 2009 that negatively impacted American Hart's-tongue fern on the HNF; known populations were protected.

Evaluation of Monitoring Activities:

In the past, the Hiawatha National Forest has maintained stable populations at known sites of American Hart's-tongue fern. Monitoring activities in 2009 confirmed that management activities continue to maintain a healthy and stable population.

Future Monitoring Activities:

The current monitoring and survey practices are effective in assessing the management approach for Hart's-tongue fern on the Forest. Assuming adequate funding, we plan to continue monitoring as was accomplished in 2009.

Lakeside daisy - Hymenoxys herbacea (threatened)

Monitoring Question:

- To what extent is management contributing to the conservation of lakeside daisy?

Monitoring Activity and Data Collection:

There are two major management activities that contribute to the health and stability of the lakeside daisy.

- Known sites are monitored to collect status information. This action helps to identify threats and develop adequate responses in a timely fashion.
- Monitoring for Non-Native Invasive Plants occurs near the known site. This helps ensure timely response before non-native invasive plants threaten established lakeside daisy occurrences. Monitoring helps to perpetuate healthy ecological conditions at the site. No herbicide use will take place at the site.

The lakeside daisy site occurs on the east side of the Hiawatha National Forest along Brevort Lake Road. This site is unique in that the plants occur under a powerline close to an existing paved road. The powerline right-of-way could be an area susceptible to disturbance by OHVs and NNIP infestations. The majority of the population occurs on private lands owned by the Michigan Nature Association, but some of the plants occur on Forest Service ownership. These populations are monitored each year to help ensure their survival.

There were no disturbances observed during the 2009 monitoring for lakeside daisy. Non-native invasive plants were removed on Forest Service land. Specifically, marsh thistle was hand removed and bagged prior to seed set on about a half acre near or around the site.

Evaluation of Monitoring Activities:

The HNF has maintained stable populations at the known site of lakeside daisy. There were no activities undertaken in 2009 that negatively impacted lakeside daisy on the Hiawatha National Forest; known populations were protected.

Future Monitoring Activities:

The current monitoring and survey practices are effective in assessing the management approach for lakeside daisy on the HNF. Assuming adequate funding, we plan to continue monitoring and NNIP treatment as was accomplished in 2009.

Pitcher's thistle – Cirsium pitcheri (threatened)

Monitoring Question:

- To what extent is management contributing to the conservation of Pitcher's thistle?

Monitoring Activity and Data Collection:

There are two major management activities that contribute to the health and stability of the Pitcher's thistle.

- Occurrences are monitored to collect status information. This action helps to identify threats and develop adequate responses in a timely fashion.
- Monitoring and hand pulling non-native invasive plants (NNIP) happens near occurrences. This activity allows response before non-native plants threaten established Pitcher's thistle occurrences.

On the east side, a monitoring plan was created for the populations along the US-2 dunes. This area has a very healthy thistle population, but spotted knapweed and other NNIP are also becoming established. NNIP infestations were mapped and in some instances removed. In 2009, a census was taken on about 200 acres along the dunes. This census detected about 10,900 individuals, 37 percent of which were flowering. Approximately 80 percent of the plants were on the Lake Michigan side of US-2. Prior to 2009, the last census was done in 1994. The NRIS database was updated and this project was entered into the Wildlife, Fish and Rare Plants (WFRP) database. Numerous healthy populations of Pitcher's thistle also occur at Pte. Aux Chenes beach but a census for that population was not taken in 2009.

Evaluation of Monitoring Activities:

There were no activities undertaken in 2009 that negatively impacted Pitcher's thistle on the HNF, and known populations were protected.

Future Monitoring Activities:

The transplant area along US-2 will be monitored to determine if the work was successful. Otherwise, the current monitoring and survey practices are effective in assessing the management approach for Pitcher's thistle on the Forest. We plan to continue these in 2009.

Dwarf lake iris - Iris lacustris (threatened)

Monitoring Question:

- To what extent is management contributing to the conservation of dwarf lake iris?

Monitoring Activity and Data Collection:

There are three major management activities contributing to the health and stability of dwarf lake iris.

- Occurrence monitoring is done to collect status information. This action helps to identify threats and develop adequate responses in a timely fashion.
- We mapped occurrences in Round Island Wilderness. This activity will assist in our efforts to continue to protect this site in the present and future.
- Monitoring and hand pulling non-native invasive plants (NNIP) happens near occurrences. This activity will help ensure we can respond before non-native plants threaten established dwarf lake iris occurrences.

An inventory of the Round Island (R.I.) Wilderness shoreline was completed on June 23, 2009. Round Island contains the east side's largest dwarf lake iris population. One of the 5 dwarf lake iris sites on the island was visited and appears to be larger than originally mapped. It was photographed and mapped with a Global Positioning System (GPS) unit, and updated in the NRIS TESP database. At Weden's Bay (on the west side), a comprehensive survey of dwarf lake iris occurrences resulted in some small-scale NNIP removal around several sites. GPS locations were mapped and population counts were conducted in order to identify the extent of populations. Population counts and site characteristics were entered into the NRIS database. Dwarf lake iris plants were in peak bloom, which resulted in the detection of additional populations in a larger area than previously known. Some habitat degradation was detected, including off-highway vehicle (OHV) travel and NNIP occurrence.

Evaluation of Monitoring Activities:

The current monitoring and survey practices are effective in assessing the management approach for dwarf lake iris on the Forest. We plan to continue monitoring as was accomplished in 2009. Impacts to occurrences documented at Weden's Bay and elsewhere will be addressed as opportunities in 2010 and later.

RFSS Plants

Monitoring Question:

- To what extent is management contributing to the conservation of RFSS plants?

Monitoring Activity and Data Collection:

The HNF implements management activities in support of Regional Forester Sensitive Species (RFSS) plants. The management activities are consistent with guidance for sensitive species conservation specified in the Forest Plan for the HNF. There were 3 major activities conducted in 2009.

- RFSS species were monitored
- RFSS plants were protected in project areas
- New occurrences were located and mapped

Monitoring activities occurred on both sides of the Hiawatha National Forest (HNF). In many cases, monitoring involved locating a historic site that was on the HNF rare plant atlas but did not have attached survey information or Global Positioning System (GPS) location. In general, a rare plant site can be as small as one plant or as large as several acres.

RFSS species that were monitored on the east side in 2009 are listed in the Table P-1. Sites were photographed, and specific data on location, habitat, population, and associate species was recorded for each site (stored in NRIS database). Sites are mapped in the NRIS TESP database (in ArcGIS) as a point or a polygon. Known RFSS fern locations in the Niagara project area were surveyed to get accurate GPS locations for future potential reserve areas.

Table P-1. RFSS monitoring for the east side of the HNF.

Species Monitored		Number of Known Sites	Approx. Acres
Walking fern	*Asplenium rhizophyllum*	6 - Niagara	6
Green spleenwort	*Asplenium trichomanes-ramosum*	6 - Niagara	8
Moonworts	*Botrychium spp.*	2 - Bobbygay Road	2
Calypso orchid	*Calypso bulbosa*	3 - Huron Complex	10
Bulrush sedge	*Carex scirpoidea*	1 - Lakeside daisy site	0.5
Wiegand's sedge	*Carex wiegandii*	1 - Delirium Wilderness	5
Slender cliffbrake fern	*Cryptogramma stelleri*	2 - Maple Hill and Scott's quarry	4

Flattened spikerush	*Eleocharis compressa*	1- Contract – Mackinac wilderness	0.5
Downy sunflower	*Helianthus mollis*	1 - St. Ignace office	0.1
Canada ricegrass	*Oryzopsis canadensis*	3 - East Red Pine 3	5
Sweet coltsfoot	*Petasites sagittatus*	1 - Rudyard	5
Lapland buttercup	*Ranunculus lapponicus*	1 - Huron Complex	5
Foam lichen	*Stereocaulon condensatum*	4 - Raco Plains	5
Lake Huron Tansy	*Tanacetum huronense*	Numerous - US2 Dunes	15
		Total	71.1

Additional RFSS species that were monitored on the west side during 2009 include:

- Leymus mollis populations at North Beach-GI NRA – 9 acres
- Cooper's milkvetch in proposed Stonemoss midscale
- Vasey's rush
- Butternut

Evaluation of Monitoring Activities:

The current monitoring and survey practices are effective in assessing the management approach for RFSS plants on the Forest. We plan to continue monitoring as was accomplished in 2009.

Snowmobiles

Monitoring Question:

To what extent is the Forest providing snowmobile opportunities?

What are the effects of snowmobiles on the physical, biological and social environment?

How effective are Forest management practices in managing snowmobile use?

Monitoring Activity Relationship to Forest Plan:

2300 Recreation Management, Motorized and Non-Motorized Trails.

Goals:

A safe and cost-effective road and trail system provides a variety of recreation experiences, responds to changing social needs and minimizes user conflicts. The system includes loops and connections to access recreation facilities and local community services.

Trail and route development provide for multiple use, mitigate social conflicts and prevent natural resource damage.

Through coordination with adjacent public land/road management agencies complementing OHV and snowmobile policies and routes are provided.

Objectives:

In this planning period complete a snowmobile and OHV trail agreement with the State and other Michigan National Forests

In this planning period, provide snowmobile trails and routes and areas indicated in Table 2300-6.

Table 2300-6. Snowmobile Trails, Roads and Snowmobile Areas

Type of Access	Forest Plan Maximum Miles Open
Maximum miles of groomed trails	340 miles
Maximum miles of open, ungroomed ML 3-5 roads	373 miles
Maximum miles of open, ungroomed ML 2 roads	2,100 miles
Maximum acres of snowmobile area	15 acres

Monitoring Activity and Data Collection:

Snowmobile Opportunities:

There have been no major changes in the number of miles of snowmobile trails since the approval of the Forest Plan in 2006. The Forest currently has 321 miles of designated snowmobile, which is below the Forest Plan maximum of 340 miles. There were no changes to the number of unplowed Forest Service roads or other areas open to snowmobile use. The current system of trails continues to provide access to services in local communities.

Snowmobile Effects:

Forest field staff routinely monitor conditions of the snowmobile trails both in the winter and summer season. No resource damage has been noted as a result of snowmobile use. Staff continues to see damage to the snowmobile trail system by illegal OHV use. Damage to trails includes rutting in wetland sections and high banking and rollers created by illegal OHV use on the trail system.

In 2009, a reroute of 1.5 miles trail of the Murphy Creek Trail (State trail #413) was accomplished. This project relocated the trail out of wetlands to an upland location on Forest Road 2417. The relocation was necessary due to illegal ORV use on the trail that caused damage to wetlands and hampered the freezing necessary for passage of grooming equipment. The damaged area will be rehabilitated in 2010.

The portion of the Nahma Grade trail that was relocated out of wetlands in FY08 was planted with native species in 2009. The trail closure and reroute appears to have been effective in keeping out motorized vehicles based on monitoring by the hydrology staff.

Munising District staff monitored tread conditions on sections of North Hiawatha (State trail # 417) and Wetmore (State trail #419) trails. Erosion is evident on sections of the North Hiawatha trail. Repair work will be done in FY2010 by the snowmobile club through MDNRE snowmobile fund. Approximately ¼ mile of the Wetmore trail was too narrow and represented a safety hazard. Trail widening will be accomplished in 2010 by the club through MDNRE snowmobile fund.

Effectiveness of Management:

Most sections of snowmobile trails not on open system roads are closed to all motor vehicles during the off season months to reduce resource and trail tread damage. Most of the closures are accomplished using gates. On the Rapid River/Manistique Ranger District eight gates were monitored in 2009. Field observations indicated that all of these gates were either vandalized to allow wheeled motor access to the closed trail system, or ORV's circumvented the gates to gain access. Most of these sections of closed trail cross through sensitive soils and wetlands, where severe rutting damages the trail footprint and causes erosion.

The Forest Plan does not allow cross country travel in wilderness and non-motorized management areas in the Forest. Illegal snowmobile use was observed again in 2009 Rock River Canyon Wilderness Area.

In 2009 the Forest continued its long-term partnership with the MDNR and local snowmobile clubs to manage the snowmobile trail system on the Forest.

Evaluation of Monitoring Activities:

Based on the monitoring of snowmobile use on the Hiawatha National Forest, there is no need to revise any of the standards and guidelines.

Monitoring activities continue to detect areas where established trails cause degradation to the areas that they pass through. To date, portions of the Nahma Grade and Murphy Creek trails have been re-routed and the Murphy Creek Trail has been rehabilitated. The trail re-routes have been effective in preventing further damage, and are indicative of successful management. Based on the damage from illegal OHV use to snowmobile trails located in wetlands, the forest will undertake a comprehensive review of the trail system in Schoolcraft and Delta Counties looking for opportunities to move trails to upland sites.

Most of the illegal use on snowmobile trails is by OHVs during the summer months. Snowmobile trail closures to summer OHV use are not always effective in preventing illegal use. While gates and signs are often used to denote closed areas, deliberate illegal use and vandalism is difficult to control. We will emphasize wilderness education to reduce the amount of illegal use in wilderness and other non-motorized areas.

One notable area of illegal snowmobile use is in the Rock River Canyon Wilderness area. Signs have been erected to educate the public of the area's closure to snowmobiles. We will monitor the effectiveness of the Rock River Canyon signage.

Future Monitoring Activities:

The Forest will continue to monitor miles of snowmobile trails using the INFRA data base. Trails passing through wetlands will be monitored to detect resource damage and look for opportunities to re-route trails to upland corridors. We will monitor the effectiveness of closures to OHV use during the summer months. We will monitor the effectiveness of signs posted at Rock River Canyon Wilderness Area for illegal motorized use.

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