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WHITE PINE INITIATIVE

REPORT TO THE MINNESOTA FOREST RESOURCES COUNCIL

By the

Minnesota Department of Natural Resources

Division of Forestry

December 1998

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I. Introduction

This report is prepared pursuant to the commitment made by DNR Commissioner, Rodney Sando, in his letter to the legislature on March 10, 1997. It states:

The DNR is committed to provide a report each year for annual review by the Forest Resources Council on progress in implementing the white pine report's recommendations involving DNR programs and DNR administered lands to the Minnesota Forest Resource Council for inclusion in their biennial report to the legislature.

In addition, it was an agreement in the report of the White Pine Timber Management Planning Public Involvement Process Work Group of August 1997 to provide an annual report to the Forest Resources Council.

DNR provides report each year for Forest Resources Council review on progress in implementing the White Pine Regeneration Strategies Work Group Report recommendations involving DNR programs and DNR-administered lands.

II. Background

For many reasons there are not as many white pine in Minnesota's forests as many people would like. Reasons include:

- Intensive harvesting for lumber from mid-1800s and early 1900s, followed by burning of slash and forest fires.
- Clearing of forest land for agricultural, urban, highway, utility, and other uses.
- Introduction of white pine blister rust disease from Europe in 1916.
- Increased deer populations that feed on white pine.
- Emphasis on managing other tree species because of insect, disease, and deer browsing problems in growing white pine.

Because of widespread concern about the white pine resource in Minnesota, a White Pine Regeneration Strategies Work Group was appointed in 1996 by the DNR to prepare a report to the Minnesota Forest Resources Council and the Department of Natural Resources. The Work Group's December 1996 report, *Minnesota's White Pine, Now and for the Future*, addressed:

- The status of Minnesota's white pine resource and its historical and current occurrence.
- Existing efforts at managing white pine.
- Research needs to address specific concerns about white pine.
- Recommended regeneration and management strategies to increase the role and presence of white pine in Minnesota.

In 1997, the Minnesota legislature appropriated \$1.5 million to begin implementing the recommendations made by the White Pine Regeneration Strategies Work Group. The 1997 Laws of Minnesota, Chapter 216, Section 5, Subdivision 4 states in part:

\$600,000 the first year and \$600,000 the second year are for programs and practices on state, county, and private lands to regenerate and protect Minnesota's white pine. Up to \$280,000 of the appropriation in each year may be used by the commissioner to provide 50 percent matching funds to implement cultural practices for white pine management on nonindustrial private forest lands at rates specified in the Minnesota stewardship incentives program manual. Up to \$150,000 of the appropriation in each year may be used by the commissioner to provide funds to implement cultural practices for white pine management on county-administered lands through grant agreements with individual counties. \$40,000 each year is for a study of the natural regeneration process of white pine. The remainder of the funds in each fiscal year will be available to the commissioner for white pine regeneration and protection on department-administered lands. \$150,000 the first year and \$150,000 the second year is appropriated to the commissioner for a grant to the University of Minnesota's College of Natural Resources for research to reduce the impact of blister rust on Minnesota's white pine.

With this funding, implementation of the work group's recommendations regarding white pine management began on the various land ownerships. This white pine regeneration report provides information on accomplishments.

During the 1997 legislative session, the DNR held discussions with a variety of interest groups to clarify statewide goals for white pine management on DNR lands. These discussions led to a commitment by Commissioner Sando that the public should have input into our white pine timber management planning process. A stakeholder work group made up of representatives from various interest groups was selected by the DNR. The work group met several times and developed a report entitled *Recommendations to Improve Public Involvement in White Pine Timber Management Planning on Minnesota DNR Timber Lands* in August 1997. The Commissioner approved the adoption of the report's recommendations.

In 1998, the Minnesota legislature provided an additional \$600,000 funding for planting and managing white pine and improved public involvement in white pine management planning. The 1998 Laws of Minnesota, Chapter 401, Section 4 states in part:

\$180,000 in fiscal year 1998 and \$120,000 in fiscal year 1999 are for increased public involvement in white pine management planning and to accelerate white pine management on state forest lands. Any amount of this appropriation not used in fiscal year 1998 is available in fiscal year 1999. (Supplemental General Fund)

Chapter 404, Section 7, Subd. 12 states in part:

White Pine Management. For planting of stands of white pine and management of white pine resources. \$300,000 (Bonding)

With strong support from the public, forest industry, and legislature, recommendations by the White Pine Regeneration Strategies Work Group and the White Pine Timber Management Planning Public Involvement Process Work Group are being implemented on forest lands throughout Minnesota.

This report is organized based on recommendations taken out of the White Pine Regeneration Strategies Work Group Report, *Minnesota's White Pine, Now and For the Future*. The recommendations from each section are followed by actions taken since 1997, the beginning of the white pine initiative.

III. Summary - White Pine Initiative

Significant accomplishments were made in Fiscal Year 1998 to increase the amount of white pine in Minnesota through increased white pine management, education, and research. White pine planting increased on all ownership categories in the state. A survey completed in 1996 by the Minnesota Forests Resources Partnership(MFRP) regarding white planting programs on DNR, U.S. Forest Service, county, and forest industry lands indicated that 967,000 white pine seedlings were being planted each year. A 1998 survey of these same forest lands showed that 1,970,000 white pine were planted in 1998 as part of over 2,300,000 seedlings on all ownerships. More white pine were planted as scattered individuals and groups in other forest types resulting in an increase of the extent of white pine across its natural range in the state. The 1996 survey showed that 1405 acres of white pine were planted; in 1998, 5555 acres were planted with white pine.

White pine planting increased on non-industrial private forest(NIPF) lands from a past 5-year average of 353,000 seedlings to 458,000 in 1998, according to state nursery tree order records. Nearly 1500 white pine care kits were distributed through a partnership with Soil Water & Conservation Districts (SWCDs) to private landowners to help them properly plant and care for their white pine. The Minnesota White Pine Cost-Share Incentives Program was developed and available to private landowners to provide 50% matching funds to implement white pine management on their lands. A shortage of seed could threaten increasing state nursery production of white pine seedlings. The MFRP partnered with the DNR last fall in getting the word out on the need for white pine cones, which helped in the collection of 860 bushels, the most collected in the past 10 years.

Bud capping to protect existing white pine regeneration from deer browsing, basal pruning to reduce white pine blister rust infection, and release of seedlings and saplings from competing vegetation were completed by private contractors, Minnesota Conservation Corps(MCC) crews, and volunteers. With additional funding provided in 1998, MCC will be doing significantly more of this follow-up care in FY99. Also, a list of volunteers is being compiled of persons interested in helping care for young white pine. Two groups of Sierra Club volunteers bud capped two sites in Fall 1997.

A State Forest Land White Pine Management Policy was adopted by the DNR that addresses white pine harvesting, protection, old growth, extended rotation forest, regeneration, and inventory management on state forest lands. Harvesting of white pine on state lands has been reduced and evaluation of stands for white pine old growth forest continues. Revisions to the state land forest inventory to account for and map smaller amounts of white pine were also completed.

New and revised technical information regarding white pine was made available to land managers. Information on proper techniques for bud capping and pruning were developed and the DNR's white pine cover type guide was revised for forest managers. A *White Pine Planting and Care Guide* was produced for private landowners; approximately 9,000 have been distributed.

A training session, White Pine Regeneration: Research Findings and Practical Applications, was held twice, with 115 people attending. Other training sessions included information on white pine such as forest health training and ecological classification system(ECS) training. An ECS field key that includes information on white pine regeneration site selection was completed for the Northern Minnesota Drift and Lake Plain Section, and other ECS unit field keys are being developed. Research is in progress on white pine blister rust and natural regeneration processes of white pine as funded by the legislature. In addition, research on deer browsing effects and competition effects on growth and survival of white pine has been conducted by the University of Minnesota. Information regarding white pine management has been made available to the public via press releases, fair displays, presentations, DNR web page, and mailings.

Much has been accomplished across the state on all land ownerships during FY98 towards increasing the amount of white pine in the state and plans for FY99 show that strong efforts in white pine management will continue.

IV. Recommendations and Actions

Planning/Budgeting

1. Recommendation: Set a regeneration goal so that the acreage of white pine stocked with 25 or more trees per acre under 5 inches (dbh) will be doubled from 149,000 acres to 298,000 acres over the next seven years through a combination of fostering natural regeneration and planting. In both natural regeneration and planting systems, there should be appropriate measures to promote growth and protection from pathogens and wildlife browsing for the early critical years.

Action: A State Forest Land White Pine Management Policy Letter was completed on 1-5-98. It states that the overall objective of the white pine initiative is to double the acreage of young white pine on all ownerships within seven years and that this would be the minimum objective for state land. See Appendix B. White Pine Planting on State Forest Lands (1987-99) for the large increase in white pine planting on DNR Forestry lands during FY98 and planned for FY99.

A February 1997 inventory report of state-administered forest lands indicated that there were 14,115 acres where white pine was the main species in a cover type and 108,651 acres where it was found as a component of other forest types. The same report in November 1998 shows 15,709 acres of the white pine cover type, plus 115,719 acres where it is a component. In February 1997, there were 3163 acres of the white pine cover type less than 31 years old and in November 1998, there were 3896 acres, an increase of 23% of this age class in the white pine cover type on DNR forest lands.

A survey was conducted by the Minnesota Forest Resources Partnership in 1996 of white pine planting programs on DNR, 2 national forests, 14 counties, and forest industries lands (Page 35-36, White Pine Regeneration Strategies Work Group Report). A 1998 survey (Appendix A) completed by the DNR showed a large increase in white pine planting on these same ownerships, see figures below. In addition, 930 acres of seeding through natural or artificial regeneration occurred.

Survey Year	White Pine Seedlings Planted	Acres Planted
1996	967,000	1,405
1998	1,969,650	5,555

Appendix A shows FY98 accomplishments on various forest land ownerships in the state. FY98 accomplishments and plans for FY99 show strong efforts by DNR Forestry personnel to promote growth of white pine and protection from white pine blister rust and wildlife browsing on state lands.

State Forest Lands White Pine Management Practice	FY98 Acres	FY99 Acres
Release of existing white pine regeneration	853	336
Thinning to increase growth	61	145
Pruning to prevent white pine blister rust infection	271	615
Bud protection to prevent deer browse damage	632	973
Totals	1817	2069

- 2. Recommendation:** Through the budgeting process, public funding should:
- 1: Target silviculture efforts that favor the survival and development of existing white pine regeneration;
 - 2: Target silvicultural methods that favor establishment of natural regeneration;
 - 3: Target planting, especially in areas with little or no existing white pine.

Action: Funding from the legislature in 1997 and 1998 greatly increased the management efforts in planting and caring for white pine in the state. The 1997 legislation states that funding is provided to implement cultural practices for white pine management on nonindustrial private forest lands and county-administered lands and for white pine regeneration and protection on department-administered lands. The 1998 legislation provides funding to accelerate white pine management on state forest lands and for planting of stands of white pine and management of white pine resources. Following are the budget plans for FY98 and 99:

**WHITE PINE INITIATIVE
Budget Allocation
7-22-98**

Item	FY98 \$\$	FY99 \$\$
Private Lands	150,000	50,000
County Lands	150,000	176,000
DNR Lands	260,000	602,000
Research (Natural Processes)	40,000	40,000
Research (White Pine Blister Rust)	150,000	150,000
Research (Regeneration)		5,000
Seed Procurement		40,000
Coordination, Public Involvement, and Education		113,000
Totals	750,000	1,176,000

1997 Legislation \$1.5MM for FY98-99

1998 Legislation \$300M Supplemental FY98-99 & \$300M Bonding

The State Forest Land White Pine Management Policy letter of January 5, 1998 includes the above listed recommendations for prioritizing white pine management practices. This letter has been distributed to all DNR Division of Forestry, Parks and Recreation, and Wildlife offices.

FY98 accomplishments and FY99 plans for state and county lands show that public funding has increased efforts in caring for existing white pine, planting of white pine, and establishing white pine through natural regeneration. Some of the accomplishments and plans are contained in this report.

3. Recommendation: Each DNR forestry area, state park, major wildlife management unit, and county land department within the range of white pine should set targets to increase the presence of white pine on lands under their administration through a process that incorporates goals set forth in this report.

Action: State-wide meetings of State Land Management Program Foresters and Private Forest Management(PFM) Program Foresters were held to discuss white pine initiative goals. Forestry Areas in the process of completing 5-year Area Forest Resources Management Plans are setting targets to increase the presence of white pine on state lands. Forestry, Wildlife, and Parks Division personnel in the Areas are involved in the process. Counties have been participating in the grant program for funding white pine management. Increased white pine management is occurring because of the renewed interest in growing white pine, funding from the legislature, and the direction to increase the amount of white pine in the state. Also, the Chippewa and Superior National Forests have held meetings to discuss white pine management and to place more emphasis on white pine management, even though they are not included in the state funding.

4. Recommendation: The Department of Natural Resources (DNR) should develop a state-funded incentives program to encourage the establishment and long-term management of white pine on non-industrial private forest (NIPF) lands. This state-funded incentive program should be developed in coordination with the Forest Stewardship Program, and be implemented through Forest Stewardship Plans and Stewardship Incentives Program practices.

Action: Money was appropriated by the 1997 legislature to be used by the commissioner to provide 50 percent matching funds to implement cultural practices for white pine management on non-industrial private lands at rates specified in the Minnesota Stewardship Incentives Program manual.

The Minnesota White Pine Cost-Share Incentives Program administered by DNR Forestry was in place in October 1997. Landowners must have a Forest Stewardship Plan to be eligible for the program. Cost-share practices include white pine site preparation, planting, pruning, protection, and thinning. Practices signed-up for during FY98 include planting of 61,000 seedlings, 69 acres of site preparation, 15 acres of basal pruning, 15 acres of release, and 110 acres of bud capping. Approximately \$17,000 of white pine cost-share funding was requested by private landowners in FY98. Since the requests for white pine funding for private lands were much less than expected in FY98, the amount budgeted for FY99 has been reduced. Approximately 1500 acres of white pine planting occurred as mixed plantings with other species cost-shared under Legislative Commission on Minnesota Resources(LCMR) and Conservation Reserve Program(CRP) cost-share programs.

Based on State Forest Nursery tree seedling sales records, white pine planting on private lands is increasing(does not include seedlings from private nursery orders):

Year	Private Landowner White Pine Seedlings Sold
1994	305,200
1995	351,000
1996	407,800
1997	385,600
1998	458,200

To reach landowners who own smaller parcels of land or who want to plant fewer trees, a partnership with Soil and Water Conservation Districts (SWCDs) was used to distribute White Pine Care Kits to landowners. White Pine Care Kits consist of a *White Pine Planting and Care Guide*, wire flags to mark tree locations, and paper for bud capping the seedlings to prevent deer browsing. The kits were developed to help landowners properly plant and protect their white pine seedlings. One kit was distributed with each order of 25 white pine seedlings sold by the SWCDs. Twenty-two SWCD offices participated and distributed nearly 1500 kits with the 38,000 trees they sold to private landowners.

5. Recommendation: Forest land management organizations should plan harvest schedules or other disturbance regimes and time the establishment of new areas of white pine cover type so that age classes of the white pine resource are distributed more evenly.

Action: DNR Forestry is managing white pine on an extended rotation basis, where the final harvest age will be 150-180 years or more versus 100-120 years. When harvesting in the pine cover types, white pine harvesting will be restricted to thinning, selective harvest, or shelterwood harvest. When harvesting in other forest cover types which contain white pine, adequate seed producing white pine will be retained and treatments carried out to increase white pine regeneration. Elimination of white pine from other cover types will not be permitted. White pine planting has increased in FY98 and FY99.

During Area Forest Resource Management Plan development, other public land administrators are invited to participate in order to be informed of forest management plan activities on state forest lands and for possible coordination of management activities on their respective lands. Increased white pine management and more uniform age class distribution are part of the statewide goals in Area plans.

6. Recommendation: Funding should be made available to county land management organizations actively encouraging the establishment and long-term management of white pine on county-administered lands.

Action: The 1997 legislature appropriated up to \$150,000 each year to provide funds to implement cultural practices for white pine management on county-administered lands through grant agreements with individual counties.

In FY98, 11 or 14 eligible counties participated in the grant contracts totaling \$150,000 for white pine regeneration and management. Approximately \$96,000 was expended during the FY98. Requests for FY99 from 12 counties total \$176,000. The following table shows the acres of white pine management completed during FY98 and plans for FY99.

Management Practice	FY98 Acres Completed	FY99 Acres Planned
White Pine Planting	629 (205,500 seedlings)	833 (416,000 seedlings)
Deer Browse Protection	108	223
White Pine Blister Rust Pruning	350	266
Release	45	126
Site Preparation	489	480

Based on seedling orders through the State Forest Nursery and surveys completed in 1996 and 1998, white pine planting has increased significantly.

Year	County White Pine Seedlings Purchased
1994	45,600
1995	66,300
1996	70,600
1997	40,000
1998	168,000

Note: Additional seedlings are purchased from other sources.

The Minnesota Forest Resource Partnership Survey in August 1996 indicated that counties planted approximately 50,000 white pine seedlings per year. During 1998, the counties reported 205,500 white pine seedlings were planted and plans for 1999 are 416,000 seedlings.

7. Recommendation: An advocate for white pine regeneration should be a participant at DNR goal setting processes designed to set the deer population goal in areas where increased regeneration is desirable.

Action: Memo's were sent out in March-April 1998 by Division of Wildlife and Parks & Recreation Directors to Region, Area, and Parks personnel reminding them to be aware of this recommendation when setting deer population goals. This has been done in some of the state parks. The DNR Section of Wildlife is planning on piloting a public involvement process for deer goal setting sometime in 1999, and is planning on involving a white pine advocate in this process in those areas where it is appropriate.

Management/Regeneration

1. Recommendation: Harvests of white pine in the pine cover types on state-administered lands should be restricted to thinnings, selective harvests, or shelterwood harvests. When harvesting white pine in other forest cover types, the best seed producing white pine will be retained and treatments carried out so as to increase white pine regeneration. These restrictions shall govern planning and timber sale design by managers on state-administered lands until new inventory indicates that the number of white pine trees has doubled from 25.9 to 51.8 million trees on all ownerships. An exception to these restrictions would allow harvest if a tree poses a hazard to the public or has been severely damaged by natural causes.

Action: White Pine Management Policy Letter, dated January 5, 1998, which includes the above recommendation, has been distributed to DNR Forestry, Wildlife, and Parks offices. Also, this recommendation is included in the December 1997 revision of the DNR-Forestry White Pine Cover Type Management Guideline. This revision has been distributed to DNR-Forestry offices, County Land Departments, Chippewa and Superior National Forests, Forest Industry, and others.

This recommendation is included in the Area Forest Resource Management Plan document for those DNR Forestry Areas currently developing their next 5-year harvest plan.

2. Recommendation: Forest land management organizations should be encouraged to reserve the better white pine trees that occur as scattered individuals or in small groups for their seed producing, aesthetic, wildlife, and ecological benefits.

Action: Same as 1. Reserving some scattered white pine from harvest has been occurring on state timber sales for several years. Distribution and distance between seed trees is covered in the management guidelines and has been discussed at training sessions. Information regarding white pine reserved on state land timber sales is being compiled.

3. Recommendation: All white pine on state-administered timber lands should be managed under the DNR's Extended Rotation Forest (ERF) Guideline so as to increase the acreage and distribution of older white pine stands and trees on the landscape.

Action: Same as 1. The minimum extended rotation age for white pine on good sites (Site Index 55-65) is 150 years and on excellent sites (Site Index >65), 180 years is the rotation age for harvest. Previous guidelines suggested rotation ages of 100 to 120 years.

4. Recommendation: White pine should be planted in smaller groups as well as on larger acreages within its range where white pine was once abundant but is now rare or non-existent.

Action: Same as 1. A large part of the increase in acres planted with white pine in FY98 was due to increased planting of white pine in small groups or mixed in plantings of other species. According to the survey of white pine management in the state in 1998, approximately 60 percent of the acres planted with white pine were in small groups or mixed throughout plantings of other species.

5. Recommendation: Managers should enhance natural seeding opportunities through treatments that create proper microsites for seedling establishment near white pine seed trees when natural and man-made disturbances occur. Treatments in the vicinity of seed trees could include mechanical scarification, prescribed burns, or leaving or enhancing the presence of coarse woody debris in advanced stages of decay on the forest floor.

Action: Same as 1. According to the 1998 accomplishment survey, natural seeding management techniques were used on 467 acres. Methods used were seed tree with scarification, seed tree with prescribed burn, and white pine shelterwood system.

6. Recommendation: The DNR should create a forum for resource managers that manage areas reserved from harvest for the purpose of identifying and discussing management techniques, including intensive management practices, to assist in the establishment, regeneration and maintenance of white pine in reserved areas.

Action: Currently, research is being conducted by Lee Frelich, University of Minnesota, on natural regeneration processes of white pine. There are tentative plans to hold a training session regarding natural regeneration of white pine during Fall 1999 which would include research findings to date. A forum will be planned during the next year for resource managers to discuss management of white pine in reserved areas.

7. Recommendation: DNR tree nurseries should expand the procurement of white pine seed native to Minnesota in collaboration with other forest land management agencies and work with private nurseries to grow more white pine adapted to Minnesota's conditions.

Action: With an anticipated good white pine cone crop during August-September 1998, efforts were made to collect cones for a several year supply of white pine seed. \$40,000 of white pine initiative monies was budgeted to purchase 2000 bushel of cones. The Minnesota Forest Resources Partnership assisted with getting the word out to the public regarding cone collection via statewide news releases and letters to its member organizations.

With the hot, dry late August and early September, the white pine cones ripened fast, opened, and released their seed sooner than normal. Also, cone borer insects were widespread affecting cone production and the cone crop was variable in the state, ranging from few cones in some areas to many cones on some sites. Even with the abbreviated cone collection period, 860 bushels of cones, the most white pine cones collected in the last 10 years, were collected and delivered to the state nursery. The estimated 500 pounds of seed which will be extracted from these cones along with 150 pounds of seed to be purchased from a private seed producer and the 200 pounds of seed in storage should meet the state nursery white pine seed needs for a 2 - 3 year period. Efforts will continue in 1999 to increase the nursery supply of white pine seed.

The DNR State Forest Nursery sold out its supply of white pine seedlings(1.13 million) for Spring 1998 planting orders. An additional 350,000 seedlings were procured from Michigan(250,000 - Oconto River Seed Orchard) and Wisconsin(100,000) which were of seed sources suitable for planting in Minnesota. As of November 1998, about 1.3 million white pine seedlings have been sold by the state forest nursery for planting in Spring 1999. Private tree nurseries have been contacted regarding availability of white pine seedlings and referrals are being made to them for seedling purchases. White pine seedling production is on an upward trend at the DNR tree nursery with the increasing demand for white pine.(See the following table.)

White Pine Seedlings (3-year old) Minnesota State Forest Nursery Production	
Year	Seedling Production
1996	851,000
1997	1,119,000
1998	1,130,600
1999	1,276,600
2000	1,000,000*
2001	1,500,000
2002	1,700,000

*Heavy rains caused loss of seed planted in 1997.
Years 2000-2002 production estimated.

8. Recommendation: The DNR should protect (maintain) selected stands of white pine greater than 20 acres in size in various age classes on state-administered lands to provide for future old growth. Limited harvesting for sanitation and maintenance may be allowed in some of the selected stands to help perpetuate the life of the stand and promote regeneration. Resource managers on federal and county-administered lands are encouraged to also follow this recommendation.

Action: Evaluation and selection of forest stands for white pine future old growth continues throughout the state on DNR-administered lands. As of November 1998, approximately 4000 acres of potential future old growth stands with white pine less than 120 years old have been identified for evaluation. Federal and county forest personnel have been participating in DNR Area Forest Resource Management Plans during 1998 and efforts have been made to work together in protecting and/or managing older white pine stands on adjacent public land ownerships.

9. Recommendation: The DNR should protect (maintain) older white pine stands greater than 20 acres in size so that approximately 25 percent of the acreage of these older and larger stands exceeds 120 years of age on state-administered lands. Fifty percent of the acreage of these stands older than 120 years should be maintained as old growth. Resource managers on federal and county-administered lands are encouraged to also follow this recommendation.

Action: According to CSA state land inventory records, there are 2135 acres, including stands less than 20 acres in size, of the white pine cover type greater than 120 years old on state-administered lands. This is about 13% of the total white pine cover type on state lands. DNR Forestry policy is to manage white pine on an extended rotation forest(ERF) basis where the final harvest age is 150-180 years old, so white pine stands available for harvest will be managed to an older age.

Evaluation and selection of forest stands for white pine old growth forest continues throughout the state on DNR-administered lands. As of November 1998, over 900 acres of old growth white pine stands have been identified to be reserved or evaluated. Landscape teams from 3 ecological classification system(ECS) subsections, Littlefork-Vermilion Uplands, Pine Moraines, and Blufflands Subsections will meet this winter to select evaluated stands for old growth designation. Federal and county forest personnel have been participating in DNR Area Forest Resource Management Plans during 1998 and efforts have been made to work together in protecting and/or managing old growth white pine stands on adjacent public land ownerships.

10. Recommendation: The Commissioner of Natural Resources, in cooperation with stakeholders should create a pilot project to identify blocks of state lands in management units of the Outdoor Recreation Act (e.g. state forest, state park) where deer density would be reduced for the short term (5-7 years) to allow white pine regeneration to out-grow the reach of the deer.

Action: Discussions have taken place with wildlife staff and some state parks are actively reducing deer populations for this purpose. The severe winters in 1995-96 and 1996-97 reduced deer populations by 50% or more in much of the northern third of the state, and it is expected that recovery will take 5-10 years in some hard hit areas. This should make identification of specific pilot areas less necessary in the short term.

11. Recommendation: Resource managers should increase the use of prescribed surface fires to regenerate white pine on reserved and commercial forest land.

Action: According to the 1998 survey on white pine management in the state(See Appendix A), prescribed burning was used on 875 acres in FY98 to promote white pine regeneration. Of this amount, 313 acres were completed on state-administered lands. In the FY99 work plan for state lands regarding white pine management, an estimated 955 acres of prescribed burning for natural seeding or site preparation for white pine are planned.

12. Recommendation: The Minnesota Conservation Corps (MCC) should be utilized as a partner in conducting management activities that will promote the presence of white pine. For the next few years, a significant portion of the MCC's time should be devoted to projects directly related to increasing the presence of white pine on the landscape.

Action: Funding from the 1998 legislature made it possible to greatly increase the amount of white pine management activities that MCC could accomplish on state lands. Over \$115,000 is budgeted in FY99 for MCC work on white pine management. Activities include 500 acres of protecting white pine from deer browsing, 570 acres of basal pruning for white pine blister rust disease protection, 180 acres of release of white pine from competing vegetation, 100 acres of prescribed burning, 80 acres of tree planting, 50 acres of thinning young plantations, and 15,000 acres of forest inventory work.

Education/Training

1. Recommendation: A "Silvicultural Guide" should be developed to recommend the care and management of white pine.

Guidelines should address the variety of landowners and land classifications in Minnesota (e.g. parks; natural areas; private, county, state, and federal ownerships). The following must be included in this guide:

- Focus and emphasis should be placed on the importance of care and management practices of white pine after regeneration and establishment. Follow-up practices ensuring the establishment of seedlings by release from competing vegetation should be suggested.
- Emphasis must be placed on the range of difficulty of establishing white pine from one type of site to another; information must be given on what prescriptions are necessary on each site.
- Additional management options, site analysis considerations, and cultural practices should be included.

Action: A revised silvicultural guide, *White Pine Cover Type Management Guideline*, was developed based on recommendations found in the White Pine Regeneration Strategies Work Group Report. It is a part of the DNR-Forestry's Forest Development Manual. It was distributed to DNR forestry offices in February 1998 and copies of the guideline were sent to counties, national forests, and forest industries in Minnesota.

The *White Pine Planting and Care Guide* was completed in January 1998. It was written for general public use. This guide covers site selection, planting, and follow-up care of white pine.

Silviculture field tip sheets have been revised and developed regarding care of white pine. The field tip sheet, *Protect Pine Tree Seedlings From Deer Browsing With Paper Bud Caps*, was revised in July 1997. The field tip, *White Pine: How to Prune for Blister Rust*, was completed in January 1998. These tip sheets provide detailed descriptions, diagrams, and photos of protecting white pine by bud capping and pruning.

An Ecological Classification System(ECS) field key for the Northern Minnesota Drift and Lake Plain Section contains information for identifying sites suitable for white pine and aids in predicting difficulty to establish white pine regeneration on various sites. Training sessions were held in June 1998. Handbooks and keys for other sections are being worked on.

Silviculture training, *White Pine Regeneration: Research Findings and Practical Applications Workshop*, was held in June and October 1998. Handouts included the above information and information on new research findings on regenerating white pine was presented.

A white pine bibliography on diskette, containing 548 citations on white pine regeneration topics with more than 450 abstracts, was distributed to all DNR Forestry Areas in July 1997.

The Chippewa National Forest distributed a *White Pine Source Book*, a 3-ring binder with a collection of white pine research papers, at a workshop in October 1997.

2. Recommendation: Develop a continuing education program for foresters that explains and demonstrates management techniques that can increase the presence of white pine. This program needs to teach how to take advantage of, and enhance natural regeneration opportunities as well as incorporate artificial processes (e.g. site preparation work, prescribed burns, planting). A similar program should also be available to all forest landowner groups and timber harvesters. These programs should consider the development of areas that demonstrate regeneration and management techniques.

Action: Several white pine training sessions and field tours were held during FY98. During September 1997, approximately 40 people attended a field tour of white pine management near Eveleth sponsored by the DNR Forestry Employees Association. In October 1997, the U.S. Forest Service held a white pine workshop at Walker that 50 people attended. Several white pine sites on the Chippewa National Forest were visited. During June in Cloquet and October in Grand Rapids, a training session called White Pine Regeneration: Research Findings and Practical Applications was held. It included information on the ecological history of white pine in Minnesota and how ECS keys can be useful in growing white pine, insect and disease management, and current white pine regeneration research by Dr. Klaus Puettmann and graduate students from the University of Minnesota. The research addressed deer browsing and the effects of competition on the growth and survival of white pine. A total of 115 resource managers attended from federal, state, county, and tribal agencies and forest industries besides the public. ECS training sessions included information on using field keys and handbooks for site selection in planting white pine. Forest pest training sessions included information on insects and disease problems in growing white pine. During 1999, a summer field tour of white pine management in the Brainerd Area and a fall workshop on natural regeneration processes of white pine based on research under the direction of Dr. Lee Frelich are planned. Also, a workshop on the use of prescribed burning for white pine management will be planned in the future.

3. Recommendation: Educational materials should be developed for non-industrial private forest landowners that describe white pine ecology, values, and silviculture, and that encourage landowners to regenerate and manage white pine on appropriate sites. These materials should reveal the numerous opportunities and scientific data available to make white pine regeneration a success. These materials should emphasize that the success will depend on commitment and follow-up treatments. There should be active promotion for white pine management in "stewardship plans" on appropriate sites.

Action: The *White Pine Planting and Care Guide* was published in January 1998. It is a guide for private landowners designed to provide the public with tips and information on how to successfully plant and protect white pine seedlings. Over 9000 have been distributed as of November 1998. It is also on the DNR Web site. Approximately 1500 White Pine Care Kits were provided to private landowners through a partnership with SWCDs. These kits included the care guide, wire flags for marking tree locations, and budcaps for follow-up care to prevent deer browsing. Also, a care kit was included in most of the state nursery private landowner seedling orders that included white pine.

Woodland Stewardship Plans now include the silvicultural field tip sheets on bud capping and pruning for white pine blister rust prevention. Increased white pine planting has been encouraged at Private Forest Management(PFM) Foresters annual meetings and there is a cost-share program in place for planting and caring for white pine. A Woodland Stewardship Plan and a project plan is required for cost-share funding.

4. Recommendations: The DNR should prepare a brief key that can be used by resource managers to identify potential sites for white pine management that currently lack a white pine component.

Action: Field keys to forested native plant communities in Minnesota are being developed. In June 1998, a field key for the Northern Minnesota Drift & Lake Plain Section was completed. Two training sessions were held in June at Deep Portage and workshops were conducted in Bemidji, Pequot Lakes, Hill City, and Aitkin Forestry Areas and Bemidji State Park during the summer.

5. Recommendation: Establish an "Adopt Young White Pines" program that provides education, training, and recognition to any individual, family, or organized group that adopts a young white pine site managed by participating public forest land management agencies and that agrees to apply cultural practices that will protect young pine from pest problems during their early critical years.

Action: During Fall 1997, two groups of Sierra Club volunteers completed bud capping projects on state land. A 14-acre site near Onamia had 26 volunteers in 1997 and 25 - 30 volunteers from the Sierra Club and Audubon Society completed the site again in Fall 1998. A 4-acre site was completed in the Lewiston Area by about 15 Sierra Club volunteers during Fall 1997. Volunteer opportunities for caring for white pine have been advertised at open house meetings for public input into Area Forest Resource Management Plans, in the DNR Volunteer Opportunities newsletter (Spring, Summer, and Fall 1998 issues), and *DiaLogue*, the school forest newsletter. As of November, 17 people have responded to the DNR newsletter ads and have volunteered to help care for white pine. The majority are from the Metro area and are willing to work in the vicinity of the Metro area. A mailing list will be made and volunteer opportunities will be passed on to the list of people.

Research

1. Recommendation: Research should be funded to address the following questions concerning white-tailed deer:

1. Determine the extent of deer browsing that will kill or retard seedling growth enough that it will lose its competitive edge.
2. Determine whether there is a threshold in patch/plantation size and/or seedling densities at which deer browsing will not prevent sufficient stocking levels to occur.
3. Determine whether there are specific "habitat types" in which white pine is less likely to be browsed.
4. Determine deer palatability as it relates to seed source and type of planting stock.

Action: A research project and manuscript, *Use of Vegetational Characteristics and Browsing Patterns to Predict Deer Damage in Eastern White Pine Plantations*, was completed by Mike R. Saunders and Klaus J. Puettmann, University of Minnesota, Department of Forest Resources during 1998. A number of oral and poster presentations have been based on this research project. Funding was through the Iron Range Resources & Rehabilitation Board (IRRRB), Minnesota DNR, and St. Louis County Land Department.

Also research by Saunders and Puettmann, includes the response of white pine seedlings to deer browsing intensity and frequency where white pine seedlings were clipped to simulate deer browsing under a range of growing conditions.

2. Recommendation: Research efforts should be funded to refine management and harvesting practices that improves the cost effectiveness of regeneration, and expansion of white pine from individual trees, clusters or stands.

Action: A research project and manuscript, *The Response of White Pine Seedlings to Weeding in Shelterwood Treatments*, was completed in 1998 by Mathew F. Smidt, Klaus J. Puettmann, and Matthew D. Duvall. This research looked at the response of white pine seedlings to overstory and understory competition. Other white pine research under the direction of Dr. Puettmann includes the importance of above and below ground competition on white pine seedling growth and survival. Funding was from the IRRRB, St. Louis County, Itasca County, and the Minnesota DNR.

3. Recommendation: Research should be funded to address the following concerns with blister rust in the State of Minnesota.

- Investigate methods of predicting site specific blister rust impacts: Where will severe impacts be likely and, therefore, where will management of white pine be difficult.
- Develop management tools and techniques that can be utilized in Minnesota to reduce the impact of blister rust.

Action: The 1997 Legislature provided funding for white pine blister rust research. A literature review on site specific blister rust incidence was conducted with research grant monies to the University of Minnesota. A follow-up project would use FIA data to more narrowly define site characteristics and rust incidence. See Appendix C for a more detailed account of blister rust related research..

White pine and insect and disease training sessions held during the last year included information on environmental factors affecting the distribution and severity of blister rust, hazard zones and their basis, and micro-scale factors favoring blister rust infection. Management/control methods for white pine blister rust were presented including site selection, Ribes eradication, understory planting, basal pruning, and resistant planting stock.

The DNR Silviculture Field Tip, *White Pine: How to Prune for Blister Rust* was printed in January 1998 has been widely distributed to foresters and private landowners. Also, site selection and blister rust control information is included in the *White Pine Planting and Care Guide*.

4. Recommendation: Funding should be provided to develop genetic improvement in growth rates and blister rust resistance in white pine.

Action: The 1997 Legislature provided \$150,000 in FY98 and \$150,000 in FY99 in grants to the University of Minnesota's College of Natural Resources for research to reduce the impact of blister rust on Minnesota's white pine. Research work in progress includes: flower induction on young grafted material; early screening for blister rust susceptibility; histological characterization of rust resistance mechanisms, salvage and measurement of Ahlgren's advanced generation plantings, and genetic improvement projects for improved growth rates. See Appendix C, Research to Reduce the Impact of White Pine Blister Rust Progress Report.

Genetic improvement projects require many years of project work and continued funding is needed.

5. Recommendation: Research should be funded to study the regeneration processes that occur in old growth stands (as defined by the Minnesota Department of Natural Resources) where white pine is an important component.

Action: The 1997 Legislature provided \$40,000 for each of FY98 and 99 for a study of the natural regeneration process of white pine. This money was granted by the DNR to the University of Minnesota, College of Natural Resources. Research projects under the direction of Lee Frelich are in progress. These projects are: (1) effects of seed rain as a limitation on white pine regeneration in northern Minnesota and (2) the interrelationship between biodiversity and success of white pine regeneration. A renewal of grant monies next year would allow a third project, comparing the effects of fire and logging on success of white pine regeneration, to take place.

6. Recommendation: An economic analysis should be conducted to gauge the potential benefit of intensively managing white pine under three situations: white pine stands, white pine as a component of other forest types, and where white pine is currently not present. The analysis should take into account different risk factors (e.g. blister rust hazard zones) and include costs associated with the long-term care required to grow white pine.

Action: No action yet.

The DNR Forest Development Module through its Stand History Report provides a summary of all the work done on a stand, including costs, as well as a summary of all of the regeneration surveys completed. It is a summary of the silviculture applied to a stand and the efficacy and cost of that silviculture. This data could be used in analyzing the costs of growing white pine on state lands.

Inventory/Monitoring

1. Recommendation: Forest land management organizations should develop ecological classification systems that have utility for managing white pine at the field level and that address plant community dynamics.

Action: Federal, state, and county forest land management agencies and forest industries have all been working on developing ecological classification systems for managing forests. In June 1998, DNR Forestry completed its first handbook and field key to forested native plant communities. The key and the Ecological Land Classification Handbook for the Northern Minnesota Drift & Lake Plains and the Chippewa National Forest was completed and training was conducted in June and throughout the summer. The handbook includes information on each native plant community regarding observed presence and abundance of white pine in the canopy of mature forests, estimated ability of white pine seedlings and saplings to reach the canopy with minimal silvicultural activities, and competing vegetation expressed as a percent of all plant species in a community with greater cover or abundance than white pine trees. Handbooks and keys for each of the ECS sections in the state will be completed over the next few years.

2. Recommendation: The Department of Natural Resources should develop a comprehensive monitoring program to evaluate the effectiveness of managing for white pine at the stand level. The program should be designed to select relevant sites through a stratified random sampling process. It should also include field audits similar to those used in the Best Management Practices to Protect Water Quality program.

Action: No action on BMP type audits yet, to be initiated in 1999.

Changes have been made to the Cooperative Stand Assessment(CSA) inventory in response to state land white pine management objectives. White pine cover types will be mapped down to a stand size of 1/2 acre and white pine clusters(less than 1/2 acre) can be identified by a "wp" symbol on CSA inventory township maps. This will help in better locating small white pine stands for follow-up regeneration surveys and management work. State forest land plantations currently have regeneration surveys conducted at 1, 3, 5, and 10 years after planting or artificial seeding. Additional stand visits may occur based on need and timing of follow-up care.

3. Recommendation: The Annual Forest Inventory System (AFIS) should be used to the extent possible in assessing the condition of the white pine resource and monitoring progress towards goals.

Action: No action yet. AFIS, which was based on a combination of re-measuring permanent inventory plots that had some type of disturbance and undisturbed plots is now being replaced by an annual inventory where a percentage of established inventory plots are visited each year. This change will capture underplantings of white pine, natural regeneration, and selective harvests which would have been difficult to detect based on a stand disturbance basis. The annual inventories of Forest Inventory Analysis(FIA) plots will be used to the extent possible along with additional information provided by the various forest landowners in the state in reports, such as Appendix A, and through stand based forest inventory records to monitor progress towards goals.

V. Summary - Public Involvement in Area Forest Resources Management Plans

Six DNR Forestry Areas began their Area Forest Resources Management Plans in 1998(See Page 21). An open house was held in January in St. Paul to allow the public from the Metro area to have a better opportunity to be informed of white pine management planning occurring on state forest lands during the coming year. Assessment and Goals Documents for the Detroit Lakes, Two Harbors, Aitkin, Hill City, Cambridge, and North Metro(Carlos Avery) provided information on the white pine resource and management activities in each of the Areas. These were available to the public and public comments were encouraged. Approximately 40 people attended the Metro open house. Similar meetings were held for the local public in the Areas with 10 to 15 people attending each of the 4 open houses held. Draft plans are in the process of being completed. Two Harbors and Detroit Lakes Areas draft plans should be completed in December 1998 or January 1999 with public involvement meetings to follow. Few written comments were received after the initial public involvement meetings. From the meetings held, there were favorable responses from attendees for having informational and input meetings regarding white pine management planning. It is expected that there will be more public input after the draft plans are published.

A follow-up meeting with the White Pine Public Involvement Process Work Group was held in September 1998. The meeting, as recommended in the work group report, was held to evaluate DNR's progress in implementing the recommendations in the work group report. Comments were received from participants regarding improvements to the process. Concerns dealt mainly with informing local and statewide public of local public involvement meetings via more methods and earlier and being more consistent in the information provided in the plans and more understandable to the general public. Comments were based on the Area Assessment and Goals Documents from January since no draft plans have been completed yet. The recommendations are being followed in the draft plans. Overall, the work group meeting participants felt the DNR was making good on their commitment to improve the public's involvement in Area plans regarding white pine management. No additional work group meetings are planned. See the final meeting report prepared by consultant Mirja Hanson, Appendix D.

VI. Area Forest Resources Management Plans Schedule for 1998-99* - Revised 12/4/98

<u>Forestry Area</u>	<u>Local Open House</u>	<u>Publish Draft Plan</u>	<u>Public Meeting</u>	<u>Finalize Plan</u>
Detroit Lakes	2/5/98	Dec 98 - Jan 99	Jan or Feb 99	April 99
Two Harbors	2/10/98	Dec 98	Jan or Feb 99	Mar-Apr 99
North Metro (Carlos Avery WMA)	3/17/98	Jan 99	Feb or Mar 99	May 99
Aitkin & Hill City	3/18/98	Feb 99	Mar 99	May 99
Cambridge	Planning process delayed until completion of update of forest inventory in the Cambridge Area, possibly Summer 1999.			

***Dates are subject to change.** Local meetings were advertised in the local newspapers and organizations or public who have indicated an interest in meeting dates were contacted. An open house was held for the Metro area public at the Ramada Inn in St. Paul on 1/28/98 from 2 pm to 8 pm. All six DNR Forestry Areas had a forester or wildlife manager present to answer questions and provide information about their Area. Some Regional Program Coordinators were also in attendance. A White Pine Goals and Assessment Document for each of the Areas was available to the public to provide information about the Area, the white pine resource, and DNR forest resources management. Also, maps were on display regarding white pine in Minnesota and the 6 Forestry Areas. Approximately 40 people attended.

Detroit Lakes Open House - 2/5/98 - Approximately 15 people attended.

Two Harbors Open House - 2/10/98 - Approximately 15 people attended.

North Metro(CAWMA) Open House @ Forest Lake - 3/17/98 - 12 people attended.

Aitkin/Hill City Areas Open House @ McGregor - 3/18/98 - Presentation on white pine given to Aitkin County Forest Advisory Committee, 10 members. 0 attended the open house.

As of 12/98, there have been few written comments submitted after the initial meetings. From the meetings held, there have been favorable responses from attendees for having informational and input meetings to white pine management planning. More public input and responses are expected after the draft plans are published.

During 1999, additional Area Forest Resource Management Plans are planned to begin. At this time, it is anticipated that these plans will be moving towards more of a landscape level approach based on ECS boundaries. In Region V (Southeast), the R. J. Dorer State Forest will be done as a unit. The Border Lakes and Littlefork-Vermilion Subsections in Region II (Northeast) will involve Area planning efforts in Grand Marais, Orr, and Tower Areas. In Region I (Northwest), the Wannaska Area plan may be scheduled to begin by Fall 1999.

White Pine
Regeneration and Management
Accomplishments
on
Minnesota Forest Lands
during
Fiscal Year 1998
(July 1, 1997 - June 30, 1998)

Foreword

The information in this report is based on survey responses received from forest land managers regarding white pine regeneration and management accomplishments that were completed during the period July 1, 1997 to June 30, 1998 (State Fiscal Year 98). A White Pine Regeneration and Management Accomplishment Report was sent to the following forest land managers in the state: DNR Forestry, Parks, and Wildlife Divisions, County Land Departments, U.S. Forest Service National Forests, Voyageurs National Park, Tribal Agencies, and Forest Industry. Non-industrial Private Forest Land data is based on information provided by DNR Private Forest Management(PFM) Program Foresters and the Minnesota State Forest Nursery. This report includes data only from surveys returned, so there is probably additional white pine regeneration and management work occurring in the state beyond what is in the report. Also, the report does not include regeneration from white pine reserved on a harvested site where there was no follow-up site preparation to enhance white pine seeding success. Thanks to everyone that returned the survey and provided information for this report.

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FY98 Acres of White Pine Planted by Ownership and Type of Planting and Trees Planted

<u>Land Ownership</u>	<u>Main Species</u>	<u>Underplanting</u>	<u>Small Groups</u>	<u>Mixed Species (%)</u>	<u>Total Acres</u>	<u>White Pine Seedlings Planted</u>
DNR-FORESTRY	445	242	66	1558 (18%)	2311	738550
DNR-PARKS	2	33	2	0	37	7100
COUNTY	65	196	22	346 (23%)	629	205500
US FOREST SERVICE	1537	201	90	550 (36%)	2378	858500
TRIBAL (BOIS FORTE)	15	0	0	0	15	15000
INDUSTRY (RAJALA)	0	200	0	0	200	160000
PRIVATE LANDS (PFM)	86	46	36	1617 (19%)	1785	304100
PRIVATE LANDS (SWCD)	0	0	75	0	75	37800
<u>Grand Total:</u>	2150	918	291	4071	7430	2,326,550

Data is based on survey responses received from land managers regarding white pine regeneration and management accomplishments during the period of July 1, 1997 to June 30, 1998 (FY98) and DNR tree nursery records. Private Lands (PFM) data is from DNR Private Forest Management (PFM) Program Foresters. Private Lands (SWCD) data based on Soil Water Conservation District (SWCD) state nursery tree orders and the 1493 White Pine Care Kits they distributed.

Main Species: Planting where white pine is the main tree species planted on the site, greater than 50% white pine.

Underplanting: White pine planted under an existing tree canopy where stand density is or has been reduced to a level which allows sufficient sunlight for seedling growth.

Small Groups: Planting of small groups of white pine on favorable sites within other species plantations.

Mixed Species: White pine planted scattered throughout the site in mixed species plantings where white pine is not the main species. (%) is the average percent of white pine included in these mixed species plantations.

FY98 White Pine Seeding by Ownership and Method - Natural and Artificial - Acres

<u>Land Ownership</u>	<u>Natural Seeding</u>			<u>Artificial Seeding</u>	
	<u>Seed Tree with Scarification</u>	<u>Seed Tree with Prescribed Burn</u>	<u>Shelterwood</u>	<u>Aerial Seeding</u>	<u>Hand Seeding</u>
DNR-FORESTRY	47	2	48	477	10
DNR-PARKS	4	156	0	0	0
COUNTY	10	0	0	0	0
US FOREST SERVICE	111	69	0	0	0
TRIBAL(BOIS FORTE)	20	0	0	0	0
Total by Method:	192	227	48	477	10
		Total Natural Seeding:	467	Total Artificial Seeding:	487

Natural seeding figures include only those acres where some method of site preparation or timber harvest has occurred for the purpose of regenerating white pine from reserved white pine on the site. It does not include seeding from scattered white pine reserved on harvested sites with no follow-up site preparation or soil scarification.

Data is based on survey responses received from land managers regarding white pine regeneration and management accomplishments during the period of July 1, 1997 to June 30, 1998 (FY98).

Seed tree with scarification: scarification or exposure of mineral soil around white pine seed trees to provide a good seedbed for seeds to germinate and grow. White pine seed trees have been reserved from harvest in a timber sale area or scarification was performed around scattered white pine trees in an unharvested area.

Seed tree with prescribed burn: prescribed fire used to reduce forest floor vegetation, litter, and duff layer to provide a good seedbed for seeds to germinate and grow. White pine seed trees may have been reserved from harvest in a timber sale area or prescribed burning was performed on a site with scattered white pine trees in an unharvested area.

Shelterwood: a partial harvest, resembling a thinning, in which trees on a harvest area are removed in a series of two or more cuttings to allow the establishment and early growth of seedlings under partial shade and protection of older trees.

Aerial seeding: distributing white pine seed from a helicopter equipped with a seeder on a site where timber harvest, site preparation, or a natural disturbance such as a wildfire or windstorm has occurred.

Hand seeding: distribution of white pine seed, usually on small acreages, by means of a hand seeder.

FY98 White Pine Deer Browse Protection and Blister Rust Control Pruning - Acres

<u>Land Ownership</u>	<u>Bud capping</u>	<u>Tree Shelters</u>	<u>Wire Cage</u>	<u>Deer Enclosure</u>	<u>WPBR Pruning</u>
DNR-FORESTRY	632	0	0	0	271
DNR- PARKS	39	27	17	7	30
COUNTY	93	15	0	0	350
US FOREST SERVICE	50	0	0	0	335
TRIBAL (BOIS FORTE)	0	0	0	0	150
INDUSTRY (RAJALA)	600	0	0	0	0
PRIVATE (PFM)	30	2	0	0	18
Total by Method:	1444	44	17	7	1154

Total acres of deer browse protection: 1512

Data is based on survey responses received from land managers regarding white pine regeneration and management accomplishments during the period of July 1, 1997 to June 30, 1998 (FY98). Private(PFM) data is from DNR Private Forest Management(PFM) Program Foresters.

Bud capping: A piece of paper wrapped and stapled around the terminal leader and bud of a seedling to deter deer from browsing the bud. Where deer browsing is a hazard, bud caps should be reapplied every fall until the tree is at least 4 feet tall and out of easy reach of deer.

Tree shelters: A biodegradable plastic tube or a mesh tube installed around each seedling to protect the tree from browsing for several years.

Wire cage: A wire fence installed around each seedling to protect the tree from browsing for many years.

Deer enclosure: A wire fence installed around a plantation or acres of trees to protect the seedlings from deer browsing.

WPBR pruning: Pruning off of the lower one-third of the branches on white pine to reduce the chance of infection by white pine blister rust (WPBR) disease.

FY98 White Pine Timber Stand Improvement - Release and Thinning by Ownership - Acres

<u>Land Ownership</u>	<u>Hand or Mechanical Release</u>	<u>Ground Herbicide Release</u>	<u>Aerial Herbicide Release</u>	<u>Thinning</u>
DNR-FORESTRY	713	55	85	61
DNR-PARKS	9	9	0	11
COUNTY	21	0	24	0
US FOREST SERVICE	484	0	0	0
TRIBAL (BOIS FORTE)	20	0	0	0
INDUSTRY (RAJALA)	200	0	0	0
PRIVATE LANDS (PFM)	14	20	0	32
Totals:	1461	84	109	104
Total Acres of Release:			1654	

Data is based on survey responses received from land managers regarding white pine regeneration and management accomplishments during the period of July 1, 1997 to June 30, 1998. Private Lands (PFM) data is from DNR Private Forest Management(PFM) Program Foresters.

Timber Stand Improvement: Timber stand management practices designed to produce improved forest crops, including thinning, pruning, and the release of crop trees from competing vegetation.

Release: To free young trees from competing vegetation that is overtopping or closely surrounding them by cutting or otherwise removing or killing nearby vegetation and branches.

Hand or Mechanical Release: Cutting of competing vegetation by use of hand tools, brush saws, chainsaws, or other mechanical equipment.

Ground Herbicide Release: Killing of competing vegetation by use of herbicides applied by use of a hand or backpack sprayer, applicator, or injector or by broadcast spraying equipment on the ground.

Aerial Herbicide Release: Killing of competing vegetation by use of herbicides applied aerially from a helicopter equipped with a spray boom.

Thinning: Removal of some of the trees in an overstocked stand to give the remaining trees adequate room for good growth.

FY98 White Pine Site Preparation by Ownership and Method - Acres

<u>Land Ownership</u>	<u>Hand Methods</u>	<u>Prescribed Burn</u>	<u>Trench, Furrow, or Patch</u>	<u>Rake or Shear Blade</u>	<u>Disking</u>	<u>Other Methods</u>	<u>Herbicide & Disc Trench</u>	<u>Herbicide</u>
DNR-FORESTRY	36	147	221	539	5	37	455	189
DNR-PARKS	2	166	0	0	0	1	0	0
COUNTY	0	0	35	174	6	17	232	25
U S FOREST SERVICE	0	482	923	78	0	0	0	0
NAT'L PARK SERVICE	0	80	0	0	0	0	0	0
TRIBAL (BOIS FORTE)	0	0	0	20	0	0	0	0
INDUSTRY (RAJALA)	0	0	0	200	0	0	0	200
PRIVATE (PFM)	10	0	34	0	68	76	0	85
Total by method:	48	875	1213	1011	79	131	687	499

Total acres of site preparation: 4543

Data is based on survey responses received from land managers regarding white pine regeneration and management accomplishments during the period of July 1, 1997 to June 30, 1998. Private Lands (PFM) data is from DNR Private Forest Management(PFM) Program Foresters.

Site Preparation: Treatment of a site to remove, reduce, redistribute, or pile unwanted vegetation and other material , and to cultivate or prepare the soil for tree seedling planting or seeding.

Hand Methods: Hand or manual methods of site preparation by use of hand tools, brush saws, or chainsaws.

Prescribed burn: Use of a planned fire on a site to reduce, set back, or eliminate forest floor vegetation, logging slash, or duff.

Trench, Furrow, or Patch: Exposing mineral soil and clearing woody debris and ground vegetation in narrow strips or patches by use of equipment such as a disc trencher, V-plow, or patch scarifier.

Rake or Shear Blade: Site preparation where logging slash is piled by use of a brush or rock rake or the shearing and windrow piling of undesirable vegetation to reduce competition and prepare a clean site for planting or seeding.

Disking: Use of a heavy harrow with large discs on a site to eliminate competing vegetation.

Other Methods: Miscellaneous methods used for site preparation such as brush mowing, anchor chain, small dozer, logging, or cover crop.

Herbicide & Disc Trench: Using a combination of herbicide application and disc trencher to prepare a site for planting or seeding.

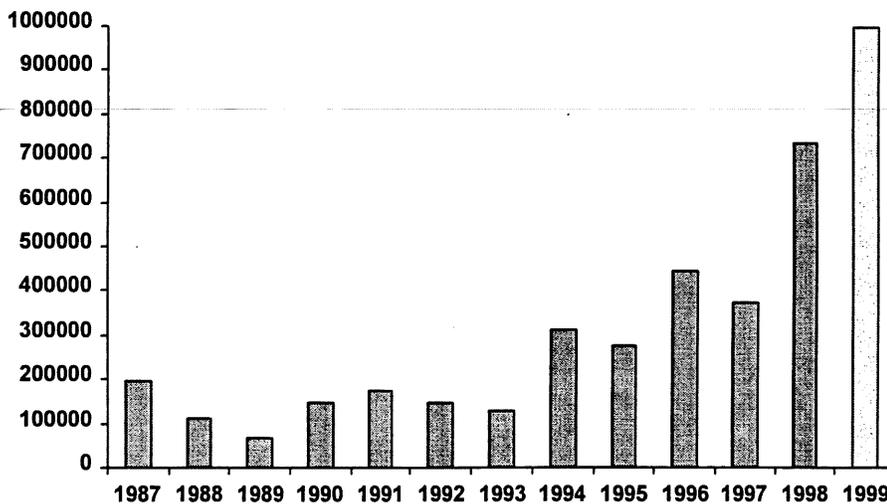
Herbicide: Use of herbicides to kill vegetation that would compete with seedling survival and growth. Applied by ground equipment or helicopter.

Appendix B

White Pine Planting on State Forest Lands (1987-99)

Year	Bareroot Seedlings	Containerized Seedlings	Total White Pine Planted	Total Acres Planted
1987	107,600	87,900	195,500	200
1988	112,200	0	112,200	100
1989	65,900	0	65,900	100
1990	145,900	0	145,900	200
1991	173,500	0	173,500	200
1992	129,100	20,000	149,100	200
1993	113,100	18,400	131,500	100
1994	172,300	141,500	313,800	300
1995	181,200	96,800	278,000	300
1996	350,100	97,000	447,100	500
1997	323,100	51,900	375,000	400
1998	644,150	94,400	738,550	2,310
1999	860,600	139,000	999,600	1,982
Totals:	3,378,750	746,900	4,125,650	6,892

White Pine Planting 1987-99



1987-97 acres estimated. 1998-99 acres include white pine as a main species in a plantation, planting white pine in an understory, small patches or inclusions of white pine in other species plantations, and white pine mixed throughout other species plantations. 1999 data based on trees ordered for planting next spring.

**Research to Reduce the Impact of White Pine Blister Rust
Progress Report**

Prepared by

Robert Stine

November 11, 1998

The research grant started July 1, 1997. This progress report covers the period through June 30, 1998. Much of the work reported below follows on work started prior to the grant period, and much of it extends beyond the period covered by the progress report.

The work can be divided into six general categories:

- Literature review on site-specific blister rust incidence
- Flower induction on young grafted material
- Early screening for blister rust susceptibility
- Histological characterization of rust resistance mechanisms
- Salvage and measurement of Ahlgren's advanced generation plantings
- Genetic improvement projects

Literature review on site-specific blister rust incidence

A literature review was conducted to find information available about the relationship between site characteristics and blister rust incidence. The review confirmed that specific site characteristics play an important role in rust incidence, and need to be considered along with the more commonly used broad hazard zones. As a follow-up to this project, we would like to use FIA data to more narrowly define site characteristics and rust incidence. The results of both studies will be reported in more detail when completed.

Flower induction on young grafted material

Fifty-three grafted eastern white pine clones (with three ramets per clone) at the Cloquet Forestry Center Breeding Arboretum were tested using a foliar spray. One ramet was treated with gibberellic acid (GA4/7), one ramet was treated with ProCone™, and one ramet was used as a control. Trees were sprayed weekly during the period of rapid shoot elongation during 1996, 1997, and 1998. Both male and female inflorescences were produced, but results were scattered across clones. No one treatment produced consistent results on all clones tested. Thirteen out of 53 clones produced either male or female inflorescences. One clone (2690) produced female inflorescences two years in a row when treated with ProCone™. Four clones (10280, 10750, 5530, and 9890) produced male inflorescences in 1997, but the control trees also flowered, perhaps as a result of spray drift.

It appears that a foliar spray application (500 mg/L) alone is not sufficient for the induction of both male and female inflorescences. The study continues and will address the concentration of GA4/7 and ProCone™ used, the influence of fertilization on flower production, timing and number of spray applications required to induce flowering, and use of stem injection rather than foliar application. Timing is critical for optimal promotion of female and male flower formation. Environmental factors such as light intensity, temperature, soil moisture, and nutrition may also affect the response of eastern white pine to these treatments. It has been reported recently that for other *Pinus* species that treatments during shoot elongation tend to promote pollen cones and treatments after shoot elongation tend to promote seed cones. Therefore, it may not be possible to promote the production of both male and

female inflorescences simultaneously on a consistent basis. Further experimental treatments should determine if this holds true.

Early screening for blister rust susceptibility

This research project has four objectives. The report lists accomplishments for each.

Objective 1: Rapid and reliable seedling screening of Eastern white pine.

An inoculation chamber was redesigned and constructed to more uniformly distribute spores falling on pine seedlings and to improve the control of relative humidity during inoculation and infection. During December, 1997, young seedlings of 18 open pollinated Eastern white pine families were inoculated in the chamber after the seedlings had been cut back to the physiologically oldest primary needles. One hundred percent of the seedlings became infected. Various types of symptoms that show the relative amount of seedling colonization were measured on three dates following inoculation. Mortality data is being collected biweekly, and families that have the greatest early colonization appear to have the most rapid mortality. Correlations between weeks to mortality and each of the measures of colonization will be made after a higher proportion of the plants have died. An additional experiment was planted that will test the resistance of young seedlings from controlled crosses among Eastern white pine trees with or without putative seedling resistance. Also, seed from Western white pine families that represent different resistance mechanisms was obtained. Some resistance mechanisms operate in needles, others operate in the stems. The Western white pine seed was stratified for an experiment that will test whether early screening can detect different types of resistance mechanisms and thus aid in determining what types of resistance operate and can be detected in Eastern white pine.

Objective 2: Effectiveness of resistance in individuals against possible races of rust, tested by cloning.

In each experiment, efforts are being made to clone all individuals by rooted cuttings. The cuttings are the side branches and extra main stem material that have been cut off prior to inoculation. The success rate from the December inoculation experiment appears high. Thus, there will be good representation of clones with different amounts of resistance that can be exposed to different populations of the rust. This will be done at western field sites, where virulent races are known to occur, or at local sites that might show indications of rust diversity by DNA marker differences.

Objective 3: Develop DNA markers for rust that can identify regions of high diversity in the Lake States and differentiate rust populations across North America.

DNA extraction methods have been developed that extract high molecular weight DNA from 10 mg samples of aeciospores, urediniospores, and teliospores. DNA has been extracted from urediniospores of pure strains of rust that represent the broadest range of blister rust on its white pine hosts from across North America. This diverse sample of blister rust DNA will allow any potentially useful differences in PCR-based DNA markers to be recognized. The samples are currently being used in analysis of RAPD markers, in a cooperative study with Dr. Richard Hamelin, Natural Resources Canada, Ste.-Foy, Quebec.

Objective 4: Using symptoms in young seedlings to predict infection rates in more mature plants in field experiments.

Seed of the 18 standard open pollinated families was stratified for greenhouse planting this summer. They will be planted at three Minnesota locations in a field study testing the resistance of seedlings with two full seasons of growth. The locations will be selected and prepared in the summer of 1998, and planted in 1999. They will be fenced to provide protection from deer browse. In addition to testing the

standard families, these locations will enable future tests of resistant and susceptible clones from the other experiments after they reach a more mature growth stage.

Histological characterization of rust resistance mechanisms

The histological work is used to examine the response of white pine tissue that is infected by blister rust. Through this work, we should gain an understanding of resistance mechanisms in infected seedlings.

Early examinations have shown distinct differences in needle reaction to infection. Needles from trees in more resistant families have an intense reaction to the fungus and tend to impede growth of the fungus through the needle. Needles from trees in more susceptible families have less intense reactions and allow extensive growth of the fungal hyphae throughout the needle.

Future work will expand to look at differences between primary and secondary needle infection, and resistance mechanisms in the stem.

Salvage and measurement of Ahlgren's advanced generation plantings

Cliff Ahlgren planted a series of white pine tests in the early 1980s. They represent crosses among trees that showed some rust resistance in earlier field trials. No site work had been performed in the plantings since their establishment. The sites are being brushed, mortality surveys are being conducted, and the incidence of blister rust will be recorded.

Genetic improvement projects

Breeding Arboretum

A breeding arboretum, comprising more than 200 clones selected from a 40,000 tree progeny test, is being developed at the Cloquet Forestry Center. The parent trees are in a test planted in 1972 and 1974 by Cliff Ahlgren on Forest Service property near Tofte, Minnesota. Grafting took place over a six year period, and the older grafts are the test material for the flower induction study. The last grafts will be outplanted in the spring of 1999. As soon as they are flowering, crosses will be made, and the resulting seedlings tested using Zambino's early screening technique.

Seed Orchard Establishment and Management

One way to reduce the incidence of blister rust is to avoid it through silvicultural practices. One of the more effective practices is to grow white pine in shaded conditions. A likely consequence of this practice, however, is reduced growth rates. To counteract this consequence, work is underway on developing white pine with genetically improved growth rates. A seed orchard of clones selected for excellent growth was established this spring as a joint effort between Itasca County and Rajala Companies. Additional clones and more ramets of the existing clones will be added in the next few years. The flower induction work will also benefit this project, since it will allow earlier progeny testing of the clones.

Two other orchards, comprising clones with putative blister rust resistance provided by the Forest Service, are being expanded to provide additional seed. Like the other materials, these clones need to be rigorously tested for rust resistance.

White Pine Timber Management Planning

PUBLIC INVOLVEMENT PROCESS WORK GROUP



Final Meeting Report

September 16, 1998

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WHITE PINE TIMBER MANAGEMENT PLANNING PUBLIC INVOLVEMENT PROCESS WORKGROUP

Final Meeting
September 16, 1998

Purpose

*Evaluation of the progress in implementing the work group recommendations
and provide advice for future area planning efforts.*

Agenda

10:00 INTRODUCTIONS

- Check-in: White Pine “encounters” and meeting expectations
- Overview: Session objectives, agenda and packet

10:30 STATUS REPORTS

- Public Involvement Implementation: Area planning progress and future schedules
- White Pine Regeneration Strategies: Workgroup update

11:15 PROCESS EVALUATION

- Experiences: What have been constituent experiences with the process?
- Assessment: What worked well? What needs work?

12:30 LUNCH

1:15 FUTURE IMPLICATIONS

- Process Advice: What are ways to improve upcoming planning processes?
- Ongoing Monitoring: How will future effectiveness be assured?

2:15 ACKNOWLEDGEMENT

- Reflection: Workgroup highlights and lessons
- Recognition: Workgroup member awards
- Closing Comments: DNR next steps and commitments

3:00 ADJOURNMENT





DNR STATUS REPORTS

Public Process Implementation

- Given the furor and events surrounding the work group process, it was significant that 12 out of 15 signed the recommendations. We have been quite successful in implementing the recommendations
- Department has made good faith effort to implement the work of the process group
- Adequate budget and full time staff committed to assure follow-through on White Pine Regeneration and public process strategies
- Area processes have been initiated
- Implementation schedules for all areas involved in area planning in 1998 have been published. Planning began fall 1997
- Created a wave of interest and collaboration on White Pine inside the department
- Scheduling meetings with enough lead time is a challenge. We will be continually improving that process
- There are spin-off results: The 10 year plan revision on the National Forests did not initially include a significant White Pine component. As a result of state efforts, the retention and expansion of White Pine stands and single trees is now part of the plan



White Pine Regenerational Strategies

- The plan has progressed far considering recent weather and events
 - Warm winter caused all kinds of havoc in forestry
 - Had an early spring fire season and are still in drought
 - People were sent to fight other states' forest fires
- Budget plans for work on private lands has been modified to reflect actual experience and constraints. White Pine seedling stock sold out early with high demand
- Soil and Water Conservation Districts partnered in distributing free White Pine Care Kits to private landowners. White Pine Planting and Care Guide is popular, distributed nearly 10,000
- Created DNR Agency chart showing division work plans related to White Pine regeneration activities
- Minnesota Forest Resources Partnership encouraged cone collection Fall '98
- Seminar for WPR Research findings and practical applications had 61 participants; Will be repeated October 1998
- Research is funded; Natural regeneration and White Pine blister rust
- Cover type management guideline were revised 1997 based on regeneration strategies work group recommendations
- MN White Pine cost share incentive programs established to cover 50% of cost of planting or caring for White Pine. Must have a landowner forest stewardship plan to be eligible
- Have had inquiries from other states and even overseas (United Kingdom) regarding Regeneration workgroup effort and White Pine Planting and Care Guide

Work Group Members' "White Pine Encounters"

In the past year, what are some experiences or anecdotes you have encountered related to the process?

- It is good to see everyone; It was a super year for growing White Pine. It is a dear species in the forests
- Somebody saw White Pine, took photos and sent them to me
- I talked to several groups about the effort
- Information on federal forests has come in the mail. I tend to understand the issues more and can relate to the process
- People in local area are now recognizing which trees are White Pine; There is an increased awareness. We are passing out seedlings and "how to" pamphlets on White Pine care
- Disappointed in the way Becker County conducted a sale which involved White Pine. They were unclearly marked if at all. I instigated a public meeting about it
- We are at a whole new level of dealing with White Pine due to whole new level of awareness and planning
- The Science Museum offices in our building they came to ask about doing a White Pine exhibit
- The main concerns I have heard relate to the time crunch between setting meeting dates and getting notices out
- Every time people raise concerns about sales involving White Pine, I realize the importance of this process. We should have a similar process for other state resource management activities
- Increased enthusiasm in managing White Pine
- Things do improve as the "disciples" of White Pine keep coming back and participating in these improvement processes and meetings





The Process At-A-Glance

PROCESS IMPLEMENTATION ASSESSMENT

I. PUBLIC OUTREACH	II. FIVE YEAR AREA PLANNING PROCESS					
Time: Ongoing	1 Month	2 Months	3-6 Months	2 Months	1-3 Months	Within 1 Month
A. Annual Planning Orientation	A. Assessment and Goal Document	B. Public Response	C. Draft Five Year Plan	D. Public Review	E. Final Five Year Plan	F. Public Reporting
B. Consistent Baseline Information	Step 1: Initiate Teams	Step 3: Broad-based Notification	Step 5: Incorporate Responses	Step 7: Broad-based Notification	Step 9: Finalize Plan	Step 10: Report Final Plan
C. Comprehensive Public Education	Step 2: Develop Document	Step 4: Gathering Inclusive Input	Step 6: Publish Draft Plan	Step 8: Conduct Meetings		Step 11: Ongoing Evaluation
D. Youth Education and Outreach	III. Annual Area Planning Process			IV. Site Level Management Activities		
	Time	3 Months		As prescribed by statute		
	A. One Year Draft Plan	B. Public Review	C. One Year Final Plan	A. Announce Auction Sites	B. Provide Volunteer Opportunities	

Process Evaluation OVERALL ASSESSMENT

- Department has followed through by allocating a budget and a position
- Implemented using a gradual and serious approach. The right people are in the place; Whole system approach; It is good that DNR was not turned inside out to get this effort started
- Minimal attendance at this evaluation meeting is a vote of confidence
- Several years ago DNR seemed defensive and insulated. Now it is obvious they are willing to be flexible and responsive
- Time spent in the work group has paid-off. We created a solid, compacted process
- Need for process verified

A STEP by STEP assessment of the process on the following pages.



Process Evaluation

I. PUBLIC OUTREACH

A. Annual Planning Orientation

- Openhouses have been scheduled and the interest in attending the meetings is good
- The openhouses and participation at meetings confirm the deep interest people have on this issue

B. Consistent Baseline Information

- Working on a data base of state land timber sales involving White Pine
- Assembled and distributed a draft plan with related maps showing status of White Pine inventory, size of stands, and locations. Assessment and goals document to be a part of the draft plan
- Tracking has been revised to better identify the locations of White Pine on State lands for inventory and management purposes; This may prove that we have under estimated the numbers of White Pine

C. Comprehensive Public Education

D. Youth Education and Outreach

- Resources provided to create materials including White Pine Care Kit
- Internal cross function advisory for educational materials.
- Future State Fair exhibit on White Pine being planned
- Website being considered as an information venue



Process Evaluation

II. FIVE YEAR AREA PLANNING PROCESS

A. Assessment and Goals Document

- Step 1: Initiate Teams
- Step 2: Develop Document

SUCCESS:

<i>What worked well?</i>	<ul style="list-style-type: none">• All experimented in good faith• Captured state wide goals well• Consistent format
<i>What needs work?</i>	<ul style="list-style-type: none">• Lack of specific area goals• Gear materials to an average citizens' knowledge. Make it more user-friendly• Inconsistency in "tree" measures (acres, bd feet, etc.)• Generally the technical terms are unclear to the public audience

SUGGESTIONS:

<i>What are ways to improve?</i>	<ul style="list-style-type: none">• Do something more on local goals beyond the general expectations or projections• Better explanations for data and tables; Help people make sense of the information by using understandable terms and pointing out what are the key messages of the tables and charts
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Process Evaluation

II. FIVE YEAR AREA PLANNING PROCESS

B. Public Response

- **Step 3:** Broad-based Notification
- **Step 4:** Gathering Inclusive Input

SUCCESS:

What worked well?

- 40 people at state wide open house
- Maps helpful
- DNR less suspicious the farther north you go (observation); More trust less participation, will have more as draft plans created
- Used multiple methods to notify people:
 - Notices to those on statewide and local area mailing lists
 - Advertised in local newspapers and statewide releases
 - Talking about putting it on the webpage
- We now know better where the interested people are and how they can be reached. Each year, the key list will grow
- Local news interviews brought awareness

What needs work?

- Minneapolis/St. Paul seemed better informed. Do elsewhere what was done in the metro
- Late notification was a problem:
 - No general public in the Aitkin area, other than County Forest Advisory Committee. Notification too late
 - Public comment period coincided with Christmas holiday
 - Some invitation letters came a day before the open house in Detroit Lakes
- In each area, DNR staff have different understanding or relationship to public participation

SUGGESTIONS:

What are ways to improve?

- Four weeks needed to notify people. In off-season, takes time to inform cabin owners and other land owners who reside elsewhere
- Increase non-conventional local communication. Use conventional public nodes such as libraries, courthouses, state parks. Also unique, local nodes such as Gooseberry Falls Rest stop, Kiosk etc. which vary in each area. Promote at key local organization and constituency meetings
- Improve statewide notification. Use Internet
- Better inform urban dwellers
- Provide internal DNR coaching of area staff to enhance process and create more consistent approaches and acceptance of public input and participation



Process Evaluation

II. FIVE YEAR AREA PLANNING PROCESS

C. Draft Five Year Plan

- **Step 5:** Incorporate Responses
- **Step 6:** Publish Draft Plan

SUCCESS:

<i>What worked well?</i>	<ul style="list-style-type: none"> • Good beginning: glossary, good maps • Provides general management recommendations • Refer to full process (self tours) • First draft plan is in the preliminary form; Assessment and goals document included as part
<i>What needs work?</i>	<ul style="list-style-type: none"> • More user friendly so “next door neighbor” can understand • The data is good (like ECS) but doesn’t clarify why it is important to average citizen • Site locations on the chart need a map as guide • Difficult to compare past and future data. Help public identify what are the significant changes • Missing specific information about planned “treatments” for sites. Need measures of success

SUGGESTIONS:

<i>What are ways to improve?</i>	<ul style="list-style-type: none"> • Define terms in body of the text. Using basic forestry vocabulary like “cover-type”, age class etc. does not communicate to average citizens. Use regular language such as age class = age of trees • Compare area current distribution with historic data • Clarify table categories • Indicate specific strategic area for area goals and objectives that will be used to guide site treatments; The more specific or focused the better for all • The response will be greater in the future as people react to a to draft plan • Indicate that draft plan is “subject to changes after site visit” • The plans don’t convey all the assumed and basic White Pine management practices used by the DNR. Need to add existing DNR guidelines for White Pine management and treatment to public documents
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Process Evaluation
III. ANNUAL AREA PLANNING PROCESS

- A. One Year Draft Plan**
- B. Public Review**
- C. One Year Final Plan**

- During this 5-year process need to clarify and remind the public that changes in Five year Plan activities affecting White Pine will be noticed each year



Ongoing Monitoring

Ongoing monitoring was built into the model. The DNR intends to implement these elements:

OPEN PROCESS

All public reviews and meetings provide an opportunity for:

- a) Input on specific area plans
- b) Question and comment on the process as a whole.

REGULAR REPORTING

Step II, calls for regular status reporting and evaluation:

- a) DNR provides report each year for Forest Resources Council review on progress in implementing the White Pine Regeneration Strategies Work Group Report recommendations involving DNR programs and DNR-administered lands.
- b) Share annual accomplishment reports.

ANNUAL CHECK POINTS

- a) Conduct annual review to identify any changes to the Five year Plan based on DNR field reviews on stands involving White Pine harvesting. If any changes are identified, proceed to steps b and c.
- b) Describe changes and provide an explanation of why they came about; include assessment and description of new information, events or other factors influencing annual plan, e.g. new information, natural events.
- c) Provide a report on the current progress of White Pine management, including sales, harvest, regeneration efforts, survival rates and a list of sites planned to be sold in the coming year.

