

2013 – 2037 Forest Management Plan
J.D. Irving Northern Maine Woodlands

Public Summary

Prepared by:
JD Irving, Limited



July 2013



SUMMARY

This document outlines a forest management strategy for J.D. Irving's Northern Maine Woodlands that is ecologically sustainable, economically viable and socially responsible; while achieving the landowner's objectives. This forest management strategy aligns with the Maine Forest Service's "Criteria, Goals and Outcomes of Forest Sustainability".

Development of the management plan involved using the latest forest inventory and an optimization model to arrive at an 80 year strategy which meets specific management objectives. The first 25 years (2013-2037) was spatially blocked to form a management plan which takes into consideration the operational realities that will be faced on the ground.

Operational and technological advances in forestry practices have been incorporated into this management plan. The latest forest inventory (2010) has been strengthened by ground plot data collected (2011-12) to forecast growth and yield over time. A wide array of even-aged and uneven-aged treatment options were used to meet the stand and forest level objectives of the management plan.

The Northern Maine Woodlands forest is being managed for both timber and non-timber objectives. Specifically, the forest has been zoned into the general forest, where timber is the primary objective and special management areas such as unique sites, deer wintering areas, and mapped riparian zones, each of which has distinct non-timber objectives. Special management areas make up 16% of the total area while the general forest accounts for 84% of the land base.

The following summarizes the key results of this 2013-2037 management plan:

- Planned harvest areas achieve regulatory and company objectives and constraints including adjacency rules, conducting harvest prescriptions which suit forest stand types and opening size, and habitat objectives.
- The sustainable Spruce-Fir Annual Allowable Cut (AAC) level after all operational net-downs is 547,000 m³/year. This is made up from several distinct zones: 429,000 m³/year from mature natural stands in the general forest, 49,000 m³/year from managed stands, and 69,000 m³/year from special management areas.
- The Hardwood AAC is 558,000 m³/year for the 2013-2022 period but will then be reduced to a long term sustainable level of 427,000 m³/year beginning in 2028.
- In the long term, we estimate the Spruce-Fir harvest level will increase to 865,000 m³/year by year 2058 from the general forest. This represents an increase of over 1.7 times the 2013-2022 AAC level.
- AAC levels for minor species are treated as "fall out volume" including saw material harvest levels for Cedar (53,000 m³/year) and White Pine (4,000 m³/year).

- Commercial thinning levels in managed stands are expected to be 600 hectares per year over the next five years. Final harvest levels in managed stands are forecasted to be approximately 180 hectares per year.
- A commitment to undertake suitable tree planting and pre-commercial thinning of natural regeneration (PCT) programs is imperative to ensure the sustainability of the short and long term AAC for Spruce-Fir. This management plan includes a planting program of 2,000 ha/year and a pre-commercial thinning program of 1,300 ha/year.
- Five important forest communities were identified and late successional targets were set as per J.D. Irving, Limited’s Late-Successional Forest Policy (7% old and 3% very old). On the Maine land base over 28,000 hectares will be spatially identified over the next five years in order to meet these objectives.
- Table 1 outlines the AAC summarized by species group for each forest management zone on the land base over the next two periods or ten years.

Table 1. Summary of AAC harvest volumes (m3/year) by zone and species group.

Period 1: 2013-2017 (m3/year) AAC Zone	Species Group				
	SPF	Hardwood	Cedar	White Pine	Other SW
Natural Unrestricted (SSF)	429,000	506,000	53,000	4,000	18,000
Natural Unrestricted (W)	-	-	-	-	-
Managed Stand Final Harvest	21,000	1,000	-	-	-
Commercial Thinning	28,000	1,000	-	-	-
General Forest Sub-Total	478,000	508,000	53,000	4,000	18,000
Steep Slopes, Operable	-	-	-	-	-
Unique Areas	-	-	-	-	-
Riparian Buffers	50,000	20,000	-	-	-
Deer Wintering Areas	19,000	10,000	-	-	-
Constrained Forest Sub-Total	69,000	30,000	-	-	-
Full Tree Harvest Volume Overrun*	-	20,000	-	-	-
TOTAL (m3/year)	547,000	558,000	53,000	4,000	18,000

* Calculated as 13% of 30% of GenFor AAC

The management strategies and policies that this plan is built around are designed to best meet the forest management objectives by utilizing the best scientific knowledge and insights available today. We implement these strategies daily over a complex set of conditions and circumstances and we are confident this plan not only balances all objectives but can also be implemented on the ground. We are proud of this management plan and we feel that it is environmentally, economically, and socially responsible.

J.D. Irving, Limited
July 2013

LANDOWNER COMMITMENT

J.D. Irving, Limited and its affiliated and subsidiary land ownership or forest management companies are committed to responsible and sustainable forest management. We want to be known as good stewards of natural resources, and protectors of wildlife. We are committed to meeting all legal requirements in every jurisdiction that we operate. We want to be partners with our workers, contractors, suppliers and customers. We will try to be good neighbors and we will actively work to support our communities. We will provide traditional recreational opportunities on our lands that do not conflict with, or compromise our goals and objectives.

- **Third Party Certification:**

We appreciate, and we believe that independent third party verification of our forest management is important for public credibility and confidence. We are committed to maintaining all our lands certified according to the standards of the Sustainable Forestry Initiative (SFI). We also support the international Principles and Criteria of the Forest Stewardship Council® (FSC® C041515). We intend to seek, achieve and maintain local FSC certification for the lands we own or manage in the State of Maine. We also intend to maintain an effective and verified ISO 14001 registration for all our operations and all the lands we manage. While at the present time we are not aware of any conflicts between any of the certification standards we utilize, and the laws or regulations where we operate; should any such conflict arise, we will bring it to the attention of both our certifier and the certification body. We are committed to track the origin of our forest products in an independent third party verified “chain-of-custody” system.

- **Management Planning and Implementation:**

We are committed to developing technologically advanced Management Plans for every land base that we own or manage. The primary purpose of these Management Plans is to determine an ecologically sound, economically appropriate, and socially responsible management strategy for the local area. Each Plan will establish habitat and biodiversity objectives and constraints. The Management Plan will determine a sustainable harvest level for each major tree species group, along with harvest and intensive silviculture treatment levels.

We will review and revise our Management Plans periodically, or when there has been a significant change to the assumptions of our Plan (sale or purchase of lands, mill closures, catastrophic occurrence, etc.).

We are committed to respecting the harvest and silviculture levels and other major provisions of our current Management Plans. While there may be annual variations due to market conditions, mill schedules, or other economic constraints; we will balance harvest and silviculture levels over at least a ten year time frame.

- **Forest Inventory, Health, Growth and Yield:**

We are committed to improving the growth and long term yield from the lands we own. We will work actively to maintain our lands in a healthy condition, relatively free of disease or insect infestation. We will be vigilant in forest fire preparedness, readiness and response.

We will continuously monitor forest health, development, growth and yield on our lands. This will be achieved through staff training and observation, regular aerial reconnaissance, and an intensive ground sampling program.

We will maintain expert staff focused on maintaining our forest inventory accurate and precise. We are committed to continue to be recognized as leaders within the fields of GIS, forest modeling, intensive silviculture, forest mensuration, growth and yield, and tree improvement.

- **Continuous Improvement:**

We are committed to continuously improving every aspect of our management and our operations. We will monitor, measure, and report on our performance and our improvement.

We will follow “Lean”, “Six Sigma” and “DMAIC” methodologies to drive and sustain improvements.

We will follow a management system, and dedicate significant staff resources to finding and implementing continuous improvement.

- **Public Monitoring Summary**

Each year we will make available a public summary of the following monitoring indicators: volume of forest products harvested, numbers of ground survey plots, species composition on the land base, environmental and social impacts of our operations, and forest management improvement projects.

FOREST MANAGEMENT OBJECTIVES

Our key management criteria, strategies and objectives are:

- ✓ Soil productivity
 - Standard operating procedures have been established for all harvest and road construction operations to avoid significant reduction to site productivity.
- ✓ Water quality, wetlands and riparian zones
 - Standard operating procedures have been established to protect water quality and aquatic habitats during our harvest and road construction operations. These procedures meet or exceed current regulatory guidelines.
- ✓ Timber supply and quality
 - Our timber supply objective is to maximize the long-term sustainable flow of quality timber products from the lands we manage.
 - Our timber quality objective is focused on growing high quality, saw log and veneer products. This includes:
 - Spruce and Balsam Fir trees of sufficient soundness and stem size will be directed to the manufacturing of dimensional lumber.,
 - Sugar Maple, Yellow Birch, White Birch, Ash, and Red Maple will be managed and merchandized to produce saw logs and veneer grade products.
 - White Pine and Cedar will be merchandized to produce solid wood products.
- ✓ Biological diversity
 - Maintain an appropriate balance of forest cover types and age class distribution.
 - We have reviewed all of our lands for the occurrence of rare or outstanding features, representing important key habitats. These sites have been catalogued and best management strategies have been developed to protect their unique characteristics.
 - Our harvesting operation sites are screened to identify special wildlife habitats, rare plants and other unique landscape features for retention during harvesting operations.

- All identified Deer Wintering Areas (DWA) are managed consistent with habitat objectives developed in consultation with Maine’s Inland Fisheries and Wildlife Department.
 - All clear-cutting activities are conducted for sound silvicultural reasons, and will be ecologically appropriate for the site.
 - A proportion of the land base must be maintained in “old forest” conditions meeting specific wildlife and habitat requirements.
- ✓ Economic and social considerations
- Our management activities will provide wood to our mills and other regional mills at costs allowing for competitive manufacturing.
 - We have an established stakeholder committee made up of a wide spectrum of public interest groups.
 - We will continue to provide historic and traditional recreational opportunities that do not conflict with our management objectives and values.
- ✓ Forest health
- Protecting the forest from fire, insects, and disease is a fundamental component of our management program.
 - We are committed to investments in tree planting, pre-commercial thinning (PCT), and silvicultural stand improvement treatments to ensure the long term health and sustainability of the lands we manage.
- ✓ Non-timber forest products
- Non-timber forest products are utilized when their use does not compromise other forest management objectives. Examples include; gravel, ash for basket making, burls, mushrooms, and fiddleheads.
- ✓ Aesthetics
- We will consider and incorporate aesthetics in our management activities where visual impacts may be of concern.
- ✓ Public accountability
- We maintain independent third party certification on the lands we manage.

LAND BASE DESCRIPTION

OVERVIEW

The forestland managed by Irving Woodlands LLC in Northern Maine is approximately 524,000 hectares. The property stretches from the western border with Quebec and to the eastern border with New Brunswick, with the majority of the land being in Aroostook County. The Maine lands under management by Irving Woodlands are shown in Appendix II by township, tract, and percentage ownership. These tracts are depicted below (Figure 1) by percent Irving Woodlands ownership class.

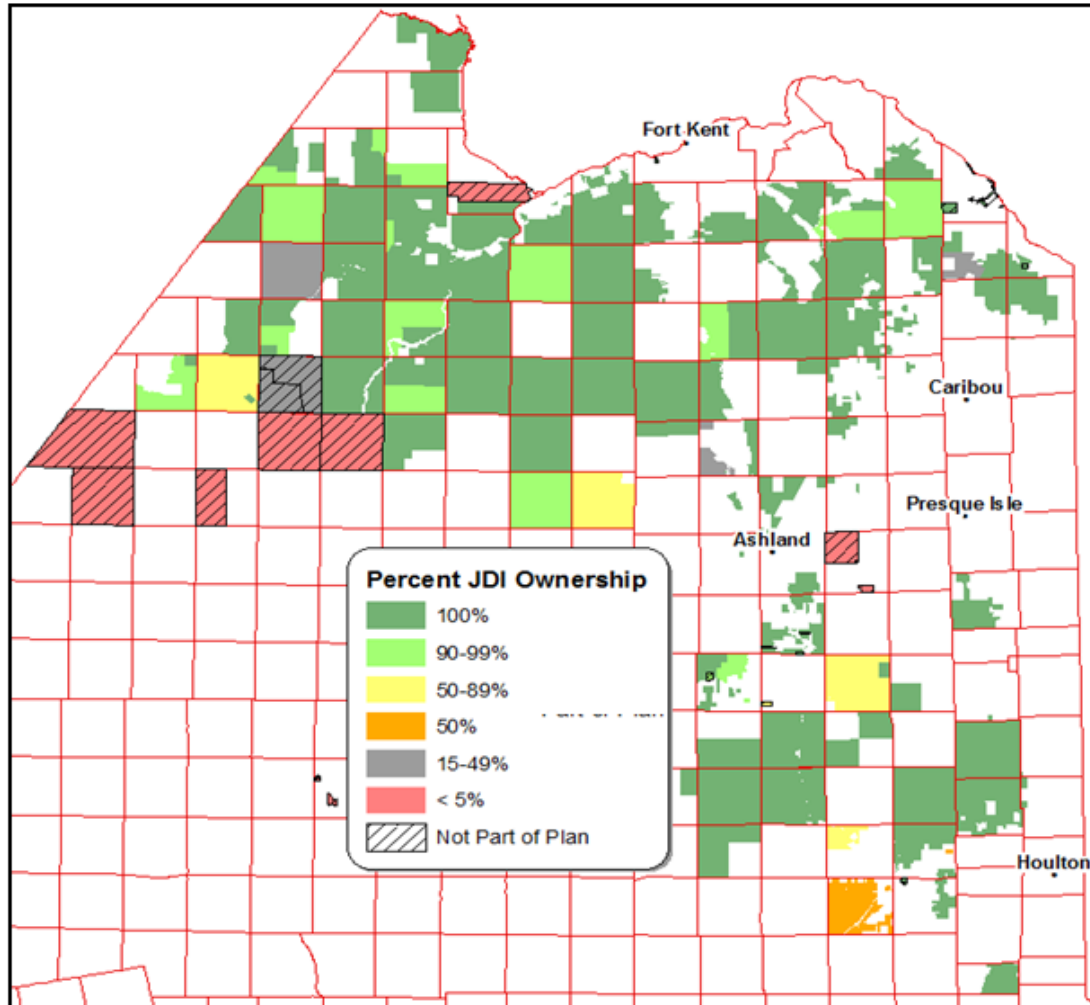


Figure 1. JD Irving, Limited's percent ownership of freehold lands in northern Maine.

THE FOREST

Approximately 95 percent of the JDI Maine land base (524,000 hectares) is productive forest land. The remaining lands include non-forest areas such as roads, water, wetlands, and other enduring (Figure 2).

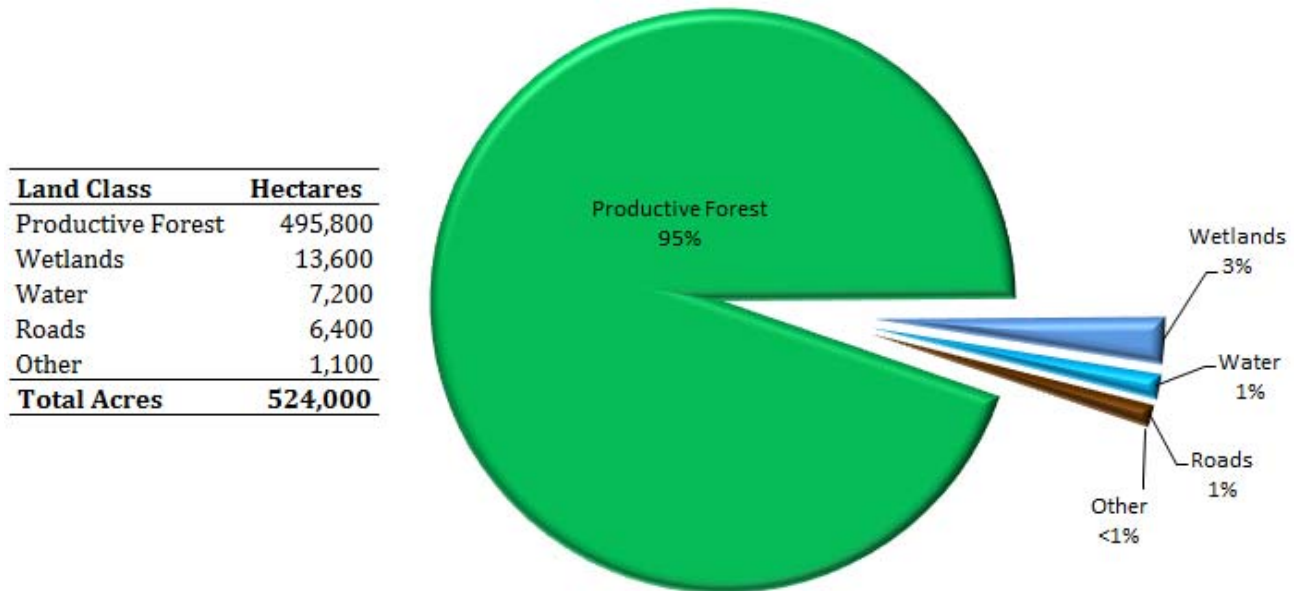


Figure 2. Summary of total area by land class managed by JD Irving in Northern Maine.

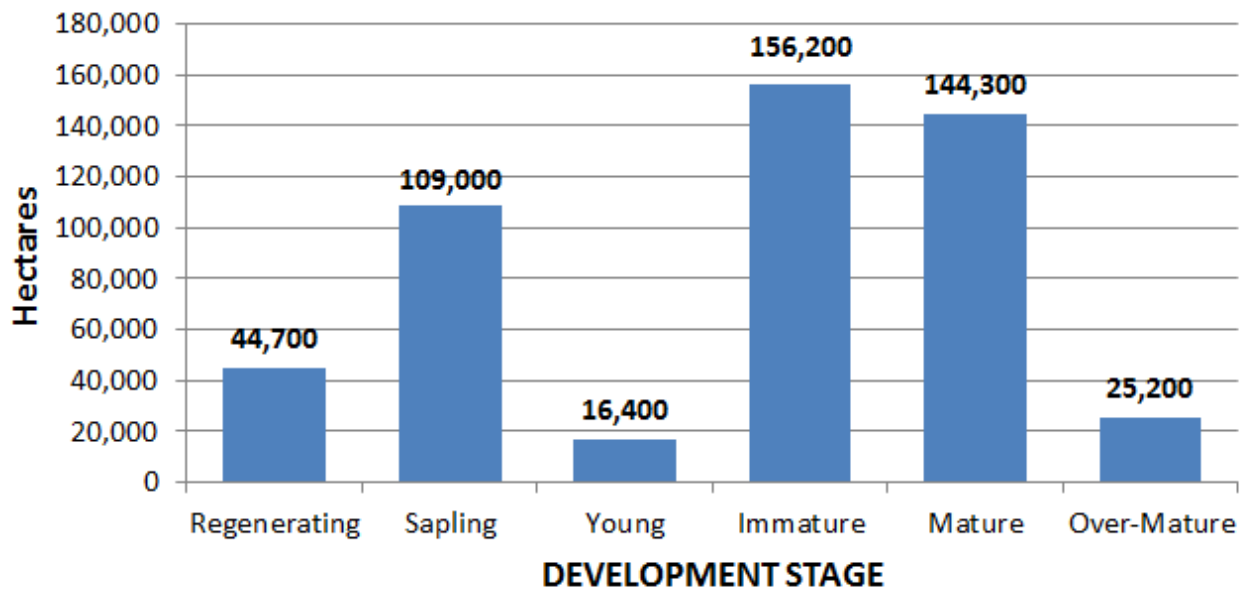


Figure 3. Area in the productive forest land base by development stage.

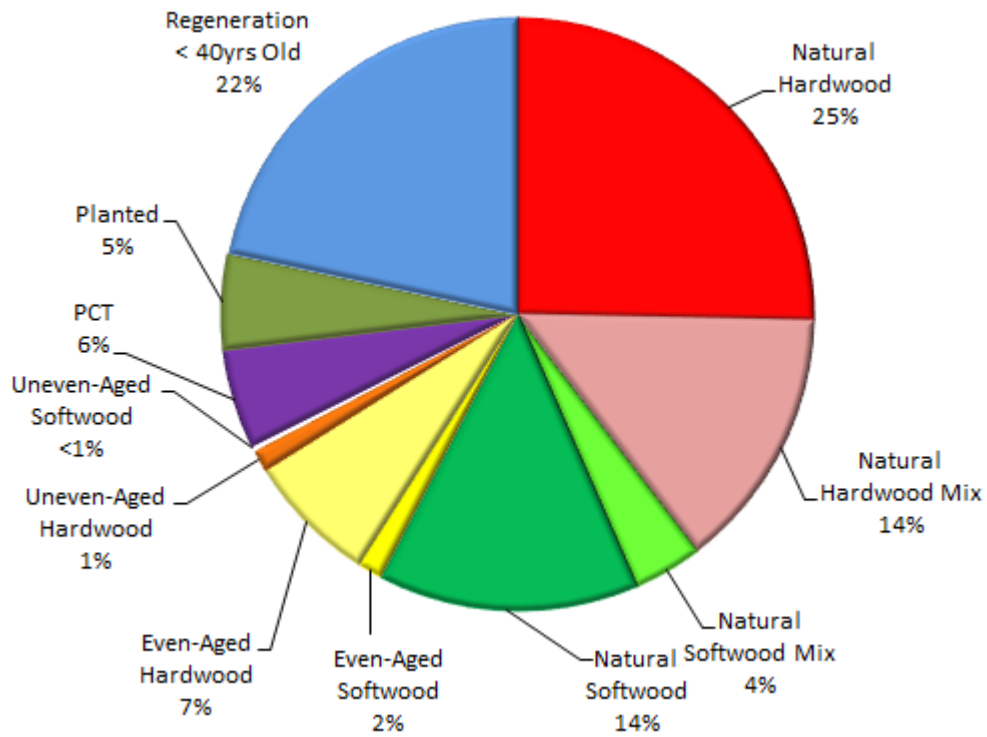


Figure 4. Distribution of productive area by broad stand types.

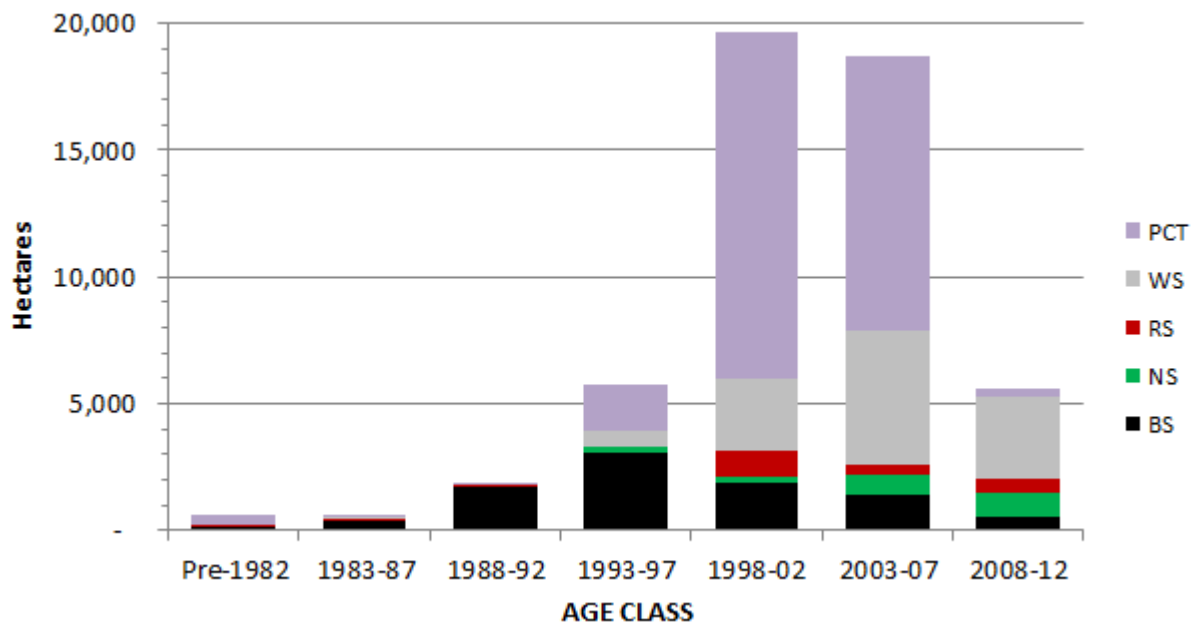


Figure 5. Distribution of planted stands and PCT by species and age class.

Table 1. Summary of planted stands (by species) and PCT by age class.

YEARS	PLANTED STANDS				PCT	TOTAL
	BS	NS	RS	WS		
Pre-1982	150	-	20	50	360	580
1983-87	400	-	40	110	30	580
1988-92	1,690	50	20	60	90	1,910
1993-97	3,080	200	10	650	1,790	5,730
1998-02	1,840	310	980	2,890	13,670	19,690
2003-07	1,370	810	430	5,270	10,840	18,720
2008-12	510	990	540	3,200	320	5,560
TOTAL	9,040	2,360	2,040	12,230	27,100	52,770

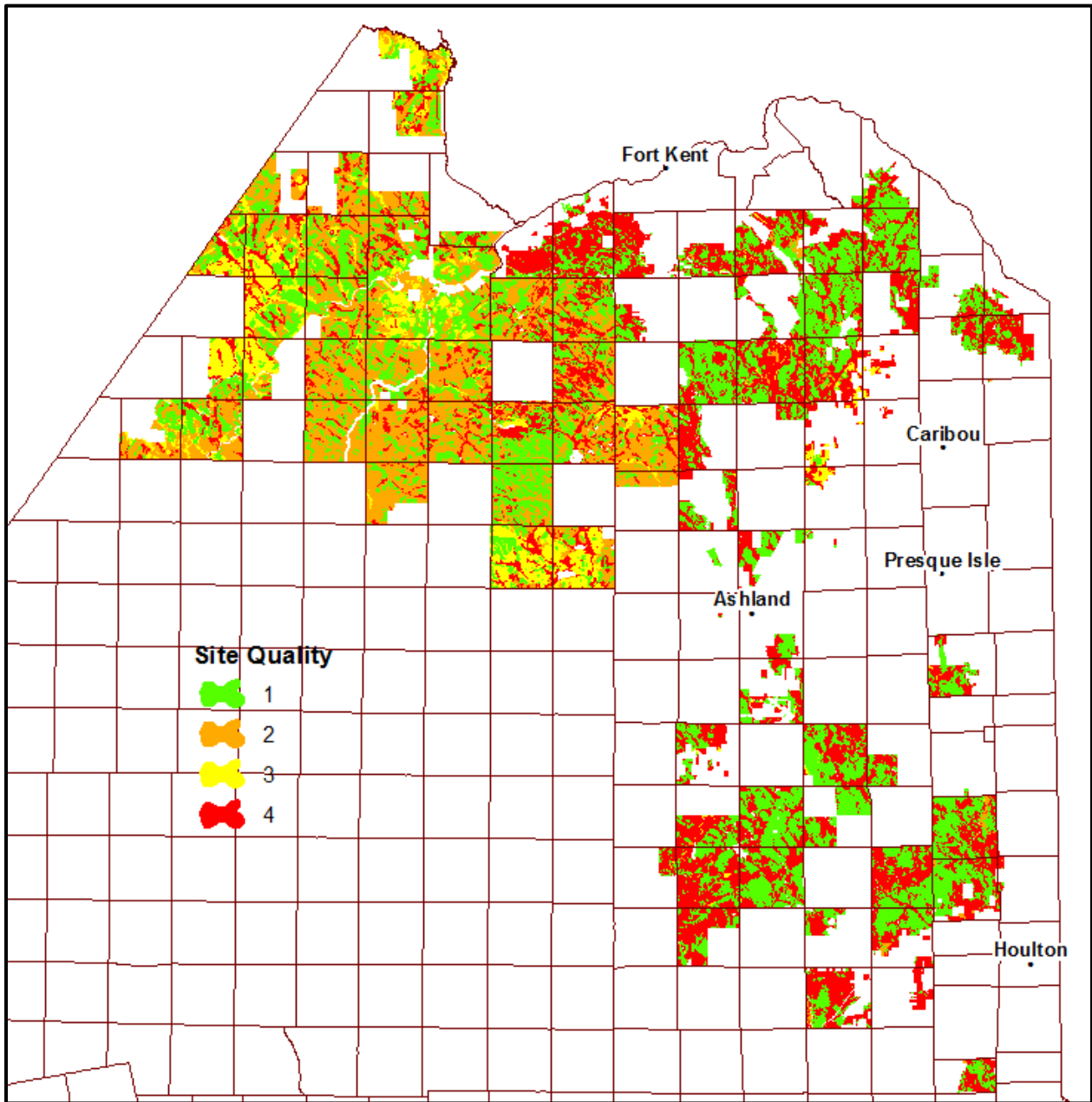


Figure 6. Site classification distribution for land JDI manages in northern Maine.

ZONING

Although the forest can be divided between productive and non-productive zones, it can also be described in terms of management objectives. For this management plan, the zone being managed primarily for timber production and utilization is referred to as the **General Forest** and makes up 84% of the productive forest area (Figure 7). Approximately 95% of this zone, called the Operable Forest, is currently accessible for harvesting using conventional harvest systems. The remaining 5% resides in the Inoperable Forest: 10,400 hectares (2%) is steep requiring specialized harvest methods and equipment and 11,000 hectares (3%) has restricted operability due to low volume, wet, unmapped buffers and inaccessibility.

Likewise, **Special Management Zones**, where objectives other than timber determine management activities, account for 16% of the productive land base (Figure 7). These special management zones include:

- Mapped Riparian zones – The Riparian zone has a primary objective of protecting water quality and maintaining wildlife corridors. It is important to note that there is also a large area of unmapped watercourse buffer zones (that are accounted for as part of the within block net-down).
- Deer wintering areas (DWA) – The DWA zone represents areas with a primary wildlife habitat objective, and more specifically is made up of areas that provide moderate thermal winter cover. These DWA zones are actively managed based on an area-by-area basis and detailed plans.
- Unique Sites – Each site has a unique feature with the primary objective being the protection of that feature.
- Late Successional Areas – The primary objective of late-successional (older growth) area is to maintain a minimum component of certain, specific long-lived stand types within our management areas. These long-lived types include tolerant hardwood, tolerant mixed-wood, Cedar, Pine-Hemlock, and softwood stands.

These management zones are not mutually exclusive. For example, DWA zones that overlap with riparian zones would be classified as riparian zones since riparian zones have a higher reservation priority on JDI land bases. There are a total of 7 management zones on the Maine land base and after all management zones have been prioritized, the forest that remains is considered the General Forest.

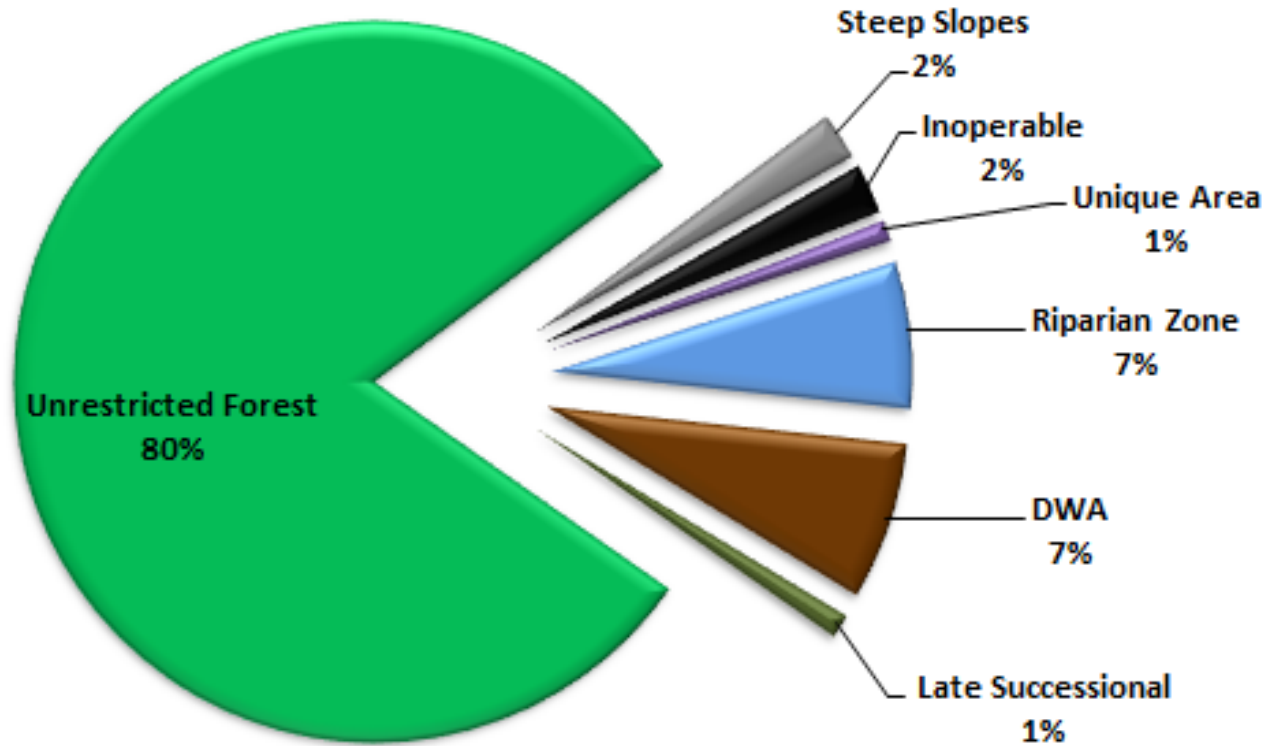


Figure 7. Area distribution by Management Zone.

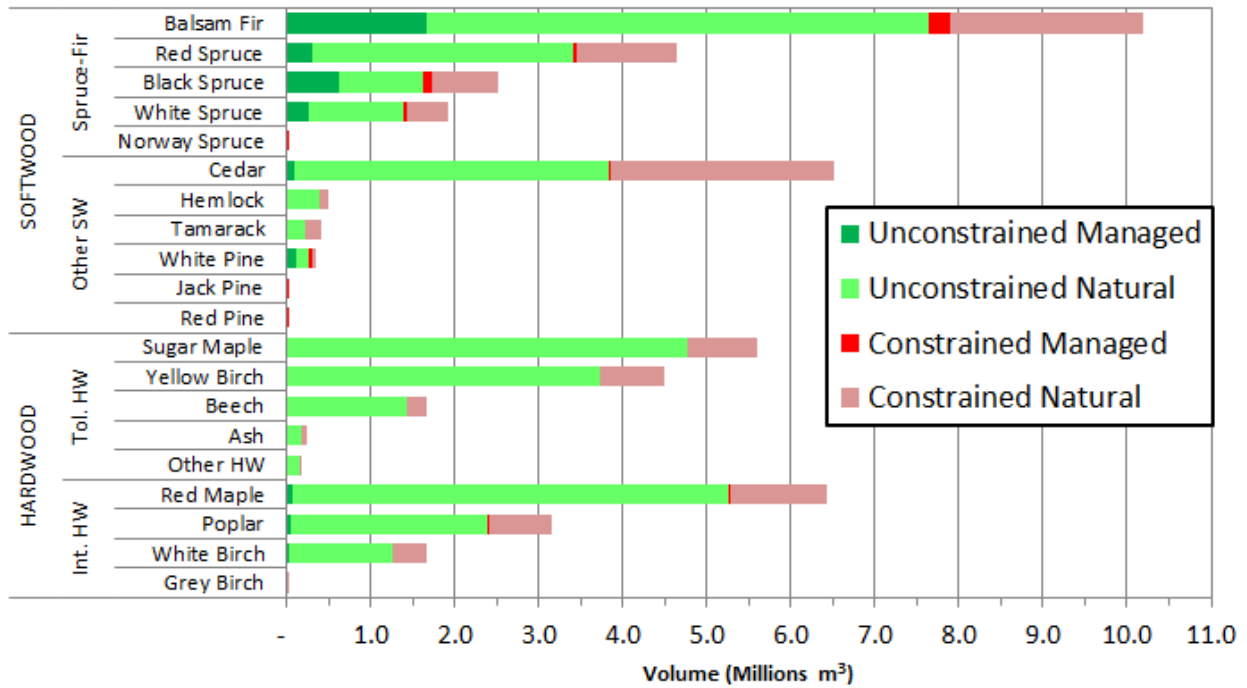


Figure 8. Distribution of merchantable growing stock (m³) by species, forest type, and management zone.

SPECIAL MANAGEMENT ZONES

Special management zones, where objectives other than timber guide management activities, account for 16% of the productive land base in Maine. These zones include Deer Wintering Areas (7%), mapped Riparian Buffers (7%), Unique Areas (1%) and Late Successional Areas (1%).

DEER WINTERING AREAS (DWA)

DWA have been the subject of a regulatory protection program under the Land Use Regulation Commission (LURC) since the early 1970's. This program has substantial weaknesses from both the landowner's and public agency's perspectives. The resolution is the creation of cooperative agreements between Irving Woodlands and the Maine Department of Inland Fisheries and Wildlife (IF&W) on a land base larger than the core areas previously zoned by LURC. These agreements have:

- Identified broader areas of deer usage using historic data and observation information not allowed under the regulatory program.
- Allowed Irving Woodlands and IF&W to mutually agree to management objectives (spatial cover objectives over long time periods).
- Allowed fewer regulatory hurdles to conducting timber management operations.

The primary objective of these agreements will be to provide adequate, long-term wintering habitat for deer. Our current cooperative DWA management area is 50,000 hectares.

UNIQUE AREAS PROGRAM

Our company's unique areas program accounts for 8,000 hectares in Maine which has evolved from Maine Natural Areas Program (MNAP), the original critical areas program of the early 1970's. These sites range from native burial sites, to rare or special plant communities. Each area will be managed to protect the value of the site. We have completed a thorough review of our forest holdings for special plant communities in partnership with MNAP, and continue to work with MNAP when new areas are identified. The purpose of this partnership is to assist MNAP in conducting a high quality Landscape Analysis to identify areas likely to support rare natural communities, outstanding examples of common communities, and/or habitat for rare plants. Our role in this effort has been to provide detailed maps and photos, GIS technical assistance and support, and financial assistance to MNAP. We annually petition the Maine Historic Preservation Commission (made of members from University of Maine, Maine State Museum, Department of Conservation and citizens with expertise in historic preservation) for information of any new sites of cultural, historical or archeological significance that may have been detected on our lands.

RIPARIAN ZONES

Forest management activities around wetlands, watercourses and within riparian zones will meet or exceed all regulatory standards. Operations will be conducted under the following principles:

- Irving Woodlands will effectively implement company best practices to protect water quality and aquatic habitats.
- Watercourses other than P-GP and P-SL1 districts will have a 30 meter special management zone along all mapped watercourses, with no clear-cut openings larger than .8 hectare (2 acres) within 15 meters of a mapped watercourse.
- We will consider input from external stakeholder groups regarding restoration of aquatic habitat.
- We will maintain a 30 meter special management zone along all mapped non-forested wetlands greater than 2 hectares in size, with no clear-cut openings larger than .8 hectare (2 acres) within 15 meters of a mapped watercourse.
- Identified vernal pools will be protected according to the “Forestry habitat management guidelines for vernal pool wildlife”.

For management planning purposes, the most accurate mapped representation of these streams is the USGS 7.5-minute maps. Both DEP and LURC have endorsed this level of mapped brooks and streams as the most important needing enhanced protection. Our riparian policy covers all of these USGS mapped streams and additional unmapped brooks we have determined on the ground. The riparian zone will be configured to the local terrain and conditions, and may vary from a strict perpendicular measurement. Presently, the total area in mapped riparian zones is 38,000 hectares, over 7% of the entire land base.

LATE SUCCESSIONAL AREAS

This management plan addresses the maintenance of the diversity of forest ecosystems through five forest community types which represent the range of important naturally-occurring forest types on the land base (Table 3). As outlined in our Late-Successional Forest Policy, we are planning to maintain our land base such that 10% of the defined forest types are maintained in an *Old* and *Very Old* category. More specifically, 3% will be maintained or managed to the very old category while the remaining 7% to the old category. Specific targets for each of the five communities have been established for the Maine land base (Table 3).

Table 3. Summary of community size and benchmark targets for old and very old categories of the five late-successional forest communities.

Forest Community	Benchmark Hectares	Targets	
		Old	Very Old
Tolerant Hardwood	106,100	7,400	3,200
Tolerant Mixedwood	29,600	2,100	900
Eastern Cedar	48,500	3,400	1,500
Pine-Hemlock	1,400	100	40
Softwood	99,800	7,000	3,000
Total Hecates	285,400	20,000	8,640

PUBLIC INPUT AND ACCESS POLICIES

Public input is incorporated into our management planning from a number of different avenues. We have an organized stakeholders group made up of local business owners, government agencies, environmental groups, outdoorsmen, neighbors and other interested parties. This group meets numerous times annually. Other important public input is received through day to day communication, conversations with concerned citizens, complaints, and through meetings with local government and community professionals.

Approximately sixty percent of the lands west of Route #11 and south of route #161, are part of the nonprofit cooperative recreational management North Maine Woods (NMW) program. The NMW area is a cooperative program organized by major private forest landowners and the State Agencies with natural resource responsibilities. The simple objective is to provide quality recreational opportunities on forestlands under active forest management. The program has been in place since 1965. Controlled gate access to the area under NMW management is in place. There are several purposes for these gates;

- to collect user fees to support the operation of the program and maintenance of recreational facilities,
- to monitor visitor locations for their own personal safety, and
- to provide some level of control regarding forest fire protection and vandalism.

On Irving Woodlands ownership outside the NMW program, access and recreational activities are also supported. A more fragmented ownership with many intersecting public roads makes a NMW gate system impractical in these areas.

HARVEST PRESCRIPTIONS

The harvest prescriptions we utilize sort into two distinct groups:

1. **Even-aged Management:** prescriptions where the forest stand is managed as predominantly one or two age-classes, and where the stand is ultimately replaced with a young age-class. This grouping includes the regeneration systems of clear-cutting, over-story removal and shelterwood harvest, as well as intermediate treatments such as commercial thinning. Even though these treatments are categorized as even-aged, they often include the management and maintenance of two-storied or three-storied stands. Below is the array of prescriptions under this grouping:
 - Clear-cuts: Removes most of the merchantable stems of all species within the definition of operability. The treatment is generally applied in mature to over-mature stands and leads to the creation of new, even-aged stands through either natural regeneration, planted trees, or a combination of both. Operational variations include leaving residual islands or patches of standing timber largely for wildlife purposes and defining block boundaries and shapes to be less square and angular and better fitting to natural stand boundaries. We have described these modifications under the term – variable retention clear-cuts.
 - Over Story Removal: Over story removal harvest prescriptions remove most of the merchantable stems of all species in a single treatment entry. This even aged management prescription is targeted to protect and release well established regeneration in the under story. Full planting is not required following an over story removal harvest, however a very minor level of fill planting of trails or small un-regenerated patches within the block may be prescribed.
 - Commercial Thinning: Commercial thinning is generally prescribed in planted stands or previously pre-commercially thinned areas. The primary objective of this treatment is to remove a portion of the trees, usually focusing on lower quality stems, in order to allow the remaining trees to continue growing vigorously.
 - Shelterwood and Multiple Pass Harvesting: Shelterwood and multiple pass treatments are often practiced in stands with a goal of promoting natural regeneration or salvaging mortality. In most situations, this prescription is even aged management. In shelterwood or multiple pass harvest prescriptions, up to 50% of the standing volume may be removed in the first pass, focusing on the lower quality or less vigorous trees. The second entry is normally delayed by 15 years, depending upon the specific stand conditions and objectives. There are some variations on the standard shelterwood that may be prescribed in specific circumstances in including irregular shelterwood and some group selection methods.
2. **Uneven-aged management:** prescriptions where the forest is managed to maintain and expand several age classes with an objective to retain a forest canopy indefinitely. This grouping typically includes individual tree selection and riparian zone treatments. Where

a truly balanced uneven aged forest can be created, it will be pursued. But some forest conditions under these prescriptions will indefinitely maintain a dominant development. The array of prescriptions under this grouping includes:

- Riparian – Selection Harvest: The purpose of selection harvesting in riparian stands is to regenerate and maintain an uneven-aged forest structure. This prescription typically occurs in riparian zones, but may also occur in areas deemed special management zones.
- Single Tree Selection: Single tree selection harvest is usually classical uneven-aged management. Ideally, this prescription targets tolerant hardwood, tolerant mixed wood or any cedar dominated stands. Sometimes it may also be used in stands with significant components of Red Spruce. In addition, harvesting in riparian zones, recreational, aesthetically important, or other constrained zones may require that a single tree selection treatment is utilized. Typically, uneven aged management may remove 40% of the stand volume each entry, depending upon the specific stand condition with subsequent entries separated by 20 to 30 years. The objective of the single tree selection treatment is generally to develop a full range of age and diameter classes in the stand; as well as to provide a suitable diversity of tree species at all times.

Harvest treatments are performed using the following harvesting systems:

- Mechanical Harvester Single Grip (MHS): MHS harvesting incorporates various at-the-stump processors combined with forwarders (porters) used to transport wood to the roadside.
- Mechanical Full Tree (MFT) Harvesting: MFT harvest systems utilize a feller buncher, grapple skidder, delimeter, slasher, chipper, and grinder combinations.
- Mechanical Processor in Box (MPB) Harvesting: MFB harvest systems utilize a feller buncher, grapple skidder, processor, chipper, and grinder combinations.
- Mechanical Processor at Roadside (MPR) Harvesting: MPR harvest systems utilize a feller buncher, grapple skidder, delimeter, chipper, and grinder combinations.
- Conventional Hand Crews: Rare occasion for specialty items. Conventional logging utilizes a cable skidder with a man and chainsaw.