SEWALL
JAMES W. SEWALL COMPANY / Since 1880

February 7, 2012

William Beardsley
Commissioner
Maine Department of Conservation
22 State House Station
Augusta, ME 04333-0022

RE: Hardwood Resource in the State of Maine

Dear Commissioner:

James W. Sewall Company (Sewall) is pleased to present the following summary of our independent assessment of the hardwood resource in the State of Maine. This work was contracted with the Department on December 8, 2011 under VC no. 1000039205.

EXECUTIVE SUMMARY

The focus of this report is only on the traditional hardwood roundwood resources of sawlogs and pulpwood. This report is restricted to "non-federal timberlands" owned by public and private entities in the State of Maine. The Statewide hardwood resource appears to have a healthy starting inventory which has declined slightly since the 2003 inventory, but is still overall 16.6% higher than the 1995 inventory. Statewide, the balance between what is being grown and what is being removed (drain) is slightly positive over the last inventory cycle.

To evaluate regional differences, Sewall was asked to divide the State into four "areas of interest" of roughly equivalent size.[1] Merchantable hardwood standing inventory is divided approximately as follows:

- 40% in the Southern/Western megaregion,
- 25% in the counties of Piscataquis and Somerset,
- 18% in the Eastern megaregion, and
- 17% in Aroostook County.

Hardwood volumes on a per acre basis are highest in the Southern/Western megaregion (32 green tons/acre), and lower in the other regions (19 tons/acre in Piscataquis and Somerset Counties, and approximately 15 tons/acre in both Aroostook and the Eastern megaregion).

[1] For the purposes of this study, the areas of interest are:
- Aroostook County,
- Piscataquis and Somerset counties combined.
- The Eastern megaregion includes Hancock, Penobscot and Washington counties.
- The Southern/Western megaregion incorporates Androscoggin, Cumberland, Franklin, Kennebec, Knox, Lincoln, Oxford, Sagadahoc, Waldo, and York counties.

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There are wide regional differences across the areas of interest with respect to growth/drain ratios:

- 0.6 to 0.7 in northern Maine (Aroostook, Piscataquis and Somerset Counties),
- 1.2 in the Eastern megaregion,
- 2.0 in the Southern/Western megaregion.

The variation in these ratios is even greater on a county basis.

Our modeling shows that, over the first 10-year projection period (2012-2021), annual statewide removals of hardwood will have to decrease slightly (1%) compared to historical drain (8.2 million tons[2]) to maintain levels consistent with current hardwood standing inventory. If this is accomplished, the model shows the potential to increase average annual removals by 29% above 8.2 million tons during the second 10-year period (2022-2031).

In contrast, if removal levels in the model are started at the estimated 3-year historical average annual drain (7.3 million tons) and constrained to an average over the prediction period equal to the 10-year historical average annual drain (8.2 million tons), then Statewide inventory of hardwood will grow steadily and increase by 11% by the end of the 20-year forecast period.

All these predicted removal levels are predicated on the assumption that all operable timberland acres in the model will be available for harvest. Indications from the data show that there is quite a divergent range in hardwood drain across the State. The report discusses a number of potential obstacles and opportunities for sustained or increased removal levels.

HARDWOOD RESOURCE

STUDY PARAMETERS

For purposes of this study we looked at timberlands in the State of Maine excluding federal lands. Private, State and local timberlands are included, resulting in 17.1 million acres of timberland in the study area. Appendix B details how acres are classified in the FIA dataset, as well as a breakdown of Maine acres.

This report utilizes the following definitions:

- € Historical drain: the estimated growing stock volume removed over the period as calculated in the FIA 2010 inventory.
- € MFS-WPR harvest: the level of forest product deliveries reported in the Maine Forest Service "Wood Processor Report".
- € Harvest: the severing and removal of wood from timberlands.
- € Removals: the predicted (modeled) quantity of growing stock volume that is theoretically available for consumption in the timeframe stated.

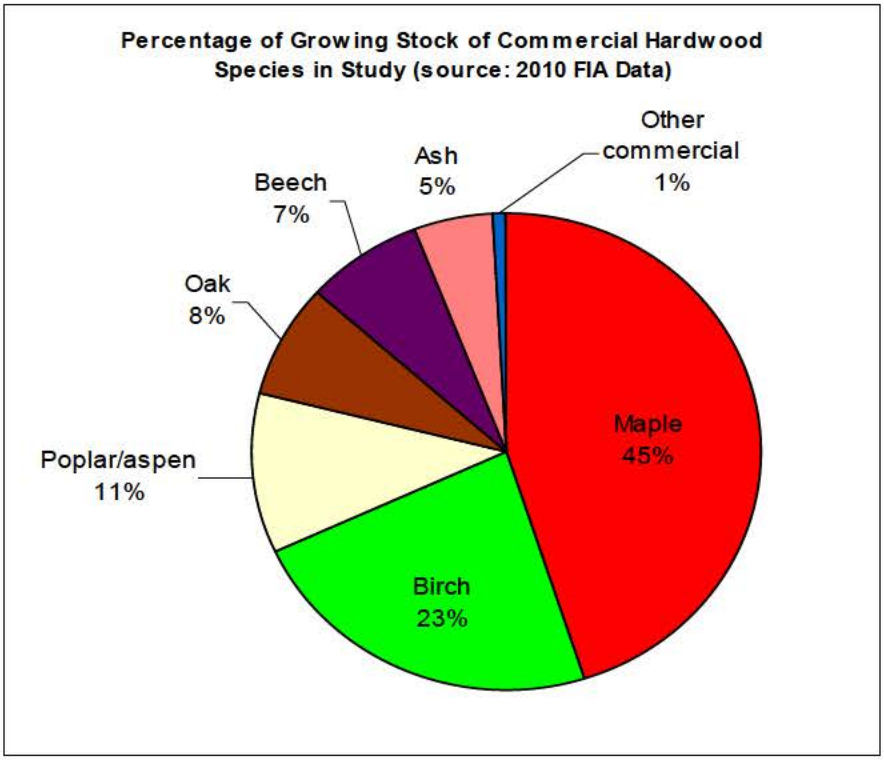
The authors recognize that these words have different definitions, and we narrow their meaning here only to give clarity to this report.

[2] Average current drain level used was the 2010 FIA drain; roughly equivalent to 8.2 million tons per year.

CURRENT ESTIMATED STANDING INVENTORY AND GROWTH/DRAIN

Estimates of standing inventory were derived using the U.S.D.A. Forest Service Forest Inventory and Analysis (FIA) dataset, which is current to the measurement of the 2010 panel.[3]
The standing inventory of commercial hardwood in the State of Maine is estimated to be 351 million green tons.[4] As a point of perspective, this quantity of standing inventory represents approximately 42 times the amount of annual average hardwood drain in the State.[5]

Figure 1. Species Composition of the Maine Hardwood Inventory



Of this estimated volume, Maple (Acer) species comprises about 45% of the total; birch (Betula) species about 23%; Poplar/aspen (Populus) species about 11%, and Oak (Quercus) species about 8%. See Figure 1 for a detailed breakdown. Most of the oak lies in southern Maine. Oak makes up greater than 30% of the hardwood mix in the four southern counties of Cumberland, Lincoln, Sagadahoc and York; while only 1% or less in the three most northern counties of Aroostook, Piscataquis and Somerset.

Sawlogs in grades I and II comprise about 18% of the total growing stock of hardwood, with the remainder (82%) being categorized in this report as pulpwood.

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[3] FIA data in Maine are collected on a five-year cycle, with roughly one-fifth of the plots being inventoried each year. The data set used included panels from 2006-2010. Change detection (i.e.: growth and drain) is done by comparing plots from one panel year (2010) with the same plots taken five years earlier (2005).
[4] Throughout this report we express inventory in terms of FIA "growing stock", plus rough cull (which we believe is often merchantable). Units are in tons. Conversion factors used are: 2.15 tons/cord for aspen, 2.7 for oak and 2.5 for other hardwoods. The study uses 80 cubic feet/cord and 2 cords per Mbf for all hardwood species.
[5] The denominator used was the FIA drain over the last inventory cycle (8.2 million green tons/year).

For the regional analysis, we were asked to divide the State into four areas of similar size. This resulted in the following four areas of interest (Figure 2):

- Aroostook County – 3.8 million acres of timberland.
- The Eastern megaregion: Hancock, Penobscot and Washington counties – 4.2 million acres of timberland.
- The Southern/Western megaregion: Androscoggin, Cumberland, Franklin, Kennebec, Knox, Lincoln, Oxford, Sagadahoc, Waldo, and York counties – 4.5 million acres of timberland.
- Piscataquis, and Somerset counties – 4.6 million acres of timberland.

Figure 2. Timberland Acres in each of Four Areas of Interest

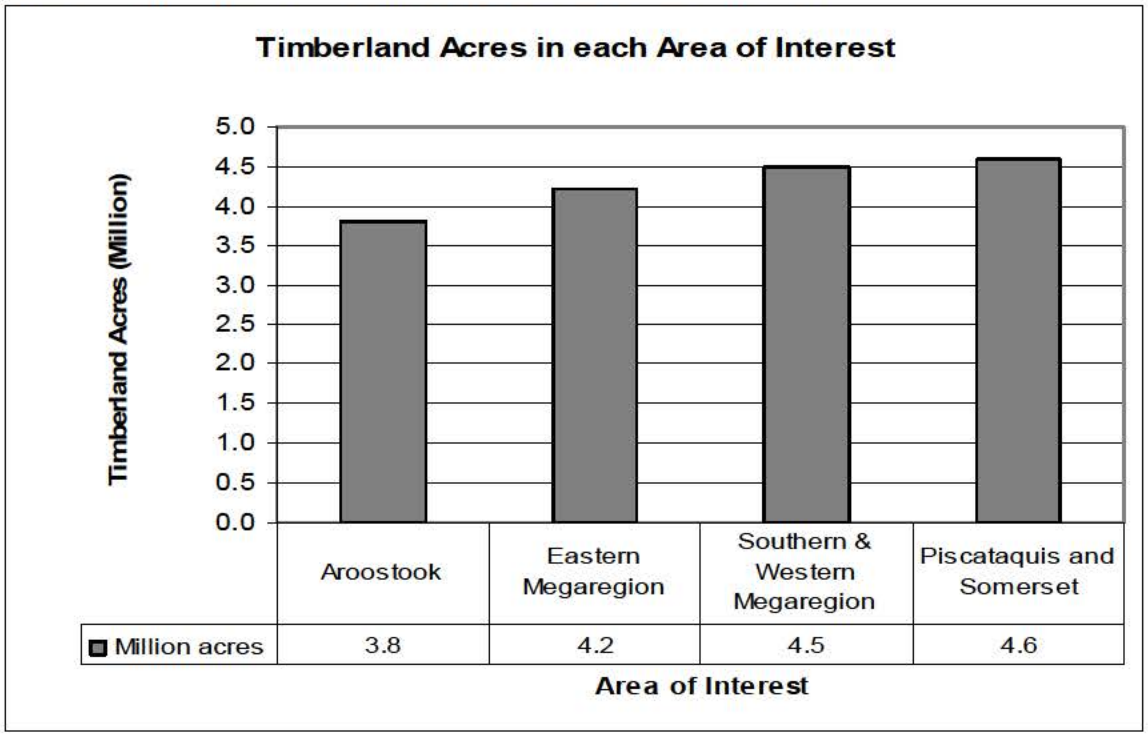
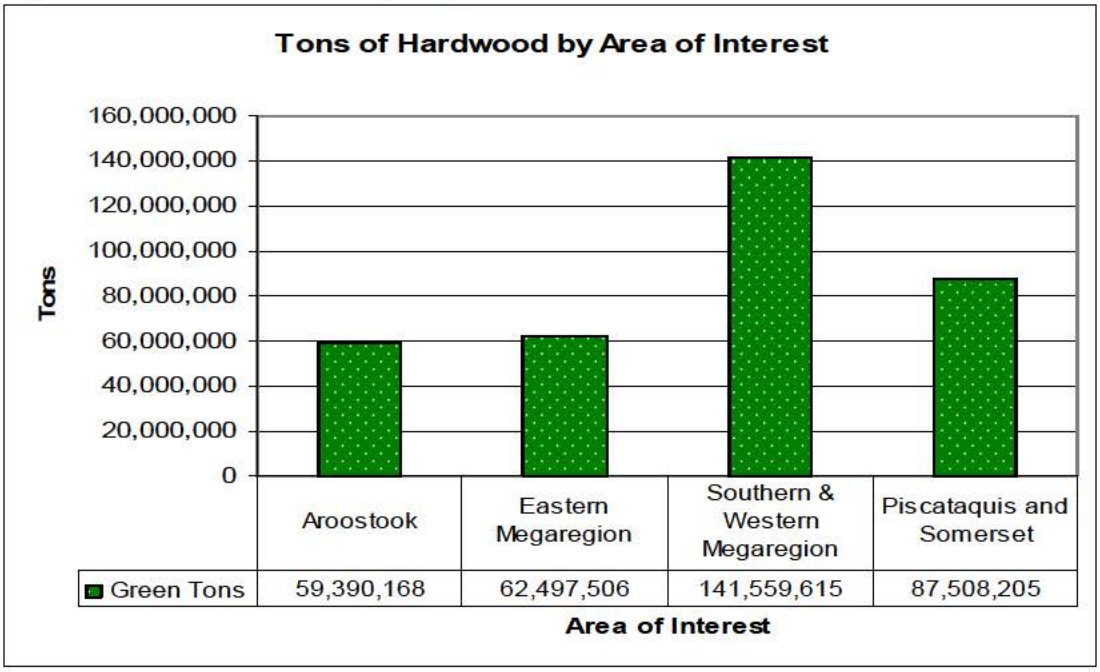


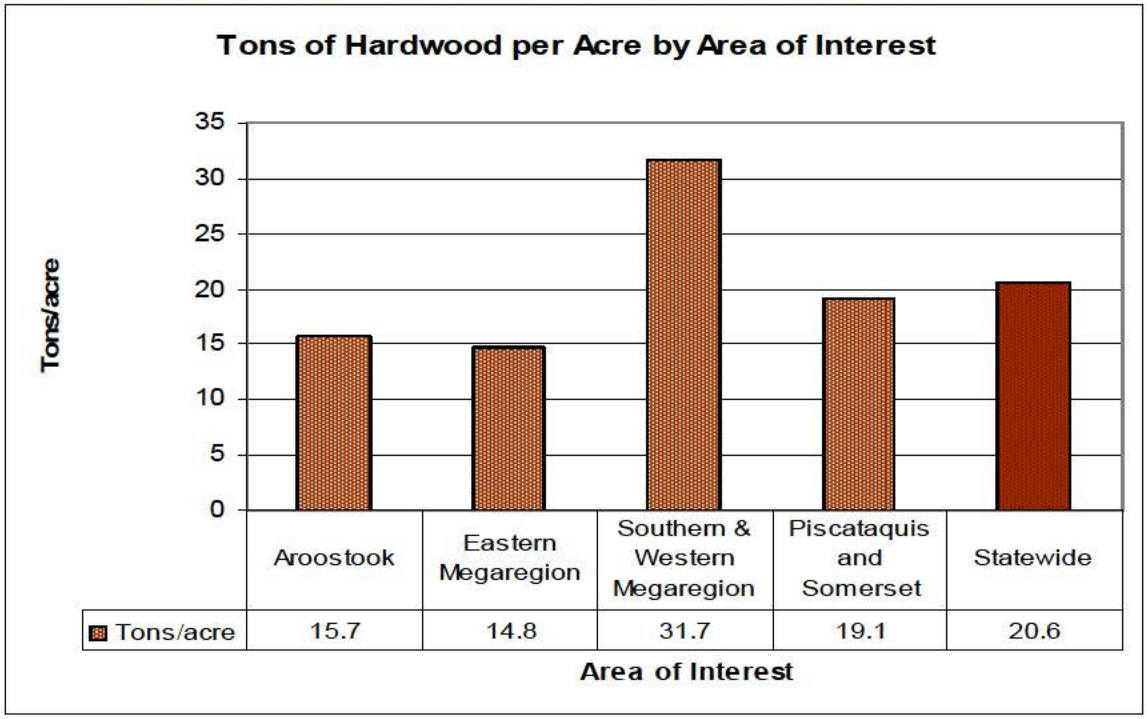
Figure 3 shows total hardwood tons by region: 40% of the merchantable hardwood standing inventory in the State is in the Southern/Western megaregion, 25% in the counties of Piscataquis and Somerset, 18% in the Eastern megaregion, and 17% in Aroostook County.

Figure 3. Hardwood Tons by Region



Hardwood volumes on a "per acre" basis (Figure 4) are highest in the Southern/Western megaregion (32 green tons/acre), and lower in the other regions (19 tons/acre in Piscataquis/Somerset, and approximately 15 tons/acre in both Aroostook County and the Eastern megaregion).

Figure 4. Volume per Acre of Merchantable Commercial Hardwood

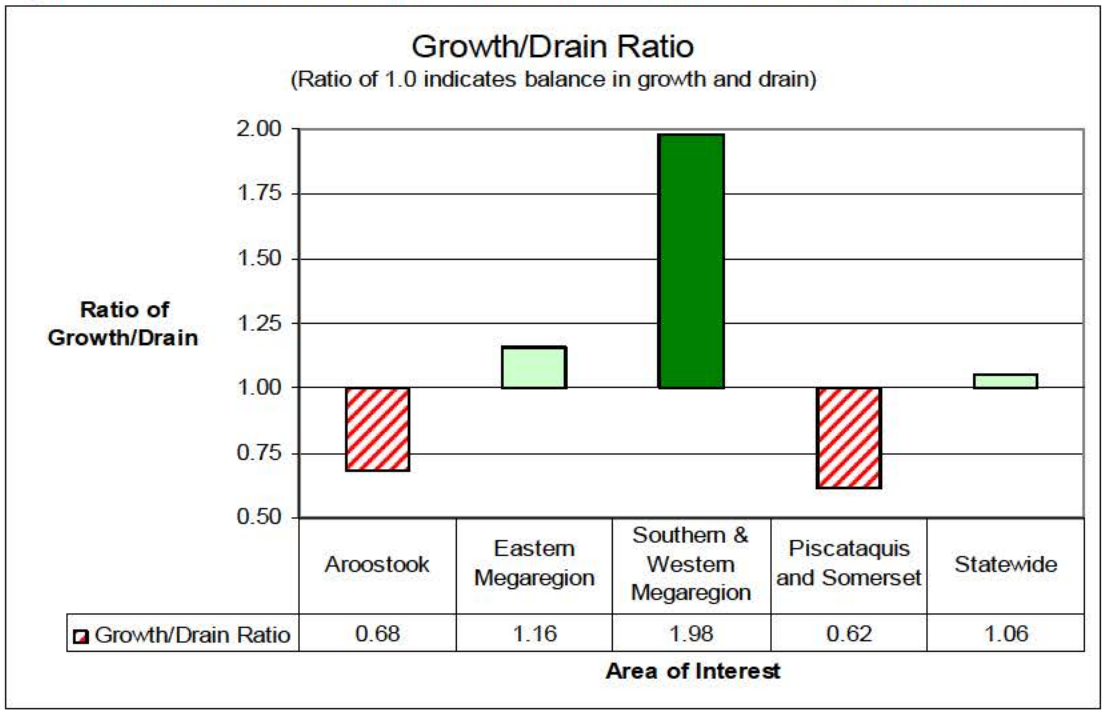


The latest Statewide inventory results show an overall growth/drain ratio of 1.06, indicating that, over the last FIA change period, growth of hardwood was approximately 6% greater than the amount drained (timber no longer available due to harvest and land use change). On a Statewide basis this is a positive trend, but there are a several factors that need to be considered before using the Statewide averages as a basis for any decision-making:

1. Regionally, there is a wide variation in growth/drain ratios (Figure 5):
   a. 0.68 in Aroostook County
   b. 1.16 in the Eastern megaregion
   c. 1.98 in the Southern/Western megaregion
   d. 0.62 in Piscataquis and Somerset Counties

   The variation in these ratios is even greater when viewed at the county level for those three areas of interest that represent combined counties.
2. Higher growth/drain ratios appear to correlate positively with the amount of public and non-industrial private timberlands in the region.[6] There are several reasons this could be the case, which we take up in the discussion section.
3. Hardwood harvest reported through the Maine Wood Processor Report has demonstrated a decline in the State of Maine over the last three years, as compared with the average over the previous seven. The State Wood Processor Report data (graph in Appendix B) shows that total hardwood harvest in the State over the last three years is 85% of the seven years previous to this. Most of this reduction has been recorded in the sawlog portion of the report (dropped to 68%), versus the pulpwood portion (95%).[7]

Figure 5. Growth versus Drain – Maine Merchantable Commercial Hardwoods



[6] The scope of this study did not fund closer examination of these apparent relationships.
[7] For purposes of this calculation the three-year average from 2007-2009 was compared to the seven-year average of 2000-2006.

FUTURE HARDWOOD PROJECTIONS

KEY ASSUMPTIONS

Sewall biometricians modeled this same 17.1 million acres of timberland forward in time for 20 years. Numerous "model runs" were performed to validate the constraints and to assess how the resource might respond to varied removal and inventory constraints. The final two model runs presented in this report were configured to optimize the total harvest subject to numerous constraints.

In both model runs:

- Sewall allowed the model flexibility, after year one, to shift the mix between sawlogs and pulpwood and to increase/decrease removals up to 6% per year (contractor availability constraint).
- Numerous other silvicultural and operational constraints are explained in the model assumptions (Appendix A).
- One of the key assumptions in all the model runs is that operable timberland acres[8] are available for removal.[9] This point is taken up in the discussion section.

In Model Run A:

- The starting harvest levels in the model were set to approximate the 10-year average annual hardwood drain (8.2 million tons) and average mix.[10]
- The model was constrained to end up with at least the same amount (or more) of total standing inventory of hardwood as current inventory (351 million tons).

In Model Run B:

- The starting removal levels in the model were set to approximate the estimated 3-year average annual hardwood drain (7.3 million tons) and mix.
- The model was constrained to remove an average amount over the 20-year period equal to the 10-year (FIA) drain to project the impact on the total standing inventory of hardwood.

Model Run A: Optimize Hardwood Removal while Maintaining Current Inventory

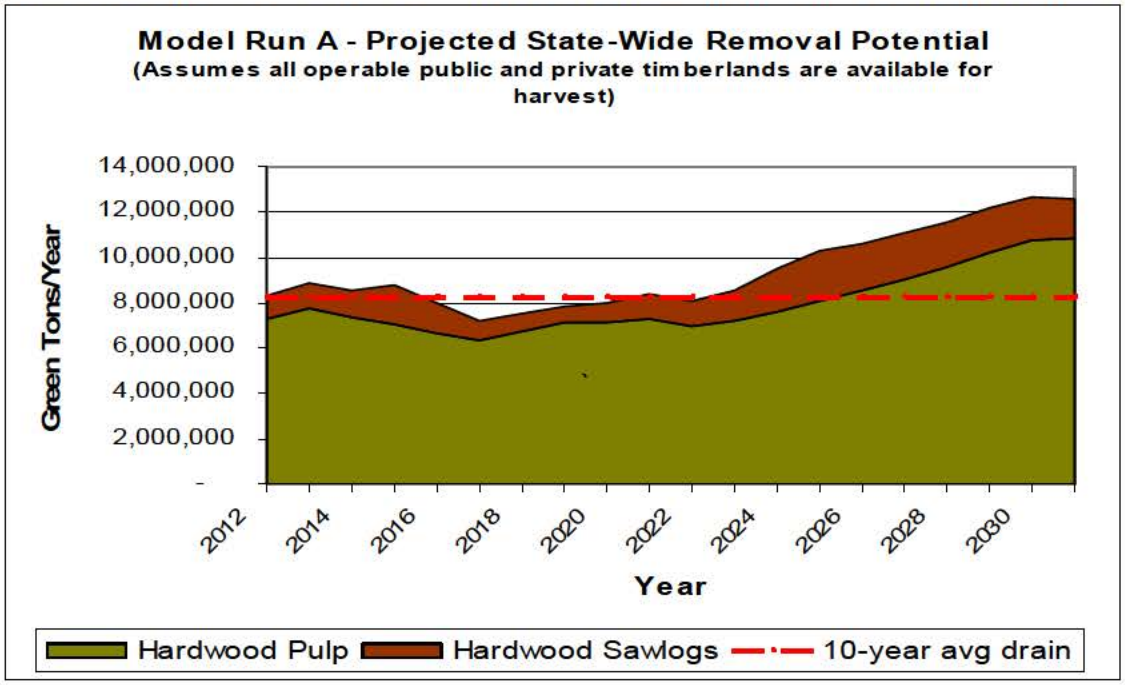
If removals are maximized while still maintaining (or increasing) standing inventory of total hardwood at current levels, the model predicts the following on a statewide basis (Figure 6):

1. The average annual removal declines from the 10-year average drain of 8.2 million tons by approximately 1% to 8.1 million tons over the first 10-year period (2012-2021). The model shifts significant amounts of removal volume from the northern half of the State to the southern half where current inventories and growth/drain ratios are higher. While this projects a decline from the historic 10-year drain, this level of hardwood removal reflects an increase over the historic 3-year average drain.

[8] Operable acres are those the model deems are able to be physically and legally harvested. Sewall constrained the model for harvesting on steep slopes, in protection zones, and in the percentage of clearcuts (see Assumptions in Appendix A).
[9] The primary reason that operable acres might not be available for harvest is landowner objectives (i.e.: unwillingness to harvest).
[10] Average historical drain is based on 2010 FIA drain figures. Average mix based on WPR ratio between sawlogs and pulpwood.

2. If this decrease and shift is accomplished in the first 10-year period, the model allows an increase in average annual removal to approximately 11 million green tons of hardwood (a 29% increase over the 10-year historical average drain) for the second 10-year period.
3. Both of these results are predicated on the assumption that all operable timberland acres are available for removal. A sensitivity analysis of this assumption is included in the *Discussion* section.
4. In this model run, the predicted hardwood inventory never drops below the current inventory of 351 million tons over the projection period.

Figure 6. Projected Hardwood Removal Potential – Maintaining Current Inventory



Run B: Removals at 10-year Average to Monitor How it Impacts Inventory

If the model is constrained to start with the estimated 3-year annual historical hardwood drain (7.3 million tons)[11] and to achieve an average over the twenty-year projection period equal to the 10-year annual drain (8.2 million tons), then it predicts the following relative to Statewide inventory (Figure 7) and harvest (Figure 8):

1. The model builds Statewide hardwood inventory throughout the period, ending with an 11% increase by 2031.
2. It does this by constraining the annual hardwood removals in the first 10-year period to an average of 7.64 million tons (4% higher than the estimated hardwood drain over the last three years). In the second 10-year period it allows removals to average 8.9 million tons (9% greater than the 10-year average drain).

[11] To derive this estimate Sewall used the percentage of the decline in the WPR data (last 3-years were 88.9% of full 10 year period) to modify the FIA drain of 8.2 million tons.

Figure 7. Statewide Hardwood Inventory under a Scenario where Removals over the 20-year Period are Equal to the Historical 10-year Average Drain

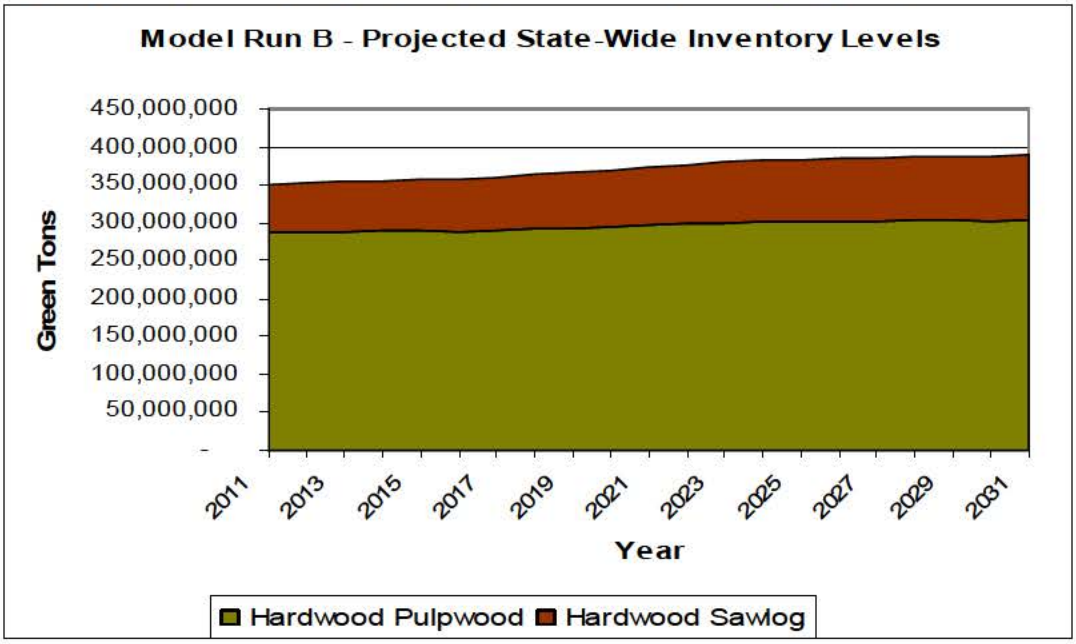
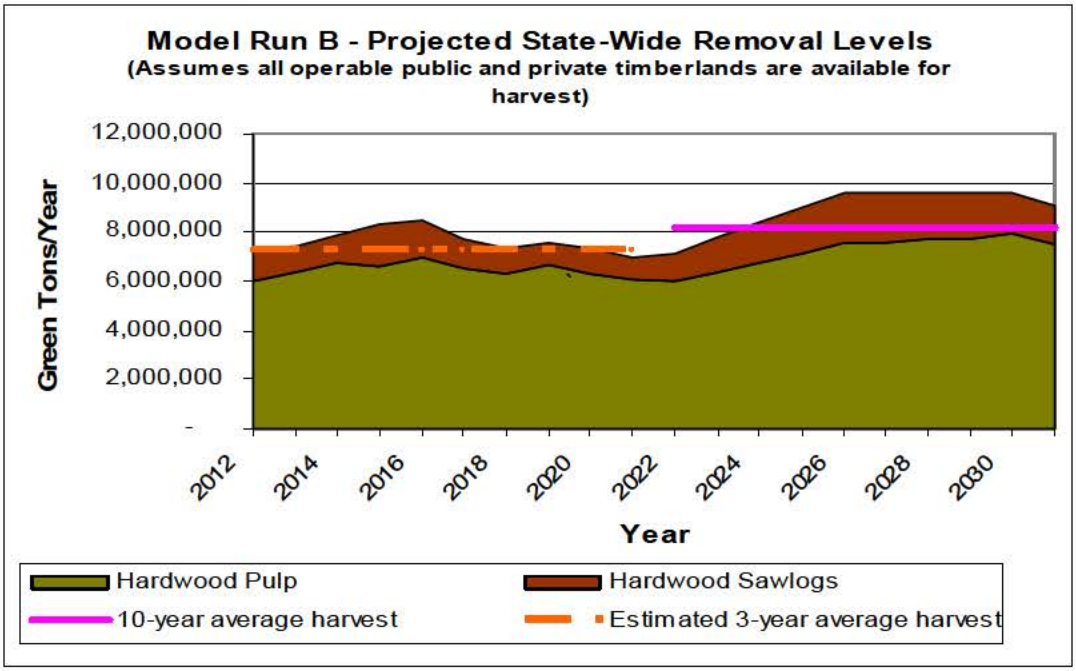


Figure 8. Statewide Hardwood Removal Potential Optimization under a Scenario where Removals over the 20-year Projection Period are Equal to the Historical 10-year Average Drain



DISCUSSION

In general, it appears that the largest volumes on a "per acre" basis of hardwood standing inventory, as well as the most positive growth/drain ratios, are in the southern (and to a lesser degree western) portions of the State. This makes intuitive sense when we consider how forest composition, land ownership objectives, economic drivers and logistics might have come together to create this current hardwood forest:

- The species mix (by volume) in northern Maine tends to be heavier to softwood (55%) and slightly less on hardwood (44%), whereas southern Maine tends to be the opposite with hardwood species making up 54% of the volume mixed with pines, hemlock, and to a lesser degree spruce/fir.
- Timberlands in northern Maine tend to be owned in larger blocks by companies with the economic drivers and staff/organization for more regular and systematic harvests,[12] versus southern Maine which is predominantly non-industrial private forest land (NIPF) with smaller and more fragmented parcels. NIPF owners tend to harvest episodically, often waiting for log markets to be favorably priced. They rarely retain their own forestry staff. Large landowners tend to have a fairly uniform annual harvest, both for economic reasons and to keep staff and harvesting infrastructure optimally employed.
- Historically a number of large land owners in the North have used silvicultural practices to favor the commercial softwood regeneration, while loggers on NIPF lands have traditionally harvested the pine and hardwood sawlogs (with pulp as a by-product of these sawlog harvests).
- The logistics of purchasing and/or logging larger tracts or those with centralized oversight are favorable over smaller and more fragmented tracts, owing to economies of scale and fixed costs.
- An increasing percentage of NIPF owners retain their lands for objectives other than timber harvest (recreation, conservation, buffer zones, etc), and thus decisions over whether to harvest may be more easily tipped toward not cutting.

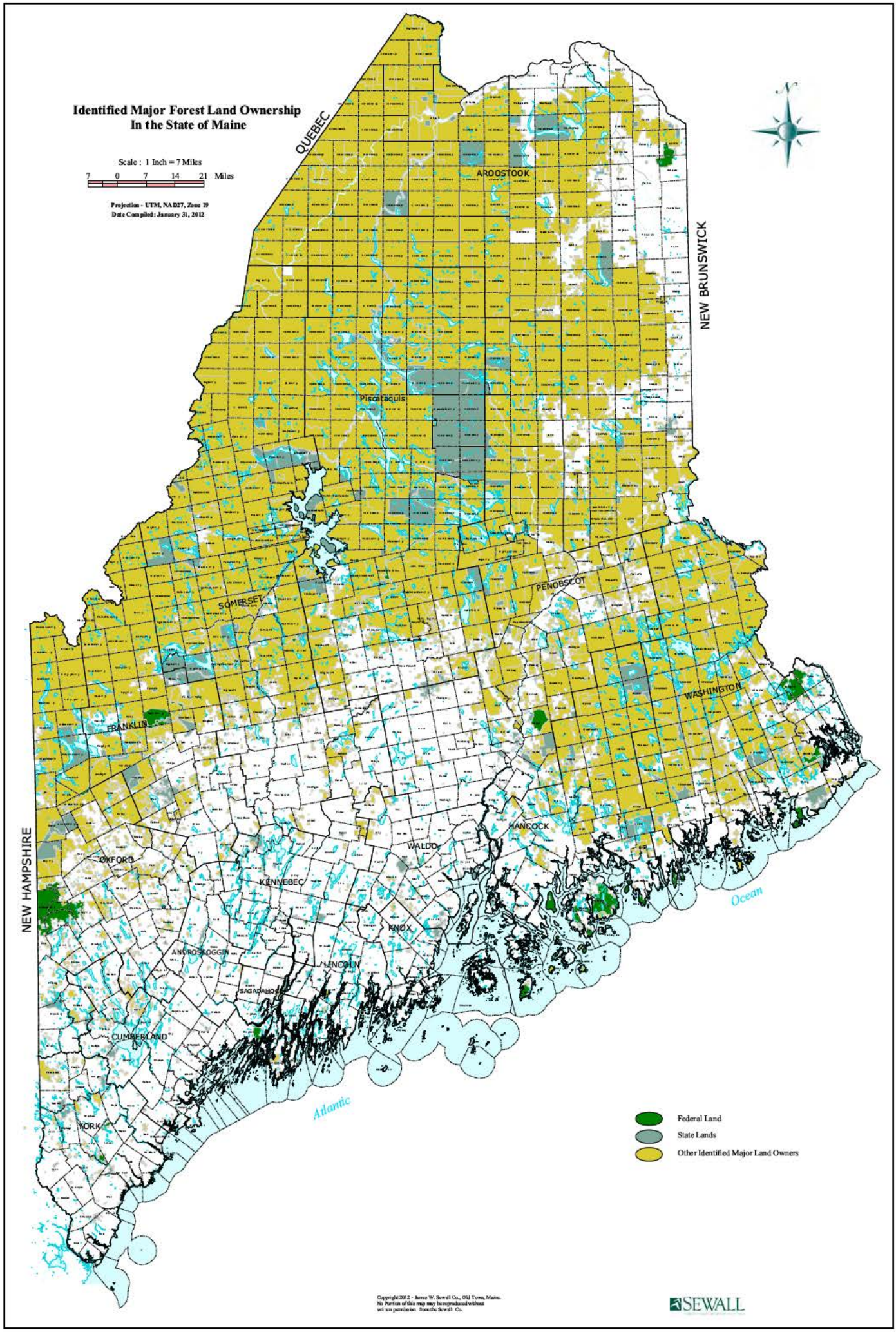
This study demonstrates the potential for a fairly sustainable removal of hardwood for 10 years and then future increases provided that all 17.06 million acres of operable non-federal timberland are available for harvest. The authors believe this will be challenging, given the demographics and logistics discussed above.

In rounded numbers, the 17.1 million acres of non-federal timberlands in the State are owned as follows (Figure 9):

- 10.0 million by large landowners,
- 0.8 million by the State and local government, and
- 6.3 million by small non-industrial private landowners.

To the degree that any of these operable acres are set aside by individuals/organizations where harvesting is not part of their ownership objectives, then the potential removals predicted by these model runs will be effected downward.

[12] The obvious exception are those lands owned by groups and individuals where harvest is not a part of the ownership objectives.


Identified Major Forest Land Ownership
In the State of Maine
Scale : 1 Inch = 7 Miles
7 0 7 14 21 Miles
Projection - UTM, NAD27, Zone 19
Date Compiled: January 31, 2012
QUEBEC
NEW BRUNSWICK
NEW HAMPSHIRE
AROOSTOOK
Piscataquis
SOMERSET
PENOBSCOT
WASHINGTON
FRANKLIN
HANCOCK
WALDO
OXFORD
KENNEBEC
KNOX
ANDROSCOGGIN
LINCOLN
SAGADAHOC
CUMBERLAND
YORK
Atlantic
Ocean
Federal Land
State Lands
Other Identified Major Land Owners
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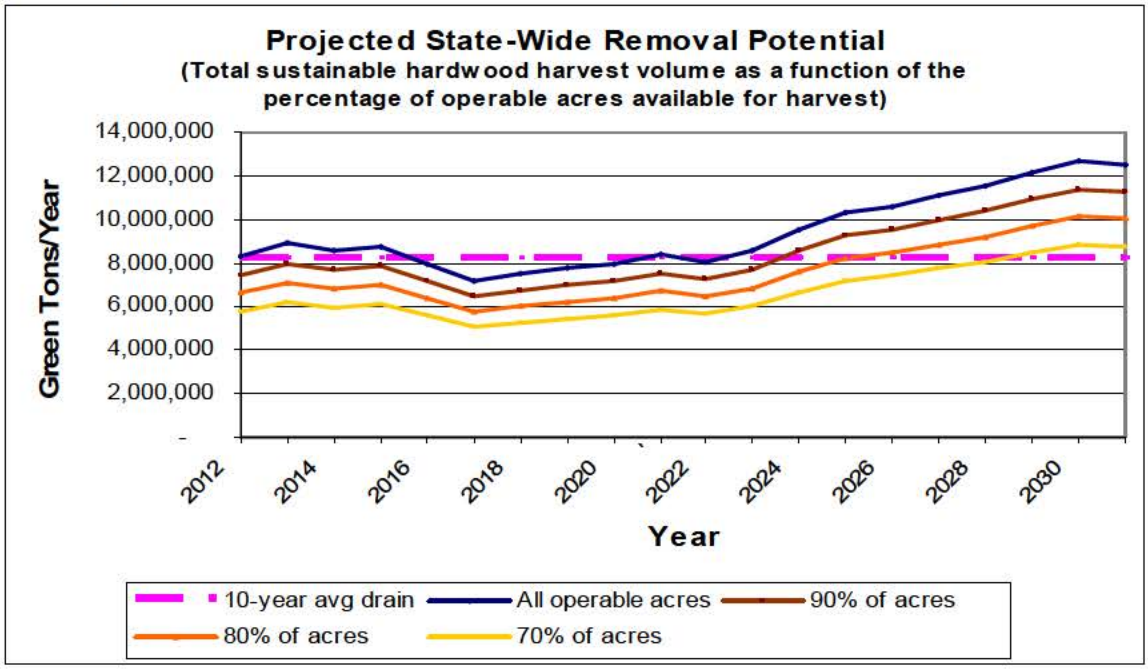
We show the reduced potential with Figure 10, where the solid lines are the maximum potential removal if current inventory is to be maintained. The solid lines represent a hypothetical percentage of study timberlands that would be available for harvest over the period, as compared to the dashed line which depicts the historical average drain.

- In all cases, the annual removal level in the first 10-years has to be less than the historical 10-year average drain of 8.2 million tons or the model predicts a reduction in inventory.
- Assuming an average volume per acre, if greater than 10%-15% of the operable timberland acres in public and private ownership are unavailable for harvest, then the predicted sustainable removal levels over the next 20 years fall below the historical 10-year average drain
- If 20%-25% of the operable timberland acres in public and private ownership are unavailable for harvest, then the predicted sustainable removal levels over the next 20 years fall below the historical 3-year average annual drain. This also assumes that any acres removed have "average" stocking

Figure 10. Sensitivity of Projected Hardwood Harvest Potential Given Willingness to Harvest



Lastly, we would be remiss if we did not mention two other factors that impact the hardwood harvests and consumption in the State of Maine:

1. The impending potential competition that could be generated by the renewable energy markets both domestically and in Europe. We continue to observe announcements and interest in all of the following:

    - Expanded firewood processing and sales (primarily pulpwood in dense hardwood species like oak, beech, and maple).

- Use of hardwood species to produce bio-refined fuels.
- Domestic use of pellets (pressed and torrefied).
- Plans and preparations to use the ports in Maine to ship Maine fiber offshore.

Several of these emerging markets could be very favorable to the landowners and economy of the State of Maine. To wit, these markets could:

- offer the opportunity to use low-valued species and wood of poor form;
- supplement harvest income and therefore motivate harvesting; and,
- encourage a greater use of silvicultural improvement to forest stands.

With these factors recognized, these new sources could also add additional demand above and beyond that recognized in our models (which utilized historical drain statistics).

2. The State is historically a net importer of hardwood fiber, and areas surrounding Maine generally appear to have favorable stocking and positive growth/drain ratios. A few facts illuminate this point:

   - Net imports of hardwood roundwood have averaged[13] between 8% and 15% of the hardwood roundwood processed in Maine since 1991.
   - Growth/drain of hardwood in the megaregion of New Hampshire and Massachusetts is greater than 2.7 (growing more than twice the drain). Nova Scotia and Quebec are both over 2 and New Brunswick is just over 1.
   - Manufacturers in the State provide alternative outlets for this wood and any utilization of these wood baskets can offset the volume that comes from Maine forests.

Thank you for the opportunity to offer our services.

Sincerely,

David Edson
President
James W. Sewall Company
State of Maine Licensed Professional Forester 694

Dave Stevens
Vice President
James W. Sewall Company

Tim Mack
Biometrician and Sr. Consultant
James W. Sewall Company

[13] Based on a five-year average.

Appendix A
Methodology & Assumptions

APPENDIX A: METHODOLOGY AND ASSUMPTIONS

FIA (Forest Inventory and Analysis)

- 2010 Data Set, including panels from 2006-2010
- Based on timberland area on non-Federal timberlands
- All data and calculations done in cubic feet and converted and reported in tons. Conversion factors for hardwood:
  - 80 cubic feet/cord,
  - Tons/cord: 2.15 for aspen, 2.7 for oak, 2.5 for other hardwood (combined)
- Product classes are as reported by FIA with the following modifications
  - Sawtimber is grades I & II only.
  - All other growing stock, plus rough cull is lumped in pulpwood category.

WPR (Wood Processor Report)

- WPR removals based on the Department of Conservation – Maine Forest Service "Wood Processor Report" (years 2000-2009).

Growth Modeling (Woodstock yields)

- Plots with BA < 30 square feet are grown using *Fiber*,[14] using the FIA volumes as the starting inventory volume. Yields based on prior JWS modeling.
- Non- managed plots (not planted and no PCT) grown in *FVS*[15], using the FIA volumes as the starting inventory volume.
  - Grown 25 years using 5-year cycles.
  - Using trees 1" and larger.
  - Used a mortality multiplier of an additional 4% over *FVS* mortality model to temper growth rates. (Starting growth rate equals that indicated by 2010 FIA data set.)
- Managed stands grown using *GNY*[16] yield tables from prior JWS modeling.

Woodstock parameters (all runs)

- Objective: maximize total harvest volume over the period.
- Model grown for 25 years. Results reported for first 20. (Done to avoid "end of model funny business" when optimizing.)
- Model constrained to produce "even flow" for key species. In this case even flow is defined as the average range of variability for these species dating back to 1990. The purpose of this constraint is to produce a historical range of variability for wood flows, preventing unrealistic trends. (i.e.: the model unrealistically cuts a whole lot of hardwood in an attempt to maximize S/F production.) Key species variability for this constraint are as follows:
  - Total Cut: 28%
  - Total S/F Cut: 41%
  - Total Pine Cut: 29%
  - Total Hemlock Cut: 50%
  - Total Hardwood Cut: 32%

[14] Solomon, Dale S.; Hosmer, Richard A.; Hayslett, Homer T., Jr. 1987. FIBER handbook: a growth model for spruce-fir and northern hardwood types. NE-RP-602. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 19 p

[15] http://www.fs.fed.us/fmsc/fvs/description/index.shtml

[16] Nova Scotia Growth and Yield Model Version 2. Brad MacPhee, Timothy P. McGrath. Timber Management Group Forest Management Planning Section, Forestry Division, Department of Natural Resources,Nova Scotia Government, Nova Scotia, Canada. Report FOR 2006-3 No. 79

- Sequential yield constraints on total cut and hardwood cut year to year of 6%. Smoothes the blocky nature of the even flow constraints. Also mimics the logging infrastructure ability to expand.
- Minimum total harvest may not drop below 392,395,000 cubic feet (about 4.5MM cords). This is the 2009 low-point since 1990. No direct cap on max harvest levels, but inventory constraint prevents liquidation.
- Areas with slopes greater than or equal to 40% are not eligible for harvest.
- 10% of the remaining area is considered to be in restricted harvest zones (i.e.: streamside protection zones and others where full harvesting is prohibited.)
    - No clear cutting, planting or other management activities are allowed in these zones.
    - Thinning and shelterwood harvesting only.
    - Not more than 1% of this area can be harvested per year.
- Clearcuts may not exceed 3.2% of the harvest area in any given year. (Based on annual Maine Forest Service (MFS) silvicultural reports.)
- Current planted area based on FIA data.
- Current Pre-Commercial Thinning (PCT) area based on MFS data by traditional MFS megaregion, which are not necessarily the same as "areas of interest" used in reporting in this report.
- New planting is limited to 5,000 acres per year. (Based on most recent MFS reports.) TIMO[17]s are not managing intensively.
    - 4,000 acres north.
    - 250 acres south.
    - 250 acres west.
    - 500 acres east.
- PCT is limited to 9,000 acres per year. (Based on most recent MFS reports.)
    - 7,200 acres north.
    - 450 acres south.
    - 900 acres west.
    - 450 acres east.
- Herbicide release to produce SW stands is limited to 11,000 acres per year. (Based on most recent MFS reports.)
    - 8,800 acres north.
    - 550 acres south.
    - 1100 acres west.
    - 550 acres east.
- Shelterwood, overstory removal (final shelterwood cut), and commercial thinning areas each may not fluctuate up or down year to year by more than 20%.

Woodstock parameters (selected runs)

- Total inventory must be >= current inventory starting in year 20.
- Hardwood total inventory must be >= current inventory starting in year 20.
- Average hardwood harvest over the period equal to #.
- Starting hardwood harvest volume (first year in model) equal to #.

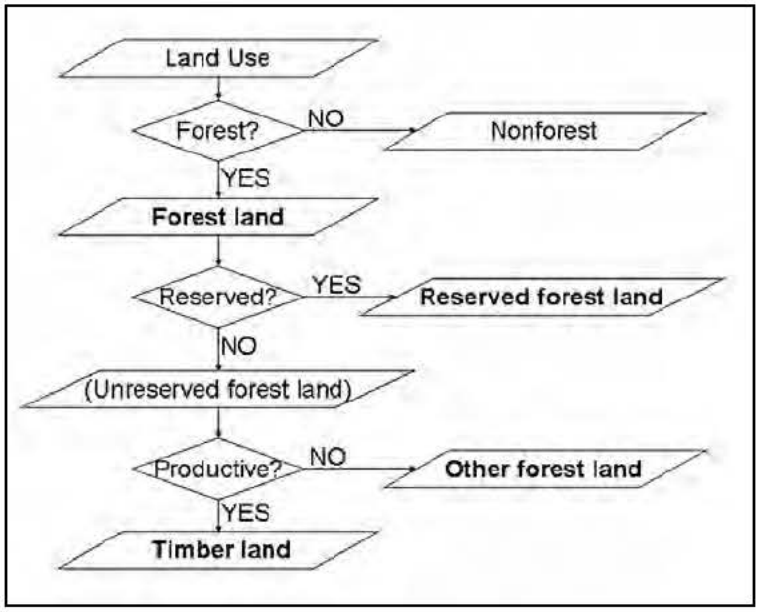
[17] Timberland Investment Management Organization (TIMO)

Appendix B
Supplementary Data & Graphs

APPENDIX B: SUPPLEMENTARY DATA AND GRAPHS

Acres - State of Maine (FIA - 2010)			
All Maine, incl water	**22,648,320**	**100%**	
Maine inland water	2,894,720	13%	
Maine landbase	**19,753,600**	**87%**	Of Total
All Forestland	17,476,014	88%	
Timberland	**17,191,655**	**87%**	Of Landbase
Forest Service	52,676	0.3%	
Other Federal	74,085	0.4%	
Study area: Private and Public	**17,064,894**	**99.3%**	Of Timberland
Private	16,238,069	95%	
Public	826,825	5%	Of Study area

Decision rules for classifying forest land into timber land, reserved forest land, and other forestland[18]



18 From, Mapping Forest Inventory and Analysis Forest Land Use: Timberland, Reserved Forest Land, and Other Forest Land
Mark D Nelson1 and John Vissage 2005 Proceedings of the Seventh Annual Forest Inventory and Analysis Symposium

Definitions:

Forest land: Land that is at least 10 percent stocked with trees of any size, or that formerly had such tree cover and is not currently developed for a non-forest use. The minimum area for classification of forest land is one acre. The components that make up forest land are timberland and all noncommercial forest land (see definitions).

Reserved forest land: Forest land that is withdrawn by law(s) prohibiting the management of the land for the production of wood products.

Other forest land: Forest land that is incapable of producing 20 cubic feet per acre per year of industrial wood under natural conditions, because of adverse site conditions (formerly known as unproductive forest land).

National Forest lands: Federal lands legally designated as National Forests or purchase units and other lands administered as part of the National Forest System by the USDA Forest Service.

Federal lands: Lands (other than National Forests) administered by Federal agencies.

Timberland: Forest land producing or capable of producing crops of industrial wood (more than 20 cubic feet per acre per year) and not withdrawn from timber utilization (formerly known as commercial forest land).

Commercial species: Tree species currently or prospectively suitable for industrial wood products; excludes species of typically small size, poor form, or inferior quality, such as hawthorn and sumac.

Growing-stock volume: Net volume, in cubic feet, of growing-stock trees 5.0 inches d.b.h. and larger from a 1-foot stump to a minimum 4.0-inch top diameter outside bark of the central stem, or to the point where the central stem breaks into limbs. Net volume equals gross volume less deduction for cull.

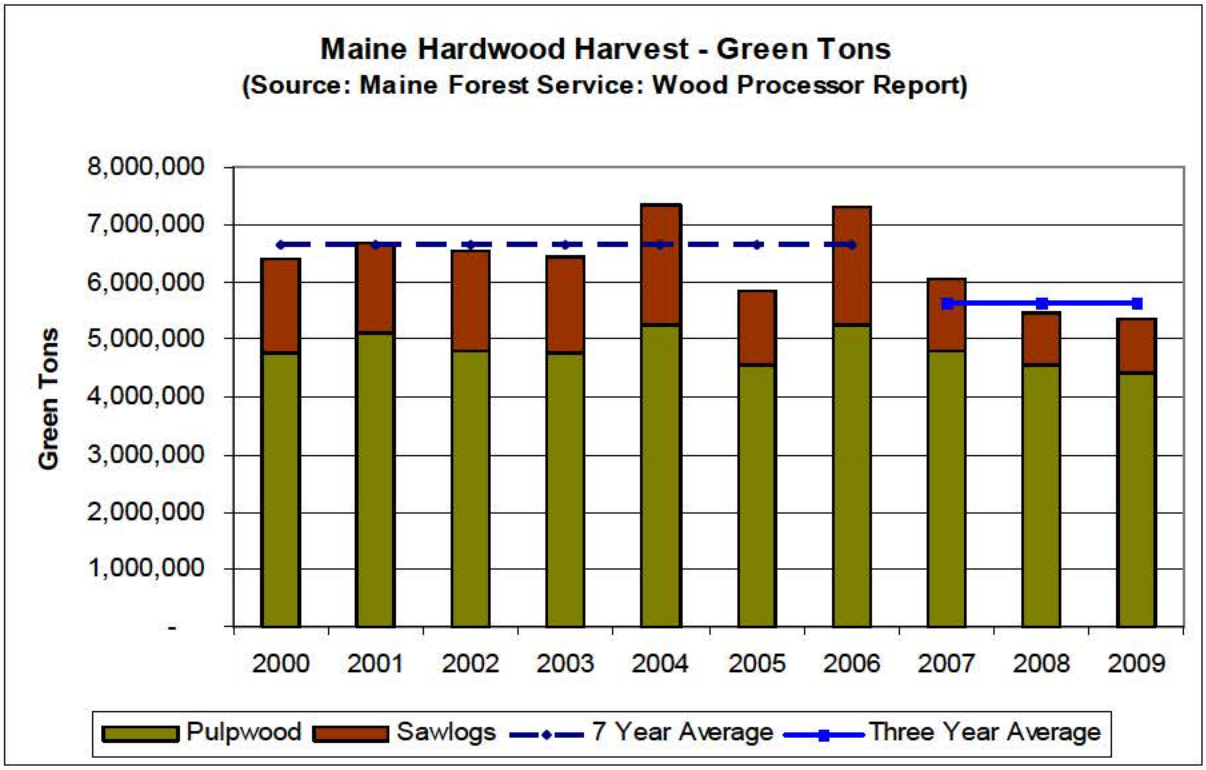
Rough tree: A live tree of commercial species that does not contain at least one 12-foot sawlog or two noncontiguous sawlogs, each 8 feet or longer, now or prospectively, and does not meet regional specifications for freedom from defect primarily because of roughness or poor form.

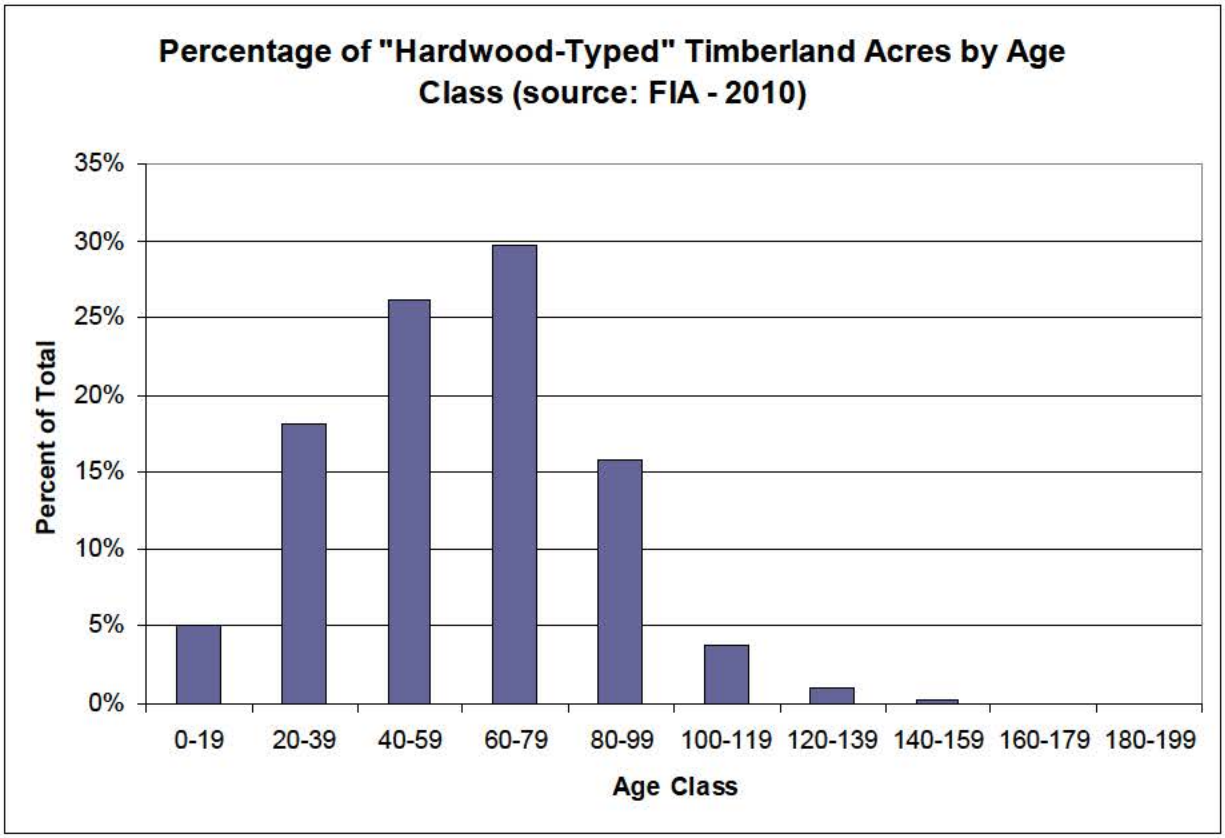
Hardwoods: Dicotyledonous trees, usually broad-leaved and deciduous.

Softwoods: Coniferous trees, usually evergreen and having needles or scalelike leaves.

Stocking (for Maine): A relative measure of stand density based on the "A line" of stocking guides for appropriate species and forest types. The relationships between the classes and the percentage of the stocking standard are: nonstocked (0 to 9); poorly stocked (10 to 34); moderately stocked (35 to 59); fully stocked (60 to 100); and overstocked (101 and over).

Sawlog: A log meeting regional standards of diameter, length, and freedom from defect, including a minimum 8-foot length and a minimum top diameter inside bark of 6 inches for softwoods and 8 inches for hardwoods.


Maine Hardwood Harvest - Green Tons
(Source: Maine Forest Service: Wood Processor Report)
Green Tons
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
-
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
Pulpwood
Sawlogs
7 Year Average
Three Year Average


Percentage of "Hardwood-Typed" Timberland Acres by Age Class (source: FIA - 2010)
Percent of Total
35%
30%
25%
20%
15%
10%
5%
0%
0-19
20-39
40-59
60-79
80-99
100-119
120-139
140-159
160-179
180-199
Age Class

Appendix C
Sewall Qualifications

APPENDIX *C: SEWALL QUALIFICATIONS*

James W. Sewall Company dates back to 1880 and is the oldest forestry and natural resource consulting firm in the Western Hemisphere. We have a long history of working on wood procurement issues for established, greenfield, and proposed forest products mills around the nation. We are the most experienced firm in the nation in the area of timberland investment analysis and forest appraisal, with a reputation for providing the highest quality due diligence and appraisal services both domestically and overseas.

David Edson, President, is one of the principals of Sewall Company. He has been involved in resource studies in the northeast since the early 70s. He managed procurement activities for three biomass facilities in Maine. Dave is a licensed professional forester, and active in industry associations.

David Stevens, Vice President and Forest Economist, has experience in forestry, mill management, and resource studies. He was the manager of Champion's Costigan plant, and built and managed a high-volume, state-of-the-art sawmill for Champion/International paper in Florida. Dave has worked at Sewall in organizational effectiveness, as a forest economist, and as Chief Operations Officer. His role in the project was overall project manager.

Tim Mack, Biometrician and Sr. Consultant, specializes in forest inventory and forest growth and yield modeling. Prior to joining Sewall, Tim spent 10 years as a forest industry analyst. Since joining Sewall, he has developed an international reputation as a forest biometrician and appraiser, working in native and planted forests around the world. Tim analyzed FIA derived components and did the modeling.

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