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Admitted in: MA, ME, NH

May 1, 2019

James R. Beyer
Maine Dept. of Environmental Protection
106 Hogan Road, Suite 6
Bangor, ME 04401

Bill Hinkel
Land Use Planning Commission
22 State House Station
Augusta, ME 04333-0022

RE: NECEC – Pre-Filed Supplemental Testimony

Dear Jim and Bill:

Enclosed is CMP's Pre-Filed Supplemental Testimony in response to DEP's 10th Procedural Order. Pursuant to the Third Procedural Orders, we are also mailing hard copies as follows:

- Original and 4 copies of CMP's Pre-Filed Direct Testimony for the DEP;
- Original and 9 copies of CMP's Pre-Filed Direct Testimony for LUPC.

Note that Gerry Mirabile's supplemental testimony includes, as Exhibit CMP-2.2-A, a list of which witnesses address each of the information requests in DEP's 10th Procedural Order.

CMP witness Amy Segal has adopted the Supplemental Testimony of CMP witness Terrence DeWan, and Ms. Segal will be present and available for cross-examination and DEP questions on May 9, 2019. However, Ms. Segal is available only until 5:00 p.m. that day. While we do not anticipate her unavailability during the evening to be a problem, given that CMP's witnesses are likely to present their oral summaries and stand for cross-examination and DEP questions prior to the witnesses of other parties, we wanted to alert the Department of her evening availability constraints. Mr. DeWan will be available for the entirety of the May 9 hearing, including that evening.

Thank you.

Sincerely,

Matthew D. Manahan

Enclosure
cc: Service Lists (via email)

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

and

STATE OF MAINE
LAND USE PLANNING COMMISSION

IN THE MATTER OF

CENTRAL MAINE POWER COMPANY	)
NEW ENGLAND CLEAN ENERGY CONNECT	)
#L-27625-26-A-N/#L-27625-TG-B-N/	)
#L-27625-2C-C-N/#L-27625-VP-D-N/	)
#L-27625-IW-E-N	)
	)
CENTRAL MAINE POWER COMPANY	)
NEW ENGLAND CLEAN ENERGY CONNECT	)
SITE LAW CERTIFICATION SLC-9	)
Beattie Twp, Merrill Strip Twp, Lowelltown Twp,	)
Skinner Twp, Appleton Twp, T5 R7 BKP WKR,	)
Hobbstown Twp, Bradstreet Twp,	)
Parlin Pond Twp, Johnson Mountain Twp,	)
West Forks Plt, Moxie Gore,	)
The Forks Plt, Bald Mountain Twp, Concord Twp	)

PRE-FILED SUPPLEMENTAL TESTIMONY
of

CENTRAL MAINE POWER COMPANY

MAY 1, 2019

EXHIBIT LIST FOR PRE-FILED SUPPLEMENTAL TESTIMONY OF CENTRAL MAINE POWER COMPANY

TAB

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

and

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PRE-FILED SUPPLEMENTAL TESTIMONY OF
THORN DICKINSON

May 1, 2019

This testimony is in response to the questions and data requests in the Tenth Procedural Order relating to installation of portions of the NECEC Project transmission line underground.

I. APPENDIX A TO THE TENTH PROCEDURAL ORDER

In this supplemental testimony, I will respond to the following Cost/Financial Questions in Appendix A:

QUESTION 22: ADDITIONAL DESCRIPTION OF ALLOWANCE FOR FUNDS USED DURING CONSTRUCTION (AFDUC), AND WHETHER THERE IS ANY AFUDC INCLUDED IN THE $950 MILLION ORIGINAL PROJECT COST ESTIMATE.

Allowance for funds used during construction (AFUDC) is the cost of financing during the construction period of a project, prior to when the project is placed in service. The cost of financing consists of interest on borrowed funds and an equity return on CMP's own funds used during construction. There is no AFUDC included in the $950 million original project cost estimate.

QUESTION 24: WHETHER THE ORIGINAL $950 MILLION COST ESTIMATE INCLUDED INDIRECT COSTS SUCH AS CMP AND AVANGRID PERSONNEL.

The original $950 million cost estimate included indirect costs such as CMP and Avangrid personnel.

II. APPENDIX B TO THE TENTH PROCEDURAL ORDER

In this supplemental testimony, I will respond to the following request for additional information in Appendix B:

ITEM 4: FOR ALL THE COST ESTIMATE SUMMARY SHEETS IN THE REBUTTAL TESTIMONY, PLEASE PROVIDE ADDITIONAL BACKUP SPREADSHEETS OR DETAILS FOR HOW EACH OF THE LINE ITEM COSTS WERE DETERMINED.

What follows are details for how each of the line item costs in Exhibit CMP-1.1-B were determined. The method used in that exhibit mirrors the way CMP developed its original cost estimate and developed its transmission rate. In addition, it mirrors the method used in the evaluation report of the Massachusetts Department of Energy Resources Independent Evaluator

(see Independent Evaluator's Report at Exhibit CMP-1.1-A) to determine total net benefit and the resulting NECEC Project ranking.

Incremental Capital Cost

An internal cost build-up was done to calculate the incremental capital cost associated with undergrounding the line. The calculation included the additional costs required for undergrounding as well as a deduction for the costs that were not applicable for the underground scenario. This method ensured that there was no double counting of costs.

Incremental Capital Cost (With AFUDC)

The incremental capital cost was then used to calculate the AFUDC amount required to account for the costs of financing during the construction period. The incremental capital cost and the AFUDC amount were then added together to establish the total additional plant in-service associated with undergrounding.

The total additional plant in-service was then used to calculate the incremental investment base. The annual incremental rate base was calculated using plant in-service minus depreciation and deferred taxes. The deferred taxes were calculated using the difference between the 40-year depreciation method used for book purposes and the depreciation calculated using the applicable state and federal modified accelerated cost recovery system (MACRS) rates.

Increase in Transmission Rate

The incremental investment base was then used to calculate the increased transmission rate by using the cost of service model. The cost of service model uses the incremental investment base (including AFUDC) to calculate the additional annual revenue requirement associated with undergrounding.

The annual revenue requirement has three components that were applicable to this analysis:

1) Investment Return - The investment return allows for a return on the average investment base using 5/12 of the beginning investment base plus 7/12 of the forecasted ending investment base. This calculation is consistent with ISO-NE practice. The average rate base was then multiplied by the pretax weighted average cost of capital on the depreciated investment base less deferred income taxes.
2) Property Taxes – The property tax amount was calculated by multiplying the additional plant in-service by the composite property tax rate used by the project.
3) Depreciation – The annual book depreciation amount which was calculated using a straight-line depreciation method over the 40-year life of the project.

These three components of the annual revenue requirement were then added together to calculate the total annual revenue requirement.

Net Present Value of Revenue

The present value (PV) was then calculated for each of the first twenty (20) years of the annual revenue requirements. The discount factor that was applied is consistent with the rate used in the Independent Evaluator's Report.

Levelized Revenue

The total calculated present value of the annual revenue requirements was then divided by the sum of each of the present value factors to derive the levelized revenue requirement for the twenty-year period. The leveled revenue requirement calculated is the same as the net present value (NPV) of the annual revenue requirements.

Annual Energy

The annual energy amount (MWh) used is the committed energy to be supplied as part of the purchase power agreement with the Massachusetts electric distribution companies. This is the same value used in the Independent Evaluator's Report.

Real Levelized $/MWh

The annual levelized revenue requirement was then divided by the annual energy amount to calculate the real levelized $/MWh. The resulting $9/MWh represents the incremental cost, or alternatively a negative net benefit, from the addition of 54 miles of underground.

Net Total Benefit – Independent Evaluator Report

$40.02 is the Net Total Benefit for the NECEC Project pulled directly from Appendix F of the Independent Evaluator's Report.

Net Total Benefit With 54 Miles of Underground

The $31.02 Net Total Benefit was calculated by starting with the actual Net Total Benefit from the Independent Evaluator's Report ($40.02) and subtracting $9/MWh in costs, or net benefits, representing the addition of 54 miles of underground.

Net Total Benefit – Rank 8

$32.62 is the Net Total Benefit for the eighth ranked project, pulled directly from Appendix F of the Independent Evaluator's Report.

Net Total Benefit – Rank 9

$30.61 is the Net Total Benefit for the ninth ranked project, pulled directly from Appendix F of the Independent Evaluator's Report.

Dated: 4/29/19

Respectfully submitted,

Thorn Dickinson

STATE OF MAINE
Cumberland, ss.

The above-named Thorn Dickinson did personally appear before me and made oath as to the truth of the foregoing pre-filed testimony.

Before,

Dated: 4/29/19

Notary Public
Name: Shari Lemar Irish
My Commission Expires:

SHARI LEMAR IRISH
Notary Public - Maine
My Commission Expires
September 25, 2021

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

and

STATE OF MAINE
LAND USE PLANNING COMMISSION

IN THE MATTER OF

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PRE-FILED SUPPLEMENTAL TESTIMONY AND EXHIBIT OF GERRY J. MIRABILE

May 1, 2019

This testimony is in response to the questions in Appendix A of the Department of Environmental Protection's (DEP's) Tenth Procedural Order. The DEP requested supplemental information and evidence on whether undergrounding, tapering, or taller pole structures in certain areas are technically feasible and economically viable minimization or mitigation measures, and whether any of these techniques would satisfy concerns raised at the hearing or be

a preferred alternative. Tenth Procedural Order ¶ 2. As explained in the CMP witnesses' answers to Appendices A and B of the Tenth Procedural Order (a listing of which is attached as Exhibit CMP-2.2-A), undergrounding, tapering, or taller pole structures in areas not already proposed for them by CMP may be technically feasible and economically viable minimization or mitigation measures only if limited to certain areas. However, even if these techniques are limited to certain areas, as discussed in the Supplemental Testimony of Mark Goodwin and of Gino Giumarro, they are only marginally valuable as minimization or mitigation measures. Because these techniques would be only marginally, if at all, useful to satisfy concerns raised at the hearing, use of any of these measures beyond those areas already proposed is not a preferred alternative.

QUESTION 1: TYPICAL CONSTRUCTION DETAILS AND SECTIONS FOR THE AREAS PROPOSED FOR TAPERING. CLARIFY WHETHER DURING INITIAL CONSTRUCTION THE ENTIRE 150-FOOT CORRIDOR IS CLEARED, OR IF ONLY THE WIRE ZONE IS CLEARED AND THE REMAINING WIDTH SELECTIVELY CUT.

Typically, during initial construction the entire 150-foot corridor would not be cleared. For visual tapering, only the wire zone would be cleared of capable vegetation (i.e., woody species and specimens capable of growing into the conductor safety zone) and most or all of the remaining width would be selectively cut to achieve the tapered effect. Areas proposed for tapering, whether for the purpose of deer winter travel corridors or for the purpose of minimizing visual impacts, would be created and managed similarly during construction.

During construction, the full 150-foot right of way width would be cleared of capable trees only if all trees in an area proposed for tapering were either intruding into the conductor

safety zone at their then-current height, or if all trees in an area proposed for tapering were anticipated to grow into the conductor safety zone prior to the next scheduled maintenance. Otherwise, tree retention and removal would be selective to create and maintain tapering, as described below. For a typical cross section detail of vegetation tapering, refer to page 101 of 273 of the February 28, 2019 Pre-Filed Direct Testimony of Amy Segal.

Within the Upper Kennebec Deer Wintering Area, deer travel corridors will be managed as softwood stands. Trees will be allowed to remain and grow to the maximum tree height that can practically be maintained without encroaching into the conductor safety zone or into the necessary cleared area adjacent to each structure. Maximum tree heights within these tapered areas will vary based on structure height, conductor sag, and topography, but will generally range from 25 to 35 feet. During construction, hardwood and softwood species that would intrude into the conductor safety zone or are at risk of growing into the conductor safety zone prior to the next scheduled vegetation maintenance will be cut at ground level and removed. Softwood specimens that would not intrude into the conductor safety zone, and are not at risk of growing into the conductor safety zone prior to the next scheduled maintenance, will be retained.

Within the areas proposed for tapering to minimize their visual impact at Coburn Mountain (Upper Enchanted Township) and Three Slide Mountain (T5R6 BKP WKR), depending upon tree age classes, distribution, density, and species, capable trees outside of the wire zone in these tapered locations will either be retained, or will be allowed to grow up and maintained in a tapered configuration to the extent practicable, with heights ranging from 25 feet (from the outer edges of the wire zone for a distance of approximately 20 feet on each side) to 35 feet (from the outer edges of the 25 foot tall areas to the edges of the maintained right of way, for

a distance of approximately 20 feet on each side). Capable vegetation will be selectively cut during periodic routine maintenance cycles to remove individual specimens likely to either grow into the conductor safety zone prior to the next scheduled maintenance cycle, or likely to grow taller than the above target heights prior to the next scheduled maintenance cycle.

In summary, during initial construction the entire 150-foot corridor is not, in general, proposed to be cleared for areas proposed for tapering. Rather, only the wire zone is cleared and the remaining width selectively cut. However, if areas to be tapered are comprised of even-aged trees which extend into the conductor safety zone, or which would do so prior to the next scheduled maintenance, most or all of these trees would be removed during construction, and these areas would grow into, and be maintained in, their tapered configuration.

QUESTION 21: EXPLANATION OF WHY TAPERING VEGETATION IS MORE EXPENSIVE THAN KEEPING THE ENTIRE 150-FOOT ROW TO SCRUB SHRUB HEIGHT.

CMP practices integrated vegetation management (IVM), including the selective use of herbicides, to safely and effectively maintain its transmission line corridors in a scrub/shrub cover. IVM practices reduce the need for pesticides, and include techniques such as manual, mechanical, and chemical vegetation management. When practiced properly and long-term, IVM of transmission rights of way typically produces and maintains lush scrub/shrub and herbaceous growth that does not interfere with overhead lines.

Systemic herbicides are part of IVM, and these herbicides control capable (tall) woody vegetation through absorption by foliage or roots and transport to other parts of the plant, effectively killing individual specimens. CMP contractor crews utilize hand-pressurized

backpack-mounted sprayers to apply herbicides to individual specimens, and to absolutely minimize drift of herbicides off-target CMP contractor crews do not spray herbicides at vegetation taller than 8 feet.

The use of systemic herbicides reduces the need for subsequent control of unwanted specimens and species, thereby reducing future labor and material costs. Also, because IVM includes application of herbicides to cut stumps, coppicing (described below) is minimized or avoided. As a result, IVM management cycles to maintain scrub/shrub are no more frequent than once every four years. Nevertheless, CMP will not apply herbicides in the 53.5 miles of new corridor in Segment 1. Instead, CMP will utilize mechanical methods for vegetation maintenance on this portion of the Project.

Because tapered trees range from 15 to 35 feet tall, these trees also would be managed by crews on foot from the ground and cut back to ground level by mechanical means, primarily chainsaws. Mechanical management of vegetation in a tapered configuration, however, is significantly more labor-intensive and expensive than mechanical management to maintain a scrub/shrub cover. As described below, mechanical management of tapering requires significant evaluation and inspection that is not required of ground crews who are simply removing all growth above a certain height to maintain a scrub/shrub cover.

Vegetation management for tapering would be extremely labor-intensive and expensive, requiring the visibility of tree tops and the gauging of tree heights relative to the conductor safety zone within tapered areas in order to selectively target and remove individual specimens that were already within the conductor safety zone, or were anticipated to grow into the conductor safety zone prior to the next scheduled maintenance cycle.

After cutting, these trees ranging from 15 to 35 feet would need to be removed. There also exists the risk that, due to poor visibility of or access to trees within tapered areas, individual trees may intrude into the conductor safety zone despite best efforts to avert this.

Also, because trees in tapered areas would be managed mechanically and without herbicides, coppicing of certain species would be widespread. Coppicing creates often dense stands of multiple-stemmed woody growth that, within a tapered area of transmission line corridor, would require subsequent intensive mechanical removal to maintain a safe and operable transmission line.

As a result of the above, and because of the less reliable and less certain control of woody vegetation in tapered areas, mechanical vegetation management in tapered areas would be conducted on a two- or three-year cycle, rather than a four year cycle.

For all of these reasons, tapering vegetation is significantly more expensive than maintaining the entire 150-foot right of way in scrub/shrub.

Exhibits

Exhibit CMP-2.2-A: List of Appendix A and Appendix B Responses

Dated: 4/25/2019

Respectfully submitted,

Gerry Mirabile

STATE OF MAINE
Kennebec, ss.

The above-named Gerry Mirabile did personally appear before me and made oath as to the truth of the foregoing pre-filed testimony.

Dated: April 25, 2019

Before,

Notary Public
Name: Alice Richards
My Commission Expires:
January 4, 2026

Exhibit CMP-2.2-A

LIST OF APPENDIX A AND APPENDIX B WITNESS RESPONSES

Appendix A to the Tenth Procedural Order

Construction Questions:

1. Typical construction details and sections for the areas proposed for tapering. Clarify whether during initial construction the entire 150-foot corridor is cleared, or if only the wire zone is cleared and the remaining width selectively cut.
    - Gerry Mirabile
2. Description of construction process, staging, and impacts for 100-foot or taller poles.
    - Nick Achorn
3. A more detailed description of undergrounding techniques including direct burial, duct bank installation, or trenchless installation. This should also include typical dimensions, materials and cross-section diagrams.
    - Justin Bardwell
4. A description of the differences of normal operation and maintenance (O&M) activities between overhead and underground lines.
    - Justin Bardwell
5. Whether fewer longer sections (versus more shorter sections) of the line could be undergrounded that would minimize both the number of transition stations as well as the environmental impact of the project.
    - Justin Bardwell
6. Explanation of why a permanent road would need to be constructed to each splice location (undergrounding), but not for overhead poles. Explanation of why matting along the ROW (which could be used for overhead poles) could not be used for splice boxes.
    - Justin Bardwell
7. How the determination was made that a 75-foot wide cleared width would be necessary for a potential underground line.
    - Justin Bardwell
8. Whether there is more cleared area with a 150-foot wide overhead line or with a 75-foot wide underground line including termination stations.
    - Justin Bardwell
9. Explanation of the number or percentage of cable faults in underground cables vs. overhead lines.
    - Justin Bardwell

10. Whether cooling station structures were included in the undergrounding cost estimates, what size or type of structure would be needed, how many, and at what distances along the line.
    - Justin Bardwell
11. Identify engineering standards, safety or design codes, etc. that specifically apply to this project.
    - Justin Tribbet/Justin Bardwell
12. Explanation of the conditions considered when engineers determined that horizontal directional drilling would be the lowest impact trenchless method for the NECEC Project.
    - Justin Bardwell

<u>Environmental Questions:</u>

13. Whether taller poles and travel corridors could provide enough of a link between the habitat on both sides of the corridor for species like the pine marten.
    - Gino Giumarro
14. In TNC's nine areas of concern, whether travel corridors must be located within a certain distance of the structures (poles), and what the minimum width would be of the travel corridors in order for species like the pine marten to use them.
    - Gino Giumarro
15. In TNC's nine areas of concern, whether tapering would adequately reduce the forest fragmentation of any clearing.
    - Gino Giumarro
16. Locations where tapering vs. taller overhead poles would be preferred.
    - Mark Goodwin/Lauren Johnston
    - Terry DeWan/Amy Segal
17. Whether tapering within the 100-foot buffers around streams would provide adequate large woody vegetation for streams in segment 1 which are typically less than 10 feet wide.
    - Mark Goodwin/Lauren Johnston

<u>Cost/Financial Questions:</u>

18. A description of the differences of normal operation and maintenance (O&M) costs between overhead and underground lines.
    - Justin Tribbet
19. What the costs would be to underground fewer longer sections (versus more shorter sections) of the line (to minimize transition stations and environmental impact) as well as other practical constraints to this approach.
    - Justin Bardwell

20. Comparison of cost for constructing a crane path to every pole location (overhead lines) with the cost to construct an access road to every splice box (undergrounding).
    - Justin Bardwell
21. Explanation of why tapering vegetation is more expensive than keeping the entire 150-foot ROW to scrub shrub height.
    - Gerry Mirabile
22. Additional description of allowance for funds used during construction (AFDUC), and whether there is any AFUDC included in the $950 million original project cost estimate.
    - Thorn Dickinson
23. What the difference is between conceptual level estimates and preliminary estimates, and how final construction-level cost estimates compare to conceptual level cost estimates.
    - Justin Tribbet
24. Whether the original $950 million cost estimate included indirect costs such as CMP and Avangrid personnel.
    - Thorn Dickinson

Routing Questions:

25. Explanation of how the connection point was chosen on the Quebec/Maine border, and whether this was decided by Hydro-Quebec or real estate constraints. Whether there is flexibility in this location or if there are other tie-in points on the Quebec border.
    - Ken Freye
26. Whether an underground route co-located with Route 201 would be technically feasible, economically viable, and/or a satisfactory option to mitigate concerns raised during the hearing.
    - Ken Freye/Justin Bardwell

Appendix B to the Tenth Procedural Order

The applicant is requested to provide additional documents by May 1st on the following items:

1. Data was provided from the Maine Forest Service for 2015-2017 on acres of forest that were clear cut (See Mark Goodwin rebuttal testimony, page 18). Please provide this same data for multiple years/decades prior to 2015 so as to determine long term trends in clear cutting acreage.
    - Mark Goodwin/Lauren Johnston
2. The Application stated that Plum Creek Maine Timberlands LLC “specifically did not want a transmission line located along the Spencer Road.” Please provide evidence from the landowner to that effect.
    - Ken Freye

3. A plan showing the alternate route noted in Section 3 of Mr. Bardwell's rebuttal testimony.
    - Justin Bardwell
4. For all the cost estimate summary sheets in the rebuttal testimony, please provide additional backup spreadsheets or details for how each of the line item costs were determined.
    - Justin Bardwell/Justin Tribbet/Thorn Dickinson

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

and

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LAND USE PLANNING COMMISSION

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PRE-FILED SUPPLEMENTAL TESTIMONY AND EXHIBIT OF
MARK GOODWIN

May 1, 2019

This testimony is in response to the questions and data requests in the Tenth Procedural Order.

I. APPENDIX A TO THE TENTH PROCEDURAL ORDER

In this supplemental testimony, I respond to certain of the Environmental Questions the DEP asked in Appendix A to the Tenth Procedural Order.

QUESTION 16: LOCATIONS WHERE TAPERING VS. TALLER OVERHEAD POLES WOULD BE PREFERRED.

My pre-filed direct testimony discussed CMP's consultation with the Maine Department of Inland Fisheries and Wildlife ("MDIFW") and the inclusion of MDIFW's recommendations into CMP's proposed Compensation Plan, demonstrating that there will be no unreasonable impact or adverse effects to wildlife due to diminished habitat connectivity. Thus, although taller vegetation and associated habitat would benefit some species, CMP has demonstrated that its proposed clearing and vegetation management practices will not cause an unreasonable impact or an adverse effect. Therefore, neither tapering nor taller structures are necessary or appropriate.

To the extent one or the other were required, though, tapering would be preferable to taller overhead structures in all locations identified by the intervenors because of cost, safety, reliability, and environmental and visual impact considerations. Tapering would present significant challenges; however, these challenges would be less than those associated with managing vegetation at full height by using taller structures.

For instance, if tapering were required (even though it is unnecessary and offers few environmental benefits), it would be preferable to taller structures from a visual perspective because of the potential for taller structures to cause adverse visual impacts to scenic resources. Tapering would consist of the maintenance of the wire zone as it is currently proposed in Exhibit 10-1 and 10-2 of CMP's Site Law application (revised versions filed on January 30, 2019), with taller trees being allowed to grow outside of the wire zone. Additionally, tapered vegetation would be maintained on a regular cycle, mitigating some of the safety, reliability and environmental impacts and risks.

From a vegetation maintenance perspective, allowing full height canopy by using taller structures may present the following negative safety, environmental, reliability, and cost concerns, which tapering does not present:

Safety

- Removal of taller and larger vegetation during maintenance cycles would require more mechanical work using heavy equipment, which is inherently more dangerous than work performed by hand.
- Climbing trees may be required for larger tree removal, putting workers in closer proximity to energized conductors and increasing the risk of falls.
- Hand felling of larger capable species within riparian areas would be dangerous to workers on the ground, especially when attempting to fell trees in a desired direction away from the resource.

Environmental

- Heavy equipment (bucket trucks, skidders, excavators, and timber forwarders etc.) used during vegetation maintenance to remove any taller tree within the conductor safety zone or forecast to grow into the conductor safety would increase vegetation damage and soil compaction that would not normally be associated with vegetation maintenance.
- Deployment of timber mats, while reducing soil compaction, would also require heavy equipment, increasing the number of trips up and down the ROW and potentially increasing ground and disturbance of sensitive and protected natural resources.
- Cable skidding (i.e., dragging) increased amounts and larger pieces of slash, associated with taller vegetation, outside of the riparian buffers to comply with the Maine Slash Law would create additional ground disturbance and impacts to vegetation.
- Increased heavy equipment operation would increase the potential and likelihood of spills of fuel, oil, and hydraulic fluids.
- Allowing full height vegetation to remain would require taller structures and potentially closer spaced structures, which may introduce additional visual/aesthetic impacts and potentially more direct fill in protected natural resource areas.

Reliability

- Allowing full height capable vegetation to grow beneath the conductors would result in limited access and work area for operations and emergency response personnel.
- Accurately measuring or estimating the heights of individual trees, and their distance from energized conductors, in order to identify individual trees to be removed, could be difficult in dense growth, increasing safety hazards associated with minimum approach distance from the transmission line and potentially resulting in line outages from tree growth into conductors.

Cost

- Additional structures may be required to shorten the span length and minimize conductor sag to allow taller trees. The incremental cost for each additional structure or replacing a typical structure with a taller structure is $115,000 to $243,000, depending on structure type and foundation requirements.

Consultation with the MDIFW, the resource agency experts in Maine on these subjects, resulted in the recommendation for full height vegetation and tapering only in those areas included in CMP's Compensation Plan. Therefore, if DEP concludes that it is appropriate to taper vegetation in additional areas, this should be limited to those areas having higher value wildlife features and are known to be used specifically as travel corridors for wildlife, i.e., riparian buffers.

As such, CMP evaluated each of the polygons included in The Nature Conservancy's pre-filed direct testimony, and focused its review by assessing the locations of significant features within these polygons, i.e., perennial streams known to include brook trout, state-listed threatened and/or special concern species, significant vernal pools, deer wintering areas, inland waterfowl and wading bird habitat, and unique natural communities.

The table below indicates where, based on the foregoing criteria, tapered vegetation could be useful, although only marginally and incrementally, if required by DEP.

TNC Area[1]	Length (Miles)	Rationale for Evaluating Locations Appropriate for Tapering if Required by MDEP	Comments
1	1.63	TNC Area 1 does not contain known brook trout habitat, T&E species, or SVPs.	Lack of higher value wildlife features in TNC Polygon 1.
2	1.39	Includes S. Branch Moose River (Roaring Brook Mayfly habitat). No known brook trout waterbodies or SVP habitat.	Tapering if required by MDEP should be restricted to the area between structure 767 and 768, which spans the South Branch of the Moose River.
3	1.23	Includes two waterbodies identified as Northern Spring Salamander habitat. No brook trout or SVP habitat identified.	Tapering if required by MDEP should be restricted to the area between structures 752 and 753, and between structures 757 and 758, both of which span Northern Spring Salamander habitat.
4	3.15	Includes the full height canopy area proposed by CMP at Gold Brook between structures 731-735, and tapered vegetation between structures 735-737. Baker Stream north of Rock Pond is brook trout habitat.	If required by MDEP, tapering would be preferred at Baker Stream north of Rock Pond due to the increased visual impact taller structures would have in this location.
5	4.22	Includes Spencer Stream and tributaries (brook trout and IWWH), Whipple Brook (brook trout) and Bitter Brook (includes IWWH but is not identified as brook trout or T&E habitat) and Jack Pine Forest communities.	If required by MDEP tapering would be preferred in the spans associated with Spencer Stream (Structures 701-702 and 703-704), Whipple Brook (Structures 693-694), and Bitter Brook and adjacent JackPineWood004 and JackPineWood005 (Structures 684-688)
6	2.45	Rusty Blackbird habitat vegetation management already addresses a portion of this area; no other higher value areas identified.	No other higher value wildlife features were identified. However, if required by MDEP, additional tapering beyond what is already proposed in Rusty Blackbird habitat, would be preferred at Piel Brook and associated IWWH (Structures 653-654)
7	0.72	The only higher value wildlife feature is Bicknell's thrush habitat.	In the event MDEP determines it is necessary, tapering of the ROW within the Bicknell's thrush habitat (between Structures 638 and 643) would be preferred because this species prefers habitat with a history of disturbance causing stunted dense understory.
8	3.71	Includes Tomhegan Stream and tributaries to Cold Stream.	If required by MDEP, tapering would be preferred within riparian areas associated with perennial coldwater streams (Structures 567-568, 573-574, and 575-576).
9	3.68	Upper Kennebec DWA; MDIFW has accepted CMP's proposed travel corridors as effective and appropriate to maintain habitat connectivity.	CMP recommends implementing the proposed tapered travel corridors previously agreed to with MDIFW.

1: TNC Areas 1 through 9 proceed from West to East and are depicted on Exhibit 7 of the TNC Pre-filed direct testimony.

QUESTION 17: WHETHER TAPERING WITHIN THE 100-FOOT BUFFERS AROUND STREAMS WOULD PROVIDE ADEQUATE LARGE WOODY VEGETATION FOR STREAMS IN SEGMENT 1 WHICH ARE TYPICALLY LESS THAN 10 FEET WIDE.

Because tapering around coldwater fisheries would result in an incremental increase in large woody debris input into smaller stream channels, it follows that the addition of tapered vegetation management practices in the riparian buffers of perennial coldwater streams would provide adequate large woody vegetation for streams less than 10 feet wide. However, consultation between CMP and MDIFW did not indicate that such tapering was necessary or that the removal of full height forest canopy in riparian buffers across a 150-foot-wide right-of-way ("ROW") would be unreasonable or would create an adverse effect through the loss of woody debris inputs into stream channels. In fact, CMP proposed a practice that would have simulated and had very similar effects to large woody debris input under natural conditions in forested habitats adjacent to coldwater fisheries; specifically, CMP proposed additions of wood, known as "chop and drop," as one of several mitigation measures for indirect coldwater fisheries impacts, and MDIFW rejected this idea apparently because it considered the reduction in woody debris inputs resulting from the proposed clearing within riparian buffers to be insignificant.

With respect to shading and insolation for streams that are 10 feet wide or less (the majority on Segment 1), there will be significant shading by lower growing overhanging vegetation through the implementation of CMP's vegetation management practices in riparian buffers. CMP's current proposal is appropriate and adequate in addressing shading and woody debris inputs and will not create unreasonable impacts or adverse effects to these waterbodies.

II. APPENDIX B TO THE TENTH PROCEDURAL ORDER

Appendix B to the Tenth Procedural Order includes requests for additional supporting data. In this supplemental testimony I will respond to the item specific to Maine Forest Service data.

ITEM 1, DATA WAS PROVIDED FROM THE MAINE FOREST SERVICE FOR 2015-2017 ON ACRES OF FOREST THAT WERE CLEAR CUT (SEE MARK GOODWIN REBUTTAL TESTIMONY, PAGE 18). PLEASE PROVIDE THIS SAME DATA FOR MULTIPLE YEARS/DECADES PRIOR TO 2015 SO AS TO DETERMINE LONG TERM TRENDS IN CLEAR CUTTING ACREAGE.

The data provided from the Maine Forest Service is provided in the attached exhibit CMP-3.2-A and is also accessible through the Department of Agriculture, Conservation, and Forestry at the following website:

https://www.maine.gov/dacf/mfs/publications/annual_reports.html

A summary of acreage clear cut in Franklin County and Somerset County for the years 2000 to 2017 is provided below:

Year	Franklin County				Somerset County		
	# of Clear Cuts >75 acres	Average Size (Acres)	Total Clear Cut (Acres)		# of Clear Cuts >75 acres	Average Size (Acres)	Total Clear Cut (Acres)
2000	0	31	1,040		0	32	3,051
2001	0	28	1,352		0	24	1,841
2002	0	31	2,070		0	18	2,899
2003	0	42	2,459		0	21	5,877
2004	0	32	1,456		0	19	7,694
2005	0	37	633		1	22	6,079
2006	0	25	925		0	22	6,038
2007	1	39	1,144		0	20	4,462
2008	0	38	545		0	24	2,134
2009	0	21	1,742		0	23	5,783
2010	0	24	2,122		0	18	6,969
2011	4	22	2,014		0	20	6,059
2012	4	19	2,033		0	20	6,614
2013	4	24	3,259		1	19	6,364
2014	3	24	2,751		2	21	7,746
2015	7	28	3,060		3	21	6,377
2016	7	34	3,175		2	22	5,507
2017	11	49	3,604		4	22	5,685

Exhibits:

CMP-3.2-A: Maine Forest Service Data

Dated: 4.29.2019

Respectfully submitted,

Mark Goodwin

STATE OF MAINE
CUMBERLAND, ss.
COUNTY

The above-named Mark Goodwin did personally appear before me and made oath as to the truth of the foregoing pre-filed testimony.

Before,

Dated: 4/29/19

Nickole Gagne
Notary Public
Name: NICKOLE GAGNE
My Commission Expires: 10/02/20

NICKOLE GAGNE
Notary Public-Maine
My Commission Expires
October 02, 2020

2000
Silvicultural Activities Report
including Annual Report on Clearcutting

Compiled from the 2000 Landowner Reports and other survey instruments.
Data collected under the provisions of Title 12 MRSA §8885 and §8878-A

Published:
May 25, 2001

DEPARTMENT OF CONSERVATION
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printed under appropriation 010-04A-5400-552

Report Highlights

Timber Harvesting:

- The total area harvested has increased 5%, from 537,333 acres in 1999 to 566,685 acres in 2000.
- The total area partially harvested increased 6%, from 513,212 acres in 1999 to 546,956 acres in 2000.

Clearcutting:

- The total area clearcut decreased by 26%, from 18,754 acres in 1999 to 13,838 acres in 2000.

  The total area clearcut in 2000 is the lowest since data collection began in 1982.

  Clearcutting made up 2.5% of the total harvesting acres in 2000.

  The average size clearcut in 2000 was 21 acres statewide. Landowners owning more than 100,000 acres had an average clearcut size of 24 acres. Landowners owning less than 100,000 acres had an average clearcut size of 12 acres.

  Landowners owning more than 100,000 acres in Maine created 85% of all clearcuts (11,781 acres). 98% of these clearcuts were smaller than 75 acres. The highest rate of clearcutting for an individual landowner was 0.6% of total statewide ownership.

  The dominant silvicultural reason for clearcutting, reported by the large landowners, was for areas where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.

Land Use Changes:

- Harvesting to convert land from forest management to some other primary land use increased 1% from 5,367 to 5,891 acres.

Herbicide Use:

- For site preparation decreased 61%, from 2,469 acres to 962 acres.
- To release crop trees from competing vegetation decreased 17%, from 28,906 acres to 24,091 acres.

Timber Stand Improvement (TSI):

- Thinning of young stands with saws increased 41%, from 17,486 acres to 24,590 acres. 87% of this activity was done by landowners owning more than 100,000 acres.

Planting:

- Tree planting decreased 12%, from 12,859 acres to 11,341 acres. 95% of the planting was by landowners owning more than 100,000 acres. The predominant species planted was spruce.

Professional Assistance:

- The harvest acres supervised by licensed foresters increased 15%, from 368,403 acres to 424,426 acres. 75% of all harvest acres in 2000 had a licensed professional forester involved.

*Footnote:

The revised Maine Forest Service Rules - Chapter 20: Forest Regeneration and Clearcutting Standards that took effect in October 1999 require 60 days preharvest notificatio on-site review by Maine Forest Service staff for any clearcut proposed to exceed 75 acres. The clearcuts reported in 2000 that exceed 75 acres in 2000 were notified and begu under the old Chapter 20 Rules.

2000 Harvesting and Land Use Changes

Commercial Harvest Information by Landowner Size and Type		Acres				
OwnershipType*	Ownership Size	Selection	Shelterwood	Clearcut	Land Use Change	Total Harvest
Forest Industry Land	1 to 100 acres	110	0	0	0	110
	101 to 1,000 acres	9,170	1,539	51	27	10,787
	1,001 to 100,000 acres	30,040	4,181	1,022	85	35,328
	100,000 + acres	55,123	84,462	9,786	263	149,634
	SubTotal	**94,443**	**90,182**	**10,859**	**375**	**195,859**
Institutional Investor Timberlands	1 to 100 acres	0	0	0	0	0
	101 to 1,000 acres	0	0	0	0	0
	1,001 to 100,000 acres	1,148	480	0	0	1,628
	100,000 + acres	37,410	53,756	1,907	0	93,073
	SubTotal	**38,558**	**54,236**	**1,907**	**0**	**94,701**
Non-Industrial Land	1 to 100 acres	56,978	7,628	402	3,262	68,270
	101 to 1,000 acres	76,707	13,213	226	1,627	91,773
	1,001 to 100,000 acres	61,014	5,055	229	363	66,661
	100,000 + acres	10,512	21,649	88	0	32,249
	SubTotal	**205,211**	**47,545**	**945**	**5,252**	**258,953**
Other woodlands (Govt, etc.)	1 to 100 acres	362	62	0	54	478
	101 to 1,000 acres	1,367	41	70	111	1,589
	1,001 to 100,000 acres	2,041	1,090	57	84	3,272
	100,000 + acres	9,485	2,333	0	15	11,833
	SubTotal	**13,255**	**3,526**	**127**	**264**	**17,172**
2000 Totals:		**351,467**	**195,489**	**13,838**	**5,891**	**566,685**
Percent of 2000 Harvest:		**62.02%**	**34.50%**	**2.44%**	**1.04%**	**100.00%**
1999 Totals:		**368,355**	**144,857**	**18,754**	**5,367**	**537,333**
Percent Change from 1999 to 2000:		**-5%**	**35%**	**-26%**	**10%**	**5%**

2000 Precommercial Activities and Professional Assistance

		Precommercial Activities by Landowner Size and Type				Licensed Professional Forester Use by Landowner Size and Type		
		Acres				Landowner	Forester Involved	
		Herbicide Use			Tree	Reports	Number of	Total
OwnershipType*	Ownership Size	Site Prep	Release	TSI	Planting	Received	Harvests	Acres
Forest Industry Land	1 to 100 acres	0	0	0	0	2	1	100
	101 to 1,000 acres	0	0	265	3	188	53	3,596
	1,001 to 100,000 acres	5	448	311	298	158	115	23,467
	100,000 + acres	645	17,550	18,568	9,753	319	316	146,271
	Subtotal	**650**	**17,998**	**19,144**	**10,054**	**667**	**485**	**173,434**
Institutional Investor Timberlands	1 to 100 acres	0	0	0	0	0	0	0
	101 to 1,000 acres	0	0	0	0	0	0	0
	1,001 to 100,000 acres	0	0	0	0	7	5	1,258
	100,000 + acres	98	5,843	1,655	986	122	119	91,593
	Subtotal	**98**	**5,843**	**1,655**	**986**	**129**	**124**	**92,851**
Non-Industrial Land	1 to 100 acres	10	25	1,046	72	3,061	817	19,638
	101 to 1,000 acres	4	0	1,180	182	1,872	767	37,003
	1,001 to 100,000 acres	200	200	305	21	314	239	58,870
	100,000 + acres	0	0	1,075	0	111	108	31,849
	Subtotal	**214**	**225**	**3,606**	**275**	**5,358**	**1,931**	**147,360**
Other woodlands (Govt, etc.)	1 to 100 acres	0	0	1	0	17	9	231
	101 to 1,000 acres	0	25	165	20	39	30	1,334
	1,001 to 100,000 acres	0	0	15	6	42	33	2,983
	100,000 + acres	0	0	4	0	40	37	6,233
	Subtotal	**0**	**25**	**185**	**26**	**138**	**109**	**10,781**
2000 Totals:		**962**	**24,091**	**24,590**	**11,341**	**6,292**	**2,649**	**424,426**
1999 Totals:		**2,469**	**28,906**	**17,486**	**12,859**	**6,954**	**2,346**	**368,403**
Change from 1999 to 2000:		**-61%**	**-17%**	**41%**	**-12%**	**-10%**	**13%**	**15%**

Definitions:

Ownership Type

Forest Industry Land: Woodlands owned by a forest products industry; usually most of the wood harvested is used by that industry.

Institutional Investor Timberlands Woodlands owned by organizations that hold assets as fiduciaries for the benefit of others.

Non-Industrial Land: Woodlands privately owned but NOT by a forest industry. These include private individuals and other non-forest product industries.

Other woodlands: Woodlands owned by a governmental entity -- local, state, federal, or tribal governments.

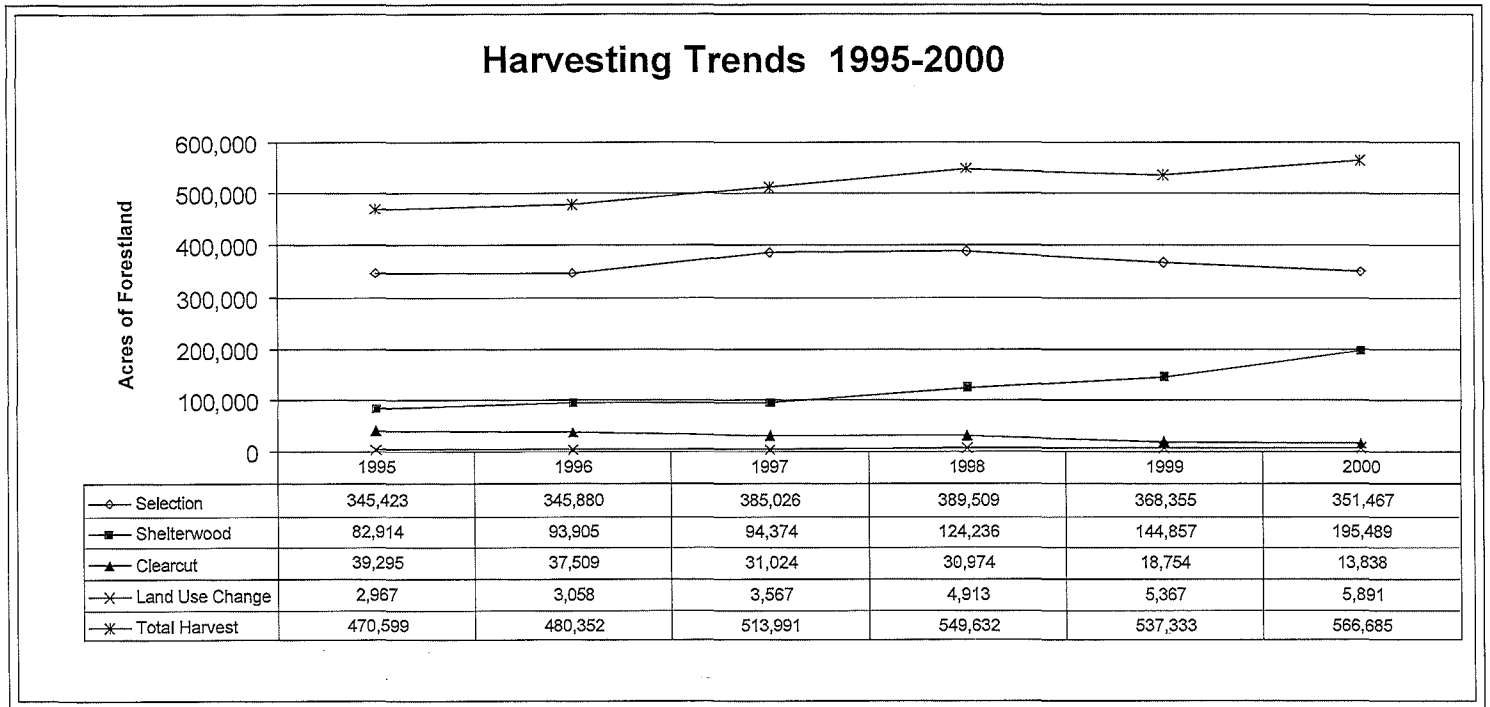
Types of Harvests

Selection: Harvest method where trees are removed individually or in small (<5 acre) patches.

Shelterwood: Harvest method of mature trees from a forest site in two or more stages. The first stage removes only a portion of the trees to allow establishment of regeneration before the remaining trees are removed in subsequent harvest.

Clearcut: Harvest method on a site greater than 5 acres that results in a residual basal area of acceptable growing stock trees >4.5" DBH of less 30 square feet per acre, unless after harvesting the site has a well-distributed stand of acceptable growing stock 3 feet tall for softwood 5 feet for hardwoods (Overstory Removal). Refer to the latest copy of the Maine Forest Practices Act, Maine Forest Service Rules Ch 20 for additional information.

Change of Land Use. the land use after harvest does not include growing forest products.



	1995	1996	1997	1998	1999	2000
Selection	345,423	345,880	385,026	389,509	368,355	351,467
Shelterwood	82,914	93,905	94,374	124,236	144,857	195,489
Clearcut	39,295	37,509	31,024	30,974	18,754	13,838
Land Use Change	2,967	3,058	3,567	4,913	5,367	5,891
Total Harvest	470,599	480,352	513,991	549,632	537,333	566,685

2000 Annual Report on Clearcutting

Compiled from the 2000 Landowner Reports and survey instruments. Data collected under the provisions of the Forest Resources Assessment Program, 12 MRSA § 8878-A

	Large Landowners (own >100,000 acres)										All Other Landowners				All Landowners
	Precommercial Activities Acres		Clearcuts > 75 acres in size		Purpose for Clearcut (see explanation below) Acres						Acres				
													Clearcut		Acres
County	TSI	Planted	#	Acres	1	2	3	4	Sub Total	Avg. Size	TSI	Planted	Sub Total	Avg. Size	Clearcut
Androscoggin	0	0	0	0	0	0	0	0	0	0	7	6	0	0	0
Aroostook	11,960	4,636	0	0	4,203	0	149	0	4,352	21	856	176	209	11	4,561
Cumberland	0	0	0	0	0	0	0	0	0	0	66	0	70	12	70
Franklin	378	377	0	0	986	0	0	0	986	31	231	9	54	8	1,040
Hancock	980	645	0	0	472	0	0	0	472	39	251	35	105	18	577
Kennebec	0	0	0	0	0	0	0	0	0	0	111	3	41	10	41
Knox	0	0	0	0	0	0	0	0	0	0	0	5	45	11	45
Lincoln	0	0	0	0	0	0	0	0	0	0	133	4	81	9	81
Oxford	0	716	0	0	1,303	0	126	0	1,429	19	594	105	89	7	1,518
Penobscot	728	863	2	174	1,021	0	0	0	1,021	24	355	31	154	12	1,175
Piscataquis	4,434	1,695	0	0	578	12	153	0	743	26	123	140	55	9	798
Sagadahoc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Somerset	1,646	1,119	0	0	1,620	0	684	0	2,304	32	202	26	747	13	3,051
Waldo	0	0	0	0	0	0	0	0	0	0	164	59	244	20	244
Washington	1,176	688	0	0	469	0	5	0	474	34	121	0	148	11	622
York	0	0	0	0	0	0	0	0	0	0	74	5	15	8	15
State Total:	**21,302**	**10,739**	**2**	**174**	**10,652**	**12**	**1,117**	**0**	**11,781**	**24**	**3,288**	**602**	**2,057**	**12**	**13,838**

Purposes for creating clearcut:

1. Removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention the residual overstory trees is not justified for further increase in value, as a source of seed, or for prote of the new stand.
2. Ecologically appropriate improvement or creation of wildlife habitat.
3. Removal of stands that, if partially harvested according to accepted silvicultural practice, are at high risk windthrow due to factors such as soils, rooting depth, crown ratio or stem quality.
4. Harvesting of an existing plantation or other forest stand established by or previously treated with precommercial silvicultural activities.

Frequency Distribution of Clearcutting
for Large Landowners who own more than 100,000 acres

2000 Clearcut as percent of statewide ownership	# of Landowners	Clearcut Acres
0% - 0.001%	13	0
0.001%-0.25%	10	5,587
0.26%-0.75%	2	6,194
0.76%-1.00%	0	0

2001
Silvicultural Activities
including Annual Report on Clearcutting

Compiled from the 2001 Landowner Reports and other survey instruments.
Data collected under the provisions of Title 12 MRSA §8885 and §8878-A

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Report Highlights

Timber Harvesting

- The total area harvested in 2001 was 565,789 acres, a slight decrease from 569,470 acres in 2000.
- The total area partially harvested in 2001 was 546,157 acres, a slight decrease from 550,243 acres in 2000.

Clearcutting:

1. The total area clearcut increased slightly, from 13,185 acres in 2000 to 15,077 acres in 2001.
   Clearcutting still amounts to less than 3% of total harvested acres and remains well below the levels of the 1990's.
2. Landowners owning more than 100,000 acres in Maine created 89% of all clearcuts (13,390 acres). No clearcuts were larger than 75 acres. The highest rate of clearcutting for an individual landowner was 0.6% of total statewide ownership.
3. The average size clearcut in 2001 was 21 acres statewide. Landowners owning more than 100,000 acres had an average clearcut size of 24 acres. Landowners owning less than 100,000 acres had an average clearcut size of 12 acres.
4. The dominant silvicultural reason for clearcutting, reported by the large landowners, was for areas where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.

Land Use Changes:

- Harvesting to convert land from forest management to some other primary land use decreased 25% from 6,042 acres in 2000 to 4,556 acres in 2001.
- Due to a change in state law that exempts small harvests (<5 acres) from reporting requirements, acres of land use change reported here most likely underestimate the actual number.

Precommercial Silvicultural Activities

Herbicide Use:

- For site preparation decreased 33%, from 962 acres in 2000 to 645 acres in 2001.
- To release crop trees from competing vegetation decreased 53%, from 24,091 acres in 2000 to 11,370 acres in 2001.

Timber Stand Improvement (TSI):

- Precommercial Thinning of young stands with spacing saws decreased 11%, from 24,590 acres in 2000 to 21,893 acres in 2001.
  87% of this activity was done by landowners owning more than 100,000 acres.

Planting:

- Tree planting decreased 4%, from 11,341 acres in 2000 to 10,885 acres in 2001.
  96% of the planting was by landowners owning more than 100,000 acres. The predominant species planted were spruces.

Professional Assistance

- The harvest acres supervised by licensed foresters remained consistent.
  74% of all harvest acres in 2001 had a licensed forester involved, compared to 75% of all harvests in 2000.

*Footnotes:

The revised Maine Forest Service Rules - Chapter 20: Forest Regeneration and Clearcutting Standards that took effect in October 1999 require 60 days preharvest notification and on-site review by Maine Forest Service staff for any clearcut proposed to exceed 75 acres.

2001 Harvesting and Land Use Changes

Commercial Harvest Information by Landowner Size and Type		Acres						
			Shelterwood					
OwnershipType	Ownership Size	Selection	Initial or Intermediate Entry	Final Entry	Sub-Total Shelterwood	Clearcut	Land Use Change	Total Harvest
Forest Industry Land	1 to 100 acres	0	0	0	0	11	0	11
	101 to 1,000 acres	1,141	60	0	60	0	2	1,203
	1,001 to 100,000 acres	1,904	1,313	92	1,405	230	54	3,593
	100,000 + acres	59,256	44,731	36,694	81,425	12,075	35	152,791
	SubTotal	**62,301**	**46,104**	**36,786**	**82,890**	**12,316**	**91**	**157,598**
Institutional Investor Timberlands	1 to 100 acres	0	0	0	0	0	0	0
	101 to 1,000 acres	0	0	0	0	0	0	0
	1,001 to 100,000 acres	2,622	343	0	343	20	0	2,985
	100,000 + acres	21,721	25,928	6,258	32,186	281	1	54,189
	SubTotal	**24,343**	**26,271**	**6,258**	**32,529**	**301**	**1**	**57,174**
Non-Industrial Land	1 to 100 acres	56,634	1,528	959	2,487	349	2,212	61,682
	101 to 1,000 acres	81,552	2,770	1,856	4,626	349	1,903	88,430
	1,001 to 100,000 acres	77,002	5,577	18,540	24,117	685	211	102,015
	100,000 + acres	35,074	37,545	10,658	48,203	1,034	13	84,324
	SubTotal	**250,262**	**47,420**	**32,013**	**79,433**	**2,417**	**4,339**	**336,451**
Other woodlands (Govt, etc.)	1 to 100 acres	589	25	10	35	0	62	686
	101 to 1,000 acres	1,702	83	11	94	24	35	1,855
	1,001 to 100,000 acres	3,314	457	242	699	18	28	4,059
	100,000 + acres	6,854	503	609	1,112	0	0	7,966
	SubTotal	**12,459**	**1,068**	**872**	**1,940**	**42**	**125**	**14,566**
2001 Totals:		**349,365**	**120,863**	**75,929**	**196,792**	**15,077**	**4,556**	**565,789**
Percent of 2001 Harvest:		**61.75%**	***21.36%***	***13.42%***	**34.78%**	**2.66%**	**0.81%**	**100.00%**
2000 Totals:		**353,230**			**197,013**	**13,185**	**6,042**	**569,470**
Percent Change from 2000 to 2001:		**-1%**			**0%**	**14%**	**-25%**	**-1%**

The 2000 totals in this report may not match those published in the May 25, 2001 report due to receipt of additional data or corrections

2001 Precommercial Activities and Professional Assistance

OwnershipType	Ownership Size	Precommercial Activities by Landowner Size and Type — Acres — Herbicide Use — Site Prep	Herbicide Use — Release	TSI	Tree Planting	Number of Reported Harvests	Licensed Professional Forester Use by Landowner Size and Type — Number of Harvests	Total Acres
Forest Industry Land	1 to 100 acres	0	0	0	0	1	0	0
	101 to 1,000 acres	0	0	0	0	6	3	640
	1,001 to 100,000 acres	10	18	0	18	37	32	2,861
	100,000 + acres	370	10,360	18,026	9,047	303	281	138,618
	Subtotal	**380**	**10,378**	**18,026**	**9,065**	**347**	**316**	**142,119**
Institutional Investor Timberlands	1 to 100 acres	0	0	0	0	0	0	0
	101 to 1,000 acres	0	0	0	0	0	0	0
	1,001 to 100,000 acres	0	0	0	0	26	23	2,425
	100,000 + acres	0	0	0	0	62	56	49,542
	Subtotal	**0**	**0**	**0**	**0**	**88**	**79**	**51,967**
Non-Industrial Land	1 to 100 acres	20	10	1,364	49	2,659	807	20,440
	101 to 1,000 acres	6	10	1,519	266	1,729	719	37,527
	1,001 to 100,000 acres	224	0	42	89	444	317	79,097
	100,000 + acres	15	822	783	1,414	191	171	74,958
	Subtotal	**265**	**842**	**3,708**	**1,818**	**5,023**	**2,014**	**212,022**
Other woodlands (Govt, etc.)	1 to 100 acres	0	0	0	0	20	5	134
	101 to 1,000 acres	0	50	7	0	36	32	1,817
	1,001 to 100,000 acres	0	100	150	2	40	36	3,953
	100,000 + acres	0	0	2	0	30	30	7,966
	Subtotal	**0**	**150**	**159**	**2**	**126**	**103**	**13,870**
2001 Totals:		**645**	**11,370**	**21,893**	**10,885**	**5,584**	**2,512**	**419,977**
2000 Totals:		**962**	**24,091**	**24,590**	**11,341**	**6,352**	**2,670**	**427,622**
Change from 2000 to 2001:		**-33%**	**-53%**	**-11%**	**-4%**	**-12%**	**-6%**	**-2%**

The 2000 totals in this report may not match those published in the May 25, 2001 report due to receipt of additional data or corrections

Definitions:

Ownership Type

Forest Industry Land: Woodlands owned by a forest products industry; usually most of the wood harvested is used by that industry.

Institutional Investor Timberlands: Woodlands owned by organizations that hold assets as fiduciaries for the benefit of others.

Non-Industrial Land: Woodlands privately owned but NOT by a forest industry. These include private individuals and other non-forest product industries.

Other woodlands: Woodlands owned by other entities not listed above -- including local, state, federal, or tribal governments.

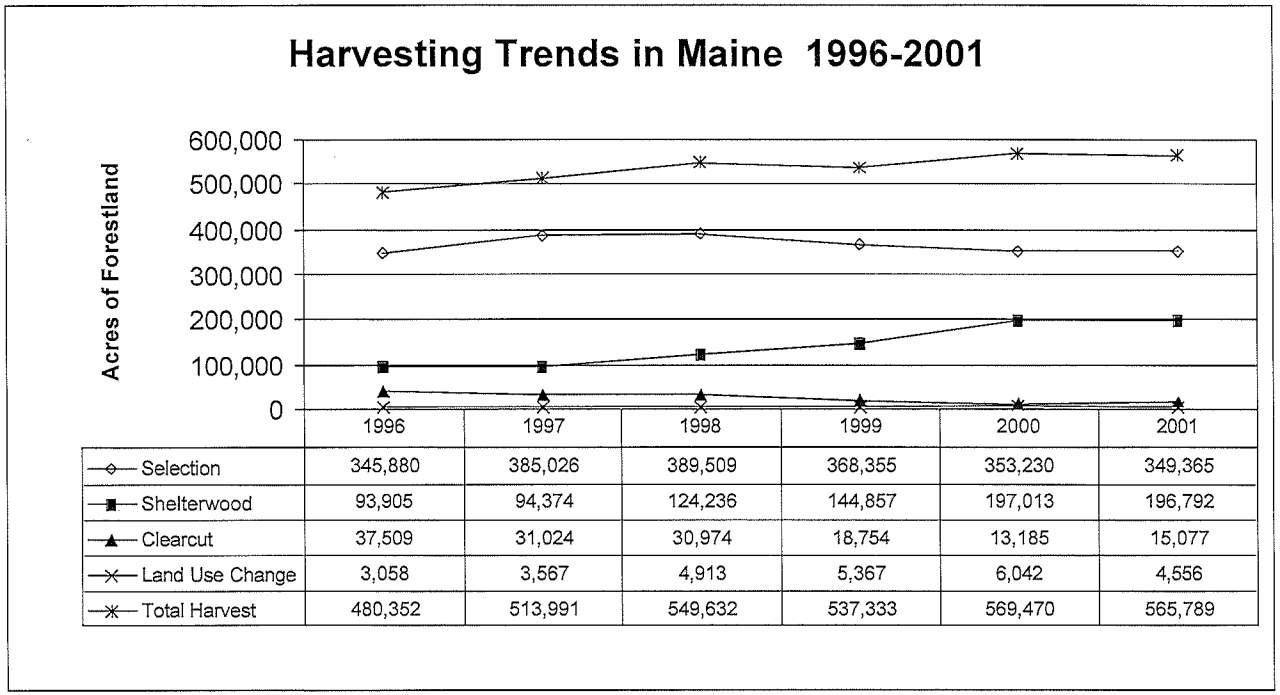
Types of Harvests

Selection: Harvest method where trees are removed individually or in small (<5 acre) patches.

Shelterwood: Harvest method of mature trees from a forest site in two or more stages. The first stage removes only a portion of the trees to allow establishment of regeneration before the remaining trees are removed in subsequent harvest.

Clearcut: Harvest method on a site greater than 5 acres that results in a residual basal area of acceptable growing stock trees >4.5" DBH of less than 30 square feet per acre, unless after harvesting the site has a well-distributed stand of acceptable growing stock 3 feet tall for softwood and 5 feet for hardwoods (Overstory Removal). Refer to the latest copy of the Maine Forest Practices Act, Maine Forest Service Rules Chapter 20 for additional information.

Change of Land Use: Harvest conducted to convert forestland to another land use such as houselots, farm pastures, etc.



	1996	1997	1998	1999	2000	2001
Selection	345,880	385,026	389,509	368,355	353,230	349,365
Shelterwood	93,905	94,374	124,236	144,857	197,013	196,792
Clearcut	37,509	31,024	30,974	18,754	13,185	15,077
Land Use Change	3,058	3,567	4,913	5,367	6,042	4,556
Total Harvest	480,352	513,991	549,632	537,333	569,470	565,789

2001 Annual Report on Clearcutting

Compiled from the 2001 Landowner Reports and survey instruments. Data collected under the provisions of the Forest Resources Assessment Program, 12 MRSA § 8878-A

	Large Landowners (own >100,000 acres)										All Other Landowners				All Landowners
	Precommercial Activities Acres		Clearcuts > 75 acres in size		Purpose for Clearcut (see explanation below) Acres						Acres				
													Clearcut		Acres
County	TSI	Planted	#	Acres	1	2	3	4	Sub Total	Avg. Size	TSI	Planted	Sub Total	Avg. Size	Clearcut
Androscoggin	0	0	0	0	0	0	0	0	0	0	83	2	46	15	46
Aroostook	11,406	4,091	0	0	4,154	0	1,272	0	5,426	20	361	149	335	15	5,761
Cumberland	0	0	0	0	0	0	0	0	0	0	90	2	0	0	0
Franklin	989	447	0	0	1,071	0	259	0	1,330	28	231	2	22	7	1,352
Hancock	1,126	708	0	0	424	0	0	0	424	53	149	9	91	15	515
Kennebec	0	0	0	0	0	0	0	0	0	0	42	9	64	16	64
Knox	0	0	0	0	0	0	0	0	0	0	192	11	0	0	0
Lincoln	0	0	0	0	0	0	0	0	0	0	137	2	5	5	5
Oxford	428	678	0	0	1,817	0	129	0	1,946	28	482	77	95	10	2,041
Penobscot	1,857	1,238	0	0	1,586	0	241	0	1,827	31	251	75	436	17	2,263
Piscataquis	1,196	731	0	0	442	0	70	11	523	25	157	13	60	15	583
Sagadahoc	0	0	0	0	0	0	0	0	0	0	22	0	0	0	0
Somerset	685	1,884	0	0	887	0	588	0	1,475	24	311	44	366	17	1,841
Waldo	0	0	0	0	0	0	0	0	0	0	148	27	64	8	64
Washington	1,124	684	0	0	304	0	135	0	439	29	94	3	70	9	509
York	0	0	0	0	0	0	0	0	0	0	332	0	32	11	32
State Total:	**18,811**	**10,461**	**0**	**0**	**10,685**	**0**	**2,694**	**11**	**13,390**	**24**	**3,082**	**424**	**1,686**	**12**	**15,076**

Purposes for creating clearcut:

1. Removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.
2. Ecologically appropriate improvement or creation of wildlife habitat.
3. Removal of stands that, if partially harvested according to accepted silvicultural practice, are at high risk for windthrow due to factors such as soils, rooting depth, crown ratio or stem quality.
4. Harvesting of an existing plantation or other forest stand established by or previously treated with precommercial silvicultural activities.

Frequency Distribution of Clearcutting
for Large Landowners who own more than 100,000 acres

2001 Clearcut as percent of statewide ownership	# of Landowners	Clearcut Acres
0% - 0.001%	18	438
0.001%-0.25%	5	1,713
0.26%-0.75%	3	11,239
0.76%-1.00%	0	0

Maine Forest Service District Foresters

The Maine Forest Service has 10 District Foresters who provide technical assistance and educational services to landowners, loggers, schools and educational institutions, municipalities and other stakeolders. Field Foresters conduct educational workshops, field demonstrations, media presentations, and can provide limited one-on-one contact with individual landowners.

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Department of Conservation, Maine Forest Service, Forest Policy and Management Division **Published September 26, 2002** **Compiled from 2001 Landowner Reports**

2002
Silvicultural Activities Report
including Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2002 Landowner Reports and other survey instruments.
Data collected under the provisions of Title 12 MRSA §8885 and §8878-A

Published:
July 9, 2003
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We help you make informed decisions about Maine's forest

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Report Highlights

Harvesting and Land Use Changes

- The total area harvested in 2002 was 562,424 acres, a slight decrease from 565,312 acres in 2001.
- The total area partially harvested in 2002 was 538,909 acres, a slight decrease from 546,386 acres in 2001.

Clearcutting:

1. The total area clearcut increased, from 14,391 acres in 2001 to 18,388 acres in 2002.
   Clearcutting amounts to less than 5% of total harvested acres.
2. Landowners owning more than 100,000 acres in Maine created 92% of all clearcuts (16,888 acres). The highest rate of clearcutting for an individual landowner, in this ownership size, was 0.8% of its total statewide ownership.
3. The average size clearcut in 2002 was 22 acres statewide. Landowners owning more than 100,000 acres had an average clearcut size of 24 acres. Landowners owning less than 100,000 acres had an average clearcut size of 12 acres. There was one clearcut created in 2002 that was over 75 acres in size.
4. The primary silvicultural reason for clearcutting reported by large landowners was for areas where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.

Land Use Changes:

- Harvesting to convert land from forest management to some other primary land use increased 11% fro 4,535 acres in 2001 to 5,126 acres in 2002.
- Due to a change in state law that exempts small harvests (<5 acres) from reporting requirements, acres of land use change reported here most likely underestimate the actual number.

Precommercial Silvicultural Activities

Herbicide Use:

- For site preparation increased 298%, from 421 acres in 2001 to 1,674 acres in 2002.
  This is a normal periodic increase of intensive management by large landowners for the purpose of establishing new forest stands.
- To release crop trees from competing vegetation increased 38%, from 11,370 acres in 2001 to 16,732 acres in 2002.

Timber Stand Improvement (TSI):

- Precommercial Thinning of young stands with spacing saws decreased 21%, from 21,862 acres in 2001 to 19,071 acres in 2002.
  92% of this activity was done by landowners owning more than 100,000 acres.

Planting:

- Tree planting decreased 37%, from 10,885 acres in 2001 to 7,926 acres in 2002.
  97% of the planting was by landowners owning more than 100,000 acres. The predominant species planted were spruces.

Professional Assistance

- The harvest acres supervised by licensed foresters remained consistent.
  76% of all harvest acres in 2002 had a licensed forester involved, compared to 74% of all harvests in 2001.
- Licensed Forester supervision on small woodlots (<= 100 acres) declined from 33% in 2001 to 24% in 2002.

2002 Harvesting and Land Use Changes

Commercial Harvest Information by Landowner Size and Type		Acres						
			Shelterwood					
OwnershipType	Ownership Size	Selection	Initial or Intermediate Entry	Final Entry	Sub-Total Shelterwood	Clearcut	Land Use Change	Total Harvest
Forest Industry Land	1 to 100 acres	77	0	0	0	0	0	77
	101 to 1,000 acres	150	0	0	0	0	0	150
	1,001 to 100,000 acres	5,140	876	0	876	32	2	6,050
	100,000 + acres	58,430	48,730	35,661	84,391	13,580	177	156,578
	SubTotal	**63,797**	**49,606**	**35,661**	**85,267**	**13,612**	**179**	**162,855**
Institutional Investor Timberlands	1 to 100 acres	0	0	0	0	0	0	0
	101 to 1,000 acres	0	0	0	0	0	0	0
	1,001 to 100,000 acres	517	1,220	229	1,449	0	0	1,966
	100,000 + acres	17,373	23,810	11,297	35,107	538	0	53,018
	SubTotal	**17,890**	**25,030**	**11,526**	**36,556**	**538**	**0**	**54,984**
Non-Industrial Land	1 to 100 acres	51,399	1,048	894	1,942	278	2,353	55,972
	101 to 1,000 acres	66,257	1,621	2,840	4,461	258	1,377	72,353
	1,001 to 100,000 acres	106,579	11,950	18,189	30,139	964	1,004	138,686
	100,000 + acres	19,558	32,720	9,429	42,149	2,673	0	64,380
	SubTotal	**243,793**	**47,339**	**31,352**	**78,691**	**4,173**	**4,734**	**331,391**
Other woodlands (Govt, etc.)	1 to 100 acres	226	60	0	60	0	67	353
	101 to 1,000 acres	1,351	150	25	175	0	81	1,607
	1,001 to 100,000 acres	2,710	372	131	503	66	50	3,329
	100,000 + acres	6,539	929	422	1,351	0	15	7,905
	SubTotal	**10,826**	**1,511**	**578**	**2,089**	**66**	**213**	**13,194**
2002 Totals:		**336,306**	**123,486**	**79,117**	**202,603**	**18,389**	**5,126**	**562,424**
Percent of 2002 Harvest:		**59.80%**	***21.96%***	***14.07%***	**36.02%**	**3.27%**	**0.91%**	**100.00%**
2001 Totals:		**349,594**	**120,863**	**75,929**	**196,792**	**14,391**	**4,535**	**565,312**
Percent Change from 2001 to 2002:		**-4%**	**2%**	**4%**	**3%**	**28%**	**13%**	**-1%**

The 2001 totals in this report may not match those published in the September 26, 2002 report due to receipt of additional data or corrections.

2002 Precommercial Activities and Professional Assistance

OwnershipType	Ownership Size	Precommercial Activities by Landowner Size and Type (Acres)				Number of Reported Harvests	Licensed Professional Forester Use by Landowner Size and Type	
		Herbicide Use						
		Site Prep	Release	TSI	Tree Planting		Number of Harvests	Total Acres
Forest Industry Land	1 to 100 acres	0	0	0	0	3	0	0
	101 to 1,000 acres	0	0	0	0	3	0	0
	1,001 to 100,000 acres	82	0	0	37	18	18	6,020
	100,000 + acres	1,067	11,397	15,877	7,143	323	306	144,890
	Subtotal	**1,149**	**11,397**	**15,877**	**7,180**	**347**	**324**	**150,910**
Institutional Investor Timberlands	1 to 100 acres	0	0	0	0	0	0	0
	101 to 1,000 acres	0	0	0	0	0	0	0
	1,001 to 100,000 acres	0	0	0	0	18	17	1,713
	100,000 + acres	0	0	0	0	51	48	51,122
	Subtotal	**0**	**0**	**0**	**0**	**69**	**65**	**52,835**
Non-Industrial Land	1 to 100 acres	6	5	344	50	2,418	516	13,539
	101 to 1,000 acres	10	8	329	53	1,513	503	28,208
	1,001 to 100,000 acres	230	647	641	76	470	313	112,662
	100,000 + acres	279	4,645	1,867	555	173	157	55,935
	Subtotal	**525**	**5,305**	**3,181**	**734**	**4,574**	**1,489**	**210,344**
Other woodlands (Govt, etc.)	1 to 100 acres	0	0	2	2	18	8	142
	101 to 1,000 acres	0	30	11	9	35	26	1,449
	1,001 to 100,000 acres	0	0	0	1	46	34	2,998
	100,000 + acres	0	0	0	0	32	32	7,905
	Subtotal	**0**	**30**	**13**	**12**	**131**	**100**	**12,494**
2002 Totals:		**1,674**	**16,732**	**19,071**	**7,926**	**5,121**	**1,978**	**426,583**
2001 Totals:		**421**	**11,370**	**21,862**	**10,885**	**5,591**	**2,504**	**419,384**
Change from 2001 to 2002:		**298%**	**47%**	**-13%**	**-27%**	**-8%**	**-21%**	**2%**

The 2001 totals in this report may not match those published in the September 26, 2002 report due to receipt of additional data or corrections.

Definitions:

Ownership Type

Forest Industry Land: Woodlands owned by a forest products industry; usually most of the wood harvested is used by that industry.

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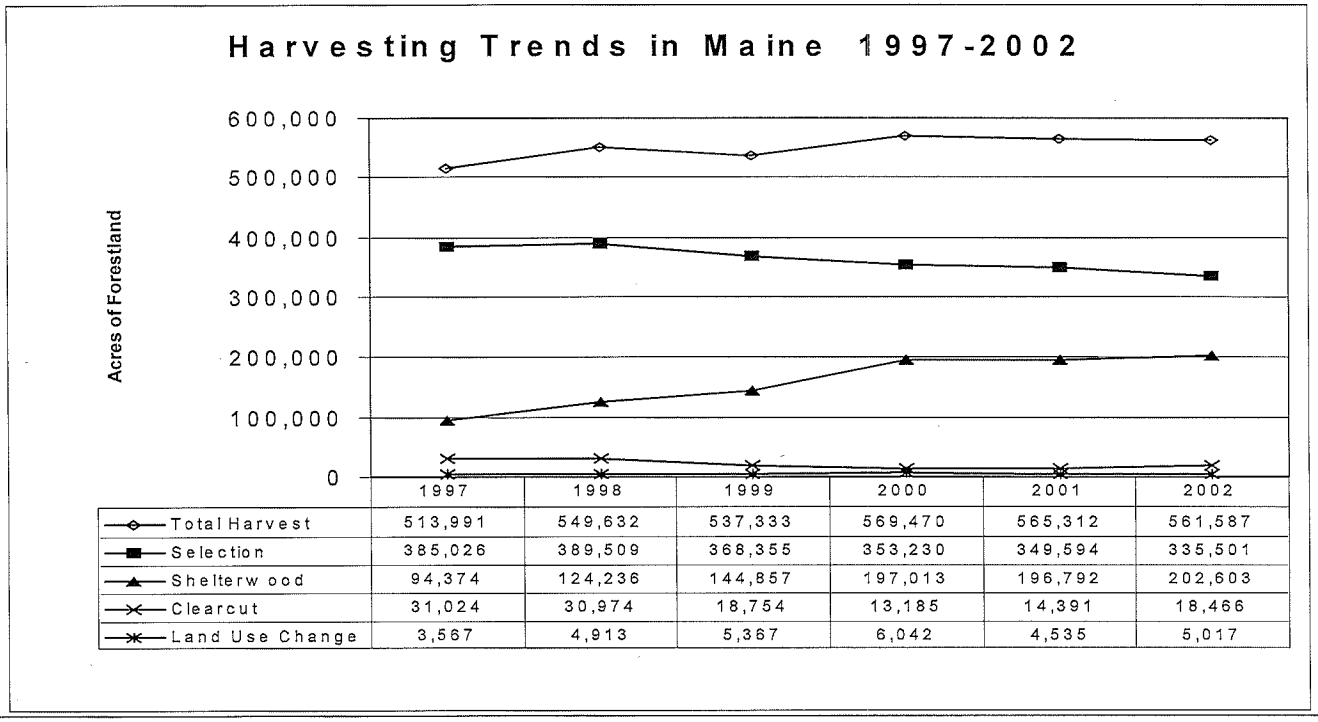
Types of Harvests

Selection: Harvest where trees are removed individually or in small (<5 acre) patches.

Shelterwood: Harvest of mature trees from a forest site in two or more stages. The first stage removes only a portion of the trees to allow establishment of regeneration before the remaining trees are removed in subsequent harvest.

Clearcut: Harvest on a site greater than 5 acres that results in a residual basal area of acceptable growing stock trees >4.5" DBH of less than 30 square feet per acre, unless after harvesting the site has a well-distributed stand of acceptable growing stock 3 feet tall for softwood and 5 feet for hardwoods (Overstory Removal). Refer to the latest copy of the Maine Forest Practices Act, Maine Forest Service Rules Chapter 20 for additional information.

Change of Land Use: Harvest conducted to convert forestland to another land use such as house lots, farm pastures, etc.



	1997	1998	1999	2000	2001	2002
Total Harvest	513,991	549,632	537,333	569,470	565,312	561,587
Selection	385,026	389,509	368,355	353,230	349,594	335,501
Shelterwood	94,374	124,236	144,857	197,013	196,792	202,603
Clearcut	31,024	30,974	18,754	13,185	14,391	18,466
Land Use Change	3,567	4,913	5,367	6,042	4,535	5,017

2002 Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2002 Landowner Reports and survey instruments. Data collected under the provisions of the Forest Resources Assessment Program, 12 MRSA § 8878-A

	Large Landowners (own >100,000 acres)										All Other Landowners				All Landowners
	Precommercial Activities Acres		Clearcuts > 75 acres in size		Purpose for Clearcut (see explanation below) Acres						Acres				
													Clearcut		Acres
County	TSI	Planted	#	Acres	1	2	3	4	Sub Total	Avg. Size	TSI	Planted	Sub Total	Avg. Size	Clearcut
Androscoggin	0	0	0	0	0	0	0	0	0	0	70	10	11	4	11
Aroostook	6,906	3,381	0	0	5,205	0	1,543	0	6,748	20	128	56	51	10	6,799
Cumberland	0	0	0	0	0	0	0	0	0	0	40	0	6	6	6
Franklin	311	379	0	0	1,663	0	221	0	1,884	31	23	6	186	13	2,070
Hancock	499	514	0	0	215	0	47	0	262	44	45	8	126	32	388
Kennebec	0	0	0	0	0	0	0	0	0	0	0	0	78	26	78
Knox	0	0	0	0	0	0	0	0	0	0	0	1	31	5	31
Lincoln	0	0	0	0	0	0	0	0	0	0	1	0	18	6	18
Oxford	808	625	0	0	2,926	0	76	0	3,002	29	36	51	20	7	3,022
Penobscot	4,789	1,198	0	0	988	0	16	0	1,004	26	716	32	247	15	1,251
Piscataquis	1,946	494	0	0	1,045	0	481	0	1,526	22	43	20	2	2	1,528
Sagadahoc	0	0	0	0	0	0	0	0	0	0	18	1	0	0	0
Somerset	1,678	853	0	0	716	0	1,585	25	2,326	18	4	1	573	21	2,899
Waldo	0	0	0	0	0	0	0	0	0	0	112	38	103	11	103
Washington	789	254	0	0	136	0	0	0	136	45	84	0	124	8	260
York	0	0	0	0	0	0	0	0	0	0	25	5	22	7	22
State Total:	**17,726**	**7,698**	**0**	**0**	**12,894**	**0**	**3,969**	**25**	**16,888**	**24**	**1,345**	**229**	**1,598**	**12**	**18,486**

Purposes for creating clearcut:

1. Removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.
2. Ecologically appropriate improvement or creation of wildlife habitat.
3. Removal of stands that, if partially harvested according to accepted silvicultural practice, are at high risk for windthrow due to factors such as soils, rooting depth, crown ratio or stem quality.
4. Harvesting of an existing plantation or other forest stand established by or previously treated with precommercial silvicultural activities.

Frequency Distribution of Clearcutting for Large Landowners who own more than 100,000 acres

2002 Clearcut as percent of statewide ownership	# of Landowners	Clearcut Acres
0% - 0.001%	**16**	**321**
0.001%-0.25%	**7**	**3,508**
0.26%-0.75%	**3**	**8,988**
0.76%-1.00%	**1**	**4,071**

2003
Silvicultural Activities Report
including Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2003 Landowner Reports and other survey instruments.
Data collected under the provisions of Title 12 MRSA §8885 and §8878-A

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Report Highlights

Harvesting and Land Use Changes

- 511,070 acres were harvested in 2003, a 9% decrease from 562,745 acres in 2002. Most of the decline in harvest acreage occurred on non-industrial lands.
- 481,315 acres were partially harvested in 2003, a 11% decrease from 539,225 acres in 2002.
- The number of harvests reported declined 9% from 5,150 to 4,743 harvests.

Clearcutting:

1. The total area clearcut increased, from 18,389 acres in 2002 to 24,021 acres in 2003. Clearcutting amounts to less than 5% of total harvested acres.
2. Landowners owning more than 100,000 acres in Maine created 96% of all clearcuts (22,953 acres).
3. Average clearcut size in 2003 was 25 acres. Landowners owning more than 100,000 acres had an average clearcut size of 27 acres. Landowners owning less than 100,000 acres had an average clearcut size of 13 acres. Two clearcuts larger than 75 acres were created in 2003.
4. The primary silvicultural reasons for clearcutting reported by large landowners were: (a) Removal of stands that, if partially harvested according to accepted silvicultural practice, are at high risk for windthrow due to factors such as soils, rooting depth, crown ratio or stem quality; (b) For areas where the retention of the residual overstory trees were at high risk of windthrow.

Land Use Changes:

- Harvesting to convert land from forest management to some other land use increased 12% from 5,131 acres in 2002 to 5,734 acres in 2003.

Precommercial Silvicultural Activities

Herbicide Use:

- For site preparation decreased 35%, from 1,690 acres in 2002 to 1,093 acres in 2003.
- To release crop trees from competing vegetation increased 9%, from 17,070 acres in 2002 to 18,663 acres in 2003.

Timber Stand Improvement (TSI):

- Precommercial thinning of young stands with spacing saws increased 41%, from 19,089 acres in 2002 to 26,894 acres in 2003.

  98% of this activity was done by landowners owning more than 100,000 acres.

Planting:

- Tree planting increased 36%, from 7,926 acres in 2002 to 10,746 acres in 2003.

  84% of the planting was by landowners owning more than 100,000 acres. The predominant species planted were spruce species.

Professional Assistance

- The harvest acres supervised by licensed foresters declined slightly.

  71% of all harvest acres in 2003 had a licensed forester involved, compared to 76% of all harvests in 2002.

  Licensed Forester supervision on small woodlots (<= 100 acres) declined slightly from 27% in 2002 to 25% in 2003.

Statewide total harvesting volumes reported in the 2003 Wood processor Report corroborate the data reported in this report that harvesting activities in Maine declined in 2003.

2003 Harvesting and Land Use Changes

Commercial Harvest Information by Landowner Size and Type		Acres						
			Shelterwood					
OwnershipType	Ownership Size	Partial Harvests	Initial or Intermediate Entry	Final Entry	Sub-Total Shelterwood	Clearcut	Land Use Change	Total Harvest
Forest Industry woodlands	1 to 100 acres	0	0	0	0	0	0	0
	101 to 1,000 acres	135	0	0	0	0	0	135
	1,001 to 100,000 acres	3,088	2,334	608	2,942	209	25	6,264
	100,000 + acres	42,496	44,784	45,183	89,967	15,975	0	148,438
	SubTotal	**45,719**	**47,118**	**45,791**	**92,909**	**16,184**	**25**	**154,837**
Institutional Investor Timberlands	1 to 100 acres	0	0	0	0	0	0	0
	101 to 1,000 acres	0	0	0	0	0	0	0
	1,001 to 100,000 acres	320	990	0	990	0	0	1,310
	100,000 + acres	14,253	23,731	14,200	37,931	1,052	0	53,236
	SubTotal	**14,573**	**24,721**	**14,200**	**38,921**	**1,052**	**0**	**54,546**
Non-Industrial Land	1 to 100 acres	41,260	1,934	1,141	3,075	193	2,019	46,547
	101 to 1,000 acres	58,191	2,970	5,553	8,523	212	2,137	69,063
	1,001 to 100,000 acres	75,547	10,460	27,176	37,636	392	1,441	115,016
	100,000 + acres	15,496	29,132	7,076	36,208	5,926	0	57,630
	SubTotal	**190,494**	**44,496**	**40,946**	**85,442**	**6,723**	**5,597**	**288,256**
Other woodlands (Govt, etc.)	1 to 100 acres	92	7	20	27	15	29	163
	101 to 1,000 acres	1,437	95	20	115	0	49	1,601
	1,001 to 100,000 acres	2,747	1,430	139	1,569	47	33	4,396
	100,000 + acres	6,266	121	883	1,004	0	1	7,271
	SubTotal	**10,542**	**1,653**	**1,062**	**2,715**	**62**	**112**	**13,431**
2003 Totals:		**261,328**	**117,988**	**101,999**	**219,987**	**24,021**	**5,734**	**511,070**
Percent of 2003 Harvest:		**51.13%**	**23.09%**	**19.96%**	**43.04%**	**4.70%**	**1.12%**	**100.00%**
2002 Totals:		**336,622**	**123,486**	**79,117**	**202,603**	**18,389**	**5,131**	**562,745**
Percent Change from 2002 to 2003:		**-22%**	**-4%**	**29%**	**9%**	**31%**	**12%**	**-9%**

2003 Precommercial Activities and Professional Assistance

OwnershipType	Ownership Size	Precommercial Activities by Landowner Size and Type — Acres — Herbicide Use — Site Prep	Herbicide Use — Release	TSI	Tree Planting	Number of Reported Harvests	Licensed Forester Involvement by Landowner Size and Type — Number of Harvests	Total Acres
Forest Industry woodlands	1 to 100 acres	0	0	0	0	0	0	0
	101 to 1,000 acres	0	0	0	0	3	1	25
	1,001 to 100,000 acres	30	0	0	17	41	22	3,802
	100,000 + acres	318	14,132	23,721	8,434	320	193	106,534
	Subtotal	**348**	**14,132**	**23,721**	**8,451**	**364**	**216**	**110,361**
Institutional Investor Timberlands	1 to 100 acres	0	0	0	0	0	0	0
	101 to 1,000 acres	0	0	0	0	0	0	0
	1,001 to 100,000 acres	0	0	0	0	13	13	1,310
	100,000 + acres	0	0	0	0	84	80	52,153
	Subtotal	**0**	**0**	**0**	**0**	**97**	**93**	**53,463**
Non-Industrial Land	1 to 100 acres	10	5	402	1,523	2,068	470	12,096
	101 to 1,000 acres	111	318	201	83	1,412	477	27,254
	1,001 to 100,000 acres	100	100	5	30	545	391	88,857
	100,000 + acres	524	4,108	2,561	651	148	141	55,970
	Subtotal	**745**	**4,531**	**3,169**	**2,287**	**4,173**	**1,479**	**184,177**
Other woodlands (Govt, etc.)	1 to 100 acres	0	0	0	0	10	4	62
	101 to 1,000 acres	0	0	0	0	29	21	1,362
	1,001 to 100,000 acres	0	0	4	8	37	29	4,102
	100,000 + acres	0	0	0	0	33	33	7,271
	Subtotal	**0**	**0**	**4**	**8**	**109**	**87**	**12,797**
2003 Totals:		**1,093**	**18,663**	**26,894**	**10,746**	**4,743**	**1,875**	**360,798**
2002 Totals:		**1,690**	**17,070**	**19,089**	**7,926**	**5,150**	**1,950**	**424,325**
Change from 2002 to 2003:		**-35%**	**9%**	**41%**	**36%**	**-8%**	**-4%**	**-15%**

Definitions:

Ownership Type

Forest Industry Land: Woodlands owned by a forest products industry; usually most of the wood harvested is used by that industry.

Institutional Investor Timberlands: Woodlands owned by organizations that hold assets as fiduciaries for the benefit of others.

Non-Industrial Land: Woodlands privately owned but NOT by a forest industry. These include private individuals and other non-forest product industries.

Other woodlands: Woodlands owned by other entities not listed above -- including local, state, federal, or tribal governments.

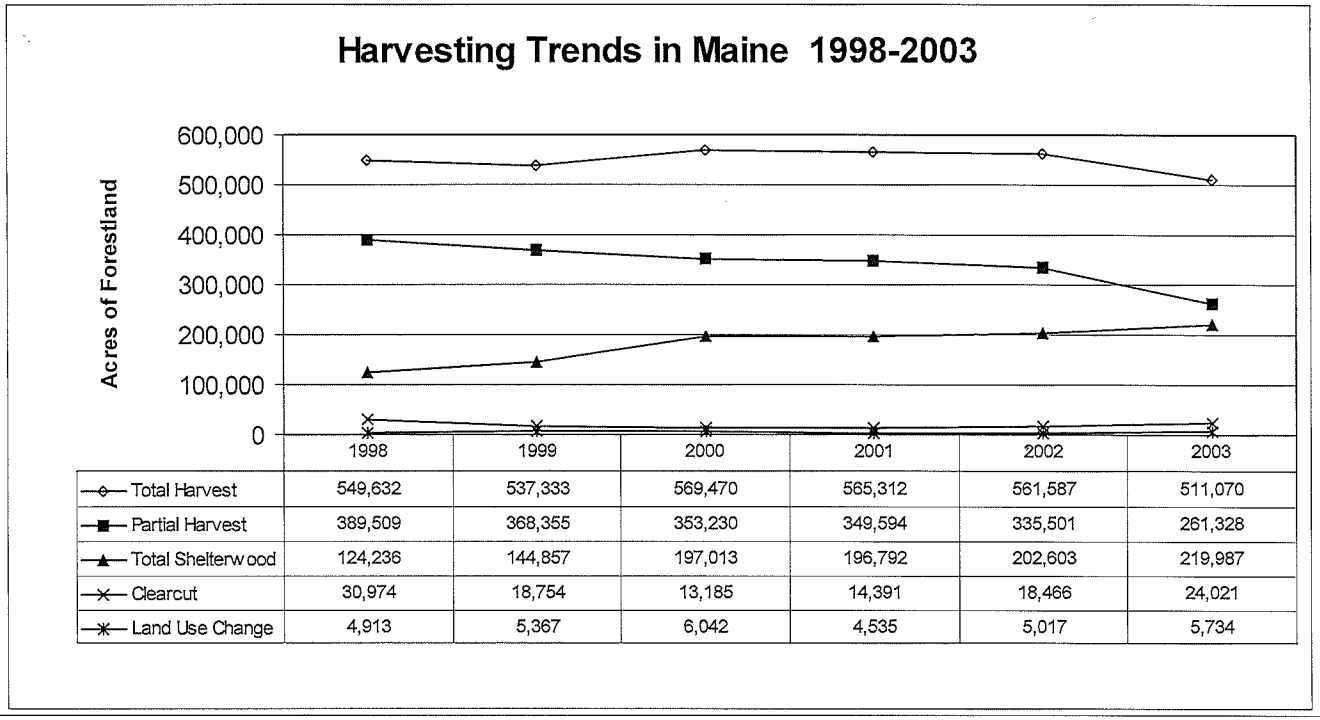
Types of Harvests

Partial Harvest: Harvest where trees are removed individually or in small (<5 acre) patches.

Shelterwood: Harvest of mature trees from a forest site in two or more stages. The first stage removes only a portion of the trees to allow establishment of regeneration before the remaining trees are removed in subsequent harvest.

Clearcut: Harvest on a site greater than 5 acres that results in a residual basal area of acceptable growing stock trees >4.5" DBH of less than 30 square feet per acre, unless after harvesting the site has a well-distributed stand of acceptable growing stock 3 feet tall for softwood and 5 feet for hardwoods (Overstory Removal). Refer to the latest copy of the Maine Forest Practices Act, Maine Forest Service Rules Chapter 20 for additional information.

Change of Land Use: Harvest conducted to convert forestland to another land use such as house lots, farm pastures, etc.



	1998	1999	2000	2001	2002	2003
Total Harvest	549,632	537,333	569,470	565,312	561,587	511,070
Partial Harvest	389,509	368,355	353,230	349,594	335,501	261,328
Total Shelterwood	124,236	144,857	197,013	196,792	202,603	219,987
Clearcut	30,974	18,754	13,185	14,391	18,466	24,021
Land Use Change	4,913	5,367	6,042	4,535	5,017	5,734

2003 Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2003 Landowner Reports and other survey instruments. Data collected under the provisions of the Forest Resources Assessment Program, 12 MRSA § 8878-A

	Large Landowners (own >100,000 acres)										All Other Landowners				All Landowners
	Precommercial Activities Acres		Clearcuts > 75 acres in size		Purpose for Clearcut (see explanation below) Acres						Acres				
													Clearcut		Acres
County	TSI	Planted	#	Acres	1	2	3	4	Sub Total	Avg. Size	TSI	Planted	Sub Total	Avg. Size	Clearcut
Androscoggin	0	0	0	0	0	0	0	0	0	0	88	3	17	9	17
Aroostook	16,352	4,595	0	0	240	0	7,684	0	7,924	26	27	1,507	165	13	8,089
Cumberland	0	0	0	0	0	0	0	0	0	0	18	0	22	7	22
Franklin	385	666	0	0	2,097	0	235	0	2,332	42	21	1	127	18	2,459
Hancock	61	391	0	0	381	22	0	0	403	34	85	62	0	0	403
Kennebec	0	0	0	0	0	0	0	0	0	0	5	2	0	0	0
Knox	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0
Lincoln	0	0	0	0	0	0	0	0	0	0	45	0	12	12	12
Oxford	950	392	2	450	3,167	0	129	113	3,409	48	40	35	10	5	3,419
Penobscot	3,500	1,380	0	0	288	0	854	0	1,142	28	27	14	137	11	1,279
Piscataquis	2,861	706	0	0	863	16	772	0	1,651	16	46	5	32	16	1,683
Sagadahoc	0	0	0	0	0	0	0	0	0	0	0	5	15	15	15
Somerset	1,406	823	0	0	3,958	0	1,849	0	5,807	21	88	4	70	9	5,877
Waldo	0	0	0	0	0	0	0	0	0	0	40	24	316	17	316
Washington	767	132	0	0	148	0	97	41	286	36	5	0	78	9	364
York	0	0	0	0	0	0	0	0	0	0	27	0	67	34	67
State Total:	**26,282**	**9,085**	**2**	**450**	**11,142**	**38**	**11,620**	**154**	**22,953**	**27**	**612**	**1,661**	**1,068**	**13**	**24,021**

Purposes for creating clearcut:

1. Removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.
2. Ecologically appropriate improvement or creation of wildlife habitat.
3. Removal of stands that, if partially harvested according to accepted silvicultural practice, are at high risk for windthrow due to factors such as soils, rooting depth, crown ratio or stem quality.
4. Harvesting of an existing plantation or other forest stand established by or previously treated with precommercial silvicultural activities.

Frequency Distribution of Clearcutting for Large Landowners who own more than 100,000 acres

2003 Clearcut as percent of statewide ownership	# of Landowners	Clearcut Acres
0% - 0.001%	**13**	**320**
0.001%-0.25%	**9**	**3,498**
0.26%-0.75%	**3**	**14,586**
0.76%-1.00%	**1**	**4,550**

2004
Silvicultural Activities Report

including Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2004 Landowner Reports and other survey instruments.
Data collected under the provisions of Title 12 MRSA §8885 and §8878-A

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Report Highlights

Harvesting and Land Use Changes

- **507,899 acres were harvested in 2004, a 1% decrease from 511,416 acres in 2003.**
- **481,153 acres were partially harvested in 2004, no significant change from 481,661 acres in 2003.**
- **The number of harvests reported increased 20% from 4,756 to 5,713 harvests.**

Clearcutting:

1. **The total area clearcut decreased, from 24,021 acres in 2003 to 18,779 acres in 2004. Clearcutting amounts to less than 5% of total harvested acres.**
2. **Landowners owning more than 100,000 acres in Maine created 90% of all clearcuts (16,963 acres).**
3. **Average clearcut size in 2004 was 20 acres. Landowners owning more than 100,000 acres had an average clearcut size of 27 acres. Landowners owning less than 100,000 acres had an average clearcut size of 13 acres. Three clearcuts larger than 75 acres were created in 2004.**
4. **The primary silvicultural reasons for clearcutting reported by large landowners were: (a) Removal of stands that, if partially harvested according to accepted silvicultural practice, are at high risk for windthrow due to factors such as soils, rooting depth, crown ratio or stem quality; and (b) For areas where the retention of the residual overstory trees were at high risk of windthrow.**

Land Use Changes:

- **Harvesting to convert land from forest management to some other land use increased 39% from 5,734 acres in 2003 to 7,967 acres in 2004.**

Precommercial Silvicultural Activities

Herbicide Use:

- **For site preparation decreased 75%, from 1,093 acres in 2003 to 268 acres in 2004.**
- **To release crop trees from competing vegetation decreased 30%, from 18,663 acres in 2003 to 13,152 acres in 2004.**

Timber Stand Improvement (TSI):

- **Precommercial thinning of young stands with spacing saws decreased 26%, from 26,894 acres in 2003 to 19,871 acres in 2004.**

  95% of this activity was done by landowners owning more than 100,000 acres.

Planting:

- **Tree planting decreased 30%, from 10,746 acres in 2003 to 7,573 acres in 2004.**

  96% of the planting was by landowners owning more than 100,000 acres. The predominant species planted were mixed softwoods.

Professional Assistance

- **The harvest acres supervised by licensed foresters declined slightly.**

  65% of all harvest acres in 2004 had a licensed forester involved, compared to 70% of all harvests in 2003.

  Licensed Forester supervision on small woodlots (<= 100 acres) increased slightly from 26% in 2003 to 27% in 2004.

2004 Harvesting and Land Use Changes

Commercial Harvest Information by Landowner Size and Type		Acres						
			Shelterwood					
OwnershipType	Ownership Size	Partial Harvests	Initial or Intermediate Entry	Final Entry	Sub-Total Shelterwood	Clearcut	Land Use Change	Total Harvest
Forest Industry woodlands	1 to 100 acres	345	2	16	18	25	141	529
	101 to 1,000 acres	1,561	25	8	33	0	14	1,608
	1,001 to 100,000 acres	22,848	1,724	4,408	6,132	603	50	29,633
	100,000 + acres	43,491	26,739	35,457	62,196	7,067	0	112,754
	SubTotal	**68,245**	**28,490**	**39,889**	**68,379**	**7,695**	**205**	**144,524**
Investor Timberlands	1 to 100 acres	18	0	0	0	0	15	33
	101 to 1,000 acres	0	0	0	0	0	20	20
	1,001 to 100,000 acres	1,203	30	550	580	404	0	2,187
	100,000 + acres	18,008	36,715	22,469	59,184	9,543	0	86,735
	SubTotal	**19,229**	**36,745**	**23,019**	**59,764**	**9,947**	**35**	**88,975**
Non-Industrial Land	1 to 100 acres	50,987	2,652	2,549	5,201	211	3,137	59,536
	101 to 1,000 acres	69,660	4,877	4,474	9,351	229	2,851	82,091
	1,001 to 100,000 acres	65,872	5,224	18,283	23,507	246	1,502	91,127
	100,000 + acres	10,144	6,454	6,683	13,137	353	10	23,644
	SubTotal	**196,663**	**19,207**	**31,989**	**51,196**	**1,039**	**7,500**	**256,398**
Other woodlands (Govt, etc.)	1 to 100 acres	396	40	40	80	0	166	642
	101 to 1,000 acres	2,529	56	131	187	5	15	2,736
	1,001 to 100,000 acres	2,618	675	672	1,347	93	23	4,081
	100,000 + acres	9,253	379	888	1,267	0	23	10,543
	SubTotal	**14,796**	**1,150**	**1,731**	**2,881**	**98**	**227**	**18,002**
2004 Totals:		**298,933**	**85,592**	**96,628**	**182,220**	**18,779**	**7,967**	**507,899**
Percent of 2004 Harvest:		**58.86%**	**16.85%**	**19.03%**	**35.88%**	**3.70%**	**1.57%**	**100.00%**
2003 Totals:		**261,674**	**117,988**	**101,999**	**219,987**	**24,021**	**5,734**	**511,416**
Percent Change from 2003 to 2004:		**14%**	**-27%**	**-5%**	**-17%**	**-22%**	**39%**	**-1%**

2004 Precommercial Activities and Professional Assistance

OwnershipType	Ownership Size	Precommercial Activities by Landowner Size and Type — Acres — Herbicide Use — Site Prep	Herbicide Use — Release	TSI	Tree Planting	Number of Reported Harvests	Licensed Forester Involvement by Landowner Size and Type — Number of Harvests	Total Acres
Forest Industry woodlands	1 to 100 acres	0	73	6	0	23	4	50
	101 to 1,000 acres	0	0	0	0	22	5	412
	1,001 to 100,000 acres	0	0	0	0	71	29	10,795
	100,000 + acres	176	10,395	16,080	6,274	270	151	78,337
	Subtotal	**176**	**10,468**	**16,086**	**6,274**	**386**	**189**	**89,594**
Investor Timberlands	1 to 100 acres	0	0	0	0	2	2	33
	101 to 1,000 acres	0	0	0	0	1	0	0
	1,001 to 100,000 acres	0	0	400	100	18	18	2,187
	100,000 + acres	0	2,628	2,427	1,003	172	158	81,165
	Subtotal	**0**	**2,628**	**2,827**	**1,103**	**193**	**178**	**83,385**
Non-Industrial Land	1 to 100 acres	77	21	71	63	2,645	584	16,233
	101 to 1,000 acres	15	20	246	82	1,741	535	30,632
	1,001 to 100,000 acres	0	0	269	47	489	305	69,602
	100,000 + acres	0	0	362	0	89	85	23,369
	Subtotal	**92**	**41**	**948**	**192**	**4,964**	**1,509**	**139,836**
Other woodlands (Govt, etc.)	1 to 100 acres	0	0	0	0	24	8	229
	101 to 1,000 acres	0	10	10	3	53	37	1,769
	1,001 to 100,000 acres	0	5	0	0	40	34	3,299
	100,000 + acres	0	0	0	0	53	51	10,469
	Subtotal	**0**	**15**	**10**	**3**	**170**	**130**	**15,766**
2004 Totals:		**268**	**13,152**	**19,871**	**7,573**	**5,713**	**2,006**	**328,581**
2003 Totals:		**1,093**	**18,663**	**26,894**	**10,746**	**4,756**	**1,856**	**358,611**
Change from 2003 to 2004:		**-75%**	**-30%**	**-26%**	**-30%**	**20%**	**8%**	**-8%**

Definitions:

Ownership Type

Forest Industry Land: **Woodlands owned by a forest products industry; usually most of the wood harvested is used by that industry.**

Institutional Investor Timberlands: **Woodlands owned by organizations, including Timberland Investment Management Organizations (TIMOs) and Real Estate Investment Trusts (REITs) that hold timberland assets as fiduciaries for the benefit of others.**

Non-Industrial Land: **Woodlands privately owned but NOT by a forest industry. These include private individuals and other non-forest product industries.**

Other woodlands: **Woodlands owned by other entities not listed above -- including local, state, federal, or tribal governments.**

Types of Harvests

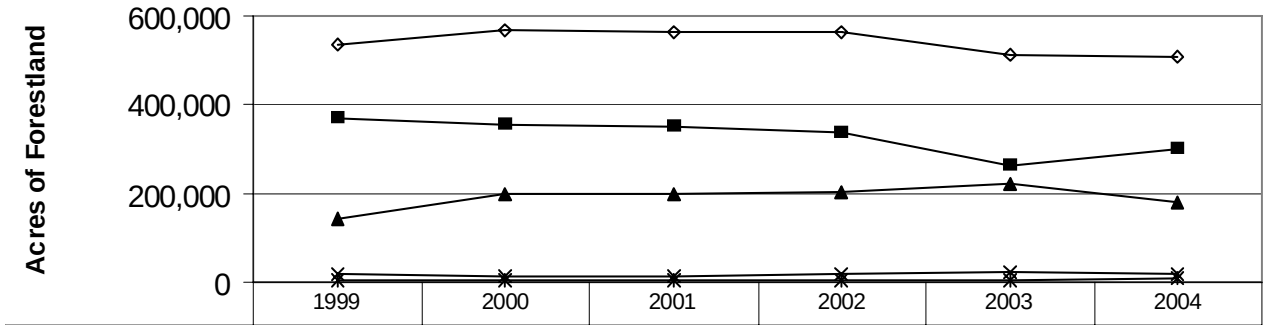
Partial Harvest: **Harvest where trees are removed individually or in small (<5 acre) patches.**

Shelterwood: **Harvest of mature trees from a forest site in two or more stages. The first stage removes only a portion of the trees to allow establishment of regeneration before the remaining trees are removed in subsequent harvest.**

Clearcut: **Harvest on a site larger than 5 acres that results in a residual basal area of acceptable growing stock trees >4.5" DBH of less than 30 square feet per acre, unless after harvesting the site has a well-distributed stand of acceptable growing stock 3 feet tall for softwood and 5 feet for hardwoods (Overstory Removal). Refer to the latest copy of the Maine Forest Practices Act, Maine Forest Service Rules Chapter 20 for additional information.**

Change of Land Use: **Harvest conducted to convert forestland to another land use such as house lots, farm pastures, etc.**

Harvesting Trends in Maine 1999-2004



	1999	2000	2001	2002	2003	2004
Total Harvest	537,333	569,470	565,312	561,587	511,070	507,899
Partial Harvest	368,355	353,230	349,594	335,501	261,328	298,933
Total Shelterwood	144,857	197,013	196,792	202,603	219,987	182,220
Clearcut	18,754	13,185	14,391	18,466	24,021	18,779
Land Use Change	5,367	6,042	4,535	5,017	5,734	7,967

2004 Annual Report on Clearcutting and Precommercial Activities

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	Large Landowners (own >100,000 acres)										All Other Landowners				All Landowners
	Precommercial Activities Acres		Clearcuts > 75 acres in size		Purpose for Clearcut (see explanation below) Acres						Acres				
													Clearcut		Acres
County	TSI	Planted	#	Acres	1	2	3	4	Sub Total	Avg. Size	TSI	Planted	Sub Total	Avg. Size	Clearcut
Androscoggin	0	0	0	0	0	0	0	0	0	0	0	0	25	25	25
Aroostook	11,398	3,624	0	0	2,071	0	374	0	2,445	29	62	42	299	15	2,744
Cumberland	0	0	0	0	0	0	0	0	0	0	4	0	30	6	30
Franklin	661	434	0	0	917	0	366	0	1,283	32	1	0	173	16	1,456
Hancock	599	541	2	397	511	40	0	397	948	40	13	17	73	10	1,021
Kennebec	0	0	0	0	0	0	0	0	0	0	40	1	0	0	0
Knox	0	0	0	0	0	0	0	0	0	0	2	1	5	5	5
Lincoln	0	0	0	0	0	0	0	0	0	0	2	0	34	17	34
Oxford	798	205	0	0	550	0	0	0	550	50	261	47	50	17	600
Penobscot	348	1,233	0	0	588	0	0	0	588	24	41	3	104	7	692
Piscataquis	2,514	382	1	154	974	0	2,931	0	3,905	15	127	9	263	16	4,168
Sagadahoc	0	0	0	0	0	0	0	0	0	0	0	0	10	10	10
Somerset	1,948	716	0	0	3,938	0	3,206	23	7,167	19	413	128	527	16	7,694
Waldo	0	0	0	0	0	0	0	0	0	0	9	42	102	15	102
Washington	603	142	0	0	77	0	0	0	77	15	24	6	106	6	183
York	0	0	0	0	0	0	0	0	0	0	3	0	15	8	15
State Total:	**18,869**	**7,277**	**3**	**551**	**9,626**	**40**	**6,877**	**420**	**16,963**	**27**	**1,002**	**296**	**1,816**	**13**	**18,779**

Purposes for creating clearcut:

1. Removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.
2. Ecologically appropriate improvement or creation of wildlife habitat.
3. Removal of stands that, if partially harvested according to accepted silvicultural practice, are at high risk for windthrow due to factors such as soils, rooting depth, crown ratio or stem quality.
4. Harvesting of an existing plantation or other forest stand established by or previously treated with precommercial silvicultural activities.

Frequency Distribution of Clearcutting for Large Landowners who own more than 100,000 acres

2004 Clearcut as percent of statewide ownership	# of Landowners	Clearcut Acres
0% - 0.001%	**15**	**24**
0.001%-0.25%	**7**	**3,963**
0.26%-0.75%	**4**	**12,976**
0.76%-1.00%	**0**	**0**

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Report Highlights

Harvesting and Land Use Changes

- **531,883 acres were harvested in 2005, a 4% increase from 511,046 acres in 2004.**
- **504,419 acres were "partially harvested" (partial and shelterwood totals) in 2005, 4% increase from 484,057 acres in 2004.**
- **The number of harvests reported decreased 5% from 5,784 to 5,490 harvests.**

Clearcutting:

1. **The total area clearcut increased, from 18,797 acres in 2004 to 21,254 acres in 2005. Clearcutting amounts to less than 5% of total harvested acres.**
2. **Landowners owning more than 100,000 acres in Maine created 89% of all clearcuts (18,840 acres).**
3. **Average clearcut size in 2005 was 20 acres. Landowners owning more than 100,000 acres had an average clearcut size of 22 acres. Landowners owning less than 100,000 acres had an average clearcut size of 12 acres. One clearcut larger than 75 acres was created in 2005.**
4. **The primary silvicultural reasons for clearcutting reported by large landowners was the removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.**

Land Use Changes:

- **Harvesting to convert land from forest management to some other land use decreased -24% from 8,192 acres in 2004 to 6,210 acres in 2005.**

Precommercial Silvicultural Activities

Herbicide Use:

- **For site preparation increased 212%, from 268 acres in 2004 to 837 acres in 2005.**
- **To release crop trees from competing vegetation decreased -12%, from 13,152 acres in 2004 to 11,530 acres in 2005.**

Timber Stand Improvement (TSI):

- **Precommercial thinning of young stands with spacing saws decreased -28%, from 19,928 acres in 2004 to 14,358 acres in 2005.**

91% of this activity was done by landowners owning more than 100,000 acres.

Planting:

- **Tree planting did not significantly change, from 7,573 acres in 2004 to 7,546 acres in 2005.**

90% of the planting was by landowners owning more than 100,000 acres.

Professional Assistance

- **In 2005, licensed foresters supervised harvesting on 369,746 acres, compared to 329,475 acres in 2004.**

70% of all harvest acres in 2005 had a licensed forester involved, compared to 64% of all harvests in 2004.

Licensed Forester supervision on small woodlots (<= 100 acres) remained steady at 24% between 2004 and 2005.

2005 Harvesting and Land Use Changes

Commercial Harvest Information by Landowner Size and Type		Acres						
			Shelterwood					
OwnershipType	Ownership Size	Partial Harvests	Initial or Intermediate Entry	Final Entry	Total Shelterwood	Clearcut	Land Use Change	Total Harvest
Forest Industry woodlands	1 to 100 acres	1,048	7	278	285	0	118	1,451
	101 to 1,000 acres	2,082	166	1	167	0	18	2,267
	1,001 to 100,000 acres	12,993	2,783	5,198	7,981	718	89	21,781
	100,000 + acres	28,677	15,902	24,305	40,207	9,132	0	78,016
	SubTotal	**44,800**	**18,858**	**29,782**	**48,640**	**9,850**	**225**	**103,515**
Investor Timberlands	1 to 100 acres	34	0	0	0	0	7	41
	101 to 1,000 acres	32	28	0	28	10	0	70
	1,001 to 100,000 acres	3,751	152	4,120	4,272	50	0	8,073
	100,000 + acres	20,761	54,589	33,826	88,415	9,457	0	118,633
	SubTotal	**24,578**	**54,769**	**37,946**	**92,715**	**9,517**	**7**	**126,817**
Non-Industrial Land	1 to 100 acres	48,477	2,453	2,106	4,559	562	3,615	57,213
	101 to 1,000 acres	67,493	4,617	4,593	9,210	450	1,463	78,616
	1,001 to 100,000 acres	50,423	7,246	35,332	42,578	558	670	94,229
	100,000 + acres	35,184	6,384	15,918	22,302	251	0	57,737
	SubTotal	**201,577**	**20,700**	**57,949**	**78,649**	**1,821**	**5,748**	**287,795**
Other woodlands (Govt, etc.)	1 to 100 acres	298	14	0	14	16	69	397
	101 to 1,000 acres	1,607	69	2	71	0	133	1,811
	1,001 to 100,000 acres	2,780	881	288	1,169	50	17	4,016
	100,000 + acres	6,793	94	634	728	0	11	7,532
	SubTotal	**11,478**	**1,058**	**924**	**1,982**	**66**	**230**	**13,756**
2005 Totals:		**282,433**	**95,385**	**126,601**	**221,986**	**21,254**	**6,210**	**531,883**
Percent of 2005 Harvest:		**53.10%**	**17.93%**	**23.80%**	**41.74%**	**4.00%**	**1.17%**	**100.00%**
2004 Totals:		**301,479**	**85,727**	**96,851**	**182,578**	**18,797**	**8,192**	**511,046**
Percent Change from 2004 to 2005:		**-6%**	**11%**	**31%**	**22%**	**13%**	**-24%**	**4%**

2005 Precommercial Activities and Professional Assistance

OwnershipType	Ownership Size	Precommercial Activities by Landowner Size and Type — Acres — Herbicide Use — Site Prep	Herbicide Use — Release	TSI	Tree Planting	Number of Reported Harvests	Licensed Forester Involvement by Landowner Size and Type — Number of Harvests	Total Acres
Forest Industry woodlands	1 to 100 acres	0	0	0	0	30	3	89
	101 to 1,000 acres	0	0	0	5	38	7	554
	1,001 to 100,000 acres	0	0	6	0	64	41	14,431
	100,000 + acres	0	7,264	5,739	4,679	140	111	42,225
	Subtotal	**0**	**7,264**	**5,745**	**4,684**	**272**	**162**	**57,299**
Investor Timberlands	1 to 100 acres	0	0	0	0	5	1	7
	101 to 1,000 acres	0	0	0	0	4	0	0
	1,001 to 100,000 acres	0	0	231	80	22	21	8,048
	100,000 + acres	0	2,624	2,190	2,146	258	239	113,479
	Subtotal	**0**	**2,624**	**2,421**	**2,226**	**289**	**261**	**121,534**
Non-Industrial Land	1 to 100 acres	10	0	224	497	2,584	578	13,840
	101 to 1,000 acres	7	14	423	90	1,585	581	32,920
	1,001 to 100,000 acres	820	1,090	457	47	456	315	78,474
	100,000 + acres	0	538	4,824	0	162	146	52,812
	Subtotal	**837**	**1,642**	**5,928**	**634**	**4,787**	**1,620**	**178,046**
Other woodlands (Govt, etc.)	1 to 100 acres	0	0	0	0	19	8	169
	101 to 1,000 acres	0	0	5	2	29	19	1,375
	1,001 to 100,000 acres	0	0	12	0	44	36	3,801
	100,000 + acres	0	0	247	0	50	48	7,522
	Subtotal	**0**	**0**	**264**	**2**	**142**	**111**	**12,867**
2005 Totals:		**837**	**11,530**	**14,358**	**7,546**	**5,490**	**2,154**	**369,746**
2004 Totals:		**268**	**13,152**	**19,928**	**7,573**	**5,784**	**2,026**	**329,475**
Change from 2004 to 2005:		**212%**	**-12%**	**-28%**	**0%**	**-5%**	**6%**	**12%**

Definitions:

Ownership Type

Forest Industry Land: **Woodlands owned by a forest products industry; usually most of the wood harvested is used by that industry.**

Institutional Investor Timberlands: **Woodlands owned by organizations, including Timberland Investment Management Organizations (TIMOs) and Real Estate Investment Trusts (REITs) that hold timberland assets as fiduciaries for the benefit of others.**

Non-Industrial Land: **Woodlands privately owned but NOT by a forest industry. These include private individuals and other non-forest product industries.**

Other woodlands: **Woodlands owned by other entities not listed above -- including local, state, federal, or tribal governments.**

Types of Harvests

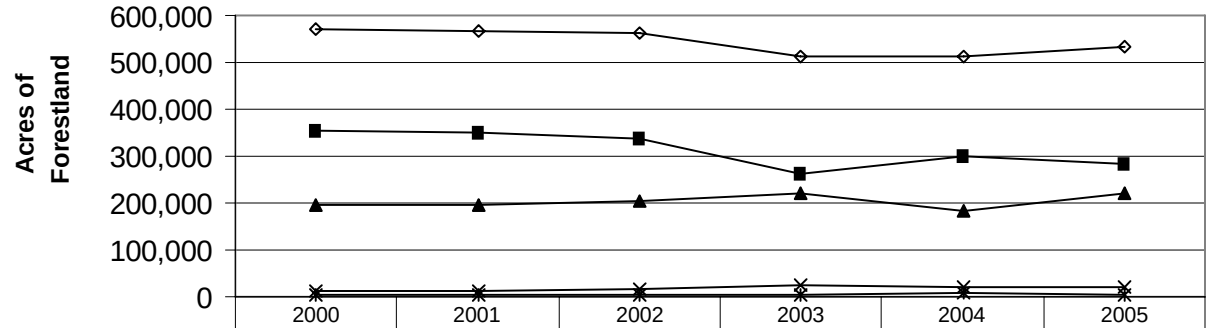
Partial Harvest: **Harvest where trees are removed individually or in small (<5 acre) patches.**

Shelterwood: **Harvest of mature trees from a forest site in two or more stages. The first stage removes only a portion of the trees to allow establishment of regeneration before the remaining trees are removed in subsequent harvest.**

Clearcut: **Harvest on a site larger than 5 acres that results in a residual basal area of acceptable growing stock trees >4.5" DBH of less than 30 square feet per acre, unless after harvesting the site has a well-distributed stand of acceptable growing stock 3 feet tall for softwood and 5 feet for hardwoods (Overstory Removal). Refer to the latest copy of the Maine Forest Practices Act, Maine Forest Service Rules Chapter 20 for additional information.**

Change of Land Use: **Harvest conducted to convert forestland to another land use such as house lots, farm pastures, etc.**

Harvesting Trends in Maine 2000-2005



	2000	2001	2002	2003	2004	2005
Total Harvest	569,470	565,312	561,587	511,070	511,046	531,883
Partial Harvest	353,230	349,594	335,501	261,328	301,479	282,433
Total Shelterwood	197,013	196,792	202,603	219,987	182,578	221,986
Clearcut	13,185	14,391	18,466	24,021	18,797	21,254
Land Use Change	6,042	4,535	5,017	5,734	8,192	6,210

2005 Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2005 Landowner Reports and other survey instruments. Data collected under the provisions of the Forest Resources Assessment Program, 12 MRSA § 8878-A

	Large Landowners (own >100,000 acres)										All Other Landowners				All Landowners
	Precommercial Activities Acres		Clearcuts > 75 acres in size		Purpose for Clearcut (see explanation below) Acres						Acres				
													Clearcut		Acres
County	TSI	Planted	#	Acres	1	2	3	4	Sub Total	Avg. Size	TSI	Planted	Sub Total	Avg. Size	Clearcut
Androscoggin	0	0	0	0	0	0	0	0	0	0	8	0	34	9	34
Aroostook	7,517	4,353	0	0	8,552	0	36	0	8,588	25	116	92	307	13	8,895
Cumberland	0	0	0	0	0	0	0	0	0	0	17	3	64	9	64
Franklin	434	146	0	0	371	0	0	0	371	37	30	6	262	13	633
Hancock	0	152	0	0	60	0	6	0	66	66	59	27	170	13	236
Kennebec	0	0	0	0	0	0	0	0	0	0	31	1	35	12	35
Knox	0	0	0	0	0	0	0	0	0	0	50	1	13	13	13
Lincoln	0	0	0	0	0	0	0	0	0	0	2	0	15	4	15
Oxford	839	532	0	0	99	0	443	0	542	17	305	46	152	12	694
Penobscot	397	651	0	0	0	0	74	0	74	15	122	9	141	11	215
Piscataquis	1,920	421	0	0	1,335	0	1,823	0	3,158	16	32	38	341	17	3,499
Sagadahoc	0	0	0	0	0	0	0	0	0	0	65	333	5	5	5
Somerset	1,339	503	1	87	5,391	0	512	7	5,910	22	283	137	169	11	6,079
Waldo	0	0	0	0	0	0	0	0	0	0	15	14	149	14	149
Washington	554	67	0	0	0	0	31	100	131	13	213	14	458	12	589
York	0	0	0	0	0	0	0	0	0	0	10	0	99	12	99
State Total:	**13,000**	**6,825**	**1**	**87**	**15,808**	**0**	**2,925**	**107**	**18,840**	**22**	**1,358**	**721**	**2,414**	**12**	**21,254**

Purposes for creating clearcut:

1. Removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.
2. Ecologically appropriate improvement or creation of wildlife habitat.
3. Removal of stands that, if partially harvested according to accepted silvicultural practice, are at high risk for windthrow due to factors such as soils, rooting depth, crown ratio or stem quality.
4. Harvesting of an existing plantation or other forest stand established by or previously treated with precommercial silvicultural activities.

Frequency Distribution of Clearcutting for Large Landowners who own more than 100,000 acres

2005 Clearcut as percent of statewide ownership	# of Landowners	Clearcut Acres
0% - 0.001%	**15**	**306**
0.001%-0.25%	**8**	**10,467**
0.26%-0.75%	**3**	**8,067**
0.76%-1.00%	**0**	**0**

2006
Silvicultural Activities Report

including Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2006 Landowner Reports and other survey instruments.
Data collected under the provisions of Title 12 MRSA §8885 and §8878-A

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Report Highlights

Harvesting and Land Use Changes

- **521,554 acres were harvested in 2006, a 2% decrease from 532,285 acres in 2005.**
- **496,446 acres were "partially harvested" (partial and shelterwood totals) in 2006, 2% decrease from 504,767 acres in 2005.**
- **The number of harvests reported increased slightly from 5,498 to 5,547 harvests.**

Clearcutting:

1. **The total area clearcut decreased, from 21,278 acres in 2005 to 18,704 acres in 2006. Clearcutting amounts to less than 5% of total harvested acres.**
2. **Landowners owning more than 100,000 acres in Maine created 88% of all clearcuts (16,479 acres).**
3. **Average clearcut size in 2006 was 21 acres. Landowners owning more than 100,000 acres had an average clearcut size of 22 acres. Landowners owning less than 100,000 acres had an average clearcut size of 14 acres. Two clearcuts larger than 75 acres were created in 2006.**
4. **The primary silvicultural reason for clearcutting reported by large landowners were the removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.**

Land Use Changes:

- **Harvesting to convert land from forest management to some other land use increased 3% from 6,240 acres in 2005 to 6,403 acres in 2006.**

Precommercial Silvicultural Activities

Herbicide Use:

- **For site preparation decreased 83%, from 837 acres in 2005 to 142 acres in 2006.**
- **To release crop trees from competing vegetation did not significantly change, from 11,530 acres in 2005 to 11,528 acres in 2006.**

Timber Stand Improvement (TSI):

- **Precommercial thinning of young stands with spacing saws decreased 32%, from 14,358 acres in 2005 to 9,709 acres in 2006.**

  85% of this activity was done by landowners owning more than 100,000 acres.

Planting:

- **Tree planting decreased, from 7,545 acres in 2005 to 4,040 acres in 2006.**

  94% of the planting was by landowners owning more than 100,000 acres.

Forester Involvement

- **In 2006, licensed foresters supervised harvesting on 374,389 acres, compared to 365,974 acres in 2005.**

72% of all harvest acres in 2006 had a licensed forester involved; the same as 2005.

Licensed Forester supervision on small woodlots (<= 100 acres) increased to 28% between 2005 and 2006.

2006 Harvesting and Land Use Changes

Commercial Harvest Information by Landowner Size and Type		Acres						
			Shelterwood					
OwnershipType	Ownership Size	Partial Harvests	Initial or Intermediate Entry	Final Entry	Total Shelterwood	Clearcut	Land Use Change	Total Harvest
Forest Industry Woodlands	1 to 100 acres	285	4	0	4	0	33	322
	101 to 1,000 acres	587	0	0	0	0	0	587
	1,001 to 100,000 acres	3,704	791	1,167	1,958	461	64	6,187
	100,000 + acres	27,087	15,172	22,593	37,765	7,015	0	71,867
	SubTotal	**31,663**	**15,967**	**23,760**	**39,727**	**7,476**	**97**	**78,963**
Investor Timberlands	1 to 100 acres	0	0	0	0	0	0	0
	101 to 1,000 acres	0	0	0	0	0	0	0
	1,001 to 100,000 acres	2,117	1,068	834	1,902	200	0	4,219
	100,000 + acres	17,751	79,873	57,079	136,952	9,292	424	164,419
	SubTotal	**19,868**	**80,941**	**57,913**	**138,854**	**9,492**	**424**	**168,638**
Non-Industrial Land	1 to 100 acres	45,736	2,331	2,640	4,971	254	2,667	53,628
	101 to 1,000 acres	61,980	3,876	8,253	12,129	307	2,045	76,461
	1,001 to 100,000 acres	53,891	6,788	12,103	18,891	753	900	74,435
	100,000 + acres	36,513	4,923	11,572	16,495	130	200	53,338
	SubTotal	**198,120**	**17,918**	**34,568**	**52,486**	**1,444**	**5,812**	**257,862**
Other Woodlands (Govt, etc.)	1 to 100 acres	157	15	42	57	0	18	232
	101 to 1,000 acres	1,488	107	24	131	0	38	1,657
	1,001 to 100,000 acres	3,586	606	366	972	251	12	4,821
	100,000 + acres	7,701	654	982	1,636	42	2	9,381
	SubTotal	**12,932**	**1,382**	**1,414**	**2,796**	**293**	**70**	**16,091**
2006 Totals:		**262,583**	**116,208**	**117,655**	**233,863**	**18,704**	**6,403**	**521,554**
Percent of 2006 Harvest:		**50.35%**	**22.28%**	**22.56%**	**44.84%**	**3.59%**	**1.23%**	**100.00%**
2005 Totals:		**282,751**	**95,413**	**126,603**	**222,016**	**21,278**	**6,240**	**532,285**
Percent Change from 2005 to 2006:		**-7%**	**22%**	**-7%**	**5%**	**-12%**	**3%**	**-2%**

2006 Precommercial Activities and Professional Assistance

OwnershipType	Ownership Size	Precommercial Activities by Landowner Size and Type — Acres — Herbicide Use — Site Prep	Herbicide Use — Release	TSI	Tree Planting	Number of Reported		Licensed Forester Involvement by Landowner Size and Type — Number of Harvests	Total Acres
Forest Industry Woodlands	1 to 100 acres	0	0	0	0	13		1	40
	101 to 1,000 acres	0	0	3	0	16		2	75
	1,001 to 100,000 acres	0	0	0	0	57		43	5,144
	100,000 + acres	0	7,560	5,453	3,038	142		146	54,690
	Subtotal	**0**	**7,560**	**5,456**	**3,038**	**228**		**192**	**59,949**
Investor Timberlands	1 to 100 acres	0	0	0	0	0		0	0
	101 to 1,000 acres	0	0	0	0	0		0	0
	1,001 to 100,000 acres	0	0	394	46	21		19	4,179
	100,000 + acres	80	2,076	2,437	748	306		281	148,832
	Subtotal	**80**	**2,076**	**2,831**	**794**	**327**		**300**	**153,011**
Non-Industrial Land	1 to 100 acres	0	30	349	53	2,651		613	14,935
	101 to 1,000 acres	62	12	349	124	1,620		552	29,518
	1,001 to 100,000 acres	0	1,850	368	21	430		287	52,546
	100,000 + acres	0	0	356	0	136		124	50,012
	Subtotal	**62**	**1,892**	**1,422**	**197**	**4,837**		**1,576**	**147,011**
Other Woodlands (Govt, etc.)	1 to 100 acres	0	0	0	0	15		5	82
	101 to 1,000 acres	0	0	0	10	43		28	1,205
	1,001 to 100,000 acres	0	0	0	0	44		34	3,750
	100,000 + acres	0	0	0	0	53		53	9,381
	Subtotal	**0**	**0**	**0**	**10**	**155**		**120**	**14,418**
2006 Totals:		**142**	**11,528**	**9,709**	**4,040**	**5,547**		**2,188**	**374,389**
2005 Totals:		**837**	**11,530**	**14,358**	**7,545**	**5,498**		**2,156**	**365,973**
Change from 2005 to 2006:		**-83%**	**0%**	**-32%**	**-46%**	**1%**		**1%**	**2%**

Definitions:

Ownership Type

Forest Industry Land: **Woodlands owned by a forest products industry; usually most of the wood harvested is used by that industry.**

Investor Timberlands **Woodlands owned by organizations, including Timberland Investment Management Organizations (TIMOs) and Real Estate Investment Trusts (REITs) that hold timberland assets as fiduciaries for the benefit of others.**

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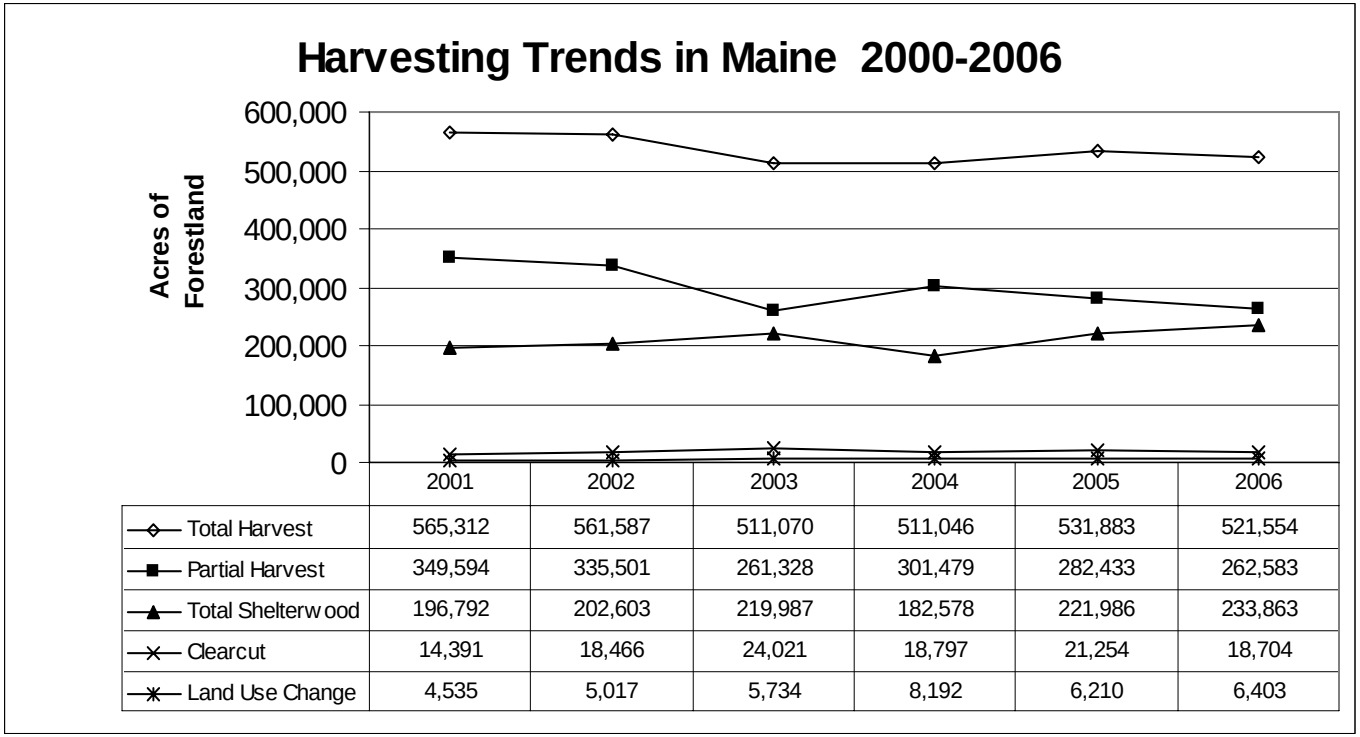
Types of Harvests

Partial Harvest: **Harvest where trees are removed individually or in small (<5 acre) patches.**

Shelterwood: **Harvest of mature trees from a forest site in two or more stages. The first stage removes only a portion of the trees to allow establishment of regeneration before the remaining trees are removed in subsequent harvest.**

Clearcut: **Harvest on a site larger than 5 acres that results in a residual basal area of acceptable growing stock trees >4.5" DBH of less than 30 square feet per acre, unless after harvesting the site has a well-distributed stand of acceptable growing stock 3 feet tall for softwood and 5 feet for hardwoods (Overstory Removal). Refer to the latest copy of the Maine Forest Practices Act, Maine Forest Service Rules Chapter 20 for additional information.**

Change of Land Use: **Harvest conducted to convert forestland to another land use such as house lots, farm pastures, etc.**



	2001	2002	2003	2004	2005	2006
Total Harvest	565,312	561,587	511,070	511,046	531,883	521,554
Partial Harvest	349,594	335,501	261,328	301,479	282,433	262,583
Total Shelterwood	196,792	202,603	219,987	182,578	221,986	233,863
Clearcut	14,391	18,466	24,021	18,797	21,254	18,704
Land Use Change	4,535	5,017	5,734	8,192	6,210	6,403

2006 Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2006 Landowner Reports and other survey instruments. Data collected under the provisions of the Forest Resources Assessment Program, 12 MRSA § 8878-A

	Large Landowners (own >100,000 acres)										All Other Landowners				All Landowners
	Precommercial Activities Acres		Clearcuts > 75 acres in size		Purpose for Clearcut (see explanation below) Acres						Acres				
													Clearcut		Acres
County	TSI	Planted	#	Acres	1	2	3	4	Sub Total	Avg. Size	TSI	Planted	Sub Total	Avg. Size	Clearcut
Androscoggin	0	0	0	0	0	0	0	0	0	0	58	0	0	0	0
Aroostook	3,883	3,060	0	0	7,134	13	192	0	7,339	25	239	15	197	15	7,536
Cumberland	0	0	0	0	0	0	0	0	0	0	27	5	20	20	20
Franklin	231	50	0	0	484	0	98	0	582	25	90	0	343	15	925
Hancock	0	0	0	0	97	0	0	0	97	24	52	4	68	10	165
Kennebec	0	0	0	0	0	0	0	0	0	0	15	1	80	20	80
Knox	0	0	0	0	0	0	0	0	0	0	2	0	5	5	5
Lincoln	0	0	0	0	0	0	0	0	0	0	6	20	15	8	15
Oxford	500	0	0	0	144	0	108	0	252	19	258	5	53	11	305
Penobscot	689	0	0	0	134	0	0	0	134	15	79	18	274	17	408
Piscataquis	803	17	2	355	545	0	1,735	0	2,280	18	24	85	163	12	2,443
Sagadahoc	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0
Somerset	1,784	659	0	0	5,145	0	634	0	5,779	22	441	62	259	16	6,038
Waldo	0	0	0	0	0	0	0	0	0	0	25	16	53	13	53
Washington	356	0	0	0	0	0	10	5	15	8	25	3	670	13	685
York	0	0	0	0	0	0	0	0	0	0	112	20	26	7	26
State Total:	**8,246**	**3,786**	**2**	**355**	**13,683**	**13**	**2,777**	**5**	**16,478**	**22**	**1,463**	**254**	**2,226**	**14**	**18,704**

Purposes for creating clearcut:

1. Removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.
2. Ecologically appropriate improvement or creation of wildlife habitat.
3. Removal of stands that, if partially harvested according to accepted silvicultural practice, are at high risk for windthrow due to factors such as soils, rooting depth, crown ratio or stem quality.
4. Harvesting of an existing plantation or other forest stand established by or previously treated with precommercial silvicultural activities.

Frequency Distribution of Clearcutting for Large Landowners who own more than 100,000 acres

2006 Clearcut as percent of statewide ownership	# of Landowners	Clearcut Acres
0% - 0.001%	**8**	**15**
0.001%-0.25%	**11**	**9,091**
0.26%-0.75%	**2**	**7,373**
0.76%-1.00%	**0**	**0**

2007
Silvicultural Activities Report

including Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2007 Landowner Reports and other survey instruments.
Data collected under the provisions of Title 12 MRSA §8885 and §8878-A

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Report Highlights

Harvesting and Land Use Changes

- **505,175 acres were harvested in 2007, a 4% decrease from 527,895 acres in 2006.**
- **485,871 acres were "partially harvested" (partial and shelterwood totals) in 2007, a 3% decrease from 502,515 acres in 2006.**
- **The number of harvests reported increased slightly from 5,622 to 5,634 harvests.**

Clearcutting:

1. **The total area clearcut decreased, from 18,853 acres in 2006 to 12,054 acres in 2007. Clearcutting amounts to less than 3% of total harvested acres.**
2. **Landowners owning more than 100,000 acres in Maine created 88% of all clearcuts (10,611 acres).**
3. **Average clearcut size in 2007 was 21 acres. Landowners owning more than 100,000 acres had an average clearcut size of 22 acres. Landowners owning less than 100,000 acres had an average clearcut size of 14 acres. One clearcut larger than 75 acres was created in 2007.**
4. **The primary silvicultural reason for clearcutting reported by large landowners were the removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.**

Land Use Changes:

- **Harvesting to convert land from forest management to some other land use increased 11% from 6,527 acres in 2006 to 7,250 acres in 2007.**

Precommercial Silvicultural Activities

Herbicide Use:

- **For site preparation increased 585%, from 142 acres in 2006 to 972 acres in 2007.**
- **To release crop trees from competing vegetation decreased 16%, from 11,683 acres in 2006 to 9,786 acres in 2007.**

Timber Stand Improvement (TSI):

- **Precommercial thinning of young stands with spacing saws decreased 21%, from 9,813 acres in 2006 to 7,792 acres in 2007.**

  81% of this activity was done by landowners owning more than 100,000 acres.

Planting:

- **Tree planting increased 11%, from 4,121 acres in 2006 to 4,594 acres in 2007.**

  91% of the planting was by landowners owning more than 100,000 acres.

Forester Involvement

- **In 2007, licensed foresters supervised harvesting on 364,931 acres, compared to 370,158 acres in 2006.**

72% of all harvest acres in 2007 had a licensed forester involved; the same as 2006.

Licensed Forester supervision occurred on 24% (675 out of 2,816 harvests) of the harvests on small woodlots (<= 100 acres) in 2007. This is a slight increase from 23% in 2006 (619 out of 2,679 harvests).

2007 Harvesting and Land Use Changes

Commercial Harvest Information by Landowner Size and Type		Acres						
			Shelterwood					
OwnershipType	Ownership Size	Partial Harvests	Initial or Intermediate Entry	Final Entry	Total Shelterwood	Clearcut	Land Use Change	Total Harvest
Forest Industry Woodlands	1 to 100 acres	88	0	0	0	0	0	88
	101 to 1,000 acres	0	0	0	0	0	0	0
	1,001 to 100,000 acres	2,453	2,051	893	2,944	506	38	5,941
	100,000 + acres	29,597	17,586	23,034	40,620	4,079	0	74,296
	SubTotal	**32,138**	**19,637**	**23,927**	**43,564**	**4,585**	**38**	**80,325**
Investor Timberlands	1 to 100 acres	0	0	0	0	0	0	0
	101 to 1,000 acres	0	0	0	0	0	0	0
	1,001 to 100,000 acres	10,944	1,393	635	2,028	31	0	13,003
	100,000 + acres	20,363	46,904	61,927	108,831	2,639	0	131,833
	SubTotal	**31,307**	**48,297**	**62,562**	**110,859**	**2,670**	**0**	**144,836**
Non-Industrial Land	1 to 100 acres	49,883	2,598	3,076	5,674	299	3,024	58,880
	101 to 1,000 acres	61,749	6,163	6,375	12,538	451	2,038	76,776
	1,001 to 100,000 acres	40,133	5,068	16,408	21,476	144	1,207	62,960
	100,000 + acres	21,571	21,141	18,436	39,577	3,761	6	64,915
	SubTotal	**173,336**	**34,970**	**44,295**	**79,265**	**4,655**	**6,275**	**263,531**
Other Woodlands (Govt, etc.)	1 to 100 acres	201	0	0	0	0	82	283
	101 to 1,000 acres	938	95	63	158	5	12	1,113
	1,001 to 100,000 acres	1,927	940	431	1,371	7	838	4,143
	100,000 + acres	10,072	221	514	735	132	5	10,944
	SubTotal	**13,138**	**1,256**	**1,008**	**2,264**	**144**	**937**	**16,483**
2007 Totals:		**249,919**	**104,160**	**131,792**	**235,952**	**12,054**	**7,250**	**505,175**
Percent of 2007 Harvest:		**49.47%**	**20.62%**	**26.09%**	**46.71%**	**2.39%**	**1.44%**	**100.00%**
2006 Totals:		**266,406**	**117,735**	**118,374**	**236,109**	**18,853**	**6,527**	**527,895**
Percent Change from 2006 to 2007:		**-6%**	**-12%**	**11%**	**0%**	**-36%**	**11%**	**-4%**

2007 Precommercial Activities and Professional Assistance

OwnershipType	Ownership Size	Precommercial Activities by Landowner Size and Type — Acres — Herbicide Use — Site Prep	Herbicide Use — Release	TSI	Tree Planting	Number of Reported		Licensed Forester Involvement by Landowner Size and Type — Number of Harvests	Total Acres
Forest Industry Woodlands	1 to 100 acres	0	0	0	0	3		1	60
	101 to 1,000 acres	0	0	0	0	0		0	0
	1,001 to 100,000 acres	0	0	0	0	50		40	4,549
	100,000 + acres	0	5,789	4,162	2,226	172		161	51,402
	Subtotal	**0**	**5,789**	**4,162**	**2,226**	**225**		**202**	**56,011**
Investor Timberlands	1 to 100 acres	0	0	0	0	0		0	0
	101 to 1,000 acres	0	0	0	0	0		0	0
	1,001 to 100,000 acres	300	825	0	92	19		19	13,003
	100,000 + acres	80	2,146	303	1,550	257		239	121,478
	Subtotal	**380**	**2,971**	**303**	**1,642**	**276**		**258**	**134,481**
Non-Industrial Land	1 to 100 acres	2	27	228	28	2,797		669	17,369
	101 to 1,000 acres	0	9	665	162	1,616		550	28,501
	1,001 to 100,000 acres	500	100	601	136	391		254	51,015
	100,000 + acres	90	890	1,833	399	186		169	61,694
	Subtotal	**592**	**1,026**	**3,327**	**725**	**4,990**		**1,642**	**158,579**
Other Woodlands (Govt, etc.)	1 to 100 acres	0	0	0	0	16		5	79
	101 to 1,000 acres	0	0	0	0	31		21	1,067
	1,001 to 100,000 acres	0	0	0	1	40		36	4,056
	100,000 + acres	0	0	0	0	56		53	10,659
	Subtotal	**0**	**0**	**0**	**1**	**143**		**115**	**15,861**
2007 Totals:		**972**	**9,786**	**7,792**	**4,594**	**5,634**		**2,217**	**364,932**
2006 Totals:		**142**	**11,683**	**9,813**	**4,121**	**5,622**		**2,196**	**370,157**
Change from 2006 to 2007:		**585%**	**-16%**	**-21%**	**11%**	**0%**		**1%**	**-1%**

Definitions:

Ownership Type

Forest Industry Land: **Woodlands owned by a forest products industry; usually most of the wood harvested is used by that industry.**

Investor Timberlands **Woodlands owned by organizations, including Timberland Investment Management Organizations (TIMOs) and Real Estate Investment Trusts (REITs) that hold timberland assets as fiduciaries for the benefit of others.**

Non-Industrial Land: **Woodlands privately owned but NOT by a forest industry. These include private individuals and other non-forest product industries.**

Other woodlands: **Woodlands owned by other entities not listed above -- including local, state, federal, or tribal governments.**

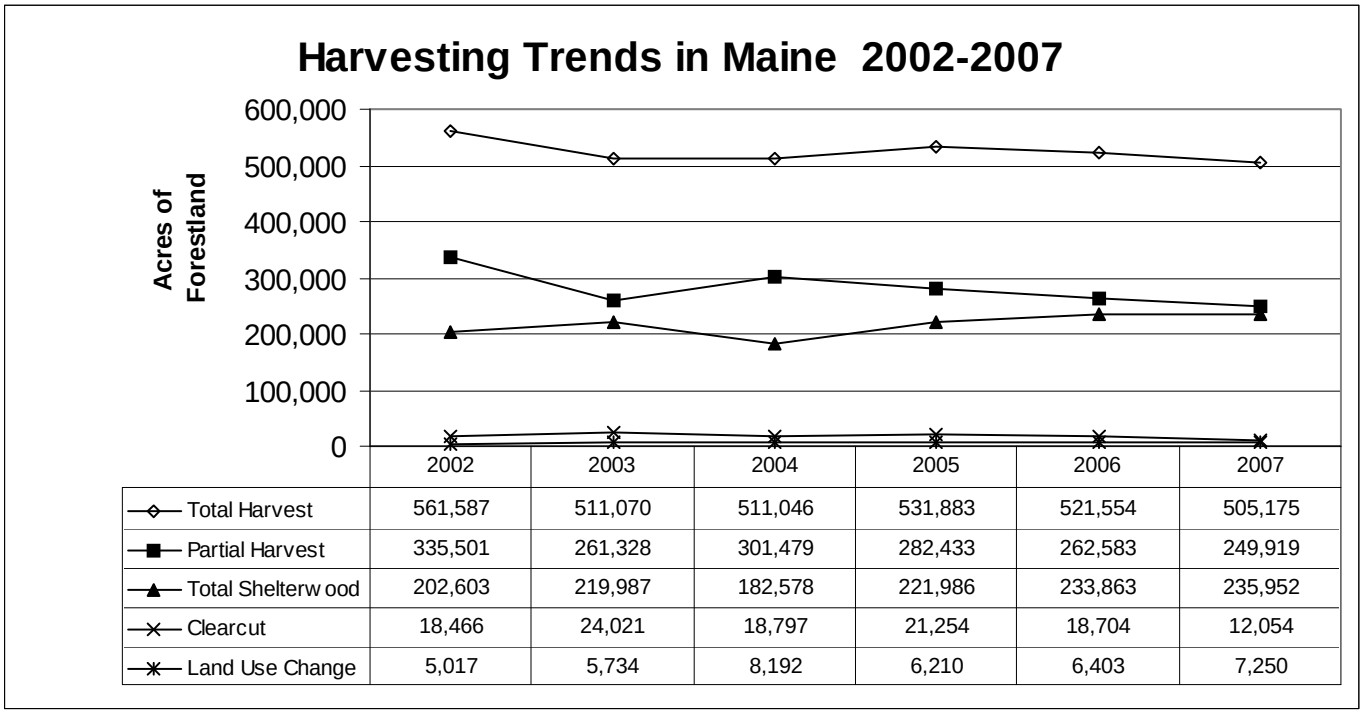
Types of Harvests

Partial Harvest: **Harvest where trees are removed individually or in small (<5 acre) patches.**

Shelterwood: **Harvest of mature trees from a forest site in two or more stages. The first stage removes only a portion of the trees to allow establishment of regeneration before the remaining trees are removed in subsequent harvest.**

Clearcut: **Harvest on a site larger than 5 acres that results in a residual basal area of acceptable growing stock trees >4.5" DBH of less than 30 square feet per acre, unless after harvesting the site has a well-distributed stand of acceptable growing stock 3 feet tall for softwood and 5 feet for hardwoods (Overstory Removal). Refer to the latest copy of the Maine Forest Service Rules Chapter 20 for additional information. It can be found on the Maine Forest Service website at http://www.state.me.us/doc/mfs/rules_regs/index.htm**

Change of Land Use: **Harvest conducted to convert forestland to another land use such as house lots, farm pastures, etc.**



	2002	2003	2004	2005	2006	2007
Total Harvest	561,587	511,070	511,046	531,883	521,554	505,175
Partial Harvest	335,501	261,328	301,479	282,433	262,583	249,919
Total Shelterwood	202,603	219,987	182,578	221,986	233,863	235,952
Clearcut	18,466	24,021	18,797	21,254	18,704	12,054
Land Use Change	5,017	5,734	8,192	6,210	6,403	7,250

2007 Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2007 Landowner Reports and other survey instruments. Data collected under the provisions of the Forest Resources Assessment Program, 12 MRSA § 8878-A

	Large Landowners (own >100,000 acres)										All Other Landowners				All Landowners
	Precommercial Activities Acres		Clearcuts > 75 acres in size		Purpose for Clearcut (see explanation below) Acres						Acres				
													Clearcut		Acres
County	TSI	Planted	#	Acres	1	2	3	4	Sub Total	Avg. Size	TSI	Planted	Sub Total	Avg. Size	Clearcut
Androscoggin	0	0	0	0	0	0	0	0	0	0	20	0	8	8	8
Aroostook	2,695	3,052	0	0	4,260	0	0	0	4,260	23	131	22	100	13	4,360
Cumberland	0	0	0	0	0	0	0	0	0	0	0	1	19	10	19
Franklin	95	0	1	229	226	0	401	0	627	39	8	0	517	21	1,144
Hancock	0	0	0	0	0	90	80	0	170	19	105	1	145	16	315
Kennebec	0	0	0	0	0	0	0	0	0	0	44	145	26	9	26
Knox	0	0	0	0	0	0	0	0	0	0	1	0	5	5	5
Lincoln	0	0	0	0	0	0	0	0	0	0	250	0	30	10	30
Oxford	420	0	0	0	29	0	170	0	199	13	430	25	75	11	274
Penobscot	239	281	0	0	374	0	0	0	374	25	100	75	63	13	437
Piscataquis	603	435	0	0	159	0	391	48	598	23	20	0	98	12	696
Sagadahoc	0	0	0	0	0	0	0	0	0	0	0	0	13	13	13
Somerset	1,970	406	0	0	3,728	0	572	0	4,300	20	93	98	162	12	4,462
Waldo	0	0	0	0	0	0	0	0	0	0	73	1	36	7	36
Washington	276	0	0	0	0	42	29	0	83	16	210	45	136	23	219
York	0	0	0	0	0	0	0	0	0	0	9	6	10	5	10
State Total:	**6,298**	**4,174**	**1**	**229**	**8,776**	**132**	**1,643**	**48**	**10,611**	**22**	**1,494**	**419**	**1,443**	**14**	**12,054**

Purposes for creating clearcut:

1. Removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.
2. Ecologically appropriate improvement or creation of wildlife habitat.
3. Removal of stands that, if partially harvested according to accepted silvicultural practice, are at high risk for windthrow due to factors such as soils, rooting depth, crown ratio or stem quality.
4. Harvesting of an existing plantation or other forest stand established by or previously treated with precommercial silvicultural activities.

Frequency Distribution of Clearcutting for Large Landowners who own more than 100,000 acres

2007 Clearcut as percent of statewide ownership	# of Landowners	Clearcut Acres
0% - 0.001%	**16**	**690**
0.001%-0.25%	**6**	**5,957**
0.26%-0.75%	**2**	**3,964**
0.76%-1.00%	**0**	**0**

2008
Silvicultural Activities Report
including Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2008 Landowner Reports and other survey instruments.
Data collected under the provisions of Title 12 MRSA §8885 and §8878-A

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Report Highlights

Harvesting and Land Use Changes

- 462,892 acres were harvested in 2008, an 8% decrease from 505,878 acres in 2007.
- 447,977 acres were "partially harvested" (partial and shelterwood totals) in 2008, an 8% decrease from 487,448 acres in 2007.
- The number of harvests reported decreased from 5,675 to 5,329.

Clearcutting:

1. The total area clearcut decreased, from 11,065 acres in 2007 to 10,069 acres in 2008. Clearcutting amounts to less than 3% of total harvested acres.
2. Landowners owning more than 100,000 acres in Maine created 94% of all clearcuts (9,508 acres).
3. Average clearcut size in 2008 was 25 acres. Landowners owning more than 100,000 acres had an average clearcut size of 27 acres. Landowners owning less than 100,000 acres had an average clearcut size of 11 acres. One clearcut larger than 75 acres was created in 2008.
4. The primary silvicultural reason for clearcutting reported by large landowners was the removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.

Land Use Changes:

- Harvesting to convert land from forest management to some other land use decreased -34% from 7,365 acres in 2007 to 4,846 acres in 2008.

Precommercial Silvicultural Activities

Herbicide Use:

- For site preparation decreased -53%, from 972 acres in 2007 to 452 acres in 2008.
- To release crop trees from competing vegetation decreased 11%, from 9,786 acres in 2007 to 8,747 acres in 2008.

Timber Stand Improvement (TSI):

- Precommercial thinning of young stands with spacing saws increased 15%, from 7,795 acres in 2007 to 8,947 acres in 2008.

  99% of this activity was done by landowners owning more than 100,000 acres.

Planting:

- Tree planting decreased -15%, from 4,593 acres in 2007 to 3,884 acres in 2008.

  98% of the planting was by landowners owning more than 100,000 acres.

Forester Involvement

- In 2008, licensed foresters supervised harvesting on 306,888 acres, compared to 362,509 acres in 2007.

  66% of all harvest acres in 2008 had a licensed forester involved; the same as 2007.

  Licensed Forester supervision occurred on 22% (557 out of 2,581 harvests) of the harvests on small woodlots (<= 100 acres) in 2008. This is a slight decrease from 24% in 2007 (680 out of 2,840 harvests).

2008 Harvesting and Land Use Changes

Commercial Harvest Information by Landowner Size and Type		Acres						
			Shelterwood					
OwnershipType	Ownership Size	Partial Harvests	Initial or Intermediate Entry	Final Entry	Total Shelterwood	Clearcut	Land Use Change	Total Harvest
Forest Industry Woodlands	1 to 100 acres	109	10	70	80	0	0	189
	101 to 1,000 acres	191	46	0	46	0	0	237
	1,001 to 100,000 acres	6,739	2,449	842	3,291	35	64	10,129
	100,000 + acres	16,323	22,119	21,265	43,384	3,791	0	63,498
	SubTotal	**23,362**	**24,624**	**22,177**	**46,801**	**3,826**	**64**	**74,053**
Investor Timberlands	1 to 100 acres	0	0	0	0	0	0	0
	101 to 1,000 acres	0	0	0	0	0	0	0
	1,001 to 100,000 acres	755	600	290	890	0	0	1,645
	100,000 + acres	27,819	31,959	51,961	83,920	2,391	57	114,187
	SubTotal	**28,574**	**32,559**	**52,251**	**84,810**	**2,391**	**57**	**115,832**
Non-Industrial Land	1 to 100 acres	47,199	2,238	1,823	4,061	162	2,279	53,701
	101 to 1,000 acres	66,858	3,834	3,506	7,340	231	898	75,327
	1,001 to 100,000 acres	37,046	4,697	19,947	24,644	68	791	62,549
	100,000 + acres	15,925	22,947	16,483	39,430	3,326	232	58,913
	SubTotal	**167,028**	**33,716**	**41,759**	**75,475**	**3,787**	**4,200**	**250,490**
Other Woodlands (Govt, etc.)	1 to 100 acres	142	0	60	60	0	45	247
	101 to 1,000 acres	2,879	633	452	1,085	12	154	4,130
	1,001 to 100,000 acres	2,839	985	547	1,532	53	323	4,747
	100,000 + acres	11,308	1,111	971	2,082	0	3	13,393
	SubTotal	**17,168**	**2,729**	**2,030**	**4,759**	**65**	**525**	**22,517**
2008 Totals:		**236,132**	**93,628**	**118,217**	**211,845**	**10,069**	**4,846**	**462,892**
Percent of 2008 Harvest:		**51.01%**	**20.23%**	**25.54%**	**45.77%**	**2.18%**	**1.05%**	**100.00%**
2007 Totals:		**251,233**	**104,259**	**131,956**	**236,215**	**11,065**	**7,365**	**505,878**
Percent Change from 2007 to 2008:		**-6%**	**-10%**	**-10%**	**-10%**	**-9%**	**-34%**	**-8%**

2008 Precommercial Activities and Professional Assistance

OwnershipType	Ownership Size	Precommercial Activities by Landowner Size and Type — Acres — Herbicide Use — Site Prep	Herbicide Use — Release	TSI	Tree Planting		Number of Reported Harvests	Licensed Forester Involvement by Landowner Size and Type — Number of Harvests	Total Acres
Forest Industry Woodlands	1 to 100 acres	0	0	0	0		4	0	0
	101 to 1,000 acres	0	0	0	0		6	1	100
	1,001 to 100,000 acres	0	0	0	28		44	32	5,316
	100,000 + acres	0	6,725	3,465	2,480		131	120	41,057
	Subtotal	**0**	**6,725**	**3,465**	**2,508**		**185**	**153**	**46,473**
Investor Timberlands	1 to 100 acres	0	0	0	0		0	0	0
	101 to 1,000 acres	0	0	0	0		0	0	0
	1,001 to 100,000 acres	0	0	0	0		6	5	945
	100,000 + acres	300	1,874	1,167	610		244	229	104,332
	Subtotal	**300**	**1,874**	**1,167**	**610**		**250**	**234**	**105,277**
Non-Industrial Land	1 to 100 acres	25	0	95	46		2,559	550	12,854
	101 to 1,000 acres	8	8	27	16		1,565	513	26,497
	1,001 to 100,000 acres	119	140	0	0		415	242	46,826
	100,000 + acres	0	0	4,183	699		181	155	51,335
	Subtotal	**152**	**148**	**4,305**	**761**		**4,720**	**1,460**	**137,512**
Other Woodlands (Govt, etc.)	1 to 100 acres	0	0	0	0		18	7	125
	101 to 1,000 acres	0	0	0	0		34	20	1,505
	1,001 to 100,000 acres	0	0	10	5		46	31	4,372
	100,000 + acres	0	0	0	0		76	65	11,624
	Subtotal	**0**	**0**	**10**	**5**		**174**	**123**	**17,626**
2008 Totals:		**452**	**8,747**	**8,947**	**3,884**		**5,329**	**1,970**	**306,888**
2007 Totals:		**972**	**9,786**	**7,795**	**4,593**		**5,675**	**2,225**	**362,509**
Change from 2007 to 2008:		**-53%**	**-11%**	**15%**	**-15%**		**-6%**	**-11%**	**-15%**

Definitions:

Ownership Type

Forest Industry Land: Woodlands owned by a forest products industry; usually most of the wood harvested is used by that industry.

Investor Timberlands Woodlands owned by organizations, including Timberland Investment Management Organizations (TIMOs) and Real Estate Investment Trusts (REITs) that hold timberland assets as fiduciaries for the benefit of others.

Non-Industrial Land: Woodlands privately owned but NOT by a forest industry. These include private individuals and other non-forest product industries.

Other woodlands: Woodlands owned by other entities not listed above -- including local, state, federal, or tribal governments.

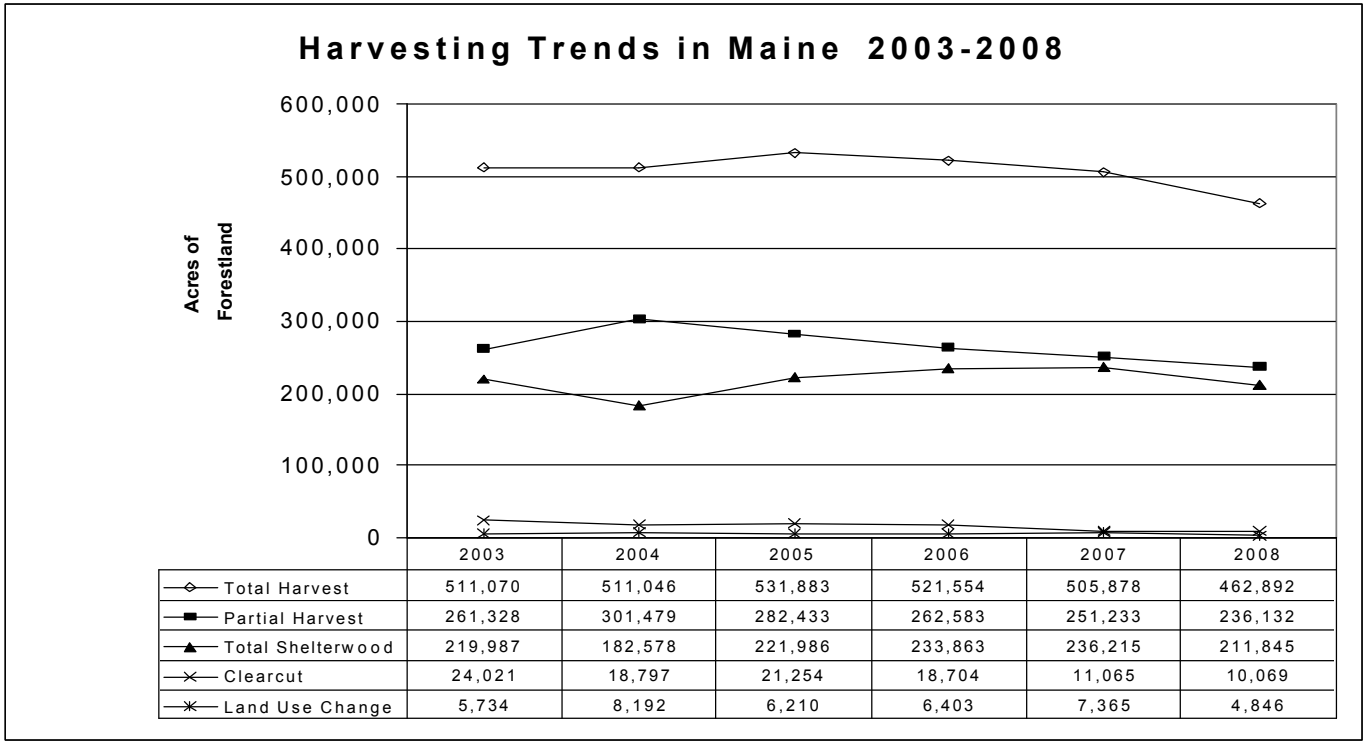
Types of Harvests

Partial Harvest: Harvest where trees are removed individually or in small (<5 acre) patches.

Shelterwood: Harvest of mature trees from a forest site in two or more stages. The first stage removes only a portion of the trees to allo establishment of regeneration before the remaining trees are removed in subsequent harvest.

Clearcut: Harvest on a site larger than 5 acres that results in a residual basal area of acceptable growing stock trees >4.5" DBH of less than 30 square feet per acre, unless after harvesting the site has a well-distributed stand of acceptable growing stock 3 feet tall for softwood an 5 feet for hardwoods (Overstory Removal). Refer to the latest copy of the Maine Forest Service Rules Chapter 20 for additional information. It can be found on the Maine Forest Service website at http://www.state.me.us/doc/mfs/rules_regs/index.htm

Change of Land Use: Harvest conducted to convert forestland to another land use such as house lots, farm pastures, etc.



	2003	2004	2005	2006	2007	2008
Total Harvest	511,070	511,046	531,883	521,554	505,878	462,892
Partial Harvest	261,328	301,479	282,433	262,583	251,233	236,132
Total Shelterwood	219,987	182,578	221,986	233,863	236,215	211,845
Clearcut	24,021	18,797	21,254	18,704	11,065	10,069
Land Use Change	5,734	8,192	6,210	6,403	7,365	4,846

2008 Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2008 Landowner Reports and other survey instruments. Data collected under the provisions of the Forest Resources Assessment Program, 12 MRSA § 8878-A

	Large Landowners (own >100,000 acres)										All Other Landowners				All Landowners
	Precommercial Activities Acres		Clearcuts > 75 acres in size		Purpose for Clearcut (see explanation below) Acres						Acres				
													Clearcut		Acres
County	TSI	Planted	#	Acres	1	2	3	4	Sub Total	Avg. Size	TSI	Planted	Sub Total	Avg. Size	Clearcut
Androscoggin	0	0	0	0	0	0	0	0	0	0	1	0	15	8	15
Aroostook	3,607	2,805	1	125	4,369	0	335	0	4,704	30	65	0	76	15	4,780
Cumberland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Franklin	0	50	0	0	0	0	537	0	537	38	0	0	8	8	545
Hancock	0	0	0	0	0	0	60	0	60	30	16	0	40	10	100
Kennebec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Knox	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lincoln	0	0	0	0	0	0	0	0	0	0	0	0	43	14	43
Oxford	0	0	0	0	70	0	468	0	538	19	0	0	14	7	552
Penobscot	0	60	0	0	151	49	144	0	344	18	25	57	12	12	356
Piscataquis	1,721	61	0	0	153	0	1,046	0	1,199	28	0	0	110	18	1,309
Sagadahoc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Somerset	3,125	813	0	0	1,710	12	169	114	2,005	24	25	33	129	12	2,134
Waldo	0	0	0	0	0	0	0	0	0	0	0	0	6	6	6
Washington	362	0	0	0	0	0	121	0	121	15	0	0	108	8	229
York	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0
State Total:	**8,815**	**3,789**	**1**	**125**	**6,453**	**61**	**2,880**	**114**	**9,508**	**27**	**132**	**95**	**561**	**11**	**10,069**

Purposes for creating clearcut:

1. Removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.
2. Ecologically appropriate improvement or creation of wildlife habitat.
3. Removal of stands that, if partially harvested according to accepted silvicultural practice, are at high risk for windthrow due to factors such as soils, rooting depth, crown ratio or stem quality.
4. Harvesting of an existing plantation or other forest stand established by or previously treated with precommercial silvicultural activities.

Frequency Distribution of Clearcutting for Large Landowners who own more than 100,000 acres

2008 Clearcut as percent of statewide ownership	# of Landowners	Clearcut Acres
0% - 0.001%	**15**	**1,820**
0.001%-0.25%	**6**	**5,515**
0.26%-0.75%	**1**	**2,173**
0.76%-1.00%	**0**	**0**

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Practical advice for your land and trees from the Maine Forest Service.

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2009
Silvicultural Activities Report

including Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2009 Landowner Reports and other survey instruments.
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Report Highlights

Harvesting and Land Use Changes

- **394,100 acres were harvested in 2009, a 15% decrease from 463,200 acres in 2008.**
- **374,963 acres were "partially harvested" (partial and shelterwood totals) in 2009, a 16% decrease from 448,277 acres in 2008.**
- **The number of harvests reported decreased from 5,340 to 4,853.**

Clearcutting:

1. **The total area clearcut increased, from 10,075 acres in 2008 to 14,866 acres in 2009. Clearcutting amounts to less than 4% of total harvested acres.**
2. **Landowners owning more than 100,000 acres in Maine created 93% of all clearcuts (13,765 acres).**
3. **Average clearcut size in 2009 was 23 acres. Landowners owning more than 100,000 acres had an average clearcut size of 24 acres. Landowners owning less than 100,000 acres had an average clearcut size of 12 acres. Three clearcuts larger than 75 acres were created in 2009.**
4. **The primary silvicultural reason for clearcutting reported by large landowners was the removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.**

Land Use Changes:

- **Harvesting to convert land from forest management to some other land use decreased -12% from 4,848 acres in 2008 to 4,271 acres in 2009.**

Precommercial Silvicultural Activities

Herbicide Use:

- **For site preparation decreased -95%, from 452 acres in 2008 to 22 acres in 2009.**
- **To release crop trees from competing vegetation increased 25%, from 8,747 acres in 2008 to 10,892 acres in 2009.**

Timber Stand Improvement (TSI):

- **Precommercial thinning of young stands with spacing saws decreased -57%, from 8,947 acres in 2008 to 3,886 acres in 2009.**

  89% of this activity was done by landowners owning more than 100,000 acres (3,444 acres).

Planting:

- **Tree planting decreased -27%, from 3,889 acres in 2008 to 2,852 acres in 2009.**

  91% of the planting was by landowners owning more than 100,000 acres (2,599 acres).

Forester Involvement

- **In 2009, licensed foresters supervised harvesting on 273,038 acres, compared to 299,809 acres in 2008.**

69% of all harvest acres in 2009 had a licensed forester involved; a slight increase from 2008 (65%).

Licensed Forester supervision occurred on 24% (563 out of 2,315 harvests) of the harvests on family forests (<= 100 acres) in 2009. This is a slight increase from 22% in 2008 (557 out of 2,581 harvests).

2009 Harvesting and Land Use Changes

Commercial Harvest Information by Landowner Size and Type		Acres						
			Shelterwood					
OwnershipType	Ownership Size	Partial Harvests	Initial or Intermediate Entry	Final Entry	Total Shelterwood	Clearcut	Land Use Change	Total Harvest
Forest Industry Woodlands	1 to 100 acres	24	0	0	0	0	10	34
	101 to 1,000 acres	479	0	0	0	0	0	479
	1,001 to 100,000 acres	6,667	2,018	412	2,430	157	402	9,656
	100,000 + acres	9,838	23,247	24,983	48,230	2,824	0	60,892
	SubTotal	**17,008**	**25,265**	**25,395**	**50,660**	**2,981**	**412**	**71,061**
Investor Timberlands	1 to 100 acres	0	0	0	0	0	0	0
	101 to 1,000 acres	0	0	0	0	0	0	0
	1,001 to 100,000 acres	1,316	922	1,991	2,913	0	0	4,229
	100,000 + acres	29,568	27,094	39,551	66,645	5,163	152	101,528
	SubTotal	**30,884**	**28,016**	**41,542**	**69,558**	**5,163**	**152**	**105,757**
Non-Industrial Land	1 to 100 acres	37,446	1,811	3,632	5,443	411	1,636	44,936
	101 to 1,000 acres	51,888	4,679	3,152	7,831	317	1,023	61,059
	1,001 to 100,000 acres	26,479	4,990	11,027	16,017	188	709	43,393
	100,000 + acres	13,435	20,852	9,142	29,994	5,778	47	49,254
	SubTotal	**129,248**	**32,332**	**26,953**	**59,285**	**6,694**	**3,415**	**198,642**
Other Woodlands (Govt, etc.)	1 to 100 acres	282	29	0	29	8	23	342
	101 to 1,000 acres	723	0	180	180	20	177	1,100
	1,001 to 100,000 acres	1,716	340	633	973	0	79	2,768
	100,000 + acres	13,854	478	85	563	0	13	14,430
	SubTotal	**16,575**	**847**	**898**	**1,745**	**28**	**292**	**18,640**
2009 Totals:		**193,715**	**86,460**	**94,788**	**181,248**	**14,866**	**4,271**	**394,100**
Percent of 2009 Harvest:		**49.15%**	**21.94%**	**24.05%**	**45.99%**	**3.77%**	**1.08%**	**100.00%**
2008 Totals:		**236,432**	**93,628**	**118,217**	**211,845**	**10,075**	**4,848**	**463,200**
Percent Change from 2008 to 2009:		**-18%**	**-8%**	**-20%**	**-14%**	**48%**	**-12%**	**-15%**

2009 Precommercial Activities and Professional Assistance

OwnershipType	Ownership Size	Precommercial Activities by Landowner Size and Type — Acres — Herbicide Use — Site Prep	Herbicide Use — Release	TSI	Tree Planting		Number of Reported Harvests	Licensed Forester Involvement by Landowner Size and Type — Number of Harvests	Total Acres
Forest Industry Woodlands	1 to 100 acres	0	0	0	0		3	2	20
	101 to 1,000 acres	0	0	0	0		6	4	399
	1,001 to 100,000 acres	0	0	0	137		61	40	5,765
	100,000 + acres	0	6,431	3,174	1,936		173	161	39,436
	Subtotal	**0**	**6,431**	**3,174**	**2,073**		**243**	**207**	**45,620**
Investor Timberlands	1 to 100 acres	0	0	0	0		0	0	0
	101 to 1,000 acres	0	0	0	0		0	0	0
	1,001 to 100,000 acres	0	0	0	0		12	11	4,204
	100,000 + acres	0	3,564	0	608		213	199	91,614
	Subtotal	**0**	**3,564**	**0**	**608**		**225**	**210**	**95,818**
Non-Industrial Land	1 to 100 acres	15	10	162	13		2,298	553	12,852
	101 to 1,000 acres	7	0	262	52		1,408	504	24,605
	1,001 to 100,000 acres	0	0	15	25		354	224	32,047
	100,000 + acres	0	887	270	55		176	164	44,588
	Subtotal	**22**	**897**	**709**	**145**		**4,236**	**1,445**	**114,092**
Other Woodlands (Govt, etc.)	1 to 100 acres	0	0	0	0		14	8	305
	101 to 1,000 acres	0	0	0	24		32	22	879
	1,001 to 100,000 acres	0	0	3	2		42	35	2,408
	100,000 + acres	0	0	0	0		61	57	13,916
	Subtotal	**0**	**0**	**3**	**26**		**149**	**122**	**17,508**
2009 Totals:		**22**	**10,892**	**3,886**	**2,852**		**4,853**	**1,984**	**273,038**
2008 Totals:		**452**	**8,747**	**8,947**	**3,889**		**5,340**	**1,957**	**299,809**
Change from 2008 to 2009:		**-95%**	**25%**	**-57%**	**-27%**		**-9%**	**1%**	**-9%**

Definitions:

Ownership Type

Forest Industry Land: **Woodlands owned by a forest products industry; usually most of the wood harvested is used by that industry.**

Investor Timberlands: **Woodlands owned by organizations, including Timberland Investment Management Organizations (TIMOs) and Real Estate Investment Trusts (REITs) that hold timberland assets as fiduciaries for the benefit of others.**

Non-Industrial Land: **Woodlands privately owned but NOT by a forest industry. These include private individuals and other non-forest product industries.**

Other woodlands: **Woodlands owned by other entities not listed above -- including local, state, federal, or tribal governments.**

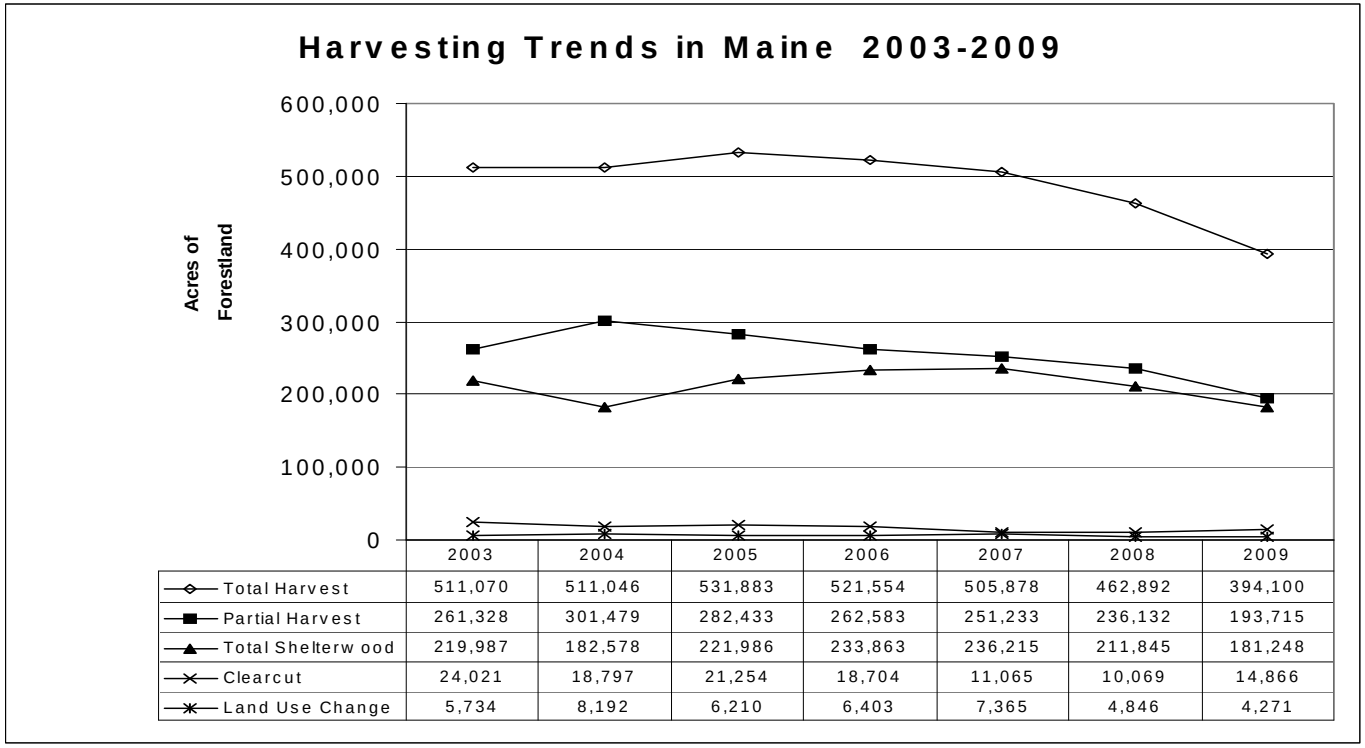
Types of Harvests

Partial Harvest: **Harvest where trees are removed individually or in small (<5 acre) patches.**

Shelterwood: **Harvest of mature trees from a forest site in two or more stages. The first stage removes only a portion of the trees to allow establishment of regeneration before the remaining trees are removed in subsequent harvest.**

Clearcut: **Harvest on a site larger than 5 acres that results in a residual basal area of acceptable growing stock trees >4.5" DBH of less than 30 square feet per acre, unless after harvesting the site has a well-distributed stand of acceptable growing stock 3 feet tall for softwood and 5 feet for hardwoods (Overstory Removal). Refer to the latest copy of the Maine Forest Service Rules Chapter 20 for additional information. It can be found on the Maine Forest Service website at http://www.state.me.us/doc/mfs/rules_regs/index.htm**

Change of Land Use: **Harvest conducted to convert forestland to another land use such as house lots, farm pastures, etc.**



	2003	2004	2005	2006	2007	2008	2009
Total Harvest	511,070	511,046	531,883	521,554	505,878	462,892	394,100
Partial Harvest	261,328	301,479	282,433	262,583	251,233	236,132	193,715
Total Shelterw ood	219,987	182,578	221,986	233,863	236,215	211,845	181,248
Clearcut	24,021	18,797	21,254	18,704	11,065	10,069	14,866
Land Use Change	5,734	8,192	6,210	6,403	7,365	4,846	4,271

2009 Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2009 Landowner Reports and other survey instruments. Data collected under the provisions of the Forest Resources Assessment Program, 12 MRSA § 8878-A

	Large Landowners (own >100,000 acres)										All Other Landowners				All Landowners
	Precommercial Activities Acres		Clearcuts > 75 acres in size		Purpose for Clearcut (see explanation below) Acres						Acres				
													Clearcut		Acres
County	TSI	Planted	#	Acres	1	2	3	4	Sub Total	Avg. Size	TSI	Planted	Sub Total	Avg. Size	Clearcut
Androscoggin	0	0	0	0	0	0	0	0	0	0	8	0	30	10	30
Aroostook	1,447	2,159	0	0	2,683	0	86	11	2,780	32	59	0	116	23	2,896
Cumberland	0	0	0	0	0	0	0	0	0	0	0	5	19	10	19
Franklin	0	0	0	0	1,383	0	200	0	1,583	21	6	0	159	11	1,742
Hancock	0	60	0	0	13	0	0	0	13	13	28	0	59	15	72
Kennebec	0	0	0	0	0	0	0	0	0	0	127	26	86	14	86
Knox	0	0	0	0	0	0	0	0	0	0	0	0	36	9	36
Lincoln	0	0	0	0	0	0	0	0	0	0	60	0	10	5	10
Oxford	556	30	0	0	436	0	512	0	948	17	35	15	36	7	984
Penobscot	100	333	1	112	415	0	0	0	415	38	18	4	69	9	484
Piscataquis	967	0	0	0	548	658	167	85	1,458	29	4	36	136	12	1,594
Sagadahoc	0	0	0	0	0	0	0	0	0	0	35	0	0	0	0
Somerset	104	17	0	0	5,099	0	99	454	5,652	23	42	137	131	13	5,783
Waldo	0	0	0	0	0	0	0	0	0	0	10	0	129	14	129
Washington	270	0	2	242	97	91	571	157	916	21	0	1	62	12	978
York	0	0	0	0	0	0	0	0	0	0	10	29	23	12	23
State Total:	**3,444**	**2,599**	**3**	**354**	**10,674**	**749**	**1,635**	**707**	**13,765**	**24**	**442**	**253**	**1,101**	**12**	**14,866**

Purposes for creating clearcut:

1. Removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.
2. Ecologically appropriate improvement or creation of wildlife habitat.
3. Removal of stands that, if partially harvested according to accepted silvicultural practice, are at high risk for windthrow due to factors such as soils, rooting depth, crown ratio or stem quality.
4. Harvesting of an existing plantation or other forest stand established by or previously treated with precommercial silvicultural activities.

Frequency Distribution of Clearcutting for Large Landowners who own more than 100,000 acres

2008 Clearcut as percent of statewide ownership	# of Landowners	Clearcut Acres
0% - 0.001%	**6**	**3,648**
0.001%-0.25%	**9**	**3,719**
0.26%-0.75%	**2**	**6,398**
0.76%-1.00%	**0**	**0**

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Silvicultural Activities Report

including Annual Report on Clearcutting and Precommercial Activities

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Report Highlights

Harvesting and Land Use Changes

- **442,707 acres were harvested in 2010, a 12% increase from 395,913 acres in 2009.**
- **420,309 acres were "partially harvested" (partial and shelterwood totals) in 2010, a 12% increase from 376,765 acres in 2009.**
- **The number of harvests reported increased from 4,864 to 5,650.**

Clearcutting:

1. **The total area clearcut increased, from 14,877 acres in 2009 to 19,292 acres in 2010. Clearcutting amounts to just over 4% of total harvested acres.**
2. **Landowners owning more than 100,000 acres in Maine created 92% of all clearcuts (17,732 acres).**
3. **Average clearcut size in 2010 was 19 acres. Landowners owning more than 100,000 acres had an average clearcut size of 20 acres. Landowners owning less than 100,000 acres had an average clearcut size of 11 acres. One clearcut larger than 75 acres was created in 2010.**
4. **The primary silvicultural reason for clearcutting reported by large landowners was the removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.**

Land Use Changes:

- **Harvesting to convert land from forest management to some other land use decreased 27% from 4,271 acres in 2009 to 3,106 acres in 2010.**

Precommercial Silvicultural Activities

Herbicide Use:

- **For site preparation increased 909%, from 22 acres in 2009 to 222 acres in 2010.**
- **To release crop trees from competing vegetation decreased 27%, from 10,892 acres in 2009 to 7,963 acres in 2010.**

Timber Stand Improvement (TSI):

- **Precommercial thinning of young stands with spacing saws increased 51%, from 4,080 acres in 2009 to 6,175 acres in 2010.**

  95% of this activity was done by landowners owning more than 100,000 acres (5,868 acres).

Planting:

- **Tree planting decreased 28%, from 2,852 acres in 2009 to 2,067 acres in 2010.**

  98% of the planting was by landowners owning more than 100,000 acres (2,020 acres).

Forester Involvement

- **In 2010, licensed foresters supervised harvesting on 304,169 acres, compared to 270,015 acres in 2009.**

69% of all harvest acres in 2010 had a licensed forester involved; a slight increase from 2009 (68%).

Licensed Forester supervision occurred on 25% (594 out of 2,338 harvests) of the harvests on family forests (<= 100 acres) in 2010. This is a slight increase from 24% in 2009 (563 out of 2,315 harvests).

2010 Harvesting and Land Use Changes

Commercial Harvest Information by Landowner Size and Type		Acres						
			Shelterwood					
OwnershipType	Ownership Size	Partial Harvests	Initial or Intermediate Entry	Final Entry	Total Shelterwood	Clearcut	Land Use Change	Total Harvest
Forest Industry Woodlands	1 to 100 acres	0	0	0	0	0	0	0
	101 to 1,000 acres	40	0	0	0	0	0	40
	1,001 to 100,000 acres	1,509	375	76	451	0	0	1,960
	100,000 + acres	14,761	14,962	23,978	38,940	2,980	0	56,681
	SubTotal	**16,310**	**15,337**	**24,054**	**39,391**	**2,980**	**0**	**58,681**
Investor Timberlands	1 to 100 acres	0	0	0	0	0	0	0
	101 to 1,000 acres	0	0	0	0	0	0	0
	1,001 to 100,000 acres	491	772	903	1,675	26	0	2,192
	100,000 + acres	25,042	25,409	33,846	59,255	9,343	0	93,640
	SubTotal	**25,533**	**26,181**	**34,749**	**60,930**	**9,369**	**0**	**95,832**
Non-Industrial Land	1 to 100 acres	36,334	2,667	2,840	5,507	491	1,182	43,514
	101 to 1,000 acres	71,372	4,633	6,266	10,899	754	1,115	84,140
	1,001 to 100,000 acres	43,858	4,234	9,907	14,141	284	274	58,557
	100,000 + acres	37,507	22,971	19,325	42,296	5,401	374	85,578
	SubTotal	**189,071**	**34,505**	**38,338**	**72,843**	**6,930**	**2,945**	**271,789**
Other Woodlands (Govt, etc.)	1 to 100 acres	112	0	10	10	0	4	126
	101 to 1,000 acres	1,770	169	184	353	0	68	2,191
	1,001 to 100,000 acres	848	467	494	961	5	89	1,903
	100,000 + acres	11,244	377	556	933	8	0	12,185
	SubTotal	**13,974**	**1,013**	**1,244**	**2,257**	**13**	**161**	**16,405**
2010 Totals:		**244,888**	**77,036**	**98,385**	**175,421**	**19,292**	**3,106**	**442,707**
Percent of 2010 Harvest:		**55.32%**	**17.40%**	**22.22%**	**39.62%**	**4.36%**	**0.70%**	**100.00%**
2009 Totals:		**194,756**	**86,773**	**95,236**	**182,009**	**14,877**	**4,271**	**395,913**
Percent Change from 2009 to 2010:		**26%**	**-11%**	**3%**	**-4%**	**30%**	**-27%**	**12%**

2010 Precommercial Activities and Professional Assistance

OwnershipType	Ownership Size	Precommercial Activities by Landowner Size and Type — Acres — Herbicide Use — Site Prep	Herbicide Use — Release	TSI	Tree Planting		Number of Reported Harvests	Licensed Forester Involvement by Landowner Size and Type — Number of Harvests	Total Acres
Forest Industry Woodlands	1 to 100 acres	0	0	0	0		0	0	0
	101 to 1,000 acres	0	0	0	0		2	0	0
	1,001 to 100,000 acres	0	0	0	0		26	23	1,655
	100,000 + acres	0	5,952	3,598	1,706		123	140	40,926
	Subtotal	**0**	**5,952**	**3,598**	**1,706**		**151**	**163**	**42,581**
Investor Timberlands	1 to 100 acres	0	0	0	0		0	0	0
	101 to 1,000 acres	0	0	0	0		0	0	0
	1,001 to 100,000 acres	0	0	0	0		7	6	1,792
	100,000 + acres	0	1,355	2,270	314		226	213	85,818
	Subtotal	**0**	**1,355**	**2,270**	**314**		**233**	**219**	**87,610**
Non-Industrial Land	1 to 100 acres	0	35	90	35		2,327	589	13,510
	101 to 1,000 acres	0	139	212	12		2,072	641	29,066
	1,001 to 100,000 acres	0	0	0	0		466	263	36,464
	100,000 + acres	217	462	0	0		262	232	80,135
	Subtotal	**217**	**636**	**302**	**47**		**5,127**	**1,725**	**159,175**
Other Woodlands (Govt, etc.)	1 to 100 acres	0	0	0	0		11	5	76
	101 to 1,000 acres	5	20	5	0		46	29	1,317
	1,001 to 100,000 acres	0	0	0	0		22	17	1,814
	100,000 + acres	0	0	0	0		60	57	11,596
	Subtotal	**5**	**20**	**5**	**0**		**139**	**108**	**14,803**
2010 Totals:		**222**	**7,963**	**6,175**	**2,067**		**5,650**	**2,215**	**304,169**
2009 Totals:		**22**	**10,892**	**4,080**	**2,852**		**4,864**	**1,966**	**270,015**
Change from 2009 to 2010:		**909%**	**-27%**	**51%**	**-28%**		**16%**	**13%**	**13%**

Definitions:

Ownership Type

Forest Industry Land: **Woodlands owned by a forest products industry; usually most of the wood harvested is used by that industry.**

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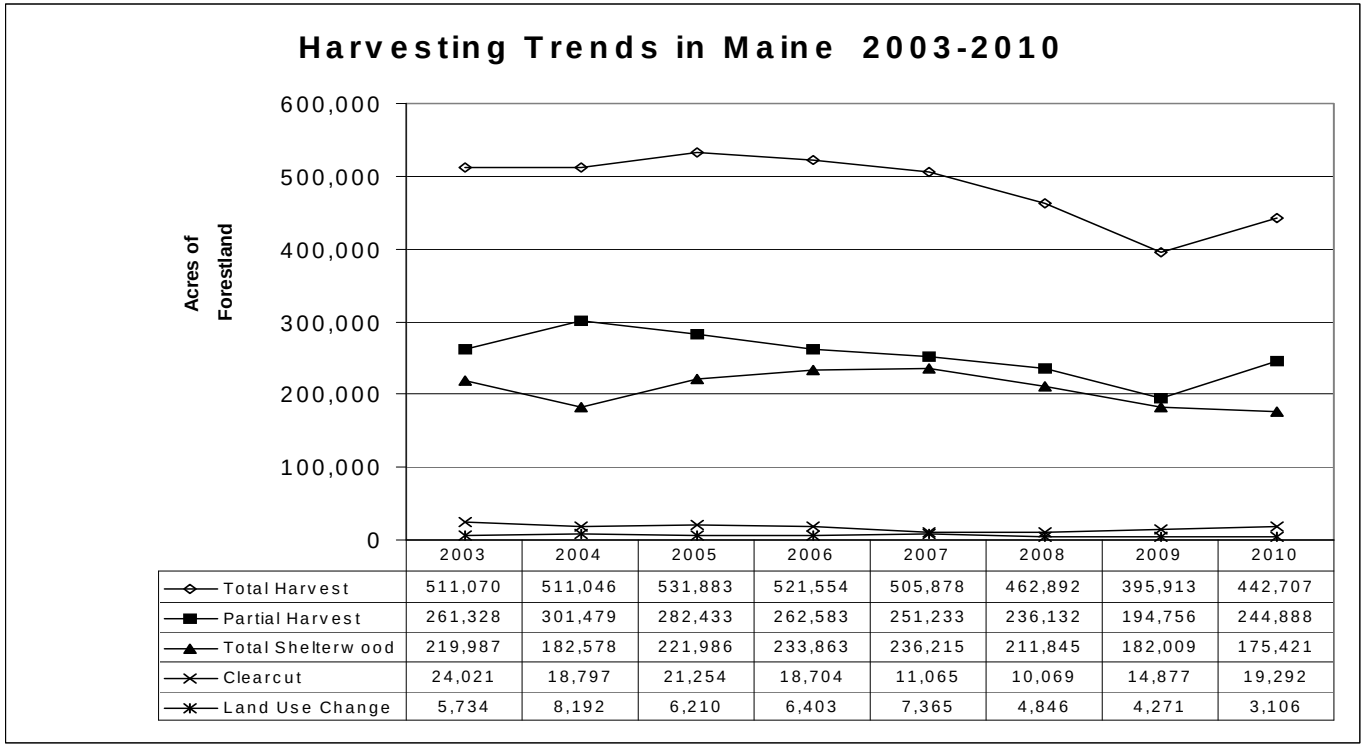
Types of Harvests

Partial Harvest: **Harvest where trees are removed individually or in small (<5 acre) patches.**

Shelterwood: **Harvest of mature trees from a forest site in two or more stages. The first stage removes only a portion of the trees to allow establishment of regeneration before the remaining trees are removed in subsequent harvest.**

Clearcut: **Harvest on a site larger than 5 acres that results in a residual basal area of acceptable growing stock trees >4.5" DBH of less than 30 square feet per acre, unless after harvesting the site has a well-distributed stand of acceptable growing stock 3 feet tall for softwood and 5 feet for hardwoods (Overstory Removal). Refer to the latest copy of the Maine Forest Service Rules Chapter 20 for additional information. It can be found on the Maine Forest Service website at http://www.state.me.us/doc/mfs/rules_regs/index.htm**

Change of Land Use: **Harvest conducted to convert forestland to another land use such as house lots, farm pastures, etc.**



	2003	2004	2005	2006	2007	2008	2009	2010
Total Harvest	511,070	511,046	531,883	521,554	505,878	462,892	395,913	442,707
Partial Harvest	261,328	301,479	282,433	262,583	251,233	236,132	194,756	244,888
Total Shelterw ood	219,987	182,578	221,986	233,863	236,215	211,845	182,009	175,421
Clearcut	24,021	18,797	21,254	18,704	11,065	10,069	14,877	19,292
Land Use Change	5,734	8,192	6,210	6,403	7,365	4,846	4,271	3,106

2010 Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2010 Landowner Reports and other survey instruments. Data collected under the provisions of the Forest Resources Assessment Program, 12 MRSA § 8878-A

	Large Landowners (own >100,000 acres)										All Other Landowners				All Landowners
	Precommercial Activities Acres		Clearcuts > 75 acres in size		Purpose for Clearcut (see explanation below) Acres						Acres				
													Clearcut		Acres
County	TSI	Planted	#	Acres	1	2	3	4	Sub Total	Avg. Size	TSI	Planted	Sub Total	Avg. Size	Clearcut
Androscoggin	0	0	0	0	0	0	0	0	0	0	15	0	5	5	5
Aroostook	2,935	1,741	0	0	2,435	0	703	0	3,138	29	12	0	396	12	3,534
Cumberland	0	0	0	0	0	0	0	0	0	0	5	0	15	8	15
Franklin	0	0	0	0	1,714	0	386	0	2,100	24	20	0	22	8	2,122
Hancock	0	0	0	0	6	0	0	0	6	6	21	0	83	14	89
Kennebec	0	0	0	0	13	0	0	0	13	13	18	4	9	4	22
Knox	0	0	0	0	0	0	0	0	0	0	0	0	52	9	52
Lincoln	0	0	0	0	0	0	0	0	0	0	0	0	8	4	8
Oxford	429	0	1	130	2,443	0	1,895	0	4,338	16	10	1	73	7	4,411
Penobscot	289	191	0	0	302	0	0	0	302	34	178	10	148	11	450
Piscataquis	1,933	88	0	0	389	0	296	168	853	21	3	20	190	13	1,043
Sagadahoc	0	0	0	0	0	0	0	0	0	0	0	0	5	5	5
Somerset	282	0	0	0	6,276	0	258	231	6,765	18	5	7	204	10	6,969
Waldo	0	0	0	0	0	0	0	0	0	0	0	5	86	17	86
Washington	0	0	0	0	195	0	0	22	217	13	15	0	110	10	327
York	0	0	0	0	0	0	0	0	0	0	5	0	154	14	154
State Total:	**5,868**	**2,020**	**1**	**130**	**13,773**	**0**	**3,538**	**421**	**17,732**	**20**	**307**	**47**	**1,560**	**11**	**19,292**

Purposes for creating clearcut:

1. Removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.
2. Ecologically appropriate improvement or creation of wildlife habitat.
3. Removal of stands that, if partially harvested according to accepted silvicultural practice, are at high risk for windthrow due to factors such as soils, rooting depth, crown ratio or stem quality.
4. Harvesting of an existing plantation or other forest stand established by or previously treated with precommercial silvicultural activities.

Frequency Distribution of Clearcutting for Large Landowners who own more than 100,000 acres

2010 Clearcut as percent of statewide ownership	# of Landowners	Clearcut Acres
0% - 0.001%	**2**	**135**
0.001%-0.25%	**14**	**12,448**
0.26%-0.75%	**1**	**5,149**
0.76%-1.00%	**0**	**0**

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2011
Silvicultural Activities Report

including Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2011 Landowner Reports and other survey instruments.
Data collected under the provisions of Title 12 MRSA §8885 and §8878-A

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Report Highlights

Harvesting and Land Use Changes

- **444,339 acres were harvested in 2011, a slight increase from 443,169 acres in 2010.**
- **414,667 acres were "partially harvested" (partial and shelterwood totals) in 2011, a -1% decrease from 420,689 acres in 2010.**
- **The number of harvests reported increased to 5,759 from 5,663.**

Clearcutting:

1. **The total area clearcut increased, from 19,301 acres in 2010 to 24,463 acres in 2011. Clearcutting amounted to 5.5% of total harvested acres.**
2. **Landowners owning more than 100,000 acres in Maine created 94% of all clearcuts (22,945 acres).**
3. **Average clearcut size in 2011 was 23 acres. Landowners owning more than 100,000 acres had an average clearcut size of 36 acres. Landowners owning less than 100,000 acres had an average clearcut size of 14 acres. 16 clearcuts larger than 75 acres were created in 2011.**
4. **The primary silvicultural reason for clearcutting reported by large landowners was the removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.**

Land Use Changes:

- **Harvesting to convert land from forest management to some other land use increased 64% from 3,179 acres in 2010 to 5,209 acres in 2011.**
- **The increase in harvested acres for land use change under the Other Woodlands ownership type is associated with the Central Maine Power transmission project.**

Precommercial Silvicultural Activities

Herbicide Use:

- **For site preparation increased 666%, from 222 acres in 2010 to 1,701 acres in 2011.**
- **To release crop trees from competing vegetation decreased 8%, from 7,963 acres in 2010 to 7,298 acres in 2011.**

Timber Stand Improvement (TSI):

- **Precommercial thinning of young stands with spacing saws increased 10%, from 6,175 acres in 2010 to 6,765 acres in 2011.**

91% of this activity was done by landowners owning more than 100,000 acres (6,188 acres).

Planting:

- **Tree planting increased 105%, from 2,067 acres in 2010 to 4,238 acres in 2011.**

97% of the planting was by landowners owning more than 100,000 acres (4,093 acres).

Forester Involvement

- **In 2011, licensed foresters supervised harvesting on 326,277 acres, compared to 304,299 acres in 2010.**

73% of all harvest acres in 2011 had a licensed forester involved; a slight increase from 2010 (68%).

Licensed Forester supervision occurred on 23% (665 out of 2,880 harvests) of the harvests on family forests (<= 100 acres) in 2011. This is a slight decrease from 25% in 2010 (588 out of 2,339 harvests).

2011 Harvesting and Land Use Changes

Commercial Harvest Information by Landowner Size and Type		Acres						
			Shelterwood					
OwnershipType	Ownership Size	Partial Harvests	Initial or Intermediate Entry	Final Entry	Total Shelterwood	Clearcut	Land Use Change	Total Harvest
Forest Industry Woodlands	1 to 100 acres	25	0	0	0	14	14	53
	101 to 1,000 acres	90	15	70	85	0	10	185
	1,001 to 100,000 acres	2,777	23	167	190	0	16	2,983
	100,000 + acres	14,562	11,770	24,178	35,948	6,105	61	56,676
	SubTotal	**17,454**	**11,808**	**24,415**	**36,223**	**6,119**	**101**	**59,897**
Investor Timberlands	1 to 100 acres	0	0	0	0	0	0	0
	101 to 1,000 acres	0	0	0	0	0	0	0
	1,001 to 100,000 acres	899	236	849	1,085	102	1	2,087
	100,000 + acres	21,909	24,122	32,429	56,551	9,981	0	88,441
	SubTotal	**22,808**	**24,358**	**33,278**	**57,636**	**10,083**	**1**	**90,528**
Non-Industrial Land	1 to 100 acres	50,728	2,518	3,612	6,130	474	1,536	58,868
	101 to 1,000 acres	65,253	4,569	5,035	9,604	557	794	76,208
	1,001 to 100,000 acres	33,346	8,978	13,794	22,772	311	354	56,783
	100,000 + acres	20,594	34,256	20,896	55,152	6,859	448	83,053
	SubTotal	**169,921**	**50,321**	**43,337**	**93,658**	**8,201**	**3,132**	**274,912**
Other Woodlands (Govt, etc.)	1 to 100 acres	107	20	0	20	0	46	173
	101 to 1,000 acres	2,199	187	101	288	5	15	2,507
	1,001 to 100,000 acres	1,090	554	936	1,490	55	1,870	4,505
	100,000 + acres	10,219	419	1,135	1,554	0	44	11,817
	SubTotal	**13,615**	**1,180**	**2,172**	**3,352**	**60**	**1,975**	**19,002**
2011 Totals:		**223,798**	**87,667**	**103,202**	**190,869**	**24,463**	**5,209**	**444,339**
Percent of 2011 Harvest:		**50.37%**	**19.73%**	**23.23%**	**42.96%**	**5.51%**	**1.17%**	**100.00%**
2010 Totals:		**245,088**	**77,206**	**98,395**	**175,601**	**19,301**	**3,179**	**443,169**
Percent Change from 2010 to 2011:		**-9%**	**14%**	**5%**	**9%**	**27%**	**64%**	**0%**

2011 Precommercial Activities and Professional Assistance

OwnershipType	Ownership Size	Precommercial Activities by Landowner Size and Type — Acres — Herbicide Use — Site Prep	Herbicide Use — Release	TSI	Tree Planting		Number of Reported Harvests	Licensed Forester Involvement by Landowner Size and Type — Number of Harvests	Total Acres
Forest Industry Woodlands	1 to 100 acres	0	0	0	0		2	1	28
	101 to 1,000 acres	0	0	0	0		3	2	150
	1,001 to 100,000 acres	0	0	0	0		28	21	2,076
	100,000 + acres	0	5,277	2,163	3,144		100	96	56,678
	Subtotal	**0**	**5,277**	**2,163**	**3,144**		**133**	**120**	**58,932**
Investor Timberlands	1 to 100 acres	0	0	0	0		0	0	0
	101 to 1,000 acres	0	0	0	0		0	0	0
	1,001 to 100,000 acres	0	0	0	0		8	8	2,087
	100,000 + acres	0	820	2,159	429		191	189	86,713
	Subtotal	**0**	**820**	**2,159**	**429**		**199**	**197**	**88,800**
Non-Industrial Land	1 to 100 acres	10	23	271	67		2,885	667	15,971
	101 to 1,000 acres	5	4	241	26		1,672	611	31,034
	1,001 to 100,000 acres	0	0	65	52		385	244	32,217
	100,000 + acres	381	1,174	1,857	520		271	250	81,118
	Subtotal	**396**	**1,201**	**2,434**	**665**		**5,213**	**1,772**	**160,340**
Other Woodlands (Govt, etc.)	1 to 100 acres	0	0	0	0		15	8	117
	101 to 1,000 acres	0	0	0	0		50	33	2,024
	1,001 to 100,000 acres	1,305	0	0	0		82	73	4,255
	100,000 + acres	0	0	9	0		72	70	11,809
	Subtotal	**1,305**	**0**	**9**	**0**		**219**	**184**	**18,205**
2011 Totals:		**1,701**	**7,298**	**6,765**	**4,238**		**5,764**	**2,273**	**326,277**
2010 Totals:		**222**	**7,963**	**6,175**	**2,067**		**5,663**	**2,190**	**304,299**
Change from 2010 to 2011:		**666%**	**-8%**	**10%**	**105%**		**2%**	**4%**	**7%**

Definitions:

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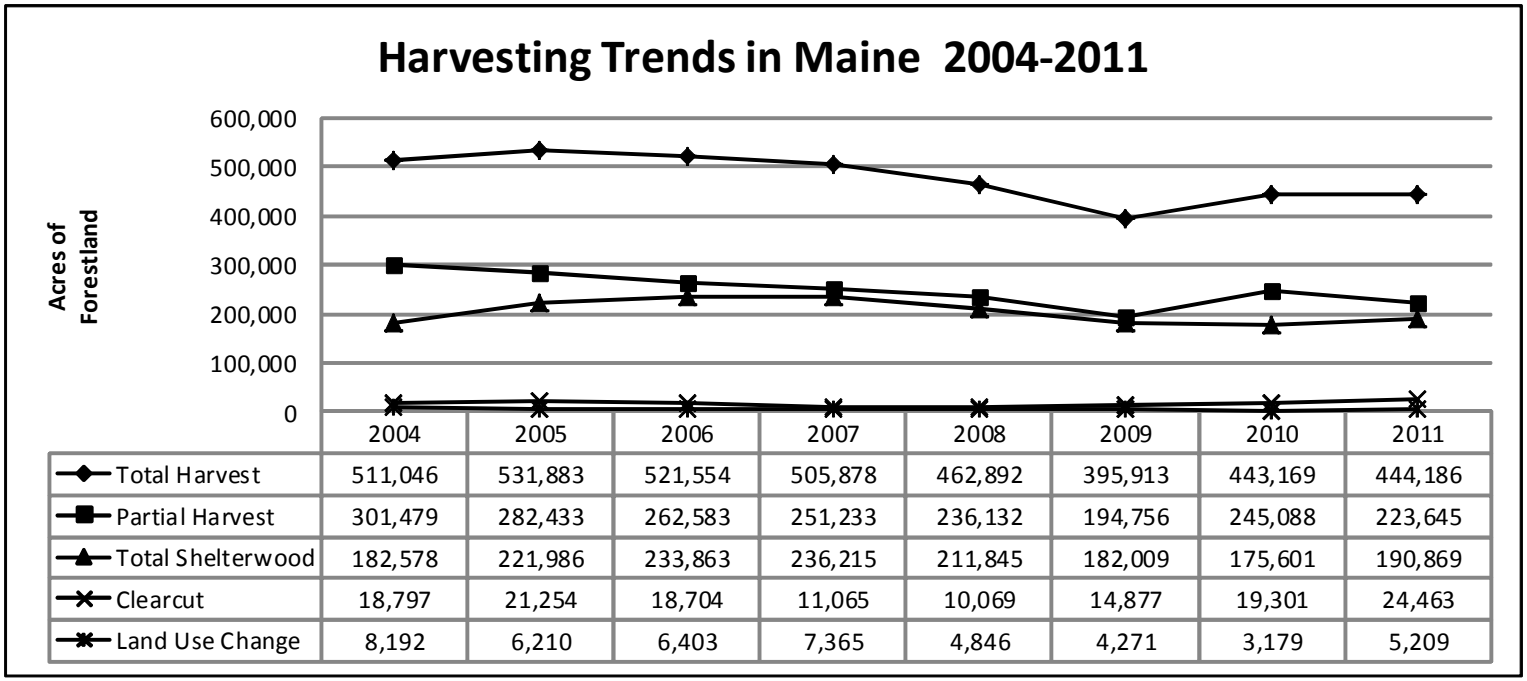

	2004	2005	2006	2007	2008	2009	2010	2011
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	Large Landowners (own >100,000 acres)										All Other Landowners				All Landowners
	Precommercial Activities Acres		Clearcuts > 75 acres in size		Purpose for Clearcut (see explanation below) Acres						Acres				
													Clearcut		Acres
County	TSI	Planted	#	Acres	1	2	3	4	Sub Total	Avg. Size	TSI	Planted	Sub Total	Avg. Size	Clearcut
Androscoggin	0	0	0	0	0	0	0	0	0	0	9	0	35	7	35
Aroostook	2,102	3,421	4	558	5,856	0	77	97	6,030	35	26	22	324	14	6,354
Cumberland	0	0	0	0	0	0	0	0	0	0	10	6	16	8	16
Franklin	0	0	4	567	1,199	0	780	0	1,979	22	85	1	35	18	2,014
Hancock	0	0	1	233	312	0	0	0	312	104	50	0	88	8	400
Kennebec	0	0	0	0	0	0	0	0	0	0	71	3	76	38	76
Knox	0	0	0	0	0	0	0	0	0	0	0	0	167	12	167
Lincoln	0	0	0	0	0	0	0	0	0	0	120	0	28	9	28
Oxford	465	0	6	869	2,490	0	1,687	0	4,177	20	5	0	216	14	4,393
Penobscot	689	142	0	0	721	0	28	20	769	28	23	41	48	8	817
Piscataquis	951	40	0	0	2,631	0	301	317	3,249	26	10	5	156	14	3,405
Sagadahoc	0	0	0	0	0	0	0	0	0	0	0	0	10	10	10
Somerset	1,566	490	0	0	5,532	0	63	311	5,906	20	56	44	153	15	6,059
Waldo	0	0	0	0	0	0	0	127	127	25	30	15	75	15	202
Washington	415	0	1	105	106	50	135	105	396	40	44	7	20	10	416
York	0	0	0	0	0	0	0	0	0	0	38	1	71	24	71
State Total:	**6,188**	**4,093**	**16**	**2,332**	**18,847**	**50**	**3,071**	**977**	**22,945**	**36**	**577**	**145**	**1,518**	**14**	**24,463**

Purposes for creating clearcut:

1. Removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.
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Frequency Distribution of Clearcutting
for Large Landowners who own more than 100,000 acres

2011 Clearcut as percent of statewide ownership	# of Landowners	Clearcut Acres
0% - 0.001%	**3**	**528**
0.001%-0.25%	**5**	**4,852**
0.26%-0.75%	**10**	**9,019**
0.76%-1.00%	**2**	**8,546**

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2012
Silvicultural Activities Report

including Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2012 Landowner Reports and other survey instruments.
Data collected under the provisions of Title 12 MRS §8885 and §8878-A

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Report Highlights

Harvesting and Land Use Change

- **443,714 acres were harvested in 2012, a slight decrease from the 444,410 acres in 2011.**
- **418,675 acres were "partially harvested" (partial and shelterwood totals) in 2012, a 1% increase from 414,707 acres in 2011.**
- **The number of harvests reported increased to 5,994 from 5,767.**

Clearcutting:

1. **The total area clearcut decreased, from 24,494 acres in 2011 to 20,461 acres in 2012. Clearcutting amounted to 4.6% of total harvested acres.**
2. **Landowners owning more than 100,000 acres in Maine created 92% of all clearcuts (18,805 acres).**
3. **Average clearcut size in 2012 was 20 acres. Landowners owning more than 100,000 acres had an average clearcut size of 36 acres. Landowners owning less than 100,000 acres had an average clearcut size of 14 acres. 12 clearcuts larger than 75 acres were created in 2012.**
4. **The primary silvicultural reason for clearcutting reported by large landowners was the removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.**

Land Use Changes:

- **Harvesting to convert land from forest management to some other land use decreased 12% from 5,209 acres in 2011 to 4,578 acres in 2012.**

Precommercial Silvicultural Activities

Herbicide Use:

- **For site preparation decreased 35%, from 1,701 acres in 2011 to 1,105 acres in 2012.**
- **To release crop trees from competing vegetation increased 30%, from 7,298 acres in 2011 to 9,507 acres in 2012.**

Timber Stand Improvement (TSI):

- **Precommercial thinning of young stands with spacing saws increased 30%, from 6,765 acres in 2011 to 8,802 acres in 2012.**

  86% of this activity was done by landowners owning more than 100,000 acres (7,604 acres).

Planting:

- **Tree planting increased 75%, from 4,238 acres in 2011 to 7,417 acres in 2012.**

  98% of the planting was by landowners owning more than 100,000 acres (7,265 acres).

Forester Involvement

- **In 2012, licensed foresters supervised harvesting on 333,507 acres, compared to 326,318 acres in 2011.**

75% of all harvest acres in 2012 had a licensed forester involved; a slight increase from 2011 (73%).

Licensed Forester supervision occurred on 30% (749 out of 2,462 harvests) of the harvests on family forests (<= 100 acres) in 2012. This is a slight increase from 29% in 2011 (666 out of 2,274 harvests).

2012 Harvesting and Land Use Changes

Commercial Harvest Information by Landowner Size and Type		Acres						
			Shelterwood					
OwnershipType	Ownership Size	Partial Harvests	Initial or Intermediate Entry	Final Entry	Total Shelterwood	Clearcut	Land Use Change	Total Harvest
Forest Industry Woodlands	1 to 100 acres	30	0	0	0	0	2	32
	101 to 1,000 acres	84	15	50	65	0	0	149
	1,001 to 100,000 acres	2,393	495	73	568	0	32	2,993
	100,000 + acres	11,882	8,152	13,117	21,269	2,481	0	35,632
	SubTotal	**14,389**	**8,662**	**13,240**	**21,902**	**2,481**	**34**	**38,806**
Investor Timberlands	1 to 100 acres	0	0	0	0	0	0	0
	101 to 1,000 acres	110	0	0	0	0	0	110
	1,001 to 100,000 acres	659	923	94	1,017	0	0	1,676
	100,000 + acres	16,349	12,350	24,076	36,426	6,012	3	58,790
	SubTotal	**17,118**	**13,273**	**24,170**	**37,443**	**6,012**	**3**	**60,576**
Non-Industrial Land	1 to 100 acres	44,358	3,103	3,334	6,437	518	1,378	52,691
	101 to 1,000 acres	71,276	4,076	6,782	10,858	463	1,498	84,095
	1,001 to 100,000 acres	30,717	8,631	11,310	19,941	667	1,397	52,722
	100,000 + acres	37,090	45,583	44,129	89,712	10,210	0	137,012
	SubTotal	**183,441**	**61,393**	**65,555**	**126,948**	**11,858**	**4,273**	**326,520**
Other Woodlands (Govt, etc.)	1 to 100 acres	158	0	0	0	0	22	180
	101 to 1,000 acres	1,740	110	60	170	8	75	1,993
	1,001 to 100,000 acres	1,784	842	705	1,547	0	125	3,456
	100,000 + acres	10,689	477	869	1,346	102	46	12,183
	SubTotal	**14,371**	**1,429**	**1,634**	**3,063**	**110**	**268**	**17,812**
2012 Totals:		**229,319**	**84,757**	**104,599**	**189,356**	**20,461**	**4,578**	**443,714**
Percent of 2012 Harvest:		**51.68%**	**19.10%**	**23.58%**	**42.68%**	**4.61%**	**1.03%**	**100.00%**
2011 Totals:		**223,826**	**87,668**	**103,213**	**190,881**	**24,494**	**5,209**	**444,410**
Percent Change from 2011 to 2012:		**2%**	**-3%**	**1%**	**-1%**	**-16%**	**-12%**	**0%**

2012 Precommercial Activities and Professional Assistance

OwnershipType	Ownership Size	Precommercial Activities by Landowner Size and Type — Acres — Herbicide Use — Site Prep	Herbicide Use — Release	TSI	Tree Planting		Number of Reported Harvests	Licensed Forester Involvement by Landowner Size and Type — Number of Harvests	Total Acres
Forest Industry Woodlands	1 to 100 acres	0	0	0	0		2	1	2
	101 to 1,000 acres	0	0	0	0		1	1	99
	1,001 to 100,000 acres	0	0	0	0		30	19	2,131
	100,000 + acres	0	5,096	0	6,319		115	106	35,544
	Subtotal	**0**	**5,096**	**0**	**6,319**		**148**	**127**	**37,776**
Investor Timberlands	1 to 100 acres	0	0	0	0		0	0	0
	101 to 1,000 acres	0	0	0	0		2	2	105
	1,001 to 100,000 acres	0	0	0	0		8	6	1,451
	100,000 + acres	90	2,251	1,822	0		139	139	58,787
	Subtotal	**90**	**2,251**	**1,822**	**0**		**149**	**147**	**60,343**
Non-Industrial Land	1 to 100 acres	69	7	255	61		2,662	750	17,284
	101 to 1,000 acres	33	29	743	51		2,068	693	34,671
	1,001 to 100,000 acres	0	0	20	40		452	274	32,089
	100,000 + acres	880	2,091	5,782	938		352	344	135,357
	Subtotal	**982**	**2,127**	**6,800**	**1,090**		**5,534**	**2,061**	**219,401**
Other Woodlands (Govt, etc.)	1 to 100 acres	0	0	95	0		11	1	5
	101 to 1,000 acres	0	0	50	0		40	31	1,669
	1,001 to 100,000 acres	33	33	35	0		35	28	2,342
	100,000 + acres	0	0	0	8		77	73	11,971
	Subtotal	**33**	**33**	**180**	**8**		**163**	**133**	**15,987**
2012 Totals:		**1,105**	**9,507**	**8,802**	**7,417**		**5,994**	**2,468**	**333,507**
2011 Totals:		**1,701**	**7,298**	**6,765**	**4,238**		**5,767**	**2,274**	**326,318**
Change from 2011 to 2012:		**-35%**	**30%**	**30%**	**75%**		**4%**	**9%**	**2%**

Definitions:

Ownership Type

Forest Industry Land: **Woodlands owned by a forest products industry; usually most of the wood harvested is used by that industry.**

Investor Timberlands: **Woodlands owned by organizations, including Timberland Investment Management Organizations (TIMOs) and Real Estate Investment Trusts (REITs) that hold timberland assets as fiduciaries for the benefit of others.**

Non-Industrial Land: **Woodlands privately owned but NOT by a forest industry. These include private individuals and other non-forest product industries.**

Other woodlands: **Woodlands owned by other entities not listed above -- including local, state, federal, or tribal governments.**

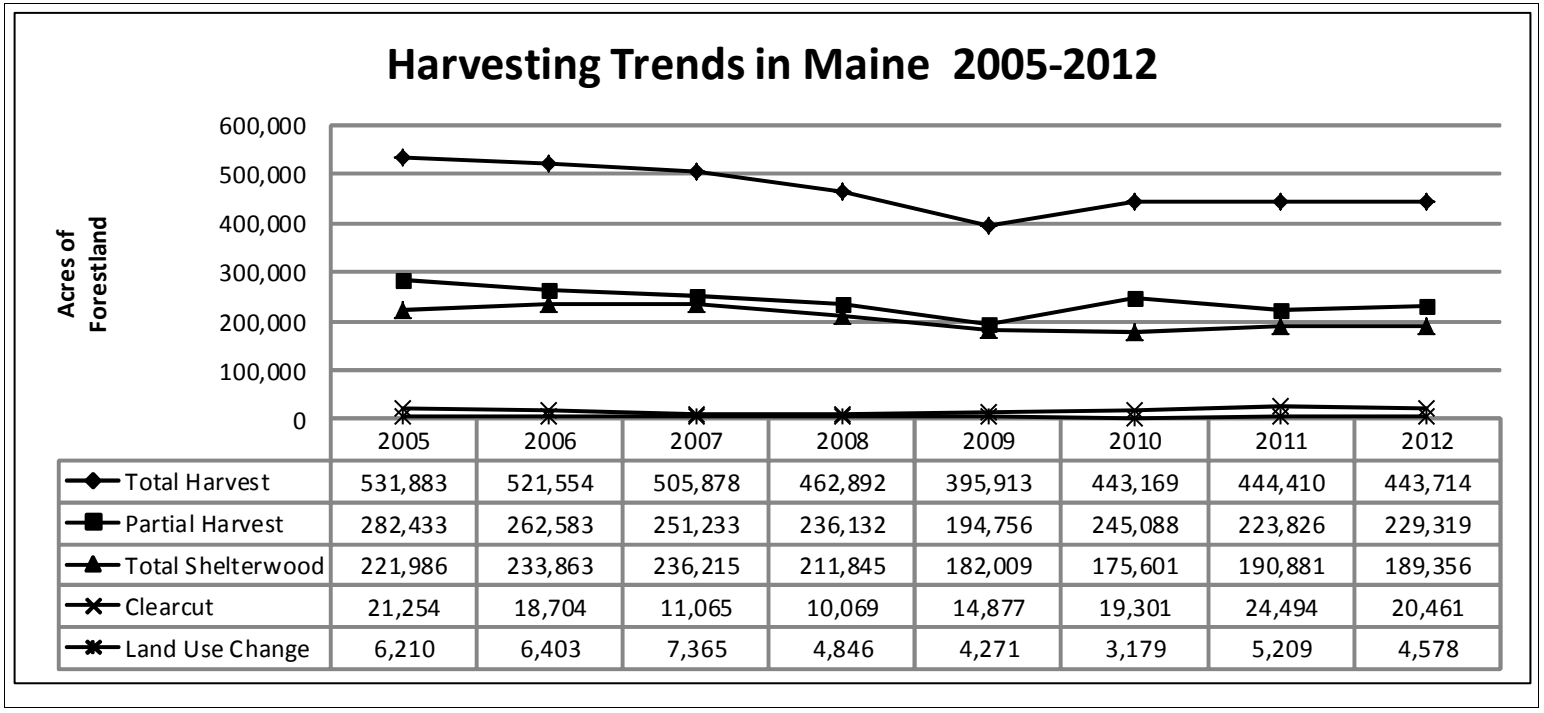
Types of Harvests

Partial Harvest: **Harvest where trees are removed individually or in small (<5 acre) patches.**

Shelterwood: **Harvest of mature trees from a forest site in two or more stages. The first stage removes only a portion of the trees to allow establishment of regeneration before the remaining trees are removed in subsequent harvest.**

Clearcut: **Harvest on a site larger than 5 acres that results in a residual basal area of acceptable growing stock trees >4.5" DBH of less than 30 square feet per acre, unless after harvesting the site has a well-distributed stand of acceptable growing stock 3 feet tall for softwood and 5 feet for hardwoods (Overstory Removal). Refer to the latest copy of the Maine Forest Service Rules Chapter 20 for additional information. It can be found on the Maine Forest Service website at http://www.state.me.us/doc/mfs/rules_regs/index.htm**

Change of Land Use: **Harvest conducted to convert forestland to another land use such as house lots, farm pastures, etc.**



	2005	2006	2007	2008	2009	2010	2011	2012
Total Harvest	531,883	521,554	505,878	462,892	395,913	443,169	444,410	443,714
Partial Harvest	282,433	262,583	251,233	236,132	194,756	245,088	223,826	229,319
Total Shelterwood	221,986	233,863	236,215	211,845	182,009	175,601	190,881	189,356
Clearcut	21,254	18,704	11,065	10,069	14,877	19,301	24,494	20,461
Land Use Change	6,210	6,403	7,365	4,846	4,271	3,179	5,209	4,578

2012 Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2012 Landowner Reports and other survey instruments. Data collected under the provisions of the Forest Resources Assessment Program, 12 MRS § 8878-A

	Large Landowners (own >100,000 acres)										All Other Landowners				All Landowners
	Precommercial Activities Acres		Clearcuts > 75 acres in size		Purpose for Clearcut (see explanation below) Acres						Acres				
													Clearcut		Acres
County	TSI	Planted	#	Acres	1	2	3	4	Sub Total	Avg. Size	TSI	Planted	Sub Total	Avg. Size	Clearcut
Androscoggin	0	0	0	0	0	0	0	0	0	0	10	15	15	8	15
Aroostook	2,877	6,113	0	0	2,338	48	275	90	2,751	18	34	16	310	15	3,061
Cumberland	0	0	0	0	0	0	0	0	0	0	15	3	37	12	37
Franklin	747	13	4	559	1,861	0	150	0	2,011	19	12	1	22	6	2,033
Hancock	0	0	0	0	189	0	0	0	189	47	91	4	72	9	261
Kennebec	0	0	0	0	0	0	0	0	0	0	291	2	62	12	62
Knox	0	0	0	0	0	0	0	0	0	0	5	0	31	10	31
Lincoln	0	0	0	0	0	0	0	0	0	0	118	0	49	8	49
Oxford	73	28	8	1,518	3,910	0	750	0	4,660	26	184	7	83	12	4,743
Penobscot	0	254	0	0	600	0	0	12	612	17	242	71	239	10	851
Piscataquis	947	53	0	0	1,303	0	512	136	1,951	27	67	2	205	13	2,156
Sagadahoc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Somerset	2,658	796	0	0	6,127	0	53	271	6,451	20	59	25	163	12	6,614
Waldo	0	0	0	0	0	0	0	0	0	0	34	2	163	13	163
Washington	302	8	0	0	0	20	80	80	180	14	16	2	111	22	291
York	0	0	0	0	0	0	0	0	0	0	20	2	74	11	74
State Total:	**7,604**	**7,265**	**12**	**2,077**	**16,328**	**68**	**1,820**	**589**	**18,805**	**36**	**1,198**	**152**	**1,636**	**14**	**20,441**

Purposes for creating clearcut:

1. Removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.
2. Ecologically appropriate improvement or creation of wildlife habitat.
3. Removal of stands that, if partially harvested according to accepted silvicultural practice, are at high risk for windthrow due to factors such as soils, rooting depth, crown ratio or stem quality.
4. Harvesting of an existing plantation or other forest stand established by or previously treated with precommercial silvicultural activities.

Frequency Distribution of Clearcutting for Large Landowners who own more than 100,000 acres

2012 Clearcut as percent of statewide ownership	# of Landowners	Clearcut Acres
0% - 0.001%	**16**	**8,691**
0.001%-0.25%	**5**	**10,114**
0.26%-0.75%	**0**	**0**
0.76%-1.00%	**0**	**0**

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Report Highlights

Harvesting and Land Use Changes

- **414,797 acres were harvested in 2013, a decrease from 443,790 acres in 2012.**
- **385,389 acres were "partially harvested" (partial and shelterwood totals) in 2013, an 8% decrease from 418,751 acres in 2012.**
- **The number of harvests reported decreased from 5,998 to 5,705.**

Clearcutting:

1. **The total area clearcut increased, from 20,461 acres in 2012 to 25,037 acres in 2013. Clearcutting amounted to 6% of total harvested acres.**
2. **Landowners owning more than 100,000 acres in Maine created 93% of all clearcut acreage (23,292 acres).**
3. **Average clearcut size in 2013 was 23 acres. Landowners owning more than 100,000 acres had an average clearcut size of 36 acres. Landowners owning less than 100,000 acres had an average clearcut size of 14 acres. 28 clearcuts larger than 75 acres were created in 2013.**
4. **The primary silvicultural reason for clearcutting reported by large landowners was the removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.**

Land Use Changes:

- **Harvesting to convert land from forest management to some other land use decreased 5% from 4,578 acres in 2012 to 4,371 acres in 2013.**

Precommercial Silvicultural Activities

Herbicide Use:

- **For site preparation a decrease of 17%, from 1,105 acres in 2012 to 913 acres in 2013.**
- **To release crop trees from competing vegetation decreased 86%, from 9,507 acres in 2012 to 1,367 acres in 2013.**

Timber Stand Improvement (TSI):

- **Precommercial thinning of young stands with spacing saws increased 53%, from 8,802 acres in 2012 to 13,474 acres in 2013.**

  95% of the acreage was done by landowners owning more than 100,000 acres (12,856 acres).

Planting:

- **Tree planting decreased 12%, from 7,417 acres in 2012 to 6,552 acres in 2013.**

  98% of the planting acreage was by landowners owning more than 100,000 acres (6,439 acres).

Forester Involvement

- **In 2013, licensed foresters supervised harvesting on 297,340 acres, compared to 329,893 acres in 2012.**

72% of all harvest acres in 2013 had a licensed forester involved; a slight decrease from 2012 (74%).

Licensed Forester supervision occurred on 28% (696 out of 2,470 harvests) of the harvests on family forests (<= 100 acres in all ownership types) in 2013. This is similiar to 2012 (752 out of 2,675 harvests).

2013 Harvesting and Land Use Changes

Commercial Harvest Information by Landowner Size and Type		Acres						
			Shelterwood					
OwnershipType	Ownership Size	Partial Harvests	Initial or Intermediate Entry	Final Entry	Total Shelterwood	Clearcut	Land Use Change	Total Harvest
Forest Industry Woodlands	1 to 100 acres	80	0	0	0	0	0	80
	101 to 1,000 acres	20	0	319	319	0	0	339
	1,001 to 100,000 acres	1,084	119	459	578	76	0	1,738
	100,000 + acres	11,695	5,980	10,090	16,070	5,845	0	33,610
	SubTotal	**12,879**	**6,099**	**10,868**	**16,967**	**5,921**	**0**	**35,767**
Investor Timberlands	1 to 100 acres	25	0	0	0	0	0	25
	101 to 1,000 acres	0	0	0	0	0	0	0
	1,001 to 100,000 acres	515	423	721	1,144	9	0	1,668
	100,000 + acres	14,891	16,945	17,960	34,905	7,387	197	57,380
	SubTotal	**15,431**	**17,368**	**18,681**	**36,049**	**7,396**	**197**	**59,073**
Non-Industrial Land	1 to 100 acres	39,416	2,588	3,242	5,830	768	1,167	47,181
	101 to 1,000 acres	68,838	7,263	8,006	15,269	494	2,222	86,823
	1,001 to 100,000 acres	30,224	4,452	11,564	16,016	221	662	47,123
	100,000 + acres	36,763	27,996	42,994	70,990	9,952	24	117,729
	SubTotal	**175,241**	**42,299**	**65,806**	**108,105**	**11,435**	**4,075**	**298,856**
Other Woodlands (Govt, etc.)	1 to 100 acres	152	0	0	0	0	36	188
	101 to 1,000 acres	1,656	150	106	256	19	22	1,953
	1,001 to 100,000 acres	2,082	300	587	887	158	30	3,157
	100,000 + acres	13,152	968	1,564	2,532	108	11	15,803
	SubTotal	**17,042**	**1,418**	**2,257**	**3,675**	**285**	**99**	**21,101**
2013 Totals:		**220,593**	**67,184**	**97,612**	**164,796**	**25,037**	**4,371**	**414,797**
Percent of 2013 Harvest:		**53.18%**	**16.20%**	**23.53%**	**39.73%**	**6.04%**	**1.05%**	**100.00%**
2012 Totals:		**229,394**	**84,758**	**104,599**	**189,357**	**20,461**	**4,578**	**443,790**
Percent Change from 2012 to 2013:		**-4%**	**-21%**	**-7%**	**-13%**	**22%**	**-5%**	**-7%**

2013 Precommercial Activities and Professional Assistance

OwnershipType	Ownership Size	Precommercial Activities by Landowner Size and Type — Acres — Herbicide Use — Site Prep	Herbicide Use — Release	TSI	Tree Planting		Number of Reported Harvests	Licensed Forester Involvement by Landowner Size and Type — Number of Harvests	Total Acres
Forest Industry Woodlands	1 to 100 acres	0	0	0	0		3	1	15
	101 to 1,000 acres	0	0	0	0		3	2	339
	1,001 to 100,000 acres	0	0	0	0		22	18	1,558
	100,000 + acres	0	0	4,333	5,151		57	51	29,782
	Subtotal	**0**	**0**	**4,333**	**5,151**		**85**	**72**	**31,694**
Investor Timberlands	1 to 100 acres	0	0	0	0		1	1	25
	101 to 1,000 acres	0	0	0	0		0	0	0
	1,001 to 100,000 acres	0	0	0	0		7	7	1,668
	100,000 + acres	77	533	2,012	104		136	130	54,900
	Subtotal	**77**	**533**	**2,012**	**104**		**144**	**138**	**56,593**
Non-Industrial Land	1 to 100 acres	22	25	245	29		2,460	692	16,252
	101 to 1,000 acres	26	26	203	84		2,074	670	33,802
	1,001 to 100,000 acres	50	50	145	0		413	248	32,671
	100,000 + acres	738	733	6,465	1,184		366	337	106,063
	Subtotal	**836**	**834**	**7,058**	**1,297**		**5,313**	**1,947**	**188,788**
Other Woodlands (Govt, etc.)	1 to 100 acres	0	0	0	0		6	2	15
	101 to 1,000 acres	0	0	0	0		48	38	1,720
	1,001 to 100,000 acres	0	0	25	0		35	31	2,869
	100,000 + acres	0	0	46	0		74	69	15,661
	Subtotal	**0**	**0**	**71**	**0**		**163**	**140**	**20,265**
2013 Totals:		**913**	**1,367**	**13,474**	**6,552**		**5,705**	**2,297**	**297,340**
2012 Totals:		**1,105**	**9,507**	**8,802**	**7,417**		**5,998**	**2,468**	**329,894**
Change from 2012 to 2013:		**-17%**	**-86%**	**53%**	**-12%**		**-5%**	**-7%**	**-10%**

Definitions:

Ownership Type

Forest Industry Land: **Woodlands owned by a forest products industry; usually most of the wood harvested is used by that industry.**

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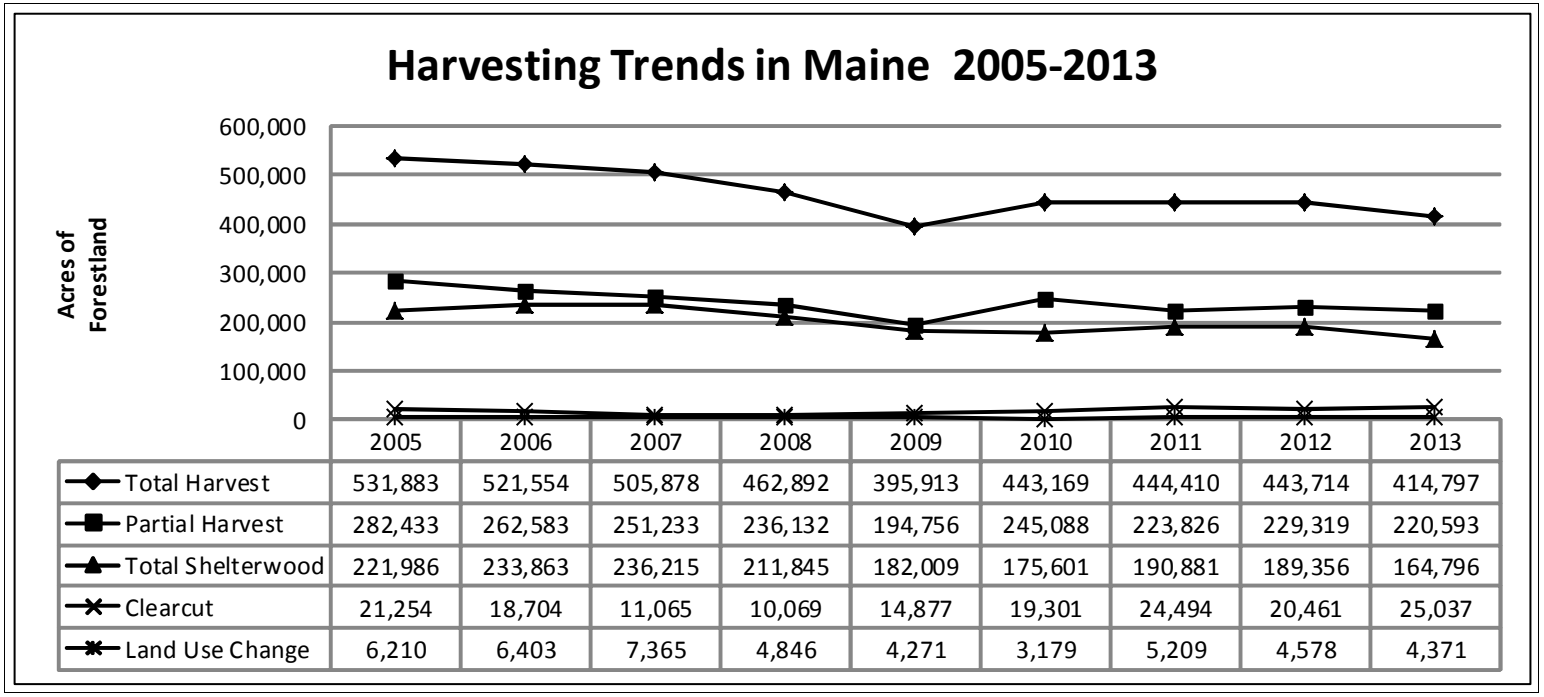
Shelterwood: **Harvest of mature trees from a forest site in two or more stages. The first stage removes only a portion of the trees to allow establishment of regeneration before the remaining trees are removed in subsequent harvest.**

Clearcut: **Harvest on a site larger than 5 acres that results in a residual basal area of acceptable growing stock trees >4.5" DBH of less than 30 square feet per acre, unless after harvesting the site has a well-distributed stand of acceptable growing stock 3 feet tall for softwood and 5 feet for hardwoods (Overstory Removal). Refer to the latest copy of the Maine Forest Service Rules Chapter 20 for additional information. It can be found on the Maine Forest Service website at http://www.state.me.us/doc/mfs/rules_regs/index.htm**

Change of Land Use: **Harvest conducted to convert forestland to another land use such as house lots, farm pastures, etc.**



	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total Harvest	531,883	521,554	505,878	462,892	395,913	443,169	444,410	443,714	414,797
Partial Harvest	282,433	262,583	251,233	236,132	194,756	245,088	223,826	229,319	220,593
Total Shelterwood	221,986	233,863	236,215	211,845	182,009	175,601	190,881	189,356	164,796
Clearcut	21,254	18,704	11,065	10,069	14,877	19,301	24,494	20,461	25,037
Land Use Change	6,210	6,403	7,365	4,846	4,271	3,179	5,209	4,578	4,371

2013 Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2013 Landowner Reports and other survey instruments. Data collected under the provisions of the Forest Resources Assessment Program, 12 MRS § 8878-A

	Large Landowners (own >100,000 acres)										All Other Landowners				All Landowners
	Precommercial Activities Acres		Clearcuts > 75 acres in size		Purpose for Clearcut (see explanation below) Acres						Acres				
													Clearcut		Acres
County	TSI	Planted	#	Acres	1	2	3	4	Sub Total	Avg. Size	TSI	Planted	Sub Total	Avg. Size	Clearcut
Androscoggin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aroostook	8,229	4,295	19	2,101	6,264	0	216	0	6,480	32	24	9	263	15	6,743
Cumberland	0	0	0	0	0	0	0	0	0	0	47	1	50	10	50
Franklin	214	160	4	726	1,593	22	1,539	0	3,154	24	40	1	105	15	3,259
Hancock	0	0	0	0	72	0	0	0	72	36	70	0	78	11	150
Kennebec	0	0	0	0	0	0	0	0	0	0	3	4	37	12	37
Knox	0	0	0	0	0	0	0	0	0	0	3	0	56	11	56
Lincoln	0	0	0	0	0	0	0	0	0	0	0	1	45	15	45
Oxford	123	0	4	738	2,915	205	602	0	3,722	21	56	17	97	9	3,819
Penobscot	146	960	0	0	1,256	11	0	8	1,275	32	119	13	225	13	1,500
Piscataquis	2,309	799	0	0	1,798	102	203	0	2,103	28	13	7	89	15	2,192
Sagadahoc	0	0	0	0	0	0	0	0	0	0	13	0	8	8	8
Somerset	1,795	225	1	214	5,297	310	107	362	6,076	19	39	35	288	12	6,364
Waldo	0	0	0	0	0	0	0	0	0	0	27	24	96	12	96
Washington	40	0	0	0	194	0	216	0	410	17	114	0	174	12	584
York	0	0	0	0	0	0	0	0	0	0	50	1	134	11	134
State Total:	**12,856**	**6,439**	**28**	**3,779**	**19,389**	**650**	**2,883**	**370**	**23,292**	**36**	**618**	**113**	**1,745**	**14**	**25,037**

Purposes for creating clearcut:

1. Removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.
2. Ecologically appropriate improvement or creation of wildlife habitat.
3. Removal of stands that, if partially harvested according to accepted silvicultural practice, are at high risk for windthrow due to factors such as soils, rooting depth, crown ratio or stem quality.
4. Harvesting of an existing plantation or other forest stand established by or previously treated with precommercial silvicultural activities.

Frequency Distribution of Clearcutting for Large Landowners who own more than 100,000 acres

2013 Clearcut as percent of statewide ownership	# of Landowners	Clearcut Acres
0% - 0.001%	**12**	**5,376**
0.001%-0.25%	**2**	**1,650**
0.26%-0.75%	**7**	**16,266**
0.76%-1.00%	**0**	**0**

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2014
Silvicultural Activities Report

including Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2014 Landowner Reports and other survey instruments.
Data collected under the provisions of Title 12 MRS §8885

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Report Highlights

Harvesting and Land Use Changes

- **424,456 acres were harvested in 2014, an increase from 415,255 acres in 2013.**
- **395,427 acres were "partially harvested" (partial and shelterwood totals) in 2014, a 2% increase from 385,784 acres in 2013.**
- **The number of harvests reported increased from 5,723 to 5,921.**

Clearcutting:

1. **The total area clearcut decreased, from 25,055 acres in 2013 to 23,369 acres in 2014. Clearcutting amounted to 5.5% of total harvested acres.**
2. **Landowners owning more than 100,000 acres in Maine created 93% of all clearcut acreage (21,663 acres).**
3. **Average clearcut size in 2014 was 25 acres. Landowners owning more than 100,000 acres had an average clearcut size of 36 acres. Landowners owning less than 100,000 acres had an average clearcut size of 14 acres. 26 clearcuts larger than 75 acres were created in 2013.**
4. **The primary silvicultural reason for clearcutting reported by large landowners was the removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.**

Land Use Changes:

- **Harvesting to convert land from forest management to some other land use increased 28% from 4,416 acres in 2013 to 5,660 acres in 2014.**

Precommercial Silvicultural Activities

Herbicide Use:

- **For site preparation a increase of 48%, from 913 acres in 2013 to 1,355 acres in 2014.**
- **To release crop trees from competing vegetation increased 190%, from 1,367 acres in 2013 to 3,966 acres in 2014.**

Timber Stand Improvement (TSI):

- **Precommercial thinning of young stands with spacing saws increased 24%, from 13,474 acres in 2013 to 16,759 acres in 2014.**

  94% of the acreage was done by landowners owning more than 100,000 acres (15,774 acres).

Planting:

- **Tree planting decreased 20%, from 6,554 acres in 2013 to 5,222 acres in 2014.**

  98% of the planting acreage was by landowners owning more than 100,000 acres (5,121 acres).

Forester Involvement

- **In 2014, licensed foresters supervised harvesting on 299,559 acres, compared to 297,101 acres in 2013.**

71% of all harvest acres in 2014 had a licensed forester involved; a slight decrease from 2013 (72%).

Licensed Forester supervision occurred on 29% (777 out of 2,663 harvests) of the harvests on family forests (<= 100 acres in all ownership types) in 2014. This is similiar to 2013 (696 out of 2,470 harvests).

2014 Harvesting and Land Use Changes

Commercial Harvest Information by Landowner Size and Type		Acres						
			Shelterwood					
OwnershipType	Ownership Size	Partial Harvests	Initial or Intermediate Entry	Final Entry	Total Shelterwood	Clearcut	Land Use Change	Total Harvest
Forest Industry Woodlands	1 to 100 acres	3	0	0	0	0	0	3
	101 to 1,000 acres	93	34	10	44	0	0	137
	1,001 to 100,000 acres	12,380	329	770	1,099	15	106	13,600
	100,000 + acres	8,802	5,795	12,843	18,638	5,479	0	32,919
	SubTotal	**21,278**	**6,158**	**13,623**	**19,781**	**5,494**	**106**	**46,659**
Investor Timberlands	1 to 100 acres	10	0	0	0	0	0	10
	101 to 1,000 acres	90	57	53	110	0	0	200
	1,001 to 100,000 acres	607	1,330	663	1,993	67	87	2,754
	100,000 + acres	14,958	17,679	29,131	46,810	10,022	66	71,856
	SubTotal	**15,665**	**19,066**	**29,847**	**48,913**	**10,089**	**153**	**74,820**
Non-Industrial Land	1 to 100 acres	43,740	3,642	5,787	9,429	631	1,313	55,113
	101 to 1,000 acres	67,130	7,331	7,627	14,958	692	1,545	84,325
	1,001 to 100,000 acres	25,061	5,419	14,165	19,584	233	903	45,781
	100,000 + acres	26,629	20,925	45,076	66,001	6,134	35	98,799
	SubTotal	**162,560**	**37,317**	**72,655**	**109,972**	**7,690**	**3,796**	**284,018**
Other Woodlands (Govt, etc.)	1 to 100 acres	186	38	0	38	0	54	278
	101 to 1,000 acres	1,232	54	107	161	30	1,166	2,589
	1,001 to 100,000 acres	1,909	614	693	1,307	38	133	3,387
	100,000 + acres	11,390	290	745	1,035	28	252	12,705
	SubTotal	**14,717**	**996**	**1,545**	**2,541**	**96**	**1,605**	**18,959**
2014 Totals:		**214,220**	**63,537**	**117,670**	**181,207**	**23,369**	**5,660**	**424,456**
Percent of 2014 Harvest:		**50.47%**	**14.97%**	**27.72%**	**42.69%**	**5.51%**	**1.33%**	**100.00%**
2013 Totals:		**220,967**	**67,206**	**97,611**	**164,817**	**25,055**	**4,416**	**415,255**
Percent Change from 2013 to 2014:		**-3%**	**-5%**	**21%**	**10%**	**-7%**	**28%**	**2%**

2014 Precommercial Activities and Professional Assistance

OwnershipType	Ownership Size	Precommercial Activities by Landowner Size and Type — Acres — Herbicide Use — Site Prep	Herbicide Use — Release	TSI	Tree Planting		Number of Reported Harvests	Licensed Forester Involvement by Landowner Size and Type — Number of Harvests	Total Acres
Forest Industry Woodlands	1 to 100 acres	0	0	0	0		0	0	0
	101 to 1,000 acres	0	0	0	0		5	1	8
	1,001 to 100,000 acres	0	0	0	0		61	46	8,932
	100,000 + acres	0	0	8,635	3,833		86	62	32,834
	Subtotal	**0**	**0**	**8,635**	**3,833**		**152**	**109**	**41,774**
Investor Timberlands	1 to 100 acres	0	0	0	0		1	1	10
	101 to 1,000 acres	20	0	27	6		4	4	200
	1,001 to 100,000 acres	0	19	0	0		11	10	2,735
	100,000 + acres	7	685	1,586	103		155	140	63,406
	Subtotal	**27**	**704**	**1,613**	**109**		**171**	**155**	**66,351**
Non-Industrial Land	1 to 100 acres	26	14	396	41		2,644	771	20,299
	101 to 1,000 acres	30	77	265	45		2,001	730	34,789
	1,001 to 100,000 acres	0	0	297	8		444	257	32,716
	100,000 + acres	1,272	3,171	5,550	1,185		332	292	86,181
	Subtotal	**1,328**	**3,262**	**6,508**	**1,279**		**5,421**	**2,050**	**173,985**
Other Woodlands (Govt, etc.)	1 to 100 acres	0	0	0	1		18	5	134
	101 to 1,000 acres	0	0	0	0		55	28	1,613
	1,001 to 100,000 acres	0	0	0	0		41	36	3,338
	100,000 + acres	0	0	3	0		63	58	12,364
	Subtotal	**0**	**0**	**3**	**1**		**177**	**127**	**17,449**
2014 Totals:		**1,355**	**3,966**	**16,759**	**5,222**		**5,921**	**2,441**	**299,559**
2013 Totals:		**913**	**1,367**	**13,474**	**6,554**		**5,723**	**2,297**	**297,101**
Change from 2013 to 2014:		**48%**	**190%**	**24%**	**-20%**		**3%**	**6%**	**1%**

Definitions:

Ownership Type

Forest Industry Land: **Woodlands owned by a forest products industry; usually most of the wood harvested is used by that industry.**

Investor Timberlands **Woodlands owned by organizations, including Timberland Investment Management Organizations (TIMOs) and Real Estate Investment Trusts (REITs) that hold timberland assets as fiduciaries for the benefit of others.**

Non-Industrial Land: **Woodlands privately owned but NOT by a forest industry. These include private individuals and other non-forest product industries.**

Other woodlands: **Woodlands owned by other entities not listed above -- including local, state, federal, or tribal governments.**

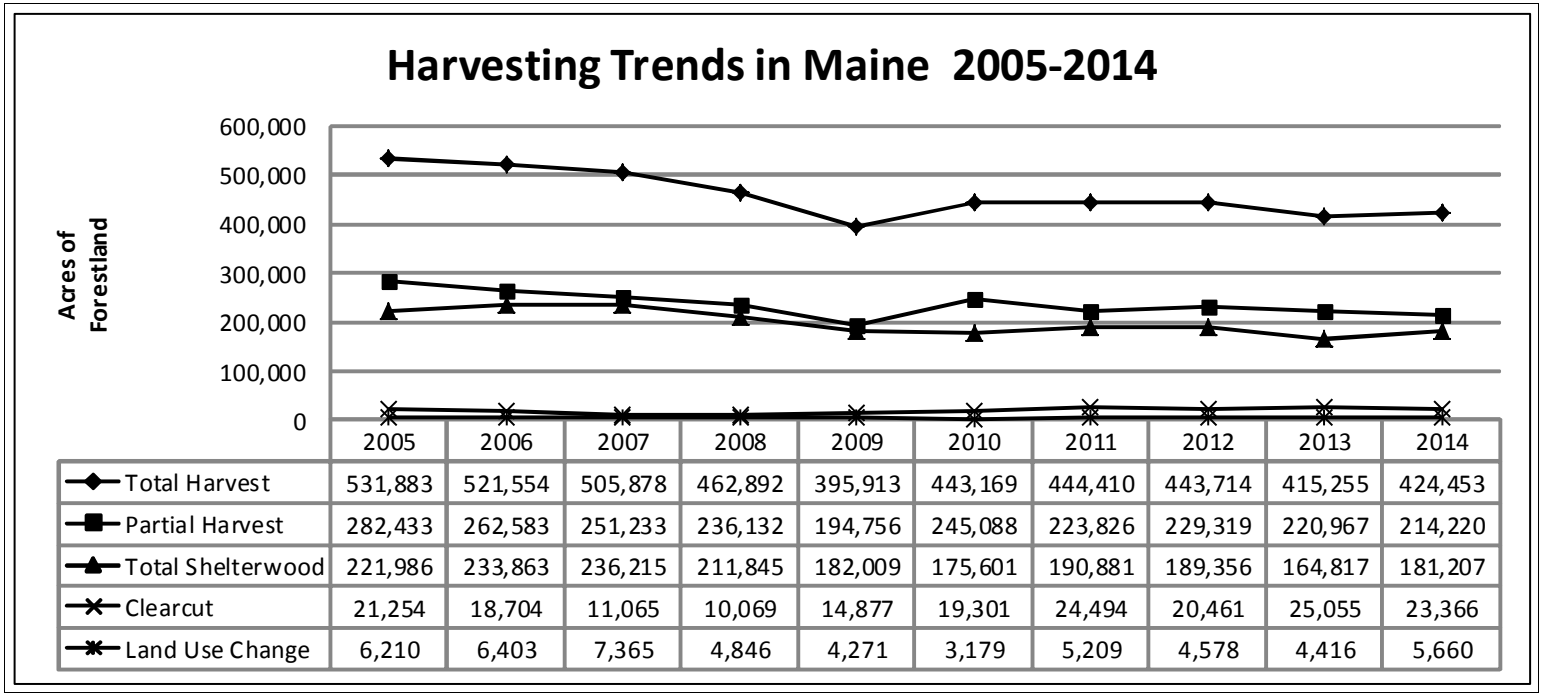
Types of Harvests

Partial Harvest: **Harvest where trees are removed individually or in small (<5 acre) patches.**

Shelterwood: **Harvest of mature trees from a forest site in two or more stages. The first stage removes only a portion of the trees to allo establishment of regeneration before the remaining trees are removed in subsequent harvest.**

Clearcut: **Harvest on a site larger than 5 acres that results in a residual basal area of acceptable growing stock trees >4.5" DBH of less than 30 square feet per acre, unless after harvesting the site has a well-distributed stand of acceptable growing stock 3 feet tall for softwood an 5 feet for hardwoods (Overstory Removal). Refer to the latest copy of the Maine Forest Service Rules Chapter 20 for additional information. It can be found on the Maine Forest Service website at http://www.state.me.us/doc/mfs/rules_regs/index.htm**

Change of Land Use: **Harvest conducted to convert forestland to another land use such as house lots, farm pastures, etc.**



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
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Land Use Change	6,210	6,403	7,365	4,846	4,271	3,179	5,209	4,578	4,416	5,660

2014 Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2014 Landowner Reports and other survey instruments. Data collected under the provisions of the Forest Resources Assessment Program, 12 MRS § 8878-A

	Large Landowners (own >100,000 acres)										All Other Landowners				All Landowners
	Precommercial Activities Acres		Clearcuts > 75 acres in size		Purpose for Clearcut (see explanation below) Acres						Acres				
													Clearcut		Acres
County	TSI	Planted	#	Acres	1	2	3	4	Sub Total	Avg. Size	TSI	Planted	Sub Total	Avg. Size	Clearcut
Androscoggin	0	0	0	0	0	0	0	0	0	0	0	20	78	16	78
Aroostook	10,806	3,680	17	1,980	5,437	0	79	0	5,516	75	70	26	162	11	5,678
Cumberland	0	0	0	0	0	0	0	0	0	0	0	0	37	7	37
Franklin	218	108	3	476	1,669	0	967	0	2,636	24	41	0	115	19	2,751
Hancock	0	0	0	0	231	0	3	0	234	47	38	0	80	8	314
Kennebec	0	0	0	0	0	0	0	0	0	0	32	0	2	2	2
Knox	0	0	0	0	0	0	0	0	0	0	0	0	55	7	55
Lincoln	0	0	0	0	0	0	0	0	0	0	29	0	18	9	18
Oxford	109	0	3	711	2,826	0	737	0	3,563	24	381	0	257	14	3,820
Penobscot	284	305	0	0	900	5	0	0	905	82	146	6	139	9	1,044
Piscataquis	1,802	106	1	98	405	0	250	98	753	22	57	10	231	12	984
Sagadahoc	0	0	0	0	0	0	0	0	0	0	23	3	0	0	0
Somerset	2,227	922	2	330	6,994	96	127	330	7,547	21	130	22	199	12	7,746
Waldo	0	0	0	0	0	0	0	0	0	0	20	10	188	13	188
Washington	308	0	0	0	308	0	104	97	509	23	18	0	53	9	562
York	20	0	0	0	0	0	0	0	0	0	0	4	92	10	92
State Total:	**15,774**	**5,121**	**26**	**3,595**	**18,770**	**101**	**2,267**	**525**	**21,663**	**36**	**985**	**101**	**1,706**	**14**	**23,369**

Purposes for creating clearcut:

1. Removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.
2. Ecologically appropriate improvement or creation of wildlife habitat.
3. Removal of stands that, if partially harvested according to accepted silvicultural practice, are at high risk for windthrow due to factors such as soils, rooting depth, crown ratio or stem quality.
4. Harvesting of an existing plantation or other forest stand established by or previously treated with precommercial silvicultural activities.

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Report Highlights

Harvesting and Land Use Change

- **400,832 acres were harvested in 2015, a decrease from 425,301 acres in 2014.**
- **372,006 acres were "partially harvested" (partial and shelterwood totals) in 2015, a 6% decrease from 396,248 acres in 2014.**
- **The number of harvests reported decreased from 5,953 to 5,420.**

Clearcutting:

1. **The total area clearcut increased, from 23,374 acres in 2014 to 25,082 acres in 2015. Clearcutting amounted to 6.3% of total harvested acres.**
2. **Landowners owning more than 100,000 acres in Maine created 94% of all clearcut acreage (23,642 acres).**
3. **Average clearcut size in 2015 was 30 acres. Landowners owning more than 100,000 acres had an average clearcut size of 36 acres. Landowners owning less than 100,000 acres had an average clearcut size of 14 acres. 42 clearcuts larger than 75 acres were created in 2015.**
4. **The primary silvicultural reason for clearcutting reported by large landowners was the removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.**

Land Use Changes:

- **Harvesting to convert land from forest management to some other land use decreased 34% from 5,678 acres in 2014 to 3,744 acres in 2015.**

Precommercial Silvicultural Activities

Herbicide Use:

- **For site preparation a increase of 44%, from 1,355 acres in 2014 to 1,957 acres in 2015.**
- **To release crop trees from competing vegetation increased 159%, from 3,966 acres in 2014 to 10,273 acres in 2015.**

Timber Stand Improvement (TSI):

- **Precommercial thinning of young stands with spacing saws decreased 27%, from 16,781 acres in 2014 to 12,212 acres in 2015.**

  96% of the acreage was done by landowners owning more than 100,000 acres (11,715 acres).

Planting:

- **Tree planting increased 31%, from 5,223 acres in 2014 to 6,820 acres in 2015.**

  98% of the planting acreage was by landowners owning more than 100,000 acres (6,661 acres).

Forester Involvement

- **In 2015, licensed foresters supervised harvesting on 299,418 acres, compared to 299,567 acres in 2014.**

75% of all harvest acres in 2015 had a licensed forester involved; an increase from 2014 (70% involvement).

Licensed Forester supervision occurred on 35% (843 out of 2,380 harvests) of the harvests on non-industrial family forests (<= 100 acres) in 2015. This is a 3% increase from 2014 (771 out of 2,441 harvests).

2015 Harvesting and Land Use Changes

Commercial Harvest Information by Landowner Size and Type		Acres						
			Shelterwood					
OwnershipType	Ownership Size	Partial Harvests	Initial or Intermediate Entry	Final Entry	Total Shelterwood	Clearcut	Land Use Change	Total Harvest
Forest Industry Woodlands	1 to 100 acres	1	0	0	0	0	0	1
	101 to 1,000 acres	30	0	0	0	0	0	30
	1,001 to 100,000 acres	10,383	1,034	240	1,274	0	110	11,767
	100,000 + acres	8,520	8,069	7,592	15,661	8,746	0	32,927
	SubTotal	**18,934**	**9,103**	**7,832**	**16,935**	**8,746**	**110**	**44,725**
Investor Timberlands	1 to 100 acres	41	0	0	0	0	0	41
	101 to 1,000 acres	0	0	0	0	0	0	0
	1,001 to 100,000 acres	646	761	2,003	2,764	285	0	3,695
	100,000 + acres	14,293	6,268	28,184	34,452	8,273	29	57,047
	SubTotal	**14,980**	**7,029**	**30,187**	**37,216**	**8,558**	**29**	**60,783**
Non-Industrial Land	1 to 100 acres	48,768	3,293	4,889	8,182	535	1,338	58,823
	101 to 1,000 acres	57,836	4,944	5,886	10,830	317	1,183	70,166
	1,001 to 100,000 acres	24,435	6,059	11,993	18,052	286	620	43,393
	100,000 + acres	30,325	20,552	47,767	68,319	6,609	277	105,530
	SubTotal	**161,364**	**34,848**	**70,535**	**105,383**	**7,747**	**3,418**	**277,912**
Other Woodlands (Govt, etc.)	1 to 100 acres	177	0	0	0	0	10	187
	101 to 1,000 acres	1,770	479	74	553	0	35	2,358
	1,001 to 100,000 acres	1,521	833	339	1,172	17	116	2,826
	100,000 + acres	10,282	804	915	1,719	14	26	12,041
	SubTotal	**13,750**	**2,116**	**1,328**	**3,444**	**31**	**187**	**17,412**
2015 Totals:		**209,028**	**53,096**	**109,882**	**162,978**	**25,082**	**3,744**	**400,832**
Percent of 2015 Harvest		**52.15%**	**13.25%**	**27.41%**	**40.66%**	**6.26%**	**0.93%**	**100.00%**
2014 Totals:		**214,971**	**63,537**	**117,741**	**181,277**	**23,374**	**5,678**	**425,301**
Percent Change from 2014 to 2015:		**-3%**	**-16%**	**-7%**	**-10%**	**7%**	**-34%**	**-6%**

2015 Precommercial Activities and Professional Assistance

OwnershipType	Ownership Size	Precommercial Activities by Landowner Size and Type — Acres — Herbicide Use — Site Prep	Herbicide Use — Release	TSI	Tree Planting		Number of Reported Harvests	Licensed Forester Involvement by Landowner Size and Type — Number of Harvests	Total Acres
Forest Industry Woodlands	1 to 100 acres	0	0	0	0		1	0	0
	101 to 1,000 acres	0	0	0	0		1	0	0
	1,001 to 100,000 acres	0	0	0	0		56	21	5,187
	100,000 + acres	0	6,222	7,022	4,875		63	61	31,772
	Subtotal	**0**	**6,222**	**7,022**	**4,875**		**121**	**82**	**36,959**
Investor Timberlands	1 to 100 acres	0	0	0	0		2	1	40
	101 to 1,000 acres	15	0	0	15		1	0	0
	1,001 to 100,000 acres	0	0	0	0		14	14	3,696
	100,000 + acres	0	473	0	197		145	142	55,490
	Subtotal	**15**	**473**	**0**	**212**		**162**	**157**	**59,226**
Non-Industrial Land	1 to 100 acres	4	61	247	70		2,650	843	23,103
	101 to 1,000 acres	44	33	173	53		1,590	585	32,192
	1,001 to 100,000 acres	0	0	69	21		428	294	32,872
	100,000 + acres	1,894	3,284	4,693	1,589		340	312	98,333
	Subtotal	**1,942**	**3,378**	**5,182**	**1,733**		**5,008**	**2,034**	**186,500**
Other Woodlands (Govt, etc.)	1 to 100 acres	0	0	0	0		11	5	156
	101 to 1,000 acres	0	10	0	0		34	26	1,944
	1,001 to 100,000 acres	0	0	8	0		31	24	2,711
	100,000 + acres	0	190	0	0		53	52	11,922
	Subtotal	**0**	**200**	**8**	**0**		**129**	**107**	**16,733**
2015 Totals:		**1,957**	**10,273**	**12,212**	**6,820**		**5,420**	**2,380**	**299,418**
2014 Totals:		**1,355**	**3,966**	**16,781**	**5,223**		**5,953**	**2,443**	**299,567**
Change from 2014 to 2015:		**44%**	**159%**	**-27%**	**31%**		**-9%**	**-3%**	**0%**

Definitions:

Ownership Type

Forest Industry Land: **Woodlands owned by a forest products industry; usually most of the wood harvested is used by that industry.**

Investor Timberlands: **Woodlands owned by organizations, including Timberland Investment Management Organizations (TIMOs) and Real Estate Investment Trusts (REITs) that hold timberland assets as fiduciaries for the benefit of others.**

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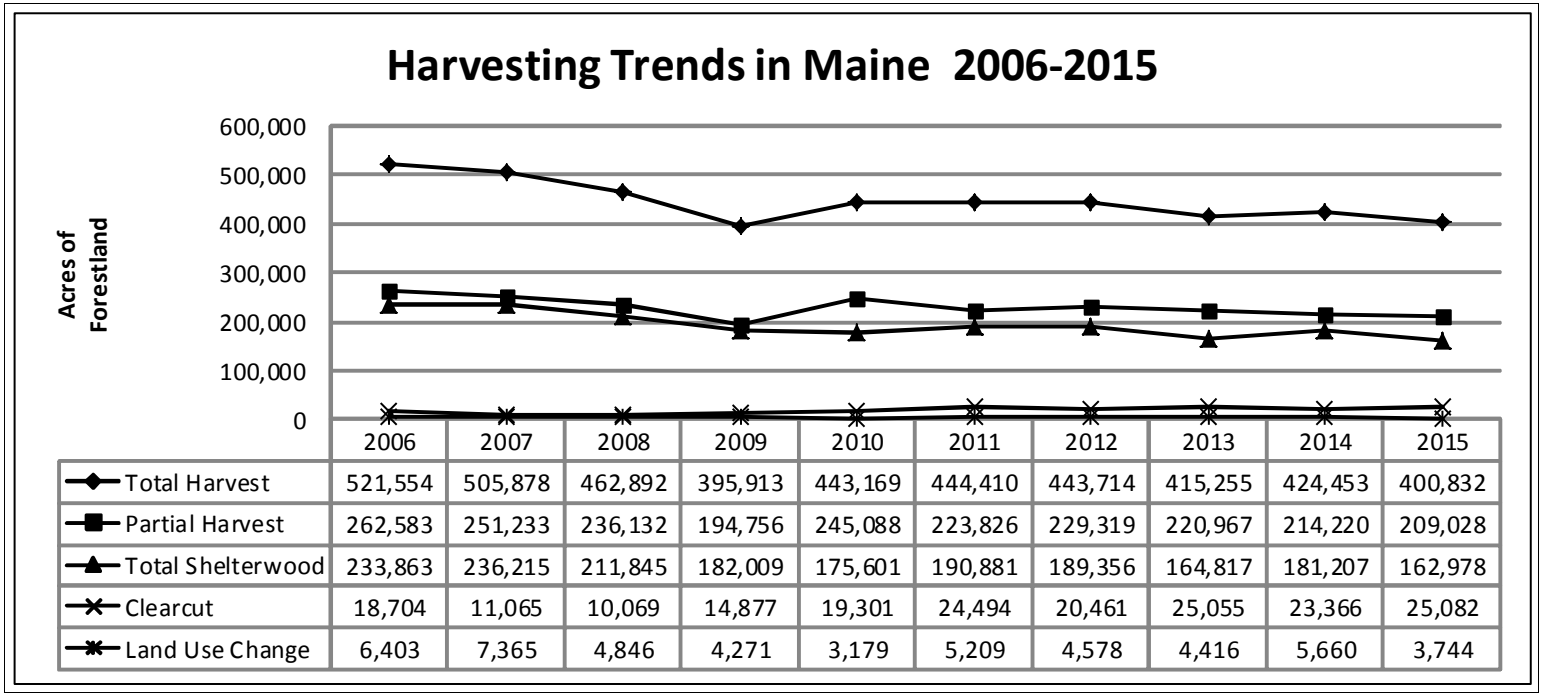
Partial Harvest: **Harvest where trees are removed individually or in small (<5 acre) patches.**

Shelterwood: **Harvest of mature trees from a forest site in two or more stages. The first stage removes only a portion of the trees to allow establishment of regeneration before the remaining trees are removed in subsequent harvest.**

Clearcut: **Harvest on a site larger than 5 acres that results in a residual basal area of acceptable growing stock trees >4.5" DBH of less than 30 square feet per acre, unless after harvesting the site has a well-distributed stand of acceptable growing stock 3 feet tall for softwood and 5 feet for hardwoods (Overstory Removal). Refer to the latest copy of the Maine Forest Service Rules Chapter 20 for additional information. It can be found on the Maine Forest Service website at http://www.state.me.us/doc/mfs/rules_regs/index.htm**

Change of Land Use: **Harvest conducted to convert forestland to another land use such as house lots, farm pastures, etc.**



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total Harvest	521,554	505,878	462,892	395,913	443,169	444,410	443,714	415,255	424,453	400,832
Partial Harvest	262,583	251,233	236,132	194,756	245,088	223,826	229,319	220,967	214,220	209,028
Total Shelterwood	233,863	236,215	211,845	182,009	175,601	190,881	189,356	164,817	181,207	162,978
Clearcut	18,704	11,065	10,069	14,877	19,301	24,494	20,461	25,055	23,366	25,082
Land Use Change	6,403	7,365	4,846	4,271	3,179	5,209	4,578	4,416	5,660	3,744

2015 Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2015 Landowner Reports and other survey instruments. Data collected under the provisions of the Forest Resources Assessment Program, 12 MRS § 8878-A

	Large Landowners (own >100,000 acres)										All Other Landowners				All Landowners
	Precommercial Activities Acres		Clearcuts > 75 acres in size		Purpose for Clearcut (see explanation below) Acres						Acres				
													Clearcut		Acres
County	TSI	Planted	#	Acres	1	2	3	4	Sub Total	Avg. Size	TSI	Planted	Sub Total	Avg. Size	Clearcut
Androscoggin	0	0	0	0	0	0	0	0	0	0	10	1	40	10	40
Aroostook	7,463	4,875	25	2,738	7,524	0	42	344	7,910	198	9	47	91	9	8,001
Cumberland	0	0	0	0	0	0	0	0	0	0	3	1	15	5	15
Franklin	318	45	7	1,268	1,327	0	1,692	0	3,019	28	37	4	41	20	3,060
Hancock	0	0	0	0	213	0	0	0	213	53	23	0	290	21	503
Kennebec	0	0	0	0	0	0	0	0	0	0	101	22	99	12	99
Knox	0	0	0	0	0	0	0	0	0	0	0	0	46	15	46
Lincoln	0	0	0	0	0	0	0	0	0	0	55	0	0	0	0
Oxford	0	0	5	965	659	27	3,736	0	4,422	25	135	2	64	8	4,486
Penobscot	818	197	1	94	299	0	18	0	317	21	8	52	57	10	374
Piscataquis	604	1,014	0	0	729	29	354	68	1,180	19	86	2	152	12	1,332
Sagadahoc	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0
Somerset	2,365	530	3	416	5,187	52	589	361	6,189	21	17	28	148	16	6,337
Waldo	0	0	0	0	0	0	0	0	0	0	5	0	92	15	92
Washington	147	0	1	178	209	13	149	21	392	39	1	0	109	10	501
York	0	0	0	0	0	0	0	0	0	0	0	0	196	11	196
State Total:	**11,715**	**6,661**	**42**	**5,659**	**16,147**	**121**	**6,580**	**794**	**23,642**	**36**	**497**	**159**	**1,440**	**14**	**25,082**

Purposes for creating clearcut:

1. Removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.
2. Ecologically appropriate improvement or creation of wildlife habitat.
3. Removal of stands that, if partially harvested according to accepted silvicultural practice, are at high risk for windthrow due to factors such as soils, rooting depth, crown ratio or stem quality.
4. Harvesting of an existing plantation or other forest stand established by or previously treated with precommercial silvicultural activities.

Conversion Table
Cord/Weight Equivalents
for various Maine Commercial Tree Species

These conversions are used by the Maine Forest Service.
Users of this report may wish to confirm the conversion rate(s) used by individual mills and/or contractors who purchase wood.

These conversions factors are handy for making estimates and for forest inventory purposes, but are advisory only. The weight of a particular volume of wood varies greatly by species, time of year and other factors.

It is illegal in Maine to convert from one system of measurement to another for the basis of payment (e.g. convert a mill payment for pulpwood in dollars per ton to a landowner payment in dollars per cord).

Species	Cords	Tons	Pounds
Spruce Fir	1	2.1	4,200
White Pine	1	2.15	4,300
Red Pine	1	2.15	4,300
Hemlock	1	2.4	4,800
Cedar	1	1.7	3,400
Tamarack (Larch)	1	2.4	4,800
Beech	1	2.25	4,500
White Birch	1	2.25	4,500
Yellow Birch	1	2.7	5,400
Sugar Maple	1	2.7	5,400
Red Maple	1	2.25	4,500
White Oak	1	2.7	5,400
Red Oak	1	2.7	5,400
Ash	1	2.25	4,500
Aspen/Poplar	1	2.15	4,300
Softwood	1	2.3	4,600
Hardwood	1	2.7	5,400
Mixed Wood	1	2.3	4,600

For purposes of comparing volumes, a rough conversion of 1 MBF = 2 cords is commonly used.

Maine Forest Service District Foresters

Be Woods Wise!
Practical advice for your land and trees from the Maine Forest Service.

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2016
Silvicultural Activities Report

including Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2016 Landowner Reports and other survey instruments.
Data collected under the provisions of 12 MRS §8885

Published:
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Report Highlights

Harvesting and Land Use Change

- **344,210 acres were harvested in 2016, a decrease of 14% from 401,213 acres in 2015.**
- **319,817 acres were partially harvested (partial and shelterwood totals) in 2016, a 14% decrease from 372,383 acres in 2015.**
- **The number of harvests reported decreased from 5,432 to 4,642.**

Clearcutting:

1. **The total area clearcut decreased, from 25,083 acres in 2015 to 20,971 acres in 2016. Clearcutting amounted to 6.1% of total harvested acres.**
2. **Landowners owning more than 100,000 acres in Maine created 92% of all clearcut acreage (19,283 acres).**
3. **Average clearcut size in 2016 was 32 acres. Landowners owning more than 100,000 acres had an average clearcut size of 36 acres. Landowners owning less than 100,000 acres had an average clearcut size of 14 acres. 16 clearcuts larger than 75 acres were created in 2016.**
4. **The primary silvicultural reason for clearcutting reported by large landowners was the removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.**

Land Use Changes:

- **Harvesting to convert land from forest management to some other land use decreased 9% from 3,747 acres in 2015 to 3,422 acres in 2016.**

Precommercial Silvicultural Activities

Herbicide Use:

- **Site preparation increased 15%, from 1,957 acres in 2015 to 2,247 acres in 2016.**
- **To release crop trees from competing vegetation increased 31%, from 10,273 acres in 2015 to 13,464 acres in 2016.**

Timber Stand Improvement (TSI):

- **Precommercial thinning of young stands with spacing saws decreased 70%, from 12,212 acres in 2015 to 3,724 acres in 2016.**

  76% of the acreage was done by landowners owning more than 100,000 acres (2,818 acres).

Planting:

- **Tree planting decreased 2%, from 6,820 acres in 2015 to 6,677 acres in 2016.**

  99% of the planting acreage was by landowners owning more than 100,000 acres (6,592 acres).

Forester Involvement

- **In 2016, licensed foresters supervised harvesting on 259,615 acres, compared to 295,335 acres in 2015.**

75% of all harvest acres in 2016 had a licensed forester involved; an increase from 2015 (74% involvement).

Licensed Forester supervision occurred on 32% (721 out of 2,240 harvests) of the harvests on non-industrial family forests (<= 100 acres) in 2016. This is the same percentage as in 2015 (843 out of 2,650 harvests).

2016 Harvesting Activities

Commercial Harvest Information by Landowner Size and Type		Acres						
			Shelterwood					
OwnershipType	Ownership Size	Partial Harvests	Initial or Intermediate Entry	Final Entry	Total Shelterwood	Clearcut	Land Use Change	Total Harvest
Forest Industry Woodlands	1 to 100 acres	0	0	0	0	0	12	12
	101 to 1,000 acres	240	0	0	0	0	0	240
	1,001 to 100,000 acres	6,083	863	171	1,034	34	0	7,151
	100,000 + acres	13,875	12,884	18,712	31,596	6,432	4	51,907
	SubTotal	**20,198**	**13,747**	**18,883**	**32,630**	**6,466**	**16**	**59,310**
Investor Timberlands	1 to 100 acres	0	0	0	0	0	0	0
	101 to 1,000 acres	0	0	0	0	0	0	0
	1,001 to 100,000 acres	549	323	2,236	2,559	0	166	3,274
	100,000 + acres	13,529	4,060	23,206	27,266	5,792	72	46,659
	SubTotal	**14,078**	**4,383**	**25,442**	**29,825**	**5,792**	**238**	**49,933**
Non-Industrial Land	1 to 100 acres	41,747	2,149	4,651	6,800	527	1,398	50,472
	101 to 1,000 acres	46,443	4,258	5,261	9,519	459	986	57,407
	1,001 to 100,000 acres	27,610	3,285	7,326	10,611	555	605	39,381
	100,000 + acres	17,463	17,648	30,482	48,130	6,870	0	72,463
	SubTotal	**133,263**	**27,340**	**47,720**	**75,060**	**8,411**	**2,989**	**219,723**
Other Woodlands (Govt, etc.)	1 to 100 acres	350	15	12	27	0	46	423
	101 to 1,000 acres	1,226	180	0	180	113	38	1,557
	1,001 to 100,000 acres	2,017	709	542	1,251	0	4	3,272
	100,000 + acres	6,852	1,271	1,589	2,860	189	91	9,992
	SubTotal	**10,445**	**2,175**	**2,143**	**4,318**	**302**	**179**	**15,244**
2016 Totals:		**177,984**	**47,645**	**94,188**	**141,833**	**20,971**	**3,422**	**344,210**
Percent of 2016 Harvest		**51.71%**	**13.84%**	**27.36%**	**41.21%**	**6.09%**	**0.99%**	**100.00%**
2015 Totals:		**209,286**	**53,096**	**110,001**	**163,097**	**25,083**	**3,747**	**401,213**
Percent Change from 2015 to 2016:		**-15%**	**-10%**	**-14%**	**-13%**	**-16%**	**-9%**	**-14%**

2016 Precommercial Activities and Professional Assistance

OwnershipType	Ownership Size	Precommercial Activities by Landowner Size and Type — Acres — Herbicide Use — Site Prep	Herbicide Use — Release	TSI	Tree Planting		Number of Reported Harvests	Licensed Forester Involvement by Landowner Size and Type — Number of Harvests	Total Acres
Forest Industry Woodlands	1 to 100 acres	0	0	0	0		1	1	12
	101 to 1,000 acres	0	0	0	0		3	0	0
	1,001 to 100,000 acres	0	0	0	0		35	20	1,915
	100,000 + acres	0	10,845	1,589	4,079		132	106	51,353
	Subtotal	**0**	**10,845**	**1,589**	**4,079**		**171**	**127**	**53,280**
Investor Timberlands	1 to 100 acres	0	0	0	0		0	0	0
	101 to 1,000 acres	0	0	0	0		0	0	0
	1,001 to 100,000 acres	0	0	0	0		13	13	3,274
	100,000 + acres	0	918	0	149		139	137	44,535
	Subtotal	**0**	**918**	**0**	**149**		**152**	**150**	**47,809**
Non-Industrial Land	1 to 100 acres	20	12	329	38		2,240	721	19,449
	101 to 1,000 acres	21	19	536	39		1,263	505	26,713
	1,001 to 100,000 acres	0	0	0	0		394	289	28,091
	100,000 + acres	2,204	1,670	1,166	2,364		280	264	70,015
	Subtotal	**2,245**	**1,701**	**2,031**	**2,441**		**4,177**	**1,779**	**144,268**
Other Woodlands (Govt, etc.)	1 to 100 acres	2	0	2	3		22	10	259
	101 to 1,000 acres	0	0	34	5		42	28	940
	1,001 to 100,000 acres	0	0	5	0		26	24	3,167
	100,000 + acres	0	0	63	0		52	50	9,892
	Subtotal	**2**	**0**	**104**	**8**		**142**	**112**	**14,258**
2016 Totals:		**2,247**	**13,464**	**3,724**	**6,677**		**4,642**	**2,168**	**259,615**	**344,210**
2015 Totals:		**1,957**	**10,273**	**12,212**	**6,820**		**5,432**	**2,381**	**295,335**	**401,213**
Change from 2015 to 2016:		**15%**	**31%**	**-70%**	**-2%**		**-15%**	**-9%**	**-12%**	

Statewide Total Harvest acres from previous page

Definitions:

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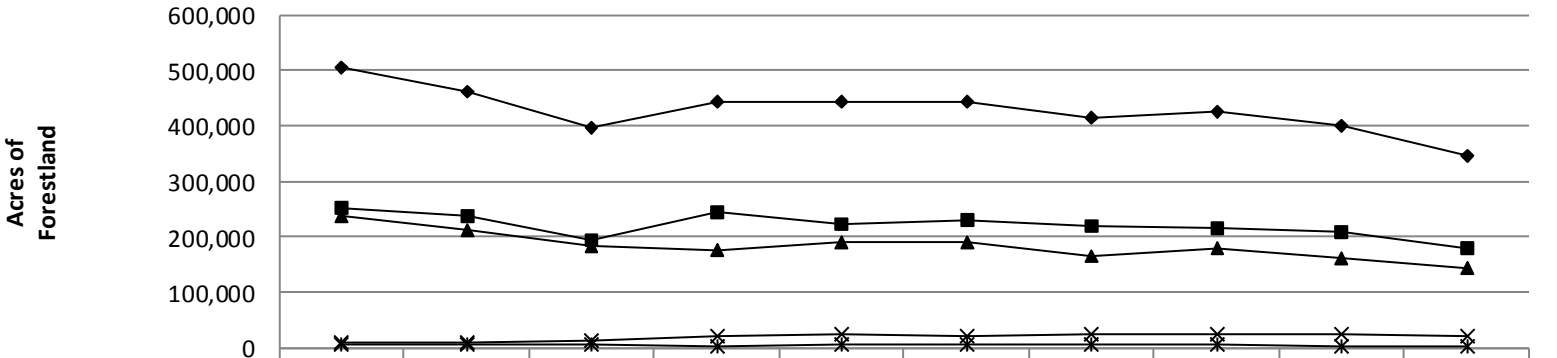

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Total Shelterwood	236,215	211,845	182,009	175,601	190,881	189,356	164,817	181,207	163,097	141,833
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	Precommercial Activities Acres		Clearcuts > 75 acres in size		Purpose for Clearcut (see explanation below) Acres						Acres				
													Clearcut		Acres
County	TSI	Planted	#	Acres	1	2	3	4	Sub Total	Avg. Size	TSI	Planted	Sub Total	Avg. Size	Clearcut
Androscoggin	0	0	0	0	0	0	0	0	0	0	12	0	10	5	10
Aroostook	1,589	4,134	1	89	6,512	5	48	0	6,565	119	199	3	297	17	6,862
Cumberland	0	0	0	0	0	0	0	0	0	0	12	4	44	6	44
Franklin	186	0	7	1,313	989	1,097	879	0	2,965	34	1	10	210	15	3,175
Hancock	0	0	1	219	400	0	0	0	400	100	85	3	289	17	689
Kennebec	0	0	0	0	0	0	0	0	0	0	44	0	80	80	80
Knox	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Lincoln	0	0	0	0	0	0	0	0	0	0	0	0	20	20	20
Oxford	0	57	2	222	750	763	649	0	2,162	23	50	10	103	13	2,265
Penobscot	3	149	1	96	277	0	12	0	289	29	3	20	10	10	299
Piscataquis	392	1,237	1	138	733	0	403	174	1,310	28	232	27	45	9	1,355
Sagadahoc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Somerset	618	997	2	373	5,045	0	53	8	5,106	22	72	4	401	24	5,507
Waldo	0	18	0	0	35	0	0	0	35	35	12	0	113	16	148
Washington	30	0	1	235	330	72	49	0	451	23	78	0	24	12	475
York	0	0	0	0	0	0	0	0	0	0	105	4	42	7	42
State Total:	**2,818**	**6,592**	**16**	**2,685**	**15,071**	**1,937**	**2,093**	**182**	**19,283**	**36**	**906**	**85**	**1,688**	**14**	**20,971**

Purposes for creating clearcut:

1. Removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.
2. Ecologically appropriate improvement or creation of wildlife habitat.
3. Removal of stands that, if partially harvested according to accepted silvicultural practice, are at high risk for windthrow due to factors such as soils, rooting depth, crown ratio or stem quality.
4. Harvesting of an existing plantation or other forest stand established by or previously treated with precommercial silvicultural activities.

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Maine Forest Service District Foresters

Be Woods Wise!
Practical advice for your land and trees from the Maine Forest Service.

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2017
Silvicultural Activities Report

including Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2017 Landowner Reports and other survey instruments.
Data collected under the provisions of 12 MRS §8885

Published: September 12, 2018

Department of Agriculture, Conservation and Forestry
Maine Forest Service
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Report Highlights

Harvesting and Land Use Change

- **335,624 acres were harvested in 2017, a decrease of 2% from 341,318 acres in 2016.**
- **309,159 acres were partially harvested (partial and shelterwood totals) in 2017, a 2% decrease from 316,890 acres in 2016.**
- **The number of harvests reported decreased from 4,665 to 4,275.**

Clearcutting:

1. **The total area clearcut increased 8% from 20,971 acres in 2016 to 22,722 acres in 2017. Clearcutting amounted to 6.8% of total harvested acres.**
2. **Landowners owning more than 100,000 acres in Maine created 94% of all clearcut acreage (21,235 acres).**
3. **Average clearcut size in 2017 was 29 acres. Landowners owning more than 100,000 acres had an average clearcut size of 36 acres. Landowners owning less than 100,000 acres had an average clearcut size of 14 acres. 24 clearcuts larger than 75 acres were created in 2017.**
4. **The primary silvicultural reason for clearcutting reported by large landowners was the removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.**

Land Use Changes:

- **Harvesting to convert land from forest management to some other land use increased 8% from 3,457 acres in 2016 to 3,743 acres in 2017.**

Precommercial Silvicultural Activities

Herbicide Use:

- **Site preparation decreased -59%, from 2,247 acres in 2016 to 932 acres in 2017.**
- **To release crop trees from competing vegetation decreased -13%, from 13,464 acres in 2016 to 11,769 acres in 2017.**

Timber Stand Improvement (TSI):

- **Precommercial thinning of young stands with spacing saws increased 136%, from 3,724 acres in 2016 to 8,791 acres in 2017.**

  83% of the acreage was done by landowners owning more than 100,000 acres (7,297 acres).

Planting:

- **Tree planting increased 11%, from 6,677 acres in 2016 to 7,430 acres in 2017.**

  98% of the planting acreage was by landowners owning more than 100,000 acres (7,314 acres).

Forester Involvement

- **In 2017, licensed foresters supervised harvesting on 260,584 acres, compared to 258,506 acres in 2016.**

78% of all harvest acres in 2017 had a licensed forester involved; an increase from 2016 (76% involvement).

Licensed Forester supervision occurred on 32% (620 out of 1,968 harvests) of the harvests on non-industrial family forests (<= 100 acres) in 2017. This is the same percentage as in 2016 (721 out of 2,240 harvests).

2017 Harvesting Activities

Commercial Harvest Information by Landowner Size and Type		Acres						
			Shelterwood					
OwnershipType	Ownership Size	Partial Harvests	Initial or Intermediate Entry	Final Entry	Total Shelterwood	Clearcut	Land Use Change	Total Harvest
Forest Industry Woodlands	1 to 100 acres	22	60	0	60	0	13	95
	101 to 1,000 acres	23	0	0	0	0	0	23
	1,001 to 100,000 acres	5,686	329	94	423	46	100	6,255
	100,000 + acres	11,264	15,009	18,885	33,894	7,593	0	52,751
	SubTotal	**16,995**	**15,398**	**18,979**	**34,377**	**7,639**	**113**	**59,124**
Investor Timberlands	1 to 100 acres	0	0	0	0	0	0	0
	101 to 1,000 acres	0	0	0	0	0	0	0
	1,001 to 100,000 acres	816	362	1,788	2,150	32	0	2,998
	100,000 + acres	16,626	6,027	24,579	30,606	5,807	0	53,039
	SubTotal	**17,442**	**6,389**	**26,367**	**32,756**	**5,839**	**0**	**56,037**
Non-Industrial Land	1 to 100 acres	36,371	2,431	3,866	6,297	346	1,297	44,311
	101 to 1,000 acres	45,026	3,838	4,965	8,803	335	1,333	55,497
	1,001 to 100,000 acres	22,822	5,867	6,910	12,777	698	647	36,944
	100,000 + acres	15,208	17,497	26,651	44,148	7,791	6	67,153
	SubTotal	**119,427**	**29,633**	**42,392**	**72,025**	**9,170**	**3,283**	**203,905**
Other Woodlands (Govt, etc.)	1 to 100 acres	391	4	0	4	10	56	461
	101 to 1,000 acres	1,258	74	0	74	10	73	1,415
	1,001 to 100,000 acres	1,670	916	417	1,333	10	52	3,065
	100,000 + acres	8,502	2,026	879	2,905	44	166	11,617
	SubTotal	**11,821**	**3,020**	**1,296**	**4,316**	**74**	**347**	**16,558**
2017 Totals:		**165,685**	**54,440**	**89,034**	**143,474**	**22,722**	**3,743**	**335,624**
Percent of 2017 Harvest		**49.37%**	**16.22%**	**26.53%**	**42.75%**	**6.77%**	**1.12%**	**100.00%**
2016 Totals:		**175,057**	**47,645**	**94,188**	**141,833**	**20,971**	**3,457**	**341,318**
Percent Change from 2016 to 2017:		**-5%**	**14%**	**-5%**	**1%**	**8%**	**8%**	**-2%**

2017 Precommercial Activities and Professional Assistance

OwnershipType	Ownership Size	Precommercial Activities by Landowner Size and Type — Acres — Herbicide Use — Site Prep	Herbicide Use — Release	TSI	Tree Planting		Number of Reported Harvests	Licensed Forester Involvement by Landowner Size and Type — Number of Harvests	Total Acres	
Forest Industry Woodlands	1 to 100 acres	0	0	0	0		4	3	75	
	101 to 1,000 acres	0	0	0	0		1	1	23	
	1,001 to 100,000 acres	0	0	0	0		35	18	1,311	
	100,000 + acres	0	10,428	7,035	4,530		110	89	52,538	
	Subtotal	**0**	**10,428**	**7,035**	**4,530**		**150**	**111**	**53,947**	
Investor Timberlands	1 to 100 acres	0	0	0	0		0	0	0	
	101 to 1,000 acres	0	0	0	0		0	0	0	
	1,001 to 100,000 acres	0	0	0	0		10	10	2,998	
	100,000 + acres	426	307	250	93		129	128	51,627	
	Subtotal	**426**	**307**	**250**	**93**		**139**	**138**	**54,625**	
Non-Industrial Land	1 to 100 acres	0	81	158	50		1,968	620	17,408	
	101 to 1,000 acres	29	50	572	24		1,247	503	28,599	
	1,001 to 100,000 acres	0	4	764	22		367	252	26,294	
	100,000 + acres	477	773	0	2,691		270	248	64,596	
	Subtotal	**506**	**908**	**1,494**	**2,787**		**3,852**	**1,623**	**136,897**	
Other Woodlands (Govt, etc.)	1 to 100 acres	0	0	0	0		19	9	297	
	101 to 1,000 acres	0	0	0	20		33	25	1,266	
	1,001 to 100,000 acres	0	20	0	0		24	21	3,013	
	100,000 + acres	0	106	12	0		58	55	10,539	
	Subtotal	**0**	**126**	**12**	**20**		**134**	**110**	**15,115**	
2017 Totals:		**932**	**11,769**	**8,791**	**7,430**		**4,275**	**1,982**	**260,584**	**335,624**
2016 Totals:		**2,247**	**13,464**	**3,724**	**6,677**		**4,665**	**2,172**	**258,506**	**341,318**
Change from 2016 to 2017:		**-59%**	**-13%**	**136%**	**11%**		**-8%**	**-9%**	**1%**	

Statewide Total Harvest acres from previous page

Definitions:

Ownership Type

Forest Industry Land: **Woodlands owned by a forest products industry; usually most of the wood harvested is used by that industry.**

Investor Timberlands: **Woodlands owned by organizations, including Timberland Investment Management Organizations (TIMOs) and Real Estate Investment Trusts (REITs) that hold timberland assets as fiduciaries for the benefit of others.**

Non-Industrial Land: **Woodlands privately owned but NOT by a forest industry. These include private individuals and other non-forest product industries.**

Other woodlands: **Woodlands owned by other entities not listed above -- including local, state, federal, or tribal governments.**

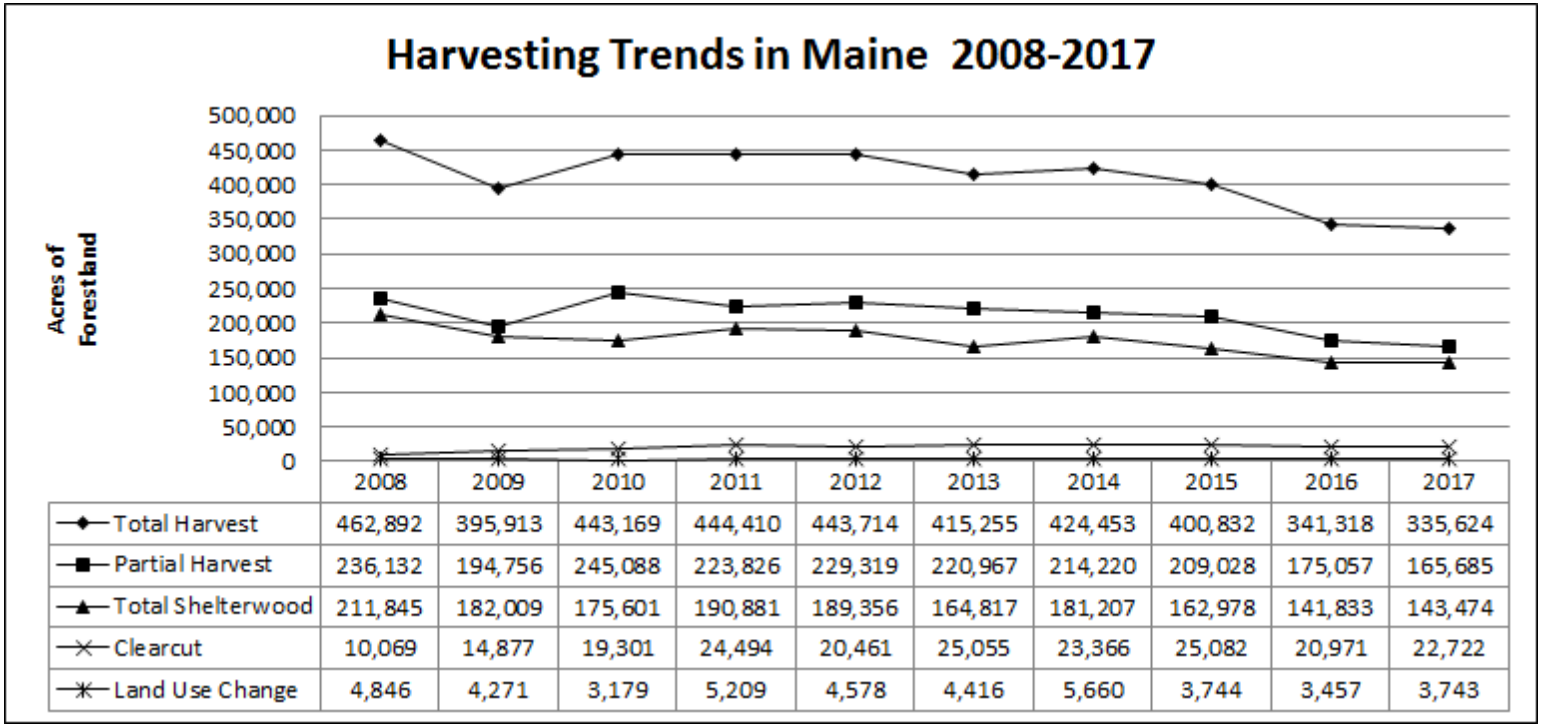
Types of Harvests

Partial Harvest: **Harvest where trees are removed individually or in small (<5 acre) patches.**

Shelterwood: **Harvest of mature trees from a forest site in two or more stages. The first stage removes only a portion of the trees to allow establishment of regeneration before the remaining trees are removed in subsequent harvest.**

Clearcut: **Harvest on a site larger than 5 acres that results in a residual basal area of acceptable growing stock trees >4.5" DBH of less than 30 square feet per acre, unless after harvesting the site has a well-distributed stand of acceptable growing stock 3 feet tall for softwood and 5 feet for hardwoods (Overstory Removal). Refer to the latest copy of the Maine Forest Service Rules Chapter 20 for additional information. It can be found on the Maine Forest Service website at http://www.state.me.us/doc/mfs/rules_regs/index.htm**

Change of Land Use: **Harvest conducted to convert forestland to another land use such as house lots, farm pastures, etc.**



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total Harvest	462,892	395,913	443,169	444,410	443,714	415,255	424,453	400,832	341,318	335,624
Partial Harvest	236,132	194,756	245,088	223,826	229,319	220,967	214,220	209,028	175,057	165,685
Total Shelterwood	211,845	182,009	175,601	190,881	189,356	164,817	181,207	162,978	141,833	143,474
Clearcut	10,069	14,877	19,301	24,494	20,461	25,055	23,366	25,082	20,971	22,722
Land Use Change	4,846	4,271	3,179	5,209	4,578	4,416	5,660	3,744	3,457	3,743

2017 Annual Report on Clearcutting and Precommercial Activities

Compiled from the 2017 Landowner Reports and other survey instruments. Data collected under the provisions of the Forest Resources Assessment Program, 12 MRS § 8878-A

	Large Landowners (own >100,000 acres)										All Other Landowners				All Landowners
	Precommercial Activities Acres		Clearcuts > 75 acres in size		Purpose for Clearcut (see explanation below) Acres						Acres				
													Clearcut		Acres
County	TSI	Planted	#	Acres	1	2	3	4	Sub Total	Avg. Size	TSI	Planted	Sub Total	Avg. Size	Clearcut
Androscoggin	0	0	0	0	0	0	0	0	0	0	10	0	53	11	53
Aroostook	5,291	4,451	0	0	7,037	23	223	0	7,283	34	20	20	213	11	7,496
Cumberland	0	0	0	0	0	0	0	0	0	0	0	0	37	9	37
Franklin	0	47	11	2,140	2,409	225	908	0	3,542	49	66	0	62	9	3,604
Hancock	0	0	0	0	182	0	0	0	182	30	44	0	231	14	413
Kennebec	0	0	0	0	0	0	0	0	0	0	402	0	12	6	12
Knox	0	0	0	0	0	0	0	0	0	0	2	0	30	8	30
Lincoln	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0
Oxford	649	79	8	1,512	1,315	716	796	0	2,827	38	30	42	99	16	2,926
Penobscot	576	93	0	0	724	0	0	0	724	48	37	36	20	5	744
Piscataquis	531	465	0	0	452	44	424	379	1,299	22	21	5	15	15	1,314
Sagadahoc	0	0	0	0	0	0	0	0	0	0	0	0	7	2	7
Somerset	0	2,179	4	441	3,662	0	258	1,236	5,156	22	49	6	529	35	5,685
Waldo	0	0	0	0	36	0	0	0	36	12	0	7	35	9	71
Washington	250	0	1	101	186	0	0	0	186	37	750	0	76	13	262
York	0	0	0	0	0	0	0	0	0	0	57	0	68	11	68
State Total:	**7,297**	**7,314**	**24**	**4,194**	**16,003**	**1,008**	**2,609**	**1,615**	**21,235**	**36**	**1,494**	**116**	**1,487**	**14**	**22,722**

Purposes for creating clearcut:

1. Removal of poor quality, intolerant, under stocked, short lived or mature overstories where the retention of the residual overstory trees is not justified for further increase in value, as a source of seed, or for protection of the new stand.
2. Ecologically appropriate improvement or creation of wildlife habitat.
3. Removal of stands that, if partially harvested according to accepted silvicultural practice, are at high risk for windthrow due to factors such as soils, rooting depth, crown ratio or stem quality.
4. Harvesting of an existing plantation or other forest stand established by or previously treated with precommercial silvicultural activities.

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Maine Forest Service District Foresters

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Practical advice for your land and trees from the Maine Forest Service.

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email: forestinfo@maine.gov

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

and

STATE OF MAINE
LAND USE PLANNING COMMISSION

IN THE MATTER OF

CENTRAL MAINE POWER COMPANY	)
NEW ENGLAND CLEAN ENERGY CONNECT	)
#L-27625-26-A-N/#L-27625-TG-B-N/	)
#L-27625-2C-C-N/#L-27625-VP-D-N/	)
#L-27625-IW-E-N	)
CENTRAL MAINE POWER COMPANY	)
NEW ENGLAND CLEAN ENERGY CONNECT	)
SITE LAW CERTIFICATION SLC-9	)
Beattie Twp, Merrill Strip Twp, Lowelltown Twp,	)
Skinner Twp, Appleton Twp, T5 R7 BKP WKR,	)
Hobbstown Twp, Bradstreet Twp,	)
Parlin Pond Twp, Johnson Mountain Twp,	)
West Forks Plt, Moxie Gore,	)
The Forks Plt, Bald Mountain Twp, Concord Twp	)

PRE-FILED SUPPLEMENTAL TESTIMONY AND EXHIBITS OF LAUREN JOHNSTON

May 1, 2019

This testimony is in response to the questions and data requests in the Tenth Procedural Order. I hereby adopt the Pre-Filed Supplemental Testimony of Mark Goodwin as if it were my own.

Dated: 4/29/19

Respectfully submitted,

Lauren Johnston

STATE OF MAINE
CUMBERLAND COUNTY, ss.

The above-named Lauren Johnston did personally appear before me and made oath as to the truth of the foregoing pre-filed testimony.

Dated: 4/29/19

Before,

Notary Public
Name: NICKOLE GAGNE
My Commission Expires: 10/02/20

NICKOLE GAGNE
Notary Public-Maine
My Commission Expires
October 02, 2020

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

and

STATE OF MAINE
LAND USE PLANNING COMMISSION

IN THE MATTER OF

CENTRAL MAINE POWER COMPANY	)
NEW ENGLAND CLEAN ENERGY CONNECT	)
#L-27625-26-A-N/#L-27625-TG-B-N/	)
#L-27625-2C-C-N/#L-27625-VP-D-N/	)
#L-27625-IW-E-N	)
CENTRAL MAINE POWER COMPANY	)
NEW ENGLAND CLEAN ENERGY CONNECT	)
SITE LAW CERTIFICATION SLC-9	)
Beattie Twp, Merrill Strip Twp, Lowelltown Twp,	)
Skinner Twp, Appleton Twp, T5 R7 BKP WKR,	)
Hobbstown Twp, Bradstreet Twp,	)
Parlin Pond Twp, Johnson Mountain Twp,	)
West Forks Plt, Moxie Gore,	)
The Forks Plt, Bald Mountain Twp, Concord Twp	)

PRE-FILED SUPPLEMENTAL TESTIMONY AND EXHIBITS OF AMY BELL SEGAL

May 1, 2019

This testimony is in response to the questions and data requests in the Tenth Procedural Order. I hereby adopt the Pre-Filed Supplemental Testimony of Terrence J. DeWan as if it were my own.

Dated: 4/30/2019

Respectfully submitted,

Amy Bell Segal

STATE OF MAINE
York, ss.

The above-named Amy Bell Segal did personally appear before me and made oath as to the truth of the foregoing pre-filed testimony.

Before,

Dated: April 30, 2019

Notary Public
Name: Lauren Hayes
My Commission Expires: 9-29-23

LAUREN HAYES
Notary
Public
EXP. 09-29-2023
STATE OF MAINE

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

and

STATE OF MAINE
LAND USE PLANNING COMMISSION

IN THE MATTER OF

CENTRAL MAINE POWER COMPANY	)
NEW ENGLAND CLEAN ENERGY CONNECT	)
#L-27625-26-A-N/#L-27625-TG-B-N/	)
#L-27625-2C-C-N/#L-27625-VP-D-N/	)
#L-27625-IW-E-N	)
CENTRAL MAINE POWER COMPANY	)
NEW ENGLAND CLEAN ENERGY CONNECT	)
SITE LAW CERTIFICATION SLC-9	)
Beattie Twp, Merrill Strip Twp, Lowelltown Twp,	)
Skinner Twp, Appleton Twp, T5 R7 BKP WKR,	)
Hobbstown Twp, Bradstreet Twp,	)
Parlin Pond Twp, Johnson Mountain Twp,	)
West Forks Plt, Moxie Gore,	)
The Forks Plt, Bald Mountain Twp, Concord Twp	)

PRE-FILED SUPPLEMENTAL TESTIMONY AND EXHIBITS

OF TERRENCE J. DEWAN

May 1, 2019

This testimony is in response to question #16 of the Department of Environmental Protection's (DEP's) Tenth Procedural Order.

QUESTION 16: LOCATIONS WHERE TAPERING VS. TALLER OVERHEAD POLES WOULD BE PREFERRED.

CMP has proposed tapered vegetation management in certain areas (Upper Kennebec deer wintering area, south of Coburn Mountain, and the shoulder of Tumbledown Mountain) and

the use of taller structures to allow full height vegetation to remain at Gold Brook and Mountain Brook. Tapering is being specifically proposed to mitigate for potential visual impacts from Coburn Mountain and the shoulder of Tumbledown Mountain (as seen from Rock Pond). The taller structures being proposed at Gold Brook to address habitat issues resulted in greater Project visibility from Rock Pond; this was mitigated by tapering vegetation on the shoulder of Tumbledown Mountain to soften the edges of the transmission corridor (as depicted in the photosimulation from Rock Pond).

To the extent that additional tapering or taller transmission structures are being evaluated for habitat protection or other environmental considerations, tapering would be preferable to taller transmission poles in all locations identified by the interveners because of the potential for greater visual impacts associated with taller structures when viewed from lakes and ponds, roads, or elevated viewpoints.

TJD&A evaluated each of the nine priority areas for habitat connectivity identified by The Nature Conservancy (TNC), as shown on Exhibit 7 of TNC's pre-filed direct testimony, to determine whether either tapered vegetation or taller poles would be visible and the potential visual effect (positive or negative) of each. Please see Exhibit CMP-6.2-A.

TNC Area 1

Location: Beattie Twp; Number 1 Brook; 1.63 miles from Structure 795 to 803.
Resources with Potential Views: Beattie Pond, a LUPC Remote Pond, east of Area 1.
Roads: Lowelltown Road.

Potential Visual Effect: The redesigned structures (included in the current application) are 38 feet lower than those originally proposed to minimize visibility from Beattie Pond. The use of taller structures in Area 1 would result in increased Project visibility from Beattie Pond. Tapered vegetation in Area 1 would not be visible from Beattie Pond. At the point where the Project crosses Lowelltown Road, a forest management road, tapered vegetation would limit views down

the corridor, which would minimize the visual effect and any impacts to the occasional recreational visitor.

TNC Area 2

Location: Skinner Twp; 1.39 mile from Structure 765 to 771
Resources with Potential Views: South Branch Moose River; no lakes or ponds with views. No. 5 Mountain is approximately 8 miles to the east.
Nearby Roads: Gold Brook Road

Potential Visual Effect: Two structures (Structures 767 and 768) adjacent to the South Branch of the Moose River were evaluated to determine if increasing their height to allow taller vegetation would result in potential visual impacts from the river. The taller vegetation would minimize views of the structures from the river; the conductors would be visible at a higher elevation than currently proposed. Tapering in the remaining portion of TNC Area 2 would not be visible from any scenic resources.

The taller structures would not be visible from any publicly owned scenic resources. At a distance of 8 miles, the view from No. 5 Mountain would not be affected. There may be some visibility on Tumbledown Mountain, which is privately owned with no trails.

Tapering and the preservation of full height vegetation would limit views down the corridor, which would minimize the visual effect and any impacts to recreational users on Gold Brook Road. Second growth vegetation adjacent to Gold Brook Road is currently 20-30± feet in height.

TNC Area 3

Location: Skinner Twp, Appleton TWP 3 1.23 miles from Structure 752 to 758
Resources with Potential Views: unnamed perennial streams w/associated intermittent tributaries; Tumbledown Mountain (located south of this area on private land).
Nearby Roads: Spencer Road is 2± miles to north and east. The area is near Pine Tree Road and several other dead-end haul roads.

Potential Visual Effect: Taller structures would not be visible from Rock Pond (5.0 miles away) or Number 5 Mountain (6.5 miles away) due to intervening topography. Taller structures may be visible from surrounding mountains on private lands, e.g., Tumbledown Mountain and Leroy Mountain (neither of which have established trails). The only roads in Area 3 are dead-end forest management roads. Tapering would have no effect on views from Spencer Road, which is 2± miles from this area.

TNC Area 4

Location: Appleton TWP; 3.15 miles from Structure 725 to 743

Resources with Potential Views: Gold Brook and tributaries; Rock Pond; perennial streams flowing into Rock Pond and Iron Pond.

Nearby Roads: Spencer Road; Rock Pond access road.

Potential Visual Effect: The application includes the use of taller structures, full height vegetation, and tapered vegetation in a concentrated area around Gold Brook. Increasing the heights of the structures closest to Rock Pond (725, 726, and 727) by 30 to 45 feet above those currently proposed would make them much more visible from the pond. These three taller structures would be farther away from the grouping of taller structures seen in the vicinity of a pronounced notch between Tumbledown Mountain and Greenlaw Mountain in the application, and would extend the area of visual effect as seen from Rock Pond.

While these three structures are approximately twice as tall as the coniferous trees that line the shoreline, from most locations on the pond they would be seen against a wooded hillside backdrop. There may be some locations near the northern end of the pond where these three structures would be silhouetted against the sky, and would thus be more prominent visually

The conductors for taller structures 725, 726, and 727 would be highly visible from the pond, even with the use of non-specular conductor, since they would be seen as unbroken lines connecting the structures.

Taller vegetation between Structures 726 and 727 resulting from taller structures would prevent views down the transmission corridor, which would minimize the effect of right-of-way clearing to recreational users going to the boat launch on the northwest end of the pond and those driving to the campsites on the northern end of the pond. Tapered vegetation in this area would also minimize visual effects to recreational users.

The use of tapered vegetation in the vicinity of TNC Area 4 would minimize visual effects to recreational users on Spencer Road.

TNC Area 5

Location: Hobbstown Twp, TR7 BKP WKR, Bradstreet Twp; 4.22 miles from Structure 683 to 704.

Resources with Potential Views: Toby Pond, unnamed pond, Whipple Pond (rated Significant), Whipple Brook, Bitter Brook, Moose River tributary, Moore Pond, Egg Pond

Nearby Roads: Spencer Road, Spencer Rips Road.

Potential Visual Effect: Three groups of taller structures were evaluated: Structures 701–704 north of Toby Pond, Structures 693 and 694 adjacent to Whipple Brook and east of Whipple Pond, and Structures 684–688 north of Moore Pond and Egg Pond.

Toby Pond: at least two taller structures would be visible from portions of Toby Pond, which is not a rated waterbody. At a height of 130 feet, Structure 702 would be silhouetted against the

sky. The use of tapered vegetation in the vicinity of Structure 702 and 703 would be preferred over taller structures.

Whipple Brook/Whipple Pond: Taller structures (693 and 694) would preserve full height vegetation adjacent to Whipple Brook and elevate the conductors a greater distance above the stream. None of the taller structures evaluated would be visible from Whipple Pond. Either tapering or the use of taller structures would minimize visual effects to camp owners and recreational users on Spencer Rips Road. Spencer Road is located at varying distances to the south and would not be affected by either tapering or taller structures in this area.

Moore Pond: Moore Pond is not a rated waterbody, but it has a public boat launch and is surrounded by Bureau of Parks and Lands property. Taller structures or tapered vegetation in this location would be not visible from Moore Pond due to topography and intervening vegetation.

TNC Area 6

Location: Bradstreet Twp, Parlin Pond Twp, Johnson Mountain Twp; 2.45 miles from Structure 649 to 656.

Resources with Potential Views: Coburn Mountain, Parlin Stream, and 2 other perennial streams.

Nearby Roads: Spencer Road.

Potential Visual Effect: Tapered vegetation would be preferred in this area over taller structures to minimize potential adverse effects on the view from Coburn Mountain, from which the Project is currently minimally visible. Taller structures would elevate the conductors above the treeline where they would be more noticeable.

The use of tapered vegetation, already proposed by CMP in the Rusty Blackbird habitat adjacent to Spencer Road, will minimize visual effects to recreational users.

TNC Area 7

Location: Johnson Mountain Twp; 0.72 mile from Structure 639 to 643.
Resources with Potential Views: Coburn Mountain, Parlin Pond, ITS 89.
Nearby Roads: Route 201.

Potential Visual Effect: Taller poles in TNC Area 7 were not evaluated because this area lacks known brook trout and threatened and endangered species waterbodies. Tapered vegetation would be preferred over taller structures in this area to minimize potential adverse effects on the view from Parlin Pond and Route 201. The Project in Area 7 is not visible from the summit of Coburn Mountain.

TNC Area 8

Location: Johnson Mountain Twp, West Forks; 3.71 miles from Structure 564 to 585.
Resources with Potential Views: Tomhegan Stream and 3 perennial tributaries, Cold Stream Forest Parcel.
Nearby Roads: Wilson Hill Road.

Potential Visual Effect: Taller structures on either side of Tomhegan Stream would preserve taller vegetation adjacent to the stream and elevate the conductors a greater distance above the stream. The taller structures would not be visible from the stream due to preserved vegetation.

Tapering would minimize visual effects to recreational users on Wilson Hill Road where the Project corridor is near the road. Taller structures would be more visible to recreational users of the road due to the presence of commercial forestry operations on the northeast side of the road.

The Cold Stream Forest Parcel is located on the southwest side of Wilson Hill Road. The Project is not visible from Cold Stream within the Cold Stream Forest Parcel in the vicinity of Wilson Hill Road.

TNC Area 9

Location: West Forks; 3.68 miles from Structure 540 to 554.
Resources with Potential Views: Kennebec River, Moxie Stream.
Nearby Roads: Fish Pond Road.

Potential Visual Effect: CMP, working with IF&W, has already proposed tapering in specific locations within the upper Kennebec deer wintering area portion of TNC Area 9. Riparian buffers are proposed adjacent to Moxie Stream. The forestland on either side of the Kennebec River will be preserved through the use of Horizontal Directional Drill (HDD) technology.

Tapered vegetation would be preferred over taller structures in this location. Taller structures would be more visible from Moxie Stream, specifically from a wetland area east of the stream crossing.

The use of tapered vegetation would minimize visual effects to recreational users on Fish Pond Road.

Exhibits

CMP-6.2-A: Evaluation of TNC Priority Areas

Dated: April 30 2019

Respectfully submitted,

Terrence J. DeWan

STATE OF MAINE
York, ss.

The above-named Terrence J. DeWan did personally appear before me and made oath as to the truth of the foregoing pre-filed testimony.

Before,

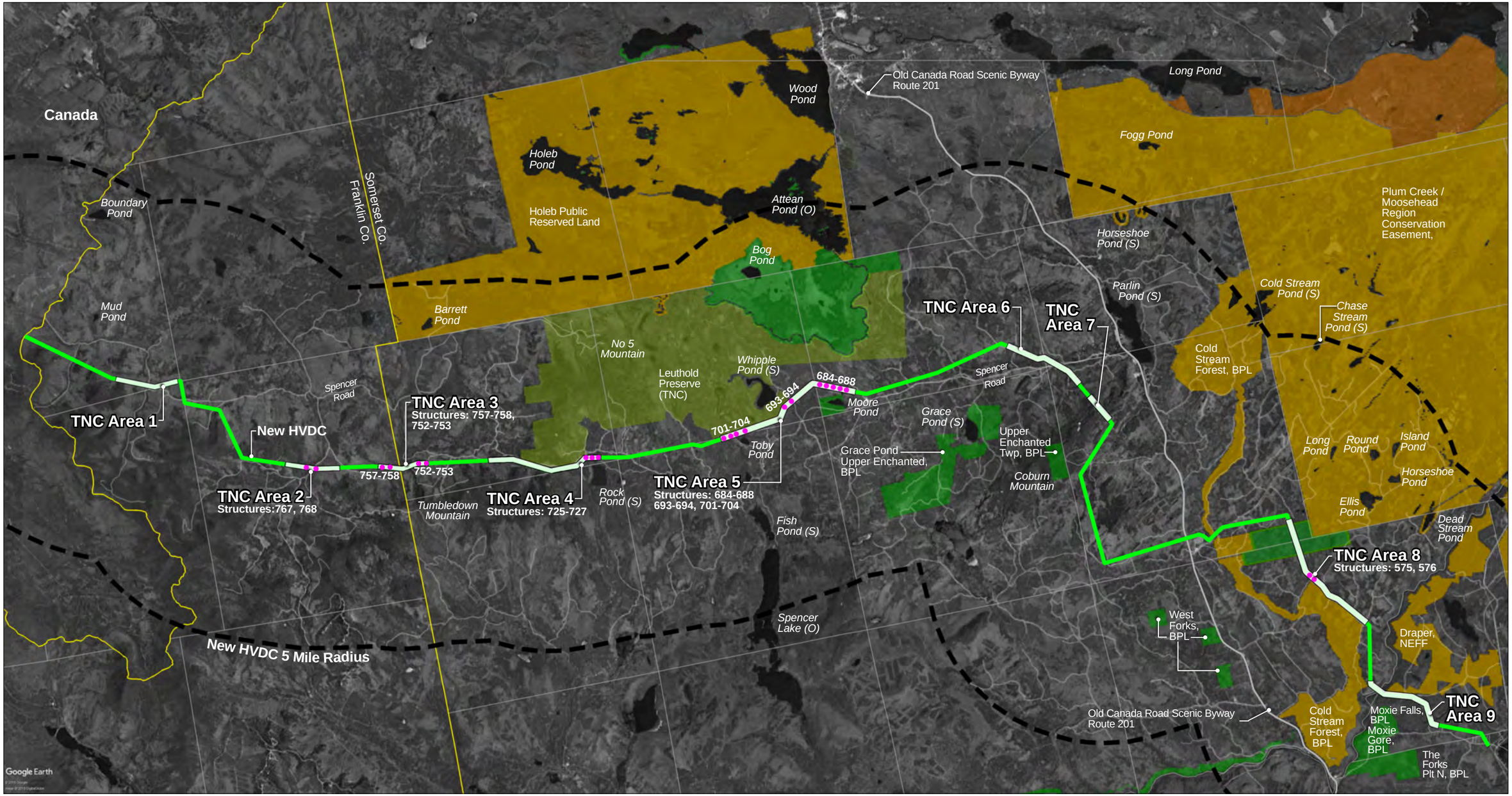
Dated: April 30, 2019

Notary Public
Name: Lauren Hayes
My Commission Expires: 9-29-23

LAUREN HAYES
Notary
Public
EXP. 09-29-2023
STATE OF MAINE

PRIORITY AREAS FOR HABITAT CONNECTIVITY

TNC Areas 1-9: Context Aerial Image



Pink circles within each TNC area represent taller structures that have been evaluated for potential visual impacts.

NORTH

1 mile

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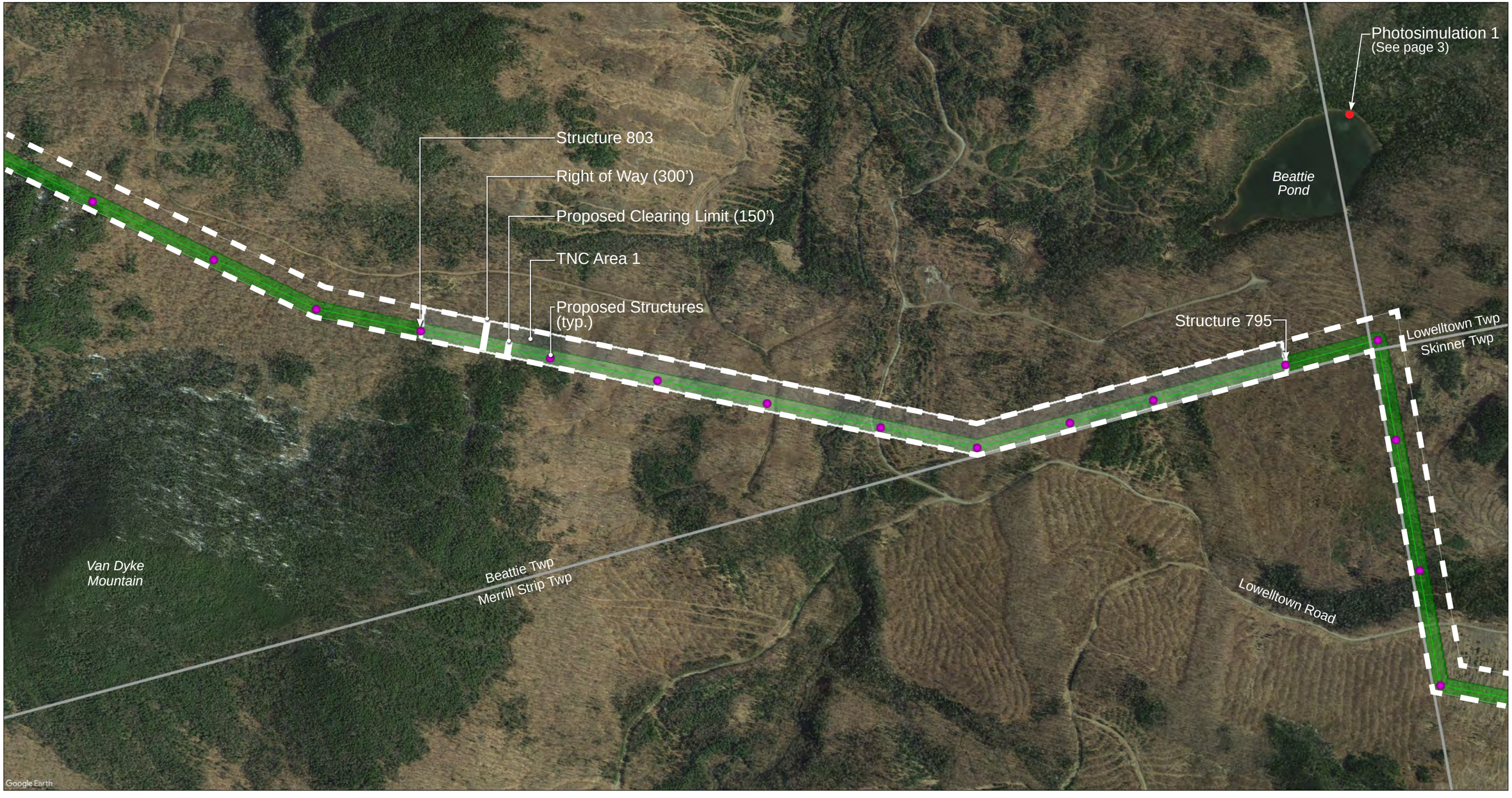
April 30, 2019

CMP-6.2-A

PRIORITY AREAS FOR HABITAT CONNECTIVITY

TNC Area 1: Context Aerial Image



The use of taller structures in TNC Area 1 would result in increased Project visual impact from Beattie Pond. Tapering within this area would not be visible from Beattie Pond. Tapering would be effective in limiting visibility down the Project corridor from Lowelltown Road (private forest management road).

NORTH
300 feet

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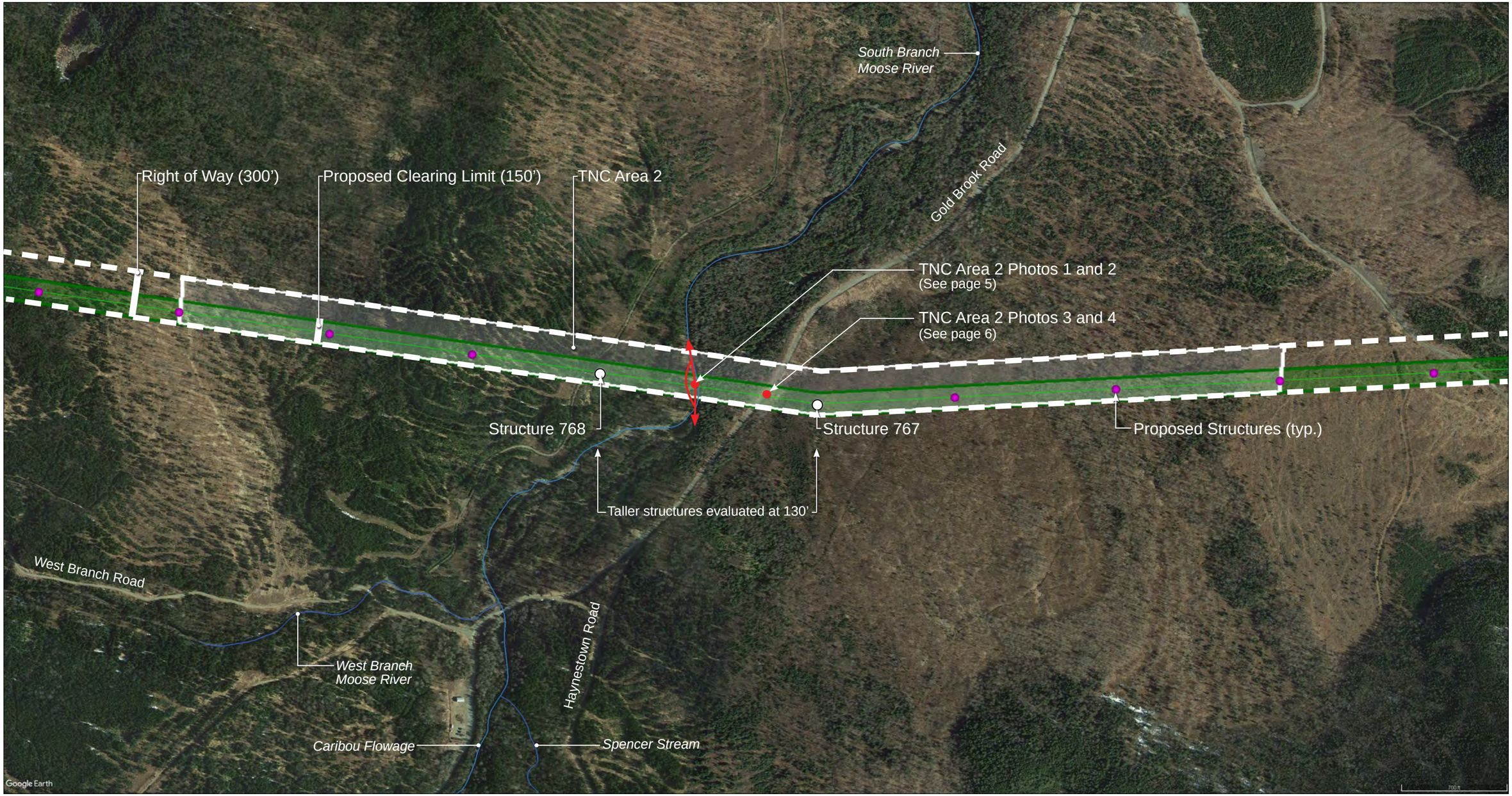
TNC Area 1: PHOTOSIMULATION 1: BEATTIE POND, Lowelltown Twp.

Beattie Pond, Lowelltown Twp

Previously submitted photosimulation from Beattie Pond looking southwest toward the re-engineered structures closest to the Pond. The tapered section of corridor in TNC Area 1 would not be visible from Beattie Pond. The use of taller structures in this area would result in increased Project visual impact from Beattie Pond.

TNC Area 2: Context Aerial Image



Taller structures (with full height vegetation) were evaluated in between Structure 767 and 768 within TNC Area 2, on either side of the South Branch of the Moose River. Full height vegetation preserved on either side of the South Branch of the Moose River would screen taller structures from view. The conductors would be visible overhead. The taller structures evaluated would not be visible from any publicly owned scenic resources. Tapering and the preservation of full height vegetation would limit views down the corridor, which would minimize the visual effect to recreational users on Gold Brook Road.

TNC Area 2: Context Photographs

South Branch of Moose River, Skinner Township

TNC Area 2 Photo 1: Panoramic photograph looking south to southwest from the shoreline of the South Branch of the Moose River in Skinner Township. See page 4 for approximate location. Preserved riparian vegetation would block views of taller structures.

TNC Area 2 Photo 2: Panoramic photograph looking west to northwest from the shoreline of the South Branch of the Moose River. Preserved riparian vegetation would block views of taller structures.

TNC Area 2: Context Photographs

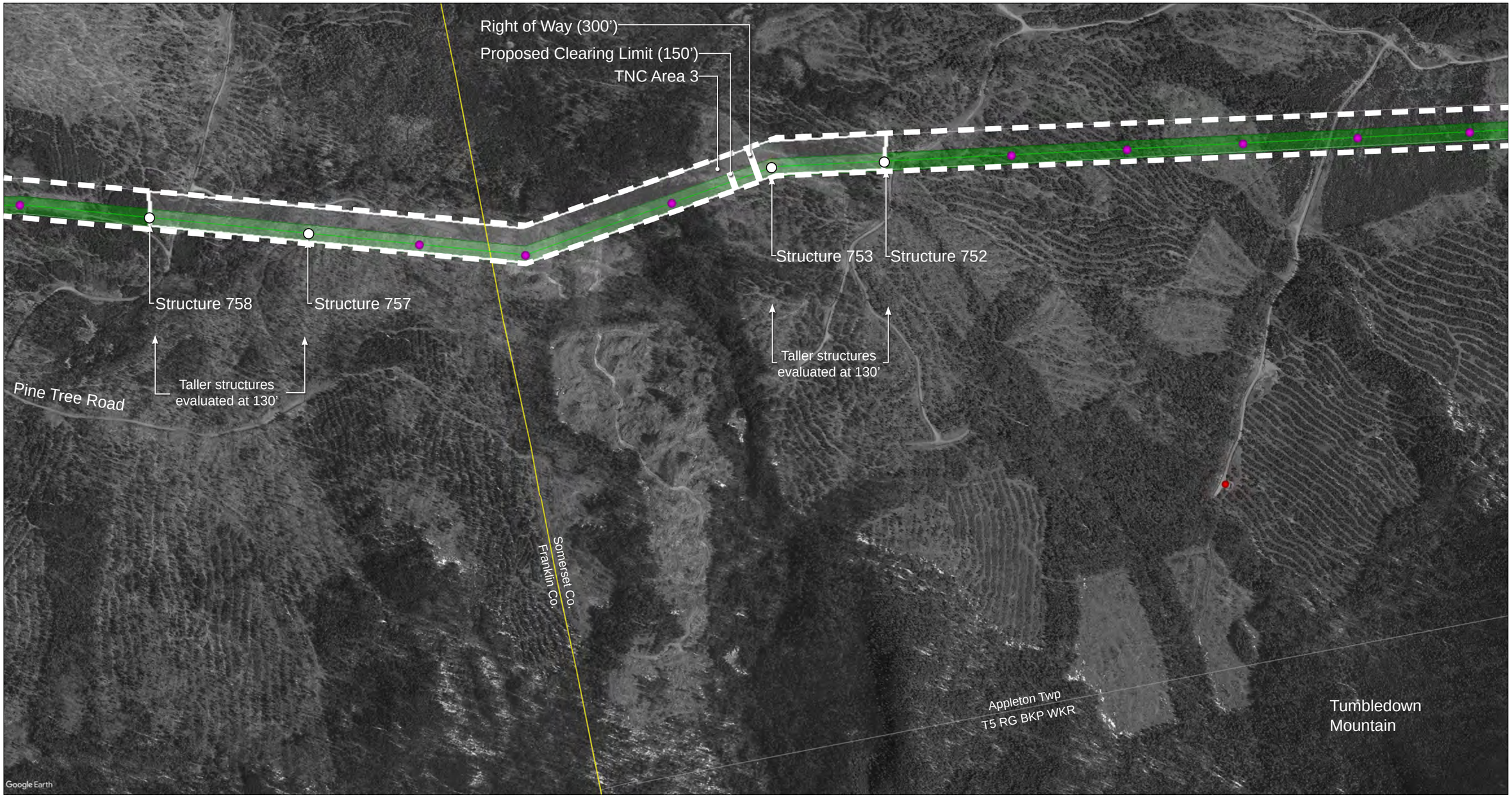
Gold Brook Road, Skinner Township

TNC Area 2 Photo 3: Photograph looking southwest from Gold Brook Road in Skinner Township. See page 4 for approximate location.

TNC Area 2 Photo 4: Photograph looking northeast from Gold Brook Road.

PRIORITY AREAS FOR HABITAT CONNECTIVITY

TNC Area 3: Context Aerial Image



Taller structures may be visible from surrounding mountains on private lands, e.g., Tumbledown Mountain and Leroy Mountain. Tapering would have no appreciable effect on scenic quality in TNC Area 3.

NORTH
300 feet

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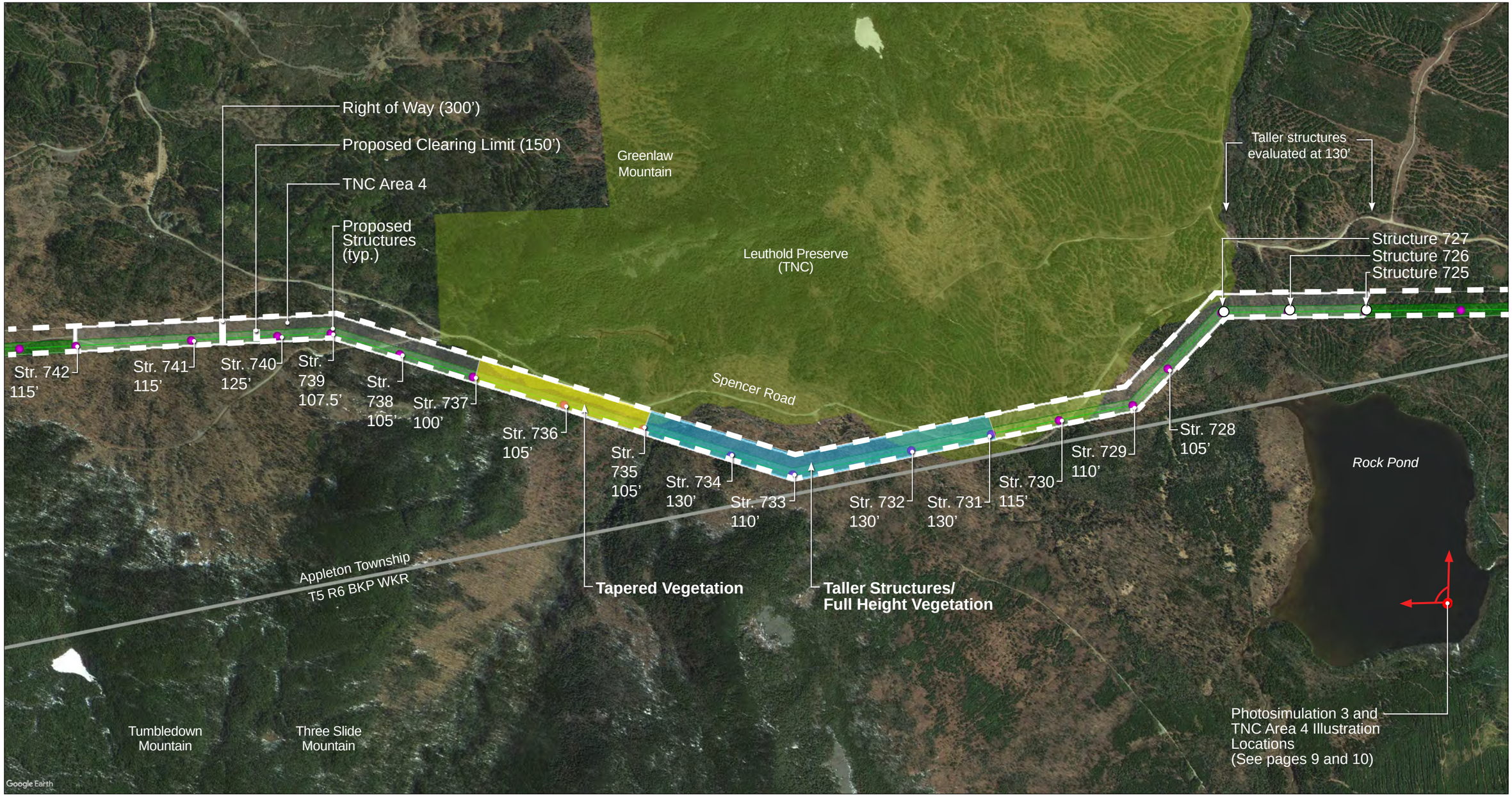
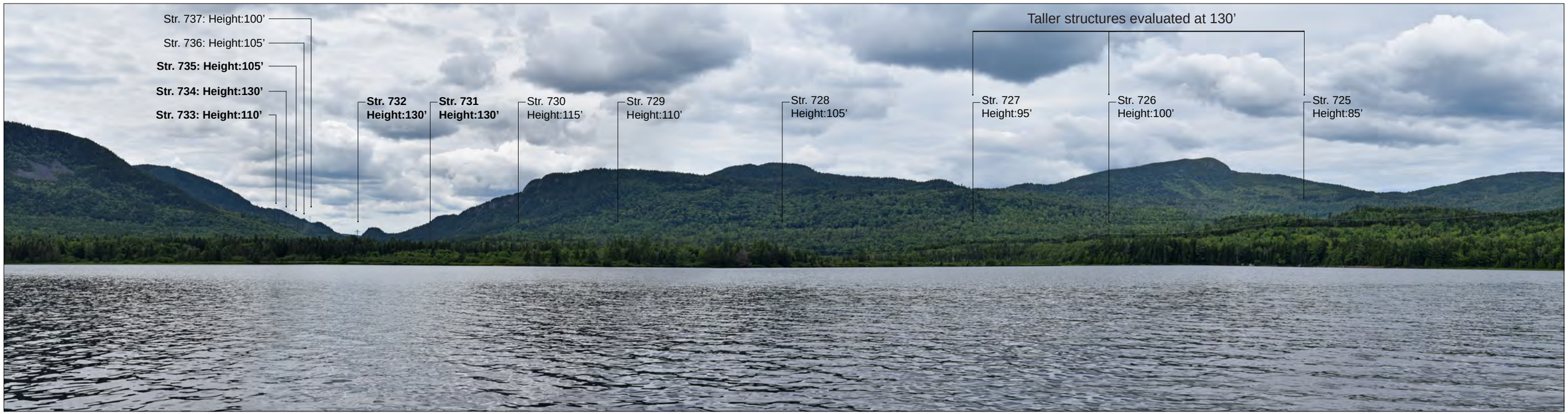
TNC Area 4: Context Aerial Image



TNC Area 4: PHOTOSIMULATION 3: ROCK POND, T5 R6 BKP WKR, PREVIOUSLY SUBMITTED

Rock Pond, T5 R6 BKP WKR

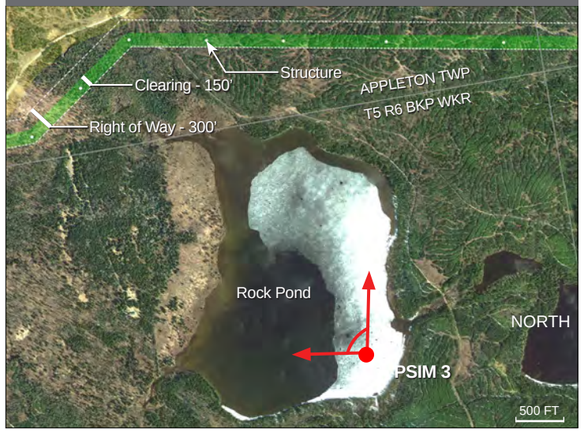


Previously submitted photosimulation: Panoramic view looking west to north from the southeast end of Rock Pond toward the proposed HVDC transmission line. Approximately twelve structures, conductors, and portions of the cleared corridor will be visible at distances of 0.7 to 2.5 miles from this viewpoint. Visible mountains from left to right: Three Slide Mountain, Tumbledown Mtn, Greenlaw Mountain, No. 6 Mountain, and No. 5 Mountain.

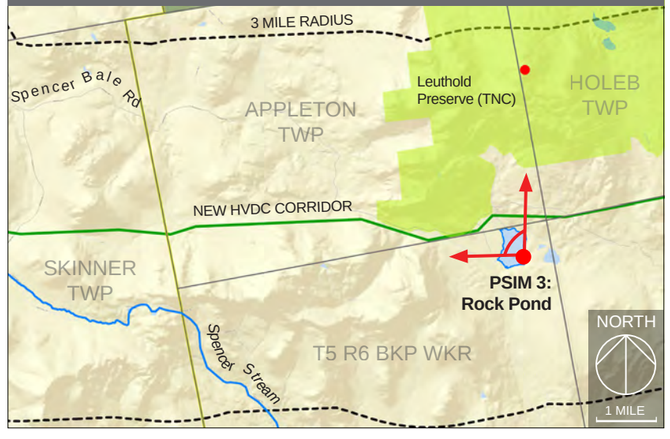
This simulation reflects the change in height for five structures in proximity to Gold Brook on the northern shoulder of Three Slide Mountain. Full vegetation height will be preserved for approximately 4,269 feet of corridor to maintain habitat between Structures 731 and 735 (**bold**). An additional 2,059 feet of corridor on the northern shoulder of Tumbledown Mountain would be maintained using a tapering vegetation management between Structures 735 and 737 which allows vegetation at heights ranging from 15 feet to 35 ft to be preserved along both sides within the corridor. This mitigation would minimize the visual 'notch' potentially viewed from Rock Pond.

The individual structure heights noted reflect the current design (taller structures/full height vegetation near Gold Brook and tapering on Tumbledown). Structures 725, 726, and 727 were evaluated at 130', with full height vegetation in between.

LOCATION MAP



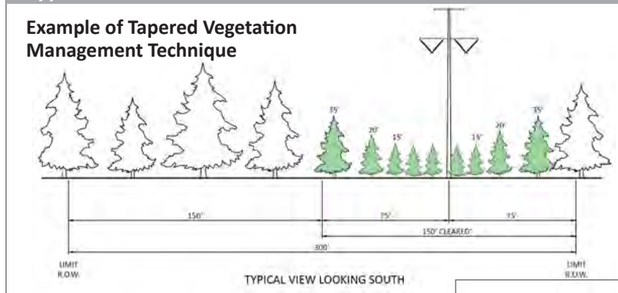
CONTEXT MAP



TECHNICAL INFORMATION

Typical Cross Section

Example of Tapered Vegetation Management Technique



Photograph / Photosimulation Information

Location	45.457577°, -70.387233°
Viewing Direction	West to North
Horizontal Angle of View	94°
Date and Time	07/25/17 at 2:29 pm
Camera Focal Length	35 mm
Camera Make/Model	Nikon D5500
Photo Source	TJD&A
Proposed Structures Visible	12
Approximate Distance to Nearest Visible Structure	0.7 miles

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Revised/Submitted December 7, 2018

TNC Area 4: PHOTOSIMULATION 3B: ROCK POND, T5 R6 BKP WKR

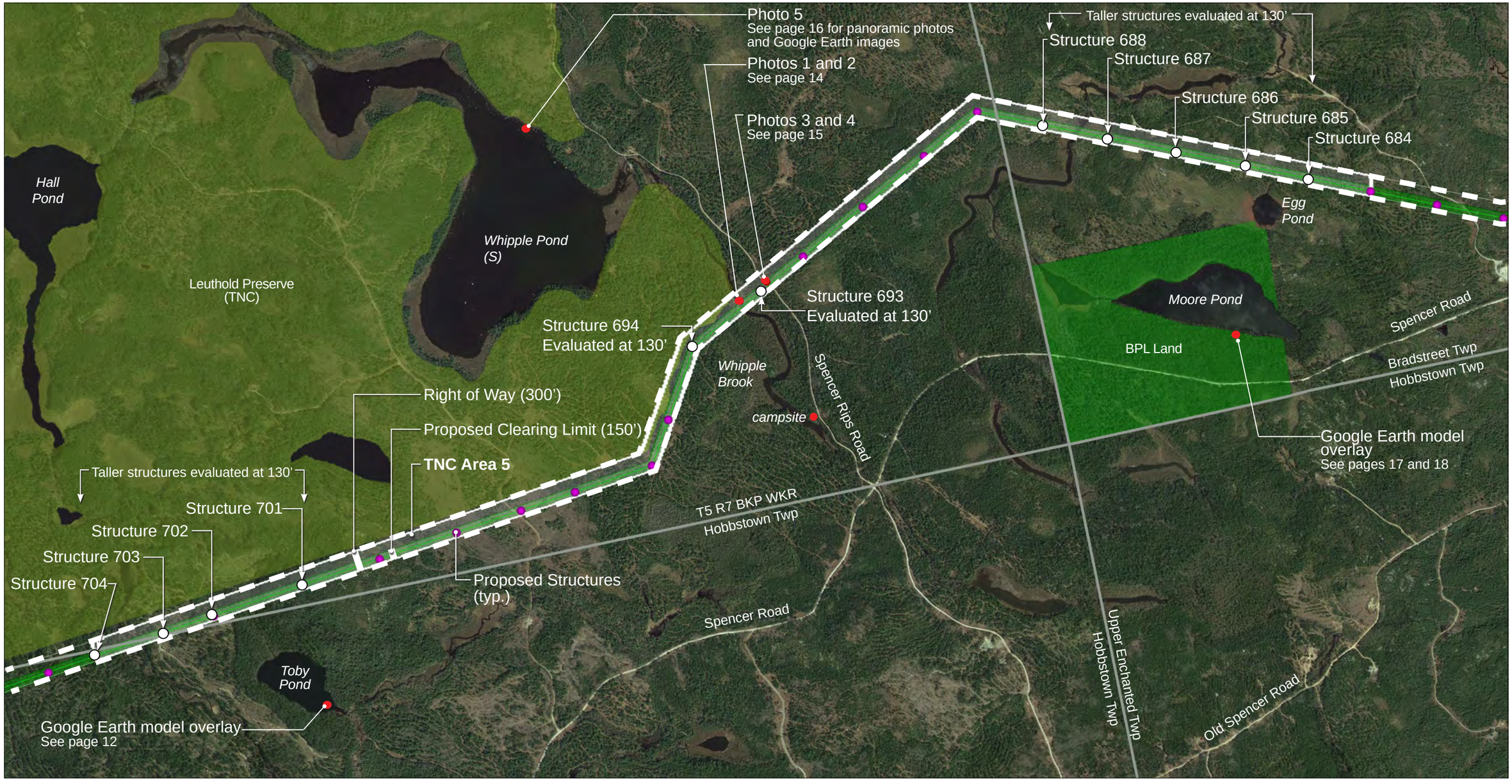
Rock Pond

Previously submitted photosimulation: Normal view looking north from southeast end of Rock Pond toward the proposed HVDC transmission line. structures, conductors, and portions of the cleared corridor will be visible at distances of 0.6 to 0.8 miles.

Submitted September 22, 2017

Taller structures would result in greater Project visibility of the conductors and Structures 725, 726, and 727 (closest to Rock Pond). Tapering would reduce the visible change in vegetation color and texture created by corridor clearing.

TNC Area 5: Context Aerial Image



At least two structures (702 and 703) would be visible from portions of **Toby Pond.** Structure 702 would be silhouetted against the sky. The use of tapered vegetation in the vicinity of Structure 702 and 703 would be preferred.

Two taller structures near **Whipple Brook** would preserve taller vegetation adjacent to the brook and elevate the conductors a greater distance above the brook. None of the taller structures evaluated would be visible from **Whipple Pond.** Either tapering or the use of taller structures would minimize visual effects to camp owners and other recreational users on Spencer Rips Road. Spencer Road is located at varying distances to the south and would not be affected by either tapering or taller structures in this area.

Moore Pond is not a rated waterbody, but it has a public boat launch and is surrounded by Bureau of Parks and Lands property. Taller structures or tapered vegetation in this location would be not visible from **Moore Pond** due to topography and intervening vegetation.

NORTH

500 feet

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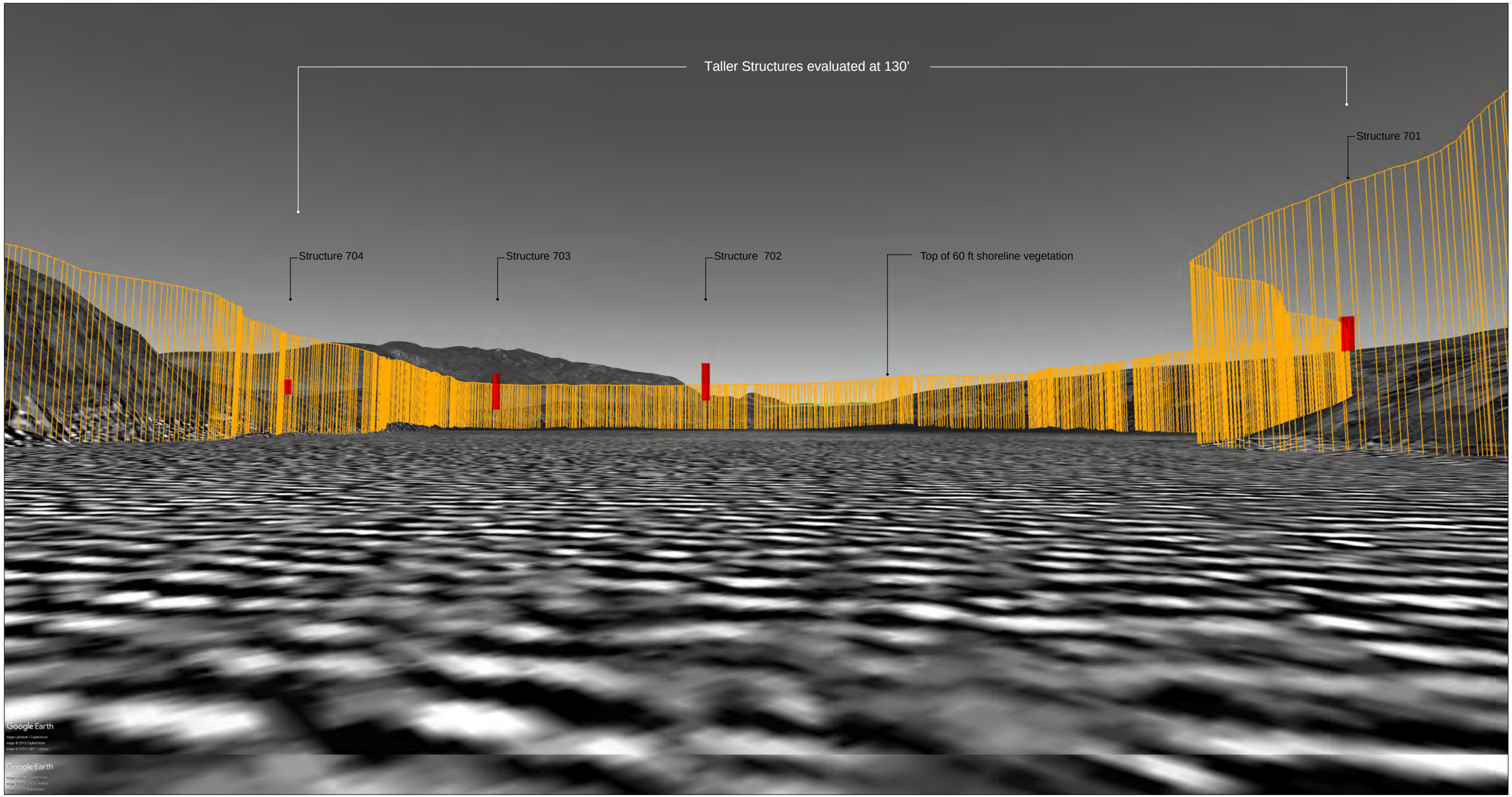
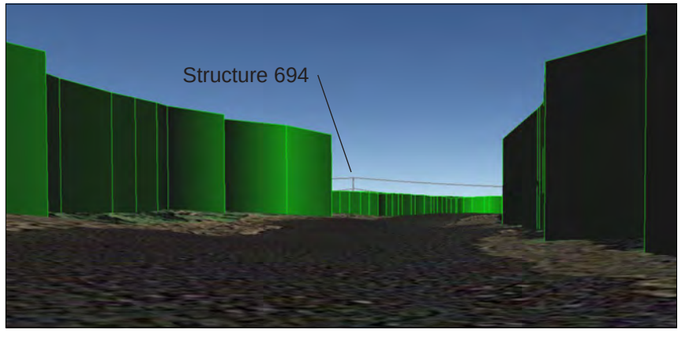


Google Earth model image illustrating a view looking northwest from Toby Pond in Hobbstown Twp. Structures 701-704, evaluated at 130 ft to allow full height vegetation, are shown as red lines. Shoreline vegetation (indicated with 60 ft orange lines) and topography would block views of proposed Structures 701 and 704. The tops of Structures 703 and 702 would be visible above the 60’ shoreline vegetation surrounding the pond. See page 11 for location of pond and structures.

Viewpoint A from a campsite on Whipple Brook, off Spencer Rips Road in T5 R7 BKP WKR. The Project is unlikely to be visible from within the campsite but one structure and a portions of the conductors may be visible from the stream in front of the campsite

View of campsite on the northeast side of Whipple Brook, approximately 1,425 feet north of the Spencer Rips Road/Spencer Road intersection. Photo Date: 6/14/17



3D Model view from Whipple Brook in front of the campsite indicates that existing 40 ft +/- vegetation along the stream will screen the majority of the Project from views, except for the top of one structure (#694) and portions of shield wires and conductors.

If Structure 694 were to be 130 feet, it would be more noticeable from Whipple Brook in front of the campsite.

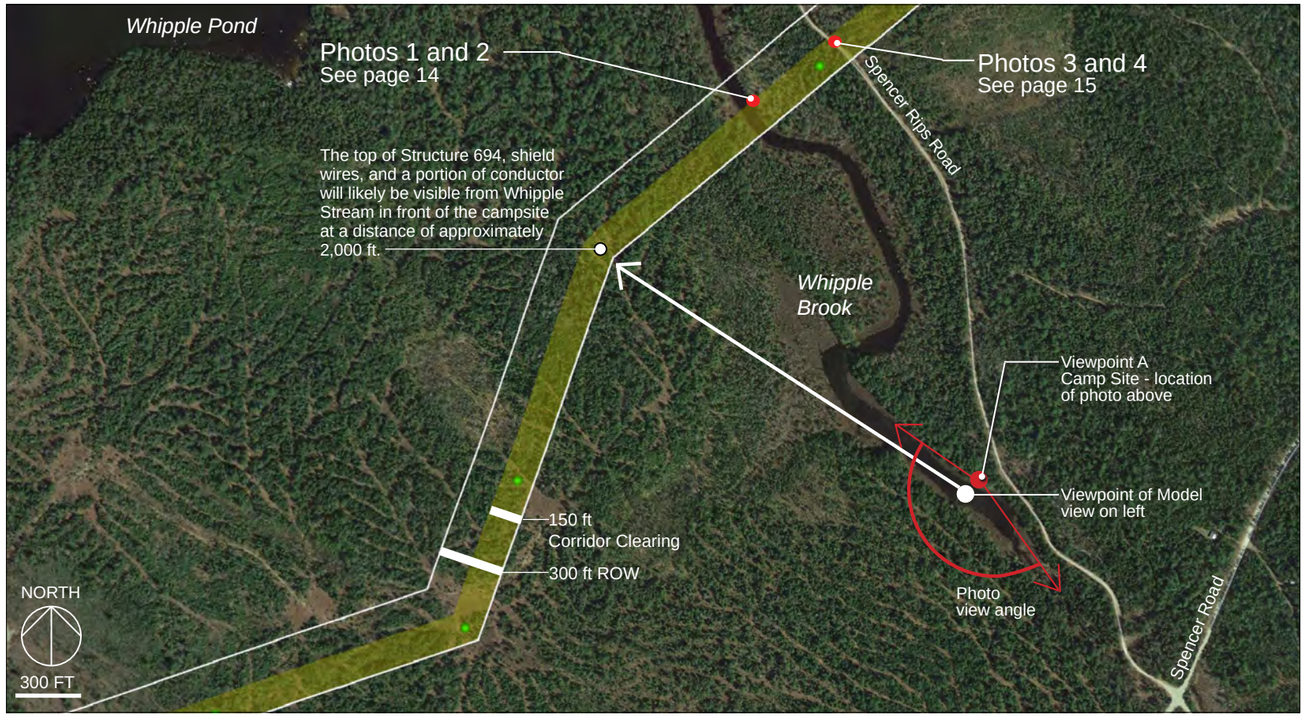


Photo 1: Panoramic photograph looking southeast to southwest from the shoreline of Whipple Brook at the Project crossing. The brook is approximately 50 feet wide in this location. (See page 11 for approximate location.) Structure 694 would be approximately 970 feet from this viewpoint. Structure 693 would be approximate 370 feet in the opposite direction from this location. Full height vegetation associated with taller structures would block views of both structures. Conductors would be visible overhead.

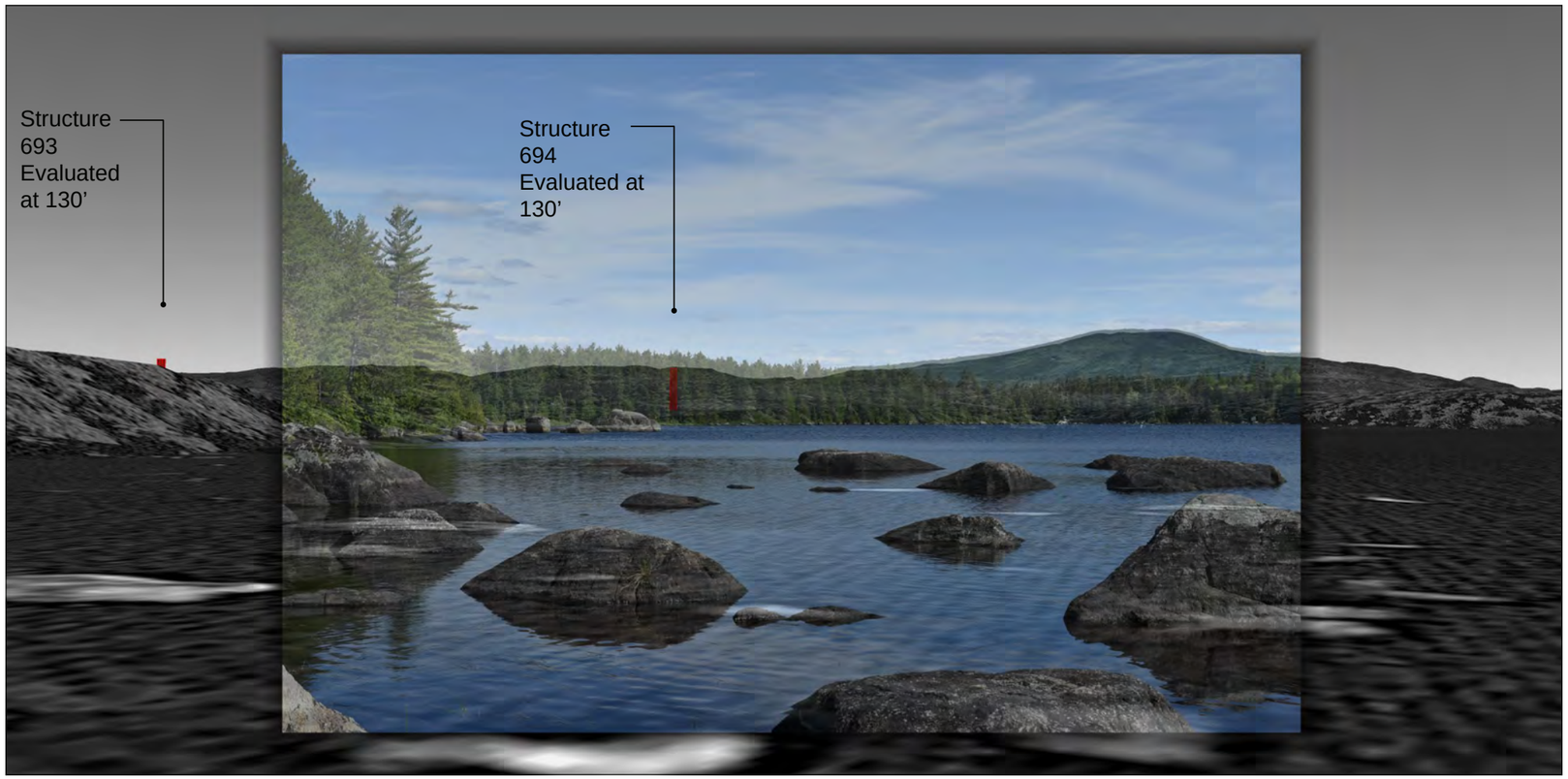
Photo 2: Panoramic photograph looking east to north from the shoreline of Whipple Brook at the Project crossing. The brook is approximately 50 feet wide in this location. Structure 694 would be approximately 970 feet from this viewpoint. Structure 693 would be approximate 370 feet in the opposite direction from this location. Full height vegetation associated with taller structures would block views of both structures. Conductors would be visible overhead.

Photo 3: Panoramic photograph looking northwest from Spencer Rips Road in T5 R7 BKP WKR at the Project crossing.

Photo 4: Panoramic photograph looking southeast from Spencer Rips Road in T5 R7 BKP WKR at the Project crossing.

Either tapering or the use of taller structures would minimize visual effects to camp owners and recreational users on Spencer Rips Road.

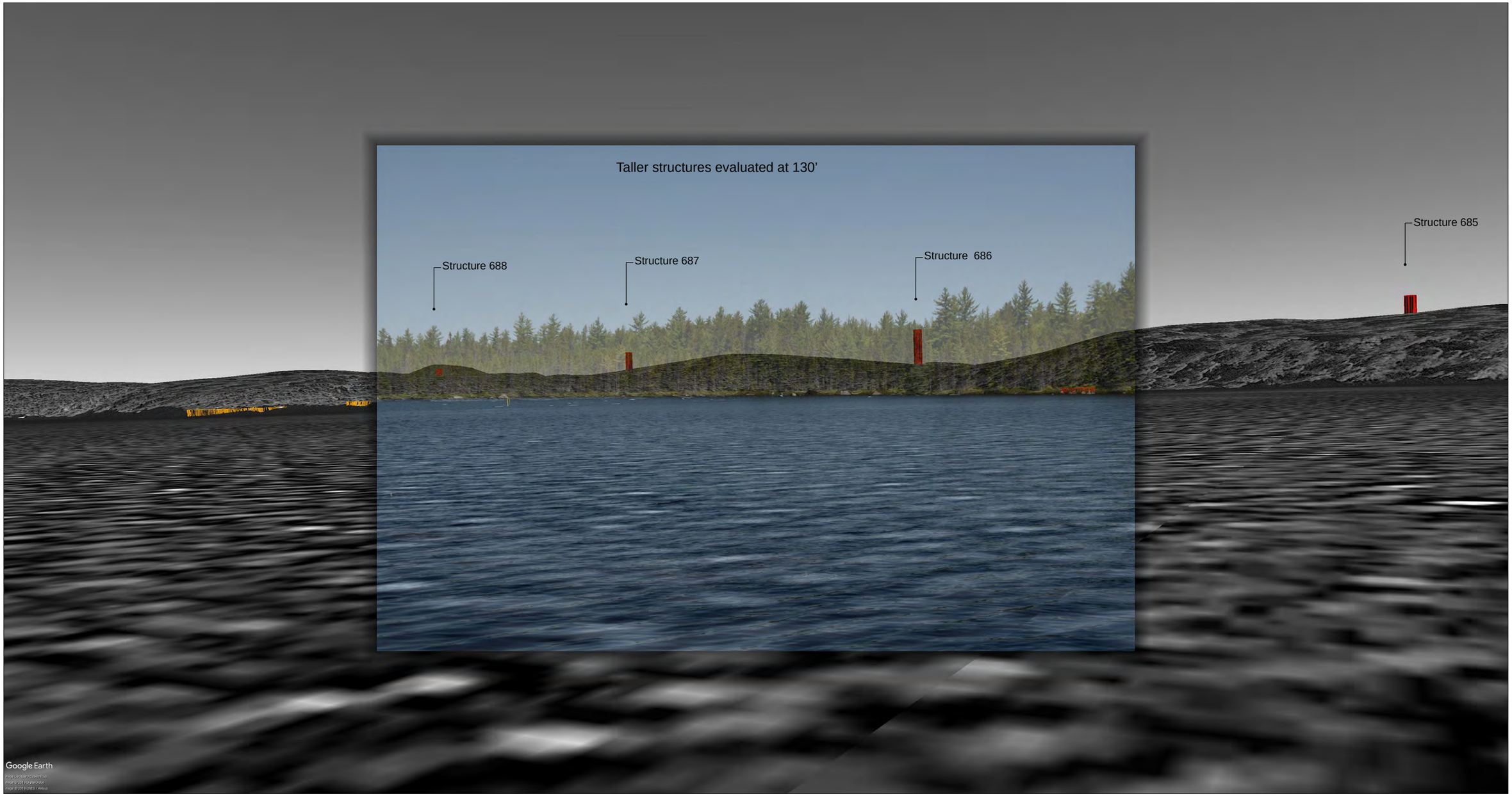
Photo 5: Panoramic photograph looking southeast to southwest from the north end of Whipple Pond. The current Project will not be visible from Whipple Pond.



Google Earth overlay image illustrating view looking southeast from Whipple Pond. Shoreline vegetation and topography would block views of Structures 693 and 694 evaluated at 130 feet from the pond.

TNC Area 5: Google Earth Image

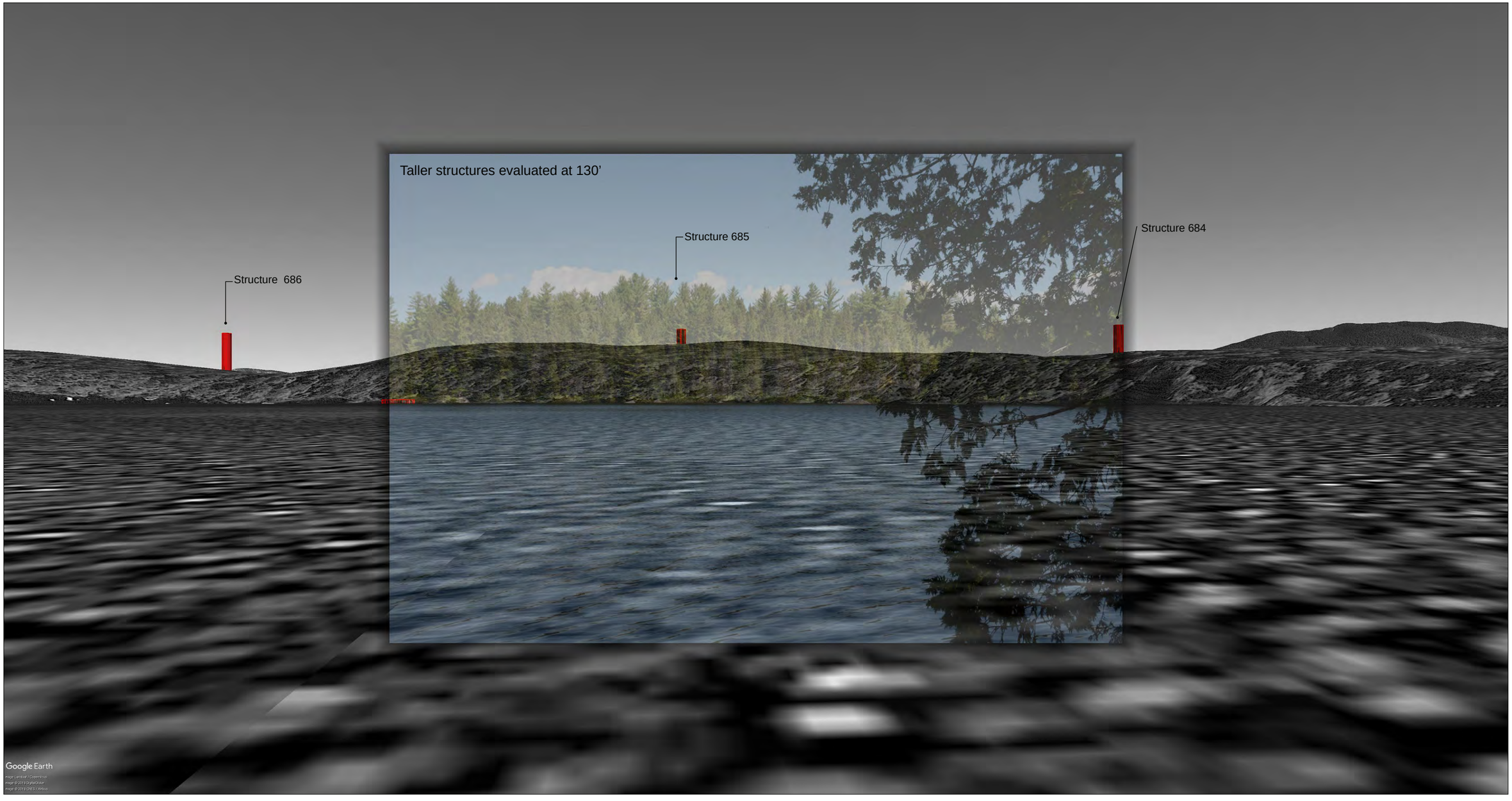
Moore Pond, Bradstreet Twp



Google Earth photo overlay image illustrating a view looking north from Moore Pond. Structures 684 - 688, evaluated at 130 feet, are shown as red lines. Intervening shoreline vegetation and topography would block views of taller structures.

TNC Area 5: Google Earth Image

Moore Pond, Bradstreet Twp



Google Earth photo overlay image illustrating a view looking northeast from Moore Pond. Structures 684 - 688, evaluated at 130 feet, are shown as red lines. Intervening shoreline vegetation and topography would block views of the structures.

PRIORITY AREAS FOR HABITAT CONNECTIVITY

TNC Area 6: Context Aerial Image

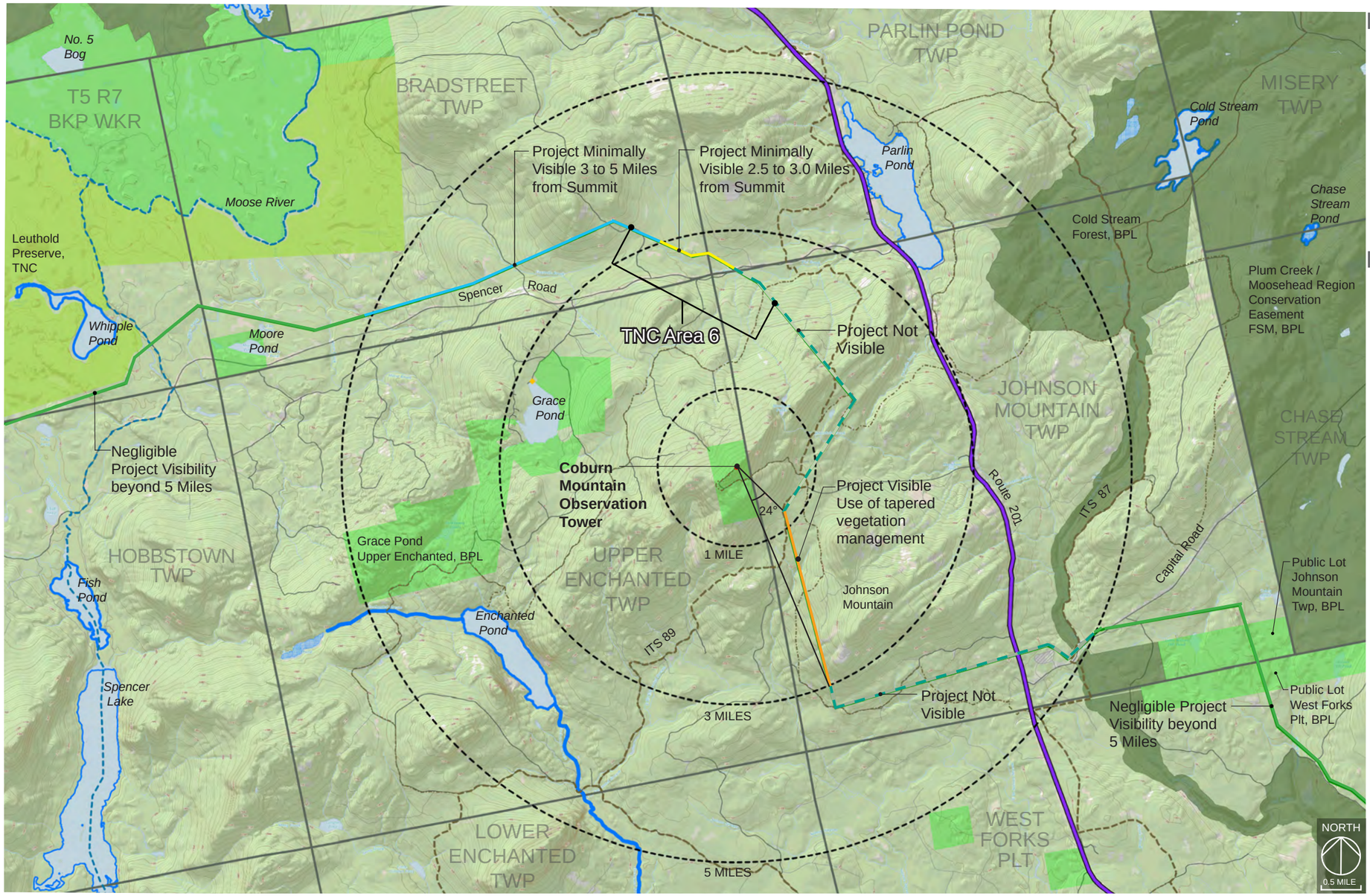
Tapered vegetation would be preferred in TNC Are 6 over taller structures to minimize potential adverse effects on the view from Coburn Mountain, from which the Project is currently minimally visible. Taller structures would elevate the conductors above the treeline where they would be more noticeable.

The use of tapered vegetation, already proposed by CMP in the Rusty Blackbird habitat adjacent to Spencer Road, will minimize visual effects to recreational users.

PRIORITY AREAS FOR HABITAT CONNECTIVITY

TNC Area 6

Rebuttal Testimony from Amy Segal
Exhibit CMP - 5.1 - A: Project Visibility from Coburn Mountain



PROJECT VISIBILITY FROM COBURN

- Negligible Project Visibility beyond 5 miles
- Project Not Visible Screened by topography
- Project Minimally Visible in Background
- Project Minimally Visible in Midground
- Project Visible Use of tapered vegetation management (See PSIM 44)

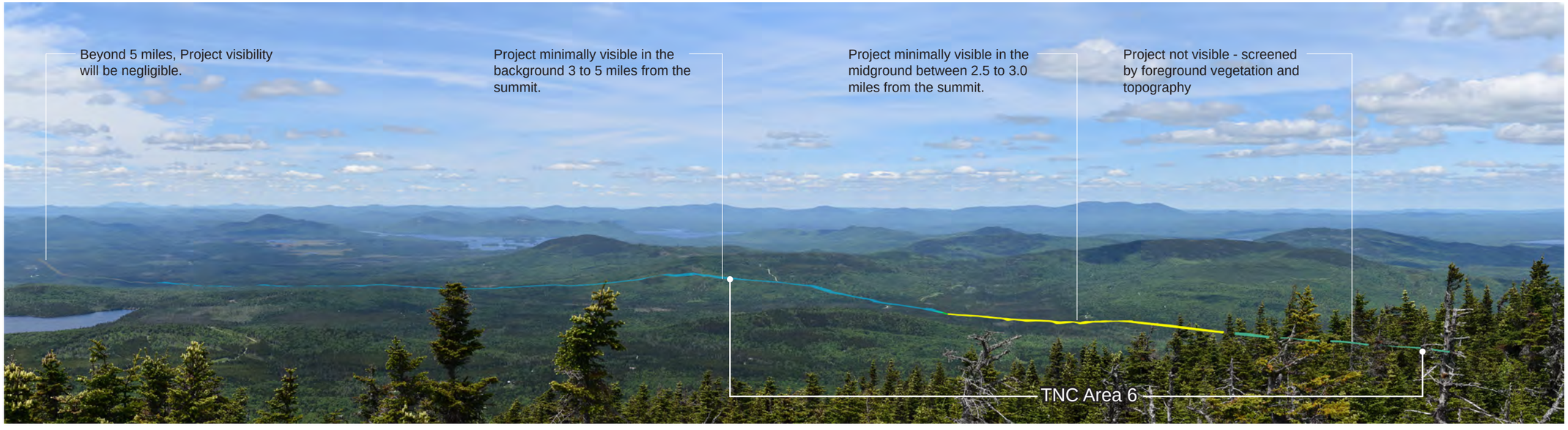
MAP LEGEND

- Municipal Boundaries
- Conservation Lands
- Conservation Lands - Harvesting permitted
- The Nature Conservancy Lands
- ITS - Interconnected Trail System
- Old Canada Road National Scenic Byway
- Remote Pond
- Great pond (rated as "Outstanding" or "Significant"), scenic rivers and streams

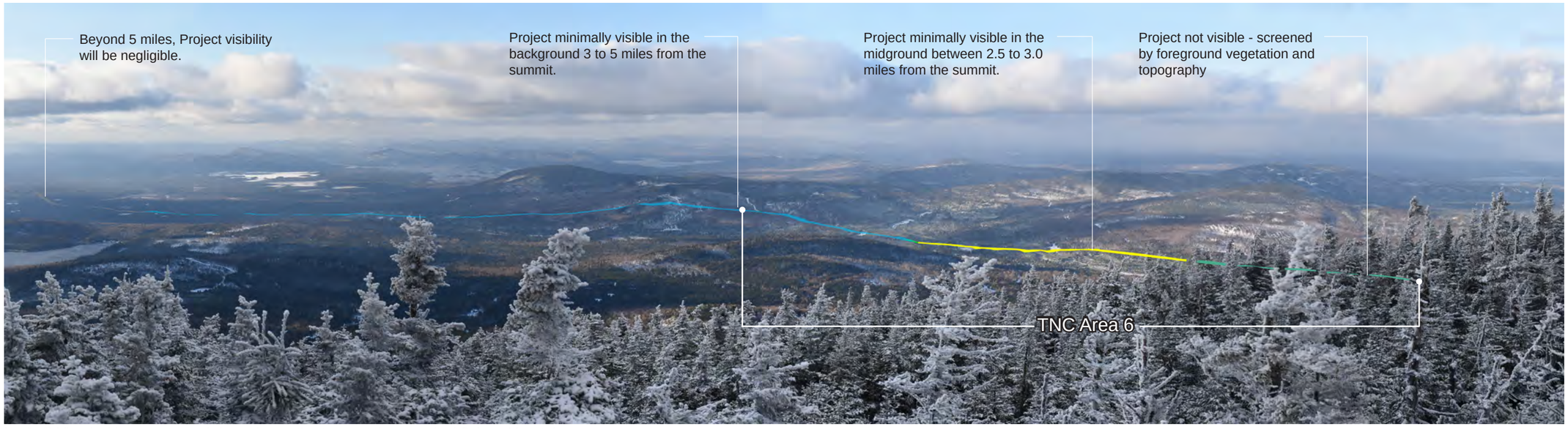
Submitted on March 21, 2019

The TNC Area 6 has been added to this illustration of Project visibility from Coburn Mountain. See photographs on page 21.

Rebuttal Testimony from Amy Segal
Exhibit CMP - 5.1 - A: Project Visibility from Coburn Mountain



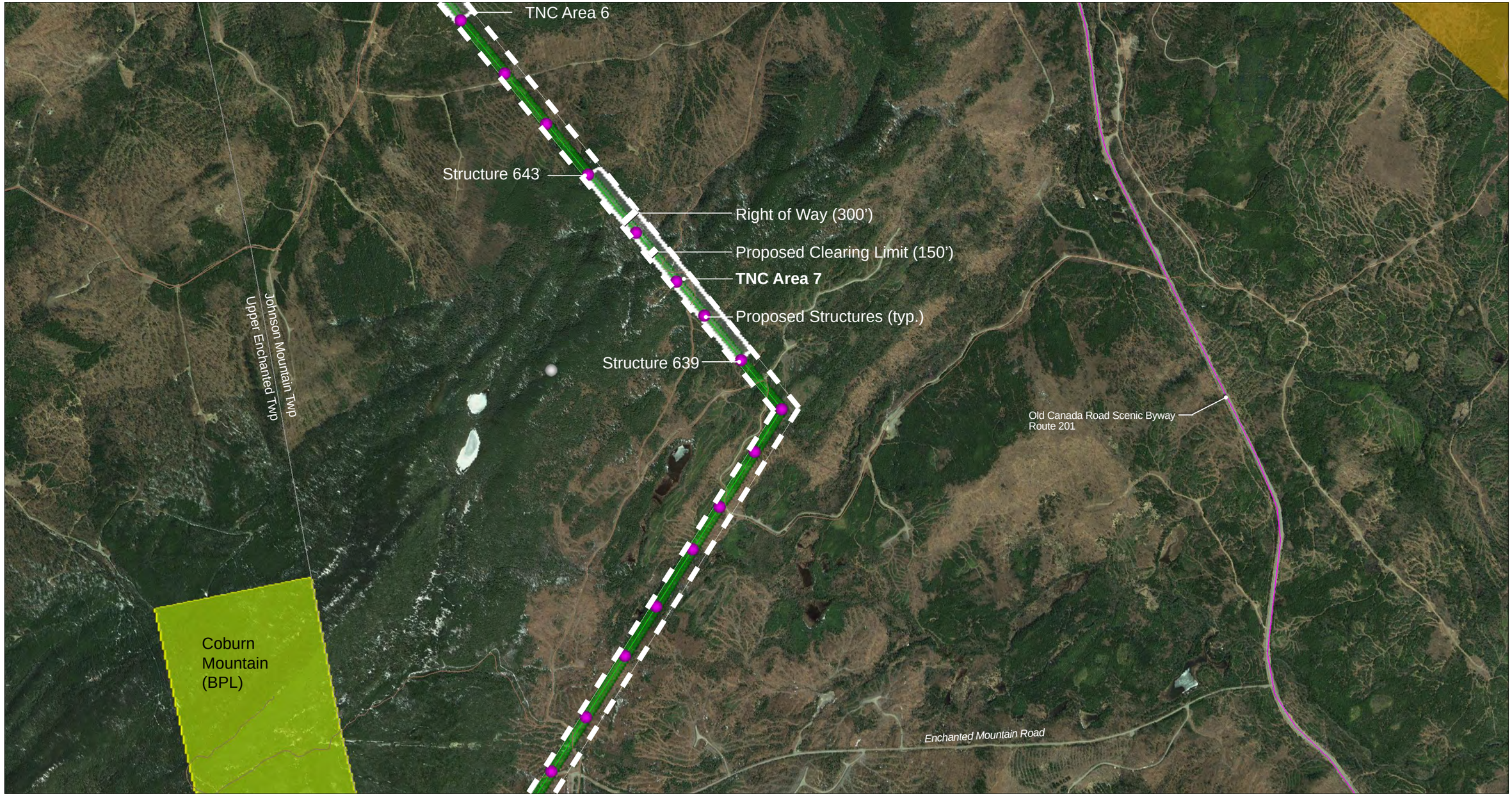
Leaf-on: View looking west to north from observation tower at the summit of Coburn Mountain.



Leaf-off: View looking west to north from observation tower at the summit of Coburn Mountain.

The TNC Area 6 has been added to these photographs from Coburn Mountain.

TNC Area 7: Context Aerial Image



TNC Area 7 would not be visible from the summit of Coburn Mountain due to intervening vegatation and topography.

NORTH

500 FT

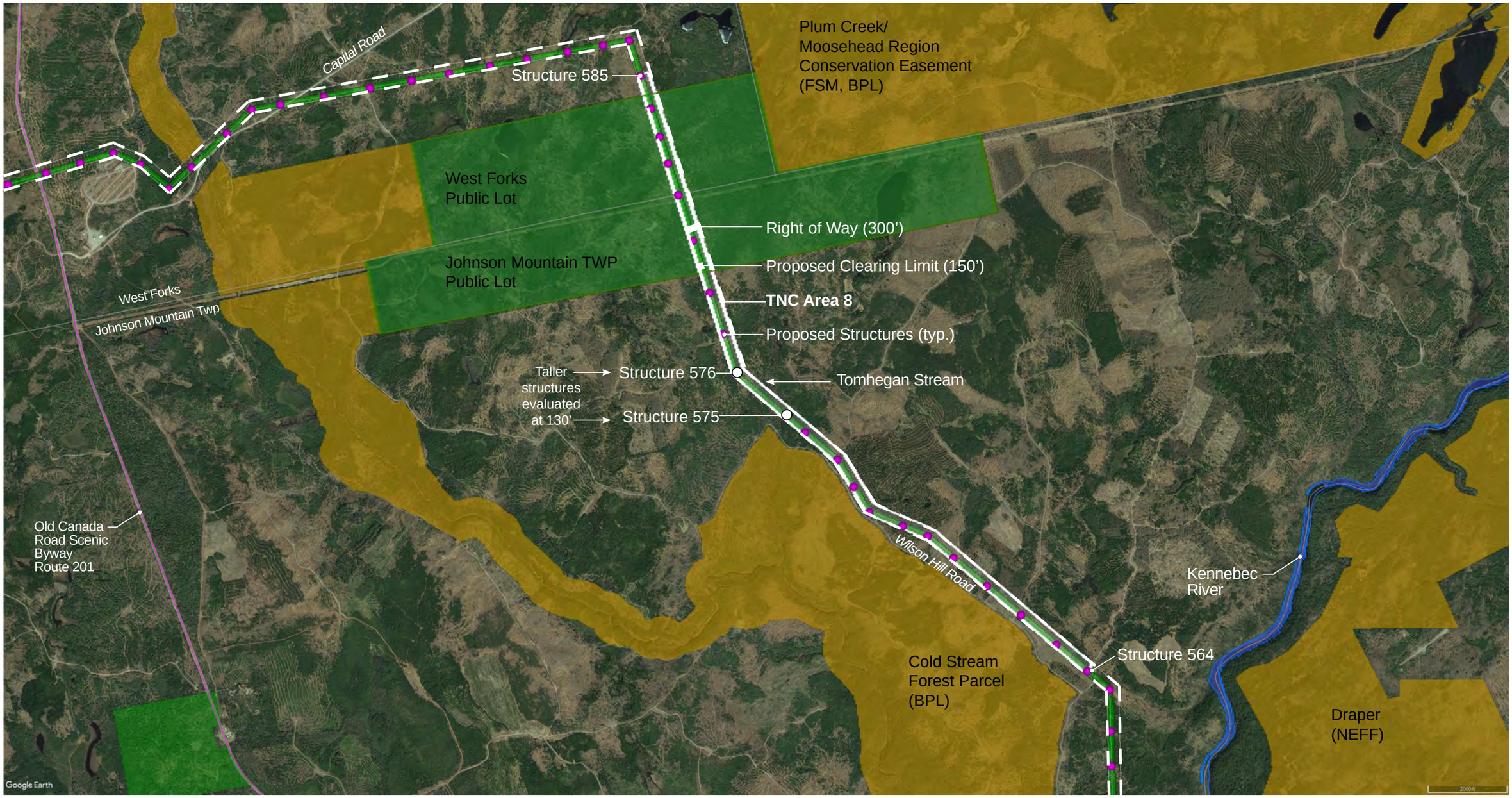
CENTRAL MAINE POWER | NEW ENGLAND CLEAN ENERGY CONNECT | tjd&a

TNC Area 7: Parlin Pond, Parlin Pond Twp

Previously submitted photosimulation: Panoramic view looking south to southwest from the northern end of Parlin Pond in Parlin Pond Twp toward the proposed HVDC transmission line. Five proposed HVDC structures, conductors and portions of the corridor clearing will be visible crossing the east shoulder of Coburn Mountain within 3 miles of this viewpoint. Portions of the cleared corridor will be slightly more visible in leaf-off conditions. The weathered steel HVDC structures will generally blend in with the wooded hillside. The conductors will be most visible in early morning light. Non-specular conductors will be used to minimize glare.

The use of taller structures in TNC Area 7 may result in greater Project visibility from Parlin Pond and Route 201 (Old Canada Road Scenic Byway). Tapered vegetation would be preferable.

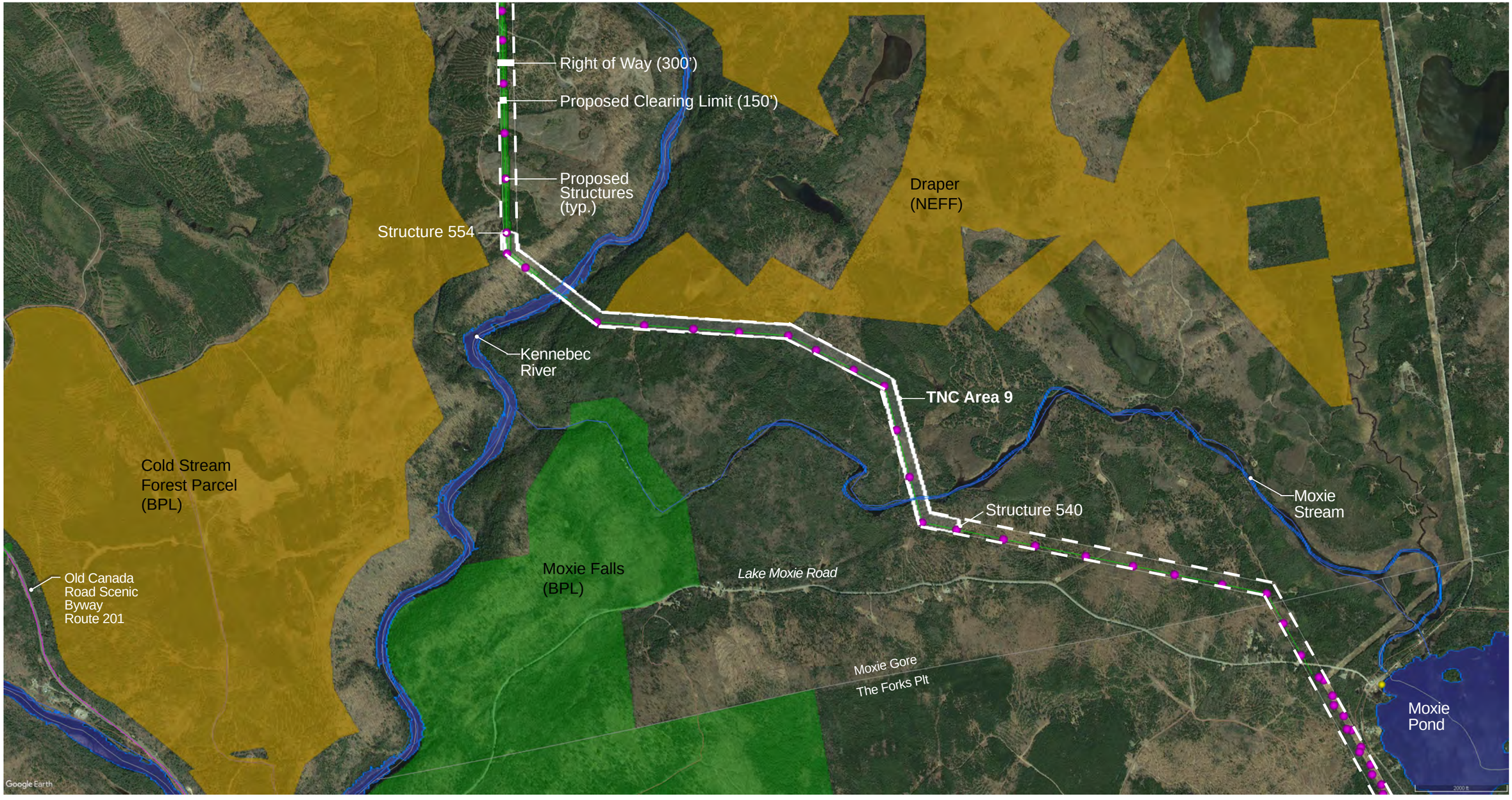
TNC Area 8: Context Aerial Image



Taller structures on either side of Tomhegan Stream would preserve taller vegetation adjacent to the stream and elevate the conductors a greater distance above the stream. The taller structures would not be visible from the stream due to preserved vegetation.

Tapering would minimize visual effects to recreational users on Wilson Hill Road where the Project corridor is near the road. Taller structures would be more visible to recreational users of the road due to the presence of commercial forestry operations on the northeast side of the road.

TNC Area 9: Context Aerial Image



CMP, working with Maine IF&W, has already proposed tapering in specific locations within the Upper Kennebec deer wintering area portion of TNC Area 9. Riparian buffers are proposed adjacent to Moxie Stream. The forestland on either side of the Kennebec River will be preserved through the use of Horizontal Directional Drill (HDD) technology.

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

and

STATE OF MAINE
LAND USE PLANNING COMMISSION

IN THE MATTER OF

CENTRAL MAINE POWER COMPANY	)
NEW ENGLAND CLEAN ENERGY CONNECT	)
#L-27625-26-A-N/#L-27625-TG-B-N/	)
#L-27625-2C-C-N/#L-27625-VP-D-N/	)
#L-27625-IW-E-N	)
CENTRAL MAINE POWER COMPANY	)
NEW ENGLAND CLEAN ENERGY CONNECT	)
SITE LAW CERTIFICATION SLC-9	)
Beattie Twp, Merrill Strip Twp, Lowelltown Twp,	)
Skinner Twp, Appleton Twp, T5 R7 BKP WKR,	)
Hobbstown Twp, Bradstreet Twp,	)
Parlin Pond Twp, Johnson Mountain Twp,	)
West Forks Plt, Moxie Gore,	)
The Forks Plt, Bald Mountain Twp, Concord Twp	)

PRE-FILED SUPPLEMENTAL TESTIMONY OF
KENNETH FREYE

May 1, 2019

This testimony is in response to the questions and data requests in the Tenth Procedural Order.

I. APPENDIX A TO THE TENTH PROCEDURAL ORDER

Appendix A to the Tenth Procedural order included questions and data requests on specific topics. In this supplemental testimony, I respond to the questions stated below.

QUESTION 25, EXPLANATION OF HOW THE CONNECTION POINT WAS CHOSEN ON THE QUEBEC/MAINE BORDER, AND WHETHER THIS WAS DECIDED BY HYDRO-QUEBEC OR REAL ESTATE CONSTRAINTS. WHETHER THERE IS FLEXIBILITY IN THIS LOCATION OR IF THERE ARE OTHER TIE-IN POINTS ON THE QUEBEC BORDER.

The process of siting and acquiring a corridor for an overhead electric transmission line between the Canadian border and CMP's existing transmission line system began in January 2014, and the siting and acquisition was substantially completed by late 2017. While a connection with Hydro-Québec was desired, the project concept included the possibility of Maine wind generation and/or Canadian wind generation. Hydro-Québec was committed to the Northern Pass project at that time and did not participate in discussions regarding a specific border crossing location.

The initial target for a border crossing location was an unspecified point in Gorham Gore Township (T1R9 WBKP). However, a crossing in Gorham Gore was quickly eliminated because any practical route to Gorham Gore would pass through the Holeb Maine Public Reserved Lands and lands of The Nature Conservancy, and would bisect lands of the Passamaquoddy Tribe. A border crossing somewhere in Beattie Township or the northern part of Merrill Strip Township appeared feasible based on topography, land ownership, and lack of known environmental constraints.

Any connection with the Hydro-Quebec system would need to originate from one of two substations located west of the Maine-Quebec border, one near Thetford Mines and one near Sherbrooke; there are no connection points closer to the Maine-Quebec border. The Hydro-Québec infrastructure between the Appalaches Substation near Thetford Mines and the border was examined, as well as the ownership on the Québec side of the border in the Merrill Strip-

Beattie area. Hydro-Quebec has a transmission line corridor between Thetford Mines and Lac-Megantic, the land on the Quebec side of the border abutting the crossing point is industrial forest land, and, based on our examination of aerial imagery, an expansion of the existing Hydro-Quebec transmission line and connection to the crossing point appeared feasible.

The actual border crossing point was selected because it has good access from existing logging roads. Conversely, the elevation along the Maine-Quebec border increases to the south, reaching 2,700 feet within ¾ mile of the crossing point, and moving the crossing point farther north would increase the length of the corridor across Beattie Township. Increasing the length of the corridor would increase the amount of clearing and the potential resource impacts, with no benefit. Thus, the corridor was sited and acquired with the border crossing at the current location in Beattie Township. Hydro-Québec sited its connection location after the NECEC corridor was acquired.

Any change in the border crossing location now would require the acquisition of a new corridor by both CMP and Hydro-Québec, new natural and cultural resource and cadastral surveys, and preparation and submission of amended permit applications. The acquisition and survey process likely would take three to four years.

In summary, the proposed Québec/Maine border transmission line crossing location was determined based on real estate constraints and other feasibility considerations, including topographic, social, and preserved/protected land locations. The contractual timeline and obligations for completion and in-service date of the NECEC Project do not allow reconsideration and evaluation of alternate transmission line crossing locations at this time.

Also, there are no other existing transmission line crossings on the Québec/Maine border that could allow co-location of a new transmission line border crossing.

QUESTION 26, WHETHER AN UNDERGROUND ROUTE CO-LOCATED WITH ROUTE 201 WOULD BE TECHNICALLY FEASIBLE, ECONOMICALLY VIABLE, AND/OR A SATISFACTORY OPTION TO MITIGATE CONCERNS RAISED DURING THE HEARING.

There are multiple aspects to this question to be considered. For example, what portions of the Project would be co-located with Route 201: Moscow to Quebec, Johnson Mountain to Quebec, or something less? What would co-location entail: entirely within the highway limits, acquisition of additional adjacent land, or crossings under the travel lanes? What other constraints would be involved: time frame to complete, use of eminent domain, or going around or through The Forks/West Forks, Jackman/Moose River?

Responses to these considerations, based on a very high level review not comparable to the thorough study that was conducted to select the proposed route (the NECEC corridor took nearly three years to site), are as follows:

- There is insufficient space within the highway limits to construct and bury an underground electric transmission line and appurtenant facilities. Although the highway is 132 feet wide in some areas, approximately 90 feet is cleared for the paved surface, shoulders, ditches, grading and utilities. This leaves 42 feet, assumed to be split generally between the east and west sides of the highway. Given that the centerline of the buried cable needs to be approximately 35 feet from the tree line, an underground transmission line would not fit within the highway limits. This does not account for additional grading that would be needed in many locations to provide a surface on which construction equipment could operate or space to excavate and install splice boxes.

- Acquiring land outside the highway limits for any distance with any consistency would be extremely difficult. Residential, recreational, and small commercial landowners likely would object to having a large trench dug across the road front of their property, losing access during construction and having permanent restrictions placed on the front of their properties.

- It would not be possible to stay within the highway limits through village areas. Acquiring new corridor around the village areas is not reasonably feasible due to physical and social constraints.

- It would not be safe or practical to construct an underground electric transmission line on the same side of the highway as the existing overhead distribution lines. The boomed equipment used to trench, move cable rolls, and place splice boxes are all capable of contacting overhead distribution lines and any underbuilt utilities. Guy cables and anchors are susceptible to contact with construction equipment; contacts can cause outages and/or damage to structures. Roadside distribution lines typically are located on the outside of curves to facilitate guying and therefore switch from one side of the highway to the other as the direction of the curve changes. Unless the underground transmission were located entirely outside of the highway limits, the underground line would need to move from one side of the highway to the other to remain on the opposite side from the overhead distribution line; how the underground transmission line crosses the roadway would need to be resolved with MDOT.

This brief summary does not address the environmental impacts to wetlands and streams, visual impacts, or impacts on traffic, which are likely to be significant but have not been thoroughly studied for this alternative. Additional considerations on the constructability along Route 201 are included in Justin Bardwell's supplemental testimony.

In sum, an underground route co-located with Route 201 would not be technically feasible, economically viable, and/or a satisfactory or practicable option to mitigate concerns raised during the hearing.

II. APPENDIX B TO THE 10TH PROCEDURAL ORDER

ITEM 2, THE APPLICATION STATED THAT PLUM CREEK MAINE TIMBERLANDS LLC "SPECIFICALLY DID NOT WANT A TRANSMISSION LINE LOCATED ALONG THE SPENCER ROAD." PLEASE PROVIDE EVIDENCE FROM THE LANDOWNER TO THAT EFFECT.

In the initial meetings (early 2014 to early 2015) with Plum Creek Maine Timberlands, LLC (PCT), the then-owner of much of the land on which the new NECEC corridor was subsequently located and the owner of most of the land along the Spencer Road, PCT and CMP

discussed the general location of the corridor and potential adverse impacts to PCT's forest operations. Because locating the NECEC corridor along the Spencer Road could adversely impact PCT's ability to relocate the road from time to time, replace culverts and bridges, construct and maintain ditches and tail ditches, use existing log landing areas and gravel pits, construct new log landing areas and gravel pits, and generally impede access to its abutting land, CMP agreed to generally locate the corridor away from the Spencer Road. From CMP's perspective, this was reasonable and the NECEC corridor was sited accordingly. These were verbal discussions without any documentation. PCT subsequently sold all of its holdings to Weyerhaeuser Company after CMP had secured the rights to the corridor and access roads.

From the perspective of the person responsible for siting the NECEC corridor, siting an overhead transmission line adjacent to a road is generally a poor idea unless the road is straight and the surrounding country flat and dry. Roads curve, while overhead transmission lines are a series of straight tangents. If the transmission line adheres to the location of the road, many angle structures are needed, some of which may need to be located in wetlands, other sensitive areas, or low points creating sub-optimal span lengths and unnecessary impacts. If the transmission line only generally follows the course of the road, as the generator lead does along the Golden Road where it parallels the Penobscot River, small islands or strips of timberland are created between the road and transmission line.

For all of these reasons, it would not have been practicable to co-locate the NECEC Project adjacent to the Spencer Road.

Dated: April 25, 2019

Respectfully submitted,

Kenneth H. Freye

STATE OF MAINE
Kennebec, ss.

The above-named Kenneth H. Freye did personally appear before me and made oath as to the truth of the foregoing pre-filed testimony.

Dated: April 25, 2019

Before Me,

Notary Public
Name:
My Commission Expires:

Tyler W. Bradbury
Notary Public, State of Maine
My Commission Expires August 18, 2025

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

and

STATE OF MAINE
LAND USE PLANNING COMMISSION

IN THE MATTER OF

CENTRAL MAINE POWER COMPANY	)
NEW ENGLAND CLEAN ENERGY CONNECT	)
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Parlin Pond Twp, Johnson Mountain Twp,	)
West Forks Plt, Moxie Gore,	)
The Forks Plt, Bald Mountain Twp, Concord Twp	)

PRE-FILED SUPPLEMENTAL TESTIMONY OF JUSTIN TRIBBET

May 1, 2019

This testimony is in response to the questions and data requests in the Tenth Procedural Order.

I. APPENDIX A TO THE TENTH PROCEDURAL ORDER

QUESTION 11, IDENTIFY ENGINEERING STANDARDS, SAFETY OR DESIGN CODES, ETC. THAT SPECIFICALLY APPLY TO THIS PROJECT.

For the NECEC Project the HVDC overhead transmission line will comply with all required transmission line codes and standards and numerous elective standards. I provide below a list of applicable standards identified by the NECEC transmission line design team to date:

1. Avangrid TM2.23.00 – Overhead Transmission Construction Standards
2. ACI 318, Building Code Requirements for Structural Concrete
3. ANSI C2: National Electric Safety Code (NESC)
4. ASCE 48: Design of Steel Transmission Pole Structures
5. ASCE 72: Design of Steel Transmission Pole Structures
6. ASCE 74: Guidelines for Electrical Transmission Line Structural Loading
7. ASCE 91: Design of Guyed Electrical Transmission Structures
8. CIGRE Overhead Lines
9. CIGRE 63: Guide to Procedures for Estimating the Lightning Performance of Transmission Lines
10. CIGRE 273: Overhead Conductor Safe Design Tension with Respect to Aeolian Vibrations
11. CIGRE 322: State of the Art of Conductor Galloping
12. CIGRE 348: Tower Top Geometry and Mid Span Clearances
13. CIGRE 518: Outdoor Insulation in Polluted Conditions - Guide to Selection and Dimensioning-Part 2: DC Case
14. EPRI Red Book: Transmission Line Reference Book, 200 kV and Above, 3rd Edition
15. EPRI Orange Book: Transmission Line Reference Book, Wind Induced Conductor Motion
16. EPRI HVDC Transmission Reference Book – The Olive Book
17. FHWA-NHI-10: Drilled Shafts: Construction Procedures and LRFD Design Methods
18. IEC 60060-1: High Voltage Test Technique
19. IEC 60071-2: Insulation Co-ordination – Part 2: Application Guide
20. IEC 60120: Dimensions of Ball and Socket Couplings of String Insulator Units
21. IEC 60383-2: Ceramic or Glass Insulators Units for DC Systems - Part 2
22. IEC 60437: Radio Interference Test on High-Voltage Insulators

23. IEC 60815-4: Selection and Dimensioning of HV Insulators for DC Systems
24. IEC 60826: Design Criteria of Overhead Lines
25. IEC 61245: Artificial Pollution Tests on High-Voltage Insulators for DC Systems
26. IEC 61325: Ceramic or Glass Insulators Units for DC Systems
27. IEEE C95.6: Standard for Safety Levels with Respect to Human Exposure to Electromagnetic Fields, 0-3 kHz
28. IEEE 4: Standard for High-Voltage Testing Techniques
29. IEEE 516: Guide for Maintenance Methods on Energized Power Lines
30. IEEE 524: Guide to the Installation of Overhead Transmission Line Conductors
31. IEEE 524a: Guide to Grounding during the Installation of Overhead Transmission Line Conductor: Supplement to IEE Std. 524-1992
32. IEEE 539: Standard Definitions of Terms Relating to Corona and Field Effects of Overhead Power Lines
33. IEEE 656: Standard for the Measurement of Audible Noise from Overhead Transmission Lines
34. IEEE 691: Guide for Transmission Structure Foundation Design and Testing.
35. IEEE 738: Standard for Calculating the Current-Temperature Relationship of Bare Overhead Conductors
36. IEEE 951: Guide to the Assembly and Erection of Metal Transmission Structures
37. IEEE 977: Guide to Installation of Foundations for Transmission Line Structures
38. IEEE 1138: Standard for Testing and Performance for Optical Ground Wire (OPGW) for Use on Electric Utility Power Lines
39. IEEE 1313.2: Guide for the Application of Insulation Coordination
40. IEEE 1243: Guide for Improving the Lightning Performance of Transmission Lines
41. IEEE 1591.1: Standard for Testing and Performance of Hardware for Optical Ground Wire (OPGW)
42. IEEE PES Overhead Lines Subcommittee TR62: “Guide for High Voltage Direct Current Overhead Transmission Line Design”
43. NESC: National Electrical Safety Code, 2017
44. USDA: RUS 1724E-200: Design Manual for High Voltage Transmission Lines

For a detailed list of underground HVDC transmission standards please refer to Justin Bardwell’s testimony.

QUESTION 18, A DESCRIPTION OF THE DIFFERENCES OF NORMAL OPERATION AND MAINTENANCE (O&M) COSTS BETWEEN OVERHEAD AND UNDERGROUND LINES.

The yearly cost of normal operations and maintenance of an overhead transmission line compared to an underground cross-linked polyethylene (XLPE) transmission line can be approximated as follows:

- Overhead Transmission Line: 1.5-2%[1] of capital costs
- Underground XLPE Transmission Line: 0.2-0.4%[1] of capital costs

Based on these estimates and considering the underground alternatives originally explored in Mr. Bardwell's rebuttal testimony, the yearly maintenance costs of the proposed NECEC HVDC line could be approximated in the table below (values in millions of USD).

[1] See Page 12, Table VII of: "Comparative Analysis of Cost between EHV AC Overhead Transmission Lines and Underground Transmission XLPE Cables" by Preet Khandelwal, Arun Pachori. International Journal of Enhanced Research in Science Technology & Engineering, ISSN: 2319-7463 Vol. 2 Issue 6, June-2013, pp: (7-14), Available online at: https://www.academia.edu/3893194/Comparative_Analysis_of_Cost_between_EHV_AC_Overhead_Transmission_Lines_and_Underground_Transmission_XLPE_Cables

Alternative Option	Overhead- (Baseline)	Underground- Proposed Route (Alternative)	Underground- Alternative Route (Alternative)	Underground-New 53.5-mile Corridor Proposed Route (Alternative)
NECEC Overhead HVDC Line Capital Costs	260[2]	0	0	160[3]
NECEC Alternative HVDC Underground Line Capital Costs	33	1,878[4]	2,067[5]	750[6]
Yearly Operations and Maintenance Costs Overhead [7]	4.6	0	0	2.8
Yearly Operations and Maintenance Costs Underground[8]	0.1	5.6	6.2	2.3
Yearly HVDC Line Operations and Maintenance Costs- Total[9]	**4.7**	**5.6**	**6.2**	**5.1**

Based on the data in the table above, the yearly operations and maintenance costs associated with the alternatives involving underground would be between 9% and 32% higher than the overhead NECEC Project baseline.

[2] From Tribbet Rebuttal Testimony, table on Page 5: Existing Project Cost [Overhead- (Baseline)] - Existing Project Cost [Underground-Proposed Route (Alternative)]

[3] From Tribbet Rebuttal Testimony, table on Page 5: Existing Project Cost [Underground-New 53.5-mile Corridor Proposed Route (Alternative)]- Existing Project Cost [Underground-Proposed Route (Alternative)]

[4] See rebuttal testimony of Justin Bardwell, Exhibit CMP-11-B.

[5] See rebuttal testimony of Justin Bardwell, Exhibit CMP-11-D.

[6] See rebuttal testimony of Justin Bardwell, Exhibit CMP-11-C.

[7] Assumed average of 1.5-2% range or 1.75% of capital costs.

[8] Assumed average of 0.2-0.4% range or 0.3% of capital costs.

[9] Total of yearly overhead and underground HVDC line operations and maintenance costs for each alternative.

Furthermore, as previously noted in the testimony of Justin Bardwell, repairing cable failures would be much more expensive and could jeopardize CMP's ability to meet the Project purpose, including the required 90% monthly availability.

QUESTION 23, WHAT THE DIFFERENCE IS BETWEEN CONCEPTUAL LEVEL ESIMATES AND PRELIMINARY ESTIMATES, AND HOW FINAL CONSTRUCTION-LEVEL COST ESTIMATES COMPARE TO CONCEPTUAL LEVEL COST ESTIMATES

In Mr. Bardwell's rebuttal testimony, he characterizes his estimates as "conceptual level" and "preliminary." These characterizations were not intended to imply a difference in estimate type or class, but rather to clarify that detailed engineering work has not been completed.

CMP utilizes the estimating procedures and practices detailed by ISO-NE Planning Procedure 4, Attachment D. This procedure specifies, in Table 1 below, the differences in each estimate type regarding the level of project definition, estimate class and type, and assumed accuracy levels of a given estimate type.

Project Stage	Level of Project Definition	Estimate Class	Estimate Type	Regional Review	RSP Listing Target Accuracy
Project Inititation	0% to 15%	-	Order of Magnitude	Need Approval (RSP Listing)	-50% to +200%
Proposed Project	15% to 40%	A	Conceptual Estimate	CRC Review / Retain Proposed Solution	-25% to +50%
Planned Project	40% to 70%	B	Planning Estimate	PPA Approval	-25% to +25%
Final Project Design	70% to 90%	C	Engineering Estimate	CRC Review / TCA Approval	-10% to +10%
Under Construction	80% to 100%	D	Construction Estimate		-10% to +10%

***Table 1**: Cost Estimate types per project phase (From AACE definition & customized for Transmission Project)*

Based on the estimate type definitions above, Mr. Bardwell's estimates are Estimate Class A- Conceptual Estimates; Mr. Bardwell uses the words "conceptual" and "preliminary" interchangeably. The term "Final Construction-Level" estimate, used in the question above, is

equivalent to an Estimate Class D- Construction Estimate, in accordance with ISO-NE Planning Procedure 4 Attachment D Table 1.

To explain further the differences between an Estimate Class A- Conceptual Estimate and an Estimate Class D- Construction Estimate, I provide below Table 2, from ISO-NE Planning Procedure 4, Attachment D. This table provides a suggested contingency range from EPRI to be considered as a function of estimate class.

		From AACE		From EPRI
Estimate Class	**Descriptive (AACE / EPRI)**	**LEVEL OF PROJECT DEFINITION** Expressed as % of complete definition	**EXPECTED ACCURACY RANGE** Typical variation in low and high ranges	**Suggested Contingency**
A	Study / Simplified Estimate	1% to 15%	L: -15% to -60% H: +30% to +120%	30-50 %
B	Budget, Authorization or Control / Preliminary Estimate	10% to 40%	L: -10% to -30% H: +20% to +60%	15-30%
C	Control or Bid / Detailed Estimate	30% to 70%	L: -5% to -15% H: +10% to +30%	10-20%
D	Check Estimate or Bid / Finalized Estimated	50% to 100%	L: -5% to -5% H: +10% to +10%	5-10%

***Table 2**: Cost Estimate types and relevance based on level of project definition*

Based on these tables, we can make the following general comparisons between an Estimate Class A- Conceptual Estimate and an Estimate Class D- Construction Estimate:

- An Estimate Class D- Construction Estimate requires a higher level of project definition (i.e., percent complete of engineering) to produce than an Estimate Class A- Conceptual Estimate, as shown in Table 1, 80% to 100% vs. 15% to 40%.

- An Estimate Class D- Construction Estimate has a higher level of target accuracy than an Estimate Class A- Conceptual Estimate, as shown in Table 1, -10% to +10% vs. -25% to +50%.

- An Estimate Class D- Construction Estimate typically has a lower level of suggested contingency than an Estimate Class A- Conceptual Estimate as shown in Table 2, 5% to 10% vs. 30% to 50%.

Note that in the case of the estimates prepared by Mr. Bardwell in Exhibit CMP-11-B, CMP-11-C, CMP-11-D, and CMP-11-F, he elected to reduce contingency levels below the EPRI recommended ranges above to make the estimates more comparable to the assumptions in the NECEC project selected bid in the 83D RFP.

II. APPENDIX B TO THE TENTH PROCEDURAL ORDER

ITEM 4, FOR ALL THE COST ESTIMATE SUMMARY SHEEETS IN THE REBUTTAL TESTIMONY, PLEASE PROVIDE ADDITIONAL BACKUP SPREADSHEETS OR DETAILS FOR HOW EACH OF THE LINE ITEM COSTS WERE DETERMINED.

Referring to my rebuttal testimony, the table on page 5 includes a tabulation that presents the incremental total project cost for the three proposed underground alternatives: Underground-Proposed Route, Underground-Alternative Route, and Underground-New 53.5-mile Corridor Proposed Route. It also includes a column labeled Overhead (Baseline), which is included as a reference to the NECEC Project baseline costs. I provide details below to explain how each of the line item costs of that table were determined.

Existing Project Costs - This row contains all the Project costs that are not related to the underground alternative analysis. To derive the number, I started with the Project total cost of $0.95 billion and subtracted the corresponding length of the overhead transmission line that would be removed under this alternative. Specifically for the Underground- Proposed Route and

the Underground- Alternative Route alternatives, the total cost of the 145.3 mile overhead HVDC transmission line was removed, so the calculation was as follows: $0.95B (project total) - $0.26B (145.3-mile removed overhead line) = $0.69B. For the Underground- New 53.5-mile Corridor Proposed Route the same approach was utilized, but only the costs of overhead line along the new corridor route were removed. In that scenario the corresponding calculation would be: $0.95B (project total) - $0.10B (overhead line removed in 53.5-mile new corridor segment) = $0.85B.

Alternative Underground Cost - This row contains the underground costs associated with each of the three alternatives, and this cost is taken directly from the Rebuttal Testimony of Justin Bardwell. Specifically, for each alternative: (1) Underground-Proposed Route, see Exhibit CMP-11-B, (2) Underground-Alternative Route, see Exhibit CMP-11-D, and (3) Underground-New 53.5-mile Corridor Proposed Route, see Exhibit CMP-11-C.

Overhead Mitigation Value Removed - This row contains a negative number equal to the incremental costs of the agreed-upon overhead line mitigation measures. The intent of this row is to ensure that we remove these costs because they are not required for the underground alternative. This is consistent between all underground alternatives, because the mitigation measures are in the new 53.5-mile corridor section. The description of the mitigation measures and the corresponding $11 million cost was provided on page 4 of my rebuttal testimony.

Total - This row contains the summation of the rows noted above and represents the total project cost for each alternative.

Incremental Project Costs - This row contains the incremental costs of each project alternative. To derive this number the following equation was used for each alternative: Total

(Respective Underground Alternative) – $0.95B = Incremental Project Costs (Respective Underground Alternative).

Incremental Project Costs (%) - This row contains the incremental costs of each project alternative expressed as a percent. To derive this number the following equation was used for each alternative: [Total (Respective Underground Alternative) - $0.95B] / $0.95B = Incremental Project Costs % (Respective Underground Alternative).

Dated: April 25, 2019

Respectfully submitted,

Justin Tribbet

STATE OF MAINE
Kennebec, ss.

The above-named Justin Tribbet did personally appear before me and made oath as to the truth of the foregoing pre-filed testimony.

Before,

Dated: April 25, 2019

Notary Public
Name: PATRICIA ANN LARRIVEE
My Commission Expires: 4/7/2026

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

and

STATE OF MAINE
LAND USE PLANNING COMMISSION

IN THE MATTER OF

CENTRAL MAINE POWER COMPANY	)
NEW ENGLAND CLEAN ENERGY CONNECT	)
#L-27625-26-A-N/#L-27625-TG-B-N/	)
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#L-27625-IW-E-N	)

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West Forks Plt, Moxie Gore,	)
The Forks Plt, Bald Mountain Twp, Concord Twp	)

PRE-FILED SUPPLEMENTAL TESTIMONY AND EXHIBITS OF
JUSTIN BARDWELL

May 1, 2019

This testimony is in response to the questions and data requests in the Tenth Procedural Order.

I. APPENDIX A TO THE TENTH PROCEDURAL ORDER

QUESTION 3, A MORE DETAILED DESCRIPTION OF UNDERGROUNDING TECHNIQUES INCLUDING DIRECT BURIAL, DUCT BANK INSTALLATION, OR TRENCHLESS INSTALLATION. THIS SHOULD ALSO INCLUDE TYPICAL DIMENSIONS, MATERIALS AND CROSS-SECTION DIAGRAMS.

My rebuttal testimony[1] describes the basic installation steps for the underground construction methods. Many of the details of the installation methods are driven by limitations on the amount of cable that can be transported and installed as a single length. For this project standard road transportable reels will hold approximately 2,500 feet of cable at most. Longer lengths are possible but would require oversize and overweight loads. The National Electrical Safety Code (NESC) requires a minimum cover (depth to surface) of 42 inches over the cable. It is common in cold weather climates to increase the burial depth to limit disruption due to freeze/thaw cycles. In the Project area a minimum cover of 60 inches is recommended.

See Exhibit CMP-11.1-A for typical sections identifying dimensions and materials for direct buried installation, duct bank installation, precast concrete joint bays (splicing vaults), horizontal directional drills, and microtunneling installations. See Exhibit CMP-11.1-B for pictures of similar installations.

QUESTION 4, A DESCRIPTION OF THE DIFFERENCES OF NORMAL OPERATION AND MAINTENANCE (O&M) ACTIVITIES BETWEEN OVERHEAD AND UNDERGROUND LINES.

Normal maintenance activities for overhead lines consist of visual inspections of the conductors, splices, insulators, poles, and vegetation along the route by helicopter twice a year, and visual inspection by foot once a year. In addition, every four to five years a more detailed inspection is conducted, including infrared scanning for conductor condition, and a condition evaluation of the poles. The access to any specific section of the line for these operations normally can be achieved through temporary access with provisional matting.

[1] Pre-Filed Rebuttal Testimony and Exhibits of Justin Bardwell (CMP-11).

Normal maintenance for underground lines depends on the type of installation. For lines installed in duct bank, visual inspection of the terminations, joints, and cable racking systems are required. This requires entering the pre-casting jointing bays roughly twice a year. For direct buried cable systems maintenance is similar, but the joints are inaccessible, so most utilities will partially expose the joints for inspection every 5 years. In both cases the utility must patrol the route, ensuring that access to the jointing locations is maintained, vegetation is managed, and no unauthorized dumping or construction has occurred over the cable route.

For transmission lines with a high availability requirement such as the NECEC, it is also common to conduct diagnostic testing on a 5-year schedule. This testing requires access to every joint and termination of any underground section. The testing includes electrically testing the cable jacket to identify breaks that could lead to corrosion and partial discharge monitoring, to identify developing deficiencies in the cable insulation body.

The requirement of having access to every joint and termination of an underground section through its operating life requires having permanent access roads to most of the joint locations, as described in my rebuttal testimony. Additionally, the maintenance of these access roads will mean additional costs not incurred by an overhead line.

Vegetation management will be similar for overhead and underground lines, with a vegetation maintenance cycle typically every four years and an annual inspection to identify areas of concern that may require remediation prior to the normal maintenance cycle.

QUESTION 5, WHETHER FEWER LONGER SECTIONS (VERSUS MORE SHORTER SECTIONS) OF THE LINE COULD BE UNDERGROUNDED THAT WOULD MINIMIZE BOTH THE NUMBER OF TRANSITION STATIONS AS WELL AS THE ENVIRONMENTAL IMPACT OF THE PROJECT.

Extending the length of the underground segment is not a reasonable alternative because, as explained in my rebuttal testimony, underground transmission has significantly higher temporary environmental impacts and limited reductions in permanent environmental impacts when compared to overhead transmission, along with increased operational risk that could compromise the Project's ability to meet its availability requirements, and greatly increased cost. Although a fewer number of longer underground sections would have fewer termination stations than a larger number of shorter underground sections, neither alternative is practicable or less environmentally damaging than the proposed overhead line.

QUESTION 6, EXPLANATION OF WHY A PERMANENT ROAD WOULD NEED TO BE CONSTRUCTED TO EACH SPLICE LOCATION (UNDERGROUNDING), BUT NOT FOR OVERHEAD POLES. EXPLANATION OF WHY MATTING ALONG THE ROW (WHICH COULD BE USED FOR OVERHEAD POLES) COULD NOT BE USED FOR SPLICE BOXES.

Splicing vaults for +/-320kV HVDC joints weigh approximately 75,000 pounds and are shipped in three sections of between 25,000 and 40,000 pounds each. Steel poles weigh approximately 30,000 pounds to 60,000 pounds but are normally shipped in three to four sections to reduce the weight of each shipment to less than 15,000 pounds, requiring fewer improvements and reinforcements to access roads during the construction phase.

As discussed earlier, underground cable systems require regular inspections from the ground in place of the aerial inspections used for overhead transmission. This requires permanent access paths to conduct the inspections. In addition, the cable joints are the most likely points of failure after damage by a third party. This requires the ability to quickly reach and evaluate joints to confirm the location of the fault.

The equipment required to make a repair is the same as the equipment used in the original construction and would require similar access requirements.

Matting is generally a temporary measure unlikely to withstand expected weather conditions over the course of a year. Stabilized permanent matting has very similar impacts to permanent stabilized access roads.

QUESTION 7, HOW THE DETERMINATION WAS MADE THAT A 75-FOOT WIDE CLEARED WIDTH WOULD BE NECESSARY FOR A POTENTIAL UNDERGROUND LINE.

As described in my rebuttal testimony, the cables need to be kept out of the roots of large vegetation and out of the root influence area to prevent long-term impacts to cable operation. The size of the root influence area varies with tree species, size, and soil conditions.

General guidelines for approximation are available. For tall trees with deep root systems such as oak or maple the main root system is expected to be roughly 2/3rds the spread of the crown, with additional filament roots impacting moisture content out to the full width of the canopy. For shorter trees with shallower root systems, such as spruce, the width of the root system area of impact is roughly the same as the height of the tree.[2]

For both types of trees in Maine the general guidance results in an impact area of nearly 35 feet. Allowing for a 5-foot trench with 35 feet on either side gives a total width of 75 feet. See exhibit CMP-11.1-C for a diagram of the expected root areas.

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[2] Lily, Sharon J.(2001). Arborist Certification Study Guide: Tree Biology. International Society of Arboriculture. Champaign, IL. ADR BookPrint. Wichita, KS.

QUESTION 8, WHETHER THERE IS MORE CLEARED AREA WITH A 150-FOOT WIDE OVERHEAD LINE OR WITH A 75-FOOT WIDE UNDERGROUND LINE INCLUDING TERMINATION STATIONS.

Total clearing area would be lower with underground construction more than a few thousand feet long. However, total cleared area does not represent the full extent of environmental impacts, nor does it determine the reasonableness of the alternative, as explained in my rebuttal testimony. The continuous nature of underground construction creates significantly more temporary impacts. In addition, the termination stations, access roads for the termination stations, access roads for the splice locations, and any vaults create new unvegetated impervous surface.

QUESTION 9, EXPLANATION OF THE NUMBER OR PERCENTAGE OF CABLE FAULTS IN UNDERGROUND CABLES VS. OVERHEAD LINES.

Due to the small quantity and relatively recent advent of polymer insulated HVDC cable in service there are no statistics on the reliability of polymer insulated HVDC cable. An international power research group, CIGRE, conducts industry surveys[3] on cable reliability every decade. Unfortunately the last published study is from 2009 and has limited data on polymer insulated cable in HVDC applications or data on extra high voltage AC cables (230kV and above).

Based on the limited data available, faults due to all causes for underground transmission lines (69kV and above) occurred approximately 0.141 times per year per 100 miles.

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[3] CIGRE Technical Brochure 379, Update of Service Experience of HV Underground and Submarine Cable Systems.

For overhead lines CMP has an estimated average of 0.53 faults per year per 100 miles at 345kV. This represents incidents where repair or remediation was required and excludes incidents where power was restored within seconds by reclosing. These data represent CMP's operating and vegetation management practices for overhead lines most similar to the proposed installation.

As described in my rebuttal testimony, the total number of faults does not provide an accurate representation of the differences in reliability. The vast majority of faults on overhead systems are minor and temporary, allowing for immediate restoration of the line to service. The faults requiring repair or remediation are relatively short, requiring hours or, at most, a few days to restore. In contrast, even very minor faults on an underground line will take the line out of service for a minimum of 2 weeks, with 4 to 6 weeks being more likely.

The Transmission Services Agreements for NECEC include a minimum availability requirement of 90% per month. CMP has an expected availability of overhead transmission lines at 345kV greater than 99%. A single outage on an underground line could violate those requirements, requiring additional costs related to installed spare cable to allow for quicker restoration. Even with the installed spare cable, some types of damage may take more than one cable out of service, requiring extended restoration periods and violating the required availability.

QUESTION 10, WHETHER COOLING STATION STRUCTURES WERE INCLUDED IN THE UNDERGROUNDING COST ESTIMATES, WHAT SIZE OR TYPE OF STRUCTURE WOULD BE NEEDED, HOW MANY, AND AT WHAT DISTANCE ALONG THE LINE.

No supplemental cooling has been included in the estimates or conceptual design. Supplemental cooling is not commonly used on solid dielectric cable systems, which is the type

of cable considered in the Kennebec River crossing, and I do not recommend the use of supplemental cooling on new lines.

Cooling is used to overcome localized ratings reductions such as a steam line crossing or unusual site conditions. All supplemental cooling systems are mechanical systems with additional maintenance requirements and lower reliability than the cable itself. When the cooling system fails, the line ratings would need to be reduced until repairs can be completed. Cooling systems add substantial cost and reliability concerns to a line. They are typically only proposed on existing lines as an alternative to replacing the line.

Supplemental cooling is usually accomplished by circulating chilled fluids through the cable conduits or pipes adjacent to the conduits. Cooling stations for solid dielectric systems consist of a water-glycol chilled water system with a circulating pump. They are above-grade structures with large condensing coils and fans, roughly 20 feet long, 8 feet high, and 6 feet wide. They require constant power and monitoring to stay in service. The distance they can mitigate varies substantially with the impact being mitigated, pipe volume available, and size of the cooling system. I am not aware of anywhere cooling has been used extensively on a solid dielectric system. Spot mitigation is more common.

Cooling is more commonly used on high-pressure fluid-filled cable systems (pipe-type). This is an older technology where paper insulated cables are installed in a steel pipe and pressurized with dielectric fluid. By circulating and cooling the dielectric fluid, localized ratings restrictions can be ignored. This type of cable system is not being proposed and is not suitable for NECEC.

QUESTION 11, IDENTIFY ENGINEERING STANDARDS, SAFETY OR DESIGN CODES, ETC. THAT SPECIFICALLY APPLY TO THIS PROJECT

I am responding only for the underground construction portion of the project. Please see Justin Tribbet's Supplemental Testimony for a listing of the standards applying to the rest of the Project.

There are relatively few prescriptive standards and design codes specific to underground HVDC cable due to the relatively recent innovations in HVDC cable. The National Electrical Safety Code (NESC) is the only prescriptive standard specific to underground cable systems and covers criteria such as minimum cover and protection for and from other utilities.

There are a few guidelines prepared specifically for HVDC cable and that are being applied to this project. Most of these have been published by the International Council on Large Electric Systems (Conseil International des Grands Réseaux Électriques, CIGRE). In particular, the Project is complying with CIGRE Technical Brochure 496, "Recommendations for Testing DC Extruded Cable Systems for Power Transmission at a Rated Voltage up to 500kV."

Several standard specifications can be used for both AC and DC cable. The Project is using the following standard specifications and guides that apply to both types of cable:

- IEEE 442 "Guide for Thermal Resistivity Measurements of Soils and Backfill Materials;"
- IEC 60060 "High-Voltage Test Techniques;" and
- IEC 60228 "Conductors of Insulated Cables."

A number of guidelines and procedures apply to the construction methods being proposed, including:

- ASTM F1962 "Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit Under Obstacles, Including River Crossings,"
- EPRI "Underground Transmission Systems Reference Book," and
- CMP procedures for excavation and trenching activities.

QUESTION 12, EXPLANATION OF THE CONDITIONS CONSIDERED WHEN ENGINEERS DETERMINED THAT HORIZONTAL DIRECTIONAL DRILLING WOULD BE THE LOWEST IMPACT TRENCHLESS METHOD FOR THE NECEC PROJECT.

There are three trenchless methods commonly used in underground transmission, horizontal directional drilling (HDD), microtunneling, and pipe-jacking. HDD is already described in my rebuttal testimony. Microtunneling and pipe-jacking are similar straight line trenchless methods. Because these methods are unable to turn, crossings are completed by digging a shaft on either side of the obstacle and advancing a casing from shaft to shaft.

In microtunneling a hydraulic cutting head is used to open the hole ahead of the casing, and spoils are removed with a slurry system. In pipe-jacking a cutting head on the leading edge of the casing is used to open the hole, and spoils are removed with a mechanical auger or hand tools. In both cases a hydraulic ram is used to push the casing and cutting head through the soil.

Being guided, HDD allows for surface to surface crossing without opening shafts. HDD allows for the longest crossing distances, between 4,000 and 7,000 feet, depending on soils. HDD also has the lowest per foot cost of the trenchless methods.

Microtunneling allows for crossings up to 1,000 feet, with no minimum length. Microtunneling requires much of the same support equipment as an HDD installation to process the drilling fluid used, requiring similar temporary work areas. Because microtunneling is limited to straight lines and limited distances it is not suitable for the potential crossings along the NECEC route. Microtunneling also has the highest cost of the trenchless methods, because of the shafts and expensive cutting heads.

Pipe-jacking has the lowest overall cost of the trenchless methods due to the minimal support equipment, reduced site work, and no minimum distance. Pipe-jacking is typically limited to 250- to 500-foot distances, depending on soils. In addition, pipe-jacking is an open-face tunneling method. There is no ability to prevent ground water from entering the casing at the cutting head and washing out soils. Removal of rock or boulders requires personnel to enter the casing. For this reason pipe-jacking is generally limited to installations in softer soils above the water table. Pipe-jacking has the shortest reach, and it cannot be used in saturated soils and therefore is not suitable for the potential crossings along the NECEC route.

QUESTION 19, WHAT THE COSTS WOULD BE TO UNDERGROUND FEWER LONGER SECTIONS (VERSUS MORE SHORTER SECTIONS) OF THE LINE (TO MINIMIZE TRANSITION STATIONS AND ENVIRONMENTAL IMPACT) AS WELL AS OTHER PRACTICAL CONSTRAINTS TO THIS APPROACH.

Based on the estimates prepared, underground transmission costs approximately $15.9 million per mile compared to $2.1 million per mile for overhead, or 7.6 times as much as overhead. Specific areas will have higher costs for the underground segment if trenchless installation methods are required or substantial rock is encountered. Although fewer longer underground sections would have fewer termination stations than more shorter underground sections, neither alternative is practicable or less environmentally damaging than the proposed overhead line.

As discussed in my rebuttal testimony, undergrounding the line will significantly increase temporary environmental impacts, will adversely impact system reliability and availability, and will increase impacts to the public during construction.

QUESTION 20, COMPARISON OF COST FOR CONSTRUCTING A CRANE PATH TO EVERY POLE LOCATION (OVERHEAD LINES) WITH THE COST TO CONSTRUCT AN ACCESS ROAD TO EVERY SPLICE BOX (UNDERGROUNDING).

The initial costs would be similar. Temporary matting suitable for overhead construction costs approximately $500,000 per mile. Permanent gravel access roads have roughly the same cost, at approximately $450,000 per mile. The main cost difference would be the future maintenance of the permanent access roads for underground construction, adding additional costs through the life of the project.

QUESTION 26, WHETHER AN UNDERGROUND ROUTE CO-LOCATED WITH ROUTE 201 WOULD BE TECHNICALLY FEASIBLE, ECONOMICALLY VIABLE, AND/OR A SATISFACTORY OPTION TO MITIGATE CONCERNS RAISED DURING THE HEARING.

In general terms, construction of underground transmission in a highway is technically possible, but that does not mean it is feasible. Underground transmission is often installed in existing road rights-of-way. However, the installation of splicing vaults in travel lanes of highways is prohibited by the Maine Department of Transportation (MDOT)[4] and there is insufficient room adjacent to the travel lanes for installation of the splicing vaults outside of the travel lanes. MDOT is also resistant to installation of longitudinal installations in highways, although exceptions have been approved in the past.

Depending on how much of Route 201 is being used, there are also concerns with relocating the interconnection point with Hydro Quebec. It is not clear that a matching route could be developed on the Quebec side of the project. The study and evaluation to confirm the feasibility of the route on both sides of the border would take an extended period of time, running to at least several years.

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[4] Maine Department of Transportation Utility Accommodation Rules, 17-229 CMR Chapter 210, Section 10, Subsection 5, Part D.

As previously discussed, the cost for underground construction, particularly in highways, would greatly increase the cost of the project and would not be economically viable.

II. APPENDIX B TO THE TENTH PROCEDURAL ORDER

Appendix B to the Tenth Procedural order included requests for additional supporting data. In this supplemental testimony I will respond to the items specific to underground construction methods.

ITEM 3, A PLAN SHOWING THE ALTERNATE ROUTE NOTED IN SECTION 3 OF MR. BARDWELL'S REBUTTTAL TESTIMONY.

Please see the attached exhibit CMP-11.1-D.

ITEM 4, FOR ALL THE COST ESTIMATE SUMMARY SHEEETS IN THE REBUTTAL TESTIMONY, PLEASE PROVIDE ADDITIONAL BACKUP SPREADSHEETS OR DETAILS FOR HOW EACH OF THE LINE ITEM COSTS WERE DETERMINED.

As discussed in Justin Tribbet's supplemental testimony, the underground cost estimates were based on ISO-NE procedures for conceptual estimates. The underground estimates were built by estimating quantities for all of the equipment and labor and applying unit prices to each item.

In general, the specific unit cost data were gathered from past projects, including +/-320kV HVDC, 230kV AC, and 345kV AC projects proposed or built within the last three years. Because +/-320kV HVDC cable is similar in size to 345kV AC cable the costs for civil construction are very similar. The cable system costs were taken from manufacturers' proposals for similar +/-320 kV HVDC projects in the last two years. All costs were corrected for escalation between the time of proposal/contracting and the time of estimate.

Going through the summary sheet provided with my rebuttal testimony:

- Cable System Furnish and Install – Includes all of the material and installation costs for the cable system itself.

- Communications – Includes the material and installation costs for the fiber-optic cables.

- Civil Work – Includes all costs to prepare a trench or duct bank system for cable installation and connection to the overhead line and restoration after installation.

    - General Subtotal – Includes mobilization, surveying and staking.
    - Splicing Vault or Jointing Location Subtotal – Includes costs for preparing the jointing locations, installing pre-cast concrete vaults and bays, backfilling, and restoration.
    - Direct Buried – Includes costs for opening and maintaining the trench, preparing bedding sand, backfilling the trench, establishing and maintaining soil erosion and sedimentation control, and restoration after construction.
    - Duct Bank Subtotal - Includes costs for opening and maintaining the trench, furnishing and installing conduit and spacers, concrete encasement, backfilling the trench, establishing and maintaining soil erosion and sedimentation control, and restoration after construction.
    - HDD Installation Subtotal – Includes costs furnishing and installing pipes by HDD for the identified or assumed crossings.

- Escalation – Estimated increase in costs due to inflation.

- Mark-Up – Allowance for prime contractor profit.

- Contingency – Allowance for unidentified changes in scope during design and construction.

- Topographic Surveying/Soil Exploration – Additional cost required to get additional survey and geotechnical data suitable for designing underground transmission installations.

- Engineering and Technical Support During Construction – Includes estimated cost for design of the underground transmission line, management of the design process, and additional permitting.

- Construction Management – Inspection, supervision, tracking, and management of construction activities by the prime contractor and CMP.

- Insurance and General Expenses – Cost for Builders All-Risk and General Liability insurance.

The quantities and assumed site conditions used as the basis of the estimate are identified on the assumptions sheet attached to each estimate.

Exhibits

CMP-11.1-A Underground Construction, Typical Sections, and Plans

CMP-11.1-B Pictures of Similar Installations

CMP-11.1-C Diagram of Expected Root Areas

CMP-11.1-D Underground Alternate Route Map

Dated: 4/25/19

Respectfully submitted,

Justin Bardwell

STATE OF KANSAS
Johnston County, ss.

The above-named Justin Bardwell did personally appear before me and made oath as to the truth of the foregoing pre-filed testimony.

Before,

Dated: 4/25/2019

Jeanette L. Hill
Notary Public
Name: Jeanette L. Hill
My Commission Expires:

NOTARY PUBLIC
STATE OF KANSAS
JEANETTE L. HILL
My Appt. Exp. 6/18/2021

CMP-11.1-A
Bardwell Supplemental Testimony
Typical Sections, Dimensions and Drawings

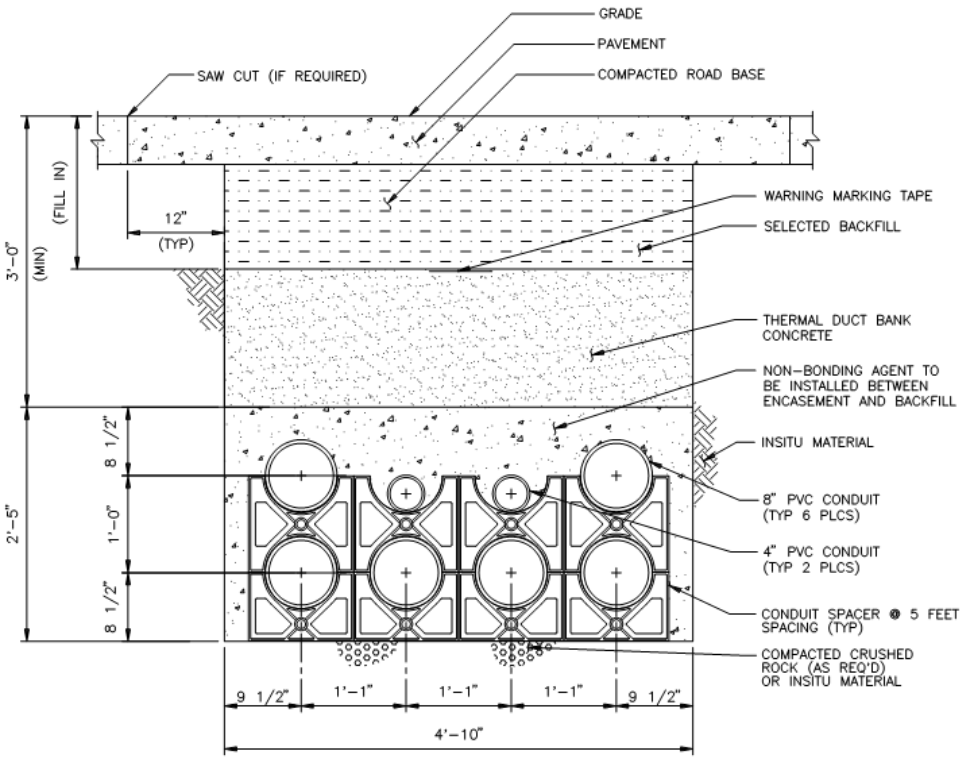


Figure 1- Typical Duct Bank Section

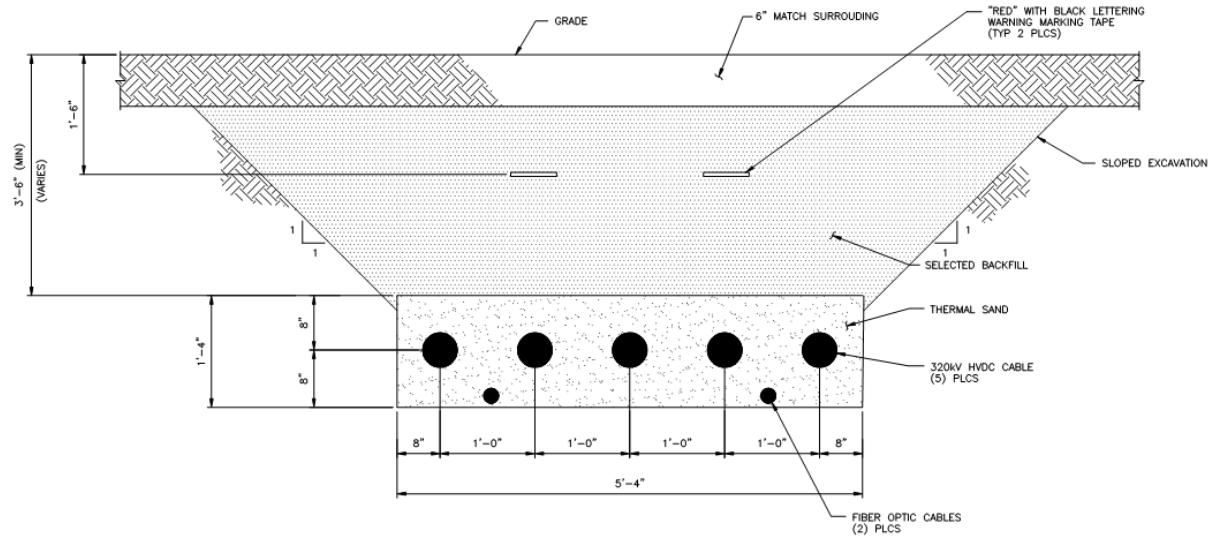


Figure 2- Typical Direct Buried Section

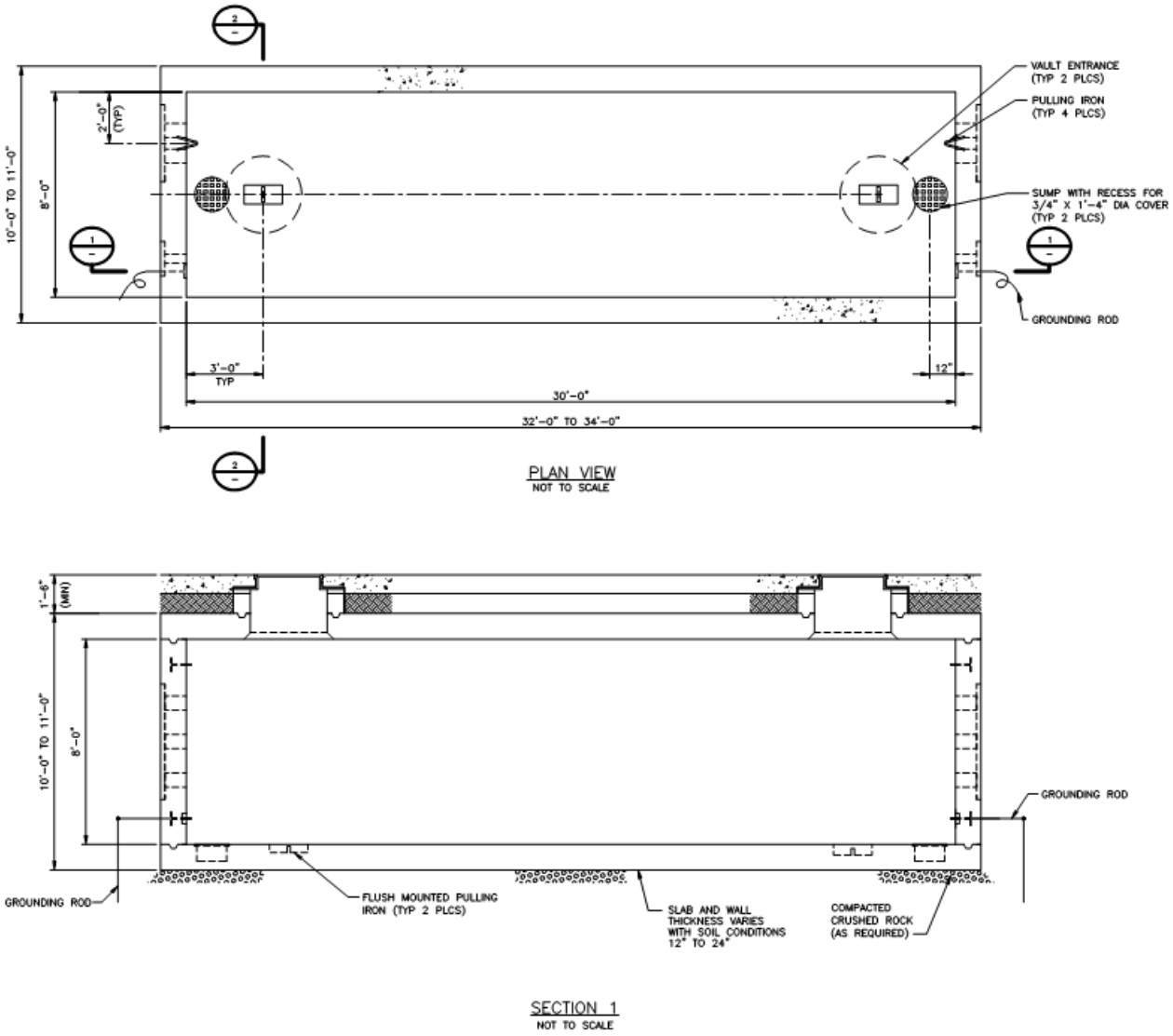
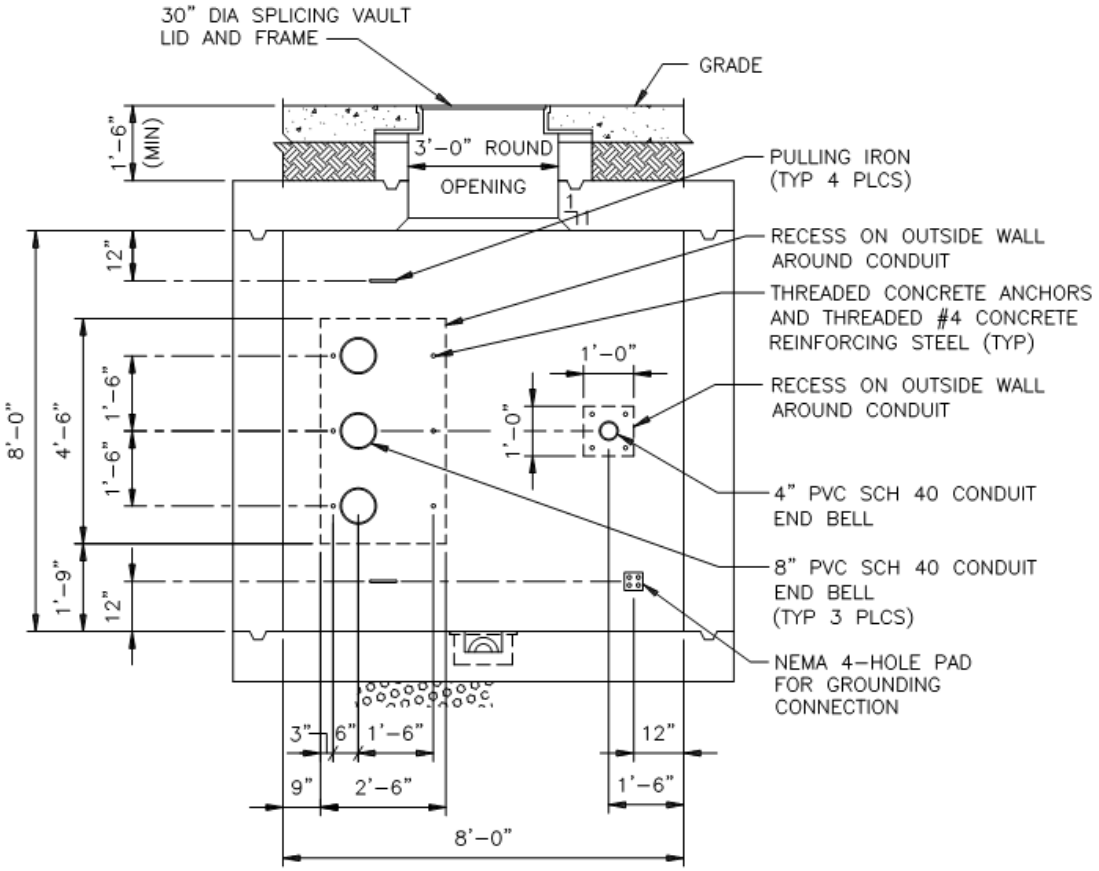


Figure 3- Typical 320kV HVDC Splicing Vault



SECTION 2

NOT TO SCALE

Figure 4- Typical 320kV HVDC Splicing Vault End Wall

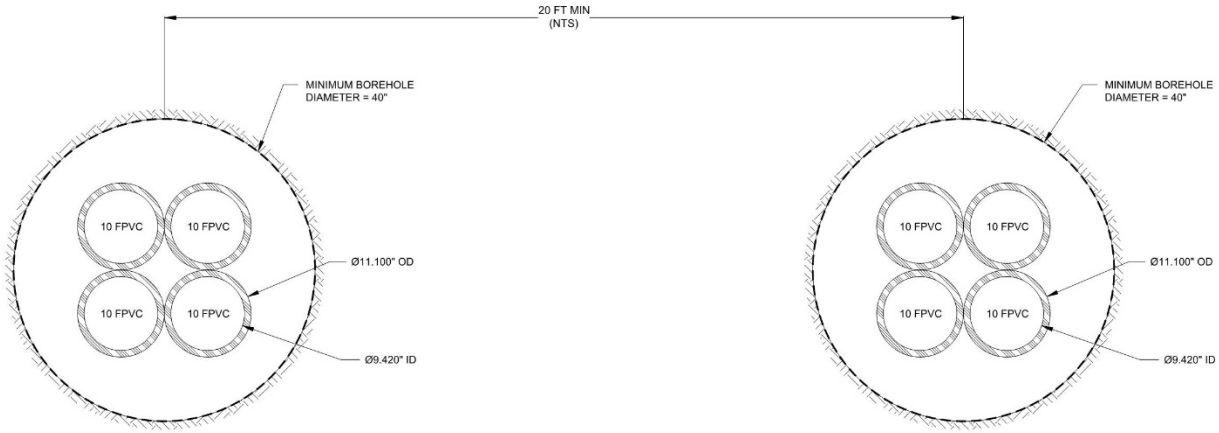


Figure 5- Typical HDD Cross-Section

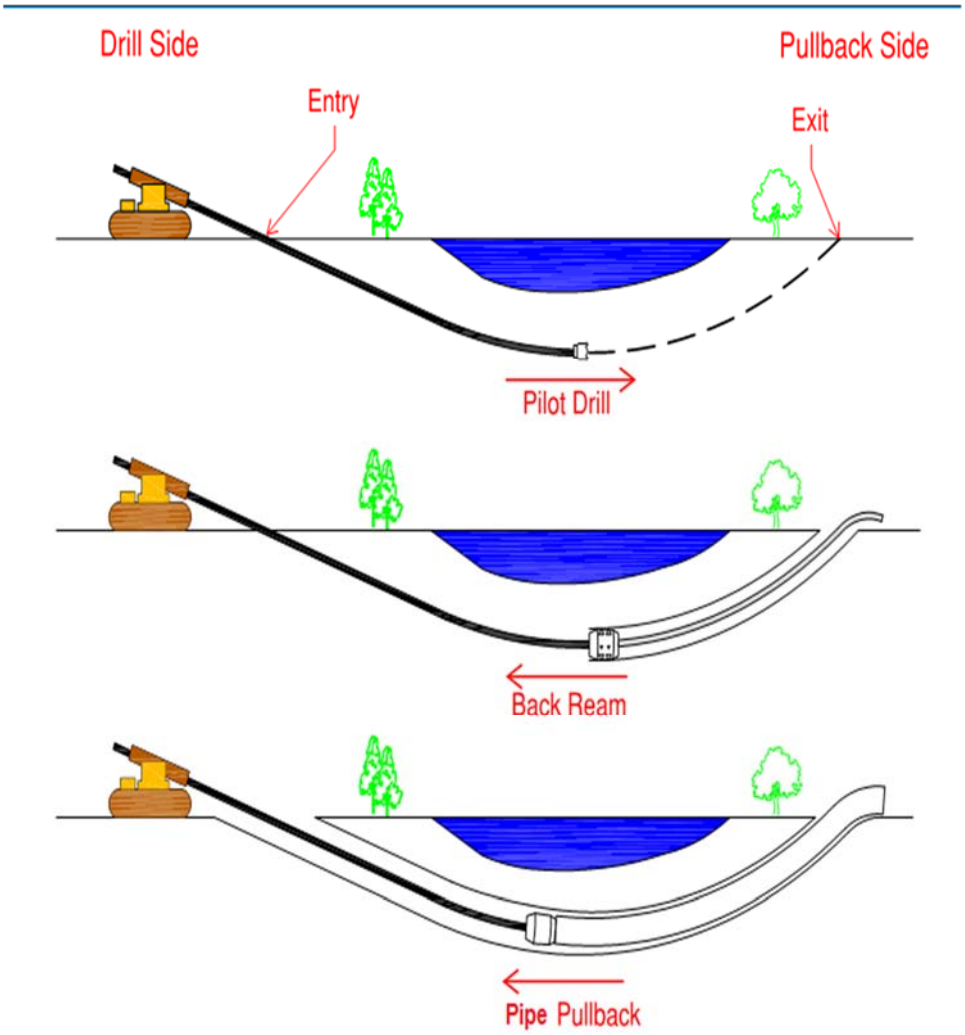


Figure 6 - HDD Work Process

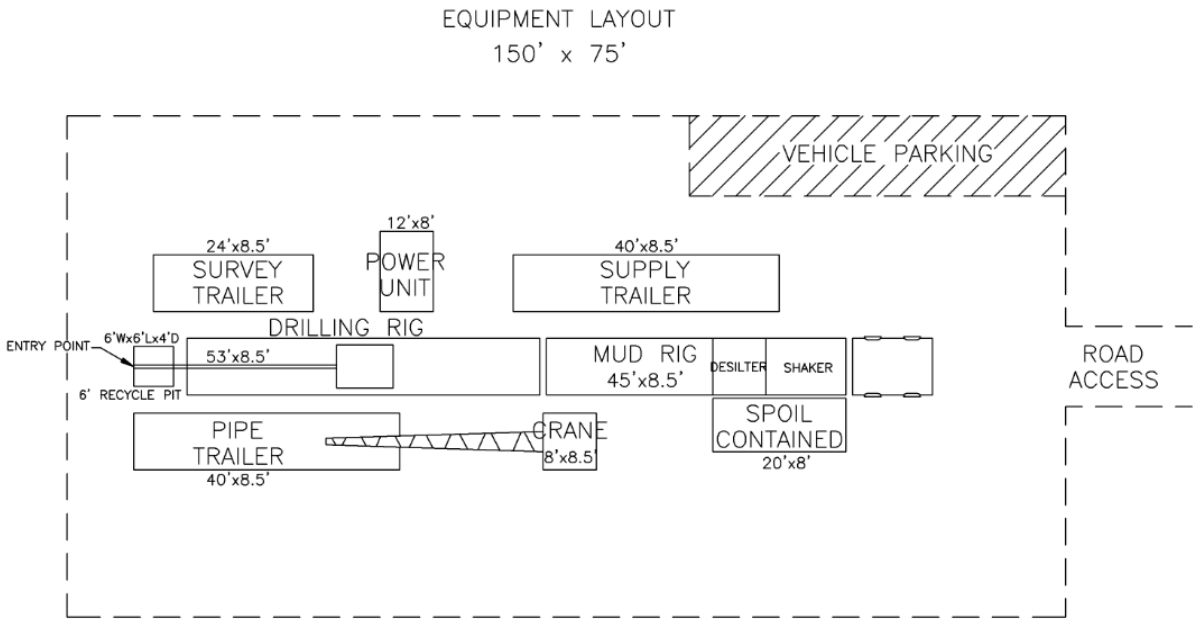


Figure 7- Typical HDD Work Area, Entry Side

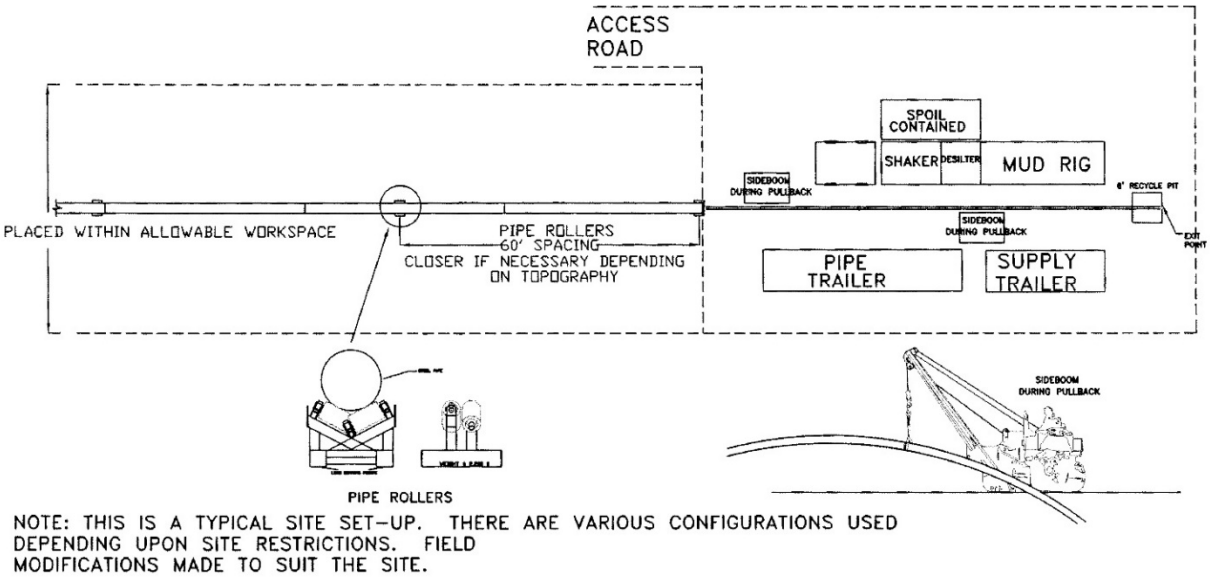


Figure 8 - Typical HDD Work Area, Exit Side

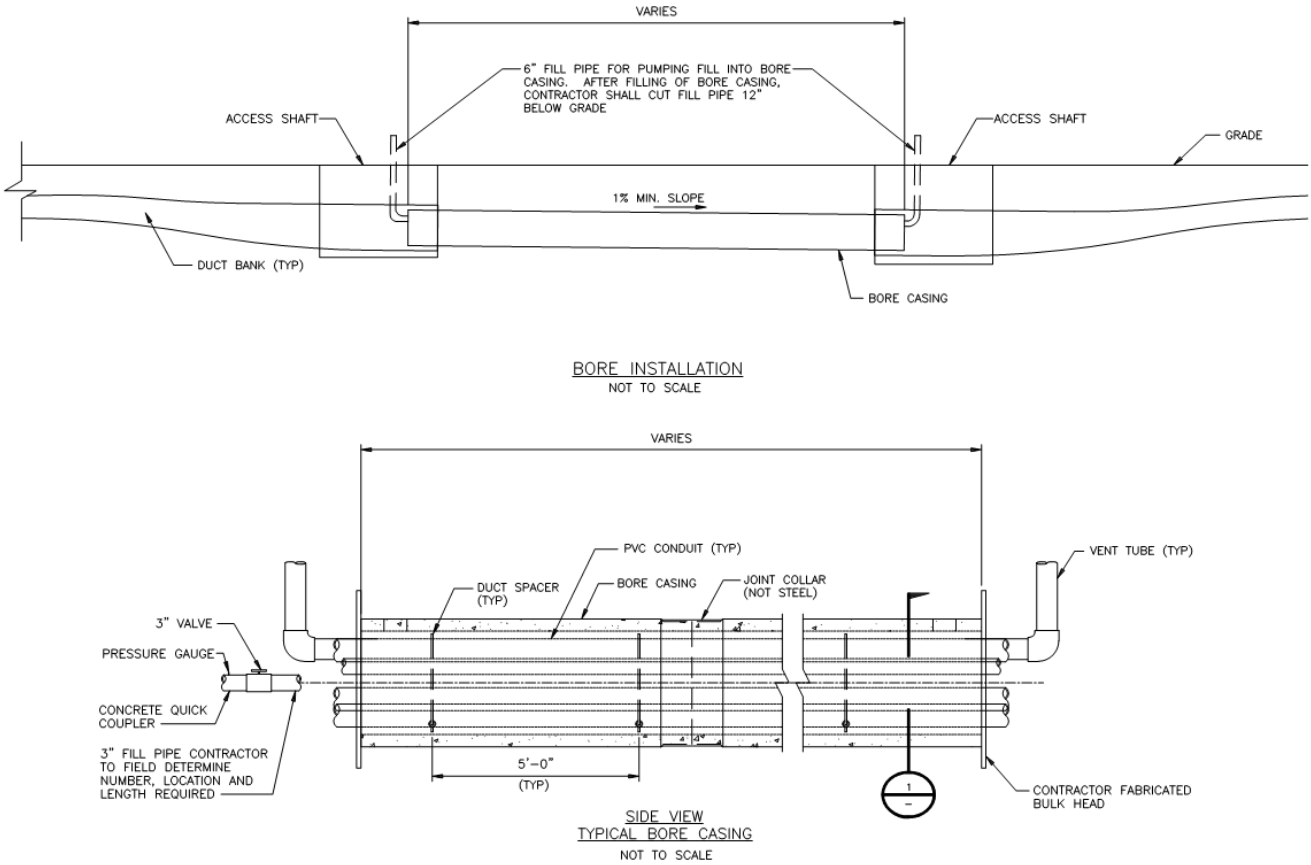


Figure 9 - Typical Microtunneling Sections

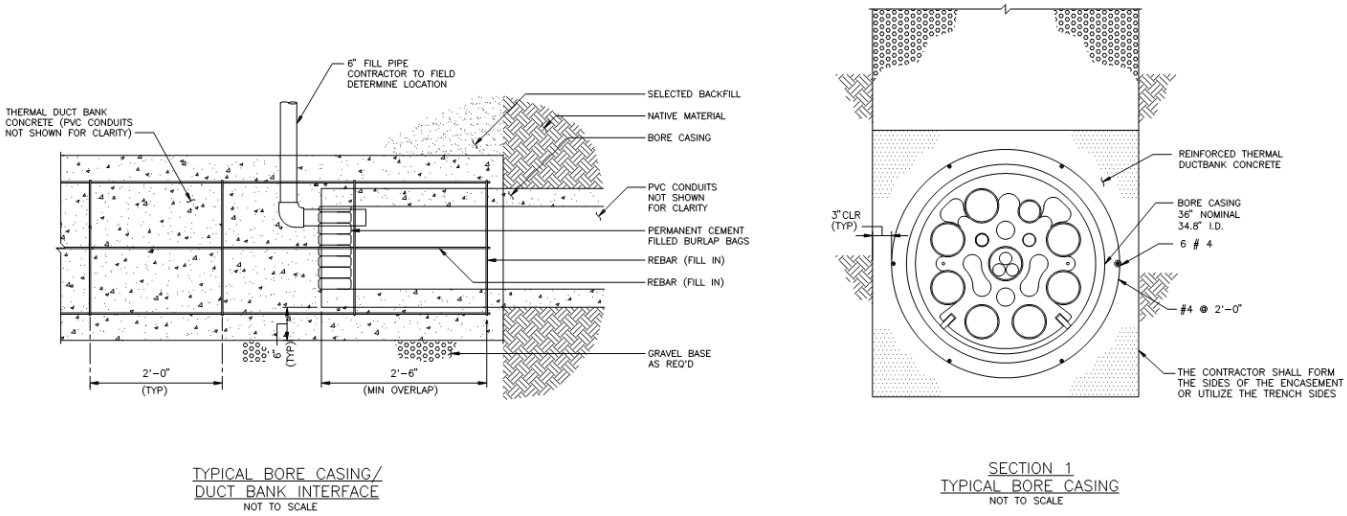


Figure 10 - Typical Bore Casing Sections

CMP-11.1-B
Bardwell Supplemental Testimony
Pictures of Similar Installations

Figure 1 - Duct Bank Excavation

Figure 2- Duct Bank Excavation

Figure 3 - 500kV Splicing Vault

Figure 4- 115kV Splicing Vault

Figure 5- 115kV Splicing Vault

Figure 6 - Horizontal Directional Drill Rig

Figure 7 - HDD Drill Rig

Figure 8 - Pipe Jacking Shaft

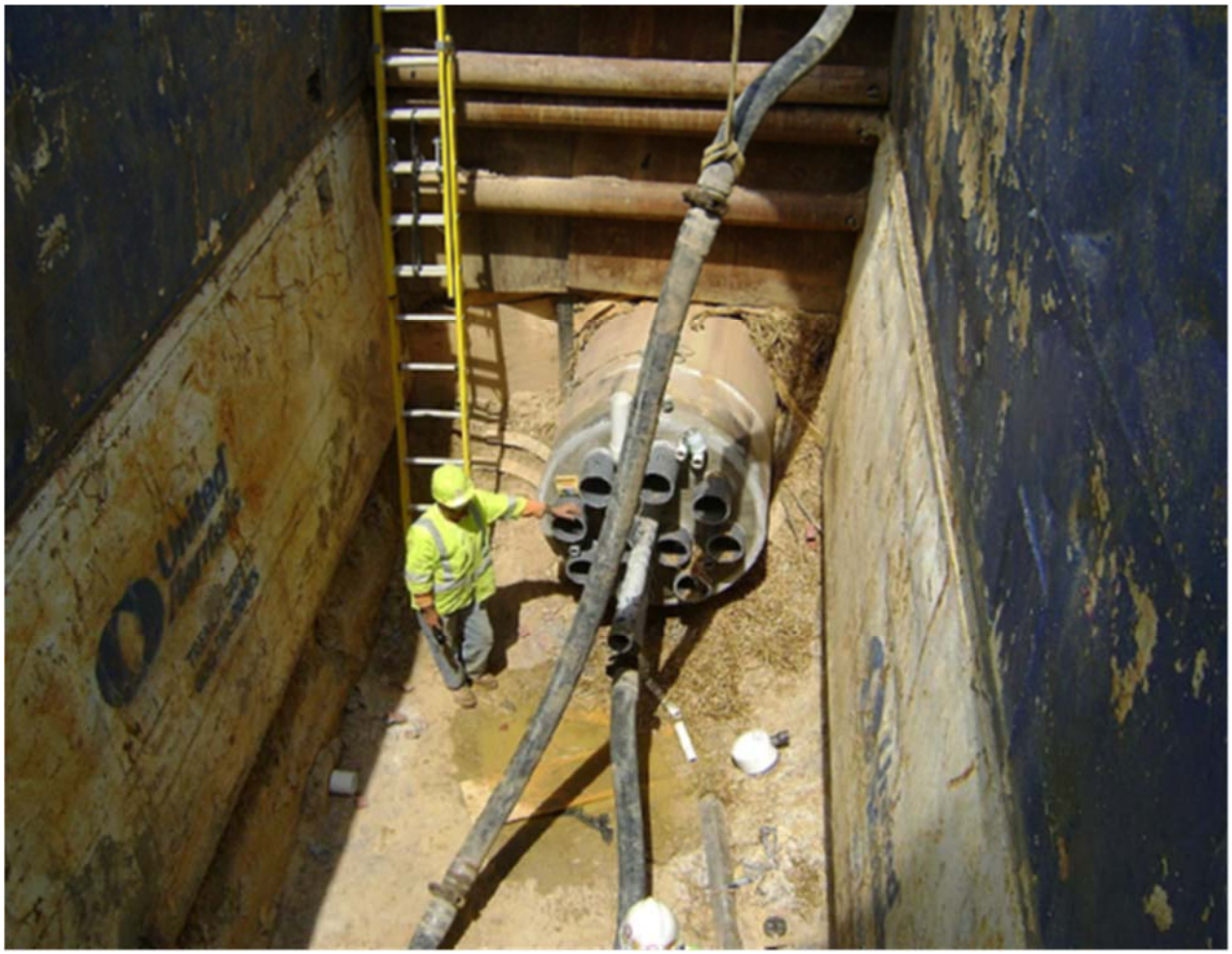


Figure 9- Pipe-Jacking Shaft

Figure 10-Oversized Reel Transport, 4,724 feet of 230kV Cable

Figure 11 - Cable Reel Trailer

Figure 12- Cable Pulling over Bullwheel

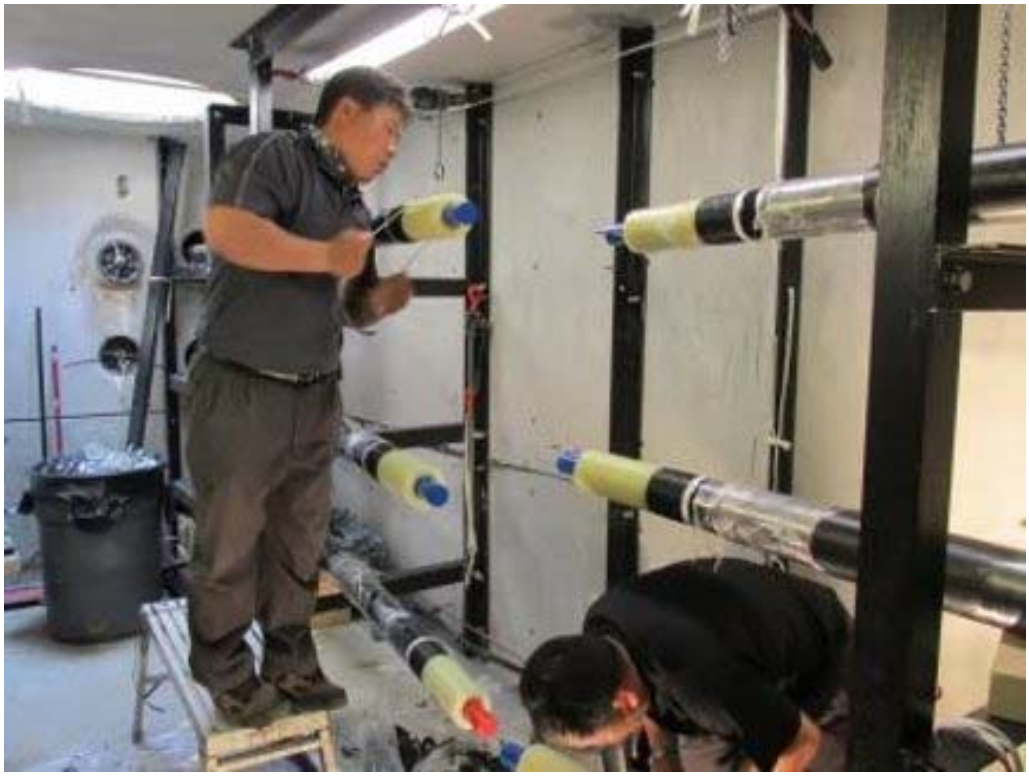


Figure 13 - Preparing Cable for Jointing

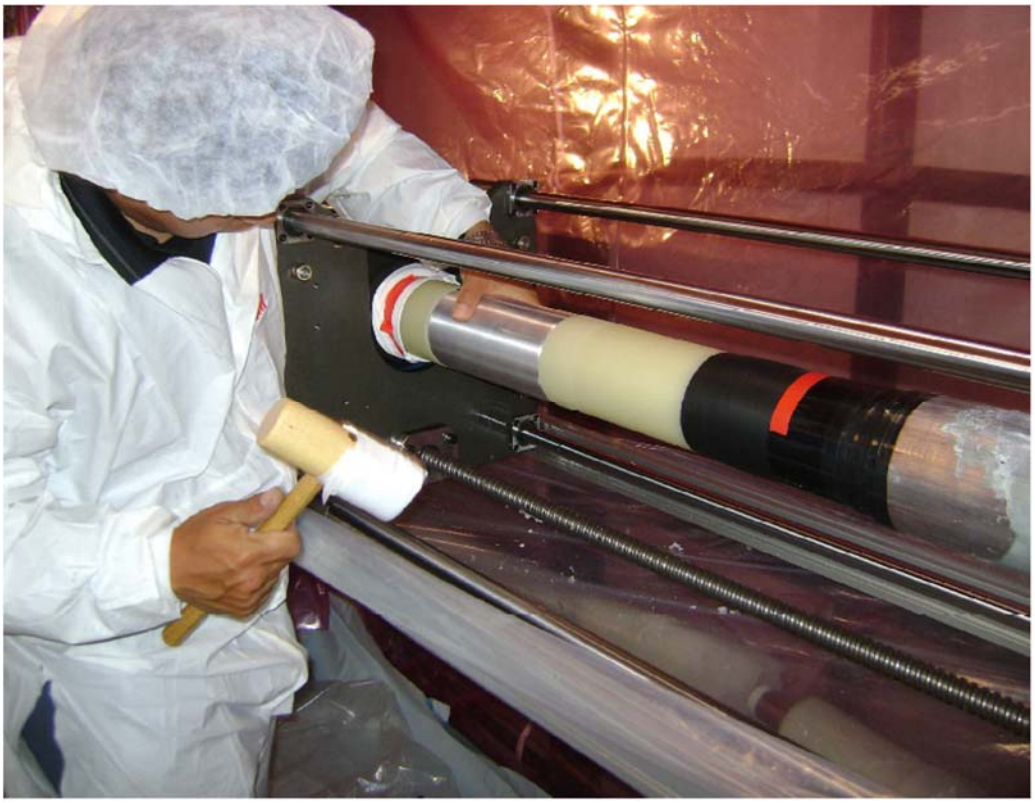
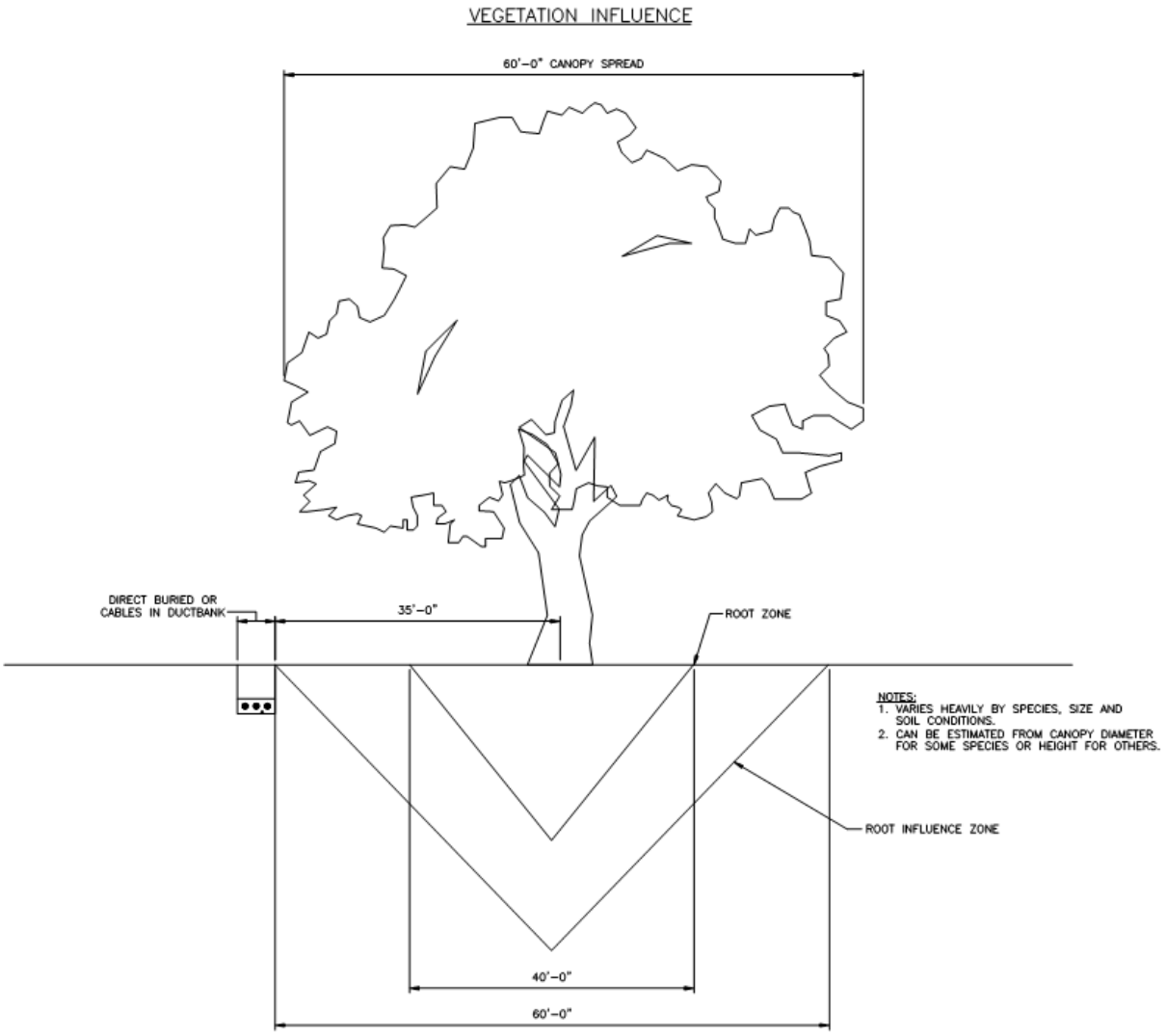


Figure 14 - Assembling Joint

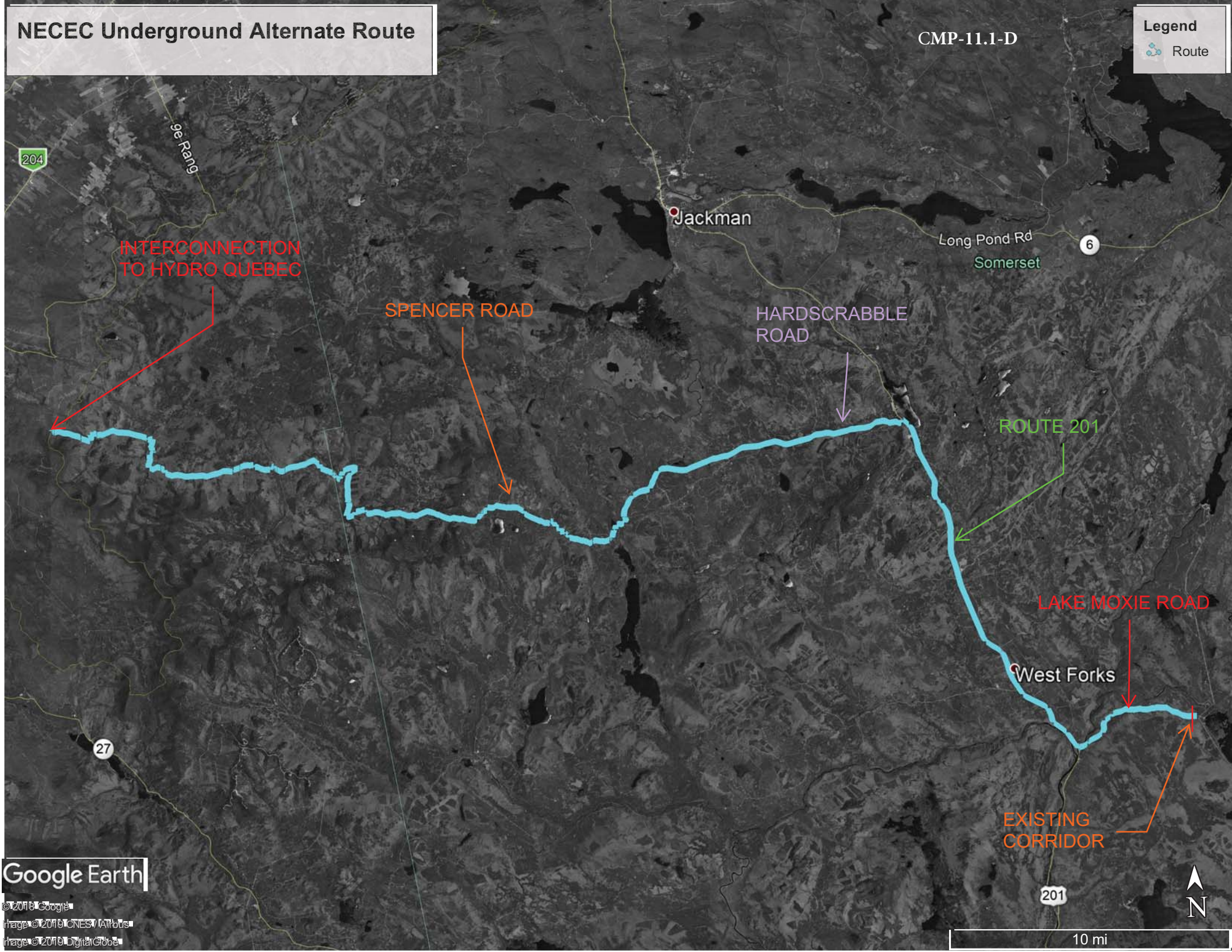
Figure 15 - Cable Joints in Vault

CMP-11.1-C
Bardwell Supplemental Testimony
Root Influence Area



NECEC Underground Alternate Route

CMP-11.1-D



STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

and

STATE OF MAINE
LAND USE PLANNING COMMISSION

IN THE MATTER OF

CENTRAL MAINE POWER COMPANY	)
NEW ENGLAND CLEAN ENERGY CONNECT	)
#L-27625-26-A-N/#L-27625-TG-B-N/	)
#L-27625-2C-C-N/#L-27625-VP-D-N/	)
#L-27625-IW-E-N	)
CENTRAL MAINE POWER COMPANY	)
NEW ENGLAND CLEAN ENERGY CONNECT	)
SITE LAW CERTIFICATION SLC-9	)
Beattie Twp, Merrill Strip Twp, Lowelltown Twp,	)
Skinner Twp, Appleton Twp, T5 R7 BKP WKR,	)
Hobbstown Twp, Bradstreet Twp,	)
Parlin Pond Twp, Johnson Mountain Twp,	)
West Forks Plt, Moxie Gore,	)
The Forks Plt, Bald Mountain Twp, Concord Twp	)

PRE-FILED SUPPLEMENTAL TESTIMONY AND EXHIBITS OF
NICHOLAS ACHORN

May 1, 2019

This testimony is in response to certain of the Construction Questions in Appendix A to the Tenth Procedural Order.

WITNESS QUALIFICATIONS (Relevant to DEP and LUPC Review)

I am a Project Manager for Black & Veatch Energy Division's Power Delivery Business Line. I am currently the Project Manager focused on the DC transmission line for the New

England Clean Energy Connect (NECEC) Project (Project). I graduated from the University of Maine at Orono with a Bachelor of Science in Civil Engineering and a minor in Construction Management Technology, in 2008. I have been employed as a Project Engineer, Engineering Manager, or Project Manager for Black & Veatch since 2014. I attached my CV as Exhibit CMP-13-A.

QUESTION 2: DESCRIPTION OF CONSTRUCTION PROCESS, STAGING, AND IMPACTS FOR 100-FOOT OR TALLER POLES.

Poles will be delivered in sections (e.g., 120-foot poles will comprise at least three separate sections), so having 100-foot or taller poles will not by itself impact the access requirements for delivery to the planned installation location. However, an increase in pole height for the full-height vegetation area will require an otherwise directly embed structure to instead require a caisson foundation to support additional loads from this height increase (e.g., larger permanent footprint, additional equipment required to transport concrete, etc.). These full-height vegetation areas will have more impact on the construction access and sequence plans to accommodate the additional equipment required.

These 100-foot or taller poles can have their respective pole sections connected while being erected, and only the hydraulic crane and man-lift equipment need to be sized to appropriately handle the height requirements. The typical temporary work pads for structure installation proposed by CMP vary by structure type, and are sized to handle the appropriate materials and equipment required, as shown in Figure 7-1 of the Natural Resources Protection Act permit application. As shown on Figure 7-1, the structures contained within the full-height vegetation areas (i.e., additional height increase to maintain clearances while increasing anticipated loads at structure base) will change from direct embed to requiring a caisson

foundation, but that change will not impact the work pad size requirements. See the following discussion for a high-level overview of the sequencing required to install either a directly embed structure or a structure set atop a concrete caisson foundation.

Directly Embed Structure Type: Construction material will be received and handled at the appropriate laydown yard. Material will be hauled via flatbed from the laydown yard to the proposed installation site. Soil will be excavated, the base of the pole will be set, and the hole will be backfilled. Using a hydraulic crane in conjunction with a man-lift, the remaining sections of pole and farming hardware will be installed.

Structure On Caisson Foundation Type: Construction material will be received and handled at the appropriate laydown yard. Material will be hauled via flatbed from the laydown yard to the proposed installation site. Soil will be excavated, rebar and anchor bolt cage will be set, and concrete will be poured. Using a hydraulic crane in conjunction with a man-lift, remaining sections of pole and framing hardware will be installed.

Exhibits

CMP-13-A: Achorn CV

Dated: 4/25/2019

Respectfully submitted,

Nicholas Achorn

STATE OF MAINE
Kennebec, ss.

The above-named Nicholas Achorn did personally appear before me and made oath as to the truth of the foregoing pre-filed testimony.

Dated: 4/25/2019

Before,

Notary Public
Name: PATRICIA Ann LARRIVEE
My Commission Expires:
4-7-2026

Nicholas Achorn, P.E.

Nicholas Achorn is a Project Manager for Black & Veatch Energy Division's Power Delivery Business Line. His experience includes the management of engineering teams for both overhead and underground design as well as previous experience performing overhead transmission line design for voltages ranging between 34.5kV to 500kV.

PROJECT EXPERIENCE

CMP; NECEC; Maine, United States; 2018-In-Progress

Project Manager - Black & Veatch. Project Manager of the 320kV DC overhead transmission line.

AEP; Gravel Pit; South Bend, Indiana, United States; 2017-2018

Engineering Manager - Black & Veatch. Engineering Manager responsible for the design and construction of two new 138kV overhead transmission lines, Gravel Pit West (approximately 3.3 miles) and Gravel Pit East (approximately 4.1 miles), as well as the removal of approximately 4.5 miles of 34.5kV line.

PPL EU; Williams Grove - West Shore, Pennsylvania, United States; 2015-2018

Engineering Manager / Section Lead - Black & Veatch. Engineering Manager for all work associated with PPL EU. Section Lead responsible for the coordination and execution of designing multiple transmission lines ranging in voltage from 69 kV to 230 kV. Responsibilities included presentations of deliverables to the client, mentoring of junior engineers in the design of their respective projects, and QA/QC throughout the design process.

National Grid; Greater Boston, Massachusetts, United States; 2014-2018

Engineering Manager - Black & Veatch. Project Lead responsible for the overhead T-line design of multiple projects, from start to finish. Responsibilities included client interface and the mentoring of junior engineers through the design and construction process.

National Grid; New York MSA Projects; New York, United States; 2014-2018

Assistant Project Manager - Black & Veatch. Responsible for six overhead transmission line asset condition projects in New York, ranging in voltage from 34 kV to 115 kV. Project work included structure replacement, reconductors, rebuilds, reroutes, APA permitting, and Article VII permitting.

Tenaska; Westmoreland, Pennsylvania, United States; 2015-2017

Overhead Transmission Line Engineering Manager - Black & Veatch. Overhead Transmission Line Engineering Manager responsible for 500 kV overhead transmission line EPC scope. Project is 1.5 miles of new 500 kV in new right-of-way connecting to a new switchyard and generation substation.

PROJECT MANAGER

Expertise:
Overhead Transmission; Project Management

Education
Bachelor of Science, Civil Engineering, University of Maine at Orono, 2008

Professional Registration
License, Civil, #83275, Ohio, 2018
License, Civil, #PE11800205, Indiana, 2018
License, Civil, #096677, New York, 2016
License, Civil, #83320, Pennsylvania, 2015
License, Civil, #14666, New Hampshire, 2015
License, Civil, #102908, Vermont, 2014
License, Civil, #51024, Massachusetts, 2014
License, Civil, #13289, Maine, 2013

Total Years of Experience
11

Black & Veatch Years of Experience
5

Professional Associations
American Society of Civil Engineers (ASCE) - Member

Language Capabilities
English

Office Location
Maine, USA

United Illuminating; Milvon - West River Railroad Study; Connecticut, United States; 2015-2016

Project Engineer - Black & Veatch. Project Engineer responsible for modeling and analysis of railroad catenary structures spanning the Metro North Railroad. Activities included overseeing team of engineers to model the overhead transmission line wires for load development in PLS-CADD and the modeling and analysis of the catenary structures in RISA.

Eversource; Confidential; Massachusetts, United States; 2015-2016

Project Engineer - Black & Veatch. Project Engineer responsible for the conceptual design of a new 115 kV steel monopole design within a new corridor. This new corridor follows a retired rail line and was expected to be converted to a walking path where special consideration to clearances and overall layout is paramount. Responsibilities included coordinating with the client to set up project status meetings and overseeing of junior engineers to complete necessary design and modeling within PLS-CAD, PLS-POLE, and PLS-TOWER. Additional responsibilities included support of the client for permitting activities.

Eversource; 211-503/504 Reconductor; Massachusetts, United States; 2015-2016

Project Engineer - Black & Veatch. Project Engineer responsible for the conceptual design of a 115 kV reconductor. Existing structure types are lattice towers which required member modifications and foundation reinforcements to withstand additional loads and tower extensions or full structure replacements to achieve required clearances. Responsibilities included coordinating with the client to set up project status meetings and overseeing of junior engineers to complete necessary design and modeling within PLS-CAD, PLS-POLE, and PLS-TOWER.

Public Service of New Hampshire (PSNH); F107; New Hampshire, United States; 2013

Project Lead Engineer - POWER Engineers, Inc. Feasibility study performed on a potential 12-mile line which would run from Madbury, New Hampshire, to Portsmouth, New Hampshire, 2 miles of which would run underground and underwater crossing a bay. Subcontracted LiDAR company and coordinated the effort required in obtaining survey for the applicable swath. LiDAR deliverable required a review of the aerial plan view imagery, oblique imagery, as well as the planimetrics and .XYZ points and feature codes. Cross sections developed for existing and proposed design/construction in parallel with cost estimates for internal PSNH review.

Public Service Electric & Gas; Lumberton, New Jersey, United States; 2013

Independent Reviewer - POWER Engineers, Inc. Performed QA/QC on PLS-CADD, PLS-Pole, and PLS-TOWER models, as well as all construction IFC documents.

Baltimore Gas & Electric; Graceton, Maryland, United States; 2013

Independent Reviewer - POWER Engineers, Inc. Performed QA/QC on PLS-CADD, PLS-Pole, and PLS-TOWER models.

Central Maine Power; Maine Power Reliability Project; Maine, United States; 2013

Independent Reviewer - POWER Engineers, Inc. Performed QA/QC on PLS-CADD and PLS-Pole models, as well as all construction IFC documents.

Central Maine Power; Section 54 Lightning Arrester Installation; Maine, United States; 2012-2013

Project Lead Engineer - POWER Engineers, Inc. Coordination with studies team to review Vaisala lightning data in determining a remediation and protection plan for 26 miles of existing 34.5 kV transmission line against lightning strikes. Once area of remediation was approved by owner, assembly drawings, material orders, and work lists were developed for the installation of lightning arresters on these existing structures.

Public Service of New Hampshire; Y170; New Hampshire, States; 2011-2013

Project Lead Engineer - POWER Engineers, Inc. PLS-CADD and PLS-Pole modeling for a rebuild of 9 miles of existing 34.5 kV distribution, as well as 7 miles of new 115 kV transmission line; approximately 3 miles of the 115 kV was double circuited with the 34.5 kV. Incorporation of client standards, as well as development of non-standard structures and hardware. Foundation design and drawing utilizing known field conditions and L-Pile software. Performance drawing development and coordination with steel pole vendor on their steel pole and anchor bolt cage design, as well as the switch manufacturer to verify allowable loading, attachment hardware and required dimensions. Coordination with drafting team to develop all required drawings. Attended numerous client meetings throughout the life of the project to review work completed, as well as forecast future required work. Assembly and submittal of IFC package to client. Construction support and site visits required throughout the construction process.

Central Maine Power; Section 48 and Section 172 Rebuild; United States; 2011-2013

Project Lead Engineer - POWER Engineers, Inc. PLS-CADD and PLS-Pole modeling for 16 miles of existing 34.5 kV single circuit rebuild designed to 69 kV transmission line standards. Incorporation of client standards, as well as development of non-standard structures and hardware. Foundation design and drawing utilizing known field conditions and L-Pile software. Performance drawing development and coordination with steel pole vendor on their steel pole and anchor bolt cage design, as well as the switch manufacturer to verify allowable loading, attachment hardware and required dimensions. Coordination with drafting team to develop all required drawings. Assembly and submittal of IFC package to client. Construction and field support, as well as submittal of record package.

Central Maine Power; Saco Bay Reinforcement Project; United States; 2009-2012

Design Engineer - POWER Engineers, Inc. PLS-CADD and PLS-Pole modeling for a rebuild of 12 miles of existing 34.5 kV single circuit line rebuilt to double circuit 115 kV/69 kV standards, as well as a rebuild of 4 additional 34.5 kV single circuit sections rebuilt to 69 kV standards. Incorporation of client standards, as well as development of non-standard structures (for all double circuit) and hardware. Foundation design and drawing utilizing known field conditions and L-Pile software. Performance drawing development and coordination with steel pole vendor on their steel pole and anchor bolt cage design to verify allowable loading, attachment hardware and required dimensions. Coordination with drafting team to develop all required drawings. Assembly and submittal of IFC package to client. Construction and field support, as well as submittal of record package.

Central Maine Power; Section 243; Maine, United States; 2009-2011

Design Engineer - POWER Engineers, Inc. PLS-CADD and PLS-Pole modeling for a 3 mile green line designed to 115 kV transmission line standards. Existing Lattice substation modeled in PLS-TOWER to analyze new loads applied and to determine members which required retrofit. Incorporation of client standards, as well as development of non-standard structures and hardware. Foundation design and drawing utilizing known field conditions and L-Pile software. Performance drawing development and coordination with steel pole vendor on their steel pole and anchor bolt cage design, as well as the switch manufacturer to verify allowable loading, attachment hardware and required dimensions. Coordination with drafting team to develop all required drawings. Assembly and submittal of IFC package to client. Construction and field support, as well as submittal of record package.

Central Maine Power; Section 218 Rebuild; Maine, United States; 2009-2011

Design Engineer - POWER Engineers, Inc. PLS-CADD and PLS-Pole modeling for a 2 mile rebuild of existing 115 kV transmission line. Incorporation of client standards, as well as development of non-standard structures and hardware. Foundation design and drawing utilizing known field conditions and L-Pile software. Performance drawing development and coordination with steel pole vendor on their steel pole and anchor bolt cage design, as well as the switch manufacturer to verify allowable loading, attachment hardware and required dimensions. Coordination with drafting team to develop all required drawings. Assembly and submittal of IFC package to client. Construction and field support, as well as submittal of record package.

Central Maine Power; Section 174; Maine, United States; 2008-2010

Design Engineer - POWER Engineers, Inc. PLS-CADD and PLS-Pole modeling for a 7 mile rebuild from existing 34.5 kV to 69 kV standards. Incorporation of client standards, as well as development of non-standard structures and hardware. Foundation design and drawing utilizing known field conditions and L-Pile software. Performance

drawing development and coordination with steel pole vendor on their steel pole and anchor bolt cage design to verify allowable loading, attachment hardware and required dimensions. Coordination with drafting team to develop all required drawings. Assembly and submittal of IFC package to client. Construction and field support, as well as submittal of record package.

National Grid; New England East-West Solution (NEEWS); Massachusetts, United States; 2008-2010

Design Engineer - POWER Engineers, Inc. Review of 345 kV steel pole and switch vendor submittals to verify drawings were in accordance with the provided performance drawings. Development and design of standard fiber assemblies for dead-end, suspension and running angle structures, as well as splice enclosures. Review of Plan & Profile drawings, structure assembly drawings, work lists and stringing charts prior to IFC submittal.

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

and

STATE OF MAINE
LAND USE PLANNING COMMISSION

IN THE MATTER OF

CENTRAL MAINE POWER COMPANY	)
NEW ENGLAND CLEAN ENERGY CONNECT	)
#L-27625-26-A-N/#L-27625-TG-B-N/	)
#L-27625-2C-C-N/#L-27625-VP-D-N/	)
#L-27625-IW-E-N	)
CENTRAL MAINE POWER COMPANY	)
NEW ENGLAND CLEAN ENERGY CONNECT	)
SITE LAW CERTIFICATION SLC-9	)
Beattie Twp, Merrill Strip Twp, Lowelltown Twp,	)
Skinner Twp, Appleton Twp, T5 R7 BKP WKR,	)
Hobbstown Twp, Bradstreet Twp,	)
Parlin Pond Twp, Johnson Mountain Twp,	)
West Forks Plt, Moxie Gore,	)
The Forks Plt, Bald Mountain Twp, Concord Twp	)

PRE-FILED SUPPLEMENTAL TESTIMONY AND EXHIBITS OF GINO GIUMARRO

May 1, 2019

This testimony is in response to certain of the Environmental Questions in Appendix A of the Tenth Procedural Order.

QUESTION 13: WHETHER TALLER POLES AND TRAVEL CORRIDORS COULD PROVIDE ENOUGH OF A LINK BETWEEN THE HABITAT ON BOTH SIDES OF THE CORRIDOR FOR SPECIES LIKE PINE MARTEN.

This question assumes that pine marten may be used as a surrogate for other wildlife to generally understand the context of wildlife movement in the region. Considering that the pine marten has specific habitat and life history requirements, caution should be exercised in drawing particular conclusions about other species.

Nevertheless, and accepting that assumption for the purposes of answering Question 13, it is important to understand that this question is predicated on there being habitat on both sides of the corridor for species like pine marten. If there is not currently habitat on both sides of the corridor for species like pine marten, provisions for travel corridor links by installation of taller structures or other means would be of no benefit. The evidence I have reviewed demonstrates that "intermediate-age" and "mature" forest pine marten habitat is, at best, marginally and intermittently present along the 150-foot wide Segment 1 right of way ("ROW") of the NECEC Project. Taller structure heights and travel corridors would not provide a link between habitat patches that are not directly proximal to the corridor.

Focus Species Forestry, A Guide to Integrating Timber and Biodiversity Management in Maine ("the Guide"),[1] provides a relevant means to evaluate habitat requirements of pine marten and thereby the potential benefit of providing a link across the Segment 1 ROW. The goal of the Guide is to "simplify the task of integrating timber management and conservation of biodiversity by identifying and managing for a few Focus Species," of which American (pine) marten is

[1] Maine Audubon 2007, Third Edition, attached hereto as Exhibit CMP-14-B.

identified as an "umbrella species." An umbrella species is often used in the context of developing a wide range of management goals and objectives for large scale anthropogenic land changes such as commercial forestry operations. Pine marten is identified as an umbrella species "typically found in older forests" due to its large home range that covers 1 to 2 square miles (640 to 1,280 acres).

Table 1 of the Guide describes six forest ecosystems, including Northern Hardwoods and Spruce-Fir. Those latter two forest types are prevalent along the Segment 1 ROW and both are identified as "Focus Habitats" for pine marten. Beyond merely the forest type, however, the Guide also recognizes the critical role of "Stand Development Stage" which is the diameter, height, basal area, and age, of trees that Focus Species require in Focus Habitats.

Range, habitat, and management information for pine marten is concisely described on page 39 of the Guide. Intact patches at least 700 to 1,000 acres of "intermediate-age" and "mature" forest are identified as Focus Habitat for marten in both Northern Hardwood and Spruce-Fir forest ecosystems. In terms of extent, a landscape scale more than 60 to 70 percent of intermediate to old age classes is recommended for pine marten (Lambert et al., 2017).[2] Importantly, Stand Development Stages described in the Guide indicates that characteristics of such Focus Habitat for pine marten are associated with trees 30 to 100+ years old.

[2] Lambert, J.D., Z.J. Curran and L.R. Reitsman, 2017. Guidelines for managing American marten habitat in New York and Northern New England. High Branch Conservation Service, Hartland, VT.

Examination of aerial photography indicates that most of the Segment 1 ROW has been cut for timber since 1984 (i.e., within the last 35 years). Commercial forestry land adjoining the ROW, if not clear-cut recently (within the last 10 years), has been cut within the last 15 to 35 years and is therefore in the "Regeneration and Seedling" stage preceding "Saplings and Small Structures" and would, at most, be of Intermediate-age and not Mature.

Accordingly, along each side of the proposed ROW, pine marten Focus Habitat is marginally present at best. In the future, with the continued use of this area as working forest, pine marten Focus Habitat also is unlikely to achieve a more advanced Developmental Stage. Consequently, taller structures and travel corridors would not provide a meaningful link between the habitat on both sides of the corridor for species like pine marten.

If such habitat were present, the scrub shrub habitat proposed for the Project ROW will provide sufficient linkage in the few circumstances where pine marten habitat is present on both sided of the ROW, without the need for taller structures or travel corridors.

Connecting suitable patches with a corridor is a well-established tool in natural resources management. *Wildlife Habitat Management of Forestlands, Rangelands, and Farmlands*[3] provides general guidelines for development and management of corridors. In the context of timber management, the authors describe the use of leave strips to connect habitats bisected by clear-cuts. Leave strips are the best travel lanes and consider the context of the connecting habitats. The authors state that these best travel corridors are often the areas of least topographic

[3] Payne, N. F., Bryant, F. (1998). Wildlife habitat management of forestlands, rangelands, and farmlands. Malabar, Fla.: Krieger Pub. Co..

resistance, such as streams and riparian corridors, saddles, or cover areas in locations deficient in cover.[4]

Foresters and ecologists agree about the use of leave strips and other corridors to connect patches of habitat. However, there is no single standard for corridor length or width since a corridor's design is dependent on many specific factors. A corridor should be sufficiently wide so that the two edges differ, and so that the central portion has a distinct internal entity that is similar in structure, ecological communities, and species richness to the patches it is connecting.[5] In addition, the design aspects of the corridor's length, curvilinearity, alignment, and relative position to connecting patches must be analyzed to determine its effectiveness.[6] These factors are important because corridors have five main functions in landscapes: habitat, conduit, filter, source, and sink. Each of these factors should be considered in corridor design.[7] Therefore, good corridors for wildlife are specifically and deliberately designed; there is no set standard for width, length, shape, or vertical structure.

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[4] Thomas, J. Ward., Parker, J. Louise., Wildlife Management Institute., Pacific Northwest Forest and Range Experiment Station (Portland, O. Information Services., Pacific Northwest Forest and Range Experiment Station (Portland, O., United States. Bureau of Land Management., United States. Forest Service. (1979). Wildlife habitats in managed forests: the Blue Mountains of Oregon and Washington. Washington, D.C.: Wildlife Management Institute.

[5] Forman, Richard T., 1995, Land Mosaics: the ecology of landscapes and regions: Land Mosaics: the ecology of landscapes and regions. Cambridge: Cambridge University Press, 1995.

[6] *Id.*

[7] *Id.*

Feathering of vegetation is used along powerline corridors to ease the transition between ecotones and thereby reduce edge effect.[8] Where possible, these should be located in natural funnels where wildlife would be normally funneled by small peninsulas of land which channel animals to the corridor[9]. These funnels exist in the landscape along stream, wetland, and riparian areas. CMP has agreed to feathering several areas of the ROW along riparian areas and deer wintering areas (DWAs). CMP also has committed to maintaining 100-foot riparian buffers along all coldwater fishery streams, outstanding river segments, waterbodies containing rare, threatened or endangered species, and all perennial streams in Segment 1 of the Project. In these cases, the buffers will act as wildlife travel corridors that preserve the connectivity of the areas that are most likely acting as current corridors for many species of wildlife. In some cases, this would include connecting habitat of the pine marten.

The factors I have described are of primary importance in considering connectivity of forested habitat that would meet the requirements of a pine marten species umbrella. Increasing structure height would be of limited value since vegetation height would not be the limiting factor in the effectiveness of these wildlife travel corridors. The modest gain of vegetation height from increasing structure height would not substantively increase wildlife movement in these

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[8] Gates, J. E. 1991. Powerline Corridors, Edge Effects, and Wildlife in Forested Landscapes of the Central Appalachians. Pages 12-32 in J. E. Rodiek, and E. G. Bolen, eds. Wildlife and habitats in managed landscapes. Island Press, Washington, D. C.

[9] Forman, R. T. T. 1987. Emerging directions in landscape ecology and applications in natural resource management. In R. Herrmann and T. Bostedt-Craig, eds., Proceedings of the conference on science in the national parks. U.S. National Park Service and the George Wright Society: Fort Collins, Colorado, pp. 59–88. as cited in Payne, N. F., Bryant, F. (1998). Wildlife habitat management of forestlands, rangelands, and farmlands. Malabar, Fla.: Krieger Pub. Co..

areas. Further, and again even if pine marten Focus Habitat were present, travel corridors such as those CMP has proposed for the Upper Kennebec Deer Wintering Area would provide sufficient linkage, without the need for taller structures and full height vegetation.

QUESTION 14: IN TNC'S NINE AREAS OF CONCERN, WHETHER TRAVEL CORRIDORS MUST BE LOCATED WITHIN A CERTAIN DISTANCE OF STRUCTURES (POLES), AND WHAT THE MINIMUM WIDTH WOULD BE OF THE TRAVEL CORRIDORS IN ORDER FOR SPECIES LIKE THE PINE MARTEN TO USE THEM.

This question must be considered in the context of the overall forest matrix. This matrix is defined by three attributes: area, connectivity, and control over dynamics.[10] The area of the forested matrix in this part of Maine can be difficult to describe because the region is continuously shifting cover types, because of rotational forest harvest. The nature of this shifting mosaic is what dominates the area of the forest matrix. In this system, we are interested in understanding connectivity to the extent that it controls ecosystem dynamics. Understanding what makes up the forest matrix is important to understand the implications of matrix dynamics and, therefore, the landscape resistance that describes the effectiveness of a corridor.[11] How much "stuff" (wildlife in this case) and the rate by which the corridor helps or hinders this flow is widely influenced by the form and function of what is around it.

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[10] Forman, Richard T., 1995, Land Mosaics: the ecology of landscapes and regions: Land Mosaics: the ecology of landscapes and regions. Cambridge: Cambridge University Press, 1995.

[11] *Id.*

To determine appropriate travel corridor width for species like pine marten and the related proximity to structures requires an evaluation of each of the nine locations identified by TNC, as summarized in the following table.

TNC Location	Length (miles)	Township	1/30/2019 NRM Map Page #s	Structures	Riparian Stream Corridors	Focus Habitat, Stand Development Stage Condition
1	1.63	Beattie	8-11	795 to 803	Number 1 Brook	Cut after 5/1988 & before 5/2004 Abuts and within 2,800 ft of Lowelltown Road.
2	1.39	Skinner	21-22	765 to 771	South Branch Moose River	Cut after 5/1988 & before 5/2004 Bounded by logging road and crossed by or within 1,800 ft of West Branch and Beaudry Roads.
3	1.23	Skinner, Appleton	26-28	752 to 758	3 unnamed perennial streams with associated intermittent tributaries	Cut after 5/1988 & before 5/2004 Within 1,800 ft Pine Tree Rd and bounded on east by a logging road.
4	3.15	Appleton	32-39	725 to 743	Gold Brook and tributaries, perennial streams flowing in Rock and Iron Ponds	Cut after 6/1997 & before 5/2004 & subsequently before 8/2011. Adjacent to, crossed 3 times, and within 1,800 ft of Spencer Road.
5	4.22	Hobbstown TR7 BKP WKR, Bradstreet	46-57	683 to 704	Toby Pond inlet, Whipple Brook, Bitter Brook, Moose River tributary and Egg Pond inlet	Cut after 6/1997 & before 5/2004 Bounded by Tobey Rd and within 8,000 ft of Spencer Road.
6	2.45	Bradstreet, Parlin Pond, Johnson Mountain	66-71	649 to 656	Perlin Brook and 2 other perennial streams	Cut multiple times after 6/1997; most recently between 9/2007 and 8/2011. Bounded, within 2,000 ft, and crossed 3 times by Mining or Spencer Roads.
7	0.72	Johnson Mountain	75	639 to 643	Not crossed by perennial stream	Crossed twice and within 500 ft of logging roads.
8	3.71	Johnson Mountain, West Forks	79-84	564 to 585	Tomhegan Stream and 3 perennial tributaries	Crossed by a transmission line and crossed by or within 11,000 ft of Wilson Road.
9	3.68	West Forks	87-91	540 to 554	Kennebec River, Moxie Stream	Crossed 3 times by and within 500 ft of Fish Pond Rd.

This table presents attributes identified by Bissonette et al. (1991)[12] as the key elements for landscape level management of marten: 1) old growth should be the matrix (prevailing) element in the landscape, and 2) corridor access routes between patches are preferably maintained along riparian corridors. Accordingly, the table shows Stand Development Stage as well as the occurrence and abundance of persistent, natural features (stream riparian corridors) and established disturbance (roads) in the nine TNC locations.

As discussed in response to the prior question, and as the chart above demonstrates, there are few old growth forest ecosystems along the 150-foot-wide Segment 1 ROW. Notwithstanding that fact, which renders taller structures and travel corridors largely futile for the travel of pine marten, I analyzed the remaining factors of riparian corridors and proximity to daily active roads to identify where travel corridors for species like marten are best located in relation to placement of taller structures. This approach is consistent with TNC findings for barrier analysis-based, cost-effective establishment of functional travel corridors (McRae et al., 2012).[13] Riparian ecosystems are also recognized for biological productivity and diversity, and often important habitat links (Pelletier, 2008).[14]

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[12] Bissonette, J., R.J. Fredrickson and B. J. Tucker, 1991. American Marten: A Case for Landscape-level Management, *in* Wildlife and Habitats in Managed Landscapes, J.E. Rodiek and E. G. Bolen eds, pgs 114-134.

[13] McRae, B.H., S.A. Hall, P. Bier, and D.M. Theobald, 2012. Where to Restore Ecological Connectivity? Barrier and Quantifying Restoration Benefits, PLOS One, V 7, Is 12, 12 pgs.

[14] Pelletier, S.K., 2008 ed. Forest Management Issues: Habitat Connectivity, *in* Biodiversity in the Forests of Maine: Guidelines for Land Management, C. A. Eliot ed., pgs. 111 – 115.

Conditions along the nine TNC locations are displayed on CMP's January 30, 2019 natural resource maps in the NECEC permit application. These maps display the timber harvest extent and Stand Development Stage relevant to pine marten Focus Habitat within approximately 900 feet of the centerline for a 0.5-mile length of Segment 1,[15] and thus can identify areas in the nine TNC locations that are best suited for travel corridors created by an increase in structure height. From this determination and with engineering analysis of conductor clearance requirements, the minimum width of the resultant spanned travel corridors can be determined.

As described in response to Question 13, there is no broadly agreed upon standard for corridor width. However, in practice within Maine and agreed to as part of CMP's mitigation, a 100-foot buffer along many streams (75-foot buffer along the remainder of streams) has been proposed to minimize and mitigate potential impacts. These 200-foot, or more, wide buffers have been agreed to by the MDIFW and CMP after careful consideration regarding protecting these resources. When used in an area that would connect existing patches, a 200-foot corridor should also be suitable to facilitate travel of marten and the associated assemblage of species under its umbrella. Again, some of these stream and riparian crossings may connect pine marten habitat.

Therefore, a specific distance from a structure for travel corridors would be an arbitrary measure, because it is not a part of the equation for good wildlife corridor design. Corridor width should look and feel like those in the landscape and should connect patches of habitat. It is my

[15] It should be noted, however, that these maps are more than three years old, and thus do not display subsequent timber harvesting nor indicate the location or extent of future timber harvests.

opinion that the treatments described in CMP's mitigation plan are a reasonable width to facilitate wildlife movement in many areas.

QUESTION 15: IN TNC'S NINE AREAS OF CONCERN, WHETHER TAPERING WOULD ADEQUATELY REDUCE THE FOREST FRAGMENTATION OF ANY CLEARING.

The question assumes that the scrub shrub cover to be maintained along the 150-foot-wide Segment 1 ROW is a source or cause of fragmentation in the area, and that "tapering" of the associated edges is an effective means to mitigate this effect. The managed scrub shrub habitat associated with transmission corridor ROWs are only one type of fragmentation. The region is highly fragmented by clear-cuts, strip cuts, skid trails, log yards, logging roads, and snowmobile/recreational trails. Each of these fragmenting features has the potential to create habitat for some species while creating inhospitable conditions for others.

Much of the proposed ROW is bordered by immature and early successional forest types caused by recent fragmenting forestry activities (as described in my responses to Question 13 and Question 14). The area surrounding the Project is a shifting mosaic of habitats found from the variety of land uses and commercial forest management practices in the region, and there is very little or no old growth forest along the 150-foot-wide Segment 1 ROW. These forests are managed for a wide variety of goals and in accordance with changes in soil type, elevation, depth to bedrock, and other biotic and abiotic factors.

Consequently, the maintained Project ROW is structurally similar to much of the forest matrix, and the consequences of any fragmentation from the scrub-shrub ROW are minimal. Indeed, when mature forest is the management objective (i.e., managing mature forest for

biodiversity and wildlife habitat), roads and power lines are responsible for dissection. More extensive clearing, such as clear-cuts, fields, and residential development, are responsible for isolation, reduction of patch size, and increasing fragmentation. [16]

In the response to Question 13, I describe how natural resources managers have used leave strips in clear-cuts in places where the best corridors should be located. It is a thoughtful and deliberate process that relies on developing an understanding of the five factors used in designing corridors. Tapering or feathering of vegetation is one of the tools land managers can use to improve the functions of corridors by providing *habitat* in the ROW. Natural funneling can improve *conduit* function if located along naturally occurring landforms (e.g., peninsulas of habitat, streams, rivers, ridges, saddles, etc.). The permeability of the *filter* effect can be increased by providing wildlife with the option of crossing at a place where the habitat is more similar to the surrounding matrix (where habitat is present on both sides of the ROW). Tapering will also change the functional dynamics of *source* and *sink* along the ROW. For some species these tapered areas might be a source of recruitment, while for many prey species these same tapered areas might act as a sink.

If TNC's nine areas of concern represented mature forest in areas that would be consistently maintained in a mature state for the life of the Project, then there could be a benefit from tapering to minimize the effects of habitat. CMP identified many of these same areas as part of their Compensation Plan for the Project; this Plan appears to have been thoughtful and

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[16] Flatebo, G., and C.R. Foss, 2008 ed. Forest Management Issues: Habitat Patch Size, *in* Biodiversity in the Forests of Maine: Guidelines for Land Management, C. A. Eliot ed., pgs. 105 – 110.

deliberate in considering and proposing measures to connect adjacent habitats, such as winter deer travel corridors within the upper Kennebec deer wintering area. The tapering described and proposed in CMP's Compensation Plan within many of TNC's 9 areas of interest, combined with tapering at select perennial stream and riparian areas, appropriately and adequately addresses habitat fragmentation concerns within the matrix of the Project.

Exhibits

CMP-14-A: Giumarro CV

CMP-14-B: Focus Species Forestry, A Guide to Integrating Timber and Biodiversity Management in Maine

Dated: 4/30/19

Respectfully submitted,

Gino Giumarro

STATE OF MAINE
Cumberland, ss.

The above-named Gino Giumarro did personally appear before me and made oath as to the truth of the foregoing pre-filed testimony.

Before,

Dated: 4/30/19

Notary Public
Name: Cindy Brouwer
My Commission Expires: 12/12/27

CINDY BROUWER
Notary Public, Maine
My Commission Expires December 12/12/23

GINO GIUMARRO

CERTIFIED WILDLIFE BIOLOGIST - BUSINESS UNIT DIRECTOR

YEARS OF EXPERIENCE

- 25

EDUCATION

- M.S., Natural Resources Planning, University of Vermont, 2000
- B.S., Wildlife Biology, University of Massachusetts, 1995

AREAS OF EXPERTISE

- Project management
- FERC licensing
- NEPA compliance
- Ecological impact assessments for energy projects
- Routing and siting
- Rare, threatened and endangered species surveys
- Federal, state and local permitting

SPECIAL TRAINING

- U.S. Army Public Health Center Environmental Noise Evaluation Training
- Incident Command System - Planning Leader Training

CERTIFICATION

- Certified Wildlife Biologist
- FAA Qualified Airport Biologist

EXPERIENCE SUMMARY

Mr. Giumarro is a Certified Wildlife Biologist with more than 25 years of experience conducting natural resources investigations and permitting in the energy, government, transportation, and commercial markets. He has led multidisciplinary teams for linear project routing, siting, assessment, and associated permitting. Mr. Giumarro was an early developer of bird and bat survey protocols for wind power assessments and in conducting wind siting assessments across the country. In addition, he has led the environmental services efforts for some of the largest pipelines and natural gas gathering systems in the country. He has specialized expertise with bird and bat surveys, with a focus on rare species surveys and consultations under the Endangered Species Act. Mr. Giumarro currently leads the POWER Engineers nationwide Biology Business Unit.

Mr. Giumarro specializes in Federal Energy Regulatory Commission (FERC) license applications, ecological community characterizations, biological assessments, Endangered Species Act Section 7 consultations, Clean Water Act permitting, and document preparation in accordance with the National Environmental Policy Act (NEPA). He has also provided emergency ecological response services at several significant oil spills across North America, and acted as a quality control lead for a multinational environmental services practice.

The following are representative projects conducted in Maine and across the country.

Ranger Solar, Commercial Generation Program, Multiple States

Biologist responsible for vernal pool surveys, RTE species surveys, and wetland delineations for five proposed Ranger Solar, LLC projects in Maine, New Hampshire, and Connecticut. Collectively, the projects span thousands of acres and required avoidance and minimization measures that maximized panel placement. Ranger has proposed to develop utility-scale commercial solar power generating facilities that would generate clean energy to be transmitted through the region's electric grid. The projects were included in Ranger Solar's successful bid in the New England Clean Energy RFP. These surveys collected information on the location, size, and quality of resources and were used to develop permitting thresholds and rare species mitigation plans

Patriot Towers – Statewide Ecological Suitability Assessment

Gino worked with agencies such as the Maine Natural Areas Program, Maine Department of Inland Fisheries and Wildlife (MDIFW), and U.S. Fish and Wildlife Service (USFWS) to help evaluate protected wildlife and flora and fauna species and critical habitat at or adjacent to the 60 sites across the forested landscape. This work was initiated through a landscape analysis whereby the landscape position of each site was evaluated in conjunction with various GIS datasets. Comparing information such as soils, hydrology, elevation, land cover, and vegetation cover allowed for the creation of a

EMPLOYMENT HISTORY

- **POWER Engineers (2017-present)**
  Business Unit Director – Ecology
- **Verdanterra, LLC (2014-present)**
  Director of Ecological Services
- **Stantec (2008-2014)**
  Principal
- **Woodlot Alternatives (2003-2008)**
  Director of Ecological Services
  Senior Project Manager
- **engineering-environmental Management (now HDR; 2000-2003)**
  Wildlife Biologist
  Project Manager
- **Maine Audubon Society (1998)**
  Wildlife Biologist
- **Chewonki Foundation (1996-1997)**
  Naturalist
- **Trustees of Reservations (1995-1996)**
  Wildlife Biologist

ADDITIONAL REPRESENTATIVE PROJECTS

- Deepwater Horizon – Natural Resource Advisor (Mobile Command Center)
- Wind Farm Development Surveys and Risk Assessments (New York, New Hampshire, Vermont, Maine, Virginia, West Virginia, and Pennsylvania)
- EdgeMarc Energy Rare Bat Surveys (Ohio)
- Equitrans TP-371 Migratory Bird Assessment (Pennsylvania)
- National Park Service Trenton Intermodal Facility Planning (Maine)
- Department of Defense INRMPs (multiple nationwide)
- Blue Racer Midstream Gas Gathering Project (Ohio)
- Access Midstream Rare Bat Surveys (Ohio)
- National Park Service Cape Cod NS Hunting EIS (Massachusetts)
- Mount Rushmore National Memorial Air Tour Management Plan Environmental Assessment (South Dakota)

biophysical profile that aids in the determination of the likelihood rare species presence. This process is not meant to replace field surveys in any way, but instead helps to focus field efforts on those areas with the greatest likelihood of species presence. Gino surveyed each area mountaintop site to determine the presence or absence of critical habitats and any state or federally-listed RTE species. The field surveys will consist of line and loop transects that focus on areas with the highest potential for rare species or communities to be present.

Riverbank Energy Center, Wiscasset Maine

Gino aided in the determination that this project would have an unprecedented impact to zooplankton and other marine organisms within Montsweag Bay and the Sheepscot River and ultimately convinced the developer to find other places to develop their concept. The project was a 1,000-megawatt ("MW") pumped storage hydroelectric Project located in Wiscasset, Maine. The principal project works included an upstream reservoir (the Back River), and an underground downstream reservoir located 164 feet above the distributor centerline elevation with a water fluctuation of 130 feet and a capacity of 1.23 billion gallons. The downstream reservoir is composed of six (6) large unlined caverns, 90 feet wide by 156 feet high, and 1,874 feet below ground.

Kinder Morgan, Utica Marcellus Texas Pipeline, Multiple States

Principal Scientist tasked with development and implementation of multi-state permitting and environmental consultation, as well as oversight of natural resources assessment along the pipeline corridor. The Utica Marcellus Texas Pipeline (UMTP) project is designed to transport purity and mixed natural gas liquids produced from the Utica and Marcellus areas to the Gulf Coast. The pipeline will provide connectivity to major processing and fractionation hubs in the basin. The proposed project involves the abandonment and conversion of nearly 1,000 miles of natural gas service on the Tennessee Gas Pipeline, the construction of approximately 200 miles of new pipeline from Louisiana to Texas, and new storage capacity and laterals in Ohio.

Spectra Energy NexusGas Transmission Project, Multiple States

Principal Manager who managed wetland and waterbody surveys and delineations on an approximately 250-mile proposed pipeline corridor crossing portions of Ohio and Michigan. Daily data collection and reporting included U.S. Army Corps of Engineers wetland data forms, Ohio Rapid Assessment Method (ORAM), stream corridor assessments (HHEI/QHEI), and GPS survey within the proposed pipeline right-of-way.

Multiple Clients, Natural Resource Services, Multiple States

As Senior Ecologist and Project Manager, conducted a reconnaissance assessment and survey of terrestrial and aquatic systems at numerous project sites throughout New England to identify and characterize suitable habitat conditions for a variety of RTE species, rare or exemplary natural resources, wetland resources, potential vernal pools, and natural communities. Determinations of applicability were provided to clients to assist with their project planning and permit applications in compliance with applicable local, state, and federal natural resource regulations.

NASA, Wallops Island Flight Facility Bat Evaluation, Virginia

Conducted bat acoustical surveys during the fall migration period. Bat acoustic data was used to characterize bat presence in the project area and allow for some identification of bat species or guilds. The data provided an index of bat activity between migration and breeding periods and will help determine whether seasonality affects bat activity.

Echolocation calls were identified to the species level whenever possible. Bat calls were identified to guild, although some calls were provisionally categorized to species when possible. Mr. Giumarro reviewed regional databases of bat calls to aid in the interpretation of results through use of filtering software.

Downeast LNG, Downeast LNG Import/Export Terminal and Pipeline, Maine

Led the environmental and permitting program for construction of a potential liquefied natural gas (LNG) import terminal and natural gas pipeline in eastern Maine. The project included a 47-acre port facility and a 30-mile natural gas pipeline. The proposed development included an associated pier facility extending approximately 3,300 feet from shore into Passamaquoddy Bay.

Mr. Giumarro directed field work and was the primary author of permitting documentation, FERC application materials, and Biological Assessments. Directed the site prospecting and selection process. Assisted the client in evaluating environmental resources and potential impacts, preparing FERC documentation. Served as a liaison with natural resource agencies, and coordinated state and local environmental permitting for the project.

Mr. Giumarro also conducted an extensive site characterization, including detailed marine and terrestrial habitat surveys, rare species studies, wetland mapping and functional assessments, essential fish habitat studies, marine mammal habitat evaluations, development of potential gas pipeline corridors, and reviews of regulatory requirements for state and federal environmental permitting. Mr. Giumarro also conducted detailed wetland and RTE species field evaluations along the pipeline corridor alternatives. Directed the preparation of Biological Assessments for Atlantic Salmon, bald eagles, and marine mammals with the USFWS and National Marine Fisheries Service (NMFS).

American Marten

Distribution: Alaska to Newfoundland, south to Nevada, New Mexico, northern Minnesota, northern New York, and northern Maine

Maine Focus Region: North

Home Range: Average 1 sq. mi. for females, 2 sq. mi. for males (640-1,280 acres)

Food: Primarily small mammals including voles, mice, red squirrels; also grouse, hare, bird eggs, fruits, berries, and nuts

Special Habitat Needs: Extensive mature hardwood, mixed-wood, or conifer forests with abundant snags and downed trees and other structural features 2= 2,500 ac and 7=8,750 ac where max Twp ROW is 230.52 ac or 2.6 to 9.2% of M hab or 0.9%Twp area

Management:

- ✓ Maintain an average of 7 marten habitat units (no less than 2) per township that are:
  - ▪ >1,250 acres, with
  - ▪ 75% of stands >40 ft. tall with basal area >80 sq. ft./acre, and ? any particular dbh?
  - ▪ include at least one large, intact patch of 700-1,000 acres that meets the height and density requirements above.
- ✓ Maintain dead trees, logs, root mounds, and other structural features as denning sites and cover for small mammals that are the marten's staple diet. See snag and cavity tree guidelines (Section 7).
- ✓ Use even-aged or uneven-aged management, as long as basal area, height, and snag/deadwood goals are met. Regeneration using a shelterwood-with-reserves system in conifer and mixed stands will promote softwood regeneration and prey, especially snowshoe hare, while maintaining canopy cover.
- ✓ Restrict access during trapping season.

Comments: Commonly called the pine marten in Maine. Extensive research at the University of Maine suggests that management for marten will provide habitat used by most northern forest species, except those that require very young or late-successional forest conditions. Marten are easily trapped, so where road densities are high, access should be restricted during trapping season to enhance survival

Habitat Use:

Forest Ecosystems																						Special-value Habitats	
Aspen-Birch				Northern Hardwoods					Oak-Pine					Hemlock			Spruce-Fir					N. White Cedar			Riparian/ Wetland Forest	Vernal Pool
R	S	I	M	R	S	I	M	L	R	S	I	M	L	I	M	L	R	S	I	M	L	I	M	L		

R Regeneration and seedlings
S Saplings and small poles
I Intermediate-aged forest
M Mature forest
L Late-successional forest

Mx Mixed conifer-deciduous
U Understory present
C Cavity tree or snag

Focus habitat
Other habitat
Little/no use

References: Boone and Krohn 1998, Burt 1976, Chapin et al. 1998, DeGraaf and Yamasaki 2001, Fuller and Harrison 2000, Harrison 2004, Payer and Harrison 2003, Payer and Harrison 2000a, Payer and Harrison 2000b

Table 2. Stand Development Stages

Stand Development Stage		Identification	
		Typical characteristics[1]	Description
Early Successional	Regeneration and Seedlings	Less than 30 sq.ft. basal area/ac. (BA) in trees >1 in. dbh. Typically 0-10 years	Regeneration phase; may include partial residual overstory
	Saplings and Small Poles	BA in trees 1-5 in. dbh greater than that of trees <1 in. or >5 in. Typically 10-30 years old	Young, closed-canopy stands or two-storied stands dominated by small trees with a partial residual overstory
Intermediate		Majority of stocking in: • Softwood stands: >5 in. • Hardwood stands >5 in. Majority of stocking typically in trees 30-70 years old	Includes even-aged stem-exclusion stands (little or no understory) and two-story stands with partial overstory of mature trees
Mature		Majority of stocking in • Spruce-fir >9 in. • Hardwoods >12 in. • Pine-hemlock >12 in. Overstory typically 70-100+ years depending on forest type	Includes stands dominated by small- to large-sized sawtimber, including stands in the late stem exclusion stage and early phases of understory reinitiation. May be single story, two story, or multi story depending on past harvest history. Depending on species and condition, may be maintained by individual tree or group-selection harvests.
Late-Successional		Majority of stocking (better site quality, will vary with species, site, and stand history): • Spruce-fir ≥12 in. • Hardwoods ≥16 in. • Pine-hemlock ≥20 in. • Large deadwood accumulating • Indicator species (e.g., certain lichens) present Transition from mature to late successional is generally in the 100-125-year age range	Net growth stable or declining in unharvested stands; principle mortality in canopy due to disease, wind, and insects. Large-diameter dead wood accumulating in standing trees and on the ground. Typically one or more age classes represented in the understory or in gaps but may be virtually even-aged in the case of pine and hemlock. When long-lived species with medium to high shade tolerance are present, this stage can be maintained over time by light individual-tree or group-selection management. Stands meeting diameter guidelines but lacking other characteristics should be classified at mature.
	Old-Growth	Generally >150 years old	Old growth is the culmination of the late-successional stage. These stands are typically unharvested or have a very light harvest history.

[1] Diameters and ages are general guidelines only and will vary based on site characteristics, stand history, and forest type. Note that diameter guidelines are overlapping; place stand in the oldest development stage possible given the diameter constraints and other characteristics. Final determination should be based on professional judgment based on stand conditions and knowledge of local forests.
See Appendix 10 for example of stand classification.

Northern Hardwoods

Identification

Sugar maple, yellow birch, and American beech are the characteristic species. Paper birch, aspen, red oak, hemlock, and red spruce are common associates. On poor sites beech and red maple may be dominant, while sugar maple, ash, and basswood are found on highly enriched sites. Stands range from pure hardwood to mixed hardwood-conifer. This type is known for an abundance of spring wildflowers.

Ecology

Northern hardwood forests are typically found on moist, medium- to well-drained sites at middle elevations in western, northern, and eastern Maine. Over time this late-successional type forms large, relatively stable forests. Under natural conditions, shade-tolerant northern hardwoods are most commonly regenerated in small gaps created by windthrow or mortality due to insects and disease. There is often a transition to spruce-fir at high elevations. Mixed hardwood-conifer stands are common on sites with intermediate site quality at lower elevations.

Wildlife

Northern hardwoods host a great variety of resident and migrant songbirds that are uniquely adapted to different ages of forest as well as different positions (ground, understory, or canopy) within the forest. Beech nuts are critical to reproductive success of black bear in northern Maine. Because of their extent—about 6 million acres in Maine—northern hardwoods are one of Maine's most important forest habitats.

Rare Species
17 rare plants are associated with this ecosystem, most frequently in enriched hardwoods
Rare Natural Communities
Maple-basswood-ash forest (also known as enriched hardwood forest)

Focus Species		
Early Successional Forest	**Mature Forest**	**Late-successional Forest**
Chestnut-sided warbler Snowshoe hare[1] Ruffed grouse	Fisher (South region) American marten (North region) Northern goshawk Pileated woodpecker Barred owl Wood thrush (South region) Black-throated-blue warbler Redback salamander	Lungwort lichen *(Lobaria pulmonaria)*

[1]conifer understory present

Focus Species Management	
Overview	Northern hardwoods are adaptable to a wide range of silvicultural practices. The natural community characteristics of northern hardwoods are best maintained by single-tree or group selection cutting, while heavier cuts may be used for specific timber and wildlife objectives.
Single Tree Selection	✓ Well suited to maintaining mature forest and consistent with natural disturbance patterns. ✓ May be used with caution in maple-basswood-ash forest (a rare natural community)—avoid soil disturbance and maintain >60% overstory canopy closure.
Group Selection	✓ Use to maintain mature forest while encouraging mid-tolerant species like yellow birch and ash and creating small patches (up to 2 acres) of early successional habitat.
Shelterwood and Clearcut	✓ Use to create patches of early successional habitat over 2 acres in size and to regenerate intolerant species or low-quality stands. ✓ Retain patches of mature stands in islands or peninsulas as well as travel corridors. See stand-level guidelines for details (Section 7). ✓ Return tree tops to the harvest area to prevent nutrient depletion and maintain soil structure. ✓ Shelterwood harvests can be used to emulate extreme natural disturbances; lengthening the period before overstory removal will minimize impacts to herbaceous plants. ✓ Clearcuts have no true natural analogue and require a longer time for ecosystem recovery. ✓ When clearcuts and shelterwood are used, long rotations (>100 years) may be necessary to restore mature forest conditions.
Other	✓ Maintain nut-producing oak and beech. Where healthy beech are not present, even trees with partial live crowns are beneficial to bears and other wildlife. ✓ Maintain inclusions of hemlock, spruce, and other conifers. ✓ Follow recommendations for snags, cavity trees, and downed woody material and other stand-level guidelines (Section 7). ✓ Refer to landscape-level guidelines for recommendations on integrating landscape structure and design into stand level-decisions (Section 8).

Mixed Northern Hardwood-Spruce-Fir Forests: In general, for mixedwood stands up to 1/3 spruce-fir and other softwoods, use the northern hardwood recommendations; for mixedwood stands with 1/3 to 2/3 in conifers, consider both the northern hardwood and spruce-fir recommendations; for mixedwood with more than 2/3 in conifers, use the spruce-fir recommendations.

References: Carlson 1999 (see Section II, Enriched Hardwood Forests), DeGraaf et al. 1992, DeGraaf and Yamasaki 2001, Flatebo et al. 1999, Eyre 1980, Leak et al. 1987, MNAP 2001, Seymour 1984, Solomon et al. 1995

Spruce-Fir

Identification

Spruce-fir forests are typically characterized by mixtures of red spruce or white spruce and balsam fir in pure stands or with other species. Common associates include yellow birch, paper birch, and other northern hardwood species as well as hemlock, northern white cedar, and black spruce. White pine in the spruce-fir/northern hardwood landscapes of northern or eastern Maine is included in the spruce-fir ecosystem for the purposes of Focus Species Forestry.

Ecology

Spruce-fir forests frequently share the same landscape as northern hardwoods, but are found on cooler sites—notably valley bottoms and high-elevation areas, and in a narrow band along the coast—or where soils are somewhat-poorly to poorly drained. Transitional stands may contain up to 50% hardwoods. The Maine Natural Areas Program recognizes 6 spruce-fir subtypes (see Appendix B). Stands dominated by white spruce are common on former agricultural land in northern and eastern Maine as well as in the spray zone on coastal islands.

Wildlife

Several species—including spruce grouse, gray jay, black-backed woodpecker, and bay-breasted, magnolia and Cape May warblers—are found almost exclusively in spruce-fir forests. Marten are strongly associated with this type, either in pure stands or in mixed hardwood-spruce-fir forests. Young spruce-fir is critical for snowshoe hare. Relatively mature to mature stands are critical deer wintering areas in northern Maine.

Rare Species
Canada lynx Bicknell's thrush (limited to fir-heartleaved birch subalpine forest) 9 rare plants
Rare Natural Communities
Fir-heartleaved birch subalpine forest

Focus Species		
Early Successional Forest	**Mature Forest**	**Late-successional Forest**
Snowshoe hare Magnolia warbler	American marten (North region) Fisher (South Region) White-tailed deer (North region) Black-backed woodpecker Redback salamander	Gray horsehair lichen *(Bryoria capillaris)*

Focus Species Management	
Overview	Under natural conditions, disturbances that lead to regeneration vary by site and location. Spruce budworm and spruce bark beetle cause severe mortality on a cyclical basis, and blowdowns are not uncommon on coastal islands, high-elevation sites, and exposed sites with a high water table. Large stand-replacing disturbances may occur, but partial canopy loss in small to large patches is more common. On sites with a northern hardwood or hemlock component, regeneration is more likely to occur in smaller canopy gaps. Disturbance frequency increases with the percent of fir, soil moisture, or exposure to wind. On better sites spruce stands will easily persist more than 200 years.
Single-tree and Group Selection	✓ Single-tree or group-selection harvests emulate the natural disturbance patterns of better-drained spruce-fir sites where mixed spruce-northern hardwood stands are found.
Shelterwood, Patch Cuts, and Clearcut	✓ An irregular shelterwood system with reserve trees and patches resulting in a two-aged stand will mimic the cyclical natural disturbance pattern frequently found on poorer-quality sites that are naturally dominated by spruce-fir. Use this approach to create and maintain abundant browse and cover needed by snowshoe hare (see species profile, Section 6), critical prey for bobcat and the threatened Canada lynx. Moose, magnolia warblers, spruce grouse, ruffed grouse, and other young-forest species will also benefit. Optimum hare browse is found in dense regeneration that is 5-20 years old. ✓ True clearcuts are less appropriate for maintaining the natural forest community because they create excessive competition from hardwoods and raspberries, which adversely impacts spruce-fir regeneration and ground cover. ✓ Where management objectives result in complete overstory removal in the shelterwood or clearcut system, leave “islands” of reserve trees. See stand-level guidelines (Section 7).
Other	✓ Follow recommendations for snags, cavity trees, and downed woody material and other stand-level guidelines (Section 7). ✓ Favor spruce over fir in intermediate thinnings and harvests. Increasing the percentage of spruce will decrease susceptibility to spruce budworm, which prefers fir, and the longer life span of spruce will allow more management flexibility. ✓ See guide to landscape-scale forestry (Section 8) and guidelines for American marten (Section 6). ✓ In northwestern Maine where lynx may be found, check with the Maine Department of Inland Fisheries and Wildlife (MDIFW). ✓ In northern and eastern Maine, work with MDIFW to develop a long-term plan for managing deer wintering areas.

Mixed Spruce-Fir Northern Hardwood Forests: In general, for mixedwood stands up to 1/3 spruce-fir and other softwoods, use the northern hardwood recommendations; for mixedwood stands with 1/3 to 2/3 in conifers, consider both the northern hardwood and spruce-fir recommendations; for mixedwood with more than 2/3 in conifers, use the spruce-fir recommendations.

References Carlson 1999 (see Section II, Enriched Hardwood Forests); DeGraaf et al. 1992; DeGraaf and Yamasaki 2001; Eyre 1980; Flatebo et al. 1999; Frank and Bjorkbom 1973; Fuller and Harrison 2000; Koehler and Brittell 1990; MNAP 2001; Payer and Harrison 2000a, 2000b, 2003; Seymour 1994