August 31, 2021 [with corrections September 1, 2021]

Submitted via email to: Jessica Rowcroft jessica.rowcroft@state.ma.us and Forestry.comments@mass.gov

Jessica Rowcroft, Project Manager
Massachusetts Department of Conservation and Recreation
251 Causeway Street, Suite 700
Boston, MA 02114

RE: Comments on Seven 2021 DCR Proposed Forest Management Projects

Dear Ms. Rowcroft,

We are writing to comment on seven forest management projects that are being proposed by the Massachusetts Department of Conservation and Recreation (DCR) in six state forests.[1] The projects include: Old House Lot[2] (Chester-Blandford State Forest), Cattle Barn Lot[3] (Mt. Washington State Forest), Birnam Road Lot[4] (Northfield State Forest), Beaman Pond Lot[5] (Otter River State Forest), Willis Road North[6] and Willis Road South[7] (Lawton State Forest), and Charge Pond Campground Complex[8] (Myles Standish State Forest).

DCR has issued an individual proposal for each logging project. These proposals include a number of claims regarding the purported benefits of logging, most of them presented in more than one project plan. These comments cite some of the major claims made in the DCR proposals and our response to these claims.

There may be some legitimate need for some of these logging activities, such as the removal of hazard trees. However, we are concerned that in most cases the claimed benefits of these logging projects are either questionable or not supported by the facts.

Carbon Capture and Storage

DCR claim: DCR contends that its logging projects will be beneficial in *"maintaining structural and species diversity, providing positive benefits to wildlife, and using silvicultural techniques to help forests adapt to climate change and enhance carbon stock management."* (Cattle Barn Lot) and that this logging will *"[enhance] carbon sequestration and storage"* (Birnham Lot).

On its website, DCR expands on these claims:

> *[T]he Department of Conservation and Recreation's Bureau of Forestry leads in delivering carbon benefits on state lands for future generations.…*

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[1] Department of Conservation and Recreation. 2021. Forest Management Projects Proposed 2021. Commonwealth of Massachusetts https://www.mass.gov/guides/forest-management-projects#-forest-management-projects-proposed-2021-
[2] https://www.mass.gov/doc/old-house-lot-proposal/download
[3] https://www.mass.gov/doc/cattle-barn-lot-mwsf-southern-berkshire-proposal/download
[4] https://www.mass.gov/doc/birnam-road-lot-nsf-proposal/download
[5] https://www.mass.gov/guides/mid-state-forest-management-projects#-beaman-pond-lot-2,-otter-river-state-forest-
[6] https://www.mass.gov/doc/willis-road-north-lsf-mid-state-proposal/download
[7] https://www.mass.gov/doc/willis-road-south-lsf-mid-state-proposal/download
[8] https://www.mass.gov/doc/charge-pond-campground-mssf-southeast-proposal/download

The Commonwealth has made it a priority to permanently protect forest land from development and keep forests as forests. The DCR alone has acquired around 116,000 acres of land in the last 60 years. In contrast since the early 1990s, 4,800 acres of forest land are permanently lost to development in Massachusetts each year. The State Parks and State Forests protected lands, which will remove and store carbon dioxide….

While it is important to have older stands that hold large amounts of carbon, these carbon stocks are at risk from severe weather, diseases, and pests…. [M]anaging [i.e., cutting down trees] for diverse conditions locally and across the landscape allows for adaptation to a changing climate and provides a level of resiliency to events and issues attributed to climate change such as weather, fire, or invasive species….

There has been a continual accrual of total carbon on the DCR's forest land since 1960. Not only has total carbon increased but carbon stocks per acre on the DCR's lands have nearly doubled as well…. [T]imber harvesting timber harvesting has a minimal impact on our overall carbon portfolio. ***In fact, carbon in trees harvested represents less than one-half of one percent of the total tree carbon stocks.*** *[Emphasis in original.]*[9]

Response: DCR maintains that it is a leader in fighting climate change. There are several serious flaws in this claim.

A recent report co-authored by a University of Massachusetts forestry faculty member states flatly: "All harvesting reduces carbon storage of a forest below the maximum potential for the site."[10] DCR does not deny this. Indeed, in a 2018 presentation to the Department of Conservation and Recreation Stewardship Council, DCR Management Forestry Supervisor, William Hill stated, "It's obvious that the choice of leaving a forest uncut sequesters more carbon. We accept that."[11]

DCR repeatedly touts the fact that carbon stocks are increasing on forest lands it administers and implies that its forest "management" (logging) program is contributing to this increase. In fact, the increase is happening *despite* the logging done by DCR, not because of it.

America's forest carbon stocks have already been depleted by about 60% due to past logging and clearing.[12] Continued logging is releasing more carbon and further reducing the potential carbon sink.[13]

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[9] Department of Conservation and Recreation. 2020. Managing Our Forests ... For Carbon Benefits. Commonwealth of Massachusetts. https://www.mass.gov/info-details/managing-our-forests-for-carbon-benefits

[10] Catanzaro, Paul and Anthony D'Amato. 2019. Forest Carbon: An Essential Natural Solution for Climate Change. University of Massachusetts Amherst and University of Vermont. https://masswoods.org/sites/masswoods.org/files/Forest-Carbon-web_1.pdf

[11] William Hill. From transcribed excerpts of recording of presentation by DCR Management Forestry Supervisor William Hill to Department of Conservation and Recreation Stewardship Council Meeting, October 12, 2018.

[12] McKinley, Duncan C., Michael G. Ryan, Richard A. Birdsey, Christian P. Giardina, Mark E. Harmon, Linda S. Heath, Richard A. Houghton, Robert B. Jackson, James F. Morrison, Brian C. Murray, Diane E. Pataki, And Kenneth E. Skog. 2011. A Synthesis of Current Knowledge on Forests and Carbon Storage in the United States. Ecological Applications, 21(6), 2011, pp. 1902–1924. doi: 10.1890/10-0697.1.

Since 1600, logging and other forest clearing have dramatically reduced carbon storage in the forests of New England.[14] However, because of their tremendous ability to recover from past abuse, Massachusetts forests are now among the most carbon-dense in the eastern U.S.[15] In addition, because these forests grow fast, decay slowly, and have an average age of only 75 years, they have centuries of growth ahead. Research has shown that the greater the amount of logging, the less carbon that is stored in the forest. If protected from logging, New England forests are capable of storing 2.3 to 4.2 times more carbon than they do currently.[16] If these forests are allowed to grow back and kept intact to reach their ecological potential — termed proforestation — there is enormous potential for additional carbon storage.[17]

DCR contends that its logging program has an infinitesimal effect on climate disruption. This is highly misleading. In the northern United States, including New England, logging accounts for about 86% of the carbon emitted by forests each year — far greater than releases by development and other land uses.[18] Moreover, logging directly emits carbon from fuel burned by logging and hauling equipment, as well as by the decomposition of trees after they are cut.[19] Because overall forest growth has yet to absorb the emissions from forest loss and degradation over the last several centuries, more logging further sets back recovery of original carbon stocks.

The claim of DCR that the carbon released by its logging program is insignificant ignores the long-established concept of cumulative effects.[20] When the impacts of logging by DCR are added to the thousands of other logging operations in New England, the United States, and around the world, the impact is massive. One study concluded that if logging were phased out across America's public lands — including state-owned lands — it could result in as much as a

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[13] Hudiburg, Tara W., Beverly E. Law, William R Moomaw, Mark E. Harmon, and Jeffrey E. Stenzel. 2019. Meeting GHG Reduction Targets Requires Accounting for All Forest Sector Emissions. Environ. Res. Lett. 14 (2019) 095005. https://doi.org/10.1088/1748-9326/ab28bb

[14] Duveneck, Matthew J., Jonathan R. Thompson, 2019. Social and Biophysical Determinants of Future Forest Conditions in New England: Effects of a Modern Land-Use Regime. Global Environ. Change 55, 115–129. doi: 10.1016/j.gloenvcha.2019.01.009

[15] Zheng, Daolan, Linda S. Heath, Mark J. Ducey, Brett Butler. 2010. Relationships Between Major Ownerships, Forest Aboveground Biomass Distributions, and Landscape Dynamics in the New England Region of USA. Environmental Management (2010) 45:377–386 DOI 10.1007/s00267-009-9408-3 https://www.ncrs.fs.fed.us/pubs/jrnl/2010/nrs_2010_zheng_001.pdf

[16] Keeton, William S., Andrew A. Whitman, Gregory C. McGee, and Christine L. Goodale. 2011. Late-Successional Biomass Development in Northern Hardwood-Conifer Forests of the Northeastern United States. Forest Science 57(6) 2011 https://www.uvm.edu/giee/pubpdfs/Keeton_2011_Forest_Science.pdf

[17] Moomaw William R., Susan A. Masino, Edward K. Faison. 2019. Intact Forests in the United States: Proforestation Mitigates Climate Change and Serves the Greatest Good. Front. For. Glob. Change, 11 June 2019 | https://doi.org/10.3389/ffgc.2019.00027 https://www.frontiersin.org/articles/10.3389/ffgc.2019.00027/full

[18] Harris, N. L., S. C. Hagen, S. S. Saatchi, T. R. H. Pearson, Christopher W. Woodall, Grant M. Domke, B. H. Braswell, Brian F. Walters, S. Brown, W. Salas, A. Forek, and Y. Yu. 2016. Attribution of Net Carbon Change by Disturbance Type Across Forest Lands of the Conterminous United States. Carbon Balance and Management. 11(1): 24. 21 p. http://dx.doi.org/10.1186/s13021-016-0066-5

[19] Law, Beverly E., Tara W. Hudiburg, Logan T. Berner, Jeffrey J. Kent, Polly C. Buotte, and Mark E. Harmon. 2018. Land Use Strategies to Mitigate Climate Change in Carbon Dense Temperate Forests. PNAS April 3, 2018 115 (14) 3663-3668. https://doi.org/10.1073/pnas.1720064115

[20] NEPA.gov. 2020. Considering Cumulative Effects Under the National Environmental Policy Act. Chapter 2: Scoping for Cumulative Effects. https://ceq.doe.gov/docs/ceq-publications/ccenepa/sec2.pdf

43% increase over current carbon sequestration levels.[21] This would be a major contribution to climate stabilization efforts.

Likewise, although some carbon may be stored in forest products, this is far less than if the forest were left standing. Studies have shown that even considering conversion to wood products, most of the original carbon in a logged forest will be released to the atmosphere within a relatively short time.[22],[23] Recent analyses have found that the benefits of cutting trees and storing carbon in wood products have been greatly overestimated by forestry advocates.[24],[25]

While a young forest recovering from logging will capture and store carbon, the amount stored in the forest will be much less than if the existing trees were allowed to grow.[26] Recent studies show that large, old trees actively fix large amounts of carbon compared to smaller trees, and a single big tree can add the same amount of carbon to the forest within a year as is contained in an entire mid-sized tree.[27] A global survey found that the largest 1% of trees store 50% of the carbon in a forest, and that old forests have far larger carbon stocks than young forests.[28] This is consistent with a recent study, which found that living trees in an intact eastern white pine forest in Massachusetts can accumulate aboveground carbon a high rate — especially in the largest trees — and can continue to accumulate high amounts of carbon in live trees for well over 150 years.[29] By cutting many, if not all, mature trees at each site, the proposed logging

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[21] Depro, Brooks M. Brian C. Murray, Ralph J. Alig, Alyssa Shanks. 2008. Public Land, Timber Harvests, and Climate Mitigation: Quantifying Carbon Sequestration Potential on U.S. Public Timberlands. Forest Ecology and Management 255 (2008) 1122–1134 http://naldc.nal.usda.gov/download/21039/PDF

[22] John Talberth, Dominick DellaSala, and Erik Fernandez. 2015. Clearcutting our Carbon Accounts: How State and Private Forest Practices are Subverting Oregon's Climate Agenda. Center for Sustainable Economy and GEOS Institute. November 2015 http://sustainable-economy.org/wp-content/uploads/2015/11/Clearcutting-our-Carbon-Accounts-Final-11-16.pdf

[23] Ann L. Ingerson. 2009. Wood Products and Carbon Storage: Can Increased Production Help Solve the Climate Crisis? The Wilderness Society, Washington, DC. https://www.sierraforestlegacy.org/Resources/Conservation/FireForestEcology/ThreatsForestHealth/Climate/CI-Ingerson-TWS2009.pdf

[24] Leturcq, Philippe. 2020. GHG displacement factors of harvested wood products: the myth of substitution. Scientific Reports Vol. 10, No. 20752. https://www.nature.com/articles/s41598-020-77527-8

[25] Hudiburg, Tara W., Beverly E. Law, William R Moomaw, Mark E. Harmon, and Jeffrey E. Stenzel. 2019. Meeting GHG Reduction Targets Requires Accounting for All Forest Sector Emissions. Environ. Res. Lett. 14 (2019) 095005. https://doi.org/10.1088/1748-9326/ab28bb

[26] Law, Beverly E., Tara W. Hudiburg, Logan T. Berner, Jeffrey J. Kent, Polly C. Buotte, and Mark E. Harmon. 2018. Land Use Strategies to Mitigate Climate Change in Carbon Dense Temperate Forests. PNAS April 3, 2018 115 (14) 3663-3668. https://doi.org/10.1073/pnas.1720064115

[27] Stephenson, N.L., A. J. Das, R. Condit, S. E. Russo et al. 2014. Rate of Tree Carbon Accumulation Increases Continuously with Tree Size. Nature: doi:10.1038/nature12914 (2014). https://doi.org/10.1038/nature12914

[28] Lutz, James A., Tucker J. Furniss, Daniel J. Johnson, Stuart J. Davies, David Allen, Alfonso Alonso, Kristina J. Anderson-Teixeira, Ana Andrade, Jennifer Baltzer, et al. 2018. Global Importance of Large-diameter Trees. Global Ecology and Biogeography. Volume 27, Issue 7, July 2018 pp. 849-864 https://doi.org/10.1111/geb.12747

[29] Leverett, Robert T., Susan A. Masino, and William R. Moomaw. 2020. Older Eastern White Pine Trees and Stands Sequester Carbon for Many Decades and Maximize Cumulative Carbon. https://doi.org/10.1101/2020.10.27.358044

projects would release massive amounts of carbon and set back the amount of new carbon sequestration for decades.

Soils in the Northeastern United States account for at least 50% of total ecosystem carbon storage, with mineral soils comprising the majority of that storage.[30] A recent study examining the effects of clearcutting on carbon storage in a northern hardwood forest indicates that mature tracts of forest store significantly more soil organic carbon in strongly mineral-bound and stable carbon pools than soils from forest tracts that are cut.[31] Furthermore, logging can cause a gradual release of carbon from soils, lasting for decades after the logging is complete.[32]

DCR asserts that cutting down trees diversifies the forest and increases resiliency to climate change impacts related to weather, fire, or invasive species. This claim is disputed in a paper published by Harvard Forest faculty.

> *[T]here [is] sparse evidence that such approaches achieve their goals of increasing resistance and resilience [and] little evidence suggests that natural disturbances yield negative functional consequences. Therefore, current management regimes aiming to increase long-term forest health and water quality are ongoing "experiments" lacking controls. In many situations good evidence from true experiments and "natural experiments" suggests that the best management approach is to do nothing.*[33]

Other studies also indicate that logging for "protection" is ineffective and counterproductive. Instead, there is growing recognition that stable older forests are more resistant to climate change than younger forests, particularly regarding carbon storage, timber growth rate, and species richness.[34]

Although the DCR website proclaims that "active management" (i.e., logging) increases carbon storage, only two of the 2021 DCR logging project proposals even mention climate change or

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[30] Fahey, T. J., T. G. Siccama, C.T. Driscoll, G.E. Likens, J. Campbell, C.E. Johnson, J.J. Battles, J.D. Aber, J.J. Cole, M.C. Fisk, P.M. Groffman, S.P. Hamburg, R.T. Holmes, P.A. Schwartz and R.D. Yanai. 2005 The Biogeochemistry of Carbon at Hubbard Brook. Biogeochemistry, **75**, 109– 176. https://www.researchgate.net/publication/226474596_The_Biogeochemistry_of_Carbon_at_Hubbard_Brook

[31] Lacroix, Emily, Chelsea L. Petrenko, and Andrew J. Friedland. 2016. Evidence for Losses from Strongly Bound SOM Pools After Clear Cutting in a Northern Hardwood Forest. Soil Science 181(5) DOI: 10.1097/SS.0000000000000147
https://www.researchgate.net/publication/301680144_Evidence_for_Losses_From_Strongly_Bound_SOM_Pools_After_Clear_Cutting_in_a_Northern_Hardwood_Forest

[32] Petrenko, Chelsea L and Andrew J. Friedland. 2015. Mineral Soil Carbon Pool Responses to Forest Clearing in Northeastern Hardwood Forests. GCB Bioenergy (2014), doi: 10.1111/gcbb.12221. http://onlinelibrary.wiley.com/doi/10.1111/gcbb.12221/abstract

[33] Foster, David R. and David A. Orwig. 2006. Preemptive and Salvage Harvesting of New England Forests: When Doing Nothing Is a Viable Alternative. Conservation Biology Volume 20, No. 4, 959–970 DOI: 10.1111/j.1523-1739.2006.00495.x
http://harvardforest.fas.harvard.edu/sites/harvardforest.fas.harvard.edu/files/publications/pdfs/Foster_ConservationBio_2006.pdf

[34] Thom, Dominik, Marina Golivets, Laura Edling ,Garrett W. Meigs, Jesse D. Gourevitch, Laura J. Sonter, Gillian L. Galford, William S. Keeton. 2019. The Climate Sensitivity of Carbon, Timber, and Species Richness Covaries with Forest Age in Boreal–Temperate North America. Global Change Biology, Volume 25, Issue 7, Pages 2446-2458.
https://doi.org/10.1111/gcb.14656https://onlinelibrary.wiley.com/doi/10.1111/gcb.14656

carbon capture and storage. They provide no information on current carbon stocks, the amount of carbon that will be released by the project, the impact of the project on future carbon capture and storage, the cumulative impacts of releasing carbon year after year from multiple logging projects, or how the potential benefits of the project outweigh any negative impacts on climate change.

Indeed, we are concerned that DCR officials do not seem to have an adequate awareness or understanding of recent science on climate change forest carbon. In comments on DCR's 2020 proposed logging projects submitted by a number of signers of these comments, we pointed out the importance of proforestation in decisions on the management of our public forests. In its response to our comments[35], DCR contended that

> *the reference to "proforestation" as a way to increase carbon stocks is, at best, an untested hypothesis; the cited reference for this approach contains questionable assumptions and interpretations of referenced literature as well. It ignores the fundamental mathematical tradeoff that comes with maximization of stock of a growing resource, in that average annual sequestration is less than maximum average sequestration.*

This response is illogical and perplexing. Proforestation is not a "hypothesis," but a term for a well-documented and widely accepted reality — that growing existing forests intact to their ecological potential is an effective, immediate, and low-cost approach to absorb and store carbon from the atmosphere. The original peer-reviewed paper synthesized data that compared "managed" forests to "passive" or "unmanaged," (i.e., areas such as Massachusetts state reserves, National Parks, wilderness areas, Adirondack preserve) and included copious up-to-date scientific references.[36] It has a special focus on New England and Massachusetts concerns. Hundreds of leading climate scientists, ecologists, and conservation biologists worldwide recommend proforestation to help achieve climate mitigation goals.[37] It is disturbing that DCR would greet this paper and its discussion of this important climate change solution with derision.

Equally perplexing is that the five references DCR cited in its criticism of proforestation are not even relevant to the issue. On the contrary, they are old papers published in the 1960s, 70s, and 80s, with the newest in 1988 — more than 30 years ago. They are focused on the mid-1900s concept of maximizing timber production through "sustained yield" logging. None of the references anticipated the climate crisis and they do not even mention forest carbon capture and storage. Most are based on traditional silvicultural and economic models, not on-the-ground empirical data. Moreover, none of these sources are specific to issues in Massachusetts or New England. The closest they come to Massachusetts is a 45-year-old paper by the MIT economist, Paul Samuelson, on whether or not "sustained-yield" forestry is a viable economic model.

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[35] DCR. 2020. Forest Management Project Comments And Responses – Winter Proposals 2020. https://www.mass.gov/doc/forest-management-proposal-comments-and-responses-for-2020-projects/download

[36] Moomaw William R., Susan A. Masino, Edward K. Faison. 2019. Intact Forests in the United States: Proforestation Mitigates Climate Change and Serves the Greatest Good. Front. For. Glob. Change, 11 June 2019 | https://doi.org/10.3389/ffgc.2019.00027
https://www.frontiersin.org/articles/10.3389/ffgc.2019.00027/full

[37] Letter from Global Scientists to Members of the European Parliament ITRE Committee, ENVI Committee, and AGRI Committee. 22 May 2020. https://sites.tufts.edu/gdae/files/2020/05/EU-Forest-Letter-3.pdf

In this context, DCR's claim that it "leads in delivering carbon benefits on state lands for future generations," rings hollow. We are seriously concerned that DCR does not have the knowledge, expertise, or commitment to protecting and managing our state lands to maximize their contribution to fight the looming threat of climate change.

These concerns come at a critical time. The 2008 Massachusetts Global Warming Solutions Act (GWSA) called for dramatic reductions in greenhouse gas emissions beginning in 2020. The 2021 report of the UN Intergovernmental Panel on Climate Change (IPCC) warns that we need to dramatically address climate change by 2030, which will require not only reducing greenhouse gas emissions from energy production, but also absorbing and storing carbon from the atmosphere.[38] Forests are a critical part of this solution. In 2019, Governor Baker recognized this by reaffirming a commitment with 24 other governors in the U.S. Climate Alliance to the goal of capturing and storing more carbon in forests as a way to mitigate climate change.[39]

DCR has an opportunity to act on Governor Baker's commitment by implementing an approach that ensures that our forests are managed to minimize carbon emissions and maximize carbon capture and storage. Instead, we are distressed to see that the seven forest projects at hand take a business-as-usual approach toward these critical issues while the global climate crisis continues to worsen.

"Treatment" for Insects and Disease

DCR Claim: The logging proposals claim that cutting down trees and other intrusive management is needed to "treat" a wide range of insect infestations and diseases. These supposed threats to forest "health" include the emerald ash borer, wooly adelgid, and hemlock looper (Old House Lot) and red pine scale and needle cast disease (Beaman Lot). The primary "treatment" is to cut down more trees through clearcutting and other intensive management.

Response: DCR contends that its logging program protects forests — and carbon stocks — from diseases and pests. On the contrary, there is little evidence to support the assumption by foresters that logging will reduce insects and disease.[40] Moreover, insects and disease are a natural part of healthy forest ecosystems. They help decompose and recycle nutrients, build soils, maintain genetic diversity within tree species, and provide homes and food for wildlife.

Emerging studies find that cutting down trees to "save" the forest from insects and disease does not solve the "problem," but makes it worse.

There is also increasing evidence that logging reduces the natural resistance of a forest to insects and disease. In one study, researchers found that after "thinning" of forest plots, 50%

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[38] IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press.

[39] United States Climate Alliance. 2020. Natural & Working Lands Challenge (Updated: January 14, 2020) http://www.usclimatealliance.org/nwlchallenge

[40] Black, Scott Hoffman. 2005. Logging to Control Insects: The Science and Myths Behind Managing Forest Insect "Pests." A Synthesis of Independently Reviewed Research. The Xerces Society for Invertebrate Conservation, Portland, OR https://www.xerces.org/wp-content/uploads/2008/10/logging_to_control_insects1.pdf

of the genetic diversity of the trees of that species had been lost. Of particular concern was the loss of rare alleles, which plants and animals rely upon to deal with new challenges.[41] Studies are finding that, despite an outbreak of the emerald ash borer that killed most ash trees, some trees "lingering ash" persisted, and offer options for breeding or reforestation.[42],[43] Cutting down ash trees that have not been infected or are still "lingering" can cause the loss of trees that could potentially have resistant genes that will be be critical in allowing the species to survive and recover.

Fire Prevention

***DCR Claim*:** Logging is needed to reduce fire risk (Charge Pond Campground Complex). Specifically:

> *The primary goal is to reduce the fuel load in and around the Charge Pond Campground Complex to protect campers in the event of a wildfire. Thinning between campground loops will occur on approximately 34 acres…. Reducing the canopy cover will result in an open habitat benefiting a variety of rare, declining, and common species…. Large diameter trees will be removed to meet the retention/spacing guidelines above by whole-tree harvesting and chipping, with all logs and chips removed from the site…. Approval from the DCR Commissioner will be required for openings above 1/3 acre that harvest all merchantable trees….*

Response: The primary goal of this project is "to protect campers in the event of a wildfire." This is a legitimate goal for public land managers. However, the strategy described in the Charge Pond Campground Complex project proposal is based on scientifically questionable assumptions regarding wildfire and wildfire mitigation.

The project would remove large diameter trees and "reduce canopy cover." However, removing large trees can increase the rate of fire spread by opening up the forest to desiccation of vegetation and soils, greater wind velocity, and increased temperatures, which increase the risk and intensity of fire.[44] Large trees are also important for carbon storage when alive and they take many decades to rot away, losing their carbon gradually during that time.[45]

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[41] Six, Diana L., Eric Biber, and Elisabeth Long. 2014. Review Management for Mountain Pine Beetle Outbreak Suppression: Does Relevant Science Support Current Policy? Forests 2014, 5, 103-133; doi:10.3390/f5010103 forestsISSN 1999-4907 https://www.researchgate.net/publication/259714120_Management_for_Mountain_Pine_Beetle_Outbreak_Suppression_Does_Relevant_Science_Support_Current_Policy

[42] Koch, Jennifer L., Mary E. Mason, David W. Carey, Kathleen Knight, Therese Poland, and Daniel A. Herms. 2010. Survey for Tolerance to Emerald Ash Borer within North American Ash Species in Proceedings of the Symposium on Ash in North America. U.S. Forest Service Forest Service, Northern Research Station. General Technical Report NRS-P-72 https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs-p-72r.pdf

[43] Steiner, K.C., Graboski, L.E., Knight, K.S. et al. 2019. Genetic, spatial, and temporal aspects of decline and mortality in a Fraxinus provenance test following invasion by the emerald ash borer. Biol Invasions 21, 3439–3450. https://doi.org/10.1007/s10530-019-02059-w

[44] Moritz, Max A., Enric Batllori, Ross A. Bradstock, A. Malcolm Gill, John Handmer, Paul F. Hessburg, Justin Leonard, Sarah McCaffrey, Dennis C. Odion, Tania Schoennagel, and Alexandra D. Syphard. 2014. Learning to coexist with wildfire. Nature 515: 58-66. doi:10.1038/nature13946

[45] Moore, David J. P., Nicole A. Trahan, Phil Wilkes, Tristan Quaife, Britton B. Stephens, Kelly Elder, Ankur R. Desai, Jose Negron, Russell K. Monson. 2013. Persistent reduced ecosystem respiration after

Indeed, a recent, large-scale analysis confirmed that logged forests tend to have more intense fires than unlogged forests that are supposedly "overgrown" with "fuel".[46]

DCR also plans to thin the forest between campground loops. Thinning can help to reduce the intensity of wildfire. However, research has shown that an average of only 1% of forests thinned by the U.S. Forest Service actually experience wildfire each year.[47] Because the effectiveness of thinning "treatments" lasts about 10 to 20 years, this means that most of these logged sites will not experience wildfire during that period. Considering how challenging and expensive fuel reduction thinning is, this raises questions regarding whether this is a wise management strategy for DCR to pursue.

An exhaustive analysis of wildfires in the United States from 1992 to 2012 found that 84% of these wildfires were started by humans, either accidentally or on purpose.[48] This indicates that the most effective strategy for reducing the risk of wildfire at the Charge Pond Campground Complex may be to prohibit or carefully regulate the use of fire by campers, rather than logging the surrounding forest.

Ecosystem Restoration

***DCR Claim*:** Intensive logging is needed to "restore" native ecosystems. For Old Town House Lot:

> *Within the state forest several small plantations were removed around 2005 creating early successional habitat, followed in 2015 by a heavy regeneration harvest on private land adjacent to the project area. As these previously harvested areas progress through natural succession their early successional habitat value is slowly being lost. The clearcutting of five acres of the red pine-red maple-aspen stand will replace some of this habitat loss.*

For Charge Pond Campground Complex:

> *[R]estore and maintain native pitch pine and scrub oak natural communities…. Reducing the canopy cover will result in an open habitat benefiting a variety of rare, declining, and common species….*
>
> *Future treatments will be mowing and/or prescribed fire to kill white pines that typically regenerate in such areas and to stimulate sprouting and growth of native shrubs.*

Response: DCR claims that it is restoring "native ecosystems" with the clearcutting and other intensive logging proposed for these projects. However, there is ample evidence that the native

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insect disturbance in high elevation forests. Ecology Letters 16(6): 731-737. https://doi.org/10.1111/ele.12097

[46] Bradley, Curtis M., Chad T. Hanson, and Dominick A. DellaSala. 2016. Does Increased Forest Protection Correspond to Higher Fire Severity in Frequent-Fire Forests of the Western United States? Ecosphere 7(10):e01492. 10.1002/ecs2.1492 https://doi.org/10.1002/ecs2.1492

[47] Schoennagel, Tania, Jennifer K. Balch, Hannah Brenkert-Smith, Philip E. Dennison, Brian J. Harvey, Meg A. Krawchuk, Nathan Mietkiewicz, Penelope Morgan, Max A. Moritz, Ray Rasker, Monica G. Turner, and Cathy Whitlock. 2017. Adapt to more wildfire in western North American forests as climate changes. Proceedings of the National Academy of Sciences of the USA 114: 4582–4590. https://www.pnas.org/content/114/18/4582

[48] Balch, Jennifer K., Bethany A. Bradley, View ORCID ProfileJohn T. Abatzoglou, R. Chelsea Nagy, Emily J. Fusco, and Adam L. Mahood. 2017. Human-started wildfires expand the fire niche across the United States. PNAS March 14, 2017 114 (11) 2946-2951. https://doi.org/10.1073/pnas.1617394114

ecosystems of Massachusetts before 1600 were dominated by dense, old-growth forests with a closed canopy.[49],[50] There were limited open areas, largely where there were cliffs and scree slopes, ridge tops, wetlands, beaver meadows, avalanche tracks, river margins, pond and lake margins, and coastline bluffs.

Natural disturbances such as hurricanes and tornadoes, ice storms, insect infestations and disease, beaver impoundments, and fires also caused forest openings. However, these did not cover a significant portion of the landscape of New England.[51] Moreover, these openings did not at all resemble a clearcut. Instead, they were a chaotic jumble of dead and damaged, downed wood, tip-ups, downed log dams in streams and water bodies, and snags and downed logs in forests. The ground was shaded by surviving and rapidly recovering trees. There was no bare ground or scarified soil and nothing was removed.[52],[53],[54]

Before 1600, the plants DCR is focusing on for "restoration" lived in these extreme and rare sites.[55] Today, DCR is attempting to reconstruct the human-created landscape of the mid-1800s to early 1900s, when most of the forest had been cleared and early-successional habitat was common on abandoned farms and other areas that were left alone. During this period, populations of early-successional species exploded, only to begin returning to their natural levels in recent years.[56],[57],[58]

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[49] Foster, David R., Glenn Motzkin, Debra Bernardos, and James Cardoza. 2002. Wildlife Dynamics in the Changing New England Landscape. Journal of Biogeography, 29, 1337–1357 https://pdfs.semanticscholar.org/56d4/afbb6a1b80b25fae122ba80885d6fe240448.pdf

[50] Oswald, W. Wyatt, David R. Foster, Bryan N. Shuman, Elizabeth S. Chilton, Dianna L. Doucette, and Deena L. Duranleau. 2020. Conservation Implications of Limited Native American Impacts in Pre-contact New England. Nat Sustain 3, 241–246 (2020). https://doi.org/10.1038/s41893-019-0466-0

[51] Lorimer, Craig G. and Alan S. White. 2003. Scale and Frequency of Natural Disturbances in the Northeastern US: Implications for Early Successional Forest Habitats and Regional Age Distributions. Forest Ecology and Management 185 (2003) 41–64. https://www.sciencedirect.com/science/article/abs/pii/S0378112703002457

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[53] Cooper-Ellis, Sarah, David R. Foster, Gary Carlton, and Ann Lezberg. 1999. Forest Response to Catastrophic Wind: Results from an Experimental Hurricane. Ecology 80 (8) 2683-2696. http://www.jstor.org/stable/177250

[54] D'Amato, Anthony W., David A Orwig, David R Foster, Audrey Barker Plotkin, Peter K Schoonmaker, and Maggie R Wagner. 2017. Long-term structural and biomass dynamics of virgin Tsuga canadensis-Pinus strobus forests after hurricane disturbance. Ecology 98(3):721-733. https://doi.org/10.1002/ecy.1684

[55] Marks, P.L. 1983. On the Origin of the Field Plants of the Northeastern United States. The American Naturalist, Vol. 122, No. 2 pp. 210-228. http://www.jstor.org/stable/2461231

[56] Foster, David R. 1995. Land-Use History and Four Hundred Years of Vegetation Change in New England. In: Turner, B. L., Sal, A. G., Bernaldez, F. G., DiCastri, F., Global Land Use Change: a Perspective from the Columbian Encounter, SCOPE Publication, Consejo Superior de Investigaciones Cientificas, Madrid. https://harvardforest.fas.harvard.edu/sites/harvardforest.fas.harvard.edu/files/publications/pdfs/Foster_GlobalLandUseChange_Chapter_10.pdf

[57] Foster, David R., Glenn Motzkin, Debra Bernardos, and James Cardoza. 2002. Wildlife Dynamics in the Changing New England Landscape. Journal of Biogeography, 29, 1337–1357 https://pdfs.semanticscholar.org/56d4/afbb6a1b80b25fae122ba80885d6fe240448.pdf

There may be a few places where intensive logging to "restore" a habitat is appropriate. In terms of these seven projects, not enough information is provided to judge that question. The Myles Standish Resource Management Plan describes recent history and the current situation and prescribes management actions, but it provides little information on how clearcutting and other extreme logging is necessary, what the potential negative impacts would be, and whether there are other less-intrusive alternatives.[59] The issue of intensive human intervention to create early-successional habitats needs far more scientific research, fact-based analysis, and public involvement than has thus far been provided by DCR.

Whether or not there is some potential benefit to ongoing human intervention to "restore" early successional habitats, it is dubious to assume this strategy is feasible in the long term. Maintaining these early successional habitat habitats requires clearcutting or other intensive clearing of each site as often as every 10-12 years, a significant undertaking.[60] This requires a permanent, never-ending commitment to logging, mulching, mowing, herbiciding, and burning over a large area.

For example, according to DCR, several small pine plantations in the vicinity of the Old Town Lot project were clearcut in 2005, creating early successional (i.e., shrubby recovering forest) habitat, and a "heavy regeneration harvest" (i.e. forest liquidation) was done on an adjacent private tract in 2015. Any benefits to wildlife are already being lost as the forest recovers, so DCR proposes another 5-acre clearcut, only 16 years after the first clearcutting operation.

This kind of intensive habitat manipulation is very expensive to maintain in terms of personnel, equipment and facilities, and fossil fuel consumption.[61] DCR's budget has been declining in recent years and there is little sign of this trend being reversed. There is a very real possibility that after the current surge of early-successional habitat logging projects, there will be inadequate funds for "treatments" to maintain the open habitat in the future. This would leave a fragmented and degraded landscape that is less, not more, biodiverse. DCR provides no information on how it can ensure that this intensive logging program can be continued indefinitely.

Liquidation of Plantations

***DCR Claim*:** Larch, red pine, white pine, Norway spruce, red pine, and Scots pine plantations need to be removed because their "health and vigor…have been declining steadily," they "are at high risk of mortality," or they suffer from other ailments. Depending on the particular plantation, the list of disorders includes fungus, insects, disease, wind damage, overcrowding, or "growth stagnation." (Cattle Barn Lot, Willis Road North, Willis Road South, Beaman Pond Lot).

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[58] Thompson J.R., Carpenter D.N., Cogbill C.V., Foster D.R. 2013. Four Centuries of Change in Northeastern United States Forests. PLoS ONE 8(9): e72540. https://doi.org/10.1371/journal.pone.0072540

[59] DCR. 2011. Myles Standish Planning Unit Resource Management Plan. https://www.mass.gov/files/documents/2016/08/xc/rmp-mssf.pdf

[60] DeGraaf, Richard M. and Yamasaki, Mariko. 2003. Options for Managing Early-Successional Forest and Shrubland Bird Habitats in the Northeastern United States. Forest Ecology and Management. 185: 179-191. https://www.nrs.fs.fed.us/pubs/6765

[61] Oehler, J. D. 2003. State efforts to promote early-successional habitats on public and private lands in the northeastern United States. Forest Ecology and Management, 185(1-2), 169–177. doi:10.1016/s0378-1127(03)00253-6

Response: The plantations targeted for logging tend to be about 85 to 100 years of age. In many cases these plantations have already been thinned by previous logging or through natural mortality and disturbances. In most cases, there is already an understory of native trees and herbaceous plants, which are gradually replacing the plantation trees as they die over time. Liquidation of plantations may speed up this process, but there is no evidence that it is necessary to ensure the eventual recovery of the native forest.

DCR plans to log plantations to "salvage" the commercial value of trees before they die. However, as discussed above, this comes at a major cost to the forest. Cutting down these trees causes major disturbance of forest ecosystems due to fragmentation of interior forest, scarification of soils, and degradation of water and air quality. It can also increase susceptibility to invasive species, spread harmful insects and disease, and worsen the risk of fire. In addition, it removes dead trees that provide vital habitat for numerous birds and other species.[62]

Perhaps the greatest cost is that liquidating plantations will worsen climate change. As noted previously, cutting down these trees will release most of their carbon, along with a significant amount soil carbon, into the atmosphere within a relatively short period of time. On the other hand, studies indicate that if these trees were left alone, even after they die they would continue to store most of their carbon for decades, releasing it slowly and gradually.[63] This is especially important because, as the IPCC warns, minimizing carbon emissions over the next decade is critical if we are to avoid catastrophic climate change.

We do not object to the appropriate use of tree removal where it is shown to be necessary for public health and safety purposes. However, DCR does not provide substantive evidence that this is the case. Regarding Beaman Pond Lot, DCR acknowledges that commercial logging is not a priority because the area is classified as a "parkland." The project proposal claims that commercial logging is justified for the sake of "public safety" or "to restore ecologically significant communities," but it provides no specific evidence to support this claim.

DCR estimates that the trees in the stands slated for logging at Beaman Pond Lot are 85 to 104 years of age. At this age, even a plantation develops ecological complexity that DCR seems to make little effort to assess. What we do know is that cutting and removing trees disrupts this balance, leading to a loss of resiliency and stability just when these things are most needed to resist the impacts of climate disruption.

Conclusion

We oppose all seven of the proposed logging projects in their current form. We believe that the people of Massachusetts want their publicly owned forests to be left uncut and intact, similar to our current reserve areas.

We believe citizens want our public forests to recover their old-growth characteristics, once again providing habitat for the full range of native plants and wildlife, with an ecological balance determined by natural processes, not by human manipulation based on a limited understanding of the natural world. We believe that our public forests should be preserved as

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[62] Thorn, Simon, Sebastian Seibold, Alexandro B. Leverkus, Thomas Michler, Jörg Müller, Reed F. Noss, Nigel Stork, Sebastian Vogel, and David B. Lindenmayer. 2020. The living dead: acknowledging life after tree death to stop forest degradation Front Ecol Environ. https://doi.org/10.1002/fee.2252

[63] Moore, David J. P., Nicole A. Trahan, Phil Wilkes, et al. 2013. Persistent Reduced Ecosystem Respiration After Insect Disturbance in High Elevation Forests. Ecology Letters, (2013) 16: 731–737 doi: 10.1111/ele.12097 http://onlinelibrary.wiley.com/doi/10.1111/ele.12097/abstract

nature sanctuaries for the health and well-being of our people, not as “working” timberlands. This is how DCR can manage our state-owned forest lands for the greatest public good.

Accordingly, we recommend that DCR cancel these seven logging projects. We urge the agency to rethink its focus on timber production, artificial wildlife “management,” and other intrusive activities. Instead, the agency should preserve more large tracts of forest for maximum long-term carbon capture and storage, the recovery of old-growth forests that are home to all of our native species, and the opportunity for people across the state to enjoy green and healthy public forests that are free of resource extraction and development.

Although many of us have submitted comments over the last several years, we have not received timely or constructive responses from DCR. We have not seen that DCR has altered any of its plans in response to our comments. It was particularly troubling to read DCR's response to our comments on the 2020 logging projects that we feel are not science-based or reflective of the intertwined emergencies of climate crisis, loss of biodiversity, and threats to public health.

We are concerned about the current state of the relationship of DCR with the citizens of Massachusetts. We are invited by DCR to comment on these logging projects, yet we receive no notice of the response by the agency to us, only to discover it posted online after we searched for it. The purpose of public participation is an honest and transparent exchange of information and viewpoints, and the revision of agency management direction in response to changing public needs and priorities. We believe the time is long overdue for DCR to create a new public process and management that meets this important purpose.

You can reach Michael Kellett of RESTORE: The North Woods with a response or questions at kellett@restore.org or 978-392-0404.

Sincerely,

Michael Kellett, Executive Director
RESTORE: The North Woods
P.O. Box 1099
Concord, MA 01742

Concerned Citizens of Franklin County
P.O. Box 653
Greenfield, MA 01370

Chris Matera
Massachusetts Forest Watch
71 Washington Ave
Northampton MA 01060

Janet Cason
Representing 350 Central Mass
40 Westbrook Road
Northborough, MA 01532

Rachel Smolker, Ph.D, Co-Director
Biofuelwatch
Hinesburg, Vermont 05461

Wendell State Forest Alliance
254 Davis Street
Greenfield, MA 01301

Friends of Peru State Forest
Peru, MA

Mass Forest Rescue
254 Davis Street
Greenfield, MA 01301

Margaret Sheehan
Save the Pine Barrens, Inc.
158 Center Hill Road
Plymouth, MA 02360;

The Enviro Show
WXOJ/WMCB/WMNB
140 Pine Street
Florence, MA 01062

Kirstin Beatty, Director
Last Tree Laws
149 Central Park Dr.
Holyoke, MA 01040

Partnership for Policy Integrity
Pelham, MA 01002

Jason Kahn, Board Member
The Rewilding Institute
Amherst, MA

Springfield Climate Justice Coalition
38 School Street
Springfield, MA 01105

Richard H Stafursky
Brattleboro, VT 05301
Species Forest, Inc.
Conway, MA

Standing Trees Vermont
P.O. Box 207
Ripton, VT 05766

Green Berkshires
PO Box 342
Great Barrington, MA 01230

Janet Sinclair
71 Ashfield St.
Shelburne Falls, MA 01370

Dr. J. William Stubblefield
346 Farley Road
Wendell, MA 01379

Susan Masino, PhD
41 Madison Lane
West Simsbury, CT 06092

Ellen Moyer, Ph.D., P.E.
Principal
Greenvironment, LLC
258 Main Road
Montgomery, MA 01085

John Cohen
86 Island Road
Northampton, MA 01060

John and Ann Galt
12 Kenilworth St.
Pittsfield, MA 01201

Fergus Marshall
55 Gaylord St.
Chicopee MA 01013

James Thornley
135 Farley Road
Wendell, MA 01379

Brock Evans, President Emeritus
Endangered Species Coalition
Washington D.C.
Board Member
Greater Hells Canyon Council
La Grande, OR

Glen Ayers
254 Davis Street
Greenfield, MA 01301

Maiyim Baron
Elders Climate Action - Mass Chapter
112 Centre Street # 10 J
Brookline MA 02446

Rick Lent, Ph.D.
Elders Climate Action - Mass Chapter
Stow, MA

Ralph S. Baker, Ph.D.
840 Ashby West Rd.
Fitchburg, MA 01420

Roslyn Feldberg, Ph.D.
Member, Mothers Out Front
Brookline, MA

Jodi Rodar
223 North Valley Road
Pelham, MA 01102

Bruce Man, MD
463 Burrage Street
Lunenburg, MA 01462

Lynne Man, PhD, MPH, MS
463 Burrage Street
Lunenburg, MA 01462

H. William Copeland, MD
179 West Road
Northfield, MA 01360

Marty Nathan MD
24 Massasoit Street
Northampton, MA 01060

Mike Kurland
566 East St,
Goshen, MA

Miriam Kurland
566 East St,
Goshen, MA

Susan Laing
47 Phillips St.
Greenfield, MA

Anne O'Connor
Former member Williamstown Select Board, 2013–2021
201 Cole Ave, Apt 103
Williamstown, MA 01267

Rema Boscov
44 Amherst Rd.
Leverett, MA 01054

Lenore Bryck, Co-founder
Regenerative Farming, Forests and Food Systems Alliance (Climate Action Now)
255 Strong St
Amherst, MA 01002

Dale LaBonte
32 Crabapple In
Northampton MA 01060

Tela Zasloff
33 McCauley Lane
Williamstown, MA 01267

Tom Neilson
37 Solar Way
Greenfield, MA 01301

Susan Purser
Becket, MA 01223

Lisa Hoag
106 Lockes Village Rd.
Wendell MA 01379

Leonore Alaniz
P.O. Box 7
Leverett, MA. 01054

Kenneth Lederman
94 S. Ashfield Road
Williamsburg, MA 01096

Laura Simon
Wilder VT 05088

Kelly Cusson
Pittsfield MA 01201

Deborah Reiter
Amherst MA 01004

Lisa Turowsky
Colrain Road
Greenfield, MA

Geoffrey Gardner
Bradford, VT

Stephanie Gelfan
7 Hawk Hill Rd
Shelburne Falls, MA 01370

Gloria Kegeles
PO Box 254
Wendell, MA 01379

Catherine LeBlanc
14 Tufts Street #3
Cambridge, MA 02139

Donald L. Walker, Jr.
102 B Delabarre Avenue
Conway MA 01341

Ruth Parnall
102 B Delabarre Avenue
Conway MA 01341

Shirley Keech
62 Hinsdale Rd,
Northfield, MA 01360

Mary King
62 Hinsdale Rd,
Northfield, MA 01360

Carissa Sinclair
14A Mill Village Road
South Deerfield, MA

Ken Kipen
152D John Ford Road
Ashfield, MA 01330

Lynn Waldron
71 Solar Way
Greenfield, MA

Osa Flory
82 Petticoat Hill Rd.
Williamsburg, MA 01096

Jill Wilcox
1752 Downer Road
Sharon, Vermont 05065

Dr. Stephen C. Frantz
Research Pathobiologist
Global Environmental Options
South Hadley, MA 01075-3300

Martha Hanner
Amherst MA

Laura Bentz
58 Jamieson Hts
Williamstown, MA. 01267

Susan Garrett
5 Laurana Lane
Hadley MA 01035

Nathalie Bridegam
53 Memorial Dr
Amherst, MA 01002

Sharon Farmer
195 Mountain View Drive
Holyoke 01040

Douglas V. Smith
Sharon, VT

Aline Euler
28 Fuller Road
Montgomery, MA 01085

Henry Euler
28 Fuller Road
Montgomery, MA 01085

Robert Spottswood, M.A.
30 Imperial Drive
South Burlington, VT 05403

Cooper Wood
Climate Action Now - Western Mass

Nancy Polan
Southampton, MA

Seth Wilpan
971 Ryan Road
Northampton, MA 01062

Marilyn Ray Smith
100 Goddard Avenue
Brookline, MA 02445

Madeline Liebling
P.O. Box 474
71 Ashfield St., #4
Shelburne Falls, MA 01370

Cynthia Lawton-Singer
Westhampton, MA