FOREST MANAGEMENT PROJECT COMMENTS AND RESPONSES – Winter Proposals 2020

The Department of Conservation - Bureau of Forestry requests comments about the specific proposals brought forth each year. The DCR considers all comments received and endeavors to respond to those comments whose focus is directed at the specific projects and the intent of the projects. Comments and questions that are general in nature are noted. Comments that are similar in theme are combined and summarized in the column below. All comments received can be found here.

Individual or Organization	Public Comment Summary	DCR Response
matt hochkeppel, Ralph S. Baker, Walt Burnham, Salvatore Raciti, Kate O'Connor and Frederick Spence, Ellen Moyer, Stephanie Jo Kent, Glen Ayers, Bill Copeland, Susan Purser, Rick Lent, Terisa E. Turner, Laura Bentz, Nathalie Bridegam, Anne- Louise Smallen, Lexi Allaway, Priscilla Lynch, Gloria Kegeles, Rebecca Hull, Christopher Queen, Alys Terrien- Queen, Paul Lauenstein, Laurel Facey, Patricia Hynes, Miriam and Mike Kurland, Lynn Waldron, Jodi Rodar, Tasondra Jardine, Fergus R Marshall, denis mahoney	All Proposed Projects Generally opposed to logging on all state properties but without specific issues with proposed projects. Many comments from individuals called for a moratorium of logging on state lands with the general premise that all forest management inappropriately benefits the logging industry, is detrimental to carbon sequestration and storage and therefore harmful to the climate.	The DCR thanks the individuals for their comments. Logging is one tool for forest management on a portion of state lands and was vetted and supported through the Forest Futures Visioning Process (FFVP) and the Landscape Designations and Guidelines (LD&G).

[T
Kenneth Conkey	All Proposed Projects	The DCR – BOF thanks the individual for
		his comment. Timber harvesting is one
	Agrees with the positive and multiple	tool for forest management on a portion
	benefits of forest management including	of state lands and was vetted and
	carbon sequestration, regeneration of	supported through the FFVP and the
	native species and wildlife habitat on	LD&G.
	DCR land but did not submit specific	
Managah wastta Fausat	comments to proposed projects.	The DCD DCC the allother agencientics
Massachusetts Forest	All or Several Proposed Projects	The DCR – BOF thanks the organization
Alliance	Clad to see varying project size that	for their comments.
	Glad to see varying project size that	The DCD DCC aslessed advantages
	could perhaps allow more competition	The DCR – BOF acknowledges that a
	for timber, lower costs, and /or greater revenue for DCR.	variety of size projects can be beneficial
	revenue for DCR.	for the reasons stated and has taken
	Palamas Pauli Ctata Pauli II. Intinatan	strides to offer a mix of timber sales that
	Balance Rock State Park, Huntington	are relatively small, medium, and large.
	State Forest and Granville State Forest	, , ,
	Appreciates the DCR – BOF explanation	We are pleased that our explanation of
	of diseased American beech	beech bark disease, beech monocultures
	monocultures, why it is important to	and control of the monocultures was
	control their proliferation and the	appreciated. We are also pleased that
	methods for control. Glad that instead	
	of using only herbicides for control, DCR	the organization concurs that the DCR –
	BOF proposes a silviculture approach	BOF prioritizes using silvicultural/cutting
	using cutting and creating openings for	approaches over herbicides when
	control of beech monocultures created	conducting beech clone control work.
	by the beech bark disease.	
	by the secon sank disease.	
	Florida State Forest, Huntington State	
	Forest, October Mountain State Forest,	
	Granville State Forest, Erving State	
	Forest, and Marlborough-Sudbury State	
	Forest	
	Native forests and the mixed species	The DCR – BOF concurs that diverse
	vegetation they provide are superior for	natural forests are superior to artificially
	a variety of ecosystem services to the	established plantation forests that are
	plantation forests established in the	1
	Great Depression. Work to harvest the	often monocultures.
	plantations and release the native forest	
	is beneficial.	
	Western MA Projects	
		The removal of trees infested or whose
	Sensible to remove some ash trees	infestation and / or mortality is
	whose mortality is imminent to capture	
	their current value and create long lived	imminent due to invasive pests such as

forest products. Also concur that hemlock wooly adelgid is a serious pest and removing weakened hemlock trees favoring healthy cohorts is an appropriate approach. the emerald ash borer and hemlock wooly adelgid is incorporated in DCR forestry guidelines and management plans. The DCR – BOF appreciates the organizations support of this approach to provide for safety in DCR facilities as well as capture the asset value in the forest products.

Huntington State Forest

Proposed work here to create early successional habitat is important because natural disturbances are suppressed. Many threatened species and species of special concern are dependent on this habitat. Expanding on neighbor's habitat work affirmed.

Florida State Forest and Granville State Forest

Glad to see cooperation with town of Florida to remove hazard trees from along town roads. Also appreciative of DCR rerouting trails and reducing illegal motorized vehicle use to reduce erosion and protect water quality.

October Mountain State Forest

Makes sense to reduce plantation trees in developed area using a timber sale instead contracting and paying for their removal. We thank the MA Forest Alliance for agreeing that diverse habitats are important on the landscape of Massachusetts and that using silviculture to establish and augment existing young forest habitat is appropriate. These are also important tenets of DCR's forestry guidelines and plans.

The DCR - BOF seeks to assist communities whose infrastructure (roads) often provide access to state properties. The timber sale program is uniquely suited to provide services to communities and the DCR Operations wing to accomplish objectives that often cannot be completed due to shortfalls in funding.

Michael Kellett, Janet Sinclair, J. William Stubblefield, Stephen C. Frantz, Rick Lent, Ralph S. Baker, Don Ogden, Christopher Queen, Alys Terrien-Queen, Gloria

All Proposed Projects

Concurs that there may be some legitimate need for some of the logging activities such as the removal of hazard trees.

Concerned that claimed benefits of logging proposed in each project - are

The DCR – BOF thanks the commenters for their letter. We offer these responses to those comments pertinent to the proposed projects.

 Carbon Sequestration – Forest management and carbon sequestration have been Kegeles, Laura Bentz, Susan Waltner, Susan Garrett, Patricia Gallagher, Joan Levy, Timothy Holcomb, Laurel Facey, Joslin Stevens, Richard Last, Teresa Turner, Madeline Liebling, Juliana Vanderwielen, James Thornley, Lynne Man, Susan Therberge, William Copland, Tim Bennett, Lisa Hoag, Patricia Gallagher, Warren Wetherell, Kimberly Wetherell, Stephanie Gelfan, Wolfe Lowenthal, Shelley Hines, Kit Sang Boos, Leonore Alaniz, Alvin Blake, Susan Waltner, Carole Horowitz. Tom Neilson, Vivienne Simon, Joanna Kent and Martin Kent, Kenneth Lederman, Jodi, Chris Matera, Glen Ayers, Miriam and Mike Kurland, Dale LaBonte, Salvatore Raciti, Carissa Sinclair, Anne Zewinski

questionable or are not supported by fact:

- Carbon Sequestration –
 Signatories comment
 - Project proposals do not provide information on carbon stocks
 - Projects are inconsistent
 with language contained
 in 2018 UN
 Intergovernmental Panel
 on Climate Change (IPCC)
 report regarding climate
 change, storing carbon
 and the importance of
 forests
 - Intimate agreement that carbon stocks are increasing but argue that it is happening not because of forest management but despite
 - Purports that allowing forests in MA grow without interference, so called proforestation is the best forest management carbon strategy
 - Infer that the forest management conducted by DCR has a cumulative and adverse effect on carbon emissions and climate change
 - State that young forests sequester carbon but store less than maturing forests and that forests increase the rate of carbon sequestration as they age and logging releases soil carbon over time
 - Submit that studies contradict the concept of

- addressed by the DCR BOF numerous times and can be viewed at these locations: 2019, 2018, 2017, and 2016 See also Managing our Forests for Carbon Benefits for further explanation of forest management and carbon storage.
 - o Additionally the DCR -BOF responds that the logging project plans do not provide projectspecific information about carbon accounting because the accounting occurs at the forest/ownership/strate gic scale (as it should) through the Continuous Forest Inventory (CFI) system using a stockchange approach. The DCR - BOF accounting program uses empirical, long-term, repeated field measurements of locations; tree, shrub, ground cover, and down woody material (DWM) dimensions, and forest floor observations; observation of the fate of trees over time; and validated, peer-reviewed models – including those consistent with USDA Forest Service Forest Inventory and Analysis (FIA) methodology (e.g., [1] [2] [3] [4]) - to estimate the volume,

forest management protecting carbon stocks and that a "do nothing" approach is the best management.

- Improvement of Wildlife Habitat
 - No evidence that forest management is a benefit to forests and wildlife habitat.
 - Naturally functioning forest ecosystems are important and are a better alternative to using forest management to improve wildlife habitat.
- Treatment for Insects and Disease
 - Disagree with DCR BOF cutting trees infested or in imminent danger of being infested with insects or disease claiming that insects and diseases are a natural part of forest ecosystems.
- Liquidations of Plantations
 - Claim that the DCR BOF goal is to maximize the timber value by removing plantations
 - State that the greatest cost of liquidating plantations will worsen climate change
 - Commends DCR for treating the entire OMSF
 Day Use Area project as Parkland and supports tree removal for public health and safety.

biomass, and carbon in ecosystem and harvested wood product pools, as well as other ecosystem characteristics. Accounting of individual harvested trees also occurs for reconciliation purposes; and while projecting the effects of an individual management action forward in time could be done [5] [6] [7], its utility is questionable and would be fraught with uncertainty over the outcome of carbon stocks on those particular acres. Additionally, a much wider range of objectives than solely carbon are considered by DSPR. DSPR acknowledges uncertainty in the outcome of management actions, and addresses this (in part) by adopting a conservative approach to forest management (e.g., structural retention); and implementing best management practices (BMPs) wherever feasible [9] [10]

- Improvement of Recreational Experiences
 - Contend that forestry work to improve wildlife habitat thus hunting and wildlife viewing will fragment the forest creating habitat not needed. Claim that improving opportunities for hunting and viewing early successional species is unwarranted.
- Sustainable Wood Products
 - There is not an agreed upon definition of sustainable forestry
 - Individuals comment that they are dubious of the viability of the local forest economy and that timber values are so low that their contribution to local economies are minimal.
- The IPCC consistently includes strong recommendations for sustainable forest management as part of an integrated crosssectoral strategy for climate change mitigation and adaptation: Fifth Assessment Report, "The most cost-effective mitigation options in forestry are afforestation, sustainable forest management and reducing deforestation . .." [11] "Cross-sectoral integrated approaches such as Integrated Water Resources Management (IWRM), sustainable forestry management (SFM), and Integrated Coastal Zone Management (ICZM) are viewed as being more effective than standalone efforts . . ." [12] "In the long term, a sustainable forest management strategy aimed at maintaining or increasing forest carbon stocks, while producing an annual sustained yield of timber, fibre or energy from the forest, will generate the largest

- sustained mitigation benefit." [13]
- o The DCR BOF is firm in its belief that total stored ecosystem and harvested wood product carbon at the scale of the ownership is increasing (e.g. [14] [15]) because of well-planned and conscious decisions about forest management activities.
- o A substantial portion (59.2%) of DSPR's land base is currently devoted to allowing stands to grow intact. However, the reference to "proforestation" [16] 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 (e.g., [17] [18] [19] [20] [21]) is less than maximum average sequestration. **Proforestation values**

forests primarily for carbon storage in the near term and does not consider the wide range of ecosystem values forests provide and their future values and productivity. Public lands – where there is less risk of forest loss to other land uses than private lands – are the perfect opportunity to reap the benefits of forest management over successive rotations and cutting cycles with respect to carbon and other ecosystem services.

The Harris reference [22] objective "was to synthesize information from remote sensing observations of forest carbon stocks and disturbance with information collected by various US agencies into a framework that (1) more explicitly attributes C losses to major disturbance types (land use change, harvesting, forest fires, insect damage, wind damage and drought); and (2) disaggregates net C change" and, "To estimate average net changes in the stock...").

- Empirical data from, for instance the FIADB, indicates that harvest removals are a far smaller (25-50%, depending on the evaluation) source of depletion from the live tree carbon pool than all sources of mortality combined (e.g., [23] [24] [25] [26]).
- o The paper [27] cited in the comments (1) explicitly acknowledges that "...increasing individual tree growth rate does not automatically result in increasing stand productivity because tree mortality can drive orders-of-magnitude reductions in population density..."; and (2) does not represent a time series from individual trees [28], [29] but rather a weaker chronosequence (or sizesequence per se) representing individual observations from different trees which obscures variability of growth of individual trees and contradicts the conclusion that tree C accumulation increases with tree size.

DCR - BOF contends that cited research [30] largely overlooks the fact that the current forest structure and composition is in fact directly attributable to human actions and thus require additional intervention to prevent further degradation; and that humans depend on forests for various ecosystem services in quantities and scales that are different than might be provided under a more natural management regime. The DCR - BOF acknowledges uncertainty around forest management activities. In response, it first has both shortterm/tactical and longterm/strategic monitoring efforts in place to observe the effects of those activities, including but not limited to carbon stock changes. Second, the DCR - BOF adopts a wide range of management practices across its land base, ranging from timber harvesting, to ecosystem restoration, to donothing. Finally, DSPR

implements BMPs consistent with the best science at the time of management, so DCR - BOF wisely uses the forest resource and mitigates adverse management effects.

- Improvement of Wildlife Habitat
 - Prior to the arrival of settlers, forests were manipulated by native peoples for habitat purposes for centuries. [31] Natural disturbance such as wind, ice, and flooding also shaped the pre-settlement landscape resulting in numerous types of habitats supporting numerous species. The forests of Massachusetts have now been manipulated and changed by post European settlement for 400 years. In particular, the last 70 – 100 years significant agriculture has faded from the landscape, massive amounts of development especially in riparian areas has occurred, flooding is controlled with dam building and the control of beavers and fires have been suppressed. This

has resulted in substantial declines in wildlife species and natural plant communities that benefit from disturbance. [32] In this light it is widely recognized that our ecosystem does not fully function naturally and habitats, especially young forests, that support a full suite of diverse species are lacking on the landscape. As a result, the 2015 State Wildlife Action Plan (SWAP) for Massachusetts includes young forest as a habitat of greatest conservation need and the Massachusetts Audubon Society has identified a need for more earlysuccessional habitat [33] [34]. The forest management work specifically calling for habitat manipulation as a goal is proposed regarding this evidence.

Treatment for Insects and
 Disease - In the face of <u>invasive</u>
 insect and disease species whose
 populations are exacerbated by
 a changing climate, it is not
 accurate to state that insects
 and diseases are a part of a

natural ecosystem. Every project proposal noted by the commenters involves non-native species of insects and disease that have profoundly changed forest ecosystems in the last 100+ years. Certainly, native insects and diseases play an important role in our ecosystems but the forestry work proposed to control the spread of invasive pests follows recommendations made by the USDA Forest Service, university researchers and many state pathologists and entomologists.

- Liquidation of Plantations
 - The DCR BOF has made it priority to manage for native forest conditions as they are more resilient to disturbance than a single species of trees planted in rows. The emphasis on native forests and native forest ecosystems through active forest management was brought forth in the FFVP and is emphasized throughout the LD&G and approved forest management plans. In appropriate areas such as Woodland designated properties this is a valid approach to managing the forest property. When there is a precipitous decline in

the health of an existing plantation, its removal is prudent from a safety and an economic standpoint. The gradual conversion of non-native plantations to native species is more desirable and conducted in that fashion whenever possible.

- The claim that the replacement of these aging plantations with a vigorous young native forest will worsen climate change is simply invalid. See discussion on carbon and forestry above.
- o The DCR BOF appreciates the support for removing plantations for public health and safety purposes. In fact, each of the projects proposed that include plantation management have a public health and safety aspect involved.
- Improvement of Recreational Experiences
 - response above
 (Improvement of
 Wildlife Habitat)
 describing the basis and
 need for diversifying
 forest structure across
 the landscape. The work
 to provide habitat for

the species noted by the commenters is as important as habitat management work for other species with different habitat needs. Of the species mentioned by the commenters the forestry work is predominantly important for ruffed grouse and American woodcock. [35] [36]

- Although hunting is on the decline the demand for hunting experience is still high. In 2019 there were 13,920 deer harvested in Massachusetts - the second highest on record. [37]
- watching in
 Massachusetts is
 extremely popular;
 webpages and
 publications are
 dedicated to this
 activity. An estimated
 46 million Americans
 participate in bird
 watching each year
 making it a 43 billion
 dollar industry (Audubon
 Birds and bird watching
 webpage. [38] [39]
- Sustainable Wood Products
 - There are numerous definitions of sustainable

forestry available whose concepts overlap. An excellent discussion of these concepts may be found <u>here</u> on the Rain Forest Alliance webpage. A globally recognized and used definition was developed by the Ministerial Conference on the Protection of Forests in Europe (FOREST EUROPE) and has since been adopted by the Food and Agriculture Organization (FAO). It defines sustainable forest management as: The stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfill, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems.

 The importance of continuing to foster and support a local forest economy was vetted and supported by the

outcome of the FFVP and the LD&G Process.
One of the most recent reports on the Massachusetts forest economy stated that the gross output in the forest products sector was over 3 billion dollars with over 17,000 jobs.

Gregory Cox

Balance Rock

Supportive of the proposed work to remove dead and dying ash to be used in long lived forest products. Believes that creating larger openings to control beech proliferation is appropriate. Appropriate to use management activity to improve roads and trails and provide funding to town.

The DCR – BOF appreciates the support of the proposed management approach.

Cold River

States that it is beneficial to harvest declining non-native Norway spruce for forest products gradually converting the stands to native species. Will benefit local residents and town by reducing maintenance costs.

The DCR - BOF agrees that it is responsible stewardship to harvest and use trees planted for forest products use while coincidently assisting those stands to regenerate into native diverse forests.

Horse Valley

Will provide multiple benefits: young forest habitat, improve health of some hemlock, provide revenue to repair roads and provide revenue to town

We agree that there are multiple benefits to this project.

October Mountain Day Use

The harvest of the non-native plantation trees in this area will offset the costs of hiring this work done. There is a benefit to replacing the non-native trees with native species.

The intent of this project was in fact to remove hazard trees commercially to offset the cost to the taxpayer. The project has the added benefit of creating conditions for the regeneration of a native diverse forest.

Hubbard River East

The project will allow threatened ash and hemlock to be utilized. The harvest will generate revenue to help repair eroding

These are goals of the project.

	roads, reduce road maintenance costs to	
	town and generate payments to the	
	town via the Forest Products Trust Fund	
	Erving SF Headquarters	
	Marlboro SF	The DCR – BOF believes this is an
	Salvaging dying red pine will release new regeneration and store the carbon long	appropriate and scientifically valid
	term in forest products instead of having	approach to forest management.
	it be released as the trees die.	approach to forest management.
	it be released as the trees are.	
Gia Neswald, Glen	Did not appreciate the DCR – BOF effort	Recognizing that we were not able to
Ayers, Bart Bouricius	and result in conducting the virtual	conduct in-person public meetings as
	public meetings	our public outreach policy requires, the
		DCR – BOF did its absolute best in
		conducting the virtual public meetings.
		Extensive preparation with the
		technology preceded the meetings with
		the knowledge and experience that
		some things could fail. The meeting
		format and "ground rules" were clearly
		defined including the timeframe which
		was set for conducting the meeting.
		Many times during the meetings
		attendees were reminded that the intent
		was to take comments, discuss and
		answer questions about the specific
		projects and to submit written
		comments and questions if they were
		not addressed during the meeting.
		Numerous comments and questions
		were submitted that were irrelevant to
		projects specific. And of course, the
		technology failed us more than once.
		We are learning with the rest of the
		world how to conduct meetings with this
		technology and apologize for the
		shortcomings in our first two attempts.
Gia Neswald	Balance Rock Lot	Since the initial infestation of
		emerald ash borer, it has spread
	1. Harvesting ash 12"+	to 70% of the US states and five
	unwarranted. No evidence that	

- the emerald ash borer (EAB) is rampant. If EAB is widespread then a passive approach will result in resistant individuals.
- 2. Not in favor of five acre openings to control beech proliferation nor the use of herbicides to control.
- 3. 1/3 acre openings in the oak hardwood forest is what is termed high grading.
- Concerned about carbon released in harvesting and lost carbon sequestration potential.
- Canadian provinces. It is in every county in Massachusetts and every New England state. After emerald ash borer was discovered in MA and on state owned lands the DCR -BOF has followed research and guidelines developed by the USDA. EAB attacks larger and stressed ash and mortality of these trees has been observed to approach 100%. Forestry operations focused on alleviating safety issues and capturing timber value emphasize harvesting ash trees that are larger (>12") because of their imminent mortality. All DCR - BOF silviculture prescriptions call for the retention of a portion of the ash component of a stand in the face of EAB infestation. Generally smaller, vigorous ash are retained to maintain stand diversity and potential for ash existing into the future. Continued research on EAB and ash indicates that certain individuals will survive and therefore some ash are retained.
- 2. The DCR –BOF believes that beech is an ecologically important species. Populations of American beech that are heavily infested with "Beech Bark Disease" (BBD) will contain disease resistant individuals. In all forest management projects on DCR lands, disease resistant beech will be left to hopefully

provide a source of future disease free beech. It has been observed and well documented now for decades that the aftermath BBD in a forest stand often results in excessive beech spouting and a preponderance of American beech seedlings and saplings that will ferociously compete with other tree species to the detriment of stand diversity and ecosystem health. The control of excessive beech sprouting is therefore to aid in ecosystem health. The use of chemicals to control excessive beech sprouting is the last choice, thus the reason for larger openings which have shown great promise in a silvicultural control of excessive beech sprouts. The shade tolerant American beech grows poorly as a seedling in full sun and often is out competed by less shade tolerant species such as red oak.

3. The opening size proposed for the oak hardwood stand is greater than 1/3 acre and up to 5 acres, one purpose being to create conditions to control beech proliferation as discussed above – open to maximum light. High grading is selecting the highest value trees over lower value trees, leaving behind the lowest value trees which populate a new forest stand with genetically inferior trees. The silviculture proposed here makes

no differentiation of which trees to select and in fact allows the forest to regenerate unimpeded and succeed to be genetically diverse.

4. See response above to Kellet et al regarding similar concerns

Cold River Lot

- There were unsubstantiated claims of that forestry activities benefit resources, particularly water.
- 2. Long life forest products storing carbon that is removed is an exaggeration.
- 3. If, as stated, this is an uneven aged management project, then the barely adult trees slated for cutting must be retained along with the younger trees that were shown to be coming up in this lot
- **4.** Concerned about carbon released with harvesting and lost carbon sequestration potential.
- Centuries of forest management and research of forestry have shown that active management of forest vegetation will affect numerous forest resources such as wildlife habitat, carbon sequestration and water yields. The intended result and actual result determines it's benefit to the landowner and society as a whole. There is no mention of benefits to water resources in the Cold River proposal.
- 2. High value forest products derived from harvesting will store sequestered carbon as long as they remain in use and beyond. No claim has been made that that the entirety of the sequestered carbon in a harvested tree will be stored in long lived forest products. The benefits of carbon stored in forest products are important and significant and a part of carbon budgeting discussions.
- 3. An uneven age management system will be used in the mixed northern hardwoods oak stand.

Individual trees across all size/age classes will be cut (single tree selection) to move the structure of the existing stand to uneven age structure. Please see the South County Silviculture prescription pages 13 – 15 for a full explanation of the prescription for this stand.

4. See response above to Kellet et al regarding similar concerns.

OMSF day Use Area

1.Harvesting ash 12"+ unwarranted. No evidence that the emerald ash borer (EAB) is rampant. If EAB is widespread then a passive approach will result in resistant individuals.

Concerned about carbon released with harvesting and lost carbon sequestration potential.

Horse Valley Lot

Concerned about carbon released with harvesting and lost carbon sequestration potential.

Erving Red Pine

No DCR activities should proceed with Forest Resource Management Plan

Please see response above for the same comment under the Balance Rock Lot.

See response above to Kellet et al regarding similar concerns.

See response above to Kellet et al regarding similar concerns.

With regard to forestry activities, the Landscape Designations for DCR Parks & Forests: Selection Criteria and Management Guidelines (LDMG) document states that "Upon finalizing the Woodlands designations, DCR will undertake projects to demonstrate excellent forestry according to the Woodlands guidelines included in this document". As management plans have been in draft the DCR – BOF has used the

LDMG guidelines to direct forestry activities.

Concerned about carbon released with harvesting and lost carbon sequestration potential.

See response above to Kellet et al regarding similar concerns.

The red pines should absolutely not be cut but monitored for safety and removed piecemeal by DCR personnel when and only when they are fully dead.

The DCR – BOF Forest Health Director has sampled red pine in the area and found that it is infested with the red pine scale. The DCR - BOF observation is that virtually all trees in red pine stands in this condition will suffer rapid mortality. The cost of removing the trees certain to die can, at this time be borne by the current value of the live trees saving the Commonwealth tens of thousands of dollars.

Hubbard River East Lot

Concerned about carbon released with harvesting and lost carbon sequestration potential.

See response above to Kellet et al regarding similar concerns.

Goodale Chipman Lots

The trees should be left to their own devices; if one fails, it will become a fantastic snag for wildlife. Unless there is a safety issue, these trees should be left. This area is naturally wild, and need not be tailored into rec area tidiness.

During the forestry operation trees will be left specifically as structural retention to in fact fail/die and be used in part as wildlife habitat. The Marlboro Sudbury State Forest is in a suburban setting where many local residents use the roads and trails for recreation. One of the major objectives of the project is to remove dead and dying trees along roads and trails in the areas for recreational safety.

Concerned about carbon released with harvesting and lost carbon sequestration potential.	See response above to Kellet et al regarding similar concerns.

References Cited

- [1] J. A. Westfall and K. M. Laustsen, "A merchantable and total height model for tree species in Maine," Northern Journal of Applied Forestry, vol. 23, no. 4, pp. 241-249, 2006.
- [2] J. A. Westfall and C. T. Scott, "Taper models for commercial tree species in the northeastern United States," Forest Science, vol. 56, no. 6, pp. 515-528, 2010.
- [3] C. W. Woodall, L. S. Heath, G. M. Domke and M. C. Nichols, "Methods and equations for estimating aboveground volume, biomass, and carbon for trees in the U.S. forest inventory, 2010," U.S. Department of Agriculture, Forest Service, Northern Research Station, Newtown Square, PA, 2011.
- [4] C. W. Woodall, V. J. Monleon, S. Fraver, M. B. Russell, M. H. Hatfield, J. L. Campell and G. M. Domke, "The downed and dead wood inventory of forests in the United States," Scientific Data, vol. 6, no. 180303, 2019.
- [5] G. E. Dixon, "Essential FVS: A user's guide to the Forest Vegetation Simulator," U. S. Department of Agriculture, Forest Service, Forest Management Service Center, Fort Collins, CO, 2002 (rev. January 7, 2006).
- [6] J. Landsberg and R. Waring, "A generalised model of forest productivity using simplified concepts of radiation-use efficiency, carbon balance and partitioning," Forest Ecology and Management, vol. 95, no. 3, pp. 209-228, 1997.
- [7] R. M. Scheller, J. B. Domingo, B. R. Sturtevant, J. S. Williams, A. Rudy, E. J. Gustafson and D. J. Mladenoff, "Design, development, and application of LANDIS-II, a spatial landscape simulation model with flexible temporal and spatial resolution," Ecological Modelling, vol. 201, pp. 409-419, 2007.
- [8] C. Hoover, "The carbon consequences of thinning Allegheny hardwoods: Lessons learned from a study designed to inform SILVAH development," in SILVAH: 50 years of science-management cooperation. Proceedings of the Allegheny Society of American Foresters training session; 2017 Sept. 20-22; Clarion, PA. Gen. Tech. Rep. NRS-P-186, Newtown Square, PA, U.S. Department of Agriculture, Forest Service, Northern Research Station, 2019, pp. 132-141.
- [9] T. A. Ontl, M. K. Janowiak, C. W. Swanston, J. Daley, S. Handler, M. Cornett, S. Hagenbuch, C. Handrick, L. Mccarthy and N. Patch, "Forest management for carbon sequestration and climate adaptation," Journal of Forestry, vol. 118, no. 1, pp. 86-101, 2020.
- [10] P. Catanzaro, J. Fish and D. Kittredge, "Massachusetts forestry Best Management Practices manual," Massachusetts Departement of Conservation and Recreation, Amherst, MA, 2013.

- [11] IPCC, "Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change," [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 2014.
- [12] IPCC, "Climate Change 2014: Impacts, adaptation, and vulnerability. Part A: global and sectoral aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change," [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom; and New York, NY, 2014.
- [13] IPCC, "Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change," [B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, 2007.
- [14] B. Lippke, E. Oneil, R. Harrison, K. Skog, L. Gustavsson and R. Sathre, "Life cycle impacts of forest management and wood utilization on carbon mitigation: knowns and unknowns," Carbon Management, vol. 2, no. 3, pp. 303-333, 2011.
- [15] T. Pukkala, "Does management improve the carbon balance of forestry?," Forestry: An International Journal of Forest Research, vol. 90, no. 1, pp. 125-135, 2017.
- [16] W. R. Moomaw, S. A. Masino and E. K. Faison, "Intact forests in the United States: Proforestation mitigates climate change and serves the greatest good," Frontiers in Forests and Global Change, vol. 2, no. 27, p. 10, 2019.
- [17] M. Faustmann, "On the determination of the value which forest land and immature stands pose for forestry," In: Gane, M., ed. Martin Faustmann and the Evolution of Discounted Cash Flow. Paper 42, Oxford, England: Oxford Institute; 1968. 54pp, 1849.
- [18] P. A. Samuelsen, "Economics of forestry in an evolving society," Economic Inquiry, vol. 14, no. Dec, pp. 466-492, 1976.
- [19] D. H. Newman, "The optimal forest rotation: A discussion and annotated bibliography. Gen. Tech. Rep. SE-48," U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station, Asheville, NC, 1988.
- [20] D. M. Adams and A. R. Ek, "Optimizing the management of uneven-aged forest stands," Canadian Journal of Forest Research, vol. 4, no. 3, pp. 274-287, 1974.
- [21] S. J. Chang, "Determination of the optimal growing stock and cutting cycle for an uneven-aged stand," Forest Science, vol. 27, no. 4, pp. 739-744, 1981.
- [22] N. L. Harris, S. C. Hagen, S. S. Saatchi, T. R. H. Pearson, C. W. Woodall, G. M. Domke, B. H. Braswell, B. F. Walters, S. Brown, W. Salas, A. Fore and Y. Yu, "Attribution of net carbon change by

disturbance type across forest lands of the conterminous United States," Carbon Balance and Management, vol. 11, no. 1, p. 21, 2016.

- [23] USDA Forest Service, Forest Inventory and Analysis Program, "Forest Inventory EVALIDator web-application Version 1.8.0.01. St. Paul, MN: U.S. Department of Agriculture, Forest Service, Northern Research Station," [Online]. Available: Available only on internet: http://apps.fs.usda.gov/Evalidator/evalidator.jsp. [Accessed June 2020].
- [24] W. Bechtold and P. Patterson, "The Enhanced Forest Inventory and Analysis Program National sampling design and estimation procedures. Gen. Tech. Rep. SRS 80," U.S. Department of Agriculture, Forest Service, Southern Research Station, Asheville, NC, 2005.
- [25] E. A. Burrill, A. M. Wilson, J. A. Turner, S. A. Pugh, J. Menlove, G. Christiansen, B. L. Conkling and W. David, "The Forest Inventory and Analysis Database: database description and user guide version 8.0 for Phase 2. U.S. Department of Agriculture, Forest Service," 2018. [Online]. Available: http://www.fia.fs.fed.us/library/database-documentation/.
- [26] S. A. Pugh, J. A. Turner, E. A. Burrill and W. David, "The Forest Inventory and Analysis Database: population estimation user guide (Edition: November, 2018). U.S. Department of Agriculture, Forest Service," 2018. [Online]. Available: http://www.fia.fs.fed.us/library/database-documentation/.
- [27] N. L. Stephenson, A. J. Das, R. Condit, S. E. Russo, P. J. Baker, N. G. Beckman, D. A. Coomes, E. R. Lines, W. K. Morris, N. Rüger, E. Álvarez, C. Blundo, S. Bunyavejchewin, G. Chuyong, S. J. Davies, Á. Duque, C. N. Ewango, O. Flores, J. J. Franklin, H. R. Grau, Z. Hao, M. E. Harmon, S. P. Hubbell, D. Kenfack, Y. Lin, J. -R. Makana, A. Malizia, L. R. Malizia, R. J. Pabst, N. Pongpattananurak, S. -H. Su, I.-F. Sun, S. Tan, D. Thomas, P. J. van Mantgem, X. Wang, S. K. Wiser and M. A. Zavala, "Rate of tree carbon accumulation increases continuously with tree size," Nature, vol. 507, no. 7490, pp. 90-93, 2014.
- [28] A. von Guttenberg, Growth and yield of spruce in Hochgebirge, Wien: Franz Deuticke, 1915.
- [29] C. Oliver, "The development of northern red oak in mixed stands in central New England," Yale University School of Forestry and Environmental Studies. Bulletin No. 91, New Haven, CT, 1978.
- [30] D. R. Foster and D. A. Orwig, "Preemptive and salvage harvesting of New England forests: When doing nothing is a viable alternative," Conservation Biology, vol. 20, no. 4, pp. 959-970, 2006.
- [31] Williams, G.W. 2003. References on the American Indian use of fire in ecosystems. USDA Forest Service, Washington, D.C. 107 pp.
- [32] Scanlon, J., and C. Buelow. 2017. Young forests and shrublands. MassWildlife Magazine. Vol. 67(1): 22-27.
- [33] Massachusetts Division of Fisheries and Wildlife, Massachusetts State Wildlife Action Plan, pg. 267 at: http://www.mass.gov/eea/docs/dfg/dfw/habitat/ma-swap-public-draft-26june2015-chapter4.pdf

- [34] Mass Audubon, State of the Birds, Massachusetts Breeding Birds: A Closer Look (pgs. 26-29 at http://www.massaudubon.org/content/download/9511/156450/file/state-of-the-birds-2013 document.pdf).
- [35] Kelley, J., S. Williamson, and T.R. Cooper (eds). 2008. American Woodcock conservation plan: a summary of recommendations for woodcock conservation in North America. Woodcock Task Force, Migratory Shore and Upland Game Bird Working Group, Association of Fish and Wildlife Agencies, Washington DC. 168 pages.
- [36] Dessecker, D.R., G.W. Norman, and S.J. Williamson. 2006. Ruffed grouse conservation plan. Resident Game Bird Working Group, Association of Fish and Wildlife Agencies, Washington DC. 95 pages.
- [37] Deer harvest data webpage https://www.mass.gov/service-details/deer-harvest-data
- [38] Mass Audubon, Birds & Birding https://www.massaudubon.org/get-outdoors/birds-birding
- [39] Top 20 Threatened Bird Habitats in the U.S. http://abcbirds.org/wp-content/uploads/2015/05/habitatreport.pdf
- [40] Carbon Benefits of Wood-Based Products and Energy https://www.fs.usda.gov/ccrc/topics/forest-mgmt-carbon-benefits/wood