Step 1: DEFINE location, project, and time frames.

What are your management goals and objectives for the project area?

Project Area or Property:	Chase Kimball Memorial Forest
Location:	Pomfret, CT

Ecosystem Type or Management Topic	Management Goals	Management Objectives	Time Frames
mixed oak/hardwood	long-term production of high quality sawtimber and other forest products, increase the quality of standing timber, provide a variety of wildlife habitat, protect wetlands and water quality	conduct timber harvest to establish regeneration and salvage dead/dying hardwoods from repeated gypsy moth infestation, have regeneration established and grown above height of potential impacts from deer	by 2023 and 2043 respectively
mature pine stand reserve	maintain stand of mature and overmature white pine as a softwood inclusion within a hardwood dominated forest to provide forest type and wildlife habitat diversity	protect existing pine stand from harvesting, conside regenerating in small patches at next management plan update	2023 and 2028
deer overbrowsing	reduce impact of deer on regenerating desirable commercial tree species	protect new regeneration from deer browse either by fencing or overwhelming deer	2023
invasive plants	stop the spread of existing invasive plants, including barberry, and competing plants, such as ferns and mountain laurel promote regeneration and growth of native plants and trees to support native wildlife species	treat existing invasives ahead of planned timber harvest, monitor for new populations of invasive species and control them before they become a problem	before 2023 and annual thereafter

Step 2: ASSESS site-specific climate change impacts and vulnerabilities.

What climate change impacts and vulnerabilties are are most imporant to this particular site?

Ecosystem Type or Management Topic (from Step #1)	Regional Climate Change Impacts and Vulnerabilities	Climate Change Impacts and Vulnerabilities for the Project Area or Property
	Temperatures in New England are projected to increase 3.5 to 8.5 °F by the end of the century, with the greatest warming expected to occur during winter.	
	The growing season in New England and northern New York is generally expected to increase by 20 days or more by the end of the century, due to fewer days with a minimum temperatures below 32°F.	
	The winter season will be shorter and milder across New England and northern New York, with less precipitation falling as snow and reduced snow cover and depth.	Concerning because of impacts on winter logging season, especially with wetland soils
	Precipitation patterns will be altered, with projected increases in annual precipitation and potential for reduced growing season precipitation in New England and northern New York.	Swings between drought and flood/extreme rain - create stress on trees. Different tree species will be affected differently. Also effects on harvest season: for example, intense or extended rain reduces access and operability
	Intense precipitation events will continue to become more frequent in New England and northern New York.	no major streams or stream crossings, good roads, so not an issue
	The timing and amount of stream flow is expected to change over then next century across New England and northern New York.	
	Warmer temperatures and altered precipitation in New England and northern New York will interact to change soil moisture patterns throughout the year, with the potential for both wetter and drier conditions depending on the location and season.	
	Forest vegetation in New England and northern New York may face increased risk of moisture deficit and drought during the growing season.	
	Certain insect pests and pathogens will increase in occurrence or become more damaging in New England and northern New York.	Recent gypsy moth defoliation-- stress and mortality; no figures on mortality EAB anticipated in future, but doesn't seem to be nearby Some areas had white pine weevil damage -quality
	Many invasive plants will increase in extent or abundance in New England and northern New York.	Present on site, particularly barberry and competative ferns and mountain laurel No/little tree species in understory-- primarily herbascous species and shrubs
	Many northern and boreal tree species will face increasing stress across much of New England and northern New York.	Future conditions may be less suitable: sugar maple, ash
	Habitat will become more suitable in New England and northern New York for some southern species.	Oak species would be expected to do better
	Forest composition will change across the landscape in New England and northern New York.	
	Shifts in forest composition in New England and northern New York will take at least several decades to occur in the absence of major disturbance.	
	Conditions affecting tree regeneration and recruitment will change in New England and northern New York.	Absence of understory trees/regeneration
	Forest productivity in New England and northern New York will increase during the next several decades in the absence of significant stressors.	
	Low-diversity systems are at greater risk from climate change.	
	Species in fragmented landscapes will have less opportunity to migrate in response to climate change.	
	Systems that are limited to particular environments will have less opportunity to migrate in response to climate change.	
	Systems that are more tolerant of disturbance have less risk of declining on the landscape	

Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

What management challenges and opportunities may occur as a result of climate change?

Ecosystem Type or Management Topic (from Step #1)	Management Objectives (from Step #1)	Challenges to Meeting Management Objective with Climate Change	Opportunities for Meeting Management Objective with Climate Change	Feasibility of Objectives under Current Management
mixed oak/hardwood	long-term production of high quality sawtimber and other forest products, increase the quality of standing timber, provide a variety of wildlife habitat, protect wetlands and water quality	Operability with shorter winters or increased rainfall, rain variability	Most tree species expected to persist or increase with climate change (as long as healthy)	challenged by impacts of deer and invasives on regeneration short-term = high, can maintain overstory long-term: Lower. Can we perpetuate either of those.
mature pine stand reserve	maintain stand of mature and overmature white pine as a softwood inclusion within a hardwood dominated forest to provide forest type and wildlife habitat diversity	White pine projected to persist if climate doesn't change much, but decline habitat if climate warms substantially; additional insect/disease issues with white pine -- increases uncertainty. Not a big white pine site-- more of a holdover from past land use. White pine or hemlock would need active work to promote as regen.	Keep as a component for wildlife diversity--softwood component in a hardwood landscape. Presence is more important than quality. Overstory is mature and maintained for this planning cycle. In 10+ years, need to take action to regenerate stand, if desired.	
deer overbrowsing	reduce impact of deer on regenerating desirable commercial tree species	High deer abundance on property and adjacent lands Variable thinning in 2010 opened up canopy, would have expected some regeneration-- but didn't, probably due to deer (did not overwhelm deer)		
invasive plants	stop the spread of existing invasive plants, including barberry, and competing plants, such as ferns and mountain laurel promote regeneration and growth of native plants and trees to support native wildlife species	present and patchy on property	starting to do management to control invasives; targeting on more highly-productive sites or where inhibiting regen	

Step 4: IDENTIFY adaptation approaches and tactics for implementation.

What actions can enhance the ability of the ecosystem to adapt to anticipated changes and meet management goals?

Ecosystem Type or Management Topic	Adaptation Actions		Time Frames	Benefits	Drawbacks & Barriers	Practicability of Tactic
	Approach	Tactic				
mixed oak/hardwood		conduct timber harvest to establish regeneration and salvage dead/dying hardwoods from repeated gypsy moth infestation, have regeneration established and grown above height of potential impacts from deer				
	5.1, 5.2, 1.4	harvest in thinned stand and salvage adjacent areas: #1: 20 acre seed tree harvest, residual 10 BA #2: salvage gypsy moth-affected trees		Open canopy for regen Overwhelm the deer (?) Revenue generating	Deer abundance might be so high-- ability to overwhelm deer is uncertain. Significant visual impact and public reaction-- increases risk if regeneration fails Adjacent landowner perceptions	Easy to implement (feasible), but still uncertain about whether it would work (effectiveness). More info from other projects needed to understand what drives success (timing, invasives, etc.). Moderate?
	5.1, 5.3, 1.4	harvest in thinned stand and salvage adjacent areas: less intensive than above perhaps shelterwood to 40 BA or similar		Less visual impact--address concerns	Less revenue generation	High Harvest is known quantify and can be easily implemented Protection is also known/understood
	2.3, 9.3, 9.4, 1.4	Deer protection in association with (following) less-intensive harvest: fencing areas to capture natural regeneration		Less visual impact Increase successs of regen and direct the species	Cost (NRCS?) Time/Effort	
	2.3, 9.3, 9.4, 9.7, 1.4	Deer protection in association with less-intensive harvest: planting with tree tubes. Species TBD, probably mixed oaks. Maybe hickories. Other species that come up in models: Yellow-poplar, sassafras, blackgum [look at list...]		More directly influence regeration	Cost (NRCS?) Time/Effort	

	2.3, 9.3, 9.4, 9.7, 1.5	Deer protection in association with less-intensive harvest-- install tree tubes or fencing before harvest and delay harvest			Would need to delay harvest and be careful of established regen Lose window on salvage Would encourage more shade tolerant species-- not goal.	Low-- there are better ways to do this.
	1.5	Use fire to restore oak within stands (wild & crazy); before or after harvest? would need to figure out specifics		Restoring fire to enhance natural processes and regeneration	Cost (LSR grant?) Time/Effort Might not be the right place: more visible to community - social element; uncertain about the fire history of that stand; would fire work here?	Low
		include softwood species in planted areas following harvest, or plant in other areas (e.g., along wetland edges) to enhance wildlife habitat; consider fencing or tree tubes to protect		Increases property-level diversity	Cost (NRCS?) Time/Effort	high
deer overbrowsing		protect new regeneration from deer browse either by fencing or overwhelming deer **-see above**				
mature pine stand reserve	5.1, 5.2, 5.3	protect existing pine stand from harvesting, consider regenerating in small patches at next management plan update	Prob next entry	leaves reserves of unique features for diversity helps increase softwood component for future	would white pine need to be protected from deer? (monitor)	high
	5.4, 4.1	protect/identify white pine stand as a reserve (for time being)		leaves reserves of unique features for diversity		high
invasive plants		treat existing invasives ahead of planned timber harvest, monitor for new populations of invasive species and control them before they become a problem - NEFF is becoming more proactive on this Probably with herbicide, but look into torch method.		Seems to be successful in reducing invasives and competition with regeneration.	Cost (NRCS?) Time/effort Don't have a well-organized program; depends on how invasives are prioritized across properties	High
		Work with loggers to minimize site impacts; be more flexible given short/unpredicable windows on harvest conditions				

Step 5: MONITOR and evaluate effectiveness of implemented actions.

What information can be used to evaluate whether the selected actions were effective and inform future management?

Ecosystem Type or Management Topic (from Step #1)	Adaptation Monitoring Variable	Criteria for Evaluation	Monitoring Implementation
	Current monitoring: management plan update every 10 years triggers close look at forest inventory and site conditions, with periodic site inspections in between		
	Annual monitoring of all fee lands needs to increase - need as part of LTA accreditation and requirements; LTA's interest is more on land use consistency with mission.		
	Invasive plant abundance, spread		
	Regeneration - presence/absence		
	Hydrologic issues - evidence of drought, flooding, erosion		
	General forest health - e.g., crown condition; insect and disease impacts		
	Effectiveness/success of regeneration in any areas that are harvested Success of natural and planted regeneration, particularly in regard to deer exclosures and barriers		