

# **The Climate Project Screening Tool Report for the Massachusetts Division of Fisheries and Wildlife's Western District**



*Rebekah Zimmerer, Toni Lyn Morelli, Melissa Ocana, John O'Leary  
February 2018*

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## **Introduction**

As the influence of climate change increases, it is important to consider how adaptation techniques can be integrated into current natural resource management to reduce vulnerabilities to wildlife and their habitats over time. Climate change adaptation in the near term is essential because, owing to inherent time lags in climate impacts, the effects of increased atmospheric greenhouse gases will be felt for decades even if effective mitigation begins immediately (Melillo et al. 2014). However, climate science is a particularly challenging field given the level of technical expertise required, its high degree of uncertainty, and the lack of knowledge of climate change impacts at biologically relevant scales. Thus, climate change adaptation, although understood to be important to resource management, has not been explicitly incorporated into most wildlife management plans or actions.

Some decision-support tools have been developed to aid climate change planning and preparedness in response to the needs of resource managers (Climate Change Resource Center 2017). One such decision-support tool is the Climate Project Screening Tool (CPST) (Morelli et al. 2012), developed initially to aid national forests in the early stages of incorporating climate concerns into operational work and recently modified to aid fish and wildlife management in Massachusetts.

The CPST is a platform that natural resource managers can readily use to assess the potential impacts of climate change on projects and management goals. The CPST is a review and assessment tool that allows managers to explicitly and methodically consider current and impending projects and priorities through the lens of climate change. It provides space to assess whether a specific goal or project is appropriate in light of future climate trends. Through the

CPST process, some projects might be deemed inappropriate as originally designed and be recommended for comprehensive redesign or removal from activity lists.

The CPST is a broad tool that can be modified to accommodate many different working groups and management goals. For the Massachusetts Division of Fisheries and Wildlife (MassWildlife), the tool was modified to focus on projects within the Wildlife Management Areas (WMAs) owned by the agency. Within MassWildlife, there are 5 Districts (Central, Western, Connecticut Valley, Southeast, and Northeast), all with their own - and occasionally overlapping - WMAs for which they are responsible. Information about many of the WMAs, including key target species, can be found on the [MassWildlife Lands Viewer](#), although this information was not available at the time of these discussions.

This report focuses on the results of a meeting with the Western District's Management team using the CPST to facilitate a discussion of climate change activities on select WMAs. This report provides specific responses to the discussion and process questions as well as general findings and useful resources. Not all WMAs were discussed during the 3-hour meeting. Those not discussed can be analyzed using this Climate Project Screening Tool at a future date.

## **Methods**

### Overview of the CPST

The CPST is a table where the first column lists specific project or management activities of interest. Next, the tool provides a summary of climate change impacts relevant to the specific management activity, poses useful discussion and process questions, and provides space for response and record-keeping. Each management activity section concludes with a question of whether to continue with the specific activity or not, and if so, if any portion of the activity should be modified.

### CPST Column Descriptions

(See Table 1 for the CPST layout and specific responses by managers at the meeting)

#### *Project activities of focus for the discussion*

- An important first step is to identify the appropriate scale at which relevant activities will be evaluated. To this end, all management activity categories were identified from the Federal Aid report produced by MassWildlife. District managers were asked to fill out a spreadsheet identifying which activities were being considered or actively done on each WMA. This process allowed the CPST to be tailored to each District and provided a coherent and efficient structure for the meeting.

#### *General climate change trends and local impacts*

- Information about projected climate and ecosystem responses can be gathered from many sources and summarized for key indicators of relevance to the local environment. The scientific literature (including a report done specifically for the northeastern states, see Useful Resources) and experts at the Department of Interior Northeast Climate Science Center were the primary sources for local climate data for this report. The purpose of this summary is to give managers a broad sense of anticipated and ongoing changes in climate and related ecological responses throughout their District. The local impacts focus on effects at a scale that is relevant to project design and highlight appropriate changes to the project.

#### *Key questions for managers*

- The purpose of this column is to facilitate thinking about the potential impacts of climate change on a specific project type. The questions used to guide the discussion were

originally developed through meetings with US Forest Service resource specialists and then modified with MassWildlife staff. Additionally, information on some project activities was gathered from the MassWildlife website. After the questions were used in the first meeting (with the Central District), modifications were made to enhance relevance in future meetings.

#### *Response narrative*

- The response narrative in the fourth column is the centerpiece of the CPST, where managers or facilitators record their answers to the questions and thus their thinking about the interaction between climate change and the project. Users are encouraged to identify and document sources for their answers.

#### *Continue with project?*

- The last column is where the user concludes whether to proceed with, modify, or cancel the project given the response narrative. It is intended as a recommendation regarding whether or not climate change impacts are likely to be: 1) insignificant enough to proceed as originally designed, 2) substantial enough to require modification to the proposed activities, or 3) whether the project cannot be adequately modified given relevant climate change effects and thus should be withdrawn. Selection and documentation of one of the three recommendations can then become part of a public report on how resource managers considered climate change prior to project implementation.

**Table 1. Climate Project Screening Tool with responses from the Western District**

<b>Project Activity</b>	<b>Climate Change Trends and Local Impacts (for more information: <a href="http://climateactiontool.org">climateactiontool.org</a>)</b>	<b>Key Questions for Managers</b>	<b>Response Narrative (please complete)</b>	<b>Continue with Project?</b>
Stream Restoration & Culvert Removal	<p><b>Trends</b> – <a href="#">Reduced snowpack</a>, thus earlier winter-spring peak flows; wetter springs with more flooding; longer, drier summers, though with heavier <a href="#">rainfall</a> events and thus increased risk of <a href="#">flooding</a>, exacerbated by decreased imperviousness from drier soils</p> <p><b>Local Impacts</b> – Vegetation and wildlife species movement; reduced water storage in soils; changed hydrologic regimes</p>	<ul style="list-style-type: none"> <li>Will the hydrologic system change from perennial to intermittent over time: e.g., what is the future range of flow?</li> </ul>	<p>Powell Brook:</p> <ul style="list-style-type: none"> <li>Dam removal and culvert replacement</li> <li>Could still consider future conditions, Eversource may be paying, might do a bridge span</li> </ul>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes, with modification:
		<ul style="list-style-type: none"> <li>Can this area (or project) withstand extreme weather events? Events more extreme than those currently experienced?</li> </ul>	<ul style="list-style-type: none"> <li>Yes</li> <li><a href="#">Beavers</a> are considered to protect the hydrologic cycles in many WMAs and mitigate some of those possible changes</li> </ul> <p>Powell Brook:</p> <ul style="list-style-type: none"> <li>Dam removal, barrier to fish passage</li> </ul>	
		<ul style="list-style-type: none"> <li>Are current plant/wildlife species viable in the future given changes in water temperatures?</li> </ul>	<ul style="list-style-type: none"> <li>Yes, at least in the near future, good habitat for <a href="#">brook trout</a> and slimy sculpin, might be ground water-fed</li> </ul>	
		<ul style="list-style-type: none"> <li>Is the restoration area vulnerable to increased fire events and/or erosion?</li> </ul>	<ul style="list-style-type: none"> <li>Yes</li> </ul>	
		<ul style="list-style-type: none"> <li>Is this culvert a barrier to species tracking climate change?</li> </ul>	<p>Powell Brook:</p> <ul style="list-style-type: none"> <li>Yes, dam is, that's why it's being removed</li> </ul>	
Vegetation Control – mowing, hand cutting,	<p><b>Trends</b> – Increased fuel buildup and risk of wildfire; increased interannual variability in</p>	<ul style="list-style-type: none"> <li>Will the activity be sufficient to control invasives that grow larger and more</li> </ul>	<ul style="list-style-type: none"> <li>Activity is working at the current time. Less snow cover in the winter allows for more time to complete mowing projects.</li> <li>The predicted outcome is that no, mowing</li> </ul>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes, with modification:

herbicide	<p><a href="#">precipitation</a>, leading to fuels build up and causing additional forest stress; increased stress to forests during periodic multi-year <a href="#">droughts</a>;</p> <p><b>Local Impacts</b> – Densification of vegetation; increased <a href="#">invasive</a> aquatic, plant, and forest pests; earlier and longer growing season</p>	abundantly?	will continue to be a useful tool to manage invasive plants but not a complete solution.	
		<ul style="list-style-type: none"> <li>Does the project area include anticipated future vulnerable areas (i.e. higher elevation sites, riparian areas, soil types or ecosystems not previously recorded as invaded)?</li> </ul>	<ul style="list-style-type: none"> <li>No</li> </ul> <p>For Chalet:</p> <ul style="list-style-type: none"> <li>This is the main area for spruce and fir in MA, a threatened cover type</li> <li>It's a bioserve so species that are connected to mature forest are targeted and may be more vulnerable to climate change</li> </ul>	
		<ul style="list-style-type: none"> <li>Will the treatment season need to be adjusted for the earlier growing season?</li> </ul>	<ul style="list-style-type: none"> <li>Activity is working at the current time. Less snow cover in the winter allows for more time to complete mowing projects.</li> <li>The predicted outcome is that no, mowing will continue to be a useful tool to manage invasive plants but not a complete solution.</li> </ul>	
		<ul style="list-style-type: none"> <li>Will additional invasives require more work hours to control?</li> </ul>	<ul style="list-style-type: none"> <li>Need to think about brook trout, <a href="#">salamanders</a>, etc. -uncertain at present time</li> <li>Keeping an eye out for phragmites but none yet. Monitoring takes time</li> </ul>	
Reforestation / Restoration	<p><b>Trends</b> – Increased stress to trees during periodic summer <a href="#">droughts</a>; reduced <a href="#">snowpack</a>; increased <a href="#">invasive insects and disease</a></p> <p><b>Local Impacts</b> – Increased risk of tree mortality; changes in local species composition; species range shifts</p>	<ul style="list-style-type: none"> <li>Will local conditions change enough to alter the desired species composition?</li> </ul>	<ul style="list-style-type: none"> <li>There is the threat of Emerald Ash Borer (EAB) which could change desired species composition (10%-12% forest loss)</li> </ul> <p>For Eugene D. Moran WMA:</p> <ul style="list-style-type: none"> <li>Currently have a desirable species composition coming in – goal of creating a young forest cover type</li> </ul>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes, with modification:
		<ul style="list-style-type: none"> <li>Does tree planting density and spacing address anticipated water availability and mortality</li> </ul>	<ul style="list-style-type: none"> <li>n/a, no planting being done</li> </ul>	



		rates?		
		<ul style="list-style-type: none"> <li>Are there certain species or genetic pools of native species that are well suited for anticipated vulnerabilities?</li> </ul>	<ul style="list-style-type: none"> <li>Unknown</li> <li><a href="#">Bear</a> activity is increasing/lasting longer into the fall and earlier in the spring</li> <li><a href="#">Deer</a> movement is less predictable as temperature is less predictable</li> </ul>	
Nesting Structures – Development and Maintenance	<p><b>Trends –</b> Reduced <a href="#">snowpack</a>; earlier green-up; longer, drier summers, general shifts in <a href="#">temperature</a> ranges; increased insect and disease</p> <p><b>Local Impacts –</b> Historical availability of food and water sources may be <a href="#">altered</a> geographically and temporally; suitable range of habitat may alter with changing forest stand structure and temperature and <a href="#">precipitation</a> regimes</p>	<ul style="list-style-type: none"> <li>Are the plant/wildlife species viable in the future given changes in food and water availability, as well as the range of future habitat?</li> </ul>	<ul style="list-style-type: none"> <li>Yes, from knowledge known at this time</li> <li>District maintains Kestrel, Bluebird, and <a href="#">Wood Duck</a> boxes</li> </ul>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes, with modification:
		<ul style="list-style-type: none"> <li>Are target species arriving earlier?</li> </ul>	<ul style="list-style-type: none"> <li>If blue birds are arriving earlier, may need to adjust next box set up</li> <li>Additional seasonal issue: Difficult to get to duck boxes when ponds don't freeze over; makes them hard to maintain</li> </ul>	
		<ul style="list-style-type: none"> <li>Are target species using different habitats?</li> </ul>	<ul style="list-style-type: none"> <li>Wood duck boxes not used that often (more often used by merganzers)</li> <li>H Heusmann says not a priority, may be using more natural areas, further inland;</li> <li>wood ducks may benefit from fallen trees and increase development of a maturing forest type</li> </ul>	
		<ul style="list-style-type: none"> <li>Will the future habitat of the focus species still consist of the current location?</li> </ul>	<ul style="list-style-type: none"> <li>Uncertain</li> </ul>	

Public Access Management	<p><b>Trends –</b> Increased interannual <a href="#">variability in precipitation</a>; more extreme flood and other weather events; decreased water quality as result of increased watershed erosion and sediment flow and warmer waters; increased likelihood of severe flood; increased risk of fire</p> <p><b>Local Impacts –</b> Changed <a href="#">hydrologic regimes</a>; soil disturbance due to increased runoff and movement of waterways; likelihood of road washouts and closures increase; storm events exacerbate sedimentation and erosion from burned areas; changing <a href="#">temperatures</a>, <a href="#">precipitation</a>, and forest stand structure (wildfire, species extirpation) may alter habitat range</p>	<ul style="list-style-type: none"> <li>• Is current infrastructure resilient given increased extreme events (floods and potentially hurricanes)?</li> </ul>	<ul style="list-style-type: none"> <li>• Subject to erosion that could get a lot worse due to climate change. So, possibly not resilient enough</li> </ul>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes, with modification:
		<ul style="list-style-type: none"> <li>• Will flooding, drought, and other extreme weather events make it more difficult to manage public access?</li> </ul>	<ul style="list-style-type: none"> <li>• Yes, in some cases and depending on how severe the weather events are</li> </ul>	
		<ul style="list-style-type: none"> <li>• Will more personnel hours be needed to manage public access given future climate trends?</li> </ul>	<ul style="list-style-type: none"> <li>• Uncertain, but probably yes. Already pressure from ATVs and other unauthorized uses create additional problems</li> </ul>	
		<ul style="list-style-type: none"> <li>• For hunting, have shifts in target species distribution, vulnerability, and phenology (timing of reproduction, migration) been considered?</li> </ul>	<ul style="list-style-type: none"> <li>• Consideration is taking place based on observations and guidance of state biologists</li> </ul>	
Fruit Trees – Prune and Release	<p><b>Trends –</b> Increased stress to trees during periodic summer <a href="#">droughts</a>; reduced</p>	<ul style="list-style-type: none"> <li>• Will local conditions change enough to alter the desired species composition?</li> </ul>	<ul style="list-style-type: none"> <li>• Low priority, try to find time to get to it but have limited time</li> <li>• Don't know about climate change effects but seeing variation</li> </ul>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes, with modification:

	<p><a href="#">snowpack</a>; increased <a href="#">invasive insects and disease</a></p> <p><b>Local Impacts</b> – Increased risk of tree mortality; changes in local species composition; geographic movement of species</p>	<ul style="list-style-type: none"> <li>• Will new trees be planted if old ones die or preform goals poorly given future climate trends?</li> </ul>	<ul style="list-style-type: none"> <li>• No</li> </ul>	
<p>Agricultural License Agreements</p>	<p><b>Trends</b> – Increased interannual variability in <a href="#">precipitation</a>; more extreme <a href="#">flood and other weather events</a>; decreased water quality as result of increased watershed erosion and sediment flow; increased likelihood of severe flood; increased risk of fire</p> <p><b>Local Impacts</b> – Changed hydrologic regimes; soil disturbance due to increased runoff and movement of waterways; likelihood of road washouts and closures increase; storm events exacerbate</p>	<ul style="list-style-type: none"> <li>• Will present uses of the fruit trees persist under new climate models?</li> </ul>	<ul style="list-style-type: none"> <li>• Uncertain, but trends indicate that most species will persist but young trees will not germinate depending on how much the conditions have changed</li> </ul>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes, with modification:
		<ul style="list-style-type: none"> <li>• Are there certain species or genetic pools of native species that are well suited for anticipated vulnerabilities?</li> </ul>	<ul style="list-style-type: none"> <li>• Blueberry bushes, possibly a new strain of chestnut</li> </ul>	
		<ul style="list-style-type: none"> <li>• In what ways do current policies regarding ag. license agreements consider future climate trends?</li> </ul>	<ul style="list-style-type: none"> <li>• Not yet considering climate change and its effect on profitability but could be a consideration in whether to have an agricultural license agreement for a new property</li> </ul>	
		<ul style="list-style-type: none"> <li>• Will climate change trends influence the level of involvement DFW has with lease holders and the properties?</li> </ul>	<ul style="list-style-type: none"> <li>• Possibly, if species of grassland-nesting birds arrive earlier/later that will influence the nature of lease agreements and possibly conversations between DFW and lease holders</li> </ul>	
		<ul style="list-style-type: none"> <li>• Should climate create a more favorable environment for agricultural land, will more properties be converted to agricultural land?</li> </ul>	<ul style="list-style-type: none"> <li>• no</li> </ul>	

	sedimentation and erosion from burned areas; suitable range of habitat may alter with changing temperatures, <a href="#">precipitation</a> , and forest stand structure (wildfire, species extirpation)			
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## **Results**

### Overview

The facilitator team met at the Western District office in Dalton, MA, with 3 Western District staff from MassWildlife: District Manager Andrew Madden, Wildlife Biologist Nate Buckout, and Stewardship Specialist Jacob Morris-Siegel. During the fall of 2017, the facilitator team met with all 5 district managers and select staff at their offices throughout the Commonwealth. Meetings centered around management activities that were identified for a given WMA. The purpose of this design was to encourage the discussion of multiple WMAs when thinking about a specific management activity as well as to ensure that each type of management activity occurring within the District was discussed at least once.

Conversation flowed from specific questions in the CPST to a broader discussion of issues related to climate change to other issues faced by the District, and then back to the tool questions in a cyclical pattern until all questions in the management activity section were asked. An interesting secondary result of this meeting was that other management issues were identified, such as bigger picture questions about the continued utility of wood duck boxes. This secondary result was an unintended but beneficial outcome of considering climate change impacts on Agency lands. Many of the comments, activities, and concerns faced by one District were echoed at other Districts as well. These similarities and overlaps are included in this report (see Table 2).

The CPST allows Districts to document that they are thinking about climate change when making management decisions, whether they then choose to modify current activities or not. Deciding that continuing with the current activities, or lack of activities, for now is sometimes

the appropriate choice at the end of the process. The critical step is to take time to consider climate change - within daily activities and larger-scale plans.

### Interesting Findings

- Berkshire and Franklin Counties are losing populations while there is an increase in the building of large second homes for non-full-time residents. This creates development pressure on local wildlife populations and habitats.
- Both Jug End and Chalet WMAs are bioreserves which means that there is no active timber management or other management activity at those locations.
- The Western District is considering the purchase of larger parcels of land that can act as connectors between other critical parcels. Also, they are considering land purchases for areas where species will move to, rather than just where species are found currently.

### Climate Change Adaptation Techniques Already in Use

- Timing of various management activities are being considered or actively changed:
  - Mowing at Jug End Fen WMA is adjusted based on when the rattlesnakes are present (as well as other WMAs based on species arrival and departure).
  - Bluebird, kestrel, and wood duck boxes are being maintained according to the arrival times of focal species
- Considering the purchase of land for where species will be under climate change models rather than where species are presently found
- Considering another extension of bear hunting season because of warmer weather and delayed onset of winter. Bear are up and moving around much later into the winter than historically observed.

### **Using the Climate Action Tool**

When faced with challenges to effective management as a result of climate change, the Massachusetts Wildlife Climate Action Tool (CAT, <https://climateactiontool.org>) can be particularly useful to District Managers. The CAT was developed in partnership by MassWildlife, the University of Massachusetts-Amherst, the Department of Interior's Northeast

Climate Science Center, and the U.S. Geological Survey's Massachusetts Cooperative Fish and Wildlife Research Unit, so the information within is specifically geared towards the Commonwealth. The CAT includes information on climate impacts, vulnerability of species and habitats, and adaptation actions that can be taken. It was developed using a literature review of the most recent scientific findings as well as new expert input.

District staff can use the CAT to find species-specific information that can be relevant to management goals. For example, the Western District has the goal of encouraging species recruitment at Eugene D. Moran WMA after a thinning was conducted there 15 years ago. If a manager was interested in knowing how to achieve that goal while being mindful of the effects climate change may have on their activities, they could look at the CAT website to find information about the vulnerability of spruce fir forest as well as forest adaptation strategies available. The spruce-fir forest at Eugene D. Moran is a cover type very affected by climate change because of its cold adaptation, presence at higher elevations, vulnerability to fire, and vulnerability to pest outbreaks. Please see Appendix 2: Additional Resources for examples of actions on the CAT. Since the CAT is a place to showcase existing expertise and practices, it could be modified to include some of the actions being undertaken by District staff as examples.

## **Next Steps**

For the WMAs that were not discussed, the CPST can be used by District staff without facilitation for future projects and plans. A manager can complete it by him- or herself or with others on a team; we found great value in having multiple members of the staff present to share their input and often to spark and deepen the dialogue. This also creates buy-in for the implementation of actions. The versatility and simplicity of the CPST allows it to be useful in

more than just a few select scenarios and times. A complete copy of the CPST developed for MassWildlife is available with this report.

Lastly, as its name indicates, the purpose of the CPST as a screening tool became apparent when the need for additional time to develop coherent climate change adaptation for some management activities and WMAs was identified. For projects such as these, the Climate Adaptation Workbook (see Appendix 2) was mentioned, and the Workbook passed around. The in-depth nature of the Workbook appealed to attendees and there is interest in planning a training day at the Headquarters office, to learn how to use and implement it. The CPST could be considered a first step and its completion can facilitate and enhance the use of the Adaptation Workbook for projects that would benefit from more in-depth discussion and detailed planning.

## **Conclusions**

Using the CPST to facilitate a discussion of climate change impacts on current and planned management activities highlighted multiple results. In many cases, management professionals did not initially identify any ways in which they were modifying their work because of climate change and, in some cases, they did not readily identify ways climate change was affecting their work. However, upon further discussion, it became clear that observations of climate change and modification of activities were occurring, just not explicitly labeled as such. Through the course of the discussion, it also became clear that agency-wide policies on climate change would be helpful or, if already in existence, these could be communicated to Districts in a more comprehensive way. As such, it would be particularly important to have both District and Division Headquarters staff present at the meeting.



Overall, the CPST meetings provided a block of time for on-the-ground managers to pause in an otherwise busy schedule and directly consider climate change as it relates to their daily projects. The goal of these meetings was to facilitate this examination and encourage thoughtful planning for current and future management activities. In this way, work hours and physical resources can be used most effectively to protect and manage Massachusetts' lands and wildlife resources in a changing climate.

### **Works Cited**

- Climate Change Resource Center. 2017. United States Department of Agriculture – United States Forest Service. *Climate Change and Carbon Tools*. <https://www.fs.usda.gov/ccrc/tools>.
- Melillo, J.M., T.C. Richmond, & G.W. Yohe, Eds. 2014. *Climate Change Impacts in the United States: The Third National Climate Assessment*. U.S. Global Change Research Program, 841 pp. doi:10.7930/J0Z31WJ2.
- Morelli, T.L., S. Yeh, N.M. Smith, M.B. Hennessy, & C.I. Millar. 2012. *Climate Project Screening Tool: An Aid for Climate Change Adaptation*. United States Department of Agriculture, Forest Service. Research Paper PSW-RP-263. 40p.

## Appendices

### Appendix 1: WMAs Not Discussed

Abbott Brook WMA	Farmington River WMA	Housatonic River East Branch WMA	North Egremont WMA
Agawam Lake WMA	Fisk Meadows WMA	Hubbard Brook WMA	Oak Hill WMA
Ashfield Hawley WMA	Flagg Mountain WMA	John J. Kelly WMA	Ram Hill WMA
Barton's Ledge WMA	Flat Brook WMA	Jug End State Reservation and WMA	Richmond Fen WMA
Bullock Ledge WMA	George L. Darey Housatonic Valley WMA	Kampoosa Fen WMA	Savoy WMA
Cumington WMA	Green River WMA	Knightville Dam WMA	Shales Brook WMA
Day Mountain WMA	Hawks Brook WMA	Lilly Pond WMA	Shaw Brook WMA
Dolomite Ledges WMA	Hinsdale Flats WMA	Long Mountain WMA	Stafford Hill WMA
Fairfield Brook WMA	Hiram H. Fox WMA	Maxwell Brook WMA	Stage Brook WMA
Swift River WMA	Hop Brook WMA	Misery Mountain WMA	

### Appendix 2: Additional Resources

- Massachusetts Wildlife Climate Action Tool <http://climateactiontool.org> - For specific information on species and habitat vulnerability, climate trends in Massachusetts, and adaptation strategies and actions. Example pages below.
  - Species
    - Brook trout - <https://climateactiontool.org/species/brook-trout>
    - Moose - <https://climateactiontool.org/species/moose>
    - American Black duck - <https://climateactiontool.org/species/american-black-duck>
  - Habitats
    - Vernal pools - <https://climateactiontool.org/ecogroup/freshwater-wetlands-vernal-pools>
    - Spruce Fir forest - <https://climateactiontool.org/ecogroup/forest-spruce-fir>
    - Coldwater fisheries streams - <https://climateactiontool.org/ecogroup/rivers-and-streams-coldwater-fisheries-resources-streams>
  - Adaptation Actions

- Culvert upgrades <https://climateactiontool.org/content/maintain-habitat-connectivity-retrofit-or-replace-culverts>
  - Riparian restoration for coldwater streams <https://climateactiontool.org/content/ensure-cool-water-temperatures-protect-and-restore-riparian-areas>
  - Promote species in the northern and middle edge of their range <https://climateactiontool.org/content/promote-drought-and-heat-tolerant-species-encourage-species-northern-and-middle-edge-range>
- Adaptation Workbook <https://adaptationworkbook.org> - A process to consider climate change impacts and design adaptation actions. Similar to this CPST, but for a deeper dive into climate change planning for a WMA.
  - Vulnerability Assessment of MA Species of Greatest Conservation Need (2017) <https://necsc.umass.edu/projects/vulnerability-northeastern-wildlife-climate-change-using-decision-science-inform-manageme-0>
  - North Atlantic Aquatic Connectivity Collaborative (NAACC) [streamcontinuity.org](http://streamcontinuity.org) – [Database](#) and background information on culvert assessment and prioritization.
  - The Deerfield Stream Crossings Explorer [SCE.ecosheds.org](http://SCE.ecosheds.org) – Tool to locate and prioritize road-stream crossings. Include ecological data (aquatic connectivity from the NAACC, coldwater streams) and transportation vulnerability data (risk of failure and EMS delays) for Deerfield Watershed. Some of the data will be expanded to the entire state in the next few months.
  - [Climate Change Resource Center](#) – Website run by the United States Forest Service containing general information about climate change. The website also has a section with specific tools that can be utilized when trying to make decisions in response to or monitor impacts of climate change. There is even a section which allows users to search for specific tools based on needs and geographic location.
  - Northeast [Regional Invasive Species and Climate Change \(RISCC\) Management network](#) <http://people.umass.edu/riscc> - Northeast Climate Science Center initiative to address the question “How can we manage for upcoming biological invasions in the light of climate change?”
  - [Integrating Climate Change into Northeast and Midwest State Wildlife Action Plans](#) <https://necsc.umass.edu/projects/integrating-climate-change-state-wildlife-action-plans>
  - Climate Change Tree Atlas and Bird Atlas <http://www.fs.fed.us/nrs/atlas/> - Includes current and possible future distributions for over 100 tree and bird species in the Eastern US.