# Climate Change Adaptation Plan

## FSI (Ash Mitigation Project) 2

April 13, 2017

Prepared by Aaron Barrigar

Prepared using the Adaptation Workbook - AdaptationWorkbook.org


### Property details

**Acres:** 500

**Ownership:** Tribal

Conduct a forest stand improvement cut with a focus on ash mitigation as a means to head off the potential risks from the invasive beetle, the emerald ash borer (EAB) Agrilus planipennis. EAB is currently known to be in Cornwall, Ontario along the Canadian border which is less than 1.5 miles away from the reservation. Because of its close proximity, EAB poses a very high risk to the health of tribal forests. The purpose of the FSI is to improve the forest by adjusting the number of trees per acre or the understory vegetation. The primary purpose is to enhance health and vigor of the stands, or to modify stand species composition. Such stands offer more abundant wildlife habitat, more diverse plant communities, and more resilient forests with reduced potential for damage by wildfire, pests, and moisture stress. At the same time, forest stand improvement may also be used to initiate stand regeneration and restore native plant communities, including desired understory plants. Other purposes include improving recreation, aesthetic and open space values, water quality protection, water conservation and yield. Forest stand improvement aids in the management of carbon storage and uptake. Another purpose of this practice is to increase the future quantity and quality of forest products. Harvesting forest products is often a secondary benefit of forest stand improvement.

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| Climate Adaptation Plan | **FSI (Ash Mitigation Project) 2** |
| Project Details | 500 acres<br><br>Tribal ownership<br><br>Conduct a forest stand improvement cut with a focus on ash mitigation as a means to head off the potential risks from the invasive beetle, the emerald ash borer (EAB) Agrilus planipennis. EAB is currently known to be in Cornwall, Ontario along the Canadian border which is less than 1.5 miles away from the reservation. Because of its close proximity, EAB poses a very high risk to the health of tribal forests. The purpose of the FSI is to improve the forest by adjusting the number of trees per acre or the understory vegetation. The primary purpose is to enhance health and vigor of the stands, or to modify stand species composition. Such stands offer more abundant wildlife habitat, more diverse plant communities, and more resilient forests with reduced potential for damage by wildfire, pests, and moisture stress. At the same time, forest stand improvement may also be used to initiate stand regeneration and restore native plant communities, including desired understory plants. Other purposes include improving recreation, aesthetic and open space values, water quality protection, water conservation and yield. Forest stand improvement aids in the management of carbon storage and uptake. Another purpose of this practice is to increase the future quantity and quality of forest products. Harvesting forest products is often a secondary benefit of forest stand improvement. |
| Management area(s) | **Lowland and riparian forest**<br><br>**Northern hardwood**<br><br>**Transition hardwood** |
| Regional Climate Change Impacts & Property-Level Considerations | The following climate change impacts are regional expectations drawn from published resources. Under each regional climate change impact statement, property-level considerations describe how the general trend might be meaningful at the scale of the property.<br><br>**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.**<br>Property considerations: longer period of growth for invasive species (buckthorn), earlier bud break in ash species and loss of cold hardening.<br><br>**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.**<br>Property considerations: less snow cover could mean increased soil frost and root damage, warmer soil temperatures degrading soil quality and increased damage caused by forest harvesting activities due to lack of snow cover.<br><br>**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.**<br>Property considerations: trees in lower elevation could be damaged by flooding and trees in higher level areas could succumb to drought in the longer, dryer summer months.<br><br>**Intense precipitation events will continue to become more frequent in New England and northern New York.**<br>Property considerations: extended flooding and extended flooding time in certain areas damaging trees and crops. increased number of ice storms and extreame weather evwents.<br><br>**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.**<br><br>**Forest vegetation in New England and northern New York may face increased risk of moisture deficit and drought during the growing season.** |

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| | **Certain insect pests and pathogens will increase in occurrence or become more damaging in New England and northern New York.**<br><br>**Many invasive plants will increase in extent or abundance in New England and northern New York.**<br><br>**Many northern and boreal tree species will face increasing stress across much of New England and northern New York.**<br><br>**Habitat will become more suitable in New England and northern New York for some southern species.**<br><br>**Forest composition will change across the landscape in New England and northern New York.**<br><br>**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.**<br><br>**Conditions affecting tree regeneration and recruitment will change in New England and northern New York.**<br><br>**Forest productivity in New England and northern New York will increase during the next several decades in the absence of significant stressors.**<br><br>**Low-diversity systems are at greater risk from climate change.**<br><br>**Species in fragmented landscapes will have less opportunity to migrate in response to climate change.**<br><br>**Systems that are limited to particular environments will have less opportunity to migrate in response to climate change.**<br><br>**Systems that are more tolerant of disturbance have less risk of declining on the landscape** |

# Climate Adaptation Plan for Individual Management areas

The following plan details the management goals and objectives for a particular component of the project. Included below is a detailed review of potential climate impacts and site level considerations, along with an evaluation of objectives, potential adaptation responses (tactics) and monitoring variables to assess success over time.

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| Plan for specific Management area | Lowland and riparian forest<br>Diverse forested wetlands are found in depressions and low-lying areas, along waterways, and in floodplains. Dominant species may include ash, red or silver maple, swamp white oak, sycamore, American elm, and river birch. |
| Management Goal<br><br>Management Objective(s) | Improve forest health to protect against future stress and invasive species.<br><br>increase species diversity through FSI cutting. Also reduce ash species down to 20% overall. *(1 year)* |
| Potential identified impacts for Lowland and riparian forest | **Lowland and riparian forests may have limited tolerance to changes in precipitation and water tables.**<br>Property considerations: lowland species are very sensitive to increases in water levels (flooding) and the lack of water during summer months (drought) which will increase due to the longer hotter days (more days above 90 degrees).<br>**Many tree species could tolerate limited increases in flooding and drought under climate change.**<br>Property considerations: Red maple could become the dominant tree species in lowland areas because of its higher tolerance to temperature changes.<br>**Many of the dominant tree species are projected to have similar or increased habitat, including American elm, eastern cottonwood, and silver maple.**<br>Property considerations: these species already make up a large portion of the forest composition and could shift the biodiversity to become a monoculture.<br>**Some tree species in lowland and riparian hardwood forests are expected to decline by the end of the century (northern white-cedar, black ash, balsam fir, yellow birch, and paper birch).**<br>Property considerations: black ash is a highly valued species for basket making which is a significant part in preserving cultural tradition.<br>**Invasive species such as Japanese stiltgrass and buckthorn are expected to become more problematic under climate change.**<br>Property considerations: buckthorn is already a problematic invasive in the area and if it were to thrive even more damage and degradation in the forest would occur.<br>**Insect pests and forest diseases could become more problematic these forests under a warmer climate.**<br>Property considerations: specifically ash species will be further damaged and killed off by EAB due to the lack of days below -20 degrees. |
| Potential impact of climate change on health and function of system<br><br>Adaptive Capacity of system to climate | Mixed/Neutral<br><br>Moderate-High |

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| change impacts or disturbances | |
| Vulnerability determination | Moderate |

## Evaluation of climate change impacts on goals and objectives

Climate change might make management objectives for this property harder or easier to achieve, presenting challenges and opportunities. This section also includes a simple rating and description for the feasibility of meeting management objectives under current management. This is a critical step to evaluate whether management objectives are robust, or whether any might need to be changed.

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| Management Goal | Improve forest health to protect against future stress and invasive species. |
| Management Objective | increase species diversity through FSI cutting. Also reduce ash species down to 20% overall. *(1 year)* |
| Challenges | species diversity will be altered towards a monoculture and a shift of southern species will encroach on northern acclimatized species creating competition for the existing forest. more frequent precipitation and longer droughts could potentially stress and kill many of the lowland riparian forests by both drowning and drying out the trees root systems. |
| Opportunities | red maple could stand to benefit the most because of its ability to deal with warmer soil temperatures. black ash could benefit from higher precipitation and longer growing seasons if it does not die from early bud break or frost damage. |
| Feasibility of meeting objectives after evaluation of climate impacts on system | Medium<br>Comments: the short term benefits will be reduced damage caused by EAB and a more gradual transition to the loss of the ash species component of the forest. with the removal of ash, species diversity will further be degraded and could cause greater problems with the changes caused by climate change. |

## Responding to climate change impacts

The following adaptation actions (tactics) were identified to help prepare for climate change impacts. Each adaptation tactic is linked to one or more Adaptation Strategies and Approaches, providing connections to climate change adaptation and forest management and conservation. Refer to the Adaptation Workbook for a complete list of Adaptation Strategies and Approaches.

Note - Tactics that are recommended can be implemented or explored further. However, some adaptation tactics might not be recommended for implementation on this property, which may be due to a combination of barriers and drawbacks or external factors.

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| Adaptation Tactic | |

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| | **a reconnaissance cruise will be conducted to delineate different forest types and map out the forest stands. Orthophotos will be used get a general idea of the forest cover and then ground truthed to confirm. Stands will be marked out with the use of a GPS and later mapped out in ArcMap. A inventory that focuses on species composition (%), BA/ac, TPA, and average DBH will be conducted. BAF10 prism plots will be used to sample the tract. The number of sample points needed will be determined by the range-mean ratio of basal area technique for a given sampling error percentage of 15% or less. FSI cutting prescriptions and marking guides will be generated from the information gathered. Trees in each stand will be marked with different color schemes to allow the cutting crew to determine which trees to remove. Trees will be felled and cut to log length. Tops will be cut to 1 meter lengths to reduce the amount of slash and increase the rate of decomposition. Ash species in particular will be reduced to 20% across a given stand overall and the potential for other FSI prescriptions will be dependent on the forest composition and data collected form the inventory. examples could be northern white cedar regeneration, quaking aspen patch clear cuts for grouse habitat or release cutting desired species through removal or girdling methods.** |
| Strategy | **Reduce the impact of biological stressors** |
| Approach | Maintain or improve the ability of forests to resist pests and pathogens |
| Benefits of this tactic | By favoring drought and heat tolerant species, maintaining soil quality and nutrient cycling, and promoting age class diversity in specific species the FSI cut will help protect the forest against the projected disturbances of climate change. The FSI will act both as a resistance and transition action in that it will act to stall change and transform ecosystems to the projected changes. |
| Drawbacks and barriers of this tactic | one potential problem will be a reduction in diversity with the removal/reduction of ash species. all though it will reduce the potential damage from EAB it will also reduce species diversity and remove a structural component of the forest. |
| Timeframe to implement | 1 year |
| Practicability | *An adaptation tactic is practicable if it is both effective & feasible to implement and to ultimately achieve desired intent.* |
| ... practicability of tactic? | Medium |
| Recommendation for implementation | *The decision to recommend a tactic may be based on the likelihood of success, potential tradeoffs, cost, and other factors.* |
| ... recommend tactic? | Yes |

## Monitoring adaptation actions

Monitoring is critical for understanding if management actions are effective or if management should be altered in the future to account for new information. The following monitoring variables were described for this particular management objective and adaptation tactics.

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| Monitoring variables used to evaluate if tactic is achieving desired | monitor the sites treated for buckthorn annually and retreat if necessary; re-inventory the tract treated with the FSI cut in (5-10 years) to confirm ash species reduction, evaluate species regenerating in place of ash, new species composition after ash reduction, expected TPA reduction and increased BA/ac. |

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| management objective(s) | |
| Monitoring Variable 1 | |
| Threshold or Criteria for Evaluation of adaptation tactic | inventory and measure; ash species composition is 20% or less, species diversity of the new regeneration, amount of drought and heat tolerant species, age class diversity. |
| Implementing monitoring efforts (frequency, time of year, etc) | in 5-10 years conduct an inventory similar to the previous inventory in the FSI tract. additionally put in micro plots to measure regeneration (species, height, density). the amount of dead standing snags and DWD per acre should also inventoried at each plot. |

# Climate Adaptation Plan for Individual Management areas

The following plan details the management goals and objectives for a particular component of the project. Included below is a detailed review of potential climate impacts and site level considerations, along with an evaluation of objectives, potential adaptation responses (tactics) and monitoring variables to assess success over time.

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| Plan for specific Management area | Northern hardwood<br>Northern hardwood forests are widely distributed over a variety of sites with dry-mesic to wet-mesic conditions and nutrient-poor to rich soils. This forest type is generally found at low to moderate elevations. Species that are commonly dominant include sugar maple, yellow birch, American beech, eastern hemlock, and red spruce. |
| Management Goal<br><br>Management Objective(s) | Improve forest health to protect against future stress and invasive species.<br><br>Increase species diversity through FSI cutting. Also reduce ash species down to 20% overall. *(1 year)* |
| Potential identified impacts for Northern hardwood | **Some tree species may be more likley to persist or increase through the end of the century , such as red maple.**<br>Property considerations: red maple might become the dominant species in many areas.<br>**Northern hardwood forests are widely distributed across a variety of sites, increasing adaptive capacity.**<br>Property considerations: suitable habitat for northern hardwood will diminish. northern hardwoods makes up 50% of the project area.<br>**High levels of diversity may increase the ability of forests to adapt to climate change.**<br>Property considerations: management to increase diversity now could help protect against changes caused by climate change.<br>**Insect pests and forest diseases could become more problematic in northern hardwood forests under a warmer climate.**<br>Property considerations: specifically ash species will be further damaged and killed off by EAB due to the lack of days below -20 degrees.<br>**Invasive species such as buckthorn, honeysuckle, and garlic mustard are expected to become more problematic under climate change.**<br>Property considerations: buckthorn is already a problematic invasive in the area and if it were to thrive even more damage and degradation in the forest would occur.<br>**Changes in herbivore populations may also have substantial effects on forest growth and composition in northern hardwood forests.**<br>Property considerations: currently the understory has a good amount of regeneration but increased deer browsing could pose a problem in future release cutting and pre commercial thinning operations. |
| Potential impact of climate change on health and function of system<br><br>Adaptive Capacity of system to climate change impacts or disturbances | Mixed/Neutral<br><br>Moderate-High |

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| Vulnerability determination | Moderate |

## Evaluation of climate change impacts on goals and objectives

Climate change might make management objectives for this property harder or easier to achieve, presenting challenges and opportunities. This section also includes a simple rating and description for the feasibility of meeting management objectives under current management. This is a critical step to evaluate whether management objectives are robust, or whether any might need to be changed.

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| Management Goal | Improve forest health to protect against future stress and invasive species. |
| Management Objective | Increase species diversity through FSI cutting. Also reduce ash species down to 20% overall. *(1 year)* |
| Challenges | species diversity will be altered towards a monoculture and a shift of southern species will encroach on northern acclimatized species creating competition for the existing forest. more frequent precipitation and longer droughts could potentially stress and kill many of the hardwood species by both drowning and drying out the trees root systems. |
| Opportunities | oak/hickory forests will move into areas of maple/beech/birch which could potentially counter act the red maple monoculture but this would be a short term benefit. |
| Feasibility of meeting objectives after evaluation of climate impacts on system | Medium<br>Comments: the short term benefits will be reduced damage caused by EAB and a more gradual transition to the loss of the ash species component of the forest. with the removal of ash, species diversity will further be degraded and could cause greater problems with the changes caused by climate change. |

## Responding to climate change impacts

The following adaptation actions (tactics) were identified to help prepare for climate change impacts. Each adaptation tactic is linked to one or more Adaptation Strategies and Approaches, providing connections to climate change adaptation and forest management and conservation. Refer to the Adaptation Workbook for a complete list of Adaptation Strategies and Approaches.

Note - Tactics that are recommended can be implemented or explored further. However, some adaptation tactics might not be recommended for implementation on this property, which may be due to a combination of barriers and drawbacks or external factors.

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| Adaptation Tactic | |

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| | **a reconnaissance cruise will be conducted to delineate different forest types and map out the forest stands. Orthophotos will be used get a general idea of the forest cover and then ground truthed to confirm. Stands will be marked out with the use of a GPS and later mapped out in ArcMap. A inventory that focuses on species composition (%), BA/ac, TPA, and average DBH will be conducted. BAF10 prism plots will be used to sample the tract. The number of sample points needed will be determined by the range-mean ratio of basal area technique for a given sampling error percentage of 15% or less. FSI cutting prescriptions and marking guides will be generated from the information gathered. Trees in each stand will be marked with different color schemes to allow the cutting crew to determine which trees to remove. Trees will be felled and cut to log length. Tops will be cut to 1 meter lengths to reduce the amount of slash and increase the rate of decomposition. Ash species in particular will be reduced to 20% across a given stand overall and the potential for other FSI prescriptions will be dependent on the forest composition and data collected form the inventory. examples could be northern white cedar regeneration, quaking aspen patch clear cuts for grouse habitat or release cutting desired species through removal or girdling methods.** |
| Strategy | **Reduce the impact of biological stressors** |
| Approach | Maintain or improve the ability of forests to resist pests and pathogens |
| Benefits of this tactic | By favoring drought and heat tolerant species, maintaining soil quality and nutrient cycling, and promoting age class diversity in specific species the FSI cut will help protect the forest against the projected disturbances of climate change. The FSI will act both as a resistance and transition action in that it will act to stall change and transform ecosystems to the projected changes. |
| Drawbacks and barriers of this tactic | one potential problem will be a reduction in diversity with the removal/reduction of ash species. all though it will reduce the potential damage from EAB it will also reduce species diversity and remove a structural component of the forest. |
| Timeframe to implement | 1 year |
| Practicability | *An adaptation tactic is practicable if it is both effective & feasible to implement and to ultimately achieve desired intent.* |
| ... practicability of tactic? | Medium |
| Recommendation for implementation | *The decision to recommend a tactic may be based on the likelihood of success, potential tradeoffs, cost, and other factors.* |
| ... recommend tactic? | Yes |

## Monitoring adaptation actions

Monitoring is critical for understanding if management actions are effective or if management should be altered in the future to account for new information. The following monitoring variables were described for this particular management objective and adaptation tactics.

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| Monitoring variables used to evaluate if tactic is achieving desired | monitor the sites treated for buckthorn annually and retreat if necessary; re-inventory the tract treated with the FSI cut in (5-10 years) to confirm ash species reduction, evaluate species regenerating in place of ash, new species composition after ash reduction, expected TPA reduction and increased BA/ac. |

| | |
|---|---|
| management objective(s) | |
| Monitoring Variable 1 | |
| Threshold or Criteria for Evaluation of adaptation tactic | inventory and measure; ash species composition is 20% or less, species diversity of the new regeneration, amount of drought and heat tolerant species, age class diversity. |
| Implementing monitoring efforts (frequency, time of year, etc) | in 5-10 years conduct an inventory similar to the previous inventory in the FSI tract. additionally put in micro plots to measure regeneration (species, height, density). the amount of dead standing snags and DWD per acre should also inventoried at each plot. |

# Climate Adaptation Plan for Individual Management areas

The following plan details the management goals and objectives for a particular component of the project. Included below is a detailed review of potential climate impacts and site level considerations, along with an evaluation of objectives, potential adaptation responses (tactics) and monitoring variables to assess success over time.

| | |
|---|---|
| Plan for specific Management area | Transition hardwood<br>These forests are transitional between central hardwood and northern hardwood forests. Common species may include sugar maple, yellow birch, American beech, eastern hemlock, white pine, red maple, and red oak. |
| Management Goal<br><br>Management Objective(s) | Improve forest health to protect against future stress and invasive species.<br><br>Increase species diversity through FSI cutting. Also reduce ash species down to 20% overall. *(1 year)* |
| Potential identified impacts for Transition hardwood | **Some of the common tree species in transition hardwood forests are projected to have similar or increased habitat, including black cherry and yellow-poplar.**<br>Property considerations: black cherry could replace or out compete sugar maple in certain areas.<br>**High levels of diversity in transition hardwood forests may increase the ability of forests to adapt to climate change.**<br>Property considerations: management to increase diversity now could help protect against changes caused by climate change.<br>**Invasive species such as buckthorn, honeysuckle, and garlic mustard are expected to become more problematic under climate change.**<br>Property considerations: buckthorn is already a problematic invasive in the area and if it were to thrive even more damage and degradation in the forest would occur.<br>**Previous human influences, including fragmentation, may have reduced the adaptive capacity of some transition hardwood forests.**<br>Property considerations: farming and potash caused many areas to be clear-cut back in the 1900's and today many areas are being cleared for house and urban development. this could reduce the acreage of transition hardwoods and reduce the amount of habitat that it provides, this could be further degraded by climate change. |
| Potential impact of climate change on health and function of system | Disruptive |
| Adaptive Capacity of system to climate change impacts or disturbances | Moderate |
| Vulnerability determination | Moderate |

# Evaluation of climate change impacts on goals and objectives

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|---|---|
| Management Goal | Improve forest health to protect against future stress and invasive species. |
| Management Objective | Increase species diversity through FSI cutting. Also reduce ash species down to 20% overall. *(1 year)* |
| Challenges | species diversity will be altered towards a monoculture and a shift of southern species will encroach on northern acclimatized species creating competition for the existing forest. more frequent precipitation and longer droughts could potentially stress and kill many of the transition forests by both drowning and drying out the trees root systems. invasive species already pose a problem and could potentially threaten the ability of the transition hardwoods to regenerate with the added competition from invasives. common buckthorn in particular. |
| Opportunities | transition hardwoods could benefit from increased CO2 levels and growth rates as long as it is not counteracted by longer droughts. |
| Feasibility of meeting objectives after evaluation of climate impacts on system | Medium<br>Comments: the short term benefits will be reduced damage caused by EAB and a more gradual transition to the loss of the ash species component of the forest. with the removal of ash, species diversity will further be degraded and could cause greater problems with the changes caused by climate change. |

## Responding to climate change impacts

The following adaptation actions (tactics) were identified to help prepare for climate change impacts. Each adaptation tactic is linked to one or more Adaptation Strategies and Approaches, providing connections to climate change adaptation and forest management and conservation. Refer to the Adaptation Workbook for a complete list of Adaptation Strategies and Approaches.

Note - Tactics that are recommended can be implemented or explored further. However, some adaptation tactics might not be recommended for implementation on this property, which may be due to a combination of barriers and drawbacks or external factors.

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| Adaptation Tactic | **a reconnaissance cruise will be conducted to delineate different forest types and map out the forest stands. Orthophotos will be used get a general idea of the forest cover and then ground truthed to confirm. Stands will be marked out with the use of a GPS and later mapped out in ArcMap. A inventory that focuses on species composition (%), BA/ac, TPA, and average DBH will be conducted. BAF10 prism plots will be used to sample the tract. The number of sample points needed will be determined by the range-mean ratio of basal area technique for a given sampling error percentage of 15% or less. FSI cutting prescriptions and marking guides will be generated from the information gathered. Trees in each stand will be marked with different color schemes to allow the cutting crew to determine which trees to remove. Trees will be felled and cut to log length. Tops will be cut to 1 meter lengths to reduce the amount of slash and increase the rate of decomposition. Ash species in particular will be reduced to 20% across a given stand overall and the potential for other FSI prescriptions will be dependent on the forest composition and data collected form the inventory. examples could be northern white cedar regeneration, quaking aspen patch clear cuts for grouse habitat or release cutting desired species through removal or girdling methods.** |
| Strategy | **Reduce the impact of biological stressors** |
| Approach | Maintain or improve the ability of forests to resist pests and pathogens |

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|---|---|
| Benefits of this tactic | By favoring drought and heat tolerant species, maintaining soil quality and nutrient cycling, and promoting age class diversity in specific species the FSI cut will help protect the forest against the projected disturbances of climate change. The FSI will act both as a resistance and transition action in that it will act to stall change and transform ecosystems to the projected changes. |
| Drawbacks and barriers of this tactic | one potential problem will be a reduction in diversity with the removal/reduction of ash species. all though it will reduce the potential damage from EAB it will also reduce species diversity and remove a structural component of the forest. |
| Timeframe to implement | 1 year |
| Practicability | *An adaptation tactic is practicable if it is both effective & feasible to implement and to ultimately achieve desired intent.* |
| ... practicability of tactic? | Medium |
| Recommendation for implementation | *The decision to recommend a tactic may be based on the likelihood of success, potential tradeoffs, cost, and other factors.* |
| ... recommend tactic? | Yes |

## Monitoring adaptation actions

Monitoring is critical for understanding if management actions are effective or if management should be altered in the future to account for new information. The following monitoring variables were described for this particular management objective and adaptation tactics.

| | |
|---|---|
| Monitoring variables used to evaluate if tactic is achieving desired management objective(s) | monitor the sites treated for buckthorn annually and retreat if necessary; re-inventory the tract treated with the FSI cut in (5-10 years) to confirm ash species reduction, evaluate species regenerating in place of ash, new species composition after ash reduction, expected TPA reduction and increased BA/ac. |
| Monitoring Variable 1 | |
| Threshold or Criteria for Evaluation of adaptation tactic | inventory and measure; ash species composition is 20% or less, species diversity of the new regeneration, amount of drought and heat tolerant species, age class diversity. |
| Implementing monitoring efforts (frequency, time of year, etc) | in 5-10 years conduct an inventory similar to the previous inventory in the FSI tract. additionally put in micro plots to measure regeneration (species, height, density). the amount of dead standing snags and DWD per acre should also inventoried at each plot. |

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