

Date completed: 11/7/19 | Updated 4/27/20 | Updated 8/4/20

Title of lesson plan: Wabanaki Studies: Out of Ash

Author: Brittany Cook

*With thanks to and input from Isaac St. John (Houlton Band of Maliseets);
Bridgid Neptune, citizen of the Passamaquoddy Tribe, consultant for Portland Public Schools;
Fiona Hopper, Social Studies Lead Teacher and Wabanaki Studies Coordinator, Portland
Public Schools; and Tilly Laskey, Curator, Maine Historical Society.
This lesson plan was developed with support of a grant from Jane's Trust.*



School/Organization: Maine Historical Society

Content Areas:

- Career & Education Development
- English Language Arts
- Health Education & Physical Education
- Mathematics
- **Science & Technology**
- **Social Studies**
- Visual & Performing Arts
- World Languages

Strand and Standard: See pages 29-31 for detailed Strand/Standard information

- Social Studies, Grades 6-8: Civics & Government 2 D1, D2; Civics & Government 3 F1, F2, D1, D2; Personal Finance & Economics Personal Finance F1, F2; Economics D1; Global Connections F1, D1; Geography 1 – F3, D1, D2; Geography 2 F1, D1; History 1 – F1, F4, D4; History 3 F1, F3, D3
- Science & Engineering, Grades 6-8: MS-ESS-3; MS-ESS-4; MS-ETS1-1; MS-LS2-1; MS-LS2-4; MS-LS2-5

Duration: 10 days (2 weeks)

Grade Levels: 6-8, 9-12, adaptable for 3-5

Materials and Resources Required: Student Worksheets A and B (pages 12-14 of packet); computer, projector; map of Maine; ash samples (optional, contact Maine Historical Society for queries about ash sample loans); optional rubric (page 31)

- This lesson plan also draws heavily from the past Maine Historical Society (MHS) exhibit, *Holding Up the Sky: Wabanaki People, Culture, History, and Art* (on view April 2019- February 2020). You may choose to view the online archived exhibit with your students as well (linked below). You will be reading some of the archived “My Maine Stories” contributed by Wabanaki partners for the exhibit that are accessible from the exhibit page (linked within body of lesson plan).

Holding Up the Sky online exhibit:

https://www.mainememory.net/sitebuilder/site/2976/page/4665/display?use_mmnr=1&page=1

Summary/Overview: What will students learn? What is the purpose? (ie. Objectives/Learning Targets)

This lesson plan will give middle and high school students a broad overview of the ash tree population in North America, the Emerald Ash Borer (EAB) threatening it, and the importance of the ash tree to the Wabanaki people in Maine. Students will look at Wabanaki oral histories as well as the geological/glacial beginnings of the region we now know as Maine for a general understanding of how the ash tree came to be a significant part of Wabanaki cultural history and environmental history in Maine. Students will compare national measures to combat the EAB to the Wabanaki-led Ash Task Force's approaches in Maine, will discuss the benefits and challenges of biological control of invasive species, the concept of climigration, the concepts of Traditional Ecological Knowledge (TEK) and Indigenous Knowledge (IK) and how research scientists arrive at best practices for aiding the environment.

- **Big Idea:** Small changes to the environment, such as the introduction of an invasive species, can have enormous and long-lasting cultural, ecological, and economic effects, and it is important to combat issues of climate threats through ethical means.
- **Essential Questions:**
 - How is the approach to controlling the spread of an invasive and destructive species different in Maine from previous approaches taken in the US?
 - Why is it important to save the Brown Ash trees in Maine?
 - How can working with Wabanaki partners in a collaborative, power- and knowledge-sharing environment, and fostering TEK/IK help all people living in Maine learn about and prepare for a more sustainable future, environment, and economy?
- **Objectives:**
 - Students will be able to identify the ash tree population's significance for Wabanaki people and the State of Maine with regard to the environment, economy, and traditions.
 - Students will make informed projections on the effectiveness of current biocontrol methods for combatting an invasive species, and the methods for preserving cultural traditions in the "short, medium, and long term."
- **Vocabulary:** *entomology, oral history/oral tradition, climigration, quarantine, parasitoid, biocontrol/biological control, Traditional Ecological Knowledge (TEK), Indigenous Knowledge (IK), Emerald Ash Borer (EAB), wikipiyik/wikepi/wipiti, Gloskape/Gluskabe/Koluskap*

Educator's Note/Reading this Lesson Plan

MHS recommends reading fully through the content of this lesson plan, as well as the information in the Teacher Resources on pages 26-28 of this packet, prior to beginning the lesson. Bullet points within each step are provided as helpful scripted talking points and background information to share with your students as you progress through each day of the lesson. Should you have any questions, please contact education@mainehistory.org – our educators are happy to help you.

Steps:**I. Day 1: Introduction****a. Acknowledgement and Introduction**

- i. *(If your classroom/school has a land acknowledgement, MHS recommends beginning this lesson with a land/water acknowledgement. More information in Teacher Resources on page 30 of this packet.)*

- ii. The goal of this lesson plan is to inform students about a significant environmental crisis that is present in Maine, and help them learn about the efforts to combat this issue that are being led by Wabanaki citizens. Students will also learn helpful context about the views and traditions of the Indigenous peoples who have been living in this region for more than 13,000 years – long before settlers/colonizers/immigrants. Native and non-Native people are neighbors, and we live on unceded Wabanaki Homelands. This lesson plan will address information about Traditional Ecological Knowledge (TEK) that anyone can learn, with the understanding that many parts of Indigenous worldviews and philosophies are privileged for Indigenous people only, though there are several ways that non-Indigenous people living in Maine can help to privilege Wabanaki voices and incorporate best practices advised by Wabanaki leaders for the benefit of the environment now and in the future.

b. Addressing stereotypes

- i. Throughout this lesson plan, we are going to be discussing concepts, histories, and current, forward-looking practices relating to Wabanaki ecological philosophies that can help all people living in Maine combat a particular environmental crisis in our back yard. First, we need to acknowledge and work to deconstruct and dismantle pervasive stereotypes that are rooted in the relations between Wabanaki people and non-Indigenous people living in Maine and throughout the US over the past 400+ years.
- ii. “Wabanaki” translates into English as “Dawnland,” and Wabanaki people are the “people of the Dawnland.”
 1. Why do you think this part of the continent might be called “Dawnland?”
 - a. This is the first part of the continent to see the sun rise in the morning.
- iii. “Wabanaki” is an overarching term for many Indigenous peoples of a large area of this part of the continent. “Borders” as they are depicted on maps you may be familiar with are boundaries inscribed by settler-colonial European and Euro-American societies, and the concept of “borders” is not as rigidly defined when it comes to determining exact Homelands of myriad Indigenous groups due to seasonal migrations and kinship ties; however, it is important to know today that what is now called Maine is part of Wabanaki Homelands. Wabanaki people live here and have been living here for more than 13,000 years.
- iv. Wabanaki people do not live only in Maine, and not all Native people living in Maine are Wabanaki. There are many Wabanaki people who live in Canada, other States, and other countries around the world, just as people living in

Maine might be Diné, Hopi, Anishinaabe, or from any other Native Nation. What we know today as the Canadian Maritimes north and northeast of Maine (New Brunswick, Nova Scotia, Prince Edward Island) are also Wabanaki Homelands, and the Homelands of other Indigenous First Nations peoples.

- v. There are four federally-recognized Wabanaki Tribes/Nations with reservation lands in Maine: the Houlton Band of Maliseets, the Aroostook Band of Micmacs, the Passamaquoddy Tribe at Motahkomikuk (Indian Township) and Sipyak (Pleasant Point), and the Penobscot Nation.

- 1. Discuss: Do you recognize any of these names?
 - 2. Look at the five locations on a map of Maine. (On a map of Maine, look for Houlton, Presque Isle, Indian Township, Pleasant Point, and Indian Island near Old Town and the land and water surrounding these areas.)

- vi. It is important to remember that Wabanaki people living in Maine and Maine citizens who are not Wabanaki are neighbors today. Wabanaki people, just like citizens of Maine who are not Wabanaki, live in homes, drive, have many different kinds of jobs, vote, make art, scroll the Internet on their cell phones, and go to school. While it is important that many traditions that have survived for hundreds or even thousands of years are preserved and taught by Wabanaki people today, members of the community who are Wabanaki do not dress in traditional regalia in their daily lives and do not live in tipis. Indigenous people in what is now known as the United States wear the same types of clothing and live in the same types of houses that non-Indigenous people do.

c. Ash trees

- i. Today we're going to begin our focus on the ash tree population, and the need and effort to preserve these trees in the face of an imminent ecological threat.
- ii. Geologically, the region that now includes Maine and the Canadian Maritimes was covered by glacial sheets from around 18,000 BCE to around 10,000 BCE. There is still much that we are learning, geologically and archaeologically, about this roughly 8,000-year span of time. We do see evidence that the ice from these glacial sheets depressed the land such that, when the glacial sheets receded to the north, the land was flooded with ocean water. Over time, as the ocean receded and the land re-emerged, the soil formed by this event was unique for the growing of brown ash trees (*Fraxinus nigra*), which require wet or marshy soil.
- iii. Of the more than 45 species of ash trees that grow throughout the world, sixteen are indigenous to the United States and three grow in Maine: white ash (*Fraxinus americana*), green ash (*Fraxinus pennsylvanica*), and brown ash, also called black ash (*Fraxinus nigra*). Today, the ash tree population in Maine makes up roughly 4% of all hardwood trees growing naturally in the state, and brown ash makes up just over 1% of the ash tree population in Maine.

d. Ecological crisis

- i. While deforestation and pollution pose significant long-term threats to the environment in the State of Maine and the livelihood of all citizens, particularly

- Native communities, one of the worst immediate threats to the ash tree population in Maine is an invasive insect called the Emerald Ash Borer (EAB).
- ii. EAB (*Agrilus planipennis*) is an insect native to Northcentral China and Eastern Russia.
 - iii. The first detection of EAB in North America was in Michigan in 2002, though it is probable that EAB has been in North America for some time before then, likely the late 1990s. EAB likely arrived undetected in the wood of packing materials. This insect has since spread to 35 states and counting, plus four provinces of Canada and counting.
 - iv. The ash tree population in the United States had in 2002 been at an estimated 7-9 billion. EAB has already destroyed more than 40 million trees in Michigan alone, and hundreds of millions of trees throughout other states and provinces, showing that this is a fast-working and unrelenting pest which, if not controlled, could cause extinction of ash trees in North America.
 - v. Of the 16 species of ash (*Fraxinus*) native to North America, six are now on the federal “critically endangered” list in the United States as of 2019. This includes all three species of ash which grow in Maine. This lesson will focus specifically on the brown ash tree (*Fraxinus nigra*).
 - vi. We will look into the specific threat to ash trees posed by EAB tomorrow, as well as some of the methods for controlling the spread.
- e. Discussion:
- i. Over the next two weeks, we'll be discussing the imminent threat EAB poses to the ash tree population, the significance of the brown ash in Wabanaki communities, the significance of brown ash as a keystone species, and the ecological impact ash tree loss could potentially have on the ecosystem.
 - ii. We will also be discussing the different approaches to defending ash tree populations against the EAB threat, and the benefits of collaborative leadership between Wabanaki leaders, tribal governments, and Maine State forest services.
 - iii. At the end of this lesson, we'll work on a project regarding ash tree protection and revitalization, based on the concepts we'll discuss over the next two weeks.
- II. Day 2: EAB Threat Overview; EAB Task Force Introduction**
- a. Intro
- i. Yesterday, we learned about the Emerald Ash Borer (EAB), an invasive species that has killed hundreds of millions of ash trees in the United States and Canada since its detection in Michigan in 2002.
- b. Discussion: About the Emerald Ash Borer:
- i. In 2011, US Forest Service entomologist Nathan Siegert declared in the New York Times that EAB is “the most destructive insect we have in North America.”
 - ii. EAB are smaller than a penny, and can be difficult for untrained eyes to detect because they tend to be found toward the top of the tree. Adult EAB will eat ash tree leaves for nutrition; the most devastating damage comes from the larvae.
 - iii. Female EAB lay their eggs (60-90 at a time) in the bark of a healthy ash tree between May and September. When the larvae hatch, they feed on the soft

- inside bark and bore through the trees, leaving S-shaped trails as they go. Eating away at the soft bark (cambial tissue) blocks the tree's ability to take in and process water and nutrients, and the tree slowly dies. Fully-grown EAB then exit the tree in a D-shaped hole. The EAB life cycle is around one year.
- iv. EAB infest *all* species of ash, not just a single strand.
 - v. The United States Department of Agriculture Animal and Plant Health Inspection Service (USDA APHIS) imposed quarantine zones in the 2000s and into the 2010s in areas where EAB had been detected. People had likely inadvertently been transporting EAB throughout the states/provinces when carrying firewood from one site to another.
 - vi. One of the first combative measures taken by the United States Department of Agriculture Animal and Plant Health Inspection Service (USDA APHIS) was to impose quarantine zones based on where EAB had thus far been detected in the United States, meaning no ash trees were to be cut down or removed from these areas. By quarantining, forestry professionals could keep EAB infestation sequestered into the areas in which EAB had already been detected, since it would limit EAB travel to new areas and allow for the study of EAB behavior within the quarantined region.
 - vii. In 2018, APHIS removed quarantine regulations, and federal funding is now being concentrated on biocontrol efforts and further study.
 - viii. 2018 was also, incidentally, the first year EAB was officially detected in Maine. EAB first appeared in Maine in northern Aroostook County and in York County. It was detected in Portland (Cumberland County) in autumn 2019.
- c. Combatting EAB in Maine
- i. As a class, watch the Maine Public video, "Basket Trees – Saving a Tradition" (26m, 50s), from October 2012.
 1. <https://www.pbs.org/video/sustainable-maine-sustainable-maine-basket-trees-saving-tradition/>
 - ii. Discuss as a class:
 1. What are some things you noticed in this video?
 2. What questions do you have?
 - iii. Ask students to record their questions and observations from the video, keeping in mind that this video came out while groups were discussing the eventuality of EAB arriving in Maine – airing six years prior to EAB's detection in York and Aroostook Counties.
 - iv. Starting tomorrow, we are going to take a close look at how groups in Maine prepared for EAB's inevitable arrival, and how the strategies in Maine differed from strategies taken in other states. The effort to combat EAB in Maine began early, and from the beginning has benefitted from Wabanaki leadership, and sharing of power and ideas between Native and non-Native people.
 - v. The EAB crisis is a significant threat to all people living in Maine, and is just one of many critical ecological issues that is being addressed and combatted by partnerships between Tribal governments and State governments.

- vi. Tomorrow we will begin learning about the fundamentals of Traditional Ecological Knowledge/Indigenous Knowledge (TEK/IK) and the importance of not just *consulting* with Indigenous partners and experts but *engaging in collaboration* between Native and non-Native groups.

III. Day 3: TEK Overview

- a. Review:
 - i. We've begun discussing the Emerald Ash Borer (EAB), a non-native wood-boring insect that has been devastating forests throughout the United States and Canada since its discovery in Michigan in 2002.
 - ii. The EAB crisis is cultural, ecological, and economic.
 - iii. Discuss:
 - 1. What were some of the things that stood out to you in the Maine Public special from 2012 yesterday?
 - 2. What questions do you still have?
 - iv. Today we're going to begin discussing the impact of the EAB crisis on the Wabanaki community. The Wabanaki are the First Peoples of the region that now includes Maine. The brown ash tree (*Fraxinus nigra*) has been designated a cultural keystone species, and the effort to combat EAB in Maine is led by Wabanaki anthropologists, foresters, and basketmakers in conjunction with Tribal governments and the Maine State government.
 - v. One of the terms we'll start discussing today is *Traditional Ecological Knowledge*, or *Indigenous Knowledge* (TEK/IK). TEK is one way to describe a way of knowing, and refers to lifeways observed by Indigenous peoples in what we now know as North America.
- b. Discussion: What is TEK?
 - i. Wabanaki knowledge, arts, history, and culture are all alive today and will continue to live in the future through passing down information from one generation to the next. *Oral tradition* reflects more than 13,000 years and counting of observations of the natural world and how Indigenous people reciprocate what they learn through stewardship of the environment. *Oral history* is the passing down of history from one generation to the next through telling, rather than writing down. It is only within the past 200+ years that Wabanaki observations and history has been written down and published in English.
 - ii. Traditional Ecological Knowledge (TEK) is a relatively contemporary term that encapsulates the ongoing body of knowledge and place-based understanding taught through oral tradition, observation, and action. TEK relates to the process of observation, reciprocity, and connection, and helps Indigenous people make informed decisions about sustainable practices. Oral tradition teaches and affirms mutual responsibility and obligation between human and non-human relations.
 - 1. Abenaki historian Lisa Brooks (Missisquoi and Pemigewasset) talks about the relative relations between Indigenous people and the land, and how TEK is inherent in the language – rather than asking, “*What is*

that?" about an animal, plant, or river, a Wabanaki person asks, "*Who is that?*" Names and the Wabanaki language are dynamic and heavy in verbs, whether they apply to people, rivers, plants, animals, or laws. The dynamic nature of the language speaks to the Wabanaki view of life, and what can be observed in the natural world, as a process, rather than things that are static.

2. Deborah McGregor (Anishinaabe, Whitefish River First Nation) wrote in 2004: "There is a major dichotomy in the realm of TEK that needs to be understood: there is the Aboriginal view of TEK, which reflects an indigenous understanding of relationships to Creation, and there is the dominant Eurocentric view of TEK, which reflects colonial attitudes toward Aboriginal people and their knowledge. In my view, to understand where TEK comes from one must start with Indigenous people and our own understanding of the world... Indigenous knowledge is not simply a product (knowledge) or a commodity; it is a process as well... It is not appropriate to limit or constrain IK [Indigenous Knowledge] by defining it, as it should not and cannot be removed from the people or the land in which it is based... IK is also about the process of learning this knowledge and the personal development that occurs along with this process." (*For McGregor's full article, please see Teacher Resources at the end of this packet.*)
3. It is a common Eurocentric misconception that Indigenous people are inherently "one with the land." Knowledge that is passed down is knowledge that has been developed for thousands of years through observation, trial and error, and active learning and participation.
 - a. "Eurocentric" refers to concepts and ideas that privilege a European or European-based world view. Because of the history of European colonizers and settlers in what is now known as the United States, people living in America today, many of whom are of white European ancestry, tend to grow up with Eurocentric histories and concepts all around them, often without even knowing about points of view and lived experiences that are not Eurocentric. We can challenge the prevalence of and privilege for Eurocentric concepts and histories by reading between the lines in historic documents, and listening to, lifting up, and privileging non-Euro-American voices today and tomorrow.
4. Traditional Ecological Knowledge is as much philosophy as it is science, and just like any science, it is intended to evolve over time as more knowledge is gained through new generations. Knowledge is not a measurable end goal but an ongoing process.
5. Indigenous Knowledge and Indigenous philosophies can in some ways be closed to non-Indigenous peoples, but there are still several things

that non-Indigenous people can learn about from Indigenous neighbors.
If you are unsure about something, you can research and ask!

c. Discuss:

- i. What are some pieces of information that have stood out to you in our discussions today?
- ii. How do you think incorporating TEK and other approaches to science, specifically ecology, might be helpful for combatting the EAB crisis in Maine?
- iii. Tomorrow we are going to continue our discussion of TEK, and take a look specifically at the significance of ash in Wabanaki communities.

IV. Day 4: TEK – Ash and Traditions

a. Review

- i. Take some time to review your discussion points from yesterday, as well as any observations or questions from students.
- ii. Today we are going to continue our discussion of TEK, and take a look specifically at the importance of ash in Wabanaki communities and tradition.

b. Discussion: What is TEK?

i. Discuss: Oral tradition/oral history

1. Show MMN item #102631 (Jason Brown's "Creation" bracelet)
 - a. Ask what students see in the bracelet – materials and imagery.
Read aloud Brown's artist statement about this particular work:
 - i. *"We know through the creation story that Wabanaki people came from the brown ash tree. By continuing to use brown ash in our basketry and artwork, we maintain and honor our connection to the past. Historically, copper was mined by Wabanaki people in the Bay of Fundy and cold formed into articles of adornment. When I combine all of these elements in a contemporary way, I feel that this piece is a powerful reflection of Wabanaki history and culture."*

2. Gluskabe oral history

- a. In 2007, an anonymous Missisquoi person was quoted in the *Wicazo Sa Review* stating, "We were created out of the wood of a tree that still thrives here." Stewardship of ash trees among several Indigenous communities, including Wabanaki communities, is deeply connected to oral history and tradition, including creation histories.
- b. Oral history and oral tradition are valuable cultural resources and must be utilized as a primary source alongside written documents, tangible objects, and historic images.
- c. In the 1880s, a Passamaquoddy woman named Molly Sepsis recounted information from Passamaquoddy oral history for Anglo-American anthropologist Charles Leland. In Leland's book, *Molly Sepsis* shared the following:

- i. “Glooskap came first of all into this country, into Nova Scotia, Maine, Canada, into the land of the Wabanaki, next to sunrise. There were no Indians here then... [f]irst born were the Mikumwess, the Oonabgemessuk, the small Elves, little men, dwellers in the rocks. And in this way he made Man: He took his bow and arrows and shot at trees, the basket trees, the Ash. Then Indians came out of the bark of the Ash-trees...”
 - d. Gluskabe (also spelled Glooskap, Koluskap) is a prominent person in Wabanaki oral history.
 - e. Take another look at Jason Brown’s “Creation” cuff bracelet and artist statement. What more do you notice?
 - f. Can you draw similarities between Molly Sepsis’s and Jason Brown’s statements?
 - g. Because oral history and oral tradition are passed down through spoken word, variations of the same information will change depending on who is passing on the knowledge. However, the culturally important and vital information will be more or less the same as it spans generations.
3. The ash tree is also known as the *basket tree* to Wabanaki communities. Ash is one of the primary relations utilized in basketmaking, and is significant to Wabanaki communities not only in an economic sense relating to basketmaking, but also as a cultural touchstone rooted in oral histories, including creation histories.
- ii. Discuss: How does knowing about this aspect of Wabanaki oral history/oral tradition impact your understanding of the EAB crisis?
- c. Discussion: Ash Basketry
- i. History of ash basketry
 - 1. Just as tradition and history is passed on orally, the knowledge needed to harvest materials for creating useful and culturally important resources such as baskets are passed down through active learning. A master basketmaker will pass on their techniques as well as the information about the traditional methods for harvesting resources to new generations of basketmakers.
 - 2. Ash basketry is one of the oldest artforms in Maine. Baskets were originally created for utilitarian purposes, such as carrying items and storing food. While the tradition is thousands of years old, few baskets made prior to the 18th century remain due to the natural erosion of wood fibers. However, the tradition has been passed down through multiple generations of basketmakers, and archaeologists have found imprints of ash fibers from baskets on ceramics, that show archaeological evidence of basketry practiced by Wabanaki ancestors.
 - 3. During the 19th century, Wabanaki artisans saw an increase in Euro-American tourism to Maine and an interest in purchasing and even

collecting Wabanaki-made ash baskets. Wabanaki artisans adapted and created several “fancy” styles and basket shapes to appeal to Euro-American tastes, such as hatboxes. In coastal towns especially, such as Bar Harbor and Boothbay Harbor, Wabanaki artisans began to set up markets each summer at which they could show and sell their baskets to collectors.

4. Until the late 19th and early 20th centuries, little documentation exists for the makers of baskets. As the industry grew, more basketmakers began signing their work, and collectors began documenting the maker (by means of keeping receipts or notes for private collectors, or museums making purchases directly from the artist and documenting the artist in the information about the basket). Many Wabanaki master artisans today can help to identify historical baskets by at least tribal affiliation and rough year/decade of make based on oral records of how the tradition and art form evolved.

ii. Future of ash basketry

1. The Maine Indian Basketmakers Alliance (MIBA) was founded in 1993 by Wabanaki basketmakers who saw that most of the basketmakers in their communities were elders, and few younger people were learning the art form. MIBA sparked interest in basketry in younger generations of Wabanaki people through training, events, and festivals. Today, the average age of practicing basketmakers has gone down since 1993 (from the average age of 63 to 40 among a population of more than 6,000) as more and more Wabanaki children and young adults take up the tradition.
2. Creating ash baskets depends upon multiple people in different roles. While some basketmakers might harvest materials themselves, it is common for basketmakers to purchase materials from other Wabanaki artisans who harvest and pound the ash. Pounding the ash is the process of splitting the wood to properly loosen the outer bark and then split the inner bark into splints used by basketmakers.
3. Several basketmakers also incorporate braided sweetgrass into their ash baskets. While some basketmakers may harvest and braid their own sweetgrass, it is also common for basketmakers to purchase sweetgrass that has already been braided from other Wabanaki artisans.
4. We will continue to discuss the role of ash harvesters tomorrow.
5. Markets for selling baskets continue to be profitable and highly important events for Wabanaki artisans. Annual markets continue in Bar Harbor, at which Wabanaki basketmakers sell their baskets, but which also serves as a cultural event that allows young basketmakers to meet and talk with elders, for youth to learn about the tradition, and for communities to come together.

iii. Discuss:

1. How does the EAB crisis affect the tradition and economics of basketry?

- a. Loss of ash trees is the loss of a culturally significant species, not only impacting a significant economic market but history and identity.
2. Tomorrow, we will start to discuss how EAB is being combatted in Maine. We will also continue to discuss possible solutions for the future of ash basketry within the context of the EAB crisis.

V. Day 5: EAB Task Force Review; TEK Review

- a. Review
 - i. Take some time to review the information you have covered thus far and any student questions and observations that have come up during the previous four days.
- b. Discuss:
 - i. What is TEK? What have we learned about TEK so far?
 - ii. What are the imminent ramifications of the EAB crisis for Wabanaki communities?
 - iii. What are the imminent ramifications of the EAB crisis for ecosystems in Maine?
- c. EAB Task Force in Maine
 - i. EAB was first detected in Maine in Aroostook County in May 2018, then in York County in September 2018, and in Portland (Cumberland County) in October 2019. However, Wabanaki leaders and forestry representatives have been preparing for the eventuality since 2009.
 - ii. The approach to EAB pest control in Maine has been different from the start. Since EAB's discovery in Michigan in 2002, other states with significant ash tree populations have been worrying about its arrival.
 - iii. The EAB Task Force in Maine was founded by Dr. Darren Ranco (Penobscot), and is based out of the University of Maine, Orono, (UMaine) at which Dr. Ranco is a professor of Anthropology. Dr. Ranco is also the Chair of Native American Programs and Director of Native American Research at UMaine. The Task Force's key members also include two members of the Maine Indian Basketmakers Alliance—Jennifer Neptune (Penobscot) and Tereasa Secord (Penobscot), MIBA's founding director—and three UMaine Forest Resources faculty members—John Daigle, a member of the Penobscot Nation, William Livingston, and Robert Lilieholm.
 - iv. In 2014, Wabanaki and St. Regis Mohawk ash harvesters met at a symposium hosted by the University of Maine, Orono.
 - v. These ash harvesters have studied the characteristics of healthy and unhealthy ash trees and are experts in knowing which trees will provide the best wood for baskets. Different baskets need different types of wood – for example, sturdy pack baskets or potato baskets will need stronger wood than a small, delicate fancy basket. The Native ash tree harvesters have studied both through learning from tradition (from elders and others in their community) and from their own highly localized observations and practice.

- vi. In addition to Wabanaki leaders and experts consulting on this matter, Wabanaki people are recognized as *stakeholders* in the initiative to save ash trees.
 - 1. Discuss:
 - a. What do we mean by *stakeholder*? What kinds of people or groups do you consider to be stakeholders of certain movements, activities, or organizations?
 - i. A *stakeholder* is a person who is invested in and impacted by something. For example, the people who serve on your local school board are stakeholders in your school, but so are the students' families. Sometimes a stakeholder is a monetary investor in a project or organization, like a trustee of a museum – but the community the museum serves are also stakeholders, since they are the ones taking part in the programming.
- vii. By leading with TEK and focusing on a combined effort between Native and non-Native professionals, the EAB Task Force in Maine is set apart from other national groups fighting the same invasive threat to the ash tree population. In addition to the key members, the task force relies on the expertise of concerned professionals in Wabanaki communities, forestry, and the Maine state government.
 - 1. Quotes from Dr. Ranco:
 - a. "Emergency response planning sometimes has a very top-down approach. We want to make sure that the planning in Maine allows for input from the bottom-up, and that the basketmakers' needs and interests are served and communicated along the chain of command."
 - b. "Those gathering ash for basketmaking might be some of the first to detect an invasion, while those who are making hardwood pulp might not even notice it."
 - c. The Task Force is adapting to EAB's presence in the "short, medium, and long-term."
 - 2. Discussion of the "short, medium, and long-term:"
 - a. Biocontrol
 - i. In July 2019, Maine Public reported that the Maine Forest Service announced the release of three species of parasitoid wasps to combat EAB.
 - ii. Task Force members are identifying infestations and applying wasp egg depositors onto ash trees.
 - 1. We will discuss more about parasitoid wasps tomorrow.
 - b. Firewood Ban

- i. The early efforts of the Task Force successfully resulted in a state ban on firewood from outside Maine. One of the early concerns regarding EAB was its transfer, unwittingly on the part of the person carrying it, in firewood logs, which could be brought into Maine from New Hampshire, or the Canadian Provinces of Quebec and Nova Scotia, all three of which have reported EAB infestations.
 - ii. It is now illegal to transport firewood from one site to another in Maine, or to bring firewood in from Canada, or New Hampshire or any other state. The ban was put into place in 2010, soon after the forming of the Task Force and eight years before EAB was detected in Maine.
 - iii. EAB has been detected in the northernmost and southernmost counties of Maine, and firewood transport outside of these counties could easily lead to the decimation of ash trees throughout the rest of Maine if laws are ignored.
 - iv. The state advises and enforces that people “burn it where you buy it,” and cut or purchase firewood local to the campsite you are using. Rather than take extra firewood with you, burn it or drop it off at one of the state designated zones.
- c. Discuss: How do you think biocontrol and the firewood ban will have an effect on the “short, medium, and long term?”
 - d. Looking at other sources for basketmaking
 - i. Jennifer Neptune and Darren Ranco bid on and acquired an important 19th century basswood bag at an auction.
 - ii. Jennifer Neptune and Theresa Secord of MIBA are now using the basswood bag as a source for studying and reviving another traditional basketmaking technique.
 - e. Keeping records of current ash basketry techniques for future generations, both through oral tradition and video
 - f. Seed collection and preservation
 - i. Longevity of seeds: Brown ash seeds can be collected between June and September, and can last in containment for up to 40 years.
 - ii. Wabanaki youth, encouraged and trained by members of the Task Force, are collecting and assisting in the preservation of brown ash seeds. The seeds are kept via cryopreservation.

VI. Day 6: EAB Control Methods in North America

- a. Review

- i. Take some time to review the information you have discussed in the previous week. Go over any student questions and observations.
- b. Today we are going to take a look at some of the EAB control methods that have been employed throughout the United States since the early 2000s. We will compare these efforts to the work being done in Maine, and discuss benefits and issues of some of these methods.
- c. USDA APHIS have tested the effectiveness of four types of non-stinging wasps native to Eastern Asia (China, Korea) and Eastern Russia, which effectively combat the EAB population in its native zones. The wasps vary in their effectiveness and methods for controlling EAB populations.
 - i. *Tetrastichus planipennisi*: The female *Tetrastichus* wasp lays eggs inside EAB larvae, which derive nutrients from and kill the EAB larvae.
 - 1. APHIS reports that roughly 130 *Tetrastichus* can emerge from a single destroyed EAB larva.
 - 2. *Tetrastichus* eggs are collected into ash bolts (small chopped logs of ash bored with an opening, prepared by scientists) that are attached to the infested ash tree, where the eggs then hatch and seek larval hosts.
 - ii. *Oobius agrili*: The female *Oobius* wasp lays eggs inside EAB eggs. "They develop inside the larva, eating it from the inside and then, sort of like a scene from *Aliens*, they'll burst forth from the carcass of the Emerald Ash Borer." – Maine Forest Service entomologist Colleen Teerling.
 - 1. APHIS reports that each *Oobius* parasitizes around 80 EAB eggs.
 - 2. Scientists working with *Oobius* wasps for biocontrol methods collect *Oobius* eggs that are laid onto paper, which is then transferred into a small plastic device dubbed an "Oobinator." The Oobinator, like an ash bolt, is then attached to an infested ash tree, where the eggs will hatch and the wasps will seek EAB egg hosts.
 - iii. *Spathius agrili*: The female *S. agrili* wasp lays eggs next to EAB larvae. When they hatch, the *S. agrili* eat the EAB larvae.
 - 1. APHIS reports that *S. agrili* effectively parasitize up to 90% of EAB larvae in its native region (Tianjin, China). It is most effective in warmer southern regions.
 - 2. *S. agrili* eggs are also deposited onto trees using ash bolts.
 - iv. *Spathius galinae*: The female *S. galinae* wasp lays eggs next to EAB larvae, similar to *S. agrili*.
 - 1. APHIS reports that *S. galinae* will be most effective in Northeastern North America due to the similar climate of the wasp's native Far East Russia.
 - 2. *S. galinae* eggs are also deposited onto trees using ash bolts.
 - v. A facility in Michigan, where EAB was first detected in North America, prepares and ships ash bolts and Oobinators to forestry services and task forces seeking to combat detected EAB populations using USDA-approved biocontrol methods.
 - vi. These four wasps were approved for deployment in the United States in 2007, and three of the species were approved in Canada between 2013-2015.

- d. Discussion: Does this seem like a viable long-term option? What makes you say that?
 - i. Note woodpecker activity as well: woodpeckers will eat EAB larvae, but they strip the outer bark off the tree in the process. While effective in terms of EAB eradication, this can still be harmful to ash trees. However, high woodpecker activity on ash trees can give clues to an EAB infestation.
- e. There is a trend in published research that discusses EAB infestations that tends to put emphasis on the economic impact EAB-related deforestation has on timber industries, including little to no input from Native voices. However, as we have discussed, ash is significant to Wabanaki (and several other Indigenous) worldviews and ecological philosophies, not to mention economies. Some reports acknowledge basketry among the other industries taking an economic dive due to EAB, but it is overshadowed by the large timber and pulp industries. Some reports will also tend to focus on or otherwise prioritize the economic, but not the ecological ramifications of tree loss.
 - i. Discuss:
 - 1. Why is it important to keep the ecological impact at the forefront of discussions about EAB?
 - 2. What is the difference between *collaborating* with Native experts and *collaborating* with Native experts and Tribal governments?
 - a. What do you think all communities can gain from collaborative efforts over short-term consultation?

VII. Day 7: TEK Review; Climigration

- a. Discussion: Climigration is the movement of human and/or nonhuman species from their environment when the environment is threatened and no longer sustainable for basic needs.
 - i. This term has been gaining more and more traction in recent years, and is often being used in academic, scientific, journalistic, and political circles as a way to describe migrating human victims of myriad climate crises, in place of terms like "climate refugees."
 - ii. Climigration, however, occurs whenever an environment is so threatened that it becomes uninhabitable. Natural occurrences such as flooding, volcanic eruption, earthquakes, and forest fires can cause mass climigration of human and nonhuman inhabitants from one region to another.
 - iii. Contributing significantly to what we are seeing today of the climate change crisis, however, are manmade changes to environments that can be traced to hundreds of years of colonization and displacement.
 - iv. Differing ways of knowing have caused discrepancies and misunderstandings between Native and non-Native peoples in North America.
 - v. Manmade tools of climate change, such as dams, deforestation, or oil pipelines, contribute significantly to the rapid changing of an environment.
 - vi. TEK is place-based knowledge, learned and adapted over centuries of observation of and reciprocity with a local ecosystem.
 - 1. A river navigated by sturgeon to swim and spawn as they have always done also provides for the people and animals who hunt the sturgeon. When European settlers arrived in what is now known as North

America, they believed it to be a land of abundance and took everything they could carry, thinking that resources were limitless, that corn grew naturally without human cultivation, that fish heavily populated rivers and would never disappear. When Europeans over-fished and dammed rivers in North America, they did so without regard to fish migration patterns. Indigenous people living in the area of the dammed river had learned more about the seasonal migration patterns through community oral history as well as their own observation and actions.

2. A dammed river will lead to pollution, and block the fish from reaching the place where they have always spawned. This causes the fish to migrate elsewhere, and disrupts the livelihood of the Indigenous peoples who have traditionally hunted the fish in that river, causing them to move as well.
- vii. EAB is not a manmade threat but an invasive species. Just as a non-native plant can choke out the roots of a native plant and take over soil, an insect not indigenous to a given area that relies on plants to live will do extreme harm to the local ecosystem.
 1. We know that brown ash trees are a cultural keystone species. They are significant to Wabanaki tradition and oral histories, and brown ash basketry is a key part of Wabanaki economies. The loss of ash trees is a tremendous loss to Wabanaki culture.
 2. Loss of ash trees from EAB infestations can result in climigration and other large-scale ecological issues. Brown ash trees are one of the few trees upon which the rare fungus flooded jellyskin depends for growth. Additionally, some species of frogs, which live in the swampy areas populated by ash trees, depend on fallen ash leaves for food. Further, mature ash trees assist in over-forest shade, also preferring shade to grow. New ash trees also thrive in shady environments. Dead ash trees from EAB infestations can result in the ultimate changing of an ecosystem, resulting in changes to things like shelter and nutrition for myriad species. If one species has to seek a new environment due to ash loss, so will other species that depended on the first to move on, and so forth.
 3. Discuss: What impact do you think the parasitoid wasps being used to combat EAB might have on the environment?
 - a. While they have not been found to destroy native species yet, these wasps are still not native to this region.
- b. Discuss: One way to combat climate change and the effects of climigration is through *climate justice*.
 - i. "The environmental impacts of settler colonialism mean that quite a few indigenous peoples in North America are no longer able to relate locally to many of the plants and animals that are significant to them... Our conservation and restoration projects are not only about whether to conserve or let go of certain species. Rather, they are about what relationships between humans and certain

plants and animals we should focus on in response to the challenges we face, given that we have already lost so many plants and animals that matter to our societies.” – Dr. Kyle Powys Whyte, Potawatomi

- c. As a class, watch Dr. Darren Ranco’s TEDx Dirigo talk, “Addressing Wicked Problems with Wabanaki Diplomacy” (run time 12m 37s).
 - i. <https://www.youtube.com/watch?v=F17fzuLSpZw>
 - ii. As a class, discuss:
 - 1. This video is from 2017, shortly before EAB was detected in Maine. How does this talk contribute to your understanding of the EAB Task Force’s preparedness strategies for eventually combatting EAB infestations?
- d. Tomorrow, we are going to begin working on a project that will combine what we have been learning over the past several days. Take some time to review notes.

VIII. Day 8: EAB Control – Leading with TEK Review; Project Introduction and Student Work Day

- a. Review
 - i. Take some time to review all of the information you have discussed over the past seven days. Go over any additional student questions and observations.
 - ii. Discuss:
 - 1. What are some of the “short, medium, and long term” efforts being used to combat the EAB crisis?
 - 2. What is TEK?
 - 3. How is the EAB Task Force leading with TEK?
 - 4. What are the benefits of *collaboration* and *power sharing* between Wabanaki experts, Tribal governments, and scientists and Maine State scientists and foresters?
 - a. How is this different from *consultation*?
 - 5. How is the EAB Task Force involving Wabanaki youth in the efforts to preserve ash trees for the future?
 - 6. What other measures has the EAB Task Force taken to preserve ash trees, identify potential infestation, and save both ash tree populations and Wabanaki basketry traditions?
- b. Project Introduction
 - i. Now that we have an understanding of what the EAB threat is, we’re going to begin a project that will incorporate what we’ve learned and how we might raise awareness.
 - ii. Take a look as a class at two awareness campaigns:
 - 1. Basket Trees:
https://www.maine.gov/dacf/mfs/forest_health/documents/BasketTrees.pdf
 - 2. Don’t Move Firewood:
<https://www.dontmovefirewood.org/map/maine/>
 - iii. Think about what your campaign would be: how would you help spread the word about saving the brown ash tree, using significant information you have learned during the course of this lesson?

- iv. Refer to Student Worksheet A for guidelines, and take some time today to brainstorm your project.
 1. *Students may work individually, or in pairs or groups of three, depending on class size and time allotment for project. You may choose to extend this project beyond the in-class work days, assigning work on the project for homework as well, or into additional in-class work days.*
- v. Utilize the rest of the class period for student brainstorming and research. Give students access to the links available in the Teacher Resources of this packet for additional research and idea generation.
- c. At the end of the class period, ask students to reflect on their brainstorming thus far:
 - i. What are some of the significant impacts of the EAB Task Force that might have inspired part of what you are thinking of for your project?
 - ii. What are some of the major talking points you will be utilizing in your project?
 - iii. What observations have you made during our discussions over the past several days? What questions do you still have? Will you incorporate some of these questions into your research and project?

IX. Day 9: Student Project Work Day; Reflection and Discussion

- a. Review
 - i. Take some time to review what you have learned over the past two weeks.
- b. Today is a day for students to work on their projects in class. Take some time to work with each student or student group as they keep on task.
 - i. Discuss with each student/student group:
 1. What type of project will you be doing?
 2. What are your main talking points?
 3. Does your project address some of the “short, medium, and long term” solutions for addressing the EAB issue?
 4. Does your project address the significant headway made on combatting the EAB as a result of Wabanaki leadership and collaboration between Tribal and State groups?
 5. Have you found any new information in your research yet that you would like to share with the class?
 - ii. If students have discovered new information in their research, take some time after check-ins or at the end of class to make that information available to all students either through shared links or short summaries from students/student groups.
- c. Take most of the class period as a student work day.
- d. At the end of class, ask students to reflect on their process thus far, and address any questions they may still have.

X. Day 10: Projects Due; Reflection, Discussion, and Carrying Discussion Forward

- a. Time allowing, give students some time to complete their projects at the beginning of class.
- b. Take most of the class for students to present their projects.
 - i. *Set a time limit appropriate for your class period and size. If you need an additional day for student work and carrying the student presentations into an*

additional day or two, take the time needed for a fully realized project from the students, and for proper presentation.

- c. Students should prepare to discuss their thought process behind their project, and to answer constructive questions from classmates.
- d. At the end of the class period, reflect on the information you have learned thus far, and see if there are any common themes in student projects.
 - i. How do projections vary?
 - ii. What are some of the major talking points in the students' projects?
 - iii. How does this reflect the work done to combat EAB thus far, the work being done currently, and the work that will continue into the future?
- e. Introduction to continuing project:
 - i. Because the EAB threat is an ongoing issue, we're going to continue checking in on this issue over the next few months. This will be a "research challenge" for our class.
 - ii. Utilize Student Worksheet B for the research challenge.
 - iii. Every month, check in and see if any news has surfaced regarding the EAB crisis in Maine, or how basketmakers and other stakeholders are increasing efforts to save ash trees and/or preserve traditions.
 - iv. What progress is being made? What other news have you found that is relevant to ash tree preservation and/or basketry tradition preservation?

Student Worksheet A: Project Brainstorm

Create a campaign for raising awareness about preserving brown ash trees (*Fraxinus nigra*) and about combatting the Emerald Ash Borer (EAB) threat. Your project can be a poster or pamphlet, a radio, television, or podcast information segment, or a mock newspaper or magazine article. Be sure to cite your sources and include relevant information about the EAB threat, the EAB Task Force in Maine, the significance of the brown ash tree as a significant cultural resource in Wabanaki communities and as a cultural keystone species, and the ecological impact of ash tree loss, as well as solutions for preserving ash trees and basketry traditions.

Use this paper to brainstorm some of your ideas based on notes you have taken during this lesson, and/or mark down some of the sources you will use for your project.

Student Worksheet B: Research Challenge

The work to combat EAB is ongoing. Additionally, other invasive species like the Asian Longhorned Beetle (ALB) threaten forests throughout Maine and the rest of North America. Every month, take some time to read news articles and check websites to see what new information has surfaced about EAB or other threats to ash trees, as well as what new or continuing measures are being taken (and/or proving effective) to preserve ash trees and combat EAB.

Information Source: _____

Source Type (website, newspaper, etc.):

What information did you find? Summarize below and be prepared to share with classmates:

Teacher Resources: Middle and high school students also encouraged to utilize these resources.

Online Resources:

APHIS USDA Emerald Ash Borer official site: <http://www.emeraldashborer.info/>

APHIS's Field Release Guidelines for EAB Biocontrol Agents:

https://www.aphis.usda.gov/plant_health/plant_pest_info/emerald_ash_b/downloads/EAB-FieldRelease-Guidelines.pdf

Don't Move Firewood's Maine Website (with additional resources, including posters):

<https://www.dontmovefirewood.org/map/maine/>

"Indigenous Climate Change and Climate Justice," Dr. Kyle Whyte, Michigan State University:

<https://kylewhyte.cal.msu.edu/climate-justice/>

Maine Department of Agriculture, Conservation and Forestry EAB official site:

<https://www.maine.gov/dacf/php/caps/EAB/index.shtml>

Maine Department of Agriculture, Conservation and Forestry EAB Regional Quarantine Map:

<https://www.maine.gov/dacf/php/caps/EAB/documents/eabRegionalQuarantine-20191031.pdf>

Maine Forest Service. "Executive Order Restricting Transportation of Firewood Into the State of Maine."

https://www.maine.gov/dacf/mfs/forest_health/invasive_threats/firewood_out_of_state_ban.shtml

(includes State firewood disposal sites and contact information)

Maine Forest Service. Information about *Fraxinus nigra*:

https://www.maine.gov/dacf/mfs/publications/handbooks_guides/forest_trees/pdf/black_ash.pdf

Maine Indian Basketmakers Alliance (MIBA) Official Facebook:

<https://www.facebook.com/MaineIndianBasketmakersAlliance/>

Maine Memory Network: "Why Environmental Advocacy is Critical for Making Baskets," Jennifer Sapiel Neptune: <https://www.mainememory.net/sitebuilder/site/2970/page/4659/display>

Maine Memory Network: "Wikpiyik: The Basket Tree," Dr. Darren Ranco:

<https://www.mainememory.net/sitebuilder/site/2977/page/4666/display>

UMaine Orono Newsletter: "Saving Maine's Basket Trees:"

<https://umaine.edu/mitchellcenter/news/newsletters/solutions-newsletter/saving-maines-basket-trees/>

Articles/Reports:

Brooks, Cassandra and Lisa Brooks: "The Reciprocity Principle and Traditional Ecological Knowledge: Understanding the Significance of Indigenous Protest on the Presumpscot River." June 2010. Available at https://www.researchgate.net/publication/269874990_The_Reciprocity_Principle_and_Traditional_Ecological_Knowledge_Understanding_the_Significance_of_Indigenous_Protest_on_the_Presumpscot_River

Cariddi, Barbara. "The Scourge at Maine's Door." Maine Public, March 23, 2018.

<http://projects.mainepublic.org/scourge-emerald-ash-borer-maine>

- Contains excellent photos of master basketmaker Gabriel Frey harvesting and splitting ash.

carr, tish, Laura S. Kenefic, and Darren J. Ranco. "Wabanaki Youth in Science (WaYS): A Tribal Mentoring and Educational Program Integrating Traditional Ecological Knowledge and Western Science." Society of American Foresters, January 2017.

- Available online: https://www.fs.fed.us/nrs/pubs/jrnls/2017/nrs_2017_carr_001.pdf

Costanza, Kara K.L., William H. Livingston, Daniel M. Kashian, Robert A. Slesak, Jacques C. Tardif, Jeffrey P. Dech, Allaire K. Diamond, John J. Daigle, Darren J. Ranco, Jennifer S. Neptune, Les Benedict, Shawn R. Fraver, Michael Reinikainen, Nathan W. Siegert. "The Precarious State of a Cultural Keystone Species: Tribal and Biological Assessments of the Role and Future of Black Ash." *Journal of Forestry*, Vol. 115 (Sept. 2017), pp. 435-446.

- Available online: <https://academic.oup.com/jof/article/115/5/435/4599906>

Duan, Jian J., Leah S. Bauer, Roy G. van Driesche and July R. Gould. "Progress and Challenges of Protecting North American Ash Trees from the Emerald Ash Borer Using Biological Control." MDPI: *Forests*. March 15, 2018.

Huntington, Henry P., Shari Gearheard, Andrew R. Mahoney and Anne K. Salomon. "Integrating Traditional and Scientific Knowledge through Collaborative Natural Science Field Research: Identifying Elements for Success." Arctic Institute of North America: *Arctic*, Vol. 64, No. 4 (December 2011), pp. 437-445.

Johnson, Daniel Morley. "Reflections on Historical and Contemporary Indigenist Approaches to Environmental Ethics in a Comparative Context." University of Minnesota Press: *Wicazo Sa Review*, Vol. 22, No. 2 (Fall 2007), pp. 23-55.

Maine Edge, The. "Native American knowledge, western science to be integrated in classes." October 4, 2017. <https://www.themaineedge.com/tekk/native-american-knowledge-western-science-to-be-integrated-in-classes>

McGregor, Deborah. "Coming Full Circle: Indigenous Knowledge, Environment, and Our Future." University of Nebraska Press: *American Indian Quarterly*, Vol. 28, No. 3/4, Special Issue: The Recovery of Indigenous Knowledge (Summer – Autumn 2004), pp. 385-410.

Mulhollem, Jeff. "Ash tree species likely will survive emerald ash borer beetles, but just barely." Phys.org, Sept. 10, 2019: [\(This article focuses primarily on Pennsylvania, but contains insight into conservation efforts.\)](https://phys.org/news/2019-09-ash-tree-species-survive-emerald.html)

Pierotti, Raymond. "Indigenous Knowledge, Ecology, and Evolutionary Biology." Routledge, July 16, 2010. On Google Books:

https://books.google.com/books/about/Indigenous_Knowledge_Ecology_and_Evoluti.html?id=9XQ7AQAAIAAJ&source=kp_book_description

Video:

Maine Public: "Basket Trees – Saving a Tradition." Aired October 4, 2012. 26m, 50s.

<https://www.pbs.org/video/sustainable-maine-sustainable-maine-basket-trees-saving-tradition/>

Hudson Museum: Molly Neptune Parker weaving baskets and discussing basketry:

<https://www.youtube.com/watch?v=2JmWIYX5Lol>

- Statement from younger basketmaker George Neptune at 05:42

Ranco, Darren: "Addressing Wicked Problems with Wabanaki Diplomacy." TEDx Dirigo. December 2017.

<https://www.youtube.com/watch?v=F17fzuLSpZw>

Teacher Background Materials – Lesson Plan: Out of Ash

Tips for Acknowledging Indigenous Land/Water: Acknowledgement is a relatively recent practice, and is ideally practiced as a respectful way to address the Indigenous inhabitants of what is now North America, acknowledge human and non-human relatives, address the ongoing effects of the structure of settler-colonialism, emphasize the importance of Indigenous sovereignty and self-governance, and help students be aware and conscientious of the fact that we are living on unceded Native Homelands. Land/water acknowledgements are best developed through meaningful connections; acknowledge with respect and use a format that lets you speak from the heart. Making connections with neighbors of a Nation near to where you live is one of the best places to start when creating a land acknowledgement from the heart. Talk with your school administrators and colleagues about creating a land acknowledgement at the institutional level.

A great online resource with more information can be found here:

https://drive.google.com/file/d/0B_CAyH4WUFQXTXo3MjZHRC00ajg/view. For information about the Nations nearest where you live/teach, a good starting point is the map at: <https://native-land.ca>

What we know of as “Maine” today is part of the unceded Homelands of the Wabanaki peoples. “Wabanaki” translates into English as the “Dawnland,” with the Wabanaki peoples being the People of the Dawnland, meaning those who see and greet the first light of the day. They share common oral histories and belong to Algonquian/Algonkian language groups, but have unique languages.

About the Wabanaki: We encourage you and your school to reach out to the tribal communities in Maine to expand your learning. More information about the four federally-recognized tribal communities in Maine can be found here:

- The Aroostook Band of Micmacs: <http://www.micmac-nsn.gov/>
 - Micmac Tribal Government: http://micmac-nsn.gov/html/tribal_government.html
- The Houlton Band of Maliseets: <http://www.maliseets.com/index.htm>
 - Maliseet Tribal Government: <http://www.maliseets.com/government.htm>
- The Penobscot Nation: <https://www.penobscotnation.org/>
 - Penobscot Tribal Government: <http://www.penobscotculture.com/index.php/8-about/81-tribal-facts>
- The Passamaquoddy Tribe
 - Indian Township (Motahkomikuk): <https://www.passamaquoddy.com/>
 - Pleasant Point (Sipayik): <http://www.wabanaki.com/>
 - Passamaquoddy Tribal Government: http://www.wabanaki.com/wabanaki_new/chief_council.html
 - Passamaquoddy Joint Tribal Council: http://www.wabanaki.com/wabanaki_new/joint_council.html

The Abenaki are the fifth Wabanaki tribe today; however, the Abenaki are not a federally-recognized tribe as of 2019. Not all Tribal Nations that exist in North America today have received federal recognition, and not all Native Nations seek federal recognition. There are no tribes in New Hampshire or Vermont that, as of 2019, have received federal recognition, but four tribes in Vermont have received state recognition. Federal recognition provides a federal relationship between Indigenous sovereign nations and the US government. Tribal Nations throughout North America are sovereign nations, and

actively work to maintain their self-governance. Federal recognition is not related to Tribal Nation sovereignty; it affords certain rights to Indigenous peoples within the laws of the United States.

It is important to recognize that not all Wabanaki people live in what is now Maine, and not all Indigenous peoples living in what is now Maine today are Wabanaki. Native and non-Native people alike live throughout Maine, the United States, Canada, and countries around the world. Maine as we know it today exists within unceded Wabanaki Homelands; the federally-recognized tribal communities in Maine own trust land throughout the state as presented through treaties.

About Sovereignty and Names/Terms

Read the Indigenous Environmental Network's (IEN) statement on Tribal Sovereignty and Indigenous Sovereignty: <https://www.ienearth.org/what-is-indigenous-sovereignty-and-tribal-sovereignty/>

It should be noted that "Indian" is a federal legal term in the United States. It is a word introduced and inscribed by settler-colonial societies and is used in varying ways by Indigenous people and federal entities today. When referring to Wabanaki people, it is best to refer to them as Wabanaki people, not as "Indians," and not as "Maine Native Americans." Please do not put humans or non-humans in possession of Maine, especially within the context of this lesson plan. Our educators and curators have consulted with Wabanaki partners during the development of this lesson plan, as well as for the creation of the MHS exhibit *Holding Up the Sky*, utilized throughout this lesson plan, and it is our intent and responsibility to incorporate their feedback, as well as to be mindful in our continued efforts to decolonize the work that we do. We intend for this lesson plan to be a living document, and to correct any of our own errors in as timely a manner as possible. Should you have any additional feedback or information with regard to this lesson plan, please reach out to us at education@mainehistory.org.

About Maine Historical Society: Maine Historical Society (MHS) is the third-oldest state historical society in the United States, following Massachusetts and New York, respectively. Founded in 1822, only two years after Maine separated from Massachusetts and became a free state as part of the Missouri Compromise, MHS today is headquartered at 489 Congress Street in Portland. The campus contains an office building and museum, the Brown Research Library (est. 1907), and the Wadsworth-Longfellow House, the childhood home of American poet Henry Wadsworth Longfellow. An enormous online database containing digitized images and objects from MHS's robust collection can be found online at Maine Memory Network: <https://www.mainememory.net/> Teachers can create free accounts on Maine Memory Network to save images to albums for classroom use.

MHS's mission: "The Maine Historical Society preserves the heritage and history of Maine: the stories of Maine people, the traditions of Maine communities, and the record of Maine's place in a changing world. Because an understanding of the past is vital to a healthy and progressive society, we collect, care for, and exhibit historical treasures; facilitate research into family, local, state, and national history; provide education programs that make history meaningful, accessible and enjoyable; and empower others to preserve and interpret the history of their communities and our state."

Tips for non-Indigenous educators when discussing Traditional Ecological Knowledge (TEK) and Indigenous Knowledge (IK):

This lesson plan exists as an introduction and brief overview of a complex subject; it was created with respect, utilizing myriad points of reference. However, new understandings and permissions are always coming to light, and this document may be amended as needed in the future.

This lesson plan is not meant to present TEK/IK as any finite practice, but, rather, to introduce to students the significance of TEK/IK and practice of Western ecologists amplifying Native voices when it comes to environmental stewardship. This lesson plan encourages seeking understanding, asking clarifying questions, and being respectful when for any reason an answer cannot be given.

For more information about TEK and Wabanaki culture and traditions, you may be interested in pairing this lesson plan with MHS's grades 3-5 lesson plan, *Stewarding Natural Resources*.

Elsewhere in North America, other projects that benefit from the collaboration between Tribal governments and Native experts and State or university teams have been and are being mounted. For recent precedent, see the Alaskan Bidarki Project (2002-2006): <http://aswc.seagrant.uaf.edu/grade-5/investigation-1/bidarki-story-background.html>

Strand and Standard Information:

- **Social Studies – Civics & Government, 6-8:** Students draw on concepts from civics and government to understand political systems, power, authority, governance, civic ideals and practices, and the role of citizens in the community, Maine, the United States, and the world.
 - o **Civics & Government 2:** *Students understand constitutional and legal rights, civic duties and responsibilities, and roles of citizens in a constitutional democracy by: (D1) Analyzing examples of the protection of rights in court cases or from current events. (D2) Analyzing how people influence government and work for the common good including voting, writing to legislators, performing community service, and engaging in civil disobedience through selecting, planning, and implementing a civic action or service-learning project based on a school, community, or state asset or need, and analyze the project's effectiveness and civic contribution."*
 - o **Civics & Government 3:** *Students understand political and civic aspects of cultural diversity by: (F1) Explaining basic civic aspects of historical and/or current issues that involve unity and diversity in Maine, the United States, and other nations. (F2) Describing the political structures and civic responsibilities of the diverse historic and current cultures of Maine, including Maine Native Americans. (D1) Explaining constitutional and political aspects of historical and/or current issues that involve unity and diversity in Maine, the United States, and other nations. (D2) Describing the political structures and civic responsibilities of the diverse historic and current cultures of the United States and the world.*
- **Social Studies – Personal Finance & Economics, 6-8:** Students draw on concepts and processes in personal finance to understand issues of money management, saving, investing, credit, and debt; students draw from concepts and processes in economics to understand issues of production, distribution, and consumption in the community, Maine, the United States, and the world.
 - o **Personal Finance:** *Students understand the principles and processes of personal finance by: (F1) Explaining how scarcity influences choices and relates to the market economy. (F2) Identifying factors that contribute to spending and saving decisions.*
 - o **Economics:** *Students understand the principles and processes of personal economics, the influence of economics on personal life and business, and the economic systems of Maine, the United States, and various regions of the world by: (D1) Explaining how scarcity requires choices and relates to the market economy, entrepreneurship, supply and demand.*
 - o **Global Connections:** *Students understand economic aspects of unity and diversity in Maine, the United States, and various world cultures, including Maine Native Americans, by: (F1) Researching the pros and cons of economic processes, economic institutions, and economic influences of diverse cultures, including Maine Native Americans, various historical and recent immigrant groups in the United States, and various cultures in the world to propose a solution to an economic problem. (D1) Describing factors in economic development, and how states, regions, and nations have worked together to promote economic unity and interdependence.*

- **Social Studies – Geography, 6-8:** Students draw on concepts and processes from geography to understand issues involving people, places, and environments in the community, Maine, the United States, and the world.
 - o **Geography 1:** *Students understand the geography of the community, Maine, the United States, and various regions of the world and the geographic influences on life in the past, present, and future by: (F3) Evaluating a geographic issue of physical, environmental, or cultural importance. (D1) Identifying consequences of geographic influences through inquiry and formulating predictions. (D2) Describing the impact of change on the physical and cultural environment.*
 - o **Geography 2:** *Students understand geographic aspects of unity and diversity in Maine, the United States, and various world cultures, including Maine Native Americans by: (F1) Explaining how geographic features have impacted unity and diversity in Maine, the United States, and other nations. (D1) Summarizing and interpreting the relationship between geographic features and cultures of Maine Native Americans, and historical and recent immigrant groups in Maine, the United States, and the world.*
- **Social Studies – History, 6-8:** Students draw on concepts and processes using primary and secondary sources from history to develop historical perspective and understand issues of continuity and change in the community, Maine, the United States, and the world.
 - o **History 1:** *Students understand major eras, major enduring themes, and historic influences in the history of Maine, the United States, and various regions of the world by: (F1) Explaining that history includes the study of past human experience based on available evidence from a variety of primary and secondary sources, and explaining how history can help one better understand and make informed decisions about the present and future. (F4) Proposing and revising research questions related to a current social studies issue. (D4) Making decisions related to the classroom, school, community, civic organization, Maine, or beyond; applying appropriate and relevant social studies knowledge and skills, including research skills, and other relevant information.*
 - o **History 2:** *Students understand historical aspects of unity and diversity in the community, the state, including Maine Native American communities, and the United States by: (F1) Explaining how both unity and diversity have played and continue to play important roles in the history of Maine and the United States. (F3) Identifying major turning points and events in the history of Maine Native Americans and various historical and recent immigrant groups in Maine, the United States, and other cultures in the world. (D3) Describing major turning points and events in the history of Maine Native Americans and various historical and recent immigrant groups in Maine, the United States, and other cultures in the world.*
- **Science & Engineering, 6-8:**
 - o **MS-ESS-3:** *Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.*
 - o **MS-ESS-4:** *Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.*
 - o **MS-ETS1-1:** *Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles*

and potential impacts on people and the natural environment that may limit possible solutions.

- **MS-LS2-1:** *Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.*
- **MS-LS2-4:** *Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.*
- **MS-LS2-5:** *Evaluate competing design solutions for maintaining biodiversity and ecosystem services.*

Teacher Resources – Assessment Rubric*Did the student meet the expectations of the lesson?*

Task	1 – Did Not Meet	2 – Partially Met	3 – Met	4 – Exceeded	Notes
Student can identify the ash tree population's significance to Wabanaki communities and traditions, to the environment, to ecology, and to the economy.					
Student can name the four federally-recognized Wabanaki tribes in Maine.					
Student can make informed projections on the effectiveness of current biocontrol methods for combatting EAB in the “short, medium, and long term.”					
Student can discuss the effectiveness of collaboration over consultancy between Tribal governments and State teams.					
Student participated respectfully in small group and classroom discussion.					
Student’s project demonstrated scientific knowledge and respectful information about the basket tree.					

Total Score and Notes: