Melinda McFarland
iSWOOP Evening Program
45-60 minutes

Searching for the Primeval Forest

Theme: Research helps us uncover the history of forests in Maine and gives us a better perspective on the change that people and forests can impact on each other.

Four Parts:

1. History of peoples and forests: a changed and altered landscape
2. Finding the Primeval Forest through research - a different perspective
3. Current changes in Acadia's forests.
4. What that change means to us.

S1: Intro: Image of Mount Desert Island from Above
- Ice breaker of interaction: Can anyone point out where Blackwoods is on this map?
- What I find most intriguing about this image is how forested this island is. Even where we are sitting tonight "Blackwoods" demonstrates the dynamics of these woods. The forests are so thick, the woods look black..

S2: Title Card: Searching for the Primeval Forest
- Beyond the granite mountains and the shore, trees and forests have been one of the primary resources that have shaped the history of this island.
- Through the program will discover the stories of how people have changed the forests, how research helps us discover the forest primeval, and ultimately delve into our complex relationships with these natural places.

Part 1: History of people and forests: a changed an altered landscape

So to start to figure out our relationship with forests, I like to ask:

S3: Does anyone have a favorite tree?
- Favorite trees can be a singular tree or a type of species: My favorite trees are the pinyon pines of southern Utah. I have taken refuge in their shade on hot days and pondered at the amazing shapes sculpted by the desert. Plus they have delicious pine nuts.

This brings us to a larger question:

S4: What is our relationship to trees or forests?
- Interaction with visitors

S5: Word Map

(A technique to show how complex and varied peoples relationships to trees are)

- These are answers that past programs have come up with. I'll add your answers to the map as well.
- Did any of these ideas surprise you? It's amazing how complex and varied our relationship are.

Transition: People have always had a relationship with the forests. Just as much as we change the forest the forests can change us. To start thinking about this lets examine two species of trees found in the Northeast:

S6: Ash Tree and the White Pine

S7: Native peoples of Maine

- When we think of people and their relationships to forests, it starts as soon as people arrived onto the landscape. In Acadia and Maine these native people were the Wabanaki.
- From archeological records Wabanaki utilized Mount Desert island year round, moving in and out along with resources and seasons starting around 10,000 years ago and have had a significant presence in the woods of Maine.
- They utilized the forests for resources to survive, we can see that through the example of shelter:
  - Wigwam at Sieur de Mont: Birch Tree!

S8: Native Artists

- Beyond providing necessities like shelter and warmth, trees can also provide the materials for expression. Materials for art and story telling: foundations for culture
- Creation story for the Wabanki people, came out of the bark of the ash tree
- Birch bark canoes and the ash basketry
- Traditions that continue to this day

Transition: We have talked about the ash tree as a symbol for the native people and their relationships with forests, but there is also a tree that signaled in the European history of this area: White Pine

S9: War Ships

- During the 1600s the large powers of Europe were looking to expand empires and in order to do that they needed the biggest Armada = the largest ships. To build those they needed the resources and they had stripped their countries of those resources. But in the northeast forests they found those: masts made of white pines.

S10: King's Cross

- Start of forests seen as resources. Extraction for power and economic gain.
- This also set the tone for rebellion, a revolution built around taxes of resources. Control of the resource, shaping the country and the state we are currently in.

S11: Logging in Maine

- Post revolution, trees and forests remained an important economic resource of the area.
- It also helped make this area suitable to early settlers, starting the European settlement of MDI and shaping what this island landscape looked like
- Lumber mill in Somerville

Transition: At the same time that lumber was a prominent industry not only in Maine, but on MDI, there was opposition to this idea that the worth of forest were only for economic gains, but they could enrich the soul or be worth something greater.

S12: Thoreau Quote
- This idea was exemplified by the writers in the mid 1800s: like Throeau
- Have any of you gone to the woods, on a hike or a walk around a park to think about things to ponder? I planned a lot of this program on the trails of Acadia
- This is an idea that is still consistent today. And from your answers to what forests mean to us, one that persists today.

S13: Hudson River School: Asher Brown Durand
- This idea to confront the lesson of nature were also seen in an artist movement known as the Hudson River School.
- These were artist that were looking to get away from the confines of the crowded cities and to learn from the sublime lessons nature had to teach,

S14: Frederick Edwin Church
- They also served as advertisements to the area: bringing in a variety of people each searching for their own relationships with this forested landscapes.
- How many of you saw images, photographs, of Acadia before visiting?
- These painting just like photographs today inspired people to get away from their everyday lives to take reprise in the woods.

Transition: These “ads” attracted visitors who had the leisure time to travel and also pursue natural history hobbies like science and botany…an example of a group of these individuals are:

S15: Champlain Society
- This group of undergrads were some of the first people of set up to discover more about the landscape.
- They were inspired to come out and live among nature - setting up tents and exploring the area. Live as “rusticators”

S16: Champlain Society - Specialities
- They also each had their own roles in the society, a speciality they were learning about
  - Charles Eliot as Captain
  - Edward Rand - ecology

- They kept log books - documenting what they experienced over the years they spent summering on MDI
- How many of you would enjoy doing more homework during the summer? (Keep asking questions to keep audience engaged)
- Although I would love to spend more time on the Champlain Society and what they accomplished, there a couple key take aways:
    1. The passion that individuals have in discovering and the creative spirit to understand places: understanding their relationships with these places in a scientific way.
    2. Through the research and summer spent on the island, Charles Eliot would seek out a way to preserve the places we enjoy seeing today.

S17: Creation of Acadia and the standard of research in the foundation document
- Charles Eliot's story
- With the park's creation, not only was research placed into the foundation document:

S18: Image of Jordan Pond
- But this piece of MDI was preserved for us to explore. A land set to rejuvenate and forests left to take their natural course.

Part 2: Finding the Primeval Forest through research - A different perspective

Transition: The Champlain society gave us an idea of the forest was like 140 years ago, but we know that weren't looking at unspoiled wilderness. How do people discover something that is no longer here? If you were a scientist where would you start?

That is the question that Dr. George Jacobson had:

S19: Dr. George Jacobson
- He became fascinated with ecology by doing what a lot of us do when we come to the national parks. Hiking and just spending time outdoors. So when he went to college and was introduced to paleoecology his world changed! (Quote)

But how to do you find the forest primeval? What do you think hold the records of the forest of the past pre-human contact?

Pull out the sediment core sample!!! Has anyone heard of a sediment core before?

S20: Types of coring
- You can core a variety of ways, but in Acadia they have focused on two ways:
- Bog and Lake coring

Coring done in Acadia:

S21: Video

S22: Coring Sargent Mountain Pond

If we are looking for pollen in the sediment cores what might the pollen tell us?

S23: Pollen
S24: Ragweed pollen

- An example of how each pollen looks different - the outer coating has a variety of bumps and ridges.

S25: All the pollen in the air

- During spring all the pollen blows in the wind and settles ….

S26: Settlement of the pollen in ponds

- Leaving a nice record so then you extract the core and then you just have this in your hands. (The sediment sample).
- Thousands of years layer after layer. How do you get to the pollen information?

S27 - 28: Separating out material - looking for clues to the landscape

- Discuss the separating out of material, taking slices - you find other things other than pollen.
- Jacquelyn's research will focus on the fungus and animals
- Charcoal and fire

S29: Counting each of the pollen

- Looking for different shapes, separating them out and counting. And you do this over and over and over again. How many of you would like that as a summer job?

S30: Timeline Core

- And one slice at a time you start to build a time line. What plants started to arrive first? We know that after a disturbance you just don't get a giant forest.
- "Profile" and radio carbon dating

S31: Tundra to forest -

- In fact right after the glacier left this area the landscape was a tundra. There wasn't even a forest! It looked like the above picture. How did we go from Tundra to Spruce Fir Forest? The pollen tells us that plants arrive at different times. Especially after a disturbance.

S32: Primary Succession

- Lichen - moss - ferns - grass - shrubs - trees
- Have the visitors shout out each one.
- These pioneer plants, slowly build up the soil through weathering, trapping of particles, and the transformation of living matter into soil. Organic matter generation after generation

- So once you have a forest established, depending on the climate conditions, the tree species may change.

S33: Question Slide: Has the Spruce-Fir forest always been the primary forest of Maine?

S34: Spruce Trees
- What kind of images do you think of when you think of pine, spruce, or evergreens?

S35: Maples Trees
- What images do you think of when you think of maples, or oaks?
- Oak and pine = temperate species with low tolerance if extreme cold but a high tolerance of drier conditions - adapted to frequent fire, can establish from seed after fire
- Spruce and fir = grow in the shade, cold wet conditions

S36: Chart - Explain the chart.
- In looking at the date produced from coring what patterns do we see?
  - Ask pointed questions if no visitor interaction: When is spruce more abundant? Is there a shift?
- Spruce were some of the first trees to arrive - showing that the climate was colder and wetter
- But then a shift happened: spruce had been largely absent here. The climate for most of that period had been too warm and dry to spruces to reproduce successfully, and forest fires were quite frequent favoring taxa like pine and birch.
- With oaks come more fire - more fuel
- But where are we sitting now? What trees have you noticed while in the park or do you think of when you think of Maine?
- In the last 1,000 - 500 years we have turned back to the spruce - fir
  - George Jacobsen and Molly Schauffler's study showed the spruce remained abundant along the cool, moist coast
    - They cored here in Blackwoods!

Lets visualize it another way:

S37: Tree progression animation:
- Did anything strike out at you?
- It's interesting to think of trees moving north - quite quickly as the glacier recedes.
- Shifting ranges 100s to 1000 miles across the north east.

S38: Jack Pine
- One of the things that I found especially interesting listening to George Jacobson talk is that Jack Pines used to be Georgia. They no longer occur in Georgie but they do

occur here now in Acadia. In fact they are at their most southern range. It shows how things shift and change, in accordance with the changing climate conditions.

It is interesting to think that they areas that we have come to depend on looking a certain way have changed. That the forest primeval looked different than the forests of today.

S39: So what does the forest primeval tell us?

1. Nature changes, sometimes a lot, sometimes very fast.
2. Climate change dramatically alters the abundance and distribution of species across the landscape. Is the climate change we are experiencing today the same as in paleoecology times?
3. However, other environmental factors also play important ecological roles, including human impacts. (This last point is something to ponder) What impacts are humans having today?

Part 3: Current changes in Acadia's forests.

Examining the past thousands of year, ranging from post glacial landscapes to the forest of European settlements brings us today.

How many of you think that the forests of Acadia are changing?

The forests are changing, not just the trees but all also the plants in the understory. One of the things you have to take into consideration is the human element of change in modern forest.

S40 - 41: Caitlin McDonough Mackenzie

- Caitlin has looked into plant distribution on MDI using historical records of Edward Rand. (Remember that guy from way back in the beginning)
- She compared Edwards Rands plant records, herbarium specimens, and log books to look and compared them to the species today.
    - Learn about Rand, reminded how young they were in taking on this task:
    - Her favorite quote.
    - It also demonstrates how the historical research done on MDI can in the end help determine what future landscapes may look like.
- This is what she has found so far:
    - Methods: Utilizing *Flora of Mount Desert Island* and the list of vascular plants and then comparing to the 2010 book compiled by biologist Mittelhauser
    - Then compared to Concord MA to find region wide patterns

- Doctorate: Vegetation over the past 100 years has seen a loss of 16% of plants recorded in 1894 by Edward Rand
    - Decline of 25% of all plant species
    - Gaining a lot of non-native plant species

- Losses of the orchid family - but there may be an over representation in historical records due to over collecting

S42: Pie Graph - Change is happening
- Plants are shifting and changing in abundance from the list of Edward Rand.
- Caitlin compared the species of Rand and the list to those of Theroux and Concord MA
  - There were the same patterns - a decline of native species and an increase in non-native species
  - This shows that there is something larger at work = RELATIVELY FAST CHANGE!
- This is a trend that is happening across the Northeast Region. So if changes are happening how …

S43: Pie Graph of New Species Recorded
- Specifically Trees:
  - Native: Red Spruce, Jack Pine, Sugar Maple, Gray Birch, Green Ash
  - Non native: Scots Pine, European Mountain Ash, Big-leaved Linden, Little-leaf Linden
  - Invasive: Norway Maple
    - Difference between non native species and invasive species is that non native species do not cause environment or economic harm - they do not disrupt the natural functions and processes of our native ecosystems. Invasive do.

S44: What is causing the change to the plant communities and the forests? (Rhetorical Question - getting visitors to think but to not answer)

S45: One researcher is building on the lessons of paleoecology and looking on the larger environmental changes of Acadia's forests: Nick Fisichell of Schoodic Institute.

S46: Tree Test - Larger Environmental Impacts
- Why does research focus on trees?
  - Paleoecology data
  - many tree species are keystone species and therefore shift in forest composition and structure will affect other trophic levels within the ecosystem
- Growing trees from seeds in raised beds at four different elevations to see how they respond to stress factors for three years. Some of the trees that are planted are not found in the park but come from southern areas of the U.S. They might be able to survive an increase in temperature a bit better.
- Climate change affects all tree life stages, from seed development, germination, and emergence to seedling growth and recruitment to survival of overstay trees.
- It was great to talk to Nick and he was so excited to send pictures of the seedlings and the seeds that they are using so I had to include them:

S47: Seeds: all occur in the park

S48: Seedlings

- As park managers, there has been a long history of letting nature take it's course. Why might park managers have to take an active management role? Is anything impeding the natural movement of forests today?
- And we come full circle with this research - think about what types of trees the pollen had in warmer and dryer conditions?
- Of these three seedlings if you were park managers preparing for the future would you spend time planting spruces or the oaks and maples?
- This is a hard question to ask and these various research projects can help the park understand where the landscape is going.

Transition: We have talked about the large impacts that are affecting the forests, climate change, but there are also teeny tiny things that if introduced can cause large impacts as well. Insects! None of these species are found in Acadia but are moving their way up the northeast.

S49: Asian Longhorn Beetle and Hemlock Woolly Adelgid (wide range of species vs. specific species)

- As people and goods are transported all over the world, insects and other factors can be introduced that change the forest dynamics. Here are two examples:
  - ALB: kills a variety of hardwoods, threaten to devote forests that protect public drinking water quality and natural communities, also the maple syrup industries
  - HWA: first reported 1924, Hemlocks provide micro shade /cool environments, especially along stream beds - found in Maine

S50: Emerald Ash Borer

- Has the Emerald Ash Borer affected anyones neighborhood?
- Think about the effects that one tree removed from the forest can produce, but also think about the cultural impacts the loss of species can have.
- We talked about the ash trees utilized in Wabanki basketry, but also maples used in syrup.

S51: Buy it Where you Burn It!

- There as steps we can take to protect the forests:

But the last thought I want to leave you with, is as you are out in the park think about how the change in Acadia woods might alter our relationships with place. We are fortunate enough to have historical and modern day research that provides us with a base for what the primeval forest looked like and how it changed. We have also seen how individuals have taken that information and utilized it for the preservation and creation of Acadia National Park. So the last action that needs to be taken is by us:

As you walk the trails of Acadia (S52), relishing in the green hues and beautiful scenery, stumble across apple trees that signal human impact (S53), or if you come for the fall foliage (S54) to find peace and quiet in the changing seasons:

Ponder, if the forests of Acadia change, will our relationship with this park change? Will Acadia be Acadia without a boreal forest? Will names of trails like Hemlock Road be just a memorial to the forest of the past?

How much change are we willing to accept and ultimately what do value? What steps can we take to encourage change that will benefit the environment? As a famous speaker for the trees stated: (S56) “Unless someone like you cares a whole awful lot, nothing is going to better. Its not.
Thank you for visiting Acadia and I hope you have a great rest of your visit.