

An aerial photograph of a large reservoir with a dam on the right side. The water is dark blue-grey, and the surrounding land is covered in dense green and yellowish-brown trees. The sky is a pale blue.

EXPERIMENTING WITH CLIMATE-ADAPTIVE FORESTRY PRACTICES: CHALLENGES AND OPPORTUNITIES

CHRISTOPHER RIELY, CF
Conservationist and Forester
May 12, 2021



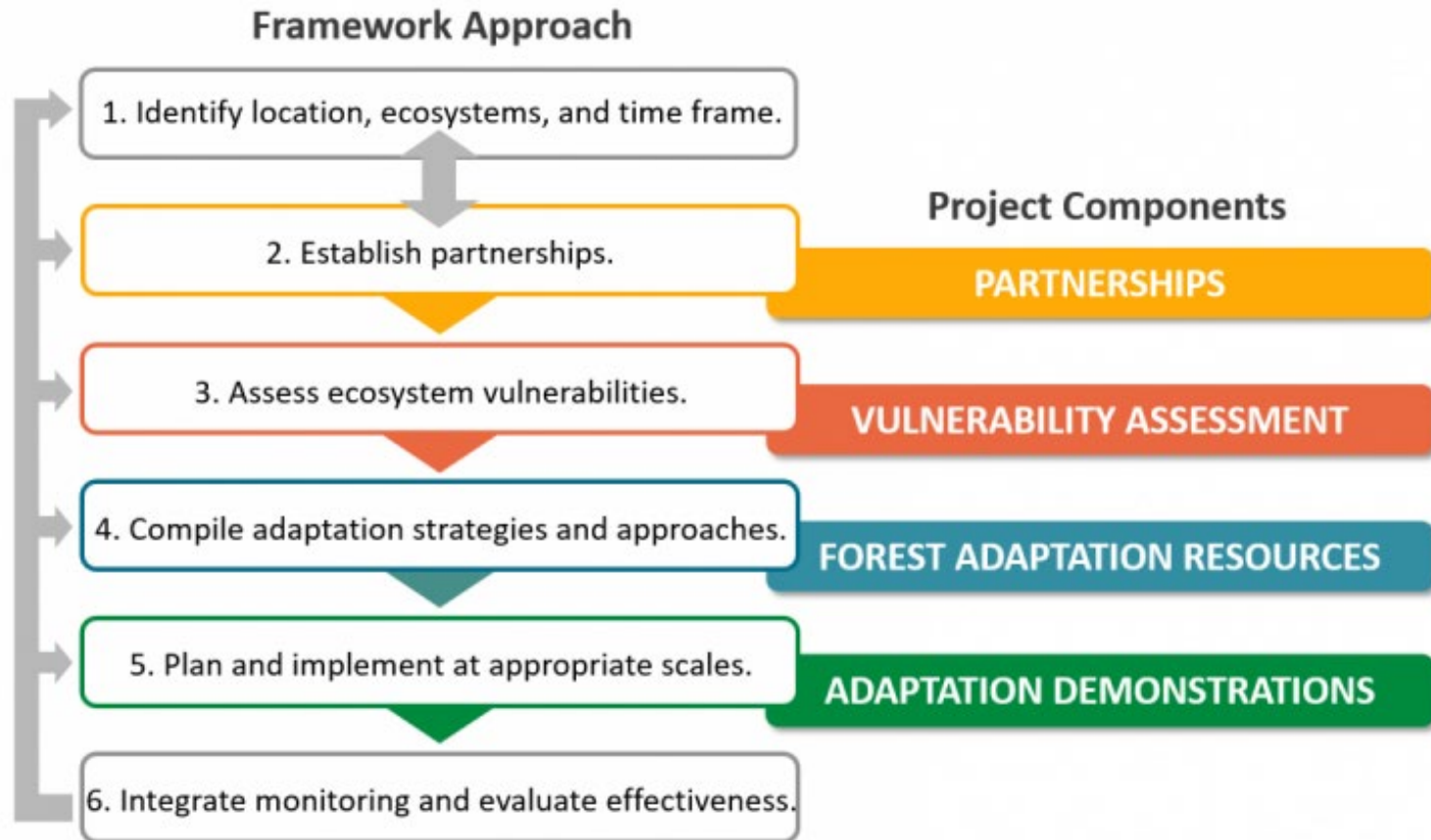
SWEET BIRCH
CONSULTING, LLC

OVERVIEW



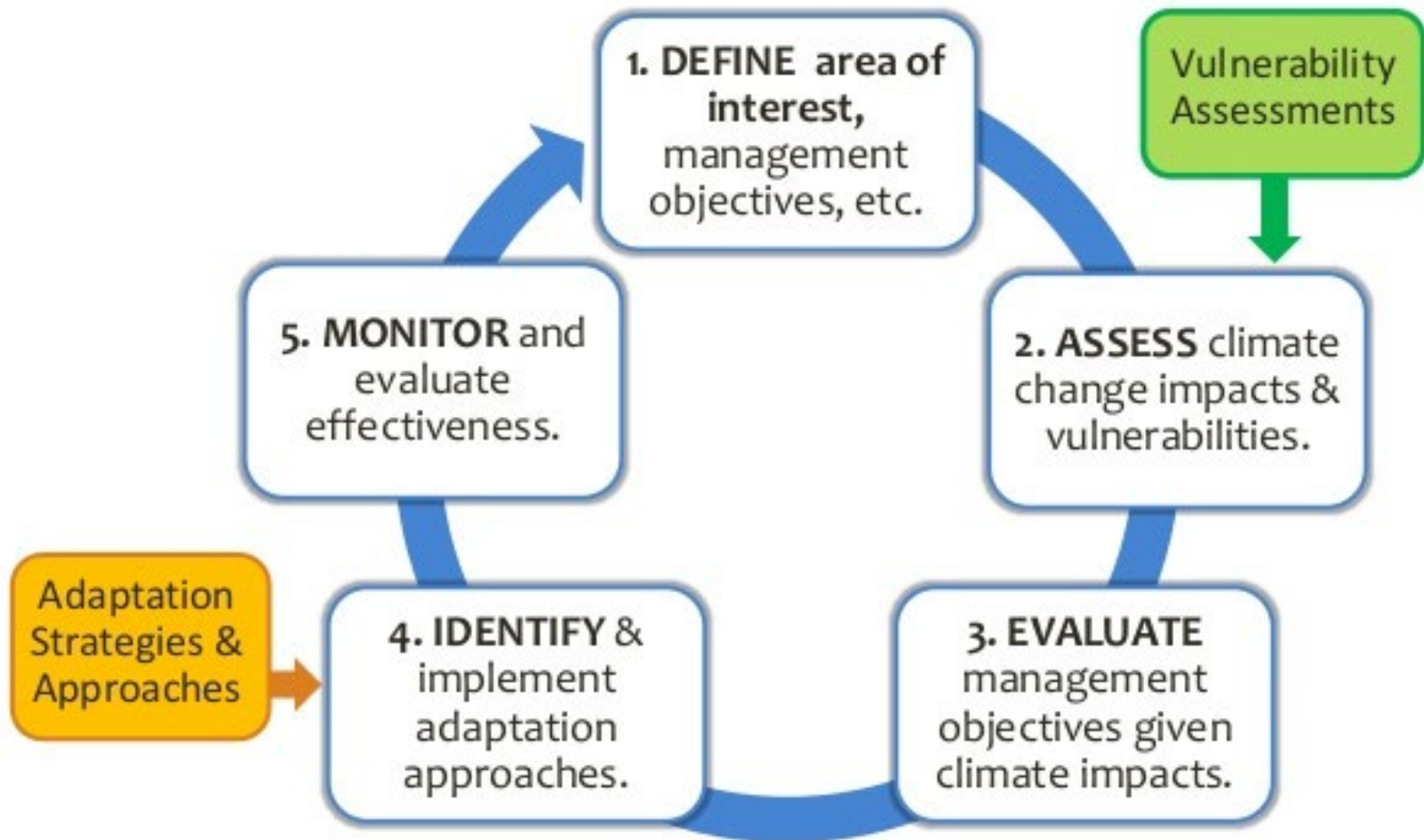
- Intro to Climate Change Response Framework
- Adaptation options
- Brief examples of two other pathways
- Focus on Scituate Reservoir watershed project
- Challenges and Opportunities

CLIMATE CHANGE RESPONSE FRAMEWORK



Courtesy of Northern Institute of Applied Climate Science (NIACS)

Adaptation resources



Climate Change Adaptation: Options

RESISTANCE



- Improve defenses of forest against change and disturbance
- Maintain relatively unchanged conditions

RESILIENCE



- Accommodate some degree of change
- Return to prior reference condition following disturbance

TRANSITION



- Intentionally facilitate change
- Enable ecosystem to respond to changing and new conditions



VERMONT LAND TRUST, HILL-ROBERT PROPERTY

RESISTANCE



- Goal: maintain a healthy & productive forest
- Timber harvest planned
- Use silviculture to help maintain native species mix as long as possible
- Protect from winds
- Protect water resources
- Keep biological legacies

Courtesy of Vermont Land Trust and NIACS

MA DCR, F. GILBERT HILLS STATE FOREST, WRENTHAM

RESILIENCE

- Fits into a broader agency-wide strategy
- Oak-hickory forest with stand on former ag land
- Increase species, tree age, and habitat diversity
- Timber sale to regenerate oak through multi-stage harvest with reserves
- Consider prescribed fire, blight-resistant chestnut



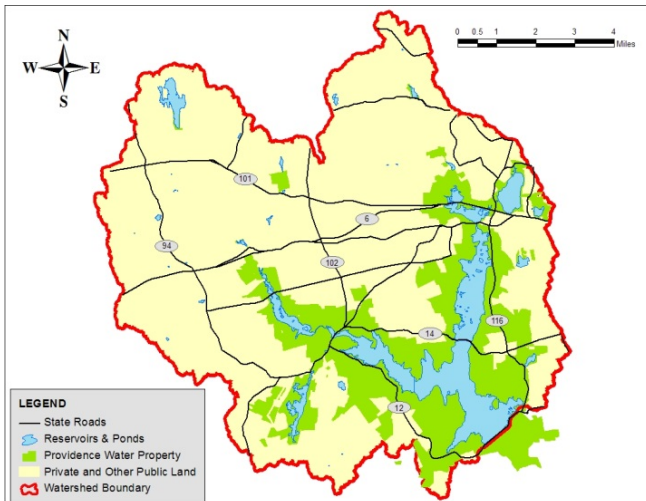
Courtesy of MA DCR and NIACS

PROVIDENCE WATER AND THE SCITUATE RESERVOIR WATERSHED TRANSITION

- Public utility developed and operated by City of Providence
- Current system established c. 1920
- Now provides water to 600,000 people or 2/3 of all Rhode Islanders
- Main Scituate Reservoir and several smaller tributary reservoirs
- 93 square mile watershed, mostly private land
- Water Resources Division manages 13,000 acres of City-owned forest surrounding reservoir system



WATERSHED MANAGEMENT PROGRAMS



- Forestry and land management
- Land conservation
- Water sampling
- Policy and planning engagement with state and watershed towns
- Outreach and education



All photos and maps
courtesy of Providence Water

WHY ACTIVELY MANAGE THE FOREST?



Overarching goal is to maintain a forest that is adaptive to change and resilient to disturbances that could impact water quality

HISTORIC MANAGEMENT CONTEXT

- Active management for nearly 100 years
- Planting species from elsewhere is nothing new
- 7 million seedlings planted
- Foresters used best info available at the time
- Species selection driven by forest heath, markets, etc.
- Looking back, sound overall but some plans have worked out better than others



HISTORIC MANAGEMENT CONTEXT



HOW DID WE COME TO PURSUE THIS PROJECT?



- 2014 NIACS Training on Climate Change Response Framework
- Hands-on day of coached work in small groups was especially helpful
- Project concept started here
- Highly recommend for incorporating climate change considerations into management

Details

DATE:

September 23-24, 2014

LOCATION:

UMass Amherst Campus
Student Union
Amherst, MA

COST & REGISTRATION:

No cost to attend

Register online (required) :

www.forestadaptation.org/amherst

QUESTIONS?

Email Maria Janowiak

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Natural resource professionals face the tremendous challenge of developing and implementing conservation and management actions that help ecosystems respond to climate change.

This session will:

- Provide information on the current and anticipated effects of climate change on Southern New England and its forests
- Describe resources and tools that can be used to integrate climate change into resource conservation and management
- Outline adaptation concepts and strategies in the context of sustainable forest management
- Identify actions that enhance the ability of forests and other ecosystems to adapt to changing conditions

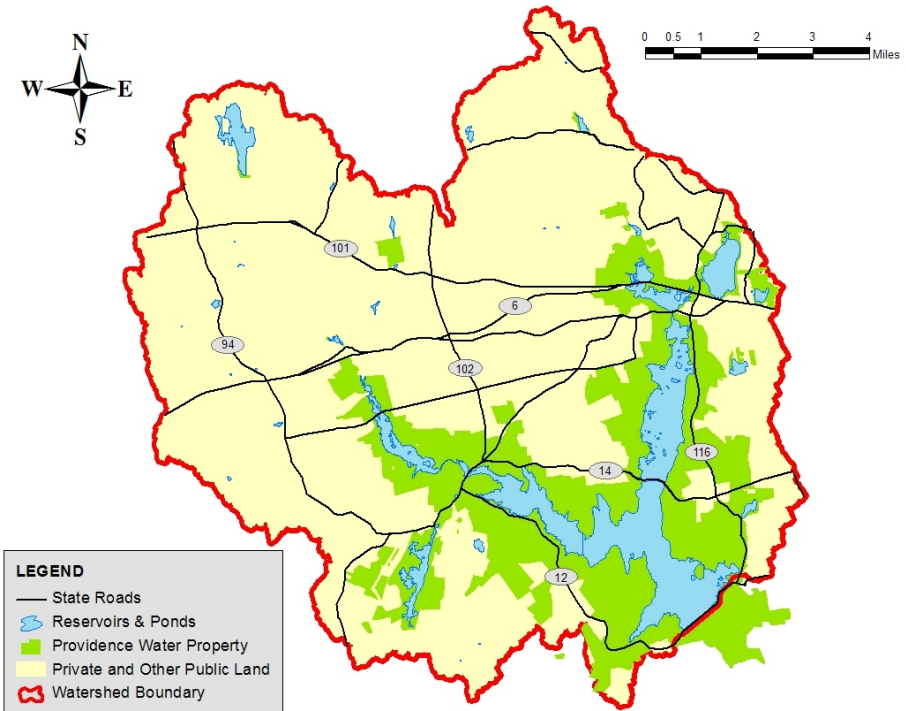
Real-world examples of adaptation projects will be featured, and participants will engage in a variety of interactive activities to identify climate change issues and potential management responses.



HOW DID WE COME TO PURSUE THIS PROJECT?

POTENTIAL VULNERABILITIES

- Climate change not explicitly addressed in current stewardship plan
- Forest health and regeneration
- Invasives
- Internal road system (severe storm effects)



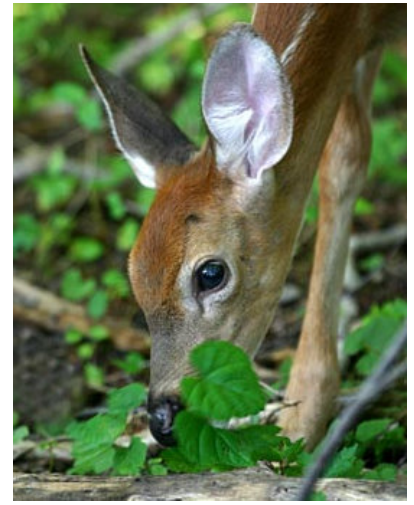
HOW DID WE COME TO PURSUE THIS PROJECT?

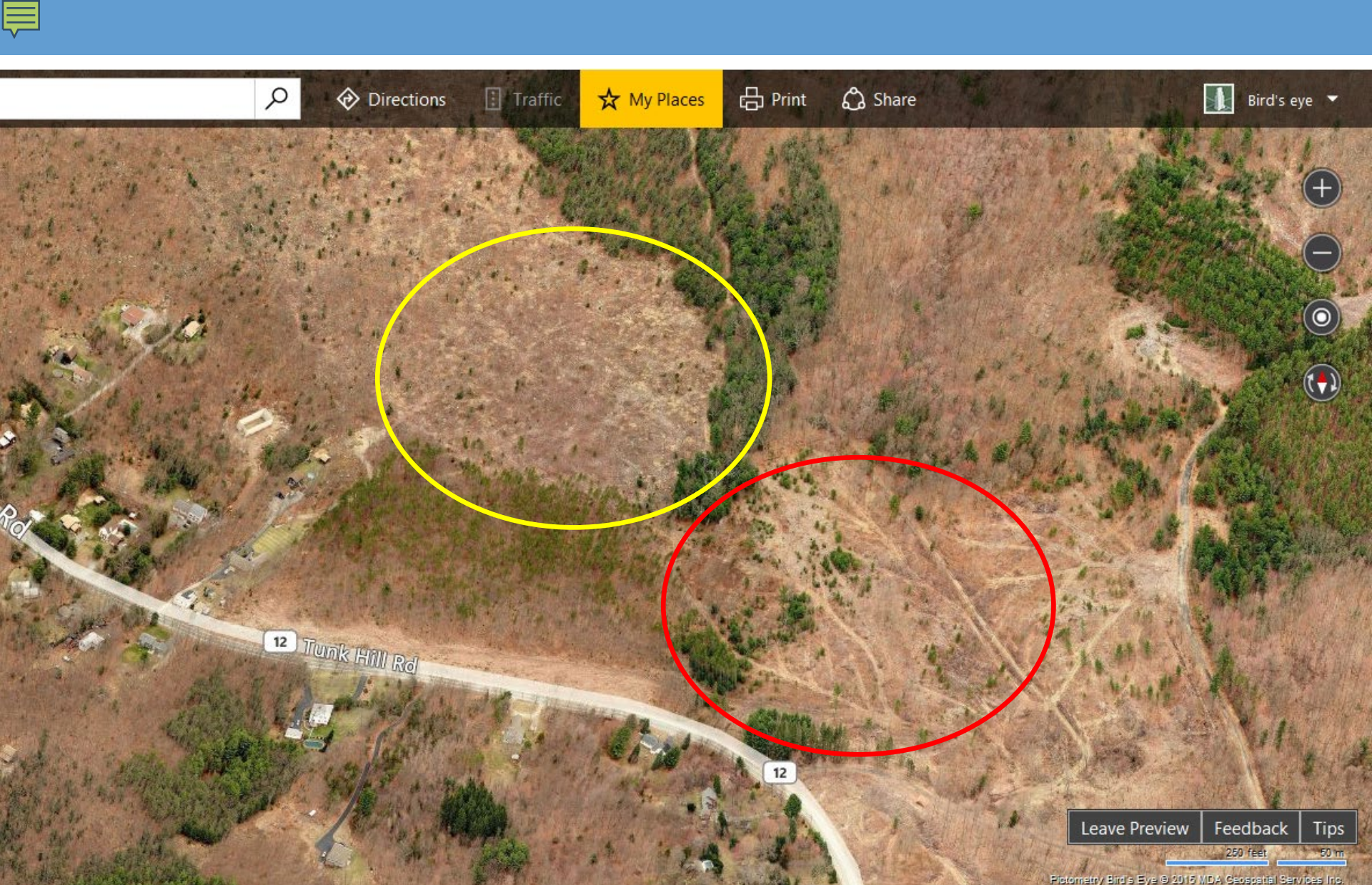


- Poor upland oak growing site with some young pine
- Land acquired recently; not historic ownership
- Death of remaining trees and regeneration failure following shelterwood timber harvest
- Drought, defoliation, deer
- “Nightmare” of what a significant acreage could come to resemble following a severe windstorm
- What to do with this site?
- Opportunity to experiment with “transition” strategy



Photo credit:
Tom Rawinski





Winter "Bird's Eye" view from more than a decade ago (Bing Maps)



2015 PLANTING: MIX OF SPECIES DIVIDED DIVIDED EQUALLY BETWEEN TWO SITES

CONIFERS (250 each)

- Eastern red cedar
- Loblolly pine
- Pitch pine
- Shortleaf pine

Native species

Non-native with limited
presence

Not currently present

HARDWOODS (100 each)

- Black locust
- Black oak
- Persimmon
- Pin oak
- Sassafras
- Sweetgum
- White oak

Planting: May 5-7, 2015

Watering: May 8

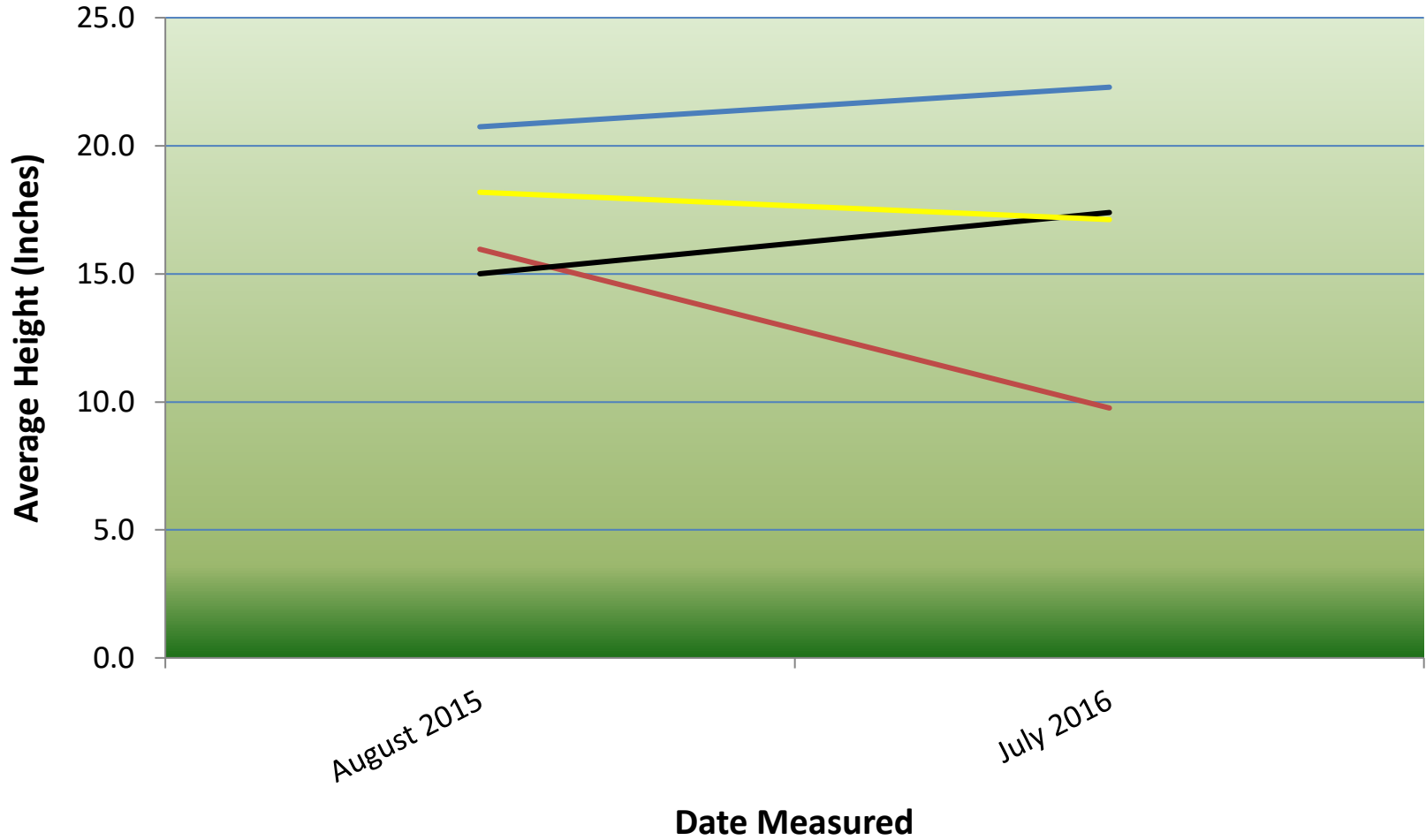


MONITORING AND INITIAL RESULTS

- Irregular but varied species distribution by planting crew
- Significant mortality resulting from drought immediately following planting
- Survivors are doing OK
- Monitoring height growth of 10 individuals of each species in both areas
- Annual height measurements planned for at least 5 years
- **Results indicate deer browse is having a significant impact**



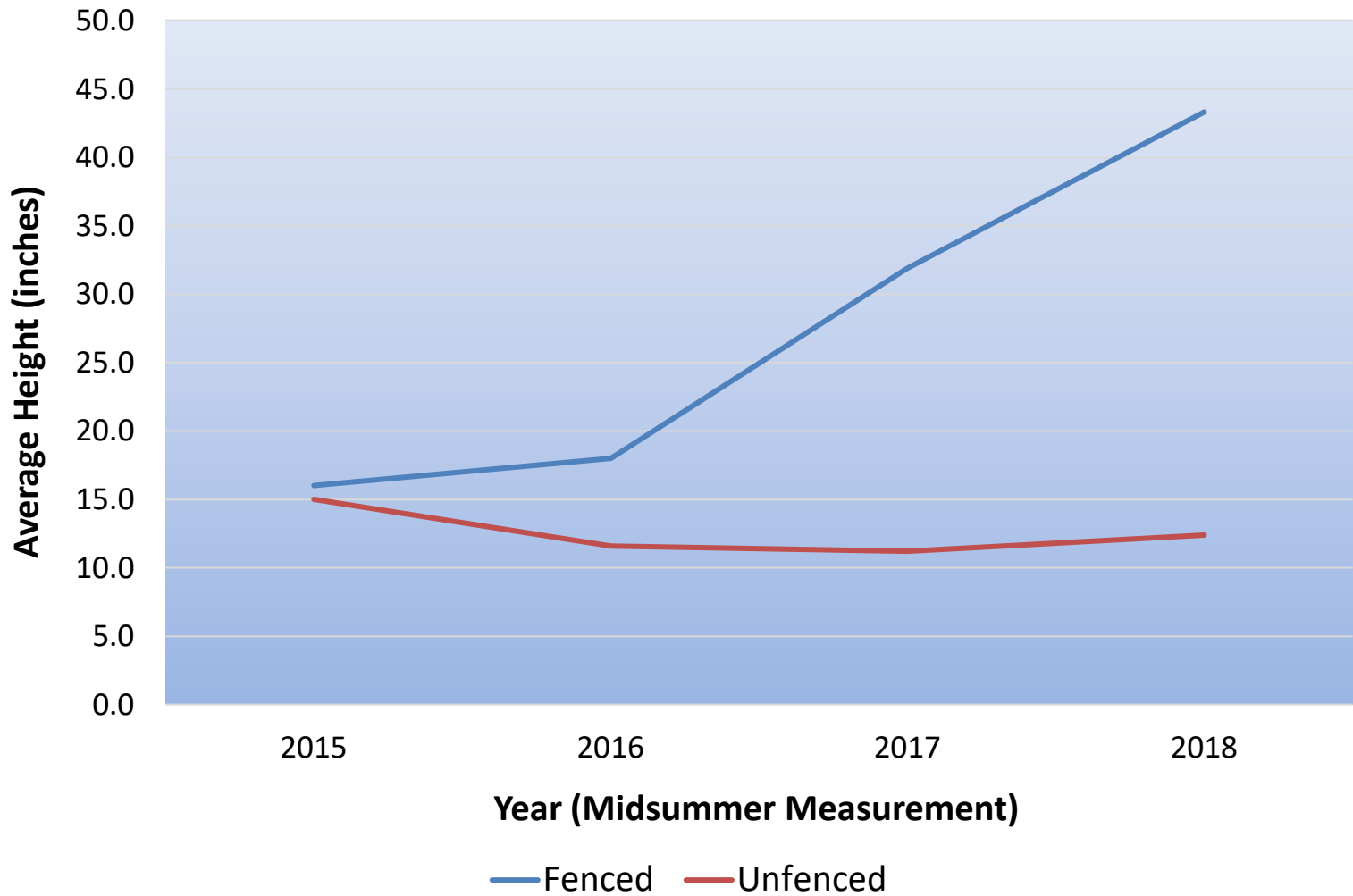
Providence Water - Tunk Hill Site
Average Height of Seedlings Fenced vs Unfenced



— Other Hardwoods - Fenced — Other Hardwoods - Unfenced
— Oaks - Fenced — Oaks - Unfenced

Providence Water - Tunk Hill Site

Average Height of Live Seedlings (Fenced vs. Unfenced)





Tunk Hill Rd

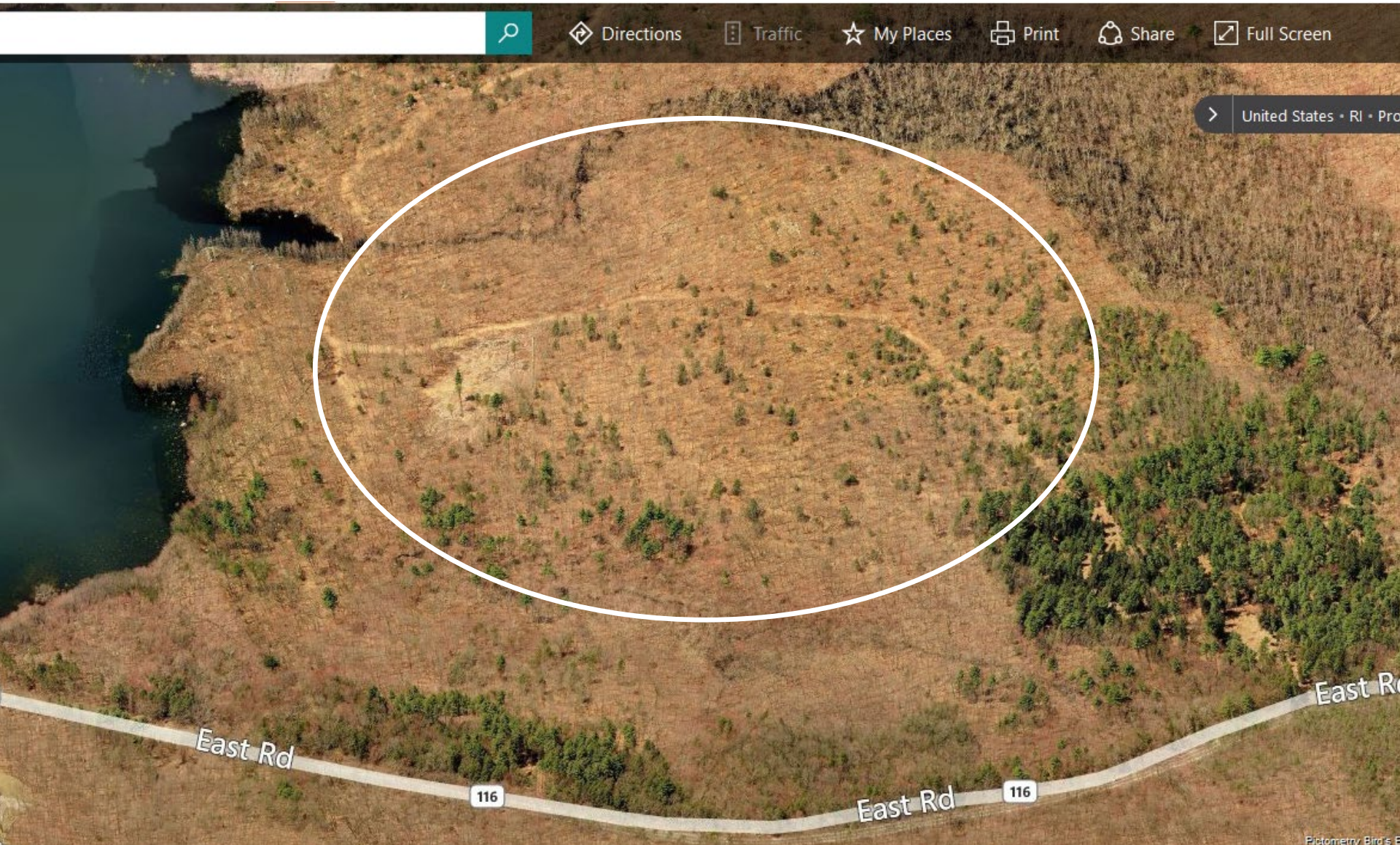
Recent summer aerial view (Google Maps)

Google

2016 ENRICHMENT PLANTING AT SIMILAR SITE



- 38 acre upland oak stand thinned in 2014-15
- Anticipated natural regeneration challenges
- Students planted “climate adaptation mix” in 2016
- Part of larger grant funded by Arbor Day Foundation TD Green Streets Program
- Possible future seeding



Pre-harvest “Bird’s Eye” view during winter (Bing Maps)

Pictometry Bird's Eye



2016 ENRICHMENT PLANTING

300 seedlings planted by high school students

CONIFERS (75 each)

- Shortleaf pine
- Virginia pine

Native species

Non-native with limited presence

Not currently present

HARDWOODS (25 each)

- Black locust
- Black oak
- Chestnut oak
- Persimmon
- Sweetgum
- White oak

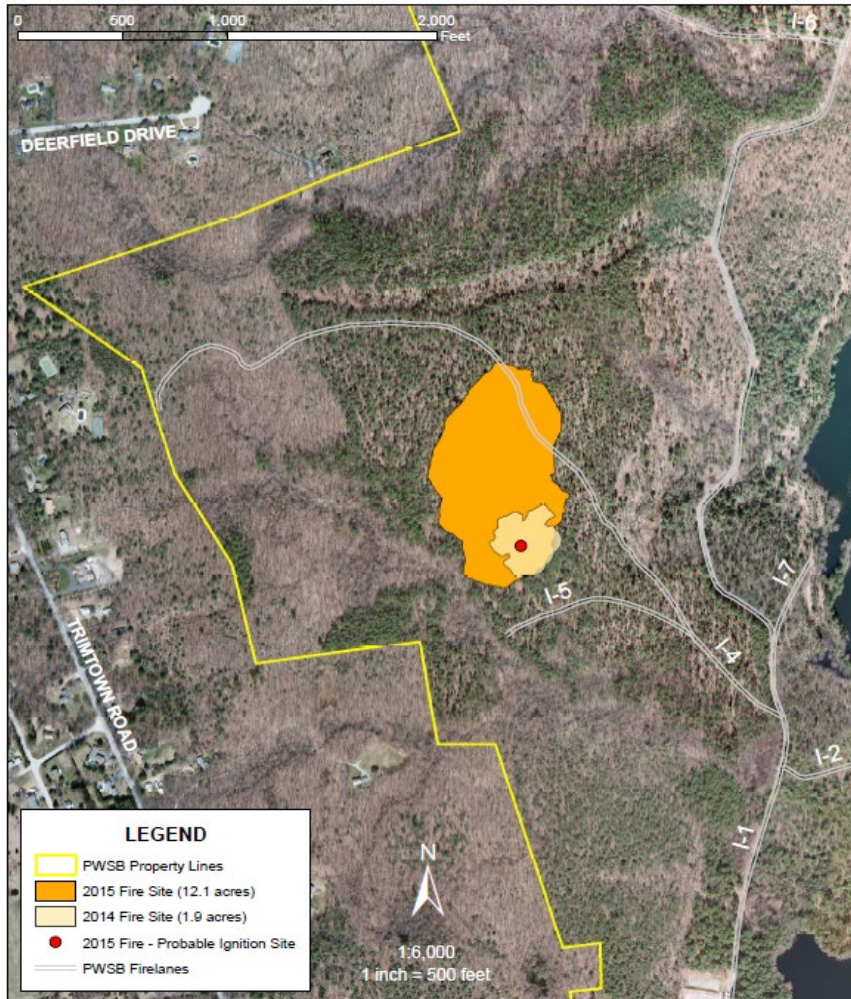


2016 ENRICHMENT PLANTING



2017 REPLANTING OF 2014-15 BURN SITE

I BLOCK FIRE SITES - June 20, 2014, and May 11-13, 2015



2017 REPLANTING OF 2014-15 BURN SITE

300 seedlings to be planted by high school students

HARDWOODS

- Chestnut oak (100)
- White oak (25)

Native species

Non-native with limited presence

Non-native similar to native species

CONIFERS

- Eastern red cedar (25)
- Japanese larch (25)
- Norway spruce (25)
- Pitch pine (100)



CHALLENGES & OPPORTUNITIES

- In CT and RI, deer take a toll on seedling survival
- Important variables:
 - seedling availability
 - planting crew experience
 - planting season weather
- Untested and not yet viable from a purely economic perspective
- Some skepticism from traditionalists
- Relatively modest cost
- Benefits from participating in community of practice and updating education
- Example of a tangible on-the-ground local action
- Opportunity to engage others on climate change
- Significant external interest in projects

A scenic landscape featuring a calm lake in the foreground, reflecting the sky and surrounding trees. The trees on the left and in the background show vibrant autumn colors, including reds, oranges, and yellows, interspersed with green evergreens. The sky is a clear, bright blue with scattered white clouds. The overall atmosphere is peaceful and natural.

THANK YOU

QUESTIONS?

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