



# Forest Carbon & Climate Information



Photo:  
Christopher Smith

# Learning Goals

## **1. Existing Frameworks**

*build upon the works of others assessing forest carbon*

## **2. Profiles in Carbon**

*what does our forest carbon pool look like?*

## **3. Changes in Store**

*need to consider risks to carbon pools*

## **4. Sustaining Solutions**

*long-term problems  
require  
long-term solutions*

# Key Concepts

- Flux vs. Pool
- Baseline & Additionality
- Leakage

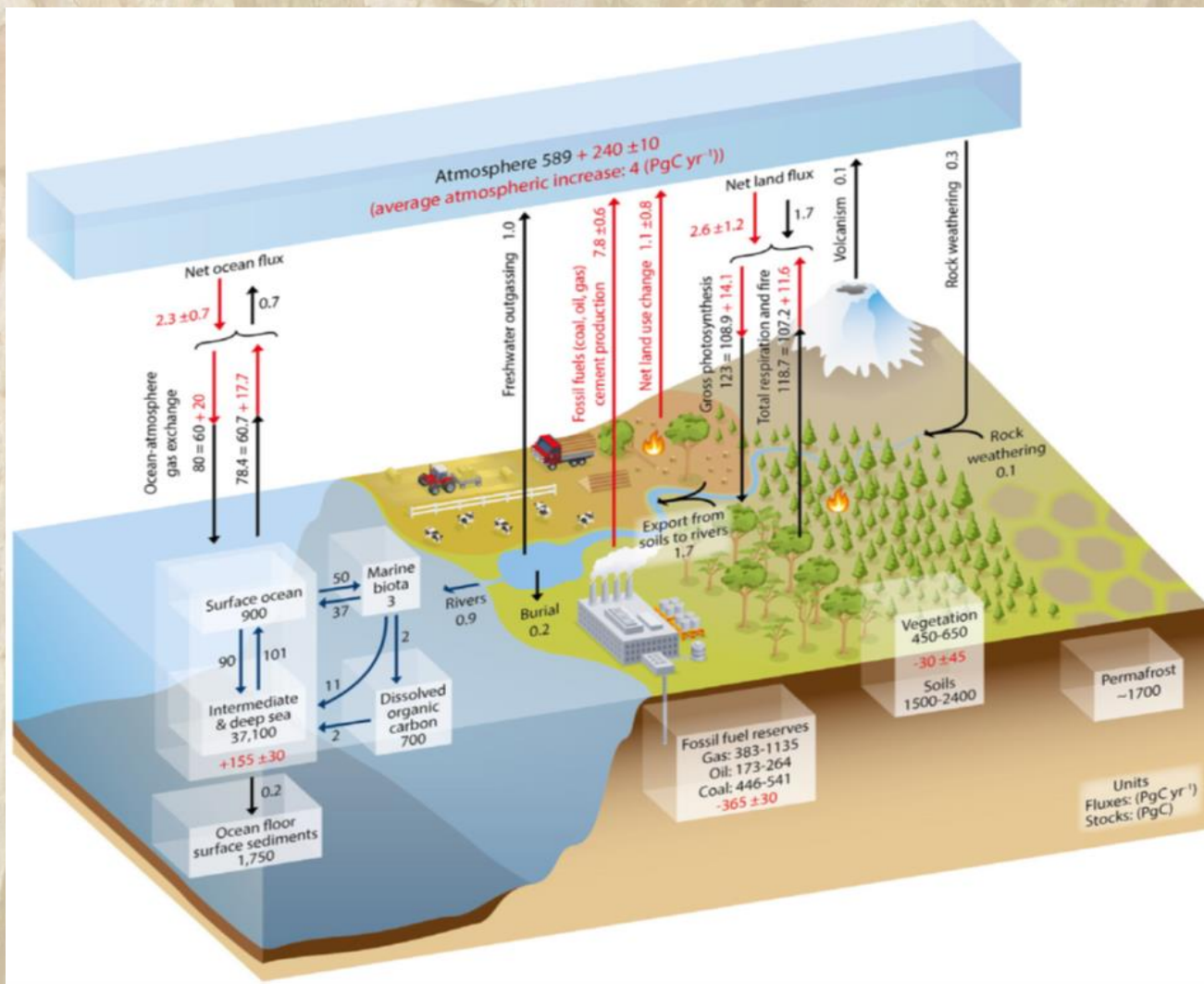
Existing Frameworks



# Flux vs. Pool

Existing Frameworks

‘sequestration’ vs. ‘storage’



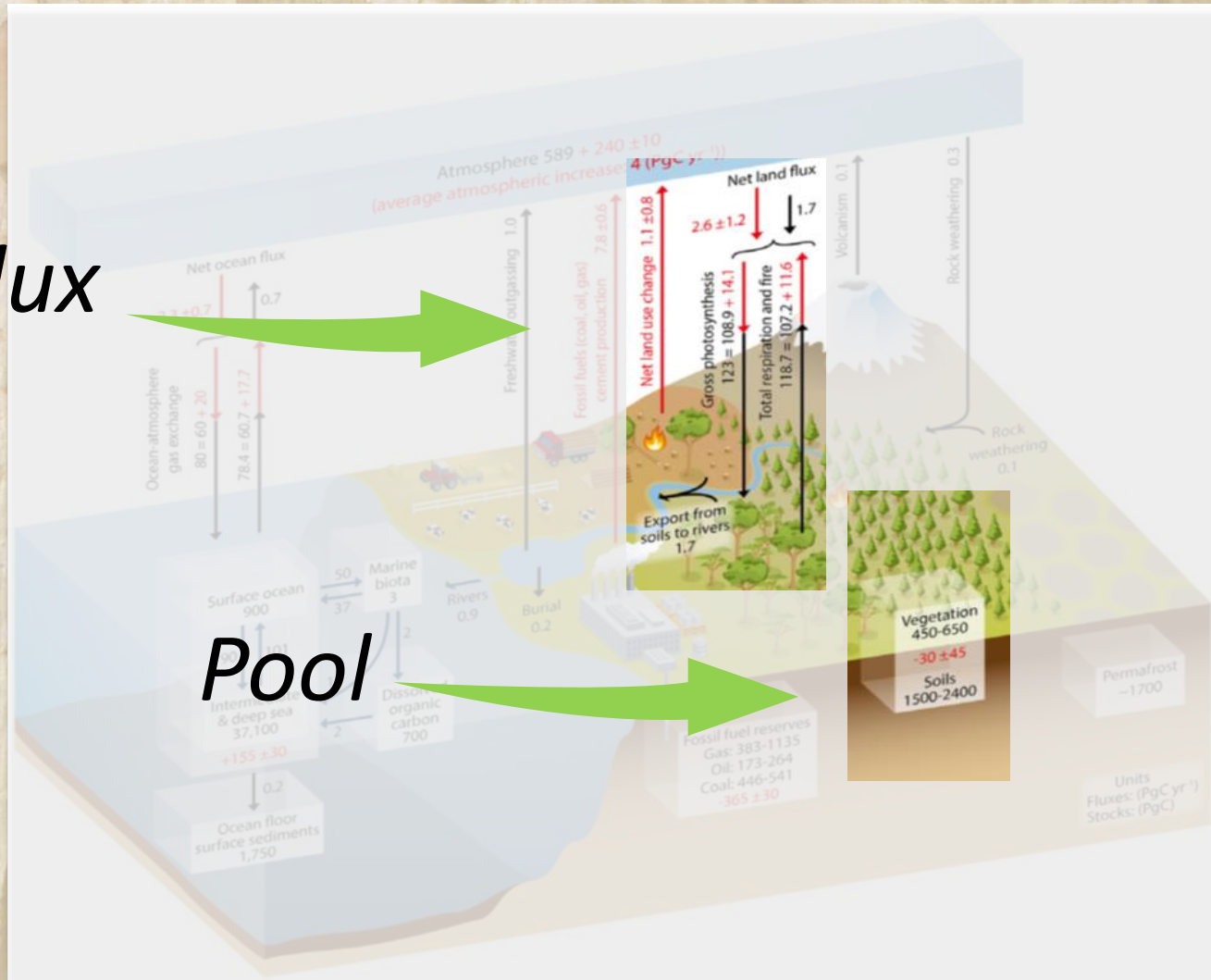
# Flux vs. Pool

Existing Frameworks

‘sequestration’ vs. ‘storage’

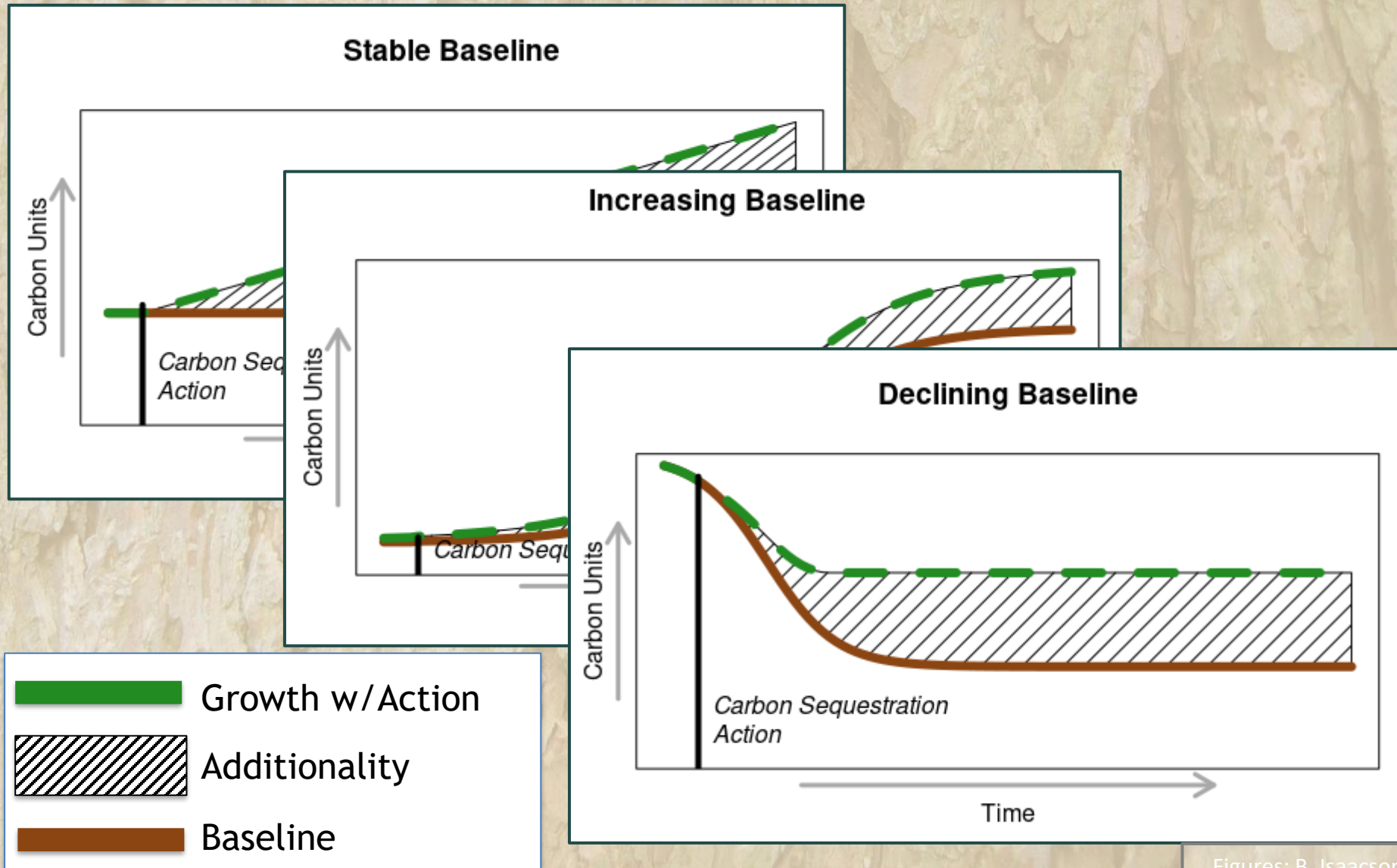
*Flux*

*Pool*



# Baseline & Additionality

Existing Frameworks



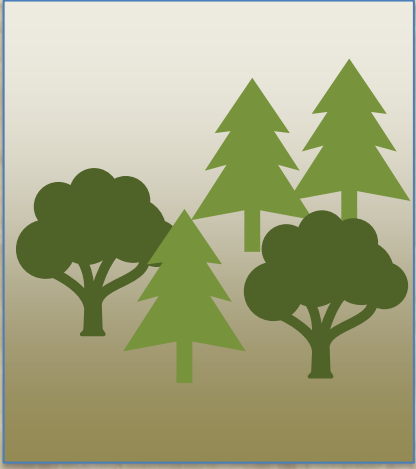
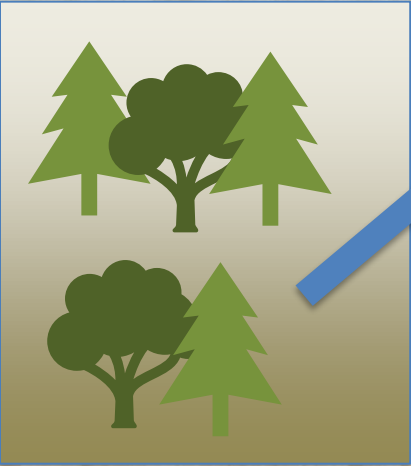
# Leakage

Existing Frameworks



Forest A

Forest B



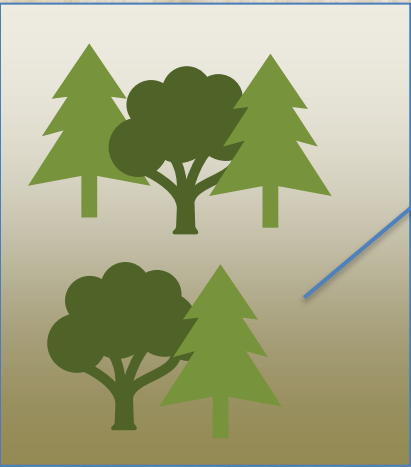
# Leakage

Existing Frameworks



Forest A

Forest B





# Leakage

@ an unnamed Grocery Store in NJ



@ an unnamed business in NJ



Existing Frameworks

# Leakage

Existing Frameworks









# Markets - Compliance


Existing Frameworks

Compliance Offset Program | Cali x +

ww2.arb.ca.gov/our-work/programs/compliance-offset-program

CA.GOV    

Calendar Help & FAQs Contact Careers  English Español  

 CALIFORNIA AIR RESOURCES BOARD

ABOUT OUR WORK RESOURCES SERVICES RULEMAKING NEWS EQUITY



## Compliance Offset Program

[< BACK TO ALL PROGRAMS](#)

### Compliance Offset Program

About

Resources

Cap-and-Trade Program

ARB Offset Credit Issuance

Compliance Offset Protocols

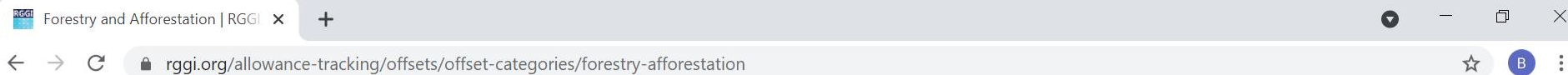
The Compliance Offsets Program is an important cost-containment element within the broader Cap-and-Trade Program. The California Air Resources Board issues ARB Offset Credits to qualifying projects that reduce or sequester greenhouse gases (GHG) pursuant to six Board-approved Compliance Offset Protocols.

[MORE ABOUT THIS PROGRAM >](#)



# Markets - Compliance

## Existing Frameworks



- RGGI, Inc. ▾
- Program Overview and Design ▾
- Auctions ▾
- Allowance Tracking ▾
- Investments ▾
- News & Releases ▾

## The Regional Greenhouse Gas Initiative an initiative of Eastern States of the US

[allowance tracking](#) / [Offsets](#) / [offset categories](#) / [Forestry and Afforestation](#)

### Forestry and Afforestation

#### U.S. Forest Projects

U.S. forest offset projects sequester carbon through three project types that increase and/or conserve forest carbon stocks, increasing the removal of CO<sub>2</sub> from the atmosphere, or reducing or preventing the emissions of CO<sub>2</sub> to the atmosphere. The eligible project types include [Reforestation](#), [Improved Forest Management](#), and [Avoided Conversion](#).

**Reforestation:** restoration of tree cover on land that currently has no, or minimal, tree cover.

**Improved Forest Management:** activities that increase carbon stocks on forested land relative to baseline levels of carbon stocks.

**Avoided Conversion:** specific actions that prevent the conversion of privately owned forestland to a non-forest land use by dedicating the land to continuous forest cover through a conservation easement or transfer to public ownership.

CO<sub>2</sub> offset allowances are awarded based on the amount of net additional carbon sequestered within the offset project boundary during

### Offsets Topics and Categories

[Application Process](#)

[Offset Contacts](#)

[Offsets Requirements](#)

[Verification Process](#)

[Offset Categories ▾](#)

# Markets - Voluntary

Existing Frameworks

The screenshot shows the Verra website homepage with a dark teal background and white text. The main navigation bar includes links for 'ABOUT VERRA', 'OUR WORK', 'RESOURCES', 'FOR STAKEHOLDERS', and 'FOR THE MEDIA'. The main headline reads 'Standards for a Sustainable Future'. Three large, colorful arrow-shaped callouts point to the right, each containing a statistic: 1,706 projects (yellow), 668 million Verified Carbon Units Issued (green), and 145 million cars taken off the road for a year (cyan). On the left side, there are four yellow buttons: 'VERRA REGISTRY', 'VERSION 4 OF JURISDICTIONAL AND NESTED REDD+ FRAMEWORK RELEASED', 'FOR THE MEDIA', and 'VCS VERSION 4.1 RELEASED'. The browser's address bar shows 'verra.org' and the page title is 'Verra - Standards for a Sustainable Future'.

VERRA Standards for a Sustainable Future

ABOUT VERRA | OUR WORK | RESOURCES | FOR STAKEHOLDERS | FOR THE MEDIA

1,706 projects

668 million Verified Carbon Units Issued

145 the equivalent of million cars taken off the road for a year

VERRA REGISTRY

VERSION 4 OF JURISDICTIONAL AND NESTED REDD+ FRAMEWORK RELEASED

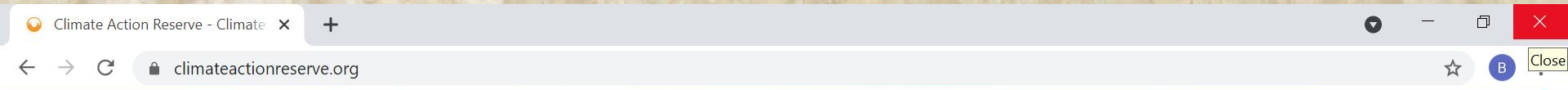
FOR THE MEDIA

VCS VERSION 4.1 RELEASED

Privacy & Cookies Policy

# Markets - Voluntary

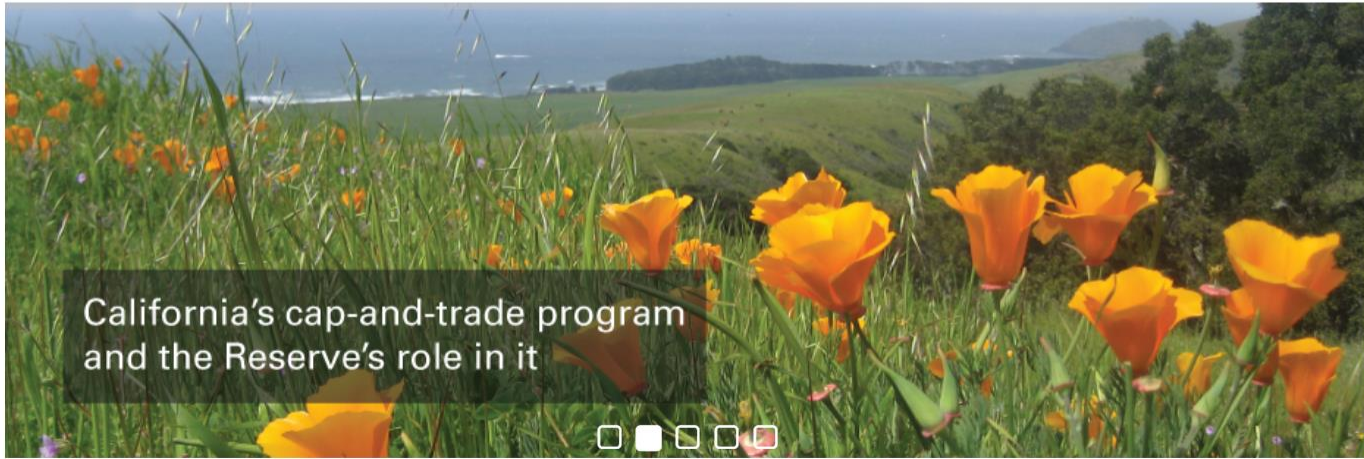
## Existing Frameworks



LOG IN [f](#) [t](#) [YouTube](#) [in](#) [@](#)

- CALIFORNIA OFFSET PROJECT REGISTRY
- VOLUNTARY OFFSET PROJECT REGISTRY
- CLIMATE FORWARD
- CLIMATE IMPACT SCORE
- NACW NORTH AMERICAN CARBON WORLD
- RESOURCES
- ABOUT US



California's cap-and-trade program and the Reserve's role in it



MEASURE THE

↓ MITIGATE

# Markets - Voluntary

## Existing Frameworks



[About Us](#)

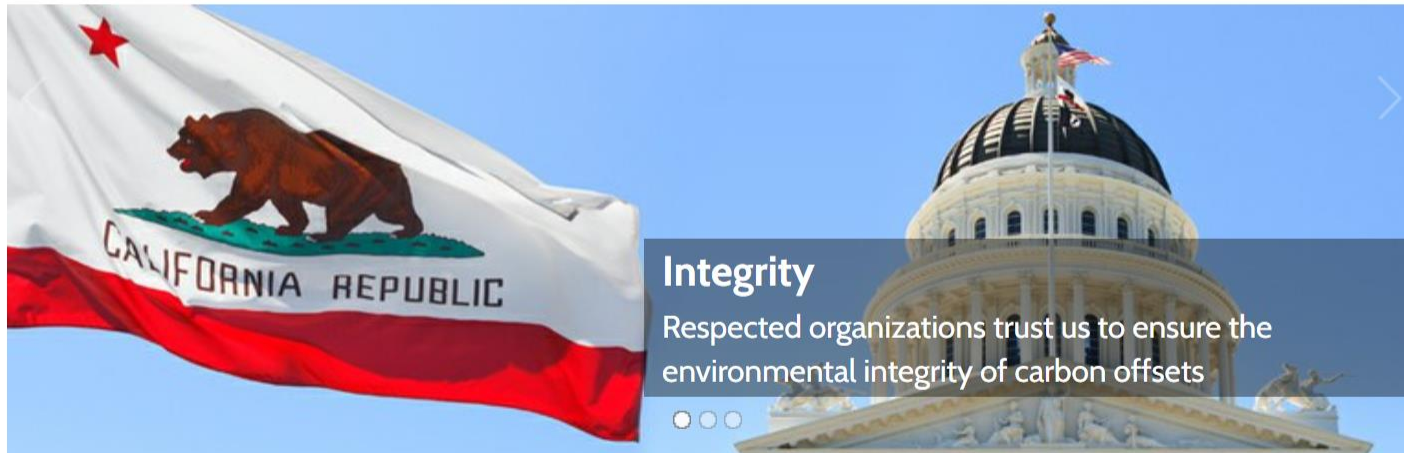
[How it Works](#)

[California Offsets](#)

[Carbon Accounting](#)

[News & Events](#)

[Resources](#)



[Sign-up for ACR News!](#)

[Log-in to My Account](#)

The American Carbon Registry (ACR), a nonprofit enterprise of Winrock International, was founded in 1996 as the first private voluntary greenhouse gas registry in the world. A mission-driven institution named for philanthropist Winthrop Rockefeller, Winrock believes

# Standards - Data

## Existing Frameworks

Requirements and Specifications x +

File | C:/Users/bisacso/Downloads/ACR%20Standard%20v7.0\_FINAL\_Dec2020.pdf

Requirements and Specifications for the Quantification, Monit... 66 / 104 | 100% +

65

66

67


**Farm** The entire operations, which may include multiple fields or parcels of land, and is under the management of a single owner or entity.

**Field** A contiguous tract of land with a homogenous management strategy and a common owner separated by permanent boundaries such as fences, waterways, woodlands, or other similar features.

**Forest** Forest projects shall use a nationally approved "forest" definition for the country where the activity occurs. For projects in the United States, Project Proponents shall use the U.S. definition in Appendix A, which is based on the U.S. Forest Service Forest Inventory & Analysis Program definition. For projects outside of the United States, Project Proponents may use the Kyoto Protocol definition in Appendix A, with the relevant Designated National Authority (DNA) selections for minimum land area, crown cover, and tree height. If the project is in a country that no longer has a designated DNA or

December 2020 [americancarbonregistry.org](http://americancarbonregistry.org) 66

**THE AMERICAN CARBON REGISTRY STANDARD**  
Version 7.0



whose DNA has not made these selections, the Project Proponent may propose another nationally approved forest definition. The definition of forest shall apply in each eligible forest project category. For example, afforestation/



# Standards - Data

## Existing Frameworks

The screenshot shows a PDF document viewer interface. The browser address bar displays the URL: [ww2.arb.ca.gov/sites/default/files/classic/cc/capandtrade/protocols/usforest/verifying-forest-carbon-invent.pdf](http://ww2.arb.ca.gov/sites/default/files/classic/cc/capandtrade/protocols/usforest/verifying-forest-carbon-invent.pdf). The document title is "ARB Compliance Offset Program U.S. Forest Projects Complian...". The viewer shows page 5 of 12, with a zoom level of 100%. On the left, a table of contents is visible with three items:

- 3
- 4
- 5

The main content area shows the following text:

the carbon pools using 20 sample plots per density class, or

- measure the affected carbon stocks based on a grid system across the Project Area.

- **Improved Forest Management or Avoided Conversion Project types:**  
Emissions (soils) resulting from site preparation activities must be captured by measuring changes in included carbon reservoirs as part of sequential sampling.

**Measurement Specifics for Verifiers**

Verifiers must use the highest professional standards (e.g. USDA Forest Service Forest Inventory and Analysis (FIA) inventory standard practice guidance documents) to conduct field measurements. Measurements utilized by verifiers during fieldwork should be consistent with the tolerance standards for measurements identified within Appendix A and should be obtained using the best management practices for data collection and review of forest carbon inventory as required in Section 10.2.2:

1. Verifiers should be aware that the Compliance Offset Protocol does require that verifiers measure tree height and diameter at breast height (DBH). If the OPO uses height estimates as a function of DBH to estimate heights, the verifier must always measure tree heights directly in the sample plots and take extra care and vigilance in thoroughly reviewing the results, and must measure each tree height in the sample plots. Verifiers cannot use estimators, models or regressions to impute heights, all measurements must originate from sampling in the field.
2. Verifiers shall measure the heights of all trees according to the height measurement used for the species-specific biomass equations (found on the ARB Forest Resource webpage).
3. ARB suggests that tools and methods used for distance measurements for plot boundaries be accurate within 1"/30'.
4. ARB suggests that tools and methods used for distance measurements for height measurements be accurate within 6"/100'
5. ARB recommends that head diameter trees be measured to determine their status as

# Standards - Data

## Existing Frameworks

Forest\_Protocol\_V5.0\_Package\_04 x +

climateactionreserve.org/wp-content/uploads/2021/04/Forest\_Protocol\_V5.0\_Package\_040921.pdf

Forest\_Protocol\_V5.0\_Package\_040921.pdf 52 / 155 | - 105% + | [Download] [Share]

(i.e., the *preliminary unadjusted baseline* at time zero).

### 6.1.1.2 Determining Common Practice and the Initial Baseline

Common Practice refers to the average stocks of aboveground standing live and standing dead carbon associated with the Assessment Area(s) covered by the Project Area. This value represents the result of the suite of management activities taking place within the Assessment Area(s) and is used to approximate a Performance Standard for Improved Forest Management Projects. The overall intent of this protocol is for projects to contribute to long-term increases in average carbon stocking in the Assessment Area(s) where they are located. Projects with initial stocking below Common Practice will increase their stocking over time. Projects with initial stocking above Common Practice will also likely increase their stocking over time, but, as or more importantly, will prevent activities that otherwise would have decreased the stocking on the project site to or below Common Practice stocking. In the absence of a forest project, there is no guarantee that a site with stocking above Common Practice will maintain their stocking levels, especially over the 100-year period committed to by projects.

The Common Practice statistic applicable to a project can be found by consulting the Assessment Area Data File on the Reserve's [FP webpage](#). If the Project Area covers multiple Assessment Areas, Common Practice must be calculated as the average of the values for each Assessment Area, weighted by the percentage of the Project Area that falls within each Assessment Area.

Common Practice statistics are calculated from United States Forest Service Forest Inventory and Analysis (USFS FIA) program. The Reserve will update the Common Practice statistics in the Assessment Area Data File periodically. The frequency of updating Common Practice statistics will be subject to the availability of new USFS FIA data but will be no more frequent than once every five years. The Reserve will announce any forthcoming updates to the Common Practice statistics before they are released, and any updates will not be retroactive.

The performance standard criteria establish minimum aboveground standing live and standing

# Standards - Data

## Existing Frameworks

The screenshot shows a PDF viewer interface. The top bar displays the document title 'Quantification\_Guidance.pdf' and the current page '14 / 16'. The main content area shows a document page with a yellow header 'Quantification Guidance for RGGI U.S. Forest Offset Projects' and the year '2015'. The text discusses models for projecting tree growth and mortality, and lists several approved growth models.

**Quantification Guidance for RGGI U.S. Forest Offset Projects** 2015

models, may project information regarding tree growth, harvesting, and mortality over time – values that should ultimately be converted into carbon in an additional step. Other models may combine steps and estimate tree growth and mortality, as well as changes in other carbon pools and conversions to carbon, to create estimated projections of carbon stocks over time.

Models are also used to assist in updating inventory plots so that the plots can represent a reporting year subsequent to their actual sample date. The model simulates the diameter and height increment of sampled trees for the length of time between their sampled date and the reporting year. Plot data can be projected for the length of time the projection method is expected to accurately reflect actual forest growth. Inaccurate updating of plot data can lead to the inability of a project to be verified. Verifiers are directed to randomly select plots or stands for verification. If the Project Sponsor's estimates deviate from the verifier's measurements, the verification will fail. Hence, it is recommended to update plots at least every 12 years.

The following growth models have been approved:

- CACTOS: California Conifer Timber Output Simulator
- CRYPTOS: Cooperative Redwood Yield and Timber Output Simulator
- **FVS: Forest Vegetation Simulator**
- SPS: Stand Projection System
- FPS: Forest Projection System
- FREIGHTS: Forest Resource Inventory, Growth, and Harvest Tracking System
- CRYPTOS Emulator
- FORESEE

A Project Sponsor may update inventory plot data for estimating diameter and height growth by incorporating data obtained from sample plots, as in a stand table projection. An example of an appropriate method of applying a stand table projection is as follows:

# Standards - Data

Existing Frameworks



Smallest scale – County Level  
Largest Scale – National

## EVALIDator Version 1.8.0.01

Revision date: October 31, 2019

### Step 1 of 4 (choosing retrieval type and estimate type group)

#### User Alerts

#### Retrieval Type

The "State(s) retrieval" type is the default. You should only select the "Circle retrieval" type when the area of interest is a circular area around some point. If you choose the circle option you must also enter the latitude and longitude of point center in decimal degrees (the latitude and longitude of Duluth, for example, is latitude = 46.78 and longitude = -92.12) and enter the circle radius in miles. A location's latitude and longitude can be obtained using [Google Maps \(opens in new window\)](#) (1. locate the point of interest using Google Maps, 2. right click on the location, 3. select "What's here?", 4. click on the green arrow to get the coordinates).

Select state or circle retrieval

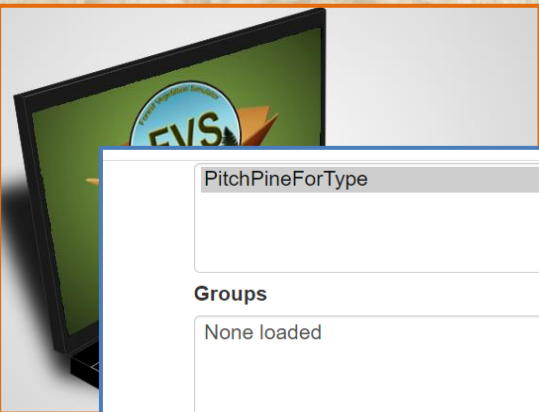
- State(s) retrieval
- Circle retrieval

If "Circle retrieval" is selected then specify latitude, longitude and radius of the circle.

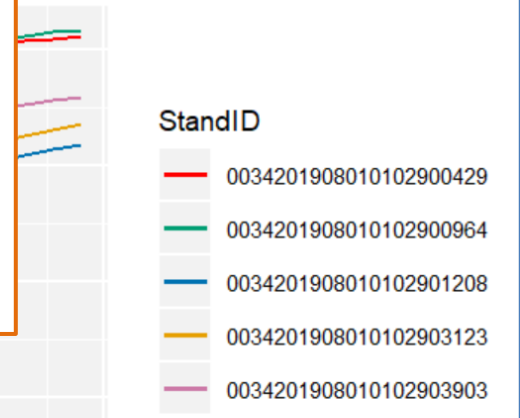
Latitude(in decimal degrees)

# Standards - Data

Existing Frameworks



e  
 label  
 label  
 re controls  Hide  Show



PitchPineForType

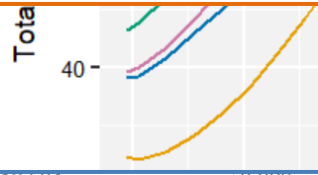
Groups  
None loaded

Stands  
 0034201908010102900429  
 0034201908010102900964  
 0034201908010102901208  
 0034201908010102903123  
 0034201908010102903903  
 0034201908010102907483

Years  
 2091  
 2096  
 2101  
 2106  
 2111  
 2116

Species  
None loader

Select variables  
 MgmtID  StandID  Year  
 Aboveground\_Total\_Live  
 Aboveground\_Merch\_Live  Belowground\_Live  
 Belowground\_Dead  Standing\_Dead  
 Forest\_Down\_Dead\_Wood  Forest\_Floor

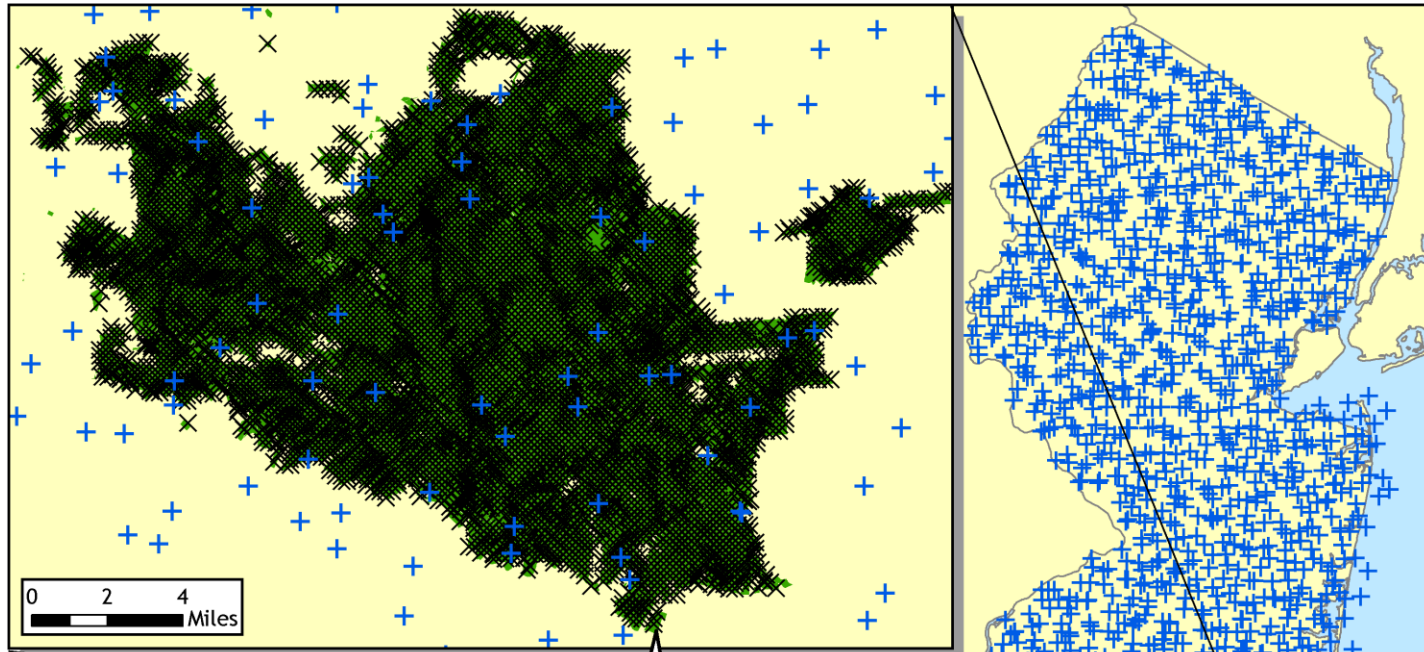


Years	Species	DBHClasses	12	2021	16.534	3.623	0.124	0.542	3.908
2019	None loader	None loader	13	2021	24.944	5.235	0.623	1.269	4.073
2020			14	2021	20.158	4.802	0.266	1.498	4.032
2021			15	2021	4.387	1.118	0.07	0.101	3.838
2026			16	2021	20.359	4.615	0.001	0.006	3.892
2031			17	2021	11.815	3.239	0.02	0.051	4.356

# Standards - State Data




Existing Frameworks

In



C

## Forest Inventory

-  USFS Forest Inventory Analysis Phase 1 (Locations +/- 3.5 miles)
-  NJFS Wharton/Penn Inventory 2017-2019
-  Wharton & Penn State Forests

NJFS  
2017-2019 data:  
5,999 Plots

USFS FIA data 2019  
Phase 1: 1532 plots  
Phase 2: 795 plots

# Forest Carbon Data Sources

- **Forest Inventory & Analysis Program (FIA)**  
<https://www.fia.fs.fed.us/forestcarbon/index.php>
- **Michigan State University Forest Carbon & Climate Program**  
<https://www.canr.msu.edu/fccp/>
- **State of the Carbon Cycle Report (SOCCR, SOCCR2)**  
<https://www.carboncyclescience.us/state-carbon-cycle-report-soccr>
- **USFS Northern Research Station: Tools for Carbon Inventory, Management, & Reporting**  
<https://www.nrs.fs.fed.us/carbon/tools/>

# Forest Inventory and Analysis National Program



Department of Forestry  
Forest Carbon and Climate Program

- About
- Graduate Certificate
- Professional Development Courses
- Partners + Projects
- Engagement + ORL
- Contact



USDA United States Department of Agriculture  
Forest Service

Northern  
Research Station



- Forest Service Home
- About the Forest Service
- News
- Jobs
- Maps
- Help
- Contact Us

Search

Go

Browse by Subject

- ▶ Research Programs
- ▶ Publications & Data
- ▶ Tools & Applications
- ▶ Locations
- ▶ Scientists & Staff
- ▶ About NRS
- ▶ Partnerships
- ▶ NRS News

Contact Information

**Northern Research Station**  
One Gifford Pinchot Drive  
Madison, WI 53726  
(608) 231-9318  
(608) 231-9544 TTY/TDD

You are here: [NRS Home](#) / [Carbon](#) / [Tools](#)

## Carbon

### Tools for carbon inventory, management, and reporting

Accurate estimates of carbon in forests are crucial for forest carbon management, carbon credit trading, national reporting of greenhouse gas inventories to the United Nations Framework Convention for Climate Change, calculating estimates for the Montreal Process criteria and indicators for sustainable forest management, and registering forest-related activities for state and regional greenhouse gas registries and programs.

Our scientists have contributed to developing a toolbox full of basic calculation tools to help quantify forest carbon for planning or reporting. The following tools are currently available:

- **PRESTO:** an online tool to estimate carbon in harvested wood products
- Measurement guidelines for the sequestration of forest carbon

### Carbon

- [Carbon Home](#)
- [Literature resources for carbon inventories](#)
- [Tools for carbon inventory, management, and reporting](#)
- [Tools Workshop](#)
- [Summaries](#)
- [Webcasts](#)
- [Carbon Factoids](#)

### Carbon Tools

- **PRESTO:** an online tool to estimate carbon in harvested wood products



# Forest & Climate Data Sources

- **Climate Change Atlas: Tree Atlas**  
<https://www.fs.fed.us/nrs/atlas/tree/>
- **Northern Institute of Applied Climate Science (NIACS)**  
<https://www.nrs.fs.fed.us/niacs/>
- **USFS Treesearch**  
<https://www.fs.usda.gov/treesearch/>
- **National Climate Assessment**  
<https://nca2014.globalchange.gov/>



# Climate Change Atlas

[List of Trees](#) | [List of Birds](#)

Northern Research Station

[Home](#) / [Research Programs](#) / [NIACS](#)

## Northern Institute of Applied Climate Science

The Northern Institute of Applied Climate Science

[About NIACS](#)



**U.S. FOREST SERVICE**  
Caring for the land and serving people

United States Department of Agriculture

## Treearch

You are currently viewing the Third National Climate Assessment. To view the most recent assessment please visit <https://nca2018.globalchange.gov>.



National Climate Assessment

[i](#) [?](#) [↻](#) [GlobalChange.gov](#)



### Highlights

Explore highlights of the National Climate Assessment including an Overview, the report's 12 overarching findings, and a summary of impacts by region.

→ EXPLORE HIGHLIGHTS



### Full Report

Explore the entire report covering our changing climate, regions, cross sector topics, and response strategies in full detail.

→ EXPLORE THE REPORT



# Forest & Climate Data Sources

- **Climate Change Vulnerability Assessments**

<https://www.fs.usda.gov/managing-land/sc/vulnerability-assessments>

- **USFS Climate Change Resource Center**

<https://www.fs.usda.gov/ccrc/>

- **Rutgers Climate Institute – NJ Forest Adapt**

<https://njforestadapt.rutgers.edu/#/splash>

- **Northern Forest Futures & Future Forests of the Northern US**

<https://www.nrs.fs.fed.us/futures/>



**Forest Service**  
U.S. DEPARTMENT OF AGRICULTURE

Enter Keyword(s)

GO



**U.S. FOREST SERVICE**  
Caring for the land and serving people

# CLIMATE CHANGE RESOURCE CENTER



United States  
Department of  
Agriculture

National Institute  
of Food and  
Agriculture

This work is/was supported by the USDA National Institute of Food and Agriculture McIntire-Stennis



USDA United States Department of Agriculture  
Forest Service

**Northern Research Station**



[Forest Service Home](#) | [About the Agency](#) | [Contact the National Office](#)

Search

Go

Northern Research Station

▶ Home

▼ Research Programs

- Themes
- Units
- Lands
- Facilities
- Special Programs

▶ Publications & Data

▶ Tools & Applications

▶ Locations

▶ Scientists & Staff

▶ About NRS

▶ NRS News

Contact Information

You are here: [Home](#) / [Research Programs](#) / [Special Research Programs](#) / Northern Forest Futures Project

## Northern Forest Futures Project

### Northern Forest Futures Project

The Northern Forest Futures Project is a window on tomorrow's forests, revealing how today's trends and choices can change the future landscape of the Northeast and Midwest. Using the latest inventory data and scientific projections, the Northern Forest Futures Project helps visualize what's here today and what to expect tomorrow. Ultimately, this project informs decision-making about the sustainable management of public and private forests in the northern United States.

### What about Northern Forests

What are they like now?

What is changing?



### Northern Forest Futures Project

- ▶ Home
- What is the *NEEP*?
- Current Conditions
- Issues and Influences
- Future Conditions
- Publications

### Future Criteria & Indicators

- Biodiversity
- Forest Productivity
- Ecosystem Health
- Soil and Water Conservation
- Global Carbon Cycles
- Socio-Economic Benefits
- Policy and Planning

# NJ Forest Carbon Pools

## NJ Forest Carbon

### NJ Forest Carbon Pools 2018

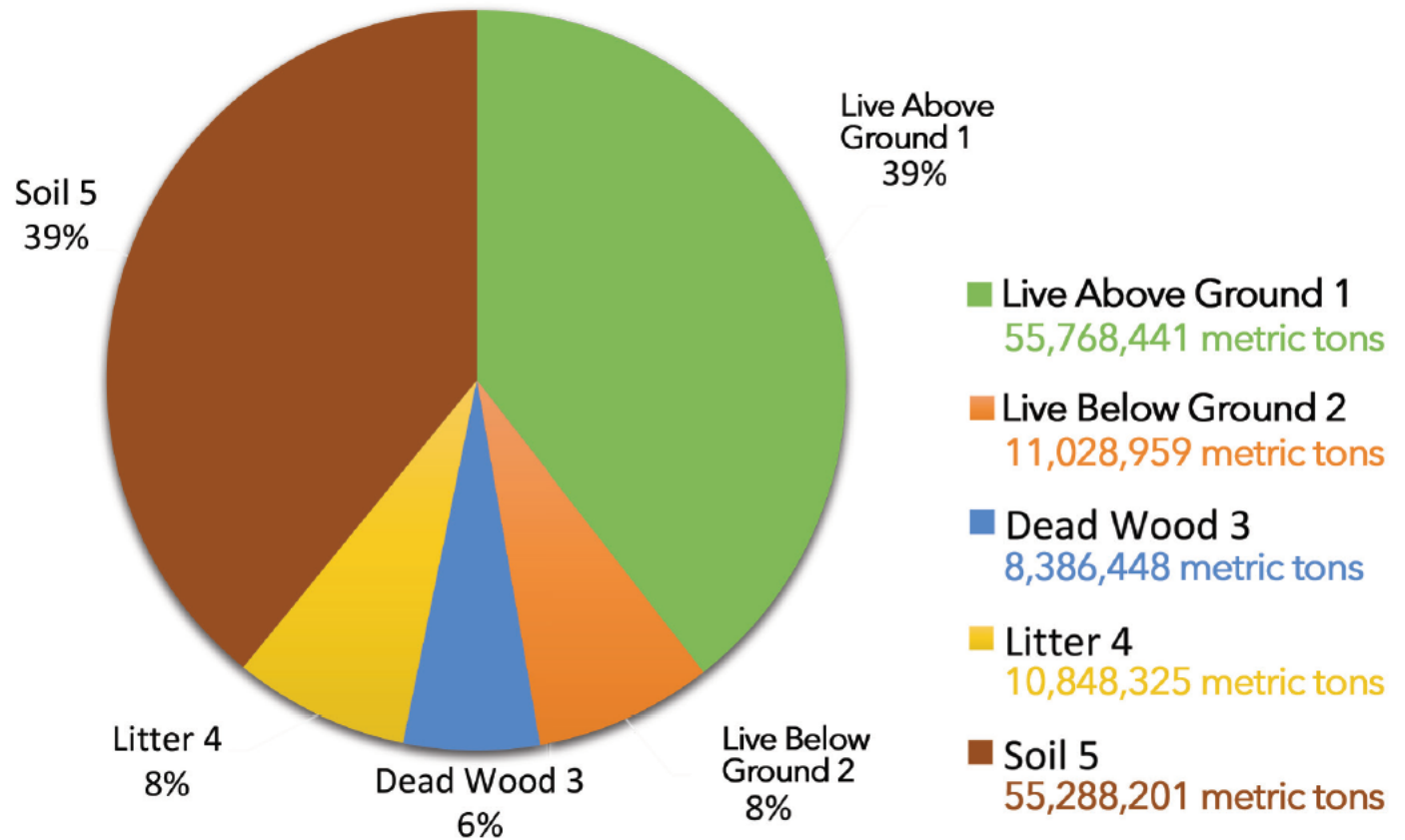
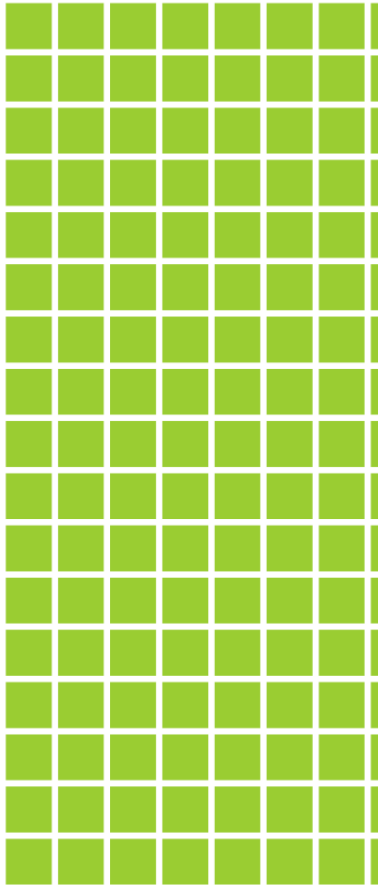


Figure 69. Forest carbon pools by percentage for New Jersey in 2018. (FIA)

Area of Land Use i



One square == 10,000 Acres, Data Source: NJDEP Land Use 2015

# NJ Forest Carbon Distribution

NJ Forest Carbon

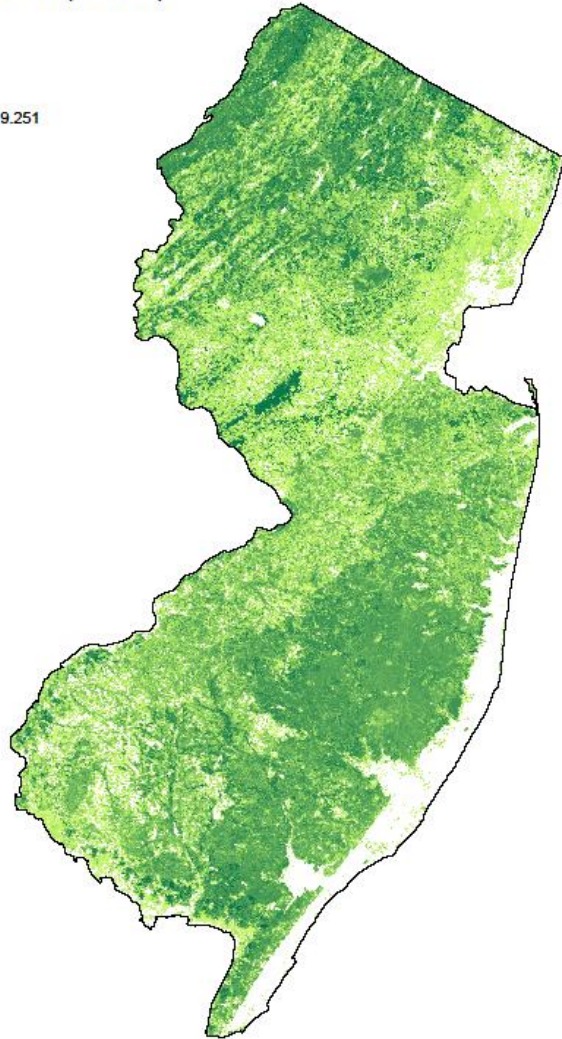
Total Carbon (ton/ac)

**Legend**

njcarbotta

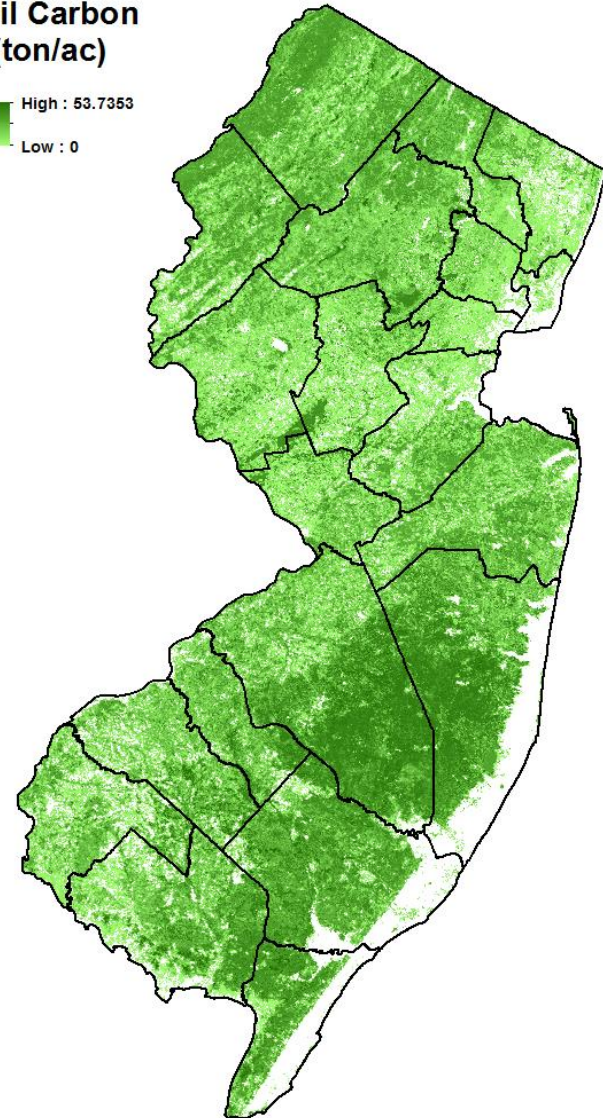
**Value**

High : 109.251  
Low : 0



Soil Carbon (ton/ac)

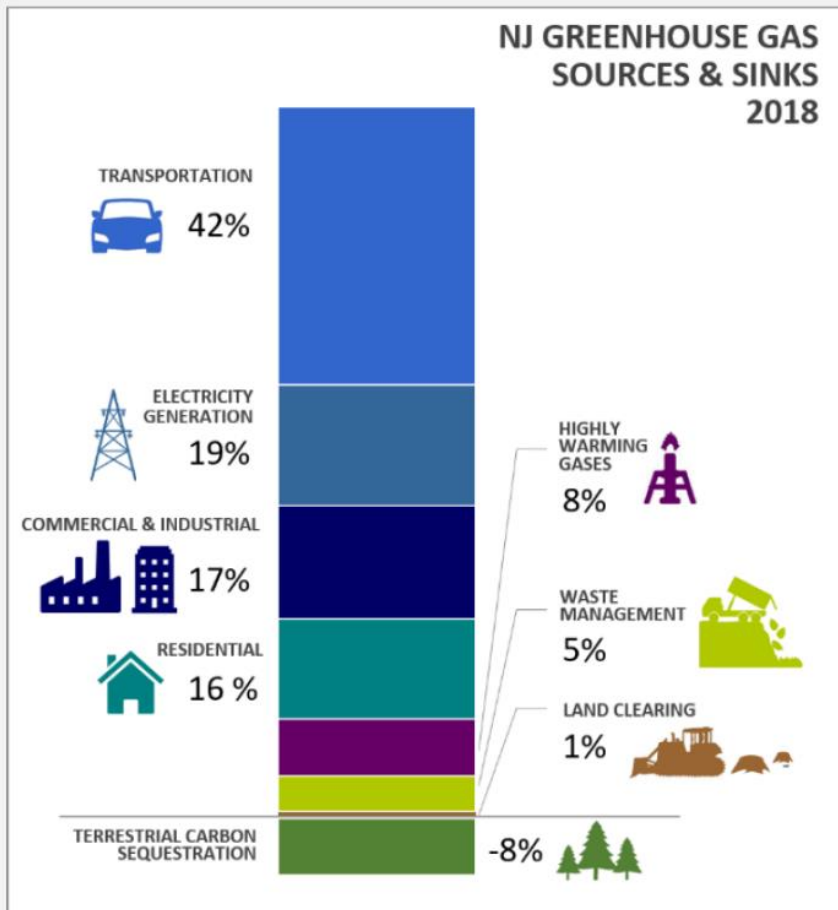
High : 53.7353  
Low : 0



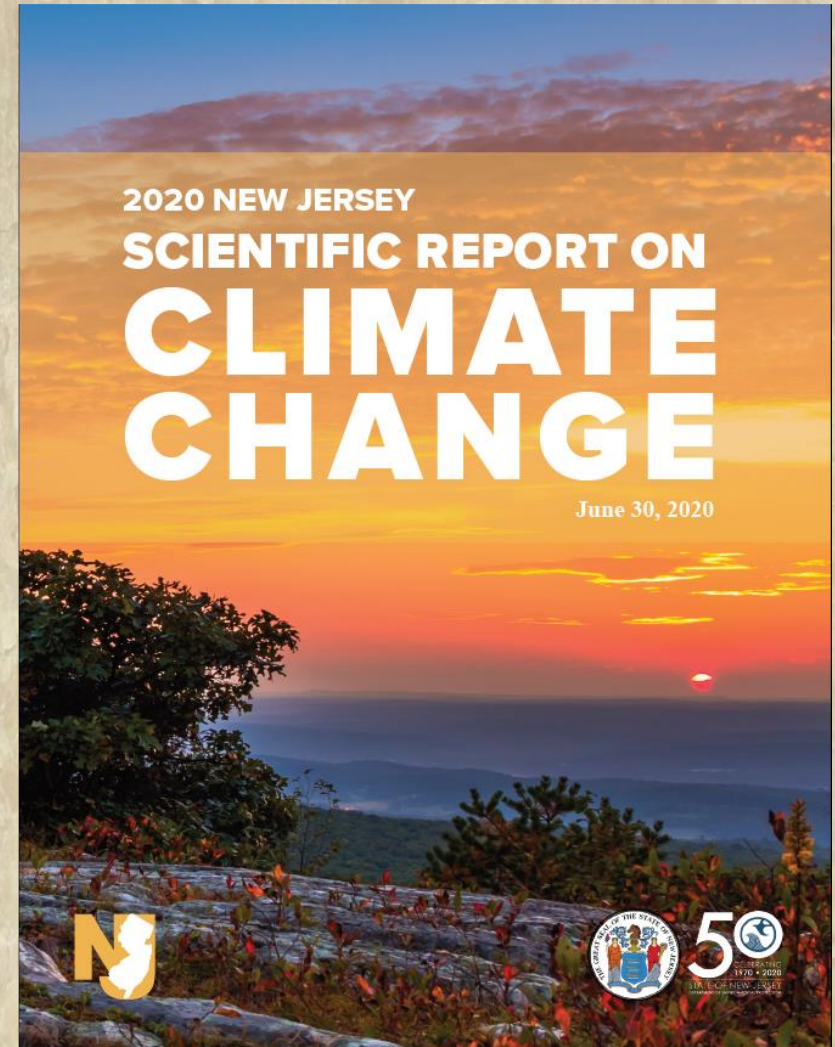
# NJ Forest Carbon

## NJ Forest Carbon

### NEW JERSEY'S GREENHOUSE GAS SOURCES & SINKS 2018



Source: New Department of Environmental Protection. 2018 Greenhouse Gas Emissions Inventory (preliminary results).

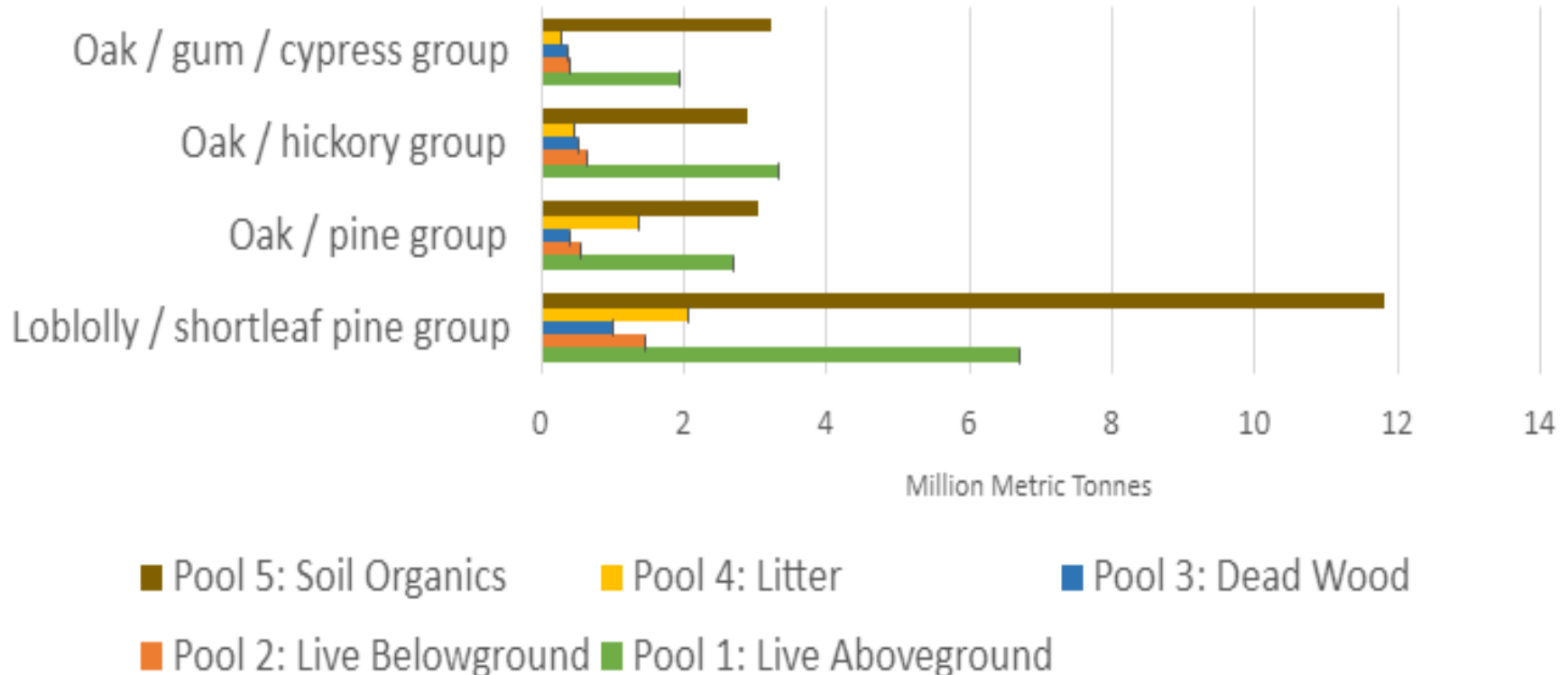


<https://www.nj.gov/dep/climatechange/docs/nj-scientific-report-2020.pdf>

# Pinelands Forest Carbon

Pinelands  
Forest Carbon

## Carbon Pools by Forest Type in the Pinelands Jurisdiction

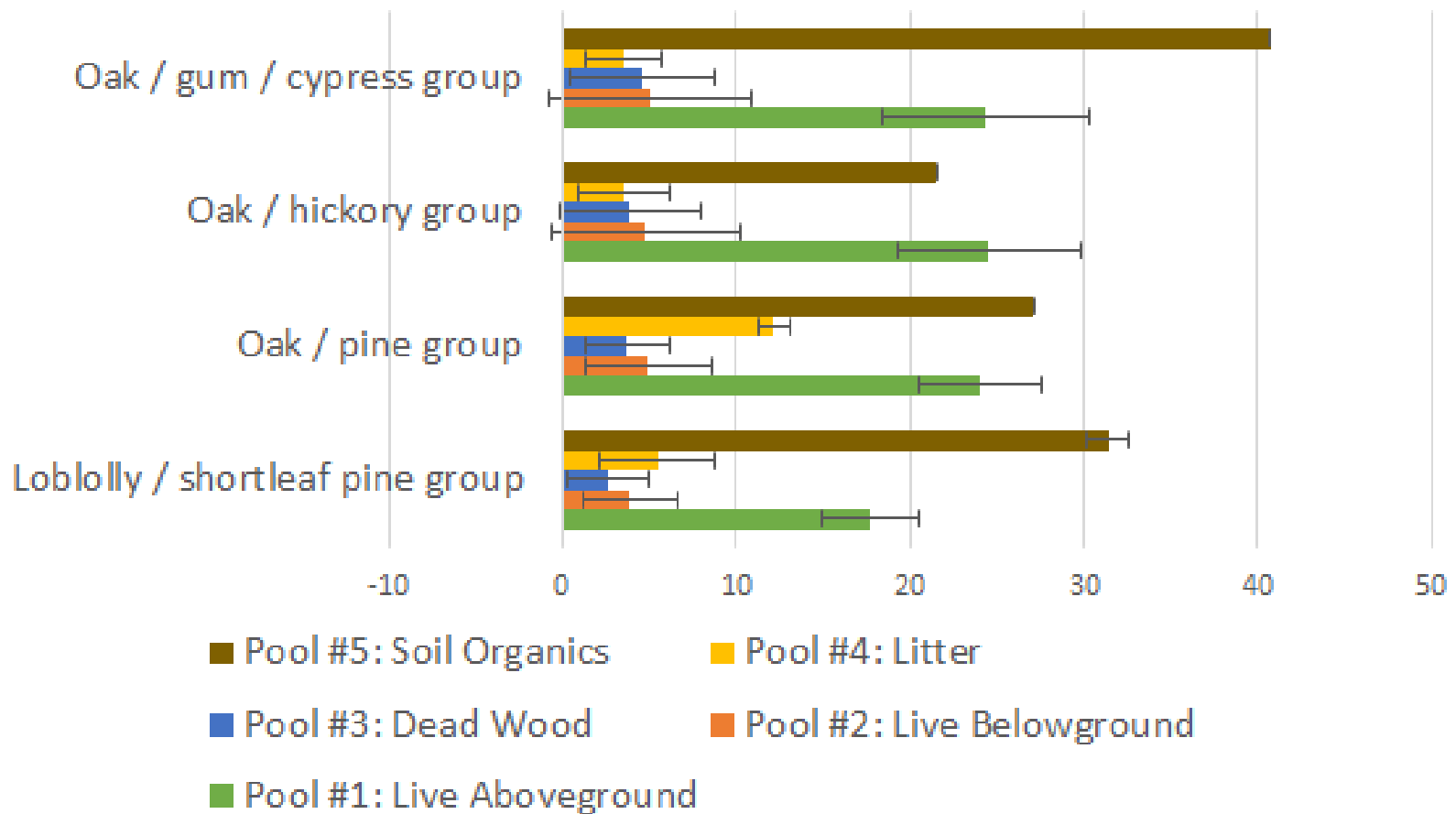




# Pinelands Forest Carbon

## Pinelands Forest Carbon

Metric Tonnes of Carbon per Acre in each Carbon Pool within the Pinelands



# Land Use Conversion

Changes to  
the Pool



[https://crssa.rutgers.edu/projects/lc/urban\\_growth.html](https://crssa.rutgers.edu/projects/lc/urban_growth.html)



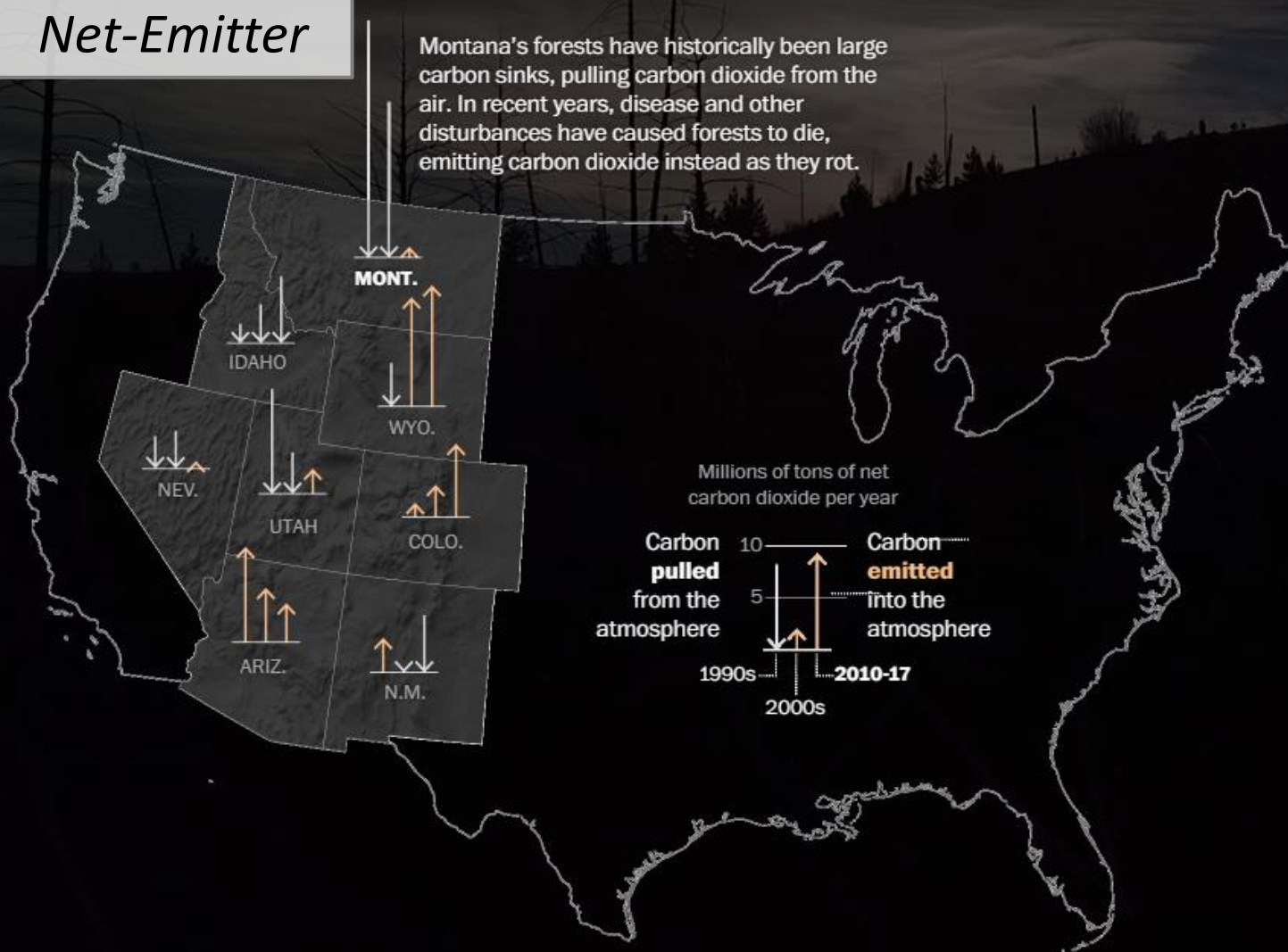
UGA4166013

# Pests

## Changes to the Pool

*Now a Net-Emitter*

Montana's forests have historically been large carbon sinks, pulling carbon dioxide from the air. In recent years, disease and other disturbances have caused forests to die, emitting carbon dioxide instead as they rot.



# Pests

## Changes to the Pool

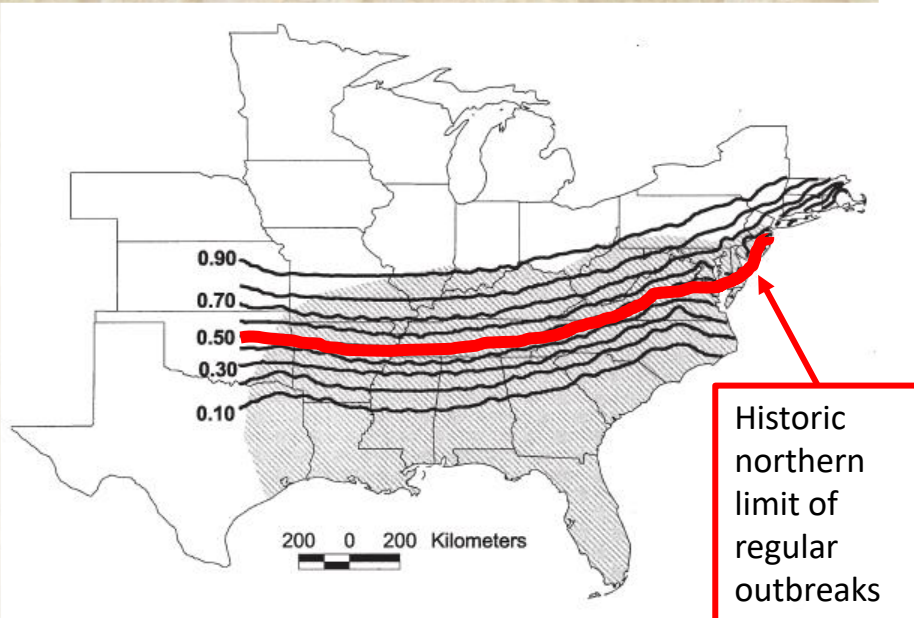


Figure 6 Annual probability of reaching the lower lethal temperature for *D. frontalis* (PLLT;  $-16^{\circ}\text{C}$  air temperature). Maximum reported *D. frontalis* distribution shown as shaded area.

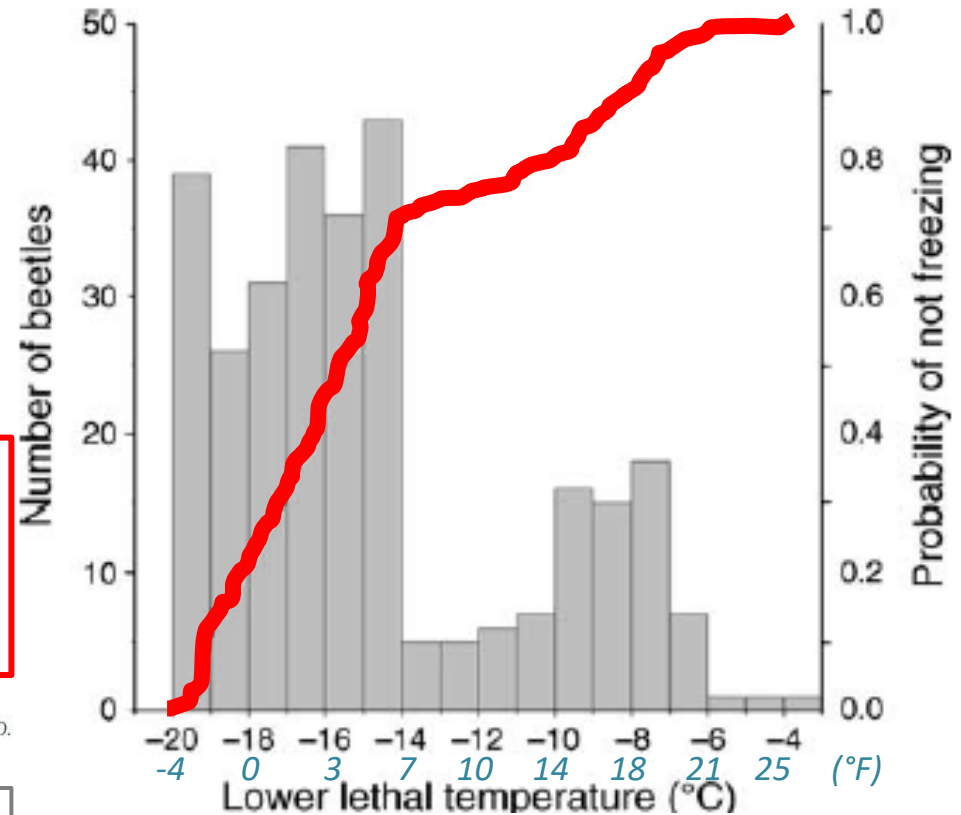


FIG. 5. Frequency distribution of supercooling points of late fourth-instar larvae from New Jersey measured during February 2005. The line indicates the probability of not freezing.

**Cold Winter Nights Are Keeping the Lid on Southern Pine Beetle in NJ**

Left: Ungerer *et al.* 1999  
 Right: Tran *et al.* 2007

# Pests

## Changes to the Pool

Southern States Have Adapted to Southern Pine Beetle

RESEARCH ARTICLE

entomology & pathol

Southern Pine  
Forest Stand  
and Prescr  
Southern Pine

John T. Nowak, James  
Chris



Journal  
RECO

Implication  
Beetle, Den

Stephen Clarke

USDA Forest Service  
<sup>1</sup>Corresponding author

J. Integ. Pest Mngm

REDUCE THE RISK OF BARK BEETLES:



**THIN YOUR  
PINE FOREST**

[www.fl-dof.com](http://www.fl-dof.com)

Florida Department of Agriculture, Division of Forestry • University of Florida/IFAS • USDA Forest Service



VIACOM

UGA2109074



Albert (Bud) Mayfield, USDA Forest Service, Bugwood.org

# Wildfire

Changes to  
the Pool



# Wildfire

**“BAD” FIRE!**

Changes to  
the Pool

*Now an  
Emitter*



# Peat Fires

Changes to  
the Pool



<https://phys.org/news/2017-10-years-washington-feds-swamp.html>

<https://doi.org/10.1016/B978-0-444-59510-2.00001-X>



# Loss of Ecosystem Function

Changes to  
the Pool

## Pine Barren Gentian



# Changes to the Pool



# Climate Stress

Changes to  
the Pool



B. Isaacson

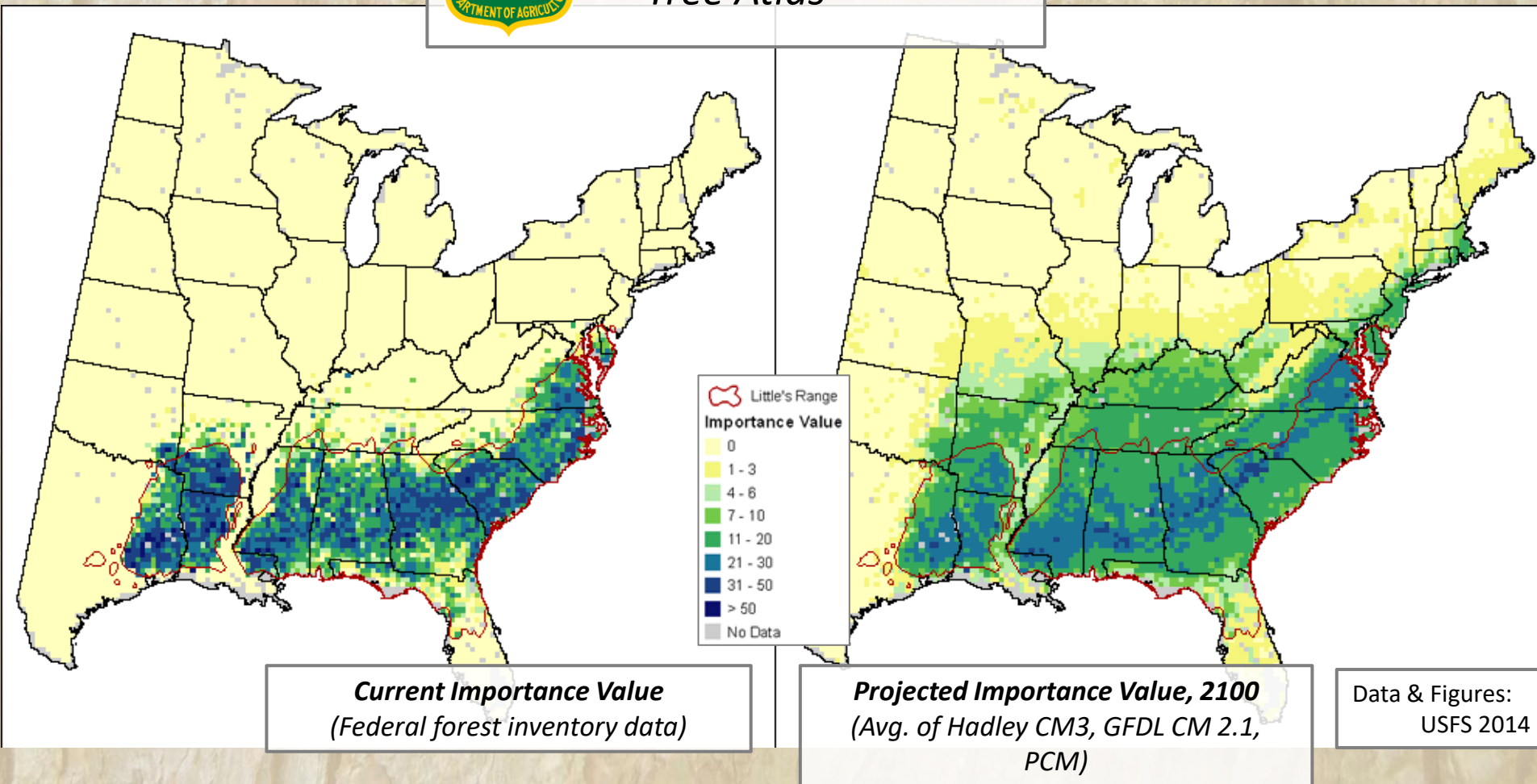
# Climate Stress

Changes to  
the Pool



*USFS Climate Change  
Tree Atlas*

**Loblolly Pine**



# Solutions

Sustaining  
Solutions

Balance - Maximizing Any One Thing Makes the  
Maximum Unstable



# Forest Carbon Solutions

Sustaining  
Solutions

**Afforestation/Reforestation**



# Forest Carbon Solutions

Sustaining  
Solutions

Restoration



# Forest Carbon Solutions

Sustaining  
Solutions

## Improved Forest Management





# Forest Carbon Solutions

Sustaining  
Solutions

Avoided Forest Conversion & Emissions

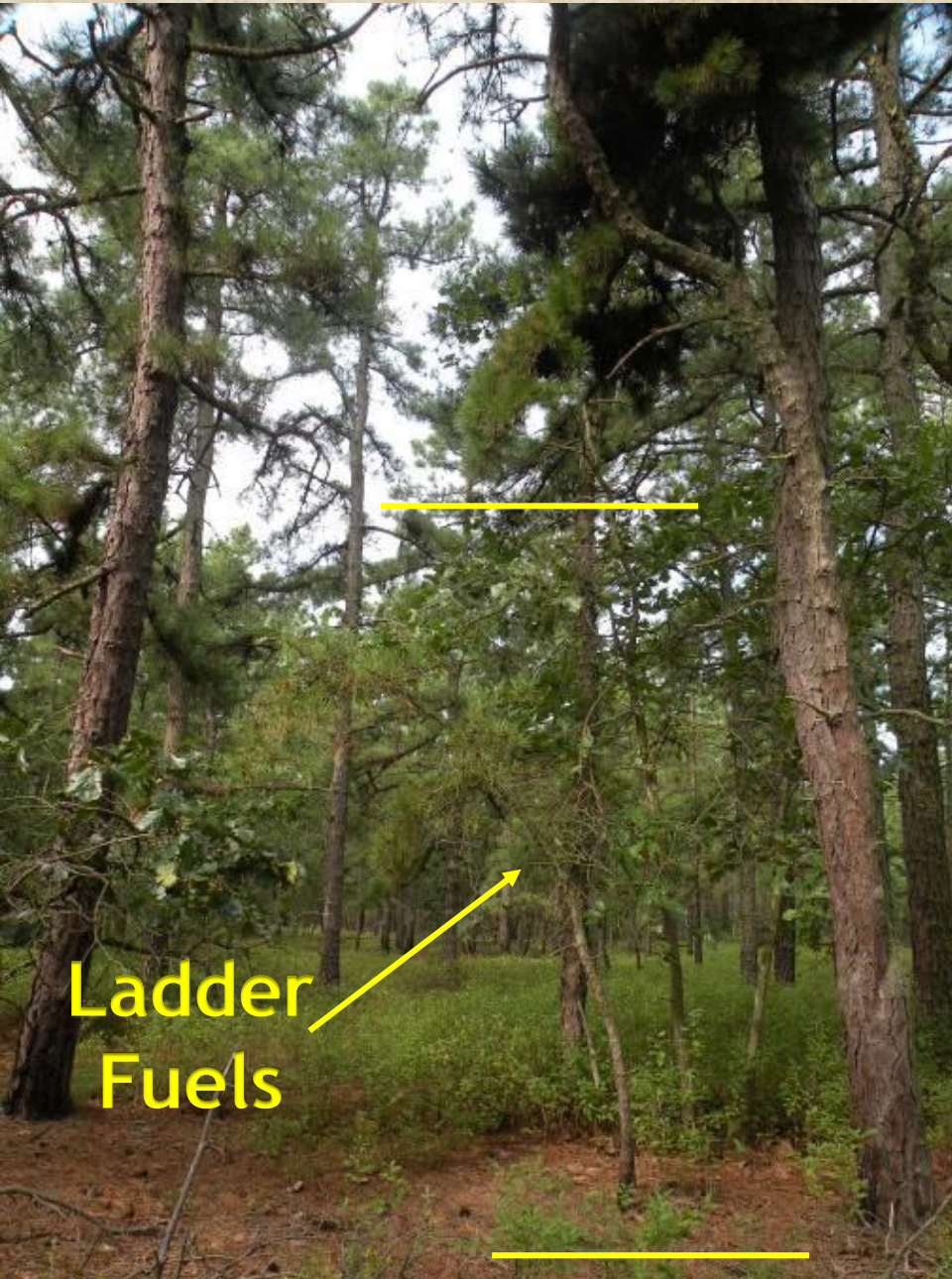


# "GOOD" FIRE!

Sustaining  
Solutions



# Sustaining Solutions



Ladder Fuels

A grid of seven red gasoline cans, each labeled "DANGER GASOLINE", "Extremely Flammable", "Vapors Can Explode", "5 Gal. 18.9L".

**New Jersey's Forestlands:**  
sequester the Carbon  
equivalent of seven 5-gallon  
gas cans worth of gasoline,  
per person, every year

Data Sources:  
USDA Forest Service FIA  
US Environmental Protection Agency

2018-07-05

# Sustaining Solutions



Utilization of **small**  
diameter products from  
**fuels treatment**

projects.  
United Wood Products,  
Boulder, Colorado, April  
2002,

Sustaining  
Solutions



# Sustaining Solutions



# Learning Goals Re-Cap

## **1. Existing Frameworks**

*build upon the works of others assessing forest carbon*

## **2. Profiles in Carbon**

*what does our forest carbon pool look like?*

## **3. Changes in Store**

*need to consider risks to carbon pools*

## **4. Sustaining Solutions**

*long-term problems require long-term solutions*



# Questions?



**William Zipse**

[Wiliam.Zipse@dep.nj.gov](mailto:Wiliam.Zipse@dep.nj.gov)

**Bernard Isaacson**

[Bernard.Isaacson@dep.nj.gov](mailto:Bernard.Isaacson@dep.nj.gov)

**Courtney Compton**

[Courtney.Compton@dep.nj.gov](mailto:Courtney.Compton@dep.nj.gov)

**Lauren Gazerwitz**

[Lauren.Gazerwitz@dep.nj.gov](mailto:Lauren.Gazerwitz@dep.nj.gov)

# Thank You!