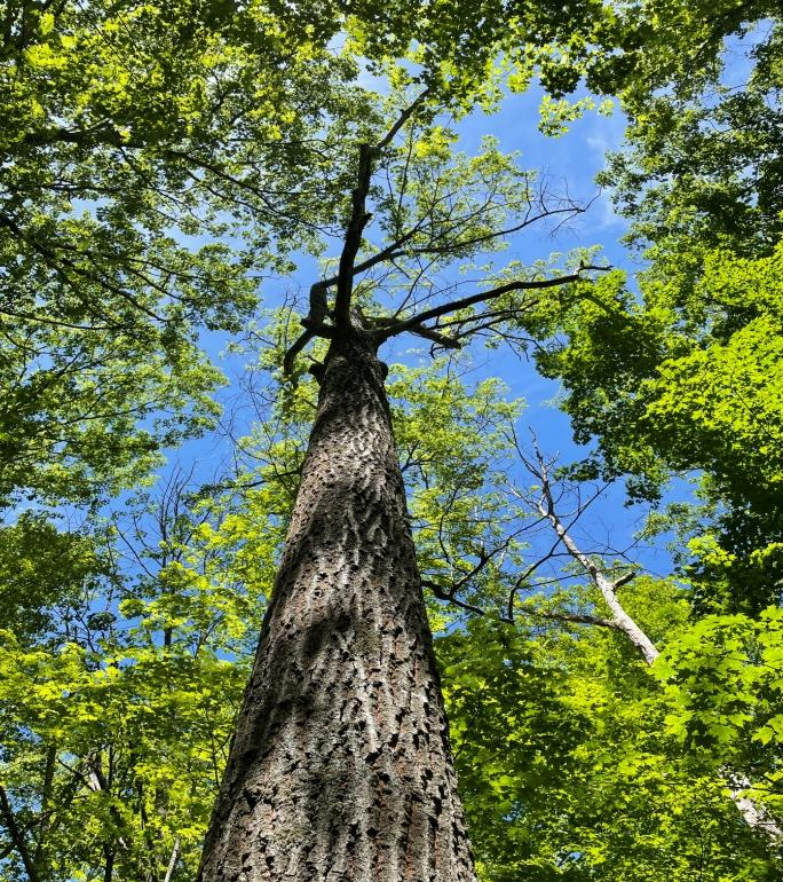
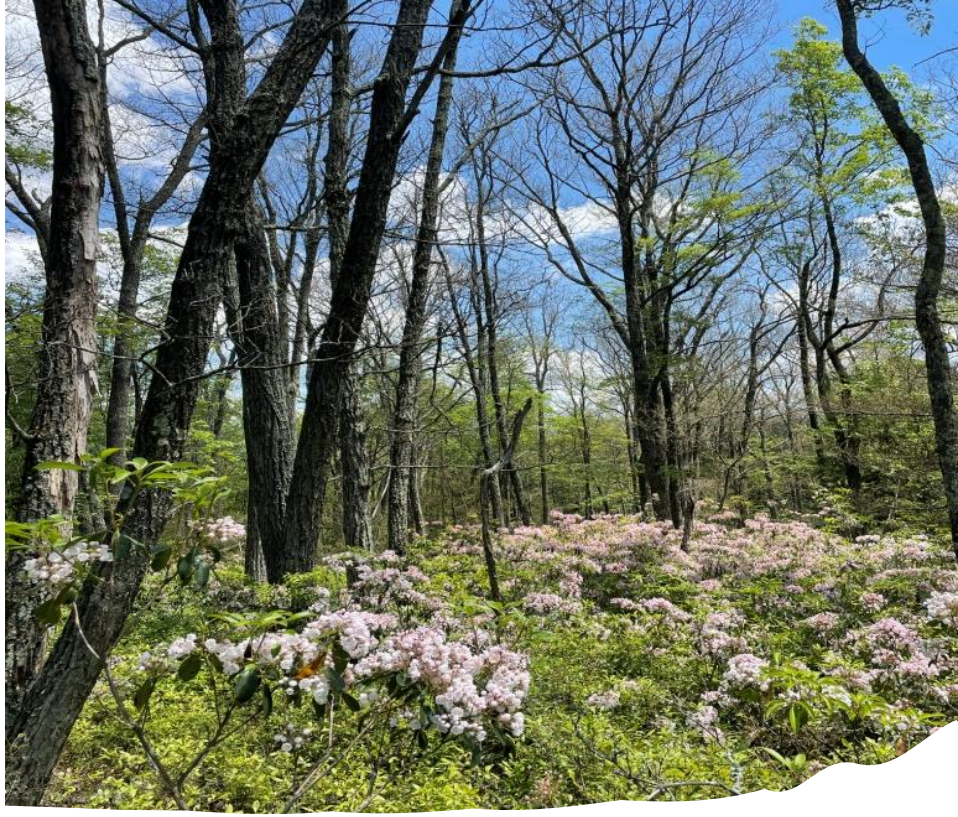




FOREST DECLINE DYNAMICS IN THE MID-ATLANTIC: OAK DECLINE AS A CASE STUDY

JILL ROSE, FOREST PATHOLOGIST

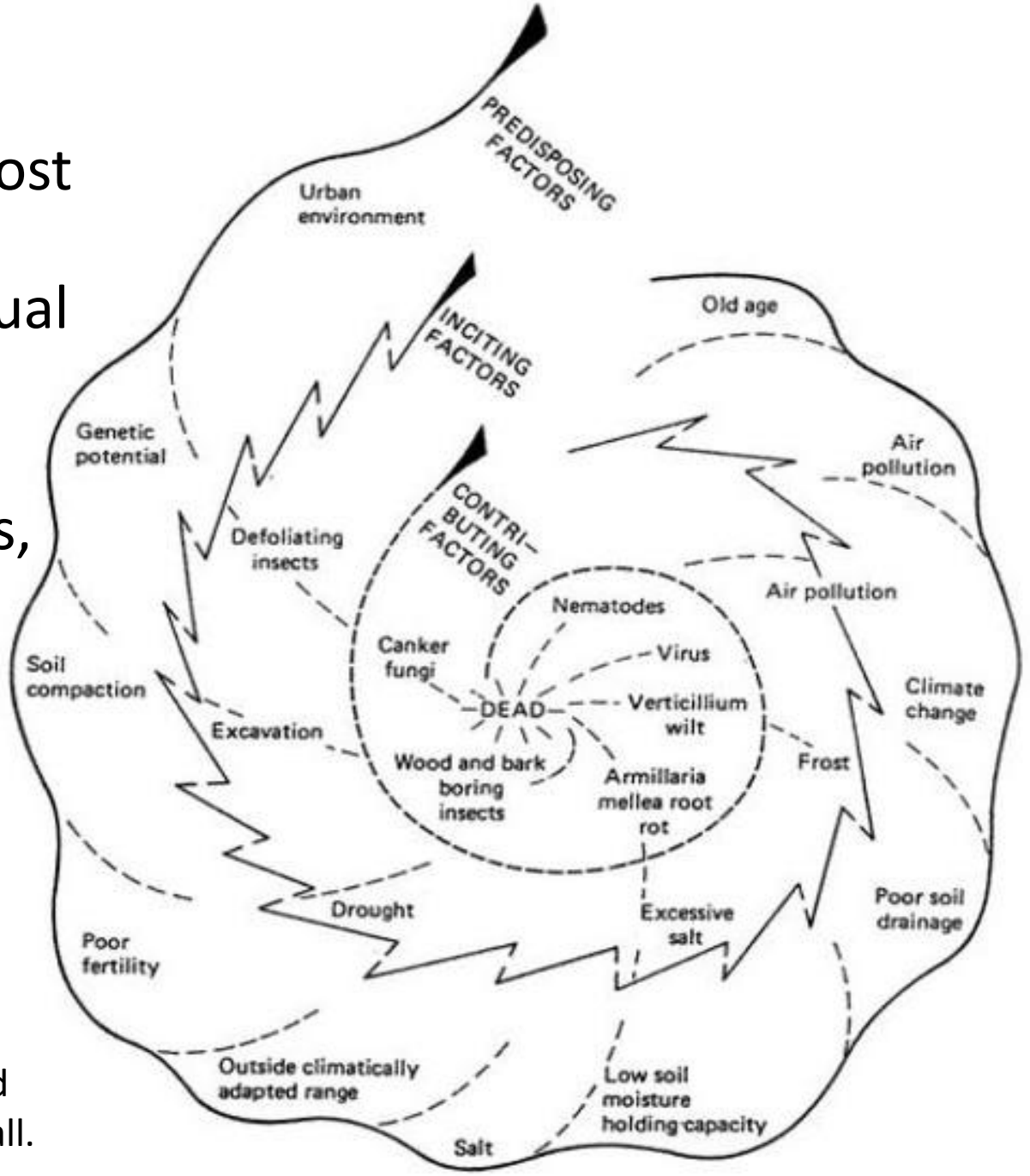
All photos by: Dino Aguire, DCNR

pennsylvania
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

The Manion Decline Spiral:

showing the 3 sets of stressors and most of the factors that could play a role in the complex that makes up an individual tree species decline.

Manion broadened the concept of predisposition to include age, genetics, and virus infection.



Manion PD. 1991. Tree Disease Concepts, 2nd ed. Englewood Cliffs, New Jersey: Prentice-Hall. 402 pp.

https://www.bayjournal.com/news/oaks-are-dying-at-record-rates-across-chesapeake-region/article_a29ee2d6-77f3-11ed-a8ec-dbc31fa09a3d.html

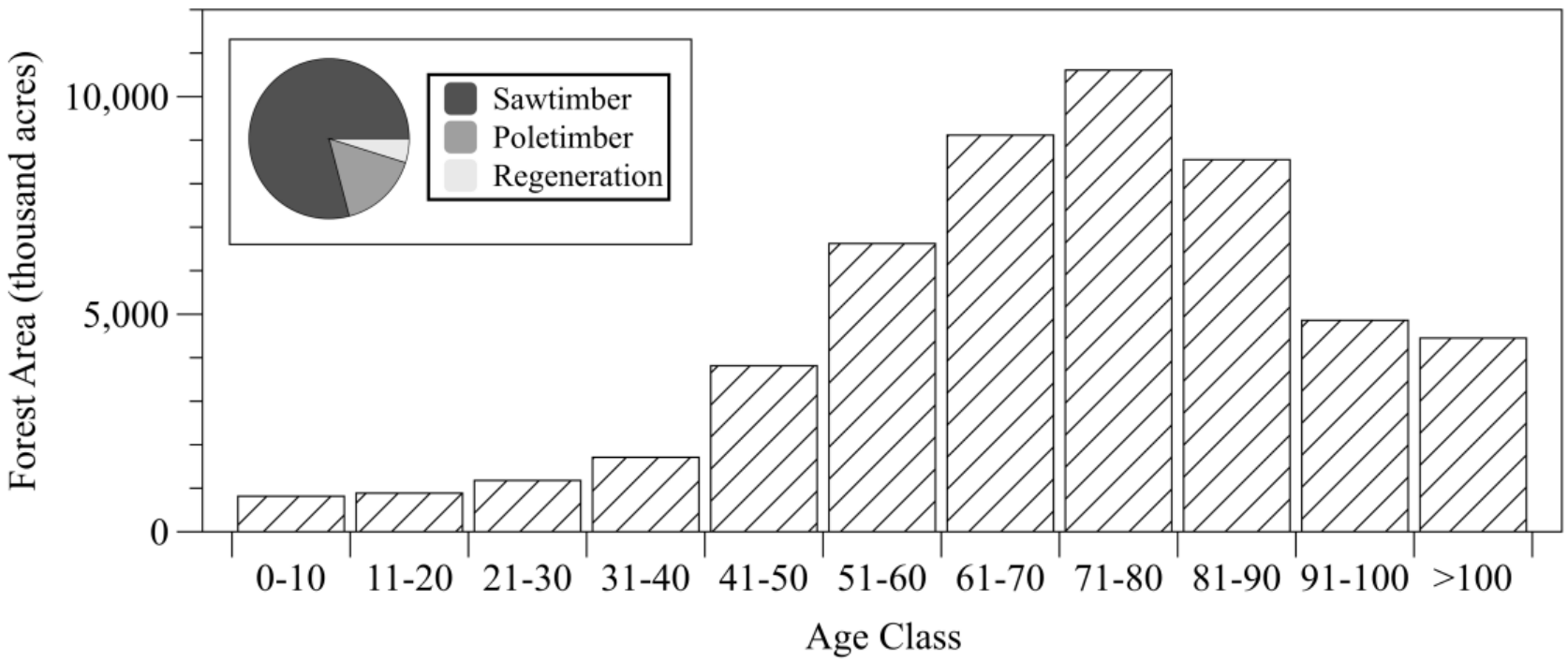
Oak Decline

In the Eastern United States

Historic disturbance regimes, chestnut blight, logging, and fire suppression have resulted in physiologically mature oak dominated forests in the eastern U.S.

Slide by Dr. Ryan Blaedow, Forest Health Protection, USFS

Oak Sustainability "Bottleneck" – Regional Scale



Forest Inventory and Analysis plot network within AL, AR, DE, GA, IL, IN, IA, KY, MA, MI, MN, MO, MS, NC, NJ, OH, PA, SC, TN, VA, WI, WV (USDA Forest Service - Forest Inventory and Analysis Program 2019)

- Oak decline (or tree decline in general) is a stress-mediated disease which is a slow-acting complex that involves the interaction of biotic and abiotic factors such as climate, site quality and advancing tree age.

- Oak decline occurs in both red oak species, and white oak and can occur in both forested and urban settings.

Joseph Obrien and Brian Lockhart, USDA Forest Service, Bugwood.org
and

- **What Are the Symptoms?**

Crown Dieback: Progressive loss of leaves starting from the branch tips of the upper crown.

Foliage Issues: Sparse, undersized, or yellowing (chlorotic) leaves.

Epicormic Growth: New sprouts emerging along the trunk and main branches.

Off-Season Changes: Early autumn coloring and brown leaves that fail to drop.

Predisposing Factors

- ✓ Soil Depth
- ✓ Soil Texture
- ✓ Nutrient Deficiency
- ✓ Slope
- ✓ Aspect
- ✓ Physiological Age
- ✓ Stocking Levels
- ✓ Competition

Inciting Factors

- ✓ Drought
- ✓ Defoliation
- ✓ Late Spring Frosts
- ✓ Flooding
- ✓ Fire
- ✓ Construction Injury
- ✓ Wind
- ✓ Hail

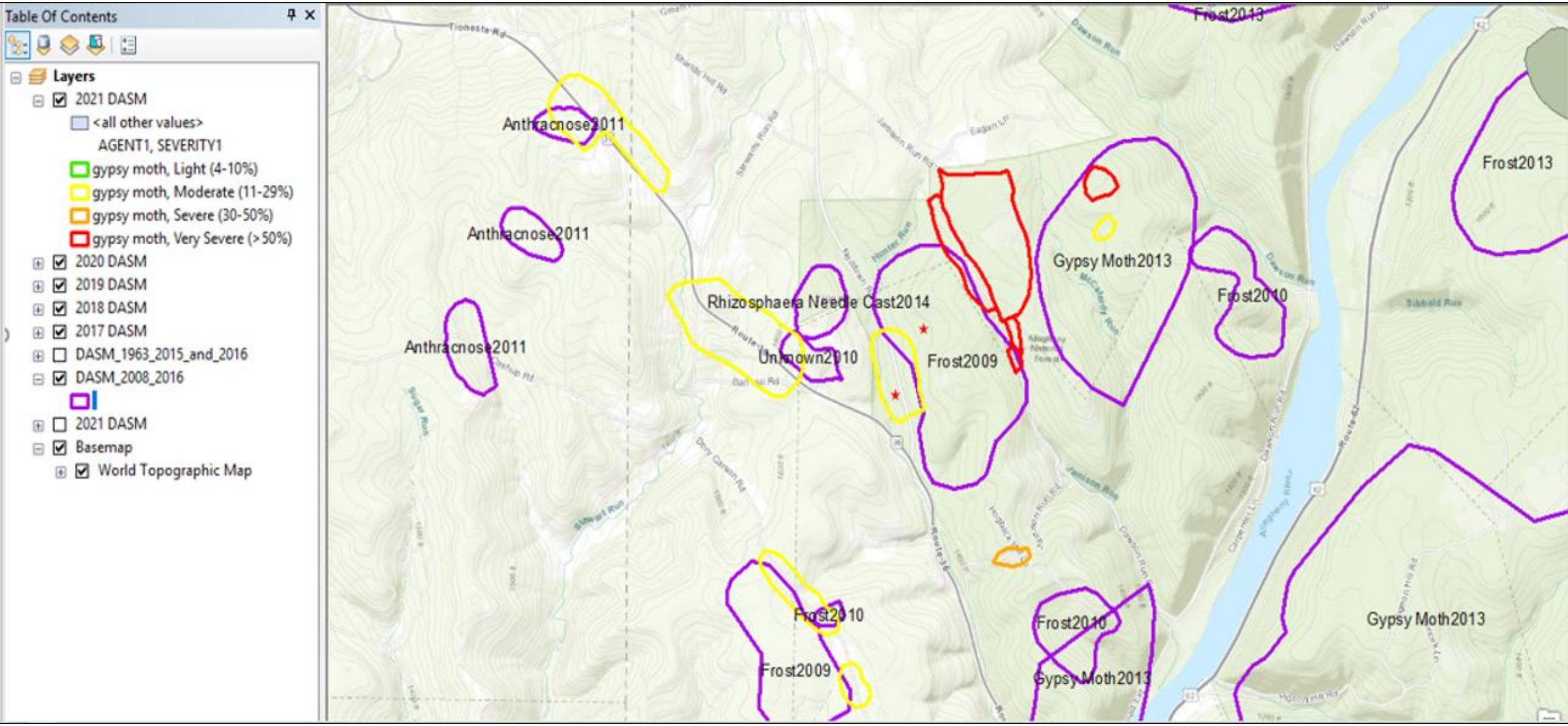
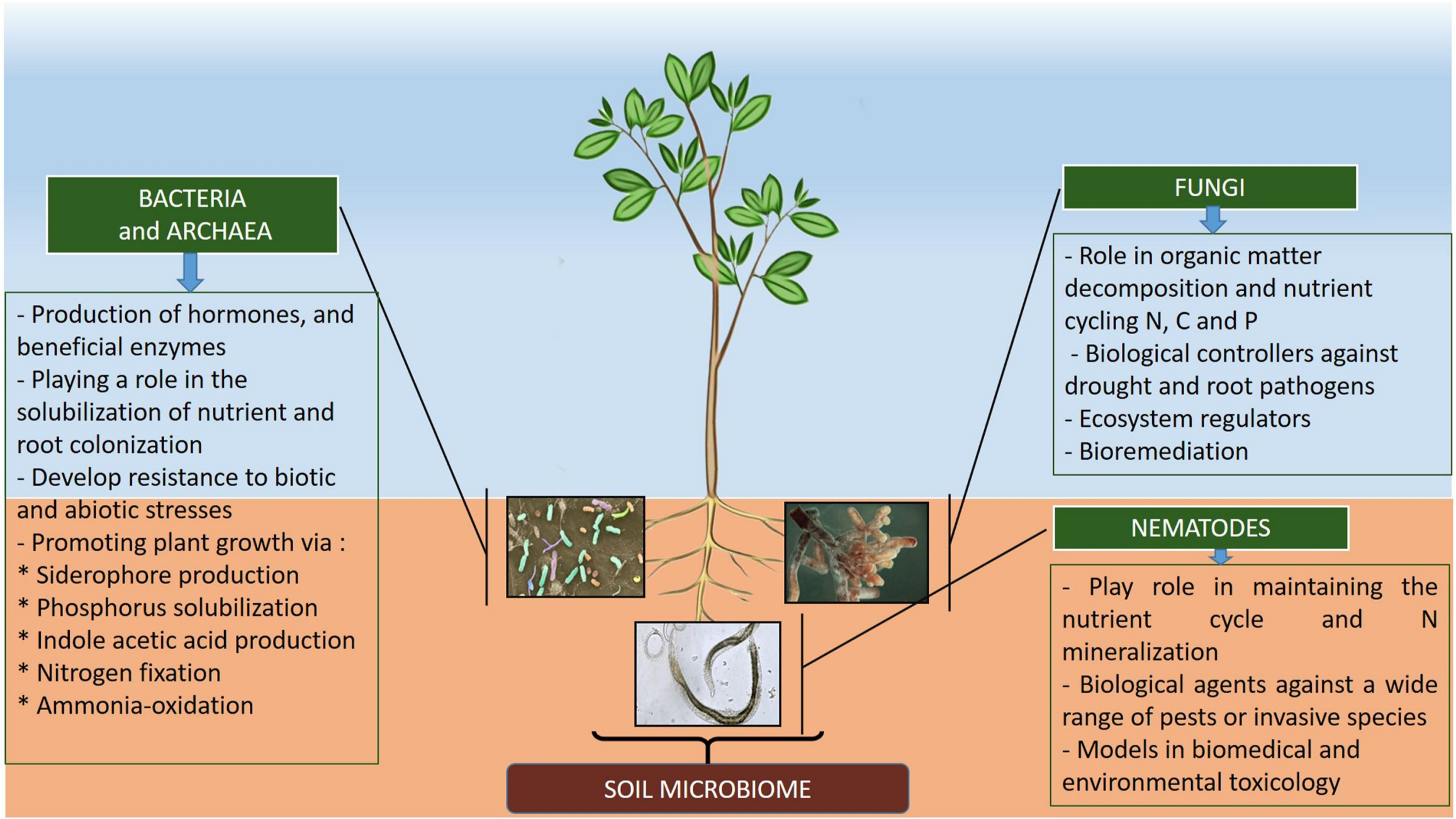


Table Of Contents
Layers
2021 DASM
<all other values>
AGENT1, SEVERITY1
gypsy moth, Light (4-10%)
gypsy moth, Moderate (11-29%)
gypsy moth, Severe (30-50%)
gypsy moth, Very Severe (>50%)
2020 DASM
2019 DASM
2018 DASM
2017 DASM
DASM_1963_2015_and_2016
DASM_2008_2016
2021 DASM
Basemap
World Topographic Map
Anthracnose2011
Anthracnose2011
Anthracnose2011
Rhizosphaera Needle Cast2014
Unknown2010
Frost2009
Frost2009
Frost2010
Frost2010
Gypsy Moth2013
Frost2010
Frost2013
Frost2013
Gypsy Moth2013
Gypsy Moth2013

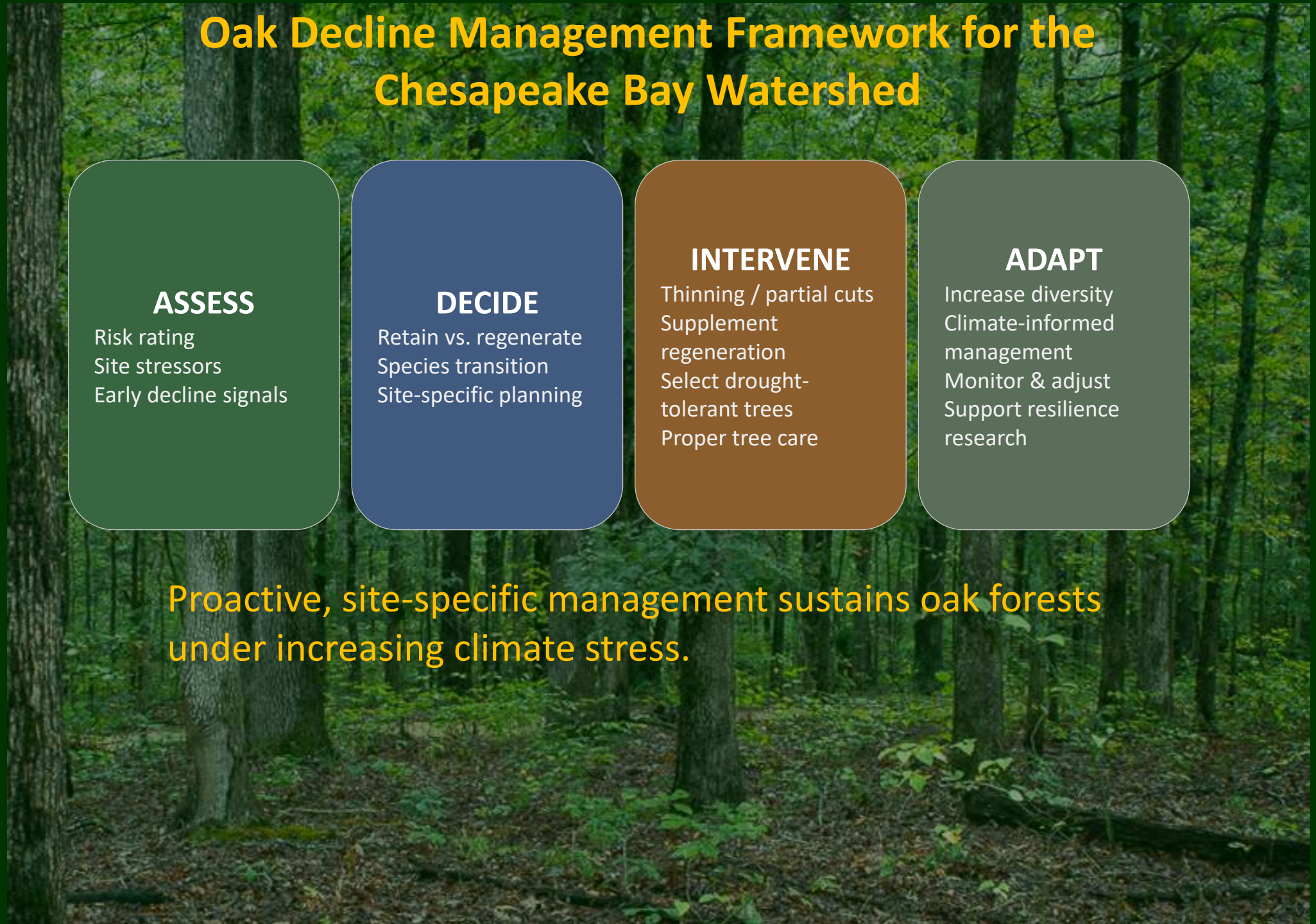
Contributing Factors

- ✓ Armillaria Root Disease
- ✓ Hypoxylon Canker
- ✓ Red Oak Borer
- ✓ Two Lined Chestnut Borer
- ✓ Bacterial Leaf Scorch



Lahlali et al., 2021

Oak Decline Management Framework for the Chesapeake Bay Watershed



ASSESS

Risk rating
Site stressors
Early decline signals

DECIDE

Retain vs. regenerate
Species transition
Site-specific planning

INTERVENE

Thinning / partial cuts
Supplement regeneration
Select drought-tolerant trees
Proper tree care

ADAPT

Increase diversity
Climate-informed management
Monitor & adjust
Support resilience research

Proactive, site-specific management sustains oak forests under increasing climate stress.

Questions?

jirose@pa.gov
717-514-6712