Major Stressors to Forest Health in the Chesapeake Bay Watershed

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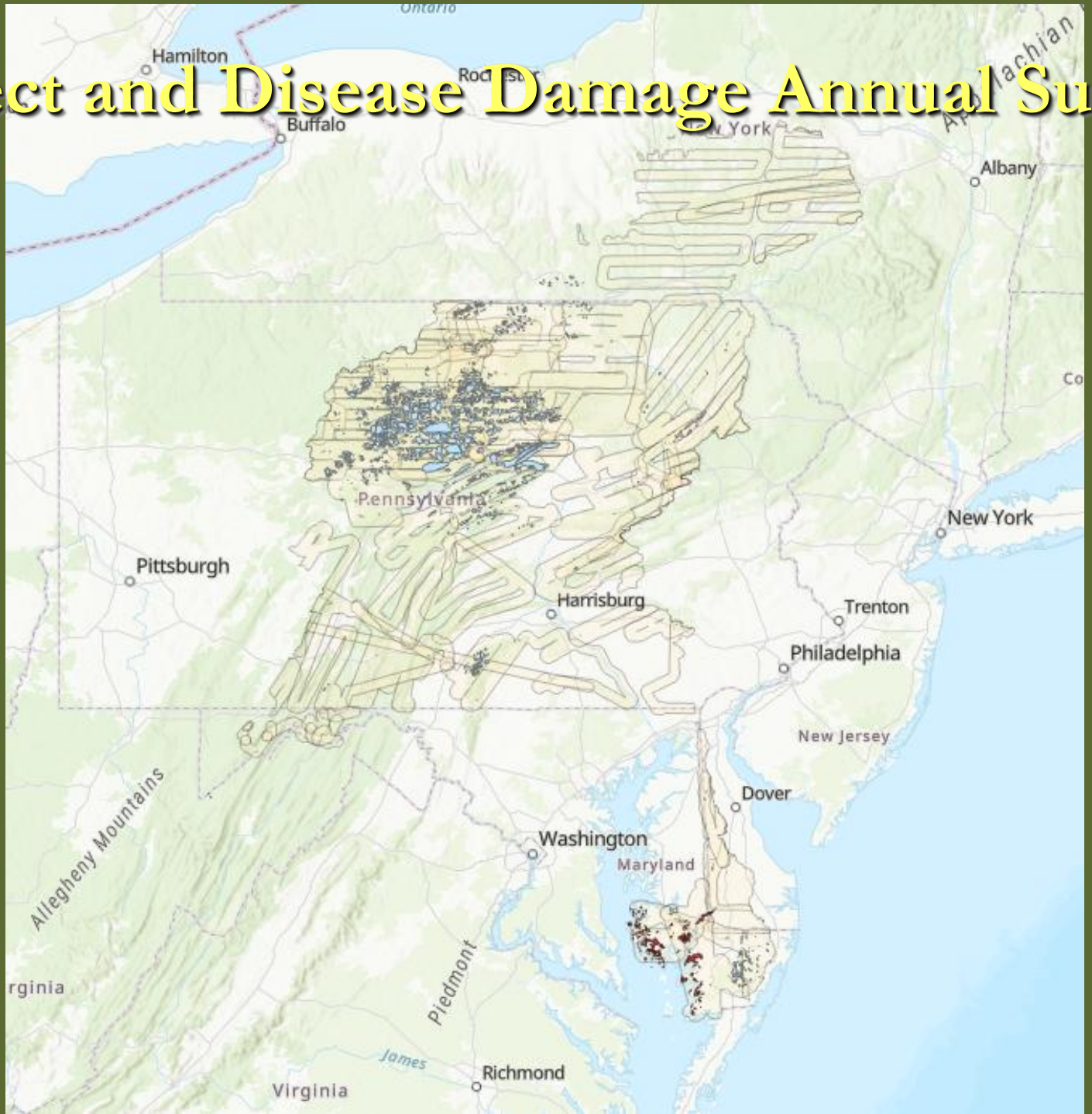
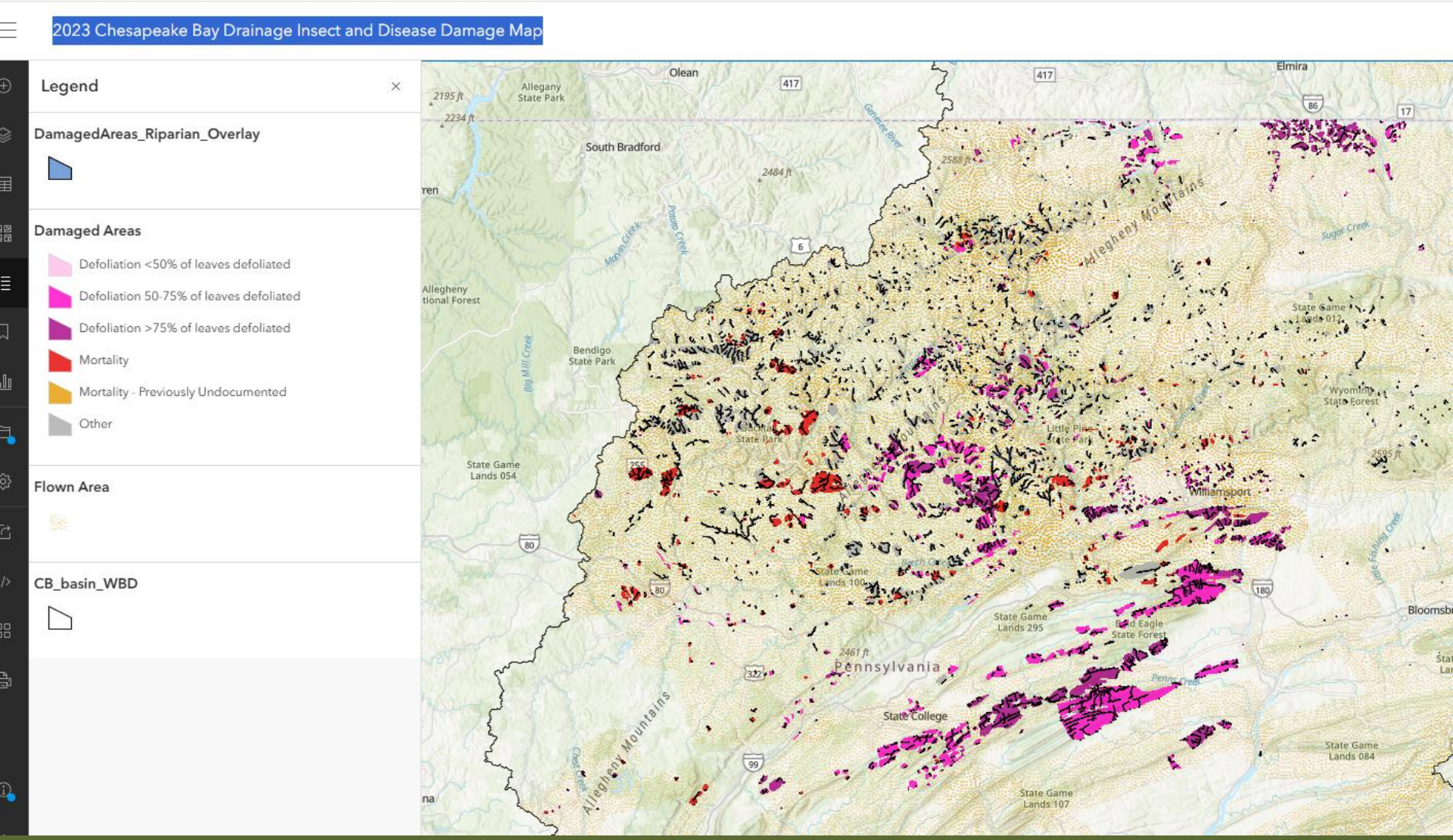
Major Forest Stressors

- Insects and Diseases
- Invasive Plants
- Excessive Deer Browse
- Environmental conditions (weather patterns, acid rain, etc.)
- Abiotic Disturbances (hurricanes, ice storms, etc.)
- Fragmentation
- Changing Disturbance Regimes
- Management Impacts (Harvest impacts, BMPs)

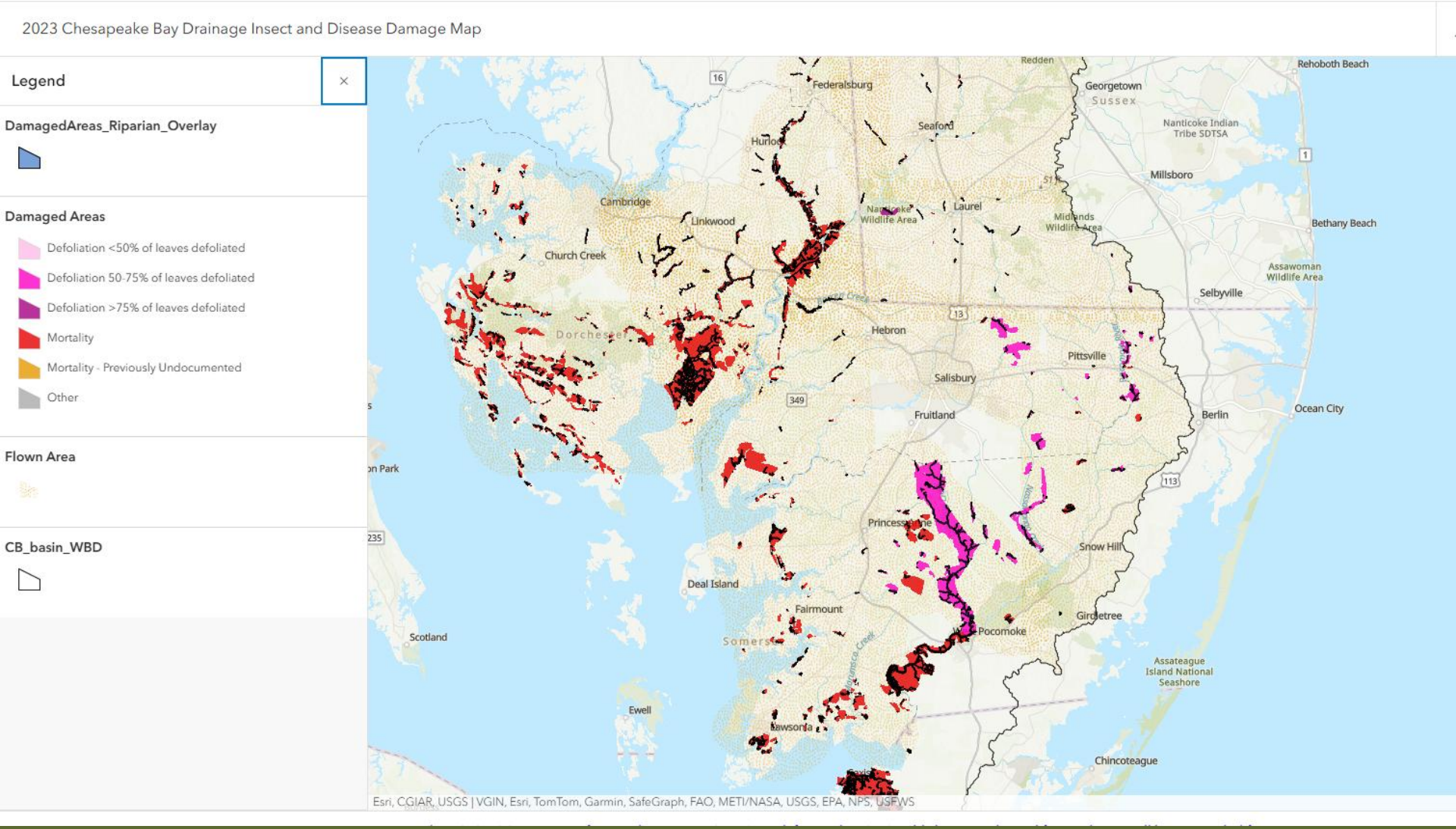
Insect and Disease Damage Annual Survey



2023 Forest Disturbance in PA

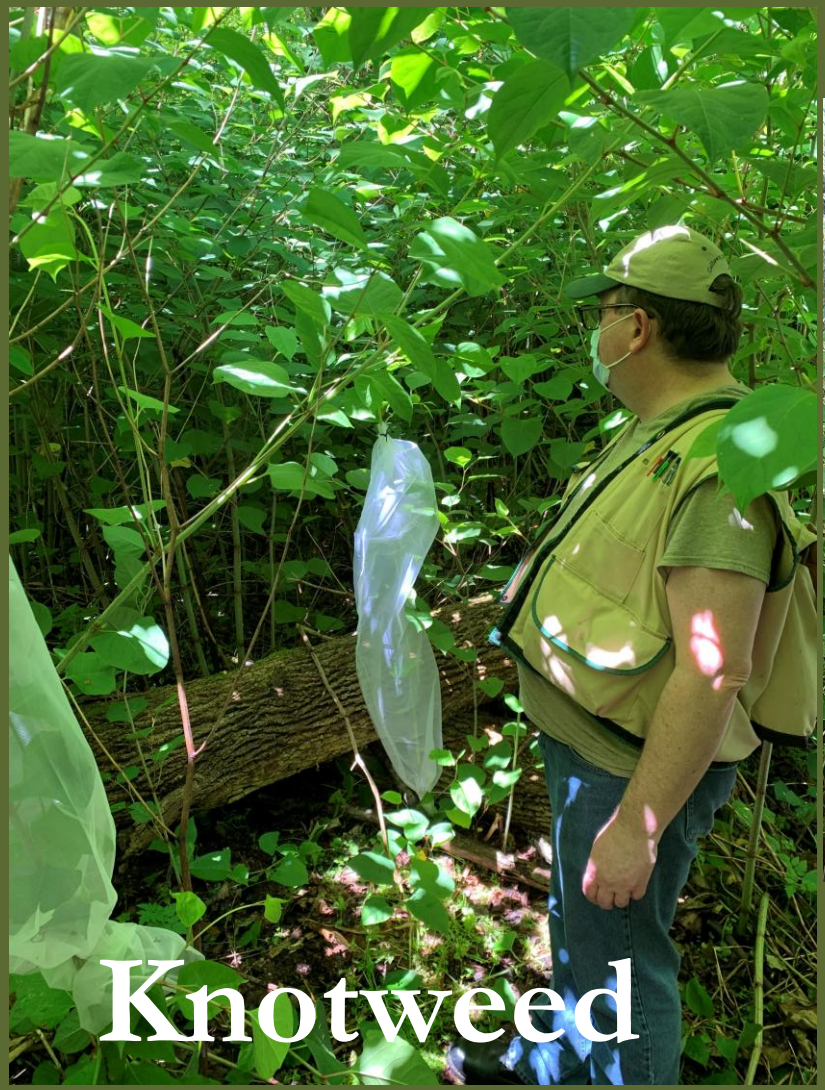


Saltwater Intrusion Caused Mortality

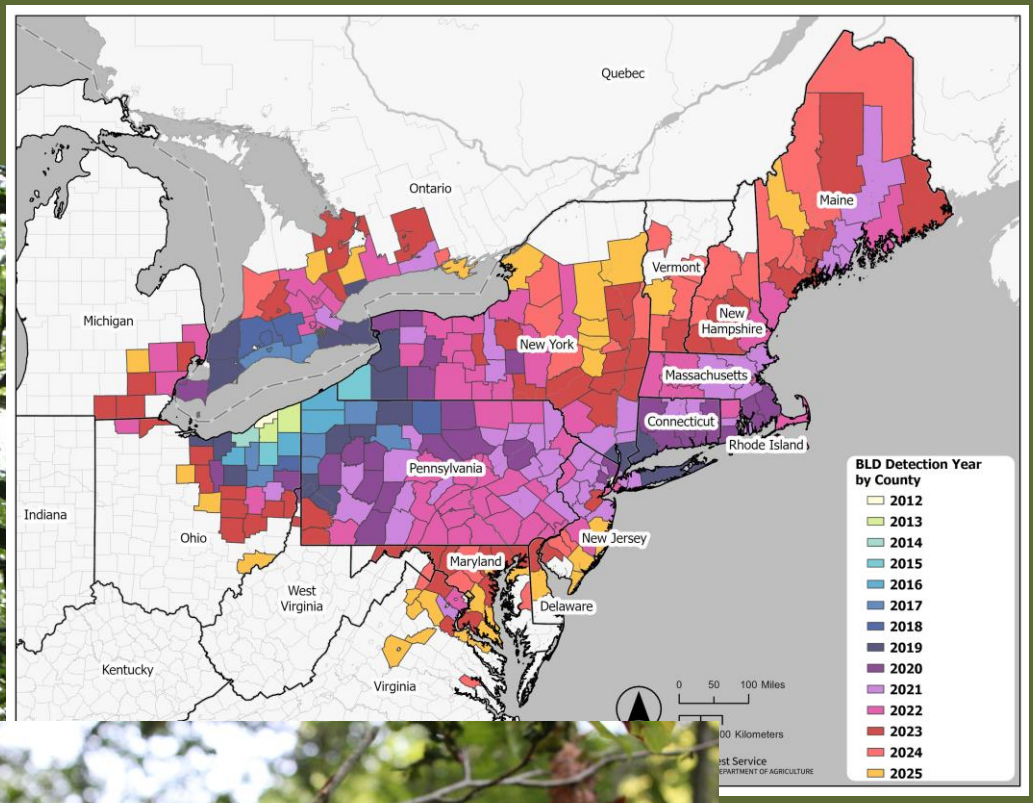


Hemlock Woolly Adelgid

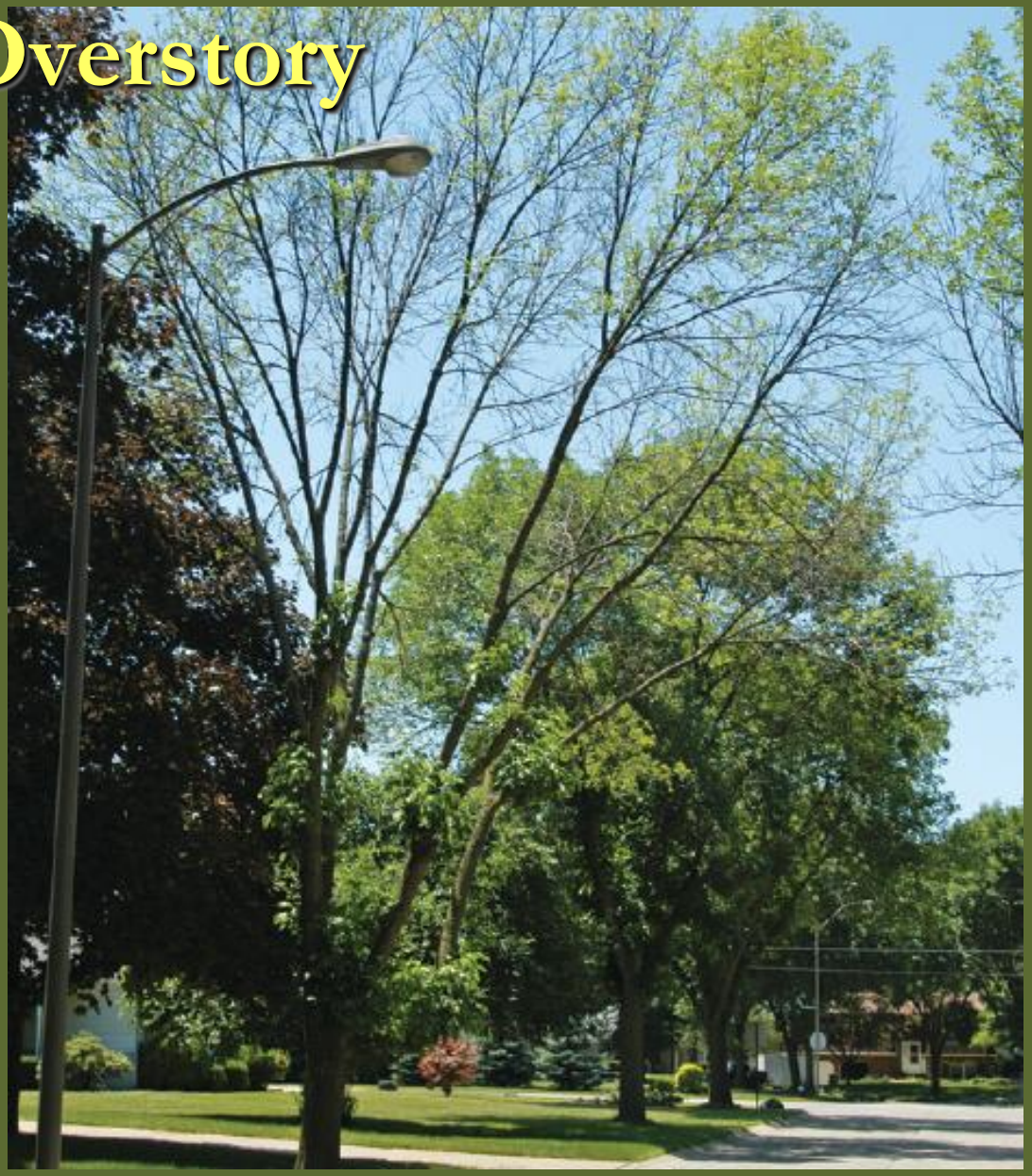
Invasive Plants



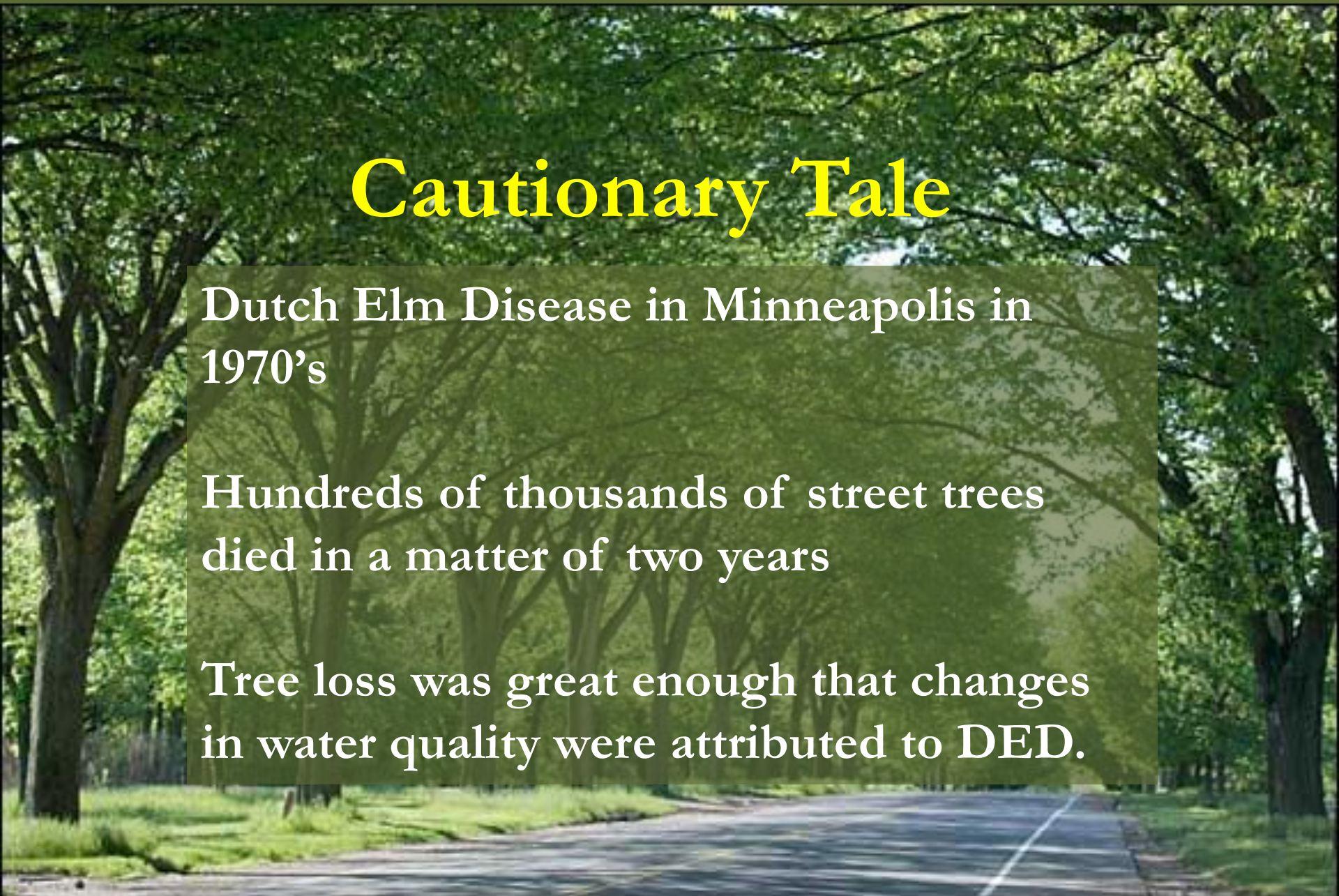
Beech Leaf Disease



Emerald Ash Borer/Loss of Ash Overstory



Dutch Elm Disease



Cautionary Tale

Dutch Elm Disease in Minneapolis in 1970's

Hundreds of thousands of street trees died in a matter of two years

Tree loss was great enough that changes in water quality were attributed to DED.

Early Season Defoliators

The following effects emphasize the large destabilizing potential that severe outbreaks of leaf-eating insects may have on an ecosystem:

(1) conversion of leaf tissue to CO_2, insect biomass, and frass;

(2) increased output of stream water, the chief vehicle for removing nutrients;

(3) decreased uptake of nutrients by green plants, perhaps leading to increased nutrient concentrations in soil and stream water;

(4) more radiant energy flow to the forest floor;

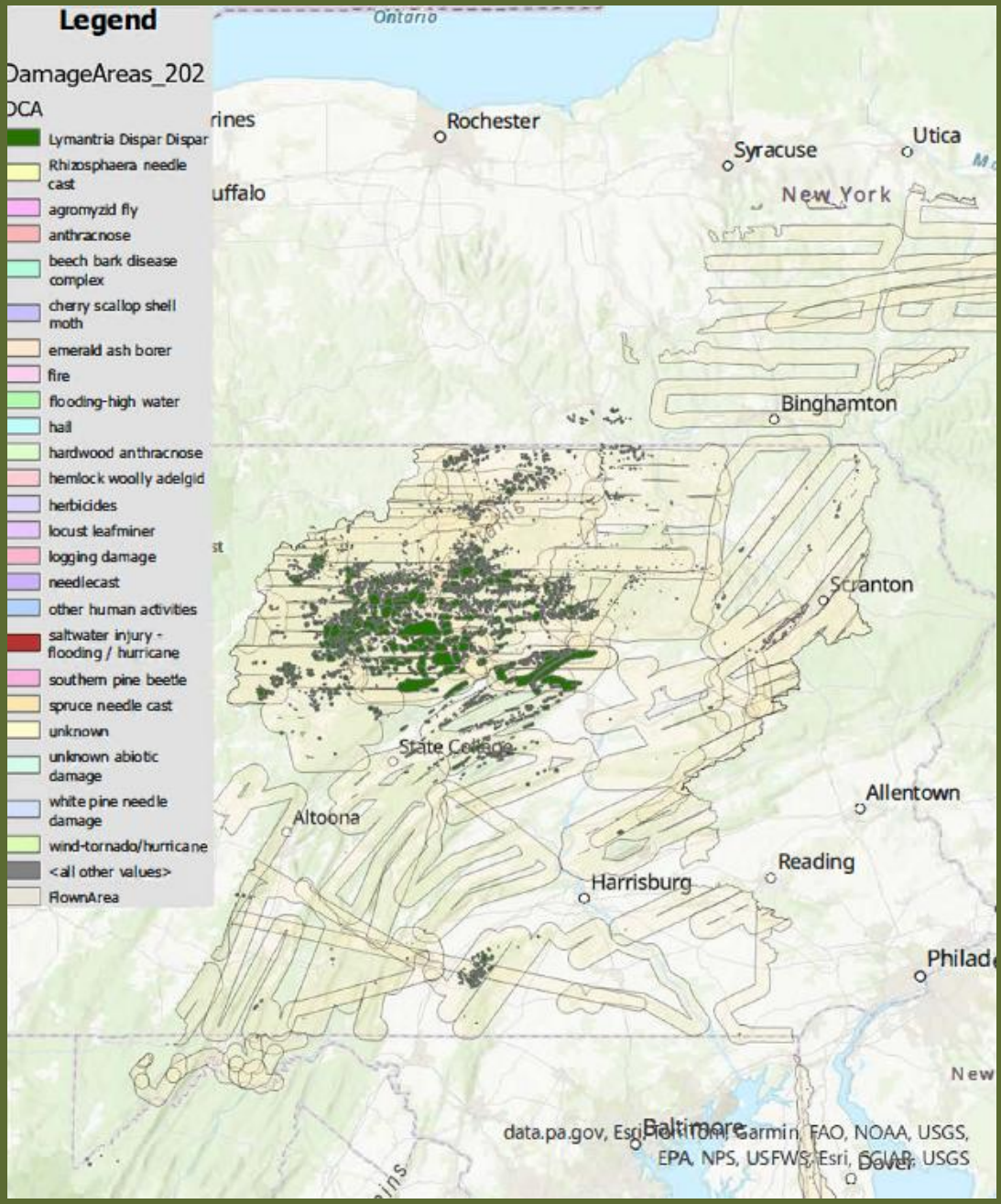
(5) increased transfer of living biomass to dead organic matter; and

(6) possible alterations in microbiologic activities in the soil leading to increased nitrification.

Production may be temporarily lowered, and the system may become more open in terms of stream-water and nutrient loss. Not only does defoliation affect major aspects of the system's biogeochemistry, but the detrital cycle also must be affected (Bormann and Likens 1979).

2022 Spongy Moth Defoliation

Damage Type	ACRES
Defoliation <50% of leaves defoliated	5
Defoliation >75% of leaves defoliated	491,283
Defoliation 50-75% of leaves defoliated	223,332
Mortality	15,158
Grand Total	729,779



Fall Cankerworm


2025 Fall Cankerworm Outbreak Near Dolly Sods
Wilderness, WV

Spongy Moth Treatments

- Cost share program (USFS and States) exists to spray large areas to reduce defoliation levels
- PA typically has some of the largest spray programs – up to 300,000 acres in recent years.
- Populations are primarily aerially suppressed with:
  - Btk
  - Insect Growth Regulator

Forest Management Impacts

Aust and Blinn (2004) in review paper conclude:

- Timber harvest reduces transpiration and increases water yield during growing season
- As vegetation recovers, transpiration increases, and bare soil in covered (generally 2-5 years post harvest), water quality and quantity recovers
- When site prep increases exposure of bare soil and removes vegetation, it accentuates water quality problems
- Most water quality problems associated with forest harvesting are actually caused by poorly designed and constructed roads and skid trails, inadequate closure of roads and skid trails, stream crossings, excessive exposure of bare soil, or lack of adequate streamside management zones