



# **Forest Health Monitoring in the USA**

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# Forest Inventory and Analysis (FIA)

## *Mission:*

To conduct forest inventories of the United States to estimate:

- the extent (area) of forest land
- the volume, growth, and removal of forest resources
- the health and condition of the forest

# FIA: A 3-phase program

## *Phase 1:*

Entails use of remotely sensed data to stratify land areas with the objective of increasing precision

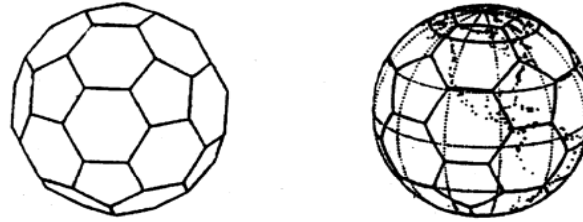
## *Phase 2:*

Entails field crew visits to locations of plots to measure mensurational variables

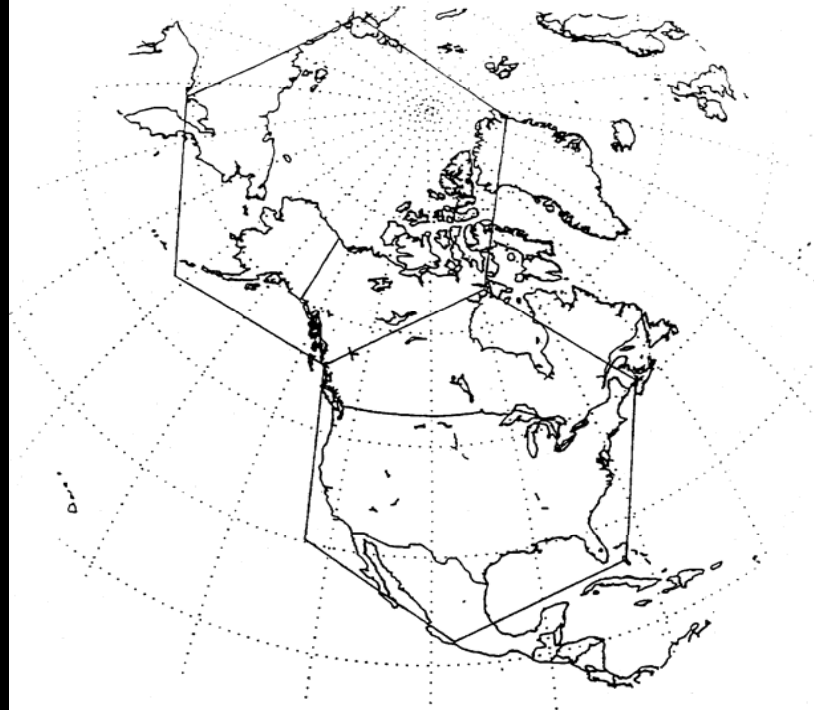
## *Phase 3:*

Entails field crew measurements of variables related to the health of the forest

# The FIA sampling design



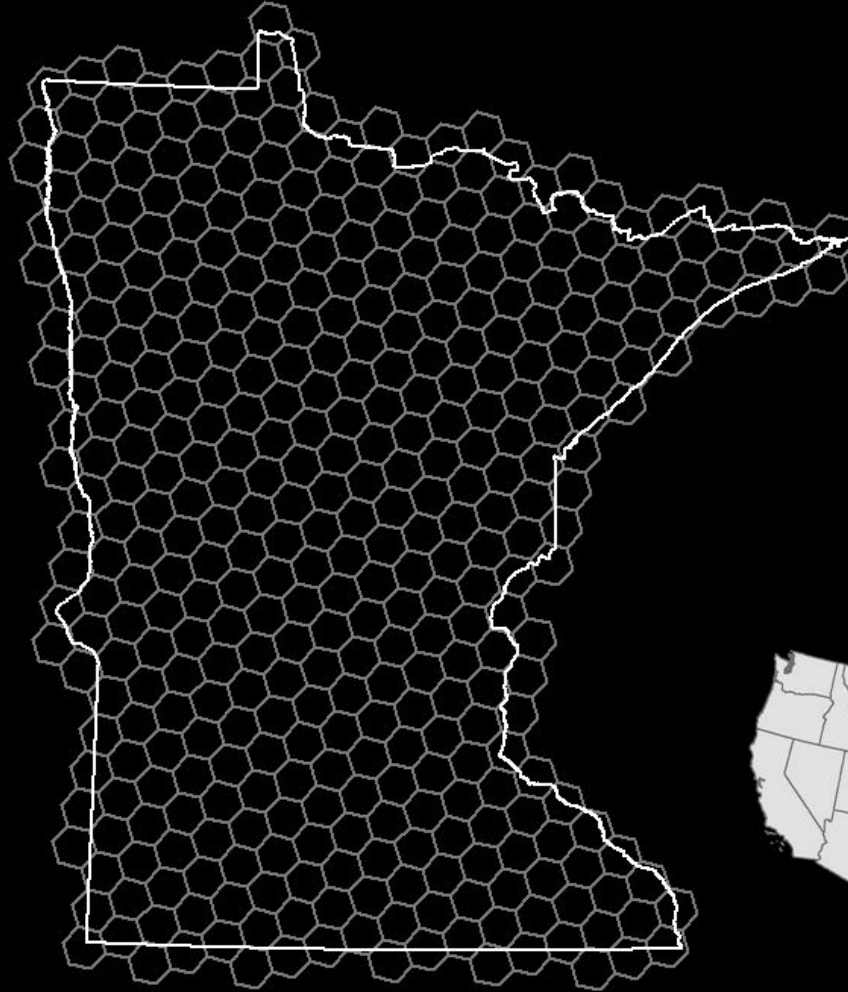
Truncated Icosahedron



Hexagons of the truncated icosahedron covering North America.

*With thanks to:  
Tony Olsen  
US EPA*

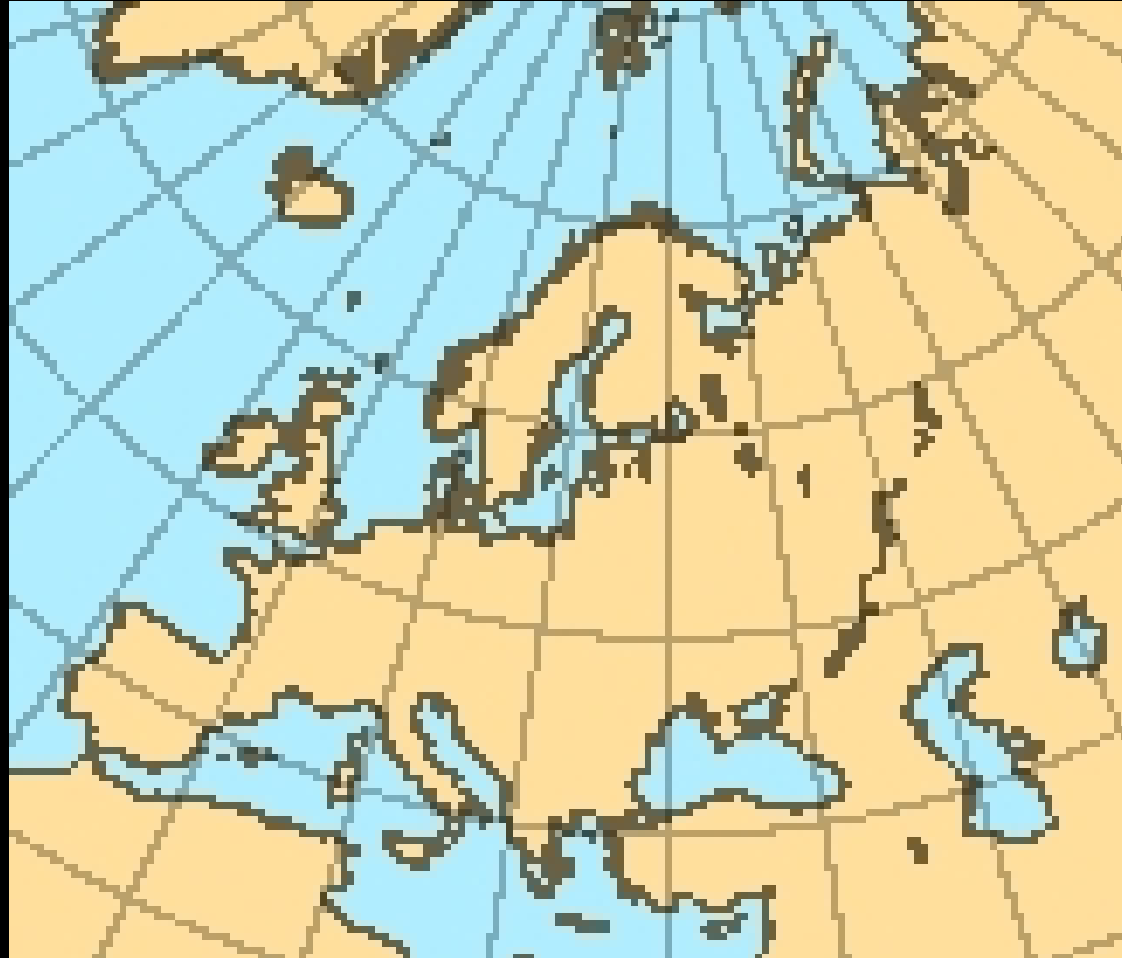
# Phase 3 hexagons (38,400 ha)



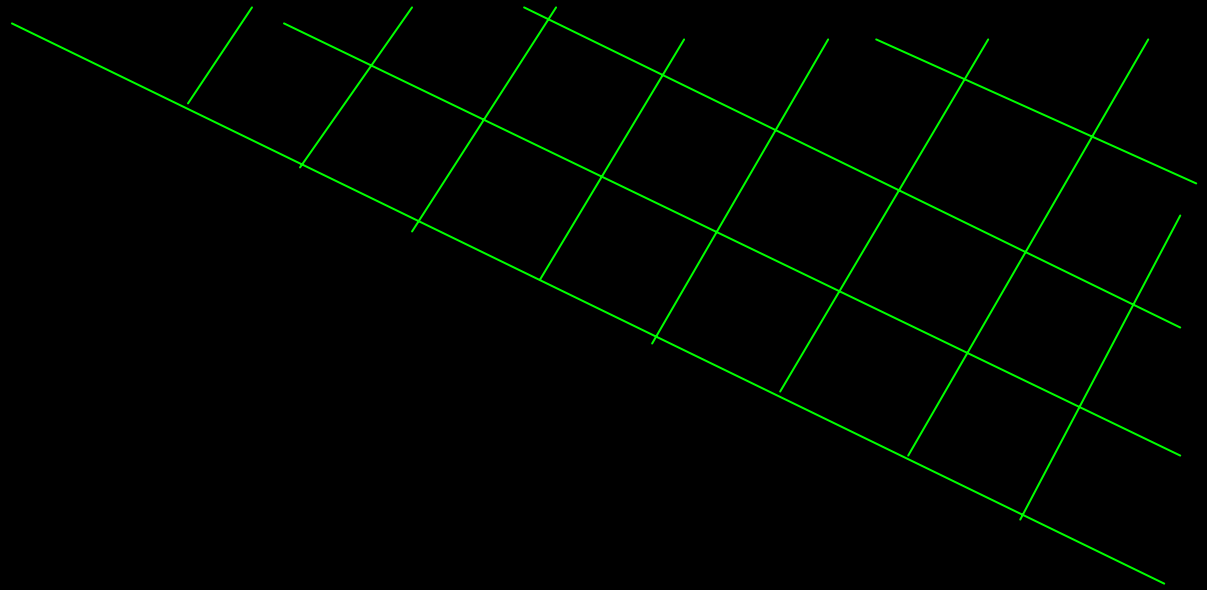
# Why use a sampling design based on hexagons?

1. The latitude problem
2. Preserving existing plots

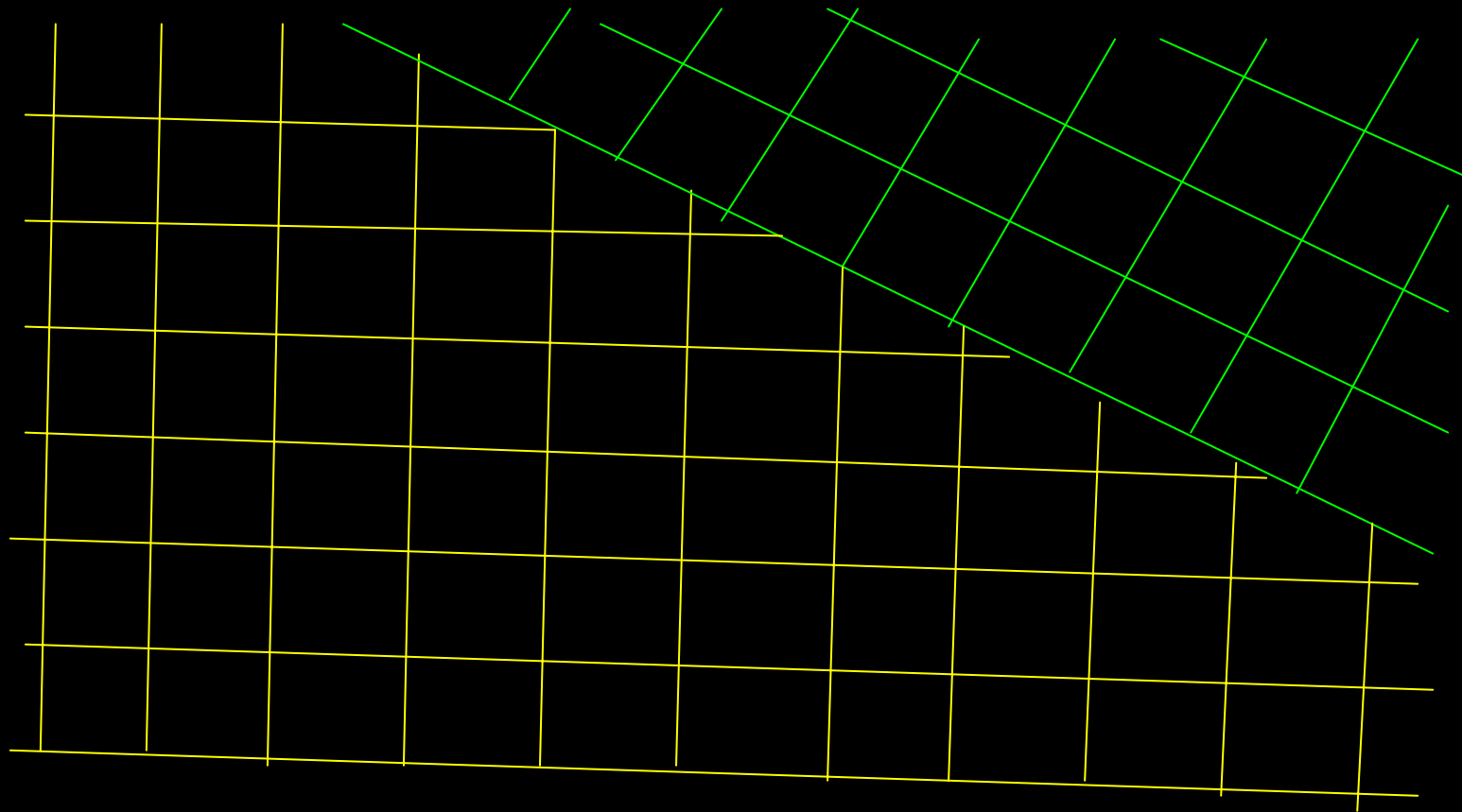
# The latitude problem



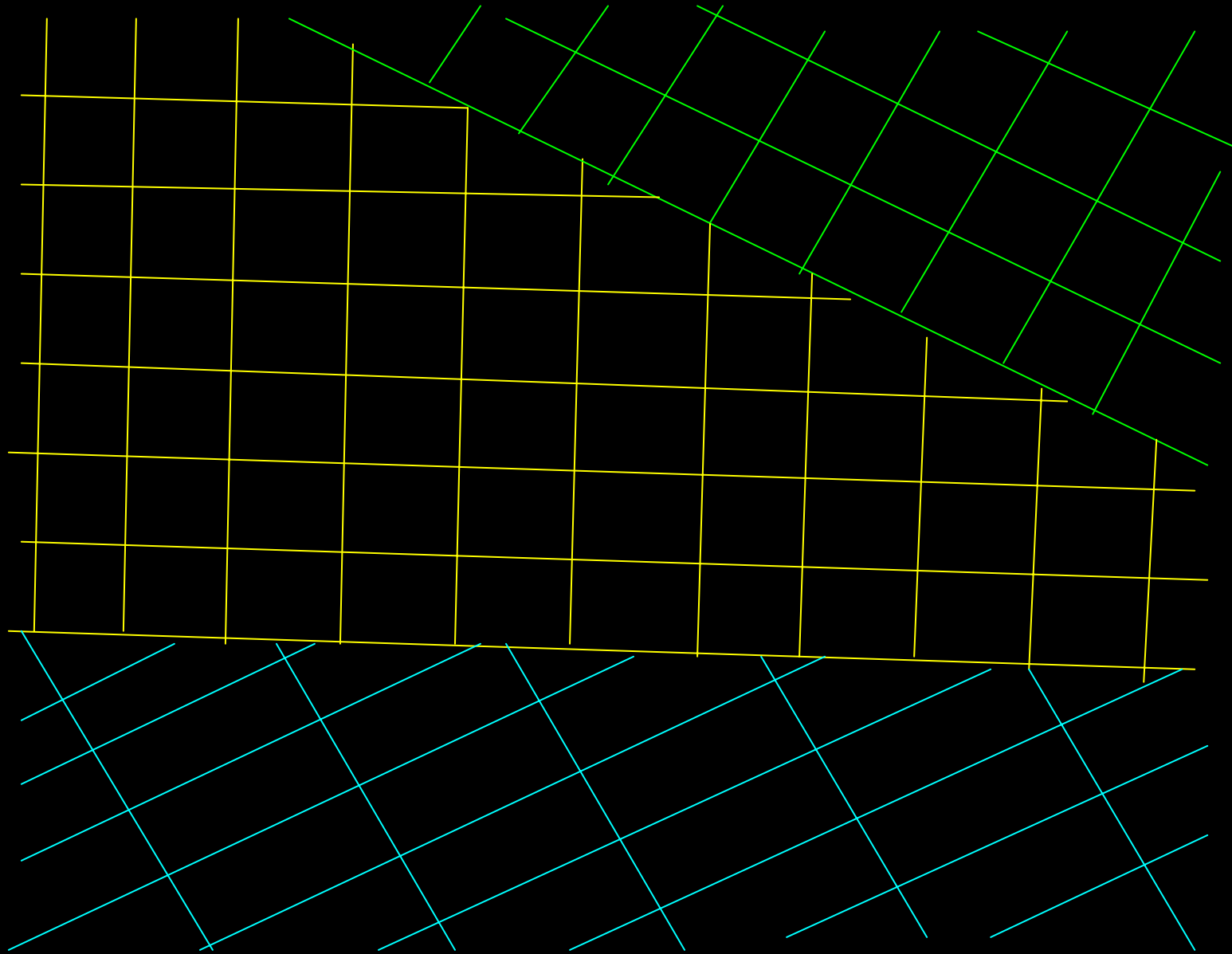
# Preserving plots



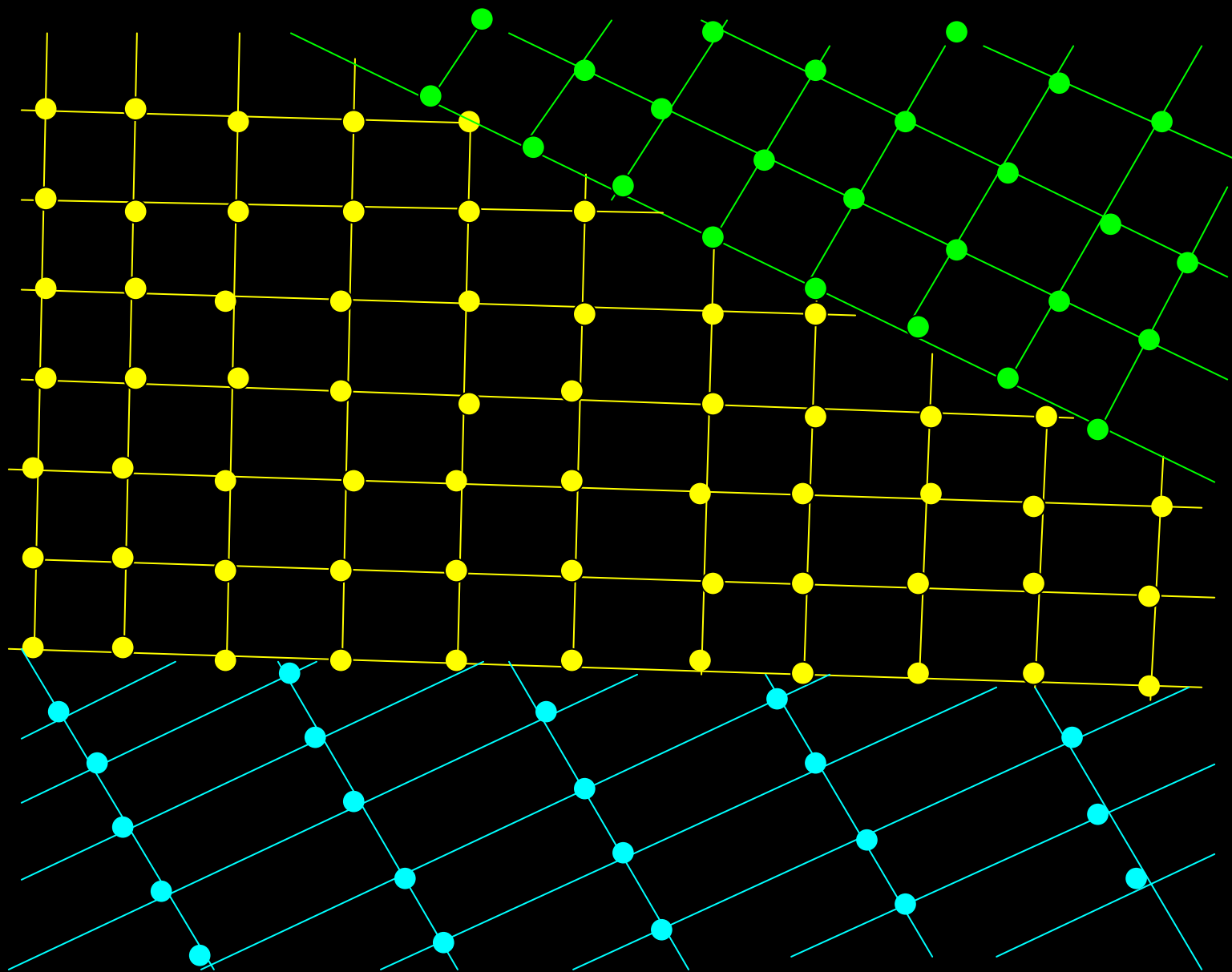
# Preserving plots



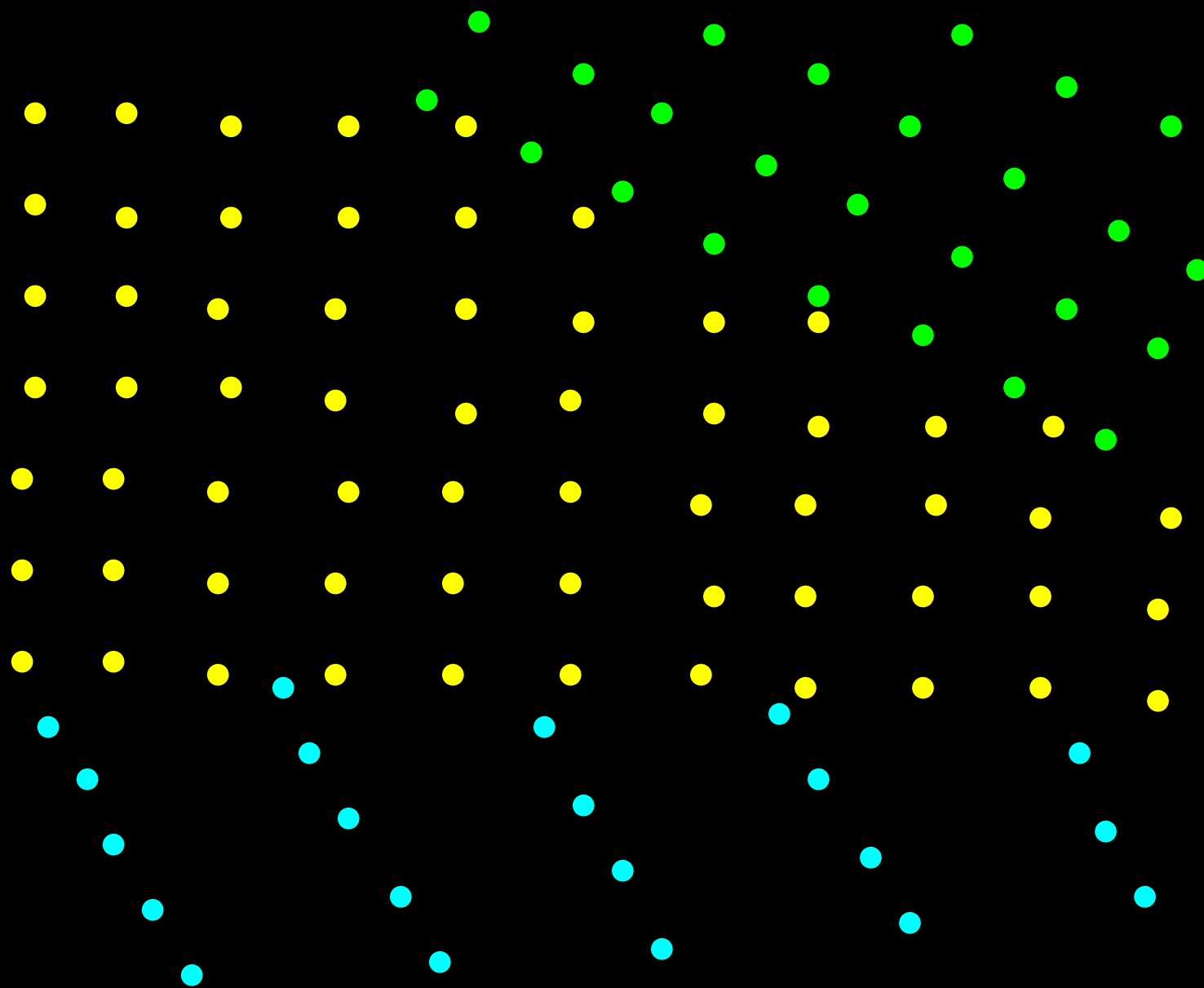
# Preserving plots



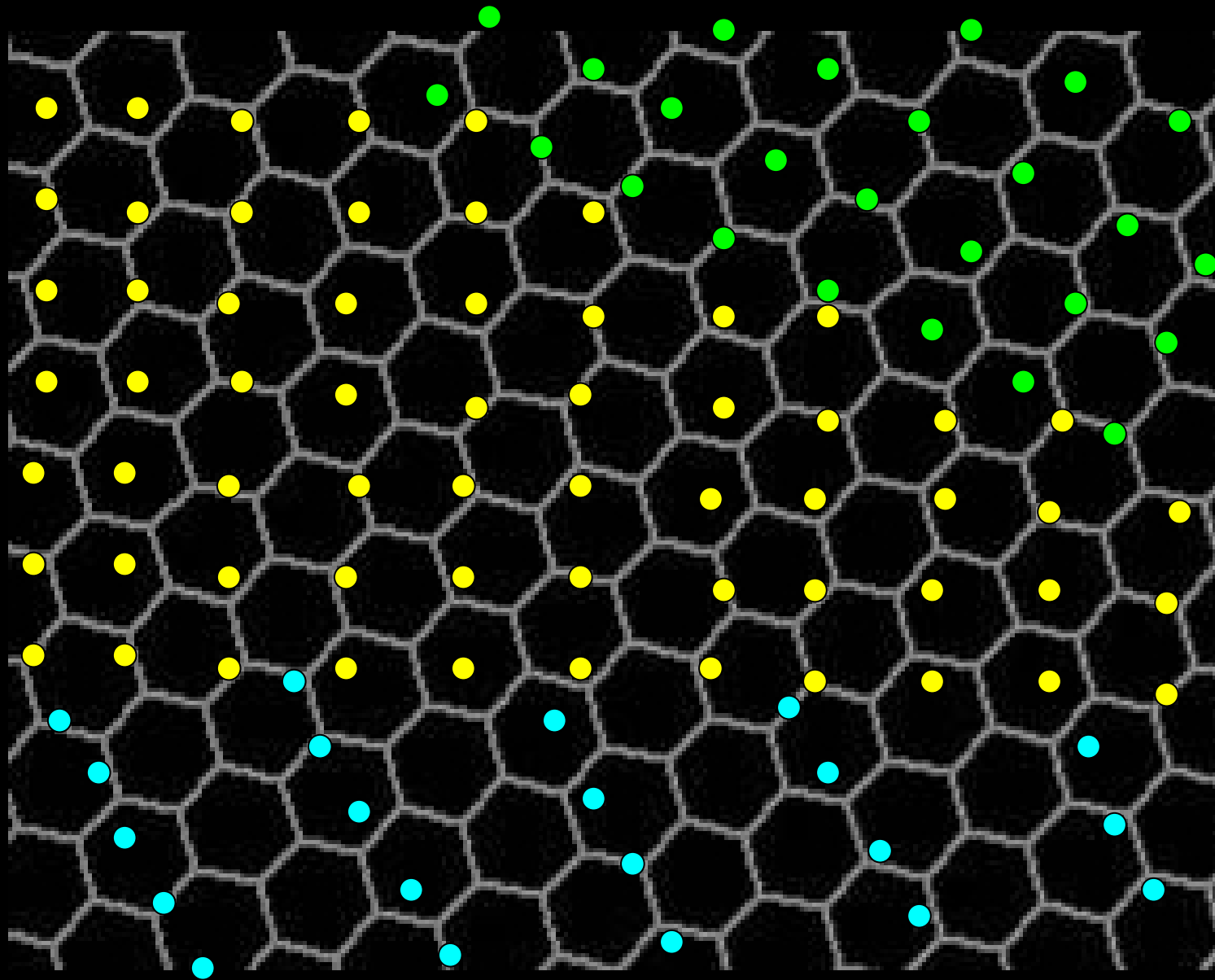
# Preserving plots



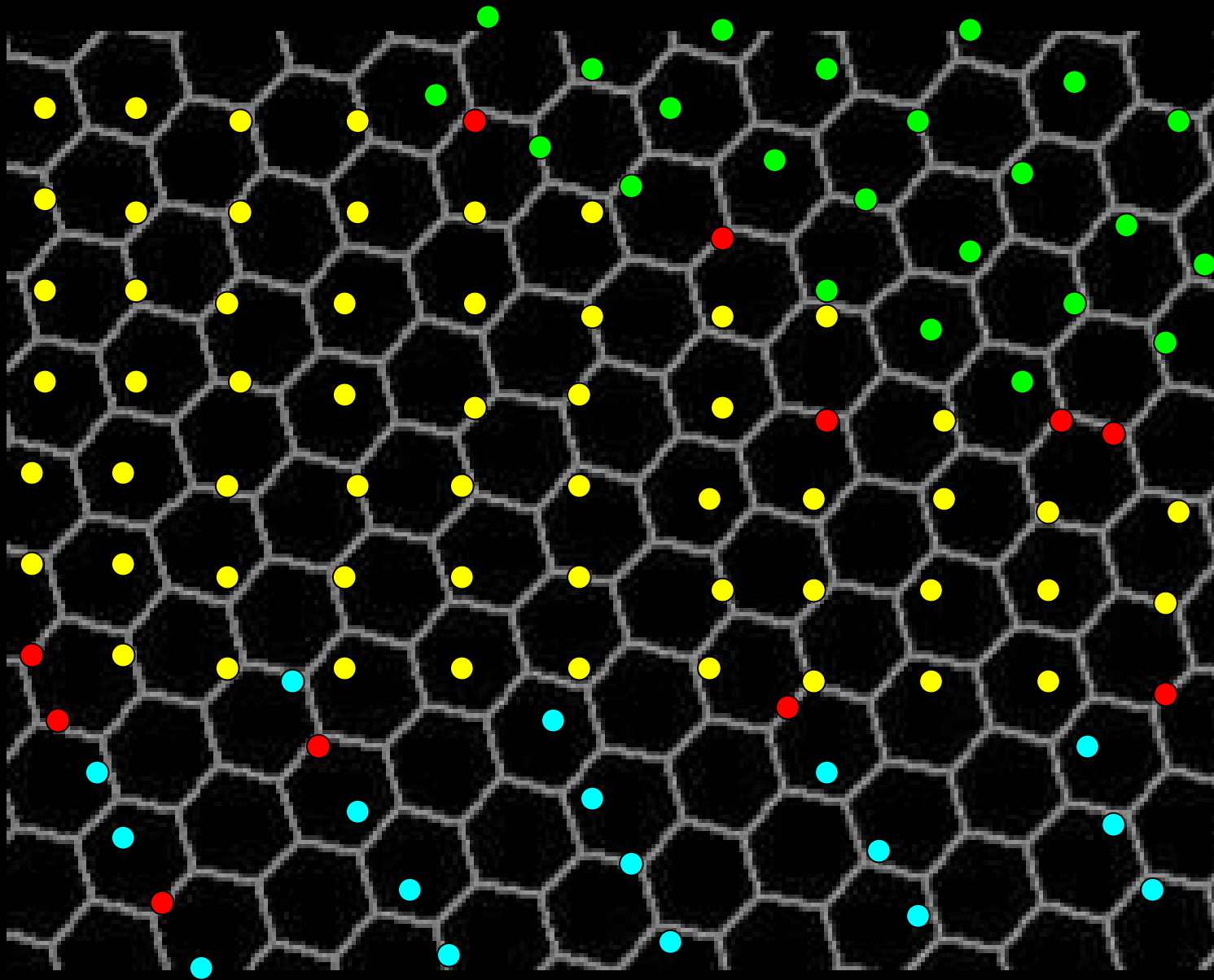
# Preserving plots



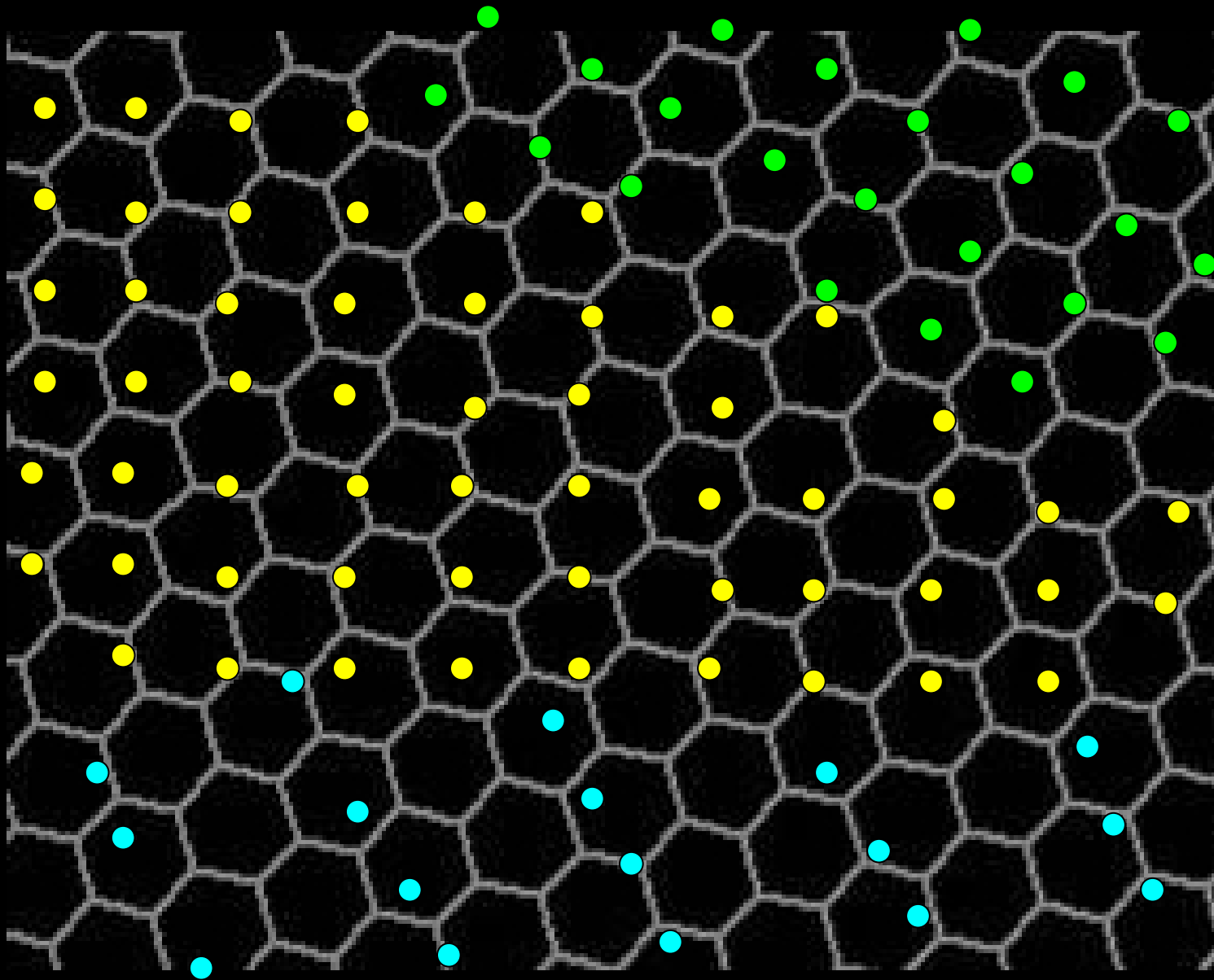
# Preserving plots



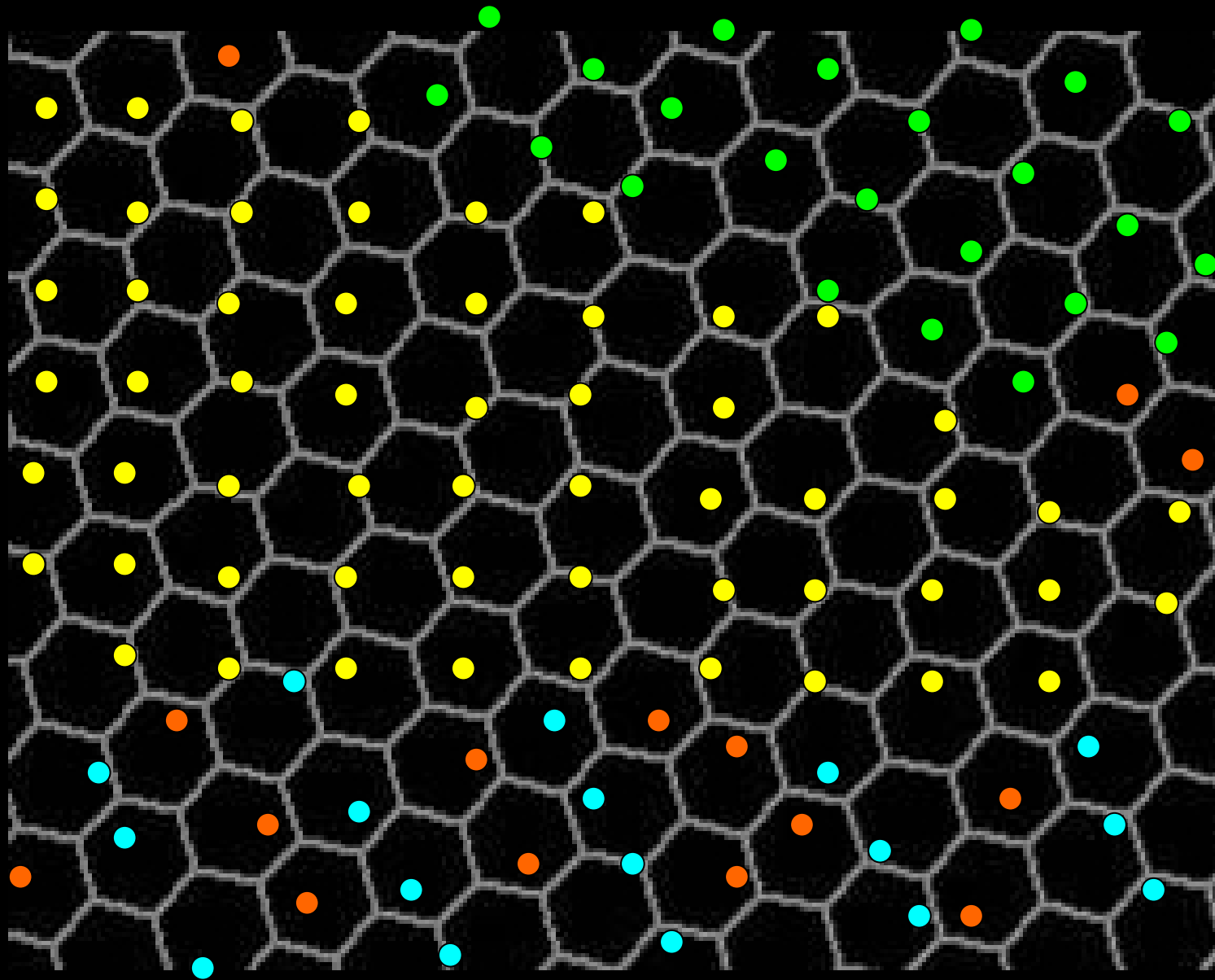
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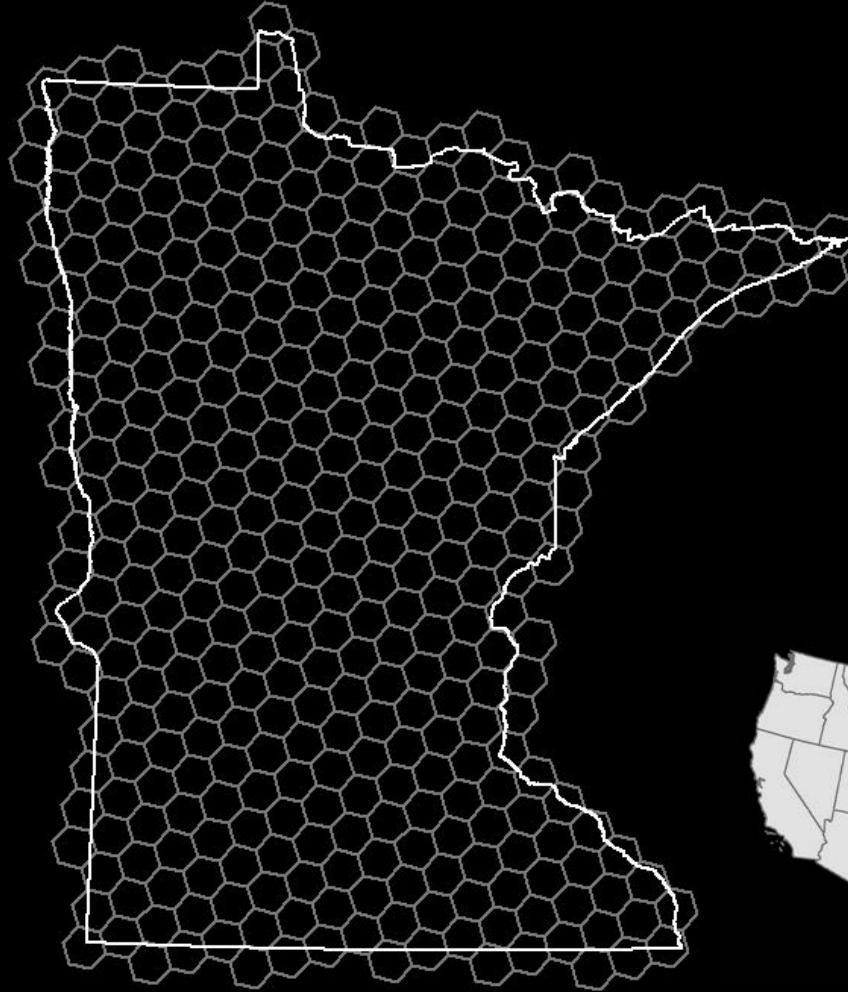
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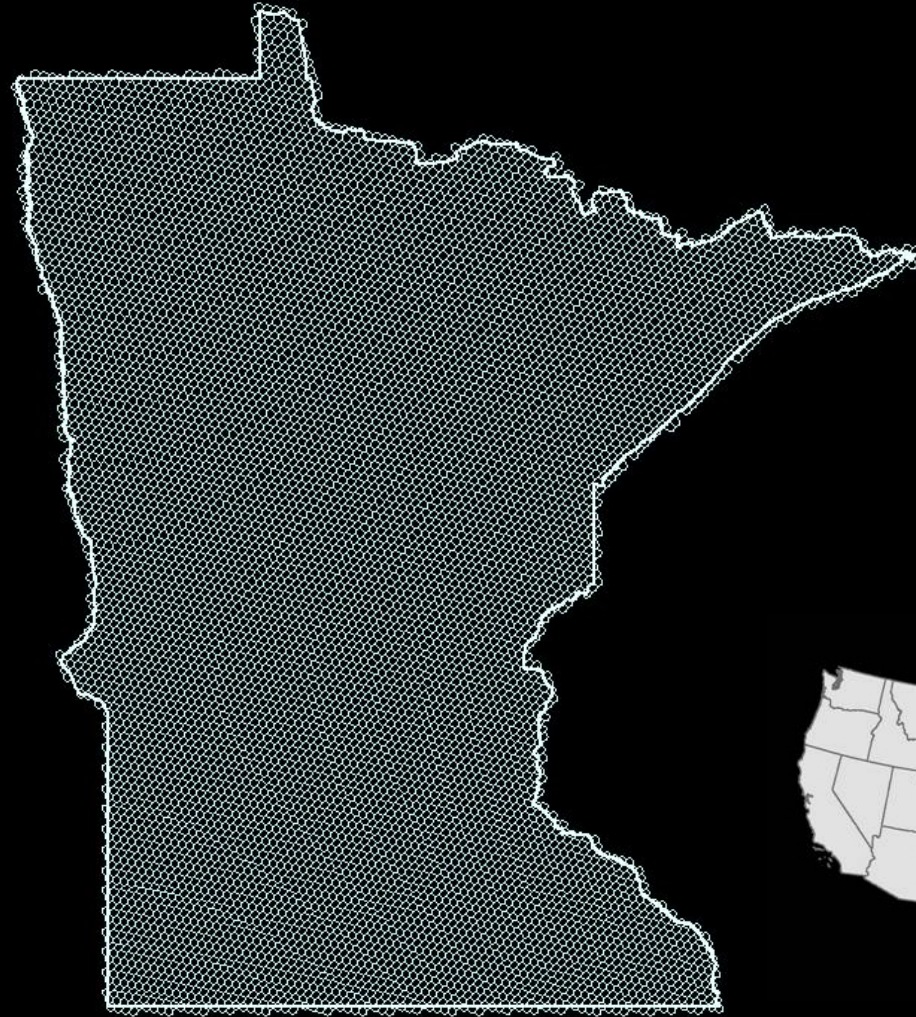
# Preserving plots



# Phase 3 hexagons (38,400 ha)



# Phase 2 hexagons (2400 ha)



0 20 40 60 80 100 Miles



## FIA Phase 2 observed variables

- Plot/subplot identification and location
- Observed condition (within subplots)
  - *land cover, ownership, forest type, stand age, size class, productivity class*
  - *origin, slope, aspect, physiographic class, disturbance*
- Observed tree attributes
  - *location*
  - *species, status, lean, diameter, height, crown ratio, crown class, damage, decay*

## FIA Phase 2 calculated variables

- Tree attributes
  - *volume*
- Subplot attributes per unit area
  - *number of trees, volume, biomass*
- By category
  - *species/species groups*
  - *status: live, mortality, etc*

## Phase 3 (Forest Health Monitoring)

- *Detection monitoring through aerial and ground surveys*
- *Evaluation monitoring for particular situations*
- *Research on monitoring techniques*
- *Intensive site ecosystem monitoring.*

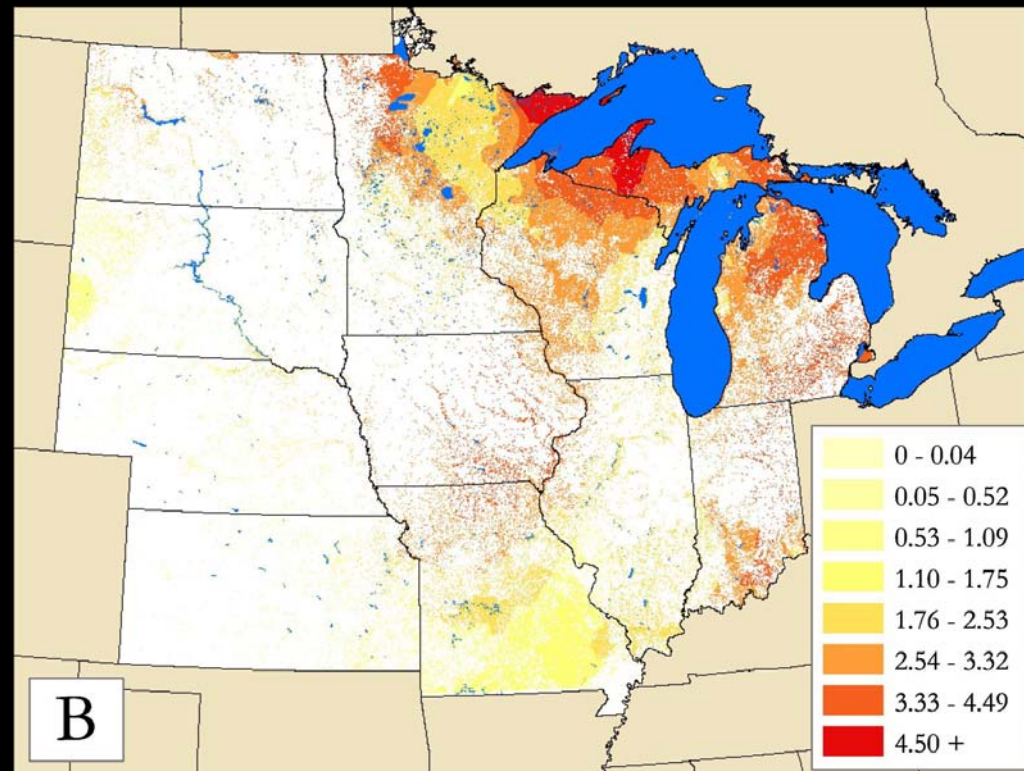
## Phase 3: Monitoring through ground surveys

Additional variables:

- crown condition
- soil variables
- lichen observations
- understory vegetation
- down wood materials
- ozone damage indicators

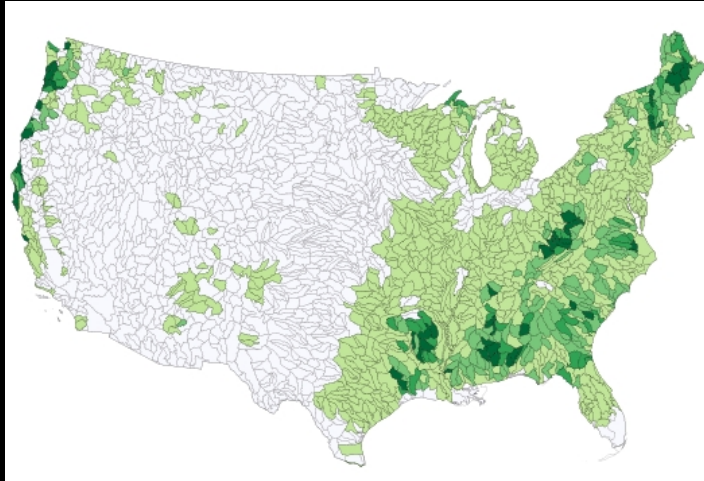
# Mapping

## Fuels in the north central region

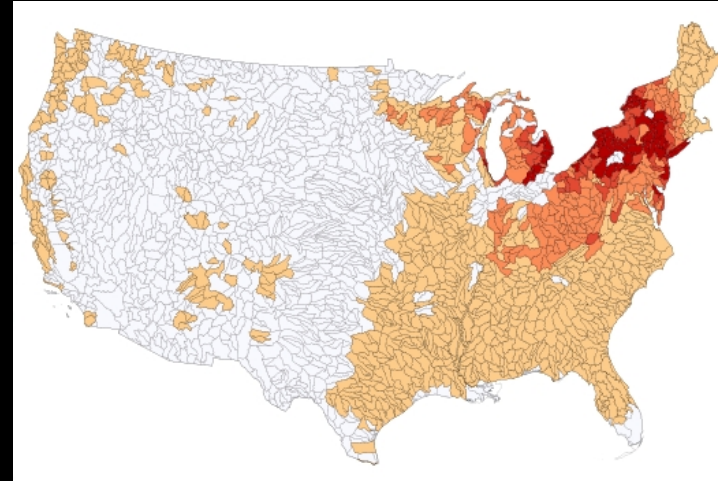


# Sustainable Forest Management

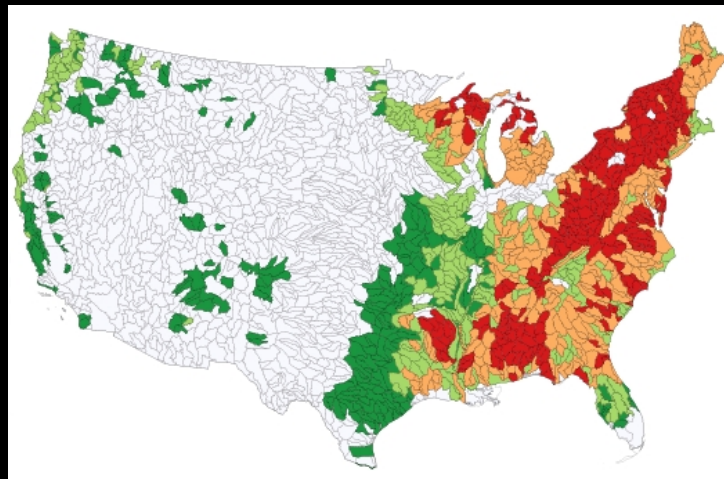
Timber Supply



Pollution

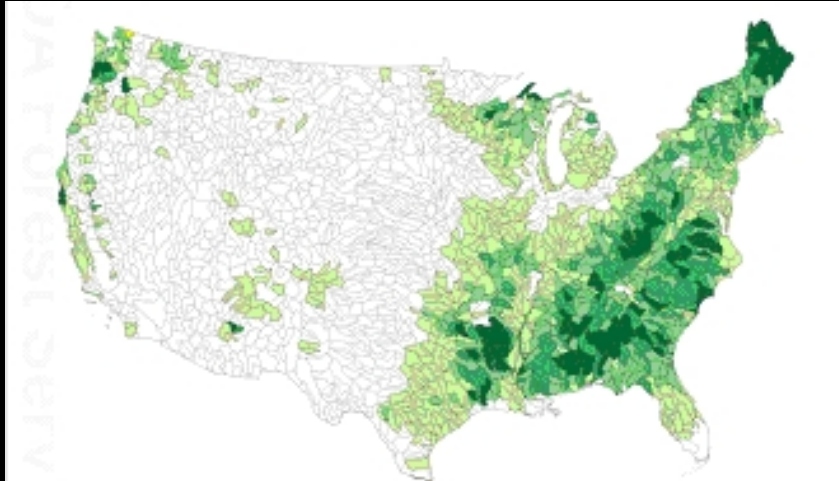


Pollution threat to Timber Supply

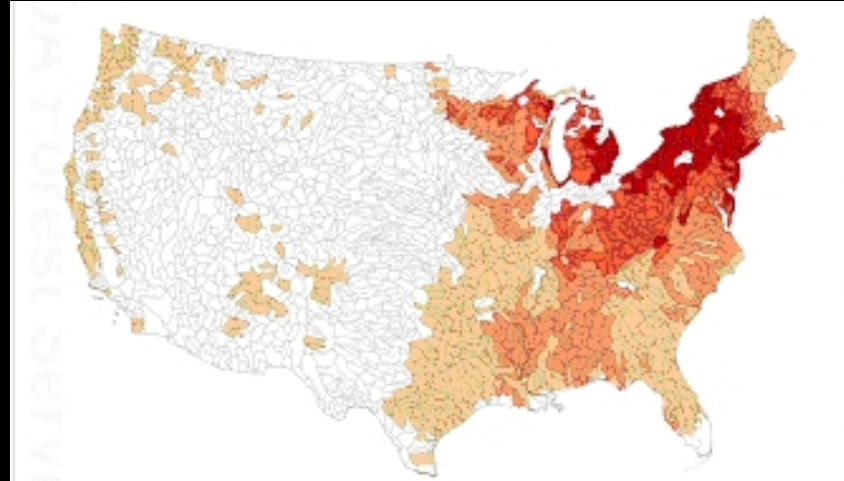


# Sustainable Forest Management

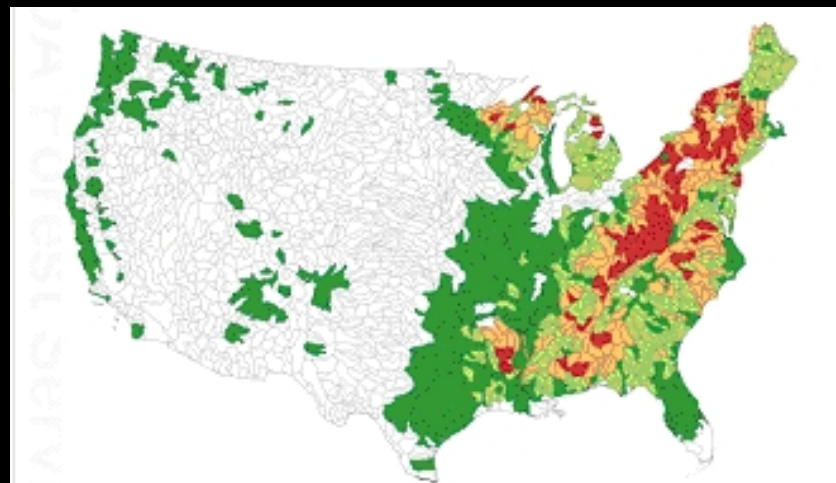
Water Quality



Pollution



Pollution threat to Water Quality





Remember, Only  
**YOU** Can Prevent  
Forest Fires!

A Public Service of the U.S. Forest Service