



Lyme Disease:

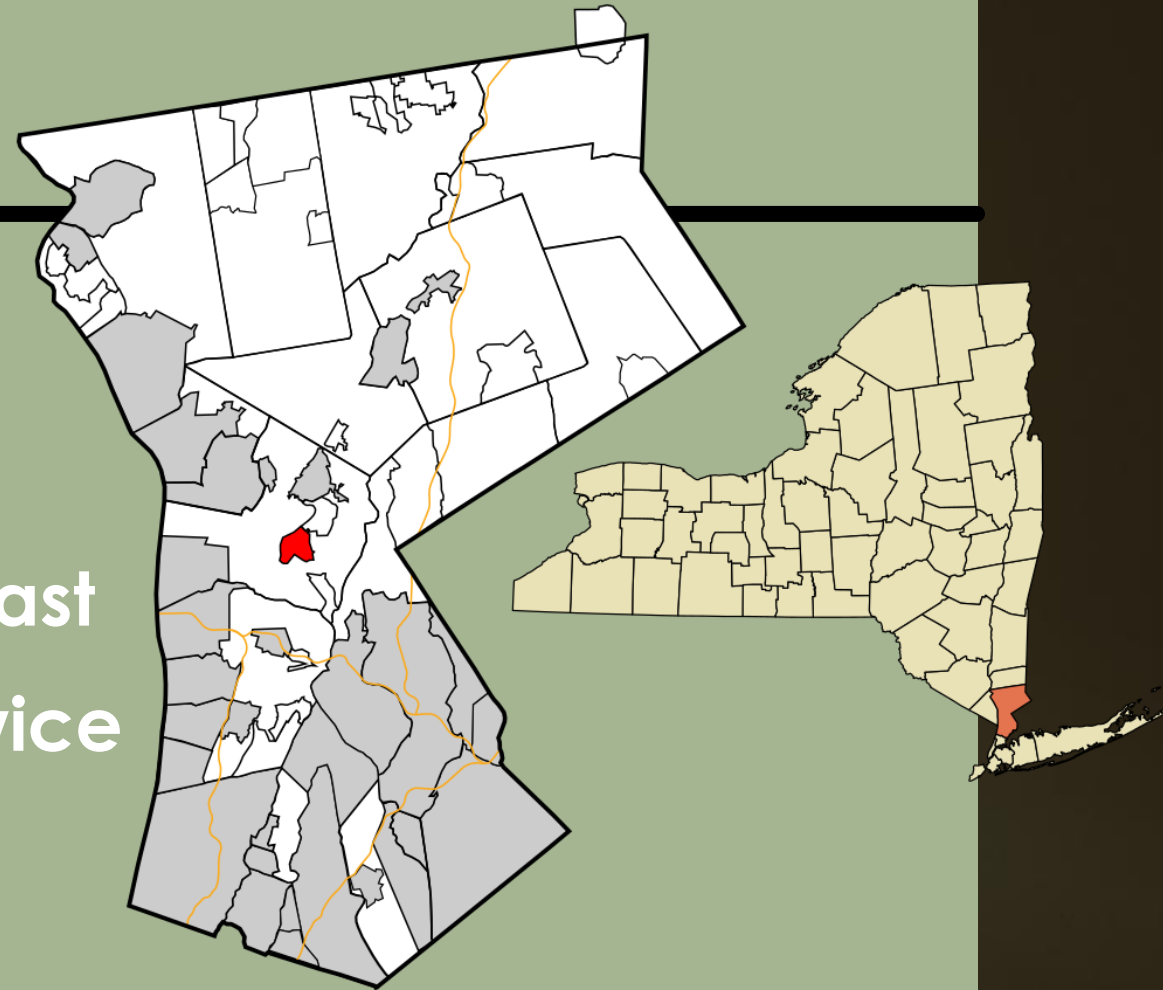
Case Trends, Climate, and Risk
Across the U.S.

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Motivation

- 01. Grew up in New York
- 02. Spent time outdoors
- 03. Road trips across the Northeast
- 04. Contracted Lyme disease twice
- 05. Explore risk in Nashville, TN



Questions to Explore

How has Lyme disease changed over the past several decades in the United States?

Which states are most affected by Lyme disease and has that changed over time?

Which states have experienced the most significant increase in cases?

Is there a relationship between winter temperatures and case counts?

Does adjusting for population change which states are considered most at risk?

What is the risk of Lyme disease in Tennessee and specifically, Davidson County?

Data Sources

Centers for Disease Control and Prevention (CDC)

- ▶ Case counts by month and year
- ▶ Case counts by state
- ▶ Case counts by county

National Centers for Environmental Information

- ▶ US average monthly temperatures
- ▶ Regional average temperatures
- ▶ State average temperatures

United States Census Bureau

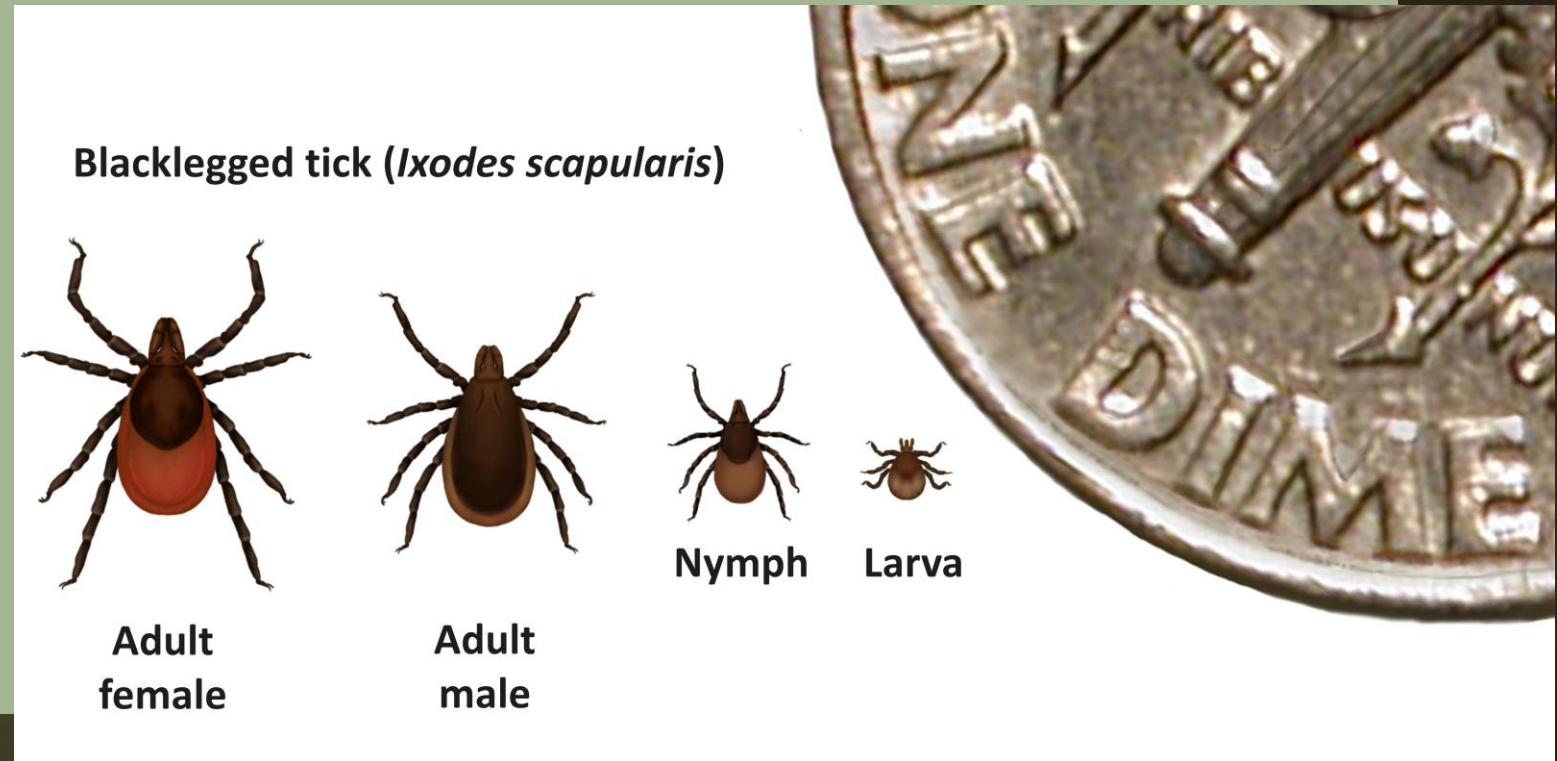
- ▶ US population by year
- ▶ State populations by year
- ▶ Tennessee County populations by year

Lyme Disease

- ▶ Bacterial infection spread through the bite of blacklegged (Ixodes) ticks
- ▶ Typical symptoms include fever, headache, fatigue, and a skin rash
- ▶ Treated with antibiotics
- ▶ Untreated can lead to more severe symptoms

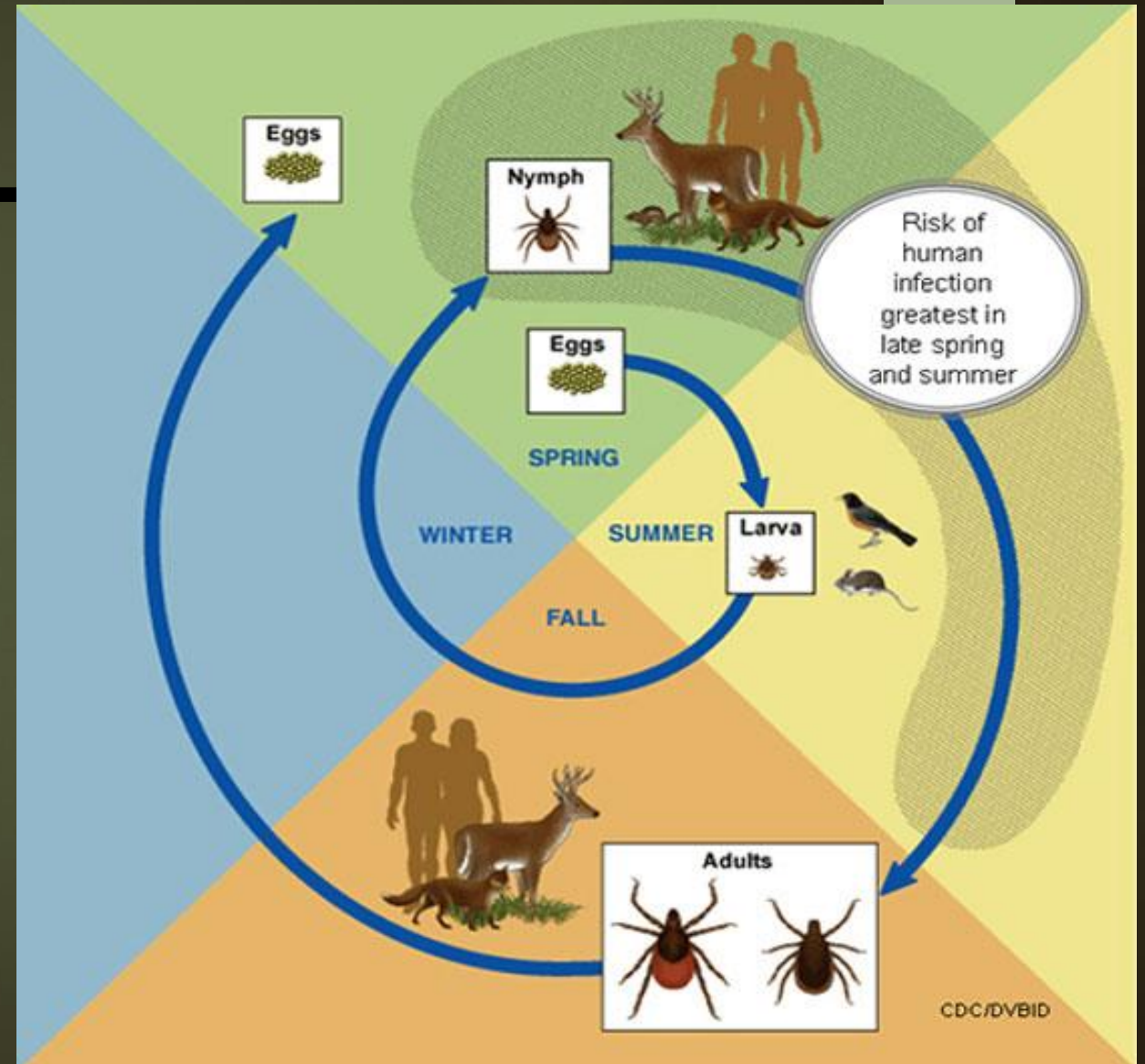
Blacklegged Ticks

- ▶ Found most commonly in forested areas
- ▶ 2 to 3 year lifespan
- ▶ 4 life stages

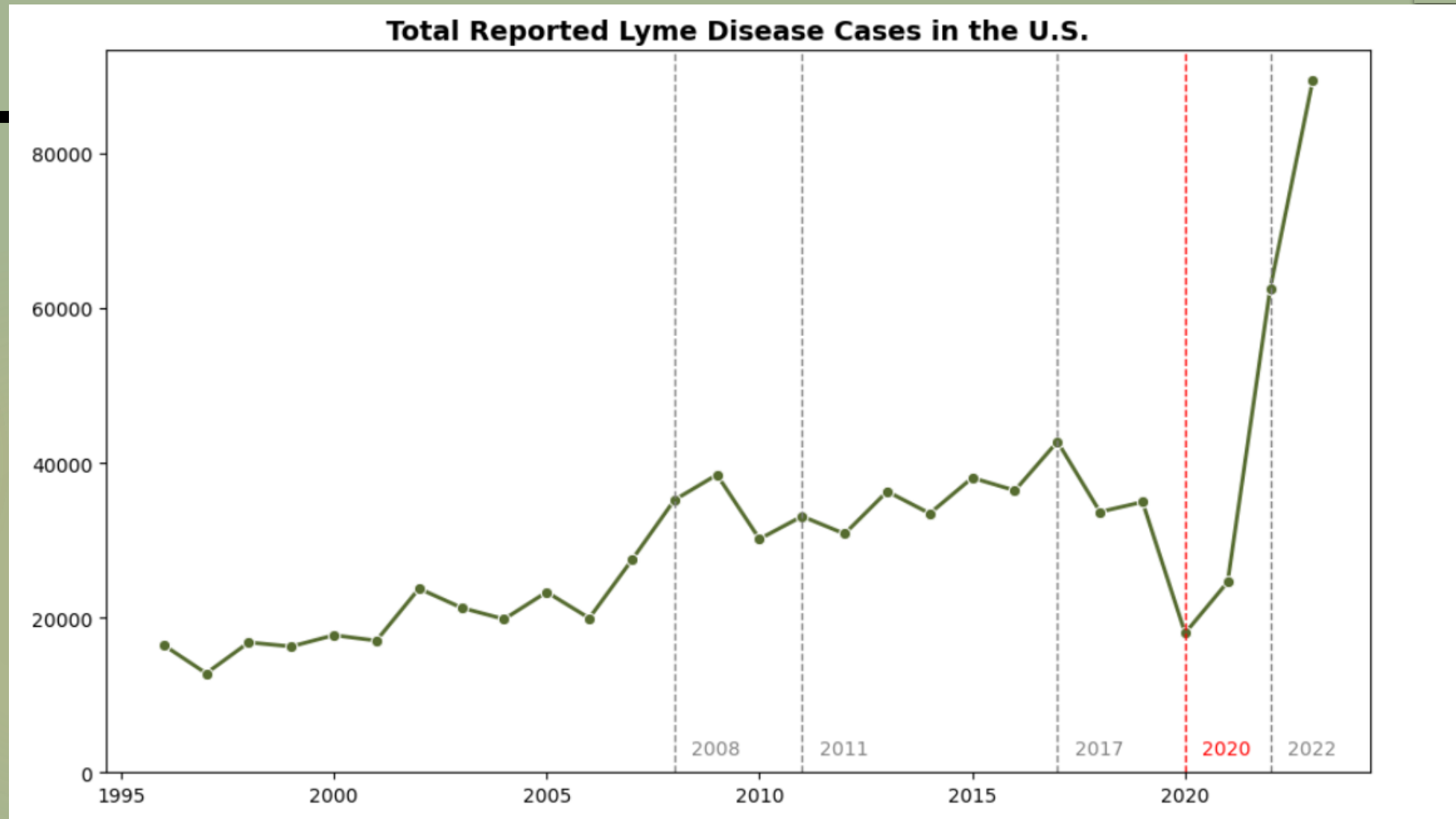


Tick Life Cycle

- ▶ Require a blood meal
- ▶ Smaller animals infect the ticks
- ▶ Must attach for at least 24 hours to transmit



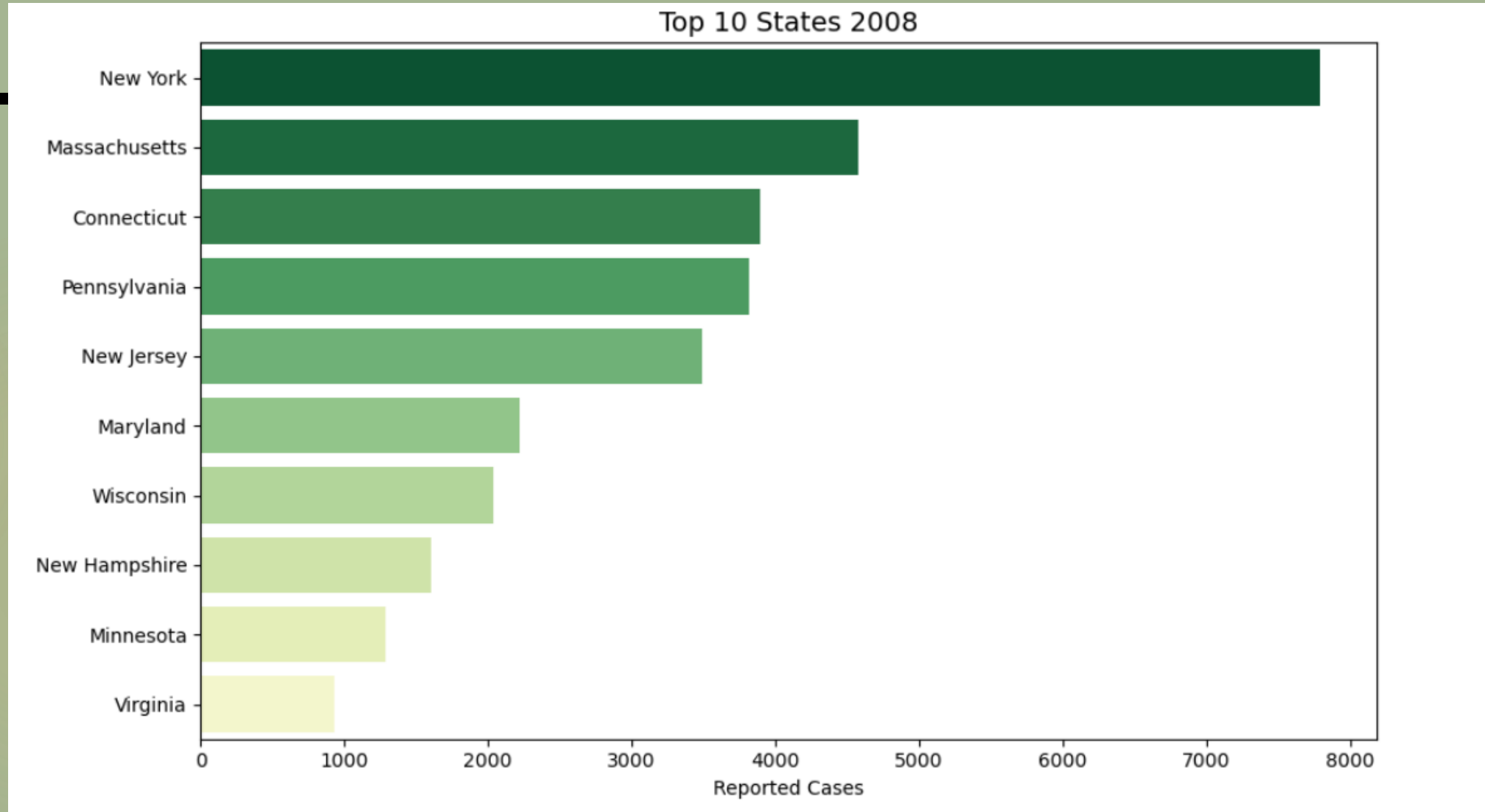
US Case Counts



2008



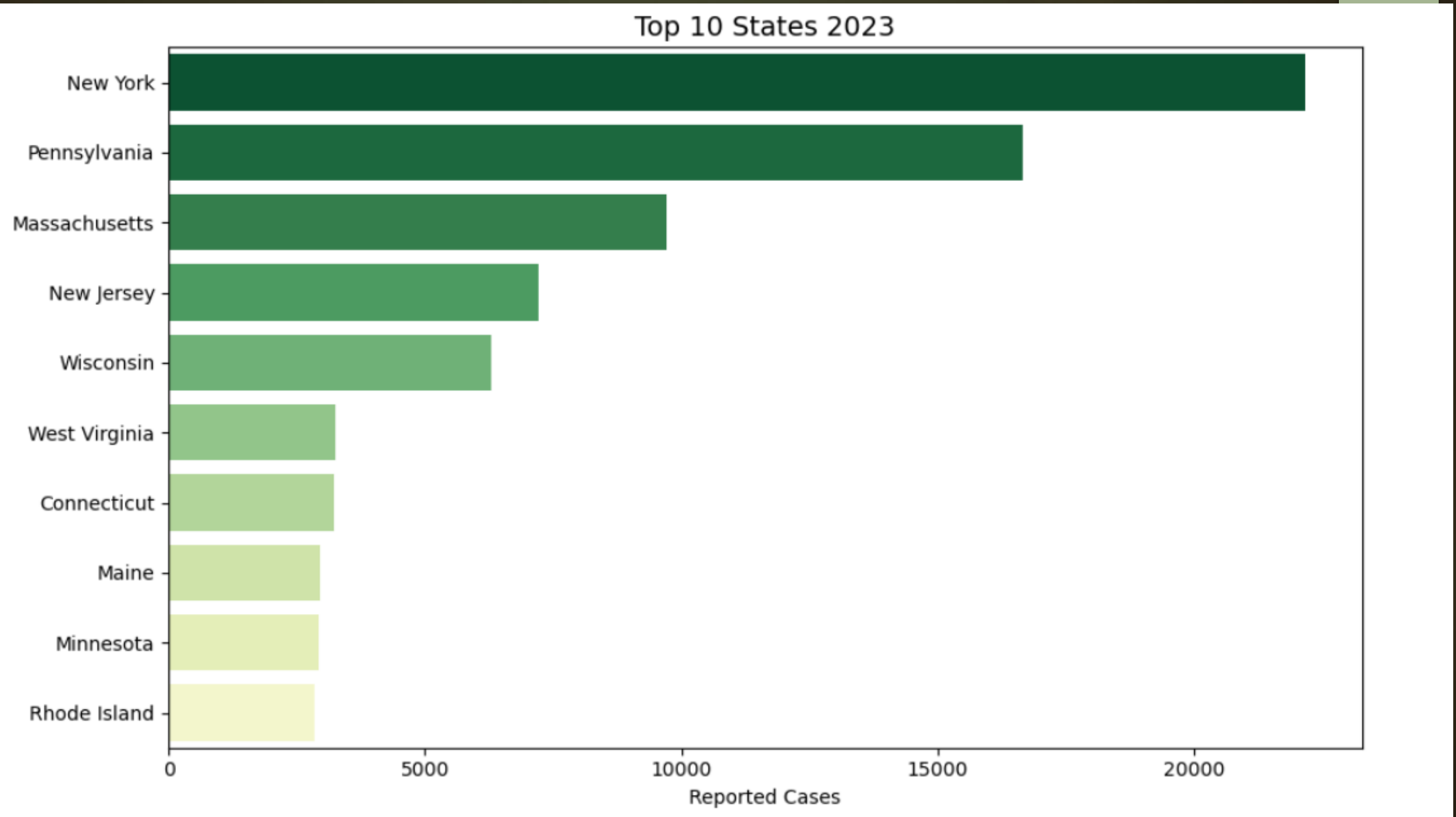
States with the Highest Counts in 2008



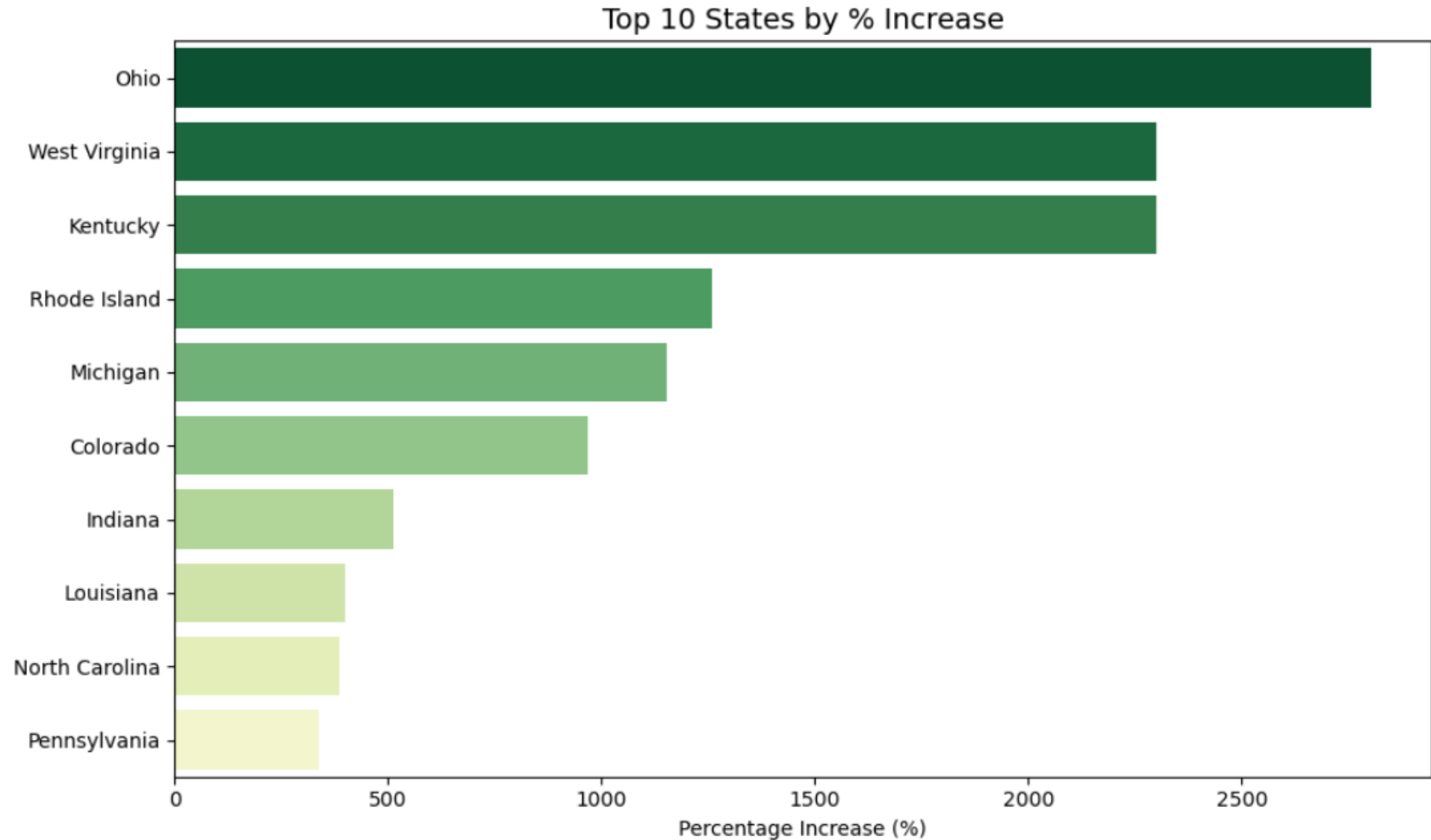
2023



States with the Highest Counts in 2023



States with the Highest % Increase



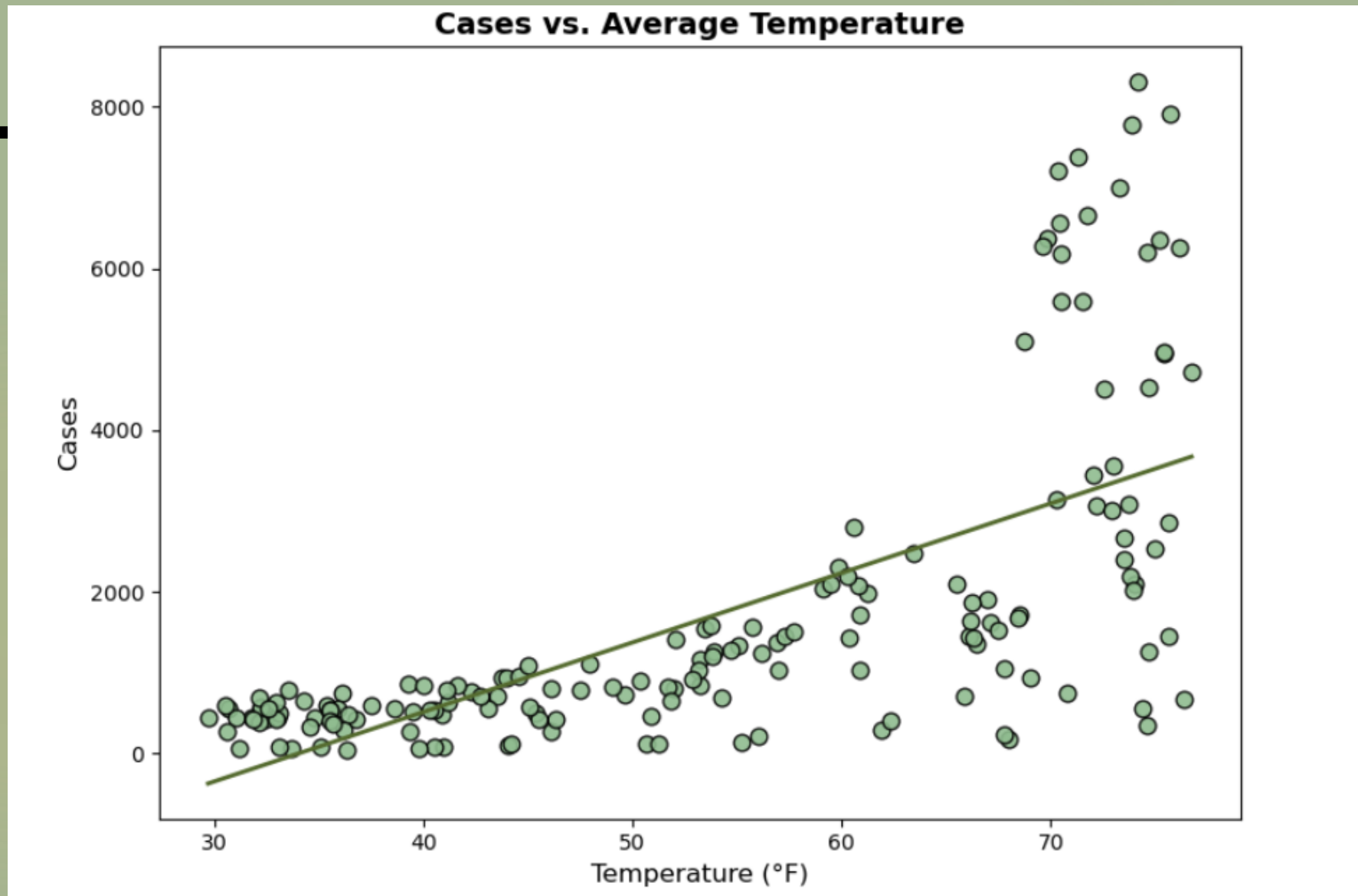
Top 10 States by Total Cases



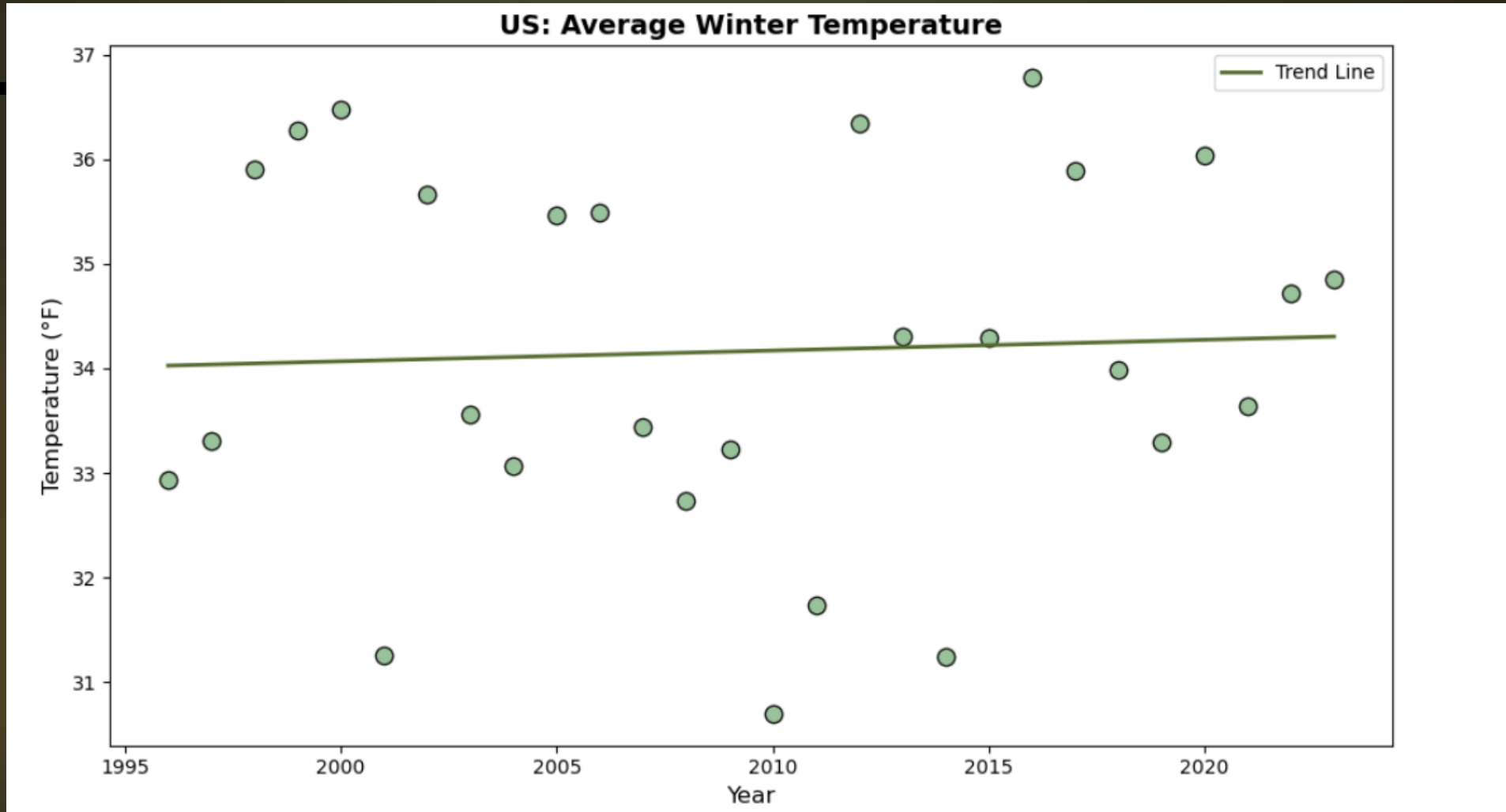
Top 10 States by % Change



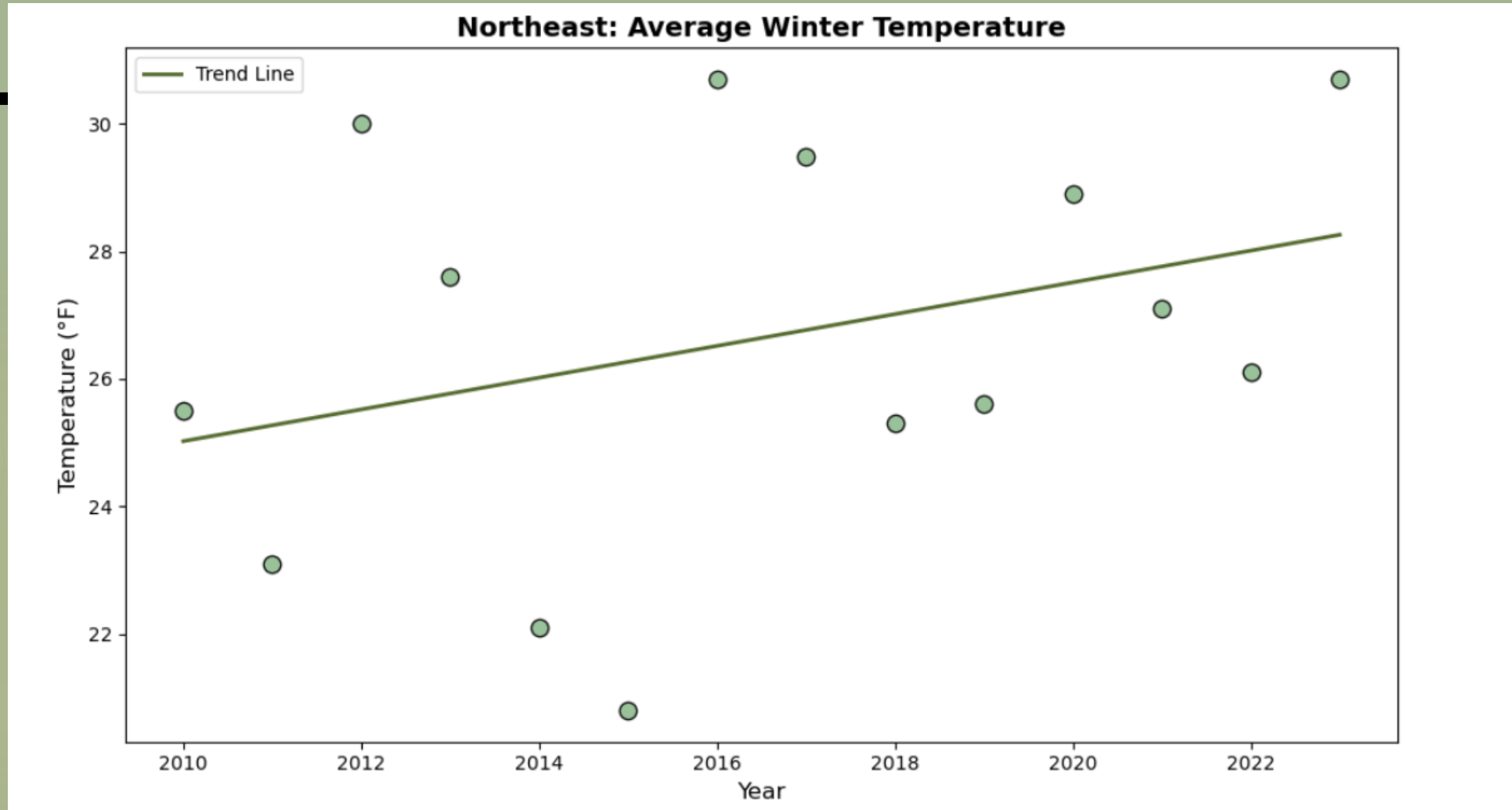
US Cases vs Average Temperature



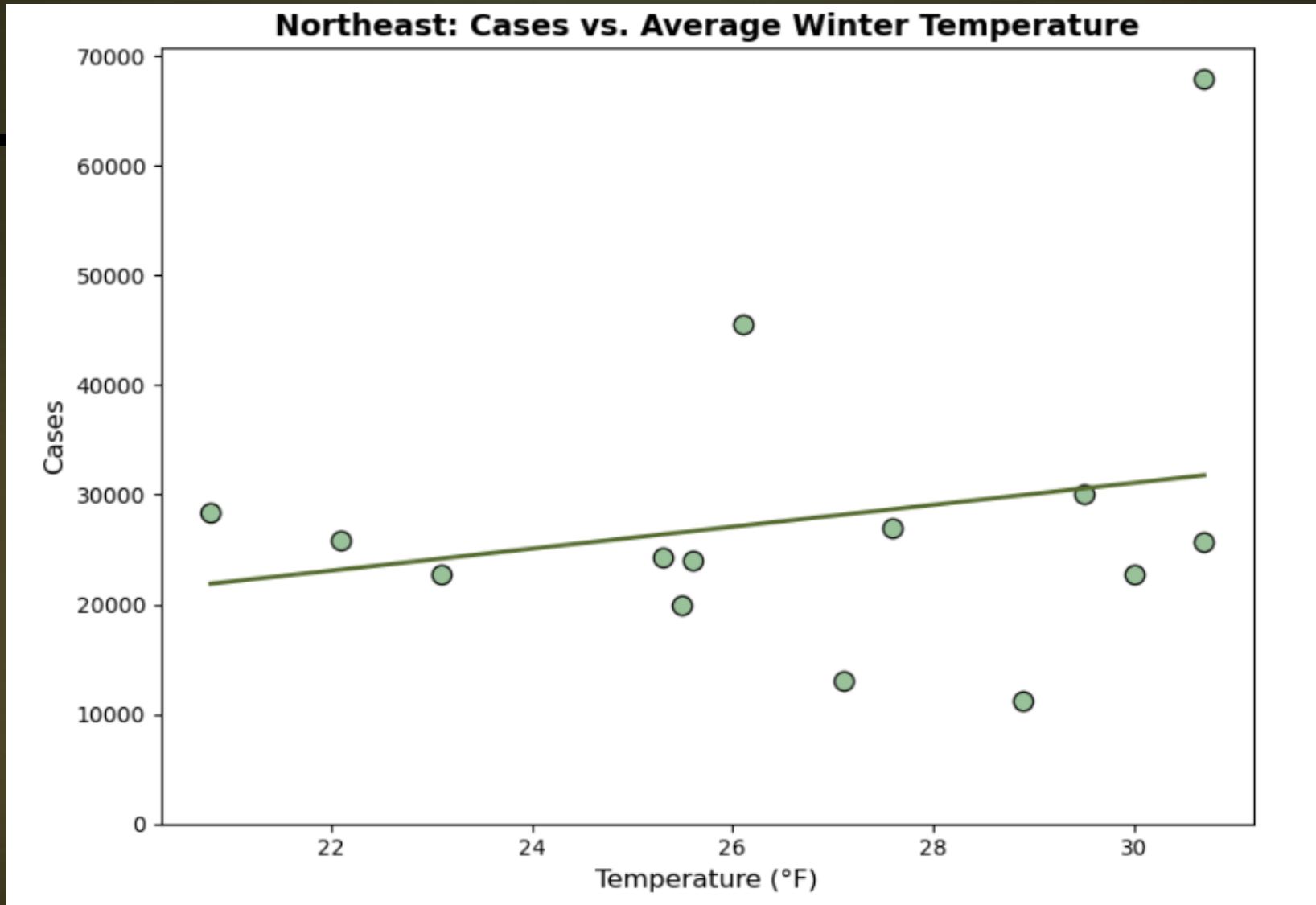
US Average Winter Temperature



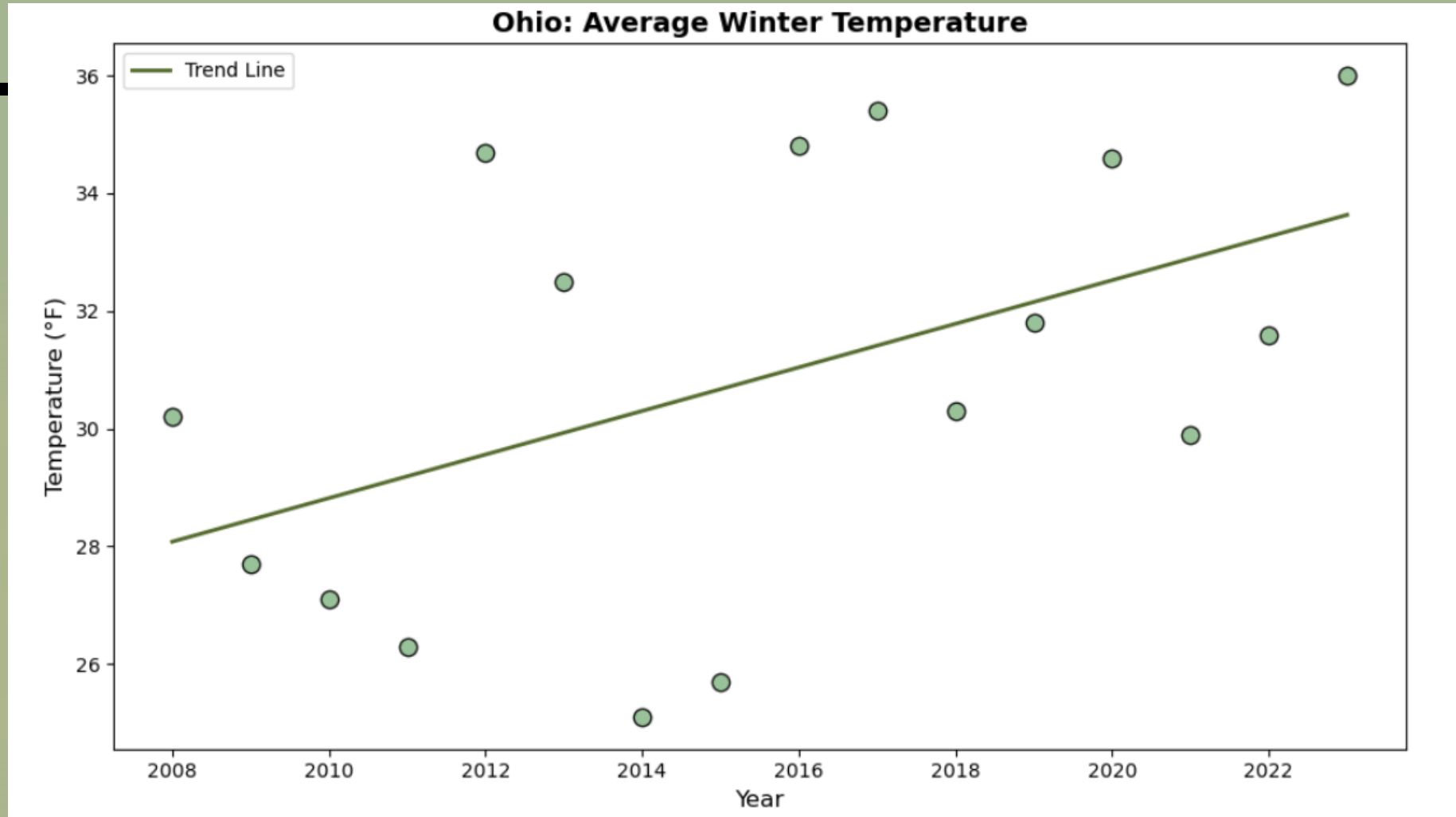
Northeast Average Winter Temperature



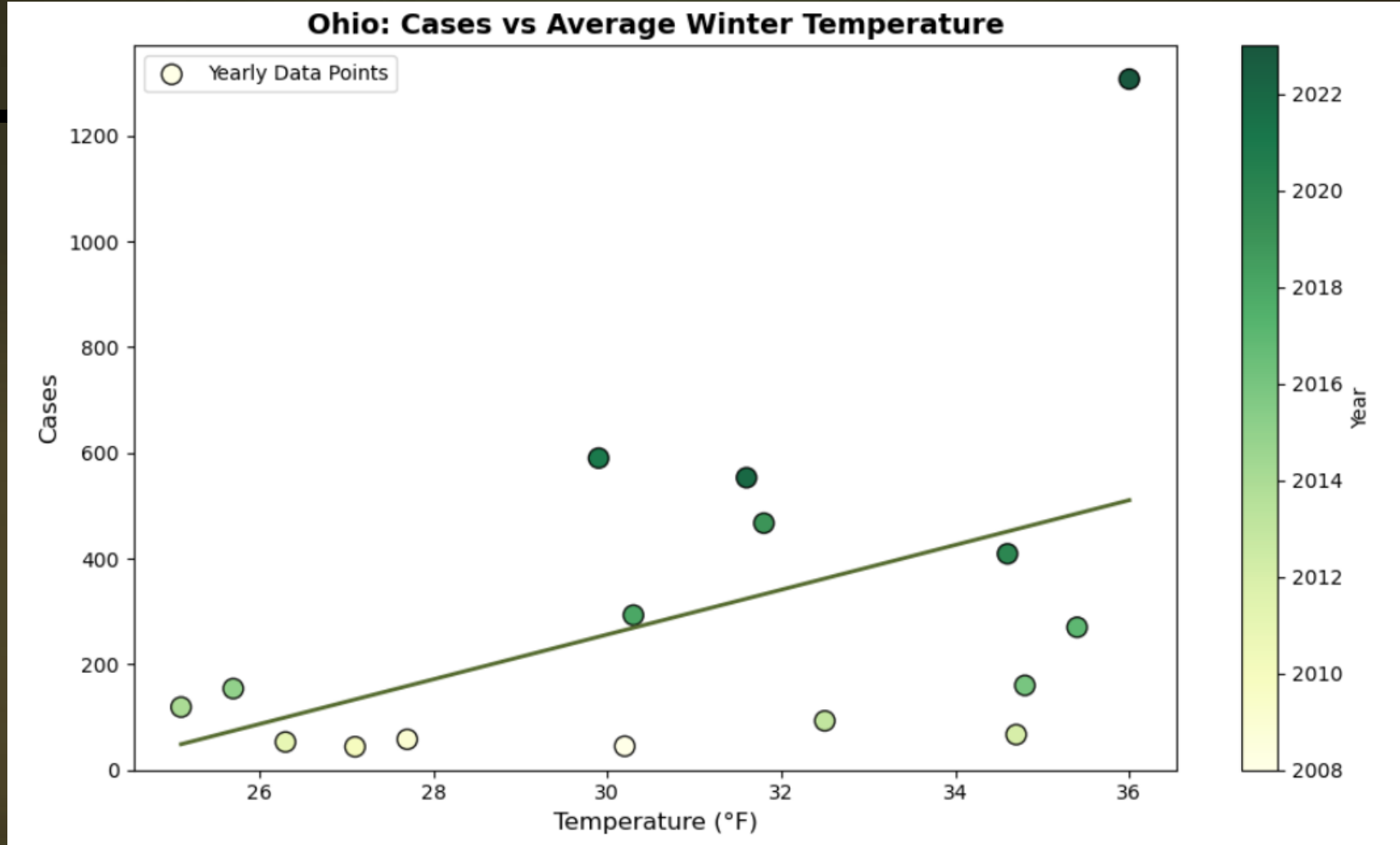
Northeast Cases vs. Average Winter Temperature



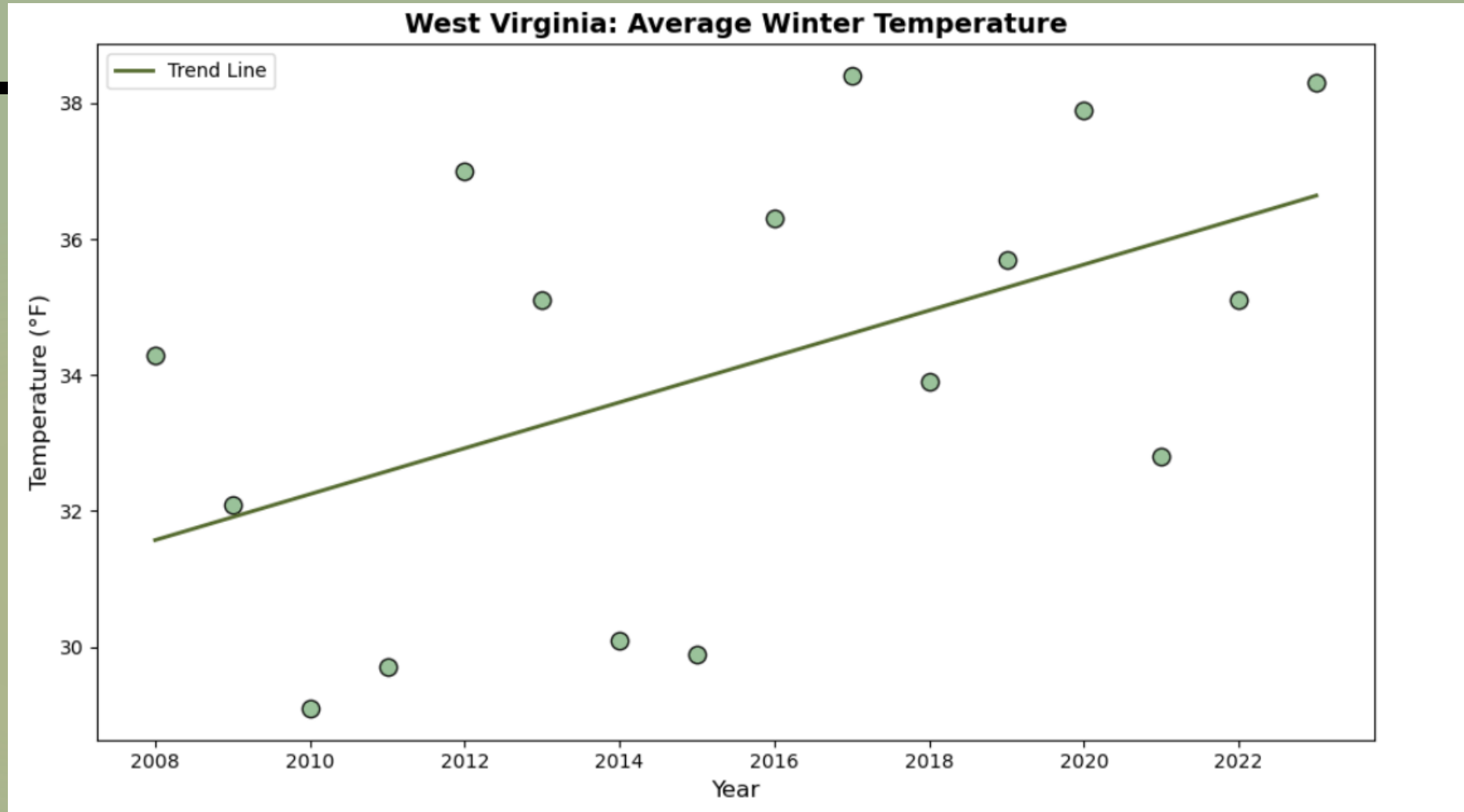
Ohio Average Winter Temperature



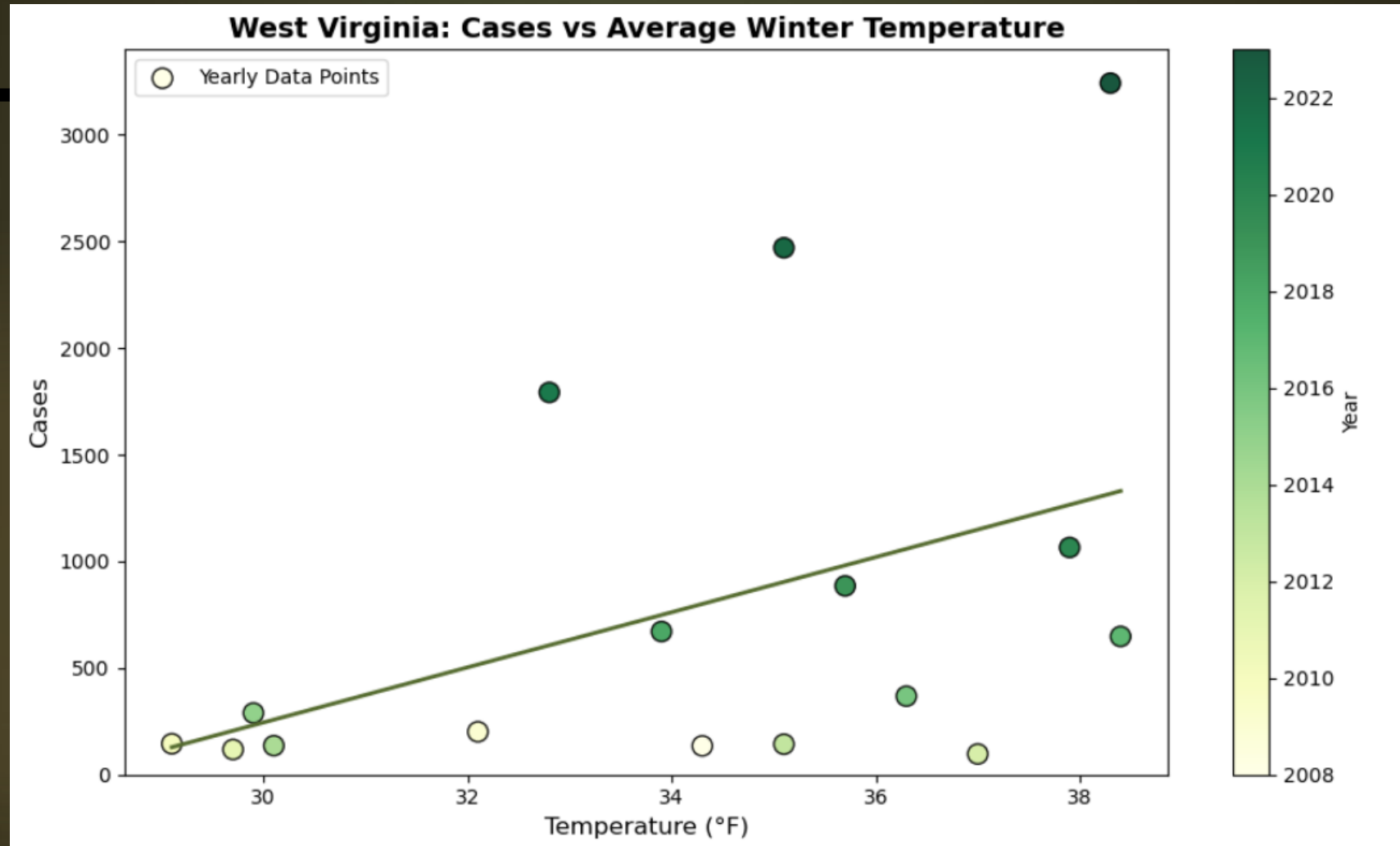
Ohio Cases vs. Average Winter Temperature



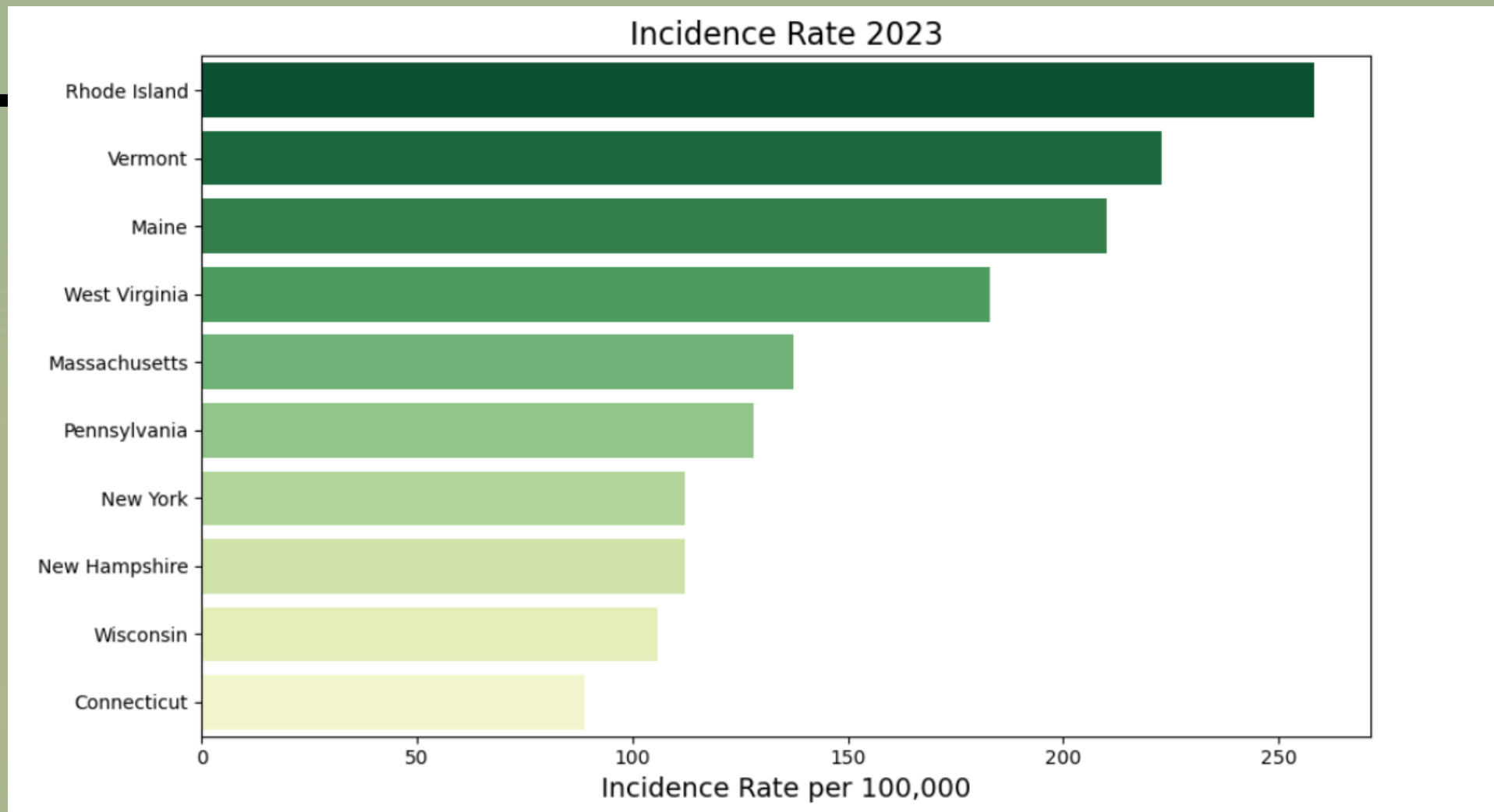
West Virginia Average Winter Temperature



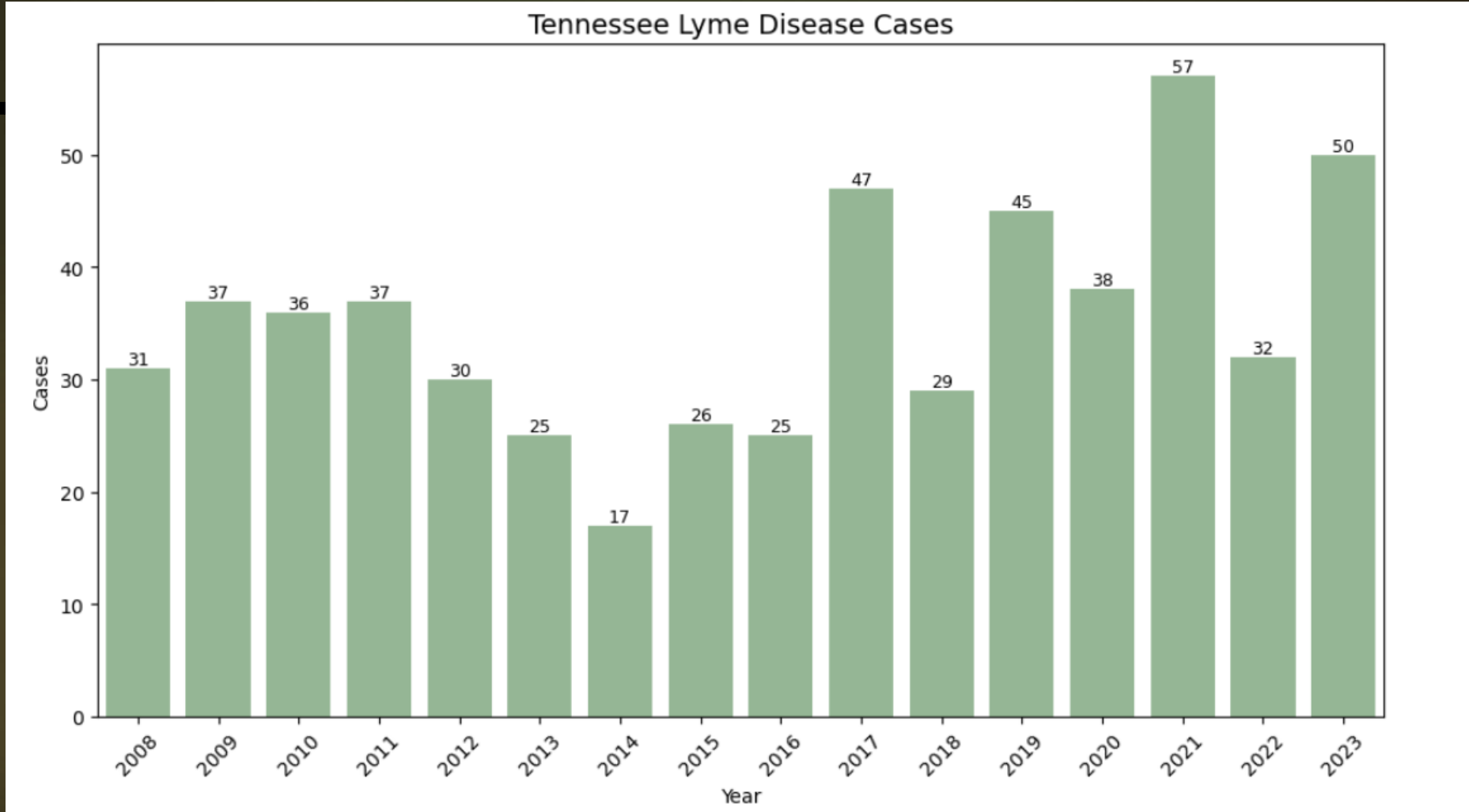
West Virginia Cases vs. Average Winter Temperature



Incidence Rates 2023



Tennessee Case Counts



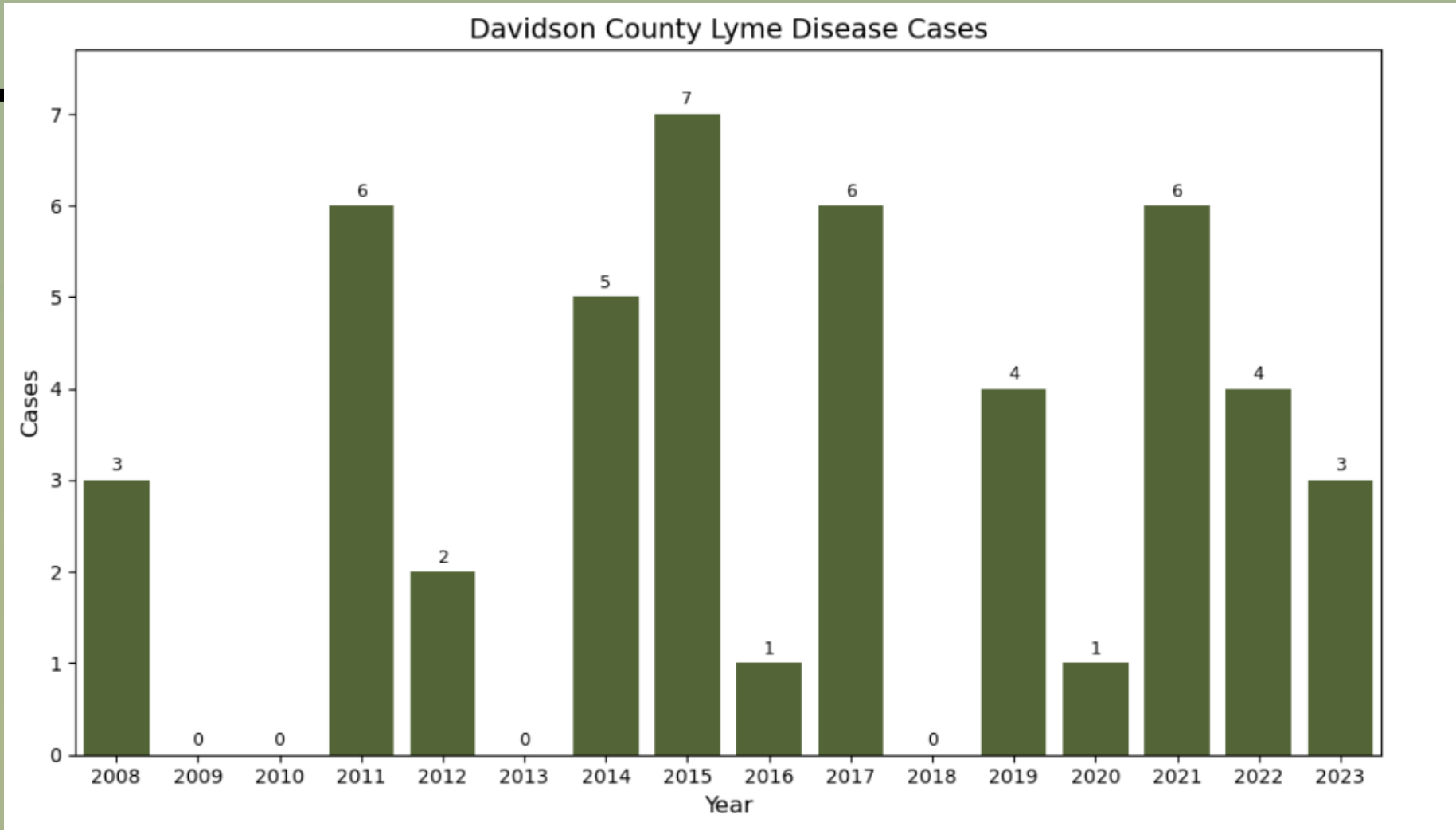
Tennessee Cases 2023



Tennessee County Incidence Rates 2023



Davidson County Case Counts



Opportunities for Further Analysis

- Other climate factors
- Tick distribution
- Behaviors and migration of host animals
- Reporting practices
- Deforestation
- Urban development
- Human behavior

Check for ticks!

- Be aware of where ticks live
- Wear long sleeves and long pants
- Wear insect repellent
- Check yourself after being outside