REVENUE TRENDS IN U.S. NATURAL RESOURCES

TEAM: INDECISION SCIENTISTS

INFO 511 - FALL 2024 - FINAL PROJECT

COLLEGE OF INFORMATION SCIENCE,
UNIVERSITY OF ARIZONA

Introduction – Project Topic & Motivation

- **U.S. Natural Resources & Revenue**
  - Renewable vs. non-renewable energy has emerged as a critical topic
  - Domestic vs. foreign resources at forefront of political priorities
  - Aside from environmental concerns, returns on investment, profitability, and revenue are part of current considerations
- **Research Motivation**
  - Interested in providing relevant perspective on economics of sustainable energy
  - Wanted to explore long-term trends in both resource types, regional land types, and revenues from resource extraction

Research Questions

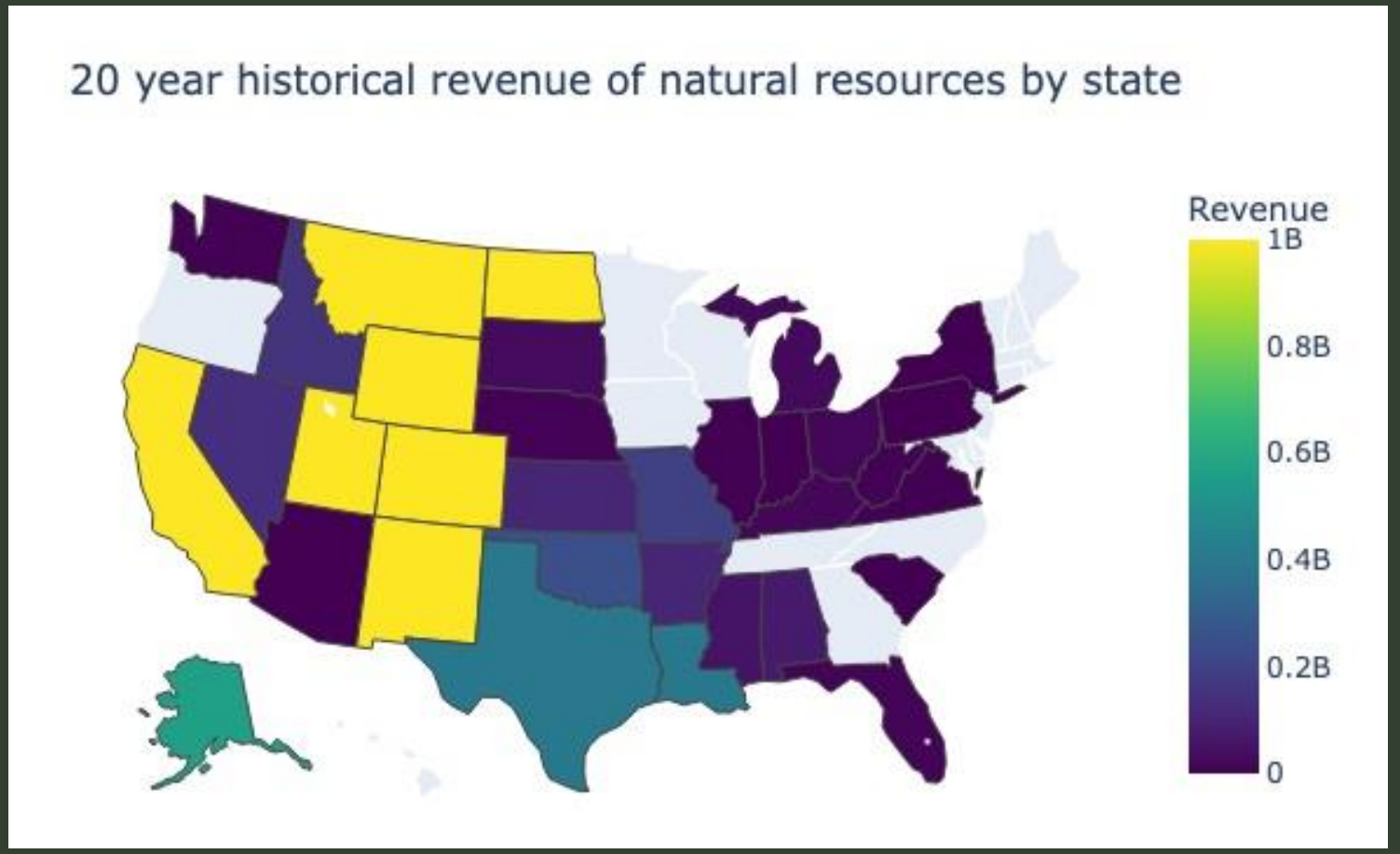
- How has revenue evolved over past two decades by resource type?
  - *Renewable vs. non-renewable resource extraction*
- Does resource type and land category influence revenue trends across geographic regions?
  - *Onshore vs. offshore lands*

Data – U.S. Natural Resources Revenue (2003-2023)

- Collected and managed by Department of the Interior's Office of Natural Resources Revenue
- 48,413 observations across 12 variables
- Comprises revenue data generated from and attributes of natural U.S. resources
- Includes information for:
  - Land classification
  - Lease types
  - Revenue types
  - Commodities/products extracted

Exploratory Data Analyses

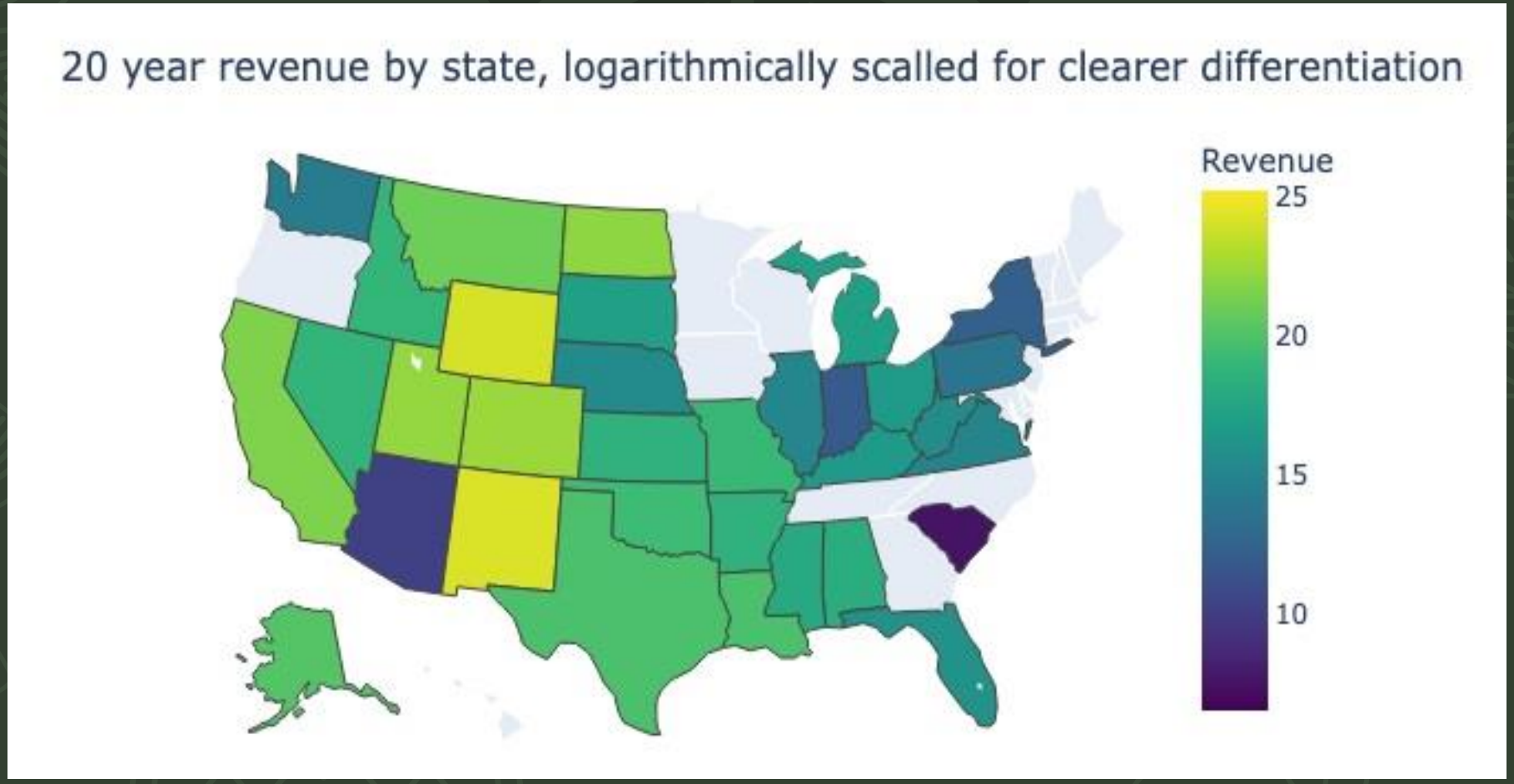
- Focus was on state revenue
- Originally created choropleth of states colored by range of min/max revenue
- We found it difficult to distinguish between overly-high performing states and high performing states



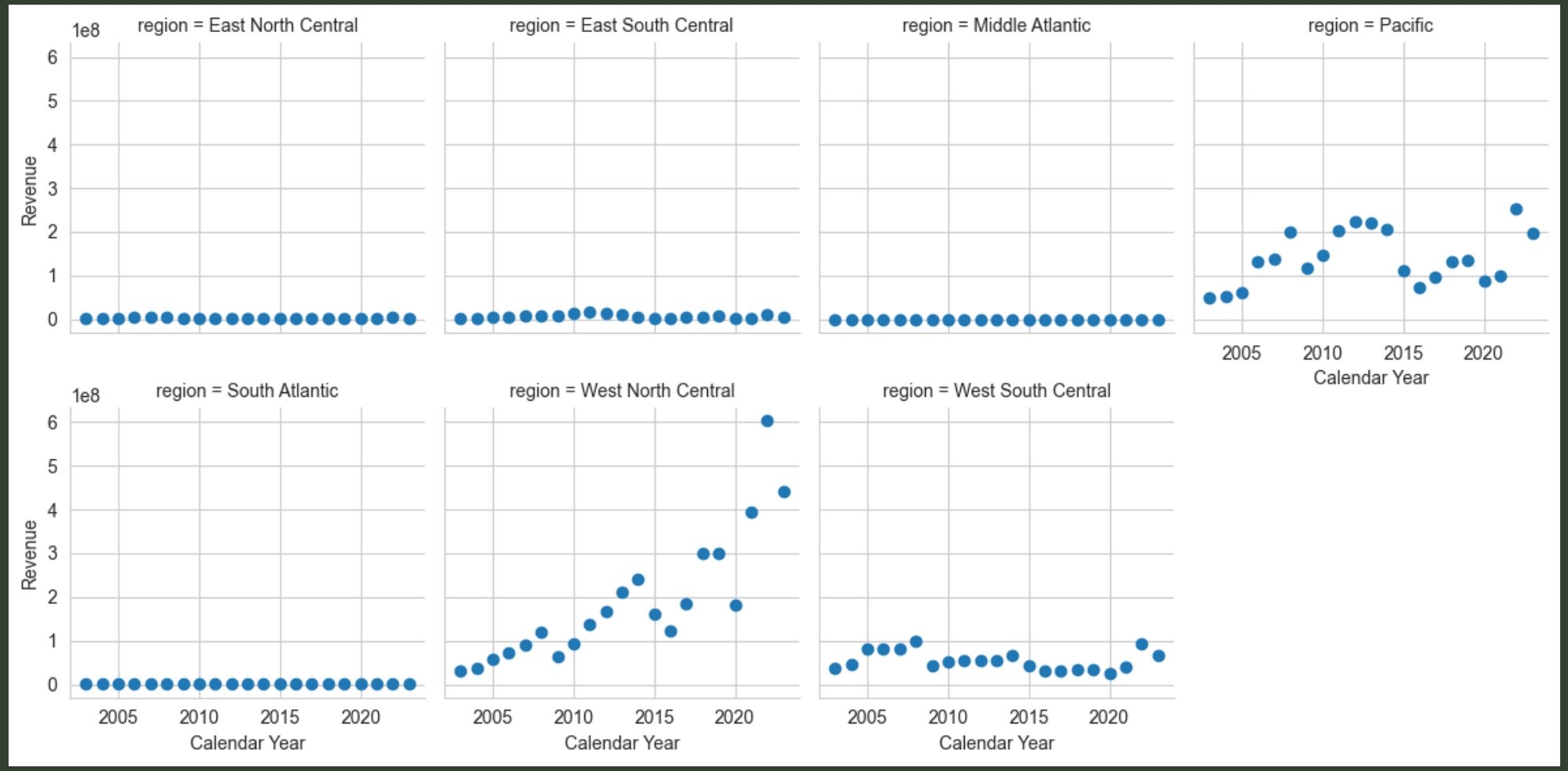
- E.g., NM = 32B, UT = 4.23B, however, both are colored yellow

Exploratory Data Analyses, cont.

- To further differentiate, we used logarithmic scaling



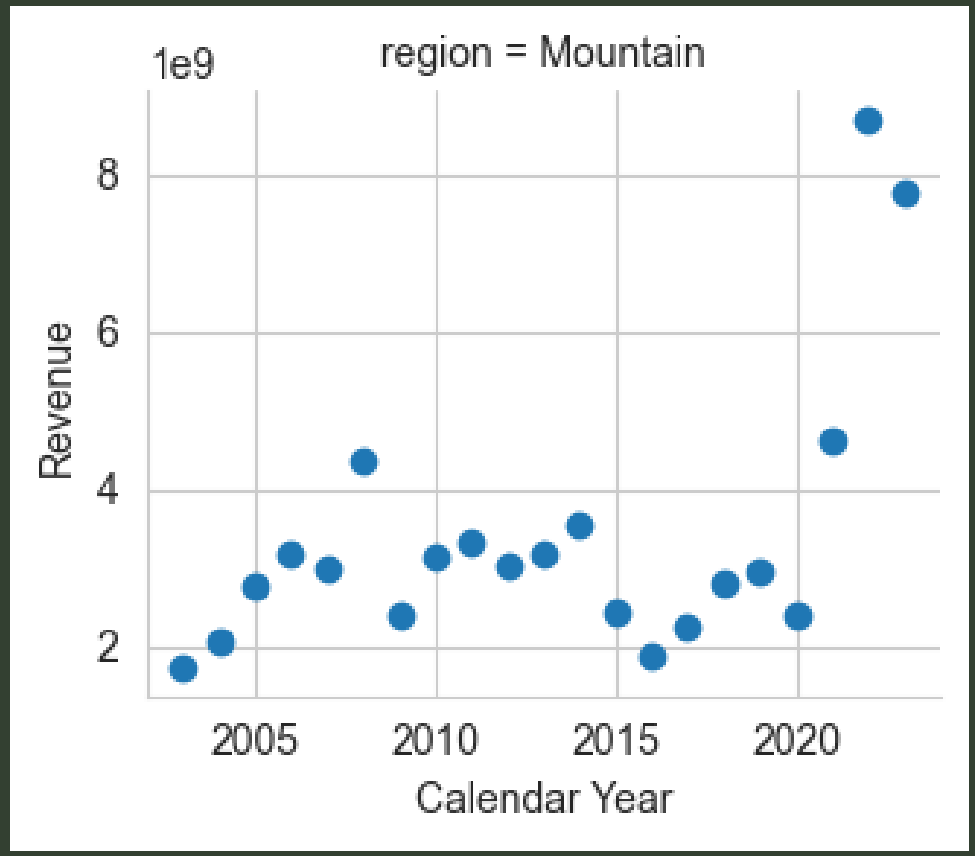
Exploratory Data Analyses, cont.



- Comparing revenue by region showed Pacific and Western North Central outearning all others

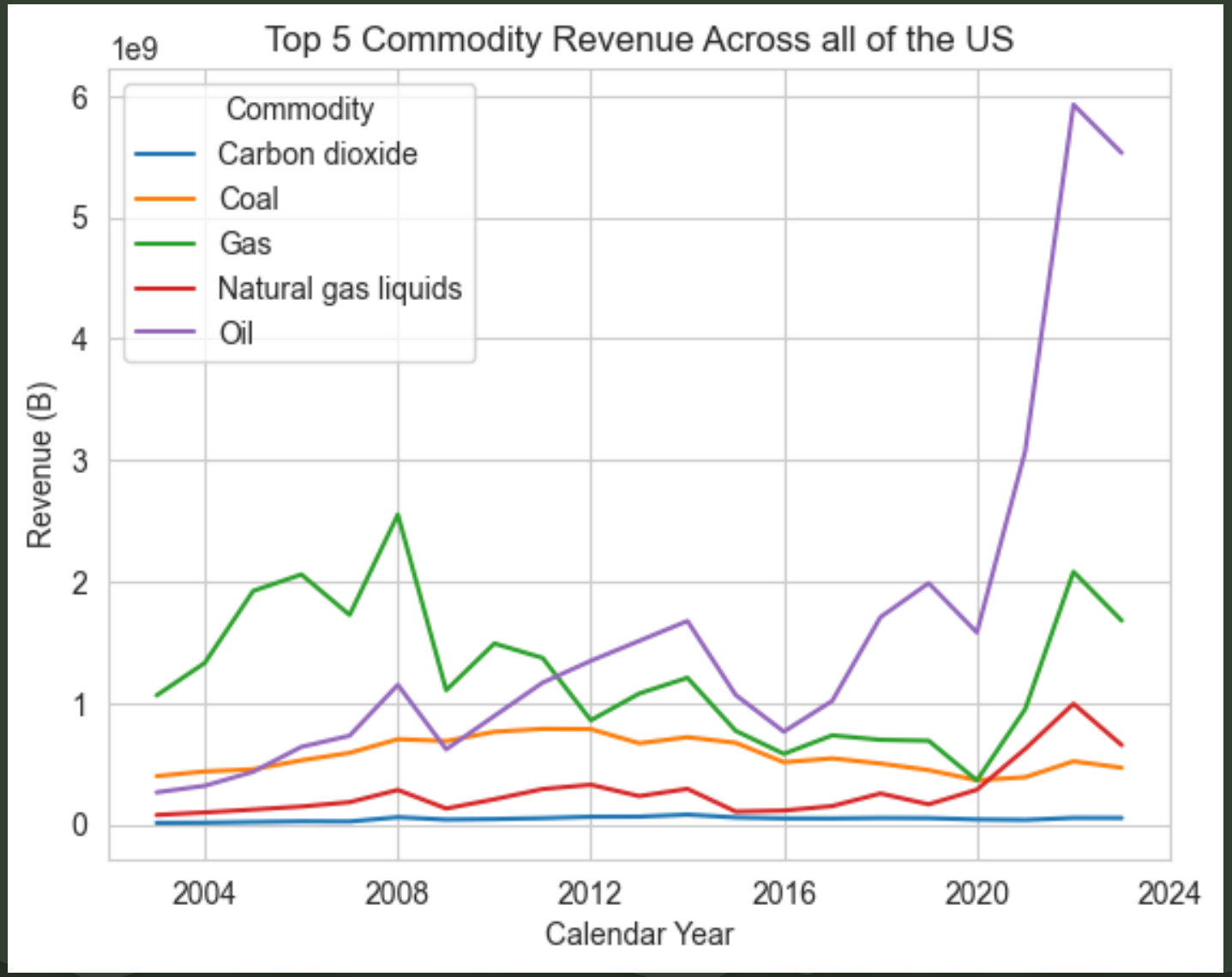
Exploratory Data Analyses, cont.

- Chose to show one region separately and not in the facet grid
- If shown in the facet grid, data for other regions was minimized and not clearly differentiable



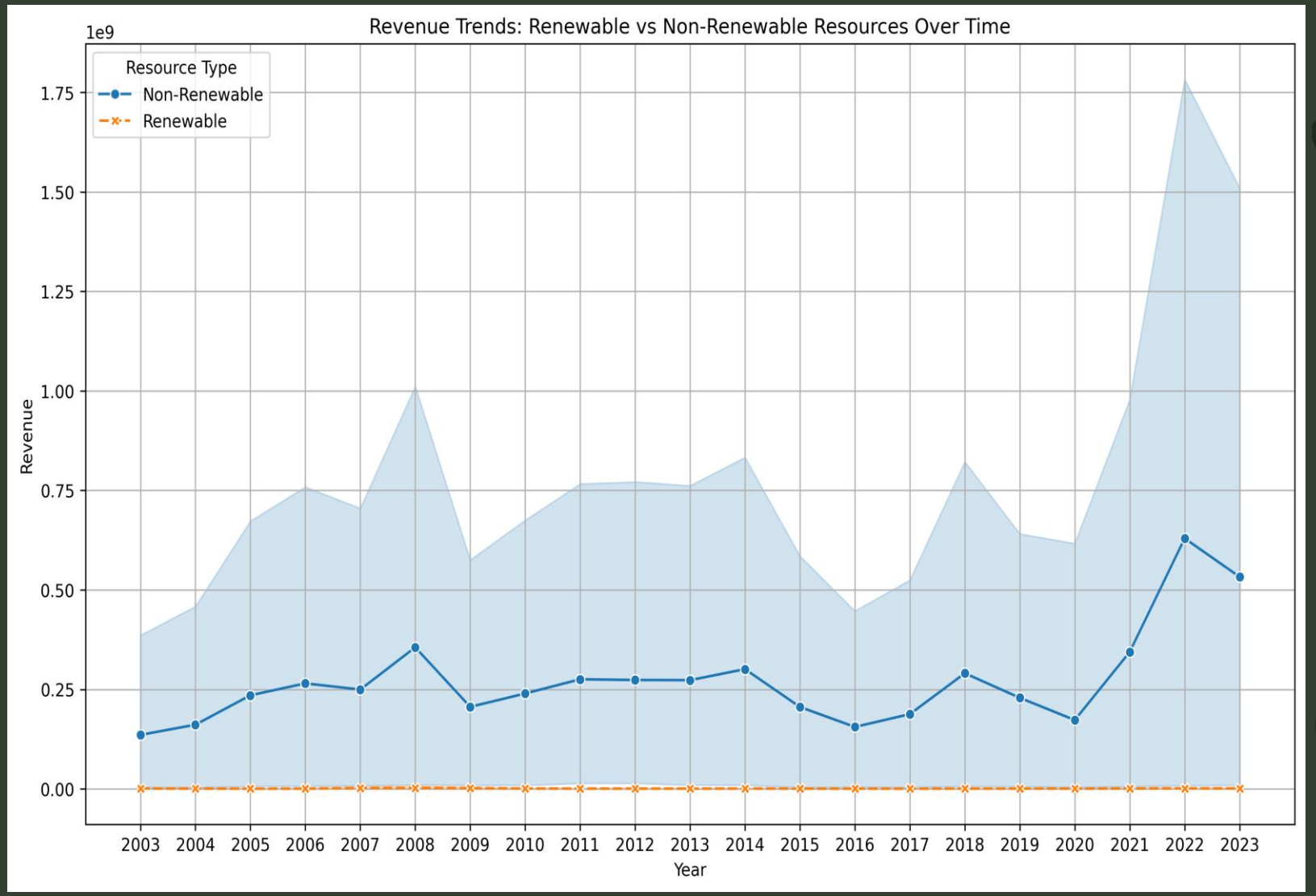
Exploratory Data Analyses, cont.

- Only top 5 commodities reviewed
  - *Many types were in the original data*
- Oil was highest producing
- Data are across all states
  - *Not stratified by geographic region*



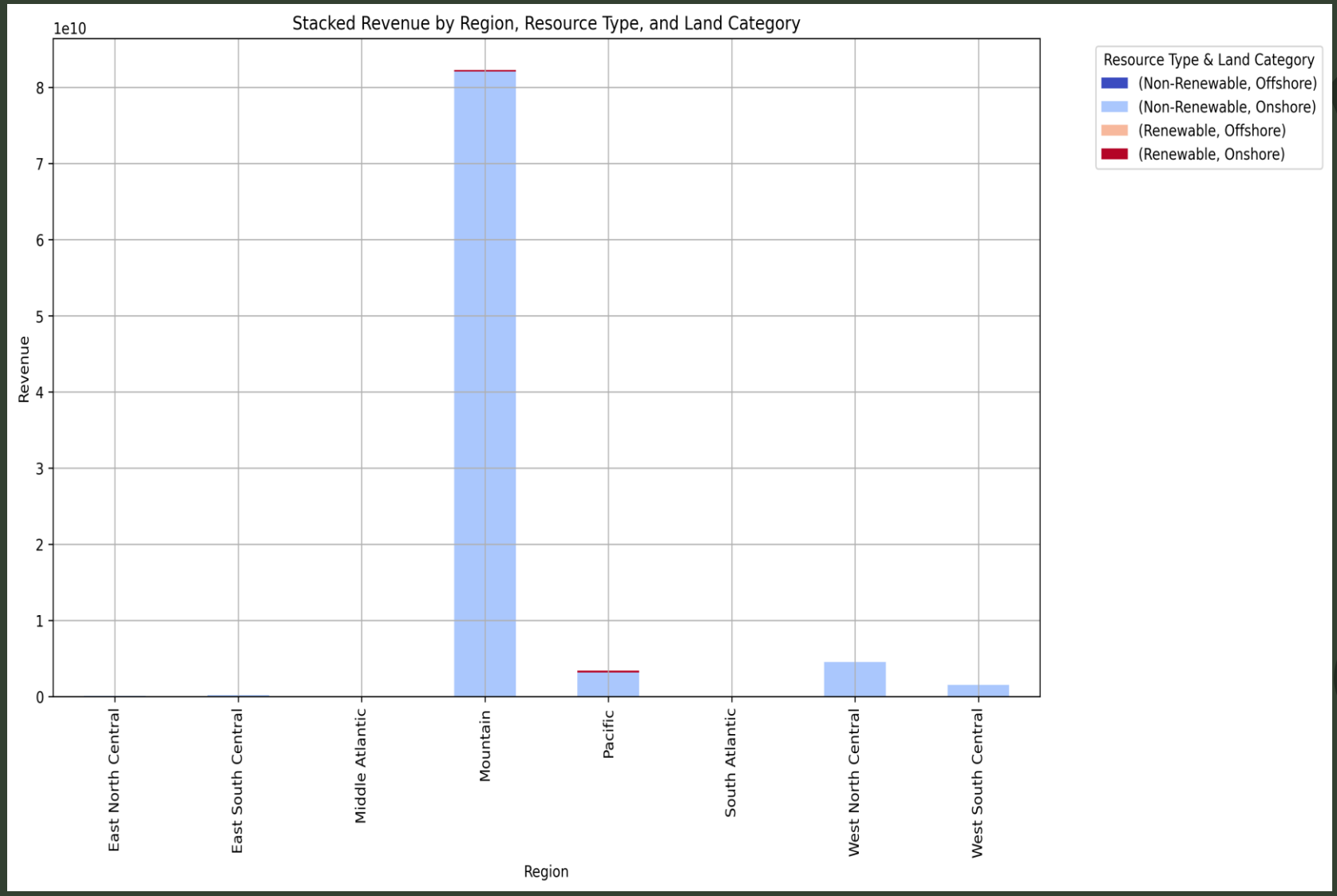
Results

- **Non-Renewable Resources:**
  - Significant revenue growth over time
  - Sharp increase post-2020
  - High fluctuations indicate market volatility
- **Renewable Resources:**
  - Minimal growth; revenue remains flat
  - Suggests slower adoption or lower revenue generation compared to non-renewables



Results

- **Mountain Region** dominates with **highest revenue** from **Non-Renewable Onshore** resources
- **Onshore resources** contribute significantly, with **higher counts** compared to offshore across all regions
- Regions like the **Pacific** and **Central** show comparatively lower revenue generation for both renewable and non-renewable onshore



Results

- This plot clearly illustrates stark difference between **onshore** and **offshore revenue**
- **Onshore resources** dominate in both revenue and density

Conclusions

- **Non-renewable onshore resources** had significant revenue growth over past two decades
  - Sharp **increase post-2020**
  - Indicates **dominance of non-renewables** in global energy market
- **Renewable resources**, however, showed **minimal growth**
  - Relatively **flat revenues**, highlighting **lag** compared to non-renewables
- **Non-renewable onshore resources** are largest revenue contributors, significantly **outpacing offshore resources**
- **Offshore resources** contribute **minimal revenue**
  - Especially in renewable sector
    - **Offshore energy extraction** remains underdeveloped compared to **onshore energy production**
- **Renewable resources** had limited growth in revenue
  - Mainly sourced from **onshore**
  - **Offshore renewables** contributed even less

Limitations & Future Considerations

- **Limitations and Confounding Factors**
  - To protect sensitive information, Indigenous/Native American resource revenue only reported at national level
  - Land categories of "onshore" and "offshore" are very broad
  - State-owned resources not included, only federal
  - Limits to full granularity for all of US as a result
- **Ideas for Future Work**
  - Future studies could examine resource and revenue trends broken down by land biomes (e.g., forest, grassland, desert, etc.)
  - Non-renewable natural federal resources far outnumber renewable
    - Could explore renewable natural resources compared to renewable manmade