Development of Subregions of the Conterminous United States

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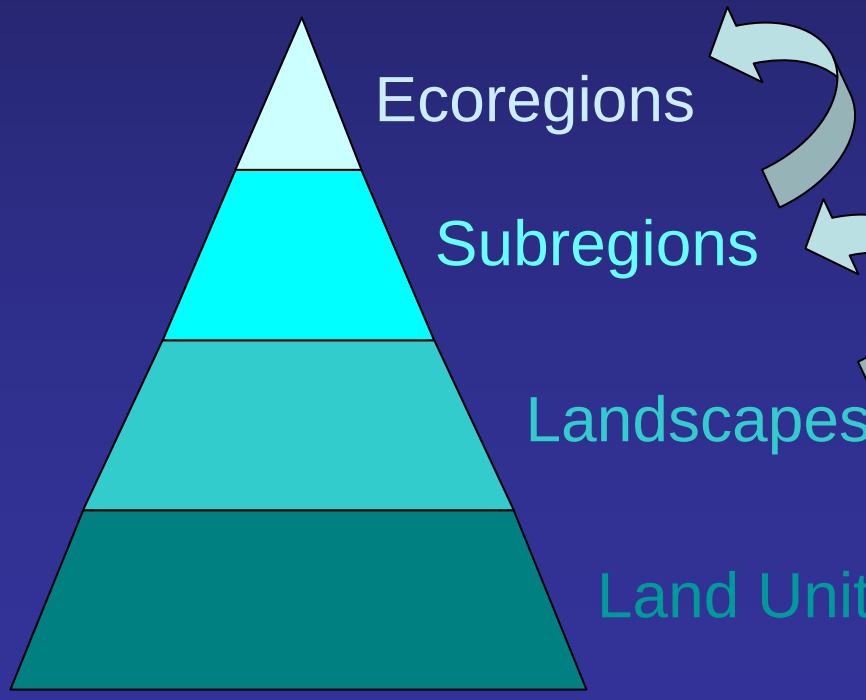


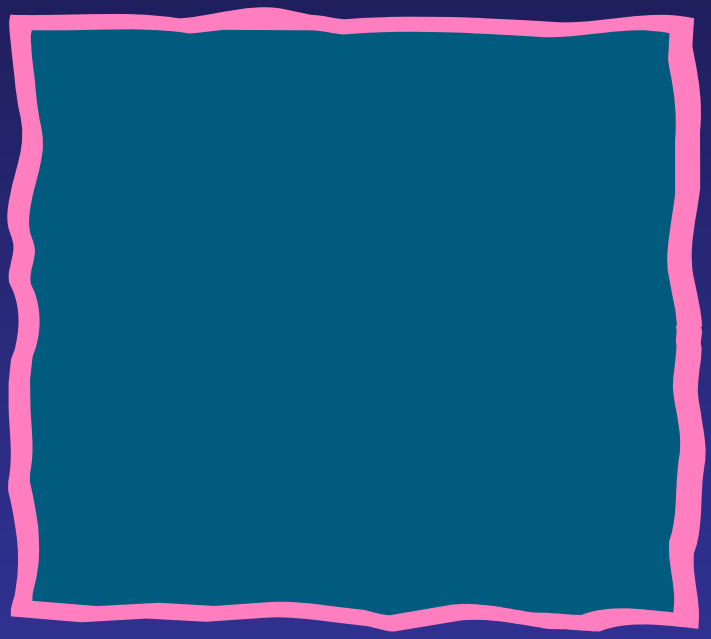
An application of the National Hierarchical Framework of Terrestrial Ecological Units

ECOMAP: assigning ecological addresses to our lands

Provides a spatial context for…

- Understanding ecological and hydrological processes, disturbance regimes, habitat and vegetation patterns, & successional pathways
- Data collection & extrapolation of models and research findings
- Ecosystem characterization
  - Forest Planning
  - Watershed Assessments
  - Landscape Analyses
  - Field Projects

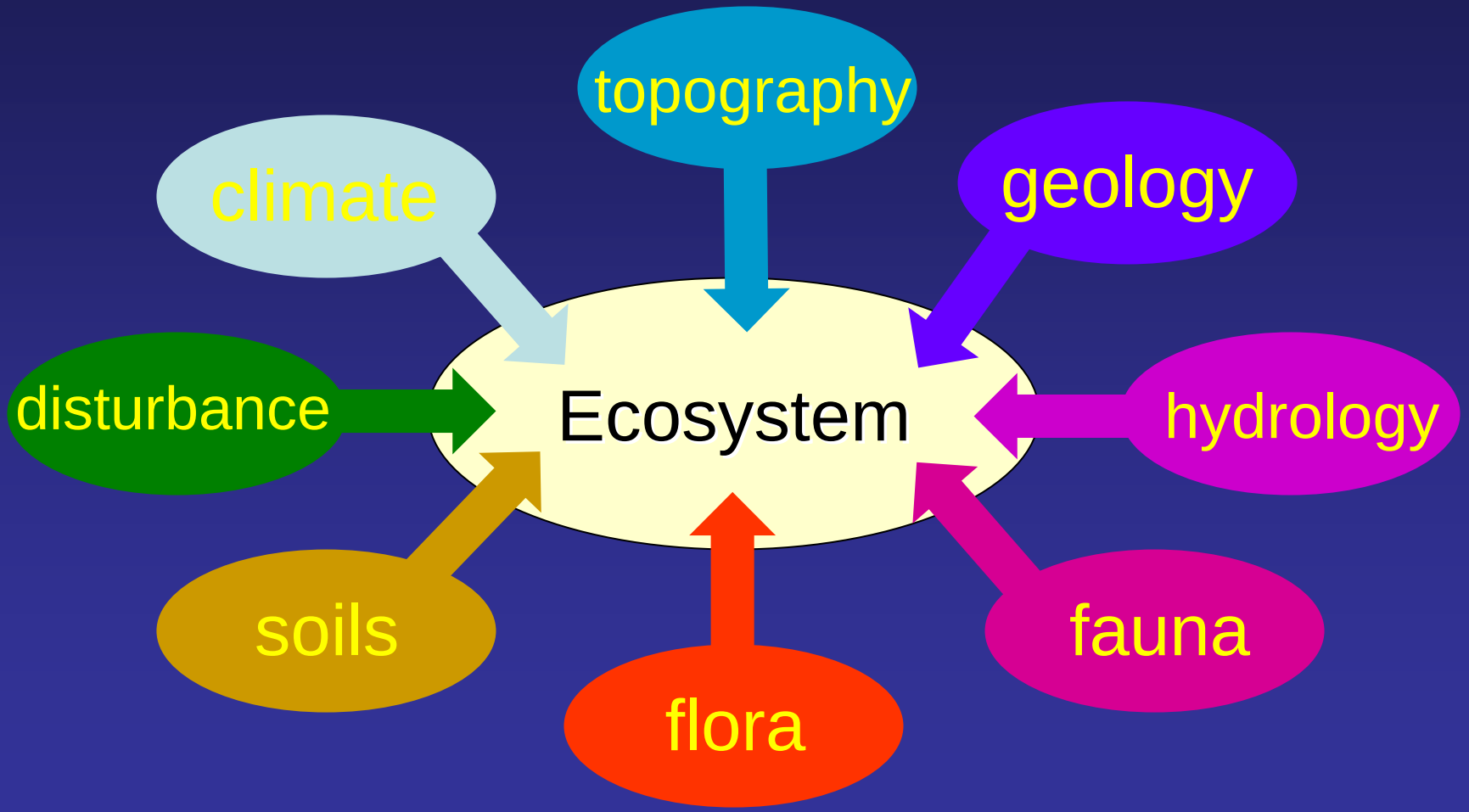
Ecosystems are places where biological and physical factors interact.



3-dimensional

terrestrial spaceGJN

Ecosystems are complex and influenced by many environmental factors



ECOMAP

Principal Environmental Factors

Climate

Physiography

Geology & Surficial Deposits

Landform

Vegetation

Soils

Hierarchical Framework

Ecoregions

- Domains, Divisions, Provinces

Subregions

- Sections, Subsections

Landscapes

- Landtype Associations

Land Units

- Landtypes, Landtype Phases

GJN '02

Policy and Direction

Implementation of the National Hierarchical Framework of Ecological Units

- Establishment and maintenance of official GIS layers/coverages in the GISDD and repository of information in the FS NRIS
- Implementation of an agency-wide process and direction for refinement of regions and subregions
- Formalization of key roles and responsibilities

Take Home Messages

- "Not Business as Usual"
  - Policy and Direction will govern the development and refinement of Ecoregions and Subregions
  - Corporate Forest Service products will be available for resource assessments, analyses, planning, and management.

Development / Refinement Process

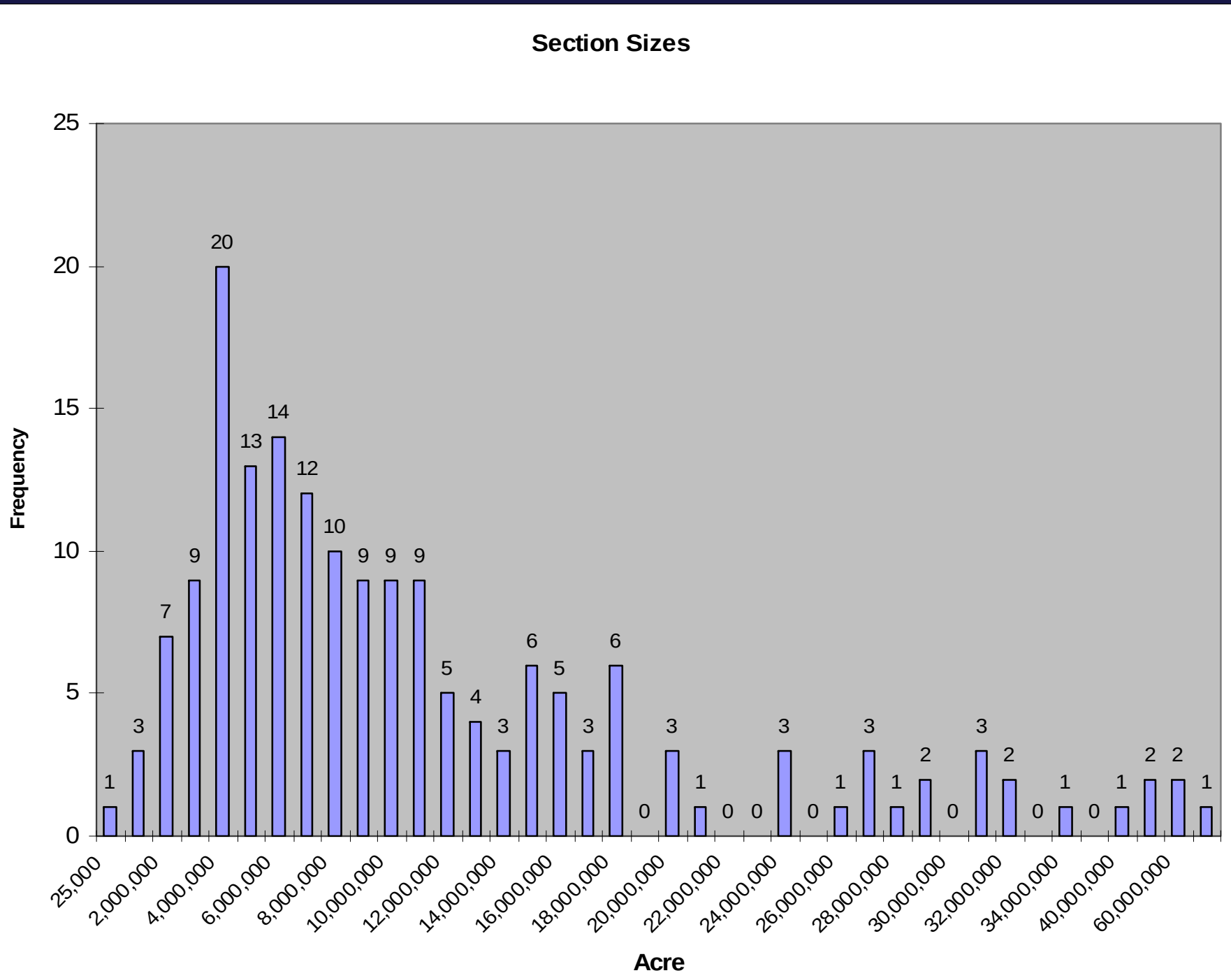
- Bailey's ecoregion mapping provided the initial basis for delineation of subregions, which consist of two tiers of ecological units: sections and subsections
- The 1976 map of ecoregions of the United States provided the first delineation of subregions at the section level.
- In 1994, a nationally coordinated project refined subregions and produced the next approximation of sections of the US.
- In following years, subregion maps were published to the subsection level in several regional projects.

Agreements from the April 2002 National ECOMAP meeting

- As maps were produced by regional teams across the entire county, a nationally coordinated project to merge existing individual subregion maps into a consistent national map of the 48 conterminous states was undertaken.

- A review of the 2004 national map created by Regional teams showed that Sections ranged from 25,000 to 70 million acres, and Subsections ranged from 6,000 to 23 million acres.

- This range of sizes in Sections and Subsections indicated some inconsistency in the national map.


Section Sizes
Frequency
Acre
0
5
10
15
20
25
1
3
7
9
20
13
14
12
10
9
9
9
5
4
3
6
5
3
6
0
3
1
0
0
3
0
1
3
1
2
0
3
2
0
1
0
1
2
2
1
25,000
2,000,000
4,000,000
6,000,000
8,000,000
10,000,000
12,000,000
14,000,000
16,000,000
18,000,000
20,000,000
22,000,000
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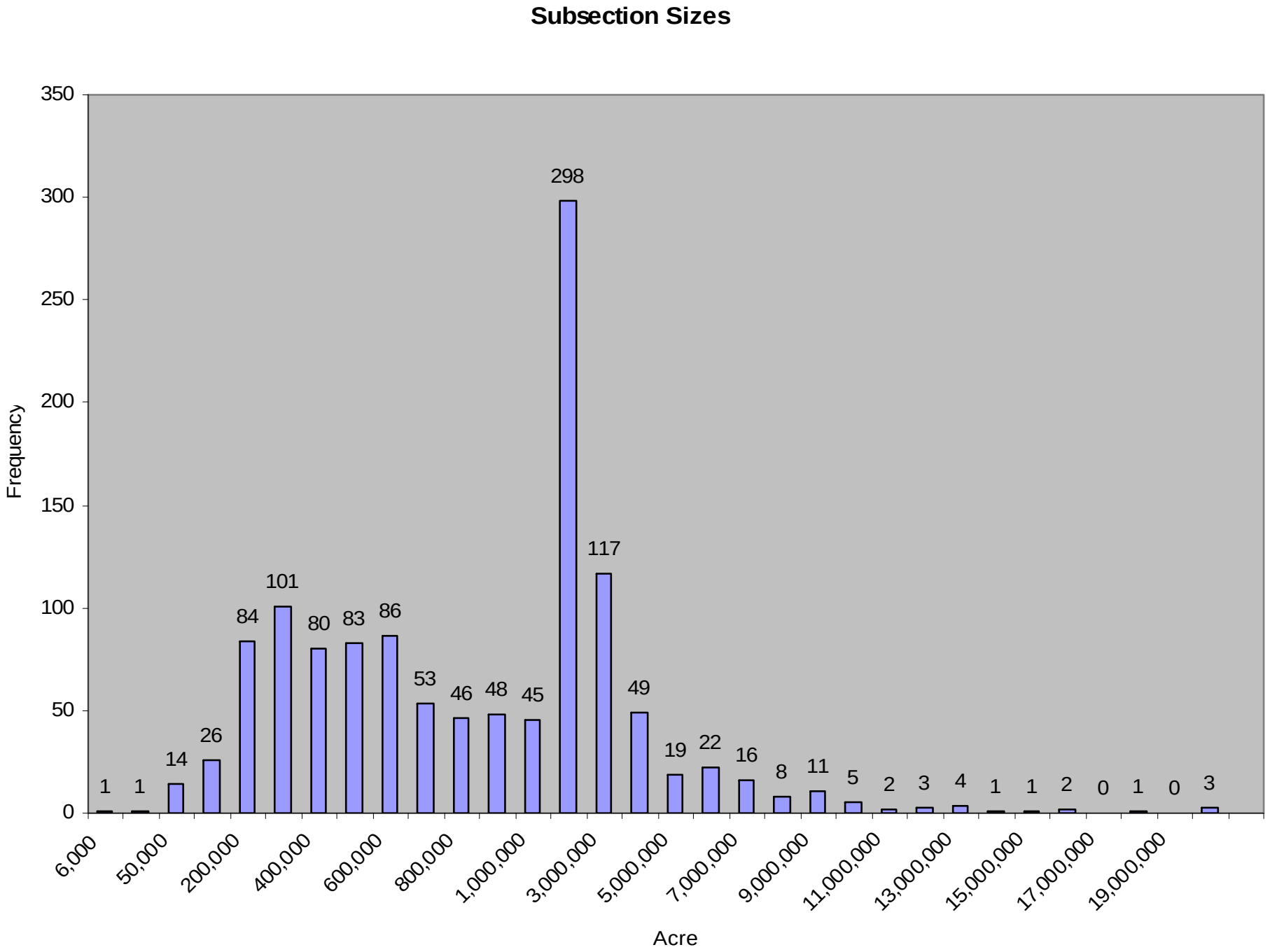
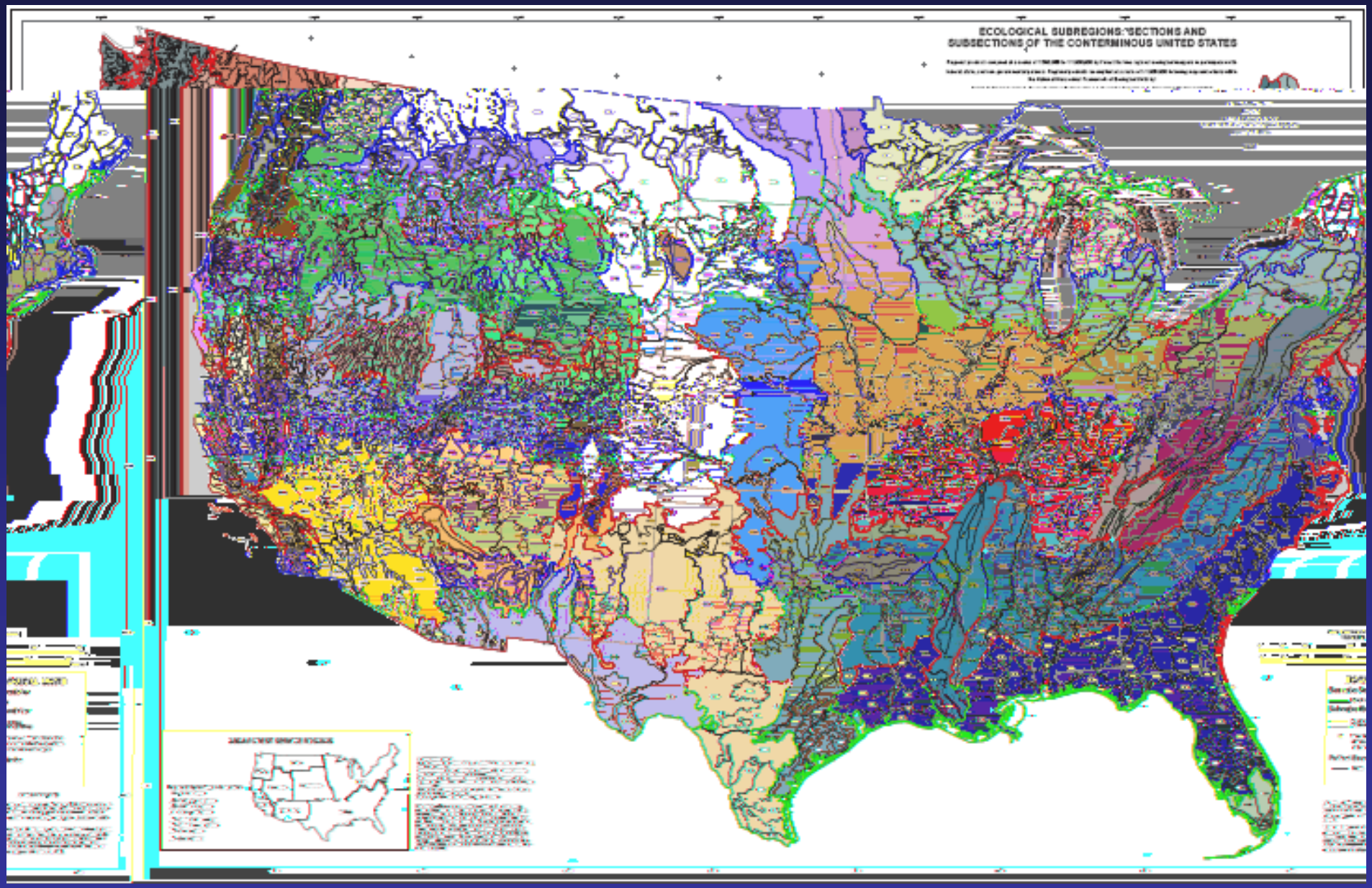

Subsection Sizes
Frequency
Acre
350
300
250
200
150
100
50
0
1
1
14
26
84
101
80
83
86
53
46
48
45
298
117
49
19
22
16
8
11
5
2
3
4
1
1
2
0
1
0
3
6,000
50,000
200,000
400,000
600,000
800,000
1,000,000
3,000,000
5,000,000
7,000,000
9,000,000
11,000,000
13,000,000
15,000,000
17,000,000
19,000,000

Agreements from the April 2002 National ECOMAP meeting

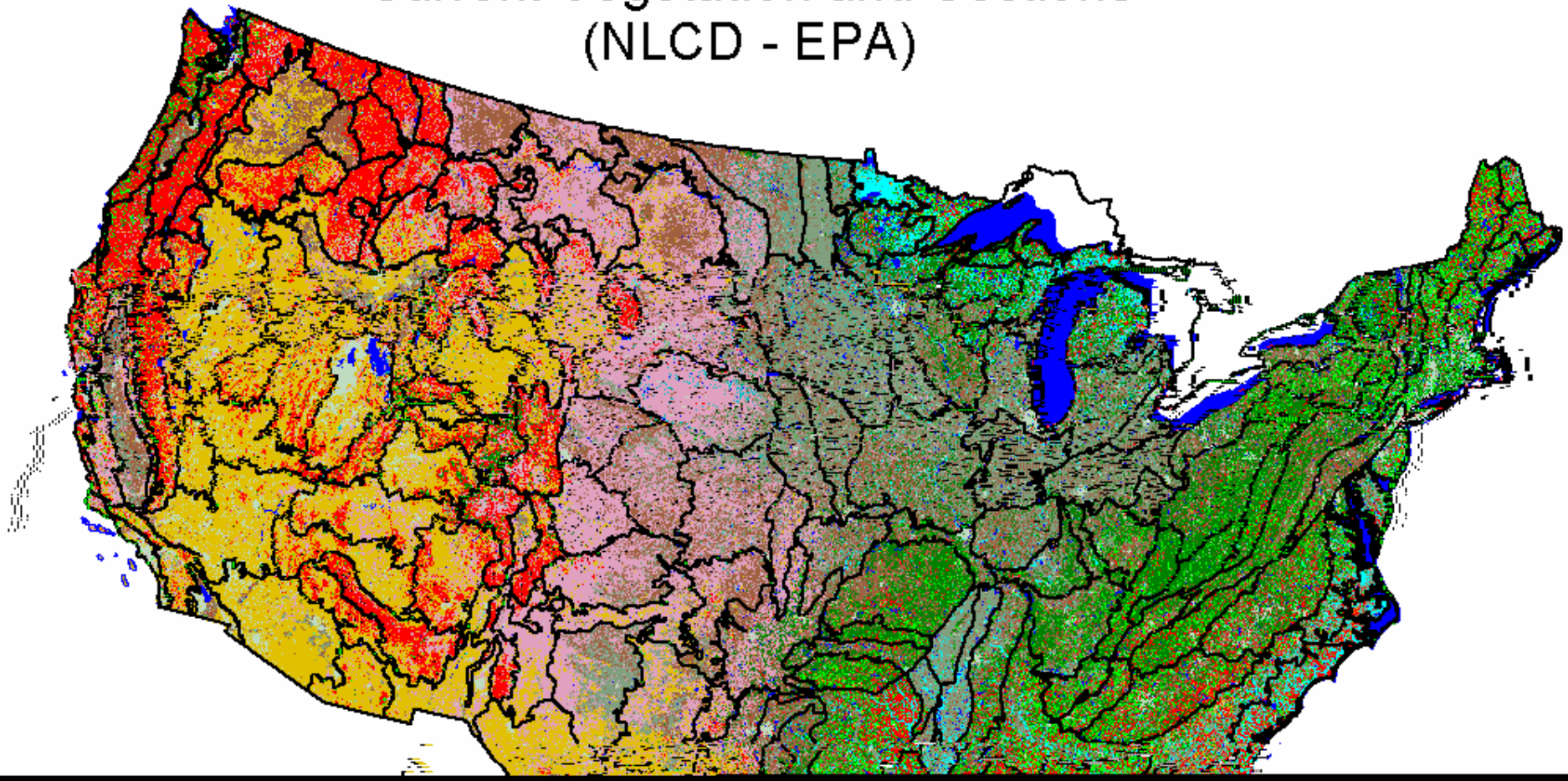
- Program managers from each Region agreed size ranges to review ecological units.
  - Sections: 4 to 20 million acres
  - Subsections: ¼ to 5 million acres
  - Units outside these ranges would be reviewed as possible outliers.
- If there was an ecological basis for grouping or subdividing units, revisions would be made.
- Size alone was not the criteria for change, but was the criteria for reviewing units for possible change.
- An agreement was also reached that Regional products will remain intact, with a National map produced that rectified Regional inconsistencies for National applications.

Information used in review of sections and subsections included:

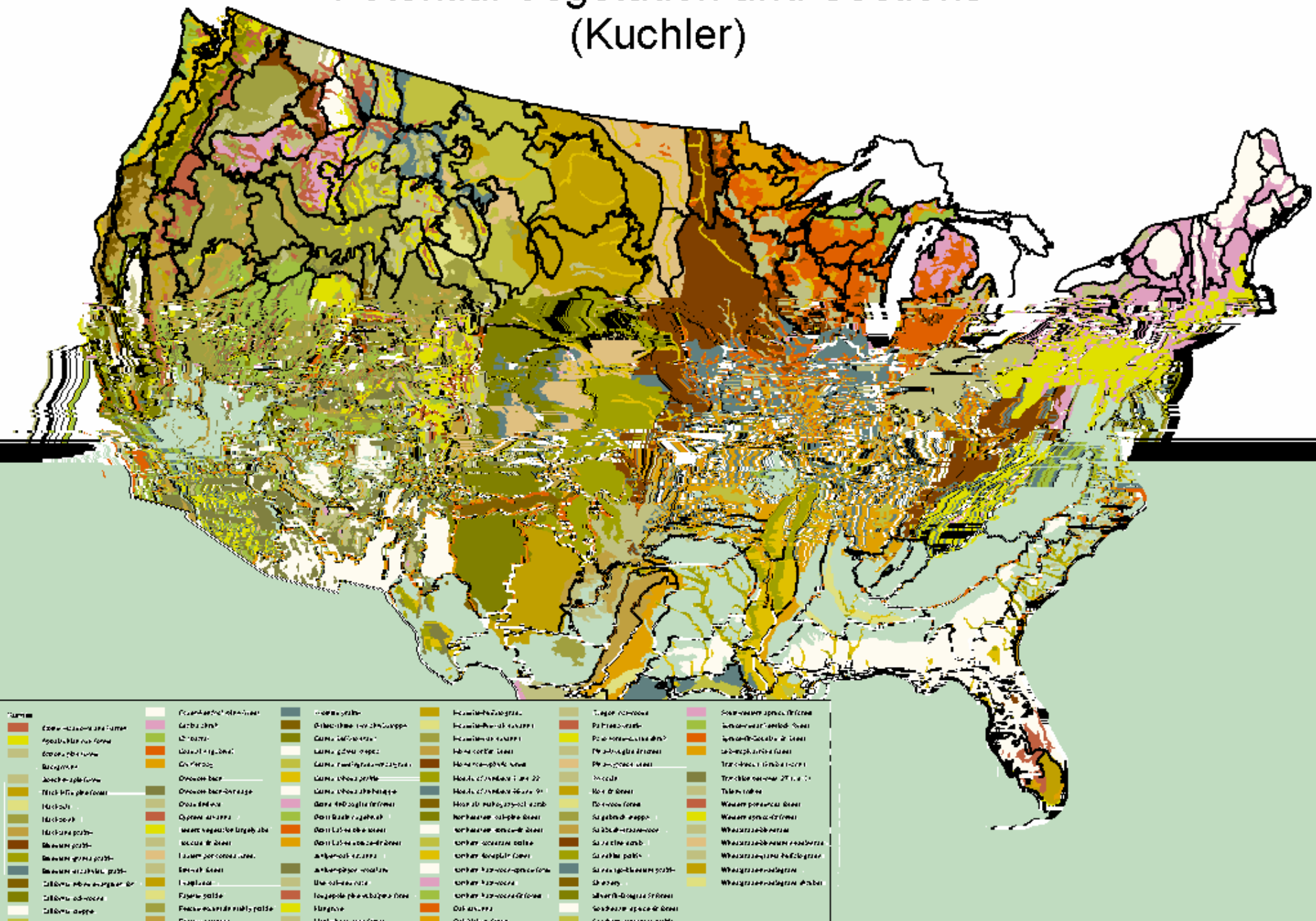
- Potential Natural Vegetation (PNV) - National Atlas Map
- Surficial Geology - USGS Quaternary Geology of the US.
- STATSGO Soils - General Soil Associations of each state.
- State Information – e.g., USGS GAP Landcover, Forest Habitat Regions of each state
- Existing vegetation - Forest Type Groups of the U.S, AVHRR, NLCD Land Cover Types
- Climatic gradients - Precipitation, Temperature, and Length of Growing Season
- Morphometry of the earth derived from DEM's
- Aquatics - Density of lakes, rivers, streams


ECOLOGICAL SUBREGIONS: SECTIONS AND
SUBSECTIONS OF THE CONTERMINOUS UNITED STATES

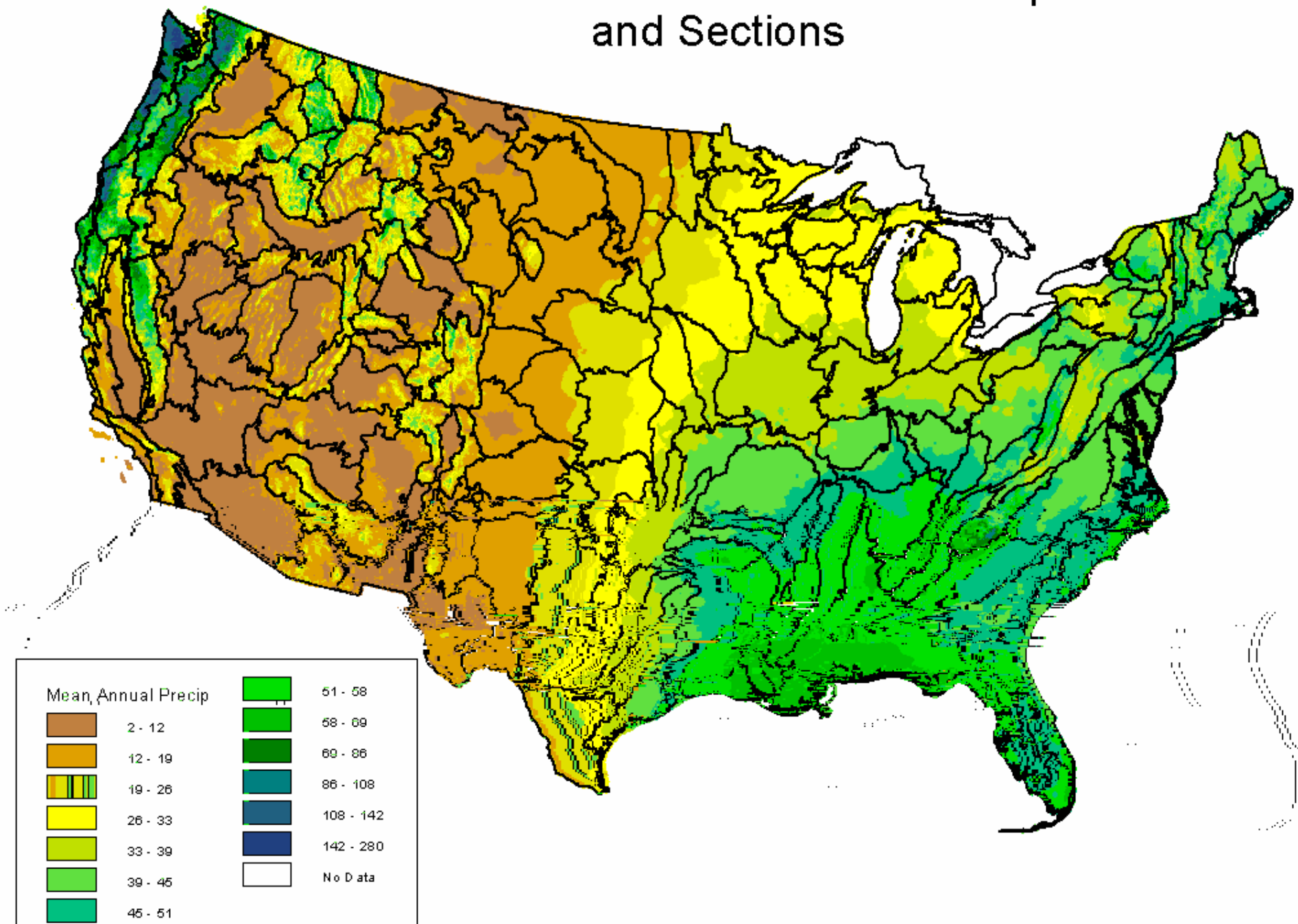
Current Vegetation and Sections
(NLCD - EPA)



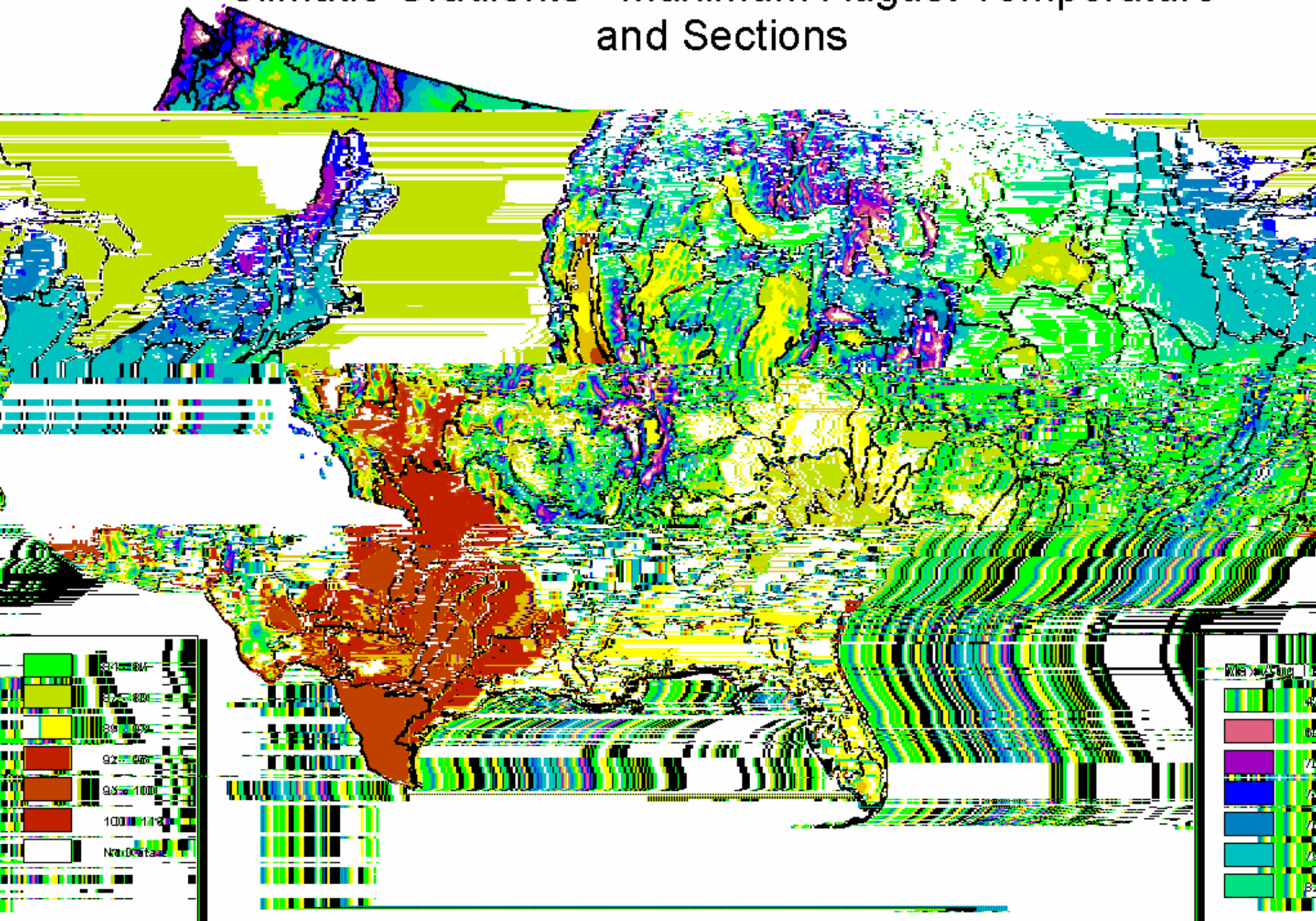
Potential Vegetation and Sections (Kuchler)



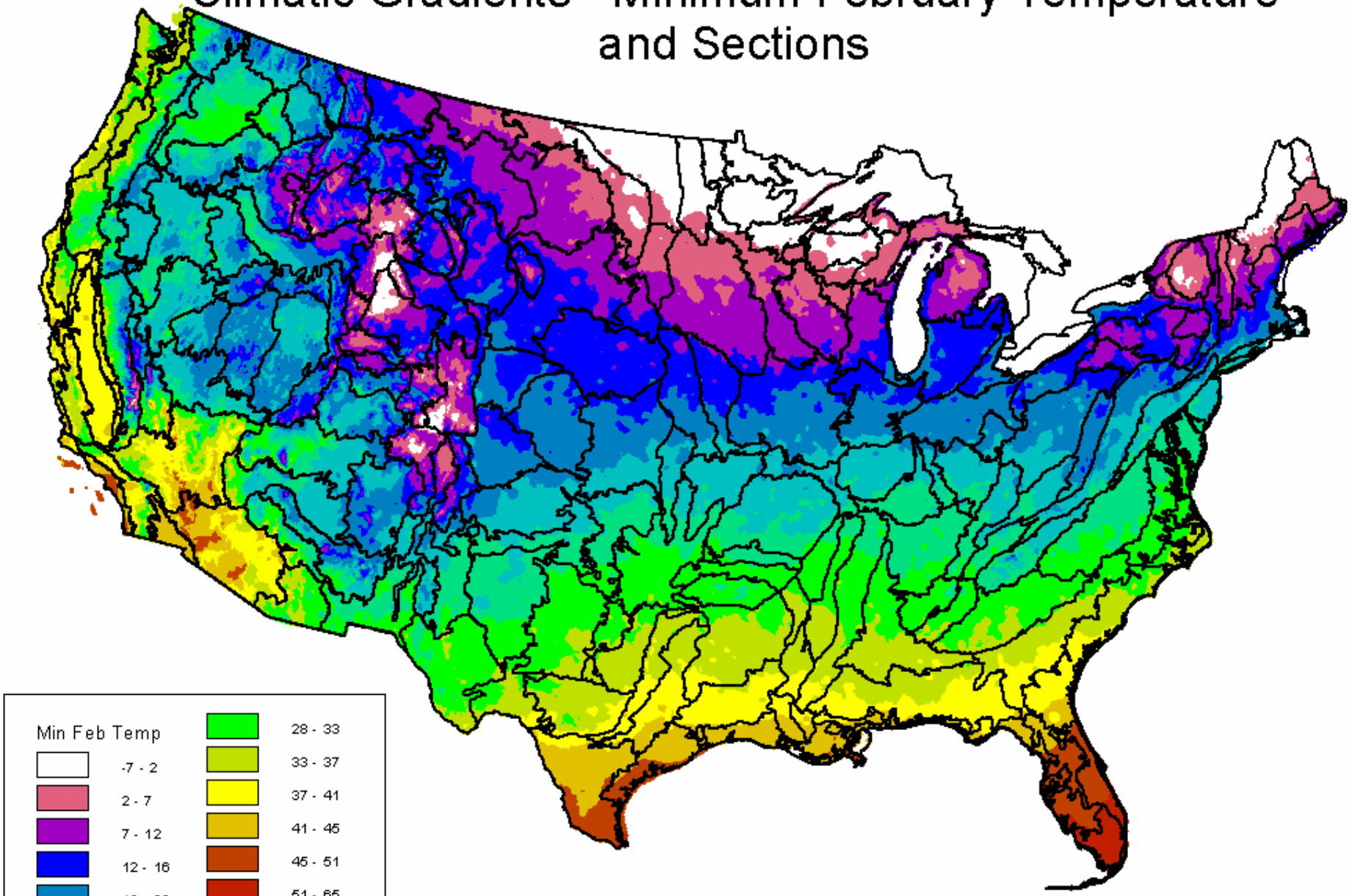
Climatic Gradients - Mean Annual Precipitation and Sections



Climatic Gradients - Maximum August Temperature and Sections



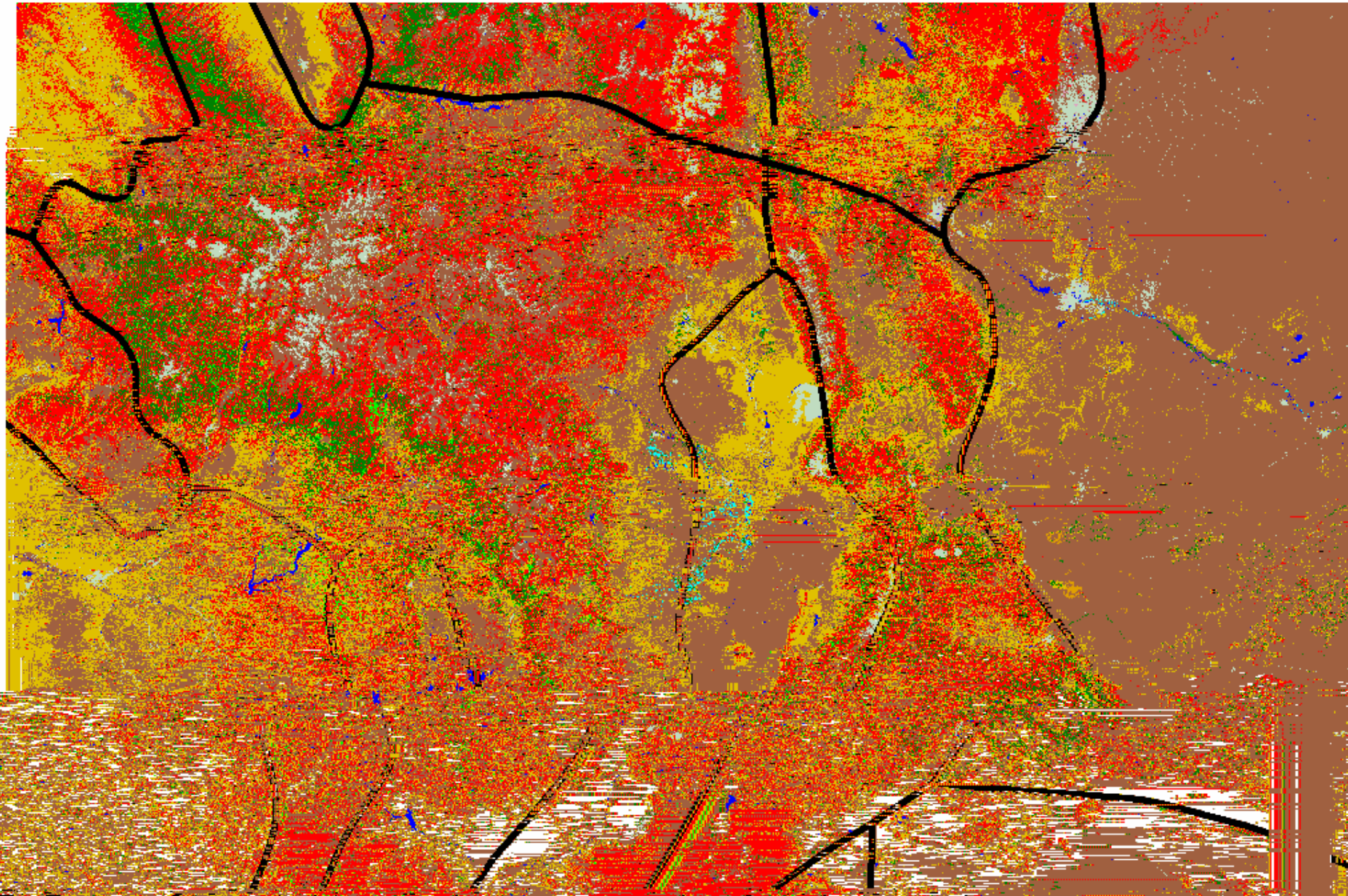
Climatic Gradients - Minimum February Temperature and Sections



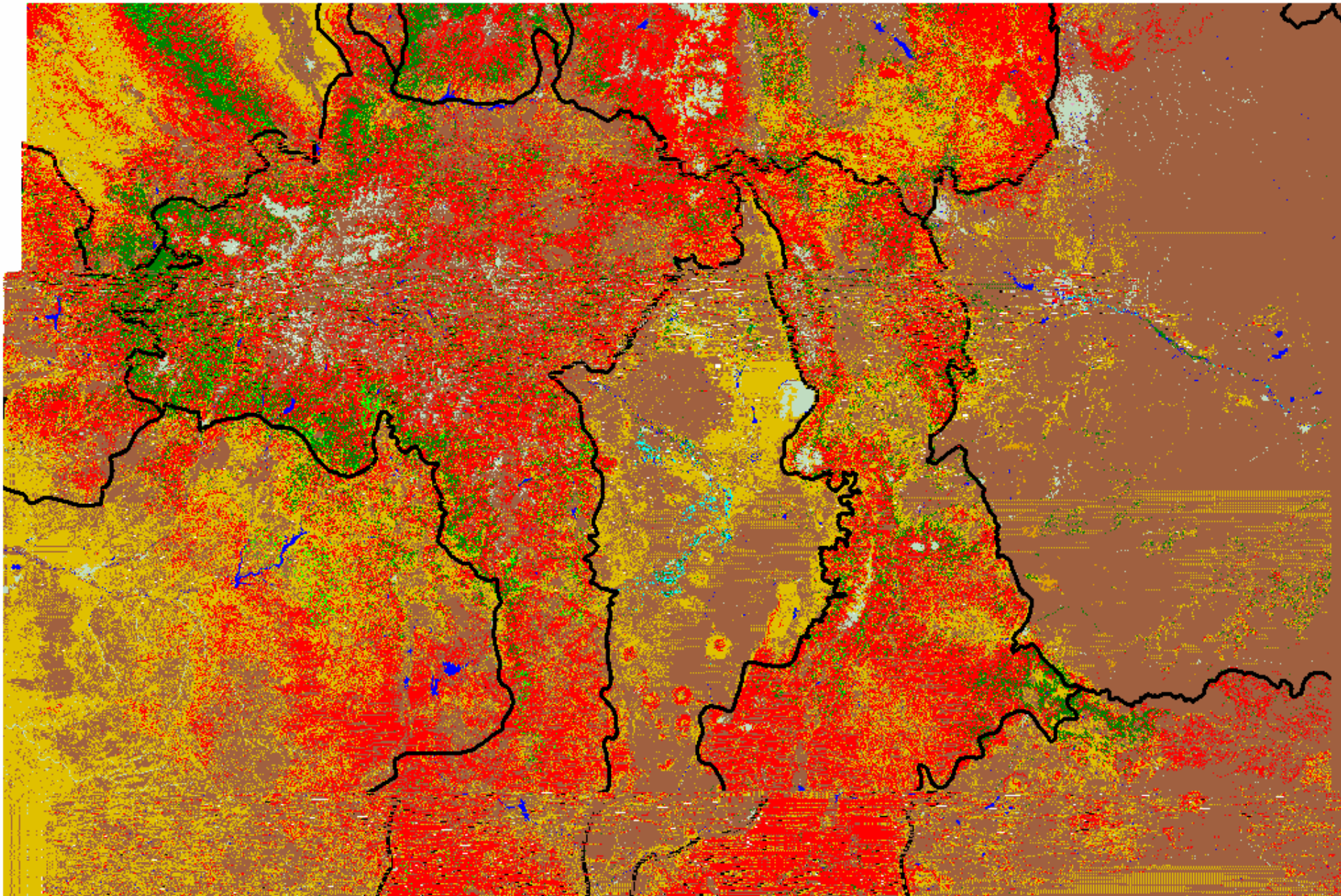
Top down - bottom up - Utah Colorado Example
1995 Lines

Top down - bottom up - Utah Colorado Example
2004 Lines

Top down - bottom up - Utah Colorado Example
EPA Landcover 1995 Lines



Top down - bottom up - Utah Colorado Example
EPA Landcover 2004 Lines



Use and Applications

- Spatial analysis and reporting units
- Setting context for understanding more localized patterns and processes

Spatial analysis and reporting units

current end-users

- Forest Inventory and Analysis Units throughout the US.
- Forest Health Monitoring
- LANDFIRE – interagency assessment of ecological condition class across the United States
- Classification of 12000 mountain lakes in western North America, George Lienkaemper, USGS Forest & Rangeland Ecosystem Science Center, Corvallis, OR.
- Center for Native Ecosystems, Denver CO
- State Heritage Programs – “species/community range maps for our conservation”
- Natureserve – “define the geographic ranges of the ecological units (e.g. associations, alliances and ecological systems) that we maintain”

Conclusion

The National Hierarchy of Ecological Units was developed to improve single factor classification and mapping systems.

The underlying premise was simple: all disciplines and associated classification and mapping systems were important, valid, and useful.

But when used together (integrated) for a number of applications, they became more useful.

A multi-factor, multi-scaled, integrated mapping and interpretation system enables discerning relationships among factors comprising complex ecological systems, and associated patterns and processes.

Acknowledgements

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