

Agricultural Land Use Modeling Projections

8/27/2026

Tom Butler, EPA

Data processing

Establish a time series trend of crop acres (County Scale)

Aggregate Crops into 12 distinct Land Uses

Force Land Use acres to match *Land Classes (Crop vs Pasture/Hay)

Land Use acres are divided to Land River Segments based on the *fraction of county cropland or pasture/hay in each Segment

NOTE, we have 16 Ag Land Uses, rules exist to parse out the remaining 4 Land Uses that require data from States

Time series data progression

1982-2022

- Census every five years
- Interpolated between years

2027 – 2040

- Double exponential smoothing
 - Weighting primarily on the last two census years
 - Crops then assigned within land uses based on proportions from final year (2022)

CAST Aggregation

Aggregating Census of Agriculture (11 Land Uses)

- ~100 Census of Ag Crops are aggregated into 11 Load Sources (Land Uses)

Creation of Double Cropped Load Source (+1 Land Use)

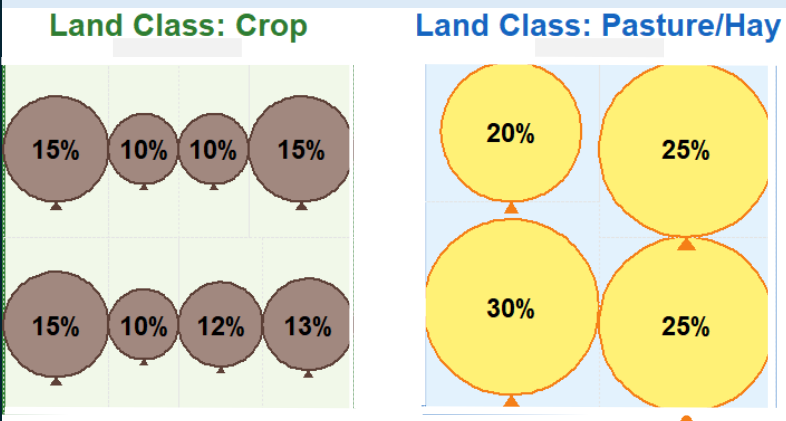
- Acres of harvested crop compared to overall harvested cropland

Enter Land Use Team Data

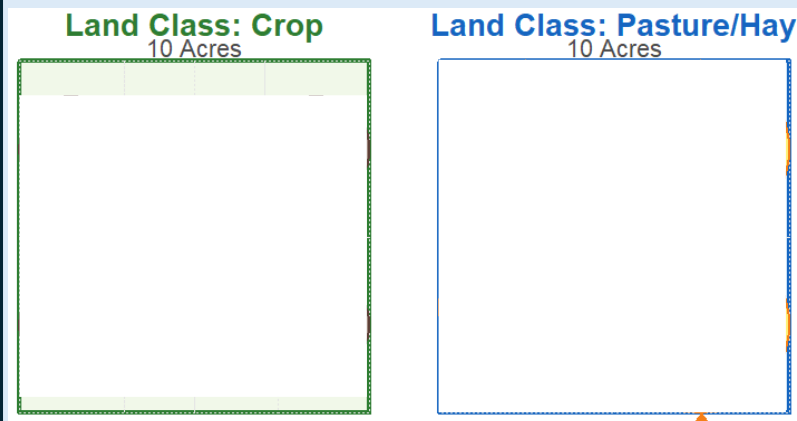
Adjust Acres within Land Classes

- Utilize census of ag proportions to adjust acres to match either Cropland or Pasture/Hay Land classes

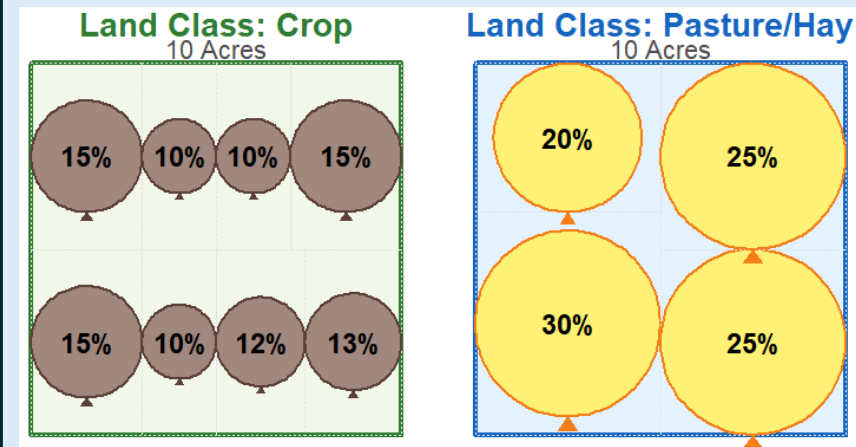
1) Census of Ag provides relative proportions of each Land Use



2) Land Use Team Provides Acres of each Land Class



3) Land Class absolute acres are divided based on Census proportions

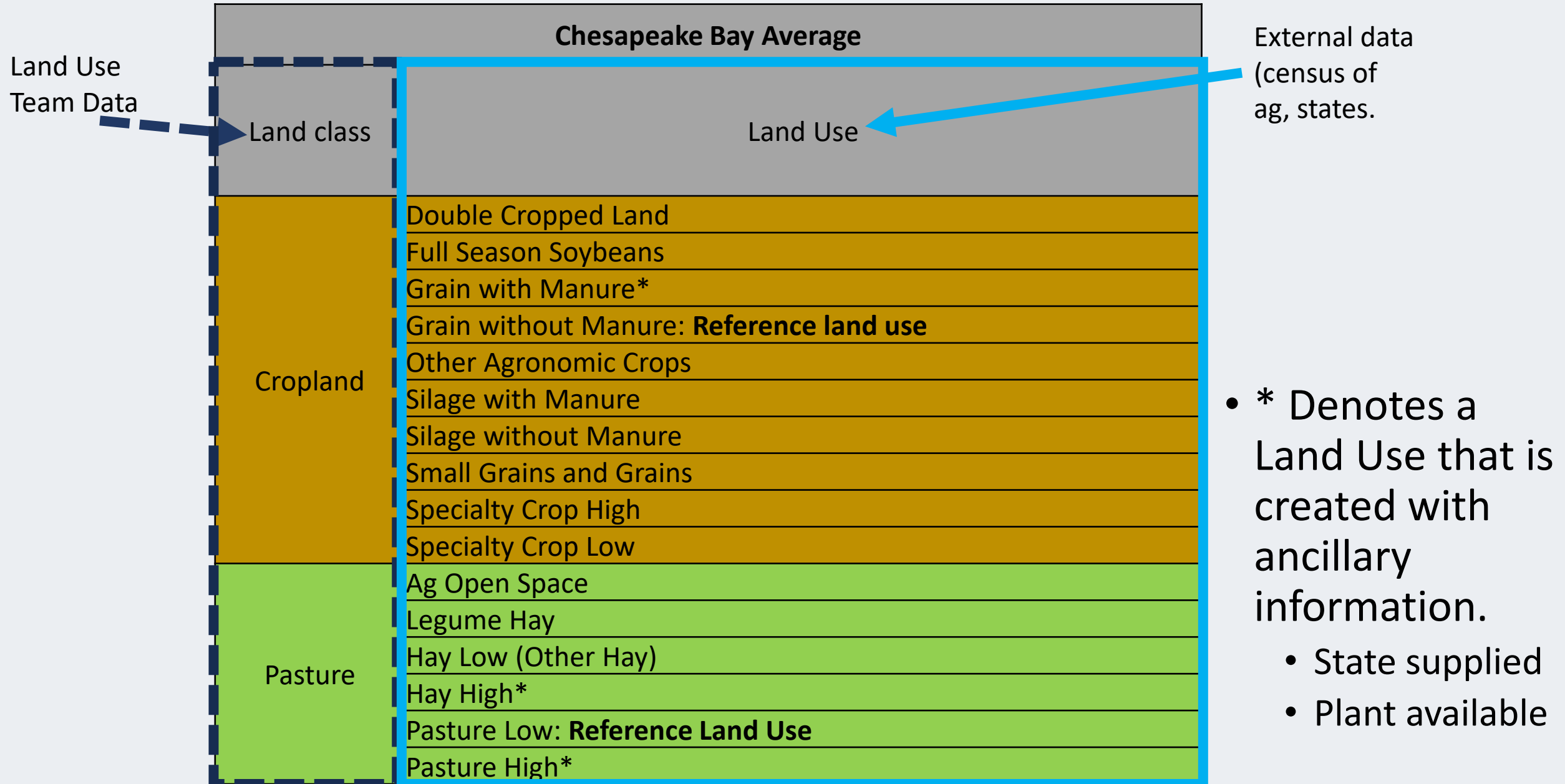


NOTE

Additional Land Uses are created

- Grains are split into eligibility WITH and WITHOUT manure based on plant available Nitrogen in P7. (+1 Land Use)
- Silage split into eligibility WITH and WITHOUT manure (+1 Land Use)
- Pasture and Hay are BOTH split into High and Low Land Uses based on state reported information (+2 Land Uses)

Complete CAST Land Uses and Land Classes



What do the acres look like?

Watershed Scale

12 Land Uses

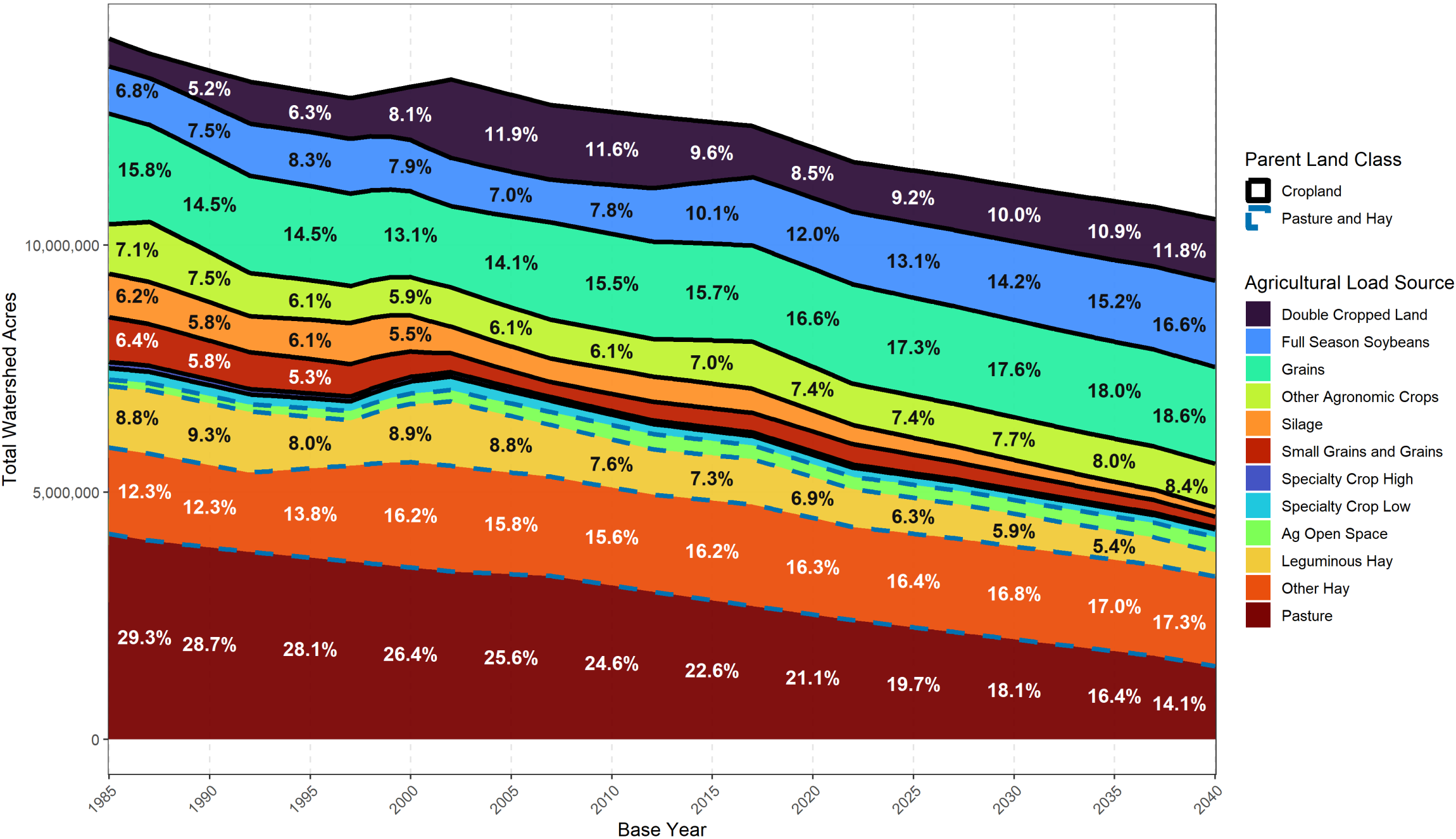
Total Acres over time

Percentage of acres that each Land Use represents

Differentiate Crop vs Pasture/Hay

Chesapeake Bay Watershed: Agricultural Load Footprint

Retained Turbo Palette | Luminescence Auto-Switching High-Contrast Labels



Questions?

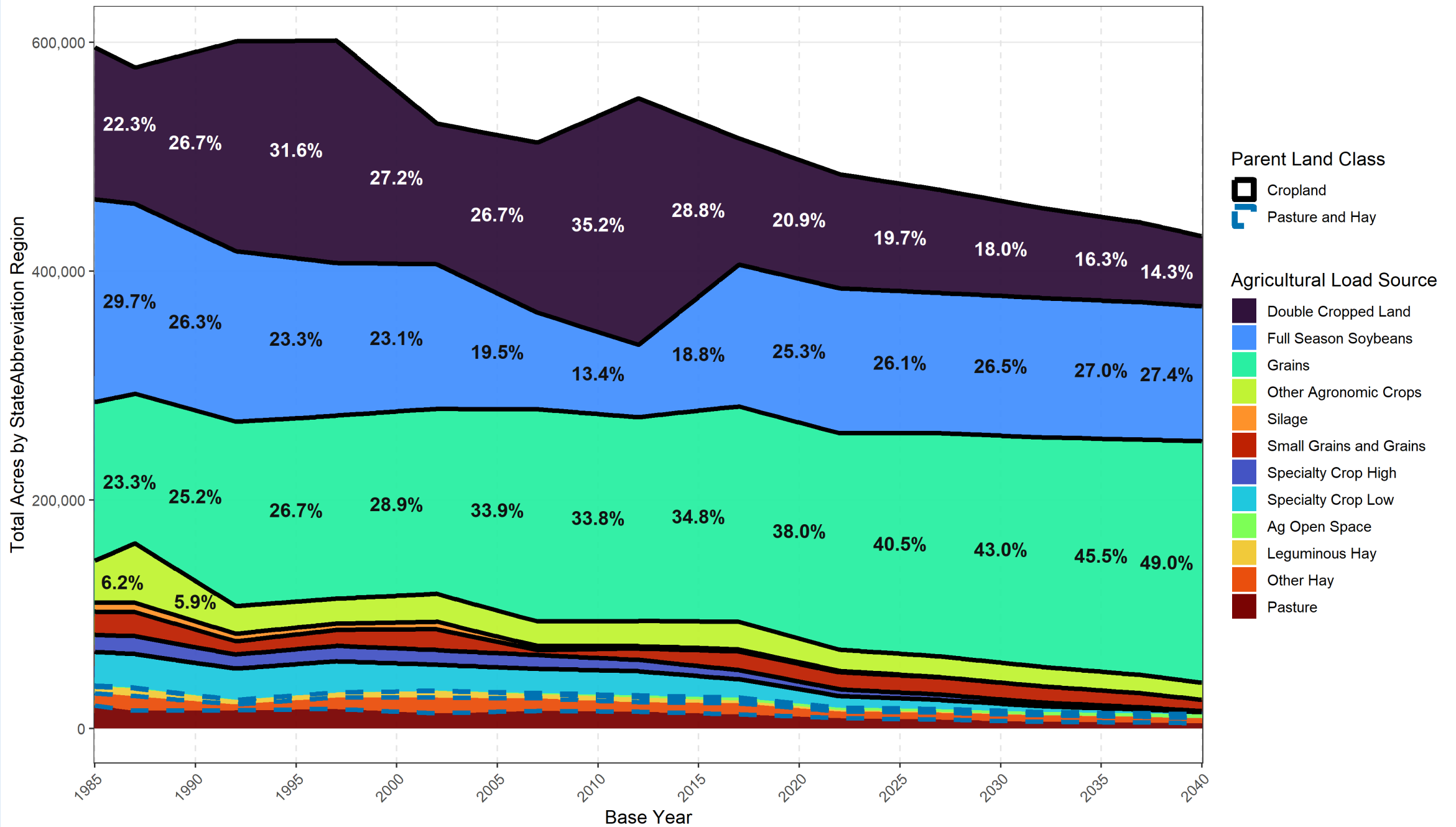
Additional Materials for those curious

- State Scale
- Representative County

State

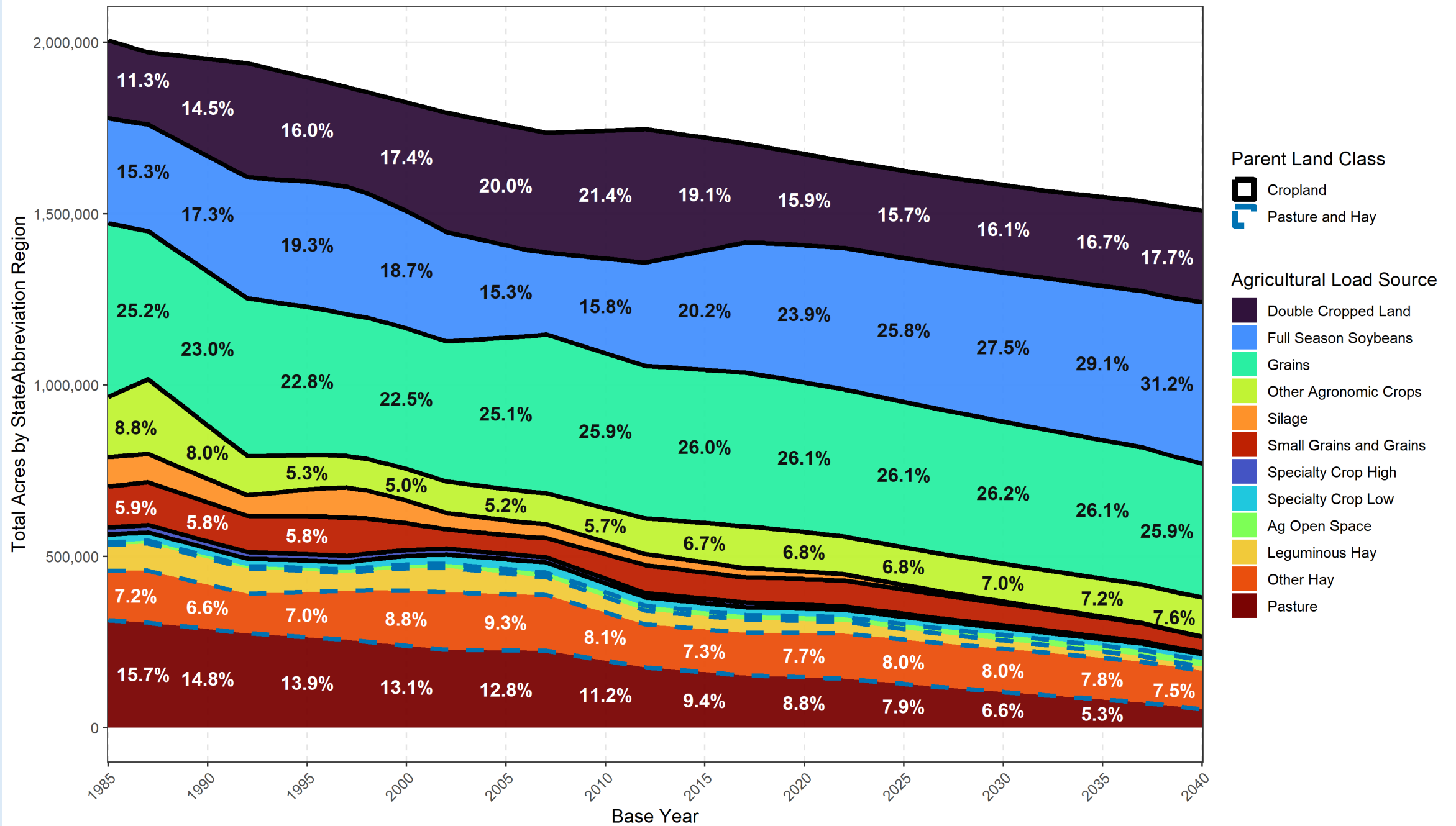
Total Acres over time for
each Land Use

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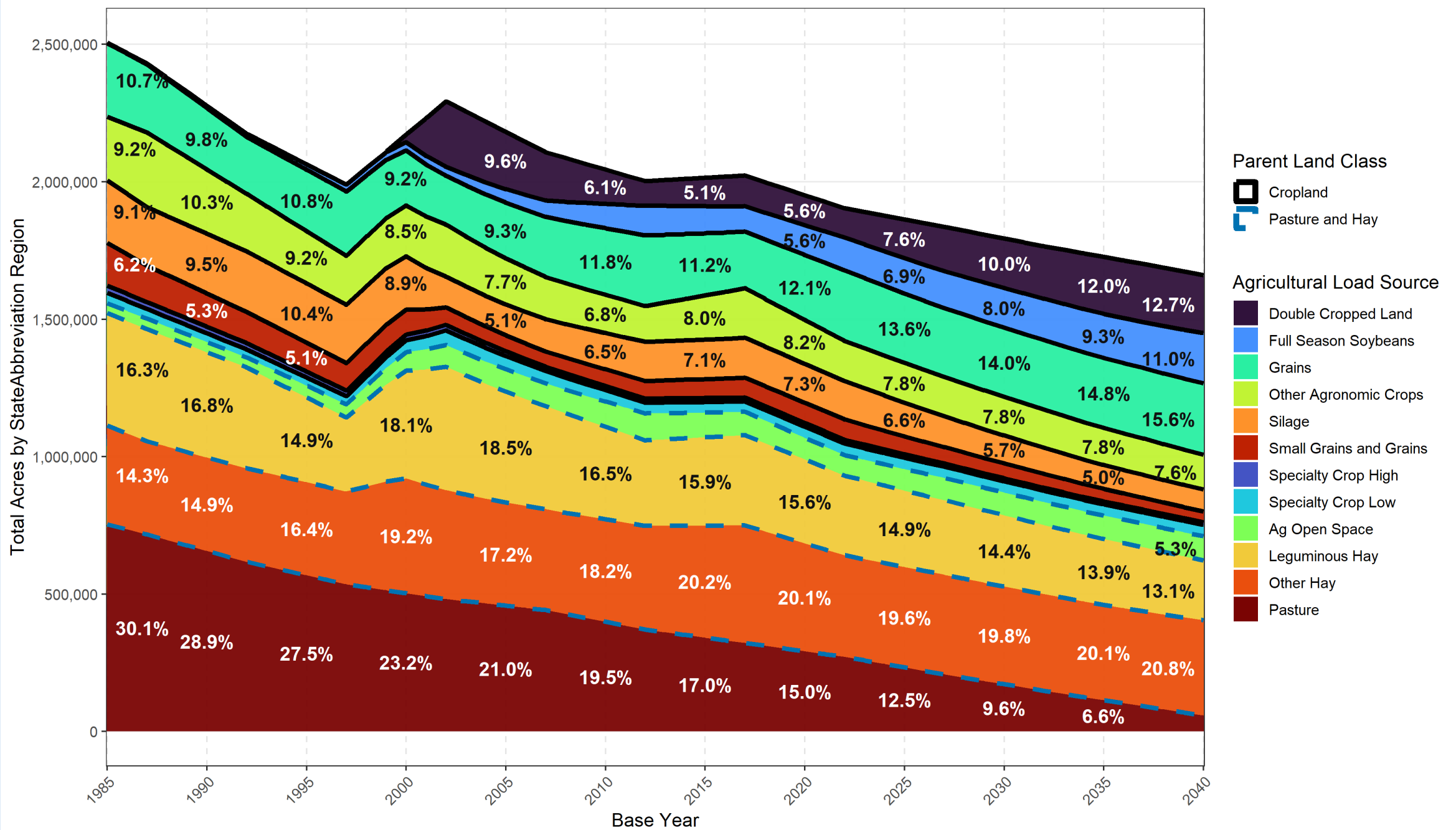


Regional Profile: StateAbbreviation = md

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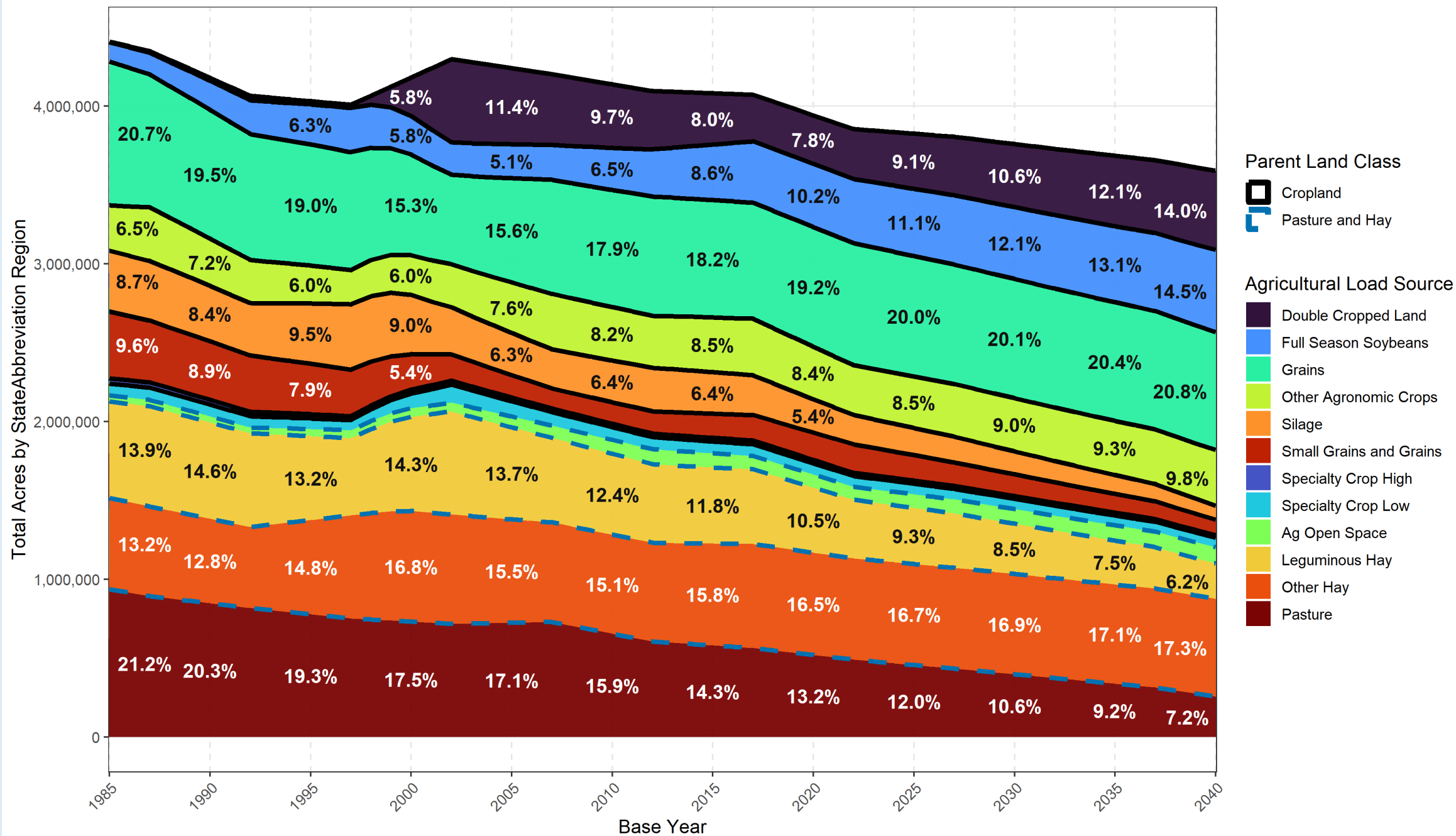


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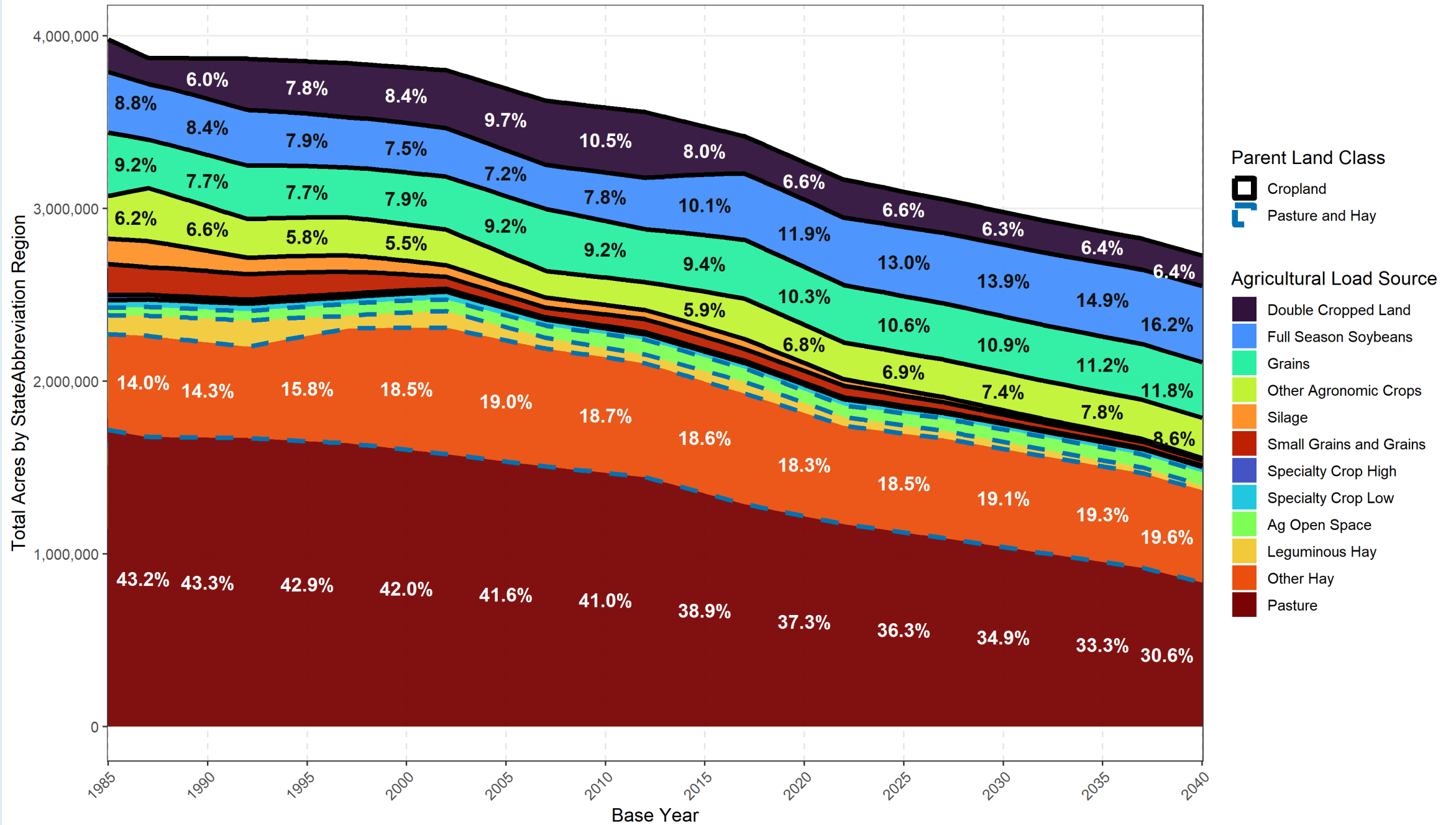
Regional Profile: StateAbbreviation = pa

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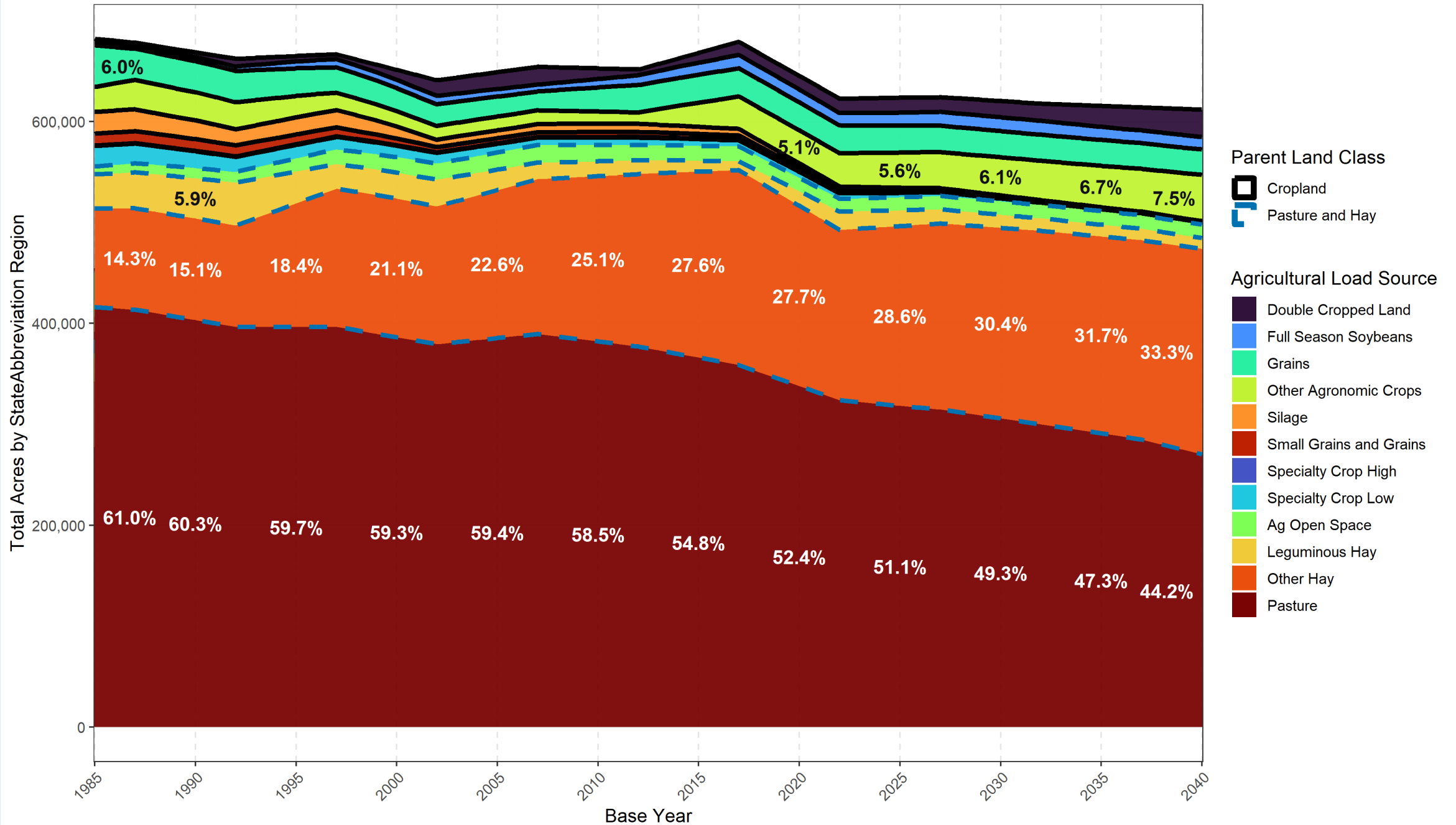
Regional Profile: StateAbbreviation = va

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Regional Profile: StateAbbreviation = ww

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“Representative” County

Exclude non-farming counties

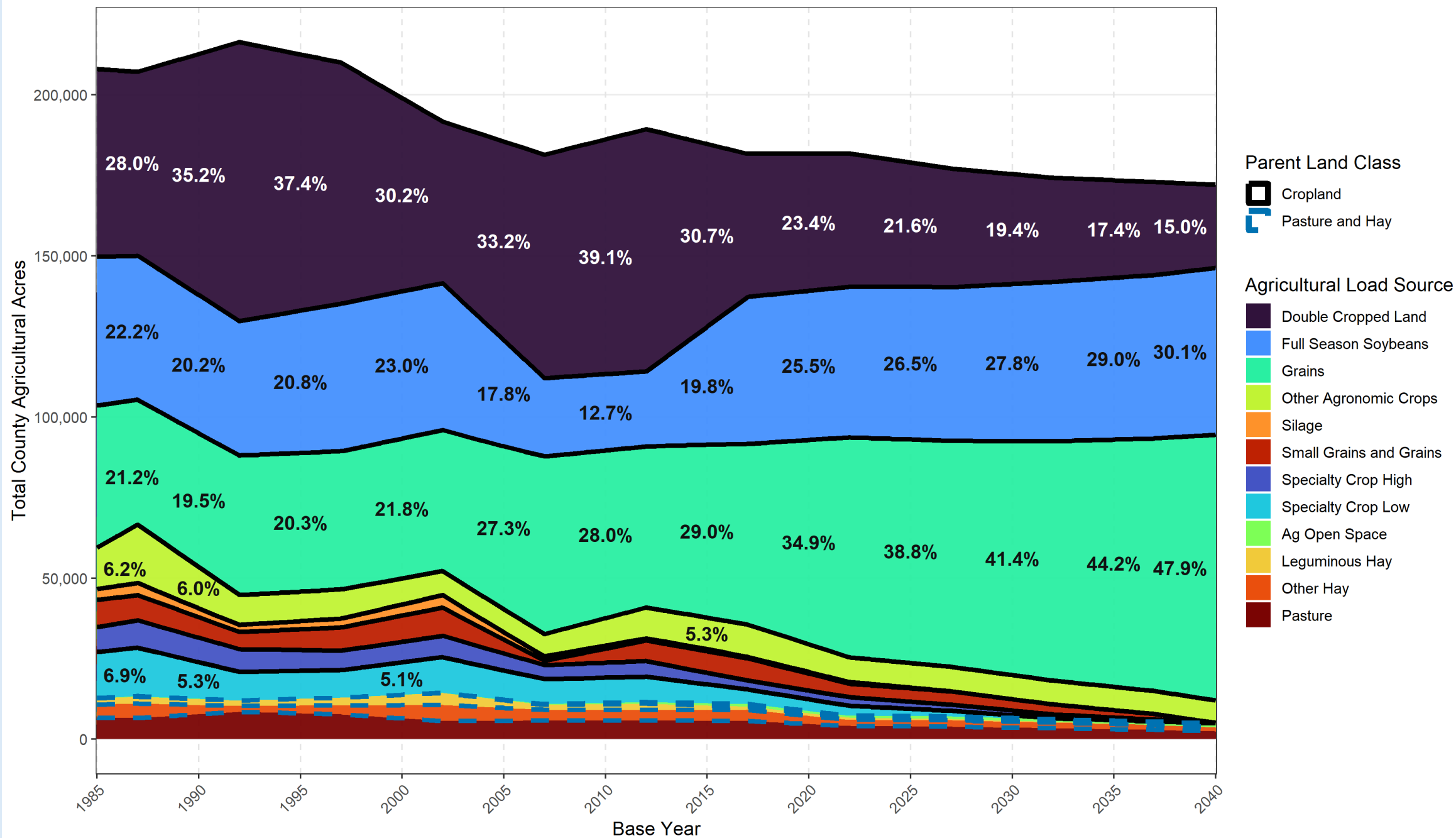
Cities

Exclude county if < 1000 acres

Euclidian comparison of each county to state median

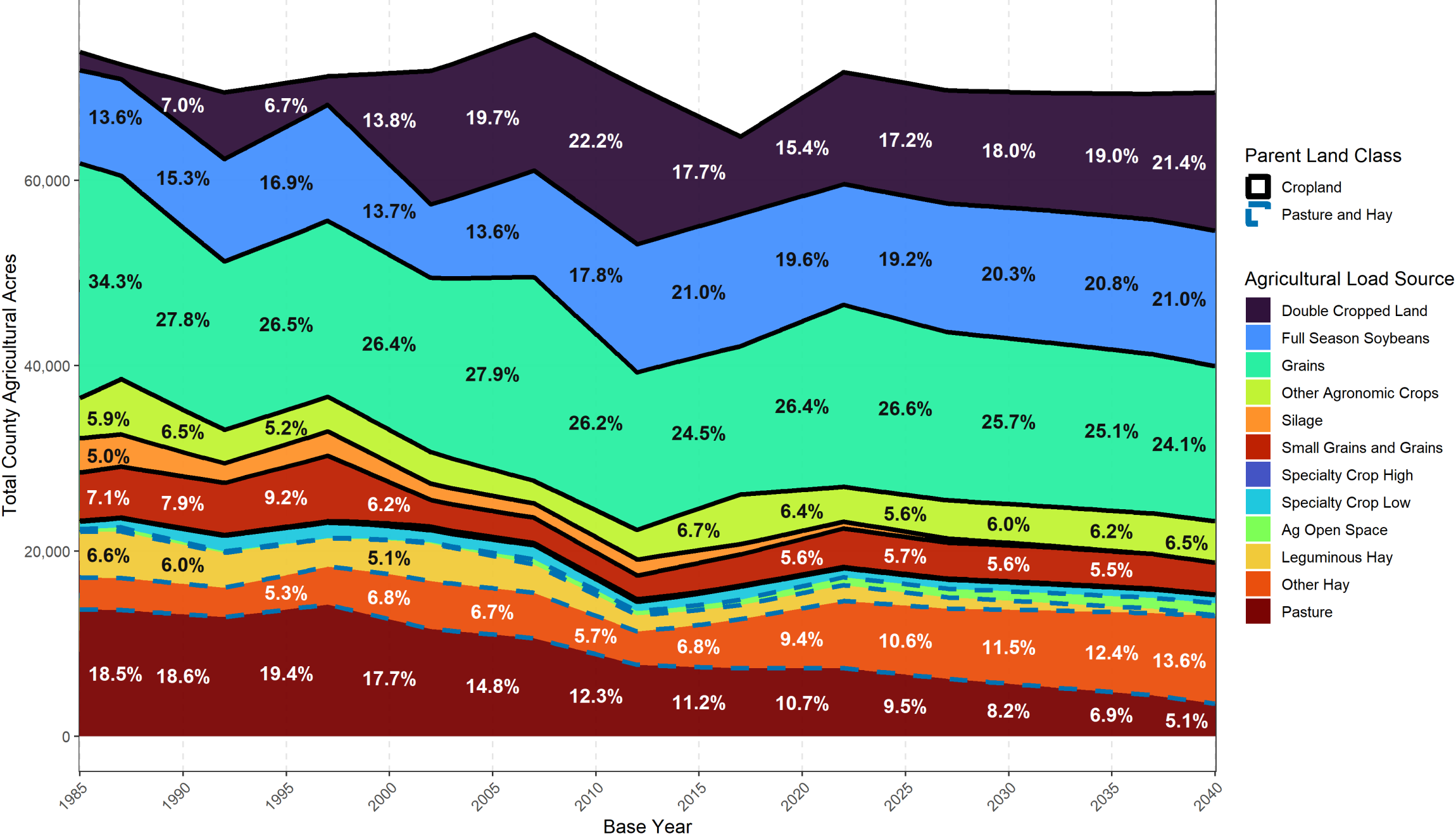
$$\text{Distance} = \sqrt{\sum (\text{Actual Acres} - \text{State Average Acres})^2}$$

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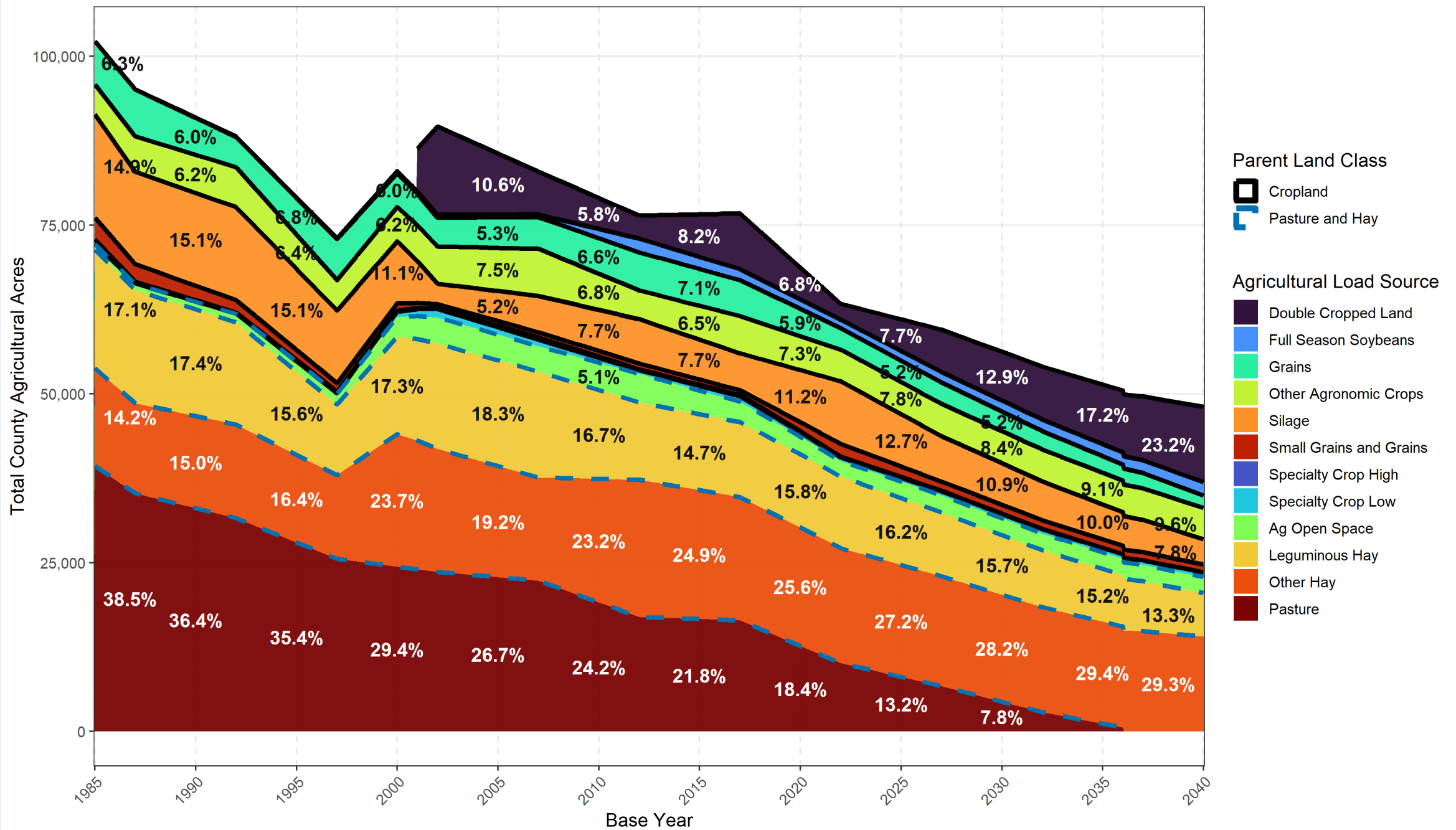
Representative Profile: Cecil County, md

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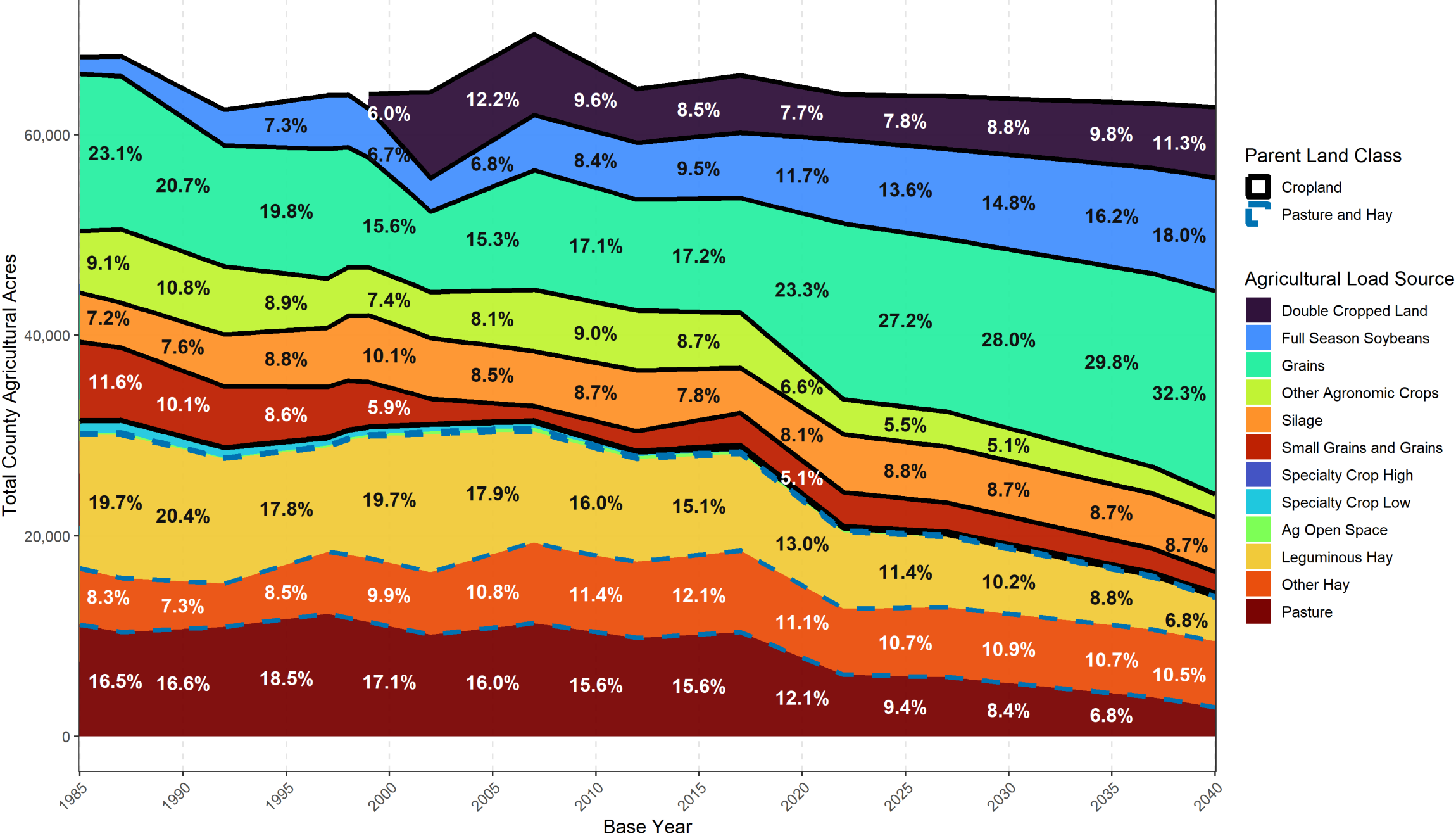


Representative Profile: Cortland County, ny

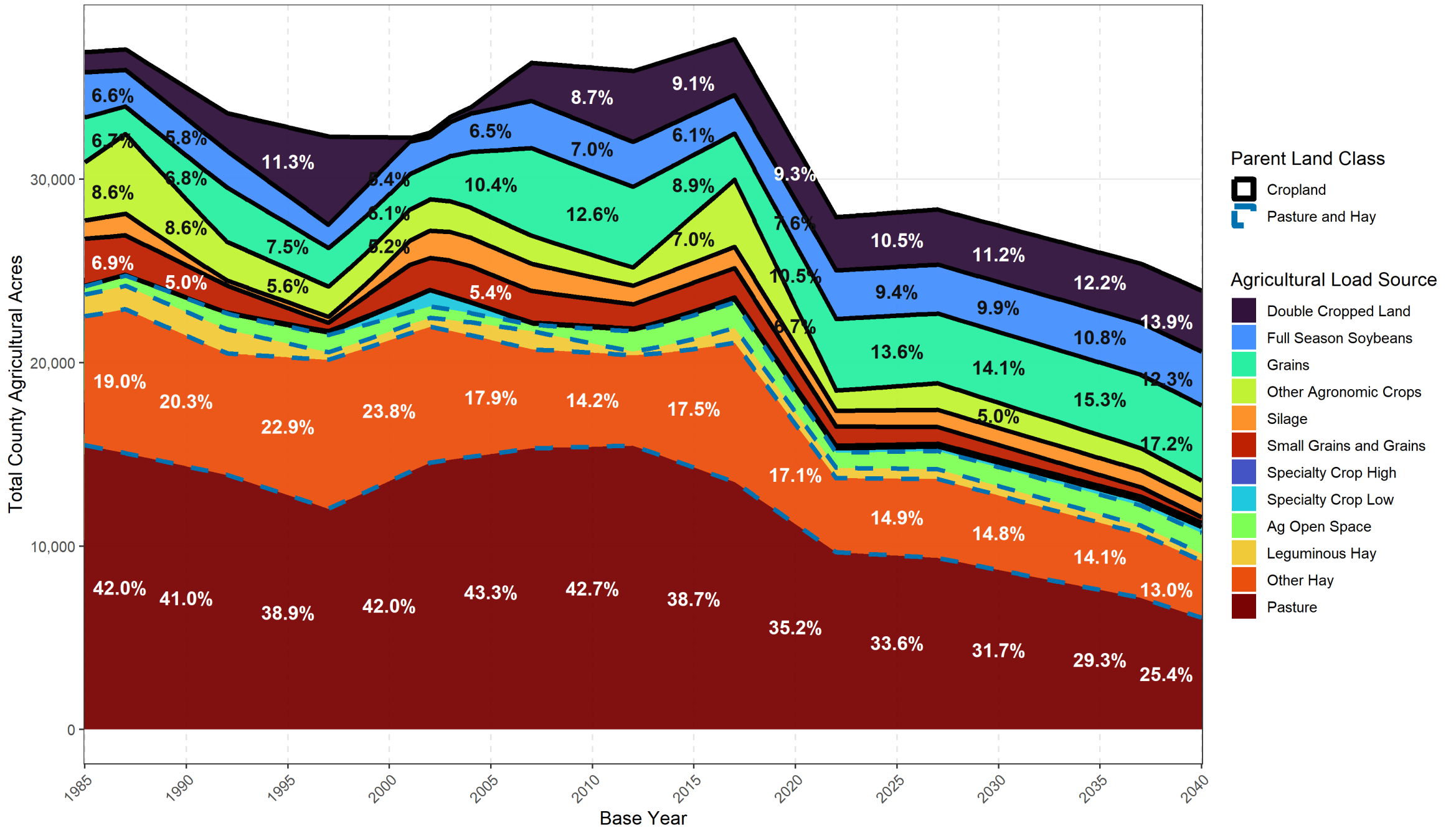
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Representative Profile: Juniata County, pa
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