

An aerial photograph of a rural landscape. The foreground is dominated by a large green field with distinct tire tracks curving across it. To the left and in the background, there are patches of yellow wildflowers. On the right side, a portion of a cornfield is visible, with the stalks appearing dry and harvested. The overall scene is a mix of green, yellow, and brown tones, suggesting a late summer or early autumn setting.

Incorporating Land Use Data into CAST

OLIVIA DEVEREUX, DEVEREUX CONSULTING, INC.
AGRICULTURAL WORKGROUP, APRIL 15, 2021

Topics

Overall agricultural acres

- Recommendation from NASS using spatially explicit data rather than Ag Census summed acres

Acres of Double Cropped Land

- Sources of data
- Method
- NASS review indicating the method and data were reliable

Upcoming Decisions for May

Timeline for approval of new data and methods for CAST-21

Today's presentation builds on the presentations to the Agricultural Workgroup on these topics on June 30 and October 13, 2020

Review with USDA-NASS

USDA-NASS Contacts

- Donald Buysse, Branch Chief, Census and Survey Planning in Statistics Division
- Lance Honig, Chief of Crops Branch in Statistics Division
- Travis Averill, Chief of Livestock Branch in Statistics Division
- Rick Mueller, Spatial Analysis Research Section Head

Meetings with NASS on July 13, July 20, and July 31, 2020

Purpose

- To confirm that the Chesapeake Bay Program is using the NASS Agricultural Census data appropriately for calculating double cropped acres.



Agricultural Acres

Peter Claggett, Rick Mueller, and Olivia Devereux discussed use of the NASS Cropland Data Layer (CDL).

Mr. Mueller offered ideas to further QA/QC of total agricultural methods against some of the USDA data products

- NASS provides a confidence layer that could help inform our estimates.
- Several datasets are used to inform the CDL. NLCD and NASS have informed both data products, making both more robust. 2016 NLCD uses CDL and reprocessed backwards all prior years. CDL now uses NLCD for pasture and hay. The 2019 NLCD will be out in late 2020, in time for the Bay Program's next land use.
- FSA 578 data are used to check the acres of observed cropland in the CDL.

Agricultural Acres

The total agricultural acres in CAST currently comes from “Land in farms” (Table 8, Census of Agriculture) minus “Total woodland” and minus “Land in farmsteads, homes, buildings, livestock facilities, ponds, roads, wasteland, etc.”

NASS’ Mr. Mueller suggested using the CBP spatially explicit land use to define agricultural land commensurate with the definition above as it likely has greater accuracy.

NASS recommended using NLCD & CDL for determining the spatial distribution of cropland and pasture within a county, where better data are unavailable.

This would lead to proportioning of NASS crop types and pasture types to the spatially explicit crop and pasture acreages mapped in the high-resolution land use for 2013 and 2017.

State	C19 2017 Acres	C21 2017 Acres	Difference	Percent Change
PA	3,890,655	3,958,033	67,378	2%
WV	599,726	577,983	(21,743)	-4%
MD	1,541,368	1,545,629	4,261	0%
DE	426,213	403,185	(23,028)	-5%
NY	2,113,708	2,274,282	160,574	8%
VA	2,910,655	2,846,675	(63,980)	-2%
Total	11,482,325	11,605,787	123,462	1%

Results with Change in Ag Acre Methods

More accuracy in local placement of acres rather than overall acres

Feeding Space



Animal production area continues to be determined by the Bay Program as a calculation outside of the land cover datasets. While NASS does not have anything specific to address those land areas, Mr. Mueller suspects they are mapped as urban by NLCD and incorporated into the CDL as urban.

Farm buildings are mapped by NLCD (and therefore by CDL too) as impervious surface and development and incorporated into CDL as developed classes.

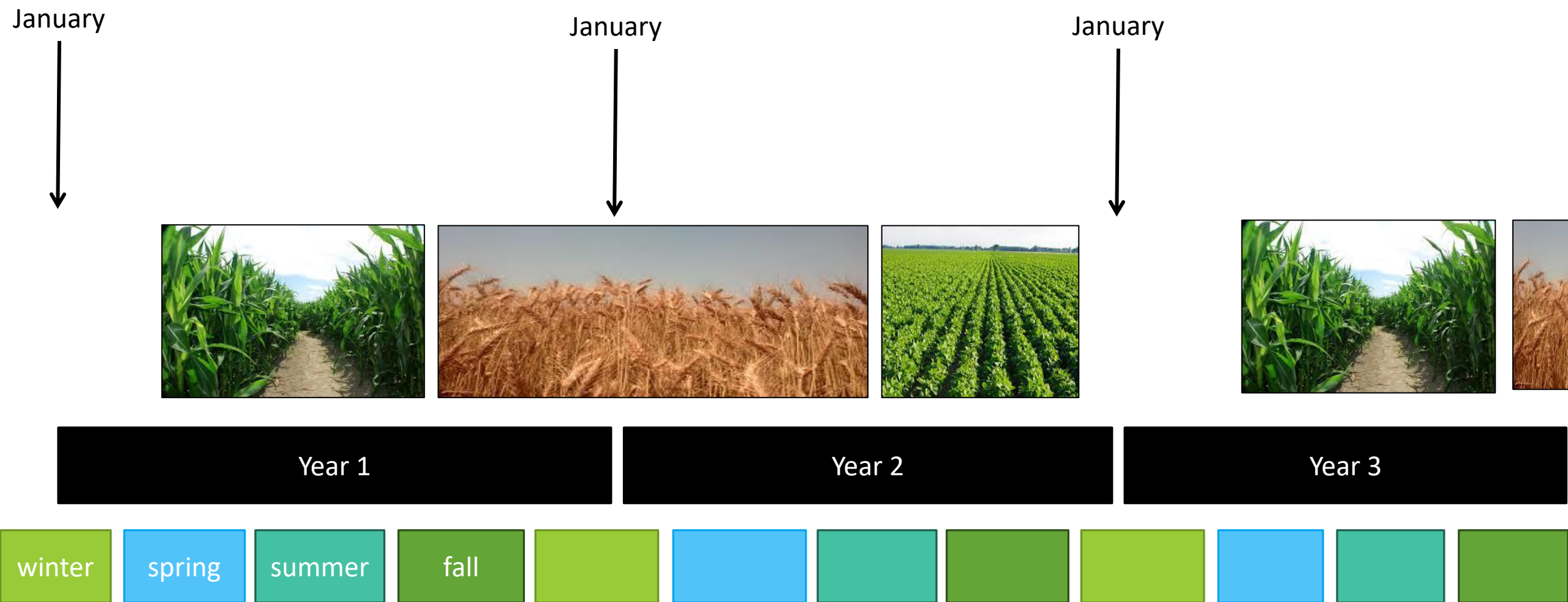
While the amount of feeding space needs to be tied to the amount of animals, not just aerial imagery, recent investigations into the mapping of animal production areas from aerial imagery show promise that it may be possible to map these areas for CAST-23.

CAST-21 will keep the same methodology for feeding space as has been used in all other Phase 6 model versions.

Double Crop Land Use Impacts

1. Load applications are different for crops in the double cropped land use than when those crops are full season.
2. BMPs are eligible to be applied to specific land uses.
 - Nutrient management includes four BMPs: core, rate, placement, and timing.
 - Nutrient management core N & P is eligible to be applied to full season soybeans. Supplemental P is available.
 - The nutrient management core BMP lowers the overall nutrients applied to the crops. The supplemental nutrient management BMPs for rate, placement, and timing reduce the amount of runoff loads but do not affect the nutrient application.
 - Addressing supplemental N is in the CAST-21 Workplan.

Modeling Crop Rotations in an Annual Model



Data and Method

Data Needed

- Ag Census Harvested Cropland area – total cropland area
- Ag Census individual crops area – summed for a total of all crops planted
- Ag Census early crop and late crop areas (Group 1 & 2)
 - Group 1 & 2 crops were determined by each state
 - Group 1 is primarily corn, sorghum, and soybeans
 - Group 2 is primarily small grains

Method

- Actual double cropped area is the minimum of:
 1. Area of crops in excess of the total cropland
 2. Group 1
 3. Group 2
- These calculations are performed at the county scale for each year.



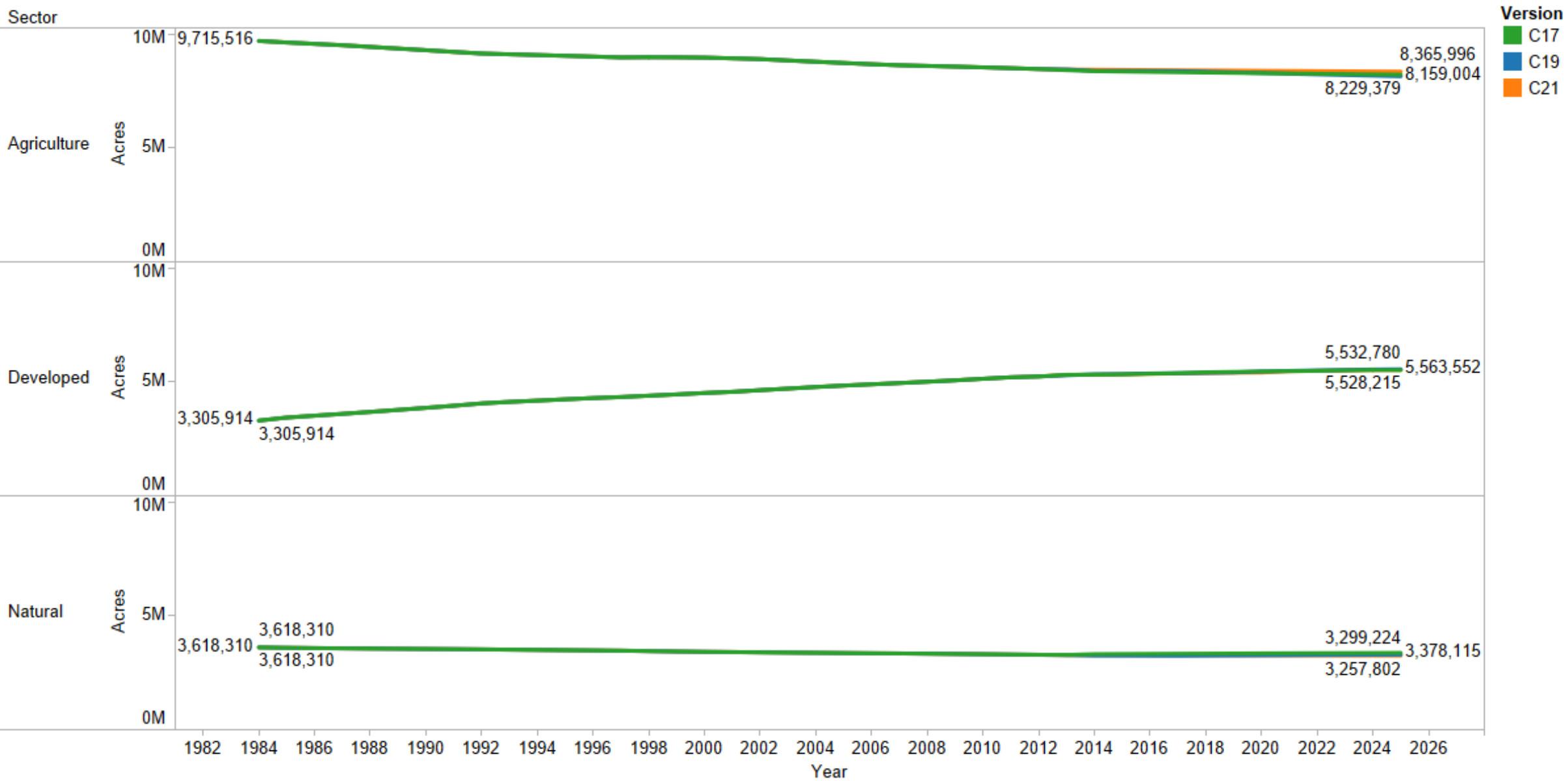
Double Cropping

NASS personnel confirmed that the approach is an appropriate use of the NASS data.

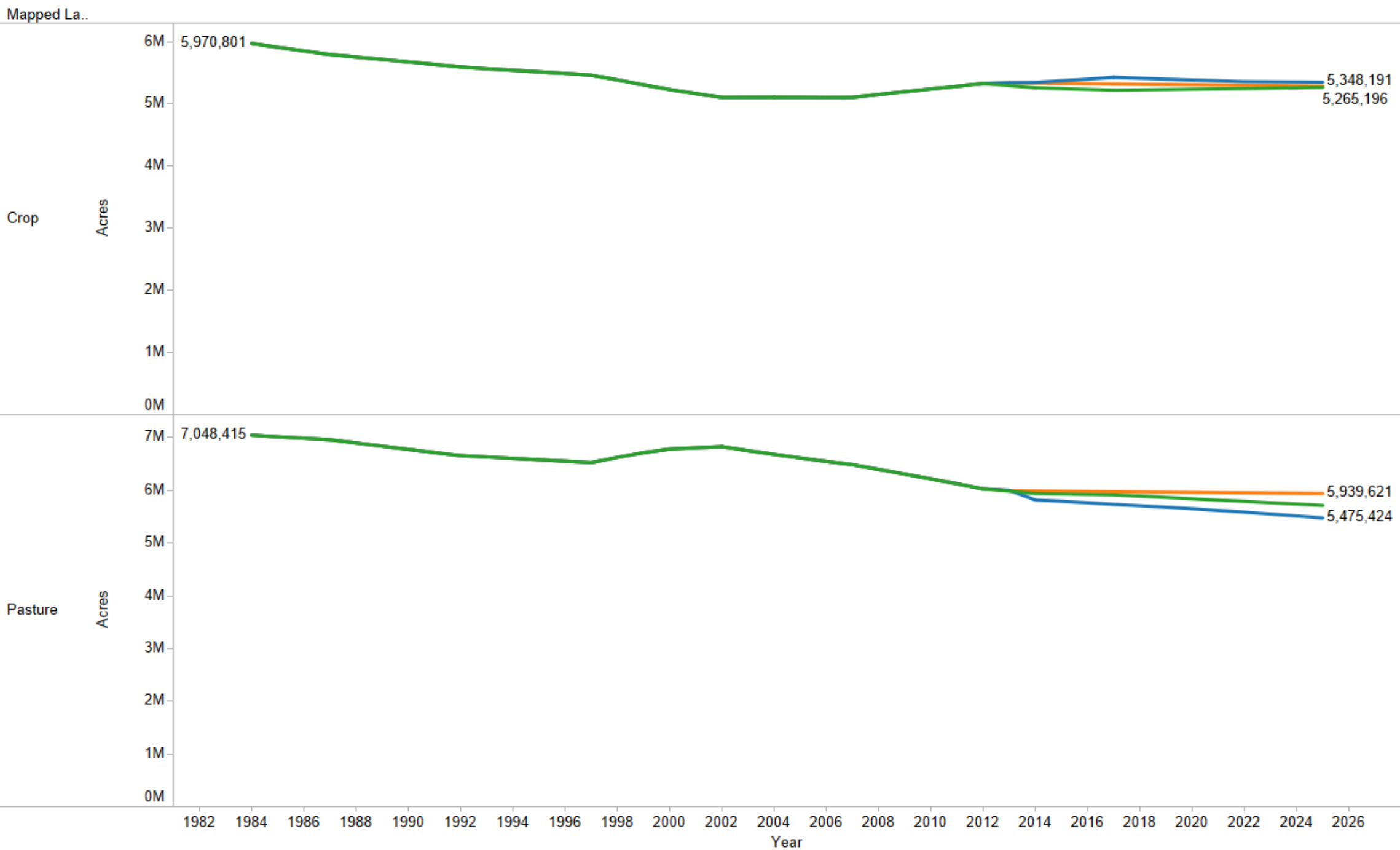
Mr. Honig also confirmed that using the “Total Vegetables” category is appropriate when we sum all other crops to compare to the “Total Harvested Cropland”.

Mr. Honig provided the helpful example that a farmer could plant an acre of lettuce followed by tomatoes. If summing the individual vegetables, this would inflate the acres for double cropping since we are not defining our double cropped acres as including vegetables.

CBWS-Version Comparison

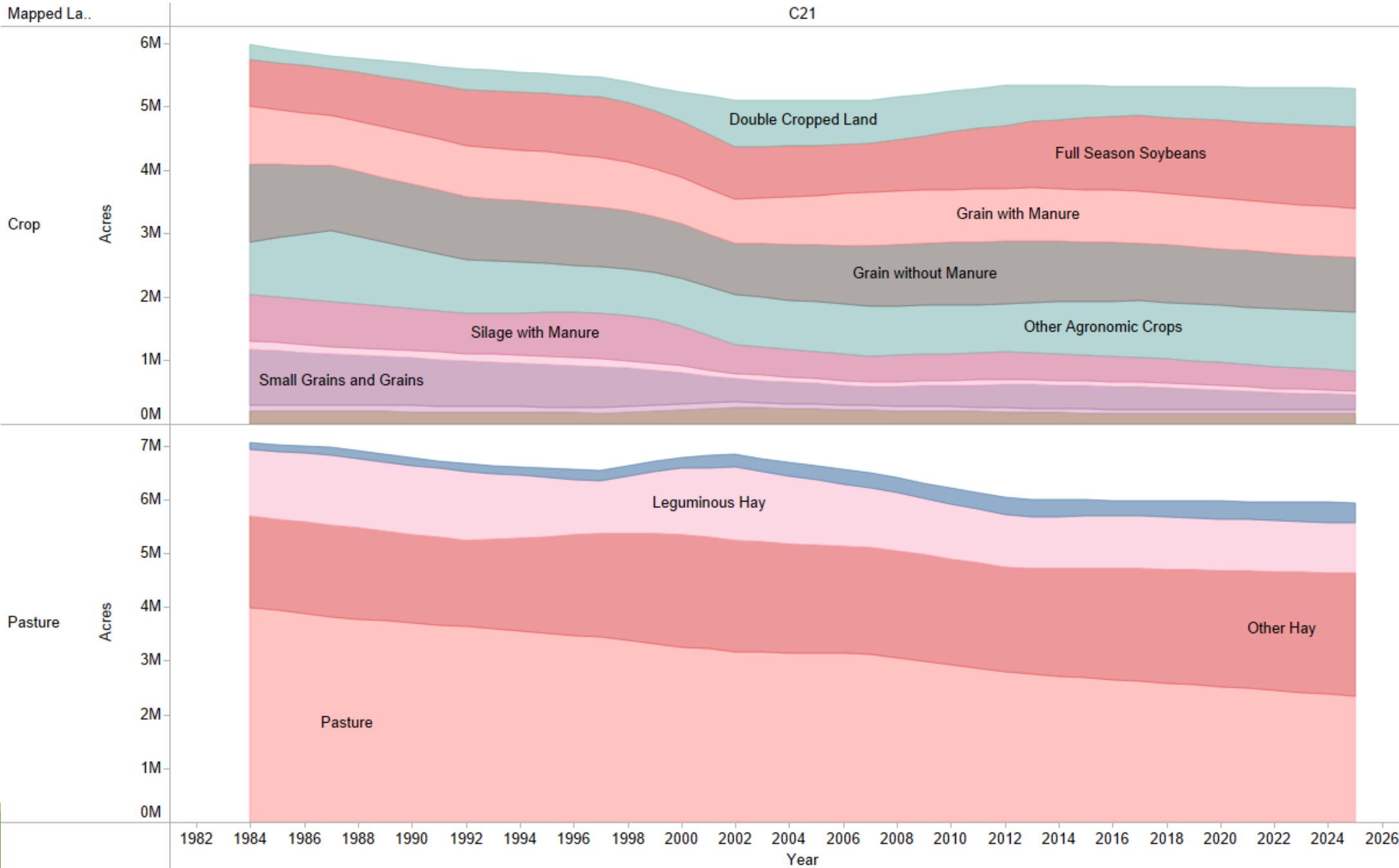


Land Use Version Comparison



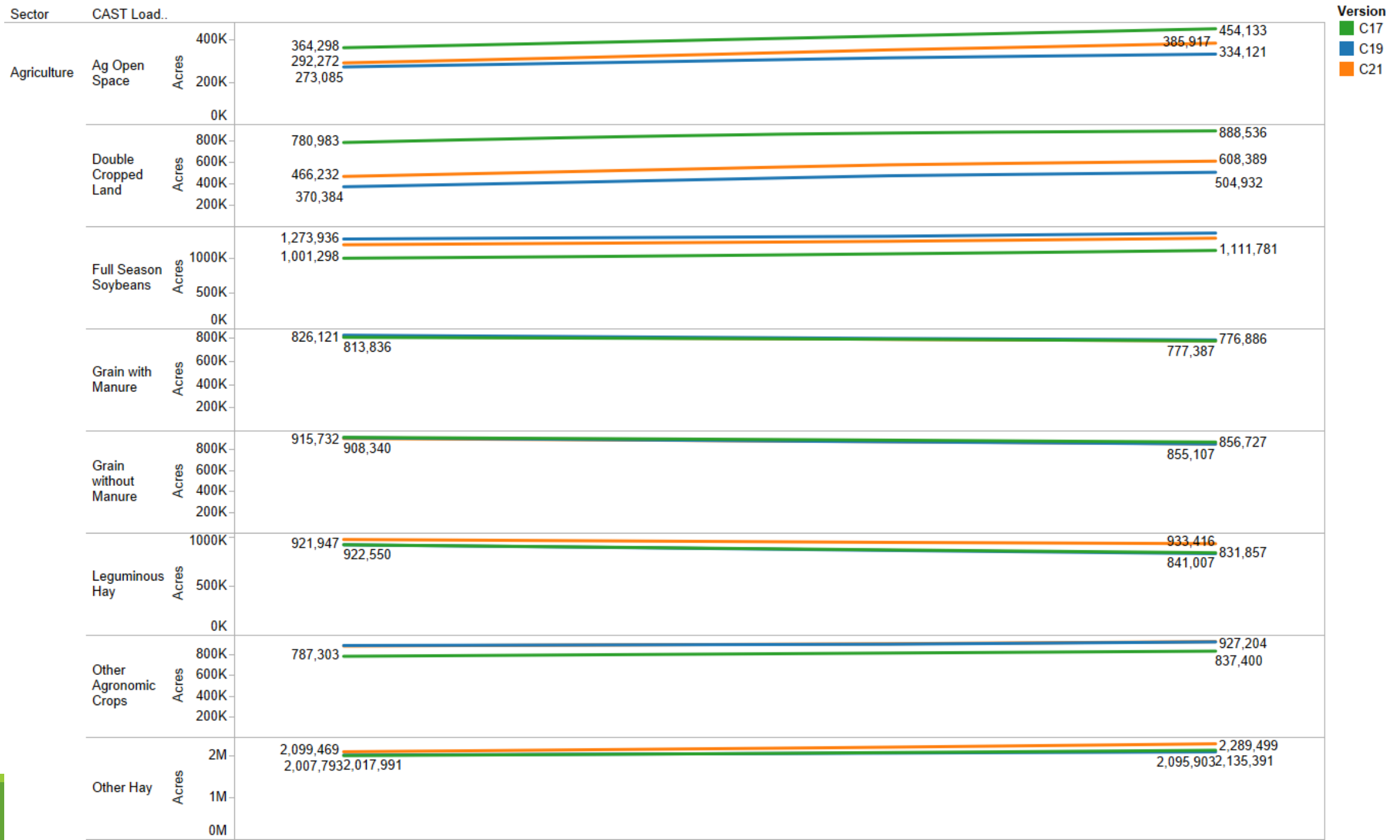
Land Use-Load Source

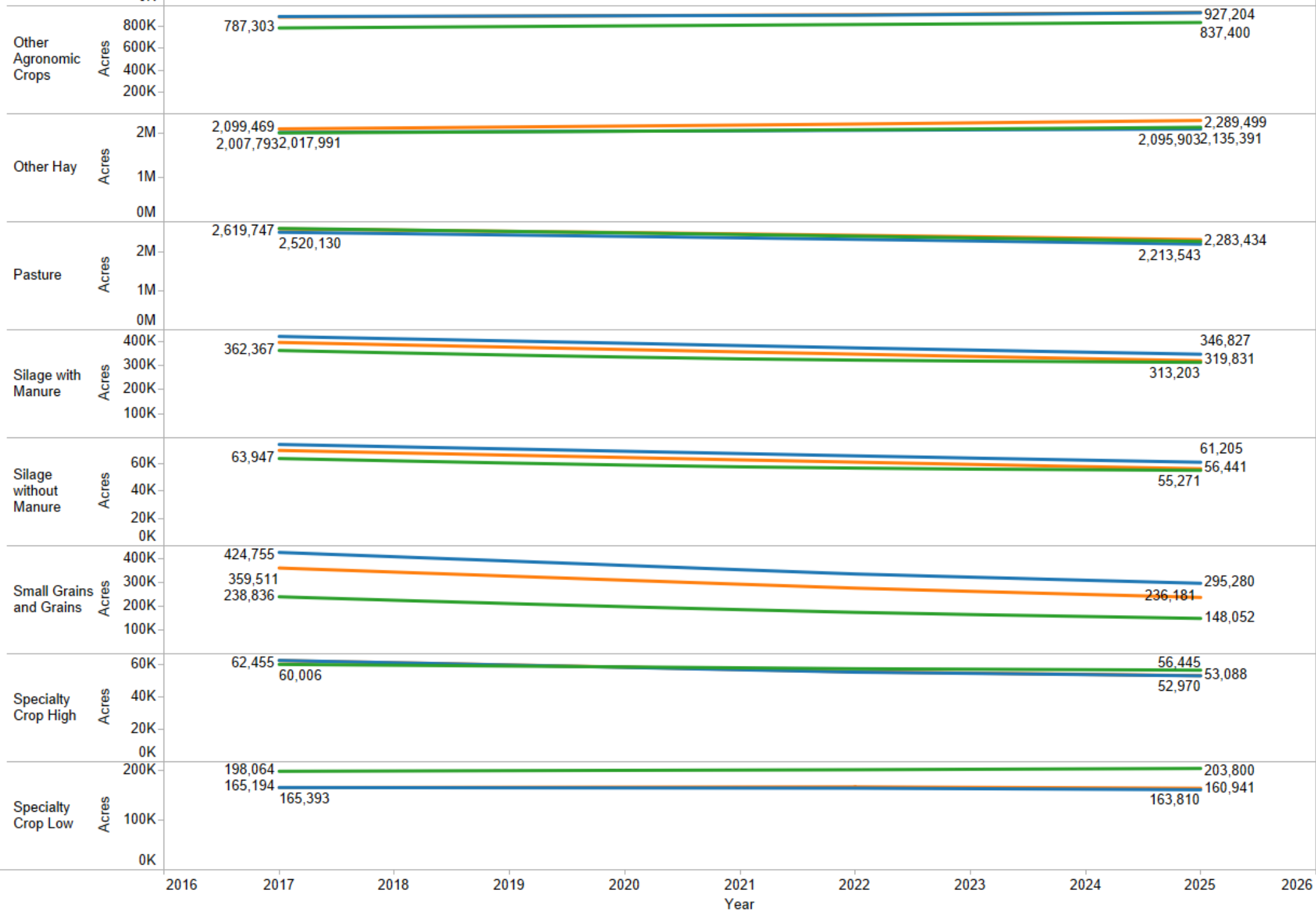
Version
C21



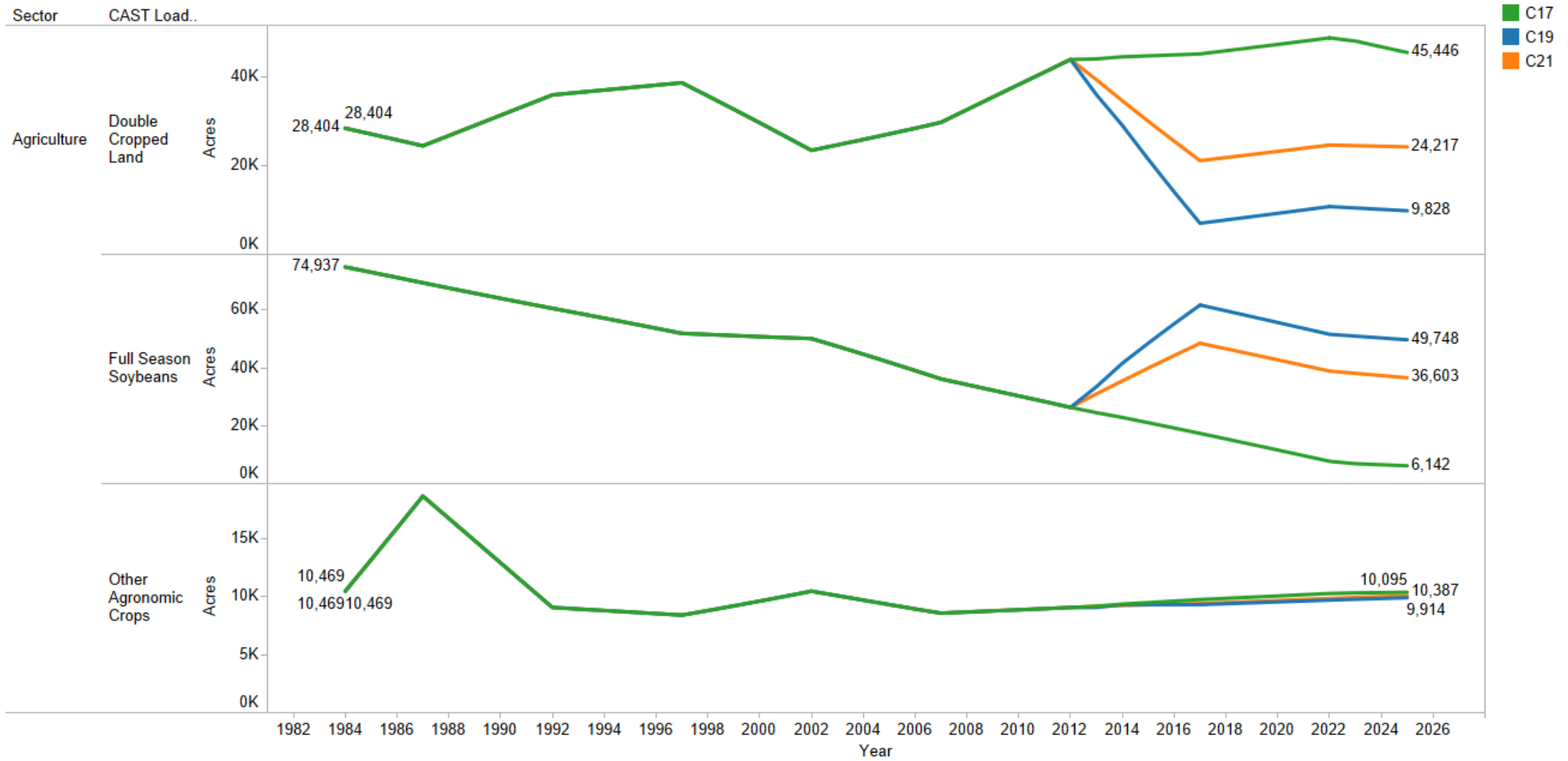
- Ag Open Space
- Double Cropped Land
- Full Season Soybeans
- Grain with Manure
- Grain without Manure
- Leguminous Hay
- Other Agronomic Crops
- Other Hay
- Pasture
- Silage with Manure
- Silage without Manure
- Small Grains and Grains
- Specialty Crop High
- Specialty Crop Low

State Load Source Version Comparison

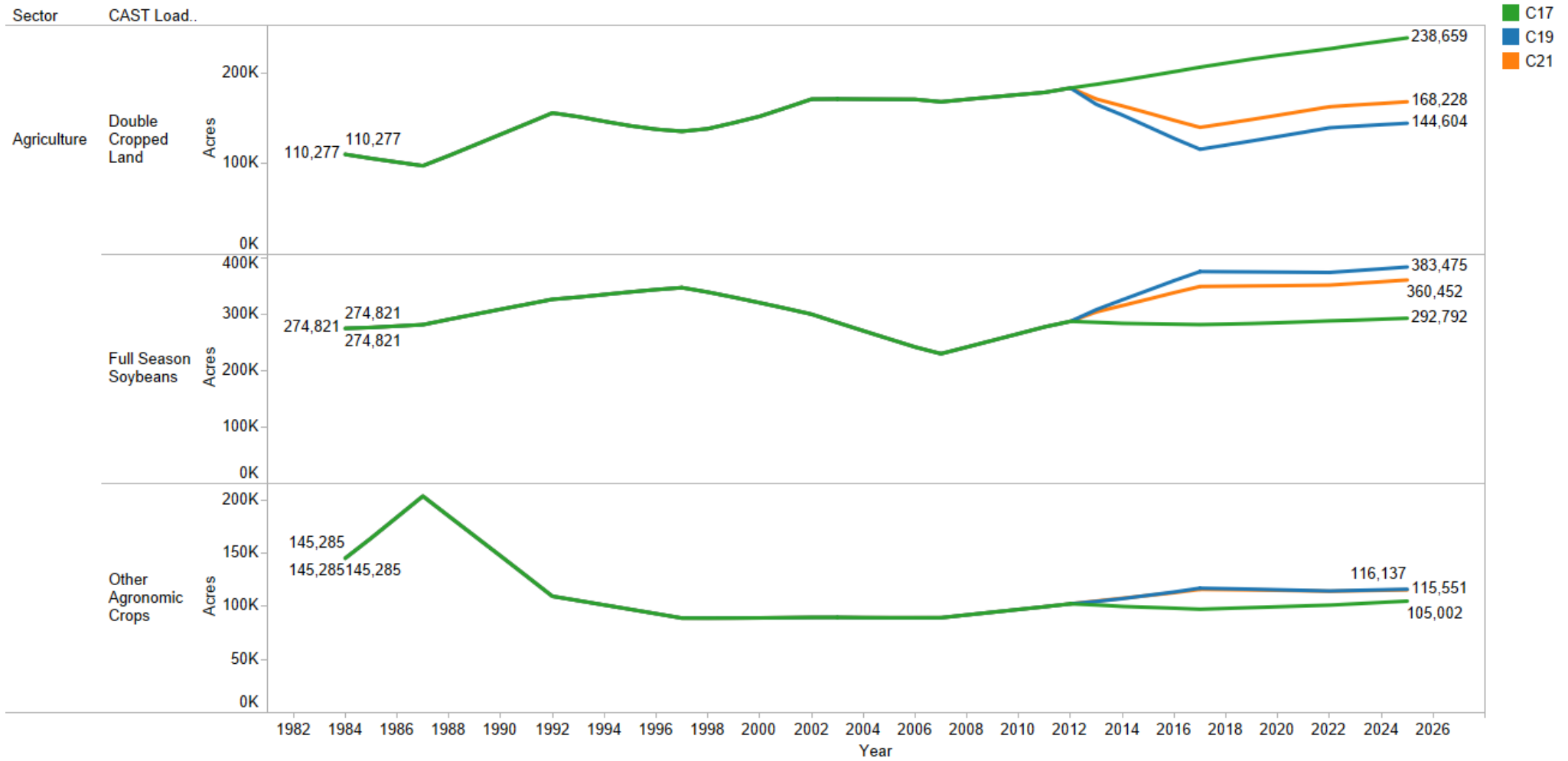




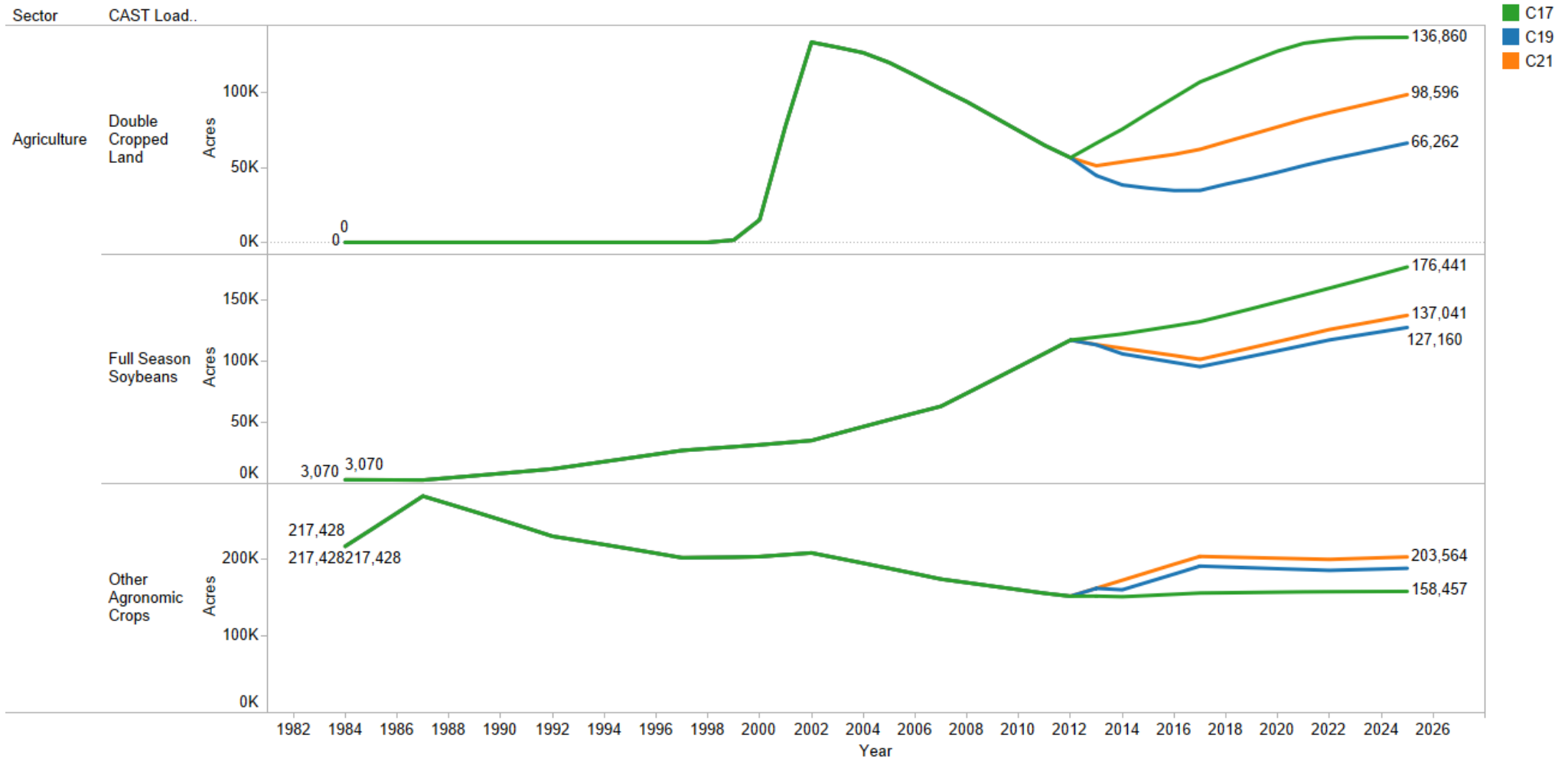
StateLandUse-DE



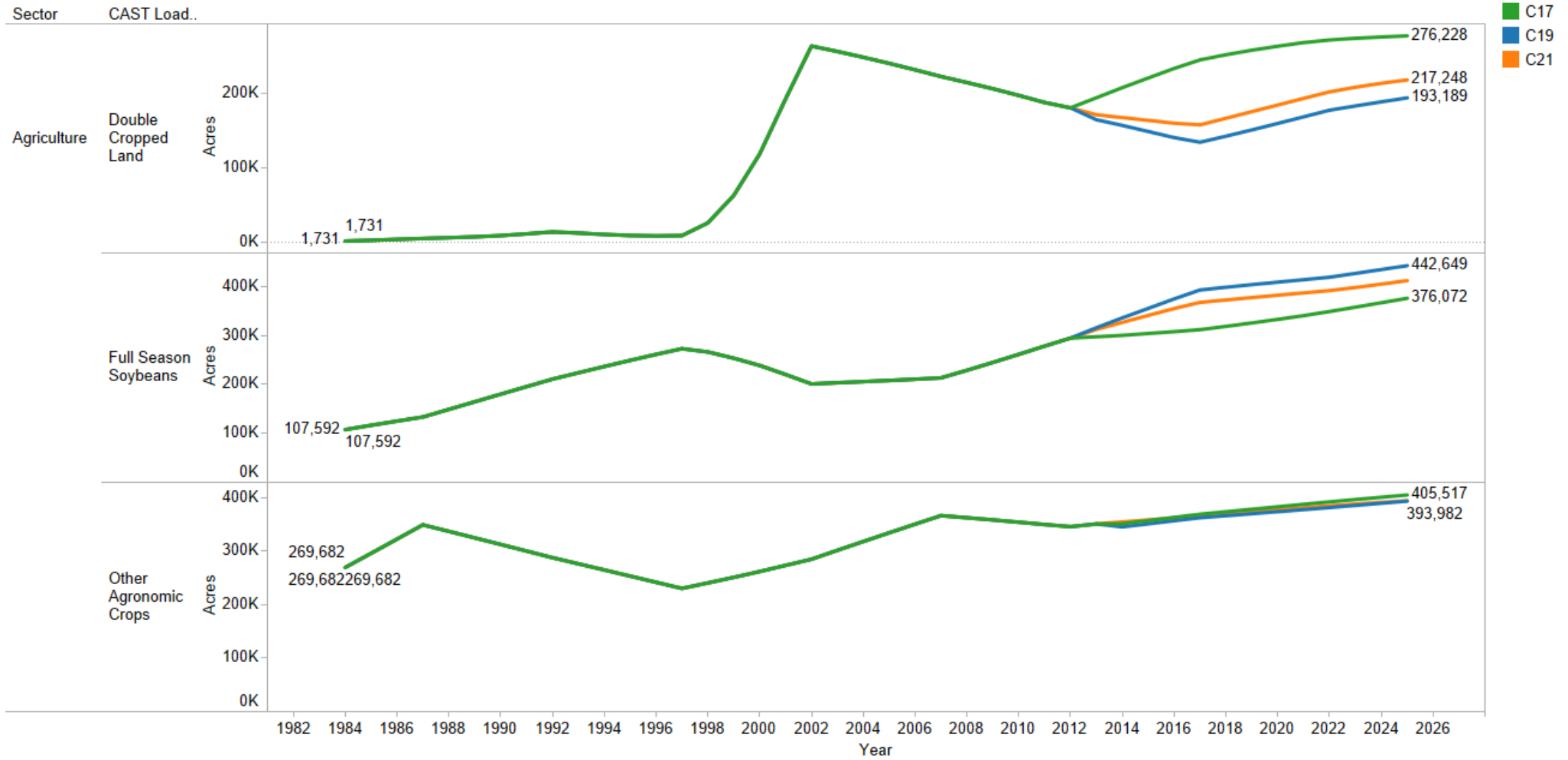
StateLandUse-MD



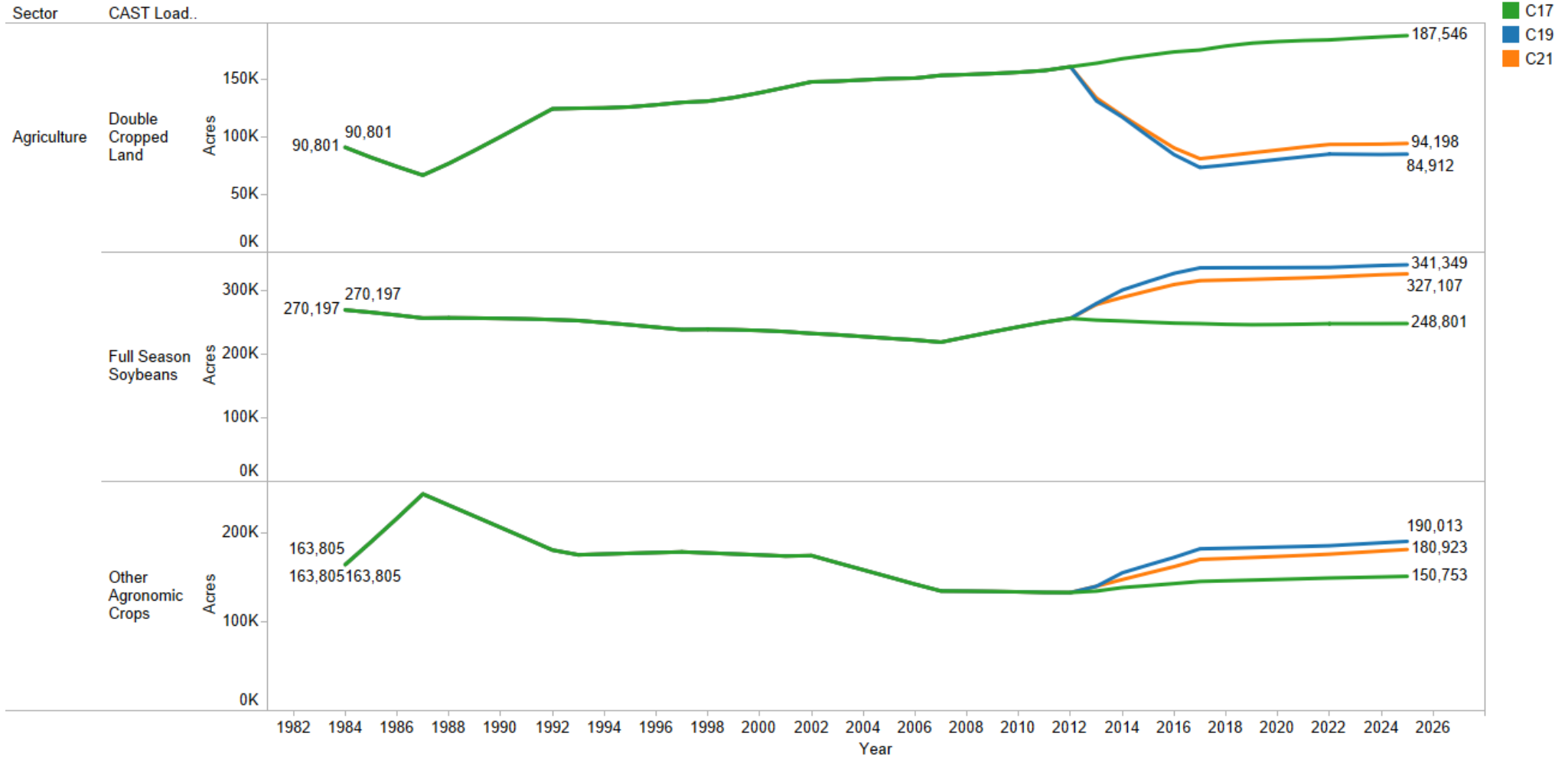
StateLandUse-NY



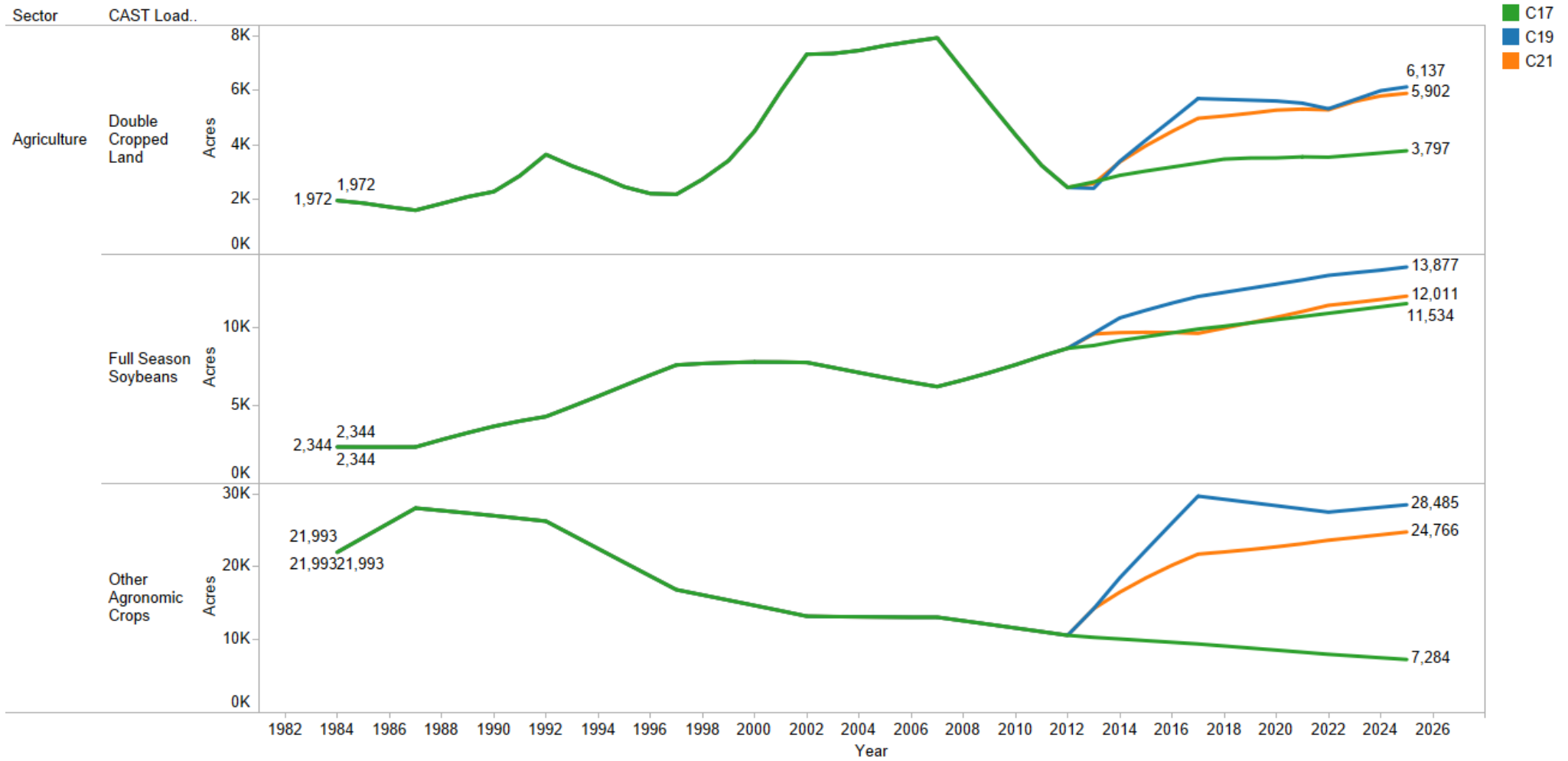
StateLandUse-PA



StateLandUse-VA



StateLandUse-WV



View Comparison of Acres

[HTTPS://PUBLIC.TABLEAU.COM/PROFILE/OLIVIA.DEVEREUX#!/VIZHOME/LANDUSEEXPLORATION/CBWS-VERSIONCOMPARISON](https://public.tableau.com/profile/olivia.devereux#!/vizhome/landuseexploration/cbws-versioncomparison)

May Decisions

Decision 1: The Agricultural Workgroup is asked to support adoption of the proposed change in land use methodology for determining the total agricultural area.

Decision 2: The Agricultural Workgroup is asked to approve the continued use of the current double cropping methodology.

CAST-21 Schedule

September 1, 2021 - All data and methods approved

November 1, 2021 - CAST-21 Beta release

December 1, 2021 – Jurisdictional comments due

January 1, 2022 - Final CAST-21 release



Contact Information:

Olivia Devereux

Olivia@DevereuxConsulting.com

301-325-7449

Double Crop Land Area Example

Harvested Crop Land Area = 5,000 acres (harvested cropland acres)

Sum of area of all crops = 8,000 acres (sum of crops)

$8,000 - 5,000 = 3,000$ (area needed to be double cropped)

Crop group 1 (corn, beans) = 2,500 acres

Crop group 2 (winter grains) = 3,000 acres

Double cropped area is 2,500. Adjusted double crop acres because not enough to double crop 1 and 2.

Each crop within its group is apportioned to the 2,500 acres using the original proportions of the crop types

Assign appropriate plant and harvest dates and application timing to those double cropped crops

