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SLIDES: Agricultural Resilience and Urban Growth: A Closer Look

William R. Travis

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Agricultural Resilience and Urban Growth: A Closer Look

William R. Travis

Department of Geography

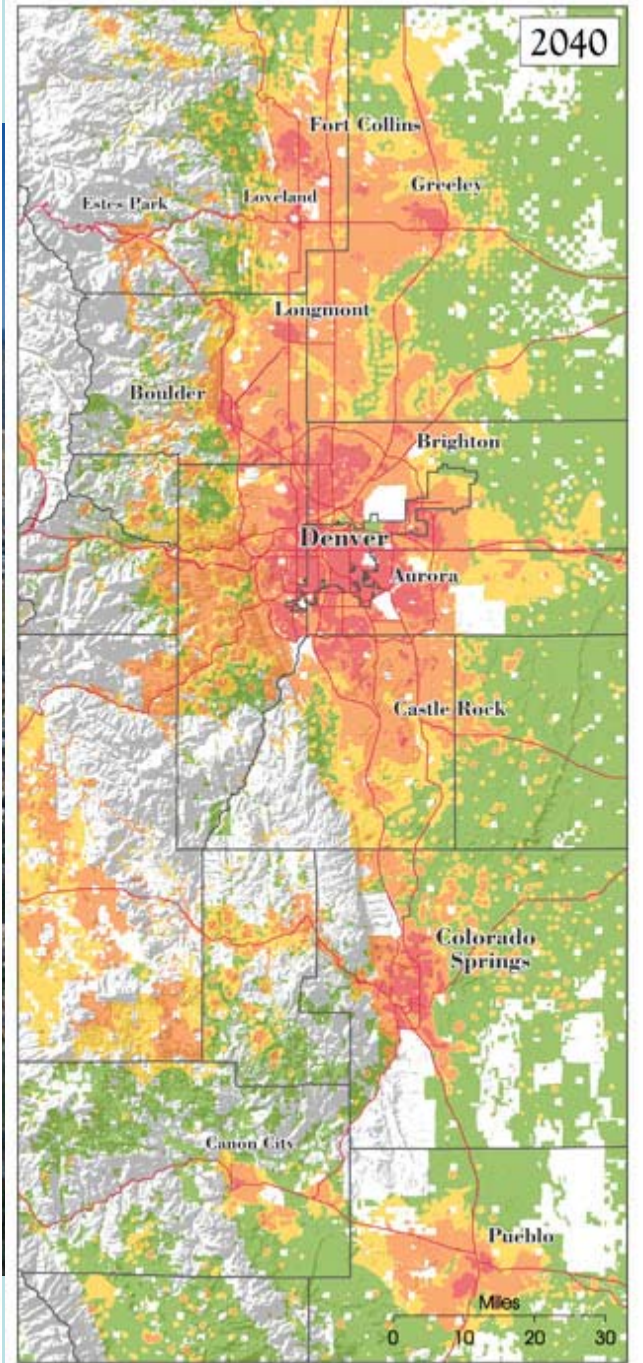
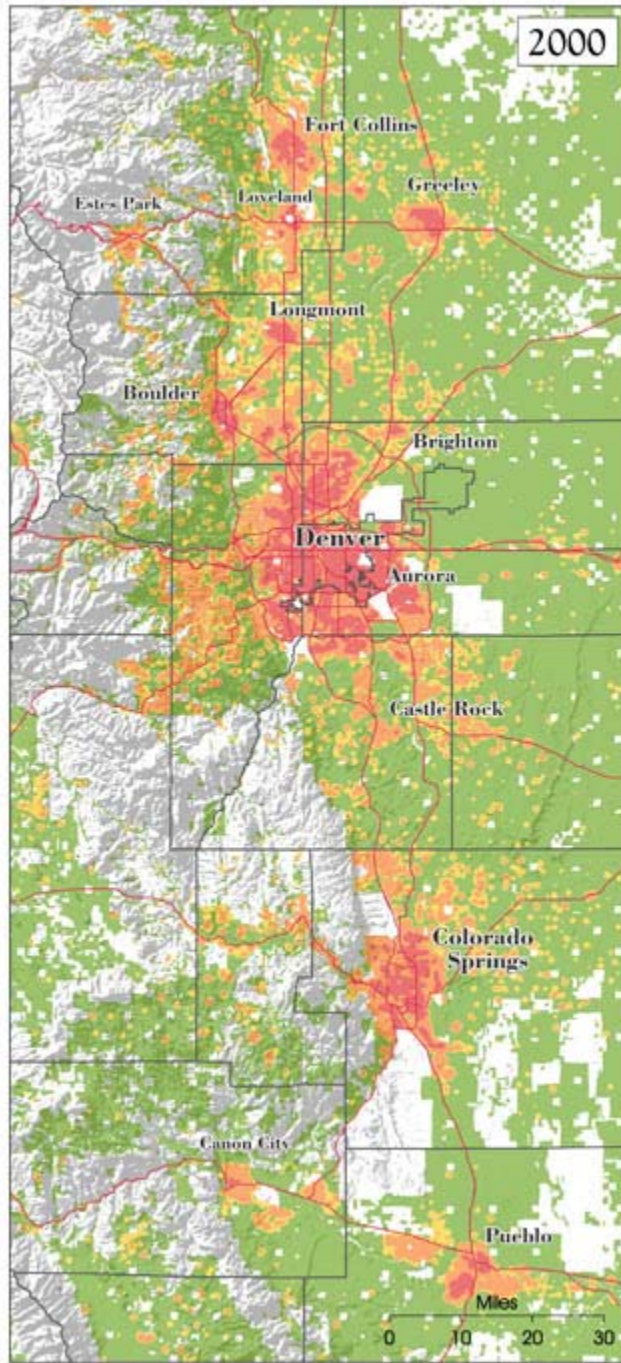
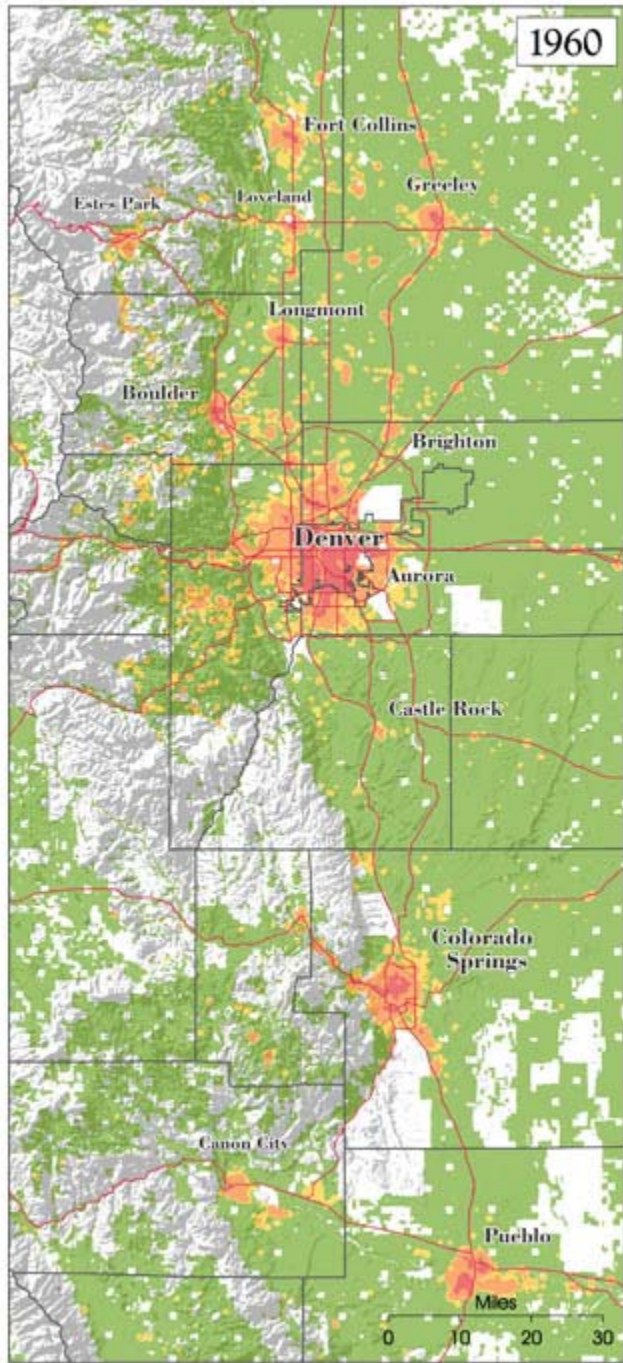
Center for Science and Technology Policy
Research, CIRES

University of Colorado at Boulder

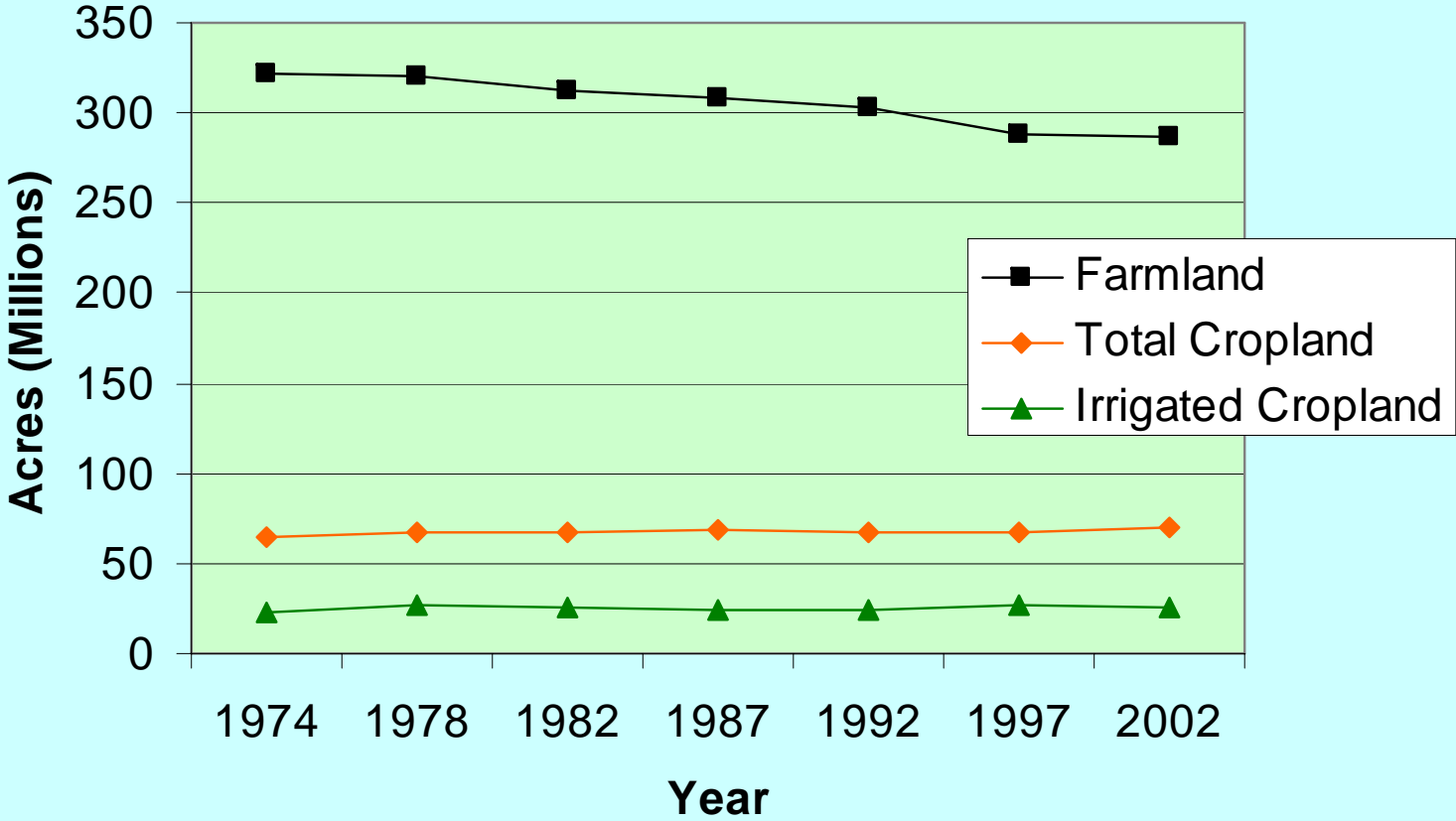
<http://spot.colorado.edu/~wtravis/>

NRLC Conference June 2009

(NTS: Avoid talking about water, stick to land!)



Agricultural Land (11 Western states)



Concerns over “Loss of Farmland”

- Population vs. resources
- Concern over agricultural land degradation (soil erosion) and food production
- Concern over urban growth and supply of farmland (first discussion of “sprawl” 1960s-70s)
 - NALS: National Agricultural Lands Study
 - Follow-up Sprawl vs. Farmland studies (USDA, RFF)
- “Prime Farmland” (AFT, others)
- Open-Space
- Culture
- Localism
- In the West: Ag-to-Urban water transfers

Land Degradation: A Century (1889-1989) of Doubt on the Great Plains

Diagnosis: Unsustainable agricultural development due to inappropriate land use, over-expansion in good years; recurrent drought, soil erosion.

Prognosis: Collapse!

- J.W. Powell: problems of arid lands (1878), ND Constitutional Convention speech (1889)
- Sears: *Deserts on the March* (1940, 1980)
- Worster: Dust Bowl I, II, III and IV (1979)
- Popper and Popper: *Buffalo Commons* (1987)



Sustainability or Collapse: The Buffalo Commons?

Culminated in the 1987-89 drought, with planner Frank Popper and geographer Deborah Popper from Rutgers:

Plains agriculture was failing.....and gov't should step in to create the "Buffalo Commons"

(Mentioned in the *NYT* last fall!)



Popper and Popper (1987) predict collapse because of a "frightening" pattern of ecological and economic dysfunction, especially worsened in the 1980s:

Soil erosion is approaching Dust Bowl conditions...

[and]...the agricultural crisis is more serious on the Plains than in its more publicized neighbor to the east, the Midwest's Corn Belt. Plains farmers and ranchers have always operated under conditions that their counterparts elsewhere would have found intolerable, and now they are worse. **Farm bankruptcy and foreclosure rates are higher on the Plains than in other rural areas...**, as are many of the indices of resulting psychological stress: family violence, suicides, mental illness...**Future droughts are inevitable, and they're more likely to hit harder and more often....Water supplies are diminishing** throughout the Plains...(1988: 14-15)

They concluded that Plains cultivation is the "**longest running agricultural and environmental miscalculation in American history**" (p. 13).

34. The United States Great Plains

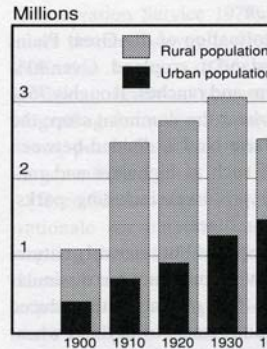
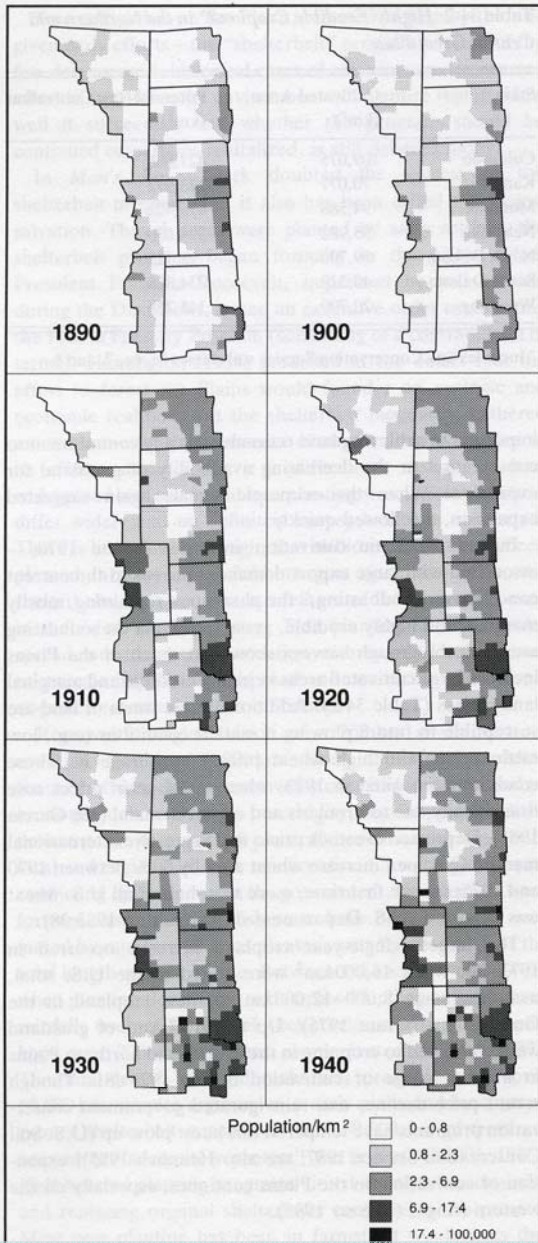


Figure 34.4 Great Plains urban and rural population. Source: U.S. Census Bureau.

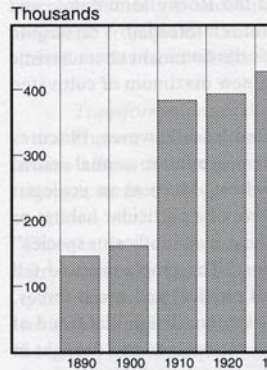


Figure 34.5 Total number of cropland acres. Sources: U.S. Census Bureau and state statistics.

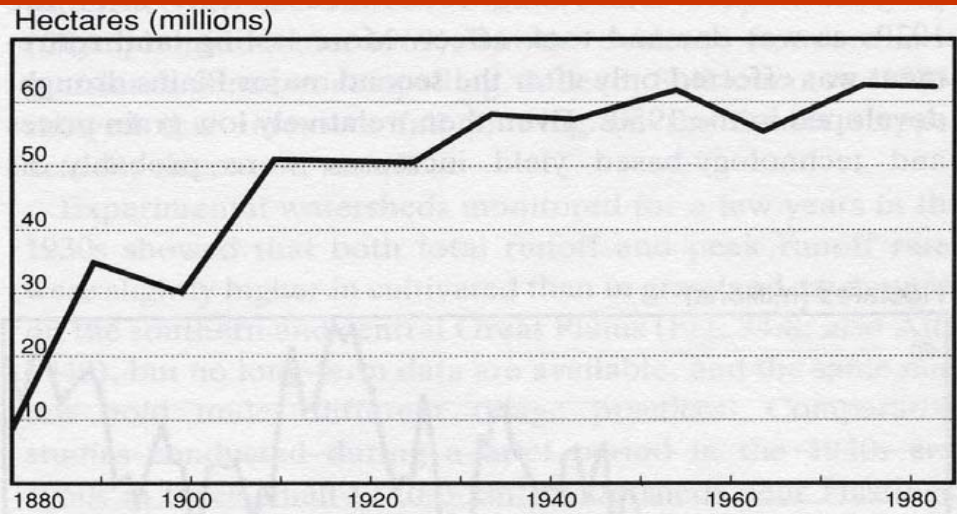
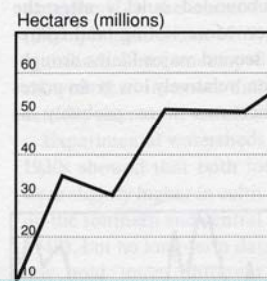


Figure 34.6 Total Great Plains cropland. Sources: U.S. Census Bureau and state statistics.

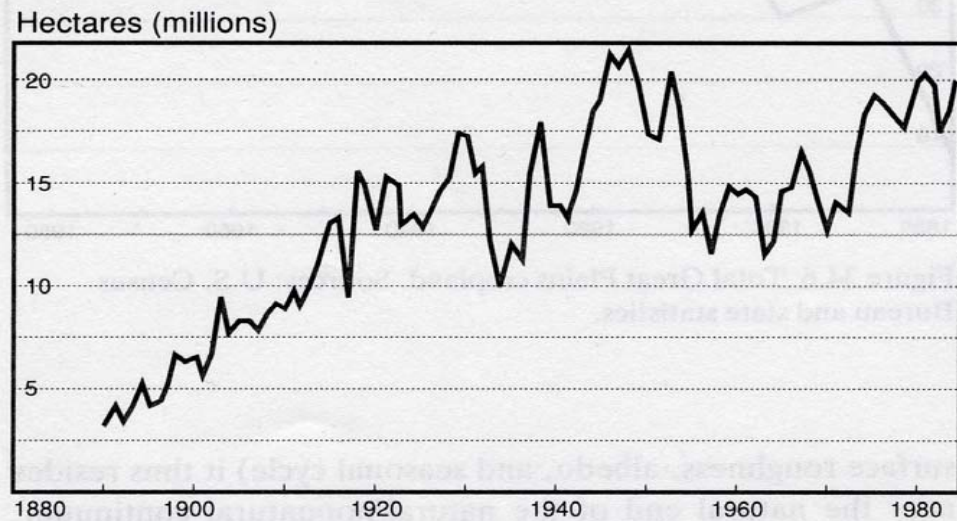
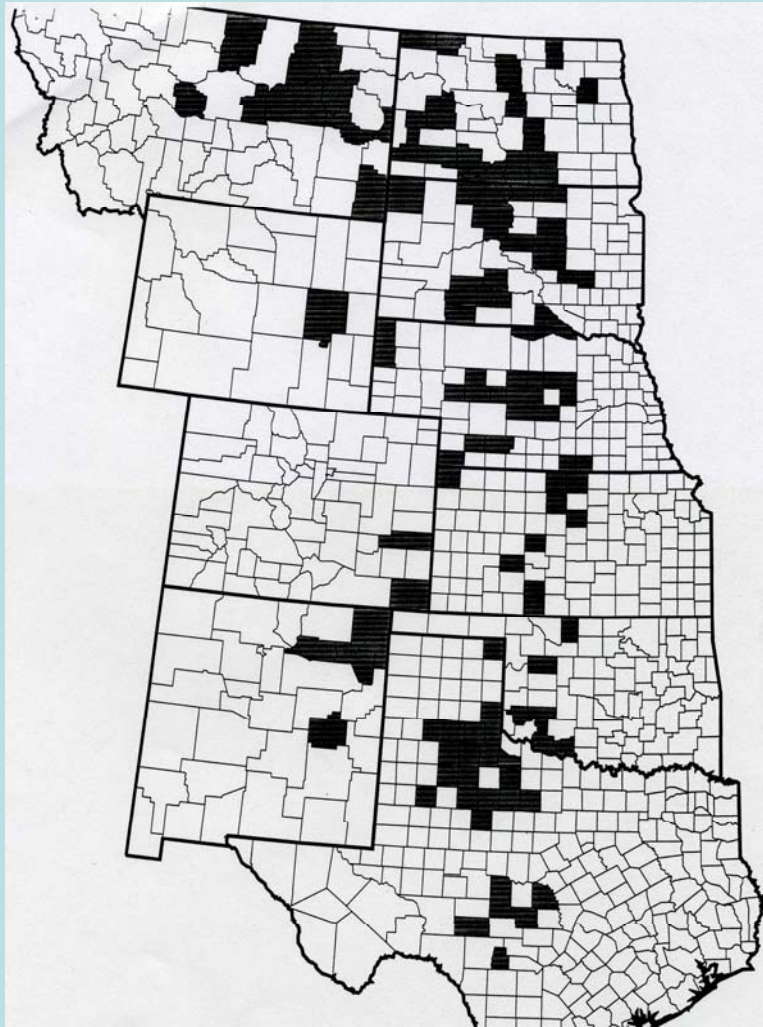
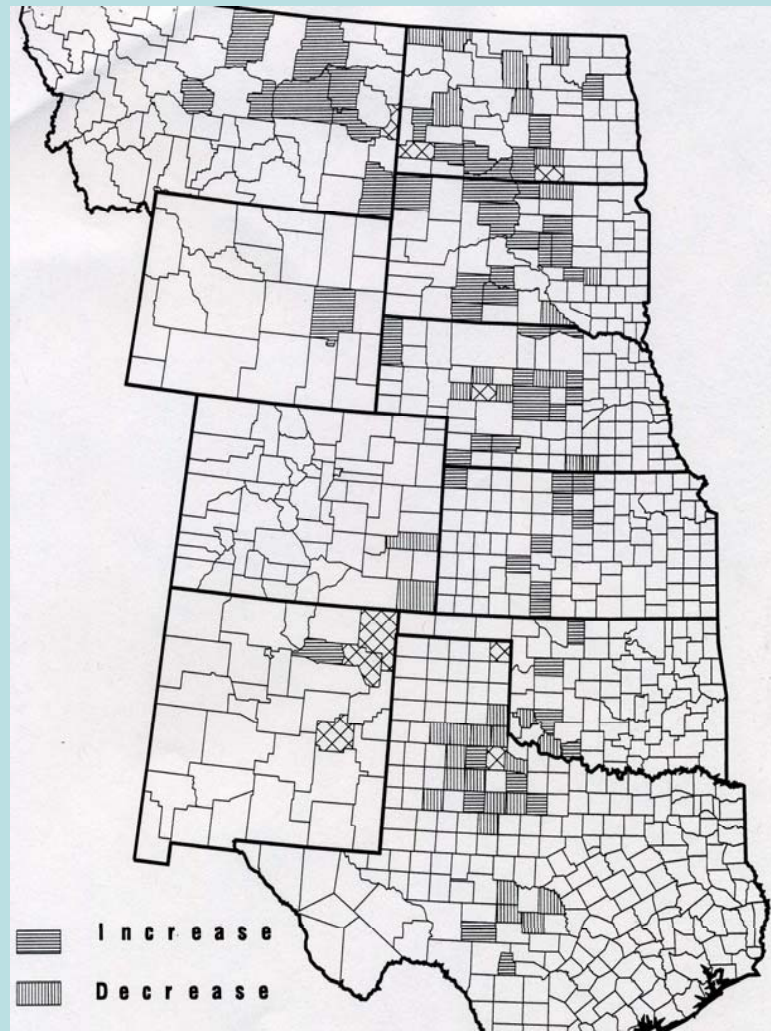


Figure 34.7 Total Great Plains wheat area. Sources: U.S. Census Bureau, U.S. Department of Agriculture, and state statistics.

Riebsame (1991) Great Plains. In The Earth as Transformed by Human Action, Turner et al., eds.



Poppers: Counties in "Land Use Distress" (~1980-88)



1978 – 1987 Census of Agriculture: cropland change

Of 98 "distressed" counties:

38 lost cropland - 60 gained cropland - Overall: 4.8% gain

A Closer Look at the LU Numbers: Eastern Colorado Trends

- Good land use data hard to come by---No central data system (like climate)
- For better validity and reliability:
 - Annual “harvested” crop reports

Parton, Gutmann and Travis, 2003

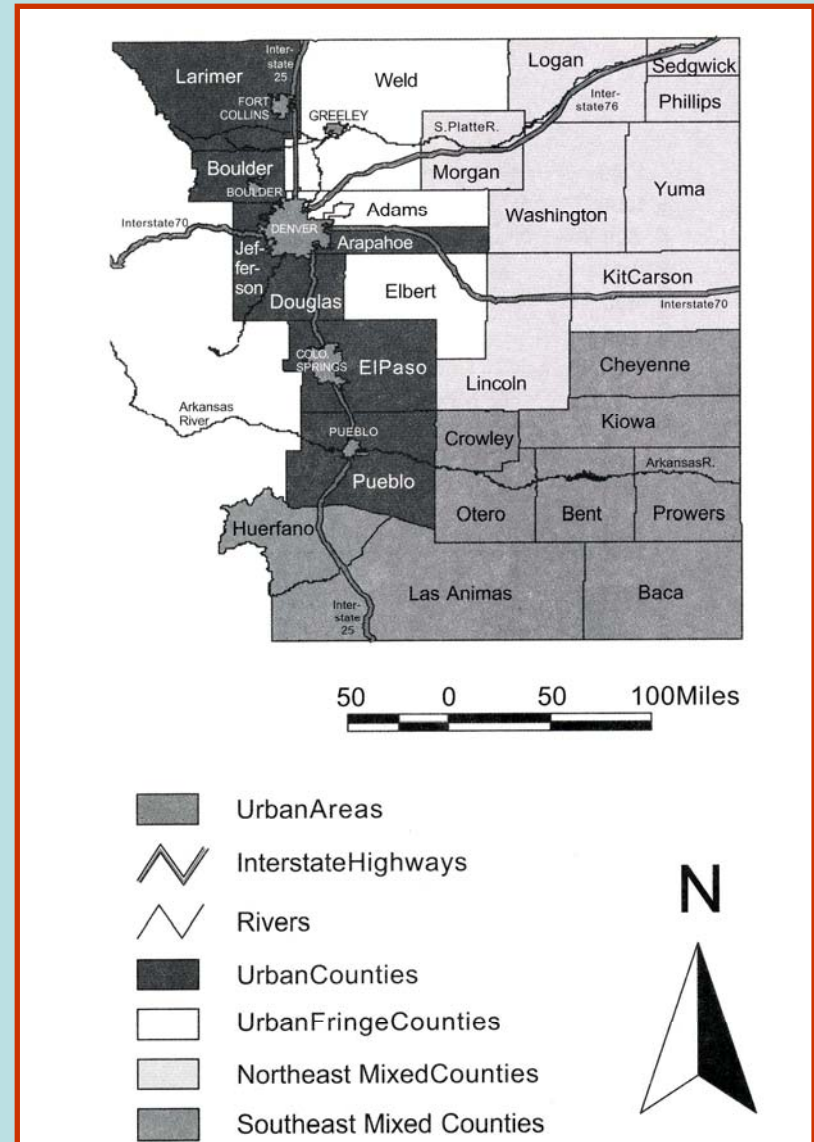


Figure 1. Eastern Colorado, showing major urban areas, interstate highways, rivers, and four categories of counties.

“Farmland” vs. Cropland

TABLE 1
CHANGES IN RANGELAND, CROPLAND, AND TOTAL FARM-
LAND IN EASTERN COLORADO COUNTIES

Census of Agriculture data*				
		Rangeland (ha X 10 ⁶)	Cropland (ha X 10 ⁶)	Farmland (ha X 10 ⁶)
Urban	1950	1.43	0.42	1.85
	1997	0.98	0.23	1.21
	Absolute Change	-0.45	-0.19	-0.64
	% Change	-32	-44	-35
Urban fringe	1950	0.90	0.68	1.58
	1997	0.83	0.64	1.48
	Absolute Change	-0.07	-0.03	-0.10
	% Change	-7	-5	-6
Southeast mixed	1950	2.73	1.05	3.78
	1997	2.41	0.94	3.35
	Absolute Change	-0.32	-0.11	-0.43
	% Change	-12	-10	-11
Northeast mixed	1950	1.83	1.50	3.33
	1997	1.64	1.74	3.38
	Absolute Change	-0.20	0.24	0.04
	% Change	-11	16	1
Total	1950	6.90	3.65	10.54
	1997	5.86	3.56	9.42
	Absolute Change	-1.04	-0.09	-1.13
	% Change	-15	-2	-11

Note: The changes reflect 1997 values minus 1950 values and the percentage change is based on the 1950 area.

* Census data: Great Plains Population and Environment Database (Gutmann et al. 1999)

TABLE 2
HARVESTED DRYLAND, HARVESTED IRRIGATED, AND TOTAL
HARVESTED LAND IN EASTERN COLORADO COUNTIES

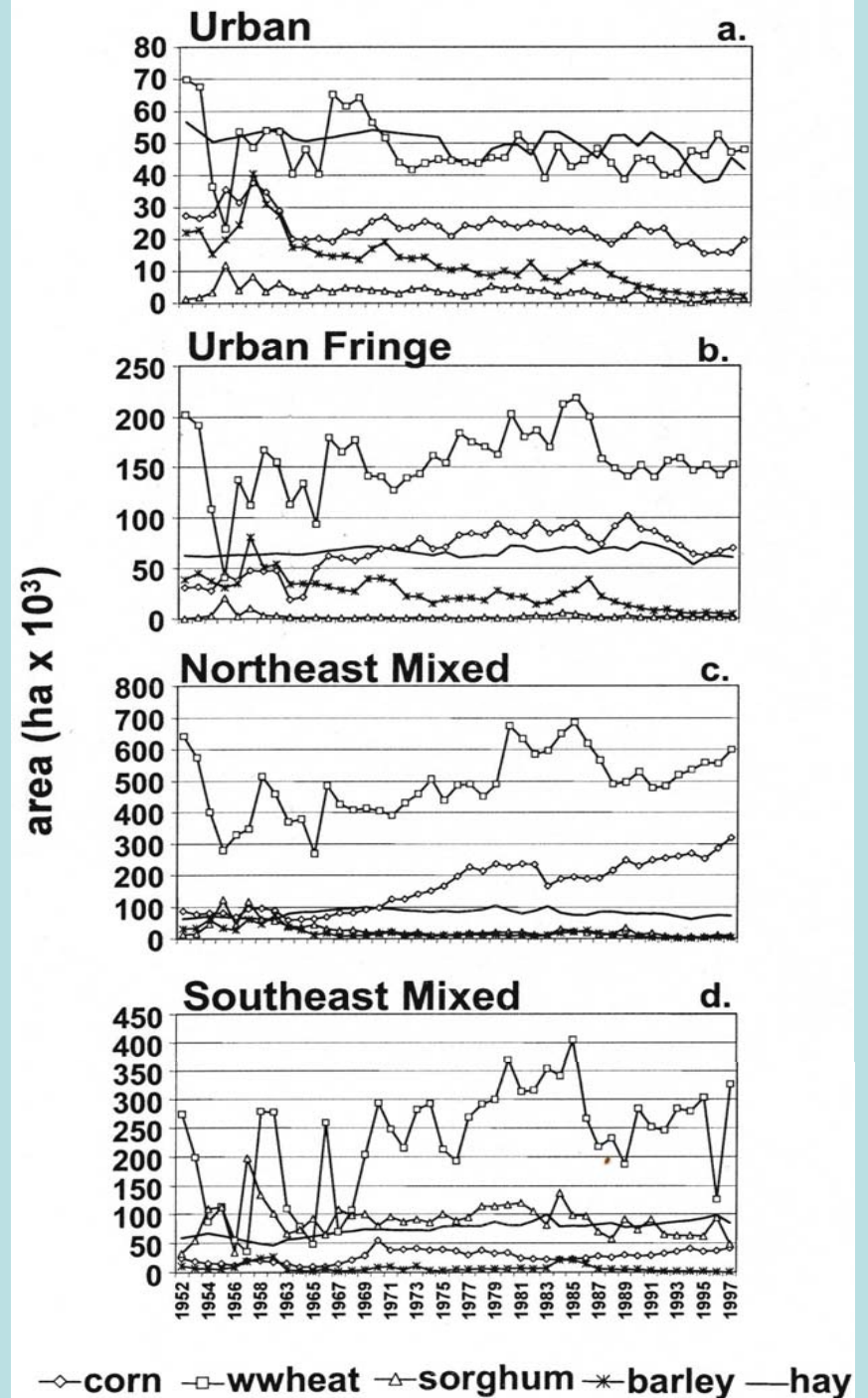
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Urban	1950	0.12	0.07	0.19
	1997	0.06	0.05	0.12
	Absolute Change	-0.06	-0.02	-0.08
	% Change	-48	-26	-40
Urban fringe	1950	0.25	0.12	0.37
	1997	0.17	0.13	0.30
	Absolute Change	-0.08	0.01	-0.07
	% Change	-32	8	-19
Southeast mixed	1950	0.30	0.13	0.43
	1997	0.36	0.17	0.52
	Absolute Change	0.05	0.04	0.09
	% Change	17	30	21
Northeast mixed	1950	0.78	0.08	0.86
	1997	0.67	0.35	1.02
	Absolute Change	-0.11	0.27	0.15
	% Change	-15	318	18
TOTAL	1950	1.45	0.41	1.86
	1997	1.25	0.71	1.96
	Absolute Change	-0.20	0.30	0.10
	% Change	-14	73	5

Note: The changes reflect 1997 values minus 1950 values and the percentage change is based on the 1950 area.

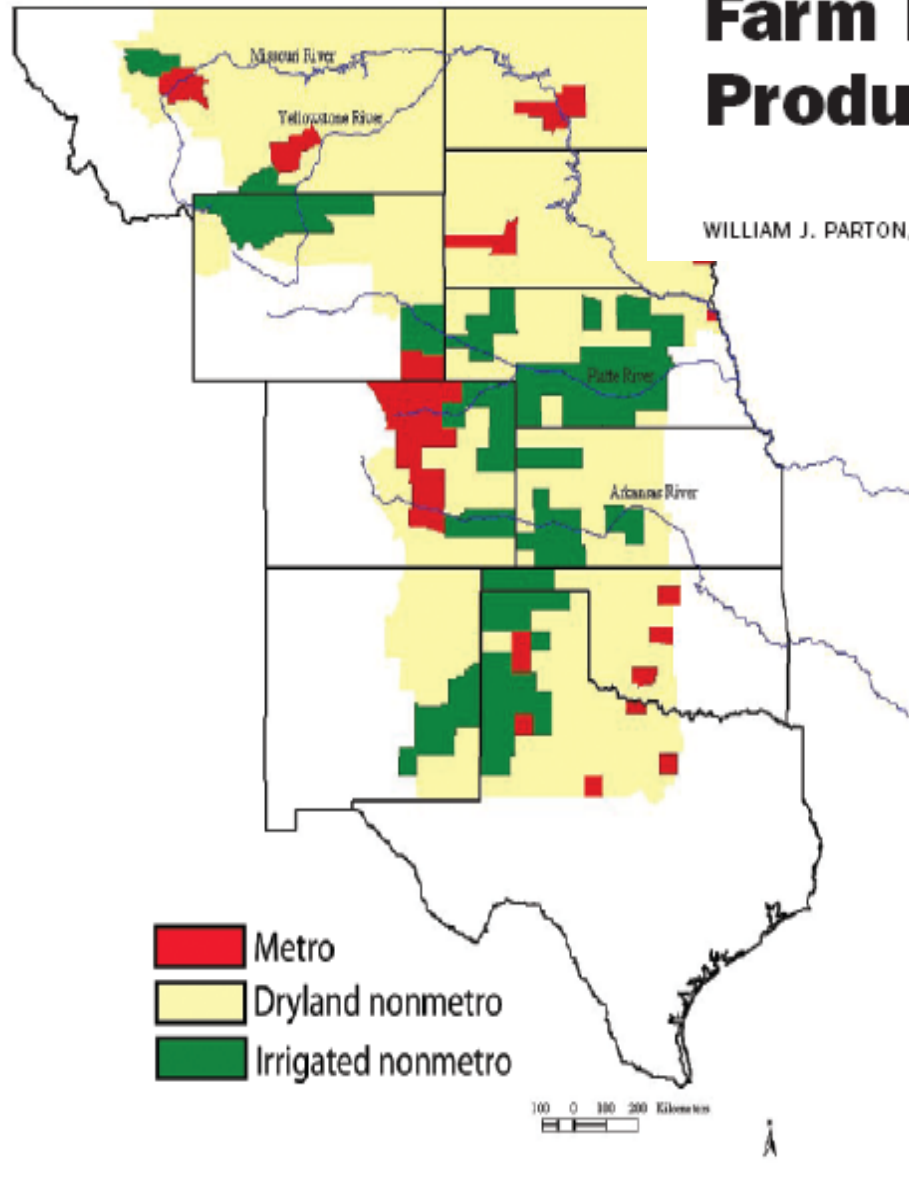
* Colorado State Annual Agricultural Data.

Harvested Cropland Results (1950-97)

- Declines in some crop areas in Urban and Urban Fringe, though some hold on: e.g., irrigated hay
- Overall: No big declines, except CRP effect obvious in dryland wheat
- Some significant gain: Irrigated corn expands, especially in NE



Long-term Trends in Population, Farm Income, and Crop Production in the Great Plains



WILLIAM J. PARTON, MYRON R. GUTMANN, AND DENNIS OJIMA

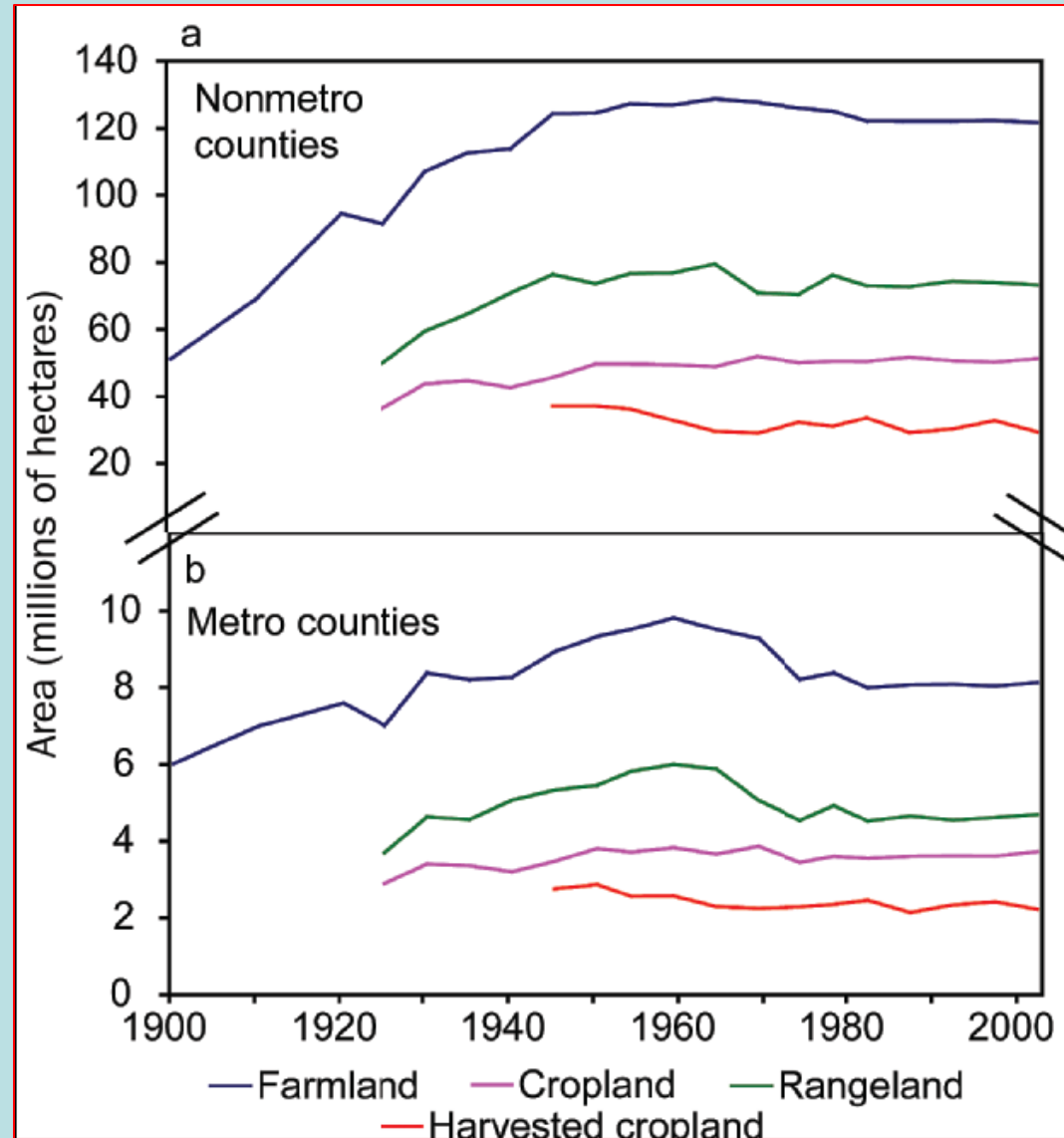
Parton, Gutmann and Ojima (2007) in *BioScience*, extended the data base and analysis to the entire Great Plains with similar results as in Colorado:

- “Farmland” declined in metro counties, held on in rural counties
- Total cropland holds on while harvested cropland slightly declines in both, roughly proportional to CRP acreage.
- Yields and total production increase dramatically.

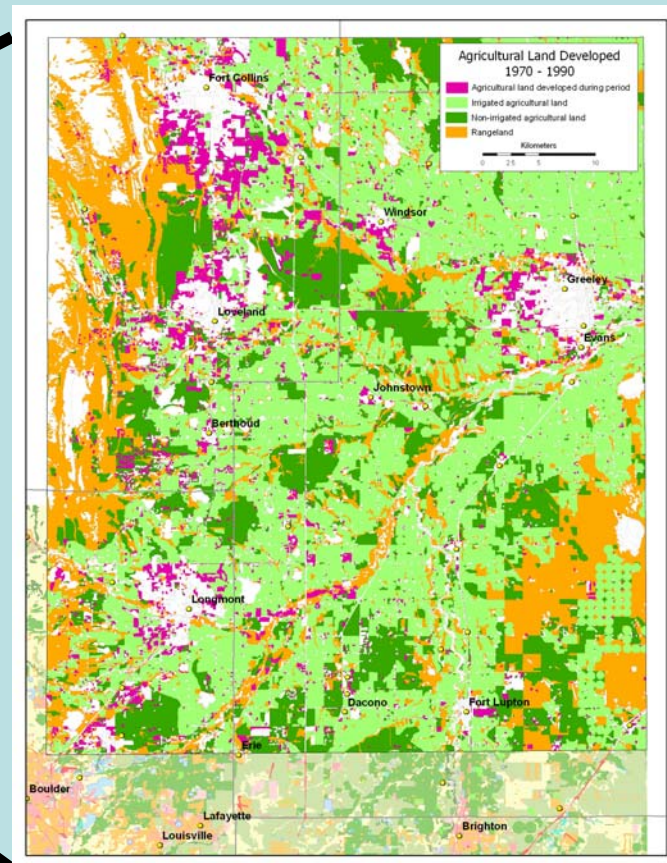
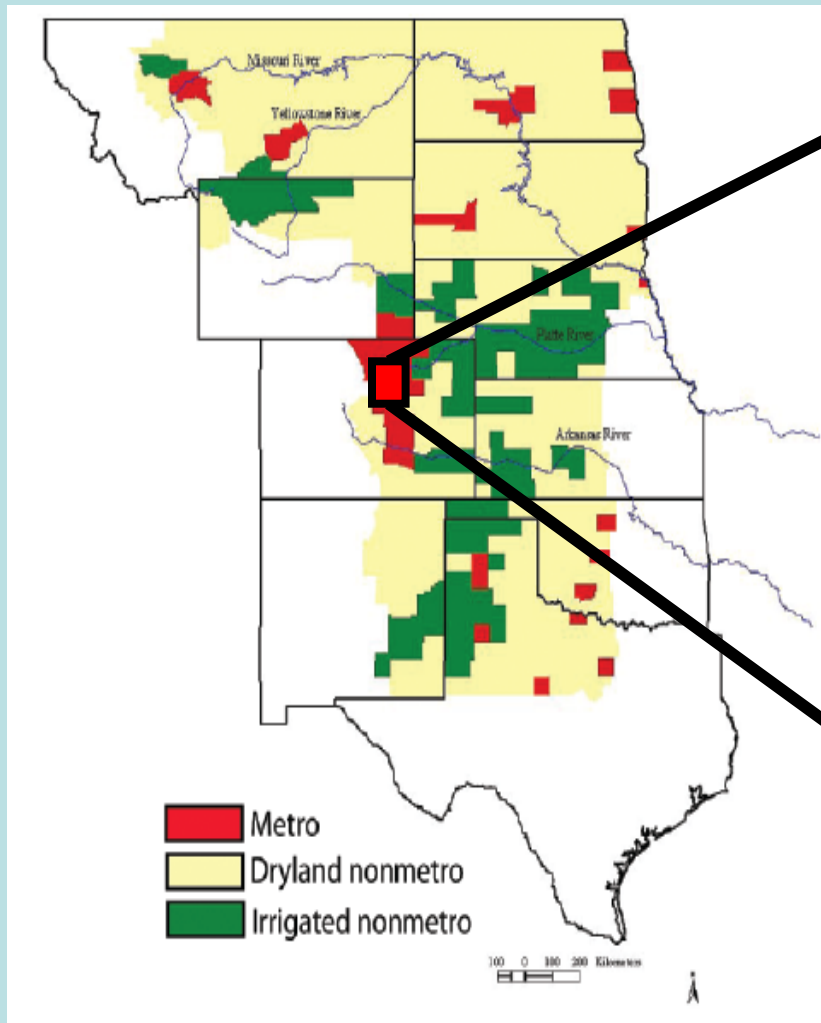
Parton, Gutmann and Ojima (2007)

Losing Farm Ground?

Note order-of-magnitude difference in y-axis scales



Closer look at land use change in Northern Front Range, a rapidly urbanizing area



USGS Front Range Infrastructure Project

Cities / Exu

Growth finds new frontier: northern towns along I-25

**U.S.
CENSUS**

Migration from east:

Search for places in the sun — and elbow room — turns western suburbs into the nation's newest boom towns. **12A**

By Coleman Cornelius

Denver Post Northern Colorado Bureau

FIRESTONE — Cole Lathrop and his family moved to this small Weld County town three years ago because it offered cheaper home prices, an easy commute to metro Denver for his schoolteacher wife, and a setting with views of alfalfa fields and mountain peaks.

"We live in a new neighborhood with a majority of young couples with kids," said Lathrop, 35, a Firestone firefighter who came from Boulder County.

He talked Wednesday while shop-

ping at a new strip mall with his two young daughters.

Lathrop's choice of Firestone as a place to live is becoming more popular. The former coal-mining center is fast evolving from an agricultural hamlet into a bedroom community for working families.

Firestone was the sixth-fastest-growing municipality in the nation from April 1, 2000, to July 1, 2002, with its population growing 123.7 percent, according to U.S. Census Bureau estimates released today. The neighboring burg of Fre-

SEE GROWTH ON 12A



The Denver Post / Cyrus

Adolfo Prieto slaps shingles on the roof of a new home in Weld County town of Firestone. The town was the nation's fastest-growing municipality from April 1, 2000, to July 1, 2002

The road to revenue



The Denver Post / John Epperson

Commercial and residential development in the Weld County area bordering I-25 northwest of Frederick and Firestone is booming.

The growth along I-25 from Denver is turning north; every mile of a 70-mile swath lies within some community's growth boundaries.

Lure of sales-tax funds drives growth along I-25 north of city

By David Olinger
Denver Post Staff Writer

Growth

For half a century, the truck- From Denver through East Col



Northern Front Range LUC study

Questions:

- **What is the geographical nature / structure of the “farmland loss” problem in Colorado?**
- **What types of land does development come out of?**

Irrigated vs dryland / range?

- **Irrigated: more expensive than dryland but comes with water (in some cases)**
- **Dryland: often in federal crop or conservation programs; on hill slopes**
- **Range: cheapest, on slopes**

Suburban Development: Approximately 4 houses per acre w/ a school and church

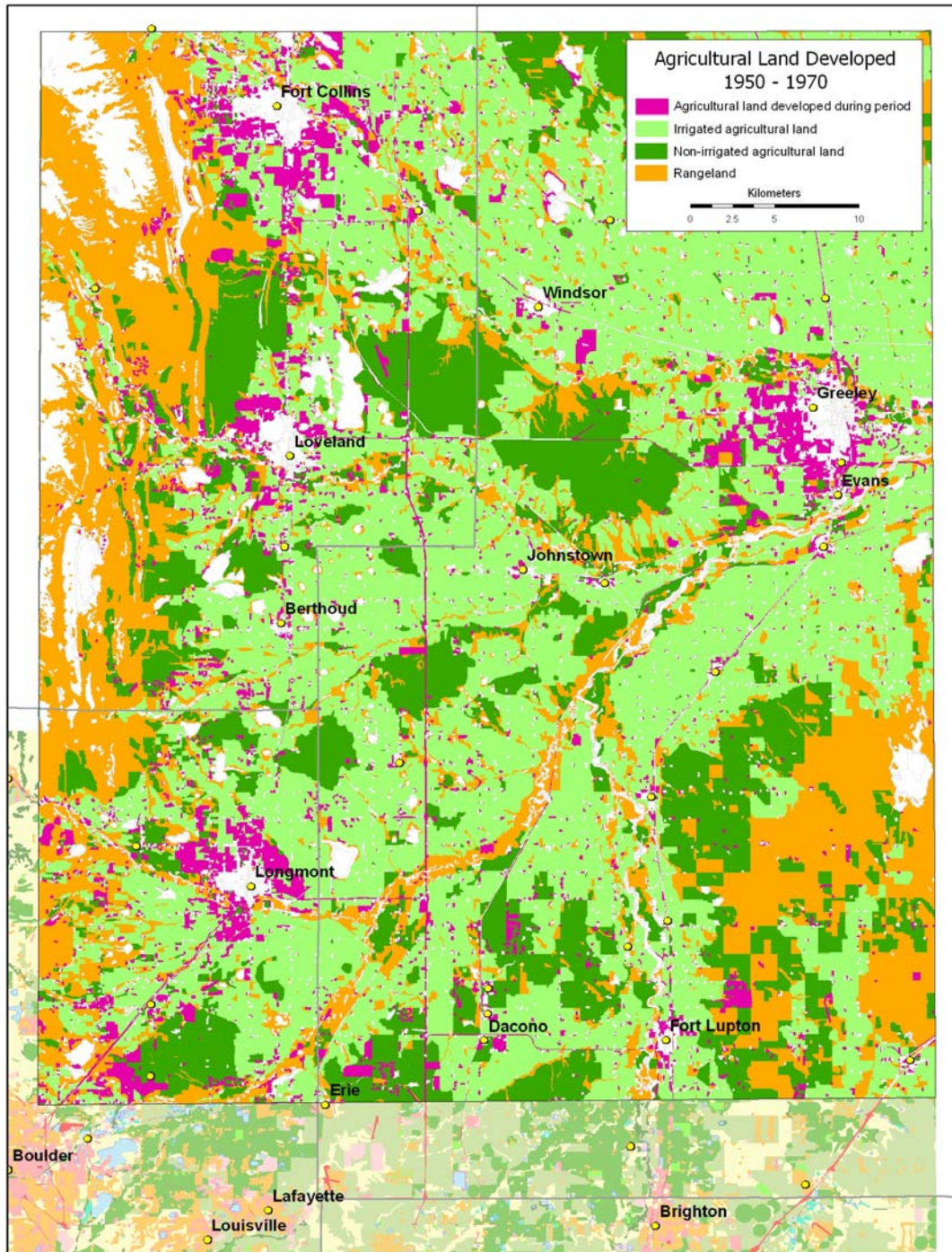


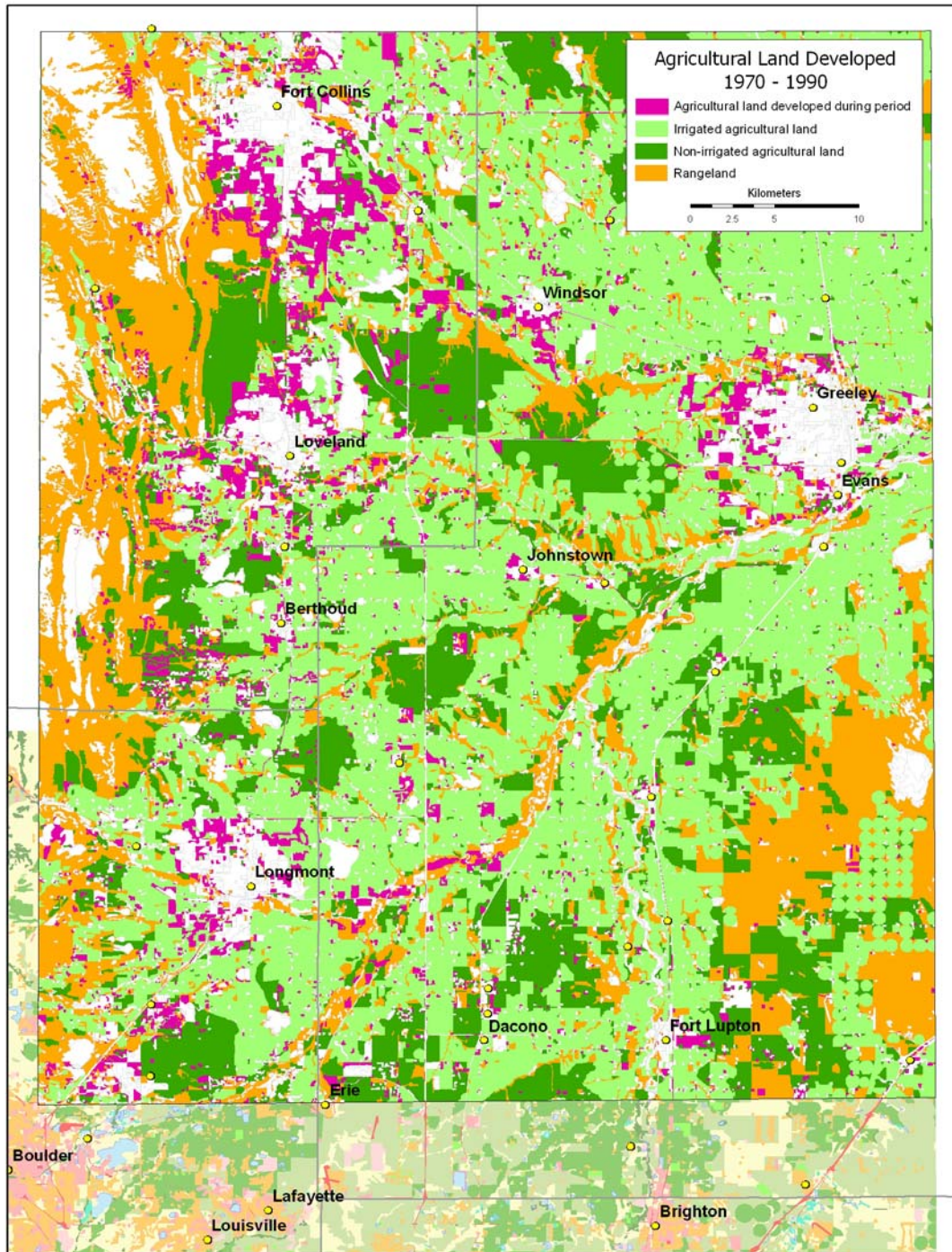
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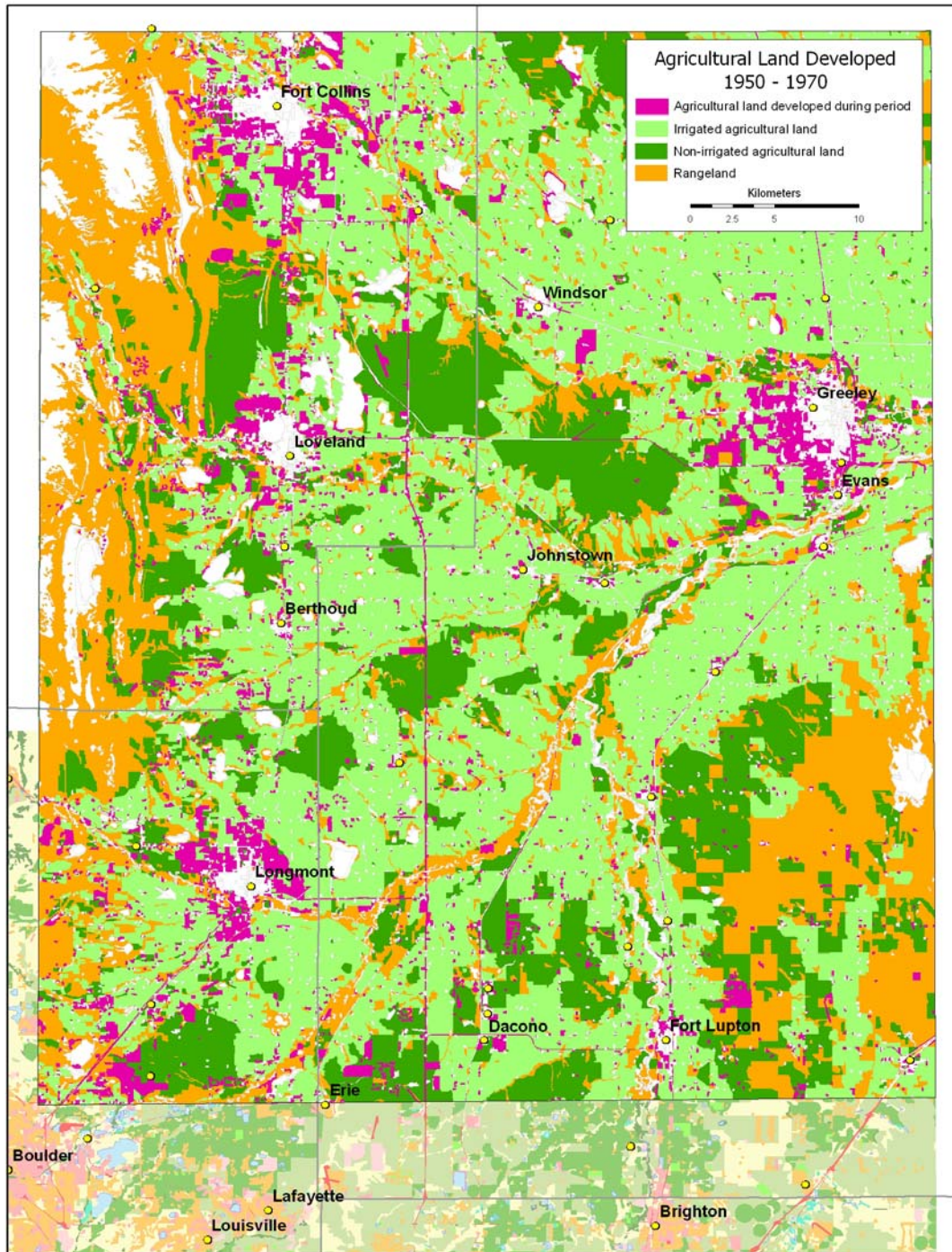
Exurban development, at about one house per acre.

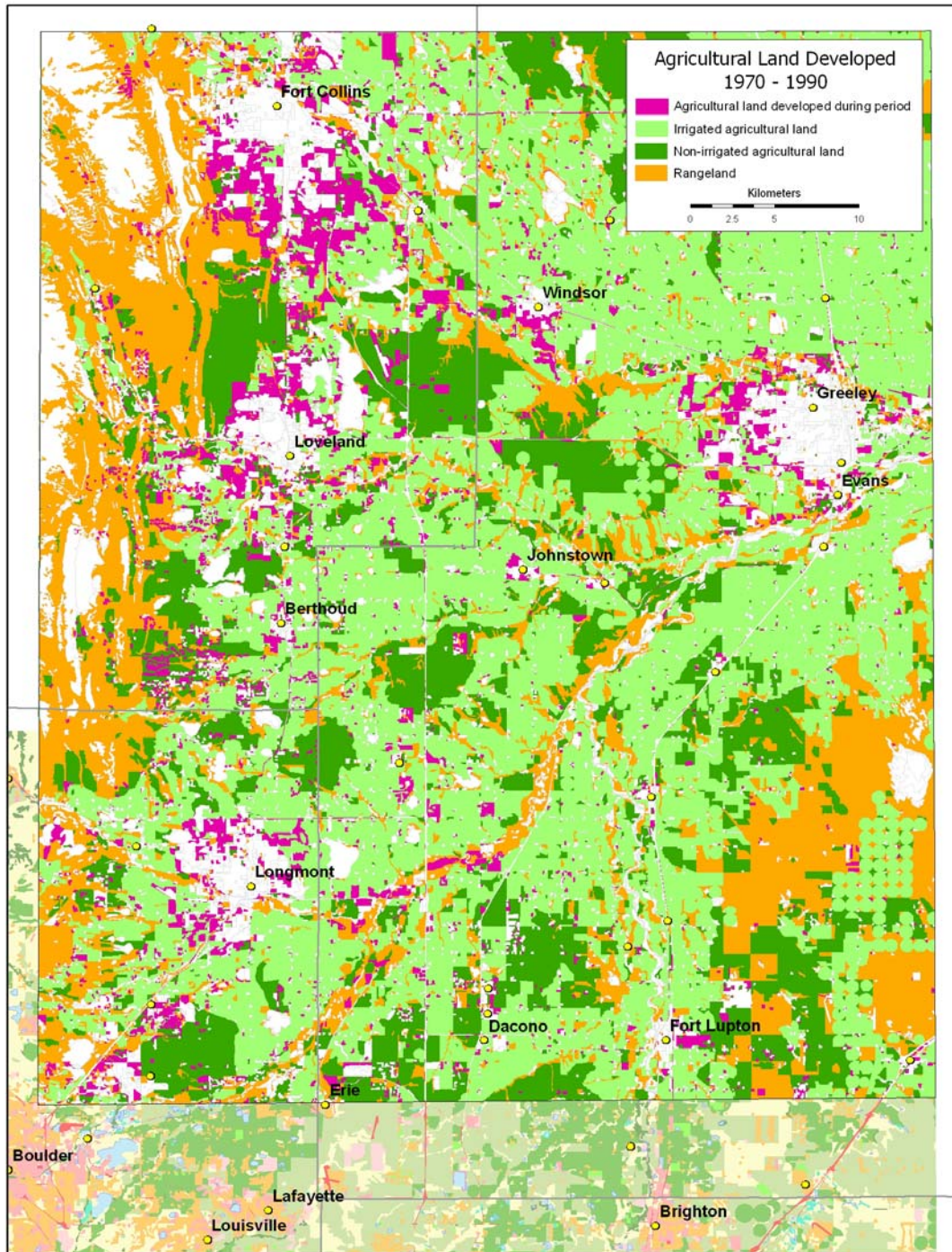


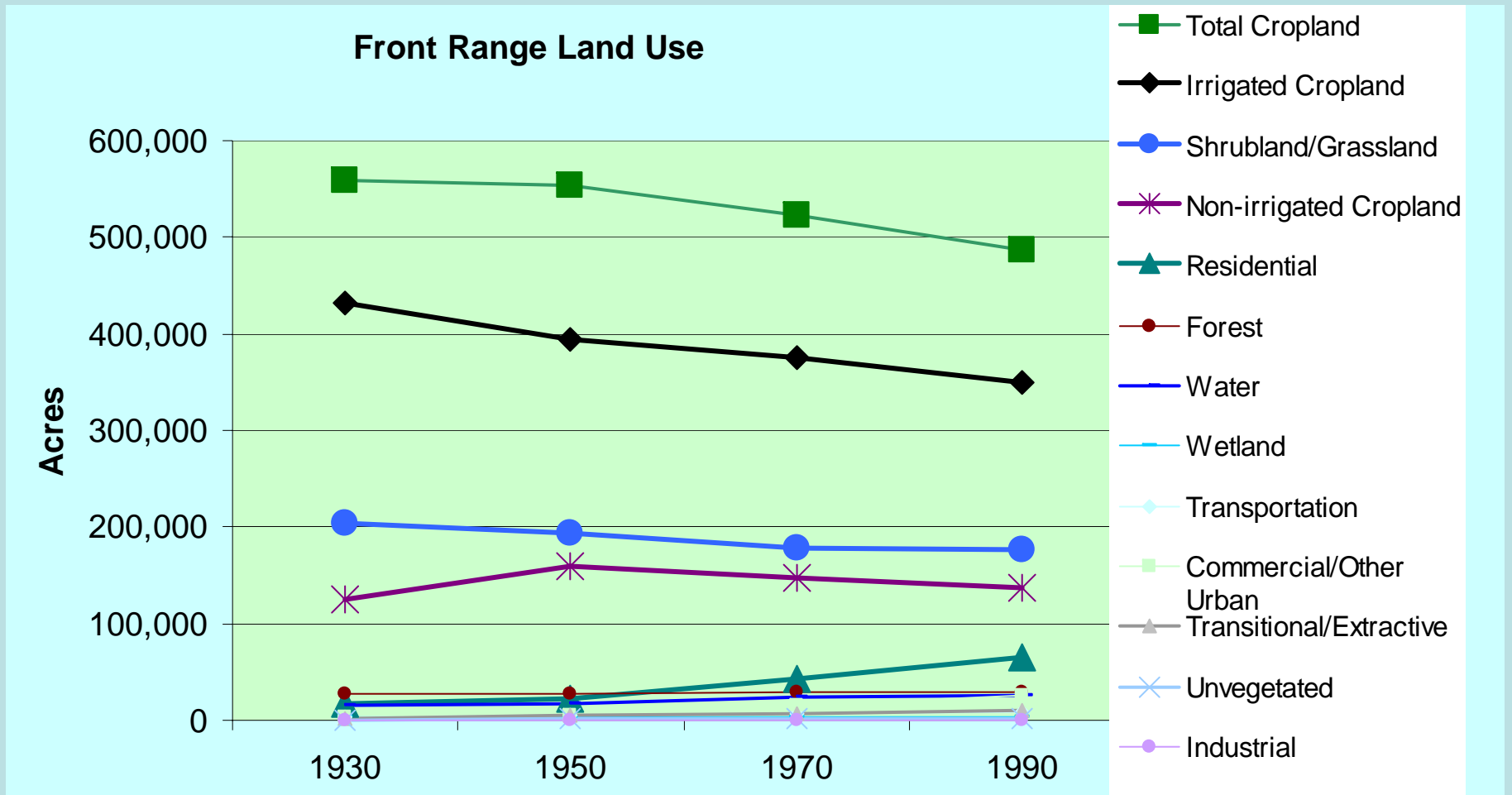
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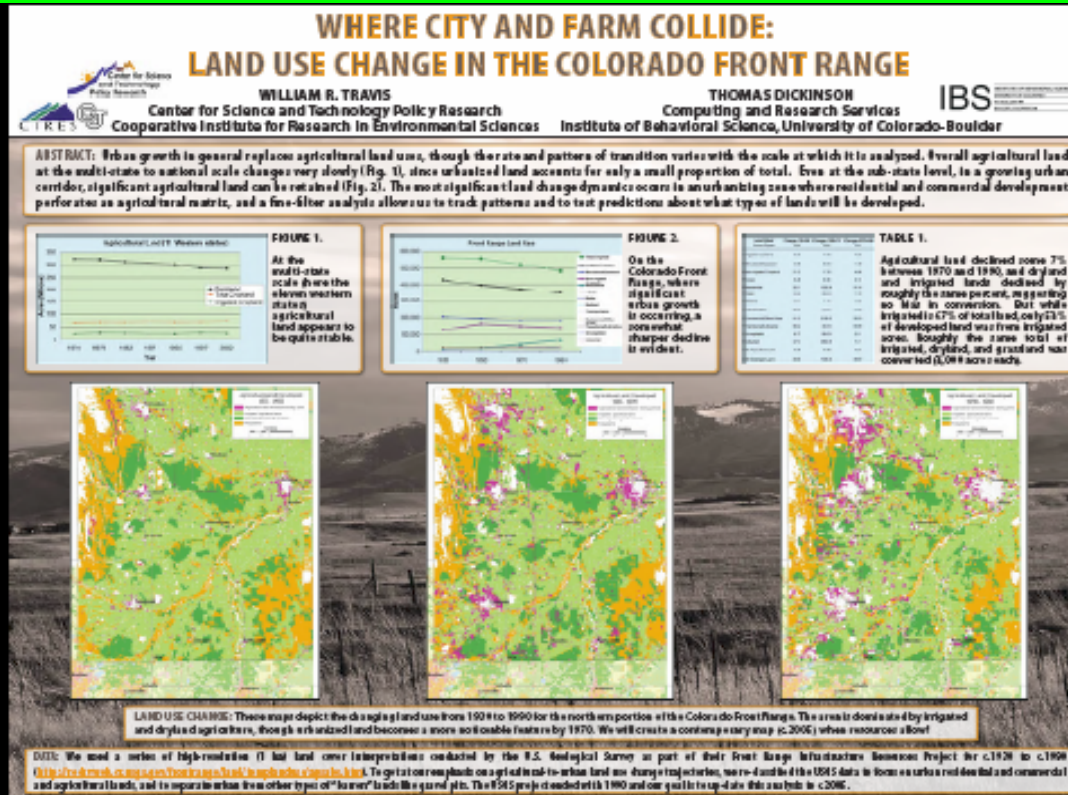




Data: USGS Front Range Infrastructure Project; re-analyzed by Thomas Dickinson, IBS

Change in Front Range LULC Type (Percent)

	1930 to 1950	1950 to 1970	1970 to 1990
Irrigated Agriculture			-6.88
Shrubland/Conifer			-1.49
Non-irrigated Agriculture			-6.98
Forest			0.18
Residential			51.41
Water			11.81
Wetland			-3.05
Transportation			some 7%
Commercial			, and dryland
Transitional			lined by
Unvegetated			ent, suggesting
Industrial			But while
Total Ag Land			irrigated is 67% of total land, only 53%
Total Dev Land			of developed land was from irrigated
			acres. Roughly the same total of
			irrigated, dryland, and grassland was
			converted (3,000 acres each).



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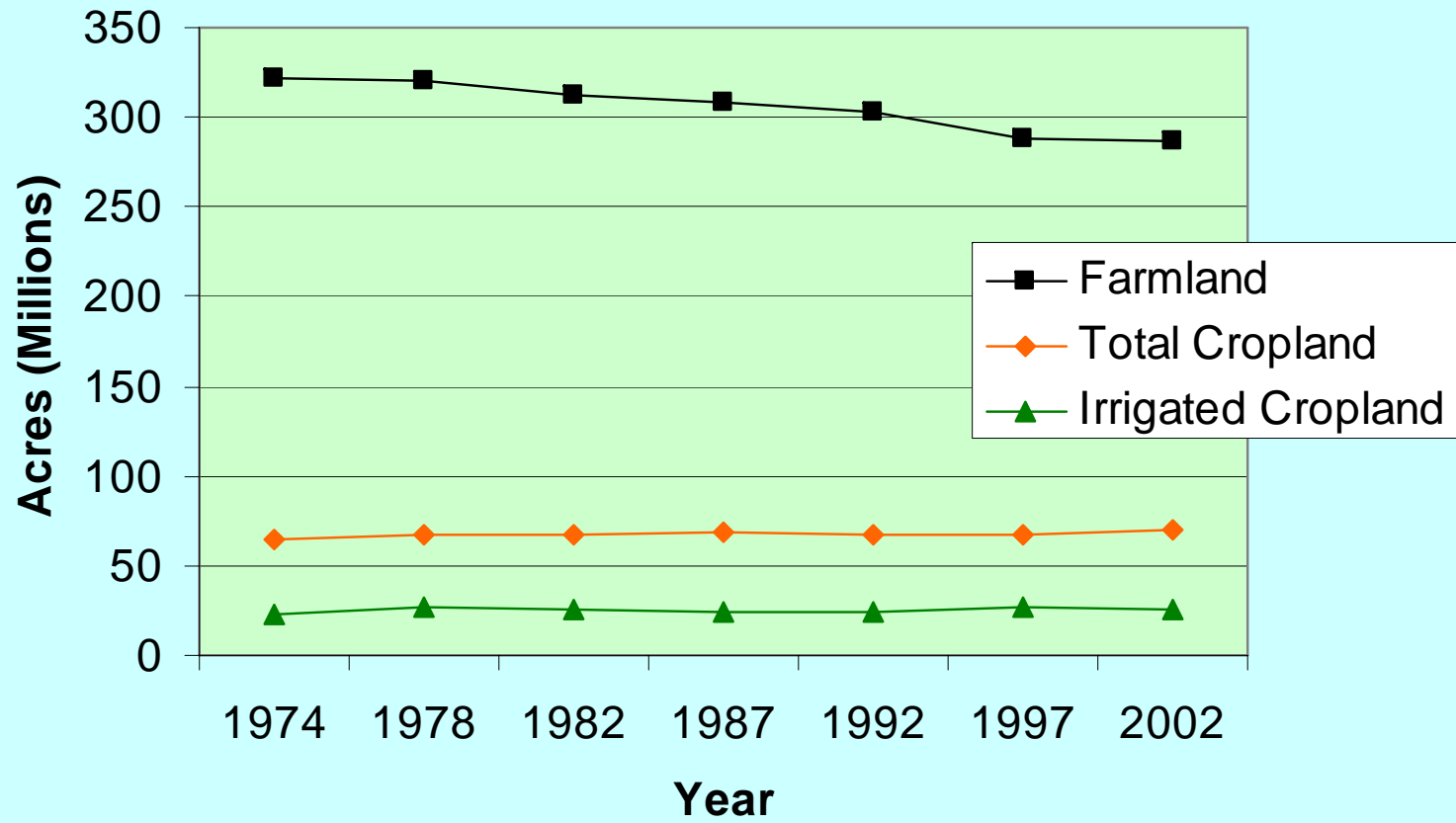
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* Colorado State Annual Agricultural Data.

Agricultural Land (11 Western states)



Some Notes on Ag Resilience

Very large base of agricultural land, so numbers obscure individual stories, cases like E. Colo. wells, and places like Crowley County

- Continued increase in productivity per unit of land
- Continued over-supply in some products and markets

Several countervailing forces:

- Broad social-economic support for agriculture
- “Open space” agriculture
- Water lease arrangements
- Urban-based demand (hay)
- Hobby farming and ranching

Growth in the American West

- More “boom” than “bust”

