Transitioning to Non-Irrigated Crop Production in Southwest Kansas – Will We Have Another Dust Bowl?

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OPTIMIZING WATER USE TO SUSTAIN FOOD SYSTEMS

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The Great American Desert

The Stephen Long expedition of 1819 appraised the land acquired by the United States in the Louisiana Purchase. In his writings, he considered a great part of the country unfit for cultivation and uninhabitable by people depending upon agriculture for their subsistence.

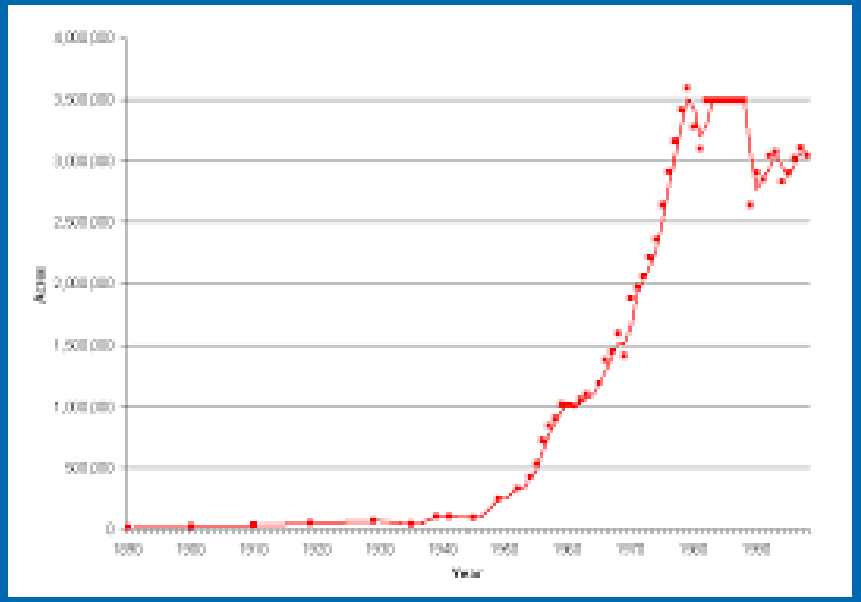
Native Grassland

Much of the Great American Desert was composed of rolling sandy land covered by native grassland. These grasses had roots as deep as 15’ which stabilized the ground against wind and drought.

The Ogallala Aquifer

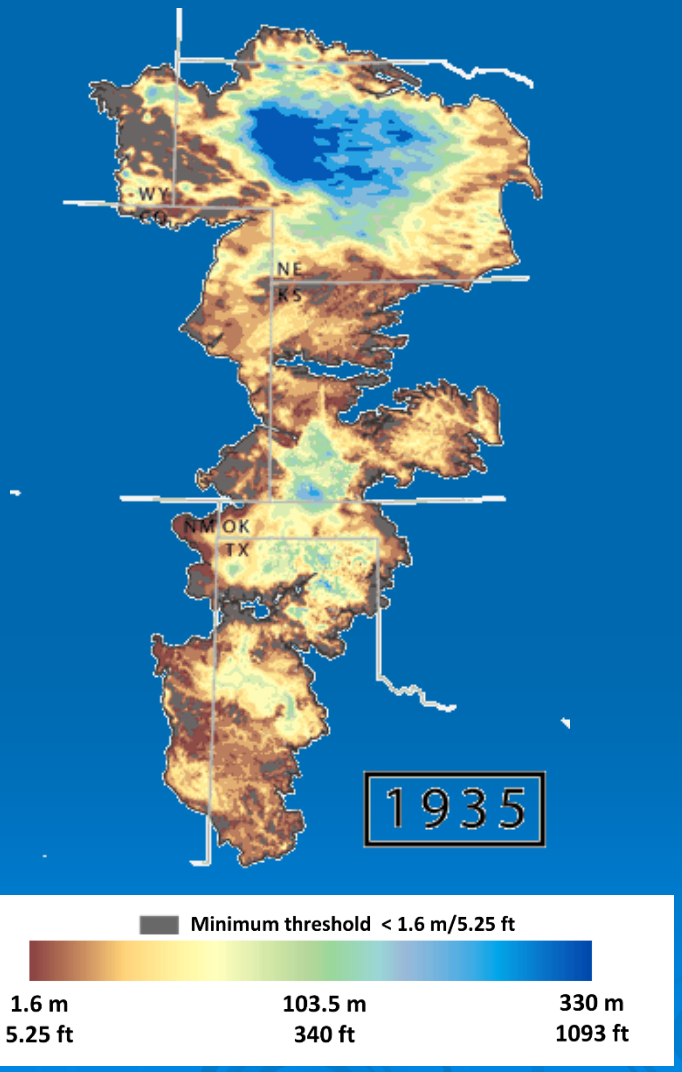
Unknown to the early settlers, the Ogallala Aquifer lay under much of the Great American Desert.

The Rise in Center Pivot Irrigation



The development of the center pivot irrigation system in the 1960s made irrigation possible on land previously considered non-irrigable and possibly even non-arable.

The Ogallala Problem



Research Question

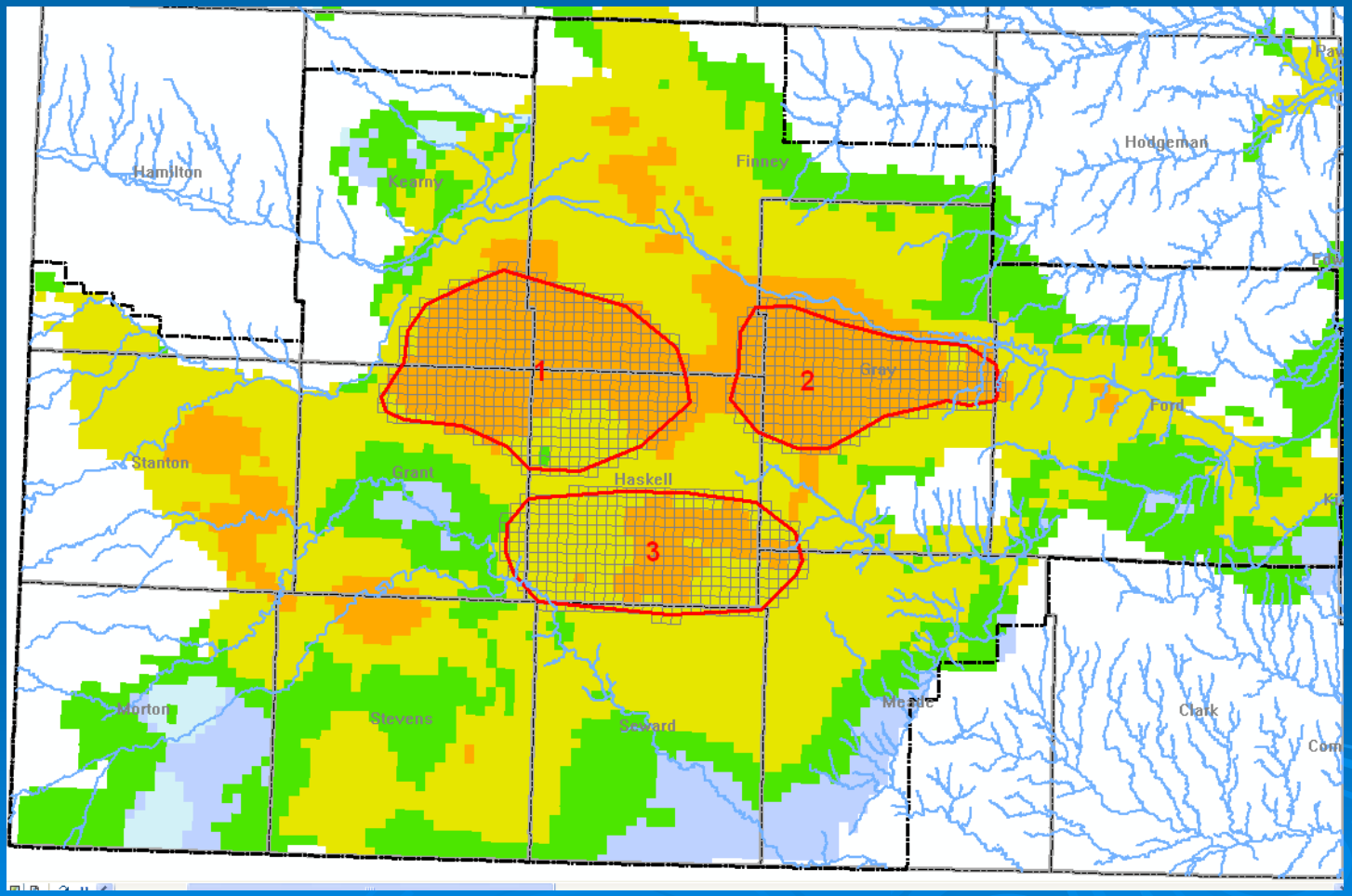
- Given that the Ogallala Aquifer is drying up and irrigated cropland may transition to non-irrigated production:
  - Will the land transition to non-irrigated crop production or pasture land?
  - What is the magnitude of the transition?
  - What can we do today to help the future transition?

Economics 101

	Cash Rent	Land Value
Irrigated Cropland	$144	$5,500
Non-Irrigated Cropland	$38	$2,370
Pasture	$10	$1,640

Cash rents from http://quickstats.nass.usda.gov/results/E0F5EB36-3313-3D7B-9E7F-E56A3365CF2B#9A9F55D7-E267-38C6-ACB9-DF106291B5A7
Land values from http://www.agmanager.info/land-leasing/land-buying-valuing/2018-kansas-county-level-land-values-cropland-and-pasture

Transitioning to Pasture – Really?

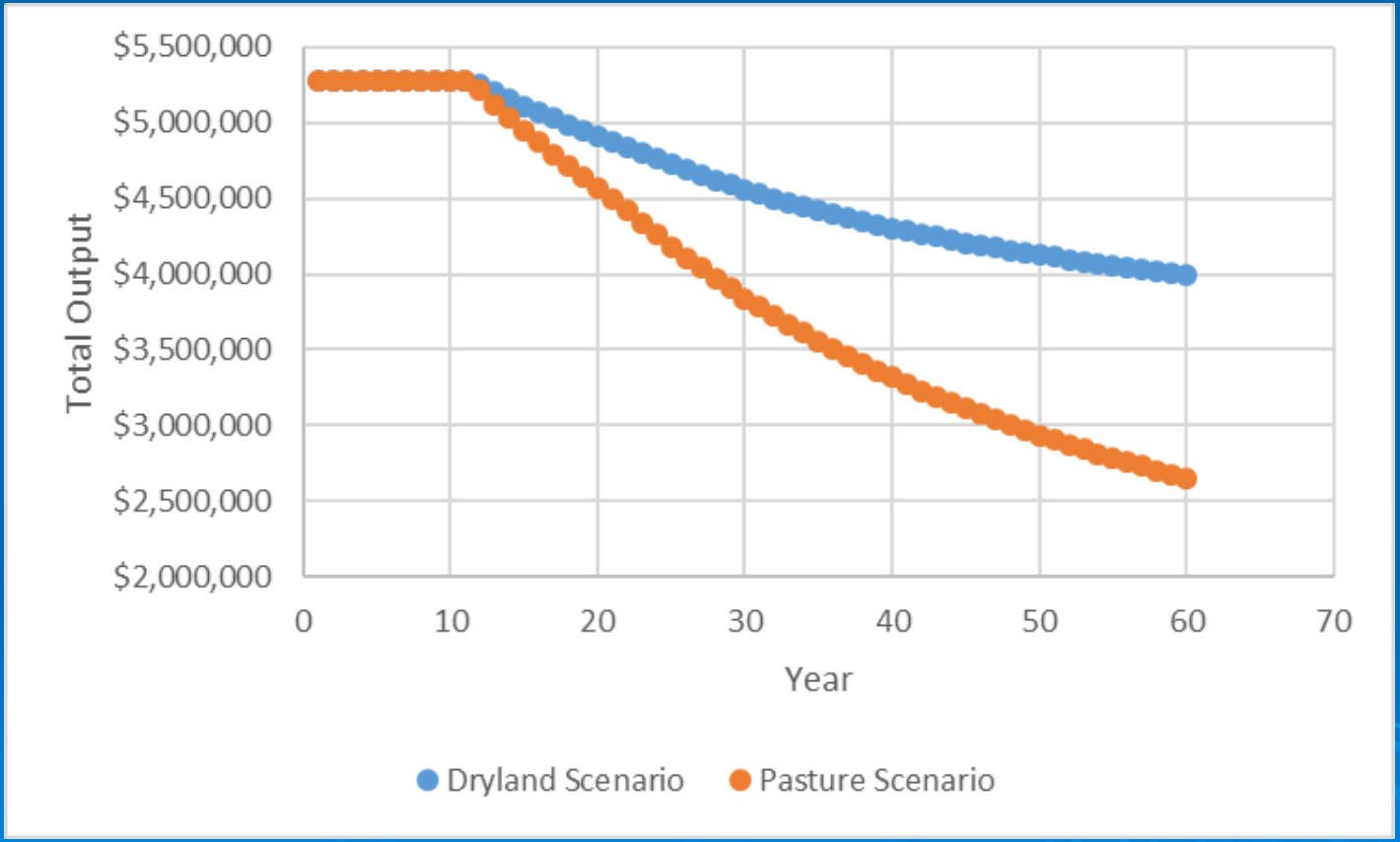


Transitioning to Pasture – Really?

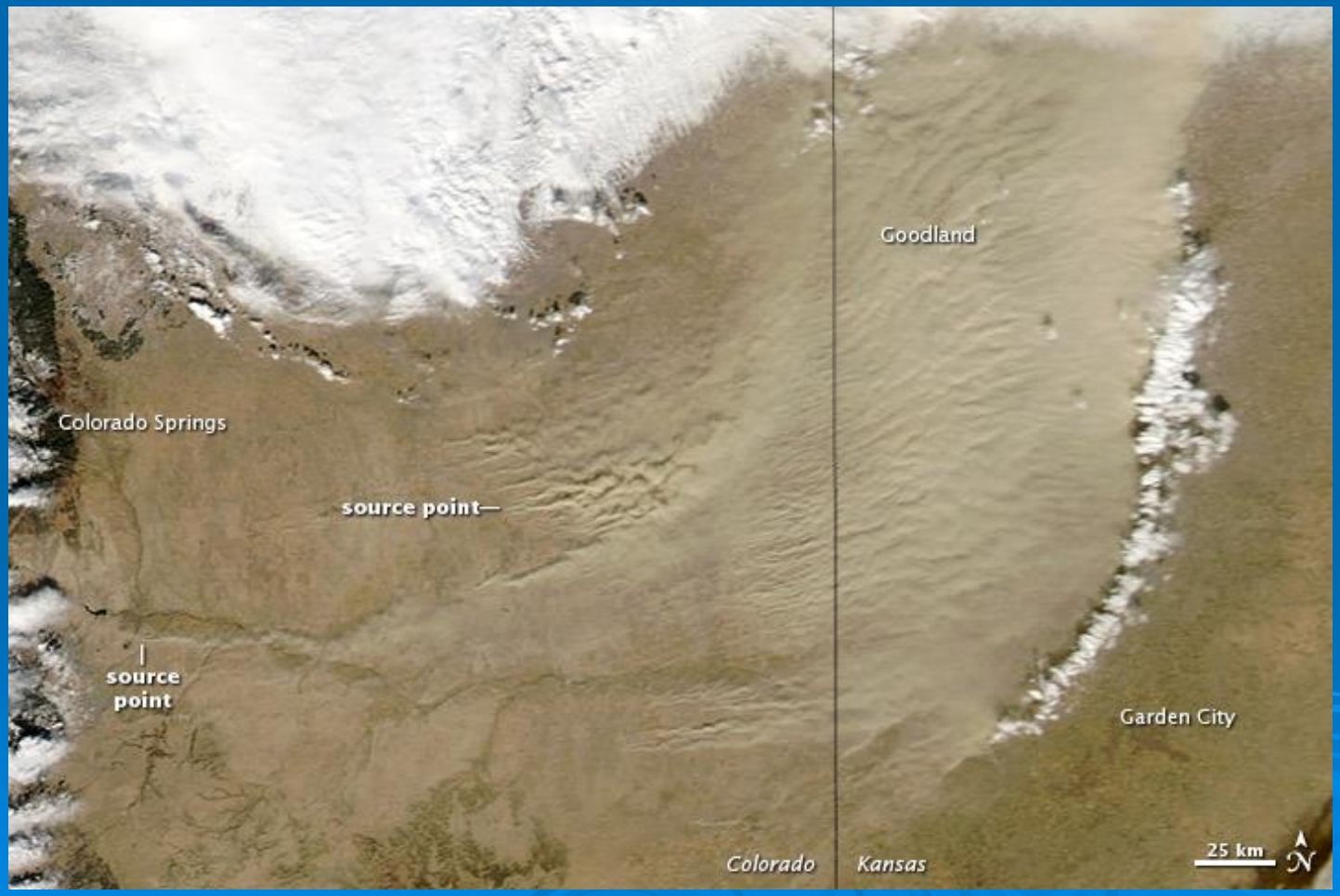
Table 4. High Priority Subarea Assumed Future Dryland Crop Mix

	Crop				
High Priority Subarea	Corn	Sorghum	Wheat	Fallow	Pasture
1	4.2%	13.1%	28.3%	15.2%	39.4%
2	3.0%	9.5%	20.4%	11.0%	56.2%
3	6.6%	20.6%	44.6%	23.9%	4.3%

The Economic Impact of Transitioning to Pasture



One Area of Concern



One Area of Concern

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The Model

(A layman's interpretation)

- Identifies individual land parcels that are irrigated, non-irrigated, or pasture, and the crops grown.
- Combines the above GIS layer with 1) and Ogallala Aquifer boundary layer 2) a saturated thickness layer, and 3) an NRCS soil classification layer.
- Predicts when a parcel will transition from irrigated production to dryland production.
- Predicts if the dryland parcel will convert to crop or pasture production.
- Generates basic economic impacts.
- Considers 6 counties in 6 states.
- Prediction are based on a 100 year time frame

Percent of Irrigated Cropland that Transitions to Non-Irrigated Production

State	County	FIPS	Percent
Colorado	Yuma	8125	27.2%
Kansas	Finney	20055	56.7%
Nebraska	Dundy	31057	29.6%
New Mexico	Roosevelt	35041	30.6%
Oklahoma	Texas	40139	55.4%
Texas	Dallam	48111	65.7%

Percent of Total Non-Irrigated Acreage that Transitions to Non-Irrigated Pasture Production

State	County	FIPS	Percent
Colorado	Yuma	8125	34.3%
Kansas	Finney	20055	17.9%
Nebraska	Dundy	31057	42.3%
New Mexico	Roosevelt	35041	33.0%
Oklahoma	Texas	40139	11.4%
Texas	Dallam	48111	27.9%

Conclusions

- In certain areas Irrigated cropland will have to transition to pasture.
- In certain areas the magnitude of the problem will be large.
- What can we do today to help the future transition?
  - Target these areas for groundwater conservation?
  - Support research with KDA and NRCS?
  - What else can we do?

Questions & Discussion