

**Incorporating Rural Population-
Business Thresholds, or
“Tipping Points”
in Water Transfer
Evaluations**

Concept and Application

Sponsors:

Colorado Water Conservation Board
(**CWCB**), with the help of
Lower Arkansas Valley Water
Conservation District (**LAVWCD**), and
CDM

Authors

- George Oamek, Honey Creek Resources, Inc.
- Richard Gardner, Bootstrap Solutions, Inc.
- David Kracman, The Flatwater Group, Inc.
- Ken Weber, Ph.D.
- Charles Howe, Ph.D.

Introduction

- **The Missing Link?**
- **Business Population Threshold:**
The minimum population needed to support a certain type business operating with average costs.

What are we trying to measure?

- The **total** impact to rural communities, the unintended consequences, or negative externalities, resulting from water transfers
 - Impact to employment
 - Impact to the number of businesses
 - Impact to population
- Previous studies have not considered possible thresholds or “tipping points” at which certain types of businesses will close
- Population-based thresholds

Sample Population Thresholds

<u>Type of Business</u>	<u>Population needed to support one business</u>	<u>Population needed to support 2 businesses</u>
Drinking places (alcohol)	224	431
Eating places	212	344
Gasoline service stations	605	773
Grocery stores	702	na
Farm & garden machinery & equipment	579	na
Farm supply	575	623
Hardware stores	1,167	1,774
Sporting goods stores & bicycle shops	836	1,207
Lumber & building material stores	1,020	1,167
Home furniture	1,640	2,589
Radio, television, & consumer electronics	1,602	4,712
Florists	1,287	na
Drug stores	1,022	2,141
Family clothing stores	1,928	na
Department stores	2,606	na
Variety stores	2,324	5,061

Source: Coon & Leistritz, 2002, *Threshold Population Levels for Rural Retail Businesses in North Dakota*

Hierarchy of Communities

1. Convenience

- a) Hamlet – Gasoline c-store, eating/drinking place
- b) Minimum Convenience – add grocery, drug, hardware, bank
- c) Full Convenience – add garage/auto dealer, variety store, clothing, dry cleaning, mortuary, lumber, motel, jewelry, farm supply

2. Specialty

- a) Partial Shopping – add plumber, florist, paint/glass, sports, etc
- b) Complete Shopping – add tires, antiques, camera, music, etc

3. Wholesale

- a) Secondary Wholesale – 50 establishments
- b) Primary Wholesale – 100 establishments
- c) Metropolitan Wholesale – 500 establishments

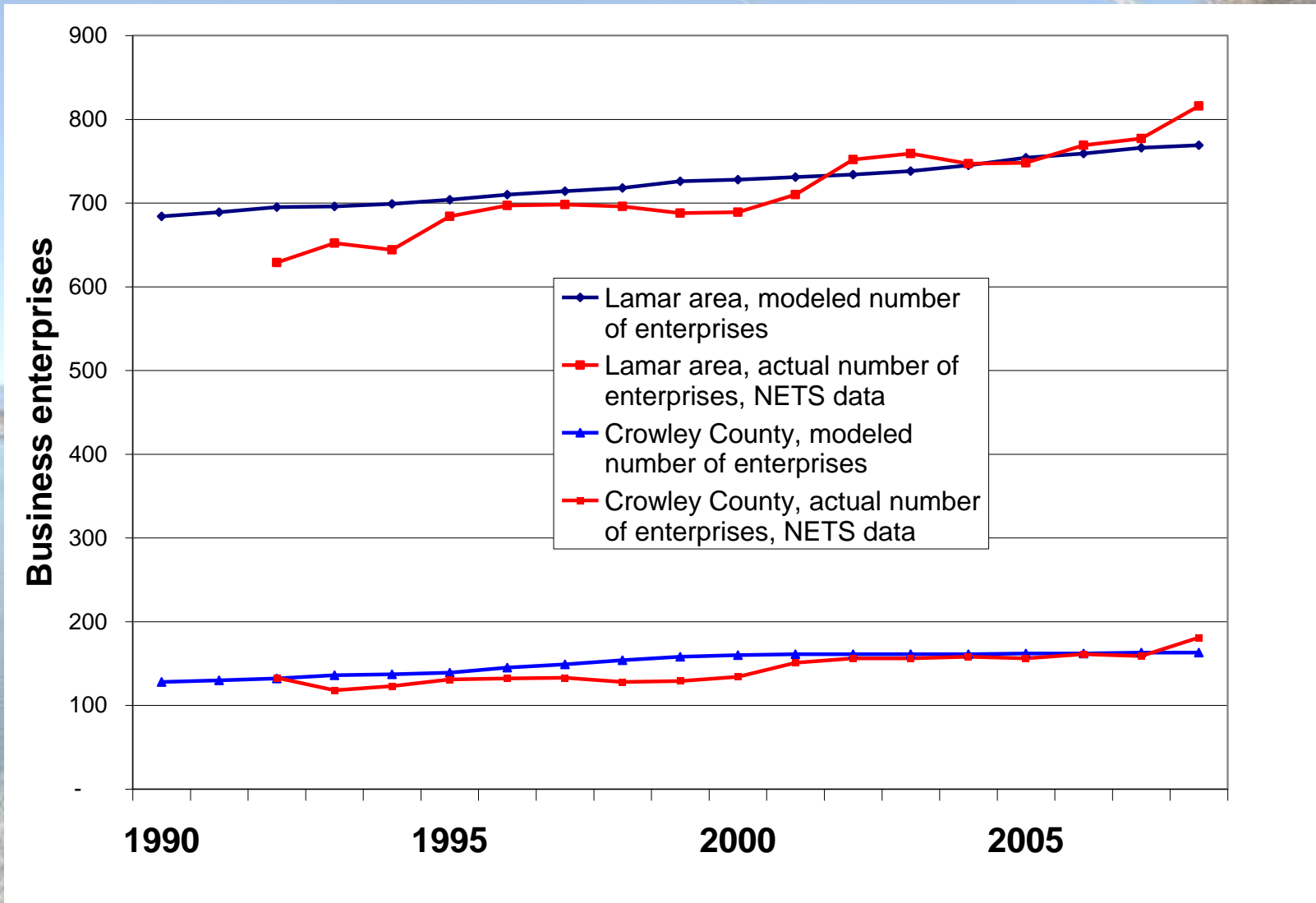
Weaknesses of Current Analysis Tools

- 1. Lumpiness of Businesses** – assumes economic activity can be smoothly dialed up or down (universal scalability).
- 2. Fixed Technology** – ignores changes in technology and economic trends, e.g. retail trend to “big box stores,” increasing farm and irrigation efficiency, etc.
- 3. Mobile Labor Assumption** – ignores community loyalty, retirement, etc.

Theoretical Foundation

- The number of businesses in a community, by type, depends on:
 1. Local population
 2. The distance to the next nearest population center
- These relationships have been statistically estimated
- We found a good data source in the National Establishment Times Series, Edward Lowe Foundation

Estimated number of businesses vs. actual number



Assumptions to Implement Threshold Approach

- There are two rounds of economic impacts from out-of-region water transfers
 - **Round 1:** initial direct impact, measured by economic multipliers
 - **Round 2:** cumulative impact resulting from Round 1 impacts plus “threshold” effects

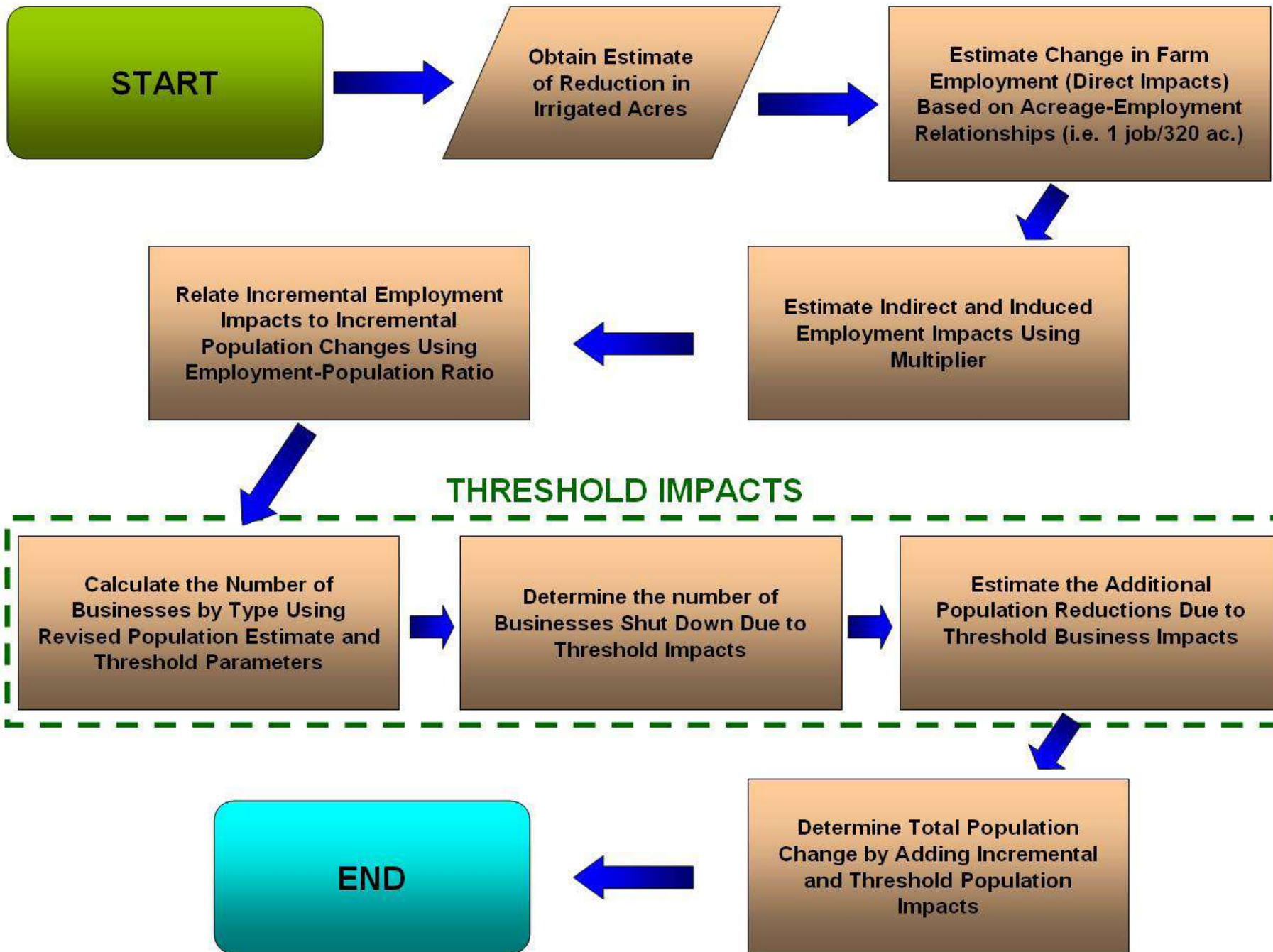
Round 1 Impacts:

Relationships between three key variables

- 1. Irrigated acreage and farm employment**
- 2. Farm employment and regional employment**
 - This is where I-O models stop
- 3. Regional employment and regional population**
 - This is a critical relationship!

Round 2 impacts: Population change and Population-Business Thresholds

- Population change from Round 1 determines how many businesses are affected by threshold effects
- Threshold effects lead to business closures, est. by type and the number of employees affected for each
- Job loss and population reduction from threshold effect comprise the Round 2 impact

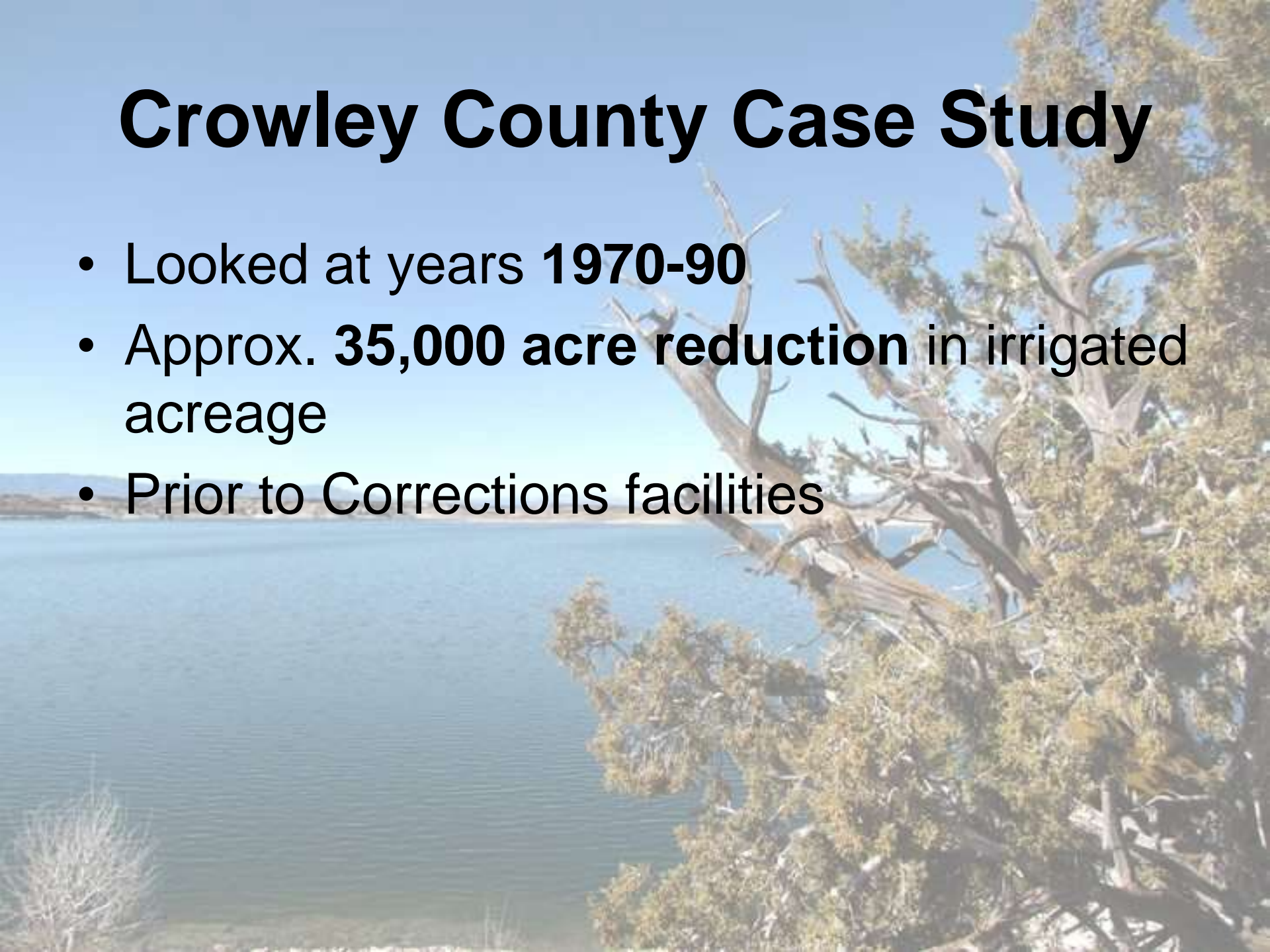


Case Studies

- To see if the new approach “hangs together”
- Many simplifying assumptions
- Considered reductions in nearby irrigated acreage
 - Crowley County, looking back
 - Lamar area, looking forward

Crowley County Case Study

- Looked at years **1970-90**
- Approx. **35,000 acre reduction** in irrigated acreage
- Prior to Corrections facilities



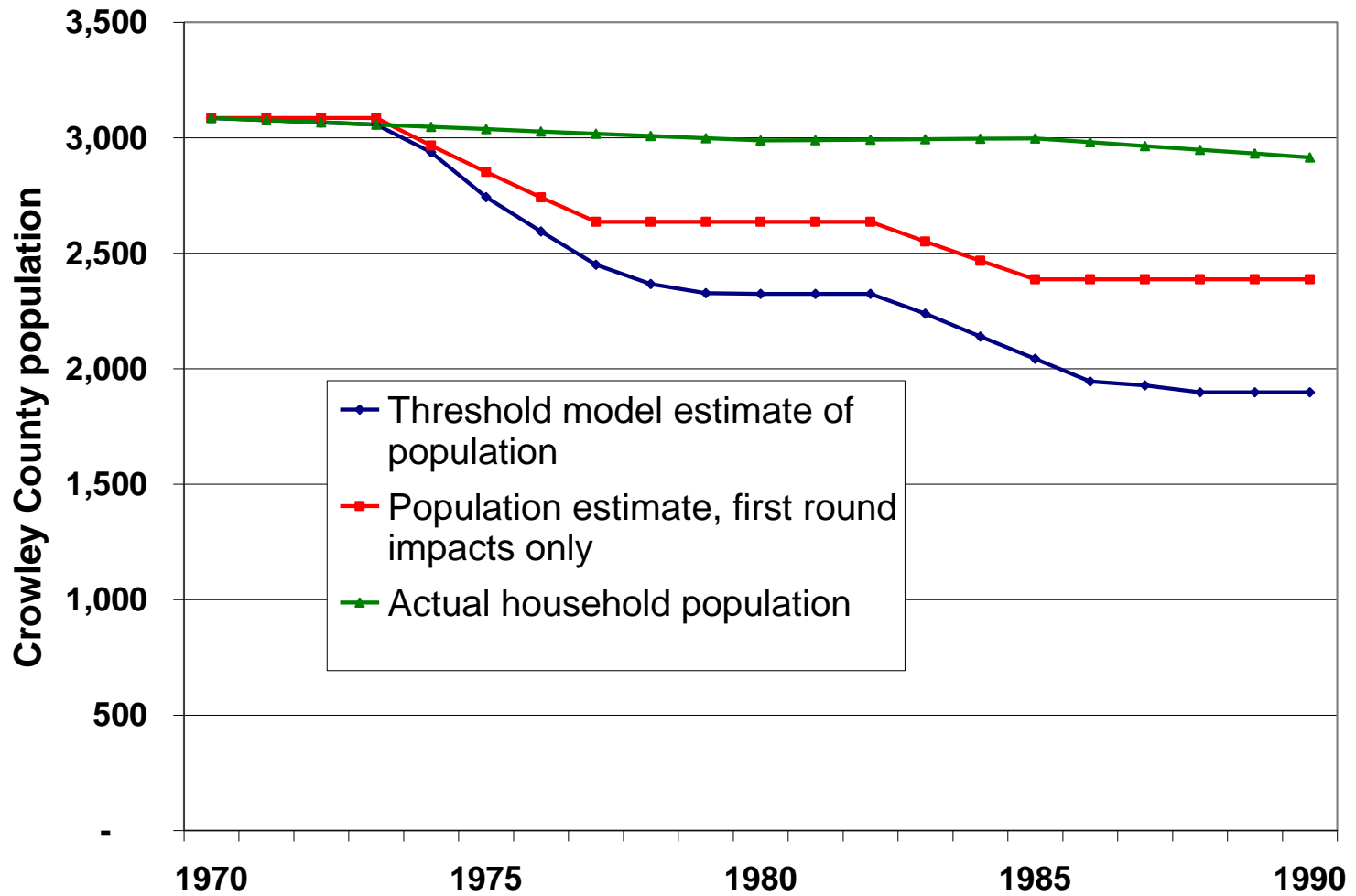
Initial Assumptions

- **Acres/Employee Ratio:** One farm employee is equivalent to 240-320 irrigated acres (increases over time from 1970-90)
- **Total employment multiplier** is assumed to be 2.0: one farm job and one support job
- **Employment-population** ratio was initially set at 0.57

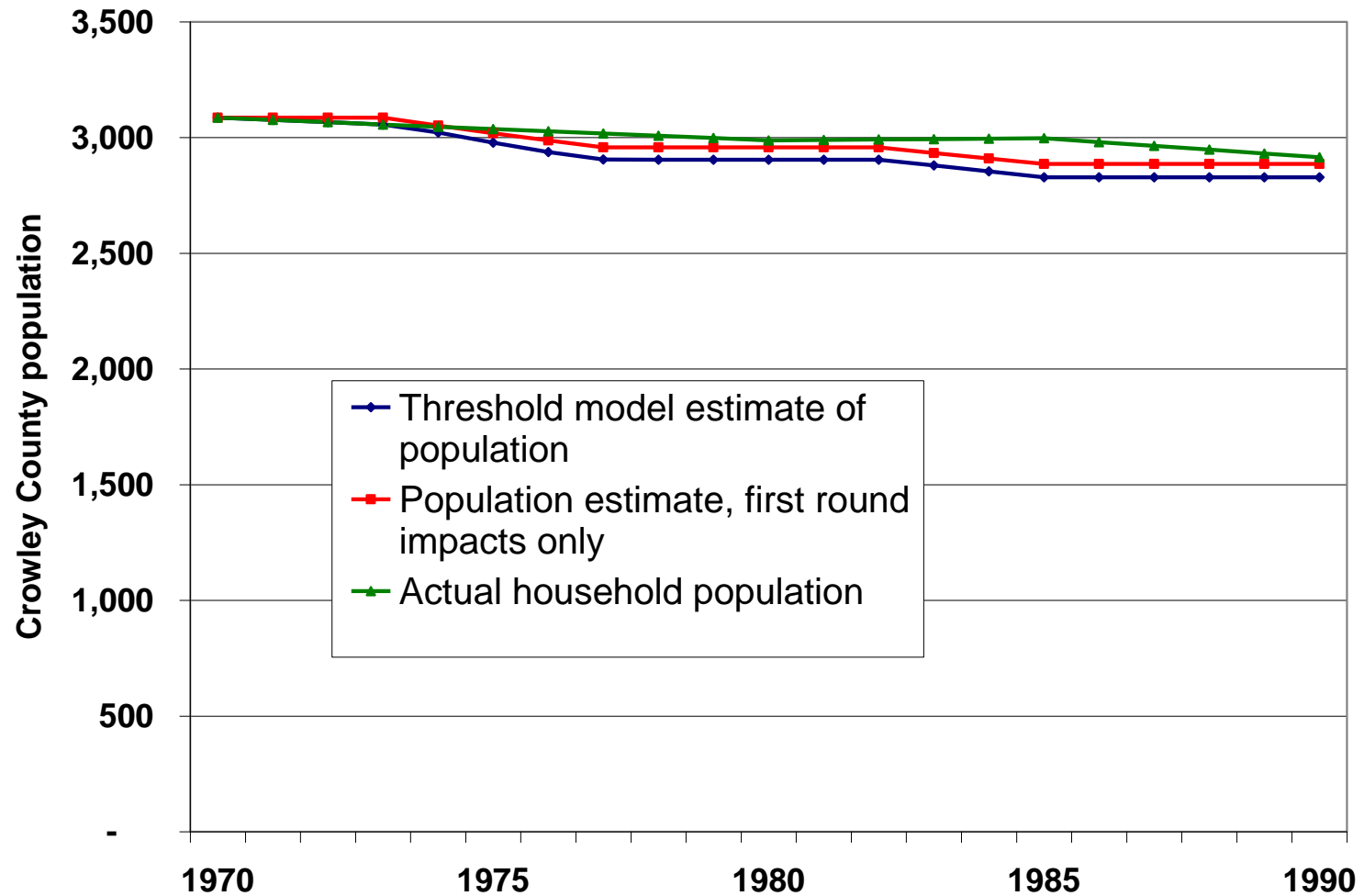
The employment-population relationship is complex

- **Labor immobility**, due to loyalty and low cost-of-living
- **County demographics**
- **Commuted elsewhere** rather than move
- **Pass-through tourism**
- **Community diversification responses**
- **Low cost rural start-ups**

Initial Results



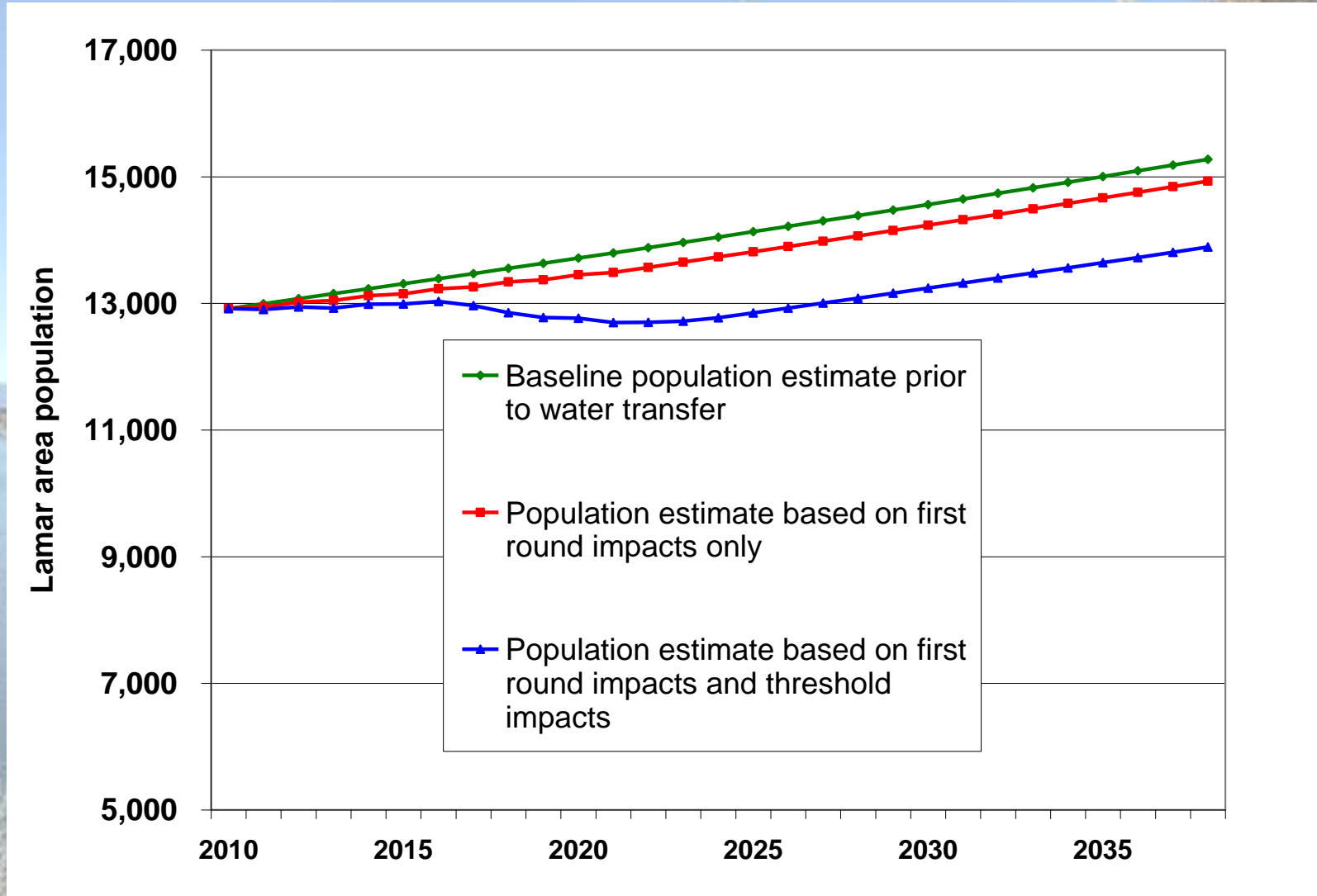
After adjusting the employment-population ratio



Lamar Area Case Study

- Assumes **30,000 acre-feet reduction** in irrigated acreage over next 10 years, with water transferred out of region
- Looked at Lamar trade area, inc. Lamar and areas east of John Martin Reservoir
- Baseline community population growth rate is 0.60% per year

Worst Case Scenario, based on average employment-population



Conclusions

- 1. Rural community economic impacts may be greater than previously estimated**
- 2. The more rural and isolated the community, the greater the impact**
- 3. Model is relatively simple and transferrable**

Conclusions, cont'd

- 5. More work is needed on the employment-population relationships**
- 6. The database used here also includes business revenue data**
 - We can also estimate impacts to local tax base
 - We could attempt to base thresholds on business revenue loss rather than population

Policy Implications

- Relatively higher adverse impacts to rural communities may require **re-evaluation of buy-and-dry transfer strategies**
- **Water storage projects** may be relatively more appealing than ag transfers
- A better way to compare **ag-urban water transfer strategies**, such as Super-Ditch
- Possible way to “work in reverse” to **examine rural development strategies**, such as increasing local value-added

Next steps

- Phase 2 is nearing it's end
 - Estimated thresholds unique to the Lower Arkansas Valley
 - Soliciting your input
 - Re-examining employment-population relationships

We welcome your Feedback!

- 1. Does this approach make sense to you?*
- 2. Does it resonate with your own experience?*
- 3. Do you believe community impacts of “buy-and-dry” water right transfers are larger than commonly reported?*
- 4. Are there other factors we ought to consider?*

Feedback Continued

5. *Should this approach be used in other watersheds?*
6. *Should this approach be used to estimate community impacts of other positive and negative economic shocks?*



Thank You

Honey Creek Resources Team

George.Oamek@HoneyCreekResources.com

712-545-9187