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Southern Agricultural Economics Association

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Agricultural Reclaimed Water in Florida

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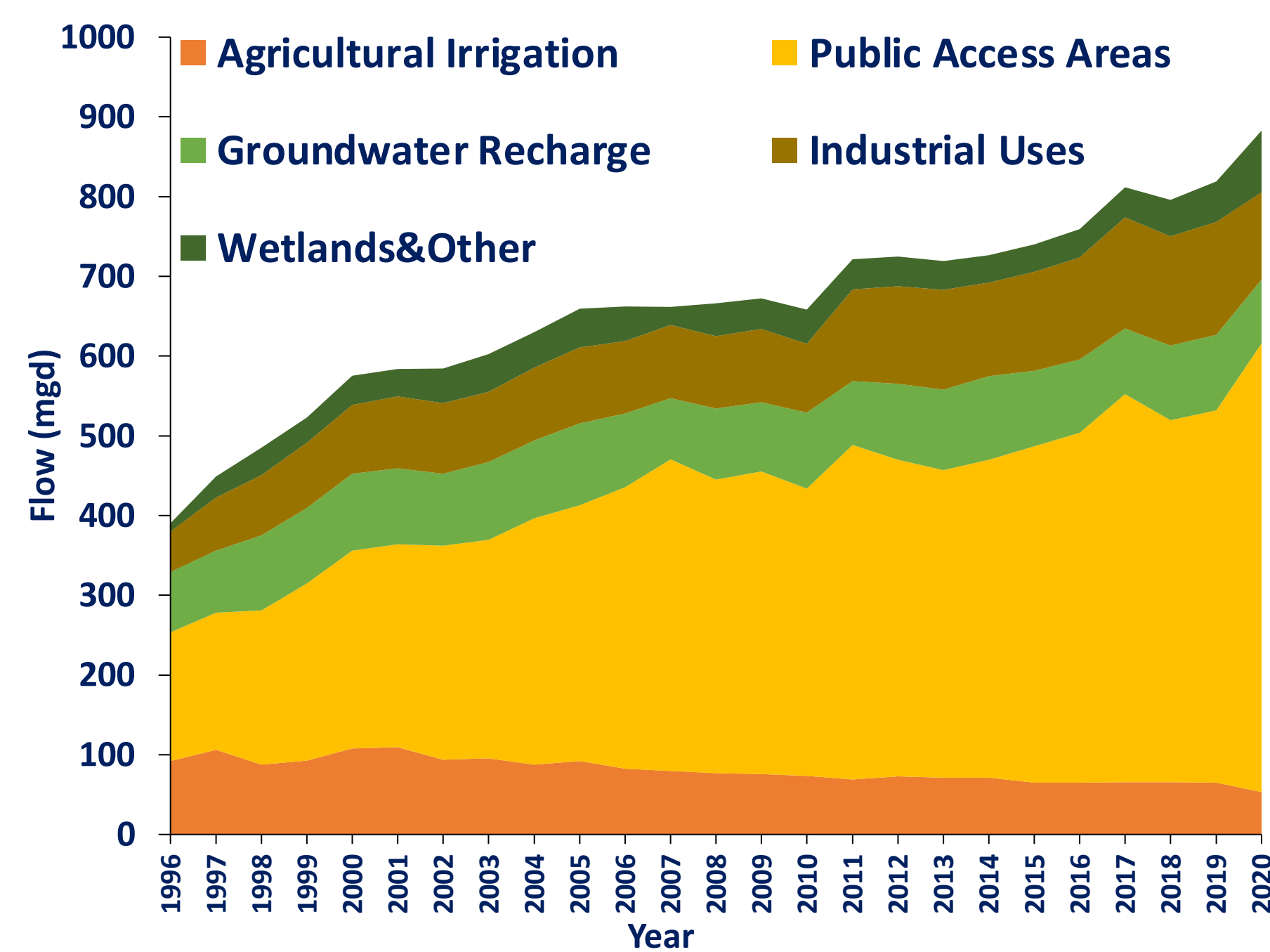
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1. Introduction

- Freshwater demand has been increasing globally.
- Reclaimed water, i.e., reuse water could save water.
- Agricultural water accounts the most (40%) of water withdraw in Florida, where citrus is a dominant crop.
- Improving reclaimed water use for agricultural is important for water saving.

2. Motivation

Fig.1 Reuse water flow for different type of use



- Florida is the largest user and producer of reclaimed water in the United States.
- Total use of reclaimed water in all areas of life in Florida has been increasing, expect for agricultural irrigation.
- Little is known about what drives this decline.

2. Objective

- Evaluate the reclaimed water use for agricultural in Florida.
- Estimate factor effect on reclaimed agricultural water use.

3. Methods and Data

Data

25-year of annual reuse water inventory reports (FEDP,1996-2020), including reuse water flow for different type (agricultural use, public access, etc.) at county level.

25-year of annual citrus statistic reports(NASS-USDA).

Dataset of water use data for Florida since 1985 (USGS).

Methods

Spatial analyze of neighboring counties with high and low usage of fresh water, reclaimed water in agriculture and other areas.

Linear regression and time series models to identify major drivers of reclaimed water use in Florida agriculture.

$$Flow_t = citrus\ prod_t + land_t + income_t + irri_cost_t$$

$T=1996,1997,\dots,2020$

$Citrus\ prod$ =citrus production per acre

$Flow$ =reclaimed water use for agriculture

$Land$ =Total farmland acreage

$Income$ =Net farm Income per acre

$Irri_cost$ =irrigation cost, use energy cost of irrigation as proxy

4. Results

Fig.2. Spatial map of agricultural irrigation and citrus production

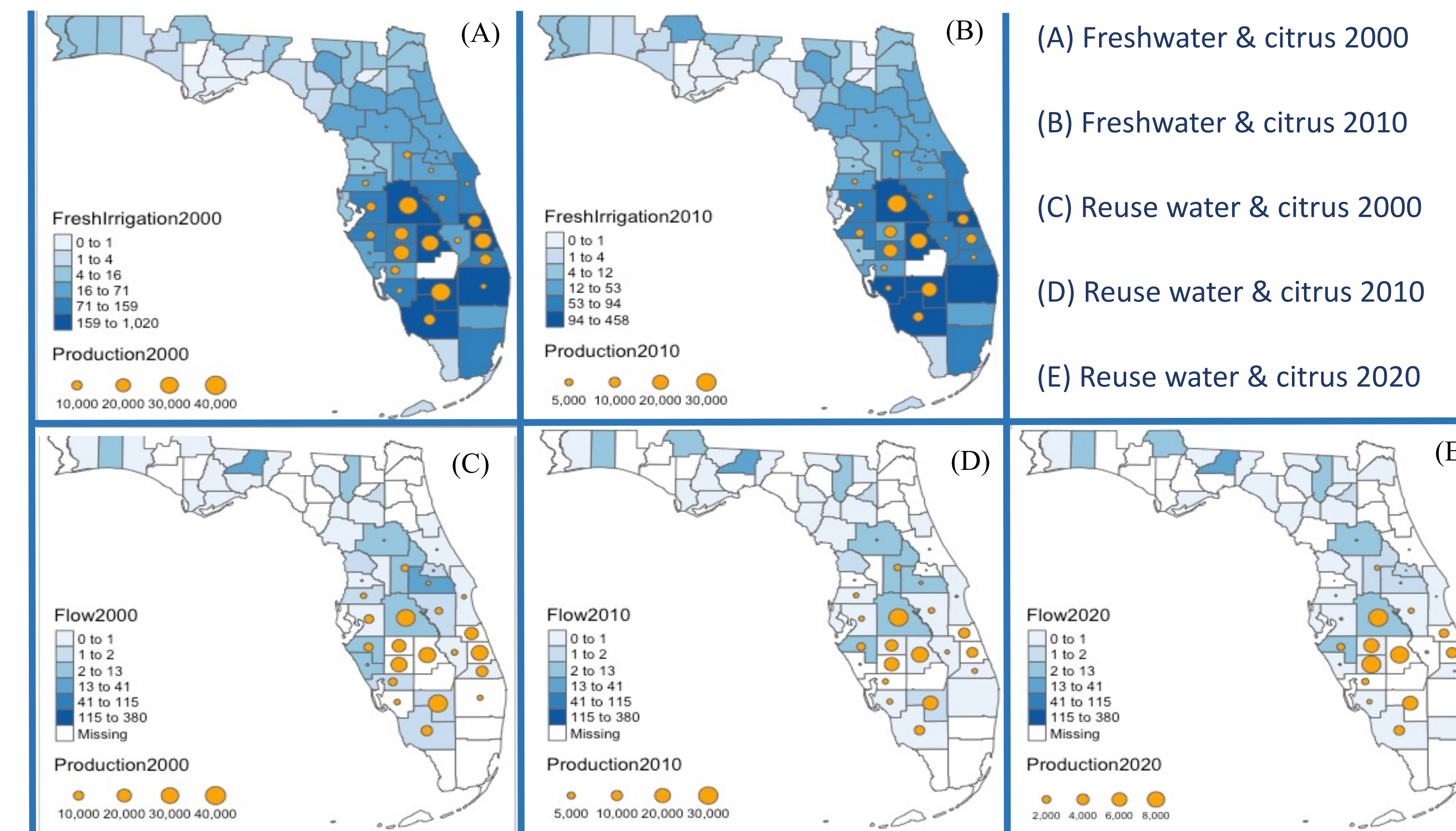


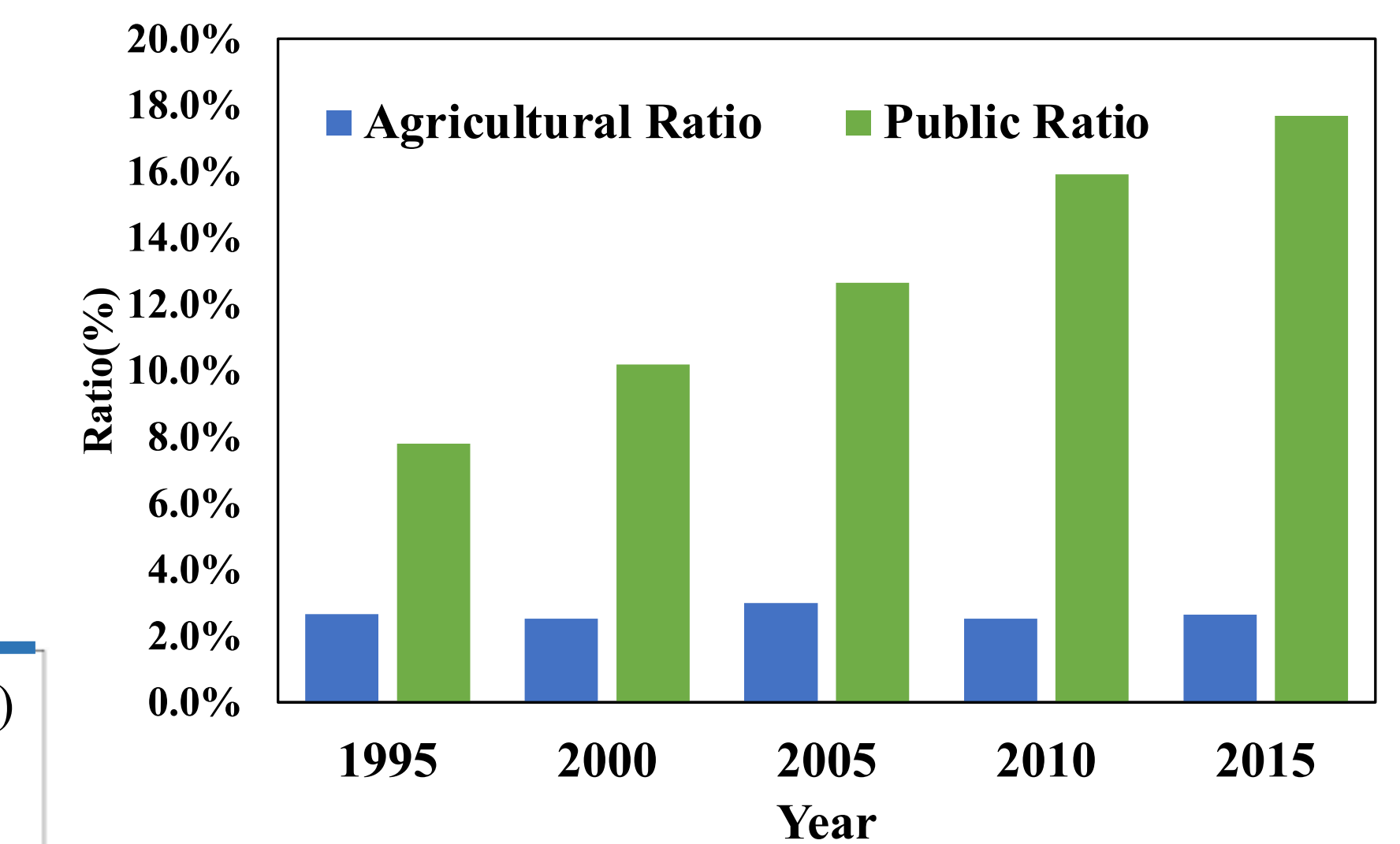
Table1. Estimate of factor effect response to agricultural reuse water usage

	Estimate	Standard Error	t value	Pr(> t)
Intercept	-101.000 *	52.380	-1.927	0.069
Income	0.049	0.030	1.608	0.124
Citrus Prod.	0.101 ***	0.020	4.980	<0.0001
land	0.013 **	0.005	2.732	0.013
Irri_cost	0.352	1.065	0.330	0.745

5. Conclusion

- Reclaimed water use accounts only less than 5% of Florida's agricultural irrigation withdrawing from freshwater. There is a massive potential for reclaimed water use for agricultural irrigation to improve in Florida.
- Urban pressure and reduction of citrus production due to citrus greening were significantly decrease the demand of agricultural irrigation, including the demand of reuse water in agricultural irrigation.

Fig.3 Ratio of reuse water over freshwater in agricultural and public area



- Freshwater Irrigation is highly correlated with citrus production
- Both citrus production and irrigation declined from 2000-2010
- Reclaimed water usage in neighboring counties are close to each other
- The ratio of reclaimed water use in total agricultural irrigation is stable
- The ratio of reclaimed water use in total public use is increasing