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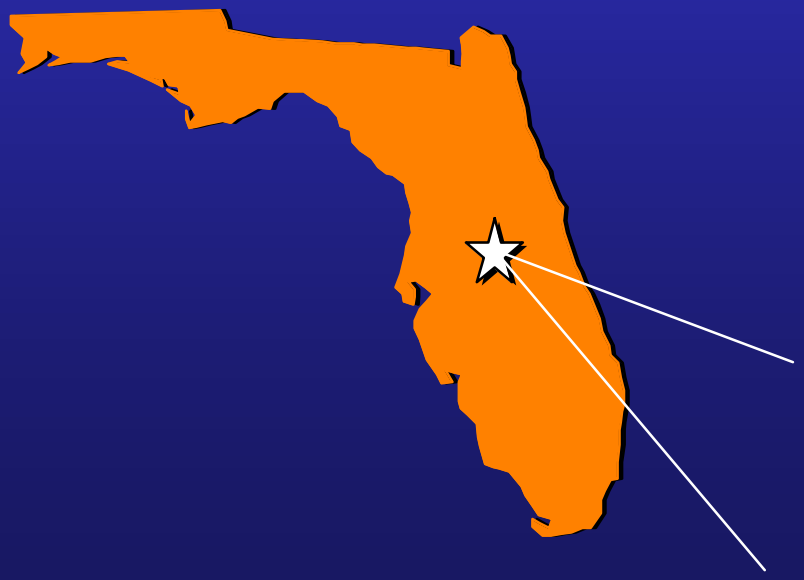
Institute of Food and Agricultural Sciences

Changing Trends in Reclaimed Water Use in Florida



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Lake Alfred, FL

Reclaimed Water

- Highly treated wastewater
- Can act as a good source of water for irrigation and other purposes
- Has been known about for many years
- Became more widely used in the 1980’s and 1990’s
- Florida is one of the largest users of reclaimed water in the U.S.

Reclaimed Water ~ Why in Florida?

- Florida's annual rainfall = 50+ Inches
- Sandy soils – poor water holding capacity
- Summer rainy season, dry winter and spring
- Rain does not always come when you want it ~ Periodic droughts

Reclaimed Water ~ Why in Florida?

- Rapid population growth ~ 16+ million
- 4th largest state in population
- 80% of population is within 20 miles of the coast
- Groundwater pumping near coast can lead to saltwater intrusion

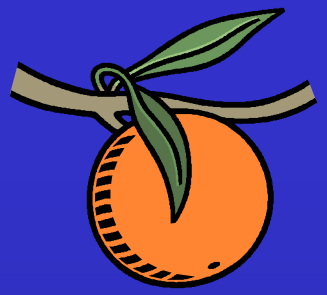
Water Reuse (mdg)

	1998	2004
Florida	490	630
Texas	160	-

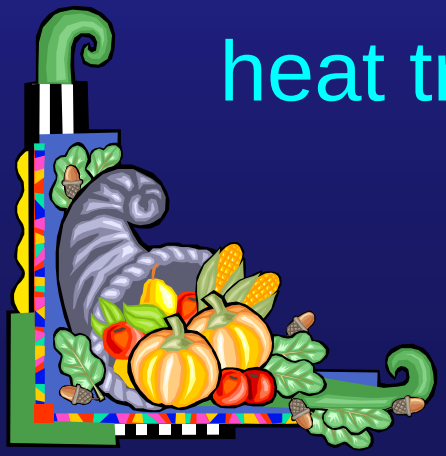
Reclaimed Water ~ History

- Disposal = Main goal in 1980's and early 90's
- Offered at no cost to growers to encourage use
- Gradual acceptance and increased usage in 1990's
- Drought in 2000 and 2001 created greater demand and general acceptance

Reclaimed Water



- Edible crops & golf courses ~ secondary effluent treatment, filtration, and high level disinfection (chlorination) required
- Edible crops irrigated with RW must be cooked, peeled, or thermally processed
- Salad crops (e.g. lettuce) that are not heat treated cannot be irrigated with RW



Reclaimed Water ~ History

- Use in Florida has increased greatly in past 15 years
- Several large projects started in the 1980's
  - Orlando Area ~ Water Conserv II

Reclaimed Water ~ Conserv II

- Growers initially refused to take reclaimed water from city

- Concerns about
  - Possible Flooding
  - Heavy Metals
  - Health & Safety
  - Image (“Yuck Factor”)

Objectives

- Describe trends in reclaimed water usage in Florida

- Discuss changes in different sector use of reclaimed water

Methods

- Data was collected from the Florida Dept. of Environmental Protection from 1986 – 2004
- Changing trends in water reuse in flow (mgd) and land area (acres) are reported

Florida Reuse Inventory

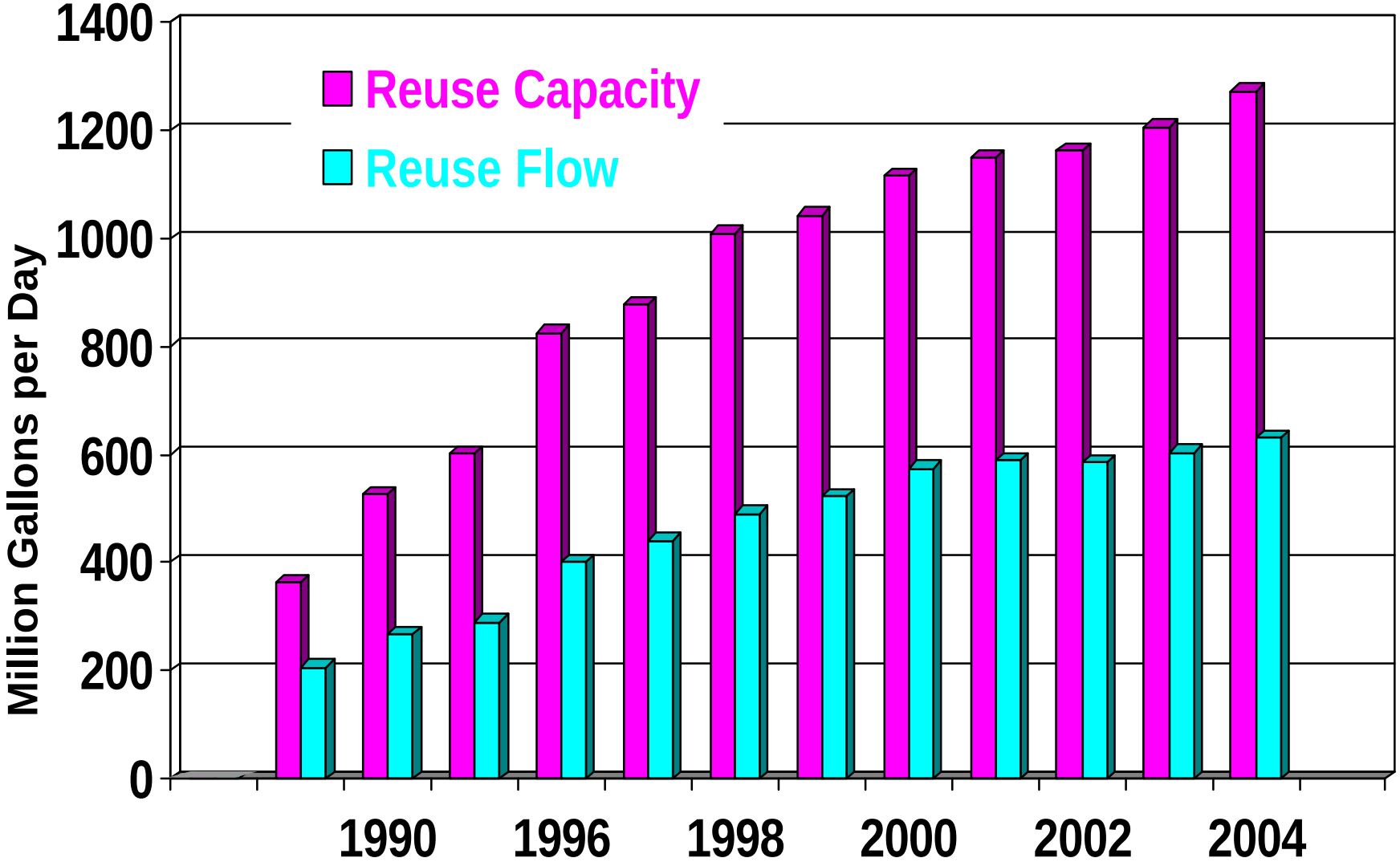


Fig. 1. **Change in reuse capacity and flow**

Reclaimed Water

- Reuse capacity – Increased 252% (1986-2004)
- Reuse flow – Increased 206% (1986-2004)

Agricultural Irrigation

- Agriculture was the largest user of RW in 1992, and was still a large user in 2004
- Agricultural use
  - Area increased 81% to 39,690 acres in 2004
  - Flow remained at 87 mgd in 2004
- From 1996 to 2004, acreage of edible crops irrigated with RW remained relatively constant around 15,000 acres
- Irrigation of other crops increased to 24,507 acres

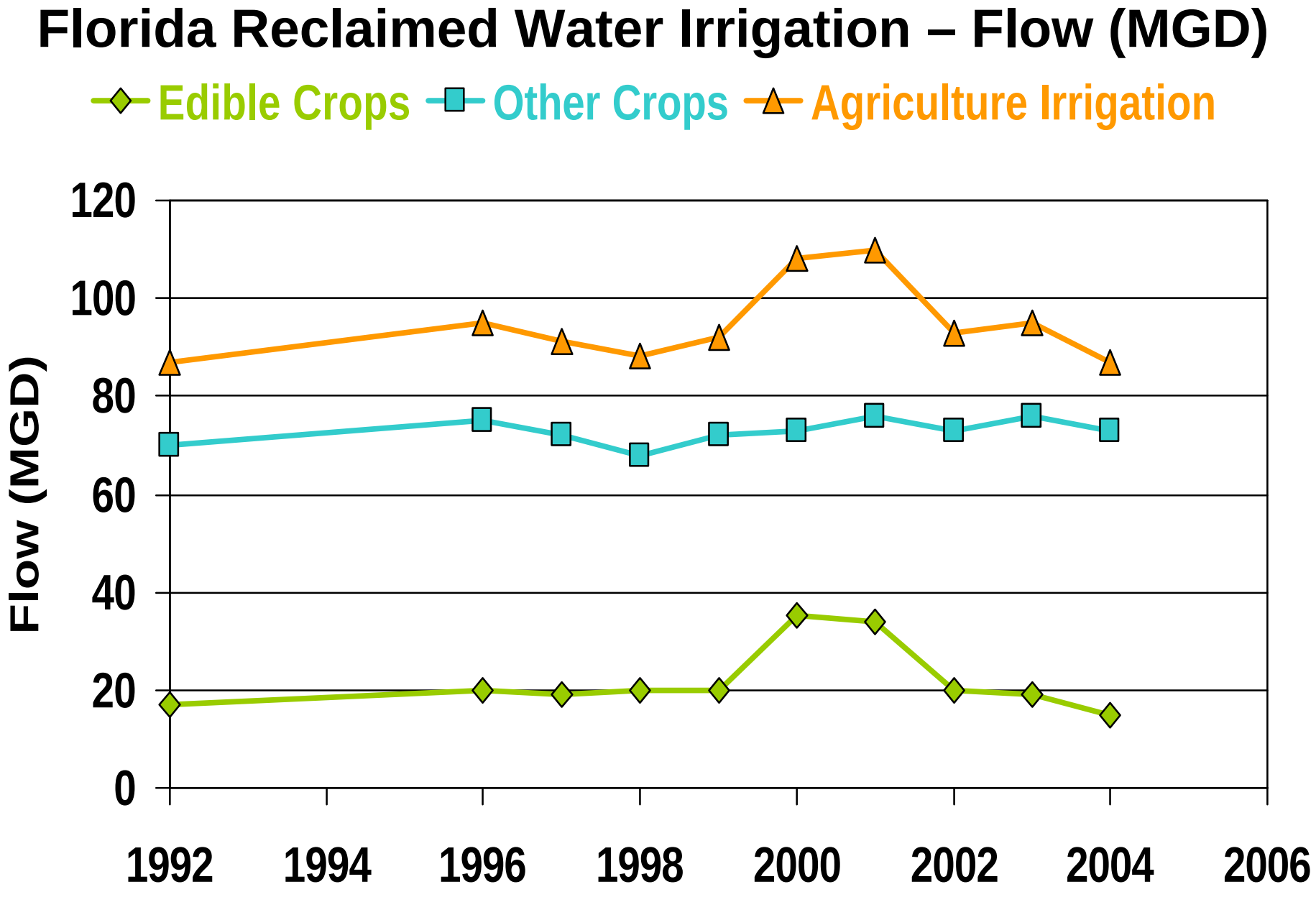


Fig. 3. **Change in agricultural reuse capacity and flow**

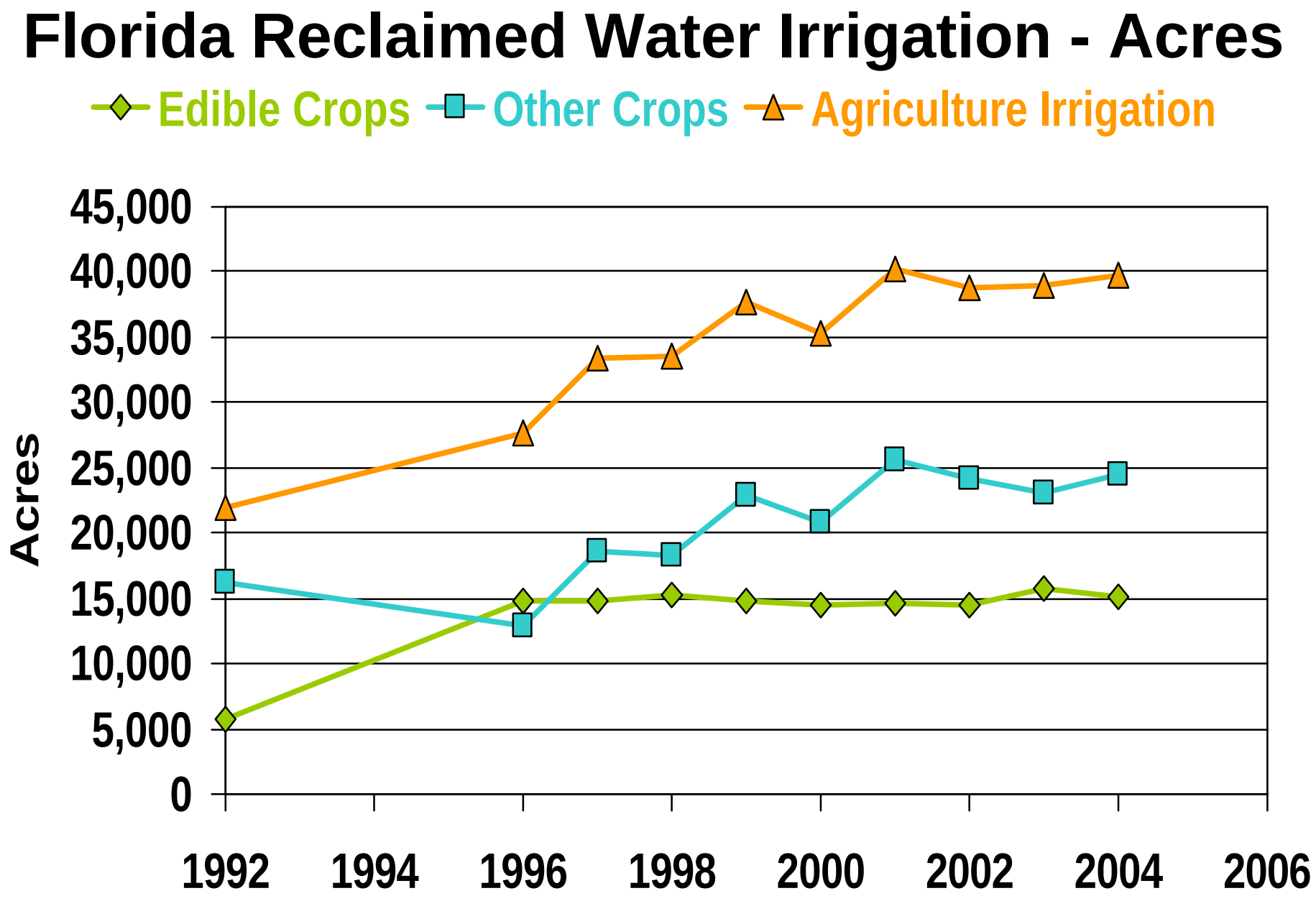


Fig. 2. **Change in agricultural reuse capacity and flow**

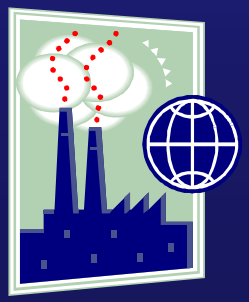
Other Uses

- Golf course irrigation

  - Next largest user of RW in 1992
  - Flow increased 74% to 113 mgd
  - Acreage increased 236% to 54,555 acres

- Other users

  - Residential flow increased over 454% to 133 mgd
  - Industrial flow increased 435% to 91 mgd
  - Ground water recharge increased 145% to 98 mgd



Florida Reclaimed Water Use - Flow

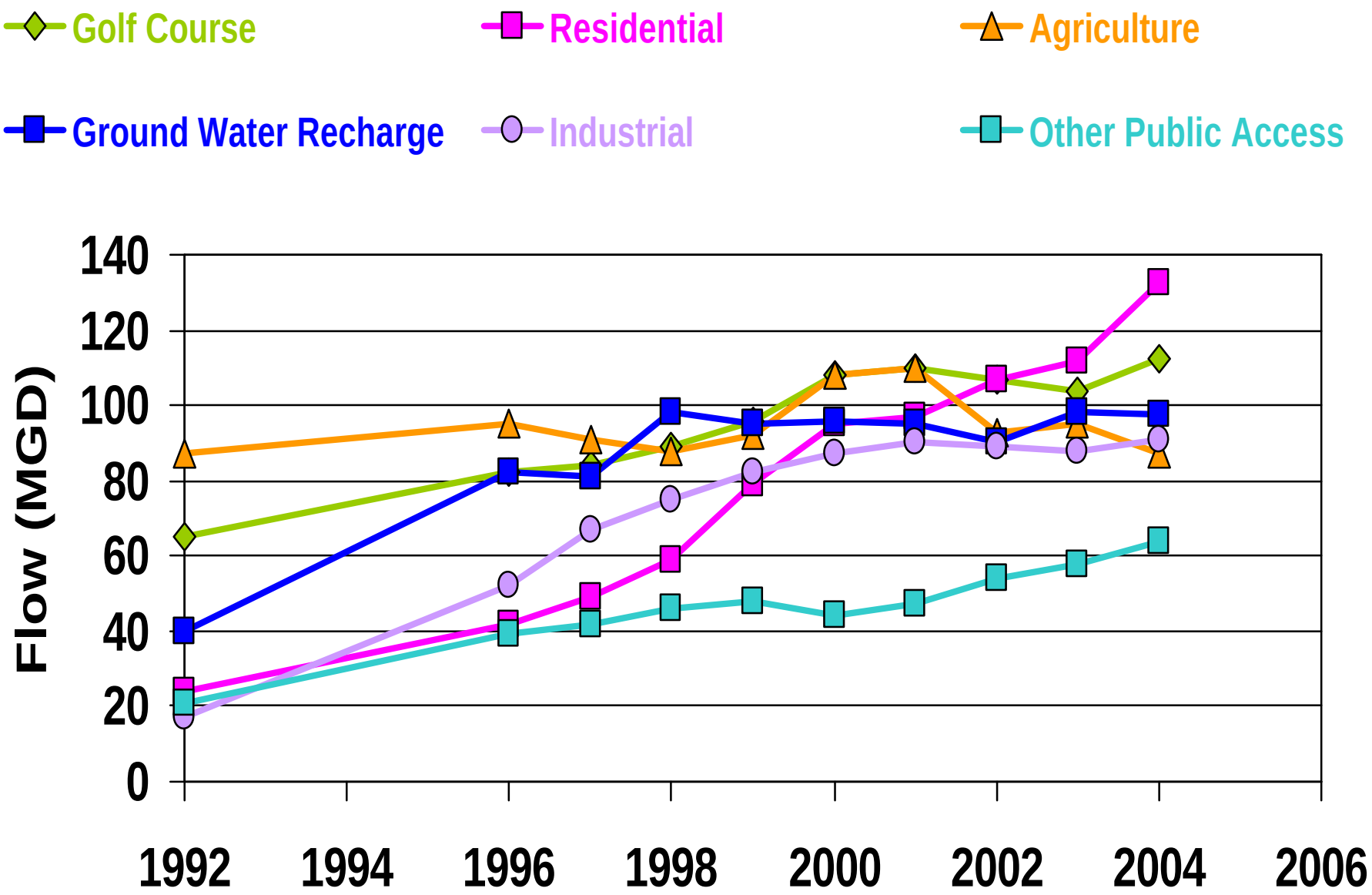


Fig. 4.

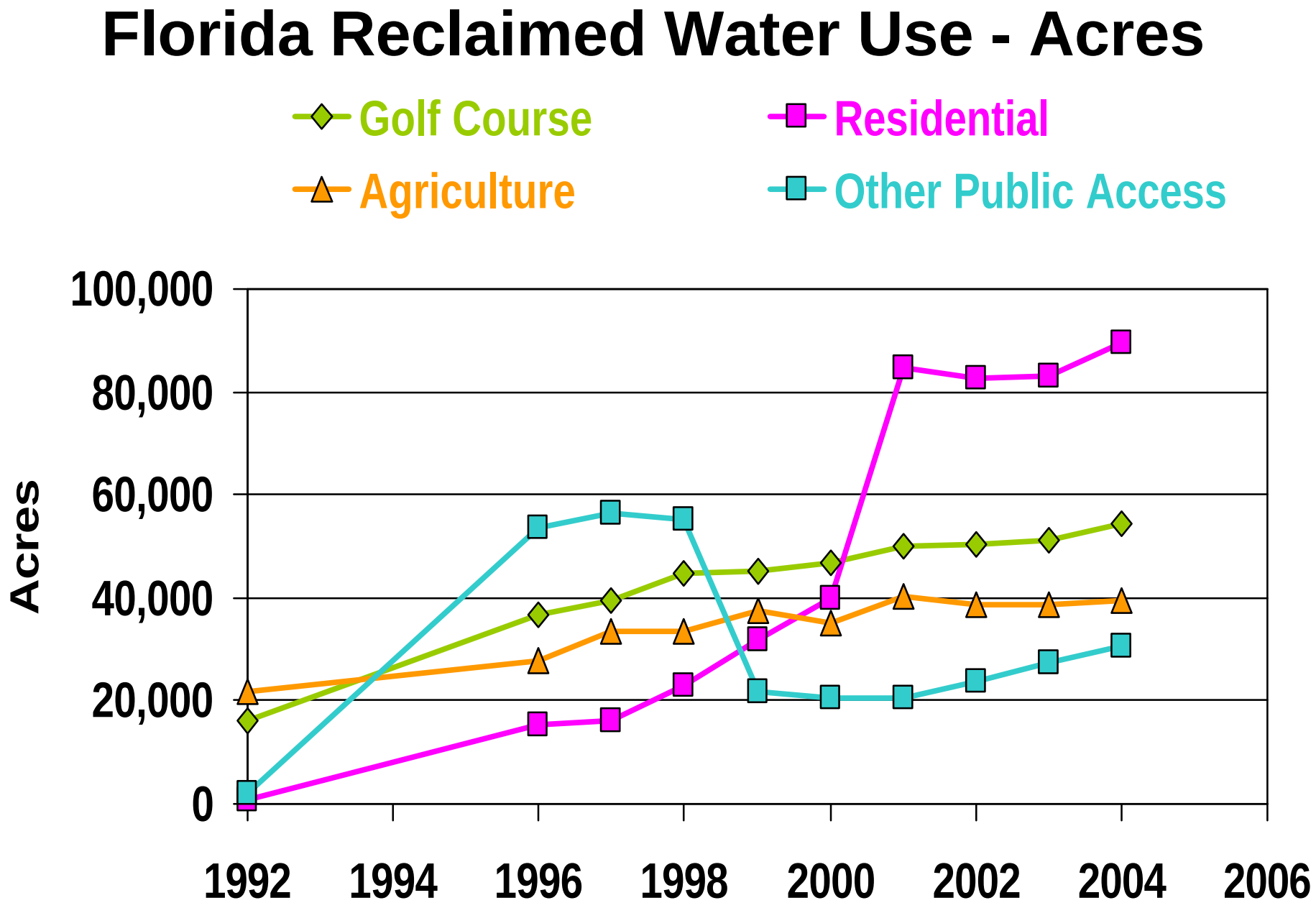

Florida Reclaimed Water Use - Acres
Golf Course
Residential
Agriculture
Other Public Access
Acres
100,000
80,000
60,000
40,000
20,000
0
1992
1994
1996
1998
2000
2002
2004
2006

Fig. 3.

Reclaimed Water Flow (MGD) 1992-2004

	% Change
Total Public Access	181
Golf Course	74
Residential	454
Other Public Access	205
Agricultural Irrigation	0
Edible Crops	-12
Other Crops	4
Ground Water Recharge	145
Industrial	435

Reclaimed Water - Acres 1992-2004

	% Change
Total Public Access	809
Golf Course	236
Residential	8855
Other Public Access	1426
Agricultural Irrigation	81
Edible Crops	168
Other Crops	50
Ground Water Recharge	150
Industrial	n/a

- Major increase in residential land irrigation of over 8000% to 89,547 acres = impressive
- Public has come to accept reclaimed water as an alternate irrigation source

Attitudes towards Reclaimed Water

- Early 1980's ~ RW = ***Disposal Problem***
  - Use lowest cost method for disposal (dump into nearby river, lake, ocean, or spray field)
  - Concerns over heavy metals, salts, odor, disease organisms
  - Given away for free to encourage use
- Safe use was demonstrated -- agricultural and urban acceptance increased
- Droughts in 2000 and 2001 created greater acceptance

- Other interests started competing with agriculture for use of this water
- Cities now consider charging agriculture for this water
- Growers = unhappy about paying for product which had been free
- Balancing act:
  - Supply and Demand
  - Disposal vs. beneficial use

Summary

- In less than 20 years, reclaimed water has changed from a urban disposal problem to a commodity of some value
- Residential, golf course, and industrial use of reclaimed water have greatly increased
- Florida agriculture, which used to benefit from free reclaimed water, may no longer be able to afford this water for irrigation

- Market and political forces will determine how reclaimed water will be distributed
- Reclaimed water still has to be disposed of in rainy periods, but shortages have developed during droughts
- Agriculture may have to pay for RW, use less water, or develop other water sources

- Some early contracts will start to expire in 2006
- Safety of reclaimed water is now established
- Reclaimed water now viewed as good, not bad
- Other entities are willing to pay for reclaimed water
- Local government officials have changed

- Growers no longer have leverage they had in 1980's
- Agriculture initially will be charged $0.11 per 1000 gallons (~ $3.00/acre inch)
- Price will rise to $0.19 per 1000 gallons (~ $5.16/acre inch)
- Growers have to decide if it is more cost effective to pay for RW or reactivate old wells

- Is **Reclaimed Water** the Wave of the Future in Florida
- Answer is **YES**

Summary

- Image of reclaimed water has changed greatly in 20 years
- Used to be disposal problem
- Now a product in demand
- Florida agriculture helped reclaimed water gain acceptance
- Now agriculture will have to pay for reclaimed water

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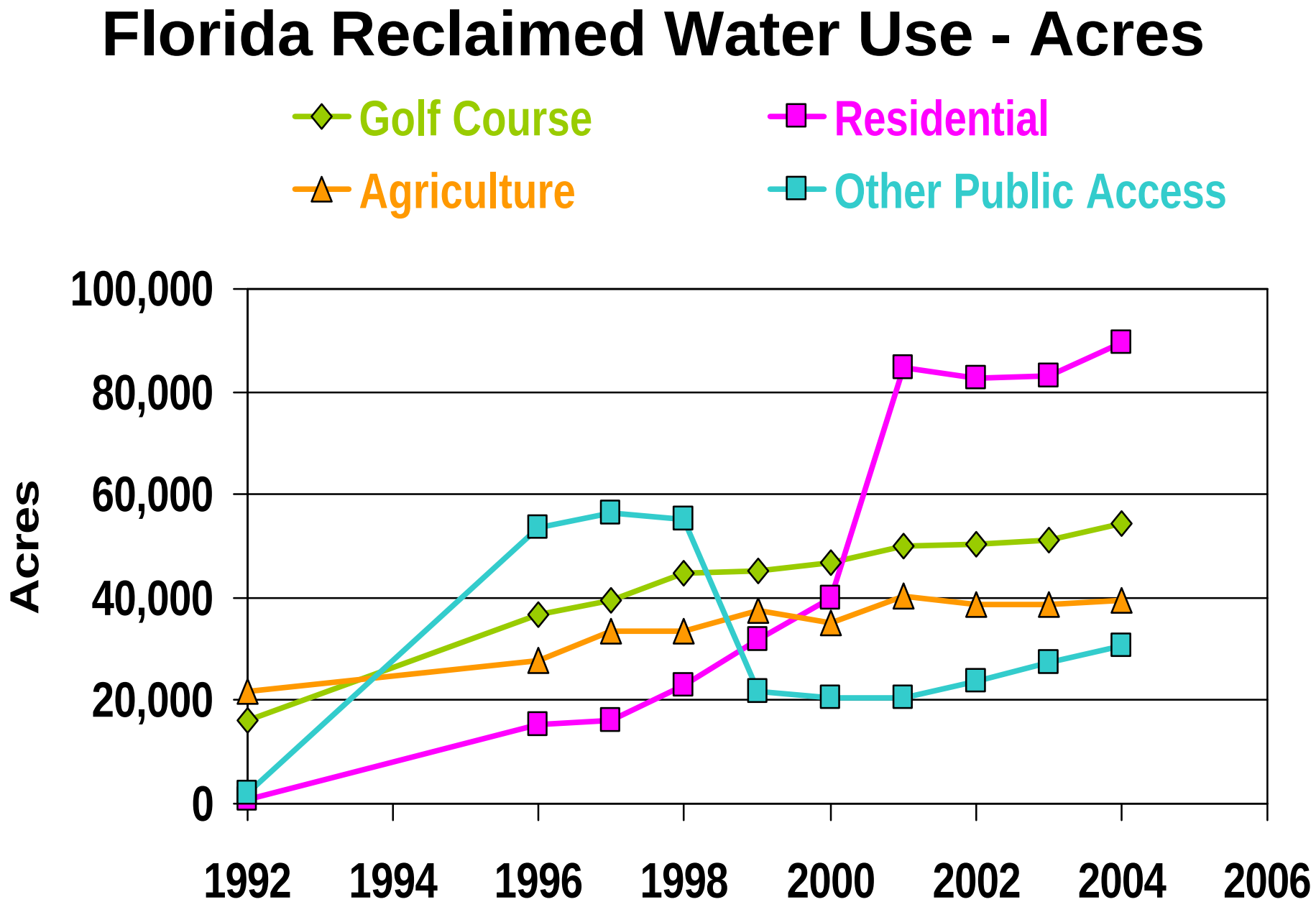
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Other Public Access
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100,000
80,000
60,000
40,000
20,000
0
1992
1994
1996
1998
2000
2002
2004
2006

Fig. 3.

Water Reuse (mdg)

	1998	2004
Florida	490	630
California	-	1070
Texas	160	160

Percent Change From Flow

	Flow (MGD) 92-03
Total Public Access	149%
Golf Course	60%
Residential	367%
Other Public Access	176%
Agriculture	9%
Edible Crops	12%
Other Crops	9%
Ground Water Recharge	145%
Industrial	418%

Percent Change From Acres

	Area (Acres) 92-03
Total Public Access	743%
Golf Course	217%
Residential	8214%
Other Public Access	1272%
Agriculture	77%
Edible Crops	179%
Other Crops	42%
Ground Water Recharge	151%
Industrial	n/a

Percent Change From Acres

	Area (Acres) 92-04
Total Public Access	809%
Golf Course	236%
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Percent Change From Flow

	Flow (MGD) 92-04
Total Public Access	181%
Golf Course	74%
Residential	454%
Other Public Access	205%
Agriculture	0%
Edible Crops	-12%
Other Crops	4%
Ground Water Recharge	145%
Industrial	435%

Reclaimed Water ~ Conserv II

- Growers initially refused to take reclaimed water from city

- Concerns about
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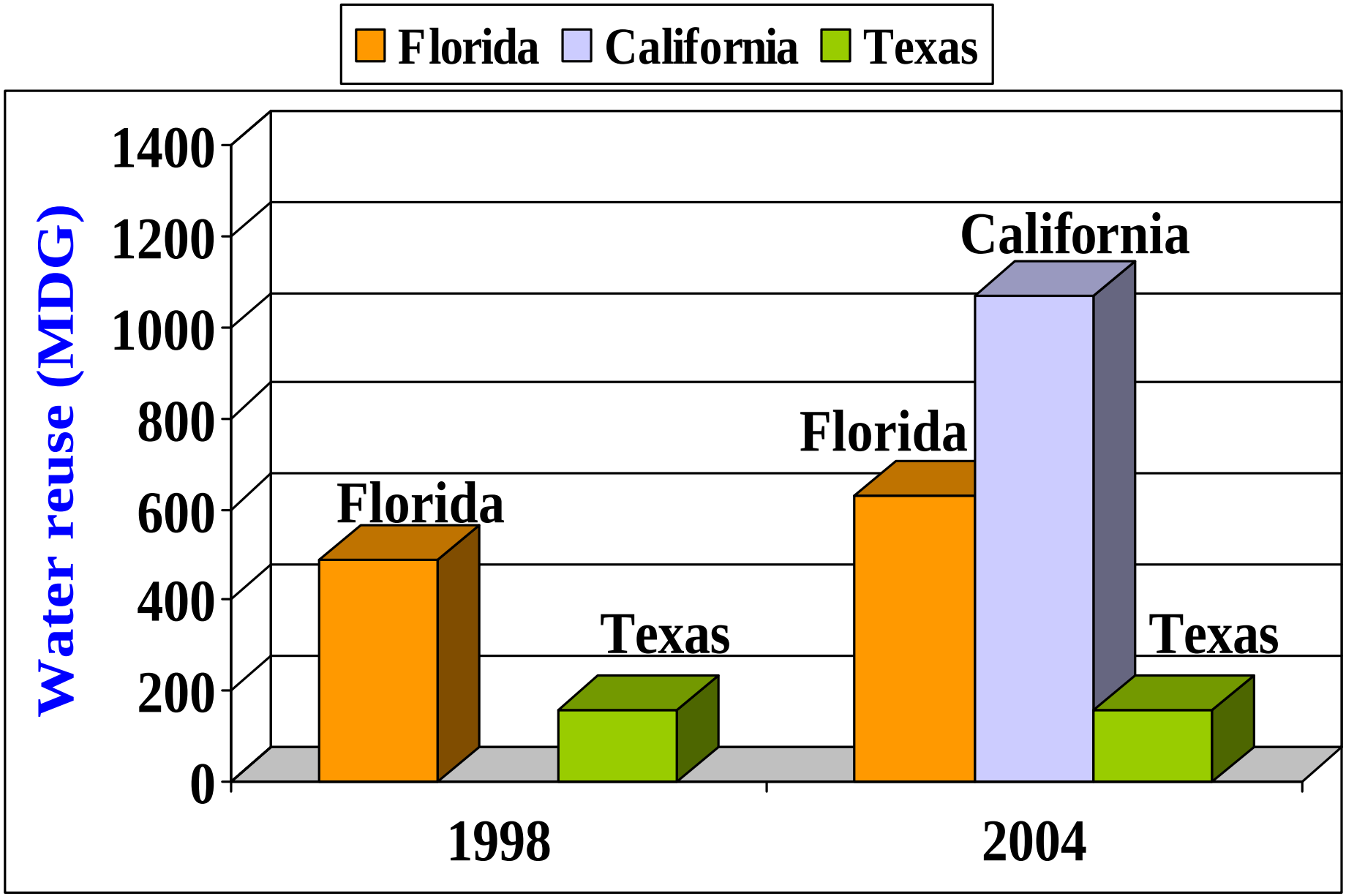
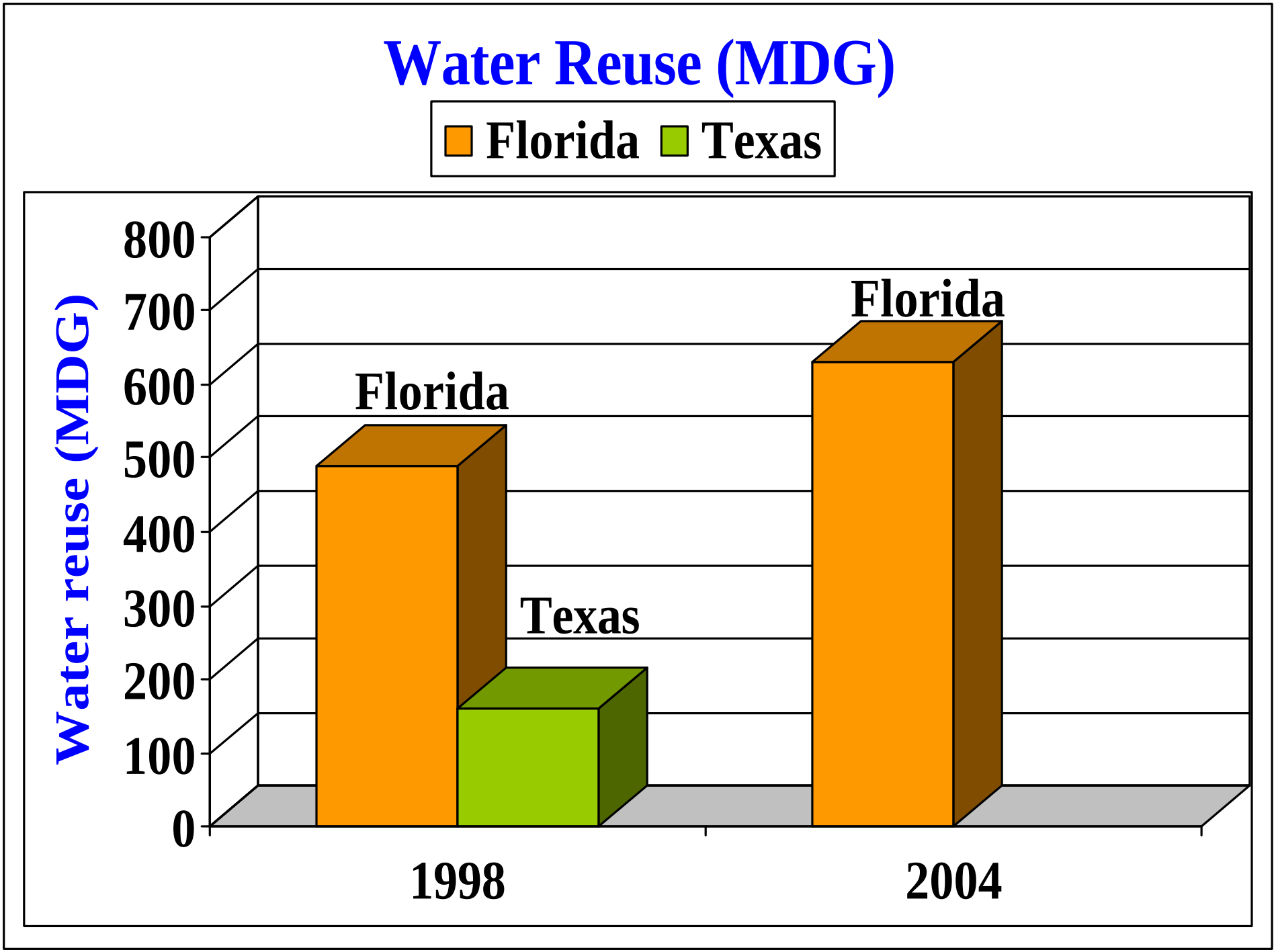
  - Health & Safety
  - Image (“Yuck Factor”)

Water Reuse (MDG)




Water Reuse (MDG)
Florida
Texas
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500
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300
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100
0
Florida
Texas
Florida
1998
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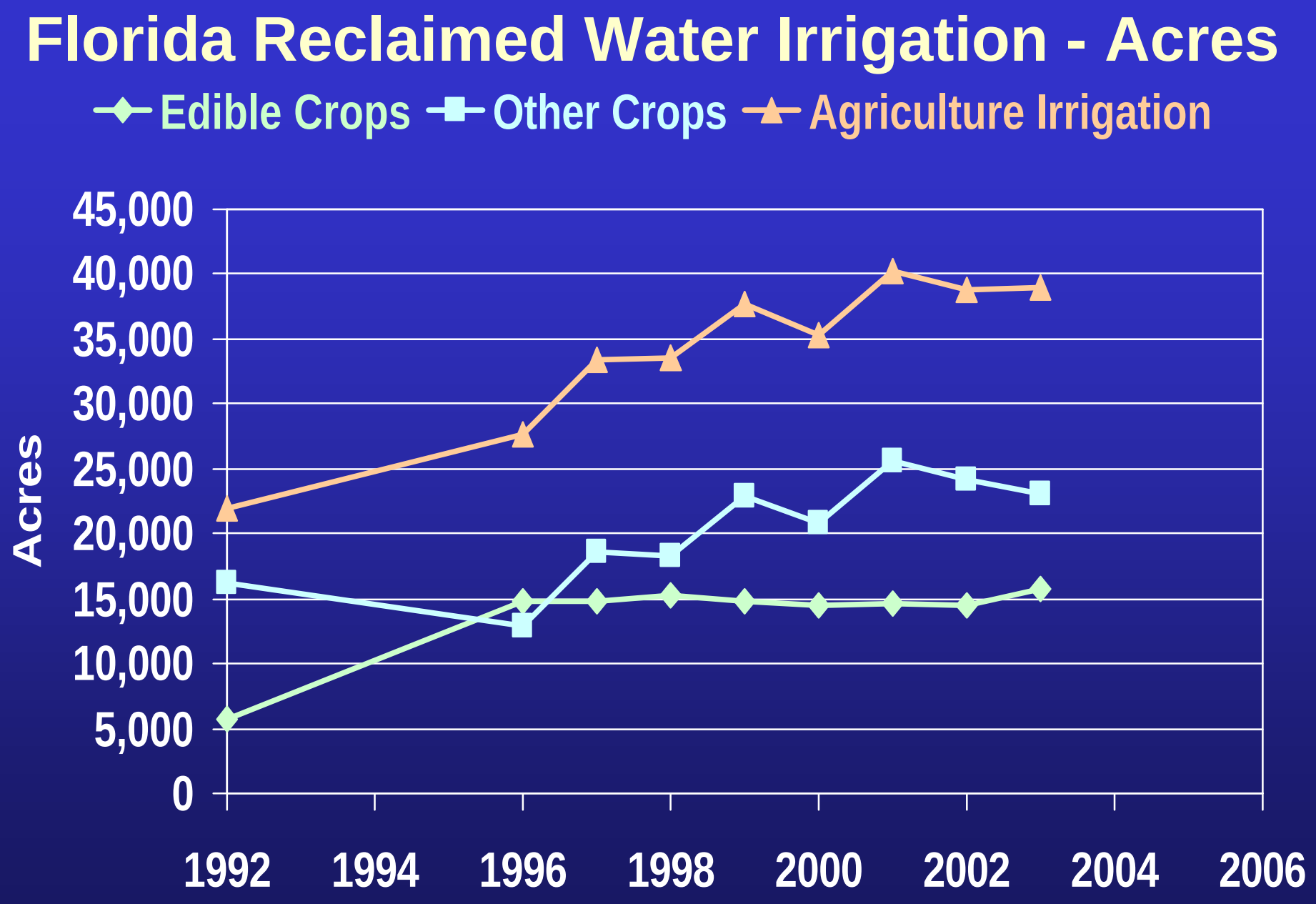

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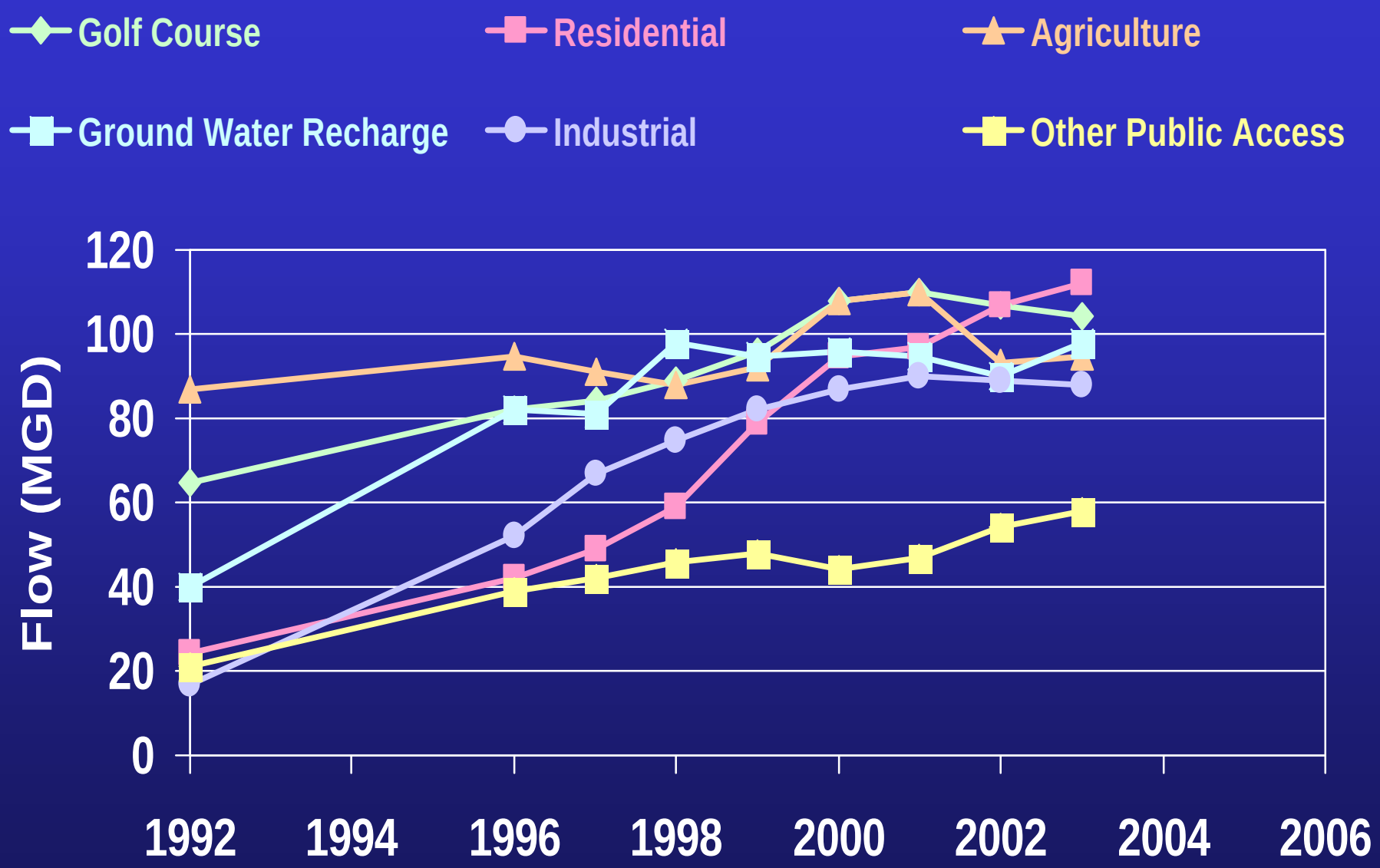

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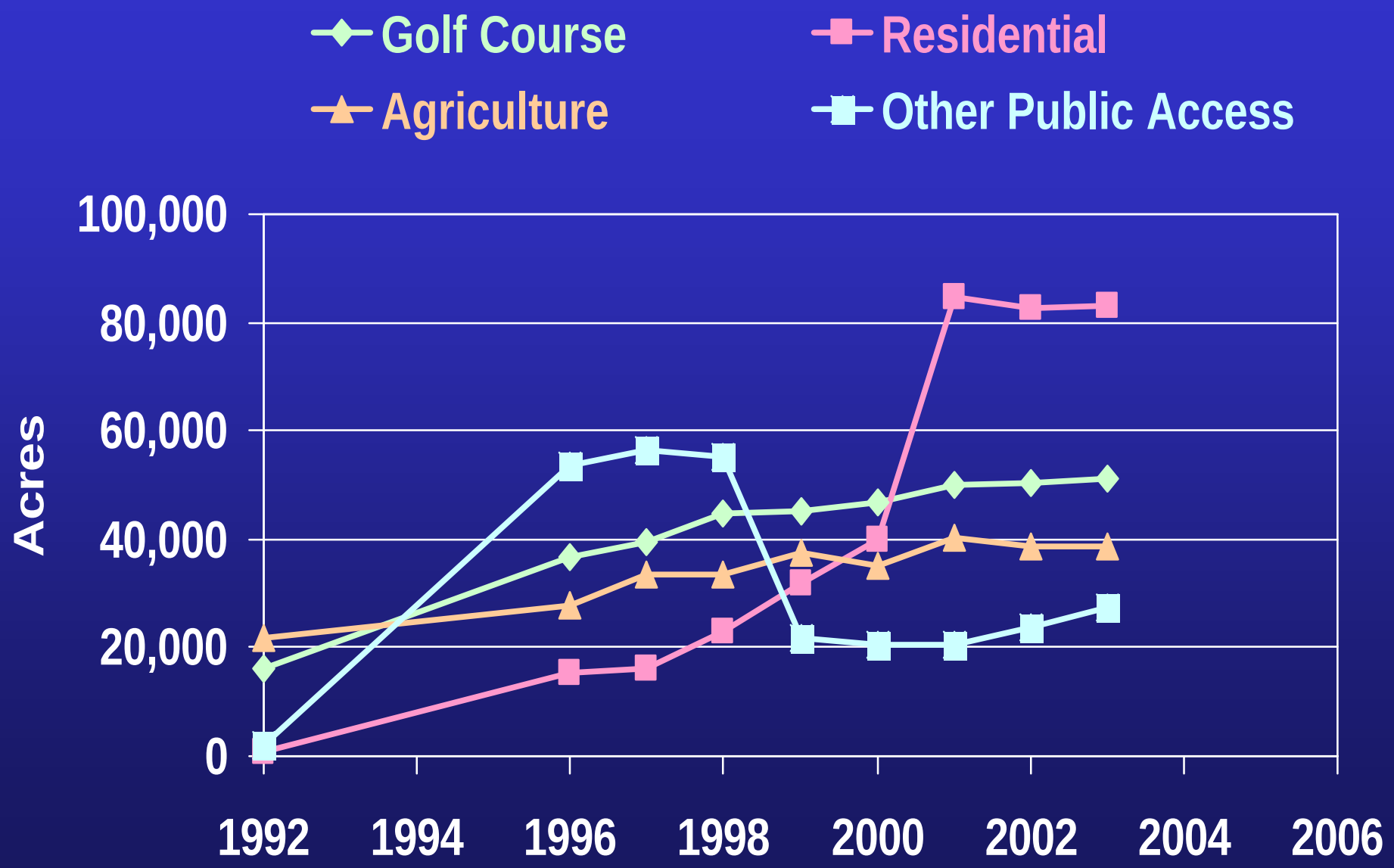

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- Other Uses:
  - Residential flow increased over 345% to 107 MGD
  - Industrial flow increased over 423% to 89 MGD
  - Ground Water Recharge increased 125% to 90 MGD

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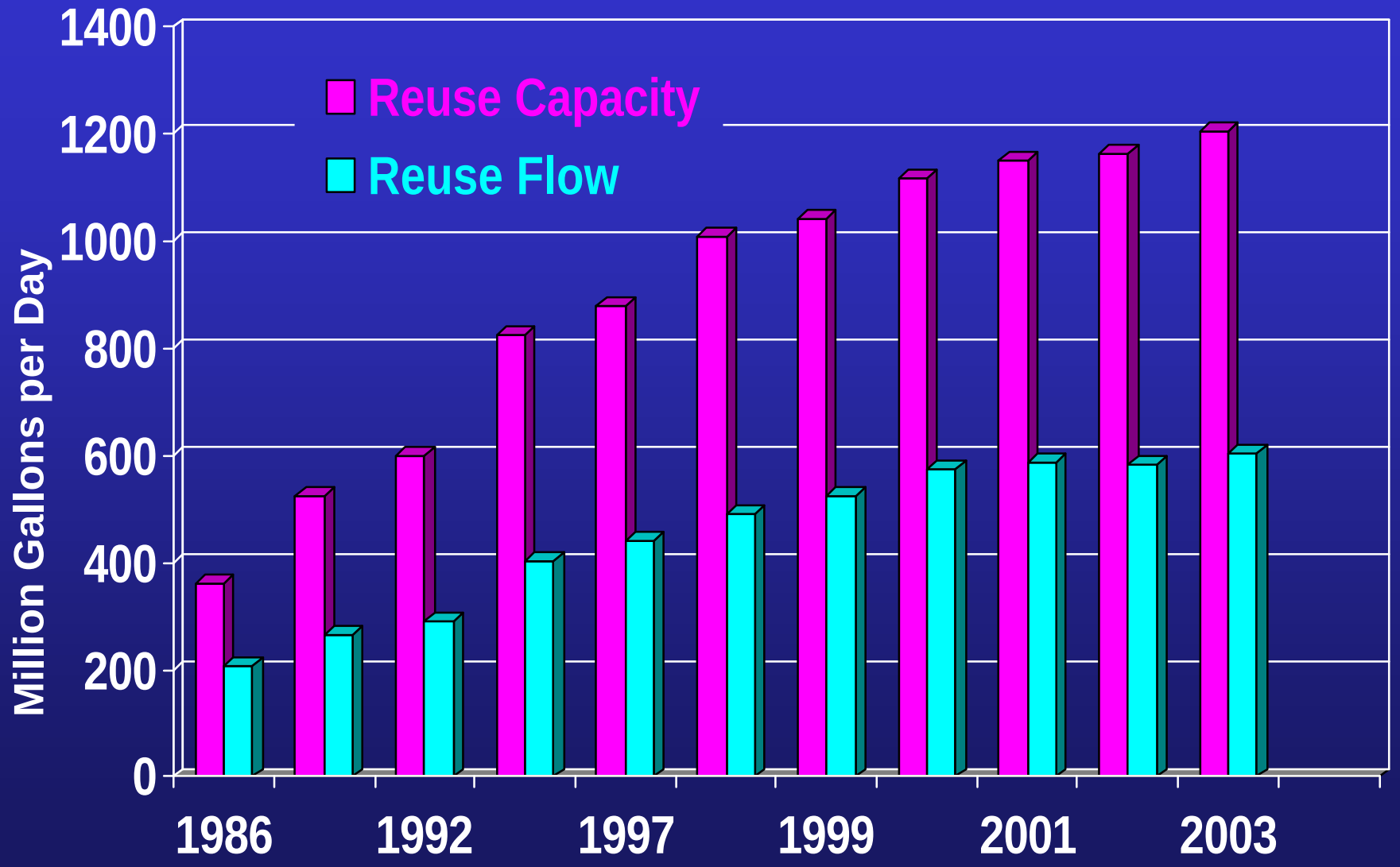

Change in reuse capacity and flow

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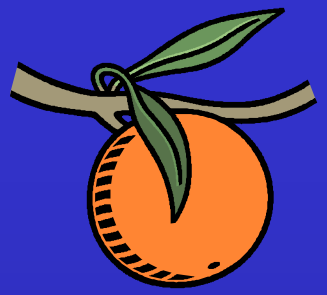
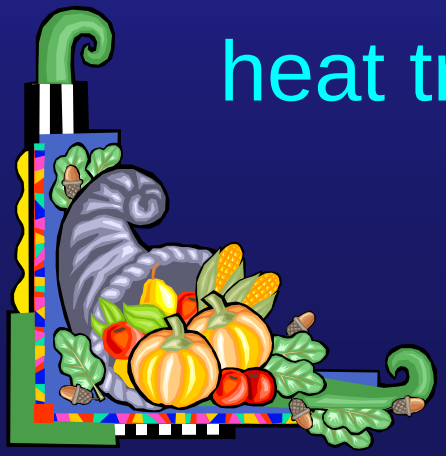
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