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Declining Outdoor Water Demand:
Impacts of Changing Tastes and Preferences

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Typical talk topics:

- How has the adoption of stricter water efficiency standards for fixtures in CA, TX, and CO affected the types of toilets and showerheads being sold in NV, AZ, and NM, and how has that impacted indoor water demand?
- Who is installing artificial turf in their backyards, and how is that impacting the penetration rate of irrigated turf in backyards?
- To what degree are community swimming pools de facto water conservation devices in that they reduce the demand for backyard pools?

40 years of municipal demand research

Gary C. Woodard, JD, MPP

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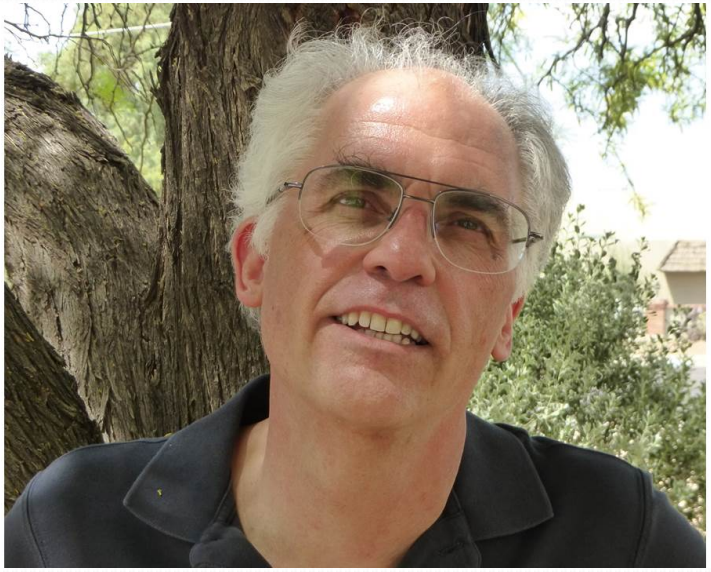
Gary has nearly 40 years experience in municipal water demand research, including 31 years at the University of Arizona, and 38 years as a consultant.



Clients include municipal water departments, private water companies, wholesale water providers, tribes, regulatory agencies, NGOs and developers.

Studies providing relevant information

- Demand studies of 12 municipal water providers in Phoenix, Tucson, & Los Angeles metro areas
- Studies of specific outdoor water uses, including:
  - Turf, including front yard/backyard, & summer/winter
  - Artificial turf, in new construction & existing homes
  - Swimming pools, including installation & removal rates
- Water efficiency audits of HOAs, irrigation systems
- Other studies of supply & demand, including:
  - Rainwater harvesting
  - Community swimming pools as conservation devices
  - Supply/demand options for improving water sustainability

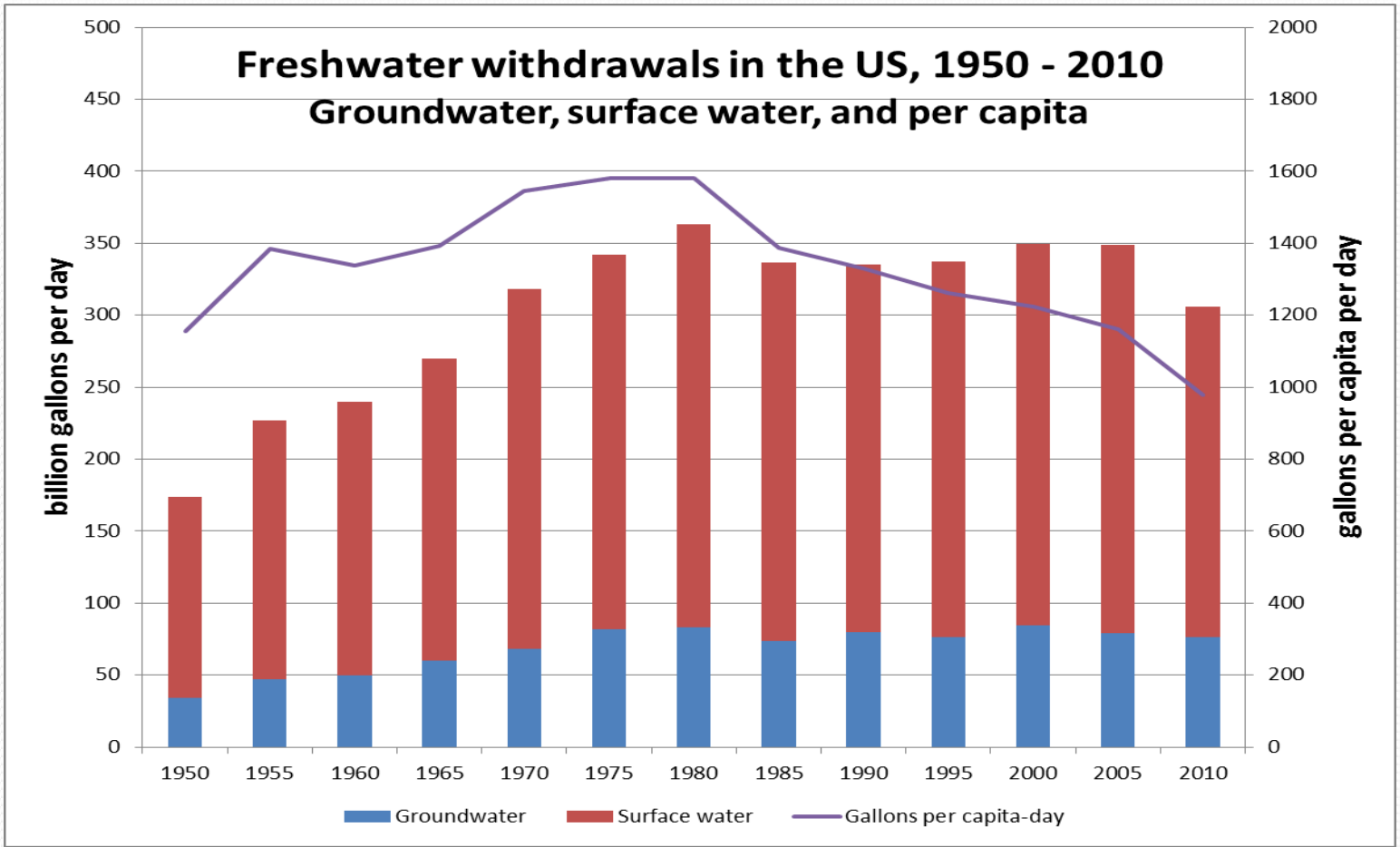
Types and sources of relevant information

- Household-level demand data including 4 to 10 years of billing records and 40 days of hourly ERT data, meter loggers
- Socio-demographic data from surveys, census, other federal and local sources
- Weather and climate data
- Housing data from county assessor offices
- Landscape data from GIS analysis
- High-frequency meter logging for 1 day to 2 months

Background on municipal demand

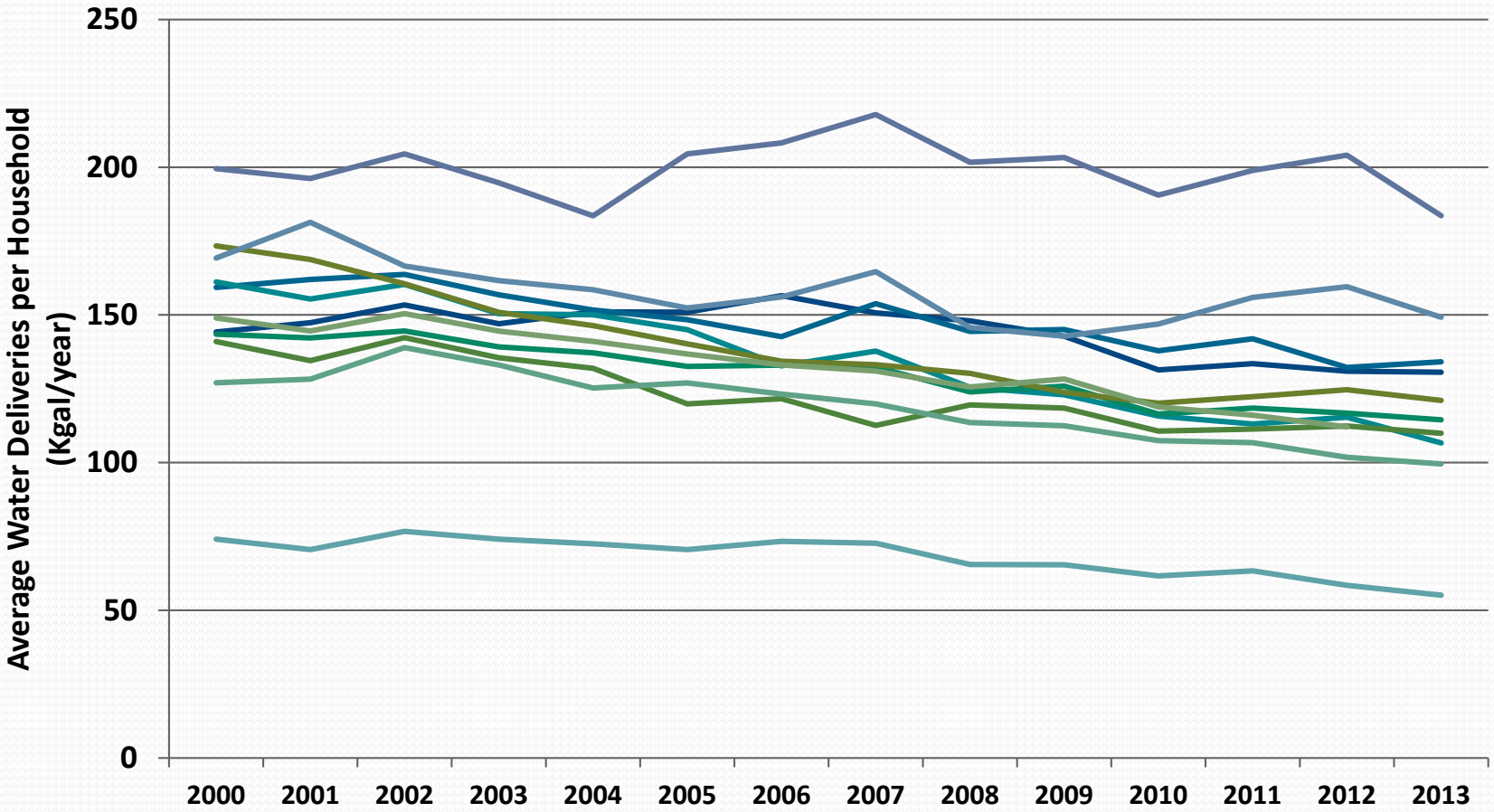
Municipal demand declining for decades

Demand has been declining for 35+ years, offsetting growth in population and the economy



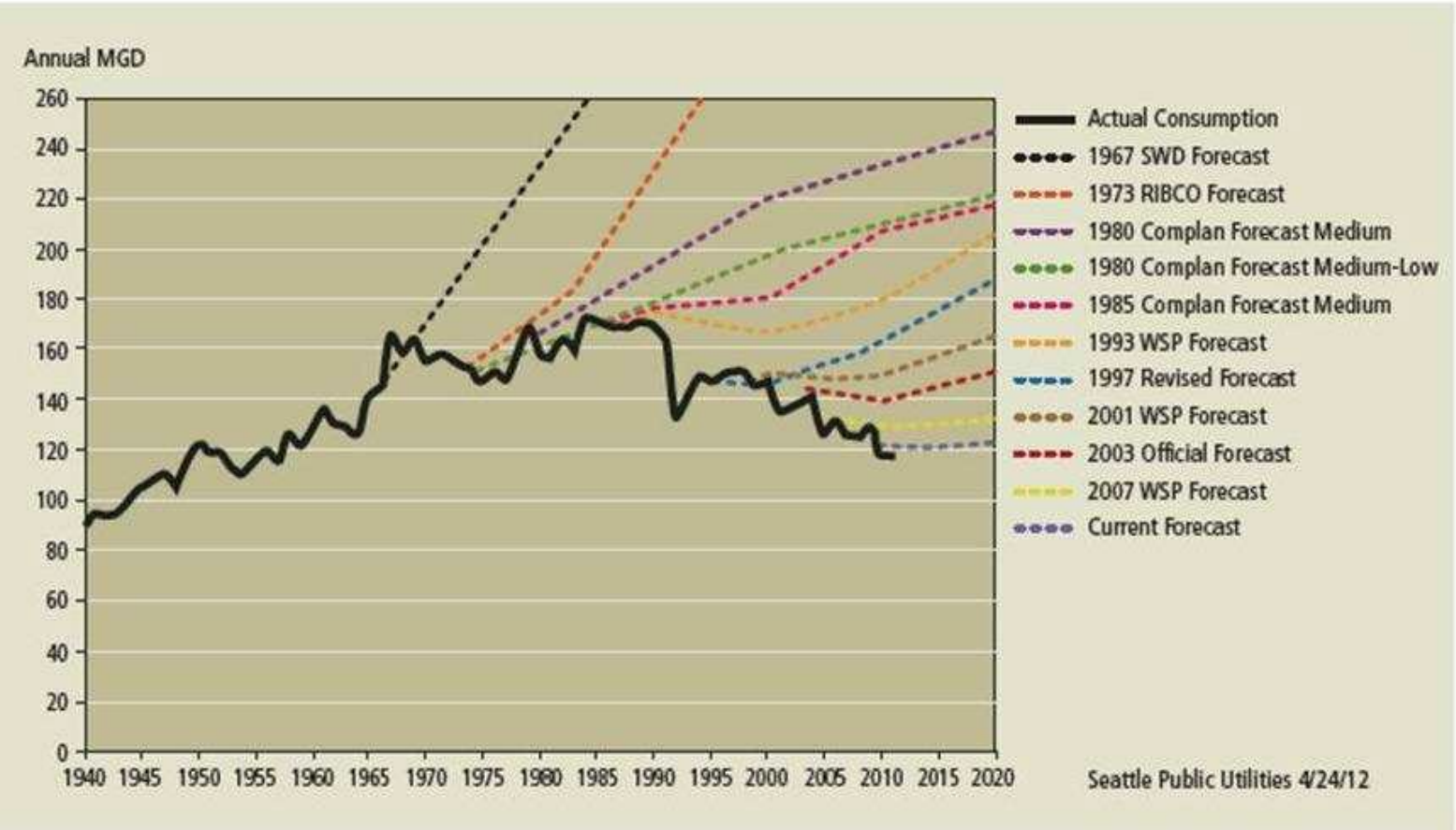
Municipal demand declining for decades

9 out of 10 Arizona municipal providers have seen declines in demand for 20 years, offsetting growth in population



Many municipal providers were slow to recognize the declines

Bad projections, over-investment in system capacity



Indoor demand overview

Definition: water uses where most of the water winds up in the sewer or septic system

Non-consumptive uses, water can be reclaimed.

Uses associated with water-using fixtures:
toilets, showerheads, bathtubs, faucets
And appliances:
clothes washers, dishwashers, softeners, humidifiers, etc.

The big 3 are toilets, showerheads, and clothes washers

More efficient appliances & fixtures have driven indoor demand reductions

Indoor reductions have been driven by Federal VOLUNTARY standards and some states adopting them as MANDATORY standards.

This has led to ever-more efficient fixtures and appliances in new homes and eventually in existing homes.

Relatively easy to model and forecast because much of it is deterministic. The only real challenge is forecasting the demographics of households which determine frequency of uses.

Tastes and preferences & indoor demand

Note that adoption has been sped by consumer desire to have the newest greatest:

- Clothes washers, front-loading with bells & whistles vs. old-fashioned top loaders
- All new showerheads are 2.0, not 2.5, and people like new things

Thus, changes in tastes and preferences play a small but real role in indoor demand reductions

Indoor demand easier to model & forecast

Future reductions in indoor demand are locked in because:

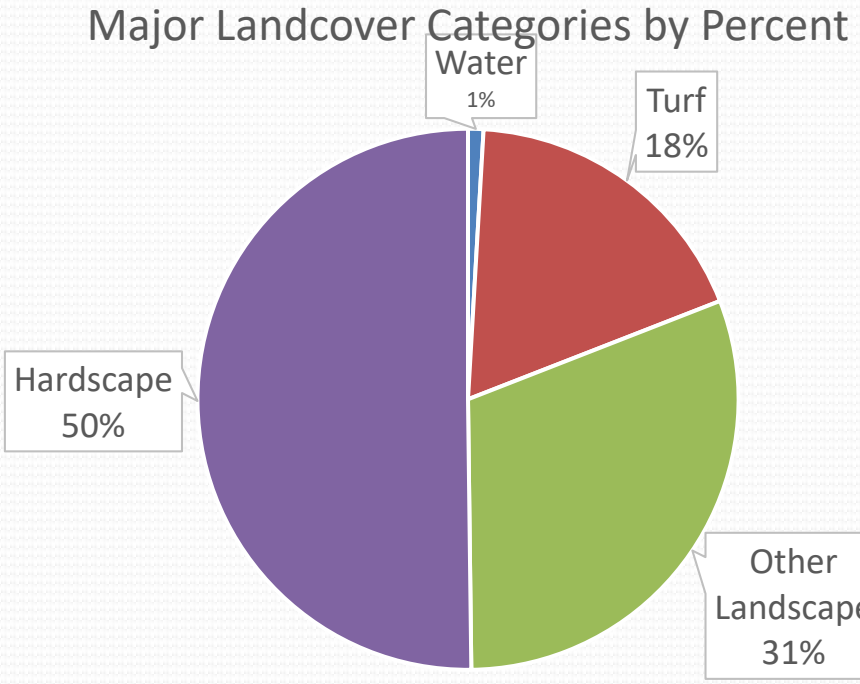
- buying a 3.5gpf toilet is illegal, and buying a 1.6gpf toilet is very hard
- buying a 2.5gpm showerheads are increasingly hard to find
- buying a water-guzzling dishwasher is impossible
- buying a clothes washer that uses more than 24 gallons per load is getting gradually harder.

By contrast, it's legal and easy to build a new home with wall-to-wall turf, overseed it so it's green year-round, put a large fountain in your front yard and an Olympic-sized pool in the backyard.

Drivers of Outdoor Demand

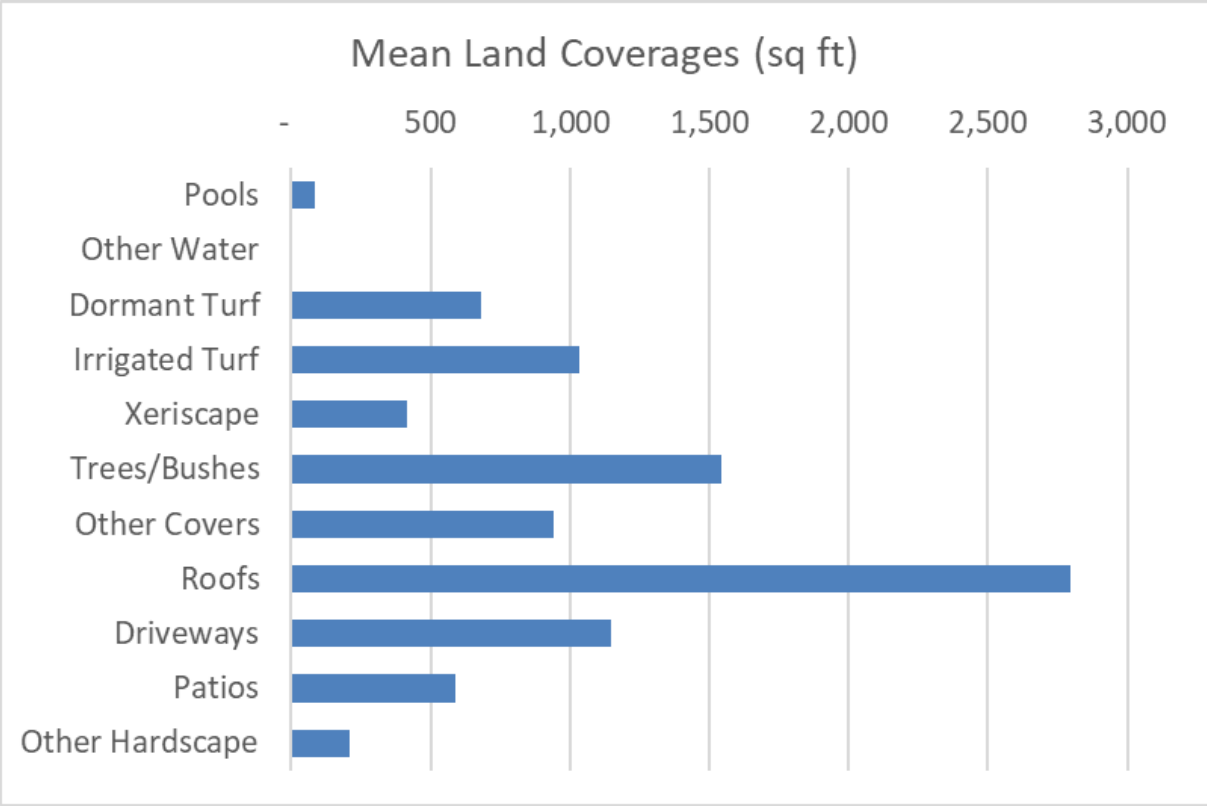
Outdoor demand is not a function of demographics.
It is driven by these factors:

- Lot size
- Turfed areas and seasonal irrigation patterns
  - irrigated v. dormant
  - winter overseeding v. no overseeding
  - real turf v. artificial turf
- Areas with other landscaping
- Frequency and size of pools
- Hardscapes
- Weather (and climate)



Tastes and preferences & outdoor demand

Tastes and preferences, along with shifting socio-demographics, play a much larger role in determining outdoor demand. And those tastes and preferences can vary hugely from community to community.



Reductions in outdoor demand are uncertain

Five choices that impact outdoor demand:

1. Where do I want to live? What type of housing?
2. What do I want my front yard to look like?
3. Do I want turf in the backyard, and if so, how much and what kind?
4. Do I want a backyard swimming pool?
5. What do I want and expect in my common areas?

1. Where do I want to live?

1. Where do I want to live?

Preferences on where to live are subject to constraints:

- What does the existing housing stock look like?
- What do new homes being built on spec look like?
- What can I afford?

Broad categories of housing include:

- Apartments/condos with common areas
- Townhouses with small yards and common areas
- Single family detached residences on lots of various size, with or without common areas

No clear trend in what people currently prefer. But there are some correlations, possibly based on affordability.

Who wants/has an SFR?

Children and SFRs – historic positive correlation became a negative correlation. Why?

Because children are positively correlated with lower incomes, poverty, while home ownership is correlated with greater income and wealth

Home ownership is also correlated with being older.

Younger people, parents are more likely to be renters and more likely to live in apartments.

The myth of shrinking lot size

Lot size – long-term misperception that lot sizes have been shrinking, when the data show variations over time related boom and bust cycles and the cost of developable land, but no clear long-term trend.

Over the past 10-12 years, the Phoenix and Tucson markets have shown a reduction in lot size, but this was accompanied by a shift away from one-story homes to two stories. As a result, the house footprint decreased and landscapable area did not decline significantly.

2. What do I want my front yard to look like?

Today, xeriscapes dominate in virtually all new developments and in the housing stocks of many communities.

The rate of the shift away from front yard turf has varied greatly across communities. Tucson has virtually no front yard turf; some communities in the Phoenix area have very little. Other communities in the Southwest have maintained their front lawns. Over 80% penetration rate in Fullerton.

Artificial turf in front yards has become an attractive option in some turf-centric communities.

It also is popular near pools.

3. Do I want turf in my backyard?

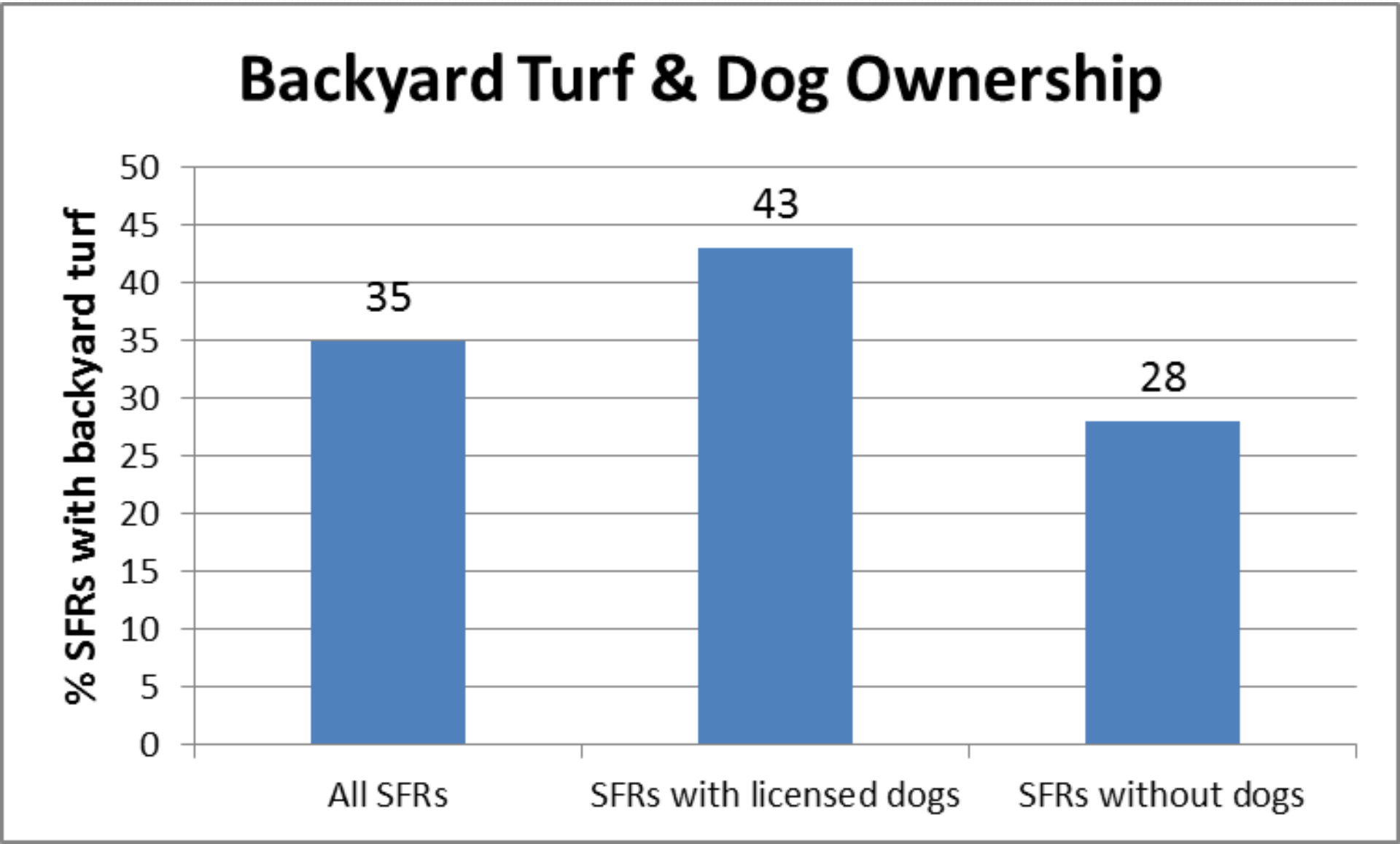
…and if so, how much and what kind?

Changing face of the American family

Only 33% of households have children, and the figure is declining.

About 45% of households had at least one dog a few years ago, and the figure has increased.

Dog ownership & backyard turf are correlated



Turf irrigation can be reduced by:

- Abandonment
- Reductions in area
- Replacement with xeriscapes, drought-tolerant plant species
- Restrictions in new housing construction
- Replacement with artificial turf

Four turf “crops” were analyzed:

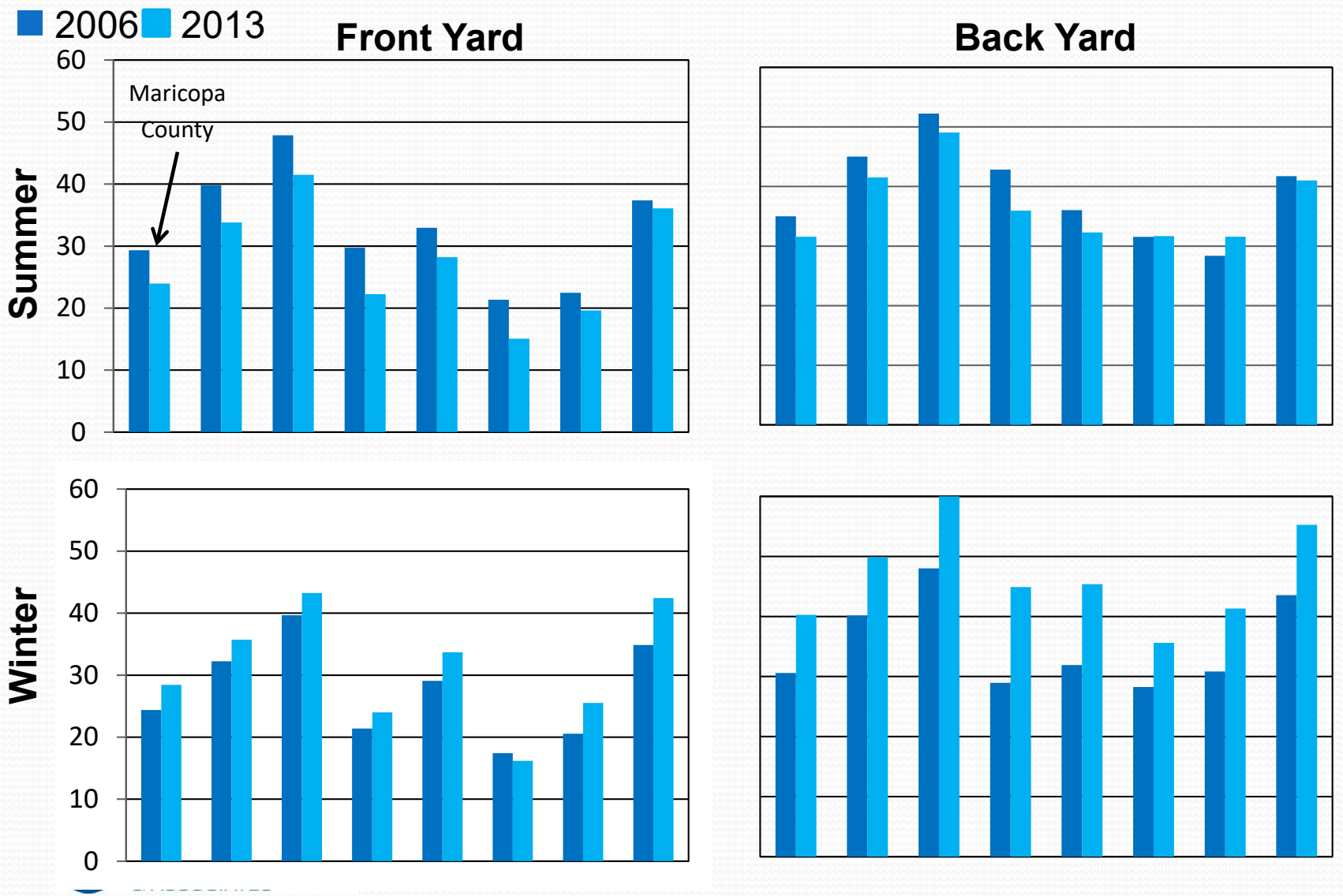
Front yard summer turf

Front yard winter Rye turf

Back yard summer turf

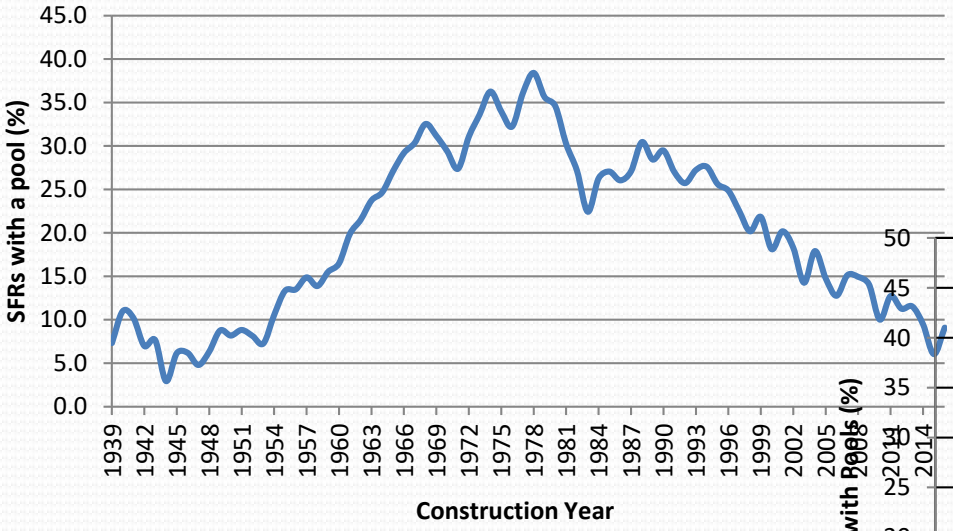
Back yard winter Rye turf

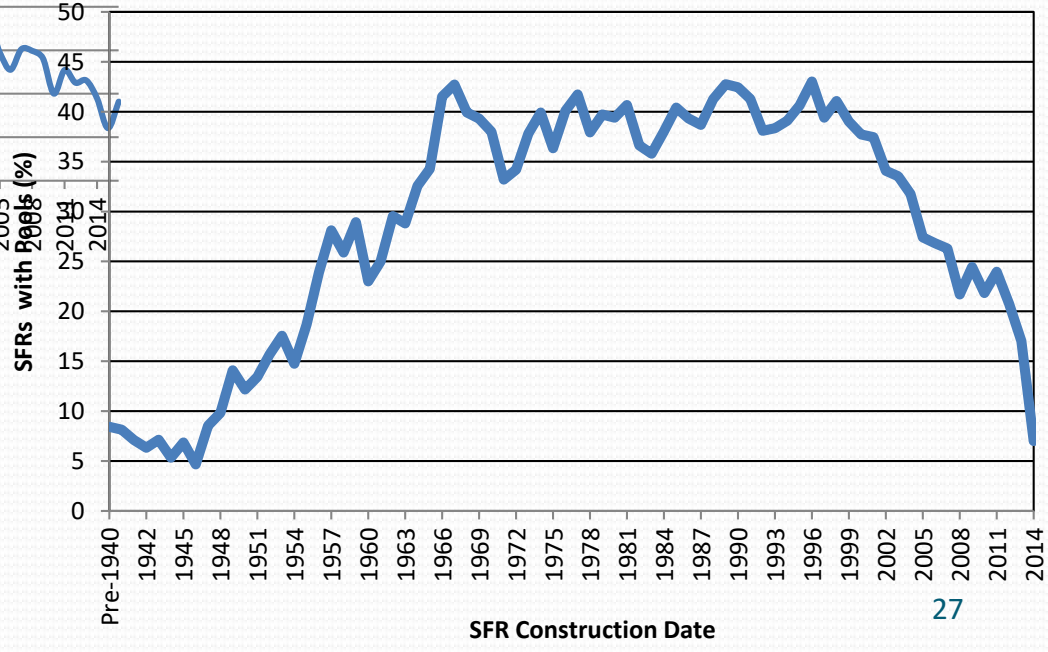
Changing Turf Preferences



4. Do I want a backyard swimming pool?

Popularity of backyard pools peaked in late 70s in Tucson, the late 1990s in Phoenix, at other times elsewhere.





Size and type of new pools has changed

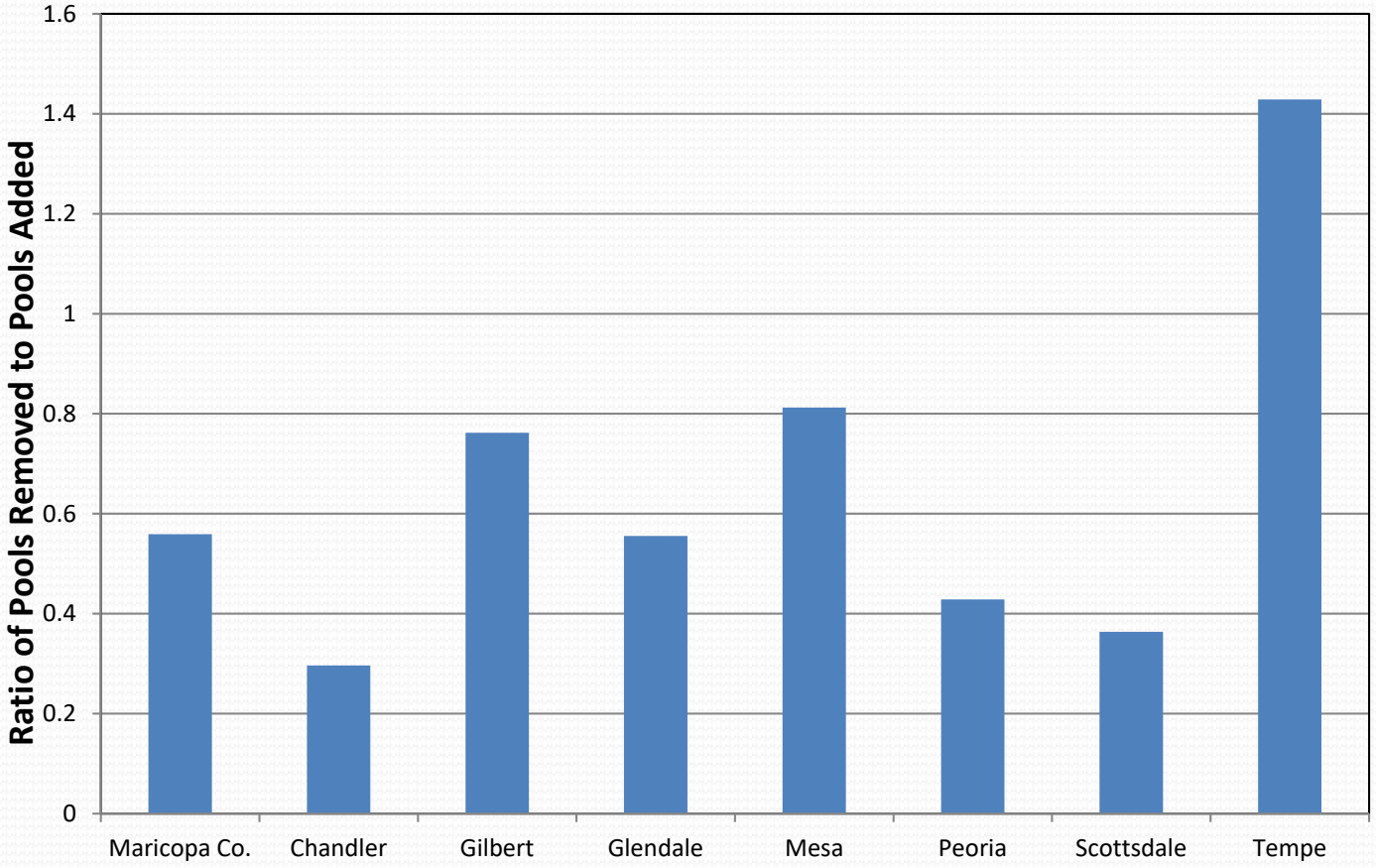
Past

Present

Future?

Surprising surge in swimming pool removals

Pool removal rates are approaching or even exceeding construction rates in some areas.



Who is removing pools and why?

A series of studies included analysis of remote sensing data, assessor databases, and homeowner surveys.

Other work analyzed pool removal options and costs, and the seven categories of costs associated with maintaining an unwanted pool.

One finding is that the greatest number of pool removals were occurring in older, moderately priced homes. That's not surprising.

Somewhat surprising was the typical payback period for removing a pool – 2 years

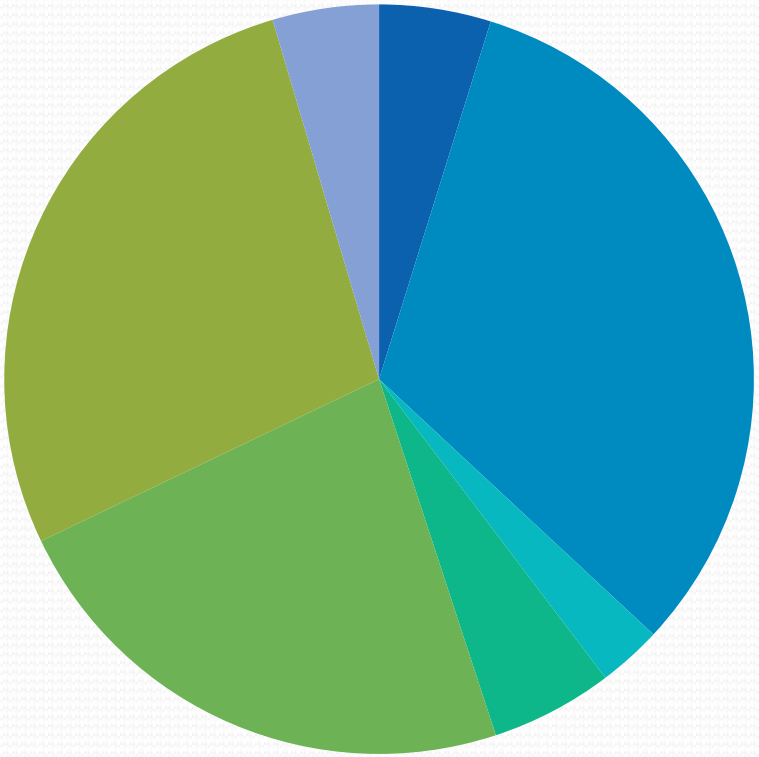
Pent-up Demand for Pool Removals

Over 20% of pool owners would like to get rid of their pool. What is stopping them?

Lack of information. They want to know:

- What are their options for pool removal?
- And what does it cost?
- What are the costs of maintaining an unused pool?
- What are all the benefits of removal?

Annual total costs of maintaining a pool



Costs are dominated by electricity, chemicals, and if used, a pool service company.

Water is a much smaller expense.

Non-monetary benefits include use of yard, satisfaction from conserving water and energy, safer for kids and pets

Solar pool heaters begin to dominate

Gas pool heaters are more common than electric, but solar pool heaters threaten to overtake them both.

This seems like a good thing from a sustainable energy perspective, but surveys show that gas and electric pool heaters are rarely used.

By contrast, solar heaters are used far more. This extends the swimming season, but at the cost of more evaporation.

Tastes & preferences have made backyard pools:

- less popular
- more associated with higher-valued homes
- more used by adults for exercise, not by families for recreation
- increasingly likely to be removed
- Increasingly likely to have solar pool heaters
- smaller in surface area (in some areas)

None of these trends are found in all communities. None are guaranteed to continue.

5. What do I want & expect in common areas?

Improving water use efficiency in HOA common areas in challenging, in part because responsibility for landscape often is split among:

- HOA board
- HOA management company, and
- Landscape company

Question:
Are water-intensive entrances amenities for residents, or aimed more at potential buyers?

Are community pools conservation devices?

A study of conservation potential for the Central Arizona Project looked at homes in HOAs with and without community pools. The penetration rate of backyard pools in these two samples was very different.

Who had a backyard pool?

26% of homes without a community pool

13% of homes with a community pool

This strong correlation suggests but does not prove that community pools reduce backyard pools. More analysis is needed.

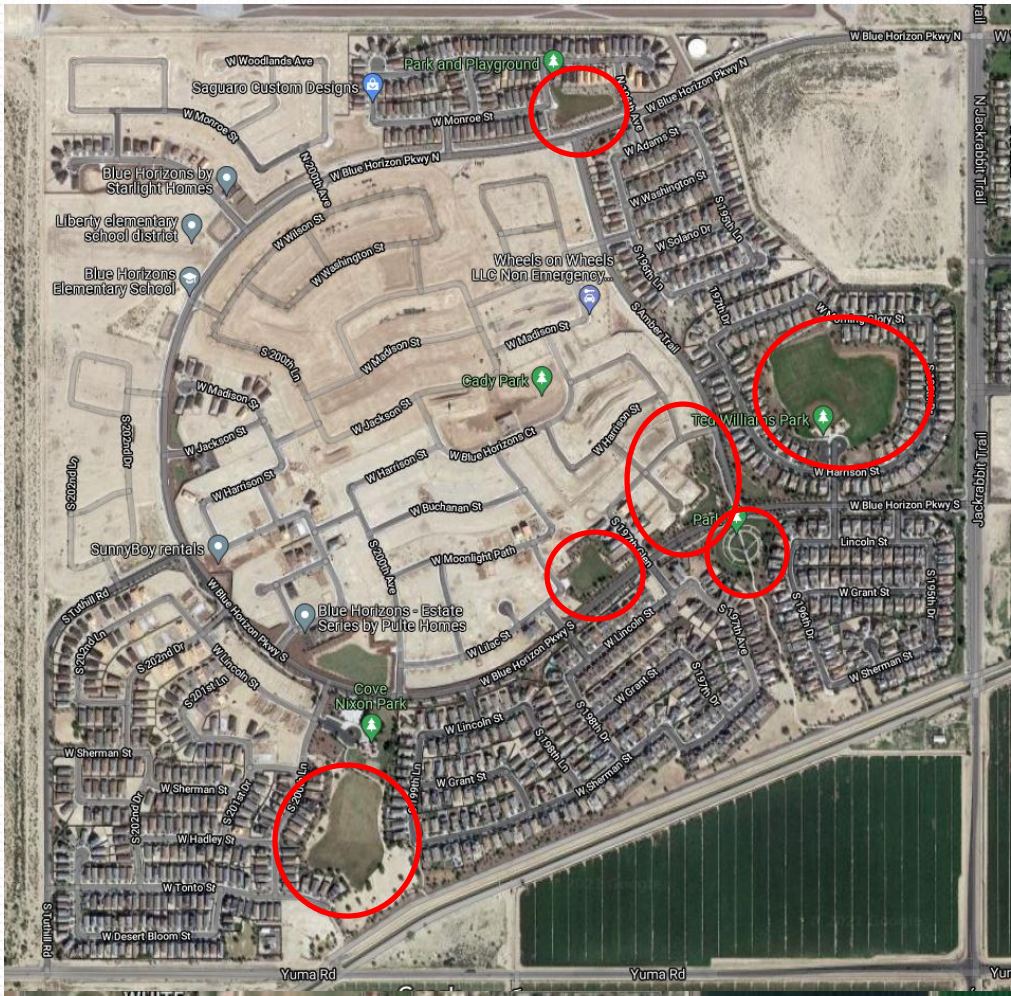
Could community parks be conservation devices?

Blue Horizons HOA in Metro Phoenix West Valley

"Themed parks" include:

- soccer/volleyball
- golf
- baseball
- strolling/gardens
- pocket parks for tots & dogs

What effect might these have on backyard landscapes?



Summary, 1 of 2 – Forecasting challenges

Impacts of changes in tastes and preferences on outdoor demand can be hard to see and predict, for two different reasons:

1. They appear under the radar – artificial turf in backyards
2. Their impact on water demand is not obvious – dog ownership and backyard turf

Failure of spray-painting dormant Bermuda grass followed 20 years later by widespread acceptance of plastic grass – who could have predicted that?

What trends can we count on?

What do we need to be alert for, even if we can't plan?

Summary, 2 of 2 – Black swan events

Black swan event – COVID

People switched spending from experiences (vacations, eating out) to nesting (more time at home, in back yards).

More space indoors, because more time spent there, and because of greater demand for home offices. At least part of this is permanent.

Also, greatly increased demand for personal outdoor space, and for enhancing existing outdoor spaces.

Also, pandemic puppies and the demand for outdoor turf

Conclusions

- Tastes and preferences are dominant factors in outdoor demand;
- Certain tastes and preferences appear to be long-lasting;

The challenges are:

- For water planners to recognize them and determine their impacts
- For conservation professionals to take advantage of these changing tastes, preferences, and demographics to further reduce outdoor demand without negatively impacting quality of life.

Recommendations

- Long-term conservation programs can shape tastes and preferences, so be patient
- Make peace with artificial turf. It's here to stay;
- Release the pent-up demand for swimming pool removals with educational efforts;
- Remain vigilant for new patterns of behavior, and keep asking yourself, is this a temporary fad or a longer-lasting trend, and how might it impact water demand?

Thank you!