

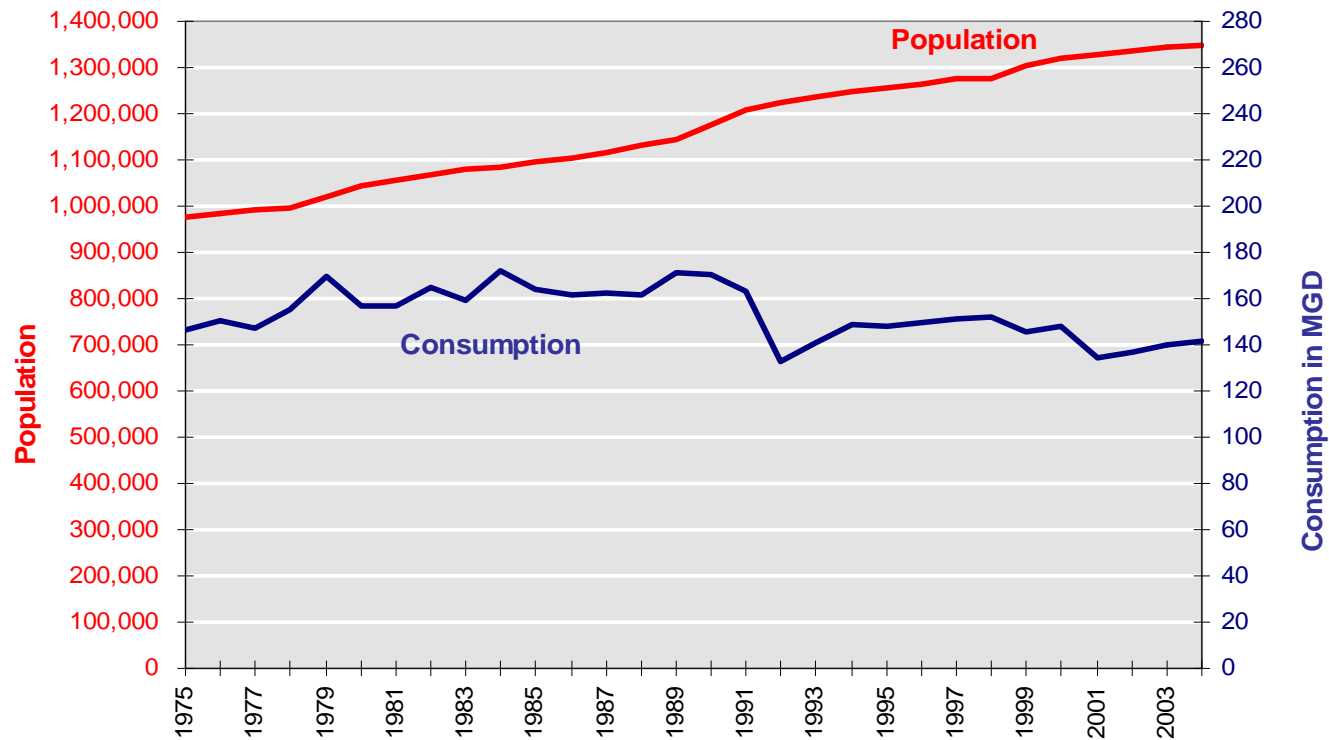


*Water Efficiency Opportunities  
in  
Commercial Buildings*

Roger Van Gelder, Water Conservation Consultant

# Success of Conservation

**Growth in Population and Water Consumption  
Seattle Regional Water System: 1975-2004**

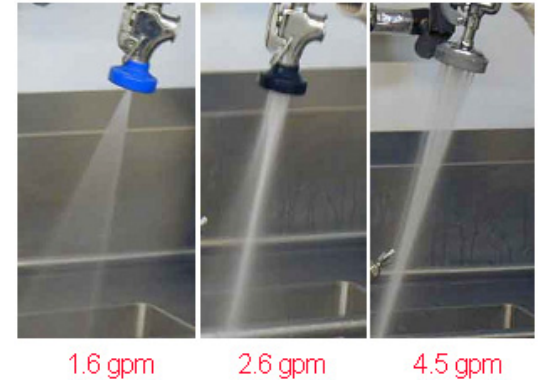


# Primary Commercial Indoor Water Uses

- Kitchen Equipment
- Laundry
- Cooling Towers
- Pools/Fountains
- Healthcare/Lab/Process Equipment
- Restrooms/Locker Rooms

# Kitchen Water Use

- **Dishwashing equipment**
  - Rack washers
  - Pre-rinse sprayers
- **Refrigeration and Ice Machines**
  - Water-cooled refrigeration
  - Water Cooled ice machines
- **Misc. Uses**
  - Disposals
  - Dipper wells
  - Steamers



# Laundry

- **Standard machines**
  - Specify “Washwise” (generally front load)
- **Commercial**
  - Rinse water reuse
  - Wash water recycle
  - Condensate reuse



# Cooling Towers

- **Chemical Treatment**
- **Non-Chemical Treatment**
  - Water Softening / Zero Blowdown
  - Pulsed Power
- **Hybrid Towers**
- **Air Cooling**
- **Load Reduction**
- **Water Meters**



# Pools / Fountains

- **Install Makeup Meters**
- **Maintain Filters & Backwash**
- **Monitor for Leaks**



# Healthcare / Lab / Process Equipment

- **No Single Pass Water Cooled Equipment**
  - Air Conditioners (Server Rooms)
  - Lab Equipment
- **Air Compressors / Vacuum Producers**
  - No Liquid Ring Pumps
- **Condensate Cooling**
  - No Continuous trap cooling
- **Rinsing / Washing**
  - Recycle water wherever possible
- **Reverse Osmosis / Pure Water**
  - Maximize Recovery Rate



# Restrooms

- Sinks
- Showers
- Toilets
- Urinals
- Trap Primers
- **2 Possible LEED points**
  - 20% reduction from EPAAct
  - 30% reduction from EPAAct



# Showerheads/Aerators

- **Aerators**

- Code Max.: 2.5 gpm
  - Code is 0.5 for commercial
- 1.0 gpm offers good flow



- **Showerheads**

- Code Max: 2.5 gpm
- Many good 1.5 gpm – 2.0 gpm
  - Test for rated flow



**Choose pressure compensating products**

# Autosensor Equipment

- **Sensor Flushometers**

- Will almost certainly increase water use, especially when used on toilets
- Should be calibrated when installed

- **Sinks**

- Tend to minimize faucet run-time



# Toilets: Water Consumption

- **Code maximum**
  - Pre-1980: 5 gpf
  - 1980 - ~1994: **3.5 gpf**
  - 1994 to current: **1.6 gpf**
- **Newer technologies**
  - Hig Efficiency Toilets (HETs)
    - Dual-flush or Single Flush
    - 1.28 gpf or less (20% less than code)



# Toilet Basics

- **Tank toilets**

- Standard
- Pressure assist



- **Flush valve (commercial) toilets**

- 4 bolt wall hung
- Floor mount
- 3 bolt wall hung



- Current 3.5 gpf exemption for “blowout” fixtures
- Don’t waste water. A good 1.6 gpf blowout fixture exists



# Toilet Fixture Use

- **General rule is 3 to 5 flushes per person per day**
  - Can vary widely
    - Women use toilets more than men if men have urinals
- **Cleaning uses need to be factored in**
  - Can vary from one to three flushes per fixture/day

# Toilets: Commercial Flushometers

- **Diaphragm**

- Used for many decades
- Easily clogged by debris
  - Newer styles attempt to bypass debris



- **Piston**

- Less susceptible to debris-related clogging
- *Sensor valves available for both of these*

*Some brands of flushometers adjust within a range of volumes*

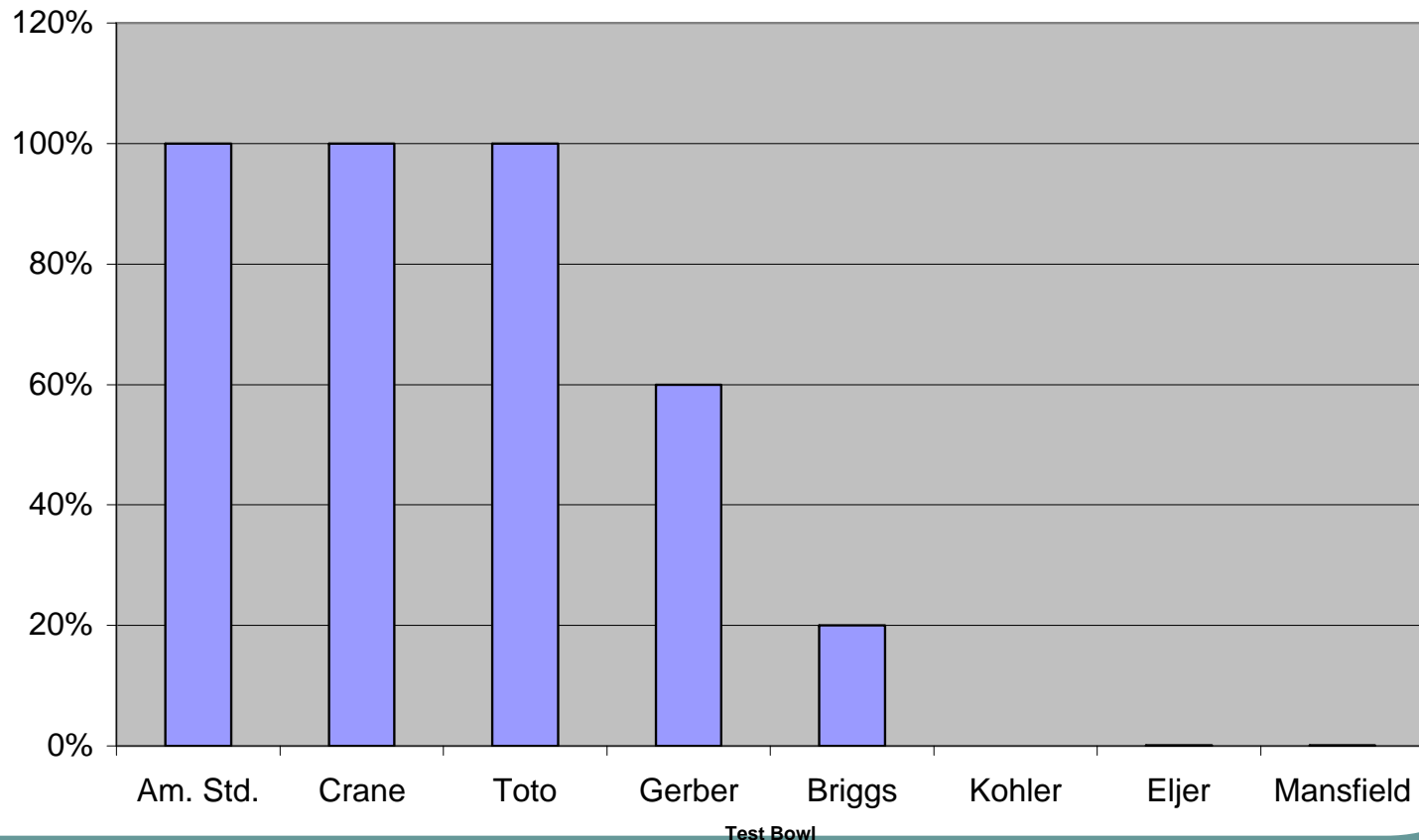
# Tank Toilets

- **Choose UINAR toilets**
  - Performance and Longevity
  - 350 g or more before clogging
  - Less than 2.0 gpf with replacement flappers



# Toilet Bowl Performance (4 Bolt Wall Mount)

**Percentage of Complete Flushes with 25 ft. Tissue Using  
1.15 gpf Gem II Valve at 70-75 psi Static**

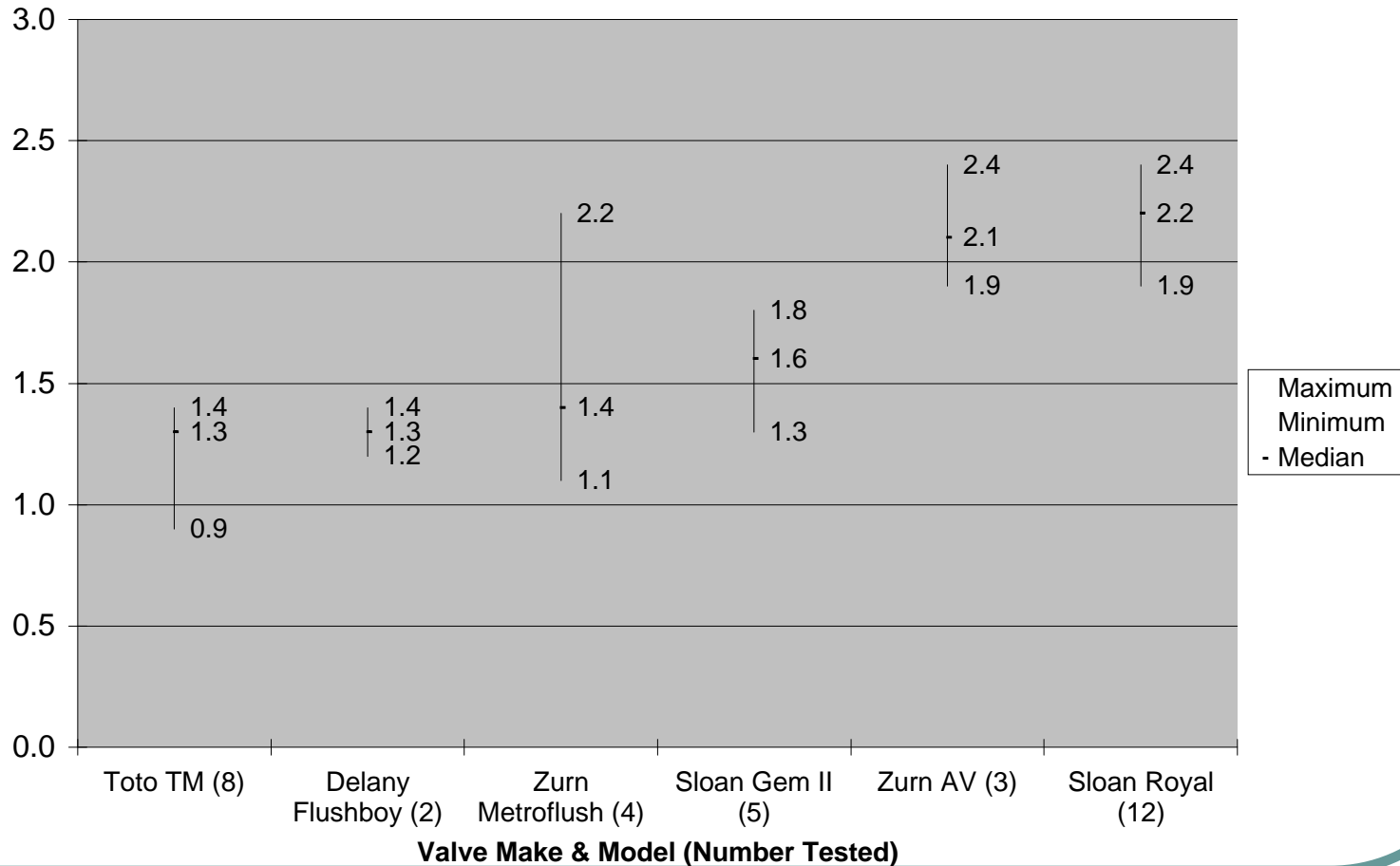


# Toilets: Flushometer Issues

- **Flush volumes are rarely as rated**
  - Typically flush more water...more on this soon.
- **Same model can have wide range of volumes**
- **Internal parts/volumes are interchangeable**
- **Dual flush handles may or may not be result in savings**
  - Men have urinals
  - Women often flush toilet paper

# Flushometer Testing

Flush Volumes for Tested Valves  
70 psi Static



# Toilet Configuration Recommendations

- **Recommendations for UW**
  - 4 bolt wall mount:
    - Sloan Gem II valve/Crane “Placidus” bowl
    - Sloan Gem II valve/Toto CT708 bow.
    - Sloan Gem II valve/American Standard Afwall
    - Toto valve: good performance but adjustments are necessary
  - Floor mount toilets
    - Anecdotal data...ask us later

# Urinals: Water Consumption

- **Code maximum**
  - Pre-1980: 3.5 was common...no clear code
  - 1980 - ~1994: **1.5 gpf**
  - 1994 to current: **1.0 gpf**
- **Newer technologies**
  - High Efficiency Urinals (HEUs)
    - Waterless
    - 0.5 gpf or less
    - 1/8 gpf now available



# Urinals: Flush methods

- **Manual Flushometer**
- **Autosensor**
- **No flush**



# No Water Urinals



Kohler Steward



Waterless



Falcon/Sloan



Duravit

# Waterless Urinal Issues

- **Fluid and cartridges can be expensive**
- **Deposits can build-up in drainline**
- **Ventilation/Odors can be an issue**
- **Clogged cartridge can cause slow draining**
- **(if applicable)...retrofits can be difficult**
  - Waste outlet is lower than most urinals



# No-Water Urinals – UW Drainline Photos

## Horizontal Pipe after 6 Months – Falcon Waterfree



# No-Water Urinals – UW Drainline Photos

## Vertical Pipe after 6 Months – Waterless Co.



# Other High Efficiency Urinals (HEUs)



**Kohler Bardon**

**0.5 gpf**



**Zurn**

**0.125 gpf**

# Cisterns/Rain Catchment

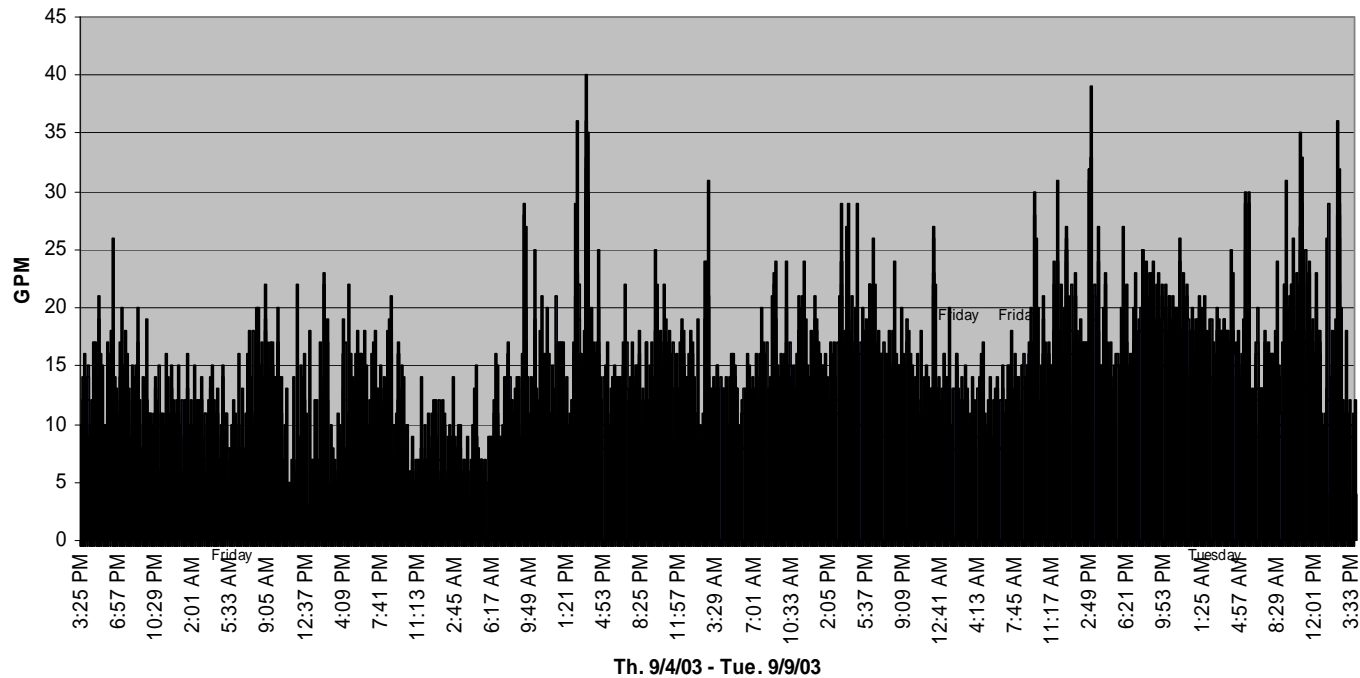
- **Toilet flushing**
  - Year-round potential use
- **Irrigation**
  - Huge capacity needed in the Northwest
- **Questionable cost effectiveness**
  - Consider minimizing toilet/irrigation uses first
- **O&M costs should be considered**

# Commissioning for Water Conservation

- **Check all toilets**
  - New construction/shutdowns can cause debris to clog valves
  - Look for leaks and proper flow rate
    - Flush each toilet
- **Check all other equipment for proper flow rate and operation**
  - Trap primers for minimal flow
  - Push button faucets: 10 seconds or less

# Water Monitoring

- **Sub-metering major uses:**
  - irrigation, cooling towers, water features, tenants



# Resources

- [www.savingwater.org](http://www.savingwater.org) Saving Water Partnership(Seattle Public Utilities and Partnering Water Utilities): technical assistance. A report on Water Closet Performance Testing of approximately (50) different tank type toilet models is available here.
- [www.resourceventure.org](http://www.resourceventure.org) Business and Industry Resource Venture: technical assistance.
- [www.waterwiser.org](http://www.waterwiser.org) American Water Works Association: online conferences, drip calculator, reference materials.
- [www.cuwcc.org](http://www.cuwcc.org) California Urban Water Conservation Council: online newsletter “Waterlogue” (listed under “Product News”), plumbing industry links, reference materials, and the Los Angeles Supplementary Purchase Specification. This specification is currently the most stringent toilet testing standard in the nation for tank style toilets. The listing of toilets that have passed the test can be found at this site by clicking “Product News”, then “Technical Information.”
- [www.p2pays.org](http://www.p2pays.org) North Carolina Dept. of Environment and Natural Resources: Water Efficiency Manual for Commercial, Industrial, and Institutional Facilities, 1998, available for free download at under “Technical Resources.”
- [www.sbcc.wa.gov](http://www.sbcc.wa.gov) Washington State Building Code Council: building and plumbing codes online.
- [www.eren.doe.gov/femp/techassist/best\\_practices.html](http://www.eren.doe.gov/femp/techassist/best_practices.html) Federal Energy Management Program (FEMP): Best management practices and other useful info.



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