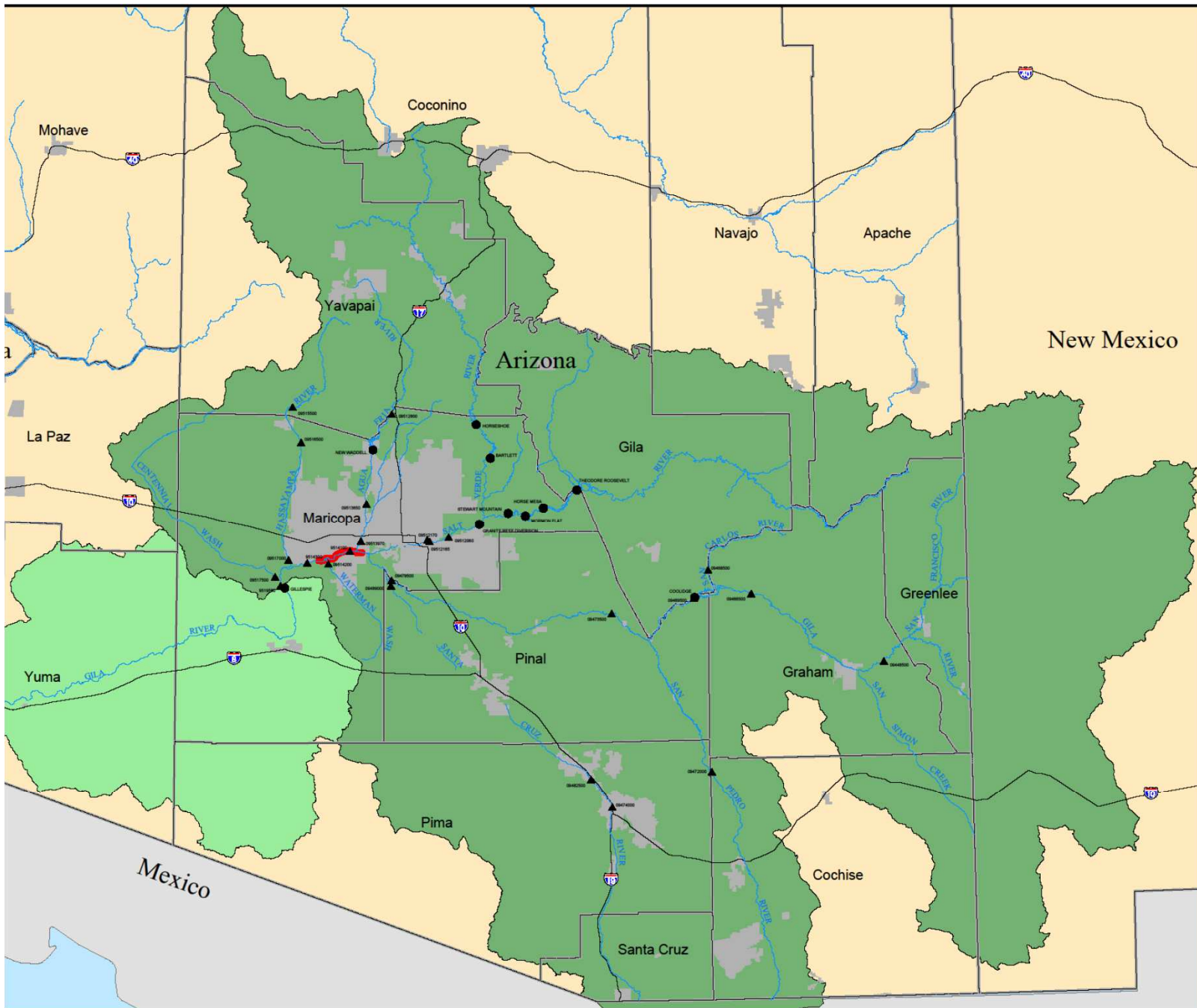


# Arizona Stormwater Programs: Looking Forward

NACWA Clean Water Act Seminar  
November 18, 2010  
Santa Fe, New Mexico

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Tempe, Arizona



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District of Maricopa County  
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Phoenix, AZ

## EL RIO WATERCOURSE MASTER PLAN FCD 2001C024

Consultants:

Stantec Consulting Inc.  
8211 S. 48th St  
Phoenix, AZ 85044

Legend:

- ▲ USGS Gaging Station
- Dam
- River
- Interstate
- State Line
- City
- El Rio Project Area
- County
- Watershed Boundary Upstream of Gillespie Dam
- Watershed Boundary Downstream of Gillespie Dam

0 5 10 20 30 40  
1:1,000,000



Notes:  
Approximately 1,000 square miles of the watershed limits outside of the U.S.

Title:

## WATERSHED MAP

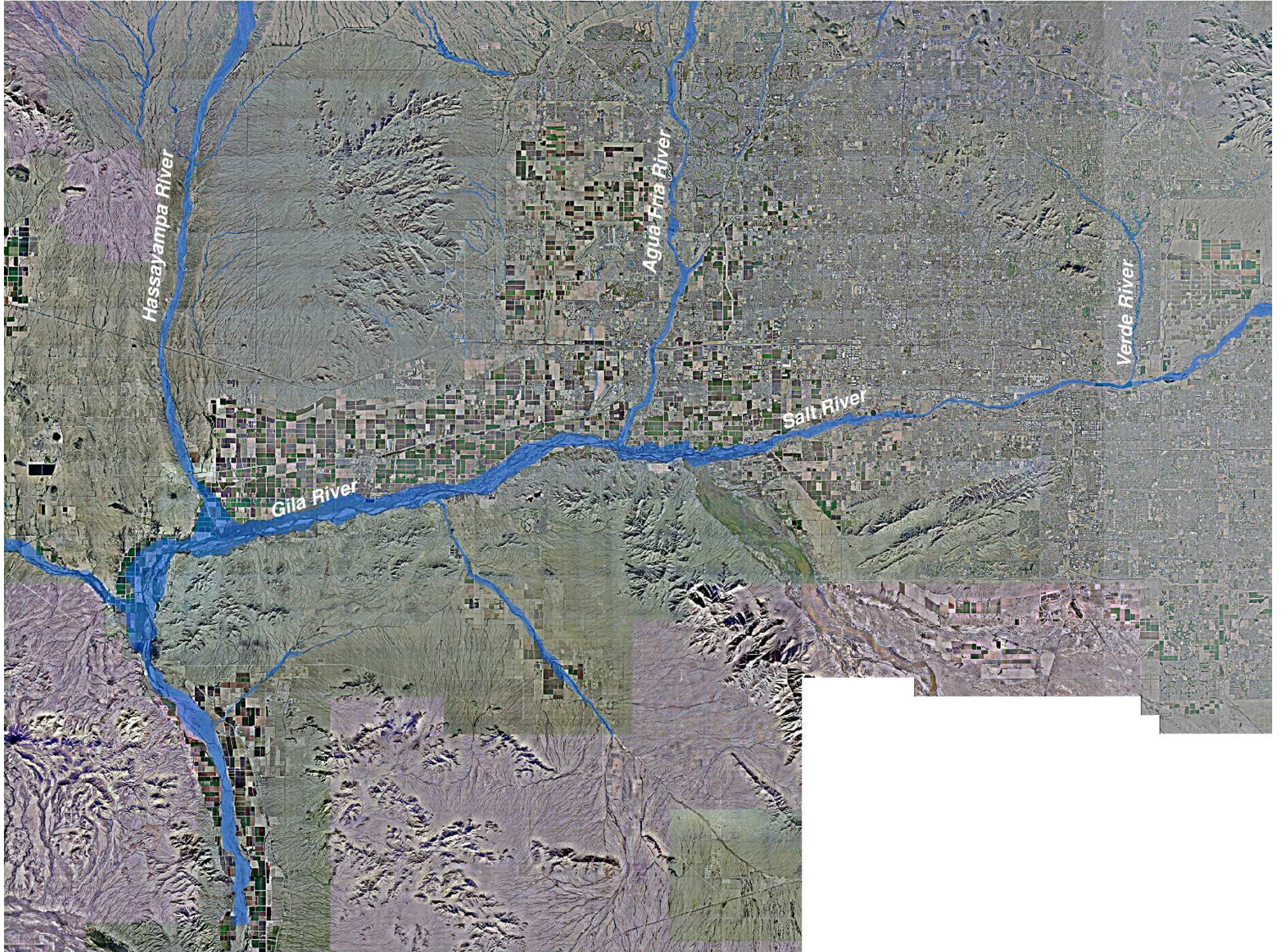
Produced by:

BGS

Date:

10/21/2002







# Past struggles

- Maricopa County – over 9,000 square miles with 26 separate governments
- Started in 1993 with three Phase I cities
- Now 5 Phase I permits and 21 Phase II
- County has Phase II issued in Dec. 2007
- Arizona Dept. of Transportation has separate individual permit
- Second ADOT and some second Phase I permits just issued this year

# What are permit issues?

- Sampling and storm/rainfall patterns
  - Summer wet season June 1 to Oct.31
  - Winter wet season Nov. 1 – May 31
  - Sample over three hours or whole storm, whatever is longer (from Mesa permit)
  - Sample storm events producing 0.10 inches or greater of rainfall, and if not, explain conditions that prevented or did not require sampling (Tempe permit)
- Standards and natural background
- Where are outfalls, and into what?
- Modifying Best Management Programs



# Construction monitoring

- Phase II permit requires developing and enforcing construction site program for sites greater than one acre
- New Phase I permits require cities to have “own ordinances and tools to control discharges from construction sites”
- State also requires construction permits

# Proposed EPA rule for permits

- Mandatory inspection of all sites after .5 inch rain events
- Monthly inspections at sites greater than one acre
- Tracking of inspection numbers
- “Rigorous inspection protocol” is necessary for consistent inspection and enforcement actions



# More clouds in the future

- Post-construction controls
- Low impact development
- Green infrastructure
- Important initiatives
- Retrofitting
- Who will pay for changes?
- Who will maintain changes in perpetuity?

# Policing a system

- Miles of interconnected channels
- Multi-jurisdictional including ADOT
- Outfall into “Waters of the U.S.” may be miles from any particular discharge
- Who is responsible?
- What happens when the HOA goes bankrupt?

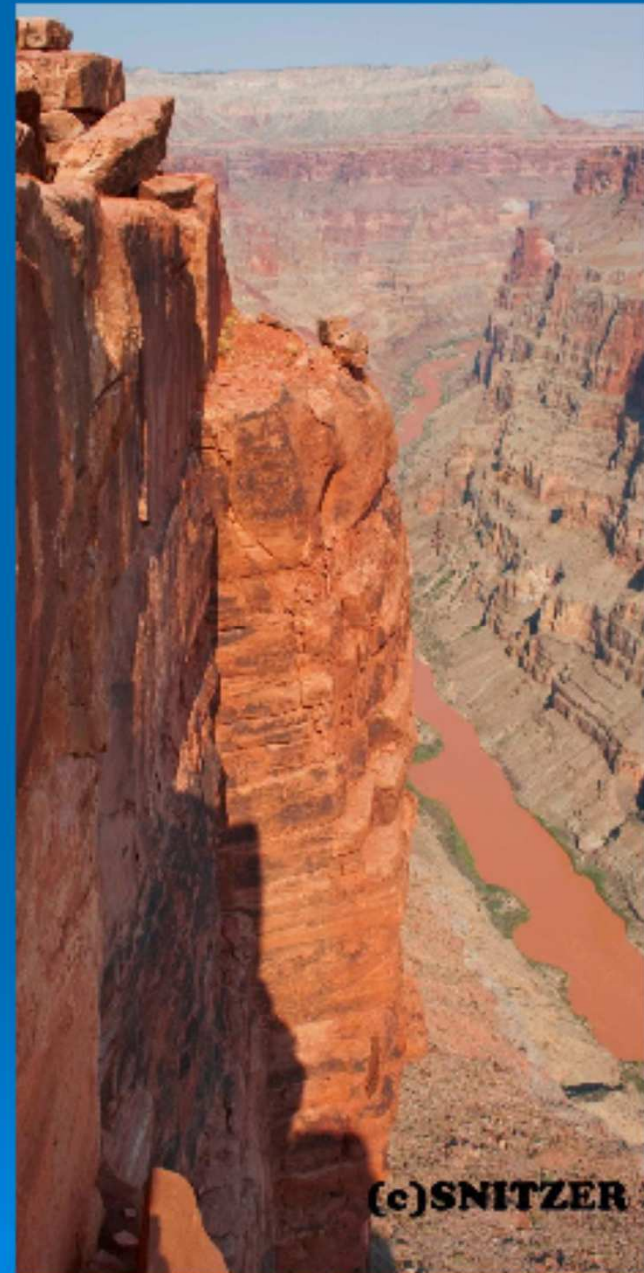
# Without sediment – “in danger”

- “...less able to support...natural environment...sediment trapped...native fish struggle to survive...in danger of becoming a sterile, manmade channel, lined with invasive species...”

– The Arizona Republic, August 24, 2010, page A7



Thank you to Stan for the Grand Canyon  
Slides



# Talking dirt

- Sediment movement is part of the natural process in the southwest
- If you take it out at point A the stormwater will just find some other sediment to carry at point B
- Liability for deposition and erosion





# Key NRC Recommendations

- “A straightforward way to regulate stormwater contributions to waterbody impairment would be to use flow, or a surrogate such as impervious cover, as a measure of stormwater loading...”
- “Efforts to reduce stormwater flow will automatically achieve reductions in pollutant loading.”

# More NRC recommendations:

- “Moreover, flow itself is responsible for additional erosion and sedimentation that adversely affects surface water quality.”
- “Stormwater control methods that harvest, infiltrate and evapotranspire stormwater are critical to reducing the volume and pollutant loading of small storms.”

# Low Impact Development

- Goal is to mimic pre-development hydrology
- Regulatory assumptions in some new permits are “on-site” retention is best
- Rain gardens, grassy swales may not be best solution for arid areas



# Who owns the water?

- All surface water in the Salt River Valley fully appropriated since 1892
- On-site detention of water other than sheet flows, with no discharge up to certain level, may trigger water right claims



“The waters of all sources, flowing in streams, canyons, ravines or in other natural channels, or in definite underground channels, whether perennial or intermittent, flood, waste or surplus water, and of lakes, ponds and springs on the surface, belong to the public and are subject to appropriation and beneficial use...” A.R.S. 45-141

# Prior appropriation doctrine

- Any person may appropriate unappropriated water for personal use or for delivery to customers
- For uses including municipal, industrial, agricultural, mining, wildlife and fish, power generation, recreation
- The person first appropriating shall have the better right.     A.R.S. 45-151

# Best place to catch stormwater?

- Trap it on-site?
  - “a quarter inch of rain can fill three 50-gallon barrels” (from Arizona gardening column)
- Use it in “green infrastructure”?
  - Watercourses
  - Lakes
  - Recreation areas



# Rainwater harvesting

- Tucson passed commercial requirements in October 2008, started June 2010
- Ordinance 10597 requires
  - Water budget
  - Implementation plan
  - Separate water meter for landscaping
  - “any combination of capture, conveyance, storage and distribution”
  - Within 3 years 50% of landscaping watered

# Tucson Development Standard

- No.10.03.0 effective June 1, 2010 details:
  - Annual average 9" rain = 244,386 gal/acre/yr
  - 4:1 ratio of catchment to plant coverage area
  - Keep away from buildings and pedestrians
  - Design inlets to avoid unsafe weight on roofs
  - Clean monthly
  - For water quantity, not quality

# Green streets in Tucson

- Watershed Management Group published “Green Infrastructure for Southwest Neighborhoods”
- Rainfall less than one-tenth of inch produces no runoff
- Average of 19.5 runoff events annually
- Irrigate 2-3 years, then wean plants off

# Reviving the Salt River

- “With no perennial water source, the Salt evolved into something more like an ephemeral desert river, funneling storm runoff, draining washes and, at several locations, carrying effluent from wastewater-treatment plants.”

– The Arizona Republic, Oct. 3, 2010, p. A16

# A stormwater fed “accident”

“One of the most vibrant and unusual lengths of the lower Salt is also something of an accident. Near the intersection of Loops 101 and 202,...a wetland has emerged in recent years...Water collects in ponds. Lush green vegetation surrounds the ponds and lines the riverbanks. Birds nest. Otters have been spotted...The source of water for this accidental wetland is a mix of treated wastewater [and] storm runoff...”















A photograph of a 'NO TRESPASSING' sign mounted on a metal bridge railing. The sign is white with a black border and black text. It is positioned in the foreground, with a body of water and a bridge structure visible in the background. The railing consists of vertical metal bars and a horizontal top rail. The background shows a calm body of water reflecting the sky, with a concrete bridge structure and several support pillars. There are some green bushes and grass in the immediate foreground and along the water's edge.

**NO TRESPASSING**  
VIOLATORS  
WILL BE PROSECUTED  
UP TO \$ 1000 FINE <sup>AND/OR</sup>  
6 MONTHS IMPRISONMENT  
ARS 13-1502 AND 13-1602  
FLOOD CONTROL DIST. OF MARICOPA CO.

# Maricopa County's greenbelts

- Va Shly'ay Akimel – Mesa and SRPMIC
- Wetlands – Mesa and Tempe and FCDDMC
- Town Lake – Tempe
- Rio Salado Project – Phoenix and FCDDMC
- Tres Rios – Phoenix, FCDDMC, Avondale, BLM, GRIC
- Rio Salado Oeste - Phoenix
- El Rio – Buckeye and FCDDMC



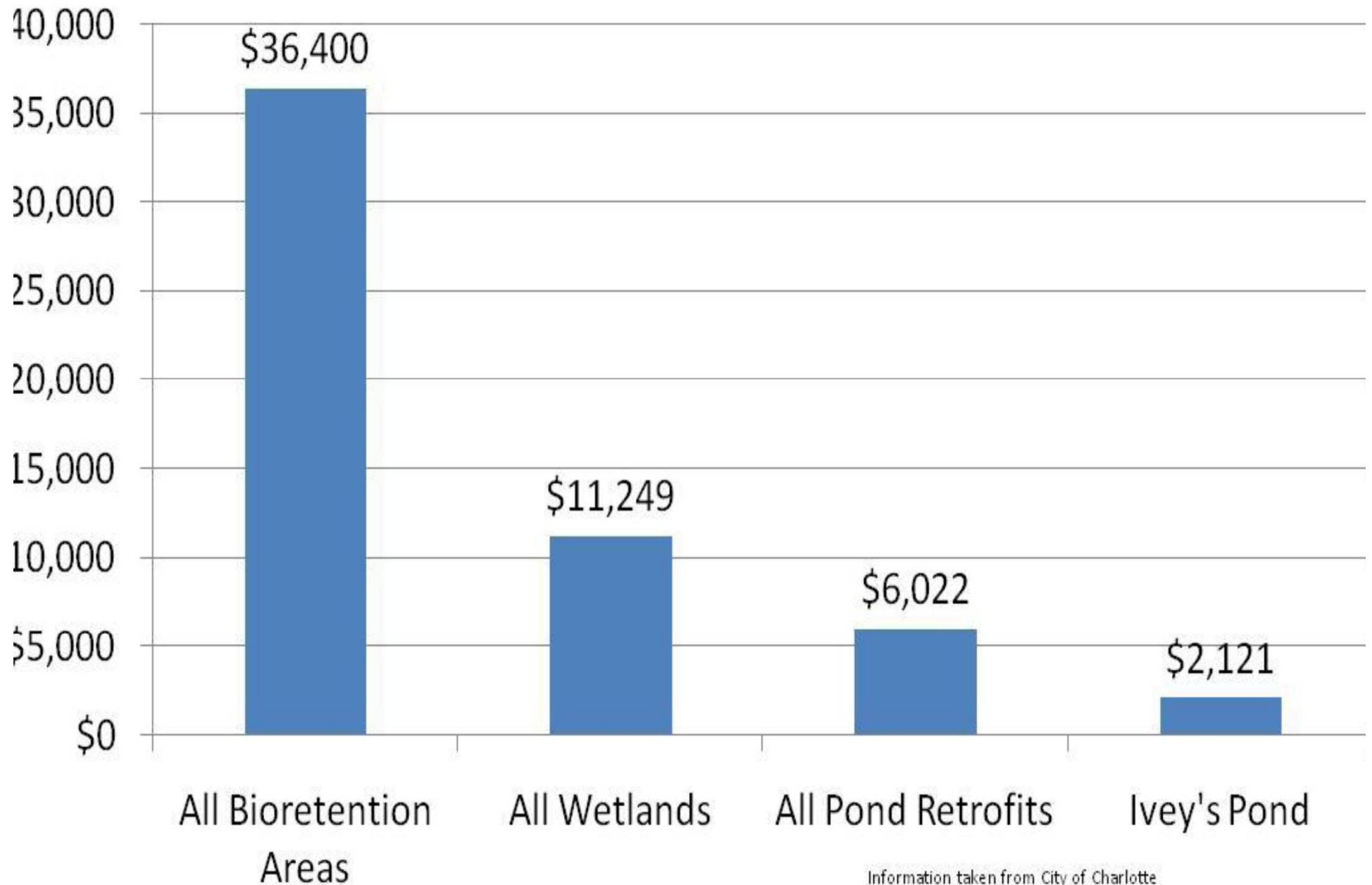
# On-site experience

- Maricopa County and most cities have had detention requirements for stormwater quantity for many years
- Moved from individual lot on-site to subdivision or regional basins
  - On-site hard to enforce
  - Lots sold, no memory
  - Enforcement difficult and expensive

# Cost matters!

- Studies done by Denver regional flood control district show big savings for use of regional basins
- Maintenance cost per treated acre:
  - wetlands = \$150 annually
  - wet ponds = \$220 annually
  - bioretention (rain gardens) = \$1,250

## COST PER WATERSHED ACRE TREATED (Typical 70% BMP efficiency)



# The NAFSMA study

- An important finding of the study was that consolidated community-based BMPs such as extended detention basins, retention ponds and sand filter basins are capable of intercepting runoff from large areas very effectively and with little bypass, more so than inlet or lot-based BMPs.

“Given the experiences we have shown with effectiveness and costs of green infrastructure, it is clear that allowing local jurisdictions the opportunity to determine for their community which type of measure they use is vitally important. We can often get more pounds of pollutant removed and more acres treated through near-site or off-site regional BMPs (dry detention, wet detention, wetlands and ponds) for far less money spent.”

NAFSMA Congressional testimony 9/30/10

# Tools, science, flexibility

- All local governments agree - cost matters
- Clean water goals are important
- Programs can't be "one size fits all"
- Regional hydrologic conditions matter!