



NACWA 2014 Winter Conference

January 3, 2014



Albuquerque's MS4 Permit

Past, Present & Future

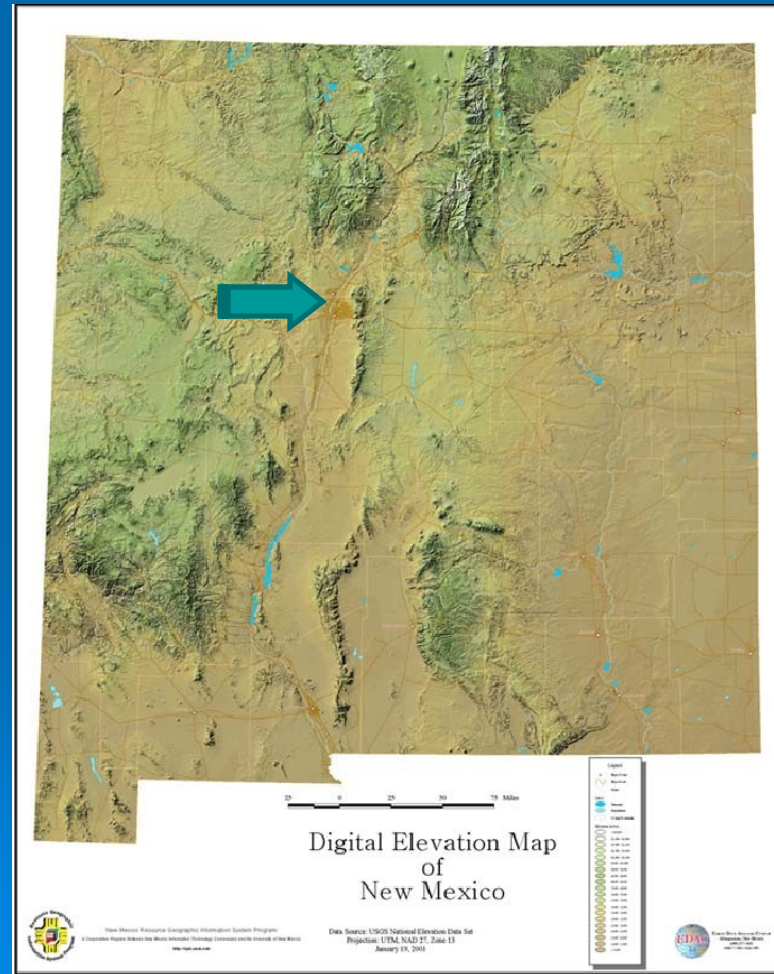
Kevin Daggett, P.E., P.S.; Stormwater Section Manager
Engineering Division
Department of Municipal Development

Background

- Albuquerque is a 188.6 square mile city of 530,000 population within a metropolitan area of 900,000
- Albuquerque was founded in 1706 and celebrated its tri-centennial eight years ago
- It is the largest city in New Mexico and the only one with a population over 100,000
- We are located in north central New Mexico on the Rio Grande

Albuquerque, NM

- Middle Rio Grande Valley in North Central NM



Aerial View of Albuquerque

- Rio Grande Flows South through the Center of the City
- Sandia Mountains Rise a 5,000' above the Valley on the East
- Rio Puerco Divide Rises 1,000' above the Valley on the West
- Majority of the Metro Population is on the East Side of the River



ALBUQUERQUE'S CLIMATE & GEOGRAPHY PRODUCE UNIQUE CHALLENGES

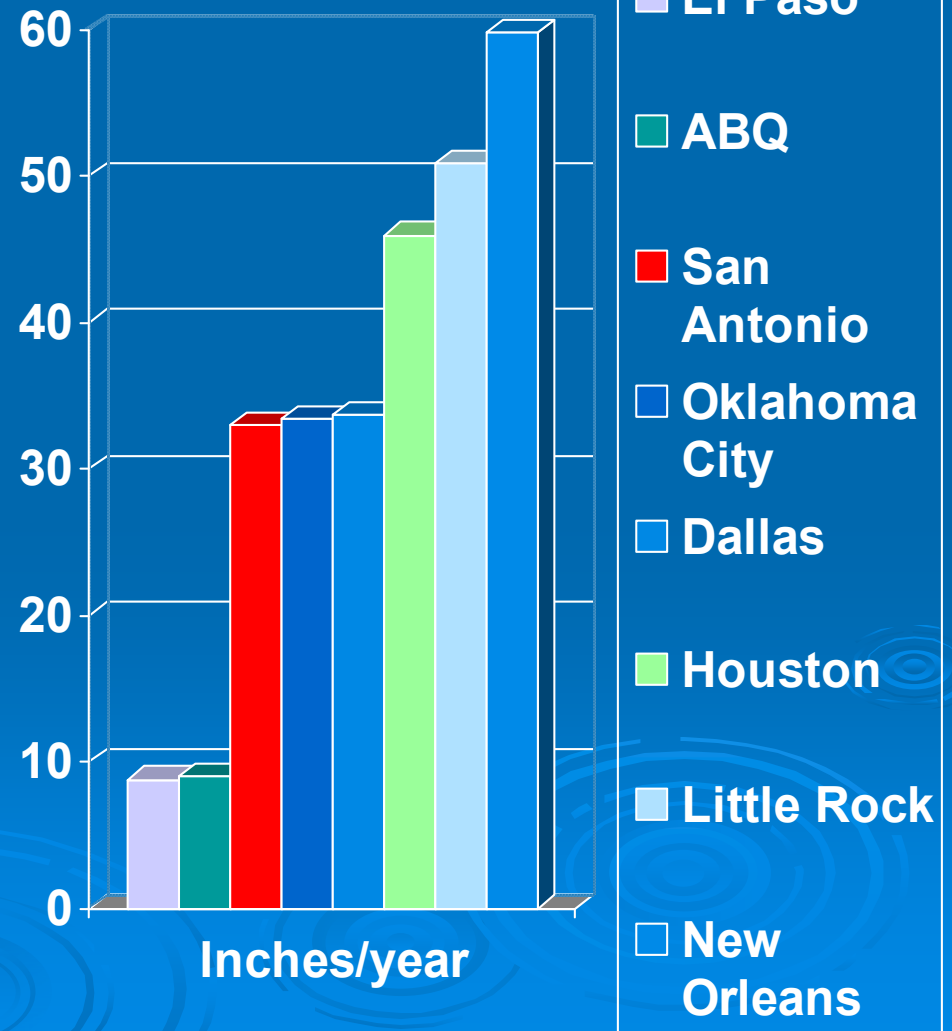
1. Albuquerque's climate is mild with 300 days a year of sunshine and temperatures between 20 and 95 degrees Fahrenheit.
2. Annual precipitation is only 9 inches which classifies it as arid.
3. Most of that precipitation occurs in the "Monsoon Season" which is July – September.
4. A typical "Monsoon" storm is a localized thunderstorm with very high intensity and short duration usually lasting 1 to 2 hours.
5. Large volumes of stormwater very quickly from storms with intensities of 2 to 6 inches per hour of rainfall.
6. Albuquerque terrain produces natural drainages (arroyos) that have very steep slopes ranging from 3 to 6%.
7. Soil types are primarily very erodible, course-grained sands.
8. The high-intensity short-duration storms and steep terrain create very high velocities in arroyos, channels, pipes and streets.
9. High volumes and velocities present significant challenges to flood control, erosion prevention and water quality.



Albuquerque Precipitation compared to other Region 6 cities

30 year mean average from 1971 to 2000 from NOAA

➤ El Paso	= 8.8
➤ ABQ	= 9.0
➤ San Antonio	= 33.0
➤ Oklahoma City	= 33.4
➤ Dallas	= 33.7
➤ Houston	= 46.0
➤ Little Rock	= 50.9
➤ New Orleans	= 59.8



History of Stormwater Regulations

- *National Pollutant Discharge Elimination System (NPDES)*
 - Authorized by the federal **Clean Water Act of 1972**
 - The **Water Quality Act** of 1987 added **Section 402** requiring EPA to issue National Pollutant Discharge Elimination System (NPDES) permits for the following categories:
- *Phase I Industrial Sources*
- *Phase I Large MS4s (started 1991)*
 - Municipalities greater than 250,000 population
- *Phase I Medium MS4s (started 1991)*
 - Municipalities greater than 100,000 and less than 250,000 population
- *Phase II (started 1999)*
 - Urbanized areas greater than 10,000 population
- **MS4** = **M**unicipal **S**eparate **S**torm **S**ewer **S**ystem. A conveyance or system of conveyances, owned by a state, city, town, or other public entity that discharges stormwater to waters of the U.S. and is not part of a combined sewer or a Publically Owned Treatment Works (POTW).



Albuquerque MS4 Permit

Role of EPA

- New Mexico does not have “Primacy”, which means it is one of only four states in the U.S. whose permits are regulated and enforced by the EPA and not the State’s own Environmental Department.
- EPA Region 6, located in Dallas, TX, is responsible for administration of all of the NPDES MS4 permits issued in the State of NM.



Cuyahoga River Fire - 1969



EPA Storm Water Quality Permit

History of the EPA Storm Water Quality Permits

Albuquerque's MS4 Permit History

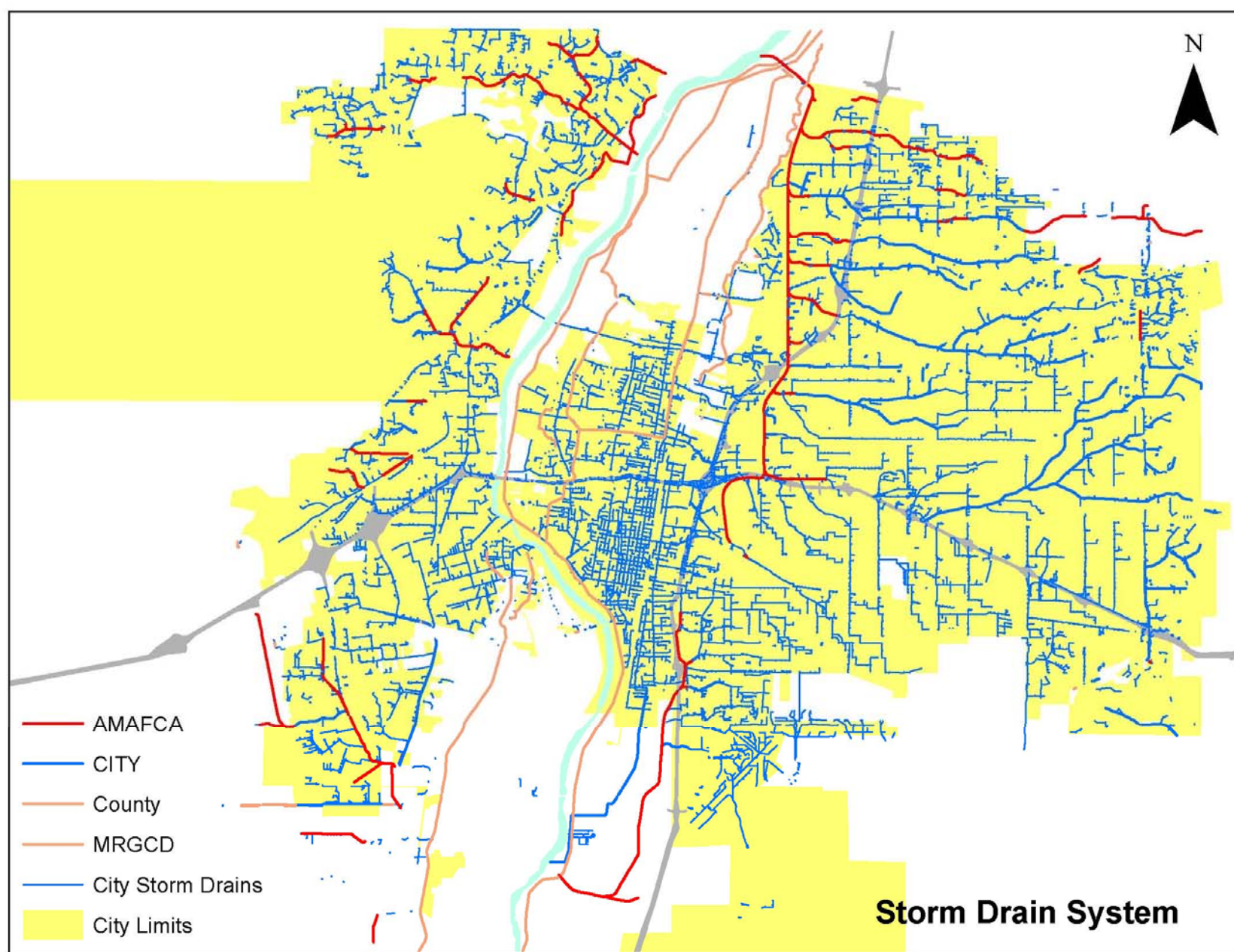
- In 1991 Albuquerque applied to the EPA Region 6 for its first MS4 permit. It was put on hold by the EPA to focus on other larger cities in Region 6 states (Texas, Oklahoma, Louisiana, and Arkansas).
Albuquerque was the last city in the U.S. to be issued an MS4 permit.
- In 2003 Albuquerque was issued its first MS4 permit. The permit was very general with few specifics and mostly focused on chemical data collection at the major outfalls to the river.
- The first permit should have expired in 2008 but was administratively extended by Region 6.
- In 2012 Albuquerque's second permit was issued and included new and more stringent requirements.



Albuquerque Metro Area MS4 Permit

2012 MS4 Partners (4) in Albuquerque

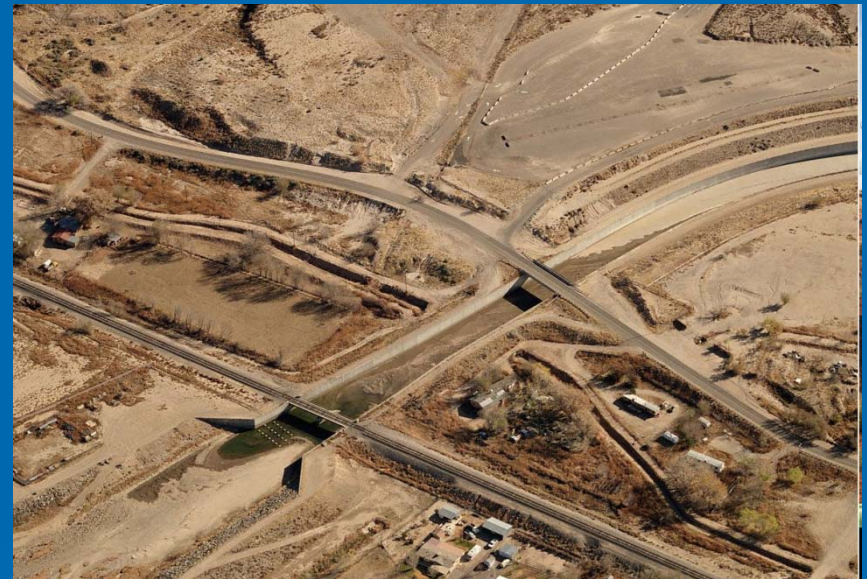
- City of Albuquerque
 - The Storm Drainage Section of the Department of Municipal Development has the responsibility of permit compliance within the City limits.
- University of New Mexico (UNM)
 - The Environmental Health and Maintenance Departments are responsible for permit compliance within their 210 acre campus.
- New Mexico Department of Transportation (NMDOT)
 - The Maintenance Department of District 3 is responsible for permit compliance on their streets and freeways within the Albuquerque MS4 boundary.
- Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA)
 - The Storm Water Quality Program Engineer coordinates with other AMAFCA staff to assure permit compliance within the AMAFCA jurisdictional area.



Capabilities

The Rio Grande and Albuquerque MS4

- 722 miles of storm drain pipes
 - 16,100 street drainage inlets
- 69 miles of concrete lined channels
- 50 miles of unlined, natural arroyos
 - 122 drainage retention ponds
 - 45 flood control dams



Each year our 8.7 inches of rain puts about 5.9 billion gallons of stormwater runoff into the Rio Grande. That stormwater does NOT receive any chemical or biological treatment.

Evidence of Urban Contaminants in Stormwater



Natural Material



Dumpster Juice

A few structural controls are in place to collect gross contaminants and detain sediments:

- 98 WQ inlets/ manholes
- 65 Trash racks



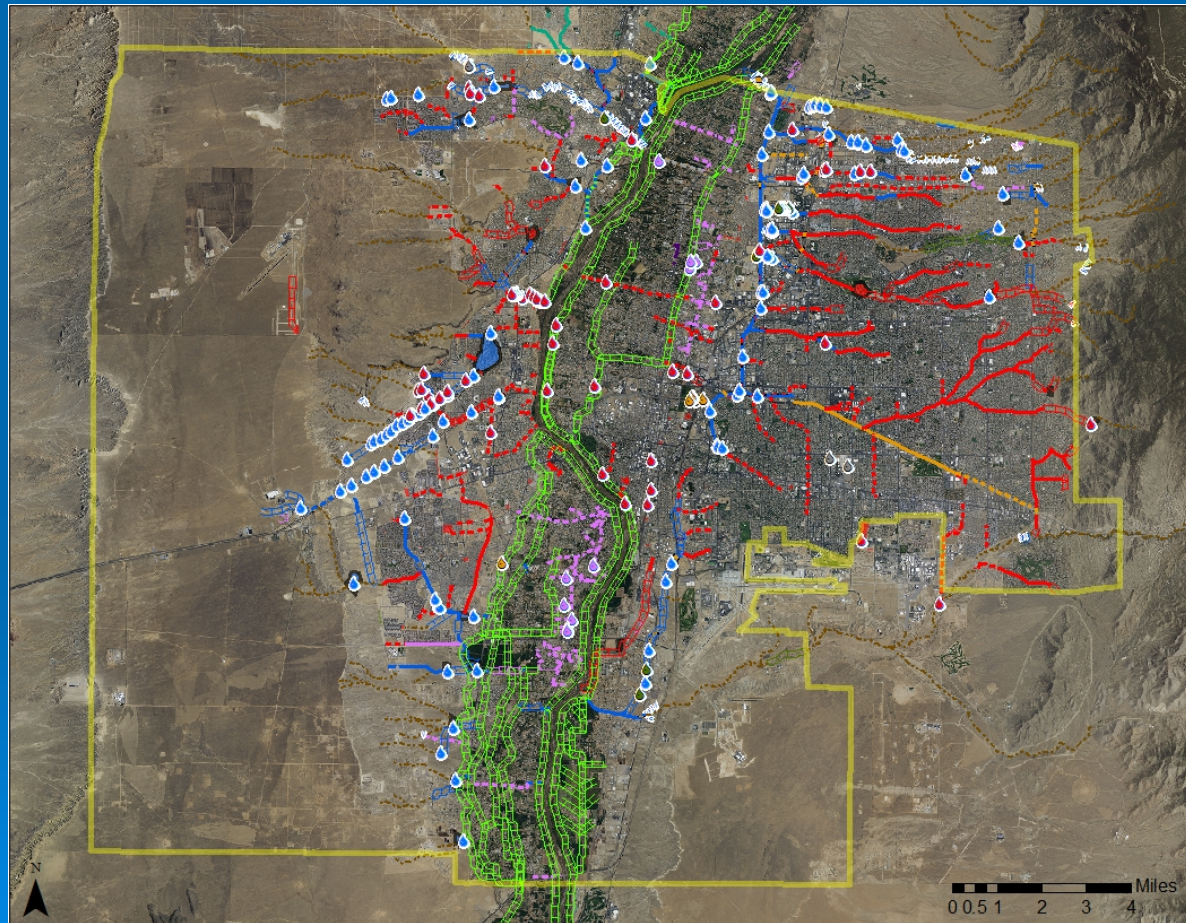
Trash/Floatables



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Albuquerque MS4 & Water Quality Facilities

Blue = AMAFCA Red = COA Orange = NMDOT Magenta = Bernco



MIDDLE RIO GRANDE IMPAIRMENTS, POLLUTANTS OF CONCERN & TMDLS

- The New Mexico 303(d) / 305(d) Integrated List identifies the following designated uses and impairments for the Middle Rio Grande reach:

Designated Use

1. Irrigation
2. Livestock Watering
3. Wildlife Habitat
4. Marginal Warmwater Aquatic Life
5. Primary Contact
6. Public Water Supply

Attainment

- Fully Supported
Fully Supported
Fully Supporting
Not Supporting
Not Supporting
Not Assessed

Impairment

1. *E.Coli*
2. Dissolved Oxygen
3. Temperature
4. PCBs
5. Gross Alpha

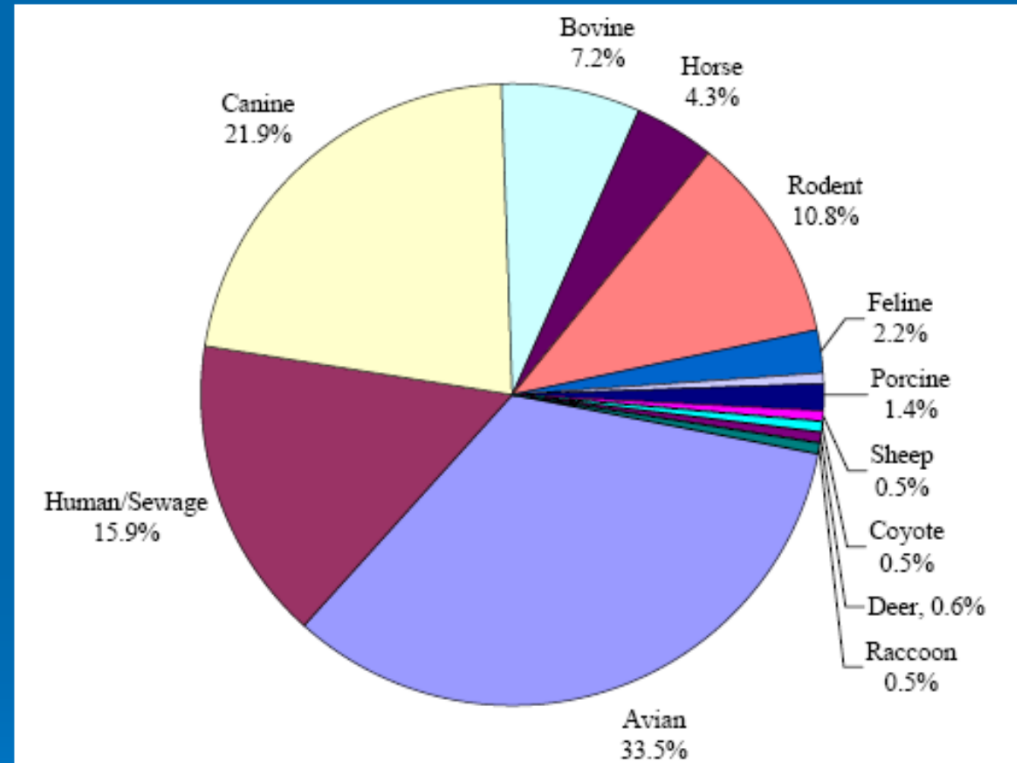
TMDL Schedule

- 2009
2016
2016
2016
2016

- Other pollutants of concern include sediment (erodible soils and ESA issues), gross organic debris, nutrients, floatables, and trash.

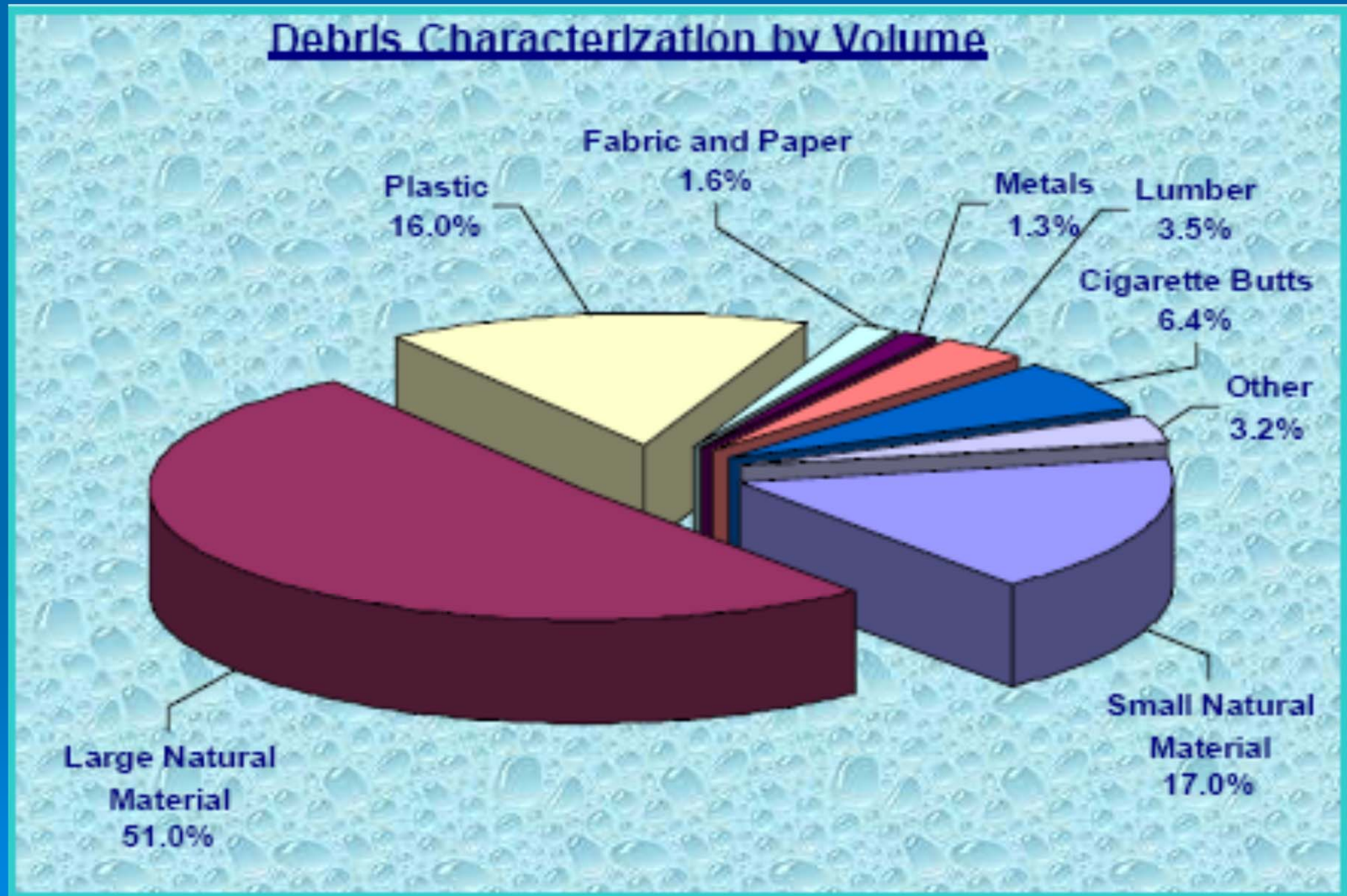
Bacteria (E-coli)

- Used as an indicator of fecal bacteria pollution of all types
- Middle Rio Grande declared impaired since 2000
 - Does not meet standards for designated uses
 - Total Maximum Daily Load report prepared by NMED (2010)
- 2005 MST study showed stormwater sources as birds, dogs & humans



**MRG Microbial Source Tracking
Assessment Report, Parsons Water &
Infrastructure, October 2005**

Gross Pollutant Study



EPA's Biological Evaluation

- In 2010, EPA wrote that “stormwater discharges may affect, but are not likely to adversely affect” the RG Silvery Minnow
- USFWS disagreed
- Consultation began
- EPA called for Formal Consultation in early 2011



3 inches

USFWS Biological Opinion

- Completed in June of 2011, response to the EPA's Biological Evaluation
- Allows incidental takes (harassments and mortalities) annually due to stormwater discharges with low dissolved oxygen (DO)
- Requires 10 "conservation measures" be added to our MS4 permit



USFWS Biological Opinion

Conservation Measures

- ✓ Identify suspended solid and sediment sources and transport pathways in the storm runoff events from urban area basins.
- ✓ Encourage the simultaneous or replacement of methods to determine TSS with the more accurate methods to determine Suspended Sediment Concentration (SSC).
- ✓ Identify pollutant concentrations on SSC and develop BMPs to reduce SSC containing pollutants effects on silvery minnow habitat.
- ✓ Estimate carbonaceous oxygen demand, SSC and ammonia concentrations associated with stormwater and their relationship to low DO events in the Rio Grande and potential effects to silvery minnow.
- ✓ Improve mixing model accuracy of stormwater runoff and its effects on DO concentrations in the MRG.
- ✓ Identify the chronic effects of avoidances of low DO concentrations to silvery minnow under a range of water temperatures from 51 to 95 °F
- ✓ Amend the SWMP to include PCB monitoring within the NDC outfall, San Jose Drain outfall, and the MRG both upstream and downstream of the Albuquerque urban area.
- ✓ Measure PCBs in insect prey of the flycatcher, conduct PCB accumulation studies on the flycatcher or a surrogate, including collection of addled flycatcher eggs by the permittee through Service's issuance of ESA permits and then analyze them for PCBs.
- ✓ Implement recovery actions identified in the flycatcher and silvery minnow recovery plans.
- ✓ Encourage volunteers, educators and classrooms to “adopt-a-watershed” for the stormwater basins that their schools reside in.

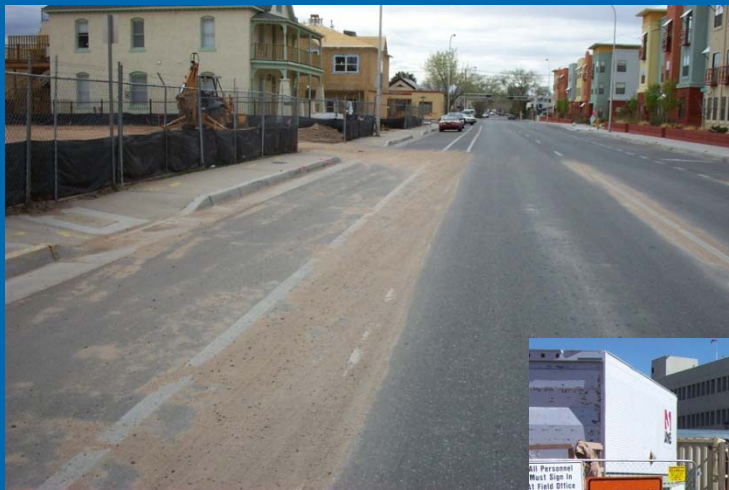
Albuquerque Metro Area MS4 Permit

➤ MS4 Permit Requirements

- Six Minimum Control Measures
 - Construction Site Storm Water Runoff Control (Requires New Ordinance)
 - Post-Construction Storm Water Management in New Development & Redevelopment (Requires New Ordinance)
 - Pollution Prevention/Good Housekeeping for Municipal Operations
 - Illicit Discharges & Improper Disposal
 - Public Education & Outreach
 - Public Participation & Involvement

Six Minimum Measures

Construction Runoff Control Requirements



- SWPPPs for all City projects are reviewed and maintained by Municipal Development
 - SWPPPs for private and commercial development are reviewed and maintained by Planning Department
- New requirements mandate inspection of ALL construction sites now a requirement
- Creation of new Drainage and Storm Water Quality Ordinances

Storm Water Pollution Prevention Plans (SWPPPs) are required for all sites disturbing greater than 1 acre. A SWPPP discusses the potential for storm water pollution generated on site and the means (BMPs) to mitigate them.



Six Minimum Measures

Post Construction Runoff Control Requirements

- Creation of 2 new draft ordinances: “Storm Water Drainage” and “Storm Water Quality” and changes to our development process manual guidelines (DPM).
- The “Drainage” Ordinance specifies capture first ½ inch of rainfall or “first flush”. This represents 90% of Albuquerque’s rain storms. More intense storms would bypass the controls.
 - The “Quality” Ordinance regulates discharges that occur “post construction”, including industrial discharges.
- Future DPM changes include potential incentives for LID features.

**Low Impact Development (LID) is
also referred to as
“Green Infrastructure”**



The Approach

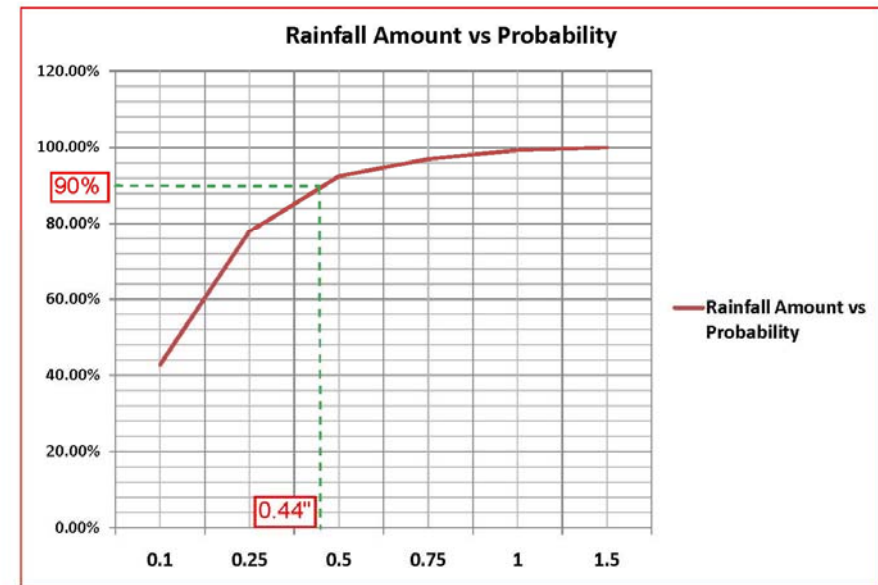
In analyzing precipitation statistics from 1891 to 2010, the rainfall volume vs. probability curve showed the 90th percentile storm was 0.44 inches.

0.44" was the volume chosen as the LID volume for first-flush capture

Albuquerque Precipitation Statistics 1891-2010
Number of Events per Period

Period	Yrs of Record	Precipitation Range					
		0.1"	0.25"	0.5"	0.75"	1"	1.5"
1891-1910	20	414	192	67	29	16	3
1911-1930	20	504	233	70	19	11	4
1931-1940	10	0	225	0	0	7	0
1951-1970	20	443	0	62	0	10	0
1970-2010	40	79	532	291	102	34	18
Totals	110	1440	1182	490	150	78	25
Percentages		42.79%	35.13%	14.56%	4.46%	2.32%	0.74%
Accumulated		42.79%	77.92%	92.48%	96.94%	99.26%	100.00%

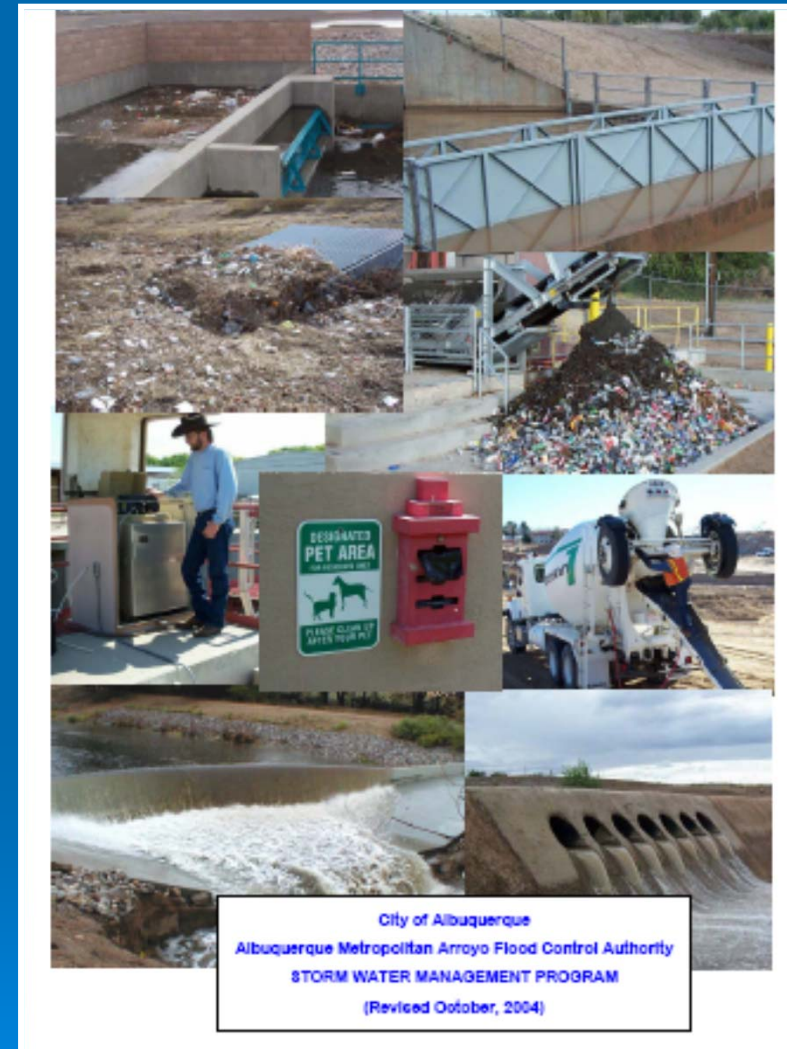
Events per Year		13.1	10.75	4.45	1.364	0.709	0.227
Rainfall Volume		0.1	0.25	0.5	0.75	1	1.5



Six Minimum Measures

Good Housekeeping Requirements

- Management and Employee Storm Water Pollution Prevention Training
- Preparation of Storm Water Management Plans (SWMPs) for every facility
- Facility Audits (by consultant)
- Herbicide and Pesticide Application Training Programs
- Examination of facility LID retrofits
- Street Sweeping, Vegetative Maintenance, and Roadway Debris Control



Six Minimum Measures

High Risk Industrial and Illicit Discharge Detection and Elimination (IDDE) Programs and Requirements

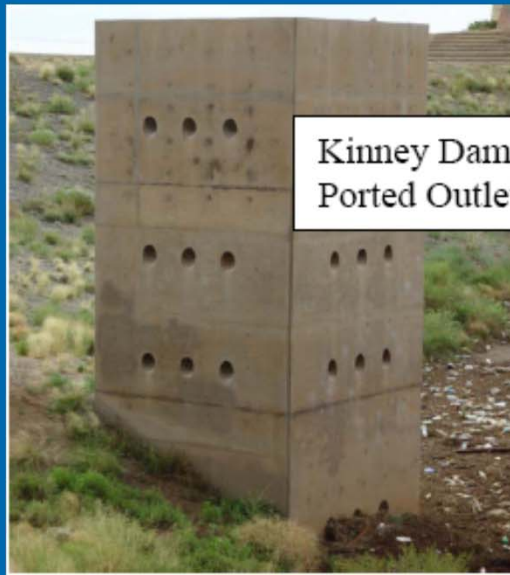


- prohibit non-stormwater discharges through an ordinance, including implementation of defined procedures to prevent illegal dumping and penalties for noncompliance (Storm Water Quality Ordinance)
- coordinate IDDE activities with adjacent municipalities
 - investigate any illicit discharge within 48 hours
 - create a database of potential high risk dischargers
- conduct site visits of facilities requiring federal Multi-Sector General Permit (MSGP)
- create a targeted source reduction program for multiple violators
- maintain a current GIS map of previous illicit discharges
 - develop a priority ranking of basins with percent severity of known or suspected pollutants



Six Minimum Measures

Control of Floatables Through Structural Best Management Practices



Kinney Dam Reverse Slope
Ported Outlet



Trash Rack Detail – South Broadway
Pond (4/23/04)



Menaul Basin Screen &
Baffled Pipe Outlet



Bear Canyon Debris Removal
Retrofit



Tierra Oeste Debris
Manhole



Bear Canyon Debris Fence and
modified dumpsters

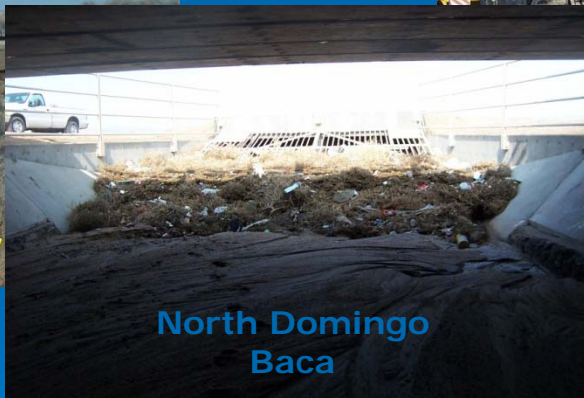


Six Minimum Measures

Silt and Trash Removal: In 2007, AMAFCA removed 2000 CY of trash and 246,000 CY of sediment from their arroyos and detention basins. Labor costs for trash and sediment removal was \$110,000.



North Diversion Outfall



North Domingo
Baca



Amole

Note that 600 CY is the approximate volume of a 2000 sq ft house with 8 ft ceilings. So 246,000 CY of material is the equivalent volume of over 400 houses

Six Minimum Measures

Silt and Trash Removal: In 2007, COA maintenance crews removed 1600 CY of silt and 2300 CY of trash from arroyos and detention basins. About 4000 CY of sediment was also removed from city streets by street sweeping crews. Labor and equipment costs were \$3.5M.



Six Minimum Measures

Structural Controls: The Hahn Arroyo Storm Water Quality Structure – A larger scale BMP and example of interagency cooperation between **the City of Albuquerque and AMAFCA**



Six Minimum Measures

Education and Outreach Program

First organized in 2005
Phase I MS4 co-permittees (AMAFCA, COA, UNM, NMDOT), plus Bernalillo County (Phase II), Cooperative Funding Agreement. SSCAFCA joined the team in 2008.

Purpose and Mission

“The Storm Water Team is a multi-agency committee *dedicated to providing public education and awareness* regarding storm water pollution and how to reduce debris and other pollutants in the ... Rio Grande”

Each agency contributes \$10,000 per year to fund:

- Radio & TV ads
- Brochures & bumper stickers

• www.keeptheriogrand.org website

- Arid LID workshops in 2010 & 2011
- Classroom Instruction
 - Children's Water Festival
- Storm Inlet Markers

Bumper
sticker

**Scoop the
Poop**
Keep the **RIO** Grand



Six Minimum Measures

➤ Education and Outreach

- Pet Waste Program

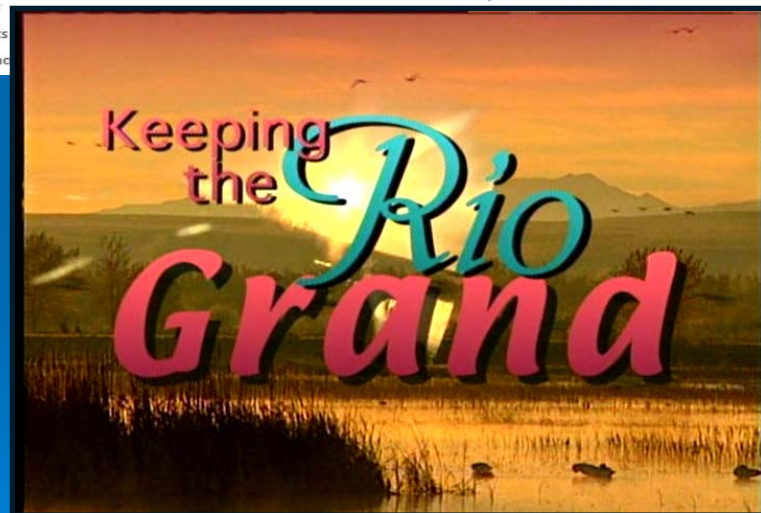


Uncollected dog waste on the city's streets and rights of way is washed into the Rio Grande during rains. It overwhelms nature's ability to absorb and treat and could harm aquatic animals and the endangered Rio Grande Silvery Minnow.

- ❑ **Distribution of educational brochures, pens, sticky pads, rack cards at local events (Q-jam, State Fair) and to community centers**

Advertising Campaign

*Website Update
(92,000 hits in 2012)*



*PSA Video and Local Interviews
(KTME & GOV-16 TV)*



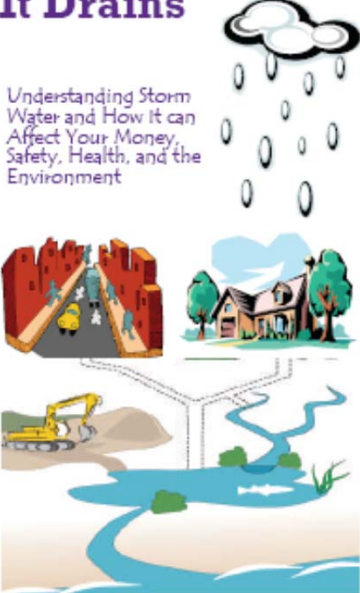
Convention Display Board

Public Education and Outreach

Brochures

**When It Rains,
It Drains**

Understanding Storm Water and How it can Affect Your Money, Safety, Health, and the Environment



City of Albuquerque
Department of Municipal Development
Storm Drainage Design
768-3645

Door Hanger

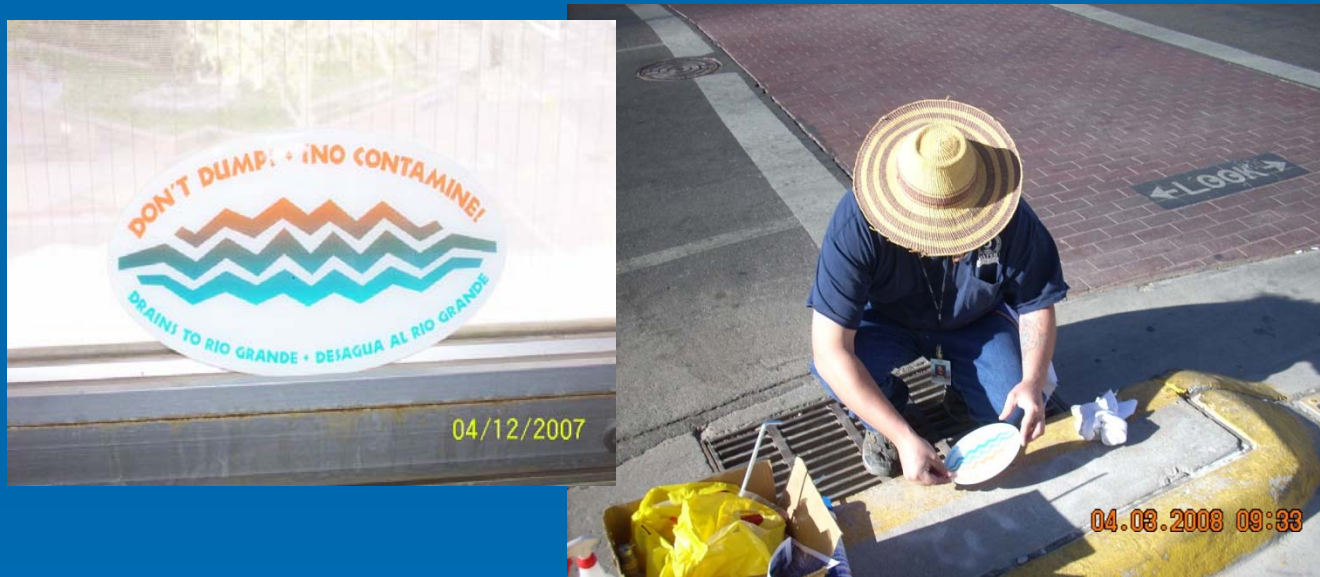


Rack Cards

10 Things YoU Can Do To Keep the RIO Grand

Public Education and Outreach

- Placement of markers on storm drain inlets



- Creation of Storm Water Education Team webpage: "keeptheriogrand.org"
- Commercials and radio ads emphasizing storm water pollution prevention practices

Six Minimum Measures



Public Involvement: Permit requires the MS4 to have a plan “to encourage public involvement and provide opportunities for participation in the review, modification and implementation of the Stormwater Management Plan

The difference between the Public Education and Public Involvement is **FEEDBACK**. EPA wants us to engage the public and obtain their input in the ongoing process.

Possible activities might include:

- Interactive webpage
- surveys or assessment of public behavioral change
 - Placing the SWMP on the web for comments
- Direct input from local, environmental groups on the plan
- Use of volunteers in pollution prevention activities

Important Permit Elements

PCB contamination

- ✓ Studies done by USGS, NMED and Bernalillo County have found high levels of PCBs in river sediments near the NDC, in ponds and in the San Jose Drain
- ✓ Levels in Rio Grande sediment exceeded human health standards by factors of between 60 to 600 times
- ✓ The NMED was looking for Los Alamos contamination and the research was funded by DOE
- ✓ When they found that local PCB contamination is NOT from Los Alamos – DOE funding ended
- ✓ EPA will require the MS4 to investigate the source of the contamination and then begin a remediation effort to eliminate it in our watershed
- ✓ Initial investigation by USGS cost \$35k



Important Permit Elements

Dissolved Oxygen

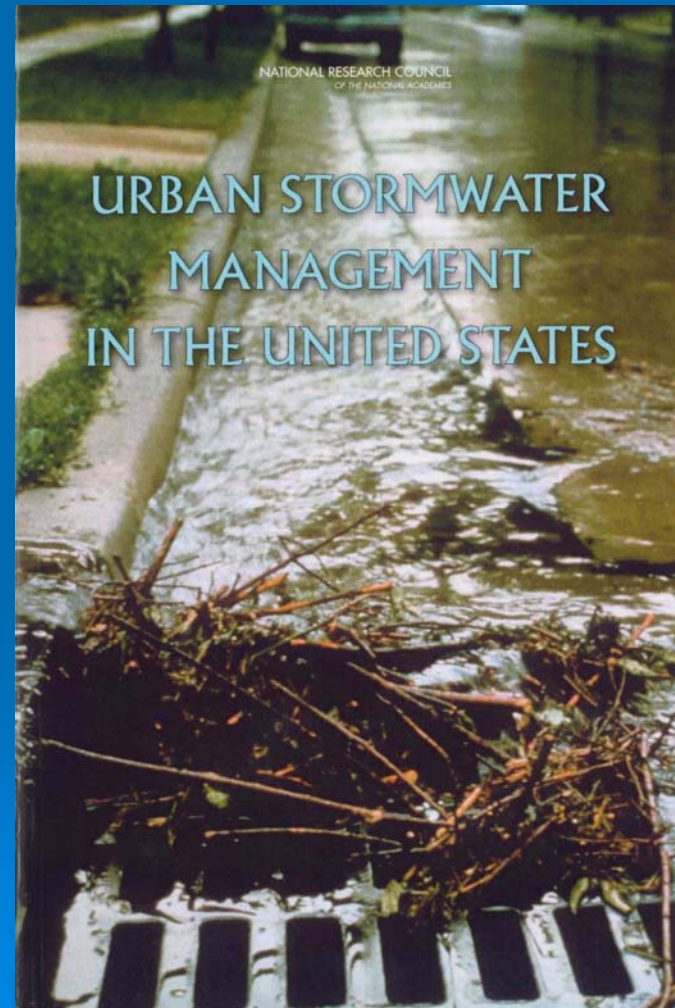


- ✓ Measured by UNM Student (VanHorn)
- ✓ Cause is the NDC Embayment (Pilot Channel)
- ✓ AMAFCA to regrade the Embayment



Future Changes -- Watershed-Based Permit

- A 2009 report by the *National Research Council* was highly critical of the EPA's current approach to urban stormwater management
- The NRC recommended that the current permitting scheme be converted to watershed-based plans
- The Middle Rio Grande was selected to be a pilot program. One of three nationally.



Future Changes -- Watershed-Based Permit



Ramsey-
Washington
Watershed,
MN

Menomenee
River, WI

Middle Rio
Grande, NM

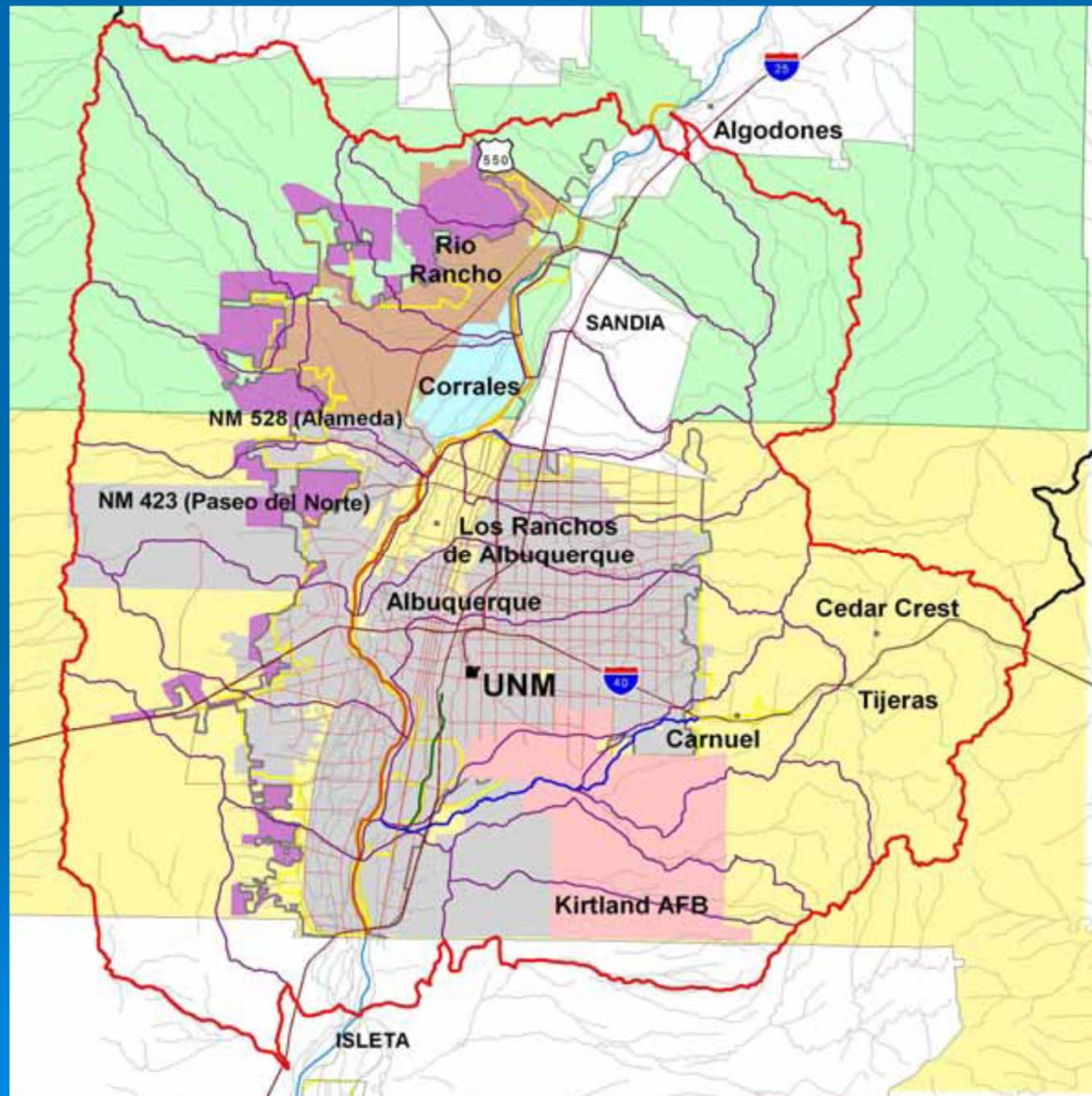
The Three National Watershed-Based Permit Pilot Programs

Future Changes -- Watershed-Based Permit

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Watershed Permit Partners

- **City of Albuquerque**
- **UNM**
- **AMAFCA**
- **NMDOT**
- Village of Carnuel (Bern Co)
- Los Ranchos de Albuquerque
- **Pueblo of Isleta**
- State Fairgrounds/EXPO
- Bernalillo County
- Kirtland Air Force Base
- City of Rio Rancho
- Town of Bernalillo
- SSCAFCA
- Village of Tijeras
- Village of Corrales
- Village of Placitas
- **Pueblo of Sandia**
- **Pueblo of Santa Ana**
- Sandia National Labs
- Sandoval County
- ESCAFCA

The Future – Watershed Based Permit

➤ Permit Requirements: 6 minimum measures + Monitoring

- “Carrots” in the form of increased compliance schedules and potentially less stringent requirements for interagency participation.
- “Sticks” in form of short compliance schedules and more stringent requirements for individual permits
- Interagency coordination in “jurisdictional” areas difficult. However “sharing” resources such as staff or existing plans and ordinances a possibility.
 - MOU regarding “general cooperation” signed by 8 agencies as of November 26, 2013:
 - Town of Bernalillo, Village of Corrales, SSCAFCA, City of Rio Rancho, SSCAFCA, AMAFCA, Los Ranchos de Albuquerque, DOE/SNL, ESCAFCA

MS4 Recent Present and Future

- One of the six is *Post-Construction Stormwater Management*, or **Low Impact Development**
- The pending permit requires that we “update or enact an ordinance to ensure implementation” of LID
- General guideline is to “*mimic pre-development hydrology*”
- The difficulty is to create and place engineering boundaries around that general guideline

LID definition

“LID is an approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible. LID employs principles such as preserving and recreating natural landscape features, and minimizing effective imperviousness to create functional and appealing site drainage that treats stormwater as a resource rather than a waste product.”

Low Impact Development (LID)

- Many implementation strategies
- Will have to be defined differently in Albuquerque than most every other place

**“All calculations based on experience
elsewhere, fail in New Mexico”**

**Lew Wallace, Territorial Governor of New
Mexico**

from 1878 to 1881 (and author of *Ben Hur*)

So, how to define LID for Albuquerque? Remember
that 50% of our total annual rainfall happens in
just three months of the summer

Where do we go from here?



- Funding
 - Stormwater Utility?
 - Monthly fees?
- Staffing
 - Increase staff from 1 to 12 or 16
- Education

Other Cities

Oklahoma City	Stormwater Utility	\$12 mill/year
	(\$5.06/mo for residences)	
Tucson	General Fund	
El Paso	El Paso Public Utility	\$2/mo
Las Vegas	Sewer Enterprise Fund	\$230/yr
Phoenix	Fee	\$1.3 mill/yr
Seattle	Fee	(\$57.32/yr/1000 sf)
Abilene	Fee	\$0.0005/mo/sf (\$5/mo minimum) (\$25/mo maximum)
Austin	Fee	\$39.95/mo/developed acre

THE END

...or is it

THE BEGINNING

