New Mexico Environment Department
Surface Water Quality Bureau

Rio Hondo Watershed TMDL Overview

Presentation to Lincoln County Commission

December 15, 2005

The Federal Clean Water Act (CWA)

“restore and maintain the chemical, physical, and biological integrity of the Nation’s waters”

In order to reach a level of water quality that "provides for the protection and propagation of fish, shellfish, and wildlife, and provides for recreation in and on the water"

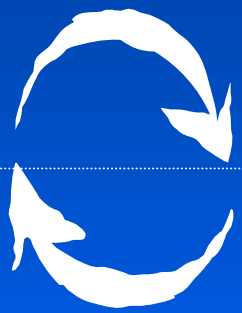
Framework for Restoring Polluted Waters

Develop Water Quality Standards

Monitor and Assess Waterbodies

List Impaired Waters (303d list)

Problem Identification



Problem Solving

Develop TMDL

Issue/ Revise Point Source Permits (NPDES)

Minimize Non-point Sources (BMPs)

What is a Total Maximum Daily Load (TMDL)?

Literal Definition

The maximum amount of a pollutant that can enter a stream without causing an impairment (violation of water quality standard).

Generally expressed in pounds/day

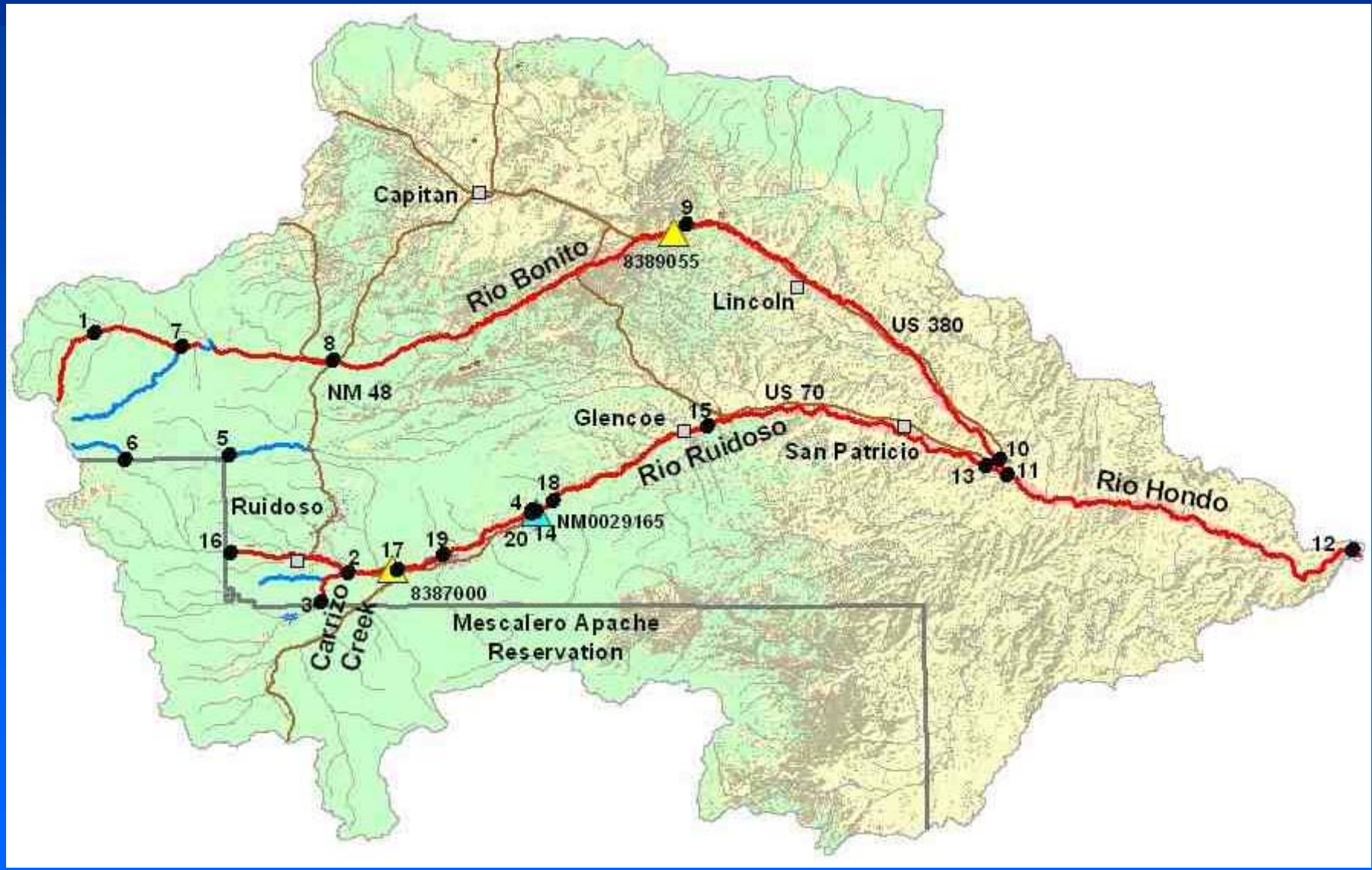
TMDL – *continued…*

- **The TMDL considers both Non-point and Point Source Pollution as possible sources of impairment.**

- **The TMDL is NOT a REGULATORY Document!!! But, loading calculations can be used for:**
  - ✓ **Regulatory Programs (National Pollutant Discharge Elimination System [NPDES] Permits)**
  - ✓ **Non-regulatory Programs (monitoring success of Watershed Protection Programs and Water Quality Improvement Projects – Clean Water Act 319)**

WHERE?

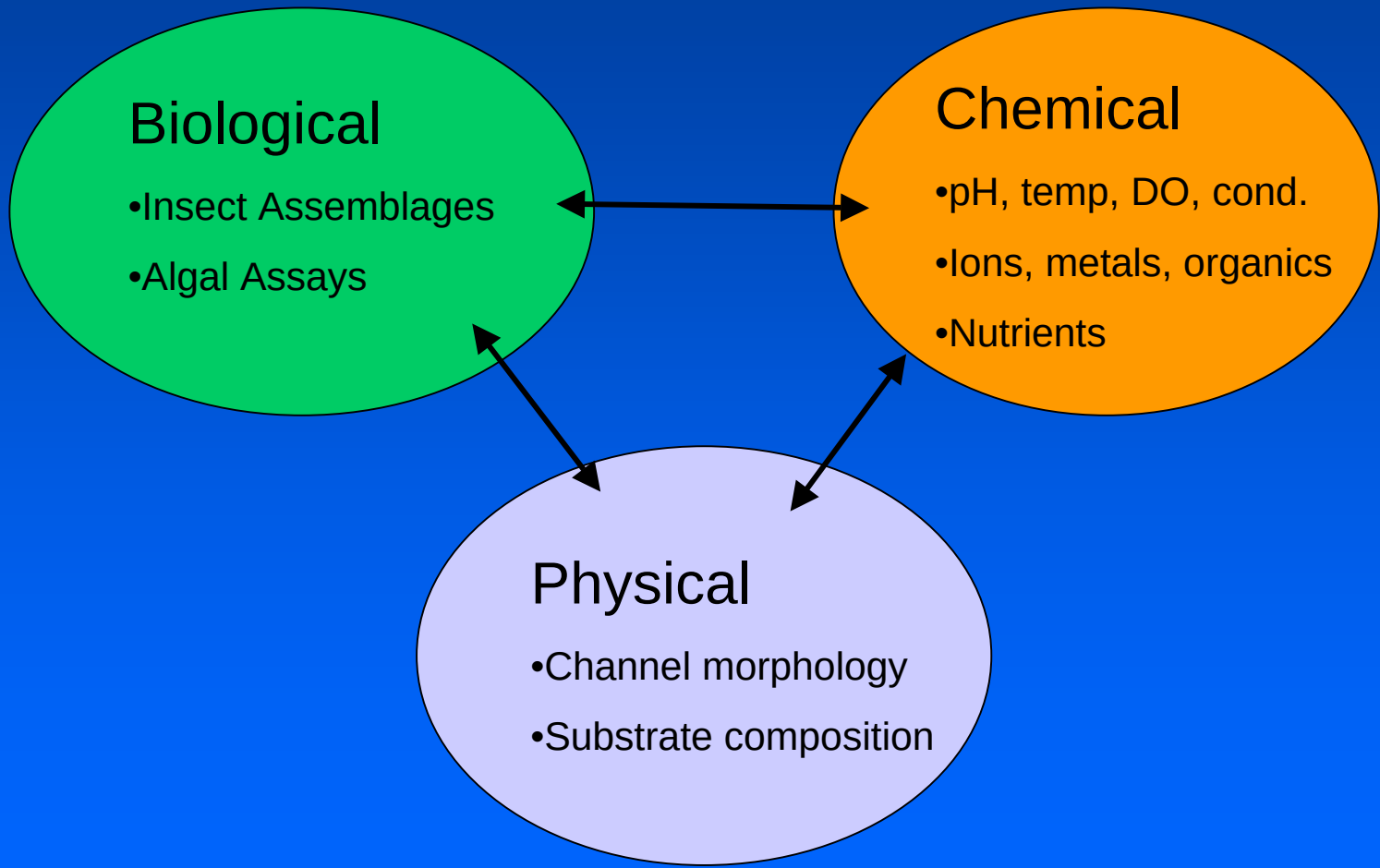
Rio Hondo USGS HUC 13060008



WHEN?

- Intensive chemical/physical watershed sampling occurred in 2003
- Rio Ruidoso nutrient assessment work occurred in 2002 and 2003

WHAT?


Biological
•Insect Assemblages
•Algal Assays
Chemical
•pH, temp, DO, cond.
•Ions, metals, organics
•Nutrients
Physical
•Channel morphology
•Substrate composition

Rio Hondo TMDLs

Assessment Unit	Bacteria	Nutrients (TP & TN)	Temp	Turbidity
Carrizo Creek (R. Ruidoso to Mescalero Apache Bnd)	X			
Rio Bonito (Angus Canyon to Headwaters)	X			
Rio Hondo (Perennial Reaches of Pecos River to Rio Ruidoso)	X			
Rio Ruidoso (Rio Bonito to US Hwy 70)		X		
Rio Ruidoso (US Hwy 70 to Mescalero Apache Bnd)			X	X

Bacteria TMDLs

- Samples were collected from March-October ‘03.
- The single sample criterion was exceeded:
  2 out of 8 sampling events for **Carrizo Creek**,
  2 out of 13 sampling events for **Rio Bonito**, and
  6 out of 13 sampling events for the **Rio Hondo**.
- The loads for bacteria are expressed in colony forming units per day (cfu/day)

Nutrient TMDLs

- One reach was identified as impaired for nutrients:
  Rio Ruidoso (Rio Hondo to U.S. Highway 70)
- Samples were collected at 6 sites along this assessment unit from March 2003 through March 2005.
- The in-stream criterion was exceeded 71% of the time for TP and 66% of the time for TN.
- The loads for TP and TN are expressed in pounds per day (lbs/day)

Turbidity TMDL

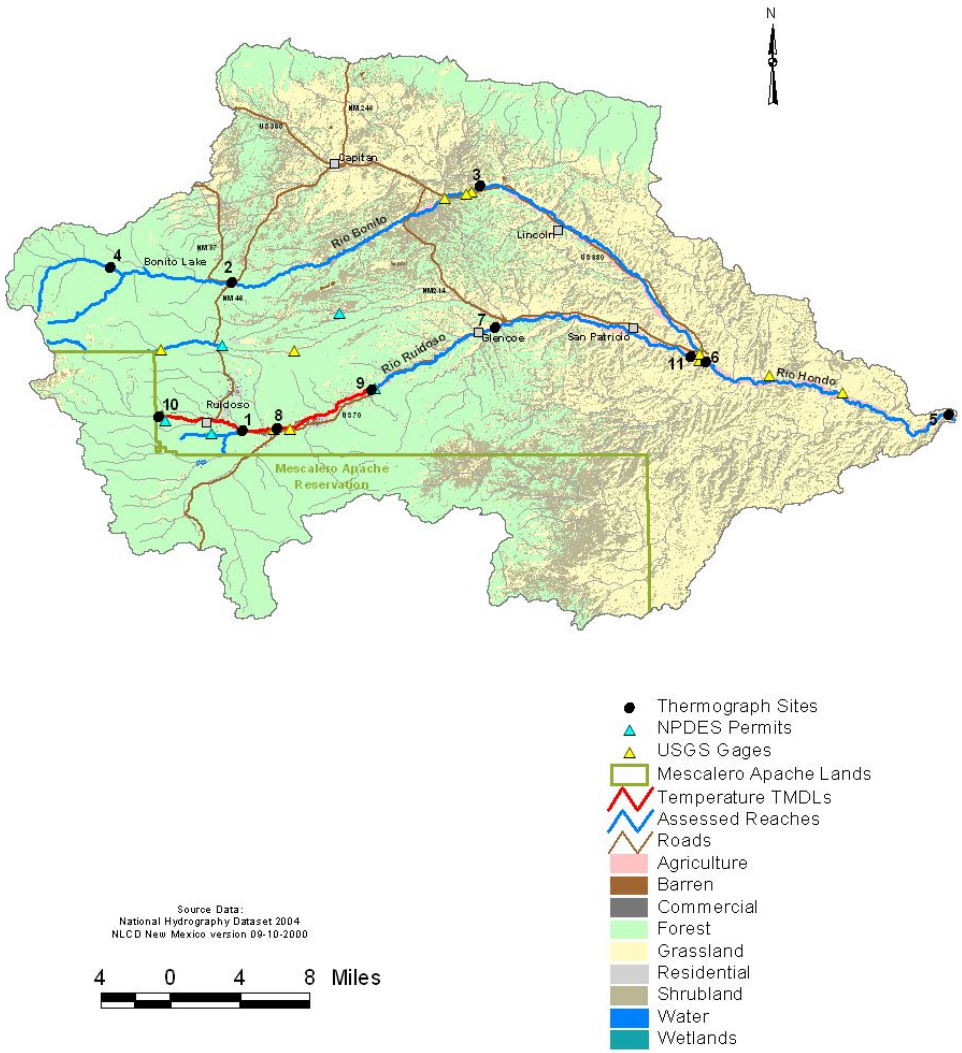
- One reach was identified as impaired for turbidity:
  Rio Ruidoso (U.S. Highway 70 to Mescalero Apache boundary)

- Samples were collected at four sites in this assessment unit from March-October 2003.

- The criterion of 10 NTU was exceeded 15 out of 36 sampling events.

- The loads for turbidity are expressed in pounds per day (lbs/day) of total suspended solids (TSS).

Temperature TMDL



- **Rio Ruidoso (U.S. Hwy 70 to Mescalero Apache Boundary)**
- 3 thermographs recorded temperatures from May 20 – Sept 15, 2003
- Exceeded the HQCWF criterion 836 of 8,536 times with a maximum temperature of 25.07°C.

Public Participation Process

- Submit completed draft TMDLs to the Environmental Protection Agency (EPA)-Region 6 for technical review
- Following technical review, open a minimum 30-day public comment period
- Inform stakeholders about draft TMDL via mailing lists, press releases, website postings, public meeting
- Stakeholders review draft TMDL document and provide written comments to be included along with NMED responses as an appendix in the final TMDL document

Public Participation Process – *continued…*

- Hold public meetings to discuss any questions regarding the TMDL draft document
- Address written public comments regarding the TMDL draft document
- Once adopted by NM Water Quality Control Commission for incorporation in the state's Water Quality Management Plan, submit to EPA for final approval

RUIDOSO/RUIDOSO DOWNS WWTP

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NPDES PERMIT NM0029165

- REISSUED BY EPA -- NOVEMBER 17, 2000
- EFFECTIVE -- JANUARY 1, 2001
- EXPIRES -- AUGUST 31, 2005 (presently drafting a new permit)

COMPLIANCE SCHEDULE

- EFFECTIVE JANUARY 1, 2004
- PHOSPHORUS
  - 0.1 MG/L 30-DAY AVERAGE
  - 0.15 MG/L DAILY MAXIMUM
  - 30-DAY AVERAGE LOAD
    - 1 KG/DAY (2.2 POUNDS/DAY)

WATER QUALITY PROBLEM

- LONG STANDING CITIZEN COMPLAINTS (SINCE AT LEAST 1994) OF NUISANCE ALGAE BELOW THE DISCHARGE
  - *"… The algae clogs up the valves in the irrigation water line and also the sprinklers. It makes it almost impossible to irrigate at the present time. It is a serious nuisance."* (excerpt from April 1994 letter from a concerned citizen to NMED)

WATER QUALITY PROBLEM

WATER QUALITY STANDARDS

- SEGMENT 20.6.4.208 HAS A SEGMENT SPECIFIC NUMERIC WATER QUALITY STANDARD
  - 20.6.4.208.B.(1):
    - *In any single sample … total phosphorus (as P) shall be less than 0.1 mg/l.*
  - ADOPTED BY WQCC (EFFECTIVE 10/12/00) DURING LAST (1998) TRIENNIAL REVIEW OF WATER QUALITY STANDARDS DUE TO NUISANCE ALGAE WATER QUALITY PROBLEMS (i.e., to address the general standard violation)

HOW DID WE GET HERE?

- ADDITIONAL COMPLAINTS WERE RECEIVED DURING 1999
- SWQB MET WITH CONCERNED DOWNSTREAM CITIZENS ON NOVEMBER 23, 1999
- SWQB MET WITH VILLAGE OFFICIALS IN RUIDOSO DEC. 15, 1999 AND DISCUSSED COMPLAINTS, THE CHANGES TO THE WQS AND ITS IMPLICATIONS TO THE NPDES PERMIT

HOW DID WE GET HERE (CON'T)

- 2000 -- EPA PROPOSED REVISIONS TO THE NPDES PERMIT WITH NEW LIMITS TO PROTECT WATER QUALITY STANDARDS
  - REQUIRED BY THE CLEAN WATER ACT
- PUBLIC & PERMITTEE ALLOWED TO COMMENT ON DRAFT PERMIT
  - NO COMMENTS FROM PERMITTEE RECEIVED
- NMED/SWQB CERTIFIED THE PERMIT AS PROTECTIVE OF WATER QUALITY STANDARDS

HOW DID WE GET HERE (CON'T)

- NMED MET WITH BOTH VILLAGE'S PERSONNEL AND THEIR CONSULTANT IN JAN. 2002, AND DISCUSSED THIS ISSUE
  - NMED PROMISED TO HELP WITH A POLLUTION PREVENTION (P2) PROGRAM TO REDUCE PHOSPHORUS CONTRIBUTIONS IN THE COMMUNITIES
  - NMED PROMISED TO RE-EVALUATE THE APPROPRIATENESS OF THE WQS UTILIZING A BIOASSAY

QUESTION

- HOW IS THE PRESENT PLANT WORKING?
  - REMOVING APPROXIMATELY 90% OF THE INFLUENT PHOSPHORUS
  - NO EXCURSIONS OF NPDES PERMIT EXCEPT FOR PHOSPHORUS
  - SHOWING ITS AGE (CRACKING, SETTLING & SPALLING OF CONCRETE)
  - SOLIDS HANDLING A PROBLEM
  - WEIRS UNEVEN AND LEAKING
  - NEED TO EXPAND HYDRAULIC LOAD AND COLLECTION SYSTEM

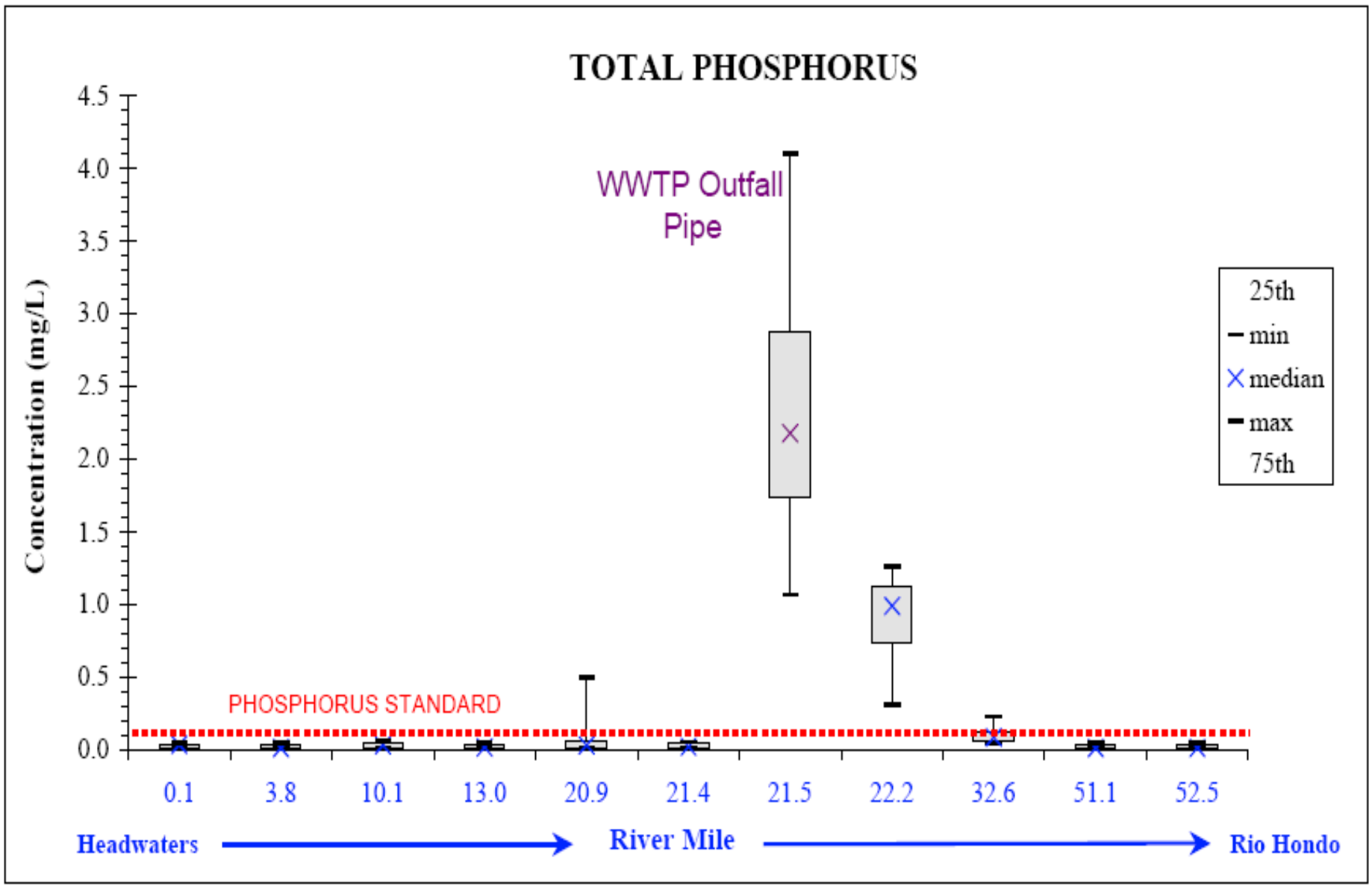
Relevant additional slides

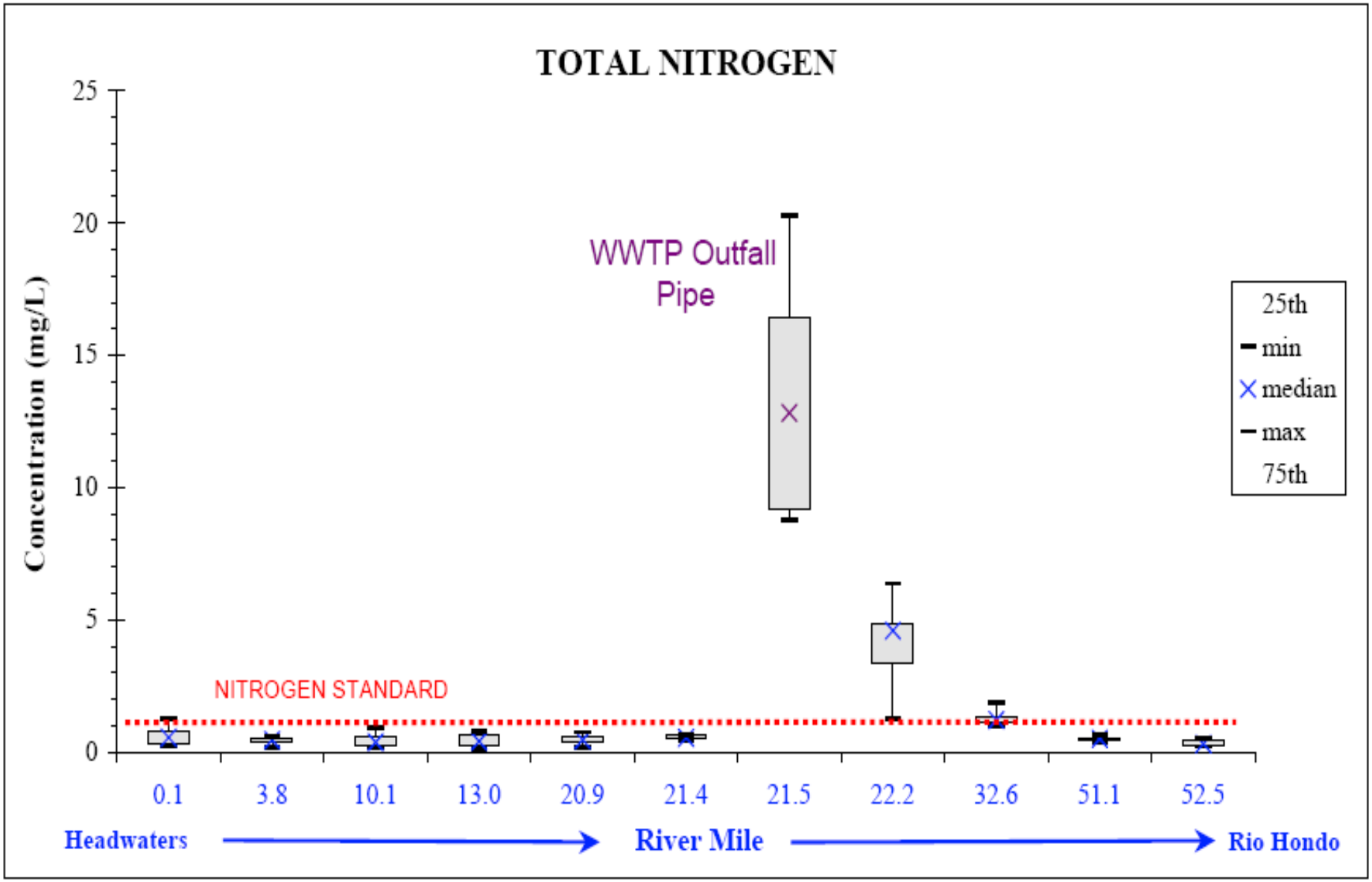
Potential Sources of Bacteria

- ✓ Municipal WWTP
- ✓ On-site Treatment Systems (Septic)
- ✓ Flow Alteration from Water Diversion
- ✓ Drought-related impacts
- ✓ Rangeland Grazing
- ✓ Streambank Modification/Destabilization

Bacteria
Best Management Practices

- Rangeland improvements such as **riparian fencing** and **upland water developments** help keep cattle from concentrating in the riparian areas and contaminating watercourses with animal waste
- Ensure **septic tanks** are correctly installed, functioning properly, and located away from water courses
- **Removal of manure and soiled straw bedding** on a daily basis to a storage area where there is no chance of water quality contamination
- **Removal of pet waste** from lawns, sidewalks, gutters, etc.


TOTAL PHOSPHORUS
Concentration (mg/L)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
WWTP Outfall Pipe
PHOSPHORUS STANDARD
25th
min
median
max
75th
0.1
3.8
10.1
13.0
20.9
21.4
21.5
22.2
32.6
51.1
52.5
Headwaters
River Mile
Rio Hondo


TOTAL NITROGEN
Concentration (mg/L)
25
20
15
10
5
0
WWTP Outfall Pipe
NITROGEN STANDARD
25th
min
median
max
75th
0.1
3.8
10.1
13.0
20.9
21.4
21.5
22.2
32.6
51.1
52.5
Headwaters
River Mile
Rio Hondo

Nutrient Assessment with SWQB Data

Assessment Unit	Sample Site	DO Sat. (Sonde) % exceedence	DO Sat. (Grab) % exceedence	pH (Max)	DO Conc. (Min)
	Criteria	>15%	>15%	>9.0	>5.5 mg/L
Rio Ruidoso (US Hwy 70 Bridge to Mescalero Bnd.)	ALL 4 Sites in A.U.	-	11/42 = 26%	0/42 = 0%	0/42 = 0%
	Ruidoso above WWTP	2/2 = 100%	9/14 = 64%	0/2 = 0%	1/2 = 50%
Rio Ruidoso (Rio Hondo to US Hwy 70 Bridge)	ALL 4 Sites in A.U.	-	6/35 = 17%	0/35 = 0%	6/35 = 17%
	Ruidoso below WWTP	1/2 = 50%	4/11 = 36%	0/2 = 0%	0/2 = 0%

Nutrient Assessment with SWQB Data

Assessment Unit	Sample Site	TN	TP	Chloro *a*	AFDM	HBI	Algal Assay	Support ?
	Criteria	**>15%**	**>15%**	>10 ug/cm$_2$	>5000 ug/cm^2	>5.5	Mod. high/ High	
Rio Ruidoso (US Hwy 70 Bridge to Mescalero Bnd.)	ALL 4 Sites in A.U.	3/38= 8%	1/38= 3%	-	-	4.86	-	**FULL**
	Ruidoso above WWTP	1/11= 9%	1/11= 9%	3.77	7623	-	Mod.	**-**
Rio Ruidoso (Rio Hondo to US Hwy 70 Bridge)	ALL 4 Sites in A.U.	18/34= 53%	13/34= 38%	-	-	-	-	**NOT**
	Ruidoso below WWTP	10/10= 100%	10/10= 100%	0.33	6653	-	Mod. High	**-**

Nutrient Assessment with SWQB & Livingston Associates Data

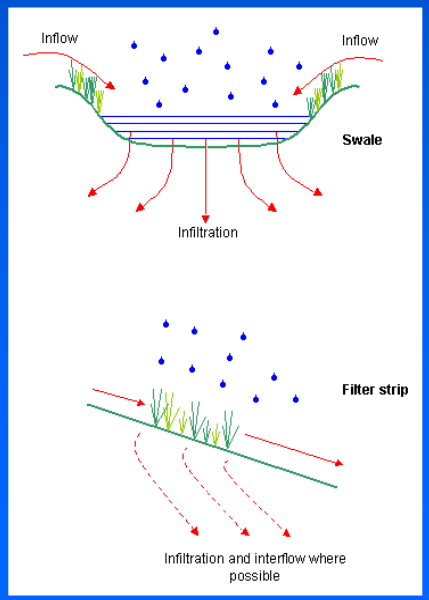
Sample Sites or Assessment Unit (AU)	DO sat. Exceedence Ratio	pH Maximum	DO Minimum	TN Exceedence Ratio	TP Exceedence Ratio
Criteria	**>15% (>120%)**	**>8.8 <6.6**	**<6.0 mg/L**	**>15% (1.0 mg/L)**	**>15% (0.1 mg/L)**
Rio Ruidoso 10 feet above WWTP outfall	25%	7.83	8.97	0%	0%
RIO RUIDOSO BLW NEW WWTP	36%	7.84	8.94	100%	100%
SONDE DATA BLW NEW WWTP	13%	6.22	8.39	-	-
RIO RUIDOSO AT GLENCOE-FR 443	0%	7.81	8.81	100%	38%
RIO RUIDOSO AT SAN PATRICIO	0%	7.25	5.90	0%	0%
LIVINGSTON DATA	-	8.24	8.81	71%	86%
LOWER RUIDOSO	**15%**	**7.29**	**8.51**	**67%**	**76%**

Potential Sources of Nutrients

- ✓ Residential Areas
  - Septic tank – leach field disposal systems
  - Landscape maintenance
  - Backyard livestock/pets
- ✓ Recreational Activities
  - Hiking and biking trail system
  - Parking lots
- ✓ Urban Areas and Construction Sites
- ✓ Municipal WWTPs
- ✓ Atmospheric Deposition
- ✓ Undeveloped Land (natural conditions)

Common BMPs for Controlling Nutrient Transport

- Bioretention areas
- ("rain gardens")
- Vegetated water quality swales



- Infiltration trenches and basins
- Riparian buffer/vegetated filter strips

Common BMPs …
continued

- Constructed wetlands
- Storm water detention or
- wetland retrofits

- Cisterns

- Permeable pavement

Turbidity Potential Sources

Probable sources of impairment for Rio Ruidoso include:

- Loss of riparian habitat
- Agriculture, rangeland grazing, pastureland, animal holding areas
- Streambank destabilization/modification
- Channelization, flow regulation
- On-site treatment systems (septic systems and similar decentralized systems)
- Site clearance (land development or redevelopment)

Temperature Potential Sources

- Loss of riparian habitat
- Agriculture, rangeland grazing, pastureland, animal holding areas
- Streambank destabilization/modification
- Channelization, flow regulation
- On-site treatment systems (septic systems and similar decentralized systems)
- Site clearance (land development or redevelopment)

Temperature Best Management Practices (BMPs)

- Riparian Restoration
  - Revegetation (shade)
  - Streambank protection
- River Restoration
  - Stream channel stabilization
  - Width:depth ratio
- Limiting in-stream diversions