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Planning for Improved Water Quality: EPA's Nine Elements Applied to the Rio Santa Barbara

Topics covered

- TMDL basics
- Watershed planning detail

There are known knowns. These are things we know that we know. There are known unknowns. That is to say, there are things that we know we don't know. But there are also unknown unknowns. There are things we don't know we don't know.

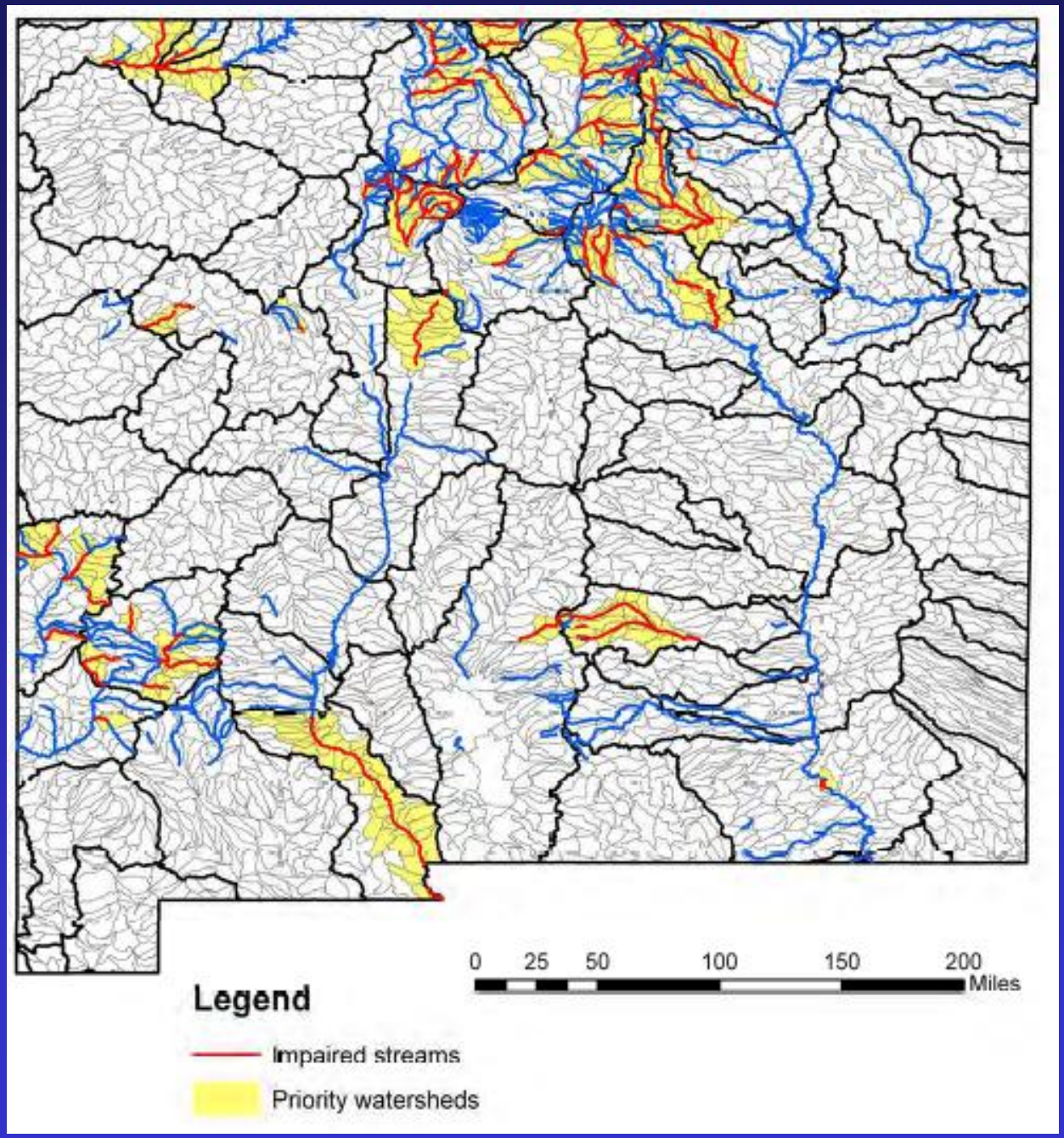
Donald Rumsfeld

Think ahead. Don't let day-to-day operations drive out planning.

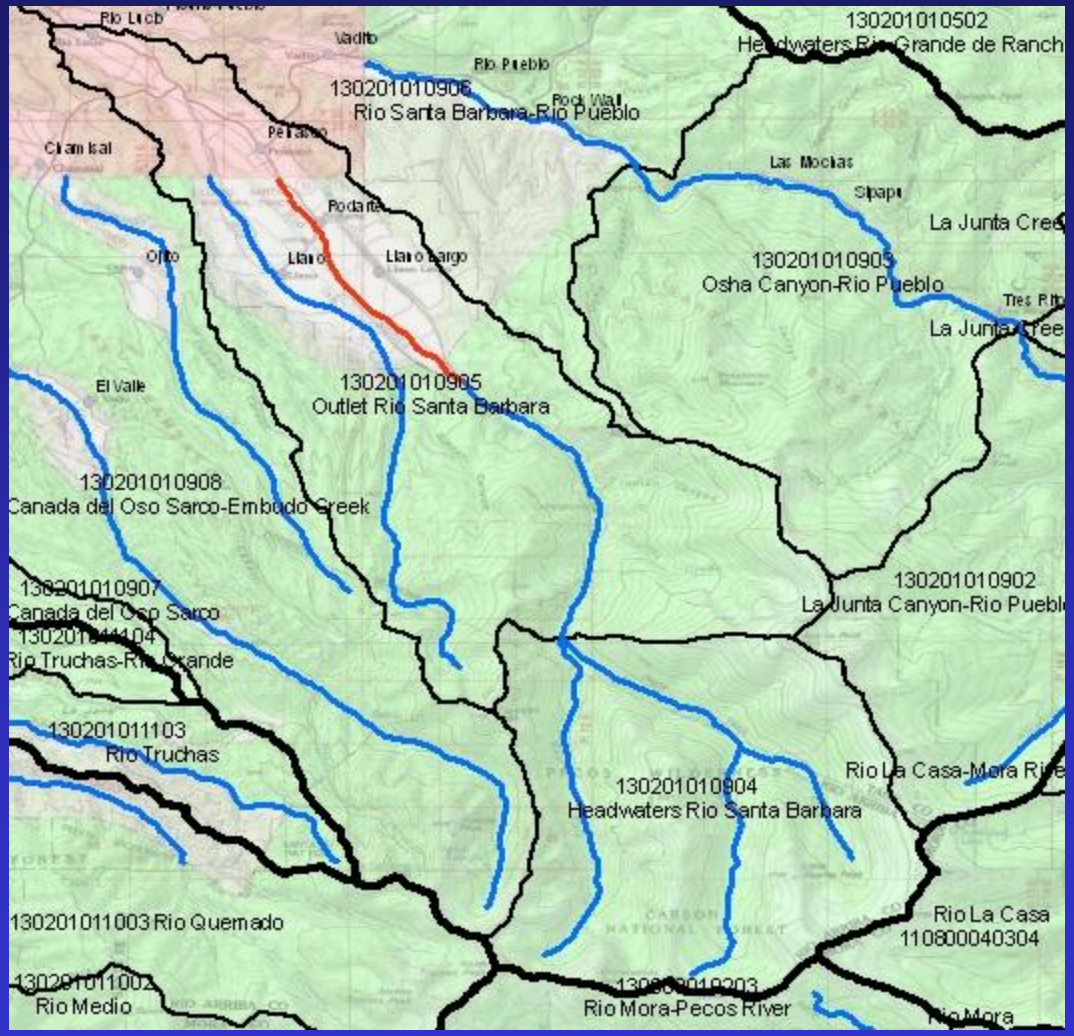
Donald Rumsfeld

Impaired streams and priority watersheds

(source: Nonpoint Source Management Plan)



Rio Santa Barbara watershed



Legend

- 10 Digit Watersheds
- 12 Digit Watersheds
- Impaired stream with TMDL
- Other assessed waters

0 0.5 1 2 3 4 Miles

TMDL 101

The total maximum daily load is the pollutant load (usually pounds/day) that the stream can handle and still meet its water quality standard, at a critical (usually low) flow.

Rio Santa Barbara TMDL

Critical Flow (volume/time) x

Standard (mass/volume) = TMDL (mass/time)

What is the TMDL for the Rio Santa Barbara?

Rio Santa Barbara TMDL

Critical Flow (volume/time) x

Standard (mass/volume) = TMDL (mass/time)

TMDL

19.81 cfs x 21.89 mg/L TSS = 2,337 lb/day TSS

Ok, but how far over the TMDL is the river?

Rio Santa Barbara Example TMDL

Critical Flow (volume/time) x
Standard (mass/volume) = TMDL (mass/time)

TMDL

19.81 cfs x 21.89 mg/L TSS = 2,337 lb/day TSS

Measured load = 3,256 lb/day TSS

Margin of safety = 25% of TMDL = 584 lb/day TSS

Target load reduction = 1,503 lb/day TSS

a. “*An identification of the causes and sources*”

What are the causes of impairment?

a. “*An identification of the causes and sources*”

Cause = turbidity

What are the sources?

a. "*An identification of the causes and sources*"

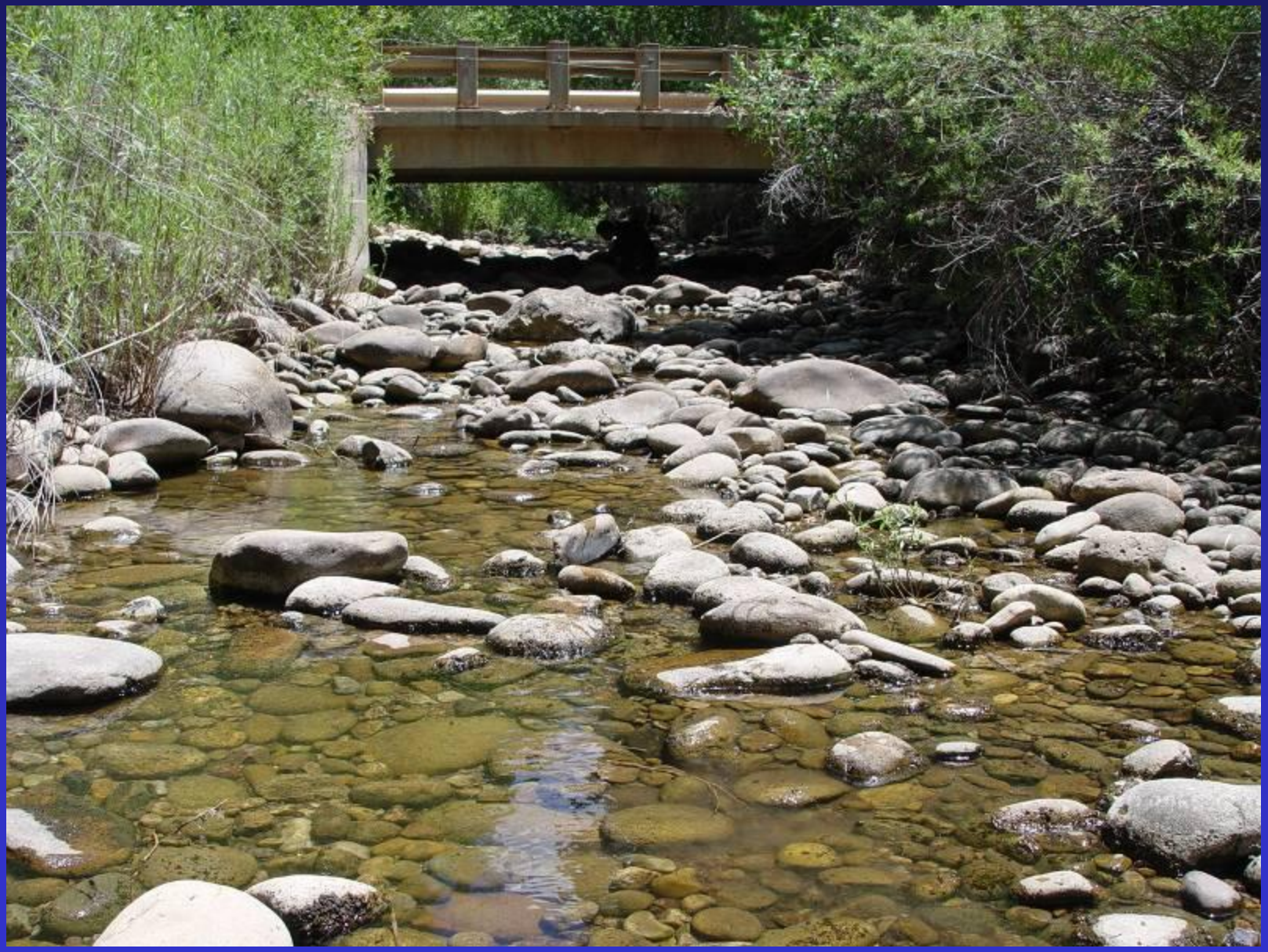
Sources:

Source Activity	Percent	Load (lb TSS / day)
Accelerated runoff from ponderosa and mixed conifer forest	5	75.15
Accelerated runoff from Piñon/Juniper forest	10	150.3
Off-road vehicles	8	120.24
Runoff from unpaved roads including driveways	50	751.5
Runoff from pastures and hayfields	20	300.6
Accelerated bank erosion	5	75.15
Rio Chiquito gravel pit	2	30.06
Totals	**100%**	**1503**

Survey Recon, Rio Chiquito near Peñasco, 2/26/2001

Rio Santa Barbara at Hodges CG, 6/21/2004

Rio Santa Barbara at Roybal Road, 6/21/2004



Rio Santa Barbara at Roybal Road, 7/16/2004

East Fork Rio Santa Barbara, 7/24/2001

Rio Santa Barbara near Rodarte, 4/16/2004

Rio Santa Barbara near Peñasco, 4/16/2004

Rio Santa Barbara valley, 5/09/2001

“…the highest priority for drainage improvements”

Turbid road runoff example

Rio Santa Barbara Near Rodarte, 8/12/2004

Rio Chiquito pasture, 2/26/2001

Copper Hill gully, 7/25/01

b. *"An estimate of the load reductions expected for the management measures"*

What load reductions are expected from BMPs?

b. *"An estimate of the load reductions expected for the management measures"*

Best Management Practices	Percent	Load (lb TSS / day)
Ponderosa pine forest restoration	1	15.03
USFS Grazing BMPs	4	60.12
Piñon/Juniper forest restoration (thinning, firewood harvest)	5	75.15
Recreation management (including ORVs)	8	120.24
Unpaved roads BMPs	45	676.35
Riparian grazing management	15	225.45
Bank stabilization BMPs	5	75.15
Mine BMPs e.g. ponding areas	2	30.06
Arroyo treatments e.g. one-rock dams, stock tanks	5	75.15
other	10	150.3
Totals	**100%**	**1503**

c. *"A description of the NPS management measures"*

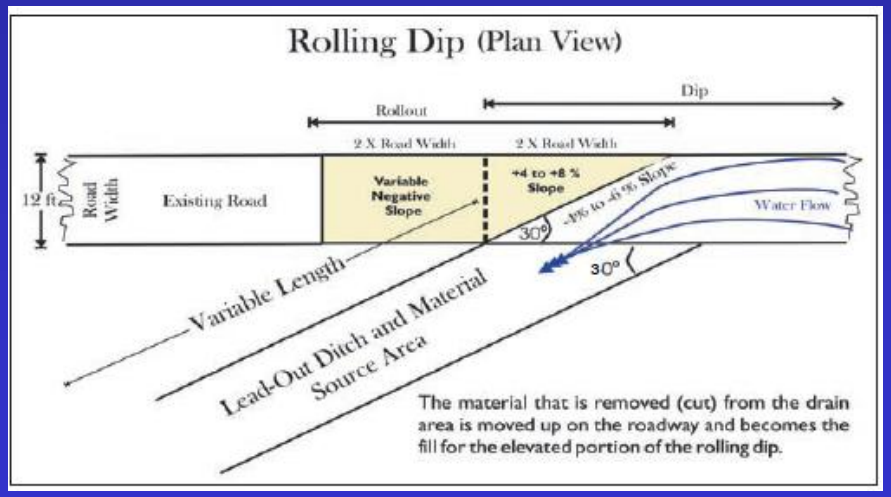
What are "unpaved roads BMPs"?

(What kind? How many? Where?)

c. *"A description of the NPS management measures"*

"Unpaved Roads BMPs

Runoff from unpaved roads, including private driveways, County maintained roads, and unmaintained roads, is thought to contribute about 50 percent of the excessive TSS loading to the Rio Santa Barbara. Ninety percent of that loading, or forty-five percent of the overall target load reduction, may be prevented with implementation of best management practices to improve drainage from these roads, along with selective road closure and reclamation. The greatest road density is in the Peñasco area. Many of these roads and driveways are near the Rio Santa Barbara and Rio Chiquito, and are the highest priority for drainage improvements."



From *A Good Road Lies Easy on the Land…* (Zeedyk, 2006)

East Fork Santa Barbara Trail, 7/24/2001

Santa Barbara Trail, 7/24/2001

Santa Barbara watershed prescribed fire, 5/09/2001

d. *"An estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon"*

How much is it going to cost?

How are we going to pay for it?

And who is going to do it?

d. "An estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon"

Management Measure Category	Management Measure Subcategory	Units	Units Needed	Estimated Cost per Unit	Total Cost
Unpaved roads BMPs	Install drainage features on unpaved roads and driveways	each	500	$1,650.00	$825,000.00
Unpaved roads BMPs	Selective road closure	each	20	$1,100.00	$22,000.00
Unpaved roads BMPs	Reclamation of closed roads (installation of drainage features)	each	30	$1,650.00	$49,500.00
Subtotal					**$896,500.00**
…					

d. "An estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon"

"Funding which is already available to support implementation of this plan include United States Forest Service operational funds (which are well suited for NEPA planning and small on-the-ground projects), Taos Soil and Water Conservation District operational funds (supported by a small tax levee), and Taos County Public Works Department (which has available a budget for maintenance of County roads)."

e. "An information/education component…"

What else needs to happen for this to work?

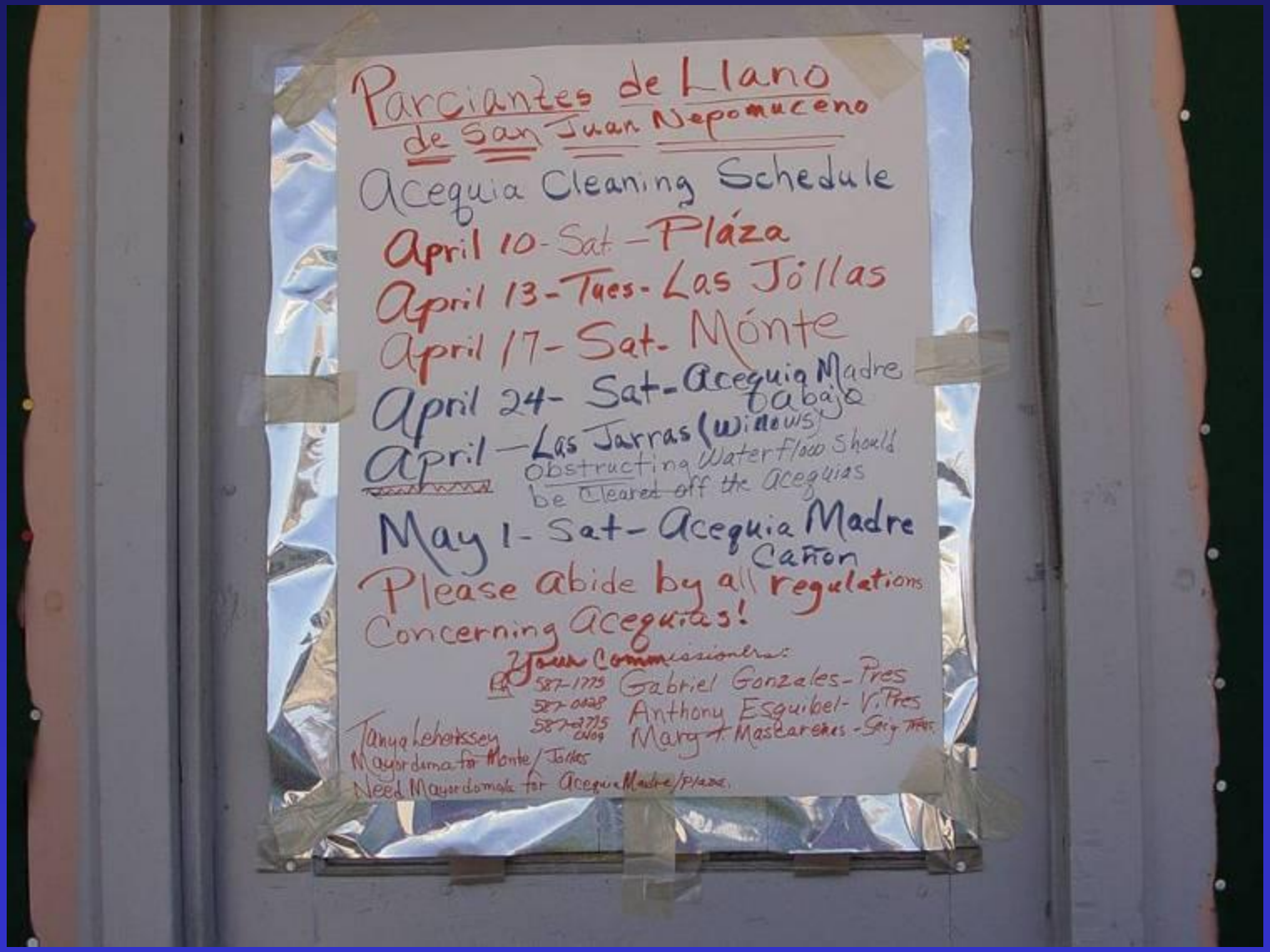
e. "An information/education component…"

Phase I: Engaging Early Implementers (2011-2015)

Phase II: Encouraging Widespread Implementation (2016 – 2020)

Phase III: Developing Incentives to Maintain Water Quality

Acequia cleaning schedule, Llano 4/16/2004



Workshop for San Juan Basin equipment operators, 10/08

f. "A schedule ... that is reasonably expeditious."

When is all of this going to happen?

f. "A schedule … that is reasonably expeditious."

Management Measure Subcategory	Units	Units Needed	Phase 1 - Early Implementation				
			2011 (year 1)	2012 (year 2)	2013 (year 3)	2014 (year 4)	2015 (year 5)
Install drainage features on unpaved roads and driveways	each	500	20	40	50	50	100
Selective road closure	each	20		1	2	3	4
Reclamation of closed roads (installation of drainage features)	each	30		2	3	4	5
…							

g. *"A description of interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented."*

What are the major events that will indicate the plan is being implemented?

g. *"A description of interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented."*

"Milestones

This section outlines the major events that can be used to determine how implementation of this plan compares with the above schedule. One milestone has been identified for each year of the plan's first and second phases."

h. *"A set of criteria that can be used to determine whether loading reductions are being achieved over time ..."*

How will we know water quality is improving?

h. *"A set of criteria that can be used to determine whether loading reductions are being achieved over time ..."*

"Criteria for Measuring Success

If this plan has been implemented and the Rio Santa Barbara is found to meet its water quality standards for turbidity, then the plan will have accomplished its goals. Assessment of standards attainment is expected to take place in 2012 (before significant implementation) and 2020 (after significant implementation)."

i. *“A monitoring component to evaluate the effectiveness of the implementation efforts over time...”*

How will we actually measure progress?

i. *"A monitoring component to evaluate the effectiveness of the implementation efforts over time..."*

Implementation Monitoring

Pollutant Load Reduction Modeling

Effectiveness Monitoring

Assessment of Standards Attainment

Rio Santa Barbara Near Rodarte, 5/09/2001