

# San Simon Watershed Assessment: Preliminary Phase and Future Directions

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Students and faculty from the University of Arizona (Barron Orr, Michael Crimmins, Bill Brandau, Chuck Hutchinson, Stuart Marsh, Taryn Kong, and Denise Garcia), joined by internationally renowned geomorphologist, Bill Bull, have joined forces with BLM Safford Field Office to conduct a preliminary assessment of the San Simon Watershed.

This preliminary work will provide critical insight into climate and stream flow patterns, preliminary assessments of environmental changes and geomorphic response associated with system interventions. The foundational assessment will serve as the first stage in a collaborative effort to assemble, catalog and share critical environmental monitoring data and the spatial data necessary for a future comprehensive evaluation.

The work will set the stage for understanding and managing the watershed in the context of longer term environmental changes and seasonal to interannual climate variability that can overwhelm even these longer term trajectories, all as the precursor to launch a larger, comprehensive evaluation of system components and processes and the status of erosion control and sediment retention structures and their influence. The presentation at the Gila Watershed Partnership's October 14, 2009 meeting will include progress made in the first phase of this initiative and feedback on efforts to bring the San Simon into a global initiative (called "PRACTICE") to identify and share best practices for controlling land degradation as well as subsequent restoration.



## IMPORTANT DOUBLE MEETING!

The October meeting of the Gila Watershed Partnership will be combining with the Upper Gila Watershed Steward Class.

### Location

The Barn at Discovery Park

### Date

October 14<sup>th</sup>, 2009

### Time and Program Details

From 5 to 7 p.m. the Watershed Steward Class features Mike Crimmins with the U of A on climate, weather, and drought, and the impact on our watershed.

At 7 p.m., we will have a short dinner break, and start our regular meeting, which features

Barron Orr with the U of A on the San Simon Watershed Assessment, and Deborah Morris with the BLM on the Gila Unit Travel Plan Alternative Maps.

Please RSVP to Jan Holder at 520-395-2499, or watershedholder@yahoo.com, to assure that we order enough food. There is no charge for dinner, but we will gratefully accept donations to defray our costs.

## San Simon Watershed Background

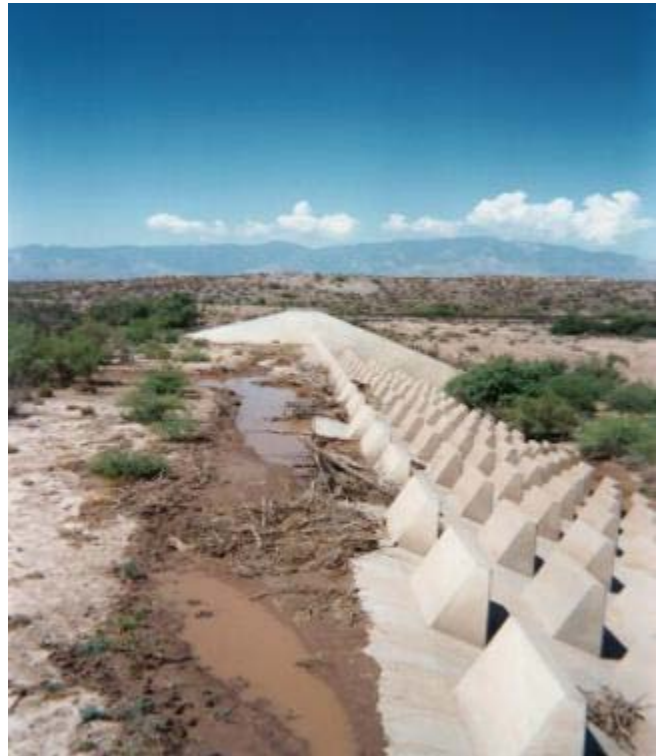
**San Simon Barrier Structure** Built in 1980 by BLM for erosion control and watershed rehabilitation of the San Simon Valley, the cost was \$1,300,000. The structure contains 224,000 cubic yards of compacted earth fill and 2,684 cubic yards of reinforced concrete requiring 313,000 pounds of steel.

Within the first two years, the channel silted in to the level of the spillway (17 feet). To date, the channel has been completely regraded one mile upstream and effects of the structure can be measured for 6-7 miles feet upstream. The dam has trapped, as of 1989, 5-6 million tons of silt. Although not specifically designed for flood control the Barrier and other dams on the watershed have reduced peak flows and protects downstream lands.

### **Goat Well Drop Structure**

The Civilian Conservation Corps, with technical assistance from the Soil Conservation Service, built this structure in 1940 to stop head cutting up Slick Rock Wash. This area is typical of the highly erodible soil conditions present on much of the San Simon watershed. The Goat Well structure has effectively stopped head cutting up the Slick Rock floodplain. Perennial grasses and mesquite trees thrive on the flooded area on the upstream side of the dike. The channel below the structure has also become vegetated by trees, shrubs and grasses in the last 20 years.

**Location** The San Simon headwaters along the Arizona-New Mexico State line about 12 miles north of the United States-Mexico border. It



flows in a northwesterly direction for about 100 miles and empties into the Gila River near Safford, Arizona. The average slope of the watershed is between 0.2 and 0.3 percent (0.2 to 0.3 feet loss of elevation per 100 feet of horizontal distance). The San Simon produces an average of 8,550 acre-feet of water per year. Suspended sediment from the watershed fluctuates from a low of about 3,000 parts per million to a high of over 180,000 parts per million. The San Simon is one of the major contributors of suspended sediment into the Gila River.

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**Acreage/Land Status** The watershed is 1,966 square miles (1,258,690 acres). The Bureau of Land Management manages 50%, private lands account for 25%, 15% is Arizona State Trust lands, 9.8 % is managed by the United State Forest Service, and the remaining 0.2 % is managed by the National Park Service.



**Elevations** range from 2,900 feet at the river's mouth to 9,800 feet in the Chiricahua Mountains on the southern end of the watershed.

**Climate** The San Simon watershed is semi-arid. Precipitation varies from about 8 inches on the northern (low elevation) end to over 20 inches in the Chiricahua Mountains. Approximately 60 percent of the rainfall occurs during the 6 hottest months, usually as

high intensity, localized thunderstorms. The remaining forty percent of the precipitation, falls in the cooler months, generally occurs as relatively gentle, widespread rains. Snow is received on the watershed at the lower elevations; it generally is present for less than 24 hours and at the higher elevations can remain for 5 to 6 months. Temperatures are relatively mild with seasonal extremes ranging from slightly over 100 degrees for summer highs to around 10 degrees for winter lows. The frost-free season in the lower elevations is 190 to 210 days.

**Historical Watershed Conditions** Historical mention of the San Simon Valley in the early 1800s gives conflicting pictures of the nature of the valley. Parke, in 1854, described the stream as having no trees or bushes to indicate the course of the stream. The surrounding valley was vegetated by creosote bush, saltbush, and yucca with grass being scarce. Hutton, in 1859, described the San Simon as being intermittent and flowing for about six months of the year. Will C. Barnes, an Arizona pioneer, cattleman, cavalryman, and Congressional Medal of Honor winner, who visited the valley in the early 1880s, remembered it as a grassy, well-watered area about 60 miles long and 40 miles wide. He remembered the stream as being intermittent, with cottonwoods and willow thickets along its banks. An 1879 map of southeastern Arizona marks the San Simon as the "Rio de Sauz" or

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Historical research and scientific knowledge of soils, climate, and vegetation leads one to believe that the San Simon Valley was a broad grassy plain bisected by an intermittent stream with little apparent erosion. The broader, flatter areas were probably covered by sacaton and tobosa grass with few shrubs and trees. Some willows may have grown in the wetter areas and cottonwoods were certainly present at San Simon Cienega, near the Arizona-New Mexico state line. There is little evidence that the stream flowed on a perennial basis. It is fairly certain that little channel erosion was present and the bottom was well vegetated. Early cattlemen have described the valley as a sea of grass with unlimited potential for raising livestock.

By 1919, the San Simon was recognized in U.S. Senate Document 436 as needing extensive restoration. From 1883 to 1916, in the short span of 33 years, head cutting (gullying) of the San Simon advanced some 60 miles up the channel and ranged from 10 to 30 feet deep and 40 to 800 feet wide. What happened in a mere 33 years that changed a grassy stream into a series of deep gullies with little vegetation? Several theories have been proposed. The most widely espoused theory is overgrazing initiated changes in vegetation and runoff patterns. Some researchers have given more credence to a combination of man's discrete activities, such as development of wagon roads, building railroads, and alteration of stream channels. Another hypothesis is that the erosion was geological, caused by the earthquake in northern Sonora in 1887. Third theory places blame on climatic change with minor changes in rainfall patterns and frequencies initiating the erosion sequence. Cooke and Reeves, in their book "Arroyo and Environmental Change in the American



Southwest" (1975), have proposed that each of the theories probably had a contribution to the rapid erosion sequence. Cooke and Reeves discount any one action as being solely to blame and cite similar erosion sequences in New Mexico on the Rio Puerco, in Arizona on the San Pedro and the Santa Cruz, and on several California streams during the same time period.

*Discrete actions that may have contributed to the rapid erosion include:*

- An extended drought, broken by intense thunderstorms (1890s)
- Sonora earthquake in 1887
- Overgrazing in the 1880s an estimated 50,000 head were grazing valley
- Construction of a drainage ditch from the Gila River up the San Simon Valley in 1883 to prevent flooding of farm fields
- Development of wagon roads and increased freight use during the early development of copper mines in the area (1880s)
- Construction of the Gila Valley, Globe, and Northern Railway (1884)

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In 1934, the Soil Erosion Service (later became the Soil Conservation Service and now the Natural Resource Conservation Service NRCS) and the Civilian Conservation Corps (CCC) began numerous erosion control measures on the San Simon watershed. Numerous CCC camps were located in the valley under the control of the Soil Erosion Service and the Grazing Service and CCC crews constructed a multitude of structures, diversion dikes, water spreaders, detention dams, rangeland seedings, and gully plugs. The Grazing Service, in 1949, became the Bureau of Land Management and responsibility for erosion control work on public lands passed to it.

### **Watershed Management 1940 to the Present**

Although serious erosion still exists on the San Simon, progress has been made to heal areas eroded at the turn of the century. From about 1935 to 1940, numerous surveys of erosion were conducted both by the Soil Conservation Service and the Grazing Service, and the first plans to control erosion and begin rehabilitation of the main channel were formulated. At this same time, Civilian Conservation Corps personnel were constructing gully plugs in small washes, building spreader dikes, seeding eroded areas, and constructing facilities to manage livestock on the eroded watershed.

The first major structures on the watershed were constructed in 1940 by the Civilian Conservation Corps. Two dams, Cienega No. 1 and Cienega No. 2, were built near the Arizona-New Mexico state line at the head of active channel erosion to protect the still-existing San Simon Cienega. These dams were drop-type structures designed to prevent further head cutting up the channel and to slow the water as it passed into the eroded portions of the channel.

Goat Well Drop Structure was also built in 1940, on a tributary of the San Simon, Slick Rock Wash. This dam was designed to prevent erosion of the wash and slow waters entering the San Simon, similar to the Cienega dams.

The San Simon Fan Structure was completed in 1953 and was washed out in 1954 by a large flood event on the San Simon. The Fan was rebuilt in 1955 and has functions as planned now for 54 years. This structure was the first detention dam of the mainstream of the San Simon designed to heal the eroded channel. The Fan has succeeded beyond expectations. The channel has been completely rehabilitated for 44,000 feet above the structure. Evidence that channel refilling continues for 10 miles above this. In 1990, the area of fill was measured and at the San Simon Fan Structure had trapped 19 million tons of silt since 1955.

From strictly a mechanical or engineering standpoint, the dam should have affected the channel for only a few thousand feet above it but with vegetation established above the dam as the channel rehabilitated allowed floodwaters to slow down farther and farther upstream and drop their silt load, causing the effects of the dam to be magnified upstream. The Contest Well seeding, in 1968, has been extremely successful. Not only does the vegetation slow the floodwaters and allow silt to drop out, the vegetation provides feed for cattle and habitat for wildlife. The 600-acre seeding provides six-month winter grazing for up to 170 head of cattle. Prior to Fan, only 4 to 6 head of cattle could graze the same area. During the summer months, the seeding is rested and conditions are favorable for a large buildup of rodent populations. In winter, the rodent escape cover is grazed off and the rodents are susceptible to predation by migrating and wintering raptors in the area.

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By 1956, seven side channel structures had been completed, including Creighton and HX. In 1957, a "Stop Work Order" was imposed by the Secretary of the Interior due to claims from downstream water users that detention dam construction was reducing amounts of water delivered for irrigation purposes.

The San Simon Community Watershed Plan was completed in 1963. It analyzed the effects of existing and proposed structures on rehabilitation and effects on water availability for downstream users. Consequently, the "Stop Work Order" was lifted in 1965 when the Secretary was convinced that losses of water to downstream users was minimal compared to the need to control erosion and rehabilitate the San Simon watershed.

Between 1967 and 1972, seven additional side channel structures were completed: Ryan Dam (1967), Ryan Dike (1968), Whitlock Dam (1968), West Doubtful (1969), Cove Darn, "111" Dam, and Sands Draw Dam (1972). Several upland seedings were implemented during this time period. Due to the erratic nature of the climate the seedings in upland areas have not been successful. Even areas that appeared to be a success for a few years later died out and returned to a pre-treatment state.

A special Congressional appropriation in 1980 authorized the construction of Tanque and San Simon Barrier Dams. The San Simon Barrier Darn was completed in 1980, but a subsequent engineering examination revealed problems with the proposed location of the Tanque Dam. A new site was found upstream and the dam site was renamed the Timber Draw Dam but it was never built.

The last detention dams built in the San Simon watershed were the Slick Rock Detention Dam (1981) on Slick Rock Wash, a tributary of the San Simon, and Creosote and South Well Detention Dams (1982), also built on tributaries.



It appears, after more than 50 years of observing results from various watershed projects, the most effective treatments are main channel structures. Side channel structures benefits have not be measured but have served to slow further head cutting of channels upstream and reduce water velocities and thus reduce sediment transport and erosion. An unplanned side benefit of all structures has been a reduction of peak flows from floodwaters. This is documented in "Sediment Study San Simon", Delbert Molitor. This reduction in peak flows may contribute to protection of the private downstream lands along the Gila River and areas near Solomonville, county roads, and State Highway 70 from flood damage

**Major San Simon Watershed Projects  
Excluding Civilian Conservation Corps Projects**

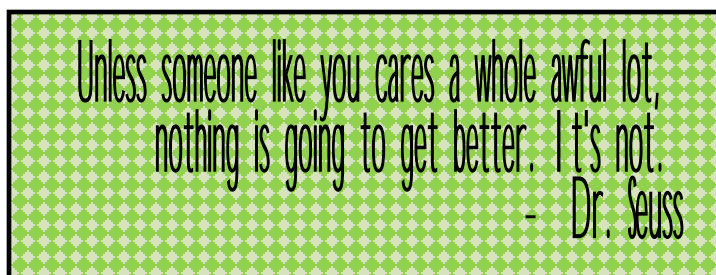
<b>DETENTION DAMS</b>	<b>COST</b>
San Simon Barrier	1,300,000
Slick rock	232,000
San Simon Fan	271,000
Creighton	140,000
South Well and Creosote	133,000
111 Dam and Cove	113,000
Whitlock	193,000
HX Dam	93,500
Sands Draw	70,000
West Doubtful	63,000
Ryan	20,000
Goat Well	13,000
West Olsen	4,000
Halfway	10,000
West Halfway	1,000
Olga	10,000
<b>Dikes</b>	
Olsen	27,000
Reservoir	17,000
Rock House	21,000
Ryan	40,000
<b>SEEDINGS</b>	
Contest Well	5,853
New Well	22,551
Antelope Well	26,297
Ryan	17,264
Ryan Dike	2,717
Timber Draw	13,987
Van Gausig	17,622
<b>WELLS</b>	
Construction Well	13,000
Barrier Well	15,000
<b>FENCING</b>	
Estimated cost for all fencing	50,000

### BLM Gila Unit Transportation and Travel Management Plan

The BLM Gila Unit transportation and travel management area includes 467,000 acres in Graham and Greenlee counties managed by the BLM Safford Field Office. A plan for the area is being developed to establish route designations to adequately provide motorized and non-motorized access to public lands. The route system will be designed to accommodate local travel needs, protect public safety and resources on the public lands, and prevent or minimize conflicts between users.

To access the Gila Unit Travel Plan Alternative Maps on the internet: [www.blm.gov/az](http://www.blm.gov/az), and click on the following:

- Safford (on map)
- What We Do (on the left)
- Planning (under what we do)
- Travel Management Plans (in red on right)
- Gila Unit (in red on bottom right). This page also gives contact info.
- Maps and Documentation (in red on right)
- Click on Overview Map for each alternative



Calendar of Events

**Wednesday, October 14, 2009, 5 - 9 p.m.** October's meeting will be held at the Discovery Park Barn. This will be a combined meeting with the Upper Gila Watershed Steward class.

**Wednesday, November 11, 2009, 7 p.m.** November's meeting will be held at the Graham County General Services Building, 921 Thatcher Blvd., Safford, AZ

### Our partners include:

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| Arizona Department of Agriculture           | Coronado RC&D  |
| Arizona Department of Environmental Quality | Gila Valley NRCD   |
| Arizona Department of Transportation        | Discovery Park   |
| Arizona Department of Water Resources       | Farm Bureau  |
| Arizona Game and Fish Department            | Graham County  |
| Arizona Geological Survey                   | Greenlee County  |
| Arizona State Land Department               | Gila Valley Irrigation District                              |
| Bureau of Land Management                   | Natural Resource Conservation Service                        |
| City of Safford                             | University of Arizona  |
| Town of Thatcher                            | Cooperative Extension  |
| Town of Pima                                | University of Arizona NEMO Project                           |
| Town of Duncan                              | U.S. Fish and Wildlife Service                               |
|   | U.S. Forest Service – Apache Sitgreaves and Coronado Forests |
|   | U.S. Bureau of Reclamation                                   |
|   | And many community members                                   |

### Get involved in your watershed

For more information, contact Jan Holder at the Gila Watershed Partnership, 711 S. 14th Avenue, 85546, 520-419-0374, email-watershedholder@yahoo.com