Memorandum

To: Pam Brown
USFS: Manti-La Sal National Forest
599 W. Price River Dr.
Price, UT 84501

CC: Justin Humble, Marlene DePietro, Pete Kilbourne, Wade Garrett, Ralph Okerlund, Mike Styler, Leonard Blackham, Donna Sackett, Ron Dean, Kay McIff, Allen Dyreng, Tom Shore, Walt Baker, Scott Daly, Chuck Williamson, Dennis Strong, Dan Aubrey, Ed Fall, Jay Olsen, Brian Miller, Sylvia Gillen, Charlie Frear, Terry Johnson, Tim Witman, Claudia Jarrett, Danny Boore, Russell Yardley, Tim Jones, Greg Schlenker

From: David Cox, Secretary
Sanpete County Water Conservancy District
90 West Union Street
Manti, Utah 84642

Brian Barton PE, Garrick Willden PE
Jones & DeMille Engineering, Inc.
1535 South 100 West
Richfield, Utah 84701
(435) 896-8266

Date: 6/25/2009

Re: Twelvemile Canyon Water Quality Study: Strategy and Requests to USDA Forest Service

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OVERVIEW

Background Information:

Water resources are critical to the economic, social, environmental and physical survival of all citizens in Central Utah. The San Pitch River watershed impacts citizens in Sanpete County, Juab County and Millard County. It is a tributary to the Sevier River and feeds Yuba Reservoir, the primary water storage facility for Millard County. One of the primary sources of water for the San Pitch is runoff and snow melt that comes from Twelvemile Canyon Creek and its tributaries. This watershed is critical to the San Pitch River, Sevier River, and all entities downstream of Yuba Reservoir. The surface water carries an extreme sediment load and significantly impacts the secondary water systems of Gunnison City, Mayfield Town, and Centerfield Town, thereby increasing the demand on the culinary water systems. *Yuba Reservoir is quickly filling with sediment, making sustainability a legitimate concern within the entire three-County region.* Twelvemile Canyon is a major contributor to the problem.

Impacts to Water Quality and Regional Watershed:

During and immediately following the high water years of 1982-1984, within Twelvemile Canyon multiple landslides and debris flows were either activated or reactivated, causing discharge of large amounts of sediment into the watershed. The largest of these slides was found in the South Fork Drainage. After 1983 the majority of these activated landslides stabilized. Over the past ten years a new slide in the Cooley Creek Drainage (which is within the larger South Fork drainage, but did not show any activity in 1983) has continued to move. The Cooley Creek Slide has slid down into the narrow canyon of South Fork and overtopped material that was deposited in 1983. At this time there is approximately 60 to 80 feet of sediment deposited from the 1983 and more recent slide events. This material will continue to be eroded away and sent downstream.

Sediment is an extremely serious issue within the watershed. Within the canyon it suppresses fish populations and habitat. For users it reduces crop value, water efficiency, fills ponds, plugs pipes and sprinklers, ruins equipment, and costs several thousands of dollars per year to dredge ponds and fix piping systems. Annual costs and losses are estimated at nearly $400,000 to $800,000/year within the South Sanpete irrigation service areas alone.

Pursuit of Solutions:

The Utah Division of Water Quality recognize the concerns and stepped forward with $150,000 to fund Phase I of the project, which is now complete. Phase II of the project is being funded by a $150,000 grant from the Utah State Legislature and a matching $150,000 grant from the Utah Community Impact Board. Additional funding is necessary to complete Phase III. The synopsis of the phases is as follows:

Phase I: Mapping and Data Gathering. COMPLETE. Geotechnical, hydrogeologic, economic, aerial mapping, topographical, water quality and other existing data was obtained. Phase I is complete and a brief overview of the major finding follows. In addition, the final report and presentation for Phase I can be accessed at the Sevier River Water Users Association Website (**http://sevierriver.org/**). A copy of the home page for this website is attached along with the Table of Contents from the Phase I Final Report. In addition GIS shape files of the area can be obtained by contacting Jones & DeMille Engineering.

Phase II: Data Evaluation and Alternatives Analysis. IN PROGRESS. Now that the existing data is gathered, alternatives intended to address the problem are being generated. These alternatives focus on solutions to keep the sediment from entering the creeks and streams.

Phase III: Final Design and Construction. The preferred alternative will be designed and implemented. Additional monies would be sought for Phase III based on the proposed solution.

This project has captured the attention of multiple state and federal agencies and representatives who are supporting and continue to aid in sponsoring this project. A list of these partners and their roles are attached.

PHASE I CONCLUSIONS

1. Geologic features within Twelvemile Canyon are generally unstable. The upper layers consist of Flagstaff Limestone and the lower layer is North Horn Shale. The overlaying limestone is fractured, jointed, and has karst sinkholes near the top of the watershed. The underlying shale is impermeable, creating a failure plane as water penetrates the limestone layers above and "greases" the shale.
2. Suspended sediment loads exceed pre-1983 suspended sediment loads and likely are the highest since the irrigation systems were created in the mid 1800's.
3. In 2008, even with very little slide activity, suspended sediment concentrations were over four times greater than sediment concentrations recorded in 1975 to 1980.
4. Sediment samples from the South Fork drainage showed the presence of dispersed clays, which cannot be feasibly settled out in conventional settling basins.
5. The hydrogeologic study showed that totally replacing Twelvemile Creek water with groundwater was not feasible.
6. Economic annual losses range from $400,000 to $800,000.
7. The present value over a 20-year life of a proposed siltation prevention project ranges from $7 to $12 million.

PHASE II OBJECTIVES

These objectives focus on alternatives to stabilize sediment in place rather than dealing with in-stream issues.

1. Continue water sampling, emphasizing the slide areas
2. Gather additional geotechnical information
    a. Estimate from Crux Subsurface Inc. - $100,000 for 3 holes and an additional $30,000 for evaluation of drill cuttings and holes by geotechnical engineer
    b. ATV drill rigs less expensive but may require a higher level of environmental clearance.
    c. Estimate from Kleinfelder - $40,000 for geophysical testing
3. Develop potential mitigation strategies
4. Evaluate feasibility of strategies based on cost and environmental permits and processes

POSSIBLE MITIGATION ALTERNATIVES

1. Replacing Twelvemile Creek with Groundwater
    a. This was determined to not be possible due to the lack of groundwater resources available in the Mayfield area.
2. In-Stream Sediment Removal Devices
    a. Settling Basins
        i. Difficult to find funding due to high maintenance costs

   b. Sluicing Desilting Structures
      i. Previously have not been able to be funded due to reintroducing concentrated sediment loads back into Twelvemile Creek
3. Sediment Mobilization Prevention and Potential Slide Stabilization – A map illustrating how these strategies could be implemented is attached.
   a. Potential Less Intrusive Solutions
      i. Rerouting streams to prevent introduction or limit length of stream across slide areas
      ii. Revegetation of slide
      iii. Tree and willow plantings along channels
      iv. Channelizing streams
      v. Armoring channels
   b. Potential Long Range Solutions
      i. Channel Lining
      ii. Piping selected areas
      iii. Subsurface water collection system

IMPLIMENTATION STRATEGY

1. The slide areas should be accessed with ATV mounted drill rigs.

   Information from these drill areas would provide information related to the material making up the slide, the depth and condition of the slipping plane, and the groundwater depth. We would like to leave these drill holes in place so that the depth of groundwater could be measured. These measurements may be able to indicate if the implemented strategies are reducing the amount of water moving through the slide.

2. The District would like to begin the process required to allow water to be diverted from the Cooley Creek Drainage and channelize areas near the top of the Cooley Creek Slide Area to remove the standing water and divert water away from running down through the slide area.

   Diverting water away from the slide area will greatly decrease the amount of water available to saturate the slide material. This is critical because water within the slide is what weakens the underlying soils making them unstable, therefore any effort that would reduce the amount of water in the slide area would work to stabilize the slide area. In addition these improvements could be made with comparatively very little construction activity disturbance as compared the other alternatives. For example a 6 to 8 inch pipe a few hundred feet long could be carried in and installed using existing ATV trails and hand tools to divert the water

from the Cooley Creek Drainage. To divert the water at the top of the slide area a small excavator would be needed.

3. The District would like to begin the process to allow willow plantings along the stream banks through the slide material and for the slide material to be seeded.

   In the past the slide area was seeded. According to observations by locals the seeded areas had established grasses, but when the Cooley Creek Slide Area slid again the slide material overtopped and covered the vegetated areas. With strategy #2 in place which would increase the stability of the slide area and would reduce the probability of the area sliding in the future allowing the seeded areas and the willow plantings to become established and locally stabilize the stream banks and soil.

REQUESTS FROM FOREST SERVICE

1. The District requests prompt processing of the special use permit application (SF299) for exploratory drilling on the slide area. The District may choose to amend the application to include an ATV-based drilling rig operation and/or geophysical testing based on the Forest's responses and recommendations.
2. The District requests prompt review of the implementation strategy above.
   a. The District requests a determination of the level of environmental review required for each numbered item above and an associated timeline.
   b. The District requests an explanation of any possible ways of shortening or fast tracking the environmental review process.
   c. The District requests your suggestions on any additional conceivable short term solutions.
3. The District requests review of the long term solutions.
   a. The District requests a determination of the level of environmental review required for each solution (3b) and an associated timeline.
   b. The District requests an explanation of any possible ways of shortening or fast tracking the environmental review process.
   c. The District requests your suggestions on any additional conceivable long term solutions.

Please contact Jones and DeMille Engineering with any questions or for any additional information required for the requests listed above.

Twelve Mile Canyon Water Quality Study - Windows Internet Explorer

http://www.jonesanddemille.com/12-mile/

Google

Convert Select

Twelve Mile Canyon Water Quality Study

Page Tools

TWELVE MILE CANYON
WATER QUALITY STUDY

Hosted by Jones & DeMille Engineering

Overview

Partners & Team Members

Maps

Schedule

Public Comments

Please click here to take Community Survey

Team Members Only

Twelve Mile Canyon Water Quality Study Summary

Background Information:
Water resources are critical to the economic, social, environmental and physical survival of all citizens in Central Utah. The San Pitch River watershed impacts citizens in Sanpete County, Juab County and Millard County. It is tributary to the Sevier River and feeds Yuba Reservoir, the primary water storage facility for Millard County. One of the primary sources of water for the San Pitch is runoff and snow melt that comes from Twelve Mile Canyon Creek and its tributaries. This watershed is critical to the San Pitch River, Sevier River, and all entities downstream of Yuba Reservoir. The surface water carries an extreme sediment load and significantly impacts the secondary systems of Gunnison City, Mayfield Town, and Centerfield Town, thereby increasing the demand on the culinary water systems. *Yuba Reservoir is quickly filling with sediment, making sustainability a legitimate concern within the entire three-County region.* Twelve Mile Canyon is a major contributor to the problem.

Geologic features within Twelve Mile Canyon are generally unstable. The upper layers consist of Flagstaff Limestone and the lower layer is North Horn Shale. The overlaying limestone is fractured, jointed, and has karst sinkholes near the top of the watershed. The underlying shale is impermeable, creating a failure plane as water penetrates the limestone layers above and □□□greases□□□ the shale. Two slides are of primary concern but there are several other slides contributing to the problem.

Impacts to Water Quality and Regional Watershed:
During and immediately following the high water years of 1982-1984, multiple landslides and debris flows were either activated or reactivated, causing discharge of large amounts of sediment into the watershed. As the landslides and debris flows move downward, the newly exposed material at the toes of these features are eroded and taken into the streams. As discussed above, communities and irrigators then have to utilize this sediment-laden water. Please see the following photos.

Sediment is an extremely serious issue within the watershed. It reduces water efficiency, fills ponds, plugs pipes and sprinklers, ruins equipment, and costs several thousands of dollars per year to dredge ponds and fix piping systems. Annual costs and losses are estimated at nearly $500,000/year within the South Sanpete irrigation service areas alone. Total damages have been conservatively estimated by these irrigation companies at over $10 million since the 1983-1984 floods as shown on the following pages.

Pursuit of Solutions:
The Utah Division of Water Quality recognizes the concerns and has stepped forward with $150,000 for the Gunnison and Mayfield Irrigation Companies for Phase I of the project. Please note the list of the multiple agencies supporting and sponsoring the project in this packet. Additional funding is necessary to complete Phases II and III. The synopsis of the Phases is as follows:

- **Phase I: Mapping and Data Gathering.** Geotechnical, hydrogeologic, economic, aerial mapping, topographical, water quality and other existing data will be obtained. Funding is secured.
- **Phase II: Data Evaluation and Alternatives Analysis.** After the existing data is gathered, alternatives intended to address the problem will be generated. ***Phase II is estimated to cost a total of $300,000. A matching grant would be requested from the Community Impact Board (CIB). Approval of this request would be most certain as the CIB historically favors planning efforts, especially those with far-reaching impacts.***
- **Phase III: Final Design and Construction.** The preferred alternative will be designed and

San Pitch Watershed Group Presentation (2007)

Project Brochure

Water Quality Sampling Plan

Media Releases

Sevier River Water Users Association

Phase I: Final Report

Phase I: Presentation (December 3, 2008)

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PROJECT PARTNERS and TEAM MEMBERS		
ORGANIZATION	**CONTACT**	**ROLE SUMMARY**
Sanpete Water Conservancy District	David Cox	Sponsor Funding Requests, Coordination
	Ed Sunderland	Sponsor Funding Requests, Coordination
Mayfield Town	John Christensen	Support
Gunnison City	Scott Hermansen	Support
Centerfield City	Darwin Jensen	Support
Utah Division Of Water Quality	Walt Baker	DWQ Approvals, Coordination
	Scott Daly	Technical reviews, Coordination with agencies
	Carl Adams	Technical reviews
Utah Division of Water Rights	Chuck Williamson	Technical reviews, Stream Alteration permits
Utah Division of Water Resources	Dennis Strong	Technical reviews
	Dan Aubrey	Technical reviews
	Ed Fall	Technical reviews
	Joel Williams	Technical reviews
	Eric Bagley	Technical reviews
Utah Water Quality Board	Jay Olsen	Public Relations, Funding
USDA Forest Service	Pam Brown	Environmental, Construction Approvals
	Marlene Depietro	Environmental, Construction Approvals
	Rod Player	Environemntal Review
	Pete Kilbourne	Environemntal Review
	Katherine Foster	Environemntal Review
	Leland Matheson	Environemntal Review
	Justin Humble	Technical Review and Assistance
	Karlton Moss	Technical Review
Utah Division of Natural Resources	Mike Styler	Funding, Technical Reviews, Approvals
Utah Department of Agiculture and Food	Leonard Blackham	Funding, Coordination between agencies
USDA Natural Resources Conservation Service	Brian Miller	Technical reviews and services
	Sylvia Gillen	Technical reviews and services
U.S. Army Corps of Engineers	Terry Johnson	Technical reviews and services
	Tim Witman	Technical reviews and services
San Pitch Watershed Stewardship Group	Tom Shore	Local Watershed Coordination
Sanpete Conservation District (soil)	Scott Sunderland	Local Support, Reviews
U.S. Senator Bob Bennet	Donna Sackett	Support
U.S. Senator Orrin Hatch	Ron Dean	Support
U.S. Congressman Jason Chaffetz	Wade Garrett	Support
Utah House of Representatives	Kay McIff	Legislative Support, Funding
Utah State Senate	Darin Peterson	Legislative Support, Funding
	Ralph Okerlund	Legislative Support, Funding
Sanpete County	Claudia Jarrett	Commission Chair, Public Relations, WCD rep
Gunnison Irrigation Company	Allen Dyreng	Company President, Approvals
	Danny Boore	Management, Water sampling
	Ray Christensen	Approvals
	Russell Yardley	Approvals, Water sampling
Mayfield Irrigation Company	Bill Kay Christiansen	Company President, Approvals
	Bruce Fuller	Approvals
	Doug Willden	Management, Water sampling
Jones & DeMille Engineering	Tim Jones	Principal in Charge, Management
	Brian Barton	Project Management, Technical, Geotech
	Garrick Willden	Project Engineer, Technical, Water Quality
Kleinfelder	Greg Schlenker	Geology, Geotechnical
	John Diamond	Hydrogeology, Groundwater Resources
John Keith	John Keith	Macro-, Micro-Economics analysis

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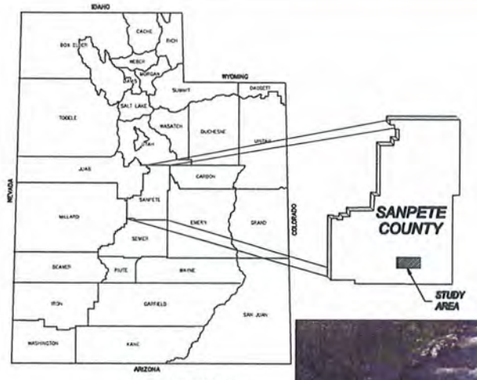
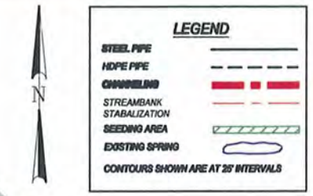
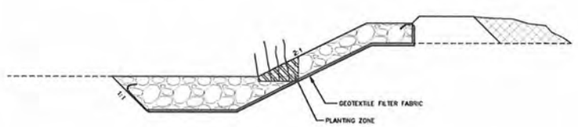


LOCATION MAP





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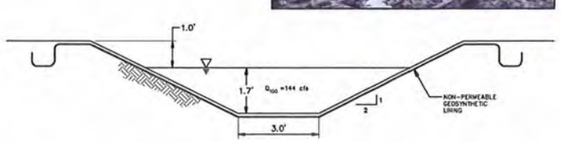

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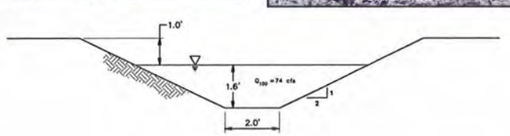

SECTION A–A

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SURVEYED BY: -	DRAWN BY: BL / LG	LAST EDIT: 07/2008

Twelvemile Canyon
Preliminary Remediation Strategies

SANPETE COUNTY
1" = 800'