

FINAL REPORT



CONTRACT NUMBER 11-177WPF

August 30, 2013

Submitted to:
Arizona Water Protection Fund
By the Gila Watershed Partnership of Arizona
711 S. 14th Avenue
Safford, Arizona 85546



EAGLE CREEK RIPARIAN PROTECTION PROJECT

The Arizona Water Protection Fund Commission has funded all or a portion of this report or Project.

The views or findings presented are the Grantee's and do not necessarily represent those of the Commission, the State, or the Arizona Department of Water Resources.



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EXECUTIVE SUMMARY

Eagle Creek is located in Greenlee County in central eastern Arizona. It is a tributary to the Gila River, an important source of water for Arizona. In the upper part of the watershed, land ownership is split between the San Carlos Apache reservation and the Apache Sitgreaves National Forest. The primary industry on the watershed is cattle ranching, with small amounts of private land supporting Forest Service leases. Ranchers in the Upper Eagle Creek area of the watershed have been working to implement Best Management Practices to restore and protect Eagle Creek and the surrounding riparian area. A majority of the riparian corridor has been fenced since 1996. However, the riparian area and the water quality of Eagle Creek are still threatened by trespass vehicles and cattle entering from the San Carlos Apache Nation.

The fence has been in disrepair for many years. The fence is on the borderline between the San Carlos Apache reservation and the Ely grazing allotment of the Apache Sitgreaves National Forest. Ownership of the fence has been debated for years. However, the Ely livestock are excluded from Eagle Creek, by Forest Service regulations. It is the tribal livestock that have frequent access to Eagle Creek, in addition to the Off-highway vehicles. This grant was written to solve that problem.



This project reconstructed five miles of boundary fence between the Ely's allotment (the 4-Drag ranch) and the San Carlos Apache Nation. As part of the Upper Eagle Creek Watershed Plan, reconstruction of the 33 miles of over fifty year-old boundary fence was outlined as being critical to the long-

term protection of Eagle Creek. Over the past five years, this Best Management Practice implementation has begun with 13 miles reconstructed on various allotments, including the East Eagle and Baseline-Horsesprings allotments, (funded by the Arizona Department of Agriculture's Livestock and Crop Conservation grant program) and the Double Circle allotment (funded by the Arizona Department of Environmental Quality).

This project eliminated recreation vehicle traffic and trespass livestock entering the floodplain and Eagle Creek itself from the San Carlos Apache Nation creating a buffer strip of floodplain between the fence and the riparian corridor fencing. Without the ongoing disturbance, floodplain areas are expected to undergo a natural revegetation process with rills and small gullies becoming healed in the process.

STATEMENT OF THE PROBLEM

The original boundary fence was constructed over fifty years ago. Generally, livestock fences have a useful life of 25 years. This fence was in very poor condition, and could no longer be adequately repaired. It no longer functioned as a barrier to vehicles and cattle. Off highway recreation vehicles created streambed down cutting, bank erosion and trails in the floodplain that result in gullies that carry sediment to the creek. In addition, trespass cattle overgrazed the floodplain adjacent to the Creek, leaving areas without cover, contributing to sediment from sheet and rill erosion that expand into gullies over time. Gaps in the boundary fence allowed recreation vehicles into the creek and allow trespass cattle to travel up tributaries and contribute to erosion, sedimentation, and deposited feces and urine in the riparian area. Ranchers in the Upper Eagle Creek community, under an agreement with the Apache Sitgreaves Forest, have all livestock fenced out of the creek but are unable to manage vehicles and trespass cattle from the reservation without the boundary fence.

A disturbance that removes one inch of soil from a 42 square inch area of unprotected surface will generate between 70 and 106 pounds of sediment that can enter a stream. (United States Department of the Interior, Bureau of Reclamation, Hydraulic and Excavation Tables, Eleventh Edition). At that rate, one inch of soil removed from a mile of tributary, vehicle trail or unprotected stream bank will generate 8800 pounds of sediment or just over 4 tons from a 42 inch wide strip.

Eagle Creek has seen increased impacts from recreational vehicles over the past ten years. Ranchers have not grazed riparian areas since 1996 but have no control over the vehicle access and trespass cattle. The erosion and degradation of the floodplain, tributaries and stream banks of Eagle Creek caused by recreational vehicles and trespass cattle multiplies this sediment number to a point that demonstrates a serious threat to water quality and the long term viability of the Creek itself. Excessive sedimentation clouds the water, which reduces the amount of sunlight reaching aquatic plants. It covers fish spawning areas and food supplies,

clogs the gills of fish, and smothers the aquatic habitats of bottom-dwelling organisms which can have a ripple effect on the entire ecosystem.



The Ely family, although the responsibility of the fence repair and replacement is not theirs, decided they had to find a way to repair the fence. Unfortunately, the five miles of fence proved to be prohibitively expensive. They approached the Gila Watershed

EAGLE CREEK RIPARIAN PROTECTION PROJECT

Partnership in 2008 about seeking grant funds to replace the fence.

PROJECT GOALS AND OBJECTIVES

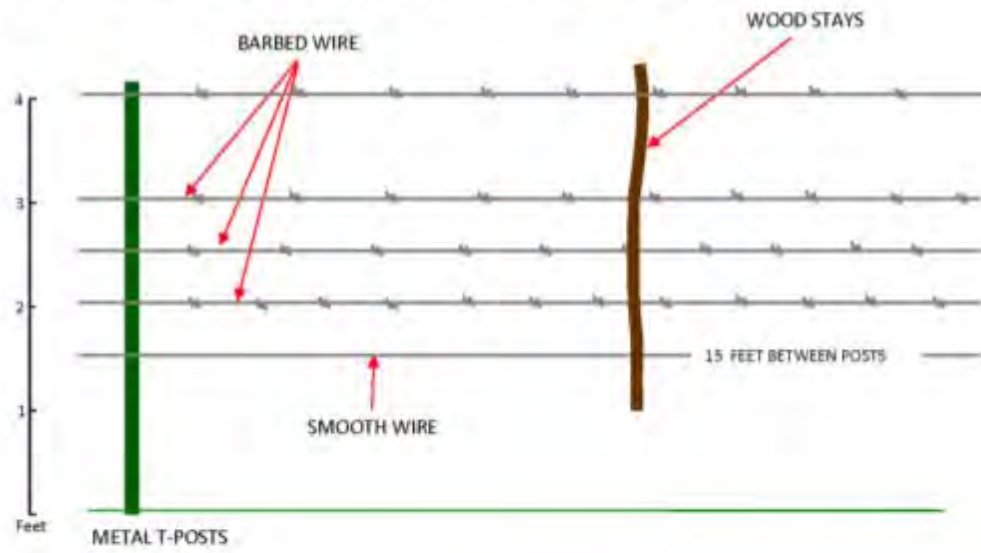
The goal of the project is to protect, enhance and restore the riparian area, and improve the water quality of Upper Eagle Creek. The objectives are to remove the existing fence and replace it with a higher, wildlife-friendly fence that will exclude the much-less-tame San Carlos Apache livestock.

PROJECT APPROACH

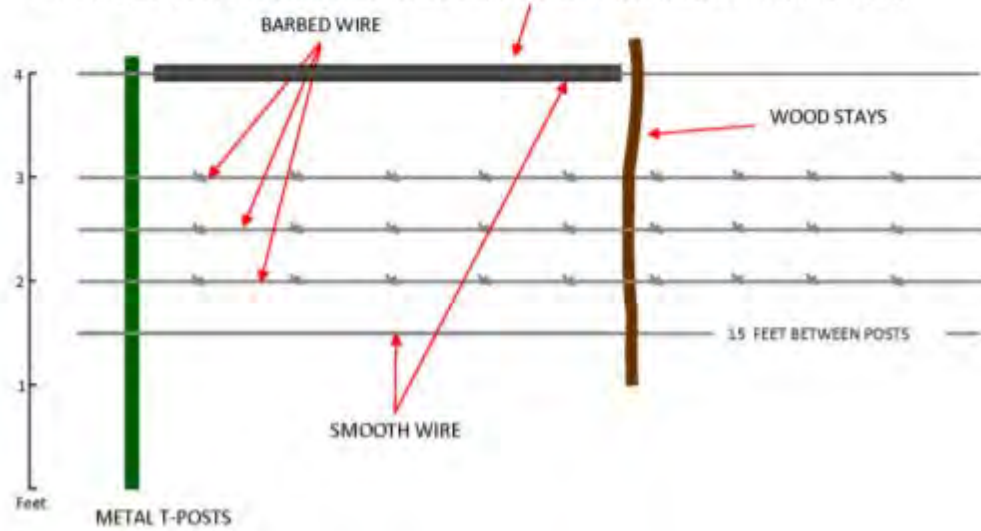
Even though we obtained the necessary Archeological clearance from the Arizona State Historical Preservation office, it was required to be built in the exact same footprint as the previous fence. In addition, the wild nature of the San Carlos Apache livestock necessitated a higher than normal fence be built to ensure that the livestock were contained by the fence. Special agreements had to be obtained from Greenlee County and the Arizona Game and Fish Department. Also, the usual white PVC pipe was replaced by black HDPE pipe as it lasts longer than PVC, and also because it is more visible against the light colored sky, and causes less risk of elk becoming injured by the barbed wire fence.

EAGLE CREEK RIPARIAN PROTECTION PROJECT

MUD SPRINGS ALLOTTMENT WILDLIFE-FRIENDLY BOUNDARY FENCE SCHEMATIC



1" HDPE BLACK POLY PIPE OVER WIRE TO INCREASE VISIBILITY FOR WILDLIFE - EVERY 1/4 MILE



PROJECT RESULTS

We contracted with a fence company named Rough Country Fence, a locally-owned company that was experienced in constructing fence in remote, rocky, and difficult terrain. Most of their fence crew was hired from the San Carlos Apache Tribe, which was particularly important because they are skilled fence builders who are familiar with the area, and the idiosyncrasies of the local soil, rock and inherent dangers of the work. Also, because of the remote location of the fence, the crew would have to pack in by mule, all equipment, materials and supplies. The crew and fence company supervisors rode in on horseback and camped out for the duration of the construction. Even in inclement weather. It was a project not for the faint of heart.

The existing fence was removed as part of the fence contract. All recyclable materials, including wire, fence ties, and t-posts were separated and hauled to an appropriate recycling center in Tucson or Phoenix. Any stays that were originally

acquired from the site that are biodegradable, were scattered on site to degrade naturally. Wood posts or stays were harvested on site. Upon completion, the fence was inspected by the Forest Service Clifton Ranger District and photo and *E.coli* monitoring were completed.

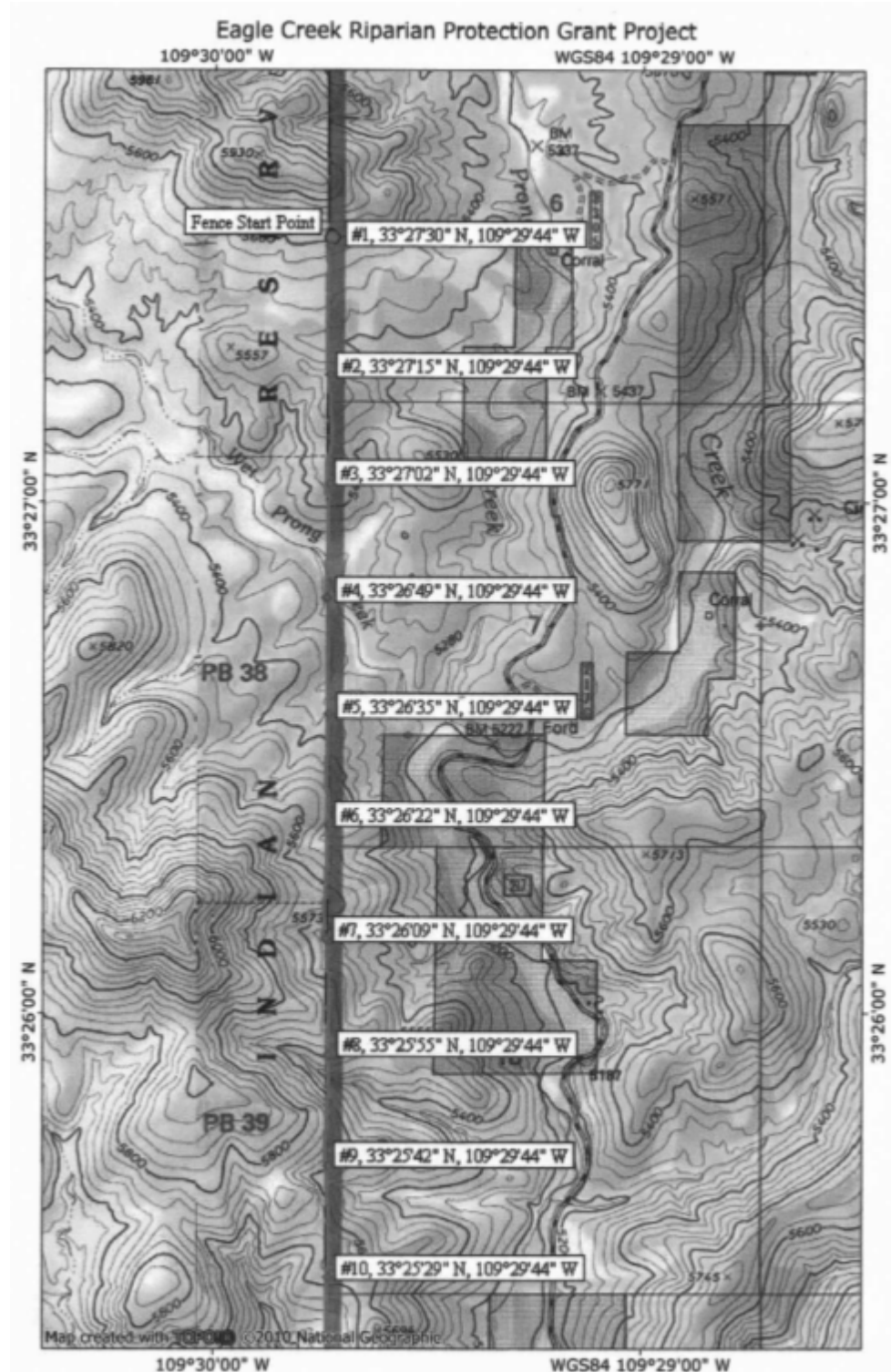


EAGLE CREEK RIPARIAN PROTECTION PROJECT

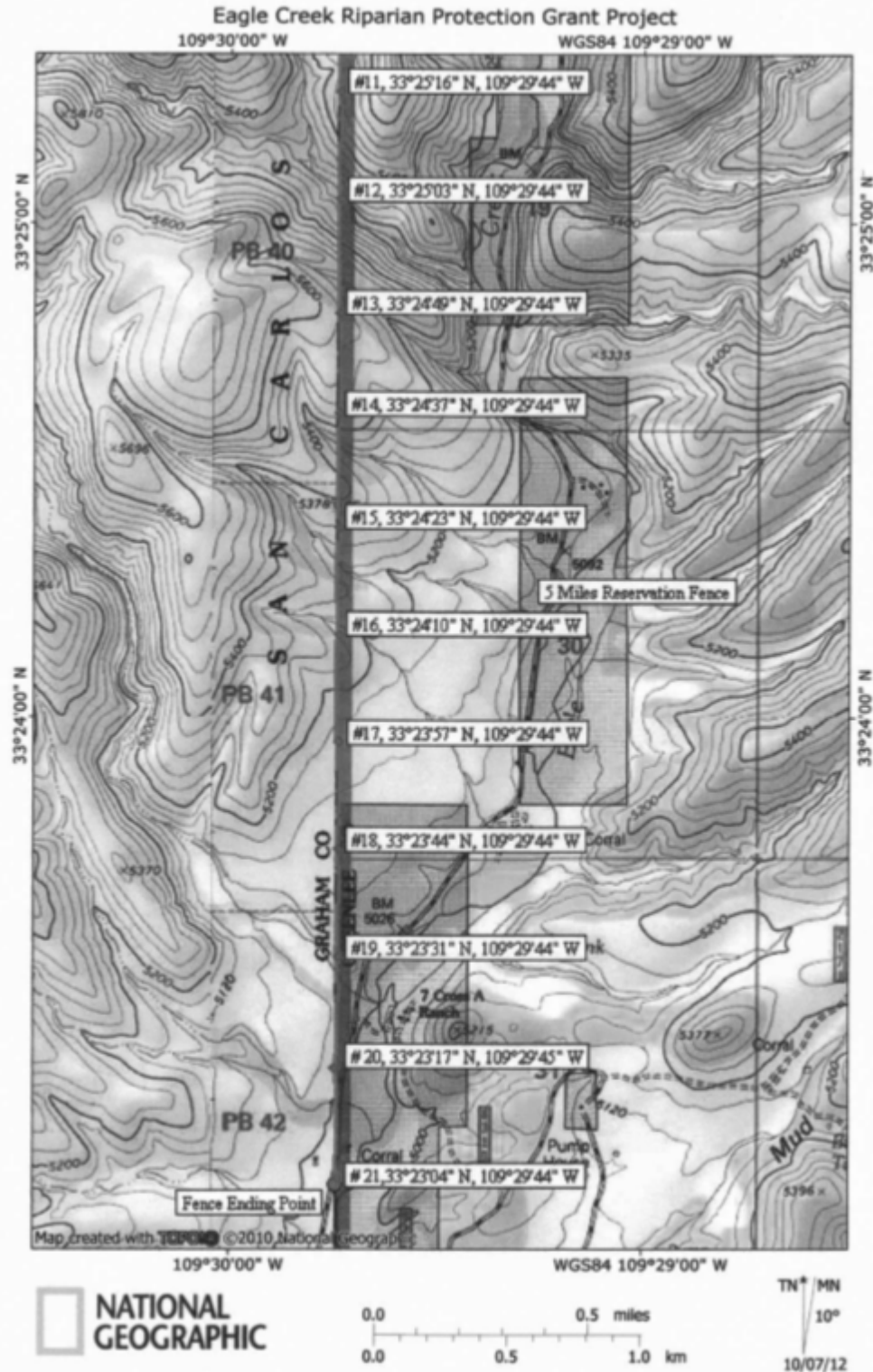
DATA ANALYSIS

Photo Monitoring

The photo monitoring was conducted at the following reference points:



EAGLE CREEK RIPARIAN PROTECTION PROJECT



EAGLE CREEK RIPARIAN PROTECTION PROJECT

PRE-PROJECT MONITORING

PHOTO POINT # 1

DATE: 06/08/2013

DIRECTION: N&E&S&W

GPS READING: N 33 27.868 W 109 29.728

PHOTOGRAPHER: CASH NOLAND

GPS UNIT: GARMIN

CAMERA: KODAK

NOTES: Northern start of fence

NORTH



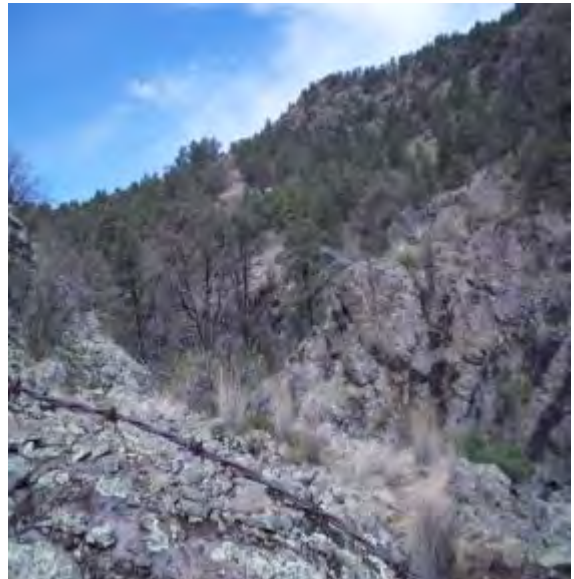
EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

PRE-PROJECT MONITORING

PHOTO POINT # 2

DATE: 06/08/2013

DIRECTION: N&E&S&W

GPS READING: N 33 27.746 W 109 29.738

PHOTOGRAPHER: CASH NOLAND

GPS UNIT: GARMIN

CAMERA: KODAK

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

PRE-PROJECT MONITORING

PHOTO POINT # 3

DATE: 06/08/2013

DIRECTION: N&E&S&W

GPS READING: N 33 27.629 W 109 29.734

PHOTOGRAPHER: CASH NOLAND

GPS UNIT: GARMIN

CAMERA: KODAK

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

PRE-PROJECT MONITORING

PHOTO POINT # 4

DATE: 06/08/2013

DIRECTION: N&E&S&W

GPS READING: N 33 27.463 W 109 29.736

PHOTOGRAPHER: CASH NOLAND

GPS UNIT: GARMIN

CAMERA: KODAK

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

PRE-PROJECT MONITORING

PHOTO POINT # 5

DATE: 06/08/2013

DIRECTION: N&E&S&W

GPS READING: 12S 8639788

GPS UTM # 3704741

PHOTOGRAPHER: CASH NOLAND

GPS UNIT: GARMIN

CAMERA: KODAK

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

PRE-PROJECT MONITORING

PHOTO POINT # 6

DATE: 06/08/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639790

GPS UTM # 3704337

PHOTOGRAPHER: CASH NOLAND

GPS UNIT: GARMIN

CAMERA: KODAK

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

PRE-PROJECT MONITORING

PHOTO POINT # 7

DATE: 06/8/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639832

GPS UTM # 3701571

PHOTOGRAPHER: Cash Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES: North start by Wet Prong

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

PRE-PROJECT MONITORING

PHOTO POINT # 8

DATE: 06/08/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639836

GPS UTM # 3701189

PHOTOGRAPHER: Cash Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

PRE-PROJECT MONITORING

PHOTO POINT # 9

DATE: 06/08/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639844

GPS UTM # 3700766

PHOTOGRAPHER: Cash Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

PRE-PROJECT MONITORING

PHOTO POINT # 10

DATE: 06/08/2013

DIRECTION: N&E&S&W

GPS READING: 12S 06439843

GPS UTM # 3700430

PHOTOGRAPHER: Cash Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

PRE-PROJECT MONITORING

PHOTO POINT # 11

DATE: 06/08/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639846

GPS UTM # 3700135

PHOTOGRAPHER: Cash Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

PRE-PROJECT MONITORING

PHOTO POINT # 12

DATE: 06/08/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639852

GPS UTM # 3699744

PHOTOGRAPHER: Cash Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

PRE-PROJECT MONITORING

PHOTO POINT # 13

DATE: 06/08/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639852

GPS UTM # 3699744

PHOTOGRAPHER: Cash Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

PRE-PROJECT MONITORING

PHOTO POINT # 14

DATE: 06/08/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639851

GPS UTM # 3698920

PHOTOGRAPHER: Cash Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

PRE-PROJECT MONITORING

PHOTO POINT # 15

DATE: 06/08/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639830

GPS UTM # 3698672

PHOTOGRAPHER: Cash Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

PRE-PROJECT MONITORING

PHOTO POINT # 16

DATE: 06/08/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639865

GPS UTM # 3698344

PHOTOGRAPHER: Cash Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

PRE-PROJECT MONITORING

PHOTO POINT # 17

DATE: 06/08/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639889

GPS UTM # 3697888

PHOTOGRAPHER: Cash Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

PRE-PROJECT MONITORING

PHOTO POINT # 18

DATE: 06/08/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639891

GPS UTM # 3697528

PHOTOGRAPHER: Cash Noland

GPS UNIT: Garmin

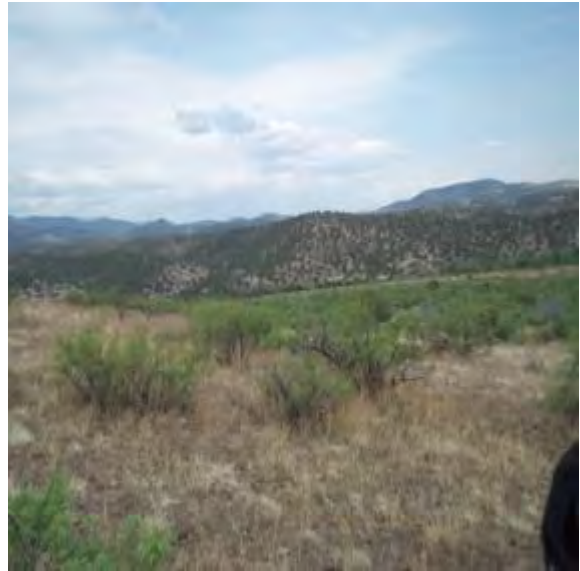
CAMERA: Kodak

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

PRE-PROJECT MONITORING

PHOTO POINT # 19 DATE: 06/08/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639899

GPS UTM # 3697141

PHOTOGRAPHER: Cash Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES: Northern Corner of 7 + A Ranch & Southern End of Fence

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

POST-PROJECT MONITORING

PHOTO POINT # 1

DATE: 07/18/2013

DIRECTION: N&E&S&W

GPS READING: N 33 27.868 W 109 29.728

PHOTOGRAPHER: CASH NOLAND

GPS UNIT: GARMIN

CAMERA: KODAK

NOTES: Northern start of fence

NORTH



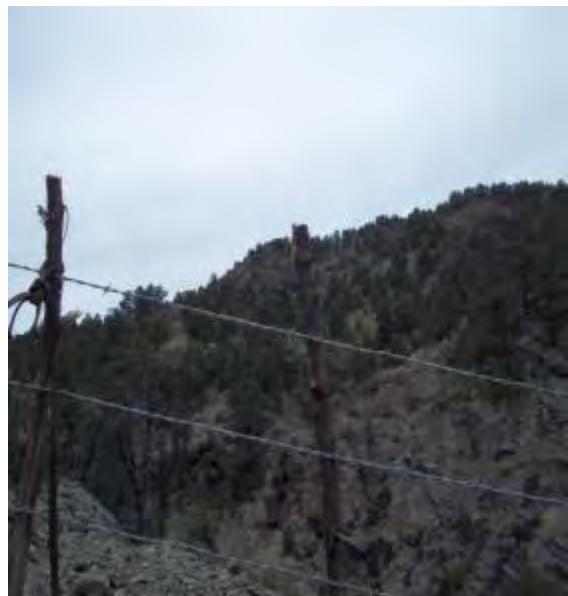
EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

POST-PROJECT MONITORING

PHOTO POINT # 2

DATE: 07/18/2013

DIRECTION: N&E&S&W

GPS READING: N 33 27.746 W 109 29.738

PHOTOGRAPHER: CASH NOLAND

GPS UNIT: GARMIN

CAMERA: KODAK

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

POST-PROJECT MONITORING

PHOTO POINT # 3

DATE: 07/18/2013

DIRECTION: N&E&S&W

GPS READING: N 33 27.629 W 109 29.734

PHOTOGRAPHER: CASH NOLAND

GPS UNIT: GARMIN

CAMERA: KODAK

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

POST-PROJECT MONITORING

PHOTO POINT # 4

DATE: 07/18/2013

DIRECTION: N&E&S&W

GPS READING: N 33 27.463 W 109 29.736

PHOTOGRAPHER: CASH NOLAND

GPS UNIT: GARMIN

CAMERA: KODAK

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

POST-PROJECT MONITORING

PHOTO POINT # 5

DATE: 07/19/2013

DIRECTION: N&E&S&W

GPS READING: 12S 8639788

GPS UTM # 3704741

PHOTOGRAPHER: CASH NOLAND

GPS UNIT: GARMIN

CAMERA: KODAK

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

POST-PROJECT MONITORING

PHOTO POINT # 6

DATE: 07/19/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639790

GPS UTM # 3704337

PHOTOGRAPHER: CASH NOLAND

GPS UNIT: GARMIN

CAMERA: KODAK

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

POST-PROJECT MONITORING

PHOTO POINT # 7

DATE: 07/19/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639832

GPS UTM # 3701571

PHOTOGRAPHER: Cash Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES: North start by Wet Prong

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

POST-PROJECT MONITORING

PHOTO POINT # 8

DATE: 07/19/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639836

GPS UTM # 3701189

PHOTOGRAPHER: Cash Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

POST-PROJECT MONITORING

PHOTO POINT # 9

DATE: 07/19/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639844

GPS UTM # 3700766

PHOTOGRAPHER: Cash Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

POST-PROJECT MONITORING

PHOTO POINT # 10

DATE: 07/19/2013

DIRECTION: N&E&S&W

GPS READING: 12S 06439843

GPS UTM # 3700430

PHOTOGRAPHER: Cash Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

POST-PROJECT MONITORING

PHOTO POINT # 11

DATE: 07/19/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639846

GPS UTM # 3700135

PHOTOGRAPHER: Cash Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

POST-PROJECT MONITORING

PHOTO POINT # 12

DATE: 07/19/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639852

GPS UTM # 3699744

PHOTOGRAPHER: Cash Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES:

NORTH



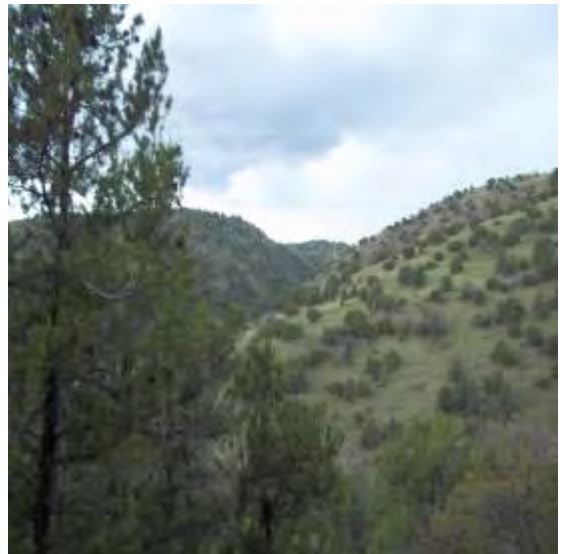
EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

POST-PROJECT MONITORING

PHOTO POINT # 13

DATE: 07/20/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639852

GPS UTM # 3699744

PHOTOGRAPHER: Cash Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

POST-PROJECT MONITORING

PHOTO POINT # 14

DATE: 07/20/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639851

GPS UTM # 3698920

PHOTOGRAPHER: Crystal Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

POST-PROJECT MONITORING

PHOTO POINT # 15

DATE: 07/20/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639830

GPS UTM # 3698672

PHOTOGRAPHER: Crystal Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

POST-PROJECT MONITORING

PHOTO POINT # 16

DATE: 07/20/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639865

GPS UTM # 3698344

PHOTOGRAPHER: Crystal Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

POST-PROJECT MONITORING

PHOTO POINT # 17

DATE: 07/20/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639889

GPS UTM # 3697888

PHOTOGRAPHER: Crystal Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

POST-PROJECT MONITORING

PHOTO POINT # 18

DATE: 07/20/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639891

GPS UTM # 3697528

PHOTOGRAPHER: Crystal Noland

GPS UNIT: Garmin

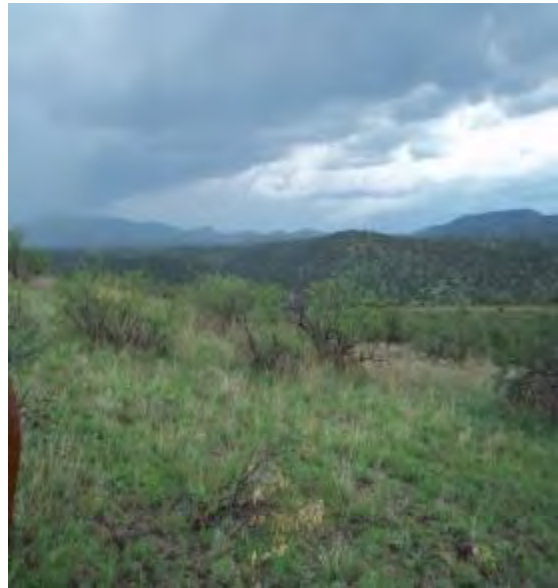
CAMERA: Kodak

NOTES:

NORTH



EAST



SOUTH



WEST



EAGLE CREEK RIPARIAN PROTECTION PROJECT

POST-PROJECT MONITORING

PHOTO POINT # 19 DATE: 07/20/2013

DIRECTION: N&E&S&W

GPS READING: 12S 0639899

GPS UTM # 3697141

PHOTOGRAPHER: Crystal Noland

GPS UNIT: Garmin

CAMERA: Kodak

NOTES: Northern Corner of 7 + A Ranch & Southern End of Fence

NORTH



EAST



SOUTH



WEST



ECOLI MONITORING

The “before” sampling events were conducted in locations above and below the area to be fenced, using sites where ADEQ had sampled in the past, so that we could reference prior E. coli sampling records if needed. At that time, because our own lab equipment was in storage, we elected to have our samples processed by the City of Safford water quality lab, which uses the same IDEXX Colilert-18 E. coli test that we have always used under our ADEQ-approved protocol.

The first “before” location was at the “First Crossing” of Eagle Creek Road through the creek, just beyond “Big Dry Wash.” On that sampling trip, we attempted to reach the second, upstream, site, but had to turn back because there was not sufficient time to collect our samples and our data and reach the lab in Safford before their 3:30 closing. The second “before” sample, upstream of “First Crossing” and upstream of the area to be fenced, was just below Honeymoon Campground, approximately where ADEQ had sampled in previous years. At that site we pulled and processed two samples, to make certain we would have test results given the difficulty of reaching the site and transporting samples within the prescribed time window to the lab. We reported both results.

Although these two samples were not taken on the same day, they establish baseline E. coli numbers under low-flow conditions in moderate temperatures, with no precipitation or surface run-off affecting stream water quality. They showed relatively high E. coli numbers at the Honeymoon Campground site, though there was no visible cattle sign in the area. Excellent toilet facilities on the site, maintained by the Forest Service for the scantily used Honeymoon Campground, suggest that the E. coli presence would not be related to human fecal matter in the stream. The earlier E. coli test results at First Crossing were significantly lower than those at Honeymoon Campground, though none of the “before” test results approached the 235 colony forming units threshold at which ADEQ’s protocols deem surface recreational waters unsafe for full-body contact.

After the fencing installation was complete, we re-established our ADEQ-approved lab in Duncan so that it would be possible to collect both of the “after” samples on one trip and get the tests into the incubator within the required six hours. Both site visits were successfully accomplished in that trip. The exact sampling site at Honeymoon Campground was inaccessible because heavy equipment was blocking the access in order to remove a fallen tree. For that reason we sampled upstream at the next accessible stream point. The downstream sample was taken at precisely the same point as the “before” sample in the spring.

At this time, summer monsoon patterns had been in effect for several weeks, but Upper Eagle Creek had not received any precipitation events that would have caused fecal material to flow across land into the mainstem stream. This was verified in part by the reports of residents of the area and in part by daily monitoring of the USGS gauge at Lower Eagle Creek, which indicates to a large extent what the upstream flow patterns are. While fecal material certainly could have entered the mainstem stream through the many small washes that empty into it, we did not have the kind of conditions that would have led to very high E. coli test results.

EAGLE CREEK RIPARIAN PROTECTION PROJECT

The E. coli results at both sites were somewhat higher than in the dry spring months, but well below the 235 cfu threshold. The E. coli content of the samples fell by almost 20 cfu between the upstream and downstream sites, indicating that there were no significant sources of fecal contamination affecting the stream between the two sites.

EAGLE CREEK RIPARIAN PROTECTION PROJECT

E. coli Sampling on Upper Eagle Creek – “after” samples for Eagle Creek Riparian Protection Project

Note: rains on the day of sampling and the night before may have caused fecal material to enter the stream via the many small washes in the region

Site: Above Honeymoon Campground (prior site below campground was not accessible because workers were removing a fallen tree on the road at the site)

GPS: 12S 0641203, UTM 3705074

Date: August 12, 2013

Time: 13:10

Colilert result: 93.2 colony forming units (cfu), most probable number (mpn)

Turbidity: 12.0

pH: 7.2

Air temp: 27 C

Water temp: 25 C



EAGLE CREEK RIPARIAN PROTECTION PROJECT

Site: First Crossing (above Big Dry Creek)
GPS: 12S 0639852, UTM 3694508
Date: August 12, 2013
Time: 13:58
Colilert result: 73.3 colony forming units (cfu), most probable number (mpn)
Turbidity: 18.4
pH: 7.8
Air temp: 26 C
Water temp: 26 C



PROJECT CONCLUSIONS

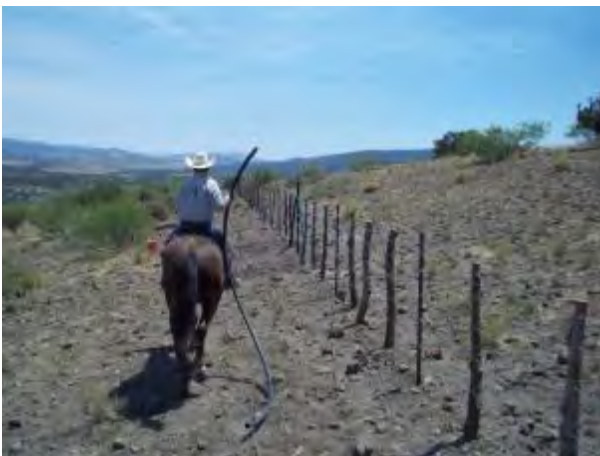
Although the project included pre- and post- photo monitoring of the fence, to show that the construction of the fence was completed and the old fence was removed and the construction site appropriately cleaned, it is very hard to adequately assess how difficult the terrain was, the challenging work that had to be undertaken, and how professionally the fence was constructed. The following photos may illustrate those challenges.



EAGLE CREEK RIPARIAN PROTECTION PROJECT



EAGLE CREEK RIPARIAN PROTECTION PROJECT



EAGLE CREEK RIPARIAN PROTECTION PROJECT

EDUCATION AND OUTREACH

Although a field visit was planned for the project conclusion, the remote nature of the fence location proved too difficult for most invitees, especially because the majority of the community is over 65 years old. The community outreach was held August 2, 2013, at the Eagle Creek one-room school house. The meeting was attended by 15 local people and five members of the San Carlos Apache Tribe. A power point presentation was made to highlight the goals and objectives and the results of the project.

On August 14, 2013, at the regular meeting of the Gila Watershed Partnership, Darcy Ely gave a presentation to 44 of the partnership's members and partners. A copy of the presentation is attached.



The Eagle Creek Riparian
Protection Project

This project was funded by a grant from the
Arizona Water Protection Fund

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RECOMMENDATIONS FOR FUTURE PROJECTS

Exclusion of the San Carlos Apache tribal livestock from this 33-mile stretch of Eagle Creek will have a considerable positive impact on the riparian area. Although this project is complete, the Gila Watershed Partnership is looking at future projects and program.

While Eagle Creek is not listed on the Environmental Protection Agency's 303(d) list of impaired waters as listed for *E.coli*, recent sampling events have indicated that Upper Eagle Creek may be impaired for *E.coli*. In a conversation between the Gila Watershed Partnership and the Arizona Department of Environmental Quality, it was suggested that it may be appropriate for the partnership to develop projects for known issues to address the *E.coli* in the near future, and not wait for the creek to be listed. These projects may include rehabilitation of old corrals with large amounts of fecal material from both livestock and horses, and two miles of another forest service allotment boundary fence south of the Ely ranch, among others.

The recent Wallow fire, which impacted the Ely's boundary fence, had numerous impacts on the natural resources of the area. The post-fire conditions fire will work both for and against this recovery. While the nutrient value of ash carried downstream from forest fire areas will generally assist riparian plant recovery, the continuing sub-normal rainfall will not give plant recovery much additional support.

This project will help to speed the recovery of the riparian area. However, we intend to continue our effort to improve the condition of the Upper Eagle Creek riparian area, as well as the whole Upper Gila Watershed of Arizona.