Upper Little Colorado River – Apache NRCD Water Quality Improvement Project

Name: Brian Nicoll/Barbra Nicoll
Ranch Name: Coyote Creek Ranch
Mailing Address:
Watershed: Carnero Creek and Coyote Creek watersheds

Date of Visit: 04/09/2015
Email: bnicoll01@msn.com
Phone Number: 928.245.7353
928.245.1180

Site Description:
About 2.2 miles of Coyote Creek meanders through the southeast corner of this ranch; however, approximately half of the ranches 17,880 acres drain into the Little Colorado River and Lyman lake. The Ranch has extensive groundwater development as part of the Tucson Electric Power operations. These wells are being used for ranch management activities. Further development of these wells will allow for greater utilization and rotation of the ranch. Grazing is the primary land use on the ranch and vegetation cover is typical of the lower Coyote Creek watershed.

Brian Nicoll purchased this ranch from Mike Udall. Mr. Udall historically participated in NRCS conservation programs and implemented many conservation practices related to vegetation and stabilization treatments (water bars, water spreaders and revegetation along water courses), as well as grazing management practices aimed at decreasing erosion. These practices are largely intact and maintained by the new owner and have been effective at reducing erosion from specific areas.

Project Description:
The landowner proposes to use fencing and the development of water lines from existing TEP wells to allow for better distribution of livestock across a wider area of the ranch, reducing grazing pressure, and improving vegetative cover. Lack of adequate watering sites has led to concentrated grazing and lost opportunities for rotation of livestock across the ranch. The existing grazing practices have increased the risk of concentrated runoff and erosion.

Proposed BMPs

Nicoll BMP 1 - Range Management (Fencing) and Water Development (Trough)

Tons of Sediment Mitigated (10 yr): 400

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Standard 4-Strand Barbed Wire Fence	ft	5600	$3.50	$19,600
Trough and Float	gal	350	$1.50	$525
			Total Estimated Construction Cost:	**$20,125**
			Estimated Engineering Cost (15%):	$3,019
			Estimated Administrative Cost (10%):	$2,013
			Estimated Permits and Clearances (6.5 Acres):	$1,000
			Total Estimated Project Cost:	**$26,156**
			Cost per Mitigated Ton of Sediment:	**$65**
			ADEQ Match (60%):	$15,693.75
			Landowner Match (40%):	$10,462.50

Nicoll BMP 2 - Range Management (Fencing)

Tons of Sediment Mitigated (10 yr): 600

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Standard 4-Strand Barbed Wire Fence	ft	4200	$3.50	$14,700
			Total Estimated Construction Cost:	**$14,700**
			Estimated Engineering Cost (15%):	$2,205
			Estimated Administrative Cost (10%):	$1,470
			Estimated Permits and Clearances (6.5 Acres):	$1,000
			Total Estimated Project Cost:	**$19,375**
			Cost per Mitigated Ton of Sediment:	**$32**
			ADEQ Match (60%):	$11,625.00
			Landowner Match (40%):	$7,750.00

Nicoll BMP 3 - Water Development (Pipeline & Trough)

Tons of Sediment Mitigated (10 yr): 400

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Pipeline (1 1/4 in. Diameter)	ft	300	$3.75	$1,125
Trough and Float	gal	350	$1.50	$525
			Total Estimated Construction Cost:	**$1,650**
			Estimated Engineering Cost (15%):	$248
			Estimated Administrative Cost (10%):	$165
			Estimated Permits and Clearances (6.5 Acres):	$1,000
			Total Estimated Project Cost:	**$3,063**
			Cost per Mitigated Ton of Sediment:	**$8**
			ADEQ Match (60%):	$1,837.50
			Landowner Match (40%):	$1,225.00

Nicoll BMP 4 - Water Development (Pipeline & Trough)

Tons of Sediment Mitigated (10 yr): 400

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Pipeline (1 1/4 in. Diameter)	ft	7000	$3.75	$26,250
Trough and Float	gal	350	$1.50	$525
			Total Estimated Construction Cost:	**$26,775**
			Estimated Engineering Cost (15%):	$4,016
			Estimated Administrative Cost (10%):	$2,678
			Estimated Permits and Clearances (6.5 Acres):	$1,000
			Total Estimated Project Cost:	**$34,469**
			Cost per Mitigated Ton of Sediment:	**$86**
			ADEQ Match (60%):	$20,681.25
			Landowner Match (40%):	$13,787.50

Site Photos

Figure 1. Pasture land on the Nicoll ranch.

Site Maps

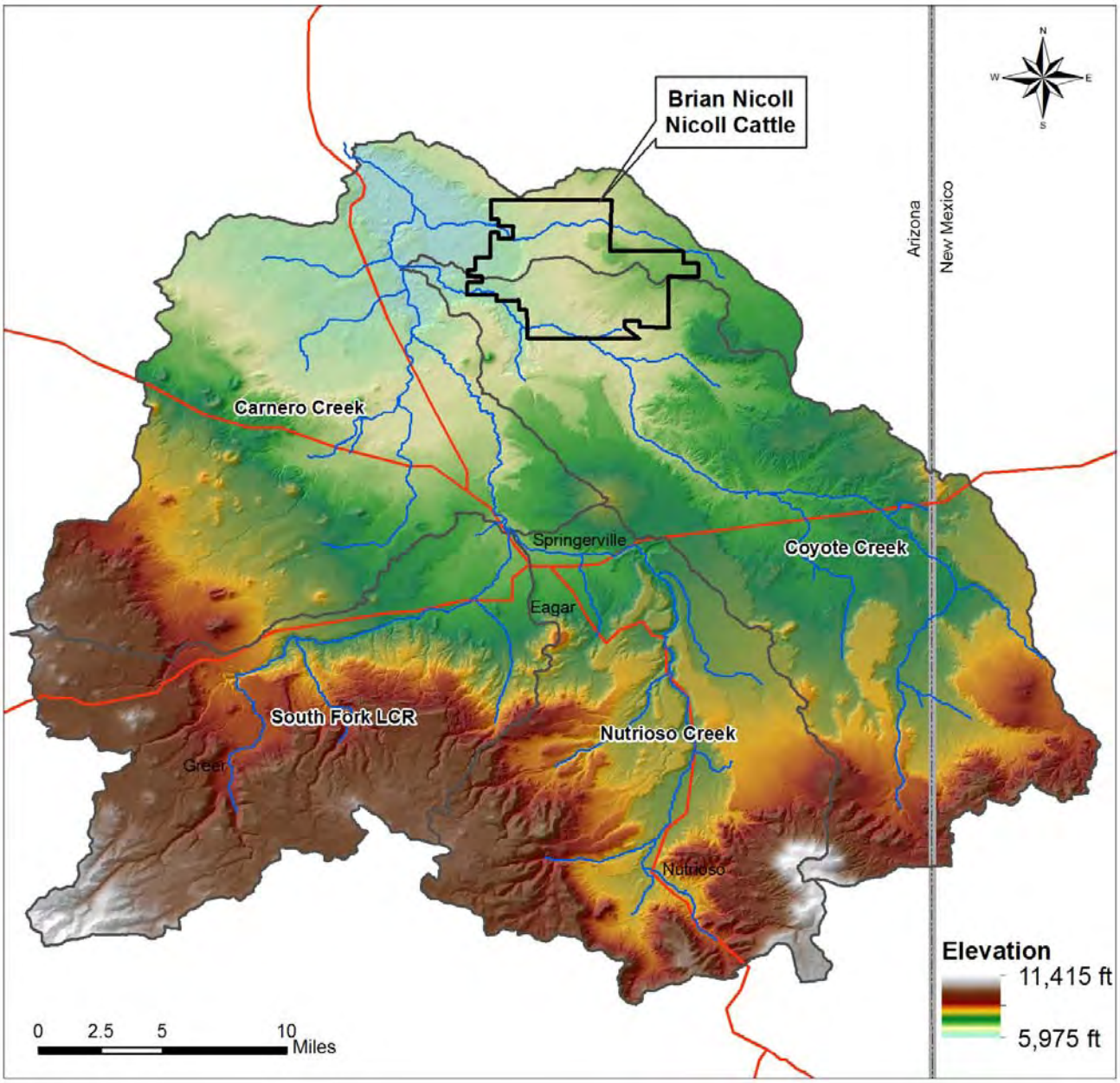

Figure 2. Watershed scale map with ranch boundary.

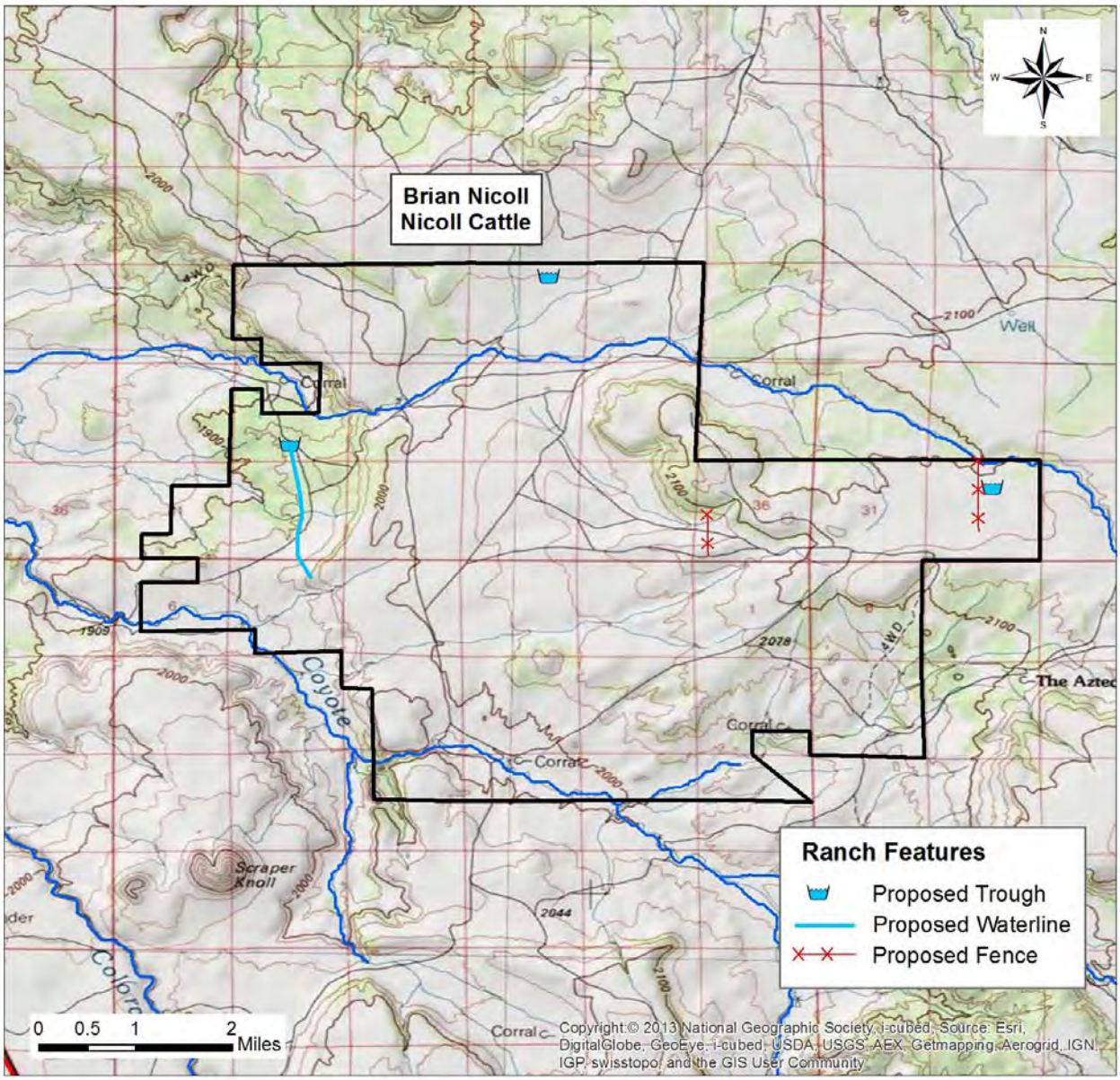

Figure 3. Topographic map with ranch boundaries and red star indication location of proposed work.

Upper Little Colorado River – Apache NRCD Water Quality Improvement Project

Name: Kevin McFee
Ranch Name:
Mailing Address:
Watershed: Carnero Creek

Date of Visit: 04/09/2015
Email: rimrocked.km.gmail.com
Phone Number: 928.551.7375

Site Description:
A significant portion of this ranch is located within the Canero Creek watershed, and borders the northeast side of Lyman Lake. The proposed project site is located ~3.5 miles up a tributary of the Little Colorado River. Grazing is the primary land use of the ranch lands.

Ephemeral channels within the ranch boundaries are headcutting, creating gullies and small arroyos with vertical banks. The headcutting is causing the system to source and mobilize sediment as the channel adjusts to a new base level. This adjustment is dissecting pasture land and contributing to the water quality impairment of the downstream fluvial network.

Project Description:
Kevin McFee proposes to slope and revegetate ~1500 ft of vertical banks. This work will accelerate the evolution of the ephemeral channels to a more stable condition, which will decrease the sourcing of sediment from the banks. It will also be necessary to construct ~3 rock lined chutes to stabilize the advancing headcut.

A small sediment basin/livestock tank has been breached upstream of the eroding channels. Mr. McFee would like to explore the possibility of repairing the failed pond that has exceeded its life expectancy. While it is unclear at this time whether the site could accommodate an adequate spillway to handle flood flows, an estimate of the cost to rebuild the basin and construct an adequate spillway has been determined, though the feasibility of the project will require a topographic survey and preliminary design analysis.

Proposed BMPs

McFee BMP 1 - Channel Bank Sloping and Revegetation

Tons of Sediment Mitigated (10 yr): 4030

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Earthwork - Bank Sloping 2310 linear feet	cy	3100	$4.25	$13,175
Double Net Erosion Control Fabric	sy	2000	$3.85	$7,700
Seeding	ac	3	$150.00	$450
			Total Estimated Construction Cost:	**$21,325**
			Estimated Engineering Cost (20%):	$4,265
			Estimated Administrative Cost (10%):	$2,133
			Estimated Permits and Clearances (4 Acres):	$2,000
			Total Estimated Project Cost:	**$29,723**
			Cost per Mitigated Cubic Yard:	**$7**
			ADEQ Match (60%):	$17,833.50
			Landowner Match (40%):	$11,889.00

McFee BMP 2 - Sediment Basin/Livestock Tank

Tons of Sediment Mitigated (10 yr): 3250

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Basin Repair	cy	4000	$4.25	$17,000
Rocklined Spillway Construction	ea	1	$9,500.00	$9,500
Seeding	ac	3	$150.00	$450
			Total Estimated Construction Cost:	**$26,950**
			Estimated Engineering Cost (20%):	$5,390
			Estimated Administrative Cost (10%):	$2,695
			Estimated Permits and Clearances (4 Acres):	$7,500
			Total Estimated Project Cost:	**$42,535**
			Cost per Mitigated Cubic Yard:	**$13**
			ADEQ Match (60%):	$25,521.00
			Landowner Match (40%):	$17,014.00

Site Photos

Figure 1. Photograph of erosion typical of the project area.

Figure 2. Headcutting to be addressed with rock lined chute.

Site Maps

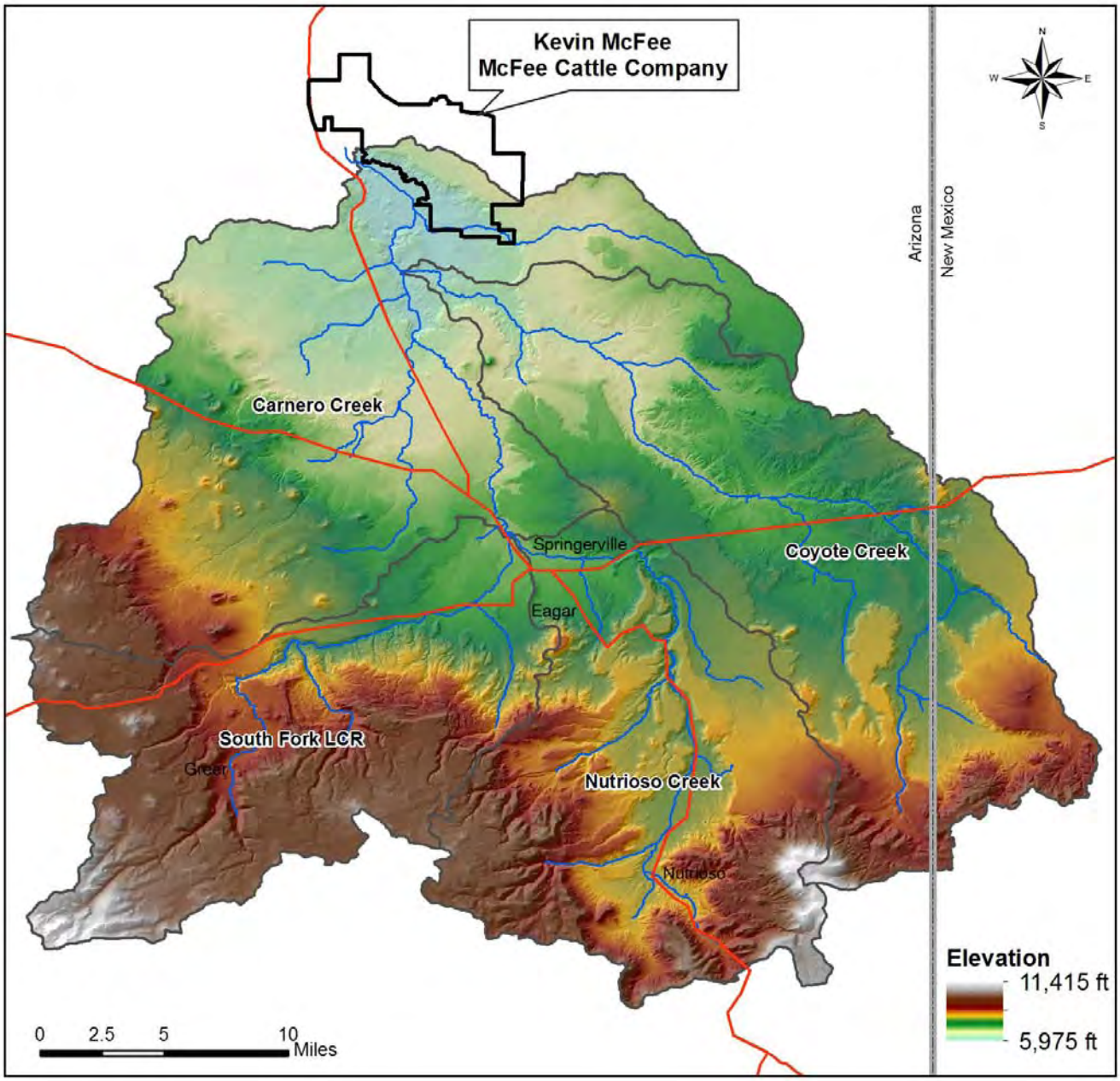

Figure 3. Watershed scale map with ranch boundary.

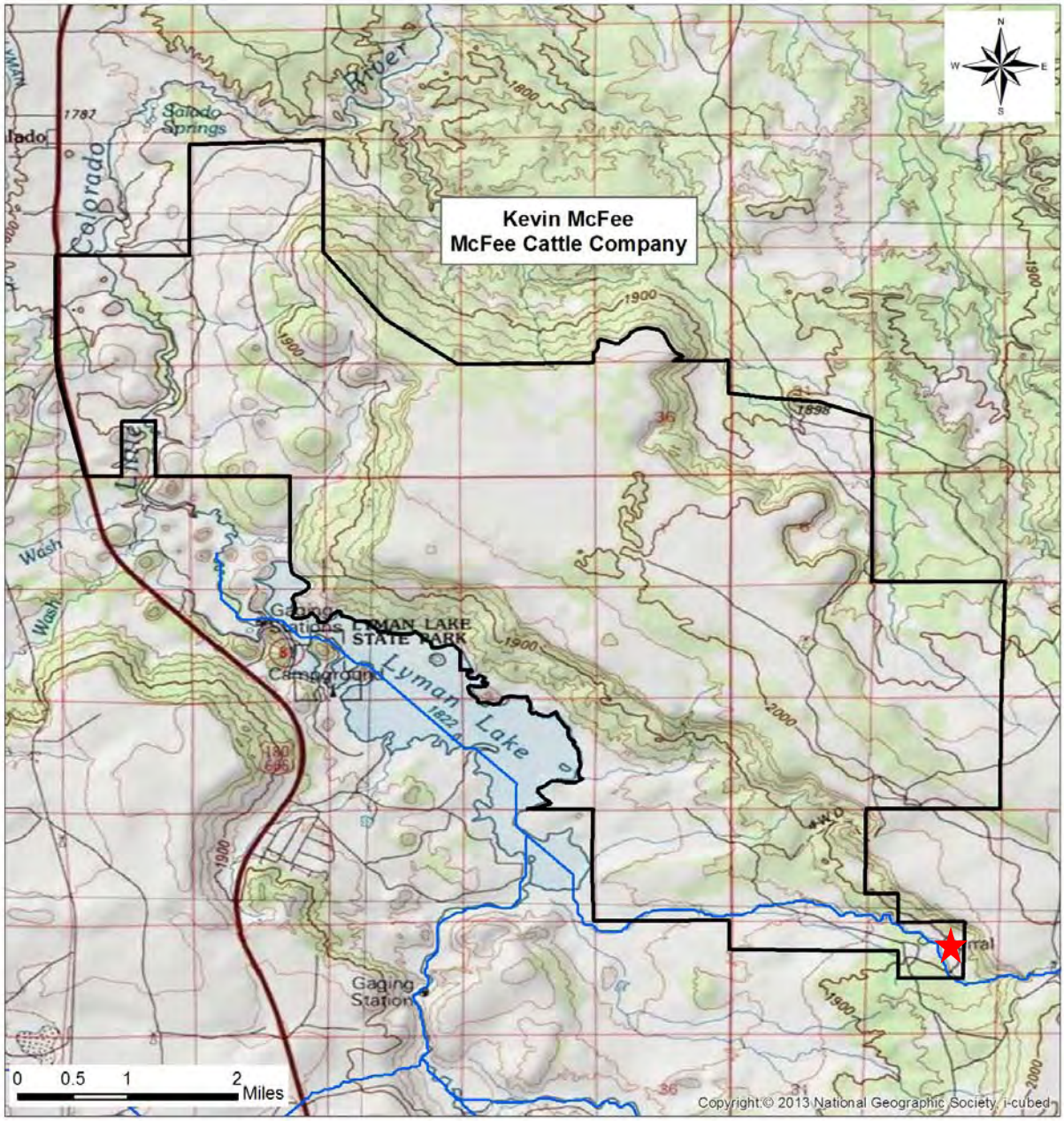

Figure 4. Topographic map with ranch boundaries and red star indication location of proposed work.

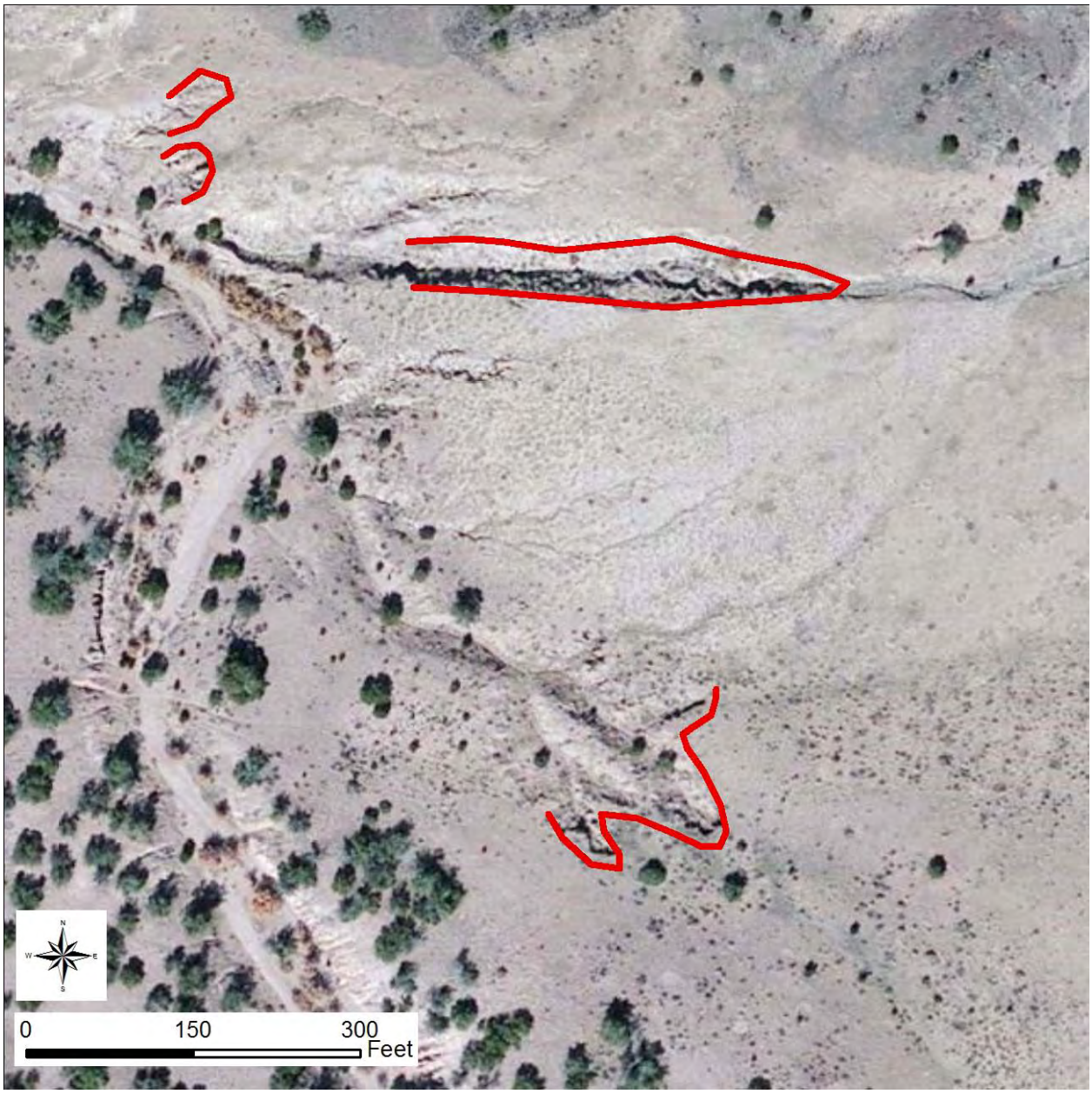

Figure 5. figure showing the location of work to stabilize headcuts and slope banks.

Upper Little Colorado River – Apache NRCD Water Quality Improvement Project

Name: Thad Wiltbank
Ranch Name: Coyote Creek Ranch
Mailing Address:
Watershed: South Fork LCR

Date of Visit: 03/02/2015
Email:
Phone Number: 928.345.0171

Site Description:
This ~34 acre lot is located within the South Fork Little Colorado River Watershed, with a contributing watershed of 5.6 sq. miles. The project site is located 1.2 miles upstream of the Little Colorado River. Grazing is the primary land use on the ranch, which is supported by irrigated hay fields.

Project Description:
Lack of adequate watering sites has led to concentrated grazing and lost opportunities for rotation of livestock across the ranch. Existing grazing practices have increased the risk of concentrated runoff and erosion. Development of water lines from existing TEP wells and additional fencing will enable distribution of livestock across a wider area of the ranch, reduce grazing pressure, and improve vegetative cover.

Proposed BMPs

Wiltbank BMP 1 - Sediment Basin/Livestock Tank

Tons of Sediment Mitigated (10 yr): 1716

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Basin Repair	cy	528	$4.25	$2,243
Seeding	ac	0.3	$150.00	$45
			Total Estimated Construction Cost:	**$2,288**
			Estimated Engineering Cost (20%):	$458
			Estimated Administrative Cost (10%):	$229
			Estimated Permits and Clearances (4 Acres):	$250
			Total Estimated Project Cost:	**$3,224**
			Cost per Mitigated Cubic Yard:	**$2**
			ADEQ Match (60%):	$1,934.68
			Landowner Match (40%):	$1,289.79

WILTBANK BMP 2 - Gated Pipe

Tons of Sediment Mitigated (10 yr): 23

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Gated Pipe	ft	1300	$6.75	$8,775
Seeding	ac	0.25	$150.00	$38
			Total Estimated Construction Cost:	**$8,813**
			Estimated Engineering Cost (20%):	$1,763
			Estimated Administrative Cost (10%):	$881
			Estimated Permits and Clearances (4 Acres):	$250
			Total Estimated Project Cost:	**$11,706**
			Cost per Mitigated Acre:	**$518**
			ADEQ Match (60%):	$7,023.75
			Landowner Match (40%):	$4,682.50

Site Photos

Figure 1. Dike that creates the water and sediment basin.

Figure 2. Basin to be cleaned out, resorting capacity.

Figure 3. Ditch and field for proposed gated pipe.

Figure 4. Example of gated pipe on the property.

Site Maps

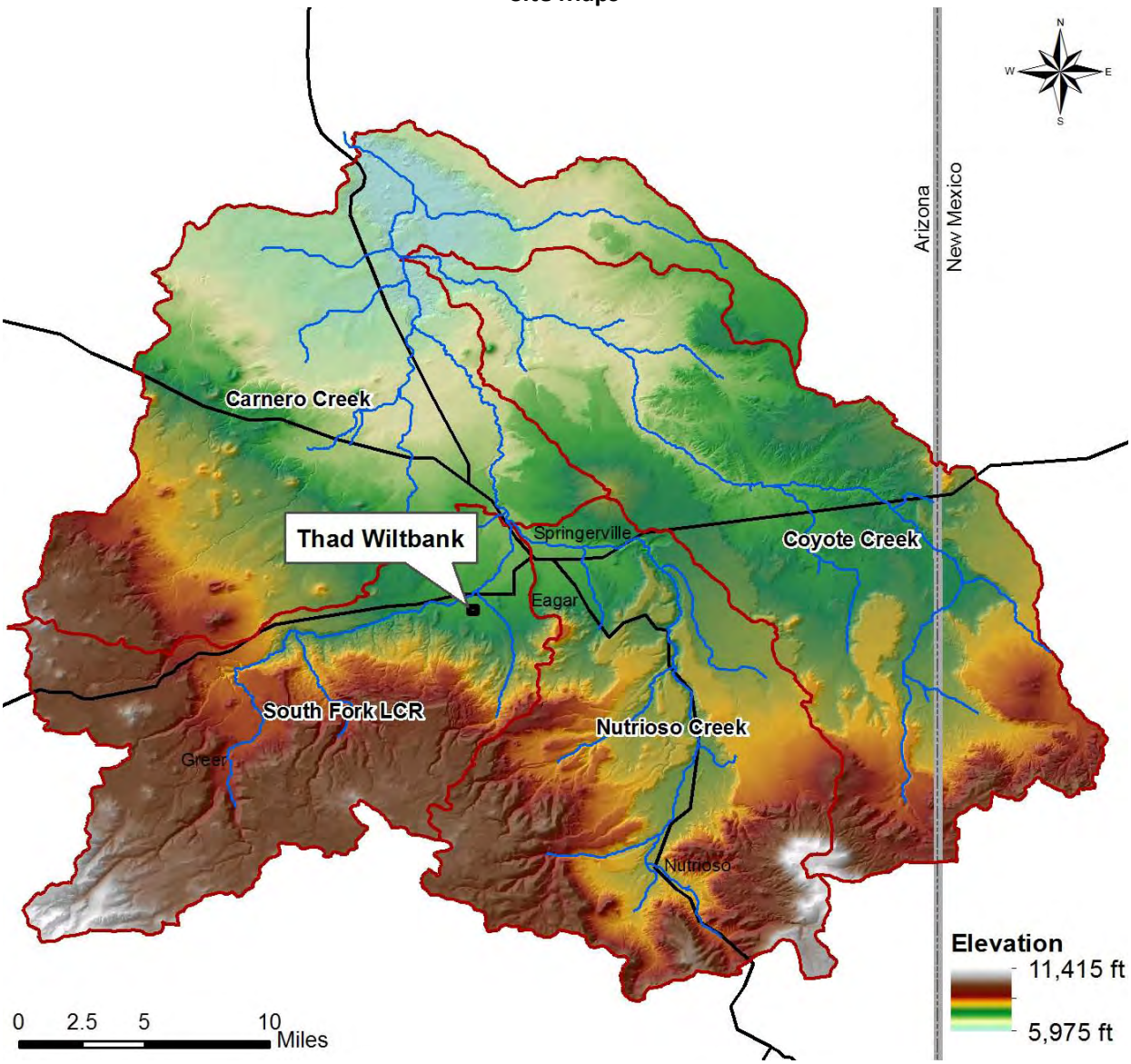

Figure 5. Watershed scale map indication ranch location.

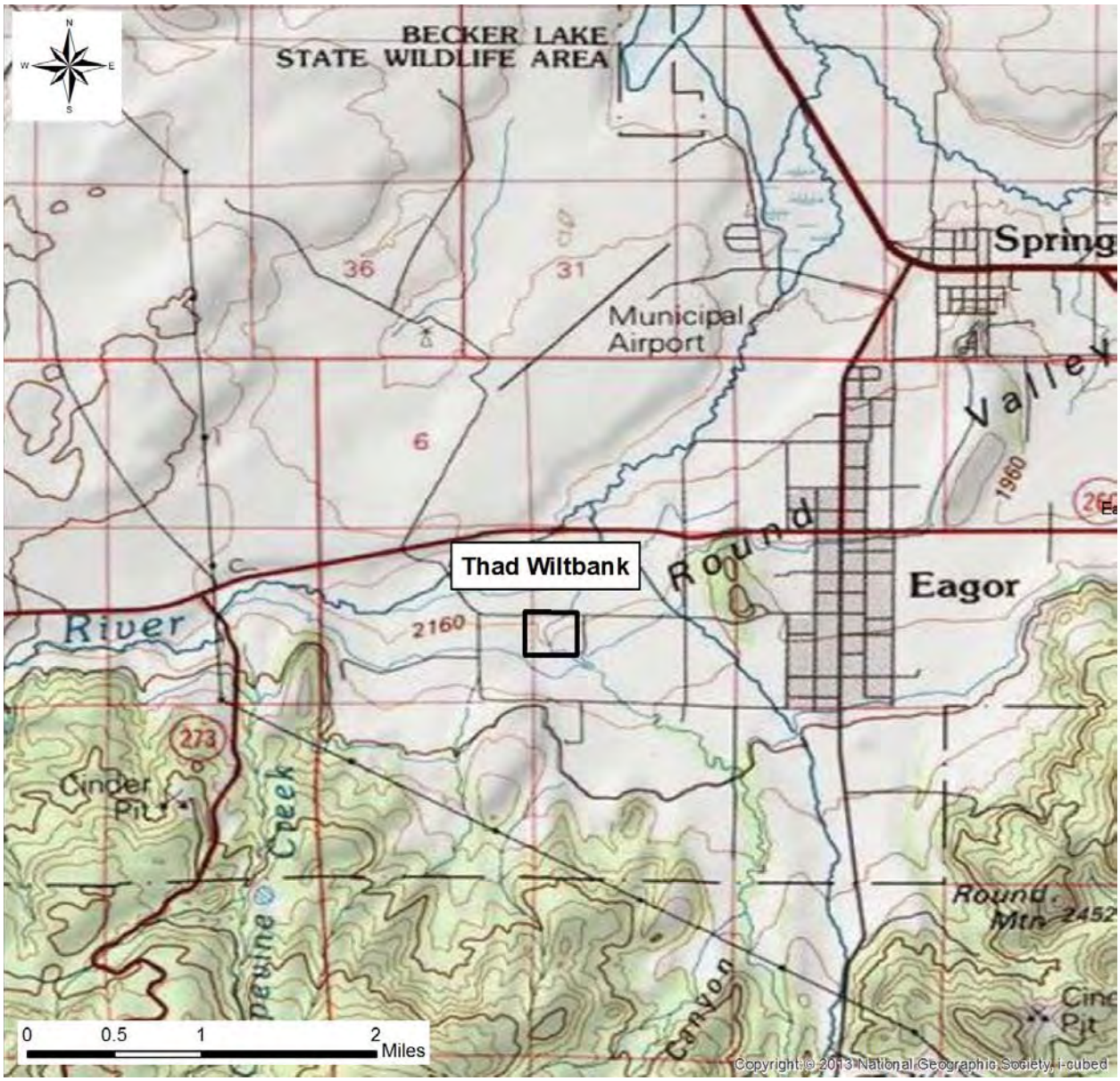

Figure 6. Topographic map with ranch boundaries.

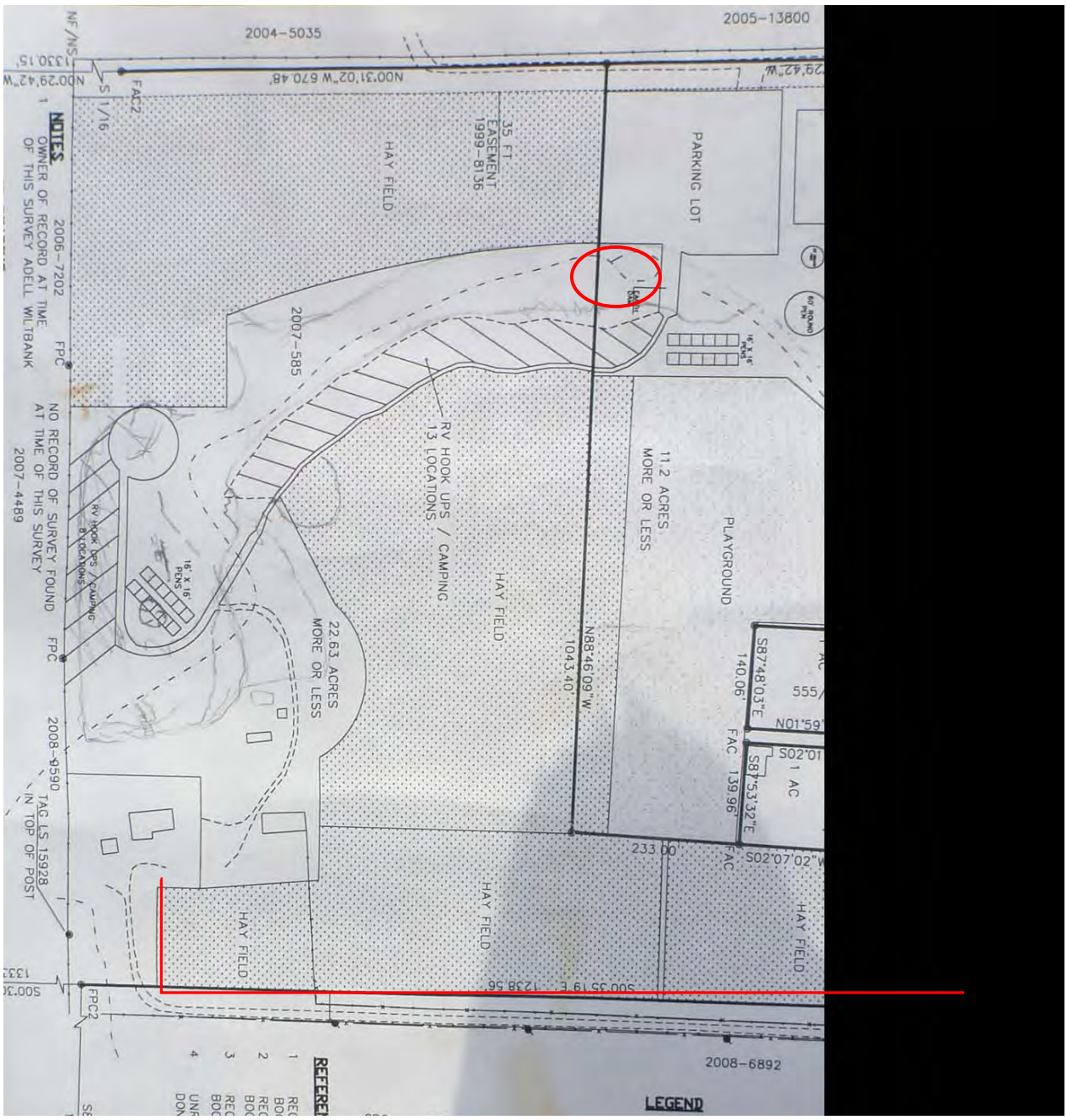

Figure 7. Landowner map of proposed future RV Park, with the location of proposed improvements add in red.

Name: Sidney Maddock
Ranch Name: Maddock Ranch
Mailing Address: P.O. Box 669
Springerville, AZ 85938
Watershed: Coyote Creek

Date of Visit: 04/09/2015
Email: spolandandcattle@gmail.com
Phone Number: 602.686.1590

Site Description:
This ~20,400 acre ranch is located within the Coyote Creek watershed, and contains ~5.8 miles of Coyote Creek. Grazing is the primary land use. Historically, conservation work on this ranch has included water and sediment control basins that have surpassed their life expectancy and have failed or are in danger of failing. As these structures become compromised, base level changes in the tributaries of Coyote Creek will further channel incision, leading to an increase in sediment mobilization.

Project Description:
This proposed work aims to bring two water and sediment control basins back into operation. The upper basin will need to be rebuilt completely, with the addition of a rock line spillway. The lower basin is still somewhat intact. However, the basin is full of sediment and the spillway is substantially eroded. If the lower basin spillway is not repaired with a rock lining, the stored sediment within the basin will be mobilized and a headcut will migrate upstream.

Proposed BMPs

Maddock BMP 1 - Water and Sediment Control Basins X2

Tons of Sediment Mitigated (10 yr): 13,650

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Basin Repair #1 Rebuild with Rock Lined Chute	ea	1	$13,500.00	$13,500
Basin Repair #2 - Construct Rock Lined Chute	cy	94	$95.00	$8,972
Seeding	ac	0.4	$150.00	$60
			Total Estimated Construction Cost:	**$22,532**
			Estimated Engineering Cost (20%):	$4,506
			Estimated Administrative Cost (10%):	$2,253
			Estimated Permits and Clearances (4 Acres):	$7,500
			Total Estimated Project Cost:	**$36,792**
			Cost per Mitigated Ton of Sediment:	**$3**
			ADEQ Match (60%):	$22,075.13
			Landowner Match (40%):	$14,716.76

Site Photos

Figure 1. Failing basin with the outlet pipe exposed.

Figure 2. The basin has reached the end of its service life and is full of sediment.

Figure 3. A rock lined chute would address the headcutting shown here, where the water has eroded through the spillway.

Site Maps

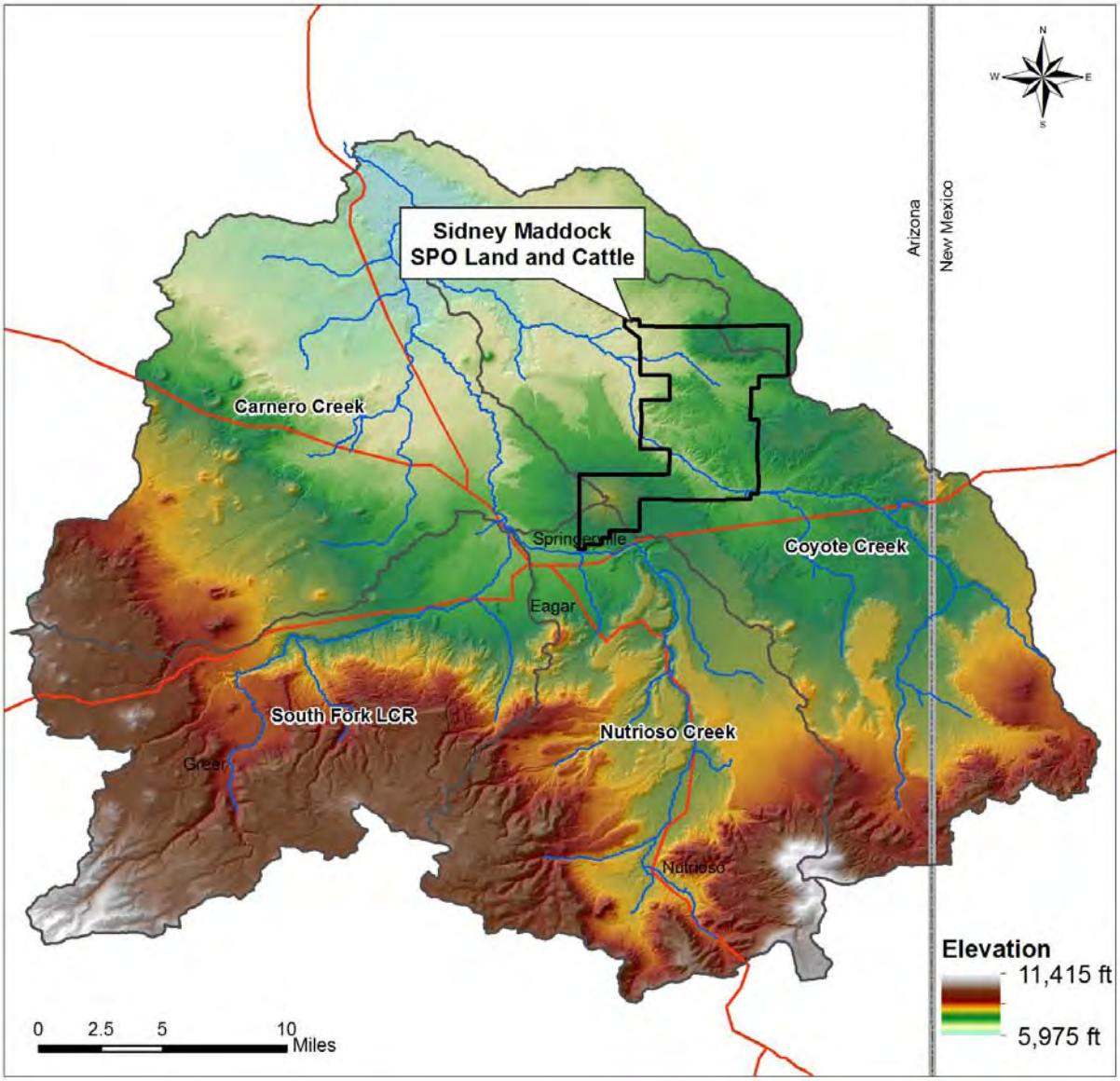

Figure 4. Watershed scale map with the ranch boundary shown in black.

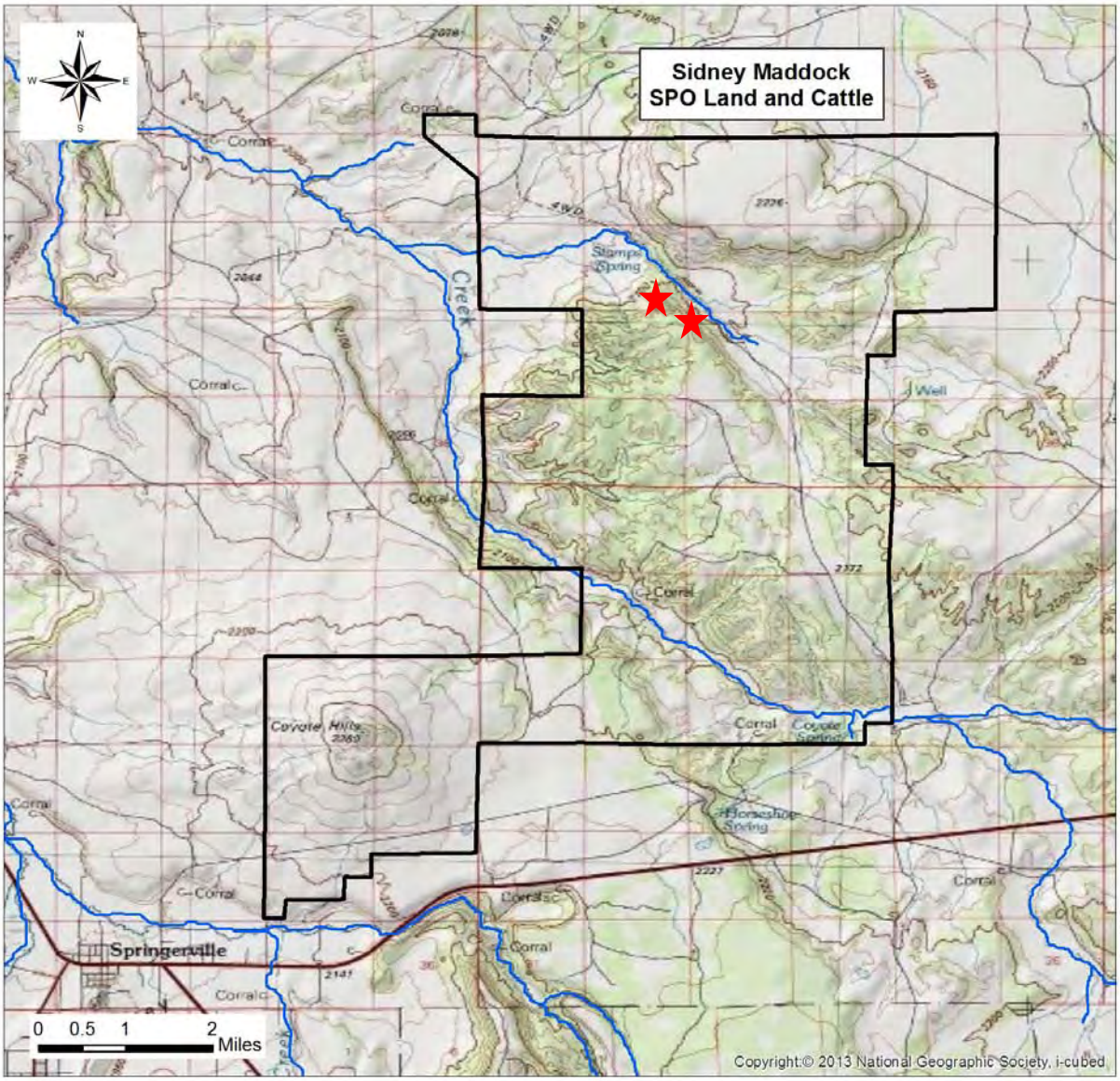

Figure 5. Topographic map with ranch boundaries and the project locations with red stars.

Name: Kevin Burk
Ranch Name:
Mailing Address:
Watershed: Nutrioso Creek

Date of Visit: 03/02/2015
Email:
Phone Number: 928.245.5770

Site Description:
The proposed work on this ~4,330 acre ranch is located within the Nutrioso Creek watershed, and contains ~3.2 miles of Nutrioso Creek. Grazing is the primary land use.

The landowner lacks watering facilities to effectively utilize pasture lands. As a result livestock drink directly out of Nutrioso Creek. The implementation of the proposed projects would allow for off creek watering and better pasture utilization and rotation.

Project Description:
The landowner proposes to use fencing and the development of water lines to facilitate better distribution of livestock across a wider area of the ranch, reducing grazing pressure, and improving vegetative cover. Lack of adequate watering sites has led to concentrated grazing and lost opportunities for rotation of livestock across the ranch. Existing grazing practices have increased the risk of concentrated runoff and erosion along Nutrioso Creek. A little more than a mile of Nutrioso Creek will be fenced off from grazing if BMP #3 is implemented.

AZDOT Permits
Jeff Minefee
928.402.5608
jminefee@azdot.gov

Proposed BMPs

Burk BMP 1 - Water Development (Pipeline & Trough) and Fencing

Tons of Sediment Mitigated (10 yr): 49

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Pipeline (1 1/4 in. Diameter)	ft	2895	$4.25	$12,304
Under Highway Boring	ft	110	$350.00	$38,500
2500 Gallon Poly Water Tank	ea	1	$1,600.00	$1,600
Trough and Float	gal	350	$1.50	$525
Fencing	ft	1000	$3.50	$3,500
			Total Estimated Construction Cost:	**$56,429**
			Estimated Engineering Cost (15%):	$8,464
			Estimated Administrative Cost (10%):	$5,643
			Estimated Permits and Clearances:	$1,000
			Total Estimated Project Cost:	**$71,536**
			Cost per Mitigated Ton of Sediment:	**$1,467**
			ADEQ Match (60%):	$42,921.56
			Landowner Match (40%):	$28,614.38

Burk BMP 2 - Water Development (Pipeline & Trough) and Fencing

Tons of Sediment Mitigated (10 yr): 49

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Pipeline (1 1/4 in. Diameter)	ft	8735	$4.25	$37,124
Trough and Float	gal	350	$1.50	$525
Fencing	ft	1000	$3.50	$3,500
			Total Estimated Construction Cost:	**$41,149**
			Estimated Engineering Cost (15%):	$6,172
			Estimated Administrative Cost (10%):	$4,115
			Estimated Permits and Clearances (6.5 Acres):	$1,000
			Total Estimated Project Cost:	**$52,436**
			Cost per Mitigated Ton of Sediment:	**$1,076**
			ADEQ Match (60%):	$31,461.56
			Landowner Match (40%):	$20,974.38

Burk BMP 3 - Water Development (Pipeline & Trough) and Fencing

Tons of Sediment Mitigated (10 yr): 472

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Pipeline (1 1/4 in. Diameter)	ft	3085	$4.25	$13,111
Trough and Float	gal	350	$1.50	$525
2500 Gallon Poly Water Tank	ea	1	$1,600.00	$1,600
Solar Pump System	ea	1	$17,525.00	$17,525
Fencing	ft	5027	$4.25	$21,365
			Total Estimated Construction Cost:	**$54,126**
			Estimated Engineering Cost (15%):	$8,119
			Estimated Administrative Cost (10%):	$5,413
			Estimated Permits and Clearances (6.5 Acres):	$1,000
			Total Estimated Project Cost:	**$68,658**
			Cost per Mitigated Ton of Sediment:	**$145**
			ADEQ Match (60%):	$41,194.50
			Landowner Match (40%):	$27,463.00

Site Photos

Figure 1. Lower pasture where Nutrioso Creek would be fenced off and a pipeline would tie into an existing well.

Site Maps

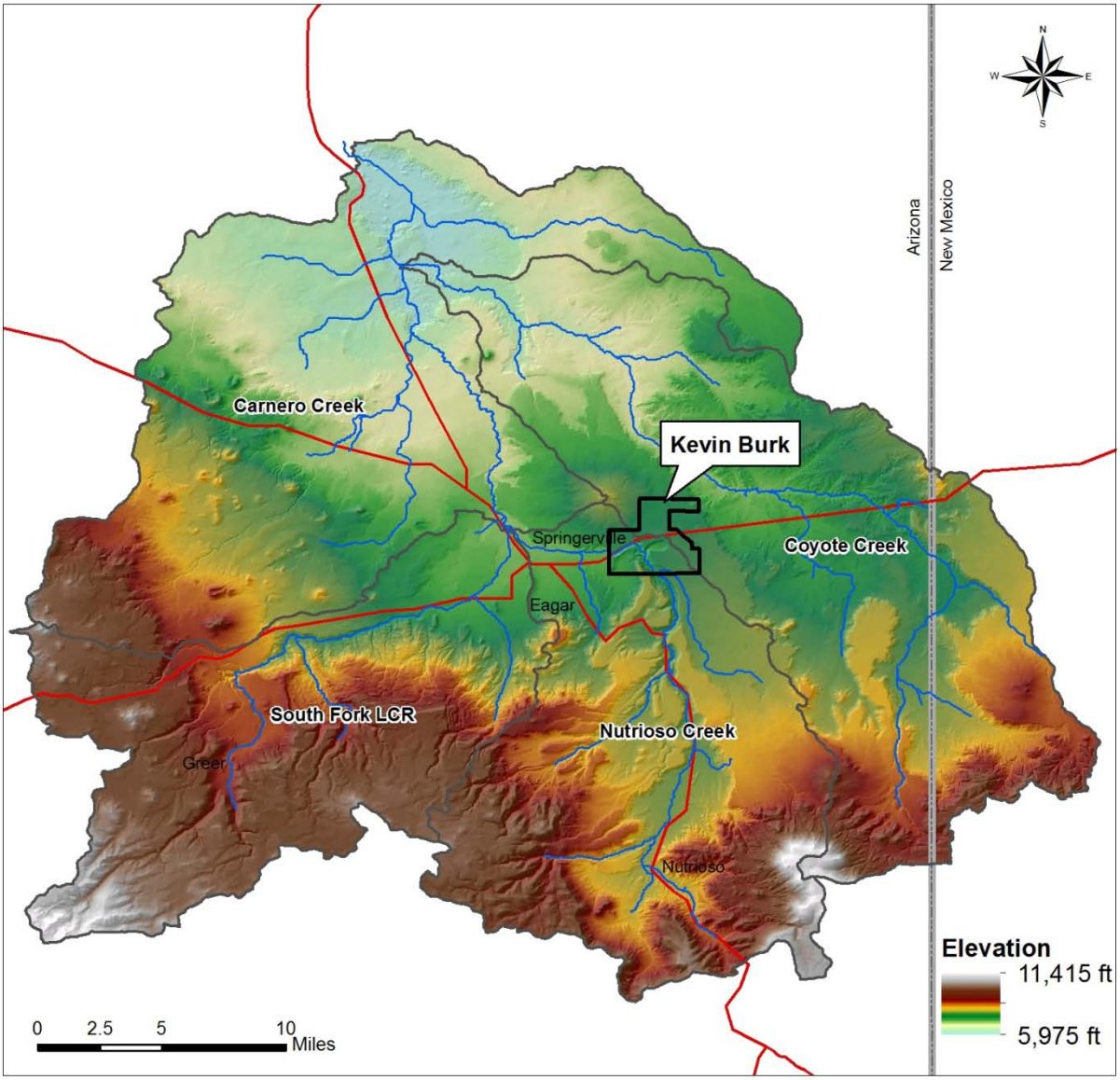

Figure 2. Watershed scale map with the ranch boundary shown in black.

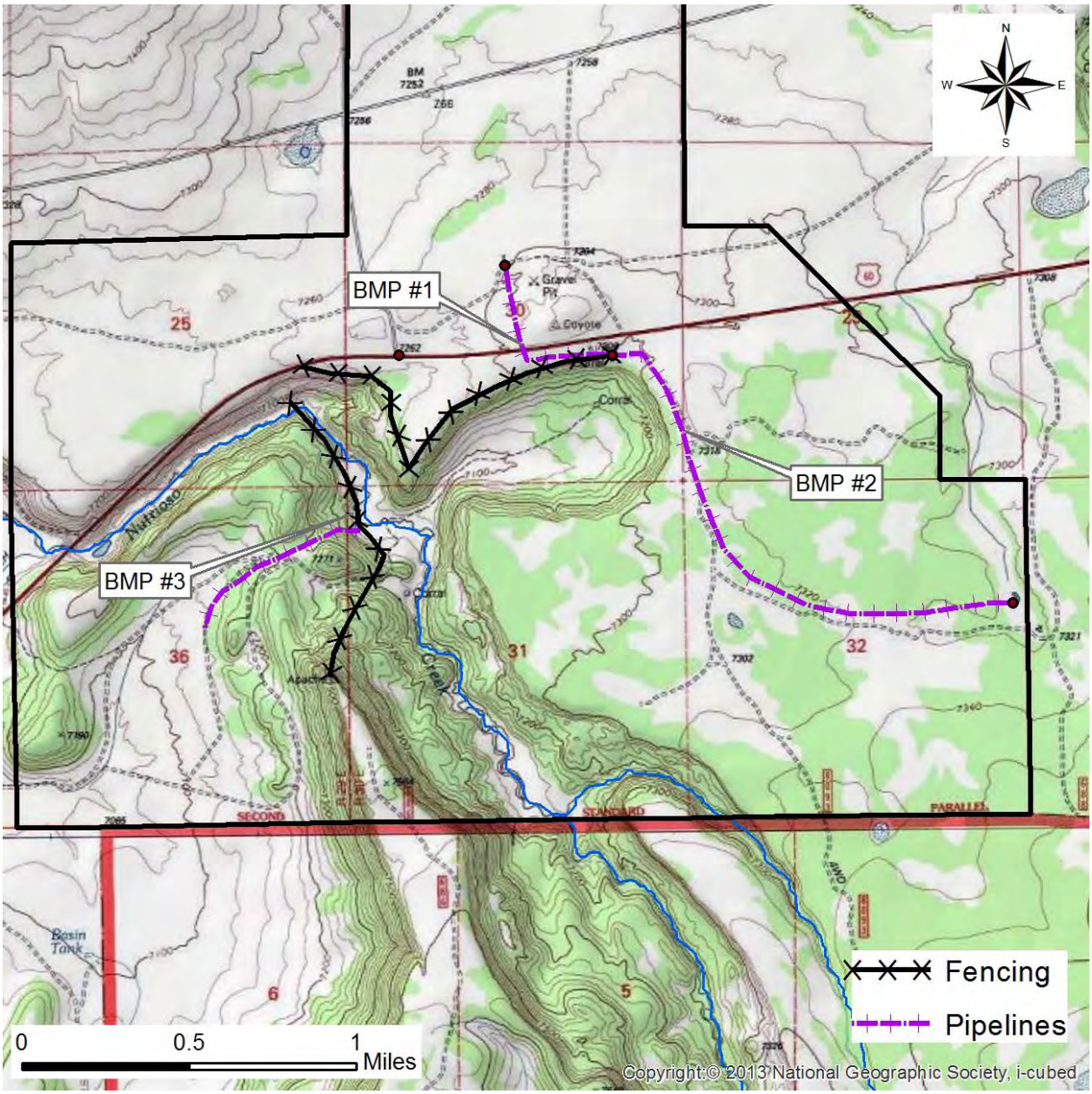

Figure 3. Topographic map with ranch boundaries and the project locations.

Name: Jason Hooper
Ranch Name: Hooper
Mailing Address:
Watershed: Nutrioso Creek

Date of Visit: 03/03/2015
Email:
Phone Number: 928.245.4222

Site Description:
This project is located within the upper portion of the Nutrioso watershed. Recent fires upstream of the project areas have altered local hydrology. Grazing is the primary land use of the property. Jason Hooper has recently finished a successful brush management project aimed at reducing fuels due to the fire danger. Watts Creek flows through this property and has historically been an ephemeral stream. However, after the Wallow Fire, Watts Creek has seen perennial flows through the property. Approximately 3.4 miles downstream of this proposed project site, Watts creek merges with Nutrioso Creek.

Project Description:
A 650 foot reach of Watts Creek flows through this ranch. After a recent fire in the watershed upstream of the reach, the creek has been incising. The landowners aim to stabilize the stream bed and banks by sloping and installing grade structures. The development of a well would facilitate off-creek watering for livestock that current drink directly in Watts Creek.

There is also an eroding headcut that the landowner would like to stabilize with a rock lined chute, or recontouring the pasture to promote sheet flow rather than concentrated flow.

The landowner would like to complete another brush management project on 10 acres of the property. This forest stewardship work would promote an increase in ground cover and reduction in fuels such as downed timber, that are a fire danger.

Proposed BMPs

Hooper BMP 1 - Stream Restoration

Tons of Sediment Mitigated (10 yr): 1095

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Bank and Channel Sloping	ft	650	$48.00	$31,200
Rock Step Structures	ea	8	$1,200.00	$9,600
Well Development and Trough	ea	1	$15,000.00	$15,000
Brush Management	ac	10	$275.00	$2,750
Seeding	ac	0.4	$150.00	$60
			Total Estimated Construction Cost:	**$55,860**
			Estimated Engineering Cost (25%):	$13,965
			Estimated Administrative Cost (10%):	$5,586
			Estimated Permits and Clearances (6.5 Acres):	$7,500
			Total Estimated Project Cost:	**$82,911**
			Cost per Mitigated Ton of Sediment:	**$76**
			ADEQ Match (60%):	$49,746.60
			Landowner Match (40%):	$33,164.40

Hooper BMP 2 - Headcut Treatment (rock lined chute)

Tons of Sediment Mitigated (10 yr): 255

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Construct Rock Lined Chute	cy	85	$95.00	$8,075
Seeding	ac	0.2	$150.00	$30
			Total Estimated Construction Cost:	**$8,105**
			Estimated Engineering Cost (20%):	$1,621
			Estimated Administrative Cost (10%):	$811
			Estimated Permits and Clearances (6.5 Acres):	$1,000
			Total Estimated Project Cost:	**$11,537**
			Cost per Mitigated Ton of Sediment:	**$45**
			ADEQ Match (60%):	$6,921.90
			Landowner Match (40%):	$4,614.60

Site Photos

Figure 1. Forest Service boundary at the edge of the property.

Figure 2. Temporary log structure installed to prevent further erosion of the channel.

Figure 3. Location of the prescribed rock lined chute to treat the headcut.

Site Maps

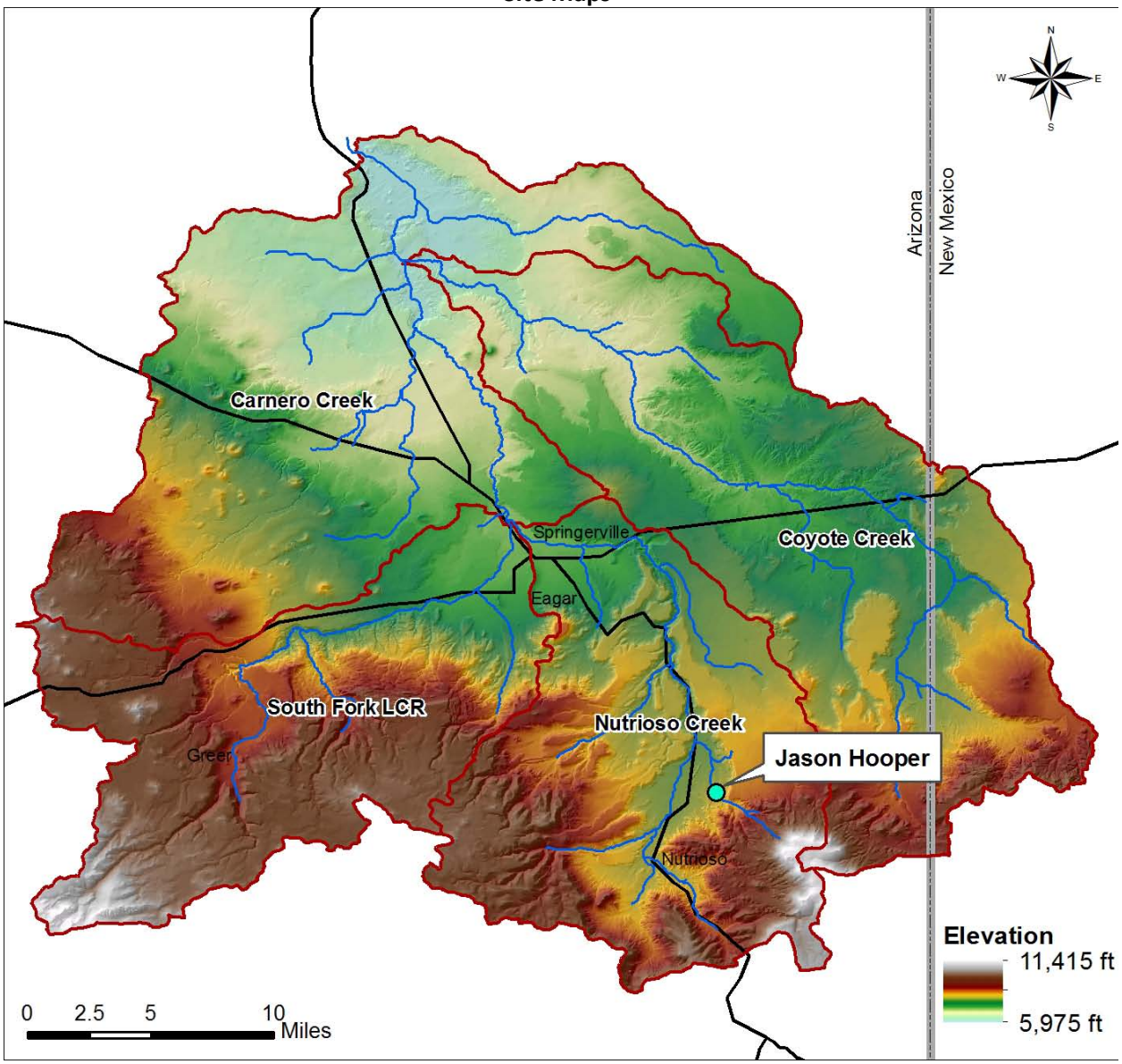

Figure 4. Watershed scale map with the project location indicated with a green dot.

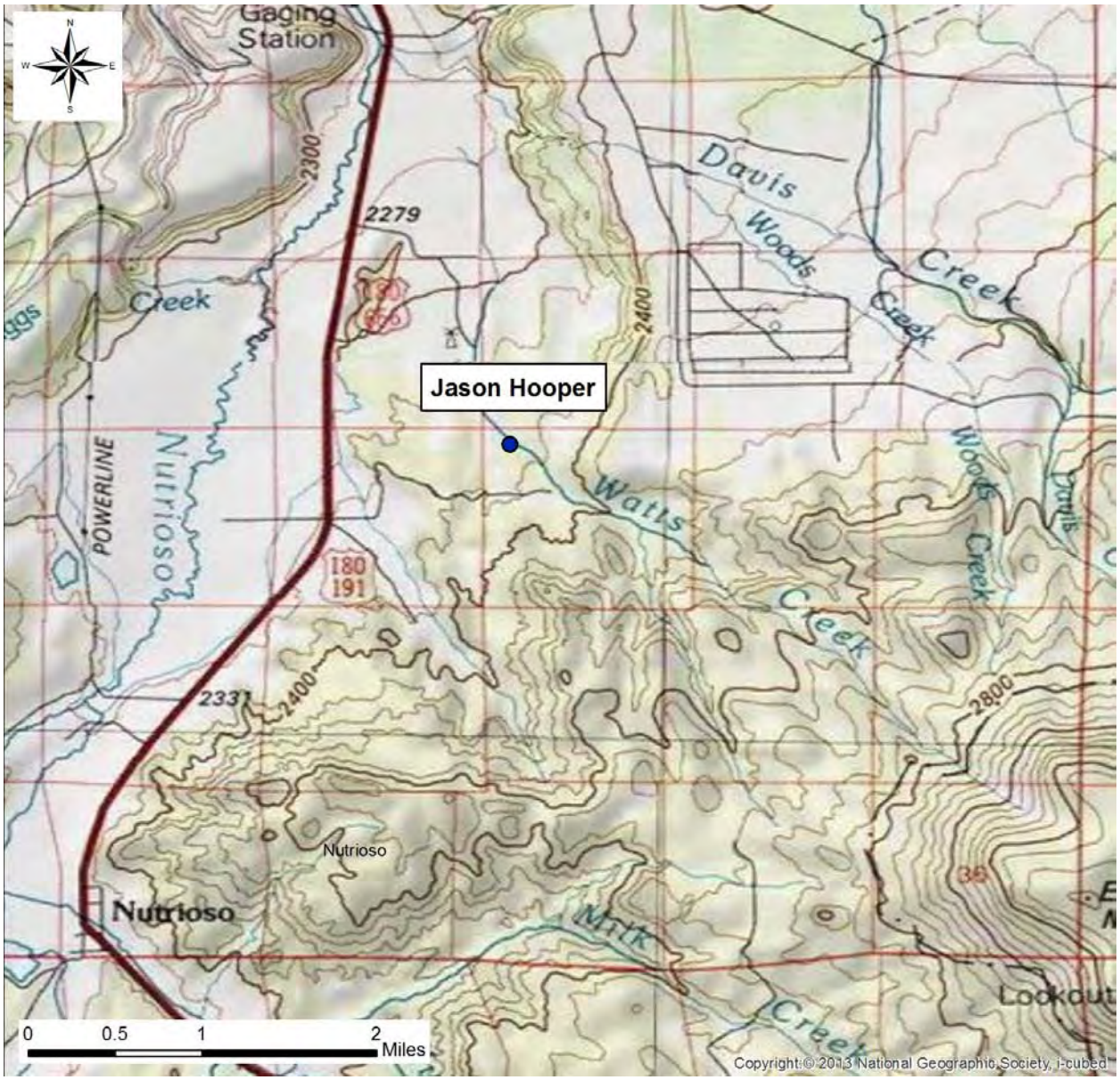

Figure 5. Topographic map with the project location indicated with a blue dot.

Name: Pioneer Irrigation Company
Ranch Name: N/A
Mailing Address: PO Box 520, Eager, AZ
Watershed: South Fork LCR

Date of Visit: 03/03/2015
Email: pioneerirrigation@yahoo.com
Phone Number: 928.245.0793

Project Description:
The Pioneer Irrigation Company conveys water from the South fork of the Little Colorado in a ditch to fill storage lakes. During the winter months a shaded portion of the canal freezes over, causing the canal banks to fail. The canal water washes sediment from the failed bank directly into the Little Colorado River. By putting the shaded reach of canal into a pipe the Pioneer Irrigation Company would eliminate the freezing of the canal, and therefore eliminate the eroded sediment from entering the South Fork of the Little Colorado River.

It is still unclear at this time what the process will be to either have the gaging station decommissioned or to have it retrofitted to the proposed pipe.

Proposed BMPs

Pioneer Irrigation BMP 1 - 36" Irrigation Pipeline

Tons of Sediment Mitigated (10 yr): 267

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Supply and Place 36" Pipe	ft	570	$185.00	$105,450
			Total Estimated Construction Cost:	**$105,450**
			Estimated Engineering Cost (25%):	$26,363
			Estimated Administrative Cost (10%):	$10,545
			Estimated Permits and Clearances:	$2,000
			Total Estimated Project Cost:	**$144,358**
			Cost per Mitigated Ton of Sediment:	**$541**
			ADEQ Match (60%):	$86,614.50
			Landowner Match (40%):	$57,743.00

Site Photos

Figure 1. Reach of the irrigation canal to be piped.

Figure 2. A portion of the hillslope that erodes when the canal freezes over and water spills out.

Site Maps

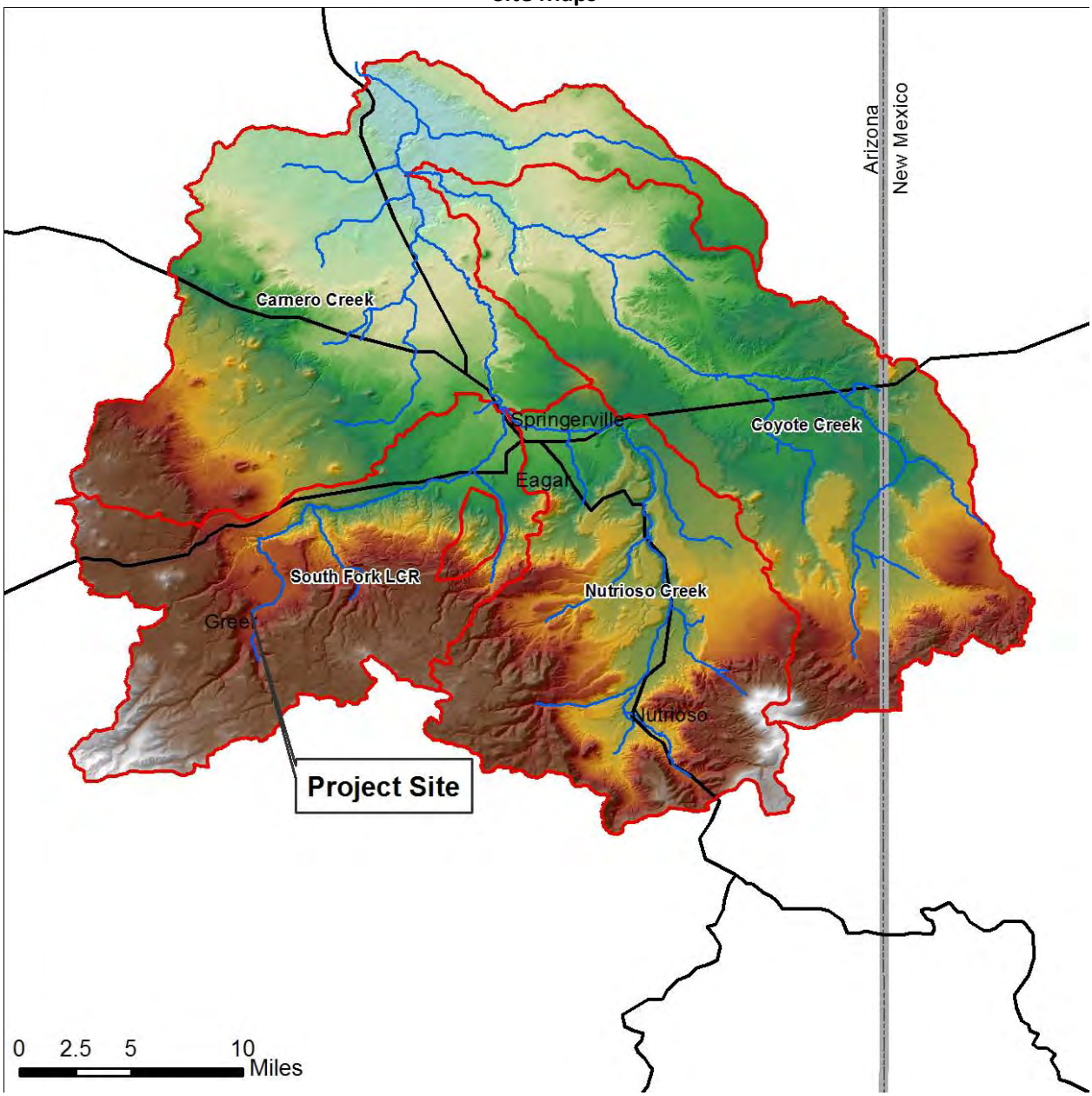

Figure 3. Watershed scale map with the location of the project site.

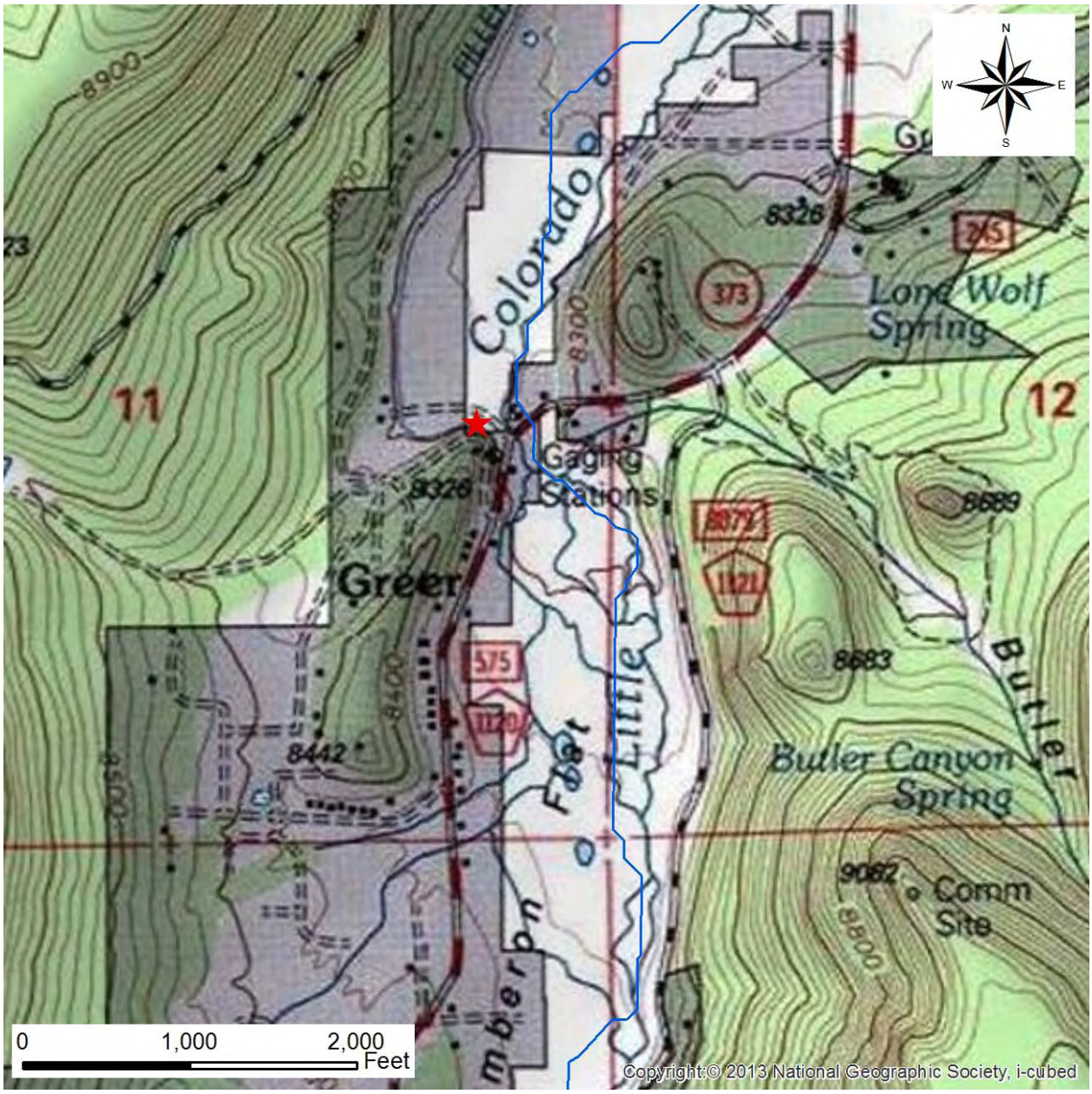

Figure 4. Topographic map with the project location indicated with a red star.

Name: Scott Hall
Ranch Name: Hall Ranch
Mailing Address: P.O. Box 961, Eagar, AZ 85925
Watershed: Carnero Creek

Date of Visit: 03/03/2015
Email:
Phone Number: 928.551.1651

Site Description:
The hall Ranch is located on the west side of the Carnero Creek watershed. The ranch consists of 2 private sections and 1770 acres of State Lease Land. It is permitted to run approximately 50 head of mother cows.

The private land was homesteaded by the family in the 1920's and has been in the family since that time. The only water source other than runoff from rains is a spring located in the southwest corner of the ranch. A Pipeline has been developed form the spring to the middle of the pasture with drinkers at the end of the pipeline. However, over the past several years, the spring has been very inconsistent and is currently dry.

When the spring dries up, cattle have to water in other drainages and also in Carnero Creek where it touches the southeast ranch corner. These other sources of water are small and are not good catchments for cattle to water. When the spring is dry, the cattle congregate in the drainages and tromp out vegetation , causing erosion and sediment to go down the drainages.

Project Description:
The landowner proposes to drill a well in the southwest part of the ranch and connect to the existing pipeline that runs to the drinkers in the center of the ranch. A second part of the project would be to extend the pipeline on to the northeast from the drinkers out into the middle of the state lease sections. This pipeline would keep the cattle our of the 2 drainages in those pastures. The pipeline and well would provide for better cattle distribution and less congregation. A third part of the project would be to construct fencing to create more pastures for rotation and heard management.

Proposed BMPs

Hall BMP 1 - Livestock Well (~800 ft)

Tons of Sediment Mitigated (10 yr): 2000

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Livestock Well	ea	1	$66,702.00	$66,702
			Total Estimated Construction Cost:	**$66,702**
			Estimated Engineering Cost (15%):	$10,005
			Estimated Administrative Cost (10%):	$6,670
			Estimated Permits and Clearances:	$500
			Total Estimated Project Cost:	**$83,878**
			Cost per Mitigated Ton of Sediment:	**$42**
			ADEQ Match (60%):	$50,326.50
			Landowner Match (40%):	$33,551.00

Hall BMP 2 - Livestock Pipeline

Tons of Sediment Mitigated (10 yr): 2000

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Livestock Pipeline	ft	4885	$4.25	$20,761
			Total Estimated Construction Cost:	**$20,761**
			Estimated Engineering Cost (20%):	$4,152
			Estimated Administrative Cost (10%):	$2,076
			Estimated Permits and Clearances:	$1,000
			Total Estimated Project Cost:	**$27,990**
			Cost per Mitigated Ton of Sediment:	**$14**
			ADEQ Match (60%):	$16,793.78
			Landowner Match (40%):	$11,195.85

Hall BMP 3 -Fencing

Tons of Sediment Mitigated (10 yr): 3080

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Fencing	ft	18895	$3.50	$66,133
			Total Estimated Construction Cost:	**$66,133**
			Estimated Engineering Cost (15%):	$9,920
			Estimated Administrative Cost (10%):	$6,613
			Estimated Permits and Clearances:	$1,500
			Total Estimated Project Cost:	**$84,166**
			Cost per Mitigated Ton of Sediment:	**$27**
			ADEQ Match (60%):	$50,499.38
			Landowner Match (40%):	$33,666.25

Site Photos

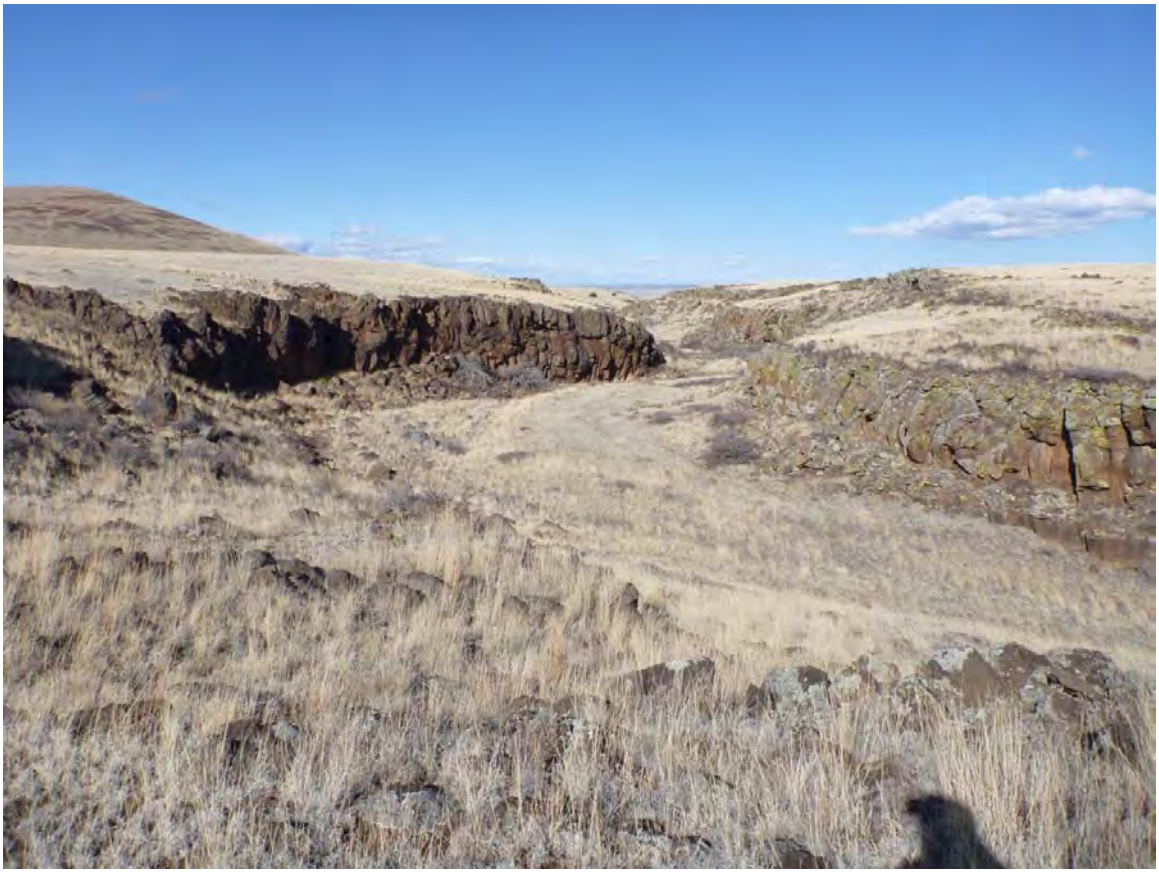

Figure 1. Typical pasture land of the ranch.

Site Maps

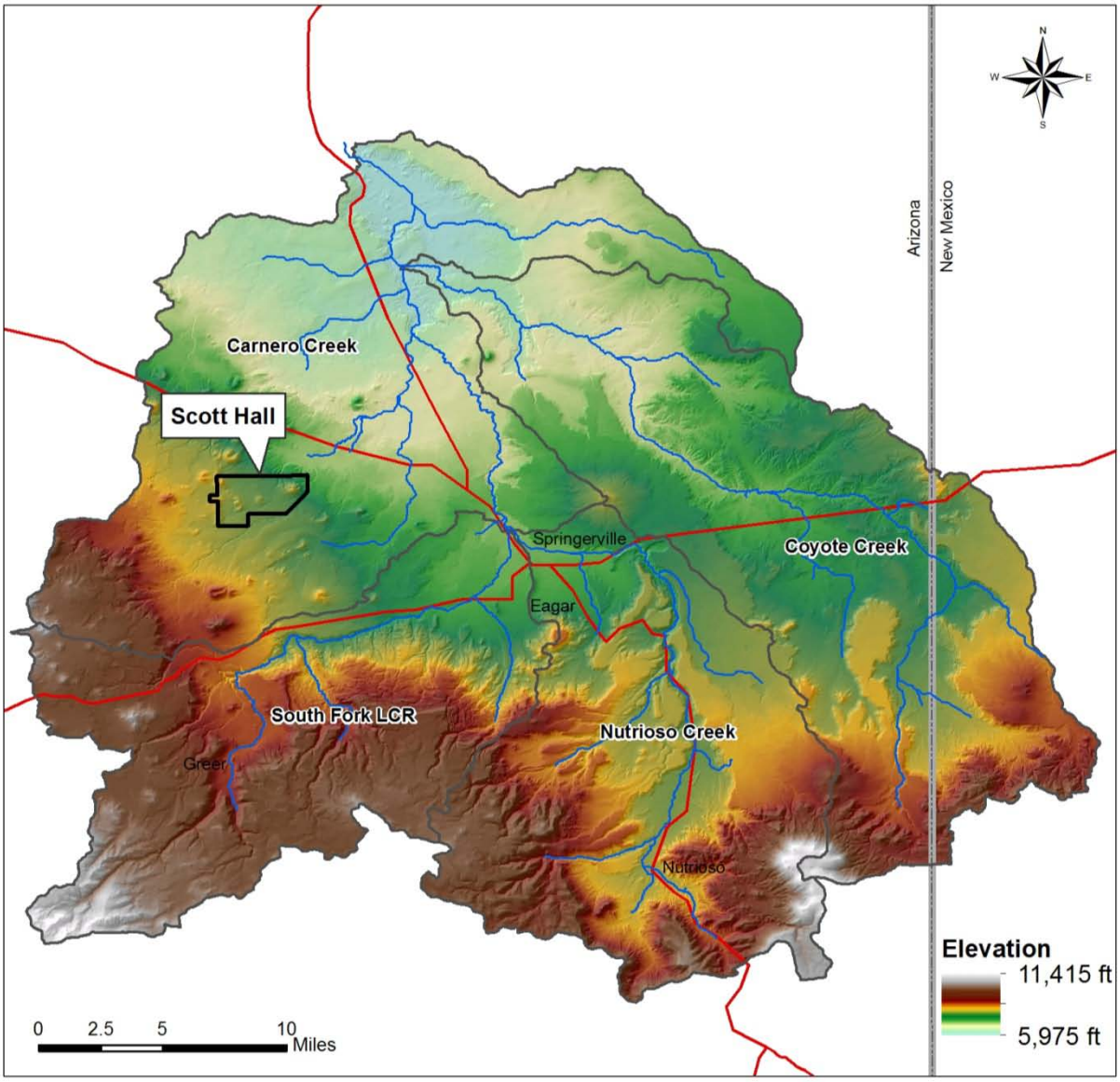

Figure 2. Watershed scale map with the ranch boundaries.

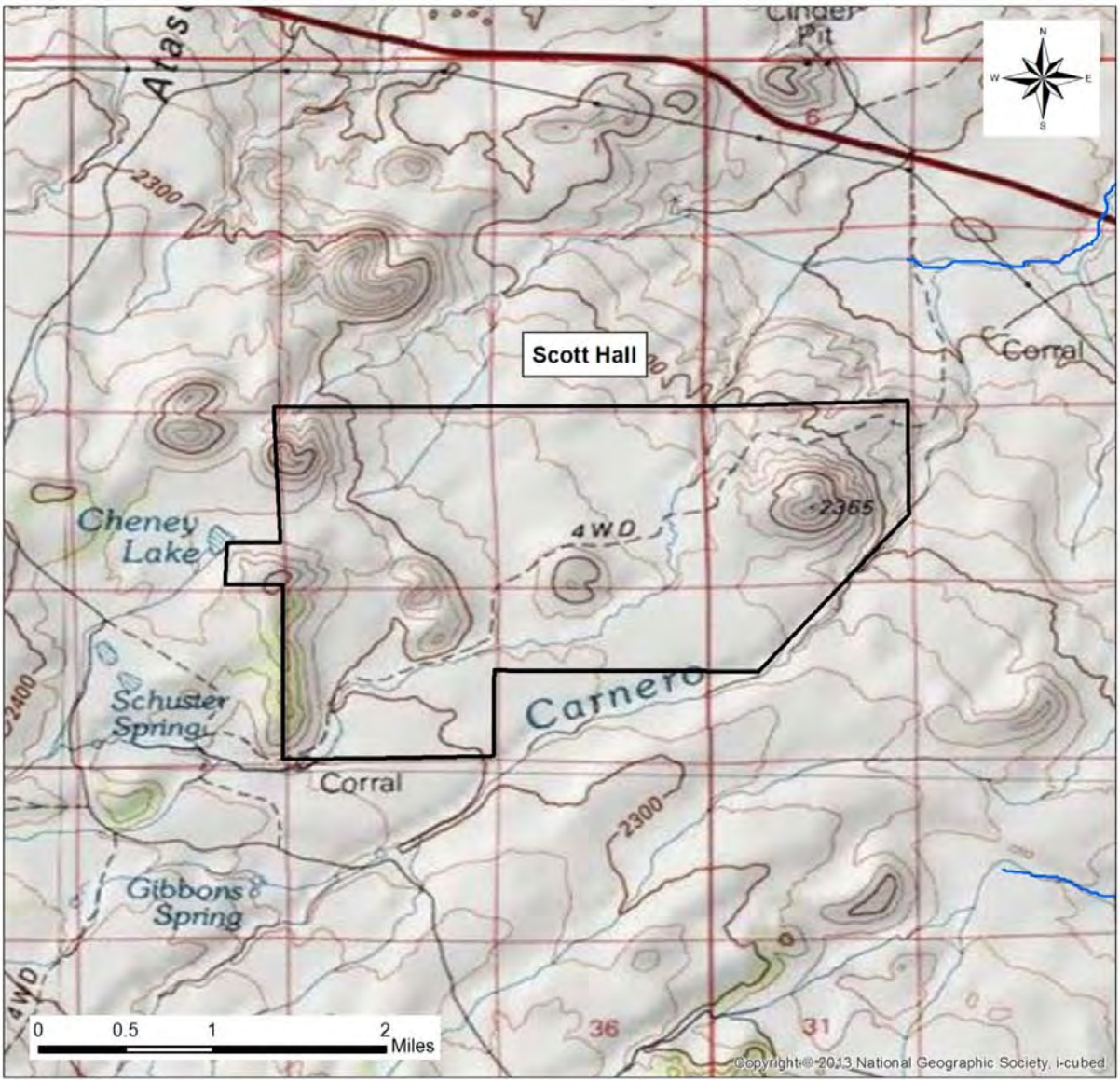

Figure 3. Topographic map with the ranch boundaries.

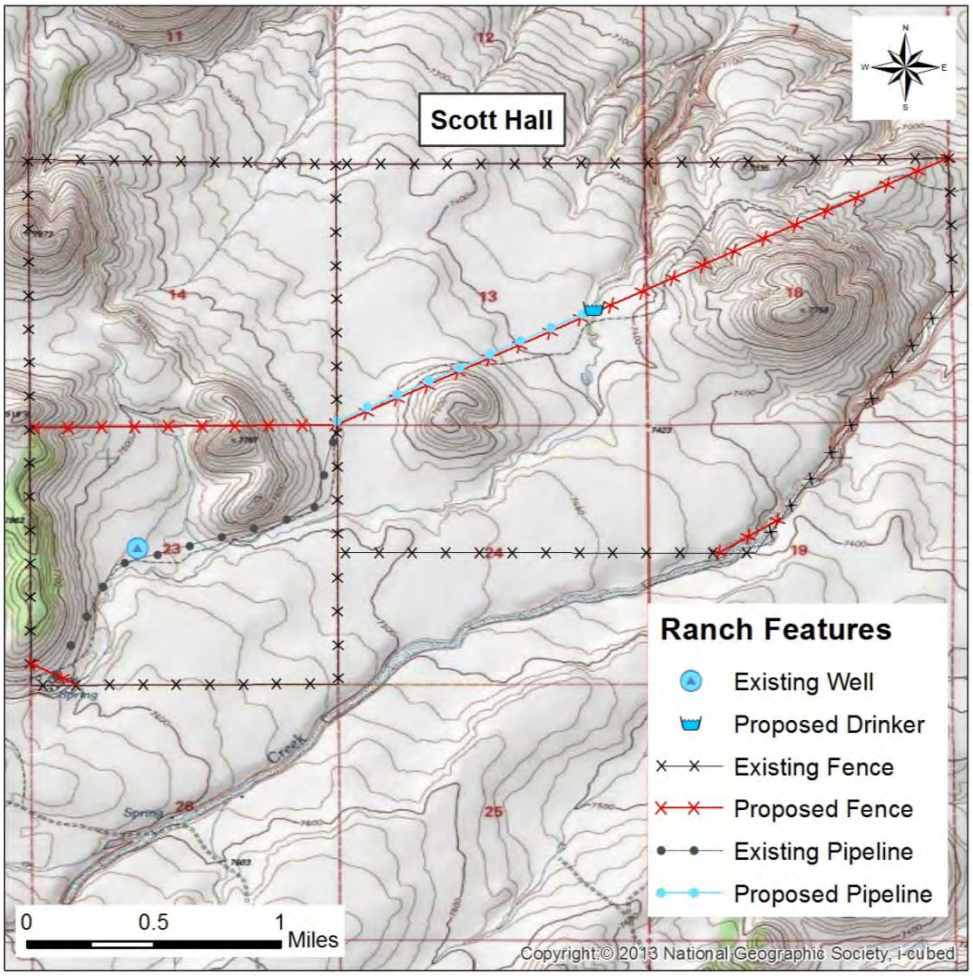

Figure 4. Topographic map with proposed work.

Upper Little Colorado River – Apache NRCD Water Quality Improvement Project

Name: Carey Dobson
Ranch Name: Timberline Ranch
Mailing Address: PO Box 720
Vernon, AZ 85940
Watershed: Carnero Creek

Date of Visit: 04/10/2015
Email:
Phone Number: 480-229-9051

Site Description:
The Timberline Ranch is quite large and spans several watersheds. The portion of the ranch within the Carnero Creek watershed lacks adequate watering facilities. Further development of the water resources would allow for greater utilization and rotation of the pasture lands. Grazing is the primary land use on the ranch and vegetation cover is typical of the Carnero Creek watershed.

Brush management activities have been carried out on other portions of the ranch. However, the area of the ranch proposed for brush management within the targeted watershed appears to be sparsely populated with Juniper.

Project Description:
The development of 3 closely spaced springs would provide a water facility for better utilization of the pasture land.

The landowner also proposed Brush Management for 1,200 acres of pasture land within the Carnero Creek watershed. An analysis of aerial photographs, of the density of Juniper, reveals the pastures within the project watershed does not require thinning. An estimate for Juniper mastication was provided, though this BMP is not recommended.

Proposed BMPs

Dobson BMP 1 - Spring Development

Tons of Sediment Mitigated: 261

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Spring Development	ea	3	2100	$6,300
			Total Estimated Construction Cost:	**$6,300**
			Estimated Engineering Cost (25%):	$1,575
			Estimated Administrative Cost (10%):	$630
			Estimated Permits and Clearances:	$1,000
			Total Estimated Project Cost:	**$9,505**
			Cost per Mitigated Ton of Sediment:	**$36**
			ADEQ Match (60%):	$5,703
			Landowner Match (40%):	$3,802

Dobson BMP 2 - Brush Management

Tons of Sediment Mitigated: 6

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Brush Management	ac	1200	35	$42,000
			Total Estimated Construction Cost:	**$42,000**
			Estimated Engineering Cost (10%):	$4,200
			Estimated Administrative Cost (10%):	$4,200
			Estimated Permits and Clearances:	$30,000
			Total Estimated Project Cost:	**$80,400**
			Cost per Mitigated Ton of Sediment:	**$13,400**
			ADEQ Match (60%):	$48,240
			Landowner Match (40%):	$32,160

Site Photos

Figure 1. One of 3 undeveloped springs.

Figure 2. Looking downhill from where spring water is piped to a livestock trough.

Site Maps

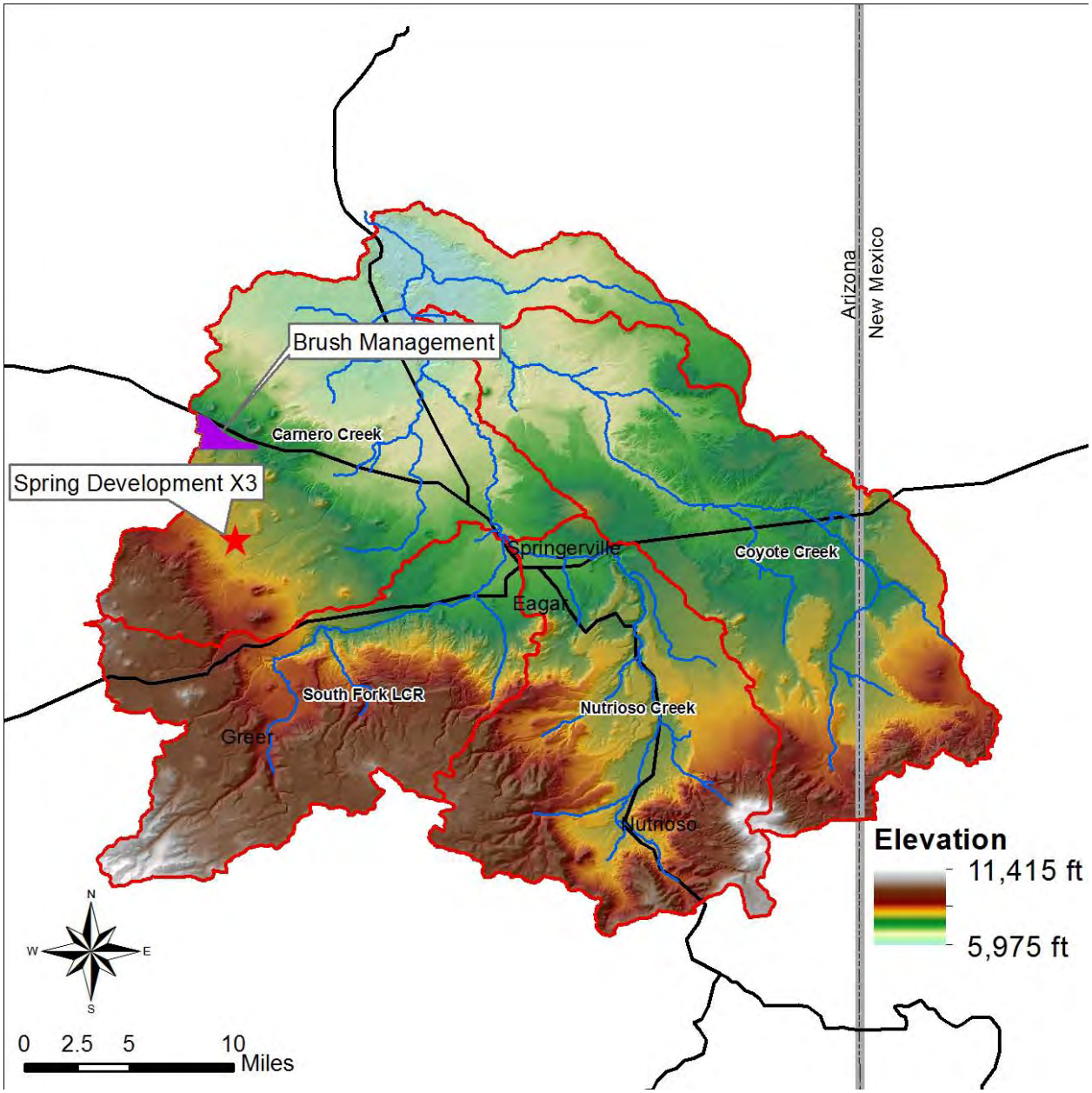

Figure 3. Watershed scale map with ranch boundary and labels showing the location of proposed projects.

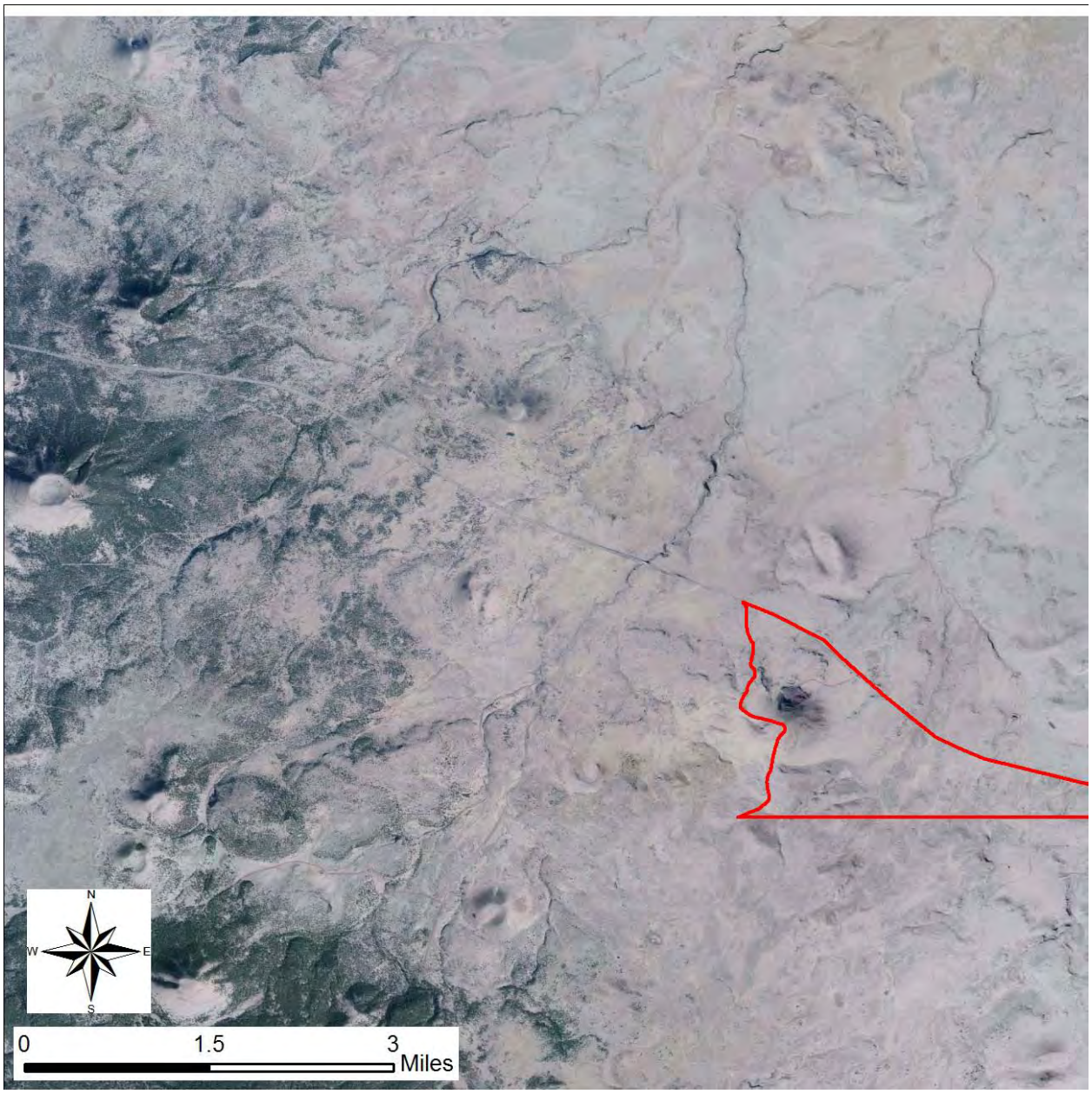

Figure 4. Aerial photograph showing the sparsity of Juniper is within the project watershed, in comparison to the surrounding area. The removal of Juniper does not seem to be warranted in this case.

Coyote Creek Watershed Improvement and Education Project

Name: Joy Udall
Ranch Name: Coyote Creek Ranch
Mailing Address: PO Box 1640
Springerville, AZ 85938-1640
Watershed: South Fork LCR

Date of Visit: 04/06/2015
Email:
Phone Number: 928.333.2984

Site Description:
Approximately 1,800 feet of the Little Colorado River meanders through pastures within this ranch. Grazing is the primary land use on the ranch and vegetation cover is dependent upon grazing pressure.

The ranch is currently flood irrigated off a main irrigation canal and it prone to failure when the stage of the canal rises. Upgrading to the irrigation system with gated pipe will lead to a decrease failure which would decrease the amount of concentrated flow. When the water organizes into concentrated flow, it causes erosion of stream banks at the downhill portion of the irrigated fields, as well as the further transport of manure and fertilizers from irrigated fields into the river.

Ranch Objectives and Resource Concerns:
The landowner wished to install 1015 ft of gated pipe to increase the efficiency of the irrigation system. The upgrade to the irrigation system will also allow the landowner to fence off more than 800 ft of the Little Colorado River from Cattle.

Coyote Creek Watershed Improvement and Education Project

Proposed BMPs

Udall BMP 1 - Range Management (Fencing and Irrigation)

Tons of Sediment Mitigated (10 yr): 138

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Standard 4-Strand Barbed Wire Fence	ft	1692	$3.50	$5,922
Stream Crossing	ea	2	$1,160.00	$2,320
Buried Irrigation Pipe	ft	583	$7.25	$4,227
Gated Pipe	ft	1015	$6.75	$6,851
Seed	ac	1	$150.00	$150
			Total Estimated Construction Cost:	**$19,470**
			Estimated Engineering Cost (25%):	$4,868
			Estimated Administrative Cost (10%):	$1,947
			Estimated Permits and Clearances:	$1,000
			Total Estimated Project Cost:	**$27,285**
			Cost per Mitigated Ton of Sediment:	**$198**
			ADEQ Match (60%):	$16,371
			Landowner Match (40%):	$10,914

Site Photos

Figure 1. Portion of the Little Colorado River that would be fenced off to grazing.

Figure 2. Area where the gated pipe with be installed.

Site Maps

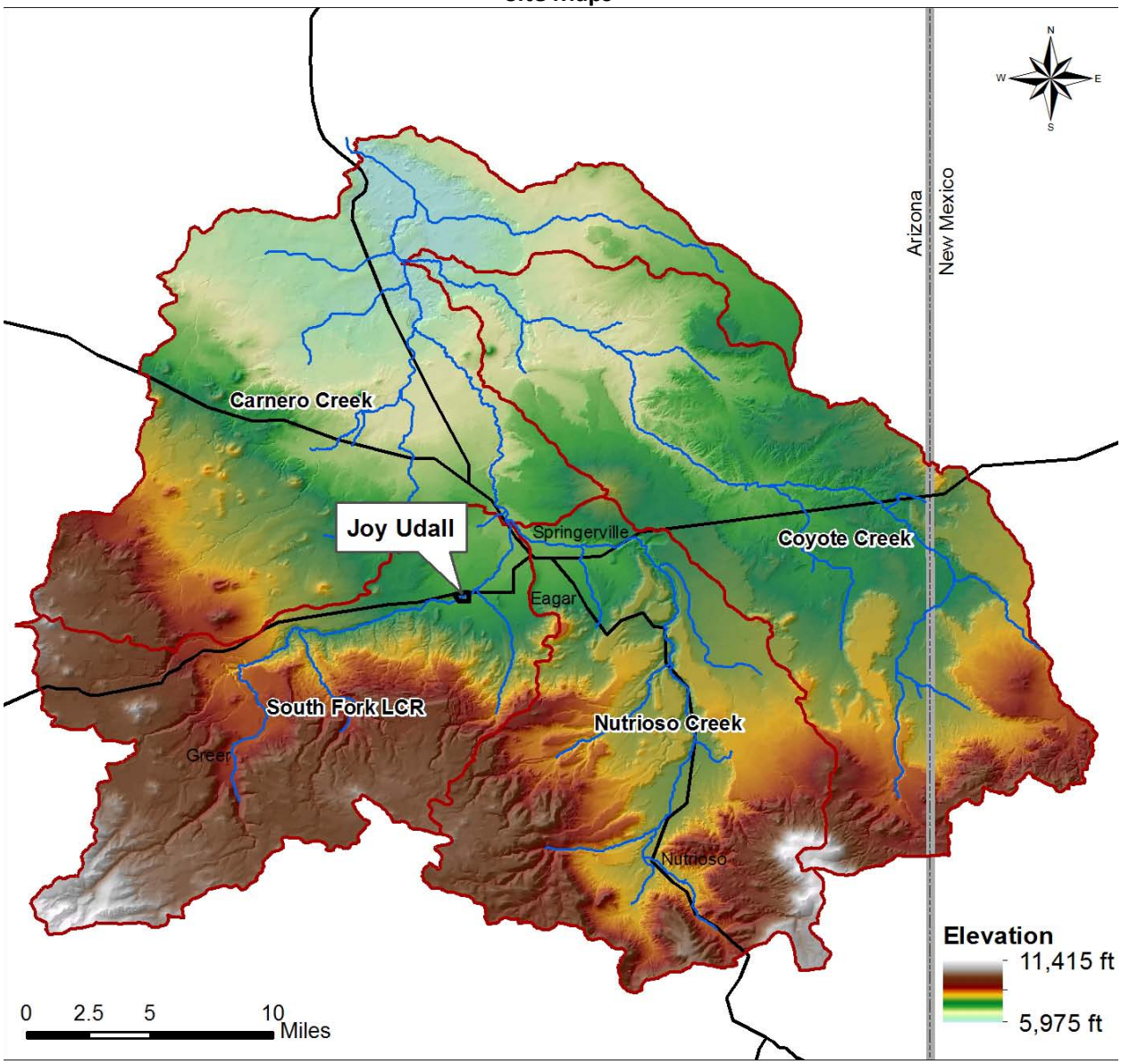

Figure 3. Watershed scale map with ranch boundary.

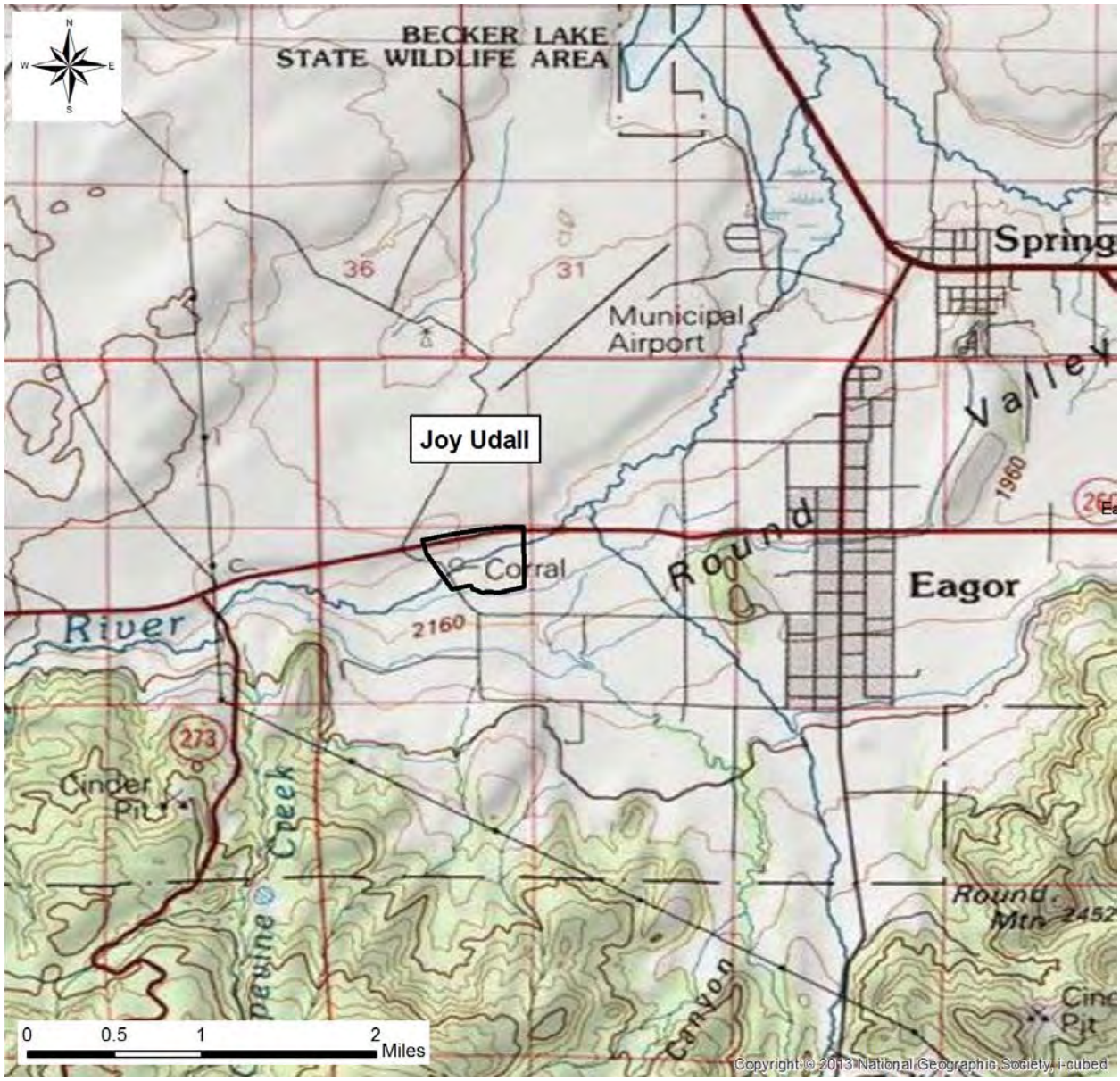

Figure 4. Topographic map with ranch boundaries.

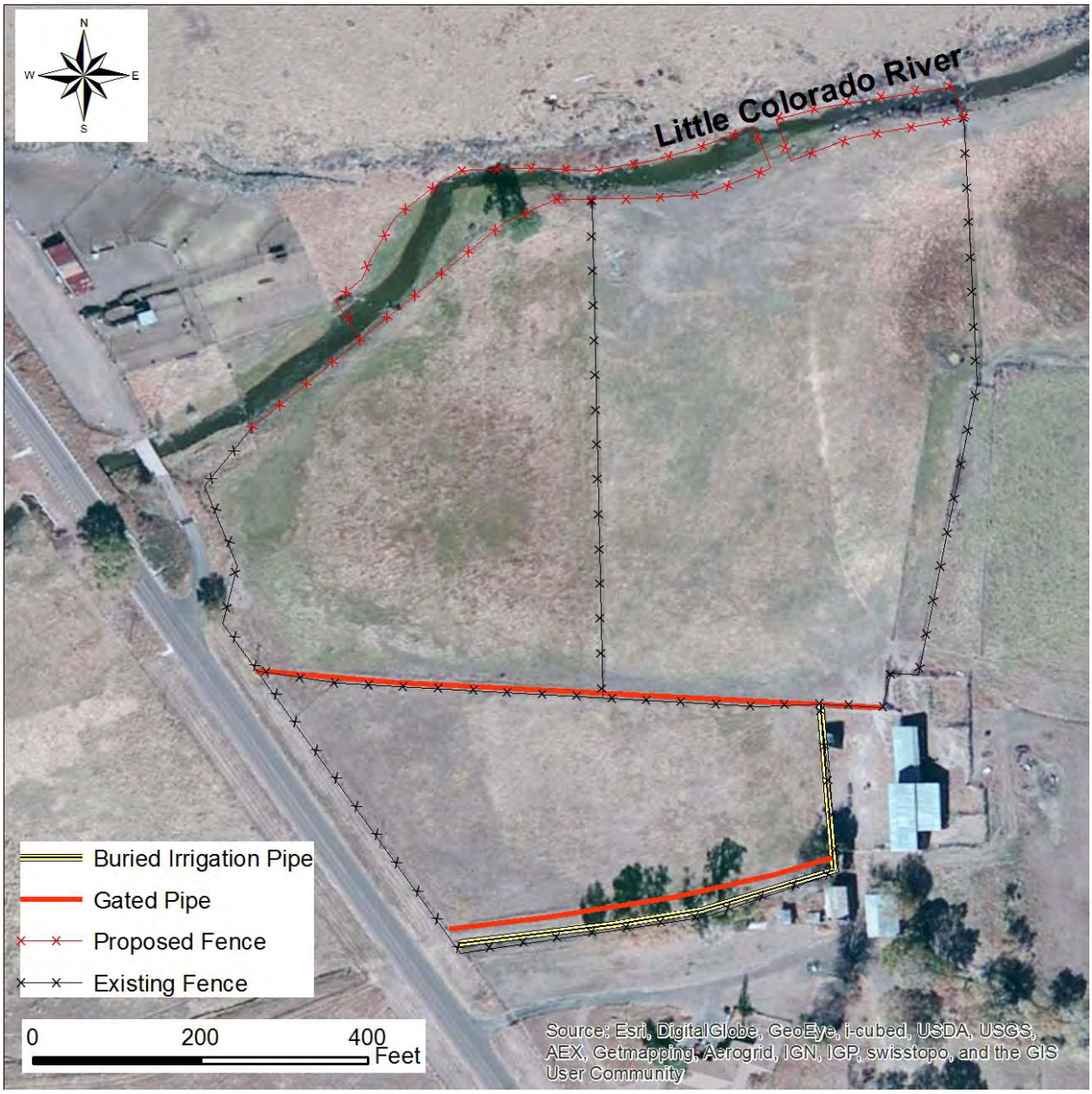

Figure 5. Aerial Photograph with proposed work.

Coyote Creek Watershed Improvement and Education Project

Name: Elaine Rogers/Danny Lee
Ranch Name: E Lazy A
Mailing Address: Po Box 1640, Springerville, AZ 85938
Watershed: Coyote Creek

Date of Visit: 04/06/2015
Email: elainer.64@gmail.com
Phone Number: 928.245.3675

Site Description:
This ranch contains ~4.3 miles of Coyote Creek. These reaches of the stream contain tall (> 6 feet), vertical banks which consist of weak alluvial soils that are easily eroded. The entire stream appears to be adjusting to a change in base level, evident by the headcuts in tributaries and a narrow stream channel with little to no floodplain. Base level change is likely stabilized upstream of a major grade control structure, but the channel and tributary morphology is still adjusting.

A concrete sill has been in place for over 30 years and has effectively controlled the local gradient of Coyote Creek just downstream of a main road used to access several ranches. Lateral movement of Coyote Creek threatens to flank this grade control structure. However, Kinder Morgan has indicated to the landowners that a bridge is being designed to cross Coyote Creek.

Grazing is the primary land use on this ~40,650 acre ranch. Vegetation is typical of the lower Coyote Creek watershed.

Ranch Objectives and Resource Concerns:
Ms. Rogers would like to treat stream banks along Coyote Creek, which are near vertical and actively eroding.

Coyote Creek Watershed Improvement and Education Project

Proposed BMPs

Rogers BMP 1 - Bank Stabilization

Tons of Sediment Mitigated (10 yr): 2465

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Earthwork - Bank Sloping 1600 linear feet	cy	3793	$6.25	$23,704
Rock-Lined Chute	ea	1	$12,450.00	$12,450
Double Net Erosion Control Fabric	sy	2133	$3.85	$8,213
Seeding	ac	1.5	$150.00	$225
Standard 4-Strand Barbed Wire Fence	ft	520	3.5	$1,820
			Total Estimated Construction Cost:	**$46,412**
			Estimated Engineering Cost (25%):	$11,603
			Estimated Administrative Cost (10%):	$4,641
			Estimated Permits and Clearances:	$8,000
			Total Estimated Project Cost:	**$70,656**
			Cost per Mitigated Ton of Sediment:	**$29**
			ADEQ Match (60%):	$42,393.75
			Landowner Match (40%):	$28,262.50

Site Photos

Figure 1. Photograph of eroding banks of Coyote Creek, along the proposed project reach.

Figure 2. The left portion of the far bank was treated as part of a previous project. There is a stark contrast to the successfully treated bank, compared to the untreated bank on the right.

Site Maps

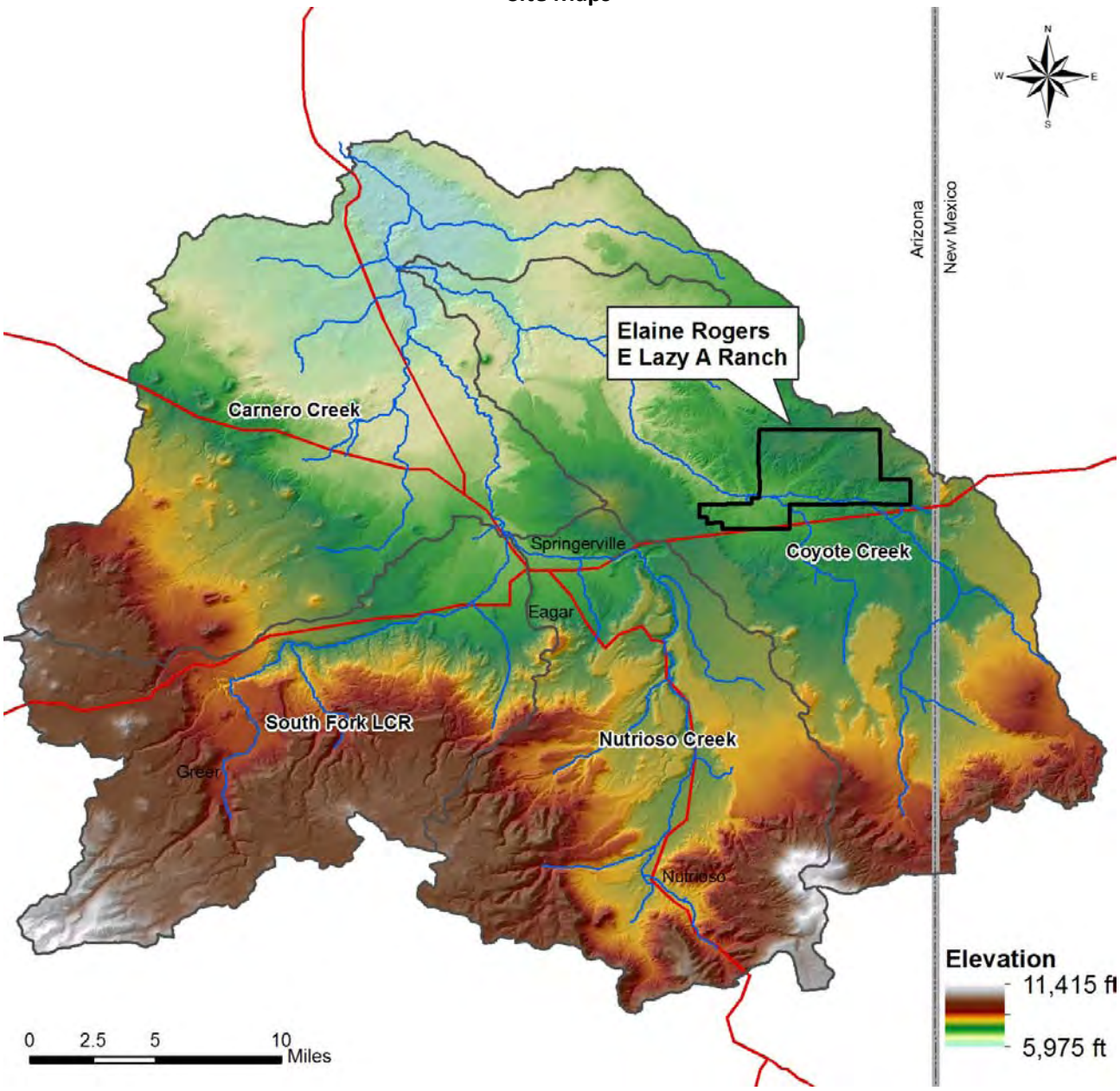

Figure 3. Watershed scale map with ranch boundary.

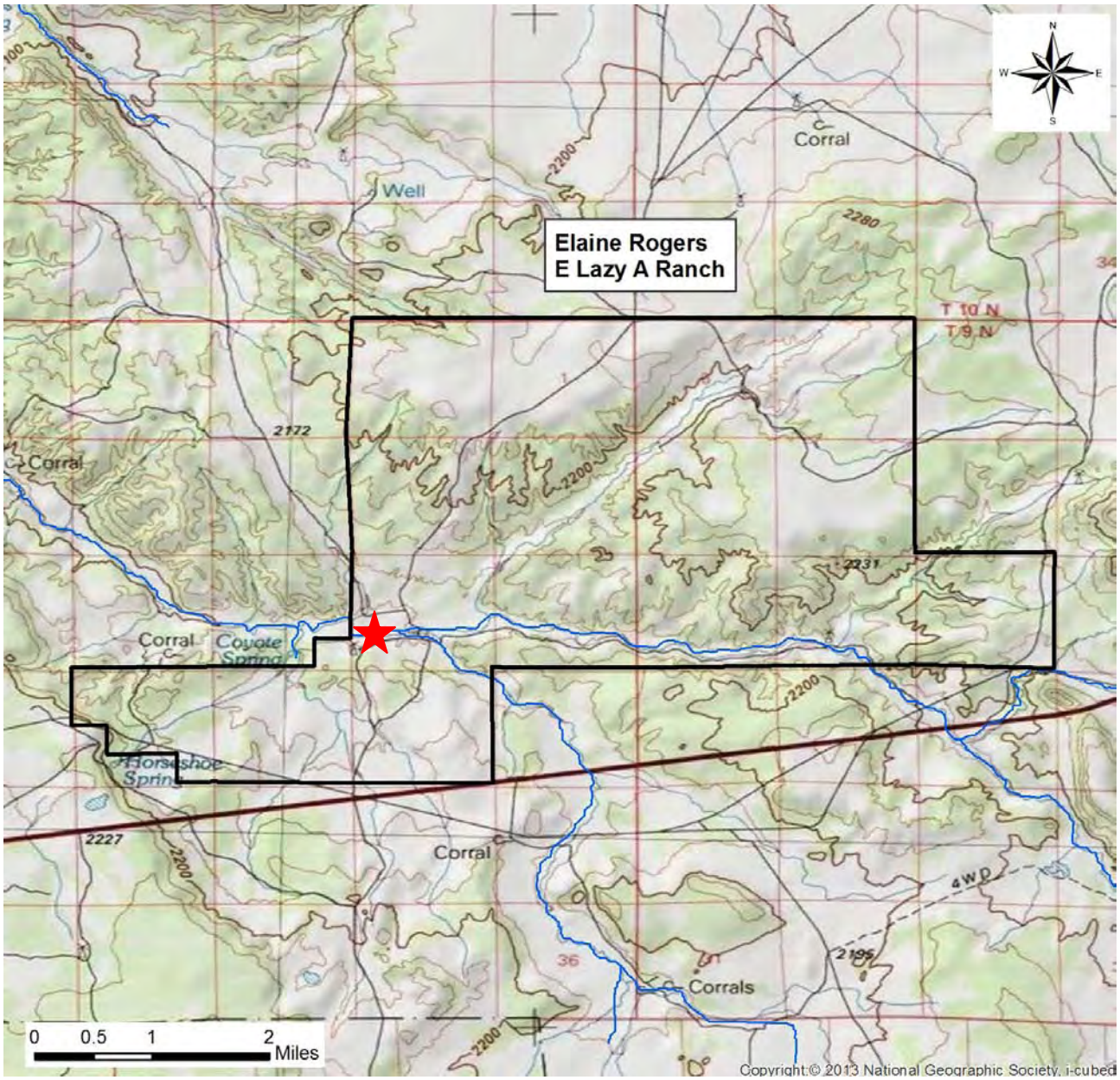

Figure 4. Topographic map with ranch boundaries and red star indication location of proposed work.

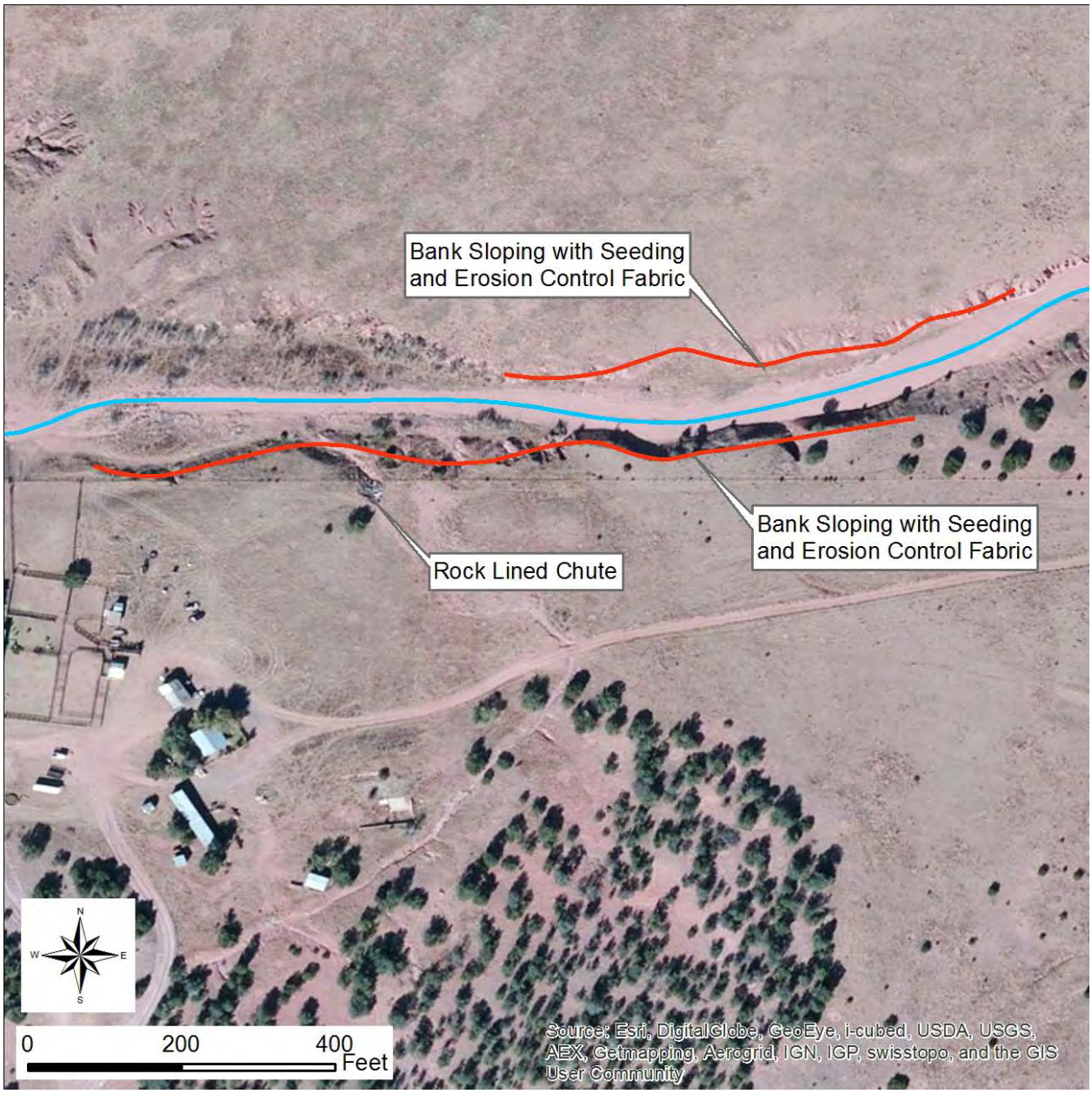

Figure 5. Project reach map of the proposed work.

Coyote Creek Watershed Improvement and Education Project

Name: Clifford Johnson
Date of Visit: 04/06/2015
Ranch Name: Johns Cattle Company
Email: cliffordjohnson@q.com
Mailing Address:
Phone Number: 602.920.1155
Watershed: Little Colorado River within the Carnero Creek Watershed

Site Description:
The project areas within this ranch contain approximately 2 miles of the Little Colorado River including 40 acres of existing riparian habitat and > 100 acres of adjacent riparian and wetland floodplain that is managed as irrigated pasture land cropland. Grazing is the primary land use.

The project *area is along reaches of the Little Colorado River* believed to contain native fish species, including two Special Status Species; Little Colorado spinedace (*Lepidomeda vittata*) and Little Colorado River sucker (*Catostomus spp.),* the spinedace is also federally threatened.

Project Description:
The landowner wished to install 5000 ft of gated pipe to increase the efficiency of the irrigation system. Similar upgrades have been completed in other areas of the ranch and led to a decrease in concentrated flow. When the water organizes into concentrated flow, it causes erosion of stream banks at the downhill portion of the irrigated fields, as well as the further transport of manure and fertilizers from irrigated fields into the river.

Also being proposed by the landowner is the reconstruction of a sediment basin that has reached the end of its service life and breached. The breach is allowing the mobilization of stored sediments as well as the transport of sediment from the watershed to wash down across the irrigated fields and enter the Little Colorado River. The reconstructed basin will require maintenance, as the contributing watershed issues in sediment and fills the basin. The basin is estimated to hold 1245 tons of sediment and with annual maintenance the basin could keep nearly 12,500 tons of sediment from entering the Little Colorado River over the span of 10 years.

Coyote Creek Watershed Improvement and Education Project

Proposed BMPs

Johnson BMP 1 - Gated Pipe

Tons of Sediment Mitigated (10 yr): 133

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Gated Pipe	ft	5000	$6.75	$33,750
			Total Estimated Construction Cost:	**$33,750**
			Estimated Engineering Cost (25%):	$8,438
			Estimated Administrative Cost (10%):	$3,375
			Estimated Permits and Clearances:	$500
			Total Estimated Project Cost:	**$46,063**
			Cost per Mitigated Ton of Sediment:	**$347**
			ADEQ Match (60%):	$27,637.50
			Landowner Match (40%):	$18,425.00

Johnson BMP 2 - Water and Sediment Basin Reconstruction

Tons of Sediment Mitigated (10 yr): 12,450

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Earthwork - Dike Repair and Clean out	cy	6500	$4.60	$29,900
Rock-Lined Chute	ea	1	$12,450.00	$12,450
Seeding	ac	1.5	$150.00	$225
			Total Estimated Construction Cost:	**$42,575**
			Estimated Engineering Cost (25%):	$10,644
			Estimated Administrative Cost (10%):	$4,258
			Estimated Permits and Clearances:	$7,500
			Total Estimated Project Cost:	**$64,976**
			Cost per Mitigated Ton of Sediment:	**$5**
			ADEQ Match (60%):	$38,985.75
			Landowner Match (40%):	$25,990.50

Site Photos

Figure 1. looking upstream across the water and sediment basin.

Figure 2. Photograph of the dike breach.

Site Maps

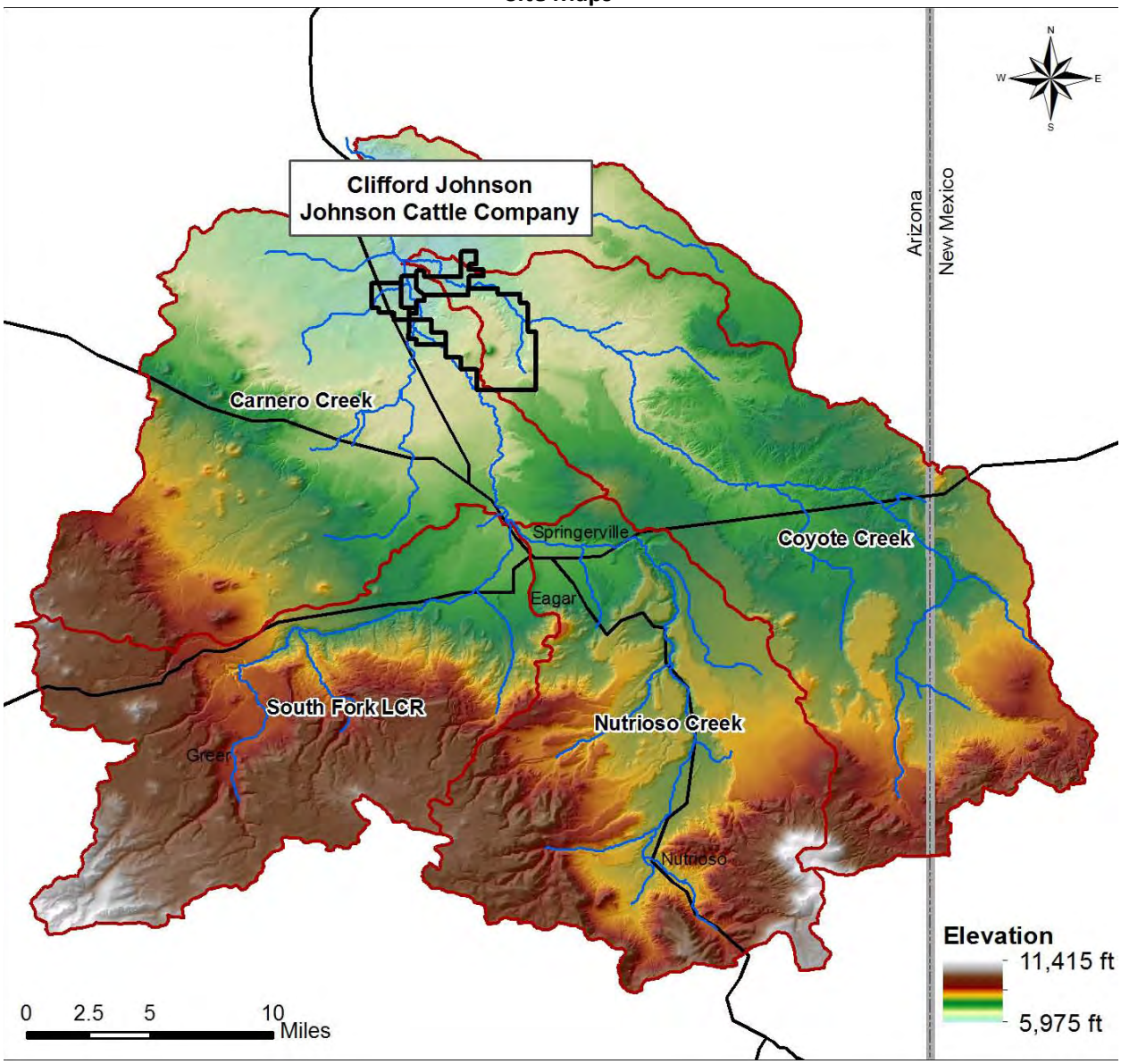

Figure 3. Watershed scale map with ranch boundary.

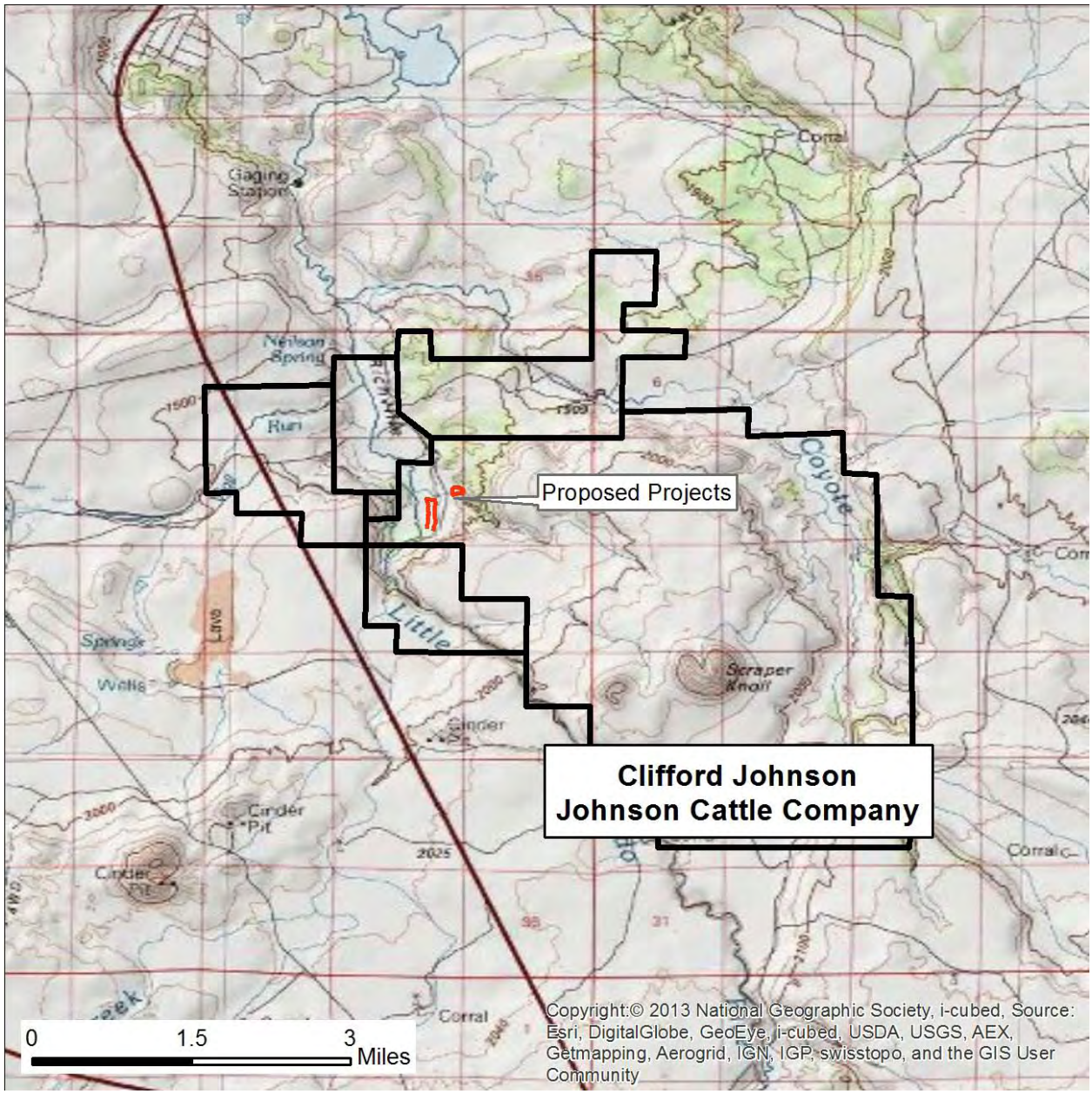

Figure 4. Topographic map with ranch boundaries location of proposed work.

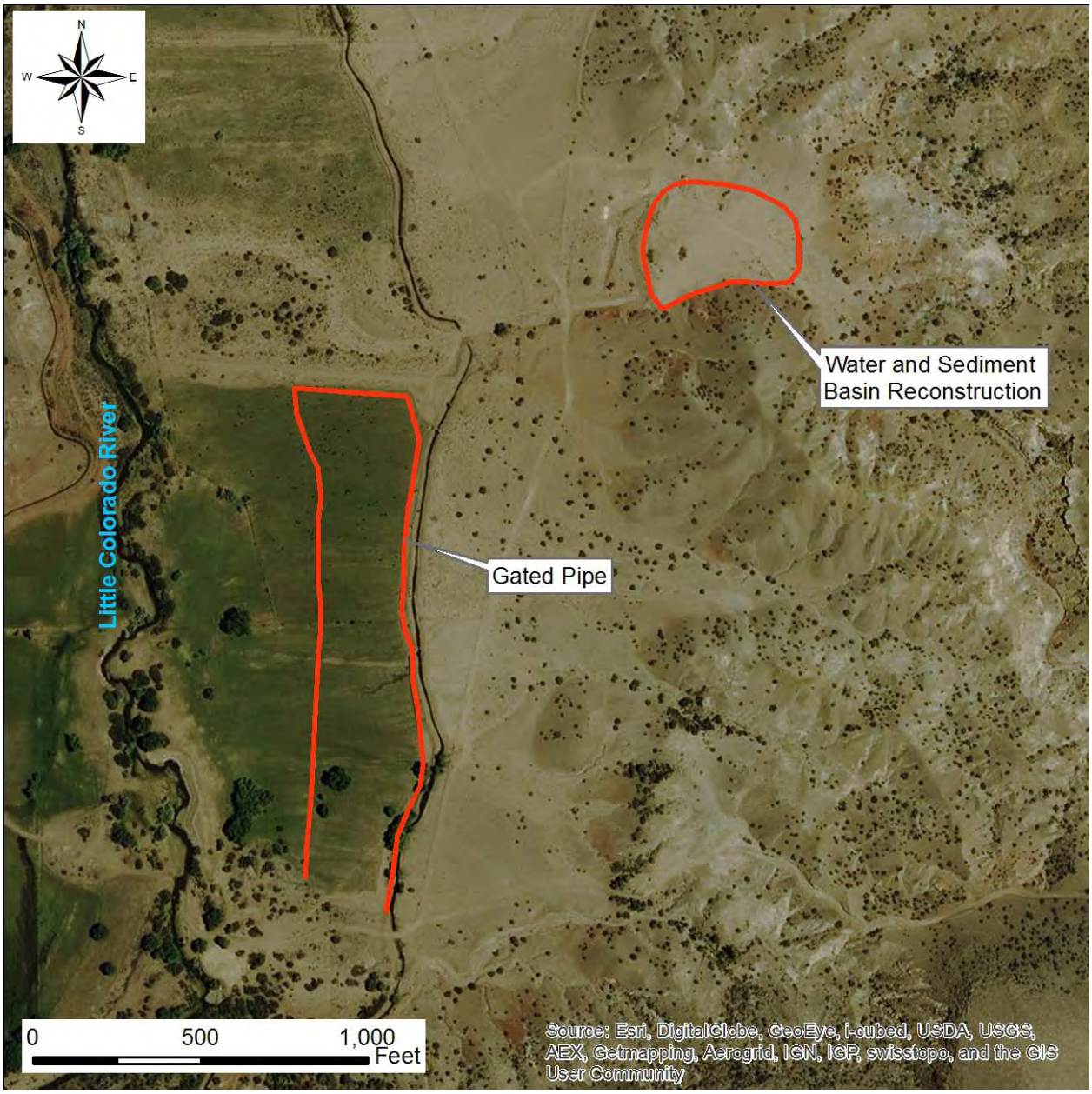

Figure 5. Project reach map of the proposed work.

Coyote Creek Watershed Improvement and Education Project

Name: Fred Moore/Daric Knight
Ranch Name: Moore
Mailing Address: 225 E. 7th Ave, Eagar, AZ 85925
Watershed: Unnamed tributary of Coyote Creek

Date of Visit: 04/09/2015
Email: dknight100@hotmail.com
Phone Number: 928.521.9897

Site Description:
The drainage network throughout this ranch consists of unnamed tributaries of Coyote Creek. Historically conservation work on this ranch has included water and sediment control basins (WASCOBs) and Sediment Detention basins to trap sediment and arrest channel incision. However, these basins have surpassed their service life and need to be reconstructed. They have effectively filled with sediment and are in danger of or have already started to breach, which will mobilize the stored sediment.

Grazing is the primary land use on this ~3,370 acre ranch.

Project Description"
The landowner would like to reconstruct 3 sediment basins to restore the historic capacity and function for sediment reduction and to arrest headcutting of the tributary. These basins will be augmented with rock-lined chutes to serve as an armored spillway, which will increase their stability and longevity. The reconstructed basin will require maintenance, as the contributing watershed issues in sediment and fills the basin. The structure is estimated to hold ~1 tons of sediment and with annual maintenance the basin could keep nearly 13,000 tons of sediment from entering the Little Colorado River over the span of 10 years.

Coyote Creek Watershed Improvement and Education Project

Proposed BMPs

Moore BMP 1 - Water and Sediment Basin Reconstruction X3

Tons of Sediment Mitigated: 15,795

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Basin Reconstruction including Rock Lined Chute	ea	3	$15,500.00	$46,500
Seeding	ac	1	$150.00	$150
			Total Estimated Construction Cost:	**$46,650**
			Estimated Engineering Cost (25%):	$11,663
			Estimated Administrative Cost (10%):	$4,665
			Estimated Permits and Clearances:	$7,500
			Total Estimated Project Cost:	**$70,478**
			Cost per Mitigated Ton of Sediment:	**$4**
			ADEQ Match (60%):	$42,286.50
			Landowner Match (40%):	$28,191.00

Site Photos

Figure 1. Water and sediment control basin filled in with sediment.

Figure 2. Downstream view of a failing water and sediment control basin. Note the outlet pipe is exposed and damaged.

Site Maps

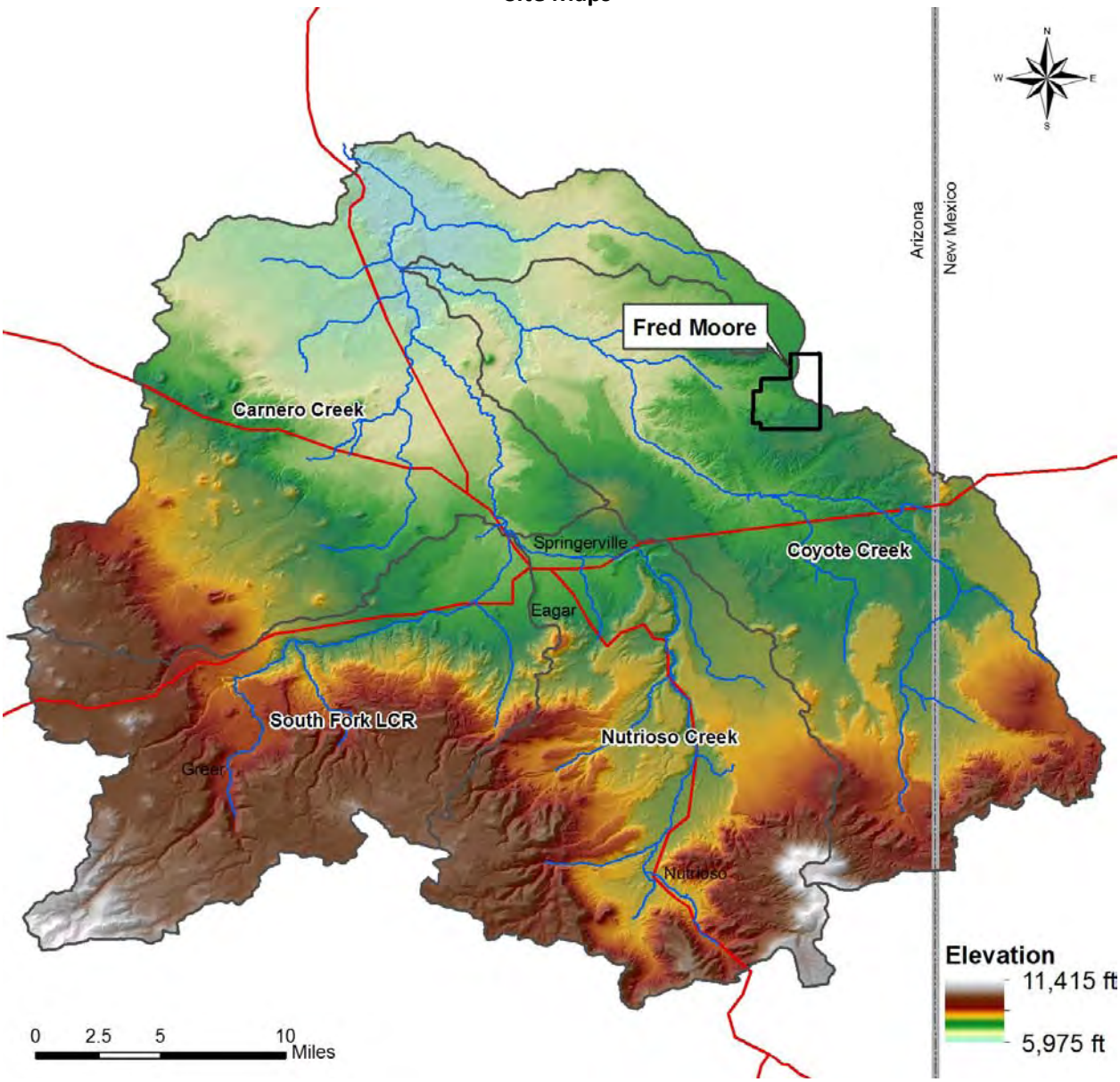

Figure 3. Watershed scale map with the Moore ranch boundary.

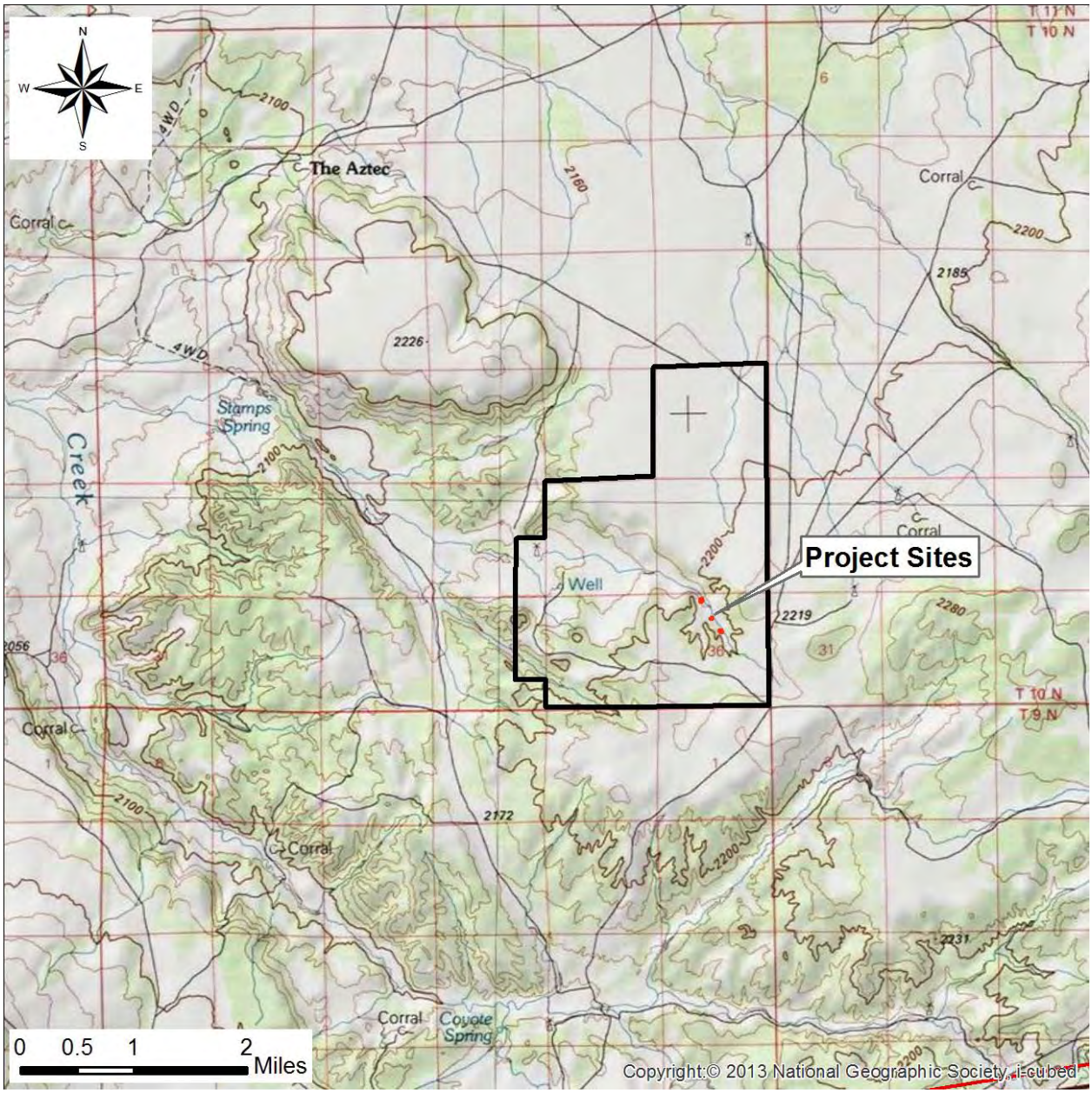

Figure 4. Topographic map with ranch boundaries and proposed project sites.

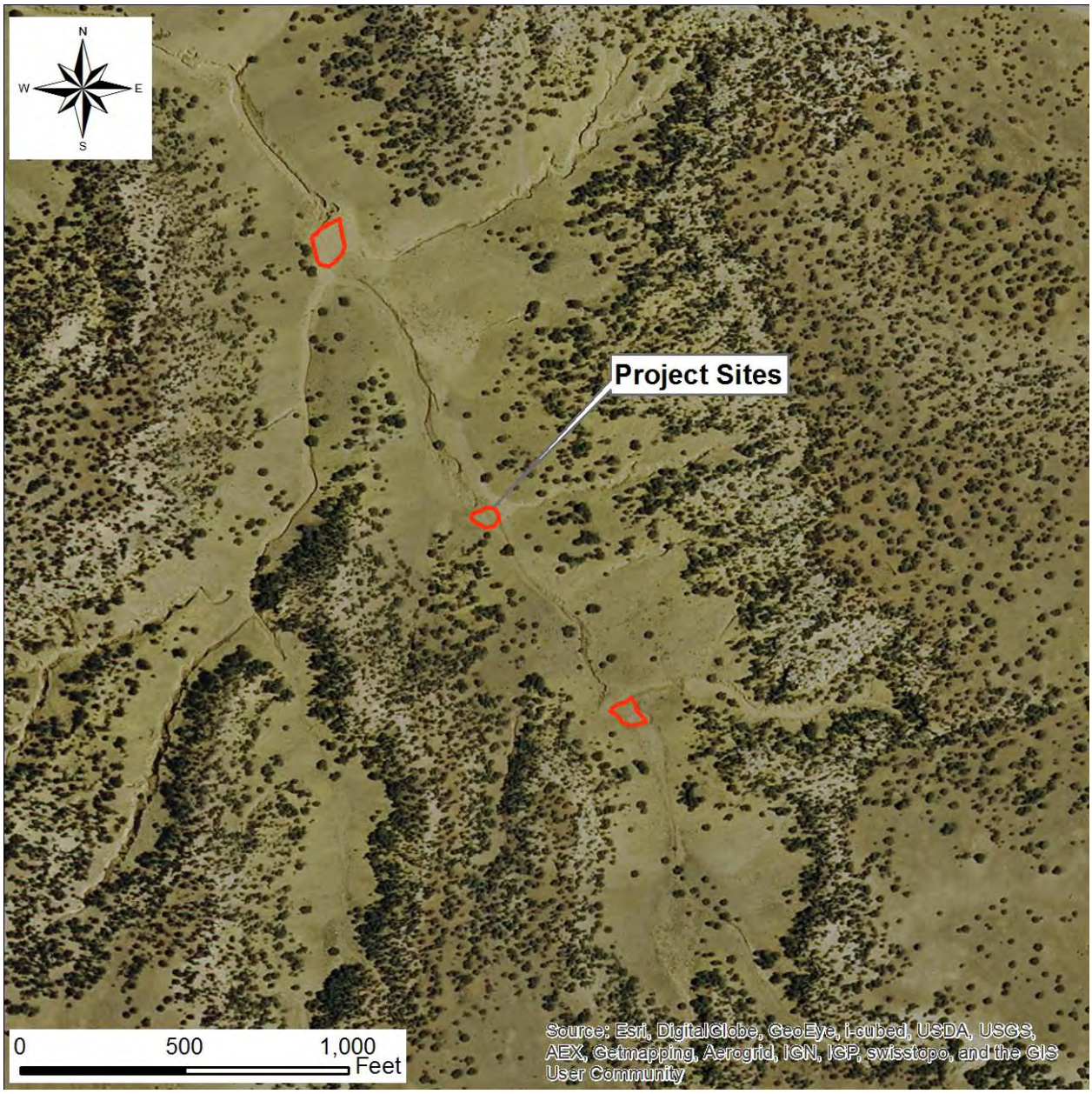

Figure 5. Project reach map of the proposed water and sediment control basin work.

Upper Little Colorado River – Apache NRCD Water Quality Improvement Project

Name: Savilla "Gracie" Sherrill
Ranch Name:
Mailing Address:

Date of Visit: 04/06/2015
Email: gsherrill@frontiernet.net
Phone Number: H928.333.4835
C928.245.5386

Watershed: Nutrioso Creek

Site Description:
This ranch contains ~3,200 ft of Nutrioso Creek. Grazing and hay production are the primary land uses of this 110 acre property. Currently the landowner utilizes Nutrioso Creek for watering of livestock. The current fencing plan does not exclude livestock from the Creek or its banks.

By providing an alternative water source, livestock will be excluded from Nutrioso Creek and provide for enhanced pasture rotation.

Project Description:
The landowner proposes to install approximately 600 ft of water line from an existing well to a new drinker. With the construction of the new drinker, nearly 6,500 ft of fencing will be installed on both the north and south side of Nutrioso Creek to exclude livestock from the Creek. 3 hard crossings will need to be constructed across the Creek for livestock to access pastures.

Proposed BMPs

Sherrill BMP 1 - Range Management (Fencing and Watering Facility)

Tons of Sediment Mitigated (10 yr): 645

Description	Unit	Quantity	Typical Unit Cost	Estimated Cost
Standard 4-Strand Barbed Wire Fence	ft	6500	$3.50	$22,750
Stream Crossing	ea	3	$1,160.00	$3,480
Pipeline (1 1/4 in. Diameter)	ft	600	$3.75	$2,250
Trough and Float	gal	350	$1.50	$525
Seed	ac	1.5	$150.00	$225
			Total Estimated Construction Cost:	**$29,230**
			Estimated Engineering Cost (20%):	$5,846
			Estimated Administrative Cost (10%):	$2,923
			Estimated Permits and Clearances:	$1,000
			Total Estimated Project Cost:	**$38,999**
			Cost per Mitigated Ton of Sediment:	**$60**
			ADEQ Match (60%):	$23,399
			Landowner Match (40%):	$15,600

Site Maps

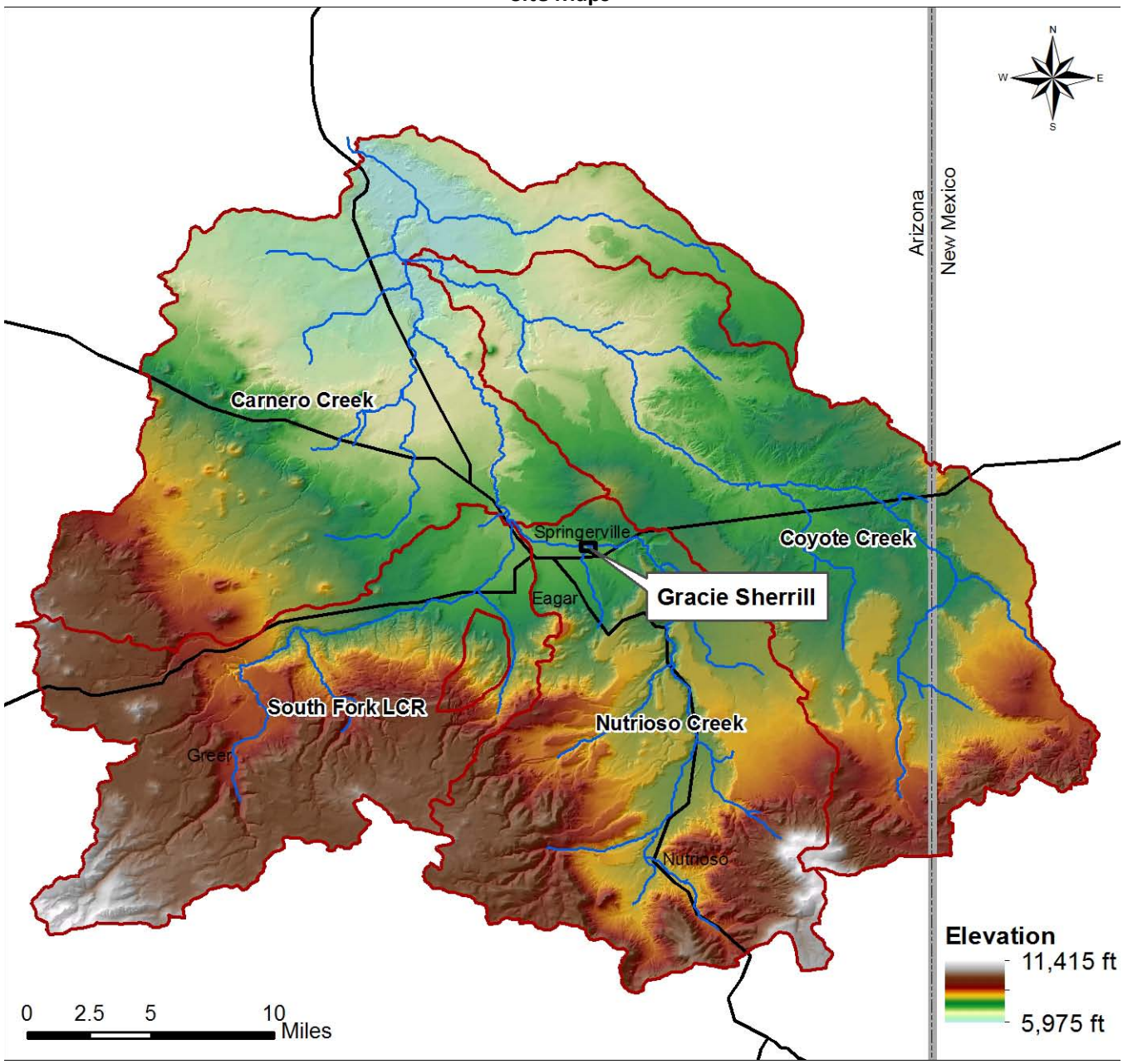

Figure 1. Watershed scale map with ranch boundary.

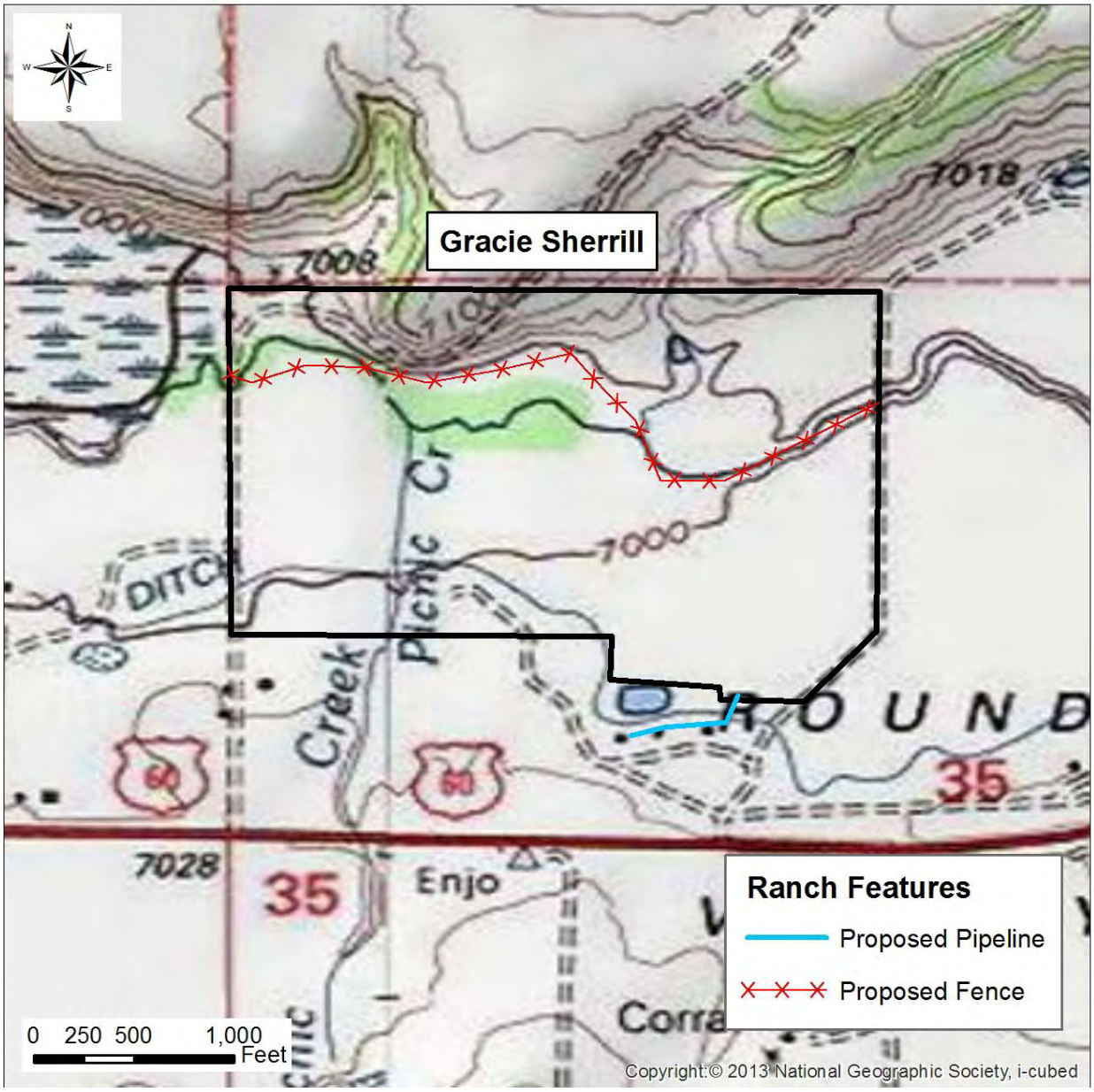

Figure 2. Topographic map with ranch boundaries and proposed work. Fencing is proposed for both sides of the creek.