

ARIZONA 319(h) DEMONSTRATION PROJECT SUMMARY

PROJECT NO: 1-003
CONTRACT NO: 00-0117(1-003)
PROJECT TITLE: Rogers Ranch Turbidity Reduction Project
HUC: 15020001-0017
PROJECT LEAD: Merlyn Rogers
PROJECT LOCATION: Nutrioso Creek- Headwaters to Picnic Creek

PROJECT FUNDING:

319(h) funds	\$29,707.00
In-Kind funds	\$21,080.00
Total Cost	\$50,787.00

PROJECT SOLICITATION: ADEQ

PROJECT SELECTION and AWARD: ADEQ 319(h) Project Selection Team

PROJECT PURPOSE: Reduce turbidity, restore exposed stream banks, and increase vegetative growth along Nutrioso Creek. using riparian fencing, off-channel water wells (drinkers) and keep water gaps closed during growing season.

PROJECT DESCRIPTION: Tasks #1,3,4 and 5. Obtained State historic Preservation Office (SHPO) certification, installed riparian fencing and off-channel drinkers, and updated website ECBarRanch.com.

PROJECT FINDINGS:

Actual Expenditures:	319(h) funds	\$24,576.00
	In-Kind funds	\$16,324
	Total Cost	\$40,900

Project came in under-budget by \$10,000. Task #2 (Prepare and submit progress reports) and Task #6 (Create a Project Advisory Group (PAG; meet periodically) were not completed and no money was paid out or used as match. No livestock have entered the Nutrioso creek riparian zone located on the Rogers Ranch since the fencing and off-channel drinkers were installed. The off-channel drinkers are being used often by livestock and wildlife. The rain as well as the absence of livestock has begun and will continue the restoration process necessary to reduce turbidity to meet TMDL standards. The

Project No. 00-0117(1-003)

Table A. TASK SUMMARY STATUS ADEQ Grant 1-002

Task No.	Application Methods	Water Quality Issue	Action Plan	Schedule and Projected Budget	Status as of December 31, 2002
# 1	Coordination	Administrative	Permits, SHPO	As required Over 3-years	Budget reallocated to Task 10 Sprinkler System Installation
# 2	Report preparation	Administrative	Report preparation	As required Over 3-years	Budget reallocated to Task 10 Sprinkler System Installation
# 3	Riparian fence installation	Exposed streambanks & livestock use	Fence ½ mile of riparian zone on 27 acre parcel	8109-ft. fence Cost \$12,787. In 90 days	Task completed August 2000.
# 4	Pipe installation	Increase water in Creek; screen aquatic life	Install pipe in earth ditches, fence, culverts	Cost \$43,654. Pipe, fence, culvert 4-seasons	Task completed December 2000.
# 5	Water wells and drinker installation	Watergaps & elk activity	Install wells and drinkers to close watergaps	2 wells/drinkers Cost \$28,200. In 9 months	Task completed October 2000. Budget excess reallocated to Task 10 Sprinkler Installation
# 6	Willow planting	Supplemental vegetation needed	Plant willows	3000 willows Cost \$3,000. Over 3-years	Task completed November 2002
# 7	Rabbitbrush management	Erosion along riparian zone; low water table	Rabbitbrush control along riparian zone	125-acres Cost \$20,000. Over 2-years	Task completed September 2002
# 8	Outreach	Information on practices	Public outreach: website, other	Cost \$12,000. Over 3-years	Task completed September 2002
# 9	Perform vegetative study	Monitor practices	Collect data and report	Cost \$15,000. Over 3-years	Task completed December 2002
# 10	Sprinkler system installation	Surface water needed for riparian zone	Reduction in surface water useage	Sprinklers/pump Cost \$55,357. In 18 months	Task completed August 2002.
# 11	Cross-fencing pastures	Rangeland sediment discharges	Fence pastures for rotational grazing	4,050-ft. fence Cost \$6,393. In 12 months	Task completed August 2000.
# 12	Over-seeding pastures	Rangeland sediment discharges	Increase pasture vegetation	1,500-lbs. seed Cost \$9,000. In 60 days	Task completed August 2000.
# 13	Project Advisory Group	Administrative	Discuss practice implementation	As required. Over 3-years.	Task completed December 2002.
# 14	Plant grass seed on streambanks	Reduce streambank erosion	Increase growth on exposed streambanks	1,000-lbs. seed Cost \$10,000. In 3-years	Task completed September 2002
# 15	Photo monitoring	Observe changes.	Annual photo monitoring.		Task deleted. Practice taken over by Task # 9 Vegetative Study.
# 16	AWPF Wildlife Drinker Project (Match Project)	Reduce riparian zone elk use	Install drinkers on elk routes	4 drinkers Cost \$15,500. AWPF funding.	Task completed September 2000
# 17	Elk Monitoring (AWPF Match)	Reduce elk activity.	Monitor drinker in Task 16.	Cost \$15,000. Over 3-years.	Matching project on schedule for completion May 1, 2003.
# 18	Grass Seeding (AGFD Match)	Reduce upland pasture erosion	Plant grass seed and fertilize	Seed & fertilizer Cost \$11,333.	Matching project completed September 2002
# 19	Brush Research (Match Project)	Reduce riparian zone erosion.	Monitor pasture grazing.	Research data \$7,500.	Grant approval pending.
# 20	Aquatic Study (AGFD Match)	Improve wetland habitat	Follow-up study by AGFD	Study Cost \$4,500.	AGFD will not perform follow-up until 2005 per Fish Report.
# 21	Volunteer Labor	Administrative	Crosswhite services donation	\$50,000. In 3-years	Task completed December 2002.

Task # 1. Coordination.

Task #1 Description: Finalize contracts for construction and materials, obtain SHPO Clearance, coordinate all methods, monitoring, and related Project Tasks for 3 years.

Type of Task: Administrative

Deliverable description: Drawings and specs; invoice for services; monitoring plans.

Project Leader qualifications: Completion of SIP, EQIP, AWPf, and ADEQ Projects.

Deliverable due date: Beginning August 1, 2000 (or 30 days after Project approval) and as required for 3 years.

Computation: Administrative = 200 hours per year at \$25.00 per hour = \$5,000. X 3 years = \$15,000.

ADEQ share of Task cost: \$3,000. X 3 years = \$ 9,000.

Match share: \$ 0

Donated share: \$2,000. X 3 years = \$ 6,000.

Total Task cost: \$5,000. X 3 years = \$15,000.

Progress Report 8/1/00 to 12/31/00. A SHPO clearance has been obtained for all completed practices. Permits were obtained according to laws applicable to water well drilling and construction activities. The budget for Task # 1 of \$15,000.00 was approved in December 2000 by ADEQ for reallocation to Task 10 Sprinkler System Installation.

Progress Report 12/31/00 to 3/31/01. No ADEQ expenses incurred.

Progress Report 4/1/01 to 6/30/01. No ADEQ expenses incurred.

Progress Report 6/30/01 to 9/30/01. No ADEQ expenses incurred.

Progress Report 9/30/01 to 12/31/01. No ADEQ expenses incurred.

Progress Report 12/31/01 to 6/30/02. No ADEQ expenses incurred.

Progress Report 6/30/02 to 9/30/02. No ADEQ expenses incurred.

Progress Report 9/30/02 to 12/31/02. No ADEQ expenses incurred.

Analysis and assessment 8/1/00 to 12/31/02. Reallocation of funds from this Task was helpful to the overall Project. Task 22 Volunteer Labor funded the costs for Coordination.

ARIZONA 319(h) DEMONSTRATION PROJECT SUMMARY

ECBarRanch.com website has been update to include The Rogers Ranch Turbidity Reduction Project. It can be found by selecting “ADEQ Project Tour” from the homepage.

- PROJECT OUTPUTS:**
- 1. Obtained State historic Preservation Office (SHPO) certification**
 - 2. Installed riparian fencing**
 - 3. Installed off-channel drinkers**
 - 4. Updated website (ECBarRanch.com.)**
 - 5. Reduced turbidity along portion of Nutrioso Creek located along Rogers Ranch**
 - 6. Restored exposed stream banks**
 - 7. Increased vegetative growth along Nutrioso Creek**
 - 8. Livestock being kept out of riparian zone**
 - 9. Quarterly reports (not applicable to this project)**
 - 10. Final report**

PROJECT DURATION: Actual project completion was less than 3 months



ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Governor Jane Dee Hull

Jacqueline E. Schafer, Director

December 11, 2000

Mr. Merlyn Rogers, Project Manager
P.O. Box 300
Nutrioso, Arizona 85932

RE: Contract # 00-0117(1-003), Rogers Ranch Turbidity Reduction Project

Dear Mr. Rogers:

The Arizona Department of Environmental Quality (ADEQ) has reviewed your letter dated October 23, 2000, for Contract number 00-0117(1-003). Thank you for informing ADEQ regarding your partial property sale to Mr. James W. Crosswhite and your withdrawal from the Water Quality Improvement Grant (#1-003). According to your letter, the State Historic Preservation Office (SHPO) certification was obtained (Task #1), the riparian fencing was installed (Task #3) and the off-channel drinkers were installed (Task #4) per the guidelines of your Grant Agreement with ADEQ.

It is considered to be in the best interest of the State of Arizona to accept your withdrawal from the Grant Agreement. However, ADEQ must have the following items before Contract #00-0117(1-003) can be considered COMPLETE:

- Per this grant agreement, a public outreach or education component must also be performed. Please update the website as specified in your Task #5 Description of the grant agreement. If you are unable to provide an outreach or education component per the agreement guidelines, please advise ADEQ.
- Please submit pictures of the completed work.
- Verify that the last payment sent to you in the amount of \$24,576.00 was the final payment and all corresponding documentation, i.e. the Project Pricing Schedule, will serve as the final budget report. The payment was made for the completion of Task #1, Task #3, and Task #4. Task #2 (Prepare and submit progress reports) and Task #6 (Create a Project Advisory Group (PAG); meet periodically) were not completed and no money was paid out or used as match.

Once ADEQ has received the requested documentation, we will verify that all requirements of the Grant Agreement have been fulfilled and will send a letter documenting that Contract #00-0117(1-003) has been CLOSED. Please remember that you must retain all records and shall contractually require each subcontractor to retain all records for a period of five years after the completion of the Grant Agreement.

If you have any questions or need further assistance, please contact me at (602) 207-4869 or toll free in Arizona at (800) 234-5677, ext. 4869. Thank you.

Sincerely,

A handwritten signature in cursive script, appearing to read "Susan Ward".

Susan Ward, Grant Coordinator
Water Quality Improvement Grant Program
Water Quality Division

cc: Carol Aby, Manager, Water Quality Planning Section, WQD

Task # 2. Report preparation.

Task # 2 Description: Prepare and submit progress and final reports.

Type of Task: Administrative

Deliverable description: Reports; invoice for services.

Project Leader qualifications: Completion of SIP, EQIP, AWPf, and ADEQ Projects.

Deliverable due date: December 31, 2000 (90 days after Project approval), then semi-annually for 3 years; final report.

Computation: Administrative = 40 hours at \$25.00 per hour = \$1,000. X 3 years = \$3,000.

ADEQ share of Task cost: \$ 600. X 3 years = \$1,800.

Matched share: \$ 0

Donated share: \$ 400. X 3 years = \$1,200.

Total Task cost: \$1,000. X 3 years = \$3,000.

Admin.

Project Leader. James Crosswhite is a landowner in the Project Area. He has helped identify a combination of conservation practices necessary to reverse the downward trend of both the riparian zone and livestock operation on the EC Bar Ranch in less than 3 years. Relying on the Conservation Plan proposed by the NRCS, he searched for funding from all available sources to implement the recommended practices in an orderly, coordinated, and timely manner. Successful projects on his ranch have demonstrated that conservation and ranching economics can be mutually compatible and beneficial. Through his efforts, the ADEQ Project Phase-I (water control structures) has been expanded into Phase-II (current Project). He has assisted other landowners in writing and evaluating ADEQ 319 funding applications. The ADEQ can be assured that all components of the Project will be accomplished under the leadership of Mr. Crosswhite. Outreach opportunities will be used to promote the Project as a model for other landowners. He is active with the Nutrioso Watershed Partnership and the Upper Little Colorado River Watershed Partnership. Crosswhite will finalize construction contracts, obtain SHPO clearance, water well drilling permits, and coordinate all methods, monitoring, and related tasks. The cost of this service over 3 years is \$15,000.00 and is described in Task #1. Crosswhite will prepare and submit progress reports for 3 years and a final report. The cost of this service over 3 years is \$3,000.00 and is described in Task #2.

Progress Report 8/1/00 to 12/31/00. Reports are being submitted as required. The budget for Task 2 of \$3,000.00 was approved in December 2000 by ADED for reallocation to Task 10 Sprinkler System Installation.

Progress Report 12/31/00 to 3/31/01. This Report was prepared.

Progress Report 4/1/01 to 6/30/01. Quarterly Report in June was prepared.

Progress Report 6/30/01 to 9/30/01. Quarterly Report in September was prepared.

Progress Report 9/30/01 to 12/31/01. Quarterly Report in December was prepared. Match Reporting Schedule revised and updated to reflect activity in 2001.

Progress Report 12/31/01 to 6/30/02. Report prepared.

Progress Report 6/30/02 to 9/30/02. Report prepared.

Progress Report 9/30/02 to 12/31/02. Final report prepared.

Analysis and assessment 8/1/00 to 12/31/02. Reallocation of funds from this Task was helpful to the overall Project. Task 22 Volunteer Labor funded the costs for Report Preparation.

Task # 3. Riparian fence installation.

Task #3 Description: Survey and construct 8,109-ft. of riparian fencing and watergaps.

Type of Task: Direct Labor Costs and Other Direct Costs

Deliverable description: Invoice for labor and materials.

Project Leader qualifications: Recent installation of 14,000-ft. of fencing under SIP and EQIP Programs.

Deliverable due date: October 1, 2000 (or 90 days after Project approval).

Computation: Direct Labor Costs = \$3,481.; Other Direct Costs = \$9,306.

ADEQ share of Task cost: \$7,671.

Matched share: \$ 0

Donated share: \$5,116.

Total Task cost: \$12,787. (\$1.58/ft.)

- (A) Description of practice (Method of Approach - #1 Water Quality Issue). Exposed stream banks that erode into Nutrioso Creek are a source of turbidity until they have enough vegetative growth to stabilize the erosion. Unrestricted domestic livestock activity along exposed stream banks makes it difficult for vegetation to grow. Fencing each side of the riparian corridor can control livestock activity. Where elk activity is present, fencing should include a top electric wire about 5-6 feet off the ground as a deterrent. Periodically a "watergap" needs to be placed in the fence to allow livestock to travel from the pasture to the Creek to drink water. When fencing the riparian zone creates a pasture on each side of the Creek, then the watergap needs to extend across the riparian zone connecting both pastures. In that case, one watergap can control livestock drinking from either pasture or can be used as a "crossing point" when livestock are periodically rotated between pastures. Ideally, an off-channel water well and drinker can be provided for use by livestock and wildlife so watergaps can be closed during the growing season from April 1 to November 1. In the dormant winter months, watergaps can be opened to allow livestock and wildlife free access to water, movement between pastures, and/or to graze the riparian zone.
- (B) Project Application (Method of Approach - #2 Action Plan). In 1997, a Livestock Management Plan (LMP) was adopted for use on the Ranch. Riparian fencing, watergaps, crossing points, and dormant season riparian grazing have all been incorporated with other conservation practices to help restore the 1 ¼ mile section of Nutrioso Creek located on the Ranch. The 1 ¼ mile section that is being restored needs to be maintained and monitored. On March 06, 2000, Crosswhite acquired a 27-acre parcel adjoining the northern boundary of the Ranch. This parcel includes a ½ mile section of Nutrioso Creek that has never been fenced to control free access to water by livestock owned by Rogers on the west and Rob Paterson on the east. Turbidity measurements in this section of Nutrioso Creek exceed TMDL standards. Exposed stream banks that erode into the Creek due to livestock activity are the source of the turbidity problem. If fencing and watergaps were installed, stream banks could be stabilized by new vegetative growth. After three growing seasons, TMDL standards should be reached.
- (C) Project riparian fencing required (Method of Approach - #3 Schedule). In order to control livestock usage and meet drinking water requirements on the 27-acre parcel, both sides of the Creek need to be fenced, including two water gaps on each side of the Creek. The amount of fencing is estimated at 8,109-ft. to be installed at a cost of \$12,787.00 (average \$1.58/ft). Construction would include use of 7-ft., 1.33/lb. T-posts, non-barb bottom wire, 3 barb wires, top electric wire with controller, H-braces, and gates to watergaps and adjoining pastures. Installation is described in Task #3 and would be completed within 90 days after Contract approval.
- (D) Project period usage. After fencing has been installed on the 27-acre parcel, livestock access to the 1 ¾ mile section of riparian zone on the EC Bar Ranch would be limited to dormant season grazing from November 1 to March 30. When off-channel water wells and drinkers are installed on the 27-acre parcel, watergaps will be closed along the 1 ¾ mile riparian corridor during the growing season. Elk activity along this section of riparian zone should be reduced after fencing and drinkers are installed on the 27-acre parcel.
- (E) Project benefits. Livestock and wildlife usage in the riparian zone will be restrained during the growing season to allow restoration of vegetation along exposed streambanks and riparian pastures. As more vegetation grows in the riparian zone, water flows will be spread over a larger area to naturally filter sediment and reduce turbidity. TMDL standards should be met within 3 years.

Progress Report 8/1/00 to 12/31/00. This Task was fully completed in August 2000 and reimbursement received on 10/2/00. The Method of Approach to install fencing along both sides of the riparian corridor to control livestock use has been achieved. This practice will reduce erosion from exposed streambanks. The fencing has had limited success controlling elk activity in the riparian zone.

Progress Report 12/31/00 to 3/31/01. Discussions were held with AGFD concerning elk jumping the riparian fence to enter the riparian zone. AGFD has prepared a draft Agreement whereby they would provide a 7 foot plastic fence to restrict elk access. If completed, I would have to install the elk fence by attaching it to existing riparian fences and certain upland pasture cross fences. Until such a fence is installed, elk activity in the riparian zone cannot be controlled thus limiting restoration of vegetation necessary to reduce turbidity. I am optimistic about completion of the AGFD Agreement and elk fencing being installed within a few months.

Progress Report 4/1/01 to 6/30/01. In April, the AGFD agreed to provide an elk proof fence with conditions for placement around certain upland pastures and all riparian pastures for a period of 5 years. Grant #3-006 was submitted for ADEQ approval to help cover costs of elk proof fence installation per AGFD Agreement. Approval is expected by August. Completion of the elk proof fence using some existing fences and some new ones is projected by September 2001.

Progress Report 6/30/01 to 9/30/01. ADEQ Grant 3-006 was approved and work on constructing the elk proof fence began on August 1. The practice was completed in about 30 days.

Progress Report 9/30/01 to 12/31/01. A few livestock are utilizing the riparian zone and upland pastures during the dormant season.

Progress Report 12/31/01 to 6/30/02. A few livestock utilized the riparian zone during the dormant season. Livestock are grazing in upland pastures.

Progress Report 6/30/02 to 9/30/02. No livestock use during period. Portions of the riparian fence installed in 1998 were constructed in floodplains, on first terraces, and/or near streambanks. These portions of the fence need to be relocated out of floodplains, off first terraces, and/or away from streambanks. ADEQ Grant Application was submitted in September 2002 to address this issue.

Progress Report 9/30/02 to 12/31/02. Riparian fencing is controlling livestock activity.

Analysis and assessment 8/1/00 to 12/31/02. Riparian fencing was completed in August 2000. It has allowed livestock, but not elk, to be controlled so that exposed streambanks could be restored, buffer strips created, riparian vegetation planted, and erosion control measures installed to help reduce turbidity. Some portions of the riparian fencing that were placed in floodplains, on first terraces, and near streambanks in 1998 (without ADEQ funding) needs to be relocated off floodplains and first terraces, and away from streambanks. When ADEQ Grant 5001 is approved, riparian fencing will be relocated and elk proof fencing will be installed. Unless riparian fencing is properly located and elk activity is controlled by special elk proof fencing, restoration of the riparian zone may not reach proper functioning condition and water quality may not meet TMDL standards. This conclusion can be drawn based on four miles of Nutrioso Creek downstream that are owned by the Apache Sitgraves National Forest. This section of Creek has no livestock activity, but elk are free to roam in the riparian zone. The TMDL identifies this section as having excessive turbidity. Therefore, we can conclude that unless elk proof fencing is installed, this section of Creek may never reach proper functioning condition. Turbidity may meet TMDL standards after all water quality improvement practices are implemented on the EC Bar Ranch located upstream.

Task # 4. Pipe installation.

Task #4 Description: Purchase and install 21,510-ft. of Armin **Poly-pipe** in earth ditches and attach 5,000-ft. of gated Poly-pipe for water distribution; total pipe 26,510-ft. Purchase and install electric fence and culvert crossing-points along pipe line in the Project Area.

Type of Task: Direct Labor Costs and Other Direct Costs

Deliverable description: Invoice for construction and materials.

Project Leader qualifications: Flood irrigation experience; recent construction of ADEQ Water Control Structures.

Deliverable due date: Pipe: August 1, 2000, (or 30 days after Project Approval) and then on April 15, 2001 and 2002; electric fence: August 1, 2000 (reusable); culvert crossing-points: August 1, 2000 (permanent).

Computation for pipe: Direct Labor Costs = \$2,651. X 4 = \$10,604.; Other Direct Costs = \$6,625. X 4 = \$26,500.

<u>ADEQ share of Task cost (pipe):</u>	\$5,566. X 4 years =	\$22,264.*
<u>Matched share:</u>	\$ 0	\$ 0 **
<u>Donated share:</u>	\$3,710. X 4 years =	\$14,840.***
<u>Total Task cost:</u>	\$9,276. X 4 years =	\$37,104.****

Computation for electric fence: Other Direct Costs = \$4,550.

<u>ADEQ share of Task cost (electric fence):</u>	\$2,730.*
<u>Matched share:</u>	\$ 0 **
<u>Donated share:</u>	\$1,820.***
<u>Total Task cost:</u>	\$4,550.****

Computation for culverts: Other Direct Costs = \$2,000.

<u>ADEQ share of Task cost (culverts):</u>	\$1,200.*
<u>Matched share:</u>	\$ 0 **
<u>Donated share:</u>	\$ 800.***
<u>Total Task cost:</u>	\$2,000.****

Total Cost Task #4

<u>ADEQ share of Task costs:</u>	\$26,194.*
<u>Matched share:</u>	\$ 0 **
<u>Donated share:</u>	\$17,460.***
<u>Total Task cost:</u>	\$43,654.****

- A. Description of the practice (Method of Approach - #1 Water Quality Issue). Earth irrigation ditches are less efficient than pipe to convey and deliver water for irrigation purposes. Fixed aluminum pipe placed above ground, plastic PIP pipe buried in the ground, or single season Poly-pipe placed on the ground are all more efficient than earth ditches. Savings in water by using pipe will result in a faster rate of riparian restoration to reduce turbidity. The best pipe to use for this Project is single season Poly-pipe. In situations where critical riparian areas are being planted, the conveyance of water through pipe for delivery by sprinklers is the only method to assure a timely and reliable supply of water for germination and growth to take place. (*Pipe comparison chart, Pg. 71, Armin Poly-pipe brochure, Pg. 72-75*)
- B. Project Application (Method of Approach - #2 Action Plan). The rights to use water from Nutrioso Creek along the east and west irrigation ditches begin on the EC Bar Ranch. The combined length of these ditches is 21,510-ft., plus 5,000-ft. is needed as gated pipe for distribution. The east ditch continues across property owned by Paterson and then ends on property owned by Reidhead. The west ditch continues across property owned by Leo Rogers and then ends on property owned by M. Rogers. Construction of water control structures, silt traps, and diversion boxes has been completed. At the beginning of the irrigation season on April 15th, earth ditches are cleared. Installation of Poly-pipe is accomplished by driving down the ditch while unrolling ¼ mile lengths into the ditch. At diversion points, the pipe is connected at the inlet of a steel box. Pipe is also connected at the outlet of the box, where a slider controls the flow of water. Pipe is also connected on the side of the box, where a slider controls water. When water is being conveyed along the pipe, the slider on the side of the box is closed and the slider on the outlet is open so water will pass through the box. When a diversion is made, the outlet slider is closed and the side outlet is opened. Water passes into the box and out the side and along conveyance pipe to the point where distribution of water onto a pasture or crop is desired. The Poly-pipe serves as a conveyance pipe up to this point,

then it becomes a gated pipe by simply punching 1-inch holes in it. The water flows out the holes in a controlled manner to efficiently reach the desired location. Holes can be plugged with a stopper. Moveable gate valves can be installed in the holes to control water delivery more evenly over longer distances. When the irrigation season is over on September 15, the Poly-pipe can be removed from the earth ditch and recycled. Gate valves are reusable. Some of the pipe to be used for conveyance and/or distribution can be used to deliver water to tanks where sprinklers can disburse it onto newly planted areas in the riparian zone. The use of pipe and sprinklers to help vegetate the riparian corridor will take priority over upland pasture irrigation.

- C. **Project materials required (Method of Approach - #3 Schedule).** The Project will provide 21,510-ft. of single season conveyance Poly-pipe for four irrigation seasons to replace the east and west earth ditches on the EC Bar Ranch. The Project will also provide 5,000-ft. of gated pipe to replace the practice of area flooding necessary to reach the crop needing water. The total amount of Poly-pipe to be provided each year is 26,510-ft. at an installed cost averaging \$0.35 (cents) per foot for funding of \$9,276.00 per year for four seasons. Total cost for this practice is \$37,104.00. Task #4 describes purchase and installation of Poly-pipe manufactured by Armin Plastics to coincide with the current irrigation season in 2000. Pipe would be installed in July 2000 (immediately after ADEQ approval), April 15, 2001, April 15, 2002, and April 15, 2003. The Contract period for the Project would expire in June 2003. Therefore, pipe would be required for four irrigation periods. An electric fence is required to keep livestock and wildlife from damaging the irrigation pipe. A solar fence controller will power a double electric wire running parallel to the pipe. The cost of controllers, posts, insulators, and wire is \$4,550.00. The electric fence will be installed when the pipe replaces the earth ditch. The fence is reusable each year. Six metal culverts are needed for the pipe to pass through so livestock and vehicles may travel across the pipe without damaging it. The cost of the culverts is \$2,000.00. The Direct Labor Cost of installation includes pipe, fence, and culverts.
- D. **Project period use.** Pipe would be installed by April 15th and removed after September 15th each year for the years 2000, 2001, 2002, and 2003.
- E. **Project benefits.** When Poly-pipe is connected to water control structures and placed in earth ditches, an immediate improvement will be realized in water delivery. This efficiency makes it possible to leave more water in the Creek than might otherwise be the case. The process of restoring exposed steam banks by increasing vegetative growth and naturally filtering sediment can reduce downstream flows in the short term. The use of pipe in earth ditches after passing through water control structures on the EC Bar Ranch will reduce the amount of water removed from the Creek for irrigation purposes. This water can be used to restore the riparian zone and maintain downstream rates of flow. In remote locations where sprinklers are used to revegetate the riparian zone, Poly-pipe may be the only method to deliver water to assure growth takes place.

Progress Report 8/1/00 to 12/31/00. This Task was partially completed in August 2000 and reimbursement received on 10/2/00. The Method of Approach to install temporary pipe in earth ditches and control livestock activity along the pipe route has been achieved. This practice reduced water lost from inefficient earth irrigation ditches during the 2000 irrigation season. In practice, the temporary pipe did not work satisfactorily along the first 2,000 feet of the east ditch due to minor flooding of Nutrioso Creek and other factors. After discussion with ADEQ staff to modify this task, in December 2000 a 10 inch steel pipe was installed beginning at the water control structure and extending in the earth ditch about 1,000 feet. After it crossed CR 2112, a diversion was placed to allow water to continue along the ditch or be routed along 500 feet of steel pipe connected to a 250,000 gallon storage tank. Water from off-channel wells can also be used to fill the storage tank. It is expected the efficient use of steel pipe and large storage tank will reduce water needed from Nutrioso Creek for irrigation purposes. A water pump operated by a diesel motor will be connected to the storage tank. It will pump water into conveyance pipes to deliver water to sprinklers located parallel to Nutrioso Creek. The sprinklers will be used to target water onto areas of upland pasture and stream banks where grass seed has been planted and/or where water is needed to improve growth. The combination of Task 4 Pipe Installation and Task 10 Sprinkler System Installation are a critical element in the success of various other Tasks involving seeding and riparian restoration.

Progress Report 12/31/00 to 3/31/01. Cold weather and snow conditions during the period delayed progress on this Task. The 10 inch steel pipe has to be connected to the water storage tank after the tank is constructed. A pipe has to connect the east ditch pipe to the west ditch pipe. This will allow the most efficient use of irrigation water from both ditches resulting in more water remaining in the Creek to help in the restoration process while at the same time providing water required for irrigation purposes.

Progress Report 4/1/01 to 6/30/01. Task #10 "Sprinkler system installation" is partially operational, with considerable reductions in water lost due to evaporation and seepage already evident. Complete operation will be assured by April

15, 2002, the beginning of next irrigation season. Task #7 (Grant 2-008) "Water storage tank and pipe installation" was completed during the period. The combination of these Tasks will provide a reliable supply of water necessary for the successful completion of other Tasks in Grants 1-002, 2-008 and 3-006 (if approved). Temporary poly-pipe was installed in the east and west earth ditches.

Progress Report 6/30/01 to 9/30/01. ADEQ Grant 3-006 was awarded on August 1. Temporary poly-pipe proved unsatisfactory as a conveyance pipe in the east and west earth irrigation ditches. Changes in water levels caused the pipe to roll, become blocked, and break. The water storage tank and sprinkler system have replaced use of the east earth ditch beyond the steel pipe section on the EC Bar Ranch. Downstream water users are using the east earth ditch but most of the water previously lost due to seepage and evaporation has been saved because of the steel pipe section. Much of the water saved is remaining in the Creek. Poly pipe placed in the west earth ditch for conveyance and poly pipe placed outside the ditch for water distribution proved unsatisfactory. Thus water was not applied to fields that were root plowed and seeded. Due to lack of water grass did not grow so efforts to control erosion were not successful. The only solution is to install gated PVC pipe instead of using temporary poly pipe.

Progress Report 9/30/01 to 12/31/01. An ADEQ Grant Application (4-004) was submitted in November to request funding for purchase and installation of gated PVC irrigation pipe to replace the west earth ditch. This is the only solution to reducing water lost from the west ditch due to seepage and evaporation. The gated pipe would be placed parallel to the ditch, but not in it. Gated pipe could also be used to convey water to filter and buffer strips to be planted between the west upland pasture and the riparian zone. Gated pipe would also allow use of travelling gun sprinkler units on the west side of the Creek. This may be necessary to sprinkle water on newly planted vegetation on the east banks of the Creek. If the ADEQ approves funding for gated pipe, it will be installed by April 15, 2002. Use during the early months of the irrigation season will help establish permanent pasture and finish growth of Winter Rye. The pipe will allow oats to be planted by overseeding permanent pastures in May. Heavy growth in upland pastures will prevent erosion during the growing season and when monsoon rains come in July and August. Gated pipe will allow early planting of Winter Rye in September to help prevent erosion during the winter months. Without gated pipe to deliver and distribute water in place of the west earth irrigation ditch, oats and rye cannot be overseeded on permanent pastures. This increases the risk of erosion and reinfestation by Rabbitbrush.

Progress Report 12/31/01 to 6/30/02. No irrigation is being done due to drought conditions. Pipe does allow water to pass through the water storage tank and back to the Creek. Sediment is filtered out in the process.

Progress Report 6/30/02 to 9/30/02. About 10 inches of precipitation fell during the period. Some water was diverted from the creek through the pipe and into the storage tank where sediment settled. Water over-flowed through pipe back into the creek with a reduced sediment load.

Progress Report 9/30/02 to 12/31/02. No water was diverted from the Creek into the irrigation system during the period.

Analysis and assessment 8/1/00 to 12/31/02. Temporary poly-pipe was not completely satisfactory for use in earth irrigation ditches. The Task was modified with approval from ADEQ to install a permanent steel pipe along about 2,000 feet of the upper east earth ditch to allow use of a water storage tank, diesel powered water pump, and a sprinkler system. This Task was completed in 2001. As a result, the EC Bar Ranch does not normally need to use east and west earth ditches for irrigation. Several other downstream water rights users do continue to use the earth ditches. They also benefit from the steel pipe placed in the earth ditch. The sprinkler system is substantially more efficient. In 2001, the headgate was opened half way and locked in position. Normally, it would have been fully opened. Thus only half the water was diverted from the Creek in 2001 irrigation season than would otherwise been the case. The quantity of water delivered through the pipe and earth ditches was sufficient to meet irrigation requirements by all water rights holders. Fish were screened from the irrigation system. We can conclude the use of steel pipe in the east earth ditch made a significant contribution toward improved irrigation efficiency and allowed more water to remain in the Creek than otherwise might have been the case. Therefore, this Task has helped reduce turbidity. The pipe also contributes toward use of the sprinkler system, which provides water when and where needed along about 1 mile of riparian zone and upland pastures on the EC Bar Ranch. Improved irrigation will reduce erosion and increase vegetation.

Task # 5. Water wells and drinker installation.

Task #5 Description: Bring two water wells and drinkers into service.

Type of Task: Direct Labor Costs, Other Direct Costs, and Outside Services Costs

Deliverable description: Invoice for labor and materials; driller reports.

Project Leader qualifications: Recent completion of AWPf Water Well Project involving 2 water wells with drinkers.

Deliverable due date: April 1, 2001 (or prior to growing season following Project approval)

Computation: Direct Labor Costs = \$3,200., Other Direct Costs = \$2,000., Outside Services Costs = \$23,000.,

ADEQ share of Task cost: \$16,920.

Matched share: \$ 0

Donated share: \$11,280.

Total Task cost: \$28,200.

- A. Description of the Practice (Method of Approach – #1 Water Quality Issue). Watergaps are needed along riparian fencing to allow livestock and wildlife to reach water for daily drinking requirements. Concentrations of animals will create erosion in the watergap. Nearby turbidity measurements may not meet TMDL standards. If watergaps were closed during the growing season, vegetation could grow without disturbance from livestock. An off-channel water source would allow watergaps to be closed during the growing season.
- B. Project Application (Method of Approach - #2 Action Plan). In 1999, two off-channel water wells and drinkers were installed along the 1 ¼ mile section of Nutrioso Creek located on the EC Bar Ranch to allow the closure of three watergaps. (*AWPF Water Well Project Summary, Pg. 57*). The watergaps are opened during the dormant season to allow livestock to reach water and graze the riparian pastures. The off-channel drinkers may be frozen during the winter months. The watergaps also allow livestock to rotate between pastures. When watergaps are opened, livestock activity is monitored to be sure riparian-wetland and stream bank restoration is not adversely affected. The 1 ¼ mile section needs to be monitored. The 27-acre parcel needs off-channel drinkers installed on each side of the Creek so watergaps can be closed during the dormant season. One water well on the east side and one on the west side need to be drilled in order to supply water to drinkers for livestock and wildlife. Unless wells and drinkers are installed, the watergaps in this parcel cannot be closed because of contractual obligations for livestock water with Leo Rogers and Rob Paterson.
- C. Project water wells required (Method of Approach - #3 Schedule). The cost to bring one well into service often requires drilling more than one hole. The depth of the well can be hundreds of feet. Water needs to be piped to the drinker. Additional fencing is needed around the drinker. The projected cost to install two wells on the 27-acre parcel will not exceed \$28,200.00. The actual cost could be considerably less depending on drilling depths and dry holes. This practice is described in Task #5 and would be completed before the next growing season or by March 31, 2001.
- D. Project period usage. The drinkers will be supplied with water year round. Domestic livestock and upland wildlife will have free access to the drinkers at all times. In the dormant winter months from November 1 to March 30, the water may be frozen in the drinkers and watergaps would be opened. When off-channel water is available and watergaps are open, there is less need and desire for animals to enter the riparian zone than if watergaps were the only means to reach water.
- E. Project benefits. After off-channel drinkers are installed on the 27-acre parcel, all watergaps along the 1 ¾ mile section of riparian zone on the EC Bar Ranch could be closed in the growing season. Erosion created by daily watergap usage by livestock would be eliminated when the watergaps are closed; watering by elk would be reduced. In the dormant season, convenient off-channel drinkers would reduce the need and desire of livestock and wildlife to enter the riparian zone. It has been observed that elk who learn to use off-channel drinkers, have less tendency to enter the riparian zone.

Progress Report 8/1/00 to 12/31/00. This Task was fully completed in October 2000 and reimbursement received on 11/9/00. The Method of Approach to install a water well and drinker on each side of Nutrioso Creek has been achieved. This practice is providing reliable off-channel drinking water for livestock and wildlife. Watergaps into the riparian zone have been closed. The east water well is also being used to supply water into the storage tank thereby reducing surface water needed for irrigation. As more water remains in the Creek turbidity is reduced and wetland habitat improved. The west water well will serve as a year round source of water for livestock and wildlife so the watergap on the 27 acre parcel will remain permanently closed. The excess of \$13,000.00 in funds budgeted for Task 5 was approved by ADEQ for reallocation to Task 10 Sprinkler System Installation.

Progress Report 12/31/00 to 3/31/01. Operation of water wells and off-channel drinkers has proven very successful during the period. Livestock had access to upland pastures and the riparian zone during this dormant period. Livestock showed a preference to take water from drinkers rather than the Creek.

Progress Report 4/1/01 to 6/30/01. Operation of wells and drinkers has continued to prove successful during the period.

Progress Report 6/30/01 to 9/30/01. Off channel drinkers are located inside and outside the elk proof fencing. They continue to provide a reliable year round source of water for livestock and wildlife.

Progress Report 9/30/01 to 12/31/01. Observations indicate that livestock prefer off-channel drinkers to water found in Nutrioso Creek during the winter months. The Creek bottom is colder than upland pastures. Water in the Creek may be covered with ice, whereas water in drinkers is more accessible.

Progress Report 12/31/01 to 6/30/02. Operation of wells and drinkers is continuing.

Progress Report 6/30/02 to 9/30/02. Operation of wells and drinkers is continuing.

Progress Report 9/30/02 to 12/31/02. Operation of wells and drinkers is continuing.

Analysis and assessment 8/1/00 to 12/31/02. Water wells and drinkers were installed in October 2000. They have eliminated water gaps in riparian fencing. They are located outside elk proof fencing so elk and other wildlife can use them for daily watering needs. Drinkers have reduced large ungulate activity in the riparian zone thus helping reduce streambank erosion and allow vegetation to grow. After additional elk proof fencing is installed by ADEQ Grant 5001, wildlife can still use off-channel drinkers installed by this Task.

Task # 6. Willow planting.

Task #6 Description: Plant 3,000 willows in riparian zone during the Project period.

Type of Task: Direct Labor Cost

Deliverable description: Invoice for materials and services.

Project Leader qualifications: Recent completion of SIP Windbreak Project involving planting of 500 plants.

Deliverable due date: April 1, 2003 (on or before the end of third dormant season).

Computation: Direct Labor Cost = Five people collecting and planting Willows for 6 days over a three year period.

ADEQ share of Task cost: \$1,800.

Matched share: \$ 0

Donated share: \$1,200.

Total Task cost: \$3,000.

- A. Description of practice (Method of Approach – #1 Water Quality Issue). While common along the riparian zone, the spread of willows can be increased by annual plantings. Eroded stream banks and sections with limited new willow sprouts can be targeted for special attention. During periods of high water, less erosion will take place and reduce turbidity more quickly than if no planting was done in advance. Where willows and other trees are available, beaver can have a very beneficial effect on the rate of riparian zone recovery. Beaver can be introduced to an area where willows have matured and a stream grade stabilization structure has become integrated into the natural settings. Additional willow planting in such areas can naturally help beaver raise the water table and expand vegetation necessary to filter sediment to reduce turbidity. Without supplemental willow plantings, beaver activity may be undesirable.
- B. Project Application (Method of Approach - #2 Action Plan). About 1000 willows will be planted for three years on the EC Bar Ranch to increase the rate of riparian restoration. Willow seeds will be transported downstream onto private and USFS property where riparian restoration is also needed to reduce turbidity. Sprinkler irrigation will be used to assure a reliable supply of water to help willows become established.
- C. Project willow planting required (Method of Approach - #3 Schedule). The cost is \$1,000.00 per year or \$3,000.00 in total. Task #6 describes this practice. It can be completed in the dormant season in 2000, 2001, and 2002.
- D. Project period use. Willow plantings in selected locations will attract beaver who will construct stream grade structures to help reduce water velocity, create pooling, and increase vegetative growth along exposed stream banks leading to reductions in turbidity.
- E. Project benefits. Dense stands of willows are important in reducing water velocity to protect exposed stream banks and other vegetation during high water events. They provide building materials for beaver to create natural grade stabilization structures that improve vegetative growth. Without planting willows in specific areas where beaver activity is desirable, beaver may move into undesirable locations.

Progress Report 8/1/00 to 12/31/00. Implementation is scheduled for the dormant season from Jan. to March 2001. Arrangements have been made to use personnel experienced at planting Willow seedlings. Uncontrolled elk activity in the riparian zone is delaying implementation of this Task.

Progress Report 12/31/00 to 3/31/01. All willow plantings were not undertaken during the period because elk activity in the riparian zone may have prevented establishment of the new plants. However, progress has been made with AGFD to install an elk proof fence around the riparian zone and certain upland pastures. Once this fence is in place, additional willows will be planted during the next dormant season.

Progress Report 4/1/01 to 6/30/01. An Agreement was reached with AGFD in April to supply an elk proof fence. Grant 3-006 was submitted to ADEQ for funding to install the fence. When approved, the elk proof fence will be installed around all riparian pastures where willows will be planted during the next dormant season.

Progress Report 6/30/01 to 9/30/01. The elk proof fence has been installed. Willows will be planted during the upcoming dormant season. Discussions are underway with US Fish & Wildlife Service about increasing willows planted in this area using Partners in Fish & Wildlife Grant funding.

Progress Report 9/30/01 to 12/31/01. An ADEQ Grant Application (4-004) was submitted in November that included Task 3 requesting funding for willow plantings in Grant 1-002 project area. The original amount awarded of \$1.00 per

cutting was under-budgeted by 65 cents per cutting. The cost should have been \$1.65 as recommended by the NRCS for WHIP and EQIP cost share. Willow plantings will follow a Riparian Restoration Plan as described in Task 7 of the ADEQ Grant Application. Willows should be planted in the dormant season of 2001-02.

Progress Report 12/31/01 to 6/30/02. Willow whips and wildings were planted during the period on point bars. In May, Bill Zeedyk began a Riparian Restoration Implementation Plan (RRIP) per Task 7 of Grant 4004. The RRIP was completed June 30, 2002.

Progress Report 6/30/02 to 9/30/02. A total of 3,000 willows have been planted on point bars in reaches 1-4. This task is completed. The RRIP recommends that about 15,000 additional willows be planted at the base of exposed banks and/or in the form of willow wattles and standing bundles. The willows already planted on point bars will slow water during high flows. Willows to be planted to protect exposed streambanks fall into the category of streambank erosion control measures which are funded and described by Grant 4004 Task 5.

Progress Report 9/30/02 to 12/31/02. Willows are in a dormant state, but would help reduce stream velocity during high flows.

Analysis and assessment 8/1/00 to 12/31/02. Willow planting is a natural method of protecting point bars and streambanks from the erosive forces during periods of high water. This Task was completed in 2002. The willows planted will help slow water so sediment can be deposited thus helping reduce turbidity. As the willows mature and expand, beaver will use the willows to build dams that will help raise the water table. This process will allow vegetation to become established at higher levels on streambanks thus reducing erosion and lowering turbidity. Aquatic life are already benefiting from a year round source of water compared to previous periods when mild droughts would dry up long sections of the Creek.

Task # 7. Rabbitbrush management.

Task # 7 Description: Control and/or eradicate **Rabbitbrush** and plant grass seed on 125-acres along the 1 ¾ miles of riparian corridor.

Type of Task: Direct Labor Costs, Other Direct Costs, and Outside Services

Deliverable description: Invoice for materials and services.

Project Leader qualifications: Brush management experience on 258 acres over 2 years under EQIP Project.

Deliverable due date: June 1, 2002 (24 months after Project approval).

Computation: Direct Labor = \$3,750.; Other Direct Costs = \$6,250.; Outside Services Cost = \$10,000.

ADEQ share of Task cost: \$12,000.

Matched share: \$ 0

Donated share: \$ 8,000.

Total Task cost: \$20,000.

- A. Description of practice (Method of Approach – #1 Water Quality Issue). Due to historic over-utilization of pastures, the Big Rubber Rabbitbrush (*Chrysothamnus nauseosus*) has invaded Nutrioso Valley, including the riparian corridor. This species often reaches a height of 5 feet; livestock and wildlife will not eat it. This type of vegetation facilitates accelerated erosion and discharges of sediment into Nutrioso Creek. Rabbitbrush has a terminal bud 4-6 inches below the surface with a long root extending down into moist sub-soil. With thousands of plants choking out productive grasses, consuming ground water, and facilitating erosion of soil into the Creek, control and/or eradication of Rabbitbrush from the 1 ¾ mile riparian corridor is essential to reducing turbidity in the Project area.
- B. Project Application (Method of Approach - #2 Action Plan). There are about 125 acres along the 1 ¾ miles of riparian corridor in need of Rabbitbrush management. The treatment area can be broken down into two parts: (1) 82 acres inside riparian fencing (2) 100 feet outside fencing on each side of the Creek that equates to 43 acres. (*NRCS letter re: Rabbitbrush control and sprinklers, Pg. 76, Rabbitbrush description, Pg. 77*) To control Rabbitbrush it has to be mowed or burned on a regular basis. Where possible, it can be eradicated by root plowing to sever the root below the terminal bud. Once the plant is controlled or eradicated, grass seed has to be planted to stop soil erosion. Sprinkler irrigation will be used to assure a reliable supply of water is available to grow grass. Some Rabbitbrush can remain in streambeds because during high water flows it serves to slow velocity and stabilize banks. As the water table rises, Rabbitbrush in streambeds will naturally be replaced by more desirable riparian vegetation.
- C. Rabbitbrush management required (Method of Approach - #3 Schedule). The cost to implement this practice is \$20,000.00 and is described in Task #7. It would be completed within 24 months or by June 1, 2002.
- D. Project period use. Where Rabbitbrush grows in larger numbers, there is increased erosion, reduction in sub-soil moisture, and lower forage production. Rabbitbrush management is an on-going practice.
- E. Project benefits. After Rabbitbrush has been treated within the fenced riparian corridor, wind and sheet erosion from non-stream bank areas will be reduced. Subsoil moisture will no longer be used to grow this unproductive species of plant. The water table could rise and supply moisture needed to grow vegetation on exposed streambanks. The effect of treating Rabbitbrush will be to help in the restoration process leading to reduction in turbidity.

Progress Report 8/1/00 to 12/31/00. Mowing and root plowing was performed in October where SHPO approval had been obtained. Additional treatment will be made after final SHPO approval. Seeding of treated areas will take place during the growing season from May to August 2001. The objective of this Task is to reduce erosion along the riparian zone and increase the water table.

Progress Report 12/31/00 to 3/31/01. Treatment of Rabbitbrush has proven successful. Livestock were restricted from treated pastures, however elk grazing could not be controlled. New seedlings were adversely affected by elk activity. Discussions have begun with AGFD about installation of an elk proof fence around certain upland pastures that have been treated or need treatment to remove brush and reseeded to prevent erosion.

Progress Report 4/1/01 to 6/30/01. An Agreement was reached with AGFD in April to supply an elk proof fence. Grant 3-006 was submitted to ADEQ for funding to install the fence around certain upland pastures. When approved, the elk proof fence will be installed by September. AGFD also approved a donation of seed and fertilizer to be used in areas where elk grazing inhibited establishment of newly planted grasses. The new Grant also requested funding for a EC Bar Ranch Turbidity Reduction Project Phase I – Grant 1-002

person approved by SHPO to survey areas where Rabbitbrush management has been delayed. A survey should be completed in August. Task #7 will be completed by September 2002.

Progress Report 6/30/01 to 9/30/01. Grant 3-006 was awarded on August 1. A SHPO survey was completed in August. Installation of an elk proof fence around certain upland pastures where Rabbitbrush had been treated and around the riparian zone was completed in September. Rabbitbrush treatments along the riparian corridor can now be done without elk activity. Upland pastures were overseeded and grass may become established without elk activity. Due to problems with temporary poly pipe, water was not supplied to grass on the west side of the Creek. Geese, ducks, ravens, and other birds are eating seed. Reapplication of grass seed will be necessary in 2002.

Progress Report 9/30/01 to 12/31/01. Mowing and root plowing are underway to control and/or eradicate Rabbitbrush plants.

Progress Report 12/31/01 to 6/30/02. Mowing and root plowing are near completion. Drought conditions, risk of wildfire, and high winds reduced progress during the period.

Progress Report 6/30/02 to 9/30/02. Root plowing and grass seeding was completed during the period.

Progress Report 9/30/02 to 12/31/02. Grass is dormant, but upland pastures are clear of brush.

Analysis and assessment 8/1/00 to 12/31/02. Rabbitbrush plants choke out grass needed to reduce wind and rain erosion into the riparian zone. Deep roots help lower the water table and consume water that could be returned to the Creek during periods of drought. Root plowing of Rabbitbrush has been done in stages depending on weather conditions but was fully completed in 2002. Eradication allows the water table to rise, grass to become established to reduce erosion, and birds (ducks and geese) to use upland pastures during migration. Increased forage in upland pastures from about 300 lbs/acre in 1996 to over 3,000 lbs/acre in 2002 has reduced the need for livestock to graze in the riparian pastures. This Task has contributed toward reduced turbidity by helping reduce erosion and raise the water table.

Task # 8. Outreach.

Task #8 Description: Update the **website** to include Project information; periodic updates; create on-line tours.

Type of Task: Outside Services Cost

Deliverable description: Website: <http://www.ECBarRanch.com>

Project Leader qualifications: None. Qualified computer consultant created website 12-1-1999 and updated since then.

Deliverable due date: December 31, 2000 (120 days after Project approval) and then 12/31/01, 12/31/02, 6/30/03

Computation: Outside Services Cost = 80 hours per year x 3 = 240 hours at \$50.00 per hour = \$12,000.

ADEQ share of Task cost: \$2,400. X 3 years = \$ 7,200.

Matched share: \$ 0

Donated share: \$1,600. X 3 years = \$ 4,800.

Total Task cost: \$4,000. X 3 years = \$12,000.

Task 8 - Public Outreach and Education. In November 1998, Jim Crosswhite organized the Nutrioso Watershed Partnership (NWP) for the purpose of coordinating and informing water users and property owners about developments in the Upper Little Colorado River Watershed Partnership (ULCR). Since Nutrioso Creek was included on the 303d list of impaired water sources, members of the Nutrioso Watershed Partnership have used the ULCR WRAS as a guideline in preparing this and other 319 grant applications to implement ADEQ recommendations to reduce turbidity to meet TMDL standards. The practices to be implemented in the EC Bar Ranch Turbidity Reduction Project are expected to be expanded about 1 mile south and 1 mile north of the Project Area to address all locations on private property where turbidity readings exceeded TMDL standards. Certain landowners can participate without making an ADEQ grant application. Their intention to cooperate is evidenced by their agreement to place Poly-pipe in earth irrigation ditches as part of the ADEQ Project. (*Landowners agreement re: Poly-pipe, Pg. 89*). Crosswhite has created a website that provides information about his conservation projects and related topics. (*www.ECBarRanch.com information, Pg. 90-93*) The site includes grants, photos, watershed information, contacts, and much more. The objective is to present information for the benefit of ranchers and other interested parties who may wish to implement conservation practices on their property to improve economics of production, restore riparian-wetlands, and institute Best Management Practices. The ECBarRanch.com website offers excellent outreach possibilities for the Project. Initially, Crosswhite will update and expand the website to include the ADEQ Grant Application, progress reports and photos as practices are implemented, and respond to email inquiries. As the Project develops, he will periodically update information for the three year period and into the future. The ADEQ Project will become a highlight of the website. One or more "on-line tours" will be added so interested parties can get a quick overview of practices, monitoring, etc. As the Project proceeds, Crosswhite will host occasional tours for groups interested in any part of the Project. Outreach opportunities will be expanded through cooperation with ADEQ, AGFD, NRCS, and ULCR. The cost to expand the website to include Project information and updates is \$4,000.00 per year for three years for a total of \$12,000.00. It is described in Task #8. (*Newspaper articles, Pg. 94-98, AGFD endorsement, Pg. 99, ULCR endorsement, Pg. 100*)

Progress Report 8/1/00 to 12/31/00. Information on practices has been included in the ECBarRanch.com website. In addition to providing information to the public, the website has been used by journalists to write articles on several occasions, including one for the EPA Newsletter. Poster presentations describing practices have been made to the following groups during the Report period: (1) AZ Assn of Conservation District Annual Meeting 8/4/00, (2) Quivira Coalition meeting on 8/12/00, (3) ADEQ and EPA on 8/24/00, (4) San Carlos/Safford/Duncan Watershed TV conference on 9/14/00, (5) David Brown, Apache County Board of Supervisors, 9/19/00, (6) Apache NRCS Board meeting, (7) NRCS staff, (8) LCR MOM watershed group, (9) ULCR watershed group, (10) AGFD, (11) USFS, and (12) other occasions. Implementation of this Task is on-going for the Grant period. The objective to provide public information about water quality improvement practices is being achieved by Task # 8.

Progress Report 12/31/00 to 3/31/01. An article was prepared for an EPA newsletter to be released in April. Another article for the Conservation Technology Information Center (Core4) magazine "Partners" was released on March 30. The magazine is attached. Prior to release, website visitors were 274 on 2/24/01. On March 31, visitors numbered 656. A poster presentation was made before Arizona Legislators about ADEQ and AWPf conservation practices on the EC Bar Ranch in February. I have been named Environmental Committee Chairman for the preparation of a master Planning and Zoning plan for Nutrioso. I will present ADEQ recommendations from the TMDL Report and explain

actions to restore the riparian zone to improve water quality. Preservation of Nutrioso Creek will be presented as an important part of the master plan for future development of the area.

Progress Report 4/1/01 to 6/30/01. In May, a segment of a TV film about TMDL issues was shot on the EC Bar Ranch. Interviews with Ranger Settles, USFS, Shad Bowman, ADEQ, and myself were included. There will be a website linked to the film when it airs on CNBC during July. The ECBarRanch.com website has been revised to focus on the "Nutrioso Creek TMDL for Turbidity" Report, recommendations in the Report, and applications on the ranch. Articles appeared during April in "Partners" magazine and "News-Notes" (EPA newsletter) that described water quality improvement practices on the ranch, including references to the website. The number of visits was at 274 on February 24, 2001, before the articles. On June 15 the number of visits was at 1303. This works out to about 250 visits a month compared to 274 in the previous 16 months. When the TV film is shown, the number of visits should increase even more. Since the focus of the site is now on water quality improvement practices, it presents a very positive image for the ADEQ, EPA, and TMDL issues. (See Grant 2-008 Quarterly Report for a CD of the ECBarRanch.com website)

Progress Report 6/30/01 to 9/30/01. The TV film is still being edited but has been mailed to persons for review before final production. The producer has agreed to include my website in the film as a reference for persons interested in TMDL practices. The LCR MOM has a 3 day conference scheduled for Oct 30, 31, and Nov 1. A tour of my ranch will be held on Nov 1 to highlight TMDL practices. Tom Moody has a workshop scheduled for Nov 6, 7, 8 with a tour of my ranch on Nov 8. Photos have been added to the website to update progress to various practices.

Progress Report 9/30/01 to 12/31/01. The LCR MOM tour was postponed, however the Moody workshop tour was held on November 8. About 25 people visited the project area for about 2 hours. Tom Moody, Ruth Valencia, Brian Sorenson (NRCS), and a few others toured the length of the riparian zone for about 6 hours. Suggestions were made to implement water quality practices. Those recommendations were included in an ADEQ Grant Application (4-004) submitted in November. Task 5 was for Streambank Erosion Control Measures such as willow clumps, brush matting, and "structural" practices focused on exposed streambanks. Task 6 was for Filter and Buffer Strips between upland pastures and the riparian zone to reduce erosion and nutrients entering the Creek. Task 7 was for a Riparian Restoration Plan that would map out locations for all riparian zone plantings, SGSS, etc. Task 2 was for Gated Pipe to reduce water lost due to seepage and evaporation in the west earth irrigation ditch, allow water to be targeted on filter/buffer strips, and supply travelling gun sprinklers to provide water when and where needed to help establish riparian vegetation. Most water saved through the use of gated PVC pipe would remain in the Creek to help in the restoration effort leading to a reduction in turbidity. Task 9 was focused on outreach to expand the ECBarRanch.com website. Task 10 was for outreach through personal presentations using the website on CD to help others understand the practical aspects of water quality improvement practices. The 45 minute film entitled "Keeping Our Waters Clean" was shown on CNBC TV on Saturday, December 8. Susan Ward has a copy of the film that includes a segment filmed in the project area. Ranger Settles, USFS, Shad Bowman, TetraTech, and Jim Crosswhite were interviewed. Monitoring, livestock grazing, closing livestock crossing points in the riparian zone by constructing a bridge, ranching economics, increasing vegetation, and other practices were briefly discussed as methods used on the EC Bar Ranch to reduce turbidity as recommended in the TMDL Report. The ECBarRanch.com website was included as a reference at the very end of the film. Visits to the website increased by about 300 in the week following the release of the film. During the year, about 2,400 persons visited the website after reading a newspaper article, magazine article, viewing a film, hearing a personal presentation by Jim Crosswhite, etc. The EPA has included an article about practices on the EC Bar Ranch in their book describing 319 "success" stories. The book should be released in early 2002. Discussions are underway with two teachers at the Round Valley High School about topics such as grant writing using ADEQ TMDL Report, Grant Manual, etc, field trips to the ranch, and personal presentations to students by Jim Crosswhite.

Progress Report 12/31/01 to 6/30/02. The ADEQ Year of Clean Water Celebration was held at the ranch June 7th. The ULCR Watershed meeting was held at the ranch on June 20th. ADEQ projects were presented and discussed.

Progress Report 6/30/02 to 9/30/02. The outreach budget has been exhausted, but website updates will continue as required through the end of the project. The total number of visits to the website on 9-30-02 was 4079.

Progress Report 9/30/02 to 12/31/02. The website on CD was used during a presentation at the Arizona Watershed Alliance meeting on December 3.

Analysis and assessment 8/1/00 to 12/31/02. This Task was implemented in stages as the project proceeded. The Task is fully completed. It has allowed the development and expansion of the EC Bar Ranch website (ECBarRanch.com). This has made presentation of conservation projects on the ranch, including ADEQ projects, easier to present to others. A number of magazines, newspapers, books, and films have used information from the website resulting in national media attention. This Task has helped in the creation of field trips and workshops on the ranch resulting in a demonstration of water quality improvement practices. A number of other farmers, ranchers, teachers, students, agency staff, and others have been exposed to the benefits of water quality improvements. Neighbors have begun to install conservation projects on their property, including a downstream neighbor who installed riparian fencing and stream grade control structures. Therefore, this Task has had a direct and indirect impact on reducing turbidity in Nutrioso Creek.

Task # 9. Perform vegetative study.

Task #9 Description: Perform a **vegetative species composition study** to measure changes in riparian vegetation over the Project period.

Type of Task: Outside Services Cost

Deliverable description: Vegetative species composition study plan; progress report; final report, invoice for services.

Project Leader qualifications: None. Study to be performed by qualified conservationist.

Deliverable due date: June 30, 2001, June 30, 2002, and June 30, 2003

Computation: Outside Services Cost Proposal for \$15,000.

ADEQ share of Task cost: \$3,000. X 3 years = \$9,000.

Matched share: \$ 0

Donated share: \$2,000. X 3 years = \$6,000.

Total Task cost: \$5,000. X 3 years = \$15,000.

Vegetative species composition study (VSCS). A baseline VSCS will be performed in a number of locations in the Project Area to compare vegetative changes over three years. Data collected in non-fenced riparian zones located on the 27-acre parcel to the north can be compared to data from the fenced riparian zone. For example, in 1996 the rating for 1 ¼ miles of riparian zone not fenced at the time was "Functional – at risk with downward trend". In July, 1999, after the riparian zone had been fenced for 10 months and grazing allowed in the dormant winter months of 1998-1999, the same qualified person rated the same riparian zone as "Functional – at risk with upward trend". (*Wight Consulting letter, Pg. 82-83*) In October 1999, the AGFD applied the same BLM standards that independently confirmed the "upward trend". It is expected that after one more growing season the rating would be "Proper Functioning Condition". The 27-acre parcel has been rated using the same BLM Riparian-Wetland Functional Checklist as "Functional – with downward trend". When fencing and off-channel wells with drinkers are installed as part of the Project, it should reverse from a downward trend to an upward trend and then reach a "Proper Functioning Condition" by the end of the Project period. Upland and wetland vegetative species composition studies will be used to document changes related to riparian fencing, livestock management, willow planting, Rabbitbrush control, and wildlife activity. The development of a VSCS is underway. The projected cost of a VSCS is \$5,000.00 per year, for a total of \$15,000.00, and is described in Task #9. (*BLM Riparian Functional Checklist, Pg. 84-85*)

Progress Report 8/1/00 to 12/31/00. A Vegetative Monitoring Plan was completed in September. Vegetative baseline data was collected in September and December. Monitoring in the riparian corridor and upland pastures will take place over the Grant period by Lamar Smith, a qualified range consultant. Task # 9 also includes wildlife baseline data and development of a Livestock Management Plan compatible with water quality improvement practices. Mr. Smith will make periodic reports.

Progress Report 12/31/00 to 3/31/01. The Vegetative Plan and Progress Report was completed 2-15-01 and reimbursement received. It proved significant because Reach 1 was rated in Proper Functioning Condition as of December 2000. This same Reach was rated as Functional At Risk in a Downward Trend in 1996 and an Upward Trend in October 1999. Reaches 2, 3 and 4 were all rated as being in an Upward Trend. In addition, photos were taken of the riparian corridor in September. They indicated water was flowing and large pools were evident on EC Bar Ranch property. This was in sharp contrast to observations that the Creek was dry immediately upstream for miles as it passed through Nutrioso town. The Creek was also dry immediately downstream in Reach 5 and Reach 6. From there it was mostly dry for four miles on USFS property to Nelson Reservoir. Restoration of the riparian zone that began in 1998 on the EC Bar Ranch is now providing a permanent aquatic habitat for the threatened LCR spinedace and many other species of plants and animals. Dormant season grazing of the riparian zone since 1998 has not proven detrimental to the restoration process. If an elk proof fence is installed in the near future, continued improvements will be reflected in the Vegetative Study Progress Reports.

Progress Report 4/1/01 to 6/30/01. In June, Lamar Smith collected data. He will collect more data in the Fall and prepare an annual report. Task #9 is proceeding on schedule.

Progress Report 6/30/01 to 9/30/01. Lamar Smith has scheduled a site visit to collect data.

Progress Report 9/30/01 to 12/31/01. Data was collected during the period.

Progress Report 12/31/01 to 6/30/02. No data collection was made during the period.

Progress Report 6/30/02 to 9/30/02. A Vegetative Report was prepared and submitted to ADEQ. Data was collected in September 2002 which will be included in the Final Report in June 2003.

Progress Report 9/30/02 to 12/31/02. The Final Vegetative Study Report was completed in December 2002 and has been provided to ADEQ.

Analysis and assessment 8/1/00 to 12/31/02. The Vegetative Monitoring Reports dated 2-01, 6-02, and 12-02 have presented data, observations, photos, and conclusions. They have been important in monitoring progress in riparian restoration and prove the water quality improvement practices implemented on the EC Bar Ranch have helped increase the amount of vegetation in the reaches of Nutrioso Creek located on the ranch. The Final Vegetative Monitoring Report is self-explanatory in terms of analysis and assessment. I have attached my comments to the report. I will use baseline data in these reports to compare with future observations. This Task is fully completed.

Task # 10. Sprinkler system installation.

Task #10 Description: Purchase and install three Kifco WaterReel units for sprinkler irrigation.

Type of Task: Capital Outlay

Deliverable description: Invoice for units.

Project Leader qualifications: Installation and use of pipe, wells, and one Kifco WaterReel for sprinkler irrigation.

Deliverable due date: August 1, 2000 (30 days after Project approval).

Computation: Capital Outlay Proposal from Kifco for three units costing \$8,119.00 each; or \$24,357.00 total.

ADEQ share of Task cost: \$ 14,614.

Matched share: \$ 0

Donated share: \$ 9,742.

Total Task cost: \$24,357.

- A. **Description of the practice (Method of Approach – #1 Water Quality Issue).** The installation of off-channel wells with sufficient rates of flow can be used for sprinkler irrigation. This practice can reduce the need for surface water to be diverted from Nutrioso Creek for flood irrigation. In order to restore vegetation in the riparian zone, water must be spread over a larger area of the streambed. As the water table rises, water helps vegetation grow on exposed stream banks. This process leads to reductions in turbidity necessary to meet TMDL standards and sustain them over the long term. Unless more water is added to the Creek, or less water is voluntarily removed for irrigation purposes, riparian restoration will most likely result in reduced downstream flows in the short term. Furthermore, existing conditions prove that even in the absence of livestock grazing, sufficient vegetation may not grow on streambanks and nearby riparian pastures to reduce erosion to levels necessary to meet TMDL standards. Critical streambanks and area plantings with sprinkler irrigation is necessary to assure vegetative growth will be sufficient to meet standards. The EC Bar Ranch has three water wells now in service and connected by 6,200-ft. of buried pipe with 36 risers spaced every 170-ft. to deliver water to a travelling gun sprinkler unit. The area that can be covered on the east and west side of each riser is 1.3 acres. In total, four travelling gun sprinkler units, called a WaterReel, can cover about 90 acres or 60% of the riparian corridor and upland pastures on the east side of Nutrioso Creek (about the same area covered by surface water from the east irrigation ditch). The WaterReel sprinkler is placed at Riser #1. A cart with a sprinkler is attached to the WaterReel by a 350-ft. plastic pipe. The cart is pulled out to the west and the WaterReel set to deliver (normally) ½ inch of water per week. When activated, the reel winds up the hose as the sprinkler sprays water about 85-ft. from side to side. After 8 hours of operation and about ½ inch of water has been delivered to 1.3 acres, the sprinkler cart has been pulled back and the hose rewound on the reel. The WaterReel automatically shuts off. The WaterReel and cart are manually repositioned (rotated) at Riser #1. The sprinkler cart pulled out 350-ft. to the east and the unit activated. In 8 hours it has watered another 1.3 acres. The WaterReel is manually repositioned 170-ft. to Riser #2 and activated. After 8 hours it has watered 1.3 acres. This process is continued from riser to riser. Assuming continuous operation, about 4 acres can receive ½ inch of water in a 24-hour period. Based on this rotation schedule, about 11 risers and 21 positions may be used to deliver ½ inch of water to 27 acres in 7 days. Three WaterReel units operating simultaneously can service 33 risers and deliver water to 81 acres each week. This is less than the area covered by the Project sprinkler system plus it is not practical to operate 3 units on a 24-hour schedule, so a fourth unit is needed. Four units are necessary to deliver water in a timely manner to newly seeded areas along the riparian corridor. (*Kifco WaterReel brochure, Pg. 61-66, San Pedro River Project memo, Pg. 67*)
- B. **Project Application (Method of Approach - #2 Action Plan).** The irrigation season is from April 15 to September 15. During that time, surface water from Nutrioso Creek can be diverted into a ditch on the east side of the Creek and a ditch on the west side of the Creek. The EC Bar Ranch is on the upper end of both ditches. There are a total of five water users with 438-acre feet (AF) of water rights equating to about 1.75 cubic feet per second (CFS) on these ditches. The EC Bar Ranch rights to irrigation water in the east ditch is 87-AF equating to .31 CFS per month. Water rights in the west ditch is 71-AF equating to .26 CFS. The effect of Crosswhite voluntarily leaving 50% (5 days per month) of his rights to surface water in Nutrioso Creek is to increase the rate of flow at the Gauging Station above Nelson Reservoir by 12% to 54%, averaging 38% during the irrigation season from April 15 to September 15. In the short term, the restoration of the riparian-wetland zone leading to reductions in turbidity to meet TMDL standards will reduce the flow rate at the Gauging Station. The use of water wells to supply a sprinkler irrigation system while voluntarily reducing surface water by 50% in the east ditch would help off-set a reduction in downstream flows. The amount of water in Nutrioso Creek has a direct relation to the rate of restoration recovery and time required for turbidity reduction. Therefore, a sprinkler irrigation system in the Project Area would help reduce turbidity in Nutrioso Creek. Table 2 breaks down the water rights for each user

and rate of flow in the east and west irrigation ditches. Crosswhite has a period of 10 days per month to use water from the east ditch. Table 3 lists monthly median flow rates in CFS and gallons during the irrigation season (April 15-September 15) at the Gauging Station above Nelson Reservoir from 1968 to 1982. Column 4 illustrates the percent increase in rate of flow at the Gauging Station if Crosswhite voluntarily reduced his use of surface water in the east ditch by 100% of his water rights, e. g. .31 CFS. Column 5 illustrates the increase based on 50% voluntary reduction in surface water usage by Crosswhite. In exchange for three sprinkler units, he would voluntarily close the east headgate diversion for 5 days per month to reduce surface water use during for the three year Project period. Sprinkler irrigation would off-set flood irrigation in the same pastures.

Water Users	East ditch - % - Days - CFS			West ditch - % - Days - CFS		
	Acre Ft.	use	use	Acre Ft.	use	use
Crosswhite	87 AF	34%	10 - .31			
Reidhead	80 AF	31%	10			
Paterson	88 AF	35%	10			
Crosswhite				71 AF	39%	12
L. Rogers				81 AF	44%	13
M. Rogers				31 AF	17%	5
Totals	255 AF	100%	30 - 1.09 CFS	183 AF	100%	30 - 0.66 CFS

1. Month 1968-82	2. Nelson R. Gauge Sta. Median CFS	3. Nelson R. Gauge Sta. Millions/gal	4. Crosswhite 100% E-ditch rights of .31 CFS vs Gauge Sta.	5. Crosswhite 50% E-ditch rights of .16 CFS vs Gauge Sta.
April	10.00 CFS	181.4 gal.	Gauge Sta. +3.1%	Gauge Sta. +1.6%
May	1.35 CFS	24.5 m/gal.	+24%	+12%
June	0.32 CFS	5.8 m/gal.	+98%	+49%
July	0.29 CFS	5.3 m/gal.	+107%	+54%
Aug.	0.40 CFS	7.3 m/gal.	+78%	+39%
Sept.	0.44 CFS	7.9 m/gal.	+70%	+35%

Notes to Table 3:

- Col. 2 - Monthly median CFS at gauging station above Nelson Reservoir 1968-1982
- Col. 3 - Gauging station CFS converted to gallons (1 CFS = 18,144,000 gal/month or 90,720,000 ga/season based on irrigation 5 month season from April 15-September 15)
- Col. 4 - Monthly relationship between 100% of Crosswhite's rights to East ditch and Gauging Station
- Col. 5 - Monthly relationship between 50% of Crosswhite's rights to East ditch and Gauging Station

One WaterReel is now in service on the Ranch so it is clear that surface water for irrigation can be reduced and critical seeded areas properly watered if three additional units are added. The use of pipe and sprinklers to help vegetate the riparian corridor will take priority over upland pasture irrigation.

- C. **Project sprinkler units required (Method of Approach - #3 Schedule).** Three travelling guns, WaterReel Model B140P with 9 HP booster pump manufactured by Kifco are required. Each unit costs \$8,119.00. Three units cost a total of \$24,357.00. Purchase and installation is described in Task #10 and will be completed by August 1, 2000, or 30 days after Contract approval. Sufficient buried pipe and risers have been installed to operate all units.
- D. **Project period use.** If three WaterReel units were provided as part of the Project, Crosswhite will voluntarily reduce surface water usage from the east irrigation ditch by 50% for the three year life of the Project. Instead of using surface water for 10 days per month, he will only use 5 days per month. The amount of water no longer diverted calculates to about .16 CFS, or 30% of the average flow measured at the gauging station. The area on the east side of the Creek that is irrigated by surface or flood irrigation is about the same as the area irrigated by a sprinkler so there would be no reduction in the irrigated area even when surface water was not in use. Wells and buried pipe with risers are already in use with one WaterReel on the east side of the Creek. Well water is not proven to be available in sufficient quantities on the west side of the Creek to operate a travelling gun for irrigation

purposes. However, Poly-pipe can deliver irrigation water from the west ditch to a temporary tank where it can be applied to critical riparian vegetation by one or more WaterReel sprinklers.

- E. **Project benefits.** More water would remain in the Creek by using sprinkler irrigation and voluntarily reducing surface water usage than would otherwise be the case. Water used for the riparian vegetation restoration process would be supplemented in an effort to maintain downstream flows near pre-restoration levels. Over the period of the Project, the restoration process would naturally balance out the flow rates. An additional benefit is that a travelling gun sprinkler can target water to specific areas within the riparian zone where a more rapid rate of vegetative growth would occur if a reliable supply of water was available. Sprinkler irrigation is the only method to assure newly planted grasses will germinate and grow throughout the growing season. Natural precipitation is a very unreliable method to establish new vegetation.

Progress Report 8/1/00 to 12/31/00. In September 2000, a reallocation of budget funds was made from Task 5 "Water Well and Drinker Installation" in the amount of \$13,000.00. In December 2000, a reallocation of budget funds was made from Task 1 "Coordination" in the amount of \$15,000.00 and from Task 2 "Reports" in the amount of \$3,000.00. Task 10 now has an additional budget of \$31,000.00. There were two reasons for increasing funding.

Firstly, a pump supplier estimated the cost for the water pump needed to provide water to the sprinkler units at \$5,000.00 in March before the Grant Application. After the pump was installed in October, it proved to be completely unusable. The pump supplier admitted their design miscalculation and the pump and related components was returned in December. The cost to purchase a 10 HP pump system that would supply water to sprinkler units at the rate of 200 GPM at 90 PSI was projected at about \$25,000.00.

Secondly, in October 2000, Mr. Crosswhite purchased an 84 acre parcel, including a ½ mile section of the Creek from Mr. Merlyn Rogers. Practices approved in the ADEQ Grant 1-002 were being implemented along a 2 mile section about ½ mile upstream from the 84 acres. With the new purchase, Mr. Crosswhite now owned 2 ½ miles of the 3 miles recommended for restoration in the "Nutriosio Creek TMDL For Turbidity Report" (July 2000). In November 2000, Mr. Crosswhite applied for a Water Quality Grant to treat the 84 acres, including the ½ mile section of riparian zone, using all applicable techniques recommended in the TMDL Report. Since sprinkler irrigation was one of those practices and essential to the success of seeding practices, the decision was made to install an irrigation system capable of delivering water along the entire 3 mile section of Nutriosio Creek recommended for treatment in the TMDL Report. While the cost of the pump, storage system, sprinkler units, and some conveyance pipe would be paid for through Grant 1-002, the capacity of the system would allow treatment for additional areas downstream after approval through the ADEQ Grant process.

The irrigation system that is now being installed consists of about 1,500 feet of 10 inch steel pipe connecting the east ditch water control structure to a 250,000 gallon storage tank. Water wells supplement water diverted from Nutriosio Creek to fill the tank. The water pump has a capacity to pump 1,500 GPM at 125 PSI and is powered by a Cummins 380 HP diesel motor. Water is pumped into a buried 3 inch PVC pipe with risers connected to Water Reel sprinkler units that can irrigate about 1 ½ miles of riparian zone and/or 100 acres of upland pastures on the east side of Nutriosio Creek. Water Reel sprinkler units can also be attached to target irrigate riparian stream banks and/or upland pastures. The effect of this sprinkler irrigation system as it relates to Grant 1-002 is to reduce water removed from Nutriosio Creek allowing restoration to take place at a more rapid rate than would otherwise be the case without irrigation improvements. Over the longer term, the improved irrigation system will assure that revegetative practices are successful in reducing turbidity in Nutriosio Creek.

The control of surface water into the storage tank and pump create the capacity to expand the system about 1 mile downstream by adding more above ground conveyance pipe. Therefore, this system could be used to treat the entire 3 miles recommended for water quality improvement practices in the TMDL Report.

There are several phases necessary to complete the installation of the irrigation system. First, about 1,500 feet of 10 inch steel pipe has to be placed in the east earth ditch connecting the water control structure with the storage tank. The pipe was purchased in November and installed in December so this phase is completed. Second, the storage tank has to be installed. The tank has been purchased and construction is underway. It should be completed in January. Third, the pump and motor have to be installed and then connected to the storage tank, manifold, and conveyance pipes. The pump and motor have been purchased. This phase should be completed in February. Fourth, above ground pipe has to be

purchased and installed. Allowing for installation time of all phases and winter weather delays, the complete irrigation system should be ready for operation on April 15 when the irrigation season begins.

Progress Report 12/31/00 to 3/31/01. Cold and snowy weather has delayed progress. The water storage tank and pumping system are under construction. Costs of construction have exceeded budgetary projections.

Progress Report 4/1/01 to 6/30/01. The 250,000 gallon water storage tank has been constructed. Water is supplied from off-channel water wells and by surface water from the east irrigation ditch connected to Nutrioso Creek. During this period of irrigation, more water remained in the Creek with less water lost due to seepage and evaporation than in previous years. Steel 10 inch pipe replaced about 2,000 feet of the east earth irrigation ditch. Water entering the storage tank is screened to prevent fish from entering the tank. Also, water is relatively free of sediment. Another 1,000 feet of 10 inch pipe connects the tank to the west irrigation ditch. Poly-pipe is being used to reduce seepage and evaporation from this ditch. These improvements to the irrigation system make it possible to deliver water where and when it is needed in Grant 1-002 project area. A diesel motor and 1,500 GPM pump provide water through buried pipe to three sprinkler units positioned close enough to the riparian zone to provide a reliable supply of as needed. Stream banks can be seeded after an elk proof fence has been installed around riparian pastures. Grant #3-006 should be approved by the ADEQ so the fence can be installed in August. Stream bank seeding can be completed in the Spring 2002. The sprinkler system can irrigate upland pastures where brush has been removed to establish grasses needed to reduce erosion into the Creek. Costs have exceeded budget projections, however the landowner has funded expenses necessary to complete this Task because an improved irrigation system is critical to the implementation of many other water quality improvement Tasks.

Progress Report 6/30/01 to 9/30/01. The elk fence has been installed so upland seeding, willow planting, and other vegetative practices can proceed without elk activity. The sprinkler system is fully operational. It will be used when the irrigation season begins in April 2002.

Progress Report 9/30/01 to 12/31/01. The earth ditches, pipe, water storage tank, pump, and sprinkler units are not used during the winter months. Legal action was taken against Desert Pump and Supply Company, Phoenix, to recover expenses incurred after the wrong pump was recommended. The specs needed were for a pump that would deliver 200 gallons of water per minute at 100 PSI over 6,000 feet of buried 3 inch PVC pipe. The recommended pump would only deliver 45 GPM. A building had to be constructed for the pump and a water storage tank. Only then was it possible to test the pump and discover the mistake. While Desert Pump took back the pump and components valued at \$5,000.00 for a credit, they did not compensate for related expenses nor loss of crop production due to delays in the installation of the proper pump. They recommended a pump system costing over \$25,000.00 plus cost of a new pump house. Discovery and depositions have been taken. The outcome remains unclear due to the position taken by one Desert Pump employee. The case proves the landowner acted in good faith but was deceived by an irresponsible and negligent water pump supplier. The landowner has taken action to mitigate damages and move forward to meet objectives to install a sprinkler irrigation system.

Progress Report 12/31/01 to 6/30/02. Irrigation pipe was installed per Task 2 Grant 4004 that allowed complete testing of the sprinkler irrigation system. Drought conditions prevented sprinkler irrigation.

Progress Report 6/30/02 to 9/30/02. Monsoon rains of about 10 inches precluded the need for sprinkler irrigation.

Progress Report 9/30/02 to 12/31/02. During testing, the water pump broke, but was repaired during the period. The irrigation system has been winterized.

Analysis and assessment 8/1/00 to 12/31/02. This Task has been fully completed. The sprinkler irrigation system has helped use water from the Creek for irrigation purposes more efficiently. Based on fixing the headgate half open for the entire irrigation season compared to the past practice of opening the headgate fully, at least 50% less water has been diverted from the Creek leaving 50% more water in the Creek. When more water is mixed with suspended solids, the sediment level is reduced. As water carries sediments along the Creek, vegetation slows the rate of flow allowing sediment to be deposited along the channel. More water is stored in streambanks that can be released during periods of drought. Since we know from vegetative monitoring that water was being released during extreme drought conditions, we know more water had to be stored in the banks prior to release. At least part of this water was available by less water being diverted for irrigation purposes. Another benefit of the sprinkler system is to provide water into the

riparian pastures to help establish grass planted on exposed streambanks, willows planted below the high water mark, cottonwoods planted above the high water mark, and other riparian vegetation. Sprinkler irrigation is similar to natural precipitation but can be delivered when and where needed to help the restoration process. Water diverted from the Creek passes through a large storage tank where suspended solids are settled out before being sprinkled back into the riparian zone. Often the water overflows out of the storage tank and drains directly into the Creek with less sediment. Thus the pipe and storage system helps reduce turbidity by cleaning the water before it is returned to the riparian zone. Water applied to upland pastures is near enough to the creek to percolate down into the water table. Even though the sprinkler irrigation system has been complex and expensive to implement, it has many benefits for the riparian zone that help reduce turbidity over the long term.

Task # 11. Cross-fencing pastures.

Task #11 Description: Survey and construct 4,050-ft. of cross-fencing.

Type of Task: Direct Labor Costs and Other Direct Costs

Deliverable description: Invoice for materials and construction.

Project Leader qualifications: Recent installation of 14,000-ft. of fencing under SIP and EQIP Programs.

Deliverable due date: June 1, 2001 (or 12 months after Project approval).

Computation: Direct Labor Costs = \$1,740.; Other Direct Costs = \$4,653.

ADEQ share of Task cost: \$3,835.

Matched share: \$ 0

Donated share: \$2,558.

Total Task cost: \$6,393. (\$1.58/ft.)

- A. **Description of practice (Method of Approach – #1 Water Quality Issue).** The EC Bar Ranch has several larger pastures where cross-fencing could be constructed to create smaller pastures. Once cross-fencing is installed, implementation of an expanded deferred rotational grazing system is possible. This practice will be effective in minimizing sediment discharges from rangelands impaired by over-utilization. Control of livestock is essential to the establishment of new grass.
- B. **Project Application (Method of Approach - #2 Action Plan).** Cross-fencing to establish discrete pastures will be installed to allow improved livestock rotation in the 300 acre Project Area.
- C. **Project cross-fencing required (Method of Approach - #3 Schedule).** The cost to install 4,050-ft. of cross-fencing in the first year is \$6,393.00 and is described in Task #11. It will be completed within 12 months or by June 1, 2001.
- D. **Project period use.** A grazing rotation plan would be used year round.
- E. **Project benefits.** Larger pastures on the ranch would be reduced in size by cross-fencing. Livestock activity during periods of flood or sprinkler irrigation would be controlled. Additional pastures would allow increased control over livestock movements. Livestock grazing in selected pastures could be deferred for longer periods. Overseeding with high yielding grass mixes could be accomplished more effectively. Improved vegetative growth in upland pastures would reduce erosion into Nutrioso Creek and reduce the need to graze the riparian zone.

Progress Report 8/1/00 to 12/31/00. This Task was fully completed in August 2000 and reimbursement was received 10/2/00. The Method of Approach to install fencing to create smaller pasture sizes has been achieved. Rotational grazing of livestock can be applied so that rangeland sediment discharges into the Creek can be reduced.

Progress Report 12/31/00 to 3/31/01. Cross fencing will prove useful if an elk proof fence is installed to restrict elk grazing in certain upland pastures and the riparian zone. Discussions are underway with AGFD to acquire and install such a fence in the near future. Without existing cross fencing and riparian fencing to attach the elk fencing onto, new fence would have to built before the elk fence could be used.

Progress Report 4/1/01 to 6/30/01. The AGFD has agreed to provide elk proof fencing. It can be attached to existing cross fencing. Grant 3-006 has been submitted to ADEQ to help cover the cost to install the elk proof fencing. After the existing fencing is modified to accept the 7 ft elk proof fence, it can be installed by September.

Progress Report 6/30/01 to 9/30/01. The elk fencing was installed using certain existing cross fences and by installing more cross fence. An alleyway has now been created on the west side of Nutrioso Creek whereby livestock can rotate from pasture to pasture and back to the corral. ADEQ Grant 3-006 was approved with one task devoted to construction of a bridge across the Creek to allow livestock to reach the corral at the barn.

Progress Report 9/30/01 to 12/31/01. Cross fencing is proving effective for livestock rotation and control.

Progress Report 12/31/01 to 6/30/02. Cross fencing has controlled livestock so grazing would not negatively impact establishment of upland grasses necessary to reduce erosion into the riparian zone. Drought conditions are delaying grow of grass so livestock control has been important.

Progress Report 6/30/02 to 9/30/02. Cross-fencing is proving effective for livestock rotation and control.

Progress Report 9/30/02 to 12/31/02. Cross-fencing is proving effective for livestock rotation and control.

Analysis and assessment 8/1/00 to 12/31/02. This Task was completed in August 2000. It has allowed the rotation of livestock from one pasture to another to avoid erosion caused by over use.

Task # 12. Over-seeding pastures.

Task #12 Description: Purchase and apply 1,500-lbs. of grass seed on 150 acres of upland pastures.

Type of Task: Direct Labor Costs and Other Direct Costs

Deliverable description: Invoice for materials and services.

Project Leader qualifications: Prior experience in grass seed applications, including sprinkler irrigation.

Deliverable due date: September 1, 2000 (or 60 days after Project approval).

Computation: Direct Labor Costs = \$1,500.; Other Direct Costs = \$7,500.

ADEQ share of Task cost: \$5,400.

Matched share: \$ 0

Donated share: \$3,600.

Total Task cost: \$9,000.

- A. **Description of practice (Method of Approach – #1 Water Quality Issue).** When large sections of upland pasture are root plowed to eradicate Rabbitbrush, about 50% of the ground is covered by grass and 50% is exposed. If the exposed soil is not planted in grass within the next growing season, there can be considerable erosion by rain and wind during the winter months. Application of a grass mixture using a grain drill is the most effective method of over-seeding upland pastures. Sprinkler irrigation will be used to assure a reliable supply of water to grow grass.
- B. **Project Application (Method of Approach - #2 Action Plan).** In June 1999, about 50 acres in the Project Area was root plowed. Considerable erosion has been observed over about 12 months. In February-March 2000, an additional 150 acres was root plowed. One over-seeding application is necessary in August to prevent sediment reaching the riparian zone due to erosion during winter and spring 2001.
- C. **Project grass seed required (Method of Approach - #3 Schedule).** The amount of grass seed needed to over-seed 150 acres at the rate of 10 lbs. per acre is 1,500 lbs. The price of an appropriate grass seed mixture is \$5.00/lb. for a cost of \$7,500.00. The cost to apply the grass seed is \$1,500.00. The total cost to implement the practice is \$9,000.00 in the first year and is described in Task #12. Moisture is critical to germinate the seed and support growth. Sprinkler irrigation will supplement rainfall. It will be completed within 60 days or by September 1, 2000.
- D. **Project period use.** The practice would be implemented during the monsoon season in 2000. Smaller pastures and rotational grazing made possible by cross-fencing would allow grass to become established by controlled and limited livestock activity.
- E. **Project benefits.** Improved vegetative growth in upland pastures would reduce erosion into Nutrioso Creek and reduce the need to graze the riparian zone.

Progress Report 8/1/00 to 12/31/00. Task #12 was fully completed in August 2000 and reimbursement received on 10/2/00. The Method of Approach to apply grass seed to existing pastures has been achieved. Newly planted grass seed was irrigated using sprinklers, surface water, and natural precipitation. Since planting, livestock have been excluded from 150 acres of seeded pastures. Fencing has not controlled elk grazing in these pastures. In fact, initial success of the practice attracted herds of 20-80 on a daily basis during October and November. Observations so far indicate the success of this practice to reduce rangeland sediment discharges by increasing pasture vegetation has been reduced by elk activity. One solution is to apply more grass seed and fertilizer in 2001. Another solution is to install an elk-proof fence. Discussions are underway with AGFD over this problem.

Progress Report 12/31/00 to 3/31/01. Discussions with AGFD to install an elk proof fence around certain upland pastures and riparian zones have progressed to a draft Agreement on March 19. A final Agreement should be executed whereby AGFD will provide the fencing and I will install it. In addition, AGFD has indicated willingness to provide grass seed and fertilizer for upland pastures. The combination of additional seeding, fertilizing, and elk control should result in permanent improvements in ground cover leading to reduced erosion into the Creek over the long term.

Progress Report 4/1/01 to 6/30/01. Over seeding of upland pastures in September 2000 has proven very successful in producing permanent pasture and an annual crop of rye grass, thus reducing erosion. Heavy elk activity in October to December and in the Spring has limited the establishment of a portion of the grasses needed to completely control erosion into the Creek. Discussions with AGFD led to Agreements whereby AGFD will provide elk proof fencing and seed and fertilizer for the majority of the project area. There are considerable expenses involved to install the fencing and apply grass seed and fertilizer in accordance with the Agreements. Therefore, in May, Grant #3-006 was submitted to ADEQ to request funding to help cover the costs to implement these practices. Until Grant 3-006 is awarded, most practices involving seeding and planting are on hold. If Grant 3-006 is awarded by August, then it is possible the elk

fence can be installed within a month. If weather conditions are right, planting will be done in September. In accordance with AGFD Agreements, no livestock or elk grazing will take place in upland pastures protected by the elk proof fencing for two years. The objective is to get cool season grasses established without large ungulate activity. After that, the elk proof fencing will be relocated around riparian corridors in the project area and remain in place for three years. During this period, livestock and elk may graze upland pastures but not riparian pastures. After five years, the AGFD Agreements terminate. Elk proof fencing may be placed around any pastures depending on forage conditions and elk activity. Through the cooperation of the AGFD, the success of many water quality improvement practices leading to permanent reductions in turbidity levels in Nutrioso Creek has been assured.

Progress Report 6/30/01 to 9/30/01. Grant 3-006 was approved. AGFD provided grass seed and elk proof fencing. The seed was applied and fence installed.

Progress Report 9/30/01 to 12/31/01. Lack of water on the west side of Nutrioso Creek due to problems using temporary poly pipe and lack of natural precipitation reduced the establishment of grass seed on upland pastures. Birds are eating seeds. If gated PVC pipe is installed to replace the west earth ditch, reapplication of seed can be accomplished in 2002 with a better chance of success since water will be available.

Progress Report 12/31/01 to 6/30/02. Drought conditions have prevented irrigation of grass. Cross fencing has prevented livestock activity that could damage grass. When monsoon rains begin in July, grass should start growing. Then it can be determined how successful seeding was during 2001.

Progress Report 6/30/02 to 9/30/02. Fertilizer was applied between rains during the monsoon period. Grass establishment appears good. Livestock have limited access for brief periods.

Progress Report 9/30/02 to 12/31/02. Grass was dormant during the period.

Analysis and assessment 8/1/00 to 12/31/02. This Task was completed in August 2000, but elk activity reduced the amount of grass that could become established. Another seeding application was made in August 2001. Elk proof fencing prevented damage from elk. As grass becomes established in upland pastures erosion will be reduced and there will be less need for livestock to graze in riparian pastures.

Task # 13. Project Advisory Group.

Task #13 Description: Create a **Project Advisory Group (PAG)**; meet periodically.

Type of Task: Administrative

Deliverable description: Invoice for services.

Project Leader qualifications: Created the Nutrioso Watershed Partnership in 11-98 and conducted related meetings.

Deliverable due date: May 30, 2001, May 30, 2002, and May 30, 2003

Computation: Administrative Costs = 4 members at \$25./hour X 24 hours per year is \$2,400./year X 3 years = \$7,200.

ADEQ share of Task cost: \$ 0

Matched share: \$ 0

Donated share: \$2,400. X 3 years = \$7,200.

Total Task cost: \$2,400. X 3 years = \$7,200.

Project Advisory Group (PAG): A Project Advisory Group (PAG) will be created in July 2000 and then meet monthly through May 2003. Initially, the members will be property owners adjoining the EC Bar Ranch: Leo Rogers, Merlyn Rogers, Shane Rogers, and Terry Reidhead. The four member PAG will advise on Project methods, review progress, and discuss results. An invoice for donated services will be available on May 30, 2001, 2002, and 2003 computed for 4 members at \$25./hour X 24 hours per year at \$2,400./year X 3 years equals \$7,200. Task #13 describes the PAG.

Progress Report 8/1/00 to 12/31/00. Periodic meetings are being held to discuss practice implementation.

Progress Report 12/31/00 to 3/31/01. Periodic meetings are being held.

Progress Report 4/1/01 to 6/30/01. Periodic meetings are being held.

Progress Report 6/30/01 to 9/30/01. Periodic meetings are being held.

Progress Report 9/30/01 to 12/31/01. Periodic meetings are being held.

Progress Report 12/31/01 to 6/30/02. Periodic meetings are being held.

Progress Report 6/30/02 to 9/30/02. Periodic meetings are being held.

Progress Report 9/30/02 to 12/31/02. Periodic meetings are being held.

Analysis and assessment 8/1/00 to 12/31/02. This Task is completed. Outreach to other farmers and ranchers has been helpful in the implementation of water quality improvement practices.

Task # 14. Streambanks over-seeding.

Task #14 Description: Purchase and apply 1,000-lbs. of grass seed on critical streambanks.

Type of Task: Direct Labor Costs and Other Direct Costs

Deliverable description: Invoice for materials and services.

Project Leader qualifications: Prior experience with seeding techniques, including sprinkler irrigation.

Deliverable due date: June 1, 2003

Computation: Direct Labor Costs = \$2,000.; Other Direct Costs = \$8,000.

ADEQ share of Task cost: \$ 6,000.

Matched share: \$ 0

Donated share: \$ 4,000.

Total Task cost: \$10,000.

- A. **Description of practice (Method of Approach – #1 Water Quality Issue).** Exposed streambanks and erosion from riparian pastures are the primary source of the turbidity problems in Nutrioso Creek on the EC Bar Ranch. Even though livestock and elk activity can be reduced and/or controlled by fencing and off-channel drinkers, the water table stabilized and/or increased, and grass seeding performed in nearby pastures, exposed streambanks will continue producing a turbidity problem unless they are directly revegetated. The NRCS has a practice called Critical Area Planting (CAP) that has proven effective when enough moisture is available to germinate the grass seed and then support growth. The NRCS has discovered the major problem limiting the success of CAP is that natural precipitation events are unreliable. Sprinkler irrigation can target critical streambanks where grass has been planted. (*NRCS Critical Area Planting guidelines, Pg. 78*)
- B. **Project Application (Method of Approach - #2 Action Plan).** Moisture is critical to germinate grass seed and support growth. Buried pipe and Poly-pipe will deliver water for sprinkler irrigation that is essential to the success of this practice. The timing of rainfall is unpredictable and unreliable. Sprinklers can deliver just the right amount of water to germinate and grow grass without washing seed away or eroding streambanks even further.
- C. **Project grass seed required (Method of Approach - #3 Schedule).** The amount of grass seed needed to plant certain streambanks at the rate of 25-lbs. per acre is 1,000 lbs. The price of an appropriate grass seed mixture is \$8.00/lb. for a cost of \$8,000.00. The cost to apply the grass seed is \$2,000.00. The total cost to implement the practice is \$10,000.00 over 3 years and is described in Task #14.
- D. **Project period use.** The practice would be implemented in stages during the growing seasons in 2000, 2001, 2002, and the spring 2003. Once established, vegetative growth on streambanks that is not disturbed by livestock or elk activity will help reduce turbidity over the long term. Normal sprinkler irrigation of upland pastures will provide periodic moisture to most riparian vegetation.
- E. **Project benefits.** Improved vegetative growth on exposed streambanks will reduce erosion into Nutrioso Creek and lower the level of turbidity.

Progress Report 8/1/00 to 12/31/00. Implementation is scheduled for May to September 2001. Arrangements have been made to use personnel experienced at critical area planting. Uncontrolled elk activity in the riparian zone may delay implementation of this Task. Discussions are underway with AGFD over this problem. Some seeding of banks was carried out by hand seeding and raking. A low success rate is predicted because of a low water table that limits streambank storage of water.

Progress Report 12/31/00 to 3/31/01. Due to uncontrollable elk activity in the riparian zone limited streambank planting has taken place. If an elk proof fence is installed, streambank plantings will proceed at the appropriate period. It is also important to have the sprinkler system in operation prior to streambank planting. The success of this practice is key to reducing turbidity so an infrastructure to control large ungulate grazing and to provide adequate moisture must be in place before planting critical area streambanks can begin.

Progress Report 4/1/01 to 6/30/01. Over seeding of upland pastures in September 2000 resulted in increased elk activity in October to December and in the Spring 2001. This uncontrolled grazing limited the establishment of a portion of the grasses needed to completely control erosion into the Creek. If stream banks had been planted as projected during the period, then elk would have been attracted to graze in the riparian zone, leading to erosion of stream banks. Discussions with AGFD over this problem led to Agreements whereby AGFD will provide elk proof fencing and seed and fertilizer for the majority of the project area. There are considerable expenses involved to install the fencing and apply grass seed and fertilizer in accordance with the Agreements. Therefore, in May, Grant #3-006

was submitted to ADEQ to request funding to help cover the costs to implement these practices. Until Grant 3-006 is awarded, complete stream bank overseeding is on hold. If Grant 3-006 is awarded by August, then it is possible the elk fence can be installed within a month. However, planting of stream banks will be done in the Spring 2002 because it is essential to have the elk fence completely installed before seeding can begin. In addition, sprinkler irrigation is important to be sure the new seeds germinate and grow properly. The irrigation season begins April 15, so planting will take place after that date. It is also important that all Tasks related to improvements to the irrigation system be completed before any stream banks are planted. This will assure a reliable supply of water anywhere in the project area. All riparian pastures will be protected by elk proof fencing for five years per the Agreements. During this period, no large ungulate grazing will take place so existing vegetation can flourish, new grasses can become well established, and willow plantings can grow without disturbances. After the AGFD Agreements expire, the elk proof fencing will continue to be used around riparian and upland pastures. There will be a livestock management plan to rotate livestock through all pastures depending on forage conditions.

Progress Report 6/30/01 to 9/30/01. Grant 3-006 was approved. The elk proof fence was installed. Streambanks were planted by spreading seed by hand and raking. Some success was noticed from prior year planting in this manner. More banks will be seeded after the irrigation season and growing season begins in April 2002.

Progress Report 9/30/01 to 12/31/01. No streambank planting was done during the period.

Progress Report 12/31/01 to 6/30/02. No streambank planting was done during the period.

Progress Report 6/30/02 to 9/30/02. Experience gained during prior years was useful in completing this task. Almost 20,000 feet of streambanks were carefully seeded as necessary to cover exposed areas. All seed was spread by hand followed by raking. Small areas were treated until the entire project area was planted. Sprinklers were used for irrigation. Natural precipitation supplemented rainfall.

Progress Report 9/30/02 to 12/31/02. No streambank planting was done during this period.

Analysis and assessment 8/1/00 to 12/31/02. This Task has been completed. Drought conditions have delayed progress to establish grass on exposed streambanks, but as the water table has increased and planting has been repeated, grass is slowly covering the banks. In 2003, when the sprinkler irrigation system becomes fully operational, exposed banks should rapidly become covered with vegetation. This will reduce erosion into the stream and help reduce turbidity.

Task # 15. Photo monitoring.

Task #15 Description: Perform **photo monitoring**.

Type of Task: Donated Outside Services Cost

Deliverable description: Photo monitoring data performed by the NRCS.

Project Leader qualifications: None. NRCS has performed photo monitoring since June 1998.

Deliverable due date: Photo monitoring performed in June 2001, 2002, and 2003. Data presented in August each year.

Computation: Outside Services Costs = 10 hours at \$50./hour X years = \$1,500.00

ADEQ share of Task cost: \$ 0

Matched share: \$ 0

Donated share: \$500. X 3 years = \$1,500.

Total Task cost: \$500. X 3 years = \$1,500.

Photo Monitoring Points. In June 1998, Brian Sorenson, NRCS, established three photo monitoring points in the riparian zone on the Crosswhite property. Photo monitoring will be done annually for five years using these baseline points. The initial photos were taken at a time when the riparian zone was in a "Functional – at risk with downward trend" before any riparian fencing, cross fencing, stream grade stabilization structures, beaver activity, off-channel wells, or a livestock management plan had been fully completed. In June 1999, after all these practices had been implemented, photo monitoring was performed. Even though a full growing season had not passed, the riparian-wetland zone was rated as "Functional – at risk with upward trend". The NRCS will continue photo monitoring in June 2000, 2001, and 2002, covering the life of the Project. The value of this donated service is \$1,500.00 and is described in Task #15. (*NRCS Photo monitoring data, Pg. 86*)

Progress Report 8/1/00 to 12/31/00. This Task has been taken over by Task # 9 Vegetative Monitoring.

Progress Report 12/31/00 to 3/31/01. The Vegetative Monitoring Progress Reports incorporate photo monitoring. This Task has been deleted.

Analysis and assessment 8/1/00 to 12/31/02. This Task was deleted because the Vegetative Monitoring includes photo monitoring. No funds were expended on this Task.

Task # 16. Wildlife Drinker Project (AWPF Match Project).

Task #16 Description: Install wildlife drinkers.

Type of Task: Matching AWPf Project

Deliverable description: AWPf confirmation that Project is completed.

Project Leader qualifications: Prior installation of buried pipe and drinkers.

Deliverable due date: February 28, 2001.

Computation: AWPf reimbursement = \$14,500.

ADEQ share of Task cost: \$ 0

Matched share: \$14,500.

Donated share: \$ 1,000.

Total Task cost: \$15,500.

- A. **Description of the practice (Method of Approach - #1 Water Quality Issue).** Elk routinely travel to the riparian zone in search of drinking water. Upon arrival they learn to return to graze. During the growing season, elk activity in the riparian zone is not desirable. The AZ Game & Fish Department (AGFD) and the Natural Resource Conservation Service (NRCS) have recommended off-channel drinkers placed in advance of riparian fencing along known elk routes as a method of reducing elk activity in the riparian zone. (*AGFD and NRCS letters recommending drinkers, Pg. 58, 59*)
- B. **Project Application (Method of Approach - #2 Action Plan).** The Arizona Water Protection Fund (AWPF) has approved the EC Bar Ranch Wildlife Drinker Project to address the problem of elk activity in the riparian zone on the EC Bar Ranch. (*AWPF Wildlife Drinker Project Summary, Pg. 60*)
- C. **Project drinkers required (Method of Approach - #3 Schedule).** The Wildlife Drinker Project includes installation of buried pipe to deliver water to two off-channel drinkers on each side of Nutrioso Creek riparian zone fencing. The amount funded is \$14,500.00 with the total construction cost projected to be \$15,500.00. The drinkers will be installed by December 31, 2000. Task #16 describes this Project. No ADEQ funding is requested. The AWPf Project should be treated as a 40% match. The AWPf also funded an elk monitoring plan which is described under Monitoring and evaluation activities item #3.

Progress Report 8/1/00 to 12/31/00. Task #16 was fully completed in August 2000 and reimbursement received from AWPf on 9/18/00. The Method of Approach to install off-channel drinkers along elk routes leading to Nutrioso Creek has been achieved. However, it is not known if the drinkers will reduce elk use in the riparian zone until Task 17 has been completed.

Progress Report 12/31/00 to 3/31/01. Discussions are underway with AGFD to install an elk proof fence. If and when this fence is constructed, it will compliment the use of off-channel drinkers by elk. Since they will not be able to reach the Creek to drink, the off-channel drinkers will become their main source of drinking water in the area. Elk will learn to use the drinkers and to walk around the elk fencing to reach sections of the Creek were fencing is not installed.

Progress Report 4/1/01 to 6/30/01. The locations of off-channel wildlife drinkers will compliment the elk proof fencing to be installed in August. Lamar Smith collected data in June 2001. He plans to collect data again in August. After the elk proof fence is relocated from upland to riparian pastures in two years, his data should provide insight into elk activity with and without a protective fence. The drinkers may play an important part in the success of the fence because elk can find drinking water outside the fence, rather than being tempted to break through it to drink in the Creek.

Progress Report 6/30/01 to 9/30/01. Off channel drinkers are located inside and outside the elk proof fencing. They will prove useful to wildlife that can no longer reach water in Nutrioso Creek that is protected by elk proof fencing.

Progress Report 9/30/01 to 12/31/01. Drinkers may be frozen at times during winter months.

Progress Report 12/31/01 to 6/30/02. Elk have been observed drinking from off-channel drinkers located outside the elk proof fence during daylight hours indicating a need for drinking water due to the drought.

Progress Report 6/30/02 to 9/30/02. Monsoon rains helped relive drought conditions.

Progress Report 9/30/02 to 12/31/02. Drinkers were in use during the period.

Analysis and assessment 8/1/00 to 12/31/02. This Task was completed in August 2000. Off-channel drinkers provide water for both livestock and wildlife. As elk proof fencing is installed around riparian pastures, certain drinkers remain outside the fencing for use by wildlife.

Task # 17. Elk Monitoring (AWPF Match Project).

Task #17 Description: Perform elk monitoring.

Type of Task: Matching AWPf Project

Deliverable description: Elk monitoring data report.

Project Leader qualifications: None. A qualified person will perform the elk monitoring and evaluate data.

Deliverable due date: June 30, 2003.

Computation: AWPf reimbursement = \$15,000.

ADEQ share of Task cost: \$ 0

Matched share: \$15,000.

Donated share: \$ 0

Total Task cost: \$15,000.

Elk Monitoring Plan. The AWPf Wildlife Drinker Project is being used as a match for the ADEQ Project. Part of the AWPf Project is an Elk Monitoring Plan to relate elk activity at off-channel drinkers to the riparian zone. Approval of the ADEQ Project will allow one or two more drinkers and a larger area to be included in the Elk Monitoring Project. Conclusions will be drawn in May 2003, and submitted to the ADEQ. The cost of the Elk Monitoring Plan is \$15,000.00. It is described in Task #17. (*Elk Monitoring Plan - AWPf Wildlife Drinker Project, Pg. 87-88*).

Progress Report 8/1/00 to 12/31/00. An Elk Monitoring Plan was completed in September. Elk baseline data was collected in September and December. Monitoring in the riparian corridor and upland pastures will take place over the Grant period by Lamar Smith, a qualified range consultant. Mr. Smith will make periodic reports.

Progress Report 12/31/00 to 3/31/01. If elk fencing is installed on the EC Bar Ranch through a cooperative agreement with AGFD, then the impact of the fence will be reflected in data obtained through the Elk Monitoring Reports in the future. No elk monitoring was performed during the period.

Progress Report 4/1/01 to 6/30/01. Lamar Smith counted elk pellets in transects in the project area in early June 2001. He plans to collect data again in August. An elk proof fence will be installed around certain upland pastures and all riparian pastures in August. Then some transects will be inside the fence and some outside the fence. As data is collected, it will be useful to observe elk activity during the two years before the fence is relocated to protect only riparian pastures. Elk activity should increase in the upland pastures unprotected by the fence. After three years, data may indicate a sufficient elk problem to justify relocation of the fence around upland pastures again. Elk monitoring is important in making management decisions to guarantee progress made in reducing turbidity will not be reversed by large ungulate grazing.

Progress Report 6/30/01 to 9/30/01. The elk proof fencing installation was completed in September. Future data will reflect elk activity including the new fencing.

Progress Report 9/30/01 to 12/31/01. Data was collected during the period.

Progress Report 12/31/01 to 6/30/02. Data was collected during the period. A report was prepared that indicated elk prefer to graze in the riparian corridor twice as much as upland pastures. Data supports the need for elk proof fencing.

Progress Report 6/30/02 to 9/30/02. Data was collected in September that will be presented in the Final Report. The RRIP recommended elk proof fencing to reduce elk activity in the riparian zone.

Progress Report 9/30/02 to 12/31/02. A Final Elk Monitoring Report will be prepared in May 2003.

Analysis and assessment 8/1/00 to 12/31/02. This is a matching project task that will be completed in 2003. So far, data indicates that elk spend twice as much time in the riparian zone as upland pastures. It is not clear how much of an effect that off-channel drinkers have in reducing elk activity in the riparian zone, however it is obvious that without off-channel drinkers wildlife must drink water in the creek. This Task supports observations by Bill Zeedyk in the RRIP that elk are causing damage to willows and other riparian vegetation. Experience on the Apache-Sitgraves National Forest and other areas where elk are present, demonstrate that riparian zones usually cannot reach Proper Functioning Condition (PFC) without installation of elk proof fencing.

Task # 18. Grass Seeding Project (AGFD Match Project).

Task #18 Description: Seed and fertilize rangeland.

Type of Task: Matching AGFD Project

Deliverable description: AGFD confirmation that Project is completed.

Project Leader qualifications: Prior experience planting grass seed and fertilizing pastures.

Deliverable due date: June 30, 2003.

Computation: AGFD Agreement for seed and fertilizer = \$7,333.; Crosswhite labor in application = \$4,000.

ADEQ share of Task cost: \$ 0

Matched share: \$11,333.

Donated share: \$ 0

Total Task cost: \$11,333.

- A. **Description of practice (Method of Approach – #1 Water Quality Issue).** Elk migration to the riparian corridor can be reduced if forage and drinking water are provided well in advance of the riparian zone.
- B. **Project Application (Method of Approach - #2 Action Plan).** The Arizona Game & Fish Department (AGFD) approved a Cooperative Stewardship Agreement (CSA) in March 2000 whereby over-seeding of 87-acres of rangeland with a dryland pasture grass seed mixture will be followed by three fertilizer applications. The Project will increase forage on Ranch property located about ½ mile west of Nutrioso Creek and frequently used by migrating elk. (*AGFD Cooperative Stewardship Agreement, Pg. 79-81*)
- C. **Project actions required (Method of Approach - #3 Schedule).** The AGFD Project will compliment the ADEQ Project by providing seed, fertilizer, and labor valued at \$11,333.00 that could reduce undesirable elk activity in the riparian zone. Task #18 describes this Project. No ADEQ funding is requested. The AGFD Project should be treated as a 40% match.

Progress Report 8/1/00 to 12/31/00. This practice was implemented on 87 acres of rangeland located about ½ mile west of Nutrioso Creek (sprinkler and surface water are not available for irrigation). The Method of Approach is to increase forage to reduce the desire of elk to travel to the Creek. Seed and fertilizer was applied in August 2000. Livestock were excluded during the growing season but elk continued to graze at will. The property was sold in October 2000. Fertilizer treatments will continue in 2001 and 2002 to complete this Task. The success of this practice is unknown at this time.

Progress Report 12/31/00 to 3/31/01. Grass has not begun to grow so the success of this Task is unknown.

Progress Report 4/1/01 to 6/30/01. Grass planting did not appear to be effective in this pasture, however it is not near the riparian zone so no erosion will contribute to increased turbidity.

Progress Report 6/30/01 to 9/30/01. Fertilizer was applied.

Progress Report 9/30/01 to 12/31/01. Grass is dormant.

Progress Report 12/31/01 to 6/30/02. Drought conditions have prevented grass from growing.

Progress Report 6/30/02 to 9/30/02. Fertilizer was applied. Grass is growing.

Progress Report 9/30/02 to 12/31/02. Grass is dormant.

Analysis and assessment 8/1/00 to 12/31/02. This matching project Task was completed in August 2000. The success rate was low due to uncontrolled elk activity and drought conditions. Since the project site is not near the riparian zone, erosion is not a source of turbidity.

Task # 19. SARE Brush Research (Match Project).

Task #19 Description: Perform Rabbitbrush research and outreach.

Type of Task: Matching SARE F/R Research Project (subject to SARE approval in May 2001)

Deliverable description: Research data report.

Project Leader qualifications: Prior experience in Rabbitbrush management and outreach.

Deliverable due date: June 30, 2003.

Computation: SARE reimbursement = \$10,000.

ADEQ share of Task cost: \$ 0

Matched share: \$10,000.

Donated share: \$ 0

Total Task cost: \$10,000.

Rabbitbrush research. (not included as Task because not approved by SARE)

- A. **Description of practice (Method of Approach – #1 Water Quality Issue).** The management of Rabbitbrush consists of a variety of techniques. Some are useful in control, while others for eradication, and others for preventing reestablishment. In the process of developing effective management techniques, Rabbitbrush infestations can be reduced.
- B. **Project Application (Method of Approach - #2 Action Plan).** An Application was made in January 2000 to SARE Western Region for a Farmer Rancher Research Grant to develop Rabbitbrush management techniques on the EC Bar Ranch. The application was disapproved in the 2000 Grant Cycle. Suggestions for amending the Application for resubmission in the 2001 Grant Cycle should meet with success.
- C. **Project research required (Method of Approach - #3 Schedule).** The SARE Project would compliment the ADEQ Project by providing funding of \$10,000.00 that could be used toward developing Rabbitbrush management techniques and providing outreach. Task #19 describes this Project. No ADEQ funding is requested. If approved in 2001, the SARE Project may be treated as a 40% match. Completion by 5-2002.

Progress Report 8/1/00 to 12/31/00. This Matching Project was not approved by SARE. It has been deleted from ADEQ Project. Reapplication to SARE in 2001 may result in approval. If so, improved techniques to control Rabbitbrush may be developed.

Progress Report 8/1/00 to 12/31/00. This Matching Project was not approved by SARE. It has been deleted from ADEQ Project. Reapplication to SARE in 2001 may result in approval. If so, improved techniques to control Rabbitbrush may be developed.

Analysis and assessment 8/1/00 to 12/31/02. Another SARE Grant Application was submitted in October 2002. If approved in 2003, monitoring of riparian pastures would be helpful to the Livestock Management Plan.

Task # 20. Aquatic Study (AGFD Match).

Task #20 Description: Perform Aquatic Study.

Type of Task: Donated Outside Services Cost

Deliverable description: Research data report.

Project Leader qualifications: None. AGFD biologist will perform and evaluate study data.

Deliverable due date: Aquatic Study performed in October 1999 with follow-up Study planned in October 2002.

Computation: Outside Services Costs = 90 hours at \$50./hour = \$4,500.00

ADEQ share of Task cost: \$ 0

Matched share: \$ 0

Donated share: \$4,500.

Total Task cost: \$4,500.

Aquatic Study. In October 1999, the AZ Game & Fish Department (AGFD) performed an Aquatic Study on the EC Bar Ranch as part of a broader Study in the Nutrioso Watershed of the LC spinedace and other aquatic life. The LCR spinedace is listed as a "threatened" species under the Endangered Species Act. The Project will contribute toward delisting criteria described in the LC spinedace Recovery Plan. AGFD has planned a follow-up Aquatic Study in 3 years. Data can be used to measure and evaluate various Project practices. The cost of the Aquatic Study is \$4,500.00. It is described in Task #20. A follow-up Aquatic Study could be used as a match.

Progress Report 8/1/00 to 12/31/00. The AGFD completed a baseline Aquatic Study in October 1999 at no cost to the ADEQ Project. A follow-up study by AGFD is scheduled for October 2002. Water quality improvement practices implemented by the ADEQ Grant may be demonstrated by an improved fish population.

Progress Report 12/31/00 to 3/31/01. After release of the Vegetative Study Plan and Progress Report, the AGFD received a copy for reference as the final fish report was being prepared.

Progress Report 4/1/01 to 6/30/01. The Fish Report is still being prepared by AGFD.

Progress Report 6/30/01 to 9/30/01. AGFD has not produced the final Fish Report.

Progress Report 9/30/01 to 12/31/01. AGFD has expressed intent to perform another fish study in 2002.

Progress Report 12/31/01 to 6/30/02. AGFD Nutrioso Creek Fish Report was completed. A copy is on the ECBarRanch.com website. Improved habitat conditions may have changed the time period of fish surveys.

Progress Report 6/30/02 to 9/30/02. The AGFD does not plan a follow up fish study until 2005.

Progress Report 9/30/02 to 12/31/02. No activity during the period.

Analysis and assessment 8/1/00 to 12/31/02. This matching project Task has been rescheduled by AGFD based on conclusions in their Fish Study. When a follow up fish study is completed on the EC Bar Ranch, it may show a stable or improved fish population because the water table and riparian vegetation have increased while turbidity has been decreased. During periods of drought, the reaches of the Creek on the ranch have not dried up like reaches above and below the ranch. Fish have survived in recent years that would have perished in the past.

Task #21. Volunteer Labor.

Task # 21 Description: Services of Jim Crosswhite in the form of personal labor, equipment (buildings, trucks, tractors, implements, tools, etc.) supplies (fuel, parts, telephone, postage, travel expenses, etc.), financial resources (loans, interest payments, etc.), and opportunity costs (reduced livestock numbers and other means of production).

Type of Task: Direct Labor Costs

Deliverable description: Invoice for services.

Project Leader qualifications: Skills, equipment, etc. necessary for the completion of all other Tasks.

Deliverable due date: December 31, 2002

Computation: 1,000 hours at \$50.00 per hour for labor, equipment, supplies, etc. = \$50,000.

ADEQ share of Task cost: \$0

Donated share: \$50,000.

Total Task cost: \$50,000.

Progress Report 8/1/01 to 12/31/02. Jim Crosswhite provided personal labor, equipment, supplies, and financial resources during the period.

Analysis and assessment 8/1/01 to 12/31/02. This Task was completed. The services of Jim Crosswhite in the form of personal labor, equipment (buildings, trucks, tractors, implements, tools, etc.),supplies (fuel, parts, telephone, postage, travel expenses, etc.), financial resources (loans, interest payments, etc.), and opportunity costs (reduced livestock numbers and other means of production) were necessary and helpful in the completion of all other Tasks.
