ADEQ Arizona Department of Environmental Quality

Water Quality Improvement Grant Program

Grant Agreement EV05-0128
ADEQ Project #8-007

Project Title: Upper Eagle Creek Watershed Restoration Project
Expiration Date: April 30, 2008
Dollars Matched: $1,056,907
Dollars Awarded: $360,930

Between
Arizona Department of Environmental Quality
and
Upper Eagle Creek Watershed Association

This Grant Agreement is established between the State of Arizona Department of Environmental Quality, located at 1110 West Washington Street, Phoenix, Arizona 85007 ("ADEQ" or "Department") pursuant to Arizona Revised Statues (A.R.S.) § 41-2701 et. seq. and A.R.S. § 49-104 and **Upper Eagle Creek Watershed Association** ("Grantee"). This Grant Agreement includes the following documents contained herein: Attachment 1 - Water Quality Improvement Grant Agreement Terms and Conditions, Attachment 2 - Grant Application (Scope of Work), this includes any and all information obtained in response to our Questions/Clarification communication, Attachment 3 - Milestones, Attachment 4 - Budget, and any amendments developed as part of this Grant Agreement. Incorporated by reference, this Grant Agreement also includes the ADEQ Water Quality Improvement Grant Program Request for Grant Applications (EV05-0021) and *2004-2007 Water Quality Improvement Grant Manual.*

Special Conditions:

1. In order to complete SHPO review, projects on federal land or having federal involvement require additional NHPA review and consultation to identify any National Register listed or eligible historic properties and the effects of the project on these identified properties. The federal agency is responsible for the completion of this consultation. A reporting of their findings must be submitted to your assigned ADEQ project manager for approval before any work can begin on the project.
2. Grantee shall submit written approval of project tasks to be completed on U.S. Forest Service (USFS) property and a written commitment from the USFS for operation and maintenance of those facilities to ADEQ before any work can begin on the project.
3. Grantee shall obtain ADEQ approval on all information pertaining to this project that is used as promotional or educational materials, including but not limited to, Web site information, brochures, signage, etc.
4. Grantee shall complete an approved Quality Assurance Project Plan (QAPP) prior to beginning work.
5. Attachment 2 is the approved Scope of Work and any adjustments or changes must be pre-approved by ADEQ.
6. Attachment 3 is the approved Project Milestone report and any adjustments must be pre-approved by ADEQ.
7. Attachment 4 is the approved Project Budget and any adjustments must be pre-approved by ADEQ.

In witness whereof the parties hereto agree to carry out the terms of this Grant Agreement.

Arizona Department of Environmental Quality	Upper Eagle Creek Watershed Association
Joan Card, ADEQ Water Quality Division Director	Chase Caldwell, Authorized Agent
Joan Card Signature of Authorized Individual	Chase D. Caldwell Signature of Authorized Individual
Date: 5-17-06	Date: MAY 15, 2006

Upper Eagle Creek Watershed Restoration Project 8-007

Questions/Clarifications

1. Question B-2, Method of Approach has only one answer: Fill in the appropriate numeric code (only one) with the appropriate selection from Appendix B. Livestock Control Projects - #14

2. It is unclear who the hydrologist will be responsible for water quality monitoring and who the biologist will be responsible for macroinvertebrate monitoring and fish surveys. Please provide qualifications for the technical advisors and key personnel listed.

   Forest Service personnel will assist and oversee the UECWA members in the development and implementation of the project monitoring plan, including but not limited to water quality monitoring and macroinvertebrate monitoring and fish surveys. Additional photo points of improvements and upland forage use and watershed condition monitoring is also done, as a normal part of Annual Operating Instructions for livestock grazing operations.

   Several members/permittees in the UECWA have had extensive training and various aspects of watershed and riparian monitoring and management. All have attended and participate with the Forest Service in upland range monitoring, and have also attended macroinvertebrate sampling field day with the Master Watershed group leaders. Most recently all members of the UECWA permittees who have applied for DEQ funding attended a 1 day workshop sponsored by Quivira Coalition covering uplands and riparian topics. Some specific examples of the qualifications of members of the UECWA follows.

   Chase Caldwell - President of the UECWA and Grant Applicant, and permittee on the AD Bar -Hogtrail allotment, is a graduate of the Master Watershed Stewardship program, working closely with Robert Emanuel at the Univ. of Arizona during their training and recent macroinvertebrate field day on Eagle Creek. Mr. Caldwell has attended several upland and forage use monitoring workshops during the last several years.

   Jim and Clarice Holder - Permittees on the Baseline-Horsesprings allotment, have been collecting vegetation and watershed information from frequency transects since the early 1990's. They currently conduct their own forage use and condition/trend monitoring at established points on the allotment. The Holders have attended numerous range and riparian condition trainings, including those provided by the Cooperative Extension and the Master Watershed program.

   Darcy Ely - Permittee on the East Eagle and Mud Springs allotment, and Greenlee County Cattlegrowers current President, is also a graduate of the Master Watershed Stewardship program. Along with her husband Gary, and like Mr. Caldwell, has

attended numerous upland and riparian monitoring workshops sponsored by Cooperative Extension, and the Forest Service.

Twig and Shirley Winkle, and Kevin Winkle -Permittees on the Tule Allotment, probably have the most extensive training and field monitoring knowledge of any member of the Association. Following Forest Service and Cooperative Extension training, these folks virtually re-read and retook all the Parker Three Step range cluster transects and pace transects across the allotment. In addition, they relocated and retook riparian photos taken by the AZ Game and Fish Department in the early to late 1980's. They are very knowledgable and have used various monitoring protocols, including but not limited to standardized forage use monitoring, trend monitoring, Proper Functioning Condition assessments, macroinvertebrate sampling, and range and ecological condition assessment techniques such as the Parker Three Step and Daubenmire frame protocols. They have regularly conducted and provided extensive summary reports on forage use and uplands monitoring for not only their allotment, but several other permittees on the District.

Water Quality Monitoring – Forest Watershed Specialist and hydrologists will provide expertise to ensure monitoring protocol is adequate. District wildlife biologist will oversee actual data collection.

Macroinvertebrate Monitoring and Fish Surveys – Clifton District is supported by a zone fisheries biologist, with support from the District biologist. The zone fisheries biologist will ensure that the ADEQ macroinvertebrate sampling protocol is followed, and be responsible for any fish surveys, and the District biologist will oversee field collection operations. In addition, ASU academics and agency biologists conduct very limited but annual surveys on Eagle creek

District Wildlife Biologist – Josh Chapman, Clifton Ranger District. Currently, Josh is a GS-7 trainee, ending grade level GS-9. Josh has a BS in Wildlife from Humbolt State Univ. He worked for three years for the Pacific Southwest Research Station's Redwood Sciences Lab as a GS-5 biological technician working for the Water and Watershed branch of the lab. He gained extensive experience conducting turbidity threshold sampling including streamflow, turbidity, estimating sediment load and temperature monitoring. In addition, Josh has six years of other wildlife related field experience with three federal agencies. Josh will be responsible for collecting all water quality data and macroinvertebrate samples.

The following four Technical Specialists will play advisory and oversight roles to Josh throughout the life of the project:

- **Supervisory Hydrologist and Watershed Specialist**– Jim Probst, Apache-Sitgreaves NF Forest Hydrologist
- **Assistant Hydrologist** – Dustin Walters, Apache-Sitgreaves NF Forest Hydrologist

- **Fisheries Biologist** – Bill Wall, Apache-Sitgreaves NF zone fisheries biologist. Bill has a BS in fisheries biology and will provide oversight for macroinvertebrate monitoring and fish surveys.
- **Research Hydrologist Engineer** – Mary Nichols, USDA Agricultural Science Research, Southwest Watershed Research Center, based in Tucson, AZ.

Project Coordinator – Melanie Gasparich. See the narrative describing Melanie's experience and qualifications in the original project proposal.
Technical Advisor – Frank Hayes, Clifton District Ranger. Frank will be responsible for overseeing and permitting the project. He has a BS in Wildlife Biology, with a minor in Range Management; and an MS in Range Management & Animal Nutrition. He has 30 years experience; 15 of those are on the Clifton Ranger District.
Technical Advisor – Kent Ellett, Clifton District Range & Watershed Staff. Kent has a BS in Range Science, extensive field experience in range and watershed management with the BLM and Forest Service, 12 years experience, and will serve as technical advisor of project, overseeing implementation measures and permit modifications required for project implementation.

3. Why is the proposed riparian exclosure fences part of the Phase 3 project? These should receive higher priority and should be listed as Phase 2 projects, as they are the project components which will most benefit sediment reduction, riparian restoration, and improved water quality.
A review of the pricing schedule clearly indicates that most of the fencing projects are riparian related, and the majority of these fences either are funded in Phase 1, are included in Phase 2 for funding. The lowest priority projects include fencing that may exist but needs replacement, or is in an area that does not have high numbers of livestock use. A realistic workload is also a consideration when planning these projects. See below for discussion about the Phase 2 and 3 fencing proposals:

East Eagle/Mud Springs

- Filleman Trap – is a riparian exclosure fence that borders private lands along Eagle creek, but is an existing fence (constructed in 1950's), and needs complete reconstruction. This project may be swapped with the Robinson Mesa fence in Phase 3, as suggested in Question #13 below, but see explanation for this fence below.
- Robinson Mesa fence – a critical fence that separates livestock using winter pastures on Mud Springs allotment and East Eagle allotment, prevents livestock from moving off into East Eagle creek. Constructed in late 1950's, burned over several times with wildfires, needs complete reconstruction. Would prefer to leave in Phase 2.
- Chitty Basin Fence – This project replaces a non-functional allotment boundary fence that will keep livestock from traveling to the upper head of Chitty Creek (Gila trout habitat) and/or over into Bear Wallow (east fork of the Black River) on the Alpine RD, Apache trout stream.

AD Bar/Hogtrail

- Mallet, Flat Spring Exclosure, and Sheep Wash fences are all riparian or wetland related exclosures or management related fence projects, all proposed in Phase 2.
- Turkey Creek Fence – isolates Upper Sheep Wash (on map this is between Mallet pvt and Pine Flat prvt) from the large south pasture containes Pipestem Mt. This fence is critical to isolate and provide for season management to reduce impacts to the live riparian along Upper Sheep Wash. It is riparian and wetland related.

Baseline/Horseprings

- No fences are proposed for this allotment, only water distribution improvement.

Tule

- Primary riparian corridor fencing of Tule Creek is funded in Phase 1. Phase 2 provides alternate water sources away from spring sources. Phase III projects are further enhancement of water sources to reduce concentrated livestock use around springs, stock tanks, or wetland areas.

Double Circle

- Phase 2 funding requests for this allotment includes priority wetland fencing to protect intermittent riparian native frog habitat in middle Sheep Wash (Project #1), fencing that compliments the Pt. Pines fencing exclosure along Eagle Creek on San Carlos Reservation boundary (#5 and #6), and a water lane/exclosure to protect native frog habitat at Sheep springs in Sheep Wash #9). Phase 3 includes NO Bar Fence which protects and provides for winter management of intermittent riparian habitat in Smith Canyon (#2), recently funded by the AZ Water Protection Fund.

4. The application submitted is very confusing. Please separate the three phases in order to determine where one phase ends and another phase begins. An explanation of each phase's milestone and budget needs to be provided.
The proposal to ADEQ is complex, and may be confusing to those who are not familiar with or have worked on large landscape level project proposals. It is critical to remember that the overall goal of this project is restoration of uplands and riparian corridors in the Eagle Creek watershed, complimenting the goals of the UECWA. Funding from ADEQ is only a portion of the total needs to accomplish objectives necessary to meet this goal. This project is a landscape level approach that requires addressing issues on each allotment to be effective.

NOTE: A landscape level approach consists of analysis and treatments of hundreds of thousands of acres, in this case over 160,000 acres. The implications of landscape

management and the scale of this approach, not only to uplands directly associated with riparian corridors, but the extent of wetland and riparian areas affected, is summarized very well in the Executive Summary. Suggest to re-read this section. It is also important to note that the restoration efforts ongoing within the UECWA area of influence has and expects to see contributions from numerous other partners. Great example is occurring within the Mesa and Pine Flat Units of the Sheep Wash 6th Code Ecosystem Restoration area (encompassing portions of AD Bar, Mesa not in DEQ proposal, and Double Circle allotments). In 2005, over $300,000 has been made available for thinning and prescribed burning to enhance grassland and pine forest conditions, complimenting planned long-term rest from livestock deferment.

CLARIFICATION:

Phase 1 - First funding effort to restore, reconstruct, and supplement principal range improvement infrastructure necessary to maintain and manage viable, effective grazing programs on each allotment. These include primarily water and fence refurbishment to improve and sustain livestock management. Primary matching and other dollars will be expended in this phase. No DEQ dollars are planned for this phase. This Phase is currently funded.

Phase 2 - Primary focus is on wetland and riparian corridor protection and management, and improved distribution of water away from wetland resources. Key phase for DEQ funding opportunities.

Phase 3 - Includes lower priority work from Phase 2, or projects expected to be funded from other sources (Double Circle NO Bar fence funded from AWPF as example), and includes fencing and water improvements. Lower priority is determined by the fact that some areas may not receive as much use, or because only so much work can be accomplished at one time. Phase 3 has been removed from this request as suggested in Question #14.

PROJECT MILESTONES

PHASE	MILESTONE (All phases will undergo the same process)	COMPLETION DATE
1	#1 – Pre-monitoring, including photo points	3/1/06
1	#2 – Necessary clearances completed for Term Grazing permit modifications (reconstruction of existing improvements does not require new clearances). Pre-monitoring (photo-points, normal AOI forage monitoring).	5/1/06
1	#3 – Term Grazing Permit modifications (no work will be initiated without permit modifications). District Ranger authorizes. Is contract for work by permittee. Includes all specifications, time frame, contribution percentages, etc.	5/1/06
2	#4 - If Phase 2 funded, Final Monitoring Plan development and peer review	6/1/06 Draft Final 8/15/06

2	#5 - Pre-monitoring water quality, macroinvertebrates, fauna surveys (fish and amphibians), and sediment reduction. With summary report.	12/1/06
1	#6 – Implement Phase 1 projects. This may take longer, depending on contractor availability and weather.	12/1/06
1	#7 – Post-monitoring, including photo points	As projects are completed
2	#8 – Necessary clearances completed for permit modifications (reconstruction of existing improvements does not require new clearances)	3/1/07
2	#9 - Permit modifications (no work will be initiated without permit modifications)	5/1/07
2	#10 – Implement Phase II projects.	12/1/07 – 5/1/08
2	#11 – Post-monitoring, all aspects of monitoring protocol. First year primarily for range improvement construction, and direct effects changes. Second year for initial effects from changes in management, exclusion, complimented non-structural restoration work like thinning and burning.	First year – 12/1/08 Second year – 12/1/09

Budget Update – Included as an attachment here is a reformatting of the project budget including only Phases 1 & 2. Phase 3 has been removed for this funding cycle as recommended in Question #14 below.

5. Allotment Questions: A concern is that the project costs associated with several of the allotment plans may not be justified for the benefits received. Several allotment management plans in this application focus on upland fencing repairs and do not provide riparian fencing as part of the proposal. Should there by a riparian fencing component to each allotment plan to ensure some direct water quality benefits from each plan? Otherwise the high costs (>100K), specifically from the Tule allotment and the Double Circle allotments, are not justified. Please clarify this information.

   The District and now UECWA permittees have long recognized the direct relationship of activities such as livestock grazing to the productivity and health of riparian corridors on the Clifton Ranger District, especially Eagle Creek. Concerns and management direction to address riparian health have been captured in Annual Operating Instructions and Allotment Management Plans for over 10 years.

   There is an indirect connection between the conditions and management of uplands and the quality of Eagle Creek remain as important now as when Forest Plan direction for riparian management was finalized in 1985, and the District AOI's completed each grazing season. Most recently, the biological opinion issued by the US Fish & Wildlife Service in 1999 for ongoing grazing included all allotments that border Eagle creek (included in original grant application package). The BO reconfirms our commitment to riparian and uplands recovery and this relationship. It states that improved management of both riparian and uplands in allotments are necessary to minimize adverse effects and take to federally listed native fish species, and to maintain the health and biotic integrity of Eagle Creek. Consequently, management of upland areas caries as key importance as management of the

riparian areas of the landscape, especially considering the key monitoring aspects that EPA now focuses on related to sediment production and transport, along with dissolved nitrogen and phosphorous.

Tule – Proposals on the Tule allotment are supporting a very intensive grazing program designed to protect wetlands, including fencing and water distribution. Phase 1 includes a significant riparian fencing project, which will directly benefit Tule Creek, a significant tributary of Eagle Creek, along with earthen tank refurbishments to improve water distribution but which will reduce downstream sediment transport. Emphasis for Phase 2 is development of existing water facilities to move livestock use away from spring or wetlands sources to reduce the impacts at these locations and reduce the need for fencing.

Double Circle – Phase 2 has a large riparian fencing component that is focused on riparian protection, management, exclusion, and long term restoration. Big Dry Fence (# 1) isolates a significant portion of the intermittent Sheep Wash riparian system. Fences along the San Carlos Indian Reservation Boundary (#5 and #6) are reconstructions of existing boundary fencing to keep trespass cattle from entering the Eagle creek drainage, and compliment the Pt. of Pines project that DEQ funded for the Gila Watershed Partnership. Double Circle requests $105K in Phase 2 and of that amount, roughly $65K is for riparian fencing.

6. The applicant provided a general list of best management practices that each allotment would implement, please be more specific and itemize these tasks that are located on each allotment map and give reasons for why their priority is either a Phase 2 or Phase 3 project.
In the application (beginning on Page 7 B2, Management Measures) we provided a list of BMP's to the UECWA that apply generally across all allotments in the Association, and also across the District as well. We interpreted this part as a request of what BMP's are currently used on the allotment as well as those that proposals would implement. Each allotment or Project Site included in the application uses most if not all of these practices extensively. Following is an in depth itemization of the BMP's that are applicable to the AD Bar – Hogtrail allotment, as an example. All projects listed in Phase 2 for funding either include one of these BMP practices, or compliment an ongoing practice that is listed. The remainder of allotments follow, with only those practices that specifically apply to improvements and tasks listed in Phase 2, DEQ funding proposals. Please keep in mind that improvements in Phase 1, funded by ADA grants, also allow implementation of many of the BMP's listed.

AD Bar – Hogtrail Allotment
Alternative Water Sources: Projects #2 and #5, along with another pipeline and storage to be completed in Phase 1 (shown yellow/black on map), are proposed to move water away from existing wetland areas that currently are impacted by horses grazing on the allotment, and heavily impacted by cattle when grazed during previous years. Both wetland sources will be fenced to exclude concentrated use, and flow maintained in each wetland to ensure surface water availability. Developments

of #2 and #5 would enable sources in adjacent pastures as well, improving livestock distribution and grazing timing and flexibility.

Wildlife – wetland management: Since 1993, a significant effort has been made to mitigate impacts from roads (Forest Road 515, 515A and 515B) while improving wetland and wildlife habitats on this allotment, with great success. The existing permittees have complimented partnered efforts in road management and other extensive habitat improvements with extended rest, and planned grazing to mitigate impacts. This management practice remains a high priority and focus for all improvements shown on the map, as described above, and for fences to exclude or reduce wetland and riparian impacts. Improvements #1, #3, #4, and #5 apply to wetland habitat improvement.

Habitat development and management: Generally as noted above. Permittees have recognized and been very cooperative in maintaining permanent and seasonal road closures for habitat protection, changes in season of use to reduce impacts to riparian and wetland areas, and continuing with planned deferment from extensive livestock use to enable large scale restoration efforts currently ongoing in the Upper Sheep Wash Corridor. Improvements #1, #2, #3, #4, #5 will enhance this practice.

Heavy use area protection: Historically, the drainages of Squaw Creek, Turkey Creek, Pipestem Creek, Upper Sheep Wash, and Bear Canyon were heavily impacted by livestock grazing. All improvements shown on the map will reduce heavily impacted areas. Project #4 specifically is proposed to keep livestock from trailing from the Pipestem area (South Pasture) into Upper Sheep Wash riparian corridor. Traps around the private lands of course have historically concentrated use along this corridor, and other wetland areas within traps. Improvements of fencing and alternative water sources will reduce this concentration on wetland areas. Project #3 specifically is proposed to isolate and significantly reduce use along a wetland area that has recently been revitalized (it was a dry rock cobble bottom in 2002, not a extensive ½ mile wetland inhabitated by native frogs).

Pasture and Hayland Management: We interpreted this BMP as upland pasture management in grazing rotations, seasonal use changes, exclusions for recover, or closely monitoring herbaceous removal to ensure watershed protection. All pastures on the allotment are managed for these objectives. All improvements proposed will provide flexibility and options for implementing these practices. Improvement #4 and #5 are specifically intended to assist in future pasture management.

Spring development: See Alternative Water sources.

Upland wildlife habitat management: The Clifton RD has been conducting extensive upland habitat management across the entire allotment since 1993, initiated with a ORV closure along the entire length of 12 miles of Road 515, and a seasonal travel closure. Several prescribed burns have been conducted in Upper Sheep Wash area on the allotment, and in upper Bear Canyon for habitat improvement and restoration. Thinning is ongoing. Expanded prescribed burning is under analysis. These are purposely not shown on the improvement map, but can be provided easily if DEQ technical advisors want this information. Proposed improvements shown on the map provided to DEQ for this application all compliment past, ongoing, and proposed upland improvements. See Habitat Management list of improvements above.

Watering facility: Watering facilities are any trough or storage and trough that provides a clean, dependable water source for wildlife and livestock. Sometimes this alternate water can provide a water source that is more secure for use, reducing predation on wild ungulates. Project #5 is the best example. Water source is a spring within a small but very incised drainage that has poor access for wild ungulates and turkeys. Fencing will protect from livestock impacts, assuring long term productivity. A small solar pump system will move water to a storage near a set of working corrals where water will be available in a more open but very accessible location with good cover. Water developments reduce or eliminate direct impacts to wetland areas, provide dependable water, and clean water sources in secure locations. Improvement #2 will accomplish a similar objective.

Fence: Projects are generally directed at protection and more effective management of wetlands and riparian corridors, or to improve distribution of livestock to increase periods of rest and ensure this rest from disturbance is effective in riparian and upland recovery. Improvements #1, #2, #3, #4 are all intended to accomplish this objective.

Grazing: Presently, a simple deferred and applied rest program for small pasture rotations is being used with the few head of horses on the allotment. Good example was scheduled use by horses into the Sheep Wash pasture (on map where project #3 is located), and decision by permittees to keep animals out of pasture until total dormancy had been achieved, in December. If all improvements are constructed, and restocking occurs, a very intensive approach to livestock management, rotation and deferment of pastures to achieve recovery objectives will be used to maintain and continue improvement in uplands and wetland areas on the allotment. Improvements #3, #4,and #5 will greatly enhance flexibility and effectiveness in both existing and future grazing management.

Habitat Restoration: Numerous partners and Forest Service funding options have been and are continuing to be used to restore various wildlife habitats within the allotment. Initiated in 1993, these practices have been largely targeted to enhance both uplands and wetland areas, and include improved road maintenance techniques that reduce sedimentation into Sheep Wash, structures that have provided long-term recovery and permanent in-stream flow, thinning and burning projects that have substantially changed conditions of habitats in a substantial portion of the allotment, and ORV closures to eliminate off road travel and disturbance during critical breeding periods for some wildlife species. Improvements #1 and #3 specifically compliment ongoing and past habitat restoration work.

Livestock Exclusion: Several sensitive wetland areas have been restored by fencing to permanently exclude livestock, and have been very supportive by the present permittees. Some projects proposed for funding will also exclude more of these sensitive areas, and others will allow longer term and effective deferment to ensure recovery during critical breeding periods for species like native frogs. Improvement #1, #2, and #3 provide for exclusion of sensitive riparian or wetland areas.

Pipeline and tanks/troughs: Use of pipelines and storage tanks with troughs is a most common practice to redistribute water and provide clean water sources, often allowing exclusion of the water source if spring. Use of transmission, storage and access facilities away from sensitive areas also provides options for keeping the

impact much reduced, and allowing recovery much quicker should impacts occur. Improvements #2 and #5 are examples.
Use Exclusion: See livestock exclusion above, but this also pertains to elimination of undesirable activities on the allotment that can cause damage or create sediment sources into wetland, like ORV travel. The allotment currently has a seasonal closure on the entire Sheep Wash corridor to reduce traffic during winter months to reduce road impacts and subsequent erosion. There is also a 12 mile buffer for ORV travel in place as well. Improvement #3 compliments and encompasses the historic access road that originally followed Sheep Wash riparian drainage.
Water/sediment control basin: This practice has been used extensively on the allotment to enhance water retention in drainages to enhance or extend in-stream flow, with great success in the Sheep Wash drainages. These sediment and water flow control measures have included large log structures to trap and hold sediment and improve long-term flow, hardened road crossings with angular rock materials to stabilize crossings while reducing sediment transport and increasing subsurface flow to support riparian vegetation establishment and growth, and natural debris jams associated with thinning to increase woody material in drainages to allow flows to stabilize and collect natural sediment and coarse materials to enhance meandering of drainage length. Improvement #3 encompasses one of the large log structures, and several natural woody debris jams inserted into the west fork of Sheep Wash.
Wetland restoration: The area where improvement #3 is proposed was once a rock cobble drainage as recently as spring 2002, used as a holding line during a prescribed burn. During drought conditions and following applied rest, this ½ mile portion of Sheep Wash became perennial and interrupted, occupied by native frog species. Improvement #3 will enable this continued restoration of this developing riparian wetland area. Improvements #1 and #4 provide similar opportunities to expanding wetland habitats.

East Eagle and Mud Springs Allotments
Alternative water sources: Apply similarly, examples include Steer Pasture water development to eliminate need for livestock use of Eagle creek. Not applicable for any proposed improvement.
Wildlife – wetland management: Practice is part of BO for Ongoing Grazing and has been practiced for over 10 years on the allotment. Example is management of Eagle creek corridor for wetland habitat, exclusion of Robinson creek at confluence of Eagle, use of Chitty pasture encompassing Chitty creek every other year during winter months. East Eagle (EE) Improvements #1, #3, #4, #5 , and Mud Springs (MS) #1 directly apply to improved and effective wetland management as included in Phase 2. Filleman trap fence Mud Springs #2 has been moved up to be funded in Phase 2, and is also wetland management enhancement.
Habitat development/mgnt: Forest Service in partnership with permittee has conducted landscape Rx burning on both allotments during the last 14 years, and is proposing landscape level treatments in the future. Improvements from ADA grant particularly apply, but specifically improvement EE #2, Robinson fence, directly applies here for not only protection of East Eagle creek but to ensure effective rest following planned prescribed fire in that area.

Heavy use protection: Practice is to ensure recovery of any areas that have received concentrated heavy use during a grazing period. EE improvements #3, #4, and #5 and MS #2 are priority for this practice, since these traps often receive very short duration, concentrated use. Long-term effective rest is critical to ensure annual recovery.
Pasture management: EE improvements #1, #2, #3, #4, #5, MS #1 and #2. are all priority to effectively graze and rest to ensure recovery and future planning for pasture rotations.
Upland wildlife habitat mgnt: See Habitat development above. EE #1 and #2 are directly applicable to implementation of this practice with pending Rx burns that will require planned and ensured rest from livestock grazing following treatments.
Fence: All EE and MS proposals are fencing improvements that improve management flexibility, ensure effective rest and protection or exclusion of riparian and wetland areas. All are priority for funding in Phase 2 to compliment funded projects from Phase 1.
Grazing – planned systems: All EE and MS proposals will also compliment emphasis in Ongoing Grazing BO issued from FWS, with specific Terms and Conditions that require exclusion or very limited trailing in upper East Eagle, and compliance with annual grazing management instructions that require planned and executed grazing and rest periods. All proposals are priority to implement effective grazing management on the allotments.
Habitat restoration: EE #1 and #2 are proposals that compliment funded projects from Phase 1 that are targeted to compliment past extensive Rx habitat improvement work, and planned Rx treatments for fall 06 for the Chitty Creek area. Effective fencing is vital to isolate and rest these areas following treatments.
Livestock exclusion: EE #3, #4, and #5, and MS #1 and #2 are fences needed to ensure ongoing exclusion of livestock from Eagle creek, or effective exclusion during critical periods of use in Middle Prong of Eagle Creek. All are priority for funding in Phase 2.

Baseline- Horsesprings Allotment
Grazing- deferred: Each improvement task proposed for this allotment is either an addition or extension to existing or funded improvements from Phase 1, and provide supplemental support to ensure that effective deferment occurs during any grazing season. Water sources from earthen tanks are generally not dependable during critical growing periods when rest and recovery are needed.
Grazing-planned systems: Each improvement task proposed has direct applicability to implementation of the intensive herding program that the Holder's practice to obtain proper uplands forage use and placement of livestock. Each added water point increases the ability to rest and allow recovery for other portions of the allotment.
Fence: No fence projects are proposed for Phase 2, but Pine Creek Corral will assist with holding and managing the herding program.
Habitat development/mgnt: The entire major solar water system that services the whole allotment was funded from significant contributions by the Rocky Mountain Elk Society, Arizona Game and Fish Department, and AZ Water Protection Fund programs purposely to supply water for improved wildlife habitat management. All

proposed improvements in Phase 2 supplement that allotment approach. In several years since construction, this pipeline and watering system has provided much of the only water available for wildlife in a 10 square mile area of important winter habitat.
Heavy use area protection: While these improvements listed do not offer direct protection from heavy use areas, indirectly they supplement the flexibility of the permittee to relocate livestock effectively during an entire year of planned grazing. Each water source makes it possible to eliminate the return of livestock back to historic, heavy use areas around earth tanks, or canyons.
Wildlife-upland area mgnt: See note on habitat development. The allotment is prime summer and winter range for a variety of large ungulate species, as well as numerous passerine and non-game species that use and depend on water sources. Every project, except the BS #7 (corral) provides critical water sources during important breeding and birthing periods when water is often in short supply and animals have to travel a substantial distance, concentrating along Eagle Creek.
Pasture management: Each proposed improvement will enhance current intensive forage and use pattern management in each pasture, especially those pastures that historically have not received much use, and allowing those which receive heavy use to recover.
Pipeline/trough/tanks: Proposed improvement tasks are all about water distribution and supply efficiency, except the corral #7.
Upland wildlife habitat mgnt: See previous sections on wildlife upland management. The allotment encompasses about 2 miles of Eagle Creek, which becomes intermittent during much of the year. Water availability in upland areas allows for better distribution of wildlife species and habitat use, decreasing concentrations in the riparian corridor and other wetland areas on adjacent allotments.
Wildlife-watering: Except the corral, all proposed improvements will supplement or increase the availability of water for wildlife species. Troughs are left open for wildlife use, generally year round in excellent distribution points to ensure optimum distribution.
Watering facilities: Proposed improvement tasks, except #7, are all watering facilities that are well designed and maintained, and supplement the entire water system currently in use.

Tule Allotment
Alternative water sources: Each water proposed as an improvement task on this allotment comes from an existing spring development, providing alternative water sources away from existing wetland areas. These include #1 (Phase 3 removed), #3, #4, and especially the system proposed in #5, #6, and #7.
Grazing- deferred: Tule permittees, through the Forest Service guidance under an MOU established in 2000, have implemented a very intensive, short duration deferred grazing program, using both long term and short term rest to ensure recovery of both uplands and wetland areas. They are considered experts at assessing the time needed for recovery and timing of grazing patterns with their livestock. Each proposed improvement will assist in implementation of these vital BMP's for effectively obtaining deferment for recovery throughout areas of the allotment. Fence improvement #2 is especially important for creating another

pasture that will prevent livestock drift from Deerhead West back to wetland areas in Deerhead East. It is a critical part of ensuring effective deferment. Other water proposals such as Improvement #5 Upper Tule Spring Pipeline, will aid in moving livestock out of small drainages and wetland areas.

Grazing-planned systems: Permittees do an excellent job of planning and implementing annual grazing plans throughout the ranch, but must now depend on waters and herding to maintain distribution. Water availability is key to implementing a good, well planned grazing program. All water improvement proposals, especially tasks #1, #4, and #5, are very important to current and future planned grazing systems. Fence project #2 is vital to ensuring that an effective grazing plan be implemented for the Deerhead pasture area.

Fence: The Tule Canyon fence funded in Phase 1 is a priority for protection of Tule riparian corridor. Improvement #2, Deerhead Division fence, is also a priority for Phase 2 to split several thousand acres of uplands, and allow protection and proper management of small wetland areas found in the east portion of that pasture (Deerhead East).

Habitat development/mgnt: The Clifton RD has been conducting prescribed burns on the allotment since 1997 in the Grey Peak and Webster canyon areas, most recently completing about 1500 acres of treatments on the east side of the allotment in 2004. Each proposed improvement will assist landscape efforts by the District and partners in habitat development and future management. More prescribed fire treatments are planned.

Heavy use area protection: Improvements completed prior to implementation of Phase 1 and proposals in both Phase 1 and 2 are all intended to reduce the heavy impact often observed around sensitive wetland areas and along Eagle Creek historically when the allotment was permitted 300 head of cattle. The Tule Canyon fence funded in Phase 1 is a good example of an improvement that allows implementation of this BMP. Each improvement task proposed in Phase 2 and Phase 3 (as originally submitted) is important to reduce the potential for and expected concentration of livestock around valuable wetland areas, ephemeral but more productive drainages, and earthen tanks. Improvement #1 is very critical to this, but a high expense (why place in Phase 3). Improvements #4 and #5 provide excellent off site sources of water to reduce concentration areas.

Habitat restoration: Photo points retaken from AZ Game and Fish originals established in the early 1980's show remarkable recovery of riparian areas throughout the allotment. Recent retakes show this restoration continuing. Upland habitats are continuing to improve. Each proposed improvement will enable the continuation of this trend, and supplement what the Forest Service is achieving with landscape level burning treatments.

Wildlife-upland area mgnt: All proposed water source improvements proposed in Phases 1, 2, and 3 offer improved water sources that help to maintain good wildlife distribution, especially for wild ungulate populations. Many of the spring sources for water are located in vary narrow, incised drainages that are not optimum for access of many wildlife species. Project #5 is especially valuable to improve water availability and increase habitat use in this area near Grey Peak.

Pasture management: Water sources, and to a letter extent fencing, are critical for effective herding and locating cattle to create pastures. While several pastures are designated on the allotment map, herding and intensive management of livestock distribution by these permittees actually increases the areas or pastures of use for any given use period. Each improvement task will increase the efficiency and availability of areas for use, thereby allowing increased rest periods and time for others. Fence project #2 is very important to create a definite division that will greatly reduce drift from west to east in Deer head pasture areas. Water projects #3 and #4 are specifically proposed to aid in distribution and effective pasture management.
Pipeline/trough/tanks: These permittees have demonstrated an excellent abilities and skills in the proper development, maintenance, and use of water systems to aid in livestock and wildlife distribution and uplands use. Those improvements that include pipelines and troughs are intended to supplement and increase water availability during critical times of use.
Upland wildlife habitat mgnt: All water points proposed for funding in Phase 2 and 3 can assist and supplement ongoing large scale habitat improvement projects underway by the Forest Service.
Wildlife-watering: Each water source development proposed in Phases 2 and 3 will provide supplemental and accessible water for many wildlife species without drying up any spring source. Improvements #1, #4, #5, and #6 will substantially increase water availability for upland big game and non-game species as well, and will be available year round.

Double Circle Allotment
Alternative water sources: Improvement tasks included in Phase 2 and 3, and those shown on the map but not proposed for any one Phase provide alternative water sources that reduce impacts along ephemeral and intermittent riparian drainages of Big Dry, Bee Springs, and Sheep Wash. Improvements #3, #4, #7, and #8 (originally in Phase 3), and #11 (not included in proposals) provide alternate water sources that reduce impacts on wetlands or intermittent drainages. Improvements #3 and #4 specifically replace original access to water from Eagle creek.
Grazing- deferred: Permittees on the allotment have implemented an excellent but often ineffective deferred grazing program, often wishing to set aside several pastures for extended rest for recovery. Lack of water in several small traps and portions of larger pastures precludes effective deferment. Improvement tasks #3, #4 #7 and #8 are important to enable planned and effective deferment of other traps that are used more because of better water availability.
Grazing-planned systems: As with all UECWA members, these permittees develop and plan a program of grazing that provides for rest and recovery of each pasture grazed during the season. Improvements included in each Phase, especially those proposed for funding in Phase 2 and 3, and those not included for this round of funding requests, are critical for total allotment management. Presently, several pastures like the ST Trap, Cross H trap, Cottonwood, and the Sheep Wash corridor, cannot either be used now because water sources have been removed (Eagle Creek or Sheep Wash), or livestock movement into sensitive areas precludes their planned use. Improvement #3 is designed to effectively use Cross H Trap. Improvement #7

and #8 will provide supplemental water for effective pasture use and system implementation. Improvement #11, if eventually funded, will provide water into two pastures that currently are not useable because of lack of dependable water.
Fence: Improvements #1, #2, #5, #6, and #9 are all proposed to isolate and either exclude or improve management to enable total allotment management and reduce impacts on wetlands or riparian corridors. Fence #1 and #9 are complimentary, isolating a substantial portion of the lower Sheep Wash intermittent and perennial riparian corridor.
Heavy use area protection: Improvement tasks #1, #2 (Phase 3 but funded from AWPF program), #5 and #6, #9 are specifically proposed to reduce historical heavy use impacts from livestock. Tendencies of all livestock will move toward available wetland areas during initial green-up periods. These improvements will either eliminate or greatly reduce these impacts.
Habitat restoration: Restoration of the entire Sheep Wash upland and riparian corridor has been a priority on the Clifton RD for over a decade. This has included the lower portion of Sheep Wash on the Double Circle allotment even though much of this section is intermittent to ephemeral. Improvements that are especially vital to continue with this restoration effort include fencing #1 and #9, and water improvement tasks #7 and #8. Eagle creek restoration has also been ongoing since 1994, with fencing constructed in 1998 to isolate portions of Eagle creek on this allotment. However, trespass livestock issues continuing up to present days make total restoration difficult. Improvements #5 and #6 (as well as #10 and #12 not proposed for this funding cycle) are critical to continue this work on the allotment. Smith canyon, a little known but important riparian corridor originating on the allotment, extending and included as a portion of Sheep Wash drainage system, is in slow restoration efforts. Improvement #2 is intended to promote this recovery effort.
Pasture management: Each improvement proposed for funding in Phase 2 and 3, along with those shown on the Site Map but not included in this funding cycle, are intended to enhance pasture management options. Improvements #1, #2, #3, #4, #8, #10, #11, #12 all are important for existing and future pasture management with existing numbers of livestock or potential stocking rates in future years.
Pipeline/trough/tanks: This BMP is implemented with funding of Phase 1, and proposed improvement tasks in Phase 2, projects #3, #4, #7, and eventually #8, #11, and #12.
Upland wildlife habitat mgnt: Improvement tasks #1 and #2, #7, #8, and #9 are specifically proposed to supplement ongoing prescribed burn activities near Mitchel Peak and Grey Peak to enhance upland habitat conditions along with thinning of Pinyon juniper grasslands near the east side of the allotment.
Wildlife-watering: Improvement tasks #3, #4, #7, #8, #9, and #11 would supplement wetland watering sources, and more importantly provide dependable sources of water for a variety of wildlife species.

7. Several of the allotment projects focused the majority of the effort and expense on repairing upland fencing, and considerably less effort on riparian fencing and off-

stream water sources. The rationale for these fencing projects should be provided, along with the total miles of fencing for each task proposed for each allotment.

In a quick scan of maps of each allotment project site, it appears that many fences are upland fences. Please note that tasks or improvements in Phase 1 are shown in black with background in yellow, and those for Phase 2 and 3 were only in yellow. This might clear up some of this appearance. None of the fencing projects proposed for funding in Phase 2 are simply reconstruction of upland fencing. All fences proposed have a substantial riparian protection element related to them, as covered under previous questions. It is also important to note that the majority of fences in Phase 1 (funded by ADA Livestock and Crop program) was directed toward upland fencing that is critical for effective pasture and allotment management. Several of these fence tasks (Tule as an example) were in fact for riparian protection. With the exception of Baseline-Horsesprings proposals, most UECWA permittees purposely chose tasks more related to riparian and wetland protection in Phase 2, specifically focusing on fencing in many cases, or alternative water sources.

Although some projects appear to be "uplands", the majority is protecting spring sources or riparian areas on tributaries. For the most part, Eagle Creek is already fenced off; the federally managed portion of Eagle Creek has been excluded from livestock use since 1994. Dollars requested from ADEQ are focused on tributaries to Eagle Creek.

East Eagle/Mud Springs Allotment Phase II Fences

- Gust Fence – 1.0 miles

This is an Eagle Creek riparian exclosure fence in poor condition. Reconstruction is critical to exclude livestock use away from the waterway.

miles = 4.95

- Robinson Mesa Fence – 1.2 miles

This is an allotment boundary fence between East Eagle and Mud Springs allotments, and is in disrepair. This reconstruction is needed to prevent livestock use in Robinson Creek, and will control livestock distribution and duration of use in 2 miles of East Eagle and 1.25 miles of Robinson Creek, an intermittent stretch of this tributary to Eagle Creek. Because of it's association with an adjacent fence segment funding in Phase 1, this fence has been retained for funding requests. As suggested in Question #3 above, however, Filleman Trap fence (MS #2 improvement) was now included for funding in Phase 2 as it is a priority. Filliman trap fence is a high priority for funding to protect Eagle creek.

- Honeymoon Trap - 0.5 miles

This fence is a riparian exclosure of ½ mile of Eagle Creek, filling in a critical gap in fencing. This segment of fence will tie into existing riparian fence.

- Eagle Trap Fence – 1.5 miles

This is the western counterpart to the Honeymoon Trap Fence above.

- Middle Prong Fence - 0.75 miles

This is a pasture fence that ties into the reservation boundary fence, and will improve control of livestock access to Middle Prong Creek, a tributary of Eagle Creek. This will reduce duration of use by two-thirds, reducing sediment input and will facilitate improved seasonal use.

AD Bar/Hogtrail Allotment Phase II Fences

- Mallett Wetland Fence – 0.5 miles

This section of fence protects Sheep Wash when livestock are in Bailey Pasture, and is in total disrepair.

miles - 3.25

- Flat Spring Exclosure – 0.25 miles

This exclosure includes fence, pipeline, and water storage to protect the water at the spring and associated 1 acre of wetland, and to provide clean and more efficient use of drinking water to livestock and wildlife.

- Sheep Wash Fence – 2.0 miles

This fence excludes livestock use from approximately 1 mile of Sheep Wash, protecting perennial segments of an intermittent stream. This section of Sheep Wash has two known locations of Lowland leopard frog in perennial pools.

- Grapevine Pipeline and Exclosure – 0.5 miles

This is an upland spring that requires fencing to protect the water at the source, in order to exclude portions of Sheep Wash. This ties directly to the feasibility of the Sheep Wash fence. This encourages livestock distribution in an easterly direction, improving overall health of the watershed.

Baseline/Horsesprings Allotment Phase II Fences

- Pine Creek Corral – ½ acre

This corral will utilize salvaged pipe to create the fence, and reduce trailing.

Tule Allotment Phase II Fences

- Tule Spring Exclosure – 1 acre

This exclosure will exclude livestock use protect the spring at the source and associated wetland.

1.5

- Deerhead Division Fence – 1.5 miles

This pasture division fence will shorten the season of use and provide for increased control over rest and recovery. This will divide a very large pasture of about 3500 acres in half, resulting in improved flexibility and timing for rest and grazing.

Double Circle Allotment Phase II Fences

- Big Dry Fence – 3.5 miles

3.5

This pasture division fence will divide a large pasture (>4,000 acres), allowing for a shortened season of use and increased control over rest and recovery. The division will cordon off the riparian area along 3.5 miles of Sheep Wash, home to Chiricahua leopard frogs and a perennial stretch of the waterway, and limit access to the wash outside of the dormant grazing period allowed.

- Willow Creek Fence - .9 miles

This is a segment of boundary fence between San Carlos Indian Reservation, Comb W Livestock Association, in very poor condition. Trespass reservation cattle at various times of year cross this fence and enter the Eagle Creek area near the confluence of Willow creek and Eagle creek, especially after periods of high use by elk. This fence segment is critical to protect Eagle creek, and is the north compliment of the recently completed Pt. of Pines fence project partially funded by DEQ.

- IDT Boundary Fence – 1.6 miles

This fence segment is the south compliment of the Pt. of Pines fence project, also bordering the San Carlos Indian Reservation, but IDT/R100 Tribal Grazing association. The most severe issues from livestock trespass from reservation cattle onto Eagle creek come from this portion of the remaining boundary fence needing reconstruction.

- Sheep Springs Water Lane – 0.5 miles

This water gap fences off a section of Sheep Wash/Sheep Springs occupied by Lowland leopard frog, while still providing a ¼ mile window of access to water for livestock.

8. Tule Allotment, Project #5 would pipeline water from Tule spring for 3 upland water troughs. Will this cause Tule Creek to dry up or will baseline flow be maintained?
Baseline flow will be determined. Based on experience with improvements at other springs in the area, lower Tule Spring at the private land and primary drainage will be unaffected. Pumping will happen seasonally, and may fluctuate to accommodate baseline flow maintenance.

9. Double Circle Allotment, Project #3 and #4 will provide upland water sources, but will they cause Sheep Wash to dry up or will baseline flow be maintained?
These water sources draw on groundwater wells. Intermittent flows up Sheep Wash will not be affected. Pumping will be seasonal. Deep groundwater wells are unlikely to affect surface flow.

10. Double Circle Allotment, Project #3, ST pipeline & storage, seems to be providing water within an "Ecosystem restoration area", is this for cattle or wildlife? Please clarify.
The map of Double Circle, as do all allotment maps, include areas the Clifton District has designated for landscape scale restoration efforts. These areas have been identified generally in relation to the dominant 6th Code watershed, such as Sheep

Wash. The focus of these ecosystem areas is restoration of riparian and upland functions, which of course includes improvements in habitats for wildlife, forage for livestock, as well as herbaceous cover for watershed protection. Each ecosystem restoration area has it's own unique set of issues and needs. As an example, current ongoing restoration efforts within the Mesa Unit of the Sheep Wash Ecosystem area include extended rest from livestock, prescribed burning, and extensive thinning to reduce tree competition and enhance habitat diversity, with the focus on restoring productivity of Alligator juniper grassland savanna habitats.

11. Double Circle Allotment, Project #5 and #6 look like county boundary fences. Will the County help maintain the fences or provide any contributions?
These are San Carlos reservation boundary fences, and as such, Greenlee County will not help maintain them. These boundary fences are important because they will restrict trespass livestock and unmanaged use of the riparian system. They also complement a previously funded DEQ project – Point of Pines.

12. Double Circle Allotment, Project #11 provides 3 upland water troughs but they are far from the riparian areas, in addition the riparian areas are not fenced off. Please explain. Cottonwood Spring probably should include a spring exclosure, as Cottonwood Canyon is an ephemeral drainage. The ST trap excludes lower Sheep Wash, and does not allow access to Eagle Creek for water, but does not provide alternative water. This project provides an alternative water source for that exclosure.

13. Will Eagle Creek be fenced off? If not, it should be prior to installing the water troughs, otherwise there is insufficient protection of the Eagle Creek riparian area and water quality benefits will not be produced. Mud Springs Allotment, the riparian fencing projects appear to be relevant and important, however, it is recommended that Project #2, Filleman Trap Fence be implemented as a Phase 2 project; as it excloses a segment of Eagle Creek from cattle usage.
Restoration and recovery of Eagle Creek was implemented in 1993, based on simple Forest Plan guidance and the fact that riparian management is good business. This effort was initiated with permittees by requiring the removal of livestock from the creek, through fencing and Annual Operating Plans for grazing. In addition, a Memorandum of Understanding (MOU) was developed in 1995 with the Gust family who own 4 parcels of private lands along upper Eagle Creek, and which encompasses about 5 miles of the riparian corridor. This provided for fence maintenance and exclusion from cattle. The MOU was recently renewed for another 10 year period, and has been extremely successful. These combined efforts resulted in Eagle Creek Forest lands being rested (22 miles of live stream corridor) for the first time in history. The BO for Ongoing Grazing issued by the Fish and Wildlife Service in 1999 for allotments that border Eagle creek recognized this effort, recommending that exclusion continue. In 2001, the District impounded and removed wild maverick trespass reservation cattle from the area near the Middle Fork of Eagle. Except some isolated private land parcels, Forest lands and several hundred acres of private lands along Eagle Creek have been excluded from livestock. However, many of the fences

that are critical to ensuring exclusion continue are in need of complete reconstruction. Many of these fences are included in Phase 2 for funding.

Good point that Filleman Trap should be in Phase 2 and is a high priority, more so than Robinson. It is the Forest Service preference that Robinson Mesa fence (EE #2) also be retained, as justified in earlier questions.

14. Phase 3 appears to make this project exceed three years. It may be prudent to consider funding for Phase 1 and 2 with the option for the applicant to re-apply for Phase 3 during a later cycle. Is this something that the Upper Eagle Creek Watershed Association would consider?
Yes, this is the intent of the proposal. Phase 3 was included here to show the breadth and depth of planning across the watershed.

15. There is a strong emphasis to quantify nonpoint source load reductions resulting from projects that are awarded funding. Will you be able to provide any quantified estimate of load reduction based on experience, research, modeling, or monitoring? Load reduction estimates for each project site area needs to be presented in the following manner; nitrogen = lbs/yr, phosphorus = lbs/yr, sediment = tons/yr.

District personnel have recognized that quantifying load reduction in sediment, and elements of nitrogen and phosphorous is an important objective for the EPA's non-point source pollution reduction program funded through 319 funding sources. When the application was originally submitted, we mentioned using the WEPP program for assessing load reductions, and attempting to quantify other elements as well. As DEQ personnel know, without extensive analysis, these measurements are difficult to assess. However, we believe we have developed a strategy to obtain some estimates of these contributions and potential reductions, based on existing Forest Service GIS based data and additional information to be collected in the future.

Sediment Load Reduction: The Forest Terrestrial Ecosystem Survey (TES) analysis was conducted in the early to middle 1980's during a time on the Forest and District when livestock use was extensive, and range/watershed conditions were not good virtually across most of the District. While this analysis was very intensive and mapped soils based on many days of intensive soil and vegetation sampling, it was still an umbrella approach. While very useful, the data still requires extensive ground checks to confirm that TES units apply, and that current erosion rates and vegetation attributes are applicable. Soil erosion rates and potential for erosion was based on the Universal Soils Loss Equation, originally developed for farmland and adapted to rangelands.

Attached as an appendix is a spreadsheet that displays estimates of current and natural erosion rates, by TES or soil mapping unit, for each allotment included in proposals for DEQ funding. While we realize this is a lot of data, the important point to note is estimated current erosion rates (remember estimated in early 1980's) compared to natural erosion rates. If management of each allotment shifted erosion

rates to natural, this change alone might result in a 40-60% reduction in soil movement over an entire 160,000 acre watershed. This improvement is significant.

While a review of the data displayed in this appendix is difficult to accept, lets use a very simple example to understand the potential for erosion across uplands into drainage systems. Loss of ¼" of soil from uplands equals .002 feet of soil, over an acre is about 900 cubic feet of soil. At 27 cu.ft. per yard, that equates to about 33 yards of soil loss. At 1.3 tons per yard, that's about 43 tons of soil lost if ¼" is moved off the uplands.

The challenge is to document actual and natural erosion rates based on current watershed and soils conditions. Inspections, data collection, and range analyses indicate current erosion rates are no longer as high as before, but we have little landscape level assessments. We plan to establish baseline erosion rates across the watershed in 2006, with the assistance and oversight of Mary Nichols, Research Hydrologist Engineer, with the USDA-ARS, SW Watershed Research Center. Mary is scheduled to meet with us at the UECWA meeting in April.

Nitrogen and Phosphorous Reduction

Measuring nitrogen and phosphorous inputs into stream or wetland systems from non-point sources is a very difficult task. Up until recently, the District was not able to locate studies that could be applied to rangeland conditions to provide some inference of potential inputs and changes that might occur with exclusion of livestock, or reductions in season of use during sensitive or important time periods when aquatic systems are most vulnerable to large influxes of these two elements.

At the request of DEQ and for this application as well as closure on previously completed DEQ funded projects (Coal Creek Riparian Corridor, Pt. Pines), Josh Chapman (District biologist) conducted a literature search for applicable studies. Such a study was conducted in 2002 at the University of Nebraska, "Integrating Animal Feeding Decisions into the CNMP (Comprehensive Nutrient Management Plan) Processes", focusing primarily on dairy and feedlot cattle conditions. A copy of the research paper is either attached as an appendix, or faxed to DEQ for distribution. The value of this research is that it provides a series of formulas to calculate nitrogen and phosphorous retention and excretion rates based on input of crude protein levels.

Clifton District personnel used these formulas to estimate potential pounds of nitrogen and phosphorous that might be produced from livestock on each allotment. Kent Ellett, Clifton District Range Management specialist, developed a set of Excel Spreadsheets that displays, by proposed Improvement Task for each allotment, the results of these calculations, provided in the attached spreadsheet documents by allotment.

As with the estimates of soil loss or movement and potential sediment loads entering drainages, it is important to place these estimates in context by examining formula

results using an applicable example. The study example used 1000 finishing yearlings, with a crude protein value of 13.5%. Their spreadsheet shows nutrients retained by the animal (for beef or milk nutrient value assessment but not applicable for range land situations), and nutrient excretion (how much is localized elements needing to be moved, or lost). Their example shows that if 1000 animals are fed out for 350 days of the year, total Nitrogen excretion is 167,000 lbs. per year or 477 lbs per day per 1000 animals, or .48 lbs. per animal per day. Phosphorous was .07 lb. per day per animal.

Several assumptions were used to calculate the amount of these elements potentially excreted by range livestock for each allotment relative to proposed improvement tasks now included for funding in Phase 2.

- Crude protein on rangeland situations is relative high during periods of growth, and was established at 8%, low range during winter dormancy to a maintenance level of 5%.
- Daily feed intake remained the same, 27 lbs.
- Number of animals was estimated based on both current stocking rates and period of use of a pasture or area where the improvement is proposed, and then a second set of calculations based on stocking to estimated capacity of the allotment. These results are displayed both with and without the improvement.
- Time period (number of days per year area grazed) was based on known actual use, or projected use periods with or without improvement. Range Specialist and District Ranger determined these periods of use.
- Unlike a feedlot situation, in most instances livestock grazing in a pasture will not stay and deficate in one location (e.g. stream area) the entire day. It was necessary to add a multiplier factor to estimate the amount of time that livestock spend in sensitive riparian or wetland areas, both with and without improvements, and at current compared to future potential stocking rates. Once again Range Specialist and District Ranger determined these percentages. It is also important to remember that ungulates are vital to cycling nitrogen and phosphorous for ecosystem functions and nutrient cycling. We did not estimate nutrient levels deposited on uplands.

Potential reduction in nitrogen and phosphorous nutrient levels by implementation of the BMP's and associated improvements proposed for funding in Phases 2 and 3 is significant if the data from the formulas and included in the spreadsheets is applicable. For example, on the East Eagle and Mud Springs allotments, 1,112 lbs. of Nitrogen and 421 lbs. of Phosphorous has the potential for entering stream or drainage systems during the year from ongoing grazing activities, current stocking rate, without proposed improvement tasks completed. With current numbers and if tasks are completed, the reduction estimates are almost 100% reduction in potential inputs.

Since the long term goal of the UECWA is maintaining viability of livestock operations on Forest lands, and Phase 1 is funded specifically to enable achievement of this goal, it is

very important to look at potential future stocking rates to determine possible nutrient changes. Spreadsheets are provided for each allotment that address potential capacity stocking. Once again, viewing data for East Eagle, potential excretion of Nitrogen and Phosphorous into sensitive stream and wetland corridors without improvements significantly increases over current stocking rates as are expected (1112 vs 9594 lbs per year of grazing). With implementation of BMP's at outlined combine with proposed improvements, reduction in both nutrients is estimated at 100%.

While the District and members of the UECWA recognize that these estimates are only estimates, it does provide some quantifiable insight into the value of various improvement tasks proposed for funding by DEQ.

16. While the project does address education and outreach, it is lacking in specifics. There is budget for developing educational curriculum, but no discussion of how the materials will be used. Who specifically will be targeted for education?
The educational materials developed will be targeted for junior and high school students in the three school districts of Greenlee County. Interpretive/educational presentations for use with constituent groups (ranchers, agency personnel, members of the UECWA , Quivira Coalition, and the Upper Gila Watershed Alliance) will be developed for adult audiences. An action plan for implementing the education and outreach component will be developed alongside and in concert with the monitoring plan.

17. Please provide more details on the operation and maintenance of fencing.
We are unclear about this question. The vast majority of fences requested for reconstruction have exceeded their lifespan, being built either by CCC crews in the 1930's, or anytime following that period. These fence segments need to be completely rebuilt, requiring removal of old wire and old metal posts if these exist, and replacement with new steel posts, standard specifications calling for 4 strands of wire, 3 barbed and one smooth bottom wire. Forest Service often contributes materials and the permittee labor for total reconstruction or heavy maintenance. General normal maintenance is completed by the permittees. Fence reconstruction or new construction is authorized through the Permit Modification process, where specifications, details about costs, shared labor and other equipment costs, and maps of locations are developed, agreed to by the permittee, and approved by the District Ranger. Each Permit Modification becames a part of the Term Grazing Permit, and must be built to specifications for clearance and acceptance.

Comments

ADEQ's method for sample collection, taxonomy and analysis with the Indexes of Biological Integrity should be used for the macroinvertebrate sampling. This information can be found in the ADEQ Biocriteria Program Quality Assurance Program Plan (2005). Contact Patti Spindler of the Water Quality monitoring and Standards program at phs@azdeq.gov for more information.
Josh Chapman has contacted Patti Spindler concerning monitoring protocols, and this method will be incorporated into the monitoring plan.

8-007
Upper Eagle Creek Watershed Restoration Project

Scope of Work (A-G)

Section A – Water Quality Problem(s)

A-1 Problem:

Pre-existing riparian exclusion fencing along several stream reaches in the Upper and Lower Eagle Creek sub-watersheds were destroyed by the floods of January 2005. Some existing pipelines to alternate water sites are in disrepair and unreliable, leaving livestock to congregate in actual spring areas instead of dispersing through the pasture. Resultant utilization of riparian vegetation plus the direct impact of manure and urine into the creek and springs has presented potential degradation of the water quality and damage to critical habitat for a variety of wetland and aquatic species. Trampling by livestock may also be contributing to stream bank erosion.

Unmanaged cattle grazing in riparian areas often removes vegetation and compacts soils during critical time periods, resulting in increased surface erosion through loss of vegetative cover and subsequent gullying. Compaction of soils by animal hoof action can reduce percolation of water into the groundwater table. Degradation of water quality and aquatic habitats may follow through increased water temperatures, sedimentation, and nutrient loads, and decreased dissolved oxygen available for aquatic species. Riparian and aquatic habitats throughout these allotments provide important and designated critical habitat for a variety of federal and state listed species, along with a diverse array of Forest and State sensitive and management indicator species. Eagle Creek, particularly stream reaches within the Clifton Ranger District, has long been noted and recognized as one of the last significant stream systems that offer habitat for a variety of native fish.

Grazing permit requirements for protection of riparian habitat and recovery of uplands following prescribed burns presents additional challenges to permittees on the Clifton Ranger District.

A-2 Pollution sources (primary and secondary):

Primary Pollution Source

Select a maximum of five (5) from the **BOLD** selections in **Appendix A.**		
Code #	**Name**	**% of Project Area**
1st -1000	Agriculture	60 %
2nd -7000	Hydromodification	20 %
3rd -8000	Other NPS Pollution	20 %
4th -		%
5th -		%
	Total	**100%**

Secondary Pollution Source

Choose all appropriate pollution sources that apply from **Appendix A** - (Do not include **bolded** entries from primary category)		
Code #	**Name**	**% of Project Area**
8950	Wildlife	10 %
8600	Natural Sources	10 %
1500	Range Grazing	60 %
7600	Removal of Riparian Vegetation	20 %
		%
		%
		%

Section B - Action Plan

B-1 Plan of Action: In summary, riparian exclusion fencing, alternative water sources, and intensive grazing management will alleviate pollutants detailed under the project sites below.

The exclusion of cattle from Eagle Creek and other riparian areas, combined with improved management of wetlands and interrupted or ephemeral riparian corridors on these allotments will contribute to the restoration of proper hydrologic conditions and functions, and increasingly functional stream geomorphology and channel characteristics over time. Rotational grazing and grass banking will be utilized to allow for rest and deferment of selected pastures. Improved grazing ensures recovery of riparian and wetlands as well as associated uplands, reducing erosion and resultant sedimentation of all aquatic habitats.

Riparian exclosures and moving water away from the creek and/or springs will allow the riparian areas to develop without use from livestock. Fencing will ensure permanent water and habitat protection and allow the riparian area to develop to its full potential, possibly returning to its historical condition as a riparian gallery forest dominated by sycamores (USFWS Biological Opinion, 2002).

The project will include, where identified, the construction or repair of fencing to Forest Service specifications (standard 4-strand barbed wire, smooth wire on bottom, post and stay spacing); and the development of alternative water sources using black poly pipe mated to fiberglass storage tanks and/or troughs, solar power systems, and/or earthen tanks. Fiberglass was chosen for maintenance ease and repair.

See the attached maps for project site-specific details of implementation items, noting that Project Sites are allotments covering landscape level areas.

B-2 Method of Approach:

11 – BMP Design/Implementation	14 – Livestock Control Projects
23 – Wetland Restoration/Protection	25 – Riparian Projects
450 – Livestock Grazing	501 – In-stream Flow Assessment
503 – Wetland Assessment/Monitoring	504 – Riparian Assessment/Monitoring
510 – Water Quality Trend Assessment	600 – BMP Effectiveness Monitoring
610 – Biological Monitoring	620 – Watershed Assessment

B-3 Management Measures

Project Site (area 1):

Mud Springs/East Eagle Allotments (Permittee – Gary & Darcy Ely)

This allotment encompasses 62,242 acres – 62,213 of which lie within the Eagle Creek watershed. The Four Drag Ranch is the headquarters for this allotment, and sits alongside Eagle Creek just north of Honeymoon Campground. The Ely family has held this permit since 2001, and has faced challenges such as the Mexican gray wolf depredation.

The management emphasis for restoration includes:

- Development of alternative water sources away from wetlands and springs
- Fencing of wetlands and riparian corridors where feasible for protection
- Creating riparian pastures for effective management during dormant seasons
- Refurbishment of amortized improvements, especially fencing, to manage livestock grazing program and compliment riparian restoration MOU with private land owners (Gusts) and to facilitate effective deferment and rest following grazing periods and landscape applications of fire
- Planned deferred and rest rotation grazing
- Partial deferment of numbers (30-75%)
- Upland and riparian monitoring
- Application of Modified Grazing Response Index in annual planning

BMPs

Alternative water sources	Fence
Wildlife – wetland mgmt.	Grazing – planned systems (seasonal or pasture rotation systems)
Habitat development/mgmt.	Habitat restoration
Heavy use area protection	Livestock exclusion
Pasture and hayland mgmt.	Pipeline
Spring development	Trough or tank
Upland wildlife habitat	Use exclusion

mgmt.	
Watering facility	Water/sediment control basin
Wetland restoration	Wildlife – watering
Wildlife – shallow water mgmt.	Wildlife – upland area mgmt.

Pollutant Type

- Sedimentation/Siltation (1100)
- Alterations (Habitat, other than flow) (1600)
- Nitrates (0930)
- pH (1000)
- Exotic species (2600)
- Dissolved oxygen (Low) (0200)
- Temperature (1400)
- Suspended solids (2100)

Load Reduction Estimate: Nitrate concentrations are anticipated to be reduced nearly 100% through removal of livestock impacts and activity directly within riparian and wetland areas by exclusion fencing. Each exclosure will provide a buffer of upland vegetative ground cover, which will act as a filter for overland flow. Placement of alternative water sources will encourage livestock use away from riparian areas. A 10-15% reduction in turbidity (expressed as total suspended solids) is expected by year two, and will increase as the vegetative buffers are further established.[1] Elimination of direct sediment input through effective stream buffers on Eagle Creek will occur from exclosure. Reductions in indirect sediment input through ephemeral drainages will be potentially reduced by 2 to 20 times through estimated improved ground cover conditions [depending on slope and soil type – based on Water Erosion Prediction Project (WEPP) modeling runs for the Eagle Creek Watershed with implementation of improved cattle management (improved ground cover)].

Project Site (area 2):

AD Bar/Hogtrail Allotments (Permittee – Chase Caldwell)

This allotment encompasses 37,304 acres – 21,276 of which lie within the Eagle Creek watershed. Reductions in stocking has been forthcoming by this permittee, Chase Caldwell, to facilitate rest and recovery following prescribed burning and other landscape restoration being implemented by the Clifton Ranger District.

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[1] Capture of sediment by riparian buffers varies depending on the width of vegetative buffers (http://www.ext.vt.edu/pubs/forestry/420-151.html).

sediment input through effective stream buffers on Eagle Creek will occur from exclosure. Reductions in indirect sediment input through ephemeral drainages will be potentially reduced by 2 to 20 times through estimated improved ground cover conditions [depending on slope and soil type – based on Water Erosion Prediction Project (WEPP) modeling runs for the Eagle Creek Watershed with implementation of improved cattle management (improved ground cover)].

a. Project Site (area 3):

Baseline/Horsesprings Allotments (Permittee – Jim & Clarice Holder)

This allotment consists of 10,595 acres – all of which lie within the Eagle Creek watershed. The Anchor Ranch serves as the headquarters for this allotment, and sits alongside Eagle Creek, next to the original Eagle Creek School. The ranch has been monitoring rangeland conditions for more than a decade, initially using frequency transects and photo points as a primary base.

The Baseline-Horsesprings allotment encompasses more then 16 square miles of continuous un-fragmented, healthy grassland communities unique to the southwest in that they remain relatively intact both in terms of vegetation and through occupancy by indigenous wildlife species.

Currently, there are no working corrals on the east side of Eagle Creek. This creates a situation where cattle must be trailed back and forth through Eagle Creek. Development of the Pine Creek Corral (as specified in the project pricing schedule) is critical in that it will reduce the need to trail cattle through the waterway and riparian area.

The management emphasis for restoration includes:

- Enhancement of ongoing intensive herding management to improve upland conditions
- Expansion of water systems to optimize animal distribution
- Upland and riparian monitoring
- Application of Modified Grazing Response Index in annual planning

BMPs

Alternative water sources	Fence
Grazing – deferred	Grazing – planned systems (seasonal or pasture rotation systems)
Habitat development/mgmt.	Habitat restoration
Heavy use area protection	Wildlife – upland area mgmt.
Pasture and hayland mgmt.	Pipeline
Wildlife – wetland mgmt.	Trough or tank

(http://www.ext.vt.edu/pubs/forestry/420-151.html).

The management emphasis for restoration includes:

- Development of alternative water sources away from wetlands and springs
- Fencing of wetlands and riparian corridors where feasible for protection
- Creating riparian pastures for effective management during dormant seasons
- Refurbishment of amortized improvements, especially fencing, to manage livestock grazing program and facilitate effective deferment and rest following grazing periods and landscape applications of fire
- Extended deferred grazing (100%) to allow recovery of wetlands and riparian areas (2005-2008)
- Upland and riparian monitoring

BMPs

Alternative water sources	Fence
Grazing – deferred	Grazing – planned systems (seasonal or pasture rotation systems)
Habitat development/mgmt.	Habitat restoration
Heavy use area protection	Livestock exclusion
Pasture and hayland mgmt.	Pipeline
Spring development	Trough or tank
Upland wildlife habitat mgmt.	Use exclusion
Watering facility	Water/sediment control basin
Wetland restoration	Wildlife – watering
Wildlife – shallow water mgmt.	Wildlife – upland area mgmt.
Wildlife – wetland mgmt.	

Pollutant Type

- Sedimentation/Siltation (1100)
- Alterations (Habitat, other than flow) (1600)
- Nitrates (0930)
- pH (1000)
- Exotic species (2600)
- Dissolved oxygen (Low) (0200)
- Temperature (1400)
- Suspended solids (2100)

Load Reduction Estimate: Nitrate concentrations are anticipated to be reduced nearly 100% through removal of livestock impacts and activity directly within riparian and wetland areas by exclusion fencing. Each exclosure will provide a buffer of upland vegetative ground cover, which will act as a filter for overland flow. Placement of alternative water sources will encourage livestock use away from riparian areas. A 10-15% reduction in turbidity (expressed as total suspended solids) is expected by year two, and will increase as the vegetative buffers are further established.[2] Elimination of direct

[2] Capture of sediment by riparian buffers varies depending on the width of vegetative buffers

Load Reduction Estimate: Placement of alternative water sources will encourage livestock use away from riparian areas. A 10-15% reduction in turbidity (expressed as total suspended solids) is expected by year two, and will increase as the vegetative buffers are further established.[3] Reductions in indirect sediment input through ephemeral drainages will be potentially reduced by 2 to 20 times through estimated improved ground cover conditions [depending on slope and soil type – based on Water Erosion Prediction Project (WEPP) modeling runs for the Eagle Creek Watershed with implementation of improved cattle management (improved ground cover)].

Project Site (area 4):

Tule Allotment (Permittee – Twig & Shirley Winkle)

This allotment consists of 14,334 acres – all of which lie within the Eagle Creek watershed. The Winkle family has held this permit since 1990, and has worked hard to document recovery of the allotment in an effort to demonstrate stewardship and eventually increase stocking numbers. Because of their expertise in upland and riparian monitoring protocol, the Clifton Ranger District has hired the Winkles to perform monitoring on neighboring allotments.

The management emphasis for restoration includes:

- Development of alternative water sources away from wetlands and springs
- Fencing of wetlands and riparian corridors where feasible for protection
- Creating riparian pastures for effective management during dormant seasons
- Expand high intensity grazing and herding program
- Refurbishment of amortized improvements, especially fencing, to manage livestock grazing program
- Upland monitoring that includes focus on soil stability and erosion potential and actual movements

BMPs

Alternative water sources	Fence
Wildlife – wetland mgmt.	Grazing – planned systems (seasonal or pasture rotation systems)
Habitat development/mgmt.	Habitat restoration
Heavy use area protection	Livestock exclusion
Pasture and hayland mgmt.	Pipeline
Spring development	Trough or tank
Upland wildlife habitat mgmt.	Use exclusion

[3] Capture of sediment by riparian buffers varies depending on the width of vegetative buffers (http://www.ext.vt.edu/pubs/forestry/420-151.html).

Upland wildlife habitat mgmt.	Wildlife – watering
Watering facility	Water/sediment control basin
Wildlife – shallow water mgmt.	

Pollutant Type

- Sedimentation/Siltation (1100)
- Exotic species (2600)
- Suspended solids (2100)

Watering facility	Water/sediment control basin
Wetland restoration	Wildlife – watering
Wildlife – shallow water mgmt.	Wildlife – upland area mgmt.

Pollutant Type

- Sedimentation/Siltation (1100)
- Alterations (Habitat, other than flow) (1600)
- Nitrates (0930)
- pH (1000)
- Exotic species (2600)
- Dissolved oxygen (Low) (0200)
- Temperature (1400)
- Suspended solids (2100)

Load Reduction Estimate: Nitrate concentrations are anticipated to be reduced nearly 100% through removal of livestock impacts and activity directly within riparian and wetland areas by exclusion fencing. Each exclosure will provide a buffer of upland vegetative ground cover, which will act as a filter for overland flow. Placement of alternative water sources will encourage livestock use away from riparian areas. A 10-15% reduction in turbidity (expressed as total suspended solids) is expected by year two, and will increase as the vegetative buffers are further established.[4] Elimination of direct sediment input through effective stream buffers on Eagle Creek will occur from exclosure. Reductions in indirect sediment input through ephemeral drainages will be potentially reduced by 2 to 20 times through estimated improved ground cover conditions [depending on slope and soil type – based on Water Erosion Prediction Project (WEPP) modeling runs for the Eagle Creek Watershed with implementation of improved cattle management (improved ground cover)].

Project Site (area 5):

Double Circle Allotment (Permittee – Doug Dressler & Wilma Ann Jenkins)

This allotment consists of 36,334 acres – 30,890 of which lie within the Eagle Creek watershed. Permittees Doug Dressler and Wilma Ann Jenkins have agreed to defer 50% of the permitted numbers for three full years to allow for a time of joint partnering efforts. This reduced stocking, along with plans for major range improvement work, will compliment ongoing Forest Service restoration efforts to reduce pinyon-juniper encroachment and return natural fire cycles back to appropriate occurrence levels.

The management emphasis for restoration includes:

- Development of alternative water sources away from wetlands and springs

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[4] Capture of sediment by riparian buffers varies depending on the width of vegetative buffers (http://www.ext.vt.edu/pubs/forestry/420-151.html).

for protection of riparian areas and to enable use of pastures that lost water sources when Eagle Creek was fenced off

- Fencing of wetlands and riparian corridors where feasible for protection
- Significant fencing (8.25 miles) will protect riparian areas and pastures recovering from prescribed fire activity (NO Bar Pasture), and planned restoration thinning
- Creating riparian pastures for effective management during dormant seasons
- Extended deferred grazing program (3-5 years)
- Upland forage use monitoring

BMPs

Alternative water sources	Fence
Grazing – deferred	Grazing – planned systems (seasonal or pasture rotation systems)
Habitat development/mgmt.	Habitat restoration
Heavy use area protection	Livestock exclusion
Pasture and hayland mgmt.	Pipeline
Spring development	Trough or tank
Upland wildlife habitat mgmt.	Use exclusion
Watering facility	Water/sediment control basin
Wetland restoration	Wildlife – watering
Wildlife – shallow water mgmt.	Wildlife – upland area mgmt.
Wildlife – wetland mgmt.	

Pollutant Type

- Sedimentation/Siltation (1100)
- Alterations (Habitat, other than flow) (1600)
- Nitrates (0930)
- pH (1000)
- Exotic species (2600)
- Dissolved oxygen (Low) (0200)
- Temperature (1400)
- Suspended solids (2100)

Load Reduction Estimate: Nitrate concentrations are anticipated to be reduced nearly 100% through removal of livestock impacts and activity directly within riparian and wetland areas by exclusion fencing. Each exclosure will provide a buffer of upland vegetative ground cover, which will act as a filter for overland

flow. Placement of alternative water sources will encourage livestock use away from riparian areas. A 10-15% reduction in turbidity (expressed as total suspended solids) is expected by year two, and will increase as the vegetative buffers are further established.[5] Elimination of direct sediment input through effective stream buffers on Eagle Creek will occur from exclosure. Reductions in indirect sediment input through ephemeral drainages will be potentially reduced by 2 to 20 times through estimated improved ground cover conditions [depending on slope and soil type – based on Water Erosion Prediction Project (WEPP) modeling runs for the Eagle Creek Watershed with implementation of improved cattle management (improved ground cover)].

Section C - Expected Outcomes

C-1 Goals:

I. Protect water quality in Eagle Creek;
II. Expand and protect existing riparian and wetland areas;
III. Establish baseline watershed conditions for Eagle Creek for effectiveness monitoring;
IV. Provide permanent water and wetland area for a variety of wildlife species;
V. Enable permittees to improve water distribution and fencing for intensive applied livestock management;
VI. Enable permittees to be responsive for complimenting Forest Service landscape restoration activities (prescribed fire and thinning);
VII. Ensure long-term effectiveness of improved grazing management to improve water quality for threatened fish and aquatic species and overall watershed health.

C-2 Project Longevity:

Present and ongoing management of allotments by the UECWA permittees has shown substantial improvements in riparian and wetland recovery within each Project site or allotment to date. Implementation and success of this Project will result in changes observable over the entire Eagle Creek watershed. Improved management to reduce impacts and improve proper management of riparian corridors will be immediate, within the first year. The expansion of wetland and herbaceous species is expected to become evident within 2-3 years of applied rest from livestock disturbance and grazing, and proper grazing during appropriate periods. Recovery and improvement in aquatic environments and subsequent water quality will be measurable for an extended time period through improved management of livestock, including utilization and distribution.

Fencing, properly installed and barring natural disasters, will last at least 25 years. Numex pipe, fiberglass troughs, and poly storage tanks will last at least 25 years at a minimum.

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[5] Capture of sediment by riparian buffers varies depending on the width of vegetative buffers (http://www.ext.vt.edu/pubs/forestry/420-151.html).

Permittees have committed to properly maintain all improvements as required in each permit's Annual Operating Instructions, as agreed by the US Forest Service.

Section D - Project Evaluation

Monitoring and evaluation of improved grazing practices supported by this project are important elements in the overall management and collaborative efforts of the UECWA. Presently, permittees within the UECWA conduct extensive upland monitoring as established in the UECWA Monitoring Plan, mutually developed in cooperation with the Clifton Ranger District. While upland monitoring is a cornerstone for progressive and effective livestock grazing practices, this data alone does not provide the entire picture of changes in the entire watershed under stewardship of the UECWA.

By establishing the baseline conditions for the Upper and Lower Eagle Creek watershed, we will be able to monitor the long-term effectiveness of grazing management and other restoration and stewardship projects to improve water quality for threatened fish species and overall watershed health.

Included in the scope of this project is the development of a monitoring plan for the watershed, in addition to implementation funds. Protocol for monitoring of upland areas has already been developed and is occurring in concert with the Clifton Ranger District, and includes forage production and utilization, photo points, condition of range improvements, and precipitation, actual use data, and modified Grazing Response Index. Development of a monitoring plan for this project (including a Quality Assurance Project Plan) would build upon existing protocol to identify and implement a full suite of tools to gauge watershed health.

The goal of the monitoring plan is to develop a long-range monitoring program that achieves two objectives:

1) Targeting the implementation of further BMPs to areas that have the greatest potential for contributing sediment and other pollutants in the Upper and Lower Eagle Creek sub-watersheds;

2) Tracking trends in reducing sediment loads, decreasing stream temperatures, and improving the overall health of the watershed.

Data gathering and monitoring for the effectiveness of BMPs may include:

- Establishment of monitoring sites
- Photo documentation from established photo points
- Measurements of percent canopy density

- Upland herbaceous production, effective ground cover measurements, and forage use monitoring to demonstrate stabilizing or improved watershed and soil conditions
- Fisheries assessments
- Macroinvertebrate sampling
- Water sampling and analysis
- Standard water parameters measurements (dissolved oxygen, pH, temperature, discharge)
- Sediment loads/transportation
- Inventory and mapping of significant features, e.g., riparian density, gullies and other high-risk erosive areas, evidence of in-stream vehicular use; exclosure locations
- Assessment of exclosure effectiveness or comparison of grazing effects on stream condition and revegetation success

Locations for installation of sampling sites have been tentatively identified (see monitoring map, attached). We propose to quarterly (once every three months) monitor water temperature, pH, dissolved oxygen, flow rate, turbidity, and bankside vegetation via a photo plot, at six locations. Two people will conduct this monitoring – it is estimated to take six person days (three days x two people) every three months, for a total of 24 person days of monitoring each year. Dissolved oxygen, pH, and temperature will be measured with an Oakton waterproof pH/DO 300 meter. Turbidity samples will be taken and measured on site using a Hach 2100P turbidimeter. Flow will be measured with a Marsh McBirney Flo-Mate, with at least 20 readings per cross section. Macroinvertebrate samples will be collected every fall from each quarterly monitored site.

At three locations we will continually collect data via a CR1000 measurement and control data logger with sensors measuring turbidity, temperature, dissolved oxygen, water depth (via a pressure transducer), pH, and conductivity. These stations will be checked and data downloaded every two weeks throughout the year. This will require two days every two weeks throughout the year, for a total of 52 person days throughout the year.

This sampling effort would be a preliminary measure to begin monitoring water quality on Eagle Creek. We request funding for one person to coordinate collaboration with ADEQ in establishing a sound monitoring protocol, as well as a Quality Assurance Project Plan (QAPP) – a refined sampling strategy to fit ADEQ monitoring standards to be able to supply usable monitoring data to ADEQ. Additionally, a quality assurance and quality control plan would be developed to assure overall project management and to ensure that the data being collected meets the quality standard set by ADEQ for incorporation into their statewide watershed assessment. A data manager will be responsible for collection and organization of all data in one accessible database for analysis and presentation.

Milestone Measures

As project implementation proceeds, milestones are used to define the control actions being implemented and their relative effectiveness. Quantifiable, interim measures for overall water quality improvement, listed as target criteria, include:

- Percent restored riparian buffers in watershed: improved bank stability, filtration capacity, and shade cover;
- Increase in length, density, and effectiveness of vegetative buffers between streams and agricultural activities
- Decreased sediment runoff from upland areas (This could include the measuring of effective groundcover through daubenmires or paced transects as a meaningful surrogate measure of soil conditions. See attached draft monitoring plan for measurement techniques. Monitoring protocol will be finalized during the development of the monitoring plan, as listed in the Milestones.)
- Decreased volume of sediment inputs from ephemeral stream tributaries, including gullies (This might include measurements such as staking and photo points.)
- Expansion of herbaceous cover (woody species thinning; improved grazing methods)
- Re-establishment of historic wetlands

Section E - Public Education, Outreach, and Partnerships

E-1 Education and Public Outreach:

This project has tremendous potential for education and outreach impacts. The UECWA will work with the Quivira Coalition and the Upper Gila Watershed Alliance to highlight the project's success through a public forum targeting other ranchers and agency personnel. Development of a monitoring plan for the Upper and Lower Eagle Creek sub-watersheds will include strategies for engaging volunteers and students in the monitoring work. Also included in the budget are funds for developing an educational monitoring curriculum, classroom presentations, classroom materials, and student transportation.

E-2 Partnerships:

By itself, the Upper Eagle Creek Watershed Association is a vast partnership (see Executive Summary). With this project, more than $600,000 in funding from the Arizona Department of Agriculture Livestock Crop Conservation Grant Program is leveraged by additional contributions from the permittees in the form of grazing deferment, labor, and administration. The Forest Service will contribute technical expertise on an ongoing basis.

Section F - Key Personnel

Project Coordinator – Melanie Gasparich is the Executive Director of the Upper Gila Watershed Alliance in Grant County, New Mexico, and has served as a project manager

AD Bar/Hogtrail Allotments
Project Pricing Schedule

Non-Federal match = ADA grant funds & permittee contribution

ProjectPhases	Requested ADEQ	Matching Permittee	Matching Other (incl. ADA)	TOTAL
Phase 1 - ADA Match				
Black Mountain Fence				
Fence materials (4 miles)	0	0	12,000	12,000
Labor - install fence (4 miles)	0	0	40,000	40,000
Pipestem Fence				
Fence materials (4 miles)	0	0	12,000	12,000
Labor - install fence (4 miles)	0	0	40,000	40,000
House Pipeline & Exclosure				
Fence materials (1/4 miles)	0	0	750	750
Labor - install fence (1/4 miles)	0	0	2,500	2,500
Pipeline & fittings	0	0	2,000	2,000
Labor - install pipeline (14 person days x 150/day)	0	2,100	0	2,100
Grapevine Spring Solar & Pipe				
Solar pump and accessories	0	0	10,810	10,810
Trough with wildlife ramps (1.5)	0	0	1011	2,400
Pipeline & fittings	0	0	3,629	3,629
Labor - install solar pump	0	0	300	300
Grazing deferment - 2006	0	83,933	0	83,933
Sub-total Phase 1	0	86,033	125,000	211,033
Phase 2 - ADEQ request - highest level				
Mallett Wetland Fence				
Fence materials (.5 miles)	1,500	0	0	1,500
Labor - install fence (.5 miles)	4,000	0	0	4,000
Flat Spring Exclosure				
Fence materials (.25 miles)	750	0	0	750
Labor - install fence (.25 miles)	1,500	0	0	1,500
Pipeline	2,200	0	0	2,200
Labor - install pipeline & storage	600	0	0	600
Storage	1,900	0	0	1,900
Admin/supplies	100	0	0	100
Sheep Wash Fence				
Fence materials (2 miles)	6,000	0	0	6,000

Labor - install fence (2 miles)	16,000	0	0	16,000
Grapevine Spring Pipeline & Exclosure				
Fence materials (1/2 miles)	1,500	0	0	1,500
Labor - install fence (1/2 miles)	4,000	0	0	4,000
Storage tank (9,000 gal)	4,000	0	0	4,000
Labor - install storage & trough	1,350	0	0	1,350
Labor - install pipeline	2,100	0	0	2,100
Trough with wildlife ramps (1.5)	1,389	0	0	1,389
Grazing deferment - 2007	0	83,933	0	83,933
Sub-total Phase 2	48,889	83,933	0	132,822
Phase 3 - ADEQ request - next level				
Turkey Creek Fence Reconstruction				
Fence materials (1 mile)	3,000	0	0	3,000
Labor - install fence (1 mile)	8,000	0	0	8,000
Sub-total Phase 3	11,000	0	0	11,000
TOTAL	**59,889**	**169,966**	**125,000**	**354,855**
	17%	48%	35%	100%

Baseline/Horsesprings Allotments
Project Pricing Schedule

Non-Federal match = ADA grant funds & permittee contribution

	Requested ADEQ	Matching Permittee	Matching Other (incl. ADA)	TOTAL
Project Phases				
Phase 1 - ADA Match				
Pasture Restoration				
Labor - install pipe	0	0	2,500	2,500
Solar array and pumps	0	0	32,743	32,743
Pipeline - 3600' black poly pipe	0	0	10,000	10,000
K-Line watering system	0	0	5,050	5,050
Archaeologist's report	0	0	1,500	1,500
Grazing Deferment for 2006	0	11,635	0	11,635
Sub-total Phase 1	0	11,635	51,793	63,428
Phase 2 - ADEQ request - highest level				
Water System Extension				
NuMEX pipe, 267 psi, 1 1/4"	11,326	0	11,400	22,726
Troughs: 4x8x2' fiberglass	4,000	0	4,200	8,200
8,800 Gal. Storage Tanks	6,600	0	12,600	19,200
Transition Fittings & Float Valves	1,125	0	900	2,025
Labor - installation at $150/day				
Install Solar Array	0	0	3,000	3,000
Tank Installation	300	0	450	750
Site Preparation	150	0	150	300
Pack in and install troughs	900	0	2,100	3,000
Pack in Pipe	600	0	600	1,200
Pipe Layout and Fuse	1,800	0	3,000	4,800
Pipe Fuser	2,400	0	50	2,450
Front-end Loader Rental	2,800	0	350	3,150
D-6 Dozer	3,600	0	0	3,600
Cement Mixer Rental	250	0	0	250
Fencing	0	0	9,100	9,100
Solar Array (panels, batteries, etc)	0	0	13,410	13,410
Mileage for delivery of trough	0	0	700	700
Pine Creek Corral				
Labor - install fence (20 person days x $150/day)	0	3,000	0	
Equipment - welder rental (20 days x $50/day)	1,000	0	0	
Misc. equipment & supplies	2,000	0	0	

(welding rods, cement, etc.)				
Sub-total Phase 2	15,500	3,000	62,010	80,510
Phase 3 - ADEQ request - next level				
Pump House Water				
Storage Tank - 8800 gals	6,600	0	0	6,600
Fiberglass Trough (1) 4x8x2	800	0	0	800
Labor - install trough (2 person days x 150/day)	300	0	0	300
Labor - install tank (2 person days x 150/day)	300	0	0	300
Transition Fittings & Float Valves	125	0	0	125
Bear Trap Troughs				
Fiberglass Trough (1) 4x8x2	800	0	0	800
Labor - install trough (2 person days x 150/day)	0	300	0	300
Transition Fittings & Float Valves	125	0	0	125
Sub-total Phase 3	9,050	300	0	9,350
TOTAL	**24,550**	**14,935**	**113,803**	**153,288**
	16%	10%	74%	100%

Tule Allotment
Project Pricing Schedule

Non-Federal match = ADA grant funds & permittee contribution

Project Phases	Requested ADEQ	Matching Permittee	Matching Other (incl. ADA)	TOTAL
Phase 1 - ADA Match				
Tule Creek Corridor Fencing				
Fence materials (3.5 miles)	0	0	10,500	10,500
Labor - install fence (3.5 miles)	0	0	24,500	24,500
Labor - clear fence line, GPS, install gate	0	7,650	0	7,650
(51 person days x 150/day)	0		0	0
Water system materials	0		22,596	22,596
Labor - storage tank	0	26,400	0	26,400
(176 person days x 150/day)				
Labor - pipeline	0	2,100	0	2,100
(14 person days x 150/day)				
Equipment - run backhoe (time & labor)	0	3,750	0	3,750
(5 person days x 750/day)				
Equipment - dozer				
(20 days x 8 hrs x 105/hr)	0	0	16,800	16,800
Tule Spring Alternative Water Development				
Storage tank - (2) 9,000 gal	0	0	8,000	8,000
Troughs w/ wildlife ramps (4)	0	0	2,400	2,400
1" NuMex poly pipe (7,080 ft)	0	0	2,124	2,124
1 1/4" NuMex poly pipe (5,280 ft)	0	0	2,270	2,270
Solar pump & accessories	0	0	10,810	10,810
Labor - install solar pump and pipeline	0	9,450	0	9,450
Sub-total Phase 1	0	49,350	100,000	149,350
Phase 2 - ADEQ request - highest level				
Upper Deerhead Pipeline				
Labor	0	4,650	0	4,650
Pipeline & fittings	3,100	0	0	3,100

	Troughs	2,000	0	0	2,000
	Admin/supplies	100	0	0	100
	Tule Spring Exclosure & Pipeline extension				
	Labor - install solar pump and pipeline	0	9,450	0	9,450
	Pipeline & fittings	1,500	0	0	1,500
	Fence materials	500	0	0	500
	Admin/supplies	200	0	0	200
	Wagon Spring Pipeline				
	Equipment - dozer	1,600	0	0	1,600
	Labor	0	2,100	0	2,100
	Pipeline & fittings	1,150	0	0	1,150
	Storage	4,000	0	0	4,000
	Troughs	700	0	0	700
	Admin/supplies	200	0	0	200
	Deerhead Div Fence				
	Labor	10,500	3,300	0	13,800
	Fence materials	4,700	0	0	4,700
	Admin/supplies	100	0	0	100
	Willow Springs Extension and Waterlot				
	Labor	0	3,600	0	3,600
	Pipeline & fittings	1,000	0	0	1,000
	Troughs	700	0	0	700
	Fence materials	300	0	0	300
	Webster Spring Pipeline				
	Labor	0	3,750	0	3,750
	Pipeline & fittings	800	0	0	800
	Troughs	700	0	0	700
	Sub-total Phase 2	32,350	23,100	0	55,450
Phase 3 - ADEQ request - next level					
	Cottonwood Spring Solar				
	Equipment	14,000	0	0	14,000

Labor	2,000	19,500	0	21,500
Pipeline & fittings	3,530	0	0	3,530
Storage	7,000	0	0	7,000
Troughs	1,500	0	0	1,500
Solar System	10,810	0	0	10,810
Admin/supplies	400	0	0	400
Sub-total Phase 3	90,390	53,250	0	143,640
TOTAL	**122,740**	**125,700**	**100,000**	**348,440**
	35%	36%	29%	100%

Double Circle Allotment
Project Pricing Schedule

Non-Federal match = ADA grant funds & permittee contribution

Project Phases	Requested ADEQ	Matching Permittee	Matching Other (incl. ADA)	TOTAL
Phase 1 - ADA Match				
Big Dry Pipeline				
Labor - install NuMex pipe (15.5 miles)	0	5,500	10,000	15,500
Equipment - Kubota tractor	0	750	0	750
Equipment - Kubota utility vehicle	0	750	0	750
Equipment - Fusion machine w/ 1.25" ins	0	0	2,300	2,300
Fuel	0	0	500	500
Cross H Extension*	0	0	27,500	27,500
Big Dry Extension*	0	0	9,000	9,000
Bee Springs Extension*	0	0	10,000	10,000
NO Bar Extension*	0	0	7,500	7,500
Solar pumping system (incl. install)	0	0	52,300	52,300
Chain link fence around solar system	0	0	4,000	4,000
Seal floor of 21,000 gal tank	0	0	1,200	1,200
Repair broken segments of existing pipeline for reuse	0	0	700	700
* Extensions include costs for all needed pipe, storage tanks, troughs, floats, valves, fittings, transitions, and other hardware needed.				
Grazing deferment - 2005	0	64,525	0	64,525
Grazing deferment - 2006	0	53,771	0	53,771
Sub-total Phase 1	0	125,296	125,000	250,296
Phase 2 - ADEQ request - highest level				
Big Dry Fence				
Fence materials (3.5 miles)	10,500	0	0	10,500
Labor - install fence (3.5 miles)	28,000	0	0	28,000
Equipment - county supplied	0	3,000	0	3,000
Admin/supplies	200	0	0	200

Willow Creek Fence				
Fence materials (.9 miles)	2,700	0	0	2,700
Labor - install fence (.9 miles)	7,200	0	0	7,200
Admin/supplies	100	0	0	100
IDT Boundary Fence				
Fence materials (1.6 miles)	4,800	0	0	4,800
Labor - install fence (1.6 miles)	12,000	0	0	12,000
Admin/supplies	100	0	0	100
ST Pipeline & Storage				
Pipeline & fittings (1.4 miles)	4,000	0	0	4,000
Storage tank	6,000	0	0	6,000
Trough	1,400	0	0	1,400
Labor - install pipeline & storage (24 person days x 130/day)	3,120	0	0	3,120
Equipment - Kubota & vehicles	0	750	0	750
Cross H Pipeline Extension & Storage				
Troughs (5)	3,500	0	0	3,500
Pipeline (3.4 miles)	8,976	0	0	8,976
Storage tanks (2- 8,800 gals)	7,000	0	0	7,000
Labor - install pipeline and storage (48 person days x 130/day)	0	6,240	0	6,240
Equipment - Kubota & vehicles	0	1,500	0	1,500
Admin/supplies	250	0	0	250
Sheep Springs Water Line				
Fence materials (.5 miles)	1,500	0	0	1,500
Labor - install fence (.5 miles)	4,000	0	0	4,000
Grazing deferment - 2007	0	43,017	0	43,017
Sub-total Phase 2	105,346	54,507	0	159,853
Phase 3 - ADEQ request - next				

level

NO Bar Fence				
Fence materials (2.0 miles)	6,000	0	0	6,000
Labor - install fence (2.0 miles)	16,000	0	0	16,000
Admin/supplies	100	0	0	100
Cat Tank Pipeline & Storage				
Pipeline & fittings (.8 miles)	2,500	0	0	2,500
Storage tank (8,800 gals)	4,000	0	0	4,000
Trough	700	0	0	700
Labor - install pipeline & storage (10 person days x $130/day)	0	1,300	0	1,300
Equipment - Kubota & vehicles	0	400	0	400
Sub-total Phase 3	29,300	1,700	0	31,000
TOTAL	**134,646**	**181,503**	**125,000**	**441,149**
	31%	41%	28%	100%