FINAL REPORT

PALO ALTO RUNOFF CONTROL PROJECT

ADEQ Project Number 04-001

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This project was funded in part by the Environmental Protection Agency/Arizona Department of Environmental Quality ***Water Quality Improvement Program****. Technical assistance was provided by the USDA-Natural Resources Conservation Service. None of the assistance provided by this federal agency was used as a matching contribution to this project.*

Matching contributions in the form of labor, materials and funds were provided by:

- *Altar Valley Conservation Alliance*
- *Palo Alto Ranch*
- *King's Anvil Ranch*
- *Pima NRCD*
- *Pima County*
- *Arizona Game and Fish Department*
- *Arizona State Land Department*
- *Americorps *NCCC*
- *Coronado RC&D Area, Inc.*

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I. ABSTRACT

The objective of this project was to reduce sediment production from gully erosion and headcutting on the historic floodplain of the Altar Wash on 1,370 acres of the Palo Alto Ranch. Benefits of the project include reduced erosion, sedimentation and flooding downstream of the Altar Valley. The Altar drainage is a major tributary to the Santa Cruz River with a watershed area of over 600,000 acres or about 10% of the total area. This project has the added benefit of enhancing wildlife habitat, increasing forage production for wildlife and livestock and improving recreation and esthetic values.

Pre project conditions allowed for rapid run off of precipitation due to lack of basal vegetative cover which had resulted in the formation of gullies and head cutting along the Altar Wash. In an assessment completed by the Altar Valley Alliance, restoration of this area was identified as a top priority project to improve watershed health along the Altar Wash. The Palo Alto came under new ownership that is interested and committed to improving and maintaining watershed health leading to the development and implementation of this project. Owners have become active members of the Altar Valley Alliance and are dedicated to working with partners on a long term basis to maintain this project and reduce runoff and sediment.

Ranching began on the Palo Alto Ranch in the late 1800's; in 1905, the Altar Wash began to cut the Altar floodplain and by 1930, it had cut through the Palo Alto as far south as Pozo Nuevo. Soil Conservation Service photographs from February 1936 show the arroyo as very deep and narrow through the ranch. Headcuts on the valley side were just starting and were only a few hundred feet long. Several areas on the flood plain were being dry farmed at this time and the same photos show a hay lot on the southern end of the Sabino- Contreareas floodplain where native grass hay was being cut and stacked. Through the 1950's and 60's, the arroyo widened and deepened and the ranch built dikes along it to keep valley-side floodwaters on the floodplain. Flooding in 1983 took out several stretches of the dikes and as the ranch changed hands through inheritance, these were not restored or repaired.

This was the first phase of a two-phase project to implement Best Management Practices (BMPs). These BMPs were designed to reduce watershed runoff that had instituted an active cycle of erosion, flooding and sedimentation that has a negative impact on the Santa Cruz River and surrounding flood plain. Implementation took place on 4,298 acres of the watershed, focusing on 1370 acres of bottomland that is a combination of State and private land along a four-mile stretch of the Altar Wash and a one-mile reach of the confluence of Sabino, Contreras and Fresno Washes.

Best Management Practices implemented in this phase, consist of a combination 39,400 feet of fencing and 14,700 feet of earthen water spreader dikes along the Altar Wash that were either constructed or rehabilitated. Fencing will facilitate grazing rotation as a management practice to maximize plant growth and species diversity. An estimate of sediment captured through the implementation of this project according to the Natural Resources Conservation Service Revised Universal Soil Loss Equation for estimating water erosion is 26,000 tons. Without implementation of this project, that soil would be displaced and deposited as sediment in the Santa Cruz River near Marana.

II. GOALS/OBJECTIVES/METHODOLOGY

A. GOALS

The primary goal of this project was to reduce sediment entering the Santa Cruz River through the erosion along the Altar Wash, one of it's major tributaries. Secondary goals included improving wildlife habitat and restoring the historic flood plain.

B. OBJECTIVES

The following objectives in the form of conservation actions were identified to reduce erosion and rehabilitate a 4,298 acre portion of the watershed that was identified as contributing a major portion of the sediment being transported through the Altar Wash.

1. Improve grazing management on the Palo Alto Ranch to increase vegetative cover.
2. Restrict livestock access to the Altar Wash reducing the acceleration of head cutting.
3. Restore the historic flood plain to increase vegetative cover and reduce active gully erosion and improve watershed health.
4. Increase awareness of benefits of restoration activities in rural watersheds through information and education.
5. Increase awareness of opportunities available for conservation activities through local, state and federal agencies and through the formation of partnerships.

C. METHODOLOGY

The need for developing a project to address the sediment delivered to the Santa Cruz as a product of active erosion was identified by a resource inventory of the Altar Valley completed in April, 2000. This was an effort of the Altar Valley Conservation Alliance, funded by the Arizona Water Protection Fund and conducted by a private contractor. The Altar Valley Conservation Alliance is a local watershed group consisting of local landowners and advised by cooperating local, state, federal and Tribal units of government.

The resource assessment evaluated the natural resource base in reference to ecological site condition. This project area was identified as a high priority for treatment due to the high rate of active erosion.

A project team was formed to identify alternatives for addressing the erosion and developing a project plan. Team members included: new owners of the Palo Alto Ranch, NRCS Rangeland Management Specialist, Biologist and Engineer, Coronado RC&D Coordinator and Council Representative and representatives from the Altar Valley Conservation Alliance, Pima Natural Resource Conservation District, Arizona State Land Department, Arizona Game and Fish Department and US Fish & Wildlife Service.

The project team identified the objectives and developed a project plan that included fencing and water spreader dikes. A grant proposal was developed from this plan and submitted to the Arizona Department of Environmental Quality (ADEQ) for funding. A contract was signed in December of 2002 for EPA/ADEQ Water Quality Improvement funds. Grant funds requested were $139,550.00 with a matching contribution of $94,450 bringing the total project cost to $234,000.00.

Permits: One of the initial tasks on implementation was obtaining the permits necessary for construction. A portion of the project area is State Trust Land so a *Permit to Place Improvements on Rangelands* had to be obtained from the Arizona State Land Department. Before any permit can be issued, any area that could be disturbed by construction needs to be cleared by a certified archeologist. The Natural Resources Conservation Service (NRCS), Pima County and Arizona State Land Department staff participated in the archeological survey which resulted in no significant findings.

The Altar Valley is home to two endangered species the Cactus Ferruginous Pygmy Owl and the Pima Pineapple Cactus. In order to implement this project, a determination had to be made on the projects impact on these two species. A Section 7 Consultation was held with the US Fish and Wildlife Service which resulted in approval to proceed with the project. There was determined to be no detrimental impact on the Owl and all of the Pineapple Cactus were to be identified, marked and avoided by the construction.

A letter of application was submitted to the US Army Corps of Engineers for approval for construction under Nationwide Permit #27. This approval was granted based upon the State Historic Preservation Office (SHPO), US Fish & Wildlife Service approval and designs developed by NRCS and the project plan developed by the project team.

Designs: Natural Resources Conservation Service (NRCS) engineers developed all of the construction designs, and a NRCS Rangeland Management Specialist developed fencing designs and grazing management plans for the project. All designs and plans are in accordance with NRCS Standards and Specifications for those practices.

Two separate contractors were hired to implement the project. Sierrita Mining and Ranching installed 39,400 feet of new fencing to separate all the northern bottomlands on the ranch from the uplands to facilitate better grazing management. Prior to construction, all Pima Pineapple Cactus in the area were marked and a fence alignment selected that did not disturb them. A pre construction tour was conducted to enable the contractor to take steps to avoid them during construction.

R&R Dirtworks installed 13,500 feet of water spreader dikes along the Altar Wash in the North Valley. An additional 1200 feet of existing dike was repaired in the central part of the ranch. These dikes spread water across the historic floodplain and directly control active headcuts and gullies along the Altar Wash.

Disturbed areas were mulched with native grass hay donated by the USDA/NRCS Plant Materials Center. Volunteers from the Altar Valley Conservation Alliance hauled the hay and spread it on the dikes and disturbed areas. The volunteers also spread seed on areas behind the dikes.

An Americorp *NCCC crew of volunteers installed gabions in upland gullies to stabilize them and reduce sediment delivered to the bottomlands. The neighboring King's Anvil Ranch installed a water pipeline and troughs to facilitate a rotational grazing system on the project area.

III. RESULTS OF PROJECT

The results of this project can be summarized in the following categories:

A. **Sediment** retained on the watershed per year using average rainfall: 27,900 tons.

B. **Practices installed**: 14,700 feet of water spreader dikes installed or repaired, 39,400 feet of fence, 47 acres mulched and seeded to native grass, 1 gabion installed, 2 cattle guards installed, water bars installed on 7 miles of road.

C. **Information/Education Activities**

- Photo display at the Arizona Association of Conservation Districts Annual Meeting
- Power point presentation at the Society for Range Management Arizona and National Meetings
- A fact sheet developed
- Information on project published in the Coronado RC&D Newsletter and annual reports
- An on site tour for the public was held in November 2003 with 45 people in attendance.

D. **Monitoring**

Project monitoring was under the direction o f NRCS Rangeland Management Specialist, Dan Robinett and consisted of monitoring of vegetation and rainfall across the entire project area. (See complete monitoring report in Appendix)

E. **Partnerships** are a valuable benefit and result of this project. This project is an example what local landowners working together with units of government on various levels can accomplish.

F. **Grazing:** None of the Palo Ranch was grazed in calendar year 2001 nor was it grazed in 2002, the first year of the project. When grazing did resume, it was at a stocking rate that followed a plan jointly developed by the rancher, the Pima NRCD, the NRCS and the Arizona State Land Department.

IV. IMPLICATIONS AND RECOMMENDATIONS

This project serves as an excellent example of what can be done on the ground to address non point source pollution. By involving various units of government and a local partnership the Altar Valley Conservation Alliance, many people had the opportunity to learn about dealing with non point source pollution through the installation of structural and management practices. As more people become familiar with working within the context of programs designed to address non point concerns the potential for implementing projects grows.

This was a two year project that implemented practices to address non point source pollution. Due to the scale of the area addressed, the majority of the time was spent on the implementation itself. Long term monitoring has been set up to assess the impacts of the implementation over time but a two year project period does not allow time for that data to become available. Sediment retention rates were calculated on the best available scientific model.

Due to the high profile and positive impact of this project other landowners in the Santa Cruz Watershed have come forward with potential projects addressing non point source pollution in the form of sediment.

PALO ALTO RUNOFF CONTROL PROJECT

Coronado RC&D
MATCH REPORTING SCHEDULE-SUMMARY # 9 (FINAL)
GRANT AWARD CONTROL # 04-001
For the Period Ending: 2/28/04

ADEQ Payments made this period: $2,198.19

FEDERAL EXPENDITURES - (CASH)

Account Title	*BUDGET*	*CURRENT EXPENDITURES*	*CUMULATIVE EXPENDITURES*	*BUDGET REMAINING*
Salaries	$ -	$ -	$ -	$ -
Fringe Benefits	$ -	$ -	$ -	$ -
Indirect Costs (10% max)	$ 6,000.00		$ 6,000.00	$ -
Travel	$ -	$ -	$ -	$ -
Mtrl/Supp/Postage	$ -	$ -	$ -	$ -
Other svc.	$ 133,550.00	$ 3,293.81	$ 133,550.00	$ -
SUB-TOTALS	$ 139,550.00	$ 3,293.81	$ 139,550.00	$ -

Match Expenditures - (CASH & IN-KIND)

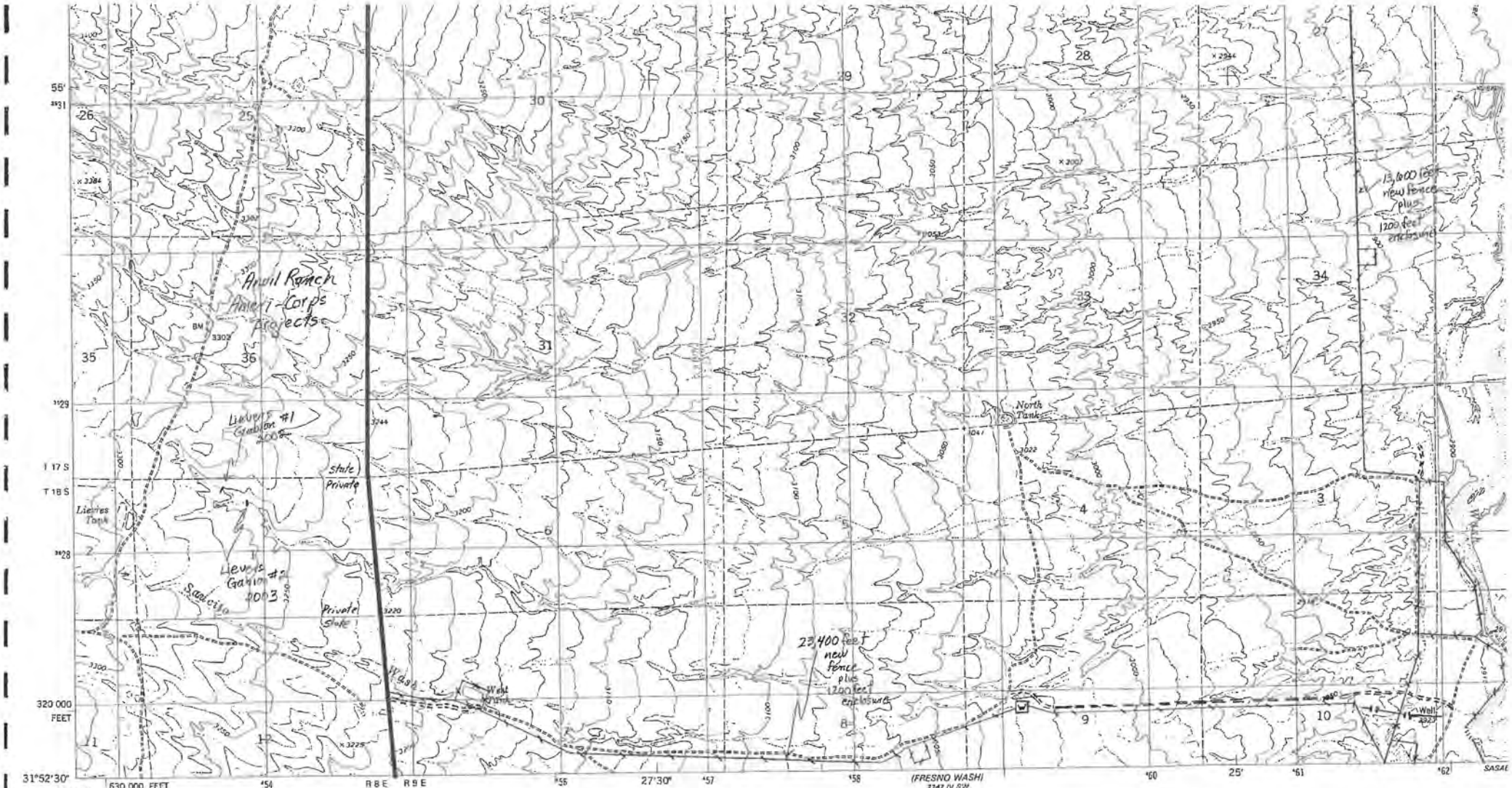
Account Title	*BUDGET*	*CURRENT EXPENDITURES*	*CUMULATIVE EXPENDITURES*	*BUDGET REMAINING*
Salaries	$ 18,300.00		$ 21,177.31	$ (2,877.31)
Fringe Benefits		$ -	$ -	
Indirect Costs (10% max)	$ 6,000.00	$ 1,750.00	$ 6,000.00	$ -
Travel	$ 750.00	$ -	$ 3,880.65	$ (3,130.65)
Mtrl/Supp/Postage	$ 1,700.00	$ -	$ 2,502.20	$ (802.20)
Other svc.	$ 67,700.00	$ 5,740.00	$ 61,234.41	$ 6,465.59
SUB-TOTALS	$ 94,450.00	$ 7,490.00	$ 94,794.57	$ (344.57)

TOTAL EXPENDITURES FOR PERIOD:	*BUDGET*	*CURRENT EXPENDITURES*	*CUMULATIVE EXPENDITURES*	*BUDGET REMAINING*
Through 2/28/04	$ 234,000.00	$ 10,783.81	$ 234,344.57	$ (344.57)

I hereby certify that this report is mathematically correct, has not been previously reported, and to the best of my knowledge and belief is a legal and proper claim against the Grant Award. I futher certify that back-up documentation (including time sheets, logs, schedules, etc.) is maintained in accordance with instructions contained in the Grant Award.

Ray H. Orf — 3-22-04

Signature — Date



Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1974. Field checked 1975
Map edited 1979

Projection and 10,000-foot grid ticks: Arizona coordinate system, central zone (transverse Mercator)
1000-meter Universal Transverse Mercator grid, zone 12
1927 North American Datum
To place on the predicted North American Datum 1983 move the projection lines 7 meters south and 63 meters east as shown by dashed corner ticks

GN MN
9°14' 4 MILS
12½° 222 MILS

UTM GRID AND 1979 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ARIZONA

QUADRANGLE LOCATION

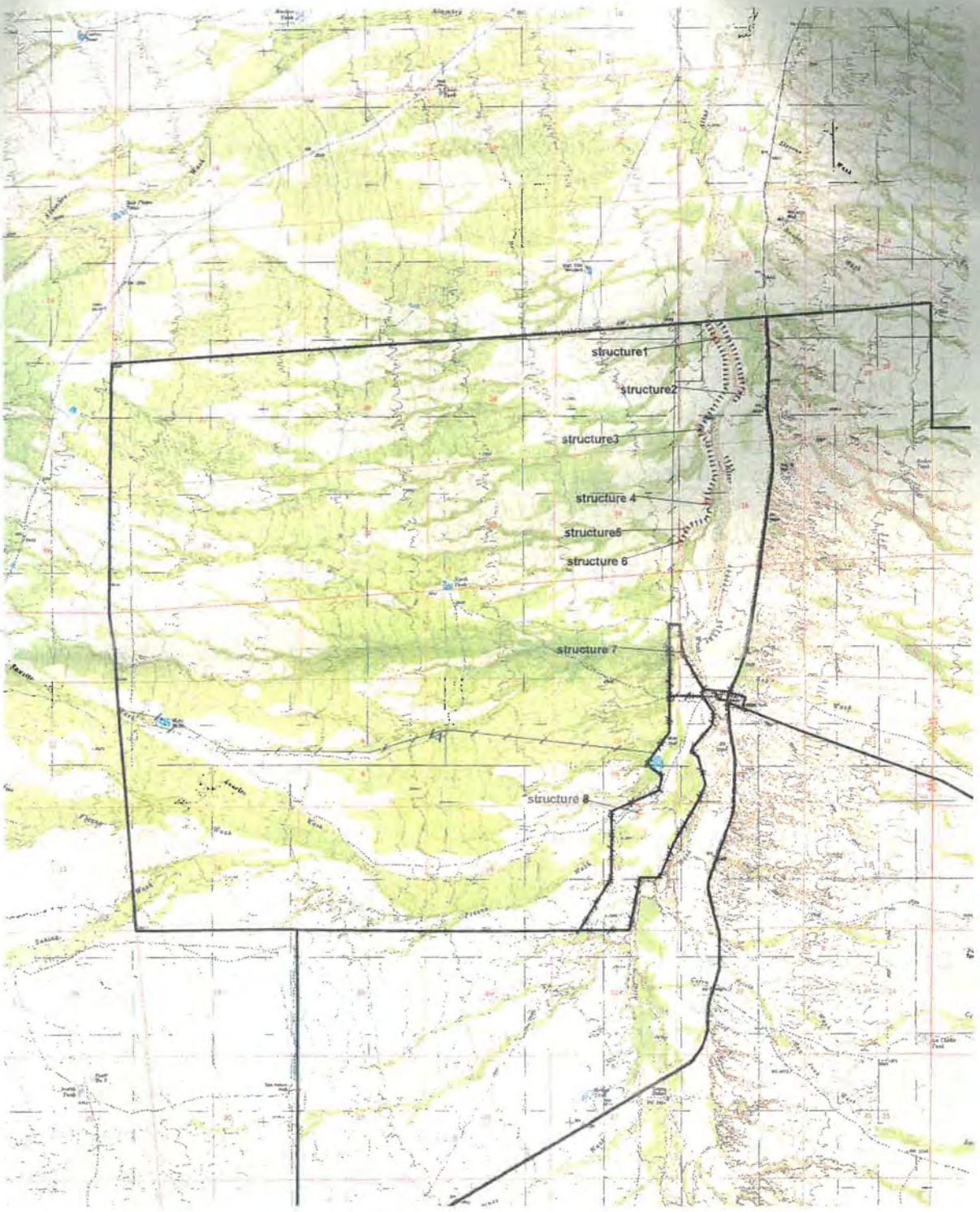
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, P.O. BOX 25286, DENVER, COLORADO 80225

Palo Alto Ranch 319 Project

Ross Humphreys

Pima NRCD
34300
Date: 11/07/2001

Tucson
USDA-NRCS
Dan Robinett



Legend

- planned structures
- planned dikes
- Planned fences
- Existing fences

N

6000 0 6000 12000 Feet

USDA

Palo Alto Ranch Monitoring 2003
Ross & Susie Humphreys

Eleven range vegetation monitoring transects were read in the fall of 2003 by Dan Robinett (NRCS), Wally Alexander (ASLD), Gabe Paz (AG&F), John King (Anvil Ranch) and Ross Humphreys (Ranch owner). These are located at Key Areas 1, 2, 3a, 3b, 4a, 4b, 5, 6a, 6b, 6c and 7. Four of these transects are un-grazed (control) plots, two of which are on the Buenos Aires NWR (3b and 4b) and two of which are in the new ex-closures at Key Areas 2 and 6. Rainfall was recorded at six new stations on the ranch and was above average at all locations. The attached spreadsheet shows both cool and warm season precipitation for these stations on Palo Alto ranch.

The severe drought of the previous year resulted in very high mortality of perennial grasses as well as half-shrubs like desert zinnia, snakeweed and burroweed. The ranch was not grazed during 2001 and 2002. It was grazed for the period of January through May 2003 by the Anvil Ranch under a sublease agreement with the Palo Alto Ranch and Arizona State Land Dept. The cow herd (340AUs) started in the West Tank pasture in January, moved into the Fresno and Bridge pastures in March and April, into the North Valley and Horse pastures in early May and then back onto Anvil Ranch the end of May. The new fencing built during the winter of 2003 was used in the cattle rotation. The Kings scattered native grass hay alongside roads and trails in these pastures as they grazed the cow herd. This resulted in establishment of cane bluestem throughout the area.

The Palo Alto 319 project was completed this year. This project was designed to reduce erosion and sediment yield to the Altar Wash through the Palo Alto Ranch. It was funded (60%) by the Arizona Department of Environmental Quality with funds received from EPA through section 319 of the Clean Water Act. Non federal funds provided 40% of the costs and included in-kind work from various non-federal agencies (AG&F, ASLD, Pima County Gov.) and individual volunteers and the ranchers. NRCS completed a consultation with US Fish & Wildlife Service to make sure the project was compatible with two listed T%E species in the area, Pima pineapple cactus and Cactus ferruginous owl.

Two new fences were constructed to isolate the North Valley into a pasture (1286 ac.) and the Fresno wash area into a pasture (3642 ac.). The total new fencing installed was 39,400 feet. These facilities separate all the northern bottomlands on the ranch from the uplands to facilitate better grazing management of these habitats. It was done by Sierrita Mining and Ranching Inc. of Green Valley, Az.

Also in the 319 project 13,500 feet of water-spreading dikes and four large gully plugs were installed to control erosion and hold floodwaters on the bottomland areas along Altar Wash in the North Valley. These dikes and dams directly control active headcuts and gullies alongside the Altar Wash. An additional 1200 feet of old dike was repaired in the central part of the ranch. This work was done by R&R Dirtworks of Willcox, Az. Both contractors did an excellent job resulting in improvements that will yield benefits in reduced erosion and sedimentation over many years.

The 319 project areas on the Altar floodplain were seeded to Sacaton grass and the dikes and dams were mulched with native grass hay (cane bluestem and Arizona cottontop) from the Tucson Plant Materials Center (NRCS). The dikes constructed on the east side of the Altar wash were done by mid August and the seeding received enough rain through September to establish Sacaton as well as native grass seed that washed into the borrow area. The dikes constructed on the west side of the Altar wash were done in September and the seeding did not receive enough rain to germinate the Sacaton.

Enough seed was reserved to reseed the entire project area next year if need be. The west side dikes were mulched with the native grass hay and, even with only 2 inches of rain received late in September from tropical storm Marty, the cane bluestem germinated and established in places where the straw collected.

The ranch rested June through November and with good summer moisture made some recovery from the severe drought of the previous year. Most areas have good cover of native annual grasses and forbs. Some areas like the northwest side of the ranch have excellent cover of native perennial grasses. The east side of the ranch made good recovery in desert browse species like Desert Zinnia, Guajilla, Janusia, Range Ratany and Twinberry. The valley received several floods and made an excellent recovery in native grasses, forbs and shrubs like wolfberry and fourwing saltbush.

Plans are to graze the ranch under the sublease agreement to Anvil ranch with cows from December 2003 through May 2004. The planned rotation will begin in the Soldier Well pasture to the Cholla pasture, then into the Bridge pasture and finally the Fresno and West Tank pastures to come back onto the Anvil Ranch in late May through the North Valley pasture.

Activities for the coming year include the possibility of using the NRCS wildlife Habitat Incentive Program with Arizona Game and Fish Dept. matching funds to construct a pipeline, storage tank, livestock trough and wildlife watering facility from Soldier Well to the east two miles. The project will involve Arizona State Land Dept. and US Fish and Wildlife service as well to do the permits and clearances needed for the project. Monitoring will continue at the seven Key Areas and a new transect will be installed in the Soldier Well pasture in 2004.

Dan Robinett NRCS 11-17-03