HEREFORD NATURAL RESOURCE CONSERVATION DISTRICT

CONSERVATION STRATEGY

2015

OUR MISSION

Working together to enhance our natural resources.

OUR VISION

To conserve natural resources by promoting and demonstrating policies and practices that are economically feasible and environmentally responsible.

PHOTO 1: JACK LADD EVALUATING BRUSH MANAGEMENT AND SEEDING AREA

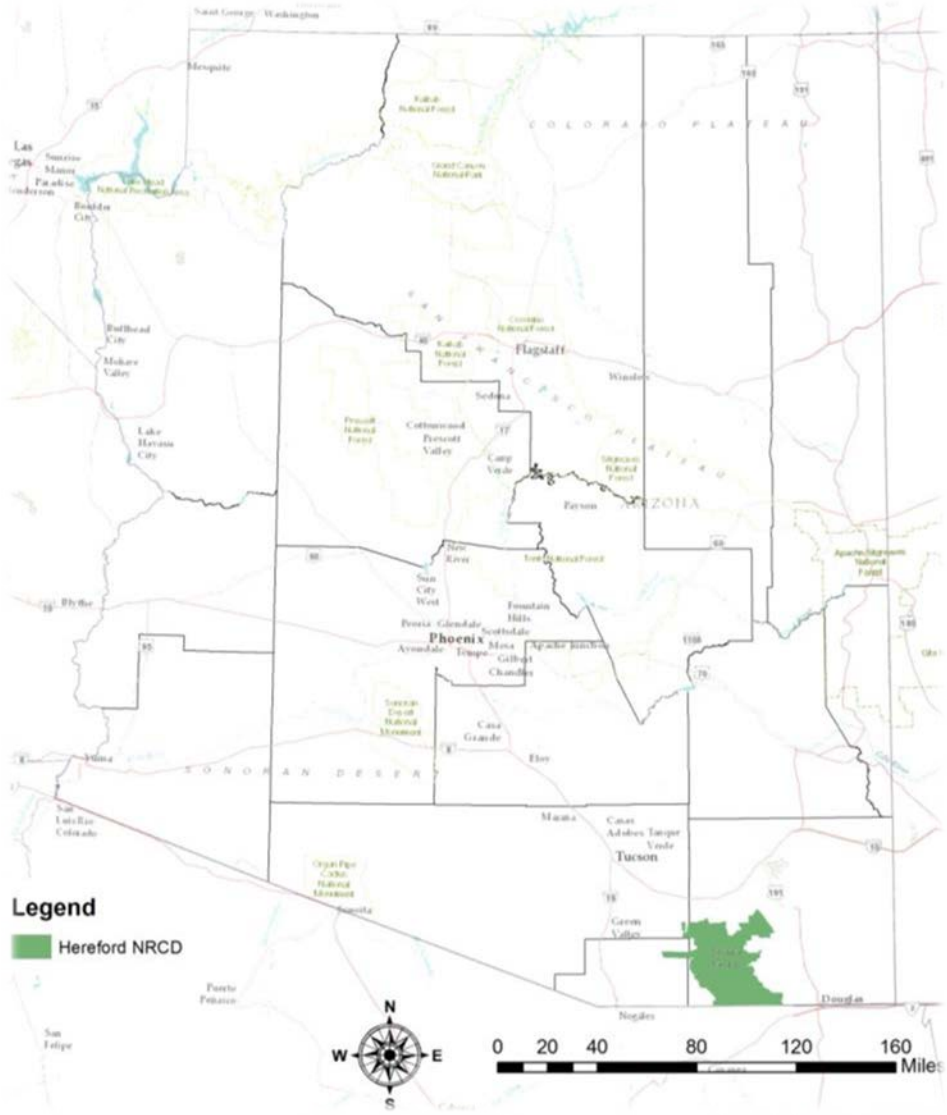
OUR AUTHORITIES

The Hereford Natural Resource Conservation District, a local division of State Government, is authorized to identify and address resource conservation needs within its boundaries (ARS 37 Chapter 6). The elected District Board of Supervisors has the responsibility for determining those needs, for developing and coordinating long range plans and programs for natural resource conservation and implementing them under the District's long range plan, and annual plan of work.

The District works with and coordinates its efforts with Federal, State and local governments, organizations, agencies and individuals to accomplish soil, water and species conservation. Arizona's conservation district law is embodied in legislation and establishes the State's natural resource policy, carried out on a local level by the District. The District also promotes a balanced environmental education program in the schools and with workshops on many natural resource subjects.

Our Goals

- To provide leadership and guidance in promoting the voluntary conservation of all natural resources within the District on private land and coordinate with government agencies for such conservation on government land.
- To promote and support programs for watershed improvement and soil erosion reparation on all lands within the District.
- To promote methods of cultivation, cropping practices, land leveling and improvement on agricultural lands and programs for proper range use, reseeding and the eradication of noxious growth on grazing lands.
- To promote programs which will protect the historic culture and the economic stability of the District.



Map 1: Hereford NRCD Location Map

OUR PARTNERS

The Hereford Natural Resource Conservation District partners with land owners and private organizations, and coordinates with Federal and State agencies, county and local governments to achieve our mission.

Arizona Association of Conservation Districts
Arizona State Land Department
Arizona Game and Fish Department
Arizona Department of Environmental Quality
Cochise County
City of Sierra Vista
Tombstone High School FAA
Arizona Antelope Foundation
Freeport McMoran
Iroquois Foundation
University of Arizona Department of Agriculture
Douglas Field Office, NRCS
Cochise County Fair
Tucson Field Office, BLM
Sierra Vista Ranger District, USFS
Walnut Gulch, Agriculture Research Service, USDA
Cochise Area Network for Therapeutic Equestrian Resources (C.A.N.T.E.R.)
Cascabel Ranch & Consulting
American Stewards of Liberty
Sierra Vista Herald
Fort Huachuca

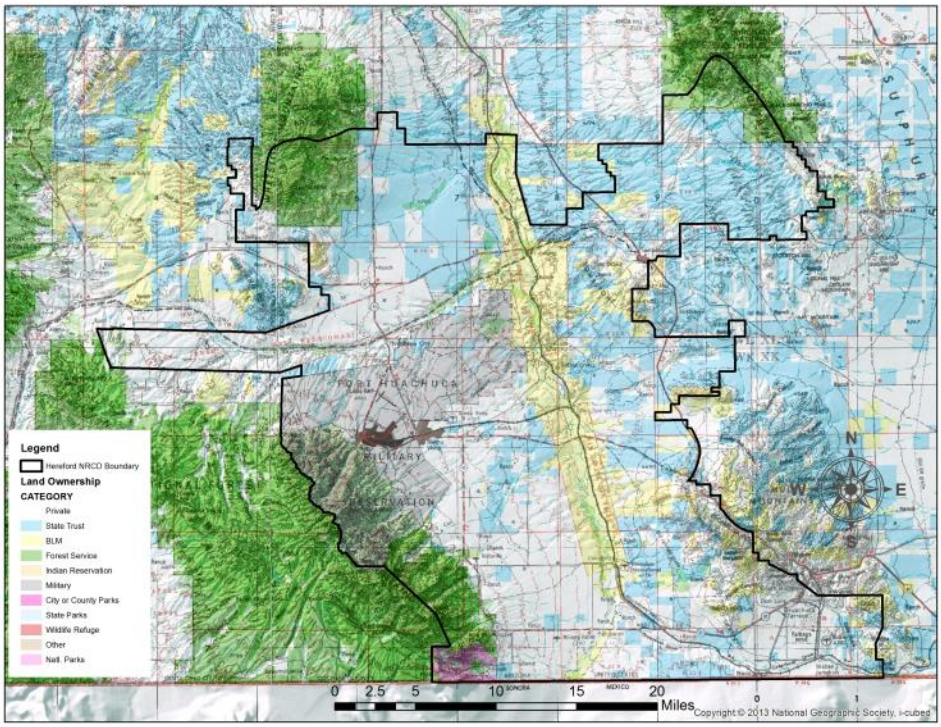
PHOTO 2: DISTRICT CHAIR JIM LINDSEY AND USDA ARS RESEARCH LEADER PHIL HEILMAN

Our Conservation Strategies

The following conservation strategies outline specific measures that are to be implemented in the attainment of the District goals.

Coordinate with State and Federal Agencies and Local Governments

The land ownership within the Hereford NRCD is a tapestry of private, county, state and federal lands, including the Fort Huachuca U.S. Army base. Multiple state and federal agencies and local governments have responsibilities for grazing, recreation, wildlife, water rights, water and air quality, mining, land use planning and zoning, border safety and other laws and regulations that impact local conservation efforts.



Map 2: Hereford NRCD Land Ownership Map

Effective conservation of the natural resources within the District requires that all of these entities work together at the local level to develop and implement a common conservation strategy. One of the basic principles for authorizing Conservation Districts, is the understanding that the local people, who live and work on the lands within the District, are the ones best suited to decide how the natural resources should be managed.

Federal laws require that federal agencies coordinate their plans, programs and management activities with local governments to resolve inconsistencies with State or local plans, policies, or programs. Coordination is defined in the Federal Land Policy and Management Act of 1976 (FLPMA) as: 1) early notification of local government; 2) opportunity for meaningful local government input; 3) agency required to be apprised of any local government policy or plan; 4) agency must consider local government policy or plan when working on federal policy or plan or management action, and; 5) make all practicable effort to make the federal policy, plan or action "consistent" with the local policy or plan.

Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA. NEPA procedures must insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken. The information must be of high quality. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA. Most important, NEPA documents must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail. §1500.1(b) To better integrate environmental impact statements into the state or local planning processes, statements shall discuss any inconsistency of a proposed action with any approved state or local plan and laws. Where an inconsistency exists, the statement should describe the extent to which the Agency would reconcile its proposed action with the plan or law. §1506.2(d)

Agencies are required to integrate the NEPA process with other planning (local government) at the earliest possible time to insure that planning and decisions reflect environmental values, to avoid delays later in the process, and to head off potential conflicts. §1501.2

Agencies are required to study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources as provided by section 102(2)(E) of the Act. §1501.2(c)

Arizona's Conservation District law allows state agencies, counties, and other governmental subdivision of the state which have jurisdiction over any state-owned lands, county owned or other publicly owned lands lying within the boundaries of any natural resource conservation district to cooperate fully with the supervisors of the district in the effectuation of programs and operations undertaken by the supervisors. The supervisors of any district are authorized by State Law to cooperate with and enter into agreements with any agency or municipality within the boundaries of the district on matters relating to soil conservation or land use planning. (ARS 37-1057)

Coordination Strategies

The Hereford NRCD will enter into coordination with the federal and state agencies and the county in the management of lands and resources located within the District to insure agency plans are either consistent with the District plans or contain an explanation for the non-consistence areas.

The Hereford NRCD will provide information to and consult with the Governor on inconsistencies between the District plans and NEPA documents.

The Hereford NRCD will promote, and participate in developing and implementing Coordinated Resource Management Plans within the District, and participate in the Field Group meetings as outlined in the Arizona Coordinated Resource Management Memorandum of Understanding signed by 19 state and federal agencies.

Continue Our Conservation education Efforts

The Hereford NRCD Conservation Education Center is funded in part through the State's general fund each year, and in part through sales of environmental license plates. The District and the Education Center hold workshops during the year for schools, District Cooperators, and the public, to provide education about our natural resources and how to manage them.

Conservation Education Strategies

Promote, develop and maintain natural resource education projects to benefit the resources and the people.

Photo 3: Summer Conference

Provide workshops for District cooperators, students and the public. Provide natural resource workshops for grade school students at schools within the District Hold workshops with other organizations to improve communication and understanding.

Publish a quarterly newsletter to keep Cooperators and other informed of District activities.

Utilize the District website www.herefordnrcd.com to provide educational information including educational material, workshop announcements, and videos.

Support the development of District operation and training videos. Post completed videos on the District web site

Provide support to the Natural Resource Conservation Workshop for Arizona Youth.

Produce and acquire programs which provide education about resource management and make them available to schools in the District using the workshops, the web site, and the newsletter.

Invite knowledgeable speakers to the District.

Encourage the District Supervisors to attend workshops and seminars to improve their knowledge of resource management and to develop better leadership skills.

Promote and encourage training sessions for agency personnel.

Encourage State and National leaders and the press to tour the District and learn more about the resource management efforts and concerns.

Encourage Universities to utilize the District resource for field training.

Provide recognition for outstanding and innovative conservation programs or service within the District .

Maintain a booth at the County Fair, and continue to present educational and historical material to students and adults.

Provide support to and coordinate resource management education programs with the Tombstone High School Agriculture FFA program. Encourage schools in the District to hold resource education fairs.

PHOTO 4:TOMBSTONE FFA CHAPTER

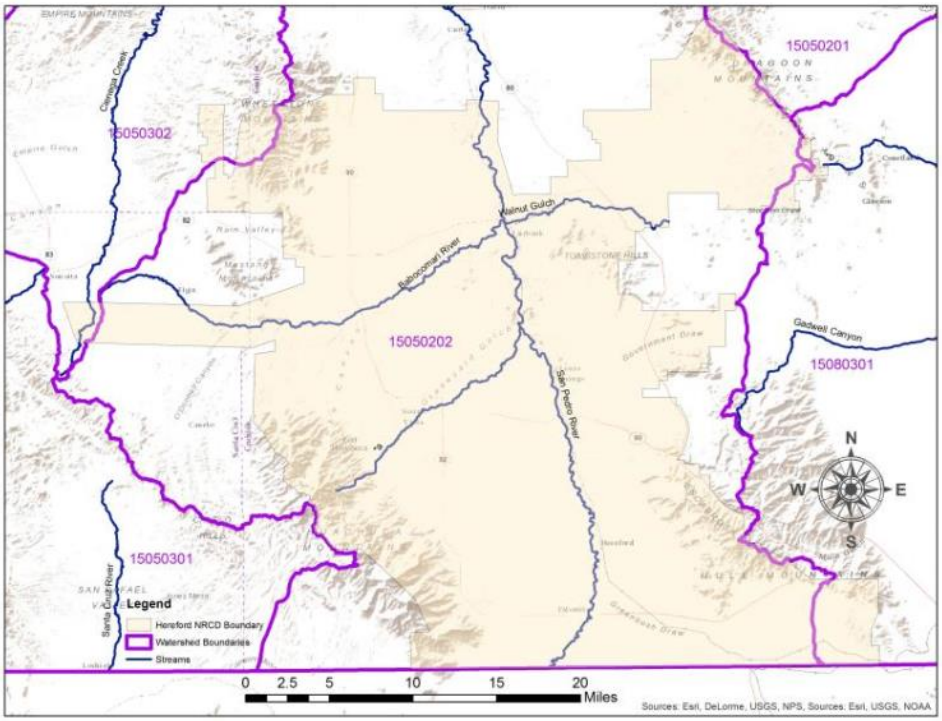
Improve The Health Of Our Watersheds to Protect our Water Supplies

Water availability is one of the most important natural resource and economic issues we face today.

Groundwater overdraft threatens to impact everyone who lives and works in our District including the federally protected San Pedro River National Conservation Riparian Area (SPRNCA) and the U.S. Army Intelligence base stationed at Fort Huachuca. Overuse of our groundwater aquifer threatens our agricultural livelihood, the health of the federally protected SPRNCA as well as impacting the U.S. Army's ability to implement its mission at Fort Huachuca.

The health of our groundwater aquifer is directly linked to the health of the watershed, its vegetative communities, and how well water and erosion is managed in our urban areas. Land disturbance activities that result in vegetation removal will reduce soil cover and increase the potential for erosion. These types of activities encourage the formation of gullies and channels that not only cause more soil erosion but also reduce the opportunity time for water to infiltrate into our aquifers.

In a 2005 report by The Arizona Department of Water Resources reported the water levels in wells in the upper San Pedro watershed from 1990 to 2004. It was found the water levels declined in 1990 to 1991 and then again in 2003 and 2004. In the Bisbee-Naco area water levels declined at a rate of 0.9 to 2.9 feet per year. However, water levels rose by 0.6 feet per year in the Pomerene area. This report showed that total groundwater use increased from 1971 to 1985 and then remained constant to 2000. However, from 2001 to 2005 it was reported that groundwater use declined to an average withdrawal rate of about 29,100 AFA which is less than the reported recharge rate of 35,700 AFA. The report also indicated that municipal demands encompass over half of the total groundwater use from 1996 to 2005.



MAP 3: HEREFORD NRCD WATERSHEDS

Demand for water resources is projected to increase to meet the water needs of a growing population in our region. An improved understanding of available water resources and how water moves through the watershed can improve the capability of resource managers to optimally use this important resource. Hydrologic models, such as those developed by ADWR, USGS and or ARS, could be useful in simulating the effects of rangeland treatments and or land use change on our groundwater aquifer, streams and surrounding areas and provide guidance to help minimize or mitigate these effects.

UPPER SAN PEDRO PARTNERSHIP

The Hereford NRCD is a member of the Upper San Pedro Partnership, which is a consortium of agencies and organizations working together to meet the long-term water needs of the Sierra Vista Sub-watershed. The organization works to achieve sustainable yield of the regional aquifer to: 1) preserve the San Pedro Riparian National Conservation Area (SPRNCA), and 2) ensure the long-term viability of Fort Huachuca.

In November 2003, the United States Congress passed the Defense Authorization Act of 2004, Public Law 108-136. This legislation requires the Secretary of the Interior, in consultation with the Secretaries of Defense and Agriculture, and in cooperation with the Upper San Pedro Partnership, to prepare an annual report to Congress that includes the water use management and conservation measures that have been implemented and are needed to restore and maintain the sustainable yield of the regional aquifer by and after September 30, 2011.

The purpose of the Partnership is to coordinate and cooperate in the identification, prioritization and implementation of comprehensive policies and projects to assist in

meeting water needs in the Sierra Vista Sub-watershed of the Upper San Pedro River Basin.

Section 321 of the Defense Authorization Act of 2004, Public Law 108-136, required that USGS produce an annual report to address five requirements. The following are some of their findings:

1. The quantity of the annual overdraft of the regional aquifer was reduced 1,500 acre-ft during the reporting period in 2010, compared to the previous reporting period in, 2009;

2. The reduction in (1) met the goal specified for the reporting period;

3. The extent of the contribution of such measures to the reduction of the overdraft was 9,000 acre ft.

In the final 321 report of 2011, the USGS concluded

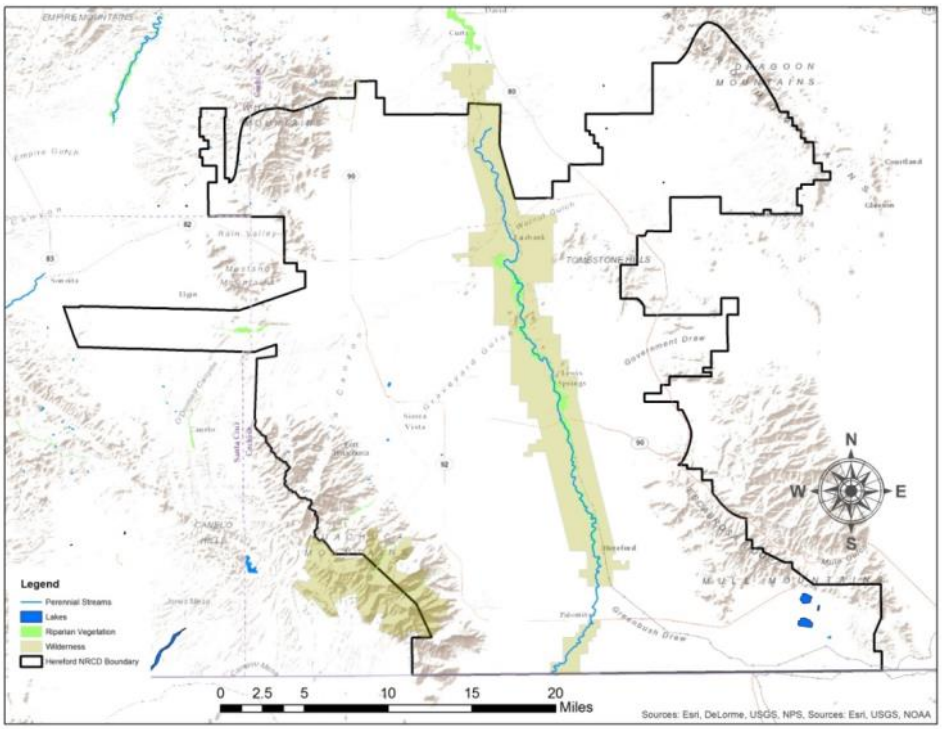
"Groundwater depletion in the Sierra Vista Subwatershed continues albeit at a rate slower than in 2002. Although the annual overdraft of the aquifer has been greatly reduced from the 13,500 acre-ft originally anticipated for 2010 (fig. 1; utilizes 2010 census data) to 4,600 acre-ft today, groundwater continues to be removed from storage. Since 2002 (the beginning of 321 monitoring), about 65,200 acreft has been removed from storage in addition to the hundreds of thousands of acre-ft that previously were removed from storage since groundwater pumping commenced in the first half of the 20th century (D.R. Pool, unpub. data, 2011). Until the aquifer begins to accrete storage (the annual water budget balance becomes greater than 0) there will be no reduction in the cumulative deficit, and until additional management measures are undertaken, it is unlikely that there will be further progress made toward this goal."

PHOTO 5:SAN PEDRO RIVER 2003 ON 3 LINKS FARM

Groundwater Recharge Projects

Cochise County, Fort Huachuca and The Nature Conservancy have been working together to develop groundwater recharge projects that will help sustain groundwater supplies. The Sierra Vista Environmental Operations Park is one of three recently acquired sites that will be used to recharge groundwater using storm water runoff and effluent water. Construction started on the Palominas recharge project in March of 2014. That project uses a large detention basin to collect rain water runoff and then stepped channel basins that allow the water to infiltrate back into the water table.

The Hereford NRCD has initiated a concept and feasibility study in the 9000 acre Horseshoe Draw watershed to help control flooding and erosion and provide groundwater recharge. When the feasibility study is completed in 2016, construction will begin when funding becomes available.



Map 4: Perennial Streams, Lakes, Riparian and Wilderness Areas

Water Conservation Strategies

Encourage practices that conform to long term water management goals.

Encourage practices which improve vegetative cover on District watersheds.

Encourage and expand the brush control and grassland restoration projects which have proven to be effective in the improvement of habitat and the healthy function of our watershed.

Encourage practices that reduce water and wind erosion.

The District encourages the Cochise County government as well as Municipal governments to implement sound land management/development plans (like the Cochise County Comprehensive Plan) that encourage the use of Best Management Practices (BMPs) to reduce erosion by stabilizing the soil disturbed by land disturbance activities, and reduce the potential negative impacts on watershed condition.

The District encourages the use of alternative road surfacing methods that mitigate the impacts of surface water runoff and help conserve water by facilitating aquifer recharge.

Develop projects and find funding to accomplish flood, erosion and sediment control, restoration and water recharge projects.

Encourage grazing, brush control and fire management to improve the resource conditions of the SPRNCA and on properties of all ownerships.

Encourage the adoption and use of The University of Arizona Cochise County Cooperative Extension's Water Wise Program in urban and rural areas as well as Municipalities. This educational water conservation program provides solutions to our communities for the conservation of our water resources. Encourage improvement of irrigation distribution systems, irrigation efficiencies, and irrigation water management on farmlands.

The District opposes any requirement for water meters on private wells.

The District opposes any transfer of water by artificial means to or from areas outside the District until such time as the scientific and economic data which meets the requirement of the Data Quality Act (Public Law 106–554, 2001) supports such action.

Support Mineral Development Within the Conservation District

Mining has always been an important part of the District's history and should continue. Mineral access, claim access and future mineral development can all be pursued, as has been done historically following best management practices and with the advancement of technology that continues to reduce short-term and long-term impacts.

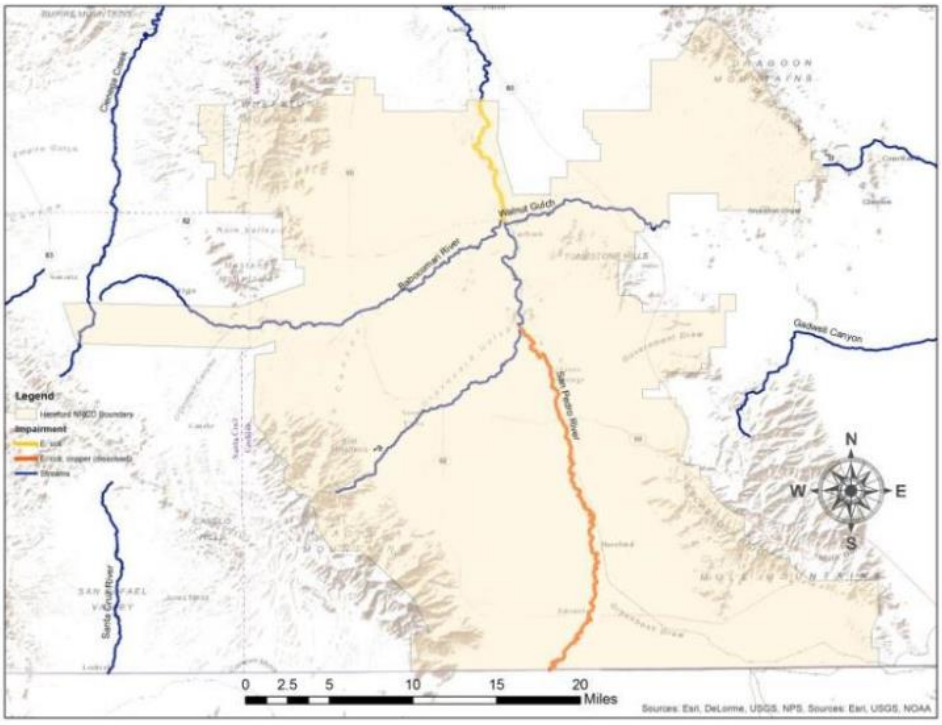
Full access to all of our natural resources must be maintained in order to ensure a productive economy and the health, safety and welfare of the citizens of the District.

Coordinate with State and Federal Agencies to Achieve Water Quality Standards

Water quality standards were exceeded in three areas along the San Pedro River. These reaches are impaired due to elevated levels of E. coli, nitrate and copper. Localized nitrate contamination near St. David is being remediated as part of the Superfund Program.

Water Quality Strategies

The District will stay active on water quality issues along the San Pedro River and throughout the District.



Map 5: Water Quality Non-Attainment Stream Segments

Promote Sound Grazing Management

The District has a long history of livestock grazing both on private and public lands. When properly managed, livestock are an important tool for resource management, helping improve habitat and decrease fire hazards. Approximately 63 percent of the beef cows raised in Arizona graze at least part of the year on public lands. Most ranches within the Conservation District include federal and/or state grazing permits. The U.S.

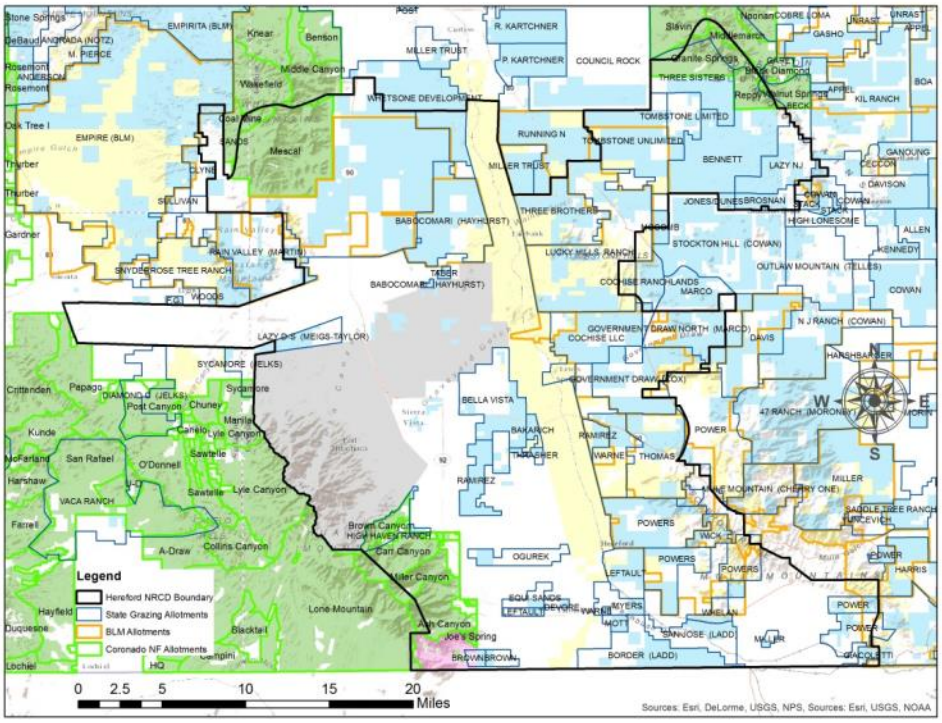
Photo 6: Hayhurst's Brookline Ranch

Forest Service (USFS), Bureau of Land Management (BLM) and the Arizona State Land Department (A.S.L.D.) administer about 290,500 acres in the Hereford NRCD that are grazed by livestock. Public land grazing allotments are increasingly under the scrutiny of the regulatory agency involved and the general public, primarily through the vigilance of individuals from various environmental organizations. Livestock grazing is an important tool to properly manage habitat and should be used in resource management. Livestock grazing should continue to be managed to benefit human health, historic culture and economic well-being.

Grazing Management Strategies

Maintain sustainable grazing consistent with historic land use and ranching practices.

Any grazing restrictions or conservation measures that are implemented through a grazing permit shall be based solely on the conditions and science, specific to that permitted grazing allotment.



Map 4: State and Federal Grazing Allotments

Annual precipitation measurements should become a part of annual operating plans. If the monitoring data shows there is an increase in forage that supports additional livestock in a suitable habitat area, then increased grazing should be considered.

Allotment management changes must be tailored to address specific problems when the cause of the problems is determined using the best available science including the flexibility to change the number of livestock the designated period of time and season of use.

Photo 7: Ladd working cattle

Prioritize completion of land (range) health assessments and grazing permit NEPA analysis on allotments.

Changes in grazing management should only occur when supported by appropriate monitoring data in conjunction with the property owner, permittee, NRCS, District and government agency.

Management changes, when needed, must be tailored to specifically address habitat objectives that need improvement, but should not adversely affect the habitat of other species.

Altering grazing schemes in allotments, where needed and appropriate, may be facilitated by enhanced grazing opportunities with brush removal and grass seeding when needed. The unintended consequences of altering grazing use, such as possible increased risk of wildfire, must be carefully considered in any management proposal.

Expand the brush eradication and grassland restoration projects which have proven to be so effective to the improvement of habitat and water.

Encourage grazing, brush control and fire management to improve the resource conditions of the SPRNCA and on properties of all ownerships.

Establish experimental aerial applied chemical mesquite removal projects with requirement for before and after monitoring according to an established protocol.

Have continued managed grazing on the 6521 acres of former State Trust land within the SPRNCA in accordance with the State exchange agreements. This area includes state lands acquired by BLM with the development of the SPRNCA.

Waters used for rural domestic, livestock, and wildlife should be classified as beneficial and minimal uses which are essential to the continued use and conservation of natural resources for the benefit of all residents of the District.

Keep District livestock operators informed about potential livestock health problems.

Coordinate, educate, and promote efforts for the control of noxious and invasive plants.

Continue to document range improvement accomplished within the District with production, *editing and posting videos of the projects on the District web site.*

Work with State and Federal Agencies to Reduce Catastrophic Wildfire Risks

Photo 8: Hunter Canyon July 9, 2011

Wildfire can be extremely destructive to natural resources including soil, water, and vegetation as well as infrastructure and property.

Wildfire Strategies

Coordinate with appropriate agencies for support for controlled burns by cooperators.

In the event of a wildfire, coordinate with appropriate agencies in developing and implementing rehabilitation plans.

When pursuing habitat restoration or rehabilitation, use native plant species produced within the District when available.

Coordinate with State and Federal Agencies to Manage Noxious Weeds and Invasive Species

Noxious and Invasive Species Strategies

Promote the control of noxious and invasive plant species by establishing a good working relationship with the federal and state agencies.

Present workshops to educate the public about how they can be involved with the control of noxious and invasive species.

Develop a program to educate and support brush removal on small parcels of land utilizing both mechanical methods and herbicides.

Develop a District native seed production program.

Provide High Quality Recreational Opportunities

One of the major attractions on the northern border of the Hereford NRCD is Kartchner Caverns. Apart from the caverns themselves, which are spectacular to see, these caves are home to approximately 1000-2000 insect-eating cave bats (Myotis velifer) from May to mid-September of each year. These bats, primarily pregnant females, return each summer to Kartchner Caverns to give birth and rear their young.

Wildlife viewing opportunities are everywhere and include a variety of animals, some as common as a hummingbird at a backyard feeder, some passing through only briefly on their seasonal migrations, and others so rare that dedicated wildlife watchers spend hours just to catch a glimpse. Arizona provides some of the best wildlife viewing opportunities in the nation, with more than 900 animal species, and Cochise County and the Hereford NRCD have their share of them.

Another major attractions here is the San Pedro Riparian National Conservation Area (SPRNCA). It is designated as a Globally Important Bird Area and it attracts thousands of birdwatchers from all over the world each year. Over 100 species of breeding birds and another 250 species of migrant and wintering birds occur in this area, representing roughly half the number of known breeding species in North America. Notably, 36 species of raptors including the gray hawk and Mississippi kite can be found within the SPRNCA. Other enticing species include the green kingfisher, Bell's vireo, northern beardless tyrannulet, Abert's towhee, Lucy's warbler, and yellow-billed cuckoo. The SPRNCA's bird checklist includes nearly 400 species (a link is provided in the Appendix).

The Hereford NRCD is home to an abundance and wide variety of wildlife, with many game species. About half of the District falls in Game Management Unit 30B, which has the San Pedro River as its western boundary and has game animals such as mule and whitetail deer, javelin, and dove and quail. The remainder of the District falls in Units 35A and 34B. Because these units take in higher upland elevations and mountains, antelope, turkey, and black bear can be added to the list.

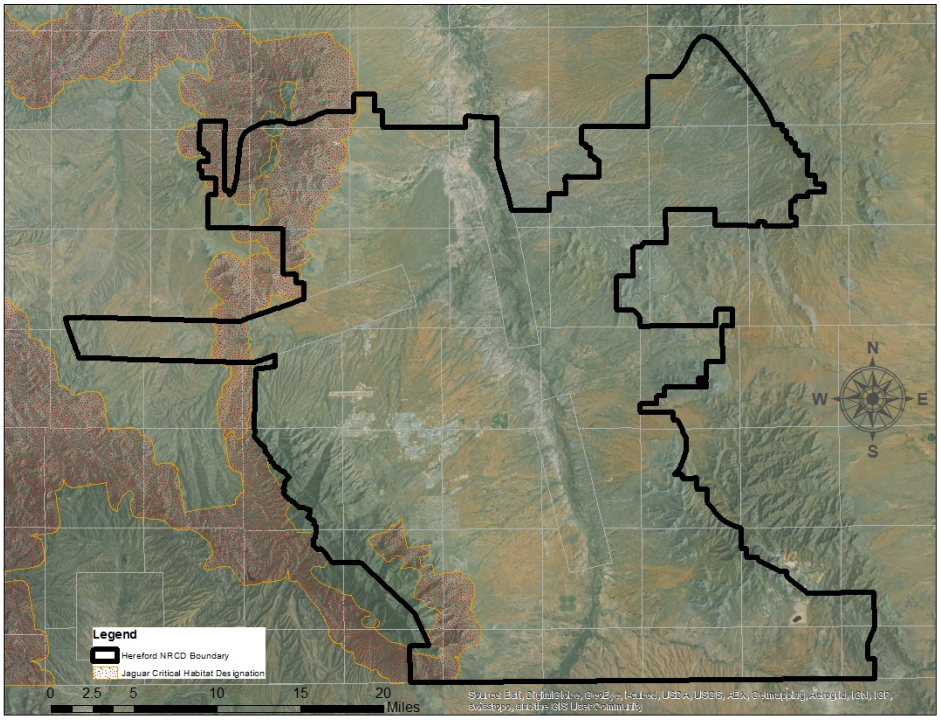
Arizona hunters are among the largest contributors to the conservation of our state's wildlife and resources. In fact, the earliest conservation efforts were developed by sportsmen more than 100 years ago, and this continues today.

Coordinate with State and Federal Agencies on Species of Concern

As of August 2015, the USFWS list of proposed species for Cochise County, plus those species already listed as threatened or endangered, included:

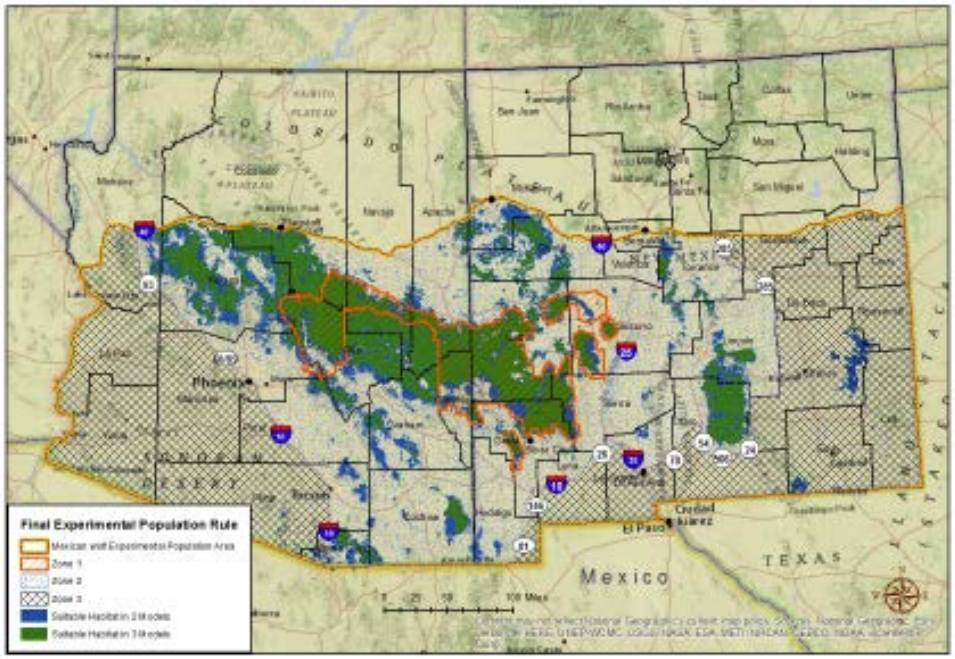
- 3 mammals
- 3 amphibians
- 5 birds
- 8 fish
- 3 reptiles
- 2 snails

On April 4, 2014, 764, 207 acres of critical habitat designated by the US Fish and Wildlife Service for the Jaguar went into effect.



Map 5: Jaguar Designated Critical Habitat

In January 2015, the final EIS revising the 10(j) rule for the Mexican Wolf experimental population was signed. This change extends the MWEPA's southern boundary from Interstate-10 to the international border with Mexico. The Hereford NRCD is in Zone 2, which is the area where Mexican wolves are allowed to naturally disperse into, and where wolves may be translocated.



MAP 6: USFWS MAP OF REVISED MEXICAN WOLF POPULATION AREA

CONSERVATION STRATEGIES FOR FEDERALLY LISTED SPECIES AND SPECIES OF CONCERN

Artificial introductions or reintroductions of threatened, endangered, and protected species, or species of special concern or species proposed for listing is opposed by the District.

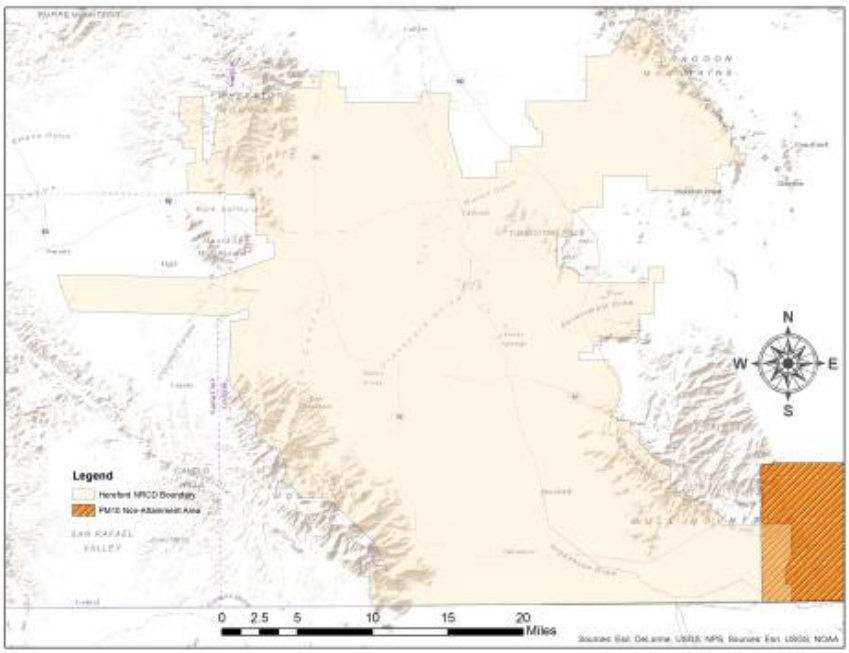
PROTECT OUR AIR QUALITY

The Douglas-Paul Spur Area was designated and classified as a moderate PM_{10} nonattainment area upon enactment of the 1990 CAAA as a result of monitoring violations of the PM_{10} NAAQS. ADEQ submitted a SIP for the Douglas portion of the nonattainment area in April 1993 and for the Paul Spur portion in July 1990; the U.S. EPA found the Douglas SIP to be complete, but did not act on the Paul Spur SIP.

On January 11, 2011, the U.S. EPA Region IX issued a Clean Data Finding for the Douglas-Paul Spur Nonattainment Area based on ambient monitoring data from 1992-1994 that demonstrated the area reached attainment of the PM_{10} NAAQS by the deadline established by the 1990 CAAA.

AIR QUALITY STRATEGIES

Encourage agricultural producers and others to voluntarily implement air quality best management practices that have been outlined in the Guide to Agricultural PM10 Best Management Practices "Agriculture Improving Air Quality"



MAP 6: AIR QUALITY PM-10 NON ATTAINMENT MAP

PROMOTE CONTROL OF FLOODING, SOIL EROSION AND SEDIMENT DEPOSITION INTO STREAM CHANNELS

PHOTO 9: SAN PEDRO RIVER SOUTH OF CHARLESTON, JULY 10 2013

EROSION AND FLOOD PREVENTION STRATEGIES

Encourage practices that reduce water and wind erosion.

Encourage practices that protect stream banks and maintain existing channels in the San Pedro River

Promote the improvement of irrigation distribution systems, irrigation efficiencies, and irrigation water management on farmlands within the District.

Encourage practices that conform to long term water management goals.

Promote practices which improve vegetative cover on District watersheds.

Develop projects and find funding to accomplish flood, erosion and sediment control, restoration and water recharge projects.

Work with Local Governments and Agencies to Maintain Infrastructure and Roads within The Conservation District

Infrastructure and roads are important for safety, fighting fires, access and management for virtually every aspect of the economy within the District including ranching, recreation, and hunting.

Infrastructure includes highways, high voltage transmission lines, commercial wind projects, energy development (e.g. solar), airports, mines, cell phone towers, landfills, residential and commercial subdivisions.

Roads provide necessary access to the area to ensure proper management of resources, infrastructure and assets, and accessibility in the event of emergencies. Full recreational access to public land including hunting, hiking and camping must be available to all the people

Horseshoe Draw Project

The Hereford NRCD is currently working on flooding problems in a 9000 acre watershed that begins 6 miles south of the Mexican border, and empties into the San Pedro River immediately upstream of Highway 92.

Issue include significant stream degradation, erosion, and scouting; Flooding hazard and closures at Paloma Trail dip crossing which is a primary access route for 20+ homes; loss

of wash bank stability, and of mature vegetation along these bank areas; heavy sediment discharges to the San Pedro River; and limited opportunity for groundwater recharge. More information is available here: http://www.herefordnrcd.com/Proposed-Flood-and-Erosion-Control-Project.html

Infrastructure Strategies

The District and the public must be notified and have an opportunity to provide meaningful input to all proposed road, primitive road, or trail closures and other restrictions that would change current access within the District prior to the changes.

Limit motorized travel to existing and primitive roads which must all remain open for access to infrastructure, range resource improvements, hunting, hiking, camping and private property.

Complete feasibility study and find funding to build an earthen embankment across Horseshoe Draw to create a storm water detention basin and install grade control structures in the wash below the embankment.

Promote Conservation Planning

Conservation planning is the fundamental starting point for maintaining and improving the natural resources that support productive and profitable LANDSCAPES. The objectives for conservation planning are to attain sound management of the soil, water, air, plant, and animal resources, ensure the long term sustained use and productivity of our working landscapes, while considering the management and economic needs for maintaining viable agricultural production and resource uses.

Conservation planning is also intended to help farmers and ranchers comply with a variety of environmental regulations, including the Clean Water Act, Clean Air Act, Endangered Species Act, Cultural Resource laws, the Arizona Native Plant law and other State laws.

Conservation Districts provide the leadership for a locally led conservation program to help land users be aware of local conservation priorities, so that everyone can work together to address the local conservation needs. Conservation Districts help their cooperators get conservation planning and application assistance, and financial assistance from state and federal other agencies.

Conservation Districts play an important role in encouraging all landowners within their District to develop and implement sound conservation plans. Where the management on ranches or other lands require a coordinated effort by multiple landowners and/or decision makers, the Hereford NRCD encourages that Coordinated Resource Management Plans be developed, so outlines how everyone will work together to implement and monitor the needed conservation work.

Coordinate with Federal and State Agencies to Develop Programmatic Approaches for Environmental and Cultural Resource Compliance

Implementation of the conservation work needed within the District requires compliance with a wide variety of environmental and cultural resource laws and regulations, by both agencies and individuals , on private, state and public lands.

Since the Clean Water Act (1970), National Environmental Policy Act (1970), Clean Air Act (1972), Endangered Species Act (1973),Federal Land Policy and Management Act (1976), and other environmental laws were passed over 40 years ago, all of the human activities associated with land management and conservation have been repeatedly analyzed by a wide variety of agencies, disciplines, organizations, and individuals. To agencies and courts have repeatedly determined that these kinds of sound land management activities can be implemented using common sense measures that minimize the effects on the environment, human health, and cultural resources.

Programmatic Compliance and Consultation Strategies

Work with the US Fish and Wildlife Service and other federal agencies to develop and implement programmatic consultation that establishes common sense conservation measures that will be followed to protect threatened, endangered, and candidate species for common activities.

Work with federal agencies to summarize the effects of human activities that have been evaluated in NEPA documents over the last 45 years. Work with the federal agencies

and the Council on Environmental Quality to establish categorical exclusions for land management and conservation activities that individually or cumulatively have no significant effect on the environment, and activities already been sufficiently analyzed and found to have no such effect during implementation.

Work with the agencies to develop programmatic environmental assessments or environmental impact statements that establish common sense measures that minimize their effect on the environment, using existing NEPA decisions.

Work with the State Historic Preservation Officer and state and federal agencies to develop standardized, programmatic agreements on how cultural resource clearances will be conducted and reported to protect eligible cultural resources while reduce excessive delays and costs to agencies and landowners.

Embrace the multiple use philosophy of the Federal Land Policy and Management Act of 1976.

Agriculture, mining, recreation, hunting, hiking, and camping are all a part of the multiple use of public lands. The District supports all these multiple uses along with the requirement for the conservation of natural resources and the economic well-being of the people and the local governments. All documents published by government agencies for management and use of public land must be based on the most current best available science and in compliance with all Agency regulations, the Federal Land Policy and Management Act of 1976, NEPA and the Information Quality Act.

Provide and support resource improvement and management on small parcels of land.

Promote, support and assist owners of small parcels of land with making improvements to their land and eliminating their resource concerns. Utilize workshops and property visits by NRCD and/or NRCS personnel to accomplish this objective.

Provide information on type and source of seed for reestablishment of native grasses.

Instruct and provide information on erosion control projects which can be accomplished on small plots of land. Workshops can be used for this purpose.

Provide information on proper livestock and manure management.

Provide guidance on correct wildlife conservation practices.

Encourage roof runoff management and other programs that conserve resources on small acreage properties

Photo 10: Gambel's Quail with Chicks

Work with Local Governments and Agencies to Address US/Mexican border Concerns

Photo 11: Mexican Border fence

With approximately 30 miles of the US/Mexican border including the San Pedro River within the District, the District should share resource concerns and solutions with resource managers in Mexico.

Investigate ways to improve communication and coordinate actions with the US Border Patrol and law enforcement to address resource and property right concerns

.

PHOTO 12: TRASH LEFT ALONG MEXICAN BORDER

MONITOR OUR PROGRESS

The preceding pages have set out the goals and objectives for resource conservation within the HNRCD and strategies for how those goals and objectives will be met. The plan identifies the resource concerns, the practices and activities to be implemented to eliminate or mitigate those concerns, and how the money and technical expertise required will be obtained. This section outlines how this plan will be monitored.

A long term conservation strategy should not be a static document but should continually be modified and updated over time. This is a process called adaptive management. Adaptive management involves monitoring whether the stated goals and objectives are being met at an acceptable rate, and if not, the reason for this lack. If the goals and objectives are not being met, or if some of the goals and objectives have changed, then the plan is modified. Monitoring is the basis for this process.

Natural resource management is not a precise science. It involves complex landscapes and natural processes that are highly variable in space and time, and which are influenced by factors that are incompletely understood and unpredictable, e.g. weather. In addition, the changing, demographic, economic, legal, scientific, and other cultural aspects of the population may alter the goals and objectives and/or the capability to reach those objectives effectively either in a positive or negative way. This fluid natural and cultural environment dictates that an “adaptive management” approach be used.

PHOTO 13: LADD RANCH TREATED AND UNTREATED BRUSH

This approach involves the collection and analysis of information to address several kinds of questions:

Implementation – Were the planned land treatments and other activities implemented? Were they implemented in a correct and timely manner? If they were not implemented as planned, what was the reason – inadequate funding, lack of technical help, lack of interest, or other unforeseen obstacles, e.g. legal challenges or government policies.

Effectiveness- Where the planned land treatments and other activities were implemented, did they have the predicted results in terms of both short and long term objectives? For example, if a land treatment to reduce shrub and increase grass cover was implemented with the goal of reducing runoff and erosion, there are two kinds of questions to answer. In the short run, was the shrub cover reduced and did grass increase as a result? In the long run, was flood runoff and soil erosion reduced in the watershed? If not, why not?

Collateral Information - Natural and Socioeconomic Environment – This information may be needed as a basis for explaining progress, or lack of it, in achieving goals and objectives and for revising goals and objectives as needed. The natural environment includes data on such things as drought, flooding, wildfires, ground water levels, etc. The socioeconomic includes such factors as availability and sources of funding, legal issues, economic factors, scientific knowledge, government policies, regulations and funding levels, endangered species, etc. It should also include an analysis of whether planned partnerships and coordination with other entities has been achieved, and if not, why?

MONITORING STRATEGIES

The HNRCD will prepare an annual report documenting implementation of planned land treatments and other activities and an analysis of progress made in implementation. This may be a stand-alone report or part of the general annual report of the District. This report should include:

District Financial Report – For each project administered by the District, the annual financial report will include money spent in current fiscal year, total money spent since inception and balance remaining. These balance sheets will include a comparison of actual expenditures to the projected timetable for payments and an analysis of significant differences and the reasons for such differences. If there are significant funds being spent to achieve District objectives by individuals or other agencies that are not administered by the District, this report will document those expenditures to the extent that they can be made available to the District without compromising personal privacy. This information can be integrated with the District Financial Report or compiled as a separate report.

District Activity Report - For each of the resource concerns and proposed activities to address them, a report should be made on progress toward implementing the planned activities and a comparison with planned implementation schedules. This report may be compiled annually or on a 2-5 year schedule, depending partly on the scope of activity and requirements of funding sources. Some examples are:

Monitoring Collateral Information

The implementation and effectiveness of this conservation strategy may depend on many factors that directly influence either of the characteristics of specific projects as described above. The need to modify and adapt the strategy as currently written may also depend on changing conditions in either the natural or cultural environment that influence the appropriateness of the basic goals and objectives of the plan. Examples are local, regional and national government policies, new laws or regulations influencing resource management, changing land ownership patterns, urban vs rural population growth, changes in land use, climatic trends, and other factors.

The District will be alert to these developments based on census data, the Federal Register, studies done by various government agencies, published research efforts, and other sources of information. Included are studies or records on precipitation, ground water, stream flow, endangered species, etc., mentioned under long term effectiveness monitoring above. These will be collected, analyzed by the District, and used to interpret long and short term monitoring data described above and to modify the resource concerns and priorities for this strategic plan as need to reflect changing priorities.

Promote The Use Of Standard protocols for monitoring and studies

Regular monitoring, within the scope of published protocols, of the resources within the District is essential to ensuring the policies and best management practices are updated and implemented.

All federal and state agencies with management responsibilities in the District for species and/or its habitat, provide the District with an annual update of the monitoring programs they have in place, data collected and specifics about their collection

protocols. Also that these agencies inform the District of proposed research projects and allow for the District's input and collaboration prior to implementation.

All data shall be collected and studies prepared using protocols that will ensure the quality, utility, objectivity and integrity of the information as required under the Information Quality Act.

All data that is gathered must be shared with the District in a timely manner regardless of the state of completion of a final report.

Private landowners are also encouraged to monitor and share data collected on private property within the District.

All data that is shared with the District that is not public information will be treated as confidential and used by the District only to help update and implement its policies and best management practices.

Appendix A: Our History

The Hereford Natural Soil District (District) was declared a Conservation District August 17, 1944 by Dan E. Garvey, Secretary of State, Arizona. The first election was held in November 1944 with Edgar Dinwiddie, chairman, R. J. Cline and John Welk. The large majority of land ownership was private and state. There was very little Federal Land other than Fort Huachuca at the time. The economic base was agriculture and mining. The towns within the District were Bisbee, Tombstone and Fry (now Sierra Vista). Huachuca City was not incorporated until 1958.

- The district initially included 1,595 acres owned by 3l parties.
- In September 1948 an additional 1,250 acres owned by 25 separate parties was added to the district.
- February 1955 - an additional 100 acres of agricultural land owned by 1 party and 207,165 acres of range land owned 30 separate parties became part of the district.

- May 1955 - a recommendation was made to change official records to conform to new findings of number of agricultural landowners which changed from 98 to 88.
- October 1955 - 9,920 acres of the Dragon Division was made a legal part of the district.
- November 1956 – Acreage of Coronado National Forest Lands was changed from 60,120 to 46,280. 287,870 acres of range land owned by 28 separate parties was added.
- April 1957 - 80 acres of agricultural lands and 31,630 acres of range land owned by 1 party was added.
- May 1958 – agricultural acreage decreased by 2,302 acres, leaving a total of 1,543 acres representing 34 land owners and range lands increased 2,302 acres making a total of 577,922 acres representing 28 land owners.
- June 1961 – decrease range lands by 21,714 acres leaving a total 428,413 acres and decreasing land owners from 28 to 22.
- November 1978 - the name was changed to Hereford Natural Resource Conservation District.

PHOTO 14: HEREFORD DEPOT

Today the district consists of 220,400 acres of private land, 164,529 state, 81,533 BLM, 79,433 military, 44,780 forest land, 4,004 park land, 83 local/state park.

The San Pedro valley was part of transfer of land from Mexico to USA in the Gadsden treaty ratified by the Senate on 25 April 1854. The settlement of ranchers, farmers, homesteaders and miners into the area was started. The records of the settlement of miners and ranching within the district go back to the 1870s but Apache raids made development of the area difficult until first quarter of the next century.

In 1877, the City of Tombstone was founded by Ed Schieffelin where in February 1881 when Cochise County was formed Tombstone was the county seat.

In 1929 the county seat was moved from Tombstone to Bisbee. Bisbee was founded as a copper, gold, and silver mining town in 1880. 1877 located the first claim in Bisbee August 1877. Rucker Claim and the Copper Queen Mining Company was incorporated April 1881. The Copper Queen smelter produced 20,000 tons of copper annually before 1887! Hauls were made to the New Mexico & Arizona's depot at Fairbank using 18 to 20-mule and horse teams pulling two or three high sided wagons hitched together. These hauls were over Mule Pass

By early 1880, the Southern Pacific Railroad from Tucson through Benson and arrived in Deming, New Mexico. In 1882 the New Mexico & Arizona Railroad was built from Benson south for about 30 miles along the banks of the San Pedro River to Fairbank then turning southwestward towards its eventual destination of the US-Mexico border at Nogales, Arizona

In 1888 Arizona & Southeastern Railroad built a 60-mile line southward along the San Pedro River. The Railroad from Fairbanks to Bisbee Arizona, a distance of 37 miles,

required 31 wood pile bridges needed to span the multiple washes the railroad crossed. The A&SE track paralleled the New Mexico & Arizona Railroad (NM&A) on the opposite side of the San Pedro River from Benson to Fairbank.

Less than a month after the Benson extension was opened the first shipment of cattle from Mexico totaled 847 head and cattle required a special 16 car train.

Through the 1900s the railroad changed ownership several times with the final owner being the San Pedro Railroad Operating Company (SPROC) which commenced operations in November 2003 and later filed for abandonment of the southern portion of the line. The STB approved abandonment of the entire line by SPROC on February 6, 2006. Rails and ties were removed in 2007.

A temporary camp was established by the military at the current site of Fort Huachuca in 1877. The Buffalo Soldiers arrived at Fort Huachuca in 1913 and remained for 20 years. During World War I they had the mission of guarding the United States-Mexica border.

In 1945, the end of World War II Fort Huachuca was declared surplus and the property was transferred to the State of Arizona. Fort Huachuca was reactivated during the Korean War by the Army Engineers and then reopened in 1954, 79,000 acres, as a signal post. The mission continues to grow and expand today. The fort was serviced by a railroad which ran from Lewis Springs onto Fort Huachuca. This was discontinued toward the end of 1967, the rails and ties removed.

The military acquired 2,598 acres for an airfield 4000 feet south of Hereford Road and 9500 feet west of the San Pedro River in August 1942 for a 9,200' long runway. The airfield offered specialized night training in B-25 Mitchell and B-26 Marauder bombers. UC-78 aircraft were also flown out of Hereford AAF. The airfield was declared surplus in 1945 and the property was sold. The airfield's 9,200' paved runway, was abandoned in 1949.

In 1880 George Hearst and a partner purchased the Boquillas land grant from the Elias family in Sonora, Mexico. George Hearst began selling off parcels of land for townsites, mills, ranches, farms and a railroad soon after. In 1891, the United States government established the Court of Private Land Claims to validate land grant claims. When George Hearst died in 1891 his son, William Randolph Hearst and his widow, Phoebe Hearst, filed papers to have their exclusive claim to the Boquillas land grant recognized. In 1899, the Land Claim Court ruled that only the Hearst family had valid title to the land grant. A group of some thirty residents of the land grant soon filed a lawsuit to dispute the ruling, and although the case eventually made it to the highest court in the nation, the Supreme Court affirmed the decision of the Land Claims Court in 1906.

In 1901 the Hearst family sold the Boquillas land grant to the Kern County Land and Cattle Company, which was a large mining and ranching conglomerate based in California. Kerns formed the Boquillas Land and Cattle Company in 1901 and began raising cattle from a new headquarters established two miles south of Fairbank. The Boquillas Land and Cattle Company also moved to clear out their rangeland for cattle by

evicting all of the "squatting" homesteaders. The Supreme Court's ruling in 1906 further served to depopulate the San Pedro Valley by triggering an exodus from the area.

The Little Boquillas Ranch gets its name from the *San Juan de las Boquillas y Nogales* (Saint John of the Little Springs and Walnut Trees) land grant, which was granted to the family of Rafael Elias Gonzales by the Mexican government in 1833. The ranch was much larger than the land grants with land going west to the foot of the Huachuca Mountains, both sides of highway 92 north of Ramsey Canyon Road to the edge of Sierra Vista. The land was north of the district line to St David, east to the Dragoon Mountains and west to the foot of the Whetstone Mountains.

Fairbank was settled in 1881, and the Fairbank US Post Office was opened 1883, and the post office was in operation until the late 1960s. Fairbank acted as a way point between Tombstone and the rest of the country, bringing supplies into the bustling town, and also acting as the departure point for the ore pulled from Tombstone's silver mines. Fairbank was also home to a stage coach station on the Butterfield Overland Mail line which opened in 1885. In 1901, the land grant on which the town was situated was purchased by the Boquillas Land and Cattle Company who extended the leases on only the commercial building and several residences into the 1970s

William Greene arrived in Arizona in 1872 and started a cattle and mining operation. He leased four Cananea mines in 1896 and immediately organized the Cananea Copper Company. The Greene Cattle Company was incorporated in 1901 encompassing land along the San Pedro of 100,000 acres. The Cananea Cattle Company was incorporated the same year for all ranch lands, about 700,000 acres, in Mexico. Until the late 1960s there were facilities by the San Pedro River, the Green Cattle Crossing, to cross cattle from Mexico into the US. The cattle were tested for Brucellosis and TB by US Government veterinaries. The cattle also had to go through a dip to kill parasites before they were loaded onto trucks. Records show that actor John Wayne visited the crossing in 1968 and purchased cattle crossing from Mexico.

The original community of Hereford was located were Hereford Road turned south along at the railroad and consisted of a railroad depot, pens for loading cattle onto the railroad, the Hereford post office and house, barn and corrals, a part of the Little Boquillas Ranch.

The Ladd family own and operate the San Jose Ranch which joins the Mexican border between Naco and the San Pedro River. The Ladd Ranch was originally homesteaded by his wife's family well over a hundred years ago.

The land Brown Canyon Ranch is on was first settled around 1880 by John Thomas Brown. Following a succession of owners, the land eventually ended up in the hands of the brothers James and Tom Haverty. Between 1905 and 1907, James and his brother built what is today the most prominent building in the canyon, a modest three-room adobe home, now known as the Brown Canyon Ranch. It operated as a cattle ranch until 1997. A year later the ranch was made a part of the US Forest Service in a land exchange.

Oliver Fry and his two oldest sons traveled from Texas and settled on 320 acres just outside of Fort Huachuca around 1901. In 1913 a group of dry land farmers settled in what is now Sierra Vista and named their settlement Buena. Buena was located east of Garden Canyon on a railroad whistle-stop between Lewis Springs and Fort Huachuca. At this site was a post office and a school house that served children in Buena.

In 1955, the area outside of Fry's property went forward with incorporation excluding the half-square-mile owned by Fry. Sierra Vista was incorporated in 1956.

The historic Sands Ranch began was settled by Louis Sands who moved to Arizona 1902 and begin to buy ranchland in 1917. Today the Sands Ranch, a cow-calf operation on 100 sections of private, state, Bureau of Land Management, Forest Service and Pima county lands is owned and managed today by Marilyn Harris and Kathy Williams sisters and granddaughters of Louis Sands.

The Brophy family acquired the Babacomari Ranch acres, in 1935. The third owner of this historic ranch since the King of Spain, four hundred years earlier. The ranch's boundaries follow those of the original land grant, about 28,000 acres, issued in 1832 by the then young Republic of Mexico as the"San Ignacio del Babacomari" to the Elias family, still prominent ranchers in Sonora after nearly 200 years. Decendent of the Brophy family still operate the ranch today.

The Walnut Gulch Experimental Watershed was selected as a research facility by the United States Department of Agriculture (USDA) in the mid 1950's. It encompasses 37,000 acres in the northeastern portion of the district and surrounds Tombstone to the north and east. Hydrologic processes and erosion and sedimentation are measured on the many watersheds, some of them no larger than 25 acres, within the 37,000 acres.

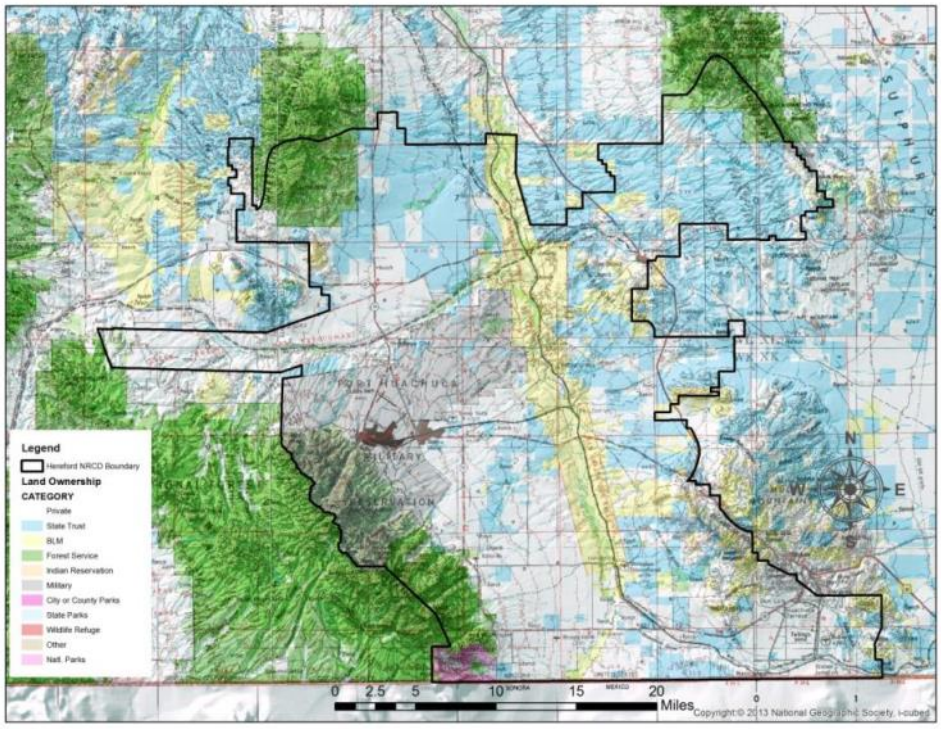
Huachuca City started out as a stop along the Southern Pacific Railroad. With the re-opening of Fort Huachuca in 1954, the area began to grow and while it went through many name changes - Campstone Station, Sunset City, and Huachuca Vista - it finally settled on the name Huachuca City and incorporated in 1958.

In November 1988 Congress established the San Pedro Riparian National Conservation Area (SPRNCA) consisting of 56.431 acres along the San Pedro from the US Mexican Border north to about St David. All the SPRNCA is in the Hereford NRCD except for the very north portion. In June 1989 a final EIS and ROD was published for the SPRNCA which excluded grazing. The statement in the EIS was "While BLM does not regard livestock grazing to be incompatible with the continued existence of the riparian ecosystem, a decision was made to prohibit livestock grazing for 15 years". There was no data, material or study to support this decision.

There has been and continues to be trespass cattle on the SPRNCA including cattle coming down the river from Mexico which cause a threat to the cattle of neighboring ranches and all of Arizona because of the danger of bringing in disease such as vesicular stomatitis, TB, brucellosis. BLM pretty much depends on neighboring ranches to remove the trespass cattle but that is difficult with BLM keeping all gates to the SPRNCA locked and all the cattle handling facilities have been removed.

An addition 6,521 acres, consisting of four allotments, were added to the SPRNCA in a land exchange with the state of Arizona with the agreement that grazing would continue by the allotment owners.

Appendix B: Our Land Use and Ownership



There are just over 595 thousand acres in the Hereford NRCD. Land ownership is a mixture of private property, State Trust Land Federal lands, including the Fort Huachuca Army Base, Bureau of Land Management lands, National Forests, and the Coronado National Memorial on the border with Mexico.

Most of the District is rangeland, with pine forests at the highest elevations in the mountains and a few farms

Ownership	Acres	Percent
Private Land	221,508	37%
State Trust Land	165,582	28%
Bureau of Land Management	81,070	14%
Fort Huachaca	79,114	13%
Coronado National Forest	43,797	7%
Coronado National Memorial	4,004	1%
OTHER	8	0%
TOTAL ACRES	**595,083**	

Rangeland Acres	371,464
Forested Acres	2,326
Urban land Acres	27,148
Surface water Acres	256

APPENDIX C: COORDINATION BACKGROUND

In 2011, the Hereford Natural Resource Conservation District (HNRCD) begin coordination by holding two coordination meetings with the USFWS on the proposed critical habitat for the Spikedace and Loach Minnow. Cochise County, Sierra Vista and Fort Huachuca joined with the HNRCD in these meetings. As a result, the final rule was issued in February 2012 by the USFWS stating "We have excluded from this designation of critical habitat: portions of the upper San Pedro River in Arizona".

In June, 2013, the Arizona Natural Resource Conservation Districts State Association and County Supervisors Association of Arizona sponsored a Coordination and Cooperating Agency Training. The training was attended be the Arizona BLM State Director and several of his staff. The BLM Gila District staff were not in attendance. The training included sessions by:

- Cynthia Moses-Nedd, DOI Liaison to State & Local Government, co-author of A Desk Guide to Cooperating Agency Relationships and coordination with Intergovernmental Partners.
- Margaret Byfield, American Stewards of Liberty

The Hereford NRCD initiated coordination with the Bureau of Land Management (BLM), Gila District on the Resource Management Plan (RMP)/Environmental Impact Statement (EIS) being proposed for the San Pedro Riparian National Conservation Area (SPRNCA). The first coordination meeting was in March 2014 with additional meetings in July, August, September 2014, and May 2015, a total of five. The meetings with BLM were attended by members of the HNRCD board, HNRCD advisors, cooperators, ranchers, consultants, Cochise County and Sierra Vista personnel and consultant, other districts and state agencies and the Natural Resource Conservation Service, Douglas Field Office.

In the March 2014, the issues discussed were:

- Livestock Grazing
- Trespass cattle/cattle diseases
- Fire Prevention/Fuel Load Management/Prescribed Fires
- Access for Ranchers and others
- Fencing –SPRNCA Boundary/International Border
- Protocol for studies
- Accomplishment of projects
- Voluntary conservation
- Watershed improvement
- Water for plants verses instream flows
- Consistency with local plans

July 2014

- Priority Role of Hereford NRCD, Cochise County and City of Sierra Vista in the preparation of the EIS and discussion of appropriate issues for coordination.
- Discussion of Hereford Long Range Plan and report from BLM of potential conflicts between the agency's proposed action and Hereford's plans and policies.
- Discussion of Cochise County Comprehensive Plan and City plans which pertain to resource issues and report from BLM of potential conflicts between the agency's proposed action and the county and city plans and policies.
- Update from BLM on monitoring activities that have been performed since the creation of the SPRNCA as noted in Appendix 10 of the San Pedro Monitoring Plan
- Report from BLM on their assessment of Lamar Smith's livestock grazing report
- Preparation of a Grazing Alternative

August 2014

- Process for developing consistency between the BLM plan and the District, City and County plans
- Discussion of the BLM Travel Management Plan
- Status of the preparation of a Grazing Alternative
- Discussion of coordination meeting for discussion with ranchers
- Discussion of data availability
- September 2014
- Trespass Cattle (Mexico and Health issues)
- Trespass Cattle (ranchers)
- Owner's and BLM's responsibilities
- Identifying problem areas
- Fencing, cattle guards, gates and water gaps
- State and BLM required reporting and enforcement measures

May 2015

- FOIA Request
- Discussion of the Analysis of the Management Situation
- Discussion of Proposed Alternatives
- Discussion of Gila Water Adjudication

In February 2014 the Hereford NRCD held a coordination meeting with Coronado National Forest to discuss information on the travel management plan.

Hereford NRCD joined with Apache NRCD, Pima NRCD, Whitewater Draw NRCD, Willcox-San Simon NRCD, and Winkelman NRCD for a Coordination Meeting with USFWS on Expansion of 10J Rule for the Mexican Wolf September 24, 2014. American Stewards of Liberty was present as a consultant. The districts were joined by Cochise County, Arizona State Land Department, Arizona Game and Fish, Arizona Cattle

Growers, Catron County NM Wildlife Investigator, Chavez County NM and ranchers. The information on the agenda for discussion:

- Discussion of background and powers of the NRCDs
- Fulfillment in NEPA analysis of district policies
- Review of district policies
- Border issues
- Discussion of economic impacts and economic analysis in the DEIS
- sheriff's office impacts
- county impacts
- local fire district impacts
- local school impacts
- impacts on ranchers, guides, local businesses
- problems with the economic analysis in DEIS methodology
- Discussion of the scientific points of the DEIS hybridization
- Species of concern other than the Mexican wolf
    - jaguar
    - bighorn sheep
    - tortoise

December 18, 2014 Hereford NRCD joined with Apache NRCD, Pima NRCD, Whitewater Draw NRCD, Willcox-San Simon NRCD, and Winkelman NRCD held a Coordination Meeting with Small Business Administration, Office of Advocacy to discuss the Regulatory Flexibility Act and economic information ignored by USFWS in the NEPA analysis on Expansion of 10J Rule for the Mexican Wolf.

The Hereford NRCD also co-sponsored two workshops in April 2015. The first on monitoring the Guide to Rangeland Monitoring and Assessment publication and the new NRCS monitoring requirements for Prescribed Grazing. The second workshop was on Principles of Range Management and Watershed Analysis by the University of Arizona.

APPENDIX D: OUR WATER RESOURCES

Water is one of the most important natural resource and economic issues in our area as well as the entire Southwest. In our District, water is supplied in the form of rain and snowfall with snowfall mostly limited to our mountains. We depend on rain to replenish our groundwater aquifer and fill our stock ponds.

Our watershed, often referred to as the upper San Pedro, has a complex variety of terrain and soils. The vegetation ranges from desert shrub land, along the San Pedro River, to pine woodland in the Huachuca Mountain's. Elevation ranges from 3,550 feet in an area along the San Pedro River near St. David to 8,410 feet at Huachuca Peak. The annual precipitation ranges from 10 to 27 inches. This variety of terrain, vegetation and soils direct how water flows into the ground to recharge our groundwater aquifer as well as how water flows through our watershed to promote healthy riparian systems within our natural drainage systems. Arizona Department of Water Resources (ADWR)

estimates that the average annual runoff is 0.5 inches, or 26.65 acre-feet per square mile, in our District.

Our District has several natural drainage systems. These systems, when they contain water, help to recharge our groundwater aquifer. The largest of these drainage systems include the San Pedro River, the Babocómari River, Walnut Gulch, and Greenbush Draw. Other smaller but notable drainage systems include Willow Wash, Graveyard Gulch, Clifford Wash, and Garden Canyon Wash. The San Pedro River is our most prominent river system within our District. It is a perennial-intermittent river where certain sections of the river have water throughout the year, while other sections have running water only after periods of rainfall. The recent drought and the delay of the summer monsoon has affected some previously perennial stretches, most notably the area near Charleston. The San Pedro River is one of the longest naturally occurring riparian areas in the Southwest and one of the few rivers that flows in a northern direction. Because of its value and uniqueness it was provided federal protection through the establishment of the San Pedro Riparian National Conservation Area (SPRNC) in 1988. This area is administered by the Bureau of Land Management (BLM).

There are numerous active stream gages, administered by the United States Geologic Survey (USGS), along the San Pedro River. The gage at Charleston has been in operation since 1904. The largest annual flow ever measured in the watershed, 152,798 acre-feet, was recorded at this gage in 1914. In 1984 a maximum annual flow of 102,107 acre-feet was measured at the gage near Tombstone. Median annual flow at the Charleston and Tombstone gages is 33,203 acre-feet and 29,654 acre-feet, respectively.

Our groundwater aquifer is classified as basin fill which consists of both younger and older basin fill, basal conglomerate and recent stream alluvium. The basin fill is our principal aquifer however stream alluvium is also utilized to supply water. Groundwater recharge, approximately 35,700 AFA, is from the mountain fronts, underflow from Mexico and streambed infiltration (ADWR, 2005a). Two effluent recharge projects in our district also help to recharge the aquifer. The ADWR report identified the major discharge factors as municipal and agricultural pumping and from riparian evapotranspiration (ADWR, 2005a). This report estimated the amount of groundwater stored in our aquifer at 19.8 to 26.1 million acre feet (maf) but there are some estimates that up to 59 maf exist.

Historically, water use was primarily for agricultural - livestock and farming uses in our District. In the late 1800's artesian wells and beaver ponds served to provide water to irrigate small farms along the river. However, due to malaria these ponds were drained and irrigation wells were developed to provide water for the cropland. At its peak upwards of 2,000 acres of irrigated farmland existed along the river from the Benson to Hereford. Today irrigated farmland is limited to small farms near Saint David and Benson. Ranching operations utilize both surface and groundwater sources to provide water for their livestock. Wells are the more dependable water sources and water is pumped from the groundwater aquifer via solar, gas or diesel pumps or windmills. Capturing surface water in stock ponds allows the rancher to store large amounts of

water for extended periods of time. Stock ponds also provide water to all wildlife. It is estimated there are over 900 registered stock ponds within the District.

Water availability in our District is strongly dependent on climate and water use, according to a water resource assessment by the U.S. Geological Survey, in cooperation with the Arizona Department of Water Resources (ADWR, 2005a).

Climate, especially over time, greatly influences the amount of water available within the San Pedro watershed. The above study found that groundwater and streamflow responded to periods of higher precipitation in the mid-1980s to mid-1990s, as well as to periods of overall lower precipitation in the 1960s through mid-1980s and mid-1990s to 2009.

Water use in our District is primarily provided through the pumping of groundwater. Groundwater is the primary source of water for municipal, domestic, industrial and agricultural use in our watershed. Demand for water resources has increased and will continue to do so as our population grows.

As the groundwater table declines the health of our District will be impacted. Partnering with the numerous Federal Agencies, Municipalities, and the Upper San Pedro partnership (USPP) and other groups in and around our District will provide the additional support needed to attain our goals for the proper management and sustained use of our natural resources, especially water.

Appendix E: Our Vegetation Resources

The Hereford District is in the Southeastern Arizona Basin and Range Major Land Resource Area (MLRA 41). The Land Resource Units within the Major Land Resource Area represent different elevation, precipitation, and temperatures that are used in classifying soils and ecological sites. There are three Land Resource Units represented in the Hereford NRCD.

41.1 Mexican Oak-Pine Forest and Oak Savannah.

Higher elevation uplands, foothills and mountains, typically 4,500 feet elevation and higher. Annual average precipitation ranges from 16-30 inches. In our District this takes in the Huachuca and Mule Mountains and their associated uplands and foothills.

41.3 Chihuahuan-Sonoran Semi Desert Grasslands

Elevations range from 3,200-5,000 feet and annual average precipitation ranges from 12-16 inches. This CRA takes in the middle elevations of the broad valley on both sides of the San Pedro River, and covers most of the District's rangelands.

41.2 Chihuahuan-Sonoran Desert Shrubs

This Land Resource Unit is at the lowest elevations along the San Pedro River on the north end of the District. Elevations range from 2,600-4,000 feet and annual average precipitation is 8-12 inches.

Within the Hereford NRCD boundaries the dominant land use is rangeland. And at the individual ranch level the most common method used to describe different plant communities, their resource concerns, and their potential is the Ecological Site Description (ESD). Ecological sites provide a framework for classifying and describing rangeland and forestland soils and vegetation.

Looking across our landscape it is not difficult to recognize that some parts are different from other parts in regard to the plant communities present, especially as to the kinds and amounts of vegetation. To understand this variation across the landscape, these different parts are classified into units called Ecological Sites. An Ecological Site is defined as "a distinctive kind of land with specific characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation". Land inventory, analysis, planning, and resulting management decisions require the knowledge of these individual sites and their relationships on the landscape. The Ecological Site Description is the document that contains information about the individual Ecological Sites.

Ecological Site Description information is presented in four major sections:

- Site Characteristics - physiographic, climate, soil, and water features
- Plant Communities – plant species, vegetation states, and ecological dynamics
- Site Interpretations – management alternatives for the site and its related resources
- Supporting Information – relevant literature, information and data sources

The following criteria are used to differentiate one ecological site from another:

- Significant differences in the species or species groups that are in the characteristic plant community
- Significant differences in the relative proportion of species or species groups in the characteristic plant community.
- Soil factors that determine plant production and composition, the hydrology of the site, and the functioning of the ecological processes of the water cycle, mineral cycles, and energy flow.
- Differences in the kind, proportion, and production of the overstory and understory plants due to differences in soil, topography, climate, and environment factors, or the response of vegetation to management.

Where changes in soils, aspect, topography, or moisture conditions are abrupt, ecological site boundaries are distinct. Boundaries are broader and less distinct where plant communities change gradually along broad environmental gradients of relatively uniform soils and topography. Although some plant communities may appear to be along a continuum, distinctive plant communities can be identified and described. These communities occur with predictable regularity and are associated with changes in soil, topography, hydrology, or climate that can also be recognized.

There are also different concepts used when looking at land use and potential on a larger scale. For example, Ecological Site Descriptions that receive similar amounts of

precipitation and that have similar soil temperature regimes are grouped together into what are known as Common Resource Areas (CRAs). And these CRAs are further grouped into Major Land Resource Areas (MLRAs), which can be useful for statewide and regional planning.

For purposes of illustrating the concepts of Ecological Sites, the two examples used when discussing soils will be used again. These are 41.3 Limy Upland 12-16" p.z. (precipitation zone) and 41.3 Sandy Loam Upland 12-16" p.z. Both are in the LRU 41.3 Chihuahuan-Sonoran Semi Desert Grasslands, and both are in the 12-16" precipitation zone. So the climate, soil temperatures, and typical rainfall received are the same.

The next differentiation used is topography. Are these sites flooded, or do they benefit significantly from water running in from the surrounding terrain? No they are not, hence the word "Upland" in their name. Sites that do receive benefit from flooding or extra water have "Bottoms" or "Swales" in their name.

Next, the amount of salts in the soil is used to separate Ecological Sites. Soils that are moderately to strongly salty have the word "Saline" in their name. Neither of our example soils and sites have sufficient salts in the soil to be called saline.

Topography is next. Soil and sites that have greater than 15% slope have "Hills" or "Slopes" in their name. Soils on steeper slopes are commonly less-developed than soils on flatter terrain and therefore have a different potential to support a plant community. Neither of the example sites are on steeper terrain and therefore are still "Uplands".

Now the process of differentiating ecological sites moves to soil depth. Are the soils shallow (less than 20 inches) to some kind of root-restricting layer? Or are they moderately deep (20-60") or deep (greater than 60")? This is where the example sites are separated. Soils associated with the Limy Upland ecological site are calcareous throughout the soil profile and also shallow to a lime-cemented hardpan, hence the modifier "Limy" in Limy Upland. The hardpan is commonly called caliche by most people, although to a soil scientist there are actually several different types. And soils that are shallow to something different such as bedrock or weathered parent material have the modifier "Shallow" in their name. In the section on soils the Bella fine sandy loam soil meets all of these criteria, and therefore this soil is associated with the Limy Upland Ecological Site. It should be understood that there are other soils, usually with different surface soil textures, that are also associated with this ecological site. These differences within the same ecological site will be discussed in greater detail in the section on rangeland resource concerns.

Based on the criteria used so far the Sandy Loam Upland site is associated with moderately deep to deep soils. The soils are not calcareous throughout the entire soil profile, and in fact the specific determination is that they are not calcareous in the top 10 inches or more. Next, certain soil development characteristics of the soil profile are used to further separate ecological sites, namely the presence or absence of an argillic horizon. An argillic horizon is a diagnostic soil science term that refers to the accumulation of clay particles in a layer, or horizon, of the soil. This accumulation is the result of weathering processes and soil development in the upper part of the soil profile

and is common in many soils in temperate climates. Anyone who has dug a hole in deep soils in this area has seen how the soil texture usually gets "heavier", or has more clay in it, as the hole deepens. This does not necessarily indicate an argillic horizon – there are specific criteria for the amount of clay – but it does illustrate the weathering and development process of soils in our area.

And for the soils that have an argillic horizon, to be associated with the Sandy Loam Upland ecological site the surface texture must be sandy loam at least 4 inches deep.

To summarize the criteria used to associate the Bella fine sandy loam soil with the Limy Upland Ecological Site,

- It is a shallow soil typically 15 inches to a hardpan cemented with calcium carbonate and gypsum
- The upper 15 inches of soil are calcareous throughout
- Slope range is 1-10%
- It is not flooded and does not benefit significantly from water from the surrounding terrain
- It is non-saline to very slightly saline

PHOTO 15: 41.3 LIMY UPLAND IMAGE FROM UNIV OF ARIZONA

The Courtland sandy loam is associated with the Sandy Loam Upland site because:

- It is a deep soil greater than 60 inches
- The top 10 inches of the soil are not calcareous
- Slope range is 1-10%
- It is not flooded and does not benefit significantly from water from the surrounding terrain
- It is non-saline
- There top 14-20 inches of the soil are a sandy loam texture

PHOTO 16: 41.3 SANDY LOAM UPLAND IMAGE FROM NRCS

- It has a well-developed argillic horizon below the sandy loam surface layers, or horizons

And both soils and their associated ecological sites are in CRA 41.3 Chihuahuan-Sonoran Semi Desert Grasslands, which is part of MLRA 41 Southeastern Arizona Basin and Range.

Because of all the factors discussed above, these two ecological sites have distinctly different plant communities and potential for production.

Consider this description taken directly from the Limy Upland Ecological Site Description:

41.3 Limy Upland 12-16"p.z. Historic Climax Plant Community

"The potential plant community on this site is a diverse mixture of desert shrubs, half shrubs and perennial grasses and forbs. Most of the major perennial grasses on the site are well dispersed throughout the plant community. Black grama occurs in patches which are small in size and appear to be well dispersed over large areas of the site. The aspect is shrub-land. Cryptogam cover (moss, lichen) can be considerable in the plant community, but diminishes as the surface cover of gravel increases. With continuous heavy grazing, the palatable perennial grasses and forbs are replaced by increases in the large woody perennials (creosote bush, white thorn, and tar bush). Natural fire may have been important in maintaining a balance between herbaceous and woody species on the site, but fire free intervals were much greater than those of more productive sites, due to the length of time needed for fuels to accumulate. Also, fuel continuity is poor in areas of this site due to slope and aspect. In addition, the major perennial grasses; bush muhly and black grama, have shrub-like characteristics (perennial culms and branching), and accumulate much old dead material and may take several years to recover to pre-fire conditions. North aspects have more perennial grass than south aspects. Shrubs will resume dominance within ten years after fire."

And then compare it to the Sandy Loam Upland Ecological Site Description:

41.3 Sandy Loam Upland 12-16" p.z. Historic Climax Plant Community

"The potential plant community on this site is dominated by warm season perennial grasses. All the major perennial grass species on the site tend to be well dispersed throughout the plant community. Perennial forbs and shrubs are minor on the site. The aspect is open grassland. With continuous heavy grazing, palatable perennial grasses are removed from the plant community and species like Rothrock grama and threeawns will increase. With severe deterioration, shrubby species will increase or invade and dominate the plant community. This is the most productive upland site in the CRA. Natural fire was important in the development of the potential plant community. Stable areas of this site can produce effective herbaceous covers with up to 10% canopy cover of mesquite. In areas where half-shrubs dominate the under-story, the potential production of perennial grasses is equal to present production of half-shrubs once they are removed by fire or another type of brush management."

The plant communities found on an ecological site are naturally variable. Composition and production will vary with yearly conditions, location, aspect, and the natural variability of the soils. The Historical Climax Plant Community represents the natural potential plant communities found on relict or relatively undisturbed sites.

The information in this section is just a small sample of the total available to planners and land managers for ecological sites in the Hereford NRCD. Complete reports of ecological sites can be found online and generated from the Ecological Site Information System (ESIS). A link is provided in the Appendix.

Threatened and Endangered plant species

In 1966 the United States Congress created the Endangered Species Preservation Act. This Act provided a means for listing native animal species, not plants, as endangered and giving them limited protection. The Departments of Interior, Agriculture, and Defense were to seek to protect listed species, and, insofar as consistent with their primary purposes, preserve the habitats of such species. The Act also authorized the Service to acquire land as habitat for endangered species. The Act was amended by Congress in 1969 to include the protection of species with the potential of "worldwide extinction" by prohibiting their importation and/or sale in the United States. Included in the 1969 Congressional actions was that the Act had its name changed to the Endangered Species Conservation Act.

In 1973 an international conference of 80 nations was held in Washington, D. C. which led to the creation and signing of the "Convention on International Trade in Endangered Species of Wild Fauna and Flora" (CITIES). This agreement monitors and or restricts international commerce in plant and animal species believed to be harmed by trade. Following this conference Congress passed the Endangered Species Act of 1973. The new act was created to provide protection for plants, invertebrates and animal species (their habitats as well) if they were identified as needing protection. This act also defined various terms such as: "threatened", "endangered", "candidate species", "proposed species", "critical habitat", "safe harbor agreement", and "petition".

"Threatened species" means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

"Endangered species" means any species which is in danger of extinction throughout all or a significant portion of its range.

"Candidate species" a species for which the FWS or NOAA Fisheries has sufficient information regarding threats and or its biological vulnerability to support a proposal to list as endangered or threatened.

"Proposed species" Is a species of animal or plant that is proposed in the Federal Register to be listed under section 4 of the Endangered Species Act.

"Critical habitat" means those specific geographic areas, whether occupied by a listed species or not, that are essential for its conservation and that have been formally

designated by rule published in the FEDERAL REGISTER. There are two additional factors regarding "critical habitat"; 1) critical habitat can be identified even if it was not originally established for a T & E species and 2) unless identified by the Secretary of the Interior, critical habitat will not include the entire geographical area which can be occupied by the T&E species.

"Safe Harbor Agreement (SHA)" is a voluntary agreement signed by FWS or NOAA Fisheries and a

property owner and any other cooperator that (a) sets forth specific management activities that the non-federal property owner will undertake or forgo to provide a net conservation benefit to species covered by the agreement, and (b) provides the property owner with the Safe Harbor assurances described within the agreement and authorized in an enhancement of survival permit.

"Petition" is a formal request from an interested individual to list, reclassify, or delist a species, or to revise critical habitat for a listed species under ESA. Critical habitat can be petitioned for designation under the Administrative Procedures Act.

Since the Act was passed in 1973 Congress has significantly amended the law in 1978, 1982 and 1988. The Endangered Species Act can be viewed at this hyperlink ESA.

All federal agencies are required to abide by the Act but the United States Fish and Wildlife Service (FWS) is the agency given the primary responsibility for implementing the Act. A few of their responsibilities include the legal determination if a species should be listed and the development of a list of species. This list includes all species that are listed as threatened or endangered as well as species that are proposed or candidates to be added to the Federal list.

In Cochise County there are twenty two Threatened and Endangered species of which only three are plants. There are five Candidate species of which only one is a plant. The plant species and their information listed below were acquired from the online tool called the Environmental Conservation Online System-Information, Planning and Conservation system or ECOS-IPaC. The "Hereford NRCD FWS IPaC Trust Resource Report" was developed from this online tool and the full report can be found in the appendices of this Strategic Plan or visit the website at http://ecos.fws.gov/ipac/.

CANELO HILLS LADIES'-TRESSES (*SPIRANTHES DELITESCENS*)—THREATENED SPECIES

Critical Habitat: No critical habitat rules have been published for the Canelo Hills ladies'-tresses.

Conservation Plans: No conservation plans have been created for Canelo Hills ladies'-tresses

Petitions: One petition has been received for this species but is not active at this time.

Life History:

Habitat Requirements: This orchid is found in fine textured, well-drained soils that are high in organic matter that are found near natural wet areas such as springs, seeps, wet meadows (cienegas) and small streams. This orchid grows with other plants such as; sedges, riparian type grasses and forbs at elevations of approximately 5,000 feet.

Movement / Home Range: This species is known from only a very few sites in southern Arizona, and further surveys need to be completed for New Mexico and Mexico.

Reproductive Strategy: The species is presumed to be perennial. Mature plants do not flower every year, and in some years, there is no vegetative growth visible above the ground. Even plants that are vegetatively present may not produce a flower stalk. Flowers appear in July or August. Seedlings must form an association with a mycorrhizal fungus and these young plants live underground for several years before above-ground vegetative growth occurs. The orchid dies back to the ground in fall and winters underground. Emergence, if it occurs, is in May.

Other: Threats to this orchid are from destruction of its habitat by improper land management and erosion.

COCHISE PINCUSHION CACTUS (*CORYPHANTHA ROBBINSIORUM*)—ENDANGERED SPECIES

Critical Habitat: No critical habitat rules have been published for the Cochise Pincushion cactus. **Conservation Plans:** No conservation plans have been created for Cochise Pincushion cactus.

Petitions: No petitions have been received for this species.

Life History:

Habitat Requirements: Found only on one type of very shallow, highly calcareous soils at elevations of 3800 to 4200 feet in the Mexican Highland vegetation community. Associated vegetation with this species is sparse and limited to lichens, mosses, and algae. Due to this sparse vegetation these plants are found mostly in open sites.

Movement / Home Range: Known range is very small and limited. Individuals are not distributed across its potential habitat, so there are likely microsite factors also controlling distribution. Insect predation (moths and beetles) is a significant cause of mortality.

Reproductive Strategy: Flowering occurs in the spring months. Flowers are pale yellow and small. Fruits are orangey red when ripening and turn brown when dry. Plants achieve sexual maturity at 17-28 mm in diameter.

Other: Very vulnerable to ground disturbing activities. The normally sparse native vegetation provides some protection from wildfire; however, invasive non-native plants that establish and increase overall plant density increase the risk of damaging fires in the habitat. Losses of adults to drought or predation restrict the ability of a local population to survive over time.

HUACHUCA WATER-UMBEL (*LILAEOPSIS SCHAFFNERIANA* VAR. *RECURVA*)— THREATENED SPECIES

Critical Habitat: Critical habitat has been determined see FR3409.

Conservation Plans: Habitat Conservation Plans (HCP) have been developed for the Malpai Borderlands group and a Safe Harbor Agreements has been developed for the Barboot/99-Ranch. (note: these are not in the Hereford NRCD)

Petitions: One petition has been received for this species but is not active at this time.

Habitat Requirements: Huachuca water-umbel is found **i**n mostly permanent wet areas of cienegas, rivers, streams, and springs at elevations from 2800 to over 7000 feet.

Movement / Home Range: Surface and groundwater development has disrupted aquatic habitat connectivity that once provided opportunities for expansion of the population into new, downstream habitats after floods. At present, the known populations are largely isolated from other waterways.

Reproductive Strategy: Huachuca water-umbel reproduces from both seed and rhizomes. Seed can remain viable for up to 10 years.

Other: loss of aquatic habitat is a threat. The small areas that remain are at risk from scouring from flooding as well as sedimentation. Expansion of non-native plant species that increase vegetation density in habitat also degrades habitat quality needed for population growth.

Monitoring reports for the water-umbel in the San Pedro Riparian Conservation Area from 2001-2010 showed that the population is stable overall, but varies with flooding dry year events as would be expected. In 2009 and 2010, Fort Huachuca conducted a transplant project for the water umbel on the fort, and in the San Pedro Riparian Conservation Area. Monitoring reports through 2012 indicate that the species can be successfully transplanted.

WRIGHT'S MARSH THISTLE (*CIRSIUM WRIGHTII*) – CANDIDATE SPECIES

There is no Critical habitat, petitions or life history information in the ECOS system at the time of this report.

Species of Concern and Sensitive Species: The Bureau of Land Management (BLM), United States Forest Service (FS), and the U.S. Fish and Wildlife Service (FWS) have additional lists of species that are considered “species of concern”, a FWS term or “sensitive species” used by both BLM and the FS. Below is a list of species that are shared by all three agencies for Cochise County. This data list was developed using the Arizona Game & Fish Departments Heritage Data Management System (HDMS).

Arizona Game and Fish Department, Heritage Data management System

For Cochise County - Updated: June 24, 2015

SCIENTIFIC NAME	COMMON NAME	ESA	BLM	USFS
Asclepias lemmonii	Lemmon Milkweed			S
Asclepias uncialis	Greene Milkweed	SC		S
Asplenium dalhousiae	Dalhouse Spleenwort		S	
Astragalus cobrensis var. maguirei	Coppermine Milk-vetch	SC		S
Astragalus hypoxylus	Huachuca Milkvetch	SC	S	S
Carex chihuahuensis	Chihuahuan Sedge			S
Carex ultra	Arizona Giant Sedge		S	S
Castilleja nervata	Trans-pecos Indian-paintbrush			S
Coryphantha robbinsorum	Cochise Pincushion Cactus	LT		
Coursetia glabella	Smooth Baby-bonnets	SC		S
Desmodium metcalfei	Metcalfe's Tick-trefoil			S
Draba standleyi	Standley Whitlow-grass	SC		
Echinomastus erectocentrus var. erectocentrus	Needle-spined Pineapple Cactus	SC		
Erigeron arisolius	Arid Throne Fleabane			S
Erigeron kuschei	Chiricahua Fleabane	SC		S
Erigeron lemmonii	Lemmon Fleabane	SC		
Eriogonum capillare	San Carlos Wild-buckwheat	SC		
Eriogonum terrenatum	San Pedro River Wild Buckwheat		S	
Euphorbia macropus	Woodland Spurge	SC		
Gentianella wislizeni	Wislizeni Gentian	SC		S
Graptopetalum bartramii	Bartram Stonecrop	SC	S	S
Heterotheca rutteri	Huachuca Golden Aster	SC	S	S
Heuchera glomerulata	Arizona Alum Root			S
Hexalectris arizonica	Arizona Crested coral-root			S
Hexalectris colemanii	Coleman's coral-root			S
Hexalectris warnockii	Texas Purple Spike	SC	S	S
Hieracium abscissum	Rusby's Hawkweed			S
Hieracium pringlei	Pringle Hawkweed	SC		
Lilaeopsis schaffneriana ssp. recurva	Huachuca Water-umbel	LE		
Lilium parryi	Lemon Lily	SC		S
Limosella pubiflora	Chiricahua Mudwort	SC		S
Lupinus huachucanus	Huachuca Mountain Lupine			S
Lupinus lemmonii	Lemmon's Lupine			S
Metastelma mexicanum	Wiggins Milkweed Vine	SC		S
Muhlenbergia palmeri	Palmer's Muhly			S
Packera neomexicana var. toumeyi	Toumey Groundsel			S
Pectis imberbis	Beardless Chinch Weed	SC		S
Pediomelum pentaphyllum	Chihuahua Scurfpea	SC	S	S
Peniocereus greggii var. greggii	Night-blooming Cereus	SC		
Pennellia tricornuta	Chiricahua Rock Cress			S
Penstemon discolor	Catalina Beardtongue			S

Peritoma multicaulis	Slender Spiderflower	SC		
Perityle cochisensis	Chiricahua Rock Daisy			S
Phemeranthus humilis	Pinos Altos Flameflower	SC		S
Phemeranthus marginatus	Tepic Flameflower	SC		S
Physalis latiphysa	Broadleaf Groundcherry			S
Polemonium pauciflorum ssp. hinckleyi	Hinckley's Ladder	SC		S
Potentilla albiflora	White-flowered Cinquefoil			S
Potentilla rhyolitica var. chiricahuensis	Chiricahua Cinquefoil			S
Potentilla rhyolitica var. rhyolitica	Huachuca Cinquefoil			S
Psilactis gentryi	Mexican Tansyaster			S
Rumex orthoneurus	Blumer's Dock	SC		S
Salvia amissa	Aravaipa Sage	SC	S	S
Samolus vagans	Chiricahua Mountain Brookweed			S
Senecio multidentatus var. huachucanus	Huachuca Groundsel			S
Sisyrinchium cernuum	Nodding Blue-eyed Grass			S
Spiranthes delitescens	Canelo Hills Ladies'-tresses	LE		
Stellaria porsildii	Porsild's Starwort			S
Tragia laciniata	Sonoran Noseburn			S
Vauquelinia californica ssp. pauciflora	Limestone Arizona Rosewood	SC		
Viola umbraticola	Shade Violet			S

Appendix E: Our Wildlife Resources

There are many game and non-game species in the Hereford NRCD. Quite a few of the non-game wildlife species are designated as Species of Concern, and some are on the Threatened and Endangered list. According to an August 2015 search of the U.S. Fish and Wildlife Service (USFWS) database, there are 47 birds of "conservation concern" to be found in Cochise County. With its variety of elevation, terrain, and rangeland sites the Hereford District will have all or most of these species, at least potentially.

Urban and other Development Pressures

Recent population expansion in Arizona is tied directly to urban growth and rural development. Population centers directly convert wildlife habitat – often along waterways – and require an infrastructure of roads, power lines and telephone lines that fragment the landscape.

Altered Water Processes

Dams, reservoirs and impoundments can result in loss of water from downstream channels, loss of natural flow variability, suppression of native tree germination, and establishment of high densities of non-native plants and animals in and around reservoirs. Other effects include reduction in sediment transport, water quality, water table integrity, and fish migration. Water diversions and groundwater depletion also reduce the amount of aquatic habitat for wildlife, especially in smaller drainages.

Invasive Species

Once established, invasive species have the ability to displace native plant and animal species (including threatened and endangered species), disrupt nutrient and fire cycles, and alter the character of the ecosystem.

Drought and Climate Change

Drought and climate change are expected to have long-term region-wide impacts. In the arid Southwest, a primary factor in the distribution of plant communities is soil moisture. Recent research has shown that considerable vegetation changes have occurred in the past and can be expected in Arizona's future. The Hereford District has already seen and will continue to see these plant community changes.

Conflicts involving livestock grazing and wildlife are an important concern to land managers, farmers, ranchers, conservation organizations, and the public. Ranchers and land managers witness these conflicts in the form of stocking reductions, exclusions or other restrictions. Wildlife and fishery managers attempt to fulfill the legal requisites of State and Federal laws to protect and conserve species of interest. Most often, there is a lack of scientific information from which to base sound decisions to mitigate conflicts. Given the variety of wildlife and fish of special interest in Arizona, it is difficult to fully grasp the scope of conflicting issues. And the lists of species of interest keep expanding.

The State of Arizona considers bats to be a high priority, and there is ample quality bat habitat within the Hereford District. Arizona was the first state to have a full-time position within its state wildlife agency specifically designated to work with bats. The Bat Management Program was created in 1990, when the Arizona Game and Fish Department (AGFD) began receiving Heritage Fund money from the Arizona Lottery. There is a statewide recovery plan for the lesser long-nosed bat, and Kartchner Caverns at the north end of the District has a well-established management plan for the cave bat that uses the caverns during the summer.

Threatened and Endangered Animals

The Endangered Species Act (ESA) was enacted in 1973 and authorizes the listing of species as endangered and threatened. The ESA also provides for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend. The ultimate goal of the ESA is to prevent extinctions and recover threatened and endangered species. Before a plant or animal species can receive protection under the Endangered Species Act, it must first be placed on the Federal list of endangered and threatened wildlife and plants. The listing program follows a legal process to determine whether to list a species, depending on the degree of threat it faces. An "endangered" species is one that is in danger of extinction throughout all or a significant portion of its range. A "threatened" species is one that is likely to become endangered in the foreseeable future. The Fish and Wildlife Service also maintains a list of plants and animals native to the United States that are candidates or proposed for possible addition to the Federal list.

For illustration, here are some selected excerpts from the USFWS Recovery Plan for the lesser long-nosed bat:

“The lesser long-nosed bat (Leptonycteris curasoae yerbabuenae) is a nectar-, pollen-, and fruit-eating bat that migrates seasonally from Mexico to southern Arizona and southwestern New Mexico. Primarily associated with dry habitats in Mexico and the southwestern U.S., this bat pollinates flowers of certain cacti. Surveys in Arizona and Mexico conducted in the mid-1970s through 1985 revealed low numbers of this bat in known roosts. This information led to the species being declared federally endangered by the U.S. Fish and Wildlife Service in 1988 (Shull 1988). No critical habitat was proposed or designated for this species.

Since the listing of the species in 1988, considerable controversy has developed between members of the scientific community familiar with the lesser long-nosed bat. Information on population size (both at the time of listing and at present), accurate census techniques, total range of the bat in Arizona, and the importance of the species to the successful reproduction of the cacti and agave species has been questioned and debated in public forums. This lack of consensus among the scientific community causes difficulty in defining the status of the species and determining appropriate delisting criteria.

The Service has not taken a position on the divergent viewpoints that exist between the scientists. However, the Service does defer to the expertise of our contractor for this recovery plan as regards the biology and habits of the species. Where appropriate, this recovery plan does identify where data or other information is questioned by another of the scientists involved. It is because of these disputes that additional information on the biology and population size of the lesser long-nosed bat must be obtained before any reconsideration of its status as an endangered species can be considered.”

It is not within the scope of this long-range plan to discuss the relative merits or deficiencies of the Endangered Species Act and how it is implemented. However, any planning within the Hereford NRCD must consider any and all species on the USFWS list, plus species of concern identified by other agencies such as the Bureau of Land Management (BLM), the State of Arizona, and the U.S. Forest Service.

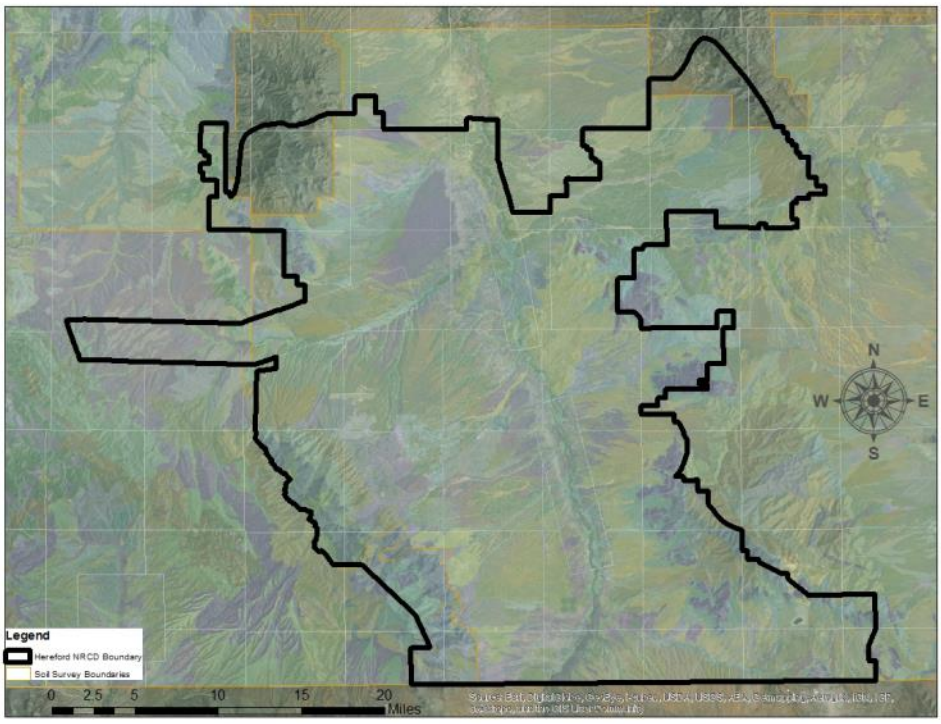
Arizona ranks third in the nation for the number of native birds species, second for reptiles, fifth for mammals, and eighth overall for vertebrate animal diversity. This diversity is well-represented in the Hereford NRCD also.

Many factors contribute to pressures on wildlife populations and the ecosystems in which they live. Conservation organizations, rangeland management specialists, and agencies with wildlife management responsibilities have identified four key areas that

APPENDIX G: OUR SOIL RESOURCES

In order to discuss the soils found in the Hereford NRCD District it is necessary to briefly review soils terminology, how they are formed, and how they develop. And in order to do that it is also necessary to briefly discuss the dominant geology of the area.

The Hereford NRCD lies within the Basin and Range Province, a vast region defined by a unique topographic expression. Basin and range topography is characterized by abrupt changes in elevation, alternating between narrow faulted mountain chains and flat arid valleys or basins. This basic topographic pattern extends from eastern California to central Utah, and from southern Idaho into the state of Sonora in Mexico. The physiography of the province is the result of tectonic extension that began around 17 Ma (million years ago) in Early Miocene time.

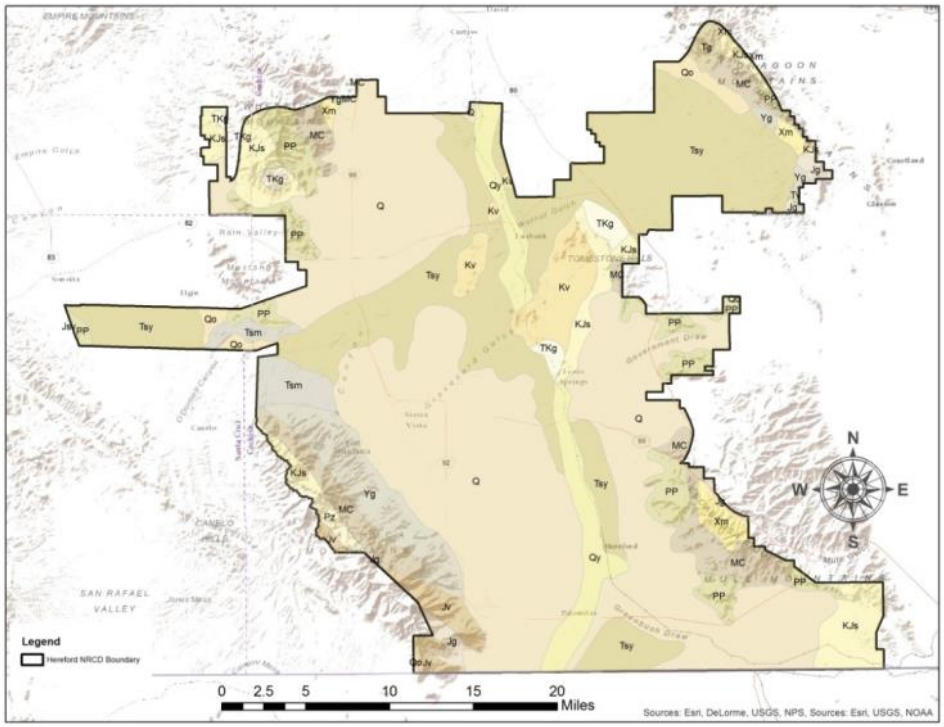


MAP 7: HEREFORD NRCD SOILS MAP

The forces which created this distinct topography lie deep beneath the surface. Within the Basin and Range Province, the Earth's crust (and upper mantle) has been stretched up to 100% of its original width. The entire region has been subjected to extension that thinned and cracked the crust as it was pulled apart, creating large faults. Along these roughly north-south-trending faults mountains were uplifted and valleys down-dropped, producing the distinctive alternating pattern of linear mountain ranges and valleys of the Basin and Range province. The geology of the area is important because parent material (the material from which the soil is derived and developed) is one of the five major soil-forming factors.

Five Soil Forming Factors:
Active Factors Climate, Organisms
Passive Factors Time, Topography, Parent Material

Soils are often defined in terms of these factors as “dynamic natural bodies having properties derived from the combined effect of climate and biotic activities (organisms), as modified by topography, acting on parent materials over periods of time” (Brady and Weil, 2007). Soil scientists identify climate and organisms as “active” factors of soil formation because their influence over soil development can be directly observed. For example, rain, heat, cold, wind, microorganisms (algae, fungi), earthworms, and burrowing animals can be directly observed influencing soil development. Time, topography, and parent material are noted as “passive” factors because their effects are not immediately observed. The passive factors can, however, control how climate and organisms affect soil development and formation. Soils are dynamic, natural bodies on the earth’s surface that are capable of supporting plants. And tremendous diversity occurs in the soils of our District as a result of unique combinations of these soil-forming factors.



MAP 8: HEREFORD NRCD GEOLOGY MAP

PARENT MATERIAL

Parent material is the unconsolidated mineral and organic material in which soil forms. It can be derived in place from the underlying bedrock (residuum) or transported by wind (eolian material), water (alluvium), or gravity (colluvium). A soil that formed in residuum derived from granite bedrock on a nearly level summit may be much different from a soil that formed in an alluvial stream deposit derived from limestone. The

chemistry, structure, grain-size distribution, and other factors of parent material are important constituents in soil formation.

Topography

Topography influences soil formation through its effect on water movement and on the stability of soil material. The rate of surface water runoff and the extent of erosion by water or gravitational forces increase on steep slopes, lessening the amount of time available for soil formation. Northern aspects of steep slopes receive less solar radiation that southern aspects and consequently lose less moisture to evapotranspiration. Runoff from adjoining uplands collects in level or concave areas, where organic matter and sediment are dropped from the alluvial waters. On steep and very steep slopes, the soils commonly are unstable and erosion occurs faster than the processes of soil formation. These soils are commonly shallow and show minimal development of genetic horizons. Soils on lesser slopes tend to be more stable and develop distinct genetic horizons over time. In areas of alluvial deposition, the surface horizons are somewhat thicker and higher in content of organic matter. The topography of the area encompassed by the Hereford NRCD ranges from broad, nearly level to gently sloping areas to steep areas near escarpments. Some areas are broken by deeply entrenched, rugged canyons and washes with steep to nearly vertical escarpments. The washes and canyons have nearly level to gently sloping areas of alluvial deposits in drainageways.

Time

Time refers to the duration of the period that a parent material has been in place and has been influenced by the other soil-forming factors. The age of a soil is related to the age or stability of the geomorphic surface on which it formed, rather than the age of the landscape. Mountains are much older than the alluvial and colluvial deposits at the base of the slopes of those mountains, but the surface of the more stable alluvial deposits may be much older than the more unstable mountain side slopes. Certain soil characteristics require long periods to become well expressed. Other morphological features may develop in less time but perhaps develop in climatic conditions known to have occurred only in the distant past.

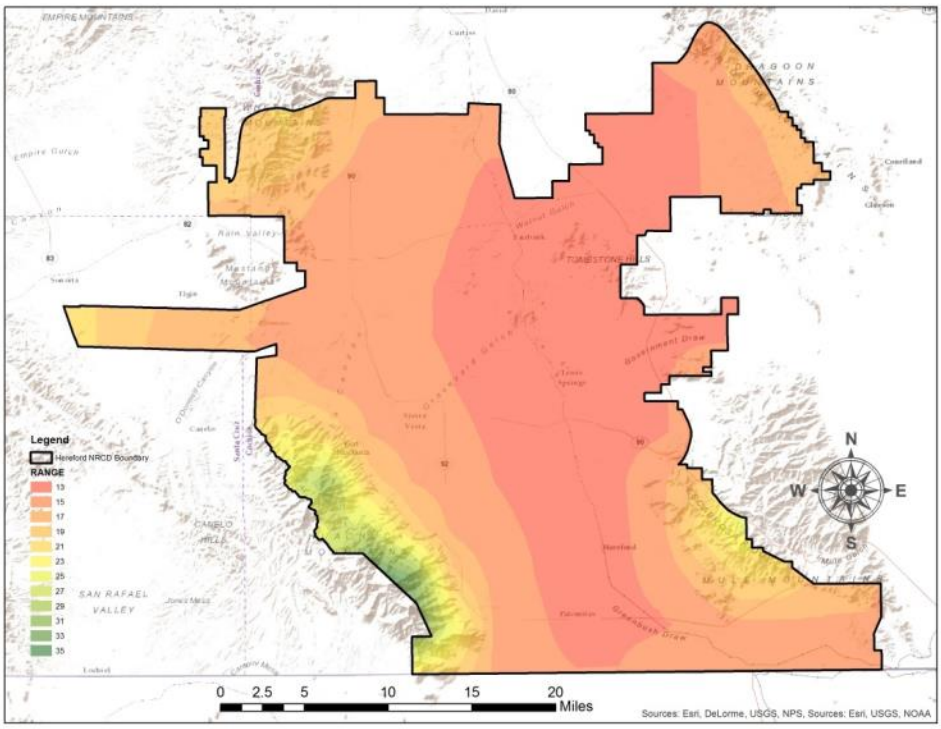
Living Organisms

The living organisms that influence soil formation include micro-organisms as well as plants and animals. Within the soil, the life processes of bacteria, algae, fungi, and protozoa decompose organic matter and minerals and thus release oxygen, carbon dioxide, and nitrogen to plants. Insects and worms burrow into the soil, redistributing soil material and creating channels for air and water movement. Animals trample and mix soil material, add and bury organic debris, and burrow into the ground. Surface plants add organic matter to the soil, create pores and channels with rooting networks, decrease the extent of erosion and the rate of surface water runoff, and affect physical and chemical properties with their decomposed residue. Within the Hereford NRCD boundaries are distinct native plant communities that are related to the environmental factors of soil formation. These communities will be discussed in more detail in the section on rangeland ecological sites.

CLIMATE

Finally climate, past and present, has a strong effect on soil formation. Temperature and moisture affect the weathering of parent material, the release and leaching and/or accumulation of nutrients, and the activity of micro-organisms. They also influence the native plant community growing on the soil, which in turn influences soil formation. Wind and water transport soil material over long distances, and solar radiation affects soil moisture retention and oxidation of surface organic matter. In general, the intensity of weathering processes increases with increases in both temperature and moisture.

Climate is one of the most important factors affecting the formation of soil. Warmer temperatures and an abundance of water have a tendency to speed up the formation of soil, in some cases rather dramatically. Whereas cooler temperatures and less precipitation slow down soil formation. In our area we certainly have the warmer temperatures but we also experience limited precipitation. Most of the soils in the District are classified as thermic ustic – hot, with slightly more precipitation than the lower desert country. Some soils at the higher elevations, typically 6,000 feet and up, are classified as mesic, or slightly cooler and wetter.



MAP 9: PRECIPITATION MAP FOR THE HEREFORD NRCD

SOIL SURVEYS

There are three soil surveys that cover most of the Hereford NRCD:

- Cochise County Douglas-Tombstone Part - This survey encompasses most of our District.
- Santa Cruz County and parts of Cochise and Pima Counties - This survey covers the area west of the Huachuca Mountains.
- Pima County, Eastern Part – This covers the northwest corner.

The large majority of the soils in the Hereford District soils support rangeland. They also vary widely in origin, landform, texture, and depth. As a result their capacity to support rangeland vegetation can be quite different. Here are two examples to illustrate this point. Both of these soils can be found in many locations within the District and are mapped in the Cochise County Douglas-Tombstone survey.

Bella fine sandy loam (Map Unit 7)

This soil typically has a surface texture that is a fine sandy loam about 15 inches deep. If you are digging a hole in this soil you will then encounter a hardpan layer that is commonly referred to as caliche. Below the caliche, which varies in depth and hardness, is more sandy loam soil. Because this soil is shallow to a layer that will restrict root growth at least somewhat, it is limited in its ability to support abundant vegetation. However, the fine sandy loam surface soil allows for rapid intake of precipitation and less runoff, at least until it is saturated. It also holds a respectable amount of water. It is not flooded and does not benefit significantly from runoff water from surrounding areas. Historically this soil had a plant community that was a mixture of grasses and shrubs. Today in many places the plant community is dominantly creosotebush with only scattered remnants of grasses such as black grama and bush muhly. This is a common soil west of the San Pedro River to Highway 90, along Highway 82 toward the area known as Mustang Corners. This soil supports the Ecological Site called Limy Upland 12-16 inch precipitation zone. Ecological Sites are covered in more detail in another section.

Courtland sandy loam (Map Unit 37).

This soil has a sandy loam surface texture about 14-20 inches deep. However, it is classified as a deep soil greater than 60 inches to any root-restricting layers. Subsurface textures below about 20 inches are clay loam to sandy clay loam. This soil also takes in water rapidly but in this case because of its depth it holds far more water that can be used by plants, especially in the subsoil with more clay content. It is not flooded and does not benefit significantly from runoff water from surrounding areas. Historically this soil supported a diverse grassland of blue grama, black grama, sideoats grama, Arizona cottontop, and many other perennial grasses. A diversity of shrubs, half-shrubs, and perennial forbs were mixed in, including mesquite here and there. The Ecological Site associated with this soil is Sandy Loam Upland 12-16 inch precipitation zone, and because of the soil characteristics is generally considered to be the most productive rangeland in the District, at least potentially.

Today there are still many examples of this historic plant community to be found, However, in many places it is now dominated by a mixture of mesquite, burrowed, and other shrubs with the grass component greatly diminished or almost gone, such as along parts of Moson Road. In other places and on similar soils the native grasses have largely been replaced by Lehmann lovegrass, such as along Highway 90 north of Sierra Vista.

The soil surveys that cover the Hereford NRCD can be found online (see Appendix for links). Soil survey information is also available from the NRCS.

APPENDIX H: AGRICULTURAL OPERATIONS

Livestock operations are the second oldest form of agriculture practiced in the Upper San Pedro Valley. The oldest is irrigated, and some dryland, farming which dates back as early as 3,000 years ago and which was well-developed in the period from AD 50 to 1450. The San Pedro Valley was depopulated in about 1450 due to drought and remained so for about 200 years.

Coronado was the first to introduce domestic livestock to the upper San Pedro in 1540. He brought a large herd of horses, cattle, sheep, goats and pigs to sustain his expedition but, although it is possible some escaped, most were only passing through. When Padre Kino came to the upper San Pedro he found about 500 head of cattle and a like number of sheep and goats at Quiburi which had been introduced by Catholic priests in their efforts to pacify and convert the Indians. Other villages also had livestock. Livestock raising has existed off and on since the late 1600s, over 300 years.

In the mid 18th century Apaches moved into the area and the Spanish government removed the Sobaipuri Indians to the Santa Cruz Valley. From 1790 to 1870 the Apache threat was reduced enough that some Spanish ranchers were raising cattle in the Valley. When Mexico won its independence from Spain in 1821, several land grants were awarded in the San Pedro and the Babocomari Valleys – including the San Ignacio del Babocomari (35,000 acres), Sand Rafael del Valle (20,000 acres) and SanJUan de los Boquillas y Nogales (20,000 acres). These grants formed the basis of commercial cattle production in the region. According to some sources there were 40,000 head of cattle on the Babocomari grant alone, although that seems a very high figure. These operations did not last long; they were abandoned in about 1833 due to depredations of the Apaches.

Although there was no active ranching in the area from the time these grants were abandoned, wild cattle and horses were reported to be abundant along the San Pedro. The Mormon Battalion had a famous encounter with wild bulls in this area on their way to California during the Mexican War of 1848. From the end of the Mexican War, when most of Arizona became part of the U.S. (upper San Pedro did not until the Gadsden Purchase of 1853), until the end of the Civil War in 1865, there was little or no settlement or ranching in the area due to the threat from Apaches.

The first American immigrants settled near St. David in 1877, the same year Fort Huachuca was established. The mines in Tombstone were started in 1878, bringing more settlers and miners to the area. Cattle were brought in from Texas and elsewhere and livestock numbers, including sheep, began to increase. By 1890 there were an estimated 36,000 head of cattle in the upper San Pedro. Although it is not often mentioned, there were apparently also large numbers of sheep in the area also. Severe drought during the early 1890s resulted in death loss of cattle or about 50-60% throughout southern Arizona. From about 1910-1920 there was a new wave of immigration and homesteading in the area. Many of the homesteads were bought out by the larger ranches so that average size of ownerships generally increased.

Throughout the history of livestock operations in the Valley there have been a few large operations and a larger number of smaller, subsistence type operations, often combined with some farming. In 1900-1910, 4 ranches ran 68% of the cattle in the upper San Pedro, and the remainder was divided among 41 operations which ran 5 cattle or more. By 1920, the Boquillas Land and Cattle Company ran about 12,000 cattle – which was 74% of the cattle on the tax rolls at the time.

All of the figures on livestock numbers quoted above are only estimates based on writings of early settlers and explorers, and on tax records which were probably not very accurate in those days. They do show that livestock operations have a long history in the economy and culture of the upper San Pedro. These early livestock operations differed in many ways from the current livestock industry of the area.

Although the percentage of private land in the upper San Pedro is higher than in many areas of Arizona, thanks in part to the Mexican land grants, there was still a large percentage of open range belonging to the Federal government and, after 1912 to the State of Arizona. Livestock were run on the open range. Very little of the land was fenced prior to about the 1950s except for some private homesteads or farm fields. Ranchers generally had an area they considered "their range" and they often owned the rights to water necessary to use that range. Water was a major limiting factor controlling livestock grazing and much of the grazing was centered along the San Pedro, Babocomari and other streams that had water at least some of the year, and on springs that occurred in foothills and surrounding mountains. Wells were mostly hand dug until the early to mid 1900s and so only occurred where water tables were shallow.

Cattle raising was an extensive operation, with minimal management. Since cattle of various owners were often mixed on the range and fenced pastures scarce, there was no control of breeding, no supplemental feeding, no vaccinations, no weaning, etc. Generally, the ranchers would hold a spring roundup to brand and castrate, and a fall roundup to cut out market animals or culls. The emphasis was more on numbers of animals than on quality. Steers were generally marketed when they were 3-4 years old and had sufficient size to be trailed to market or to the railroad. Not many cows were sold because low calf crop percentages and high death loss meant they were required just to maintain herd size. In some eras, cattle were as valuable for hides and bones as for meat. Likewise, there was little incentive or chance to manage the range. If one rancher tried to keep a forage reserve, it would likely be used by another. Fencing was expensive, but more importantly, no established grazing rights had been recognized on government lands and it was illegal to fence these lands until the mid-1900s.

Starting in the 1930s and gaining ground after World War II, the livestock operations began to change. Grazing permits were established for state and federal rangelands and both private land and government leased lands were fenced. Additional wells with windmills provided more reliable and better spaced water. Pipelines were built to carry water to some areas. Animal breeding, veterinary practices, nutrition and other practices improved. New knowledge about range management (proper stocking, rotational grazing, brush control, etc) was developed and adopted by ranchers. The

result has been an overall great improvement in both the productivity of livestock and the general condition of the rangelands.

Current Operations

Livestock production continues to be a major part of agriculture in the District, an important contributor to the local economy, and the foundation for local culture and traditions. This section will characterize some of the features of livestock operations as they are currently practiced. However, livestock operations are highly variable in terms of type of livestock, size of operations, goals and objectives of the operators and other factors, which makes it difficult to generalize.

First of all it should be recognized that there are two more or less distinct types of livestock operation: commercial ranches and "backyard" or hobby ranches. The latter includes many people who own a few animals which are usually kept on smaller properties (up to 40 acres) or corrals. These animals are kept for various purposes such as 4-H projects, personal consumption of meat or milk, recreation (horseback riding, roping, etc), or as pets. For example, most of the horses in the area are kept for these purposes. The commercial ranches typically operate on hundreds or thousands of acres and have herds up to several hundred or more animals. Their objectives are to sell animals for meat and by products and to generate income. Some operators make their entire living from these operations and some supplement their income from off ranch jobs or other sources. The remaining discussion will focus on the commercial operations.

Cattle ranches are the main commercial operations. Although formerly there was some range sheep and goat production, this has largely disappeared due to problems of labor, predators, and markets. Most cattle ranches produce crossbred cattle (i.e. mixed breeds) which are sold for eventual slaughter. Some raise purebred cattle to supply bulls and replacement heifers to the crossbred herds. Commercial ranches are generally classes as cow-calf or steer operations. Cow-calf ranches maintain a breeding herd of cows and bulls and market the calves produced. Steer operations do not have a breeding herd – steers and/or heifers about 6-12 months old are purchased and kept on the range for a few months to a year to grow in size and, in some cases, to add some fat. They are then sold to feedlots, and the cycle repeats. Some ranches are a mixture – called cow-calf-yearling – where the calves are not sold as weaners but kept over and sold as yearling steers or heifers.

Most of the ranches in the upper San Pedro today are small to medium sized operations running from 50-500 head of cattle. There are no really large outfits, like the Boquillas Land and Cattle Company, left. Rangeland in this area will generally support about 10-15 animal units (An animal unit is a 1000 pound cow) year round per section of land depending on the type of vegetation and rainfall. Lower elevation shrub dominated ranges may only support 3-5 animal units per section. Therefore, to support 200 cows requires about 15-20 sections (square miles) or about 10-13 thousand acres. Most ranches do not own this much private land, so they lease land from the State of Arizona, BLM, US Forest Service, or other landowners in order to have a viable operation.

Ranchers tend to characterize an operation by the number of cows it runs, e.g. that is a 200-cow outfit. However, the carrying capacity (sustainable stocking rate) is usually figured in animal unit months (AUMs). An AUM is the amount of forage that an animal unit (1000 pound cow or equivalent) will eat in a month. Cattle and other grazers consume about 2-3% of their body weight in air dry forage per day, or about 20-30 pounds for a 1000 pound cow (1 AU). An AUM is usually defined as about 750 pounds of dry forage. The carrying capacity of the range is expressed as acres/AUM, depending on the production of forage plants on that range. For example, if the range will produce 400 pounds of dry forage per acre which can be used by livestock, then the carrying capacity would be expressed as 1.9 acres/AUM.

A 200 cow ranch is not the same thing as 200 animal units. Shown below is an example of the typical makeup of a cow-calf herd in terms of numbers and AUs.

Class of Stock	Number	Animal Units	Notes
Cows	200	200 (1 cow = 1AU)	Age 2-10 (sold at age 10)
Bulls	10	15 (1 bull=1.5AU)	1 bull for 20 cows
Yearling heifers	30	18 (1 yrlng = .6AU)	To replace culled cows and death loss
Calves	160	0	Assumes 80% calf crop
Total	400	233	

With the herd described above, the ranch would sell about 80 weaned steer calves and 50 weaned heifer calves each year (30 of the heifers would be kept to replace the cows that were culled or died). It would also sell about 20-25 cull cows – cows that were too old or otherwise unfit to keep in the breeding herd, and about 2-5 bulls, depending on how long bulls were kept in the herd. The ranch would purchase and equal number of bulls to replace those sold. These figures vary depending on the calving percentage (the number of calves weaned per year as percentage of cows in the herd), culling practices on cows, whether replacement heifers are raised or purchased, bull:cow ratio, and how long bulls are kept in the herd.

Following is a description of the annual activity on a typical commercial cow-calf ranch, although any given ranch may vary considerably in how it operates.

Calving – Most calves are born sometime in the winter or spring – sometimes later. The time of calving is dictated by the time the bulls are turned in with cows and/or the nutritional plane of the cows. In order to have a calf each year a cow has to breed within 90 days of calving. This is sometimes difficult to achieve in Arizona's environment. Calving percentage is a major determinant of herd productivity.

Breeding – Bulls are usually turned in with the cows in the spring in order to have calving occur in the following winter or late spring (gestation period is 9 months). Some

operations leave bulls with the cows year round. In this case cows may calve any time – but usually tend to breed during the summer when forage is green and nutrition of cows is high.

Branding – Most ranches have a "spring roundup" when calves are old enough to brand, vaccinate, castrate, and, if necessary, dehorn. On some ranches this corresponds to movement of cattle to summer pastures.

Weaning/Culling – Most ranches wean calves in the early fall. Calves born in the previous winter or spring will be old enough to wean and usually weigh around 400-600 pounds, depending on age. Cows are often checked to see if they are pregnant at this time. Cows that are not bred are identified for sale, along with other cull cows. Cows will maintain better condition through the winter, the most difficult time nutritionally for range livestock, if they do not have a nursing calf with them.

Sale – Weaned calves are usually sold in the fall. They may be sold to a stocker operation (steer ranch) or directly into feedlots. Some ranchers retain ownership of the calves, i.e. they contract to have them fed and therefore participate in any profit from the feeding operation. Some operations market calves though the local auctions, some by private sale, and some on televised markets. Cull cows and bulls are usually sold in the local auction.

Health – Livestock operators take care of the health of the animals by vaccinating all calves against a variety of diseases, e.g. blackleg. Many re-vaccinate older animals periodically. Another measure is to control external parasites (lice, ticks), internal parasites (worms), and flies. Operators also take great care to avoid introducing various diseases from outside animals, especially sexually transmitted diseases that can severely reduce pregnancy rates and/or cause abortions. Most ranchers try to minimize introduction of animals from outside and carefully test those that are, e.g. purchased bulls.

Nutrition – Range forage varies considerably in nutritive value and digestibility throughout the year. In general, range grasses can fully meet the needs of cattle during the growing season but the nurititive value declines greatly during the winter or dry periods, especially protein. In Arizona, range cattle consume considerable browse (shrubs) in addition to grass, and shrubs that maintain some green material through the winter can help supplement the grass. In order to keep cattle on a reasonable nutritional basis, which is necessary for growth and reproduction, it is usually necessary to supplement the range forage. These supplements usually involve salt mixed with various trace minerals, protein, phosphorus, and, sometimes energy (e.g. molasses). Hay is not usually fed except when cattle are confined in corrals, or in exceptional drought times. There is a difference in "feeding" and "supplementing". Supplementing means to make up for deficiencies in the **quality** of the forage, and it is usually necessary to some extent even on the best managed ranges. Feeding is done to make up for deficiencies in **quantity** of forage available, which often means the range is overstocked.

Grazing Management – Rangelands in southern Arizona can be grazed year round – in contrast to those farther north which often are only useable in summer or winter due to snow and growing conditions. Many ranches used to graze continuously year round, that is they left cattle in the same pastures all year. This often allows the most palatable plants and the most favored grazing areas to be heavily and repeatedly grazed, which reduced the productivity and condition of the range. Most ranches now employ some form of rotational grazing which allows these more favored plants and locations to recover from grazing periodically. These practices not only help the range provide more forage for livestock, but also benefit the watershed and wildlife. A considerable portion of the rangeland in the District has been invaded by shrubs over that past 50-100 years and this has resulted in lower forage production and, sometimes, excessive soil erosion. Grazing management will not reverse this process – it requires treatment (herbicides, mechanical treatments) to remove or thin the shrubs so that grass can respond to good grazing management. Modern ranchers have learned that ranges in good condition as a result of conservative grazing will produce more beef and often at lower cost than poor condition ranges which are heavily stocked. The emphasis has shifted from numbers of cattle run to pounds of beef produced, which depends on a productive rangeland.

Livestock Water Requirements

In a 2013 letter from the Hereford NRCD, it was estimated that there were approximately 3200 cattle in the Sierra Vista sub watershed. Eighty percent of the water utilized by cattle is ground water. Ground water use by cattle in the watershed is approximately 57.4 acre feet per year.

Cattle numbers in the watershed probably peaked in 1979, then decreased gradually until 1986, then dropped another 50% in 1986-1987, since then it has decreased 10% a year until 2008 when it stabilized at the current number, but it does change somewhat up and down 15-20%/year at around 3,200 AUYL depending on range conditions and markets. For the last 20 years 95% of the ranches have been almost entirely cow/calf operations, with very little seasonal stocker/yearling grazing in the area.

3200 animal units year around in the upper Sierra Vista sub watershed.

2560 or 80% use ground water times 20 gallons a day = 51,200 gallons a day times 365 = 18,688,000 gallons a year or 18,688,000 / 325,851 = 57.4 acre feet.

The primary source of the information is Gary Thrasher, D.V.M., a large animal veterinarian who has had a practice in the area since 1973. Dr. Thrasher's primary practice is cattle. He has/does work with ranchers on both sides of the US Mexican border assisting them in keeping their cattle herd healthy and productive. He is Hereford Veterinary Service in Palominas and also operated "Servicios Veterinarios Asociados, Hereford, S.C." in Mexico from 1991-2005. Dr. Thrasher is also a member of ALIRT - the Arizona Livestock Incident Reporting Team - which was formed through the U.of A. of veterinarians to help protect the public against incidents of agro terrorism.

Guidance is provided to ranchers that, as arid as it is around here, and because relatively large open-top troughs and storage tanks are often used, we recommend pumping,

pipe, storage, and trough capacity to provide 20 gal/day per AU (beef type cow & calf) to keep them supplied (realizing that 10-15 % is lost to evaporation, leakage, overflow, wildlife usage, border traffic, ranch horses, etc.)

Managing Public Land Conflicts with Grazing

Range Management Specialists at the University of Arizona have identified six general areas that provide ranchers a process to improve range management and their ability to reduce and/or mitigate public land management conflicts:

- Maintain open lines of communication with the agency personnel associated with your grazing allotment.
- Communication with the land management agencies is essential. To communicate you need to speak the same language. Increased attention to multiple range resources is often warranted in addition to discussions about livestock. Interest in soils, vegetation, wildlife, and watershed values may be a common ground for further discussions.
- Gather and organize available information.
- Organizing and studying key information will enable you to become the expert on all aspects of your grazing allotment. These documents and data provide the framework for future planning and management decisions as well as a foundation for defending your actions.
- Design and implement a monitoring plan to document vegetation changes over time.
- Vegetation changes on rangeland grazing allotments are due to a complex interaction of events that include environmental and management factors. Natural fluctuations in climate, plant population cycles, fires, insect manifestations and grazing animals are some of the major influences on vegetation changes. Many procedures are available to keep track of these changes. This subject is discussed in greater detail in the section on livestock operations.

Locate and study problem areas

Federal and State Allotment Management Plans (AMPs) for grazing have goals that center on plant species composition, soil protection and critical wildlife habitat, to name some of the common ones. Any part of the allotment where these goals are not being met may be identified as a problem area.

Evaluate alternatives for management

Once you have identified - from available maps, data and your own observations - where your real problems of poor condition and overuse are, you can start looking for ways to alleviate the pressure on these areas. Since no two allotments are alike in either problems or opportunities, there are no formulas for how to do this. The key is your ability to identify where the problems are and your imagination in looking for feasible changes in management to reduce the problems.

KNOW YOUR LEGAL RIGHTS, RESPONSIBILITIES AND APPEALS PROCEDURES.

Grazing permits carry with them both legal rights and responsibilities. Read your permit and understand the requirements. Access and wildlife regulations should also be known and followed, as failure to do so may invalidate grazing privileges.

This subject is discussed in much greater depth in the publication "Strategies for Managing Grazing Allotments on Public Lands", put out by the University of Arizona Cooperative Extension, and is readily available on the Internet. See Appendix for link.

APPENDIX I: FORT HUACHUCA

Fort Huachuca is located within the District, and is both a partner with the Hereford NRCD and an important part of the community. One of Arizona's largest military installations, Fort Huachuca was established in 1877. The fort was the headquarters of the 4th Cavalry patrols that pursued Geronimo and his band of Chiricahua Apache and ultimately brought about their surrender in 1886. Fort Huachuca also served as home of the famous "Buffalo Soldiers" who, among other things, pursued Pancho Villa in 1916 following his attack on Columbus, New Mexico.

Typical of early U.S. Army installations, a small community formed outside the post gates. As it grew, the community underwent several name changes. In 1915, it was called Buena, then changed to Overton, then to Garden Canyon and subsequently to Fry. When incorporated in 1956, the city was once again renamed and became Sierra Vista. In 1950 the U.S. Census recorded a population of 50 persons living in Fry. In 1956, when incorporated, the population had reached 1671. Today, the population of Sierra Vista and Fort Huachuca is over 45,000.

Fort Huachuca is an important military intelligence and communications center and is home of the U.S. Army Intelligence Center and the 9th Army Signal Command. It covers 73,272 acres, including the East Reservation (28,544 acres) and the West Reservation (44,728 acres), divided by Arizona Highway 90. The West Reservation is further divided into the West Range, the cantonment or built-up area, and the South Range.

Hunting and fishing are open to the public, as are several hiking trails and viewing areas. Garden Canyon is sometimes called the most beautiful canyon in the Huachuca Mountains, and this scenic area contains some of the most diverse plant and animal life in the mountain range. Garden Canyon also serves as a hub for some of Fort Huachuca's main trails. Crest Trail follows the fort's borders about 7 miles through the Huachuca Mountains, with a southern trailhead that meets Sawmill Canyon Trail. Trailheads at the Ash, Carr, Miller and Ramsey Canyons offer hikes that reach elevations of about 10,000 feet, offering great views of the Coronado National Forest and Miller Peak.

Fort Huachuca has an active wildlife and natural resources department. For example, from 1989 through 2009, Fort Huachuca hosted an annual mountain lion track count in partnership with the Arizona Game and Fish Department and several conservation groups. About two dozen mountain lions use the Huachuca Mountains, which transect the fort lands, as part of their range. An adult male mountain lion needs up to 200 square miles of land for his range. Six to eight mountain lions can be using Fort Huachuca as part of their range at any given time. Although track counts are considered an imprecise tool for detailed information about the mountain lion population, this 20-year effort has shown the persistence of the lion population in the face of continued population growth around the mountains.

Fort Huachuca Wildlife Viewing Areas
http://www.wildlifeviewingareas.com/wv-app/ParkDetail.aspx?ParkID=194

APPENDIX J: ECONOMICS

No figures were available on the economic value of livestock operations specifically for the HNRCD. However a report published by the University of Arizona in 2014 (based on data from 2011) indicated the following economic impact of the beef cattle industry for Cochise County.

The number of beef cattle in Cochise County was 56,725 head. About 30% of the "farms" in Cochise County specialize in beef cattle, i.e. they are not mainly producing agricultural crops. The total contribution of the beef cattle industry to Cochise County's economy was estimated as:

$59.1 million in direct output

$10.3 million in value added

$ 7.7 million in labor income

This totals $77.1 million for Cochise County. Comparable figures are not available for the HNRCD. However, some estimates of the value of beef cattle production can be made.

If the $77.1 million is divided by the number of beef cattle the result is $1359 per head. In other words each animal contributes that much to the total economic value of the beef industry in Cochise County. If only the "direct output" figure is used ($59.1 million), then the value per animal is $1042 per head. Assuming the numbers of cattle represent mature animals each animal is equivalent to 12 animal unit months. Therefore the value of beef production in Cochise County is somewhere between $87 and $113 per AUM. These were based on 2011 prices for beef and may have changed under current market conditions. Presumably, these values can be extended to the HNRCD.

Using the above calculations it can be seen that each additional AUM of grazing capacity that can be obtained would be worth about $100 to the local economy. These additional AUMs can be achieved by installing additional range improvements to improve the control and timing of grazing in order to improve range production, brush control and/or reseeding to increase forage production, and grazing areas which have for one reason or another had grazing removed or restricted.

The figures discussed above only consider commercial beef operations. There are no data to estimate the value of the "back yard" operations mentioned above. Few of these are operated with a production objective so the impact from sales is probably not great. However, these types of livestock holdings do purchase a significant amount of feed, veterinary supplies and services, and other equipment in the local market. The

amount spent per animal is surely much higher than in commercial operations. These expenditures also have a contribution to the local economy and tax base.

The economic contributions of the beef industry will vary depending on the market prices for beef. However, it should also be recognized that the economic contributions of this industry are related to expenditures on supplies, fuel, vehicles, food, medicine, clothing, and all the other basic necessities needed to operate a ranch. The ranches also pay taxes on land and equipment as well as sales taxes that support local governments. All of these payments generally continue whether the general economy is good or not – the ranch must operate even if it losing money. This is in contrast to some aspects of the economy, e.g. tourism, that may be very profitable in good economic times, but dry up when times are hard.

COCHISE COUNTY AGRICULTURE

	2012	2007	2002	1997	1992
Farms					
Number	1,093	1,065	950	824	**831**
Land	916,672	824,226	969,253	1,260,021	**1,891,644**
Average	839	774	1,020	1,529	**2,276**
Estimated market value of land and buildings					
Average	1,175,308	1,475,858	704,895	545,528	**731,623**
Average	1,401	1,907	631	348	**318**
Estimated market value of all machinery and equipment					
Average	81,234	77,792	53,260	41,138	**32,720**
					Farms by size
1 to 9	182	122	110	60	**68**
10 to 49	297	252	211	135	**140**
50 to 179	232	285	227	172	**165**
180 to	137	149	147	141	**128**
500 to	56	76	74	97	**89**
1,000	189	181	181	219	**241**
Total cropland					
Farms	496	496	557	446	**501**
Acres	123,311	141,156	131,382	116,018	**120,472**
Irrigated land					
Farms	374	368	460	379	**409**
Acres	65,483	67,598	64,593	63,252	**52,434**
Market value of agricultural products sold					
Total	149,998	117,130	78,307	60,154	**47,277**
Average	137,235	109,981	82,429	73,003	**56,891**
Crops	(D)	74,358	55,737	41,054	**27,654**
Livestoc	(D)	42,771	22,570	19,101	**19,623**
Farms by value of sales					
Less	420	490	363	210	**260**
$2,500 to	159	119	97	84	**79**
$5,000 to	103	91	118	100	**106**
$10,000	133	120	111	162	**126**
$25,000	85	87	82	81	**72**
$50,000	48	50	59	58	**74**
$100,000	145	108	120	129	**114**
Hired farm labor					
Workers	1,375	1,382	N/A	N/A	**N/A**
Payroll ($1,000)	16,195	10,359	N/A	N/A	**N/A**

Source: U.S. Department of Agriculture and Cochise College Center for Economic Research

N/A Not Available

(D)Withheld to avoid disclosing data for individual operations

COCHISE COUNTY REAL GROSS DOMESTIC PRODUCT (GDP)

Industry	2009	2010	2011	2012	2013
All industry total	4,060	4,158	4,127	3,967	3916
Private industries	2,228	2,197	2,071	1,975	1983
Natural resources and mining	114	(D)	(D)	(D)	133
Agriculture, forestry, fishing, and hunting	80	(D)	(D)	(D)	107
Farms	71	85	78	72	(NA)
Forestry, fishing, and related activities	9	(D)	(D)	(D)	(NA)
Mining	34	38	32	28	21
Oil and gas extraction	(L)	(L)	(L)	(L)	(NA)
Mining, except oil and gas	(D)	(D)	(D)	(D)	(NA)
Support activities for mining	(D)	(D)	(D)	(D)	(NA)
Transportation and utilities	258	286	285	249	244
Utilities	206	235	237	201	200
Construction	126	124	104	108	91
Manufacturing	82	75	(D)	77	70
Durable goods manufacturing	27	21	(D)	24	(D)
Wood products manufacturing	(L)	(L)	(L)	(D)	(NA)
Nonmetallic mineral products manufacturing	17	11	11	14	(NA)
Primary metals manufacturing	(D)	(L)	(L)	(L)	(NA)
Fabricated metal products	2	2	2	2	(NA)
Machinery manufacturing	(L)	(L)	(L)	(D)	(NA)
Computer and electronic products manufacturing	2	2	2	1	(NA)
Electrical equipment, appliance, and components manufacturing	(D)	(D)	(D)	(L)	(NA)
Motor vehicles, bodies and trailers, and parts manufacturing	(D)	(D)	(D)	(D)	(NA)
Other transportation equipment manufacturing	(D)	(D)	(D)	(D)	(NA)
Furniture and related products manufacturing	(D)	(D)	1	(D)	(NA)
Miscellaneous manufacturing	1	1	1	2	(NA)
Nondurable goods manufacturing	55	54	56	53	(D)
Food and beverage and tobacco products manufacturing	(D)	(D)	(D)	(D)	(NA)
Textile mills and textile product mills	(L)	(D)	(D)	(D)	(NA)
Apparel and leather and allied products manufacturing	(L)	(L)	(L)	(L)	(NA)
Paper products manufacturing	(L)	(L)	(L)	(L)	(NA)
Printing and related support activities	1	1	1	1	(NA)
Petroleum and coal products manufacturing	(L)	(L)	(L)	(L)	(NA)
Chemical products manufacturing	(D)	(D)	(D)	(D)	(NA)
Plastics and rubber products manufacturing	(L)	(L)	(L)	(L)	(NA)
Trade	302	295	301	306	311
Wholesale trade	39	42	44	38	37
Retail trade	263	253	257	268	274
Transportation and warehousing	51	51	48	48	44
Air transportation	(L)	(L)	(L)	(L)	(NA)
Rail transportation	6	6	6	6	(NA)
Water transportation	(L)	(L)	(L)	(L)	(NA)
Truck transportation	12	13	12	14	(NA)
Transit and ground passenger transportation	(D)	3	3	4	(NA)
Pipeline transportation	(D)	(D)	(D)	(D)	(NA)
Other transportation and support activities	(D)	(D)	(D)	21	(NA)
Warehousing and storage	3	3	3	(D)	(NA)
Information	108	113	112	60	59
Publishing industries, except Internet (includes software)	7	7	7	7	(NA)
Motion picture and sound recording industries	8	(D)	(D)	(D)	(NA)
Broadcasting and telecommunications	(D)	97	98	46	(NA)
Data processing, internet publishing, and other information services	(D)	(D)	(D)	(D)	(NA)
Finance, insurance, real estate, rental, and leasing	298	(D)	(D)	(D)	257
Finance and insurance	52	68	73	95	101
Federal Reserve banks, credit intermediation, and related services	14	13	15	16	(NA)

Securities, commodity contracts, and investments	1	1	2	2	(NA)
Insurance carriers and related activities	36	54	56	77	(NA)
Funds, trusts, and other financial vehicles	(L)	(L)	(L)	(L)	(NA)
Real estate and rental and leasing	246	(D)	(D)	(D)	154
Real estate	158	(D)	(D)	(D)	(NA)
Rental and leasing services and lessors of intangible assets	88	72	63	62	(NA)
Professional and business services	521	485	451	362	357
Professional, scientific, and technical services	375	374	348	272	241
Management of companies and enterprises	12	11	8	5	4
Administrative and waste management services	134	100	95	84	111
Administrative and support services	129	96	92	81	(NA)
Waste management and remediation services	5	4	3	3	(NA)
Educational services, health care, and social assistance	236	244	228	292	268
Educational services	16	22	20	88	66
Health care and social assistance	220	221	208	202	201
Ambulatory health care services	99	96	88	85	(NA)
Hospitals and nursing and residential care facilities	103	109	105	101	(NA)
Social assistance	18	17	16	16	(NA)
Arts, entertainment, recreation, accommodation, and food services	115	117	121	118	117
Arts, entertainment, and recreation	15	15	14	13	13
Performing arts, spectator sports, museums, and related activities	4	4	4	5	(NA)
Amusements, gambling, and recreation industries	11	11	10	8	(NA)
Accommodation and food services	100	102	108	105	104
Accommodation	23	23	25	27	(NA)
Food services and drinking places	77	78	83	78	(NA)
Other services, except government	69	68	65	65	63
Government	1,832	1,959	2,053	1,989	1930
Federal civilian	619	647	713	697	(NA)
Federal military	778	875	908	866	(NA)
State and local	435	437	432	426	(NA)

Note. Expressed in millions of chained 2009 dollars
(D) Not shown in order to avoid the disclosure of confidential information; estimates are included in higher level totals.
(NA) Not available.
(NM) Not meaningful.
Last updated: September 16, 2014
Source: U.S. Bureau of Economic Analysis

Economic Strategies

Increase or maintain agricultural economic sustainability and protect the historic culture of the District.

Appendix K: Monitoring Guidelines

Effectiveness Monitoring

The data and information necessary to compile the Implementation Monitoring will be relatively easy to acquire since it will normally be required by whatever funding source provides support for the activity. However, dollars spent and projects completed do not really measure actual progress toward solving the resource concerns outlined in the conservation strategy. In other words documenting acres of brush control with the objective of improving watershed condition does not tell whether the brush control practice was successful or not (short term effect), and if successful, whether the watershed condition actually improved as a result (long term effect). To provide answers to these questions requires monitoring plans specific to each type of project and objective.

The District's annual activity report will include an analysis of any factors that have altered the expected progress of implementation including such things as weather, failure to acquire required permits or environmental clearances, delays in agency decisions due to appeals or other factors, failure of contractors to perform as required, failure of landowners to complete the work in a timely fashion, etc.

Monitoring of Treatment Effects (Short Term)

This monitoring is designed to document the effectiveness of land treatments, structures, water developments, fire control activity, etc. in making the expected changes in vegetation, hydrology, wildfire, or animal behavior that were projected. The information will be collected from field observations on each project implemented. Some examples are:

Brush Control. The purpose of the brush control is to reduce shrub cover and increase grass cover to reduced flood runoff and soil erosion. In the short term, the data needed to document the effectiveness of the treatment are the percentage of shrub and grass cover before treatment and after treatment (1-5 years after depending on expected response). If "before" data are unavailable, then the percentage kill on shrubs and grass cover on treated vs untreated areas may be used.

Range Seeding. The purpose of seeding is to introduce a seed source of desirable plants where such species are currently lacking or sparse. It is usually done in conjunction with brush control, wildfire rehab, or improvement of abandoned cropland. In this case, the success of any seeding should be evaluated by seedling counts of desired species in the first growing season and by some measure of desirable plant abundance and/or trends in succeeding years.

Check Dams. The purpose of check dams is to slow runoff in draws or gullies, capture sediment, and reduce flooding and sediment yield of the watershed. Short run monitoring would include photos, written observations and/or quantitative measurement of sediment accumulation behind the dams and functionality of dams in retention of water flow (i.e. was the dam properly designed and constructed).

Workshops. The purpose of workshops is to increase the knowledge and understanding of natural resource conservation among the general public or specific target groups. Evaluation of the short term effectiveness of these projects generally relies on course evaluations and comments solicited from the participants at the conclusion of the workshop.

To facilitate collection of such data it is desirable to require such monitoring as part of the project, i.e. every project should have a monitoring component built into it. Interpretation of the data on short term effectiveness will include an analysis of why the treatment was effective or not, and any recommended changes for future practices.

Monitoring Treatment Effects (Long Term)

Most resource conservation practices are aimed at a long term objective or goal for entire watersheds, vegetation types, or human environments. For example, the ultimate objective of brush control and increased grass cover is to reduce peak runoff and soil erosion, as well as to increase forage for livestock and improve wildlife habitat, on a specific watershed or other designated area. It is difficult to conclusively demonstrate such results over large areas and to provide conclusive evidence of cause and effect. In part this is because monitoring to detect such effects may be required far beyond the duration of individual projects. It is also because there is so much variability in soils, topography, vegetation, and weather over larger areas and because most land treatments only affect a portion of the area. Therefore, monitoring these long-term and broader scale effects is more subjective than shorter term project-specific monitoring. Some examples are:

Resource Concerns – Watershed Condition– The objective is to reduce flood runoff and soil erosion. Several practices contribute to this objective, e.g structures,shrub control, reseeding, prescribed fire, prescribed grazing, wildfire control. These practices may be applied in varying scales and intensities across any given watershed; thus identifying the specific contribution of each practice is difficult to impossible. To measure whether any or all of these practices are in fact reducing flood flows and sediment yield on any specific watershed or area requires measurement of stream flows and sediment over a considerable length of time to identify trends. These type of measurements are expensive and require long periods of record due to variability in weather (drought, El Nino events, etc). The problem is illustrated by the Walnut Gulch Experimental Watershed which, despite over 50 years of intensive monitoring, still has many questions to be answered about the effects of soils, vegetation, weather and other factors on runoff and erosion. Therefore, the District will make an effort to obtain data and analysis from other agencies that collect some of this type of information and that incorporate relevant information into periodic reports. For instance, this would include

records of streamflow (USGS or DWR), records of ground water levels (DWR), records of precipitation(NOAA), results of water quality tests(ADEQ or others), and any interpretive reports made by these agencies. This type of information can be used, in some cases at least, to document trends in watershed conditions over longer periods of time and possibly to infer the contribution of land treatments.

Education and Training – The objective of this strategy is to increase the knowledge and understanding of the public or specific groups so that they are motivated to manage their own resources better and/or they are supportive of policies and budgets of agencies and organization that fund or implement sound resource conservation projects. Workshop or training evaluations done at the time of the exercise can measure whether people learned the material presented or found it relevant, but that doesn't necessarily mean that such knowledge will change their thinking or behavior. In order to determine whether education efforts have had any real effect in reaching resource conservation goals in the District will require some follow-up surveys on recipients of educational training and/or analysis of public support for these practices.

Analyses of long term effects of activities undertaken in this conservation plan will require gathering data from available public documents and collecting information from surveys or questionnaires. Such information will be collected on a continual basis and periodically (at 5-10 year intervals) analyzed and compiled into a report. This type of report may become a project that requires additional money and expertise not normally available to the District without obtaining financial support.

REFERENCES

Hereford District 2013 Long Range Plan

Federal Land Policy and Management Act of 1976 (FLPMA)

http://www.blm.gov/flpma/FLPMA.pdf

Guide to Agricultural PM10 Best Management Practices "Agriculture Improving Air Quality"

Endangered Species Act http://www.fws.gov/endangered/esa-library/pdf/ESAall.pdf

Clean Water Act (1970), https://www.law.cornell.edu/uscode/text/33/chapter-26

REGULATIONS For Implementing The Procedural Provisions Of The National Environmental Policy Act (1970), http://energy.gov/sites/prod/files/NEPA-40CFR1500_1508.pdf

Summary of the Clean Air Act http://www2.epa.gov/laws-regulations/summary-clean-air-act

http://www.azwater.gov/AzDWR/StatewidePlanning/WaterAtlas/SEArizona/Geography/UpperSanPedro.htm

http://www.usgs.gov/newsroom/article.asp?ID=4210#.VdoddZceqNc

http://pubs.usgs.gov/sir/2013/5040/

http://www.sanpedrorivervalley.org/

http://www.fws.gov/endangered/laws-policies/esa-history.html

http://www.azgfd.gov/w_c/edits/hdms_species_lists.shtml

Arizona's State Wildlife Action Plan

http://azgfdportal.az.gov/wildlife/actionplan

Arizona's Species Recovery Programs
http://www.azgfd.gov/w_c/conservation/EndangeredWildlifeConservation.shtml

Grassland or Shrubland?
http://ag.arizona.edu/research/archer/reprints/Archer%20et%20al.%202009%20B&B_GrassOrShrub.pdf

Brush Management as a Rangeland Conservation Strategy
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1045798.pdf

Arizona Soils http://southwest.library.arizona.edu/azso/

U.S. Fish and Wildlife Service Southwest Region
http://www.fws.gov/southwest/es/arizona/Threatened.htm#CountyList

Birds of the San Pedro Riparian National Conservation Area
http://www.blm.gov/style/medialib/blm/az/pdfs.Par.81954.File.dat/sp-cklst.pdf

NRCS Field Office Tech Guide
http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/fotg/

Ecological Site Information System (ESIS) Database for Ecological Sites
https://esis.sc.egov.usda.gov/

Strategies for managing grazing allotments on public lands
http://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az9506.pdf

Brush Management as a Rangeland Conservation Strategy: A Critical Evaluation
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1045798.pdf

Guide to Rangeland Monitoring and Assessment
https://aznrcd.files.wordpress.com/2014/10/guide-to-rangeland-monitoring-assessment.pdf

History, Status and Management of Lehmann Lovegrass
https://journals.uair.arizona.edu/index.php/rangelands/article/viewFile/11221/10494

Lehmann Lovegrass—Central South Africa and Arizona, USA
http://www.tucson.ars.ag.gov/unit/publications/PDFfiles/694.pdf